

National Accident Sampling System

Special Studies Number Four

Side Intrusion

Users Guide  
and  
Coding Manual

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16. Abstract  This Users' Guide describes the National Accident Sampling System (NASS) Special Studies data collection project Number Four: Side Intrusion. Contained herein is the necessary information and instructions for the field investigator to use in measuring, recording, and encoding the data necessary to describe the location and extent of exterior crush to the side surface of the vehicle and to quantitatively describe vehicle interior intrusion resulting from this side surface crush.			
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## CONTENTS

Purpose	1
Side Surface Defined	1
Organization of the Data Form	1
Case Selection--When to Use This Form	1
Additional Documentation--Photographic	2
Supplemental Information	2
Data Recording	2
Variable Coding and Description	3
Form Identification	3
Side Surface	4
Crushing Force	6
Component Damage	15
Intrusion	18
Field Data Form	33

## SIDE INTRUSION

### Purpose

The purpose of this Special Study is to gather data on the performance of the passenger compartment lower side surface during a collision, to document the location and extent of intrusion of the side surface into the passenger compartment, and to note resulting occupant contact and injury.

### Side Surface Defined

The side surface of the vehicle is defined as the area extending from the A-pillar to the last passenger compartment pillar and from the bottom edge of the door sill/rocker panel (extended) to the belt line. Window glass and upper pillars are not included in this area. The side surface consists of up to three zones (depending upon the vehicle) defined as: (1) front--the area between the A and B pillars, (2) back--the area between the B and C pillars, and (3) rear--the area between the C and D pillars.

### Organization of the Data Form

The data form is organized into three distinct major sections: (1) Crushing Force; (2) Component Damage; (3) Intrusion. The first two sections describe the location and extent of the damage to the exterior skin of the side surface, while the third describes the intrusion of the inner side surface into the passenger compartment.

### Case Selection--When to Use This Form

The basic case selection criteria are the same for this study as for the NASS Vehicle Section.

This special study is to be completed whenever this vehicle has met the initial NASS sample selection and whenever an external crushing force has been applied to the side surface of the vehicle as a result of a side contact. The force can be from any direction but must crush the exterior side skin inward.

Additional Documentation--Photographic

The data form is designed to be a response-only form with no additional drawing or sketching required. However, to facilitate a complete understanding of the damage pattern, photographic documentation is necessary.

Internal--Photograph each side surface intrusion. Take at least two views so as to best depict the location and magnitude of the intrusions.

External--Photograph each side surface zone where the side surface was contacted by a crushing force. Take at least two views so as to best depict the location and magnitude of the crush.

Supplemental Information

Additional notes, supplemental drawings, etc., are extremely valuable for understanding unusual situations. Such notation should be placed on the data form or supplemental paper as necessary. Extra pictures, brief descriptions, etc., are encouraged and should be included in the Special Studies documentation.

Data Recording

The data form is designed for ease of data recording by the field investigator such that only a check mark or investigator supplied numbering value is needed to indicate the desired response. Provision is made in the lower right hand corner of each variable (or group of related variables for subsequent coding by a data editor. See example below.

Right Door Hardware Contact									
46. 47. 48. 49. 50. 51.									
Latch/		Striker Hinges		Sill		Zone:			
F	B	F	B	F	B			Component Damage CODRS	
---	---	---	---	---	---			-----	
---	---	---	---	---	---	(1)		(1) Not damaged,	
---	---	---	---	---	---	(2)	} See Codes Above or Adjacent	(2) Direct damage, no separation*	
---	---	---	---	---	---	(3)		(3) Direct damage, separation*	
---	---	---	---	---	---	(4)		(4) Indirect damage, no separation*	
---	---	---	---	---	---	(5)		(5) Indirect damage, separation*	
---	---	---	---	---	---	(8)		(8) Not applicable [not equipped]	
---	---	---	---	---	---	(9)		(9) Unknown	
									* Separation must be complete.
						LF LB HF HB SF SB			
						---			
						---			

To increase understanding of the coding, the element (code) values have been separated from the element (code) structure in this document only.

VARIABLE CODING AND DESCRIPTION

VARIABLE GROUP: Form Identification

VARIABLE NAME: 1-6. Form Header and Case Identification

FORMAT: 12 columns, numeric, beginning in column 1\*

ELEMENT VALUES: 1 Primary Sampling Unit Number  
2 Case Number  
3 Special Study Number  
4 Record Number  
5 Card Number  
6 Vehicle Number

SOURCE: NASS Vehicle Form

REMARKS: Use the same number as coded for this vehicle in variable 06 on  
on the Vehicle Form.

\*See data form for layout.

VARIABLE GROUP: Side Surface Zones

VARIABLE NAME: 7-12. Side Surface Zones

FORMAT: 1 x 6 columns, numeric, beginning in column 13

ELEMENT STRUCTURE:\*    7.  8.    9. 10.    11. 12.  
                          Front        Back        Rear  
                          L   R        L   R        L   R  
                          --- ---        --- ---        --- ---  
  
                          \_\_\_\_ \_        \_\_\_\_ \_        \_\_\_\_ \_

ELEMENT VALUES: L = Left, R = Right

- 1 Door
- 2 Panel
- 8 Not an applicable side surface
- 9 Unknown

SOURCE: Inspection only

REMARKS: The side surfaces of the passenger compartment consist of the two sides (left and right), each of which are divided into three zones:

- Front zone: from the A to the B pillar
- Back zone: from the B to the C pillar
- Rear zone: from the C to the D pillar

Depending on the type of vehicle, there may be up to six side zones. Each side zone is filled by either a door or a panel. If the vehicle configuration is such that no side zone exists, the zone is coded "8 Not an applicable side surface."

\*See section "Data Recording" on page 2.

Code each zone to indicate which components make up each side surface.  
 A standard two-door passenger car would be coded as follows:

PASSENGER CAR				
		Left side	Right side	
	Front	1 Door	1 Door	
Zone	Back	2 Panel	2 Panel	
	Rear	8 NA	8 NA	

A van would be coded as follows:

VAN				
		Left side	Right side	
	Front	1 Door	1 Door	
Zone	Back	2 Panel	2 Door	
	Rear	2 Panel	2 Panel	



VARIABLE GROUP: Crushing Force

VARIABLE NAME: 13. Angle of Intersecting Longitudinal Axes

FORMAT: 3 column, numeric, beginning column 19

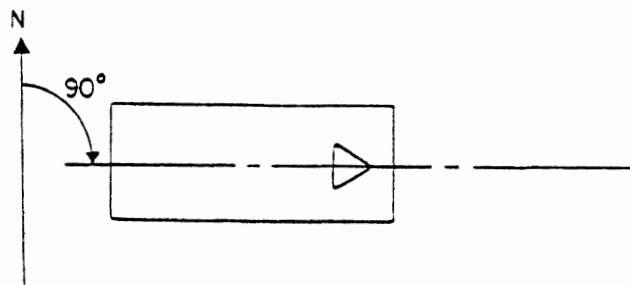
ELEMENT VALUES: \_\_\_ \_\_\_ \_\_\_ degrees -- Code to nearest ten degrees  
500 Vehicle-object contact  
999 Unknown

SOURCE: Inspection of Crash Scene  
Crash Scene Data or Drawings  
Inspection of Vehicles Involved

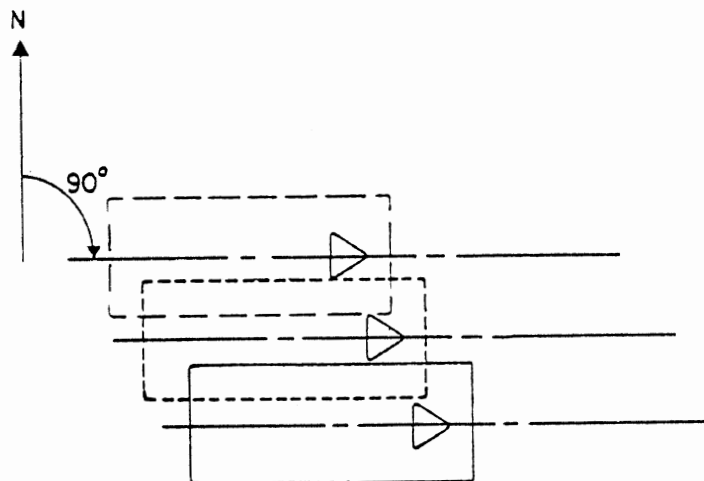
REMARKS: Record the forward longitudinal axis of the other vehicle relative to the forward longitudinal axis of this vehicle at the moment of the initial collision between the two. The forward longitudinal axis of the other vehicle is to be measured clockwise from the forward longitudinal axis of this vehicle. This value is equal to the algebraic difference between the heading angles of the two vehicles. The value should be rounded off and recorded to the nearest 10 degrees.

The heading angle of a vehicle is the direction the front of the vehicle is pointing, relative to a fixed coordinate. This can be different from the direction in which the vehicle is moving. For example, the heading angle of a vehicle being driven eastbound is 90° relative to north. If this same vehicle, while being driven in an easterly direction, begins sliding sideways (south), the heading angle remains 90°. If, however, the vehicle rotates so that the front is now point south (while skidding), the heading angle becomes 180°.

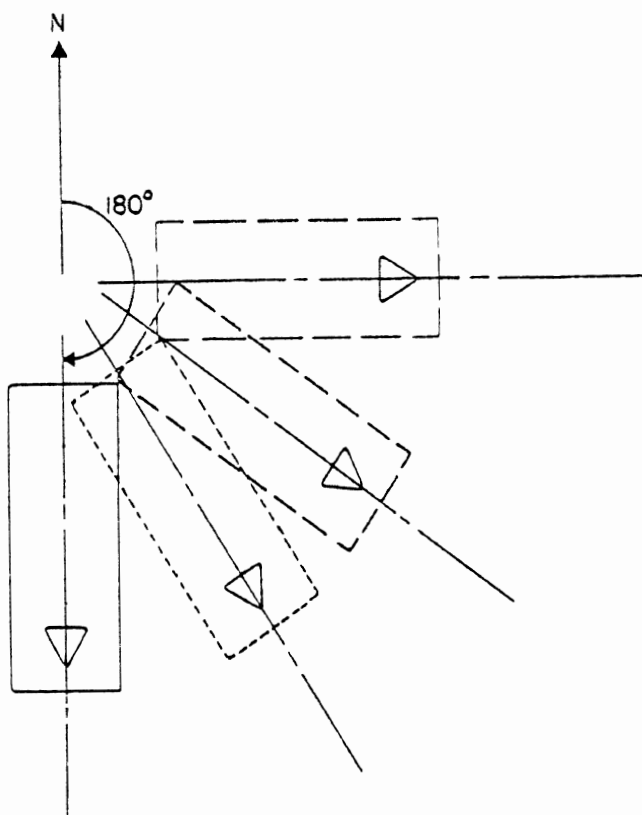
Vehicle being driven east



Vehicle being driven east but skidding sideways



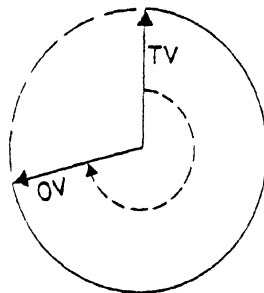
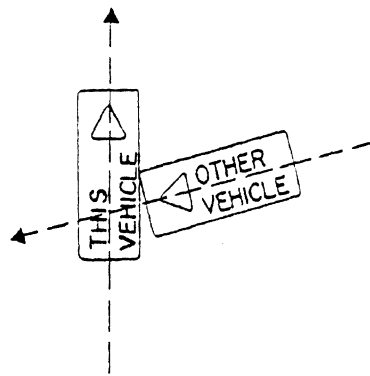
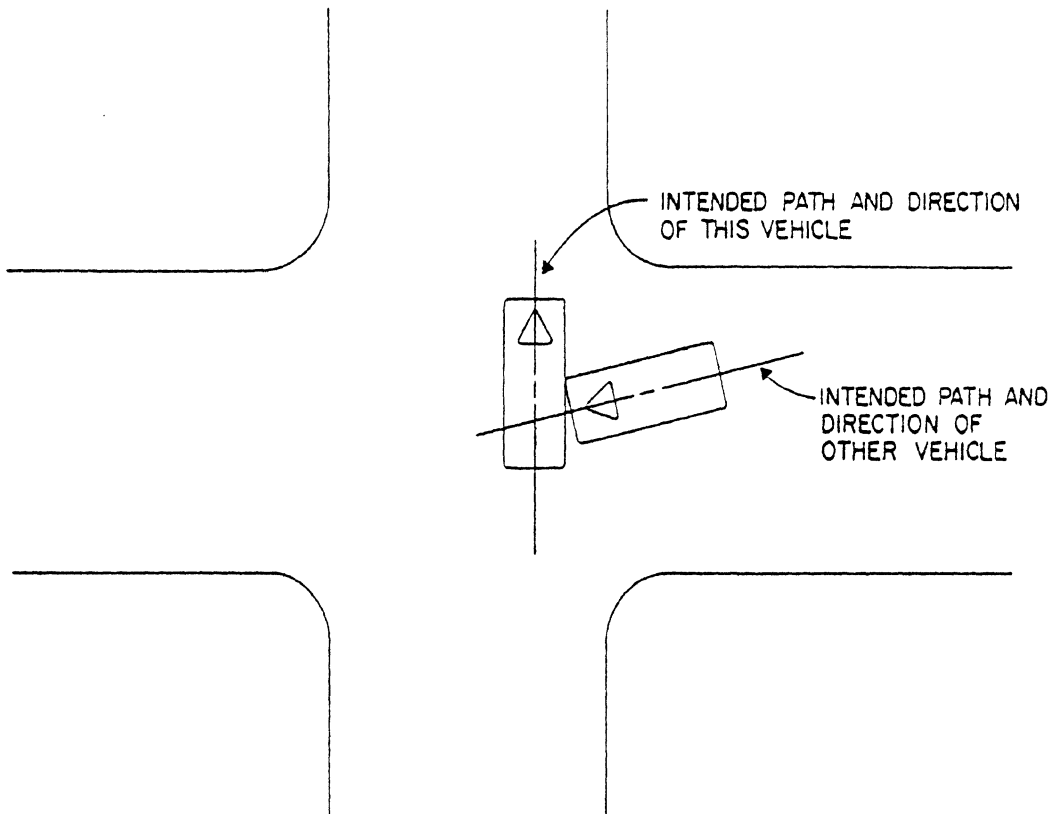
Vehicle, originally headed east, rotated and is skidding south



Method for determining heading angle

- (1) Make a sketch by drawing in the case vehicle and its centerline at the time of initial contact relative to the roadway.
- (2) Continue the sketch by drawing in the other vehicle and its centerline at the time of initial contact relative to the case vehicle.
- (3) Extend the centerlines (longitudinal axis) of each vehicle so they intersect and continue beyond the point of intersection.
- (4) Place an arrowhead beyond the point of intersection to show the forward end of the path of travel had they not collided.
- (5) Measure (in a clockwise direction) the angle formed by the direction-of-travel arrows, using the case vehicle as the baseline.

Example 1:

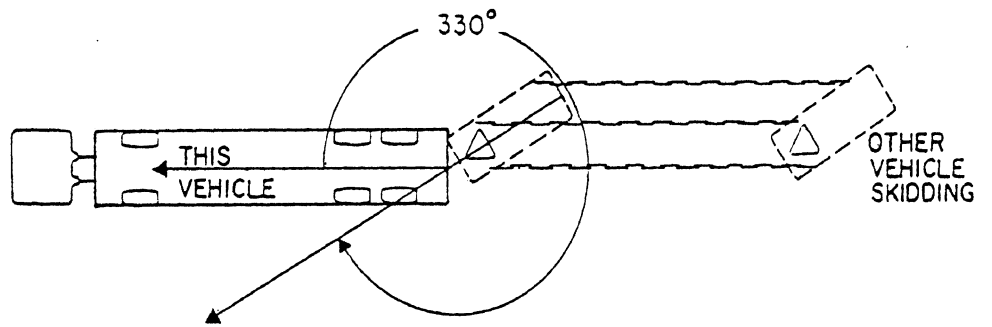


Result =  $263^\circ$

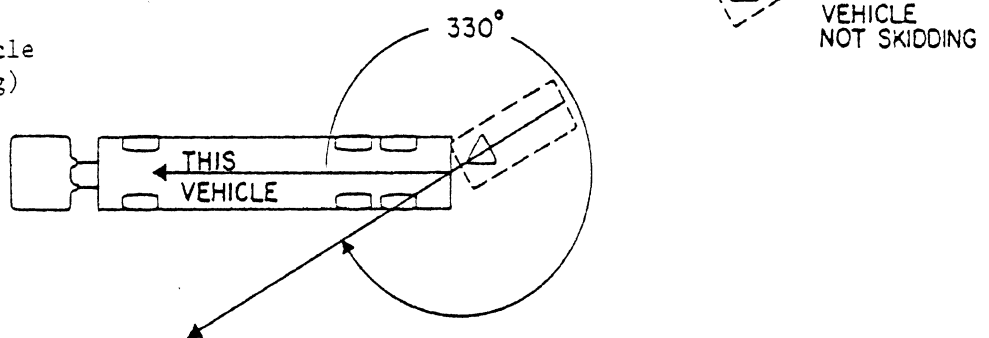
Record as  $260^\circ$

Example 2:

Non-Tracking  
(other vehicle skidding)



Tracking  
(other vehicle non-skidding)



VARIABLE GROUP: Crushing Force

VARIABLE NAME: 14-19. Which Zones Were Contacted by a Crushing Force

FORMAT: 1 x 6 columns\*, numeric, beginning column 22

ELEMENT STRUCTURE: 14. 15. 16. 17. 18. 19.  
                    Front    Rear    Back  
                    L    R    L    R    L    R  
                    ---  ---  ---  ---  ---  ---  
  
                    ---  ---  ---  ---  ---  ---

ELEMENT VALUES: Side: L = Left, R = Right

- 1 Contacted
- 2 Not contacted
- 8 Not applicable, not a side surface
- 9 Unknown if contacted

SOURCE: Inspection

REMARKS: Inspect the vehicle and record whether or not each side zone was contacted by a crushing force. If no side zone is present (see variables 17-12) it cannot have been contacted and must be coded "8--Not applicable".

The force that which contacts a side zone can be different from the force that contacts another zone. The only restriction is that the force be direct and crush the side inward. Induced damage alone is not applicable damage because there was no direct crushing force application.

\*Format specification indicates that each of the six variables described on this page have a field width of one column.

VARIABLE GROUP: Crushing Force

VARIABLE NAME: 20-25. Location of the Center of the Crushing Force in Each Side Zone Contacted

FORMAT: 2 x 6 columns, numeric, beginning column 28

ELEMENT STRUCTURE:

Front		Back		Rear	
L	R	L	R	L	R
---	---	---	---	---	---

-----

ELEMENT VALUES: Side: L = Left, R = Right

- 11-43 Center of crush (preceding page) \*
- 55 Crush distributed over all of zone (no crush center possible)
- 98 Not applicable, no side surface zone, or not damaged
- 99 Unknown center

SOURCE: Inspection only

REMARKS: This variable further defines the location of the crushing force by locating the point of application of the force to each of the side zones affected by the particular force.

Each zone is divided into a matrix of 12 areas. The door or panel itself is divided into nine equal areas numbered 1 to 3 vertically (from the top) and 1 to 3 horizontally (front to back). The door sill-rocker panel area below the door (or similar area in a panel-filled zone) is divided into three areas horizontally to correspond with the three areas in the door or panel area above it. The number for the rocker-sill zones is 1 to 3 horizontally (front to back) and 4 vertically.

To implement the coding, the zone is examined and the location of the maximum penetration is determined. The matrix outline is mentally superimposed on the door or panel. The area is then determined which best represents or includes the location of the maximum crush. The two-digit number associated with this area is recorded on the data form.

A note of caution: The damage and crush must be by direct contact with an object. Induced damage--no matter how severe--is not recorded.

In certain instances the location of the center of crush will be distributed in one or both directions. The use of code 5 for distributed crush allows the coding of tree or post impacts, guardrail contact, or totally distributed contacts made by a broad surface.

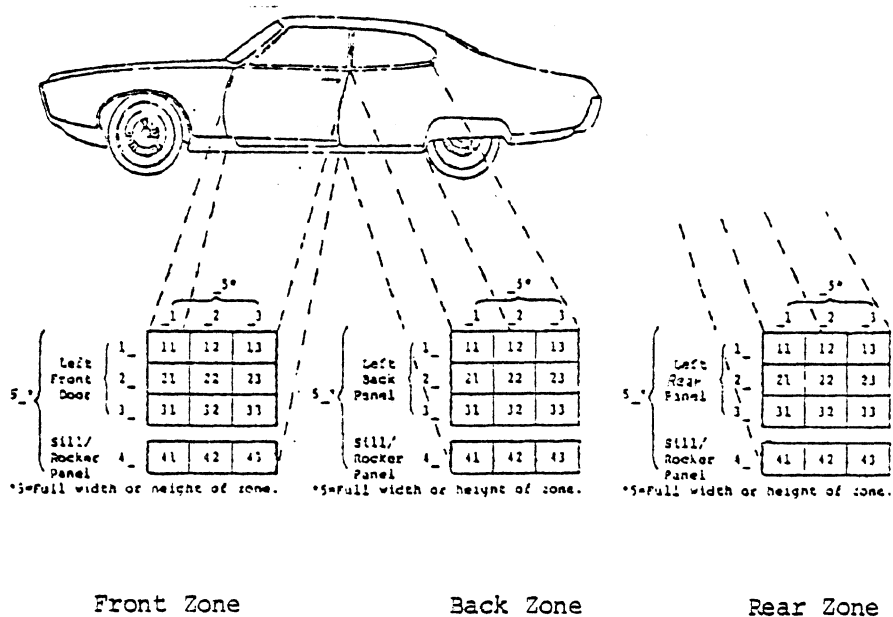
In the case of a pole-type impact, determine in which horizontal areas the contact lies and code 1 - 3. Code the vertical component 5. Thus a tree impact to the center of the front door would be coded 52. The same code would be used for either the left or right side. A guardrail contact to the rear door near the rocker panel would be coded 35.

In the case of overall contact to a zone (large truck into a small van), where the damage is uniformly distributed over the entire zone, code 55.

Where the contact is on a borderline, choose the area most representative of the location of the contact.

The above procedure is repeated for each zone that makes up the side surface. The same crushing force can contact two or more zones, or a different crushing force can contact each zone. Code a center for each zone. If there are multiple contacts to a zone, choose the most severe.

If a zone was previously coded as not applicable or not contacted, then it cannot be coded as having a crush center. Code as "98 Not applicable".





VARIABLE GROUP: Crushing Force

VARIABLE NAME: 26-31. Depth of Crush to Each Zone

FORMAT: 1 x 6 columns, numeric, beginning column 40

ELEMENT STRUCTURE: Front            Back            Rear  
                  L   R            L   R            L   R  
                  --- ---            --- ---            --- ---  
  
                  --- ---            --- ---            --- ---

ELEMENT VALUES: Zone:  
                  Side: L = Left, R = Right  
                  1 0-2 inches  
                  2 2-4 inches  
                  3 4-6 inches  
                  4 6-8 inches  
                  5 8 inches  
                  8 Not applicable, no contact or no side surface  
                  9 Unknown

SOURCE: Inspection

REMARKS: Estimate the depth of crush to each zone at the crush center. If a zone was previously coded as not applicable or not contacted, then it cannot have a crush depth. Code as "8 Not applicable".

VARIABLE GROUP: Component Damage

VARIABLE NAME: 32-39. Structural Contact  
(Pillar Damage)

FORMAT: 1 x 8 columns, numeric, beginning column 46

ELEMENT STRUCTURE: 

Pillar							
Left Side				Right Side			
A	B	C	D	A	B	C	D

ELEMENT VALUES: 1 Not damaged  
 2 Direct damage, no separation\*  
 3 Direct damage, separation\*  
 4 Indirect damage, no separation\*  
 5 Indirect damage, separation\*  
 8 Not applicable (not equipped)  
 9 Unknown  
 \*Separation must be complete.

SOURCE: Inspection

REMARKS: In addition to the damage described previously, were any structural/hardware components contacted or damaged? (NOTE: Contact and damage (direct and induced) must result from a direct application of a crushing force to the side surface between the A-pillar and the last pillar of the passenger compartment.)

Induced damage to concealed components is permitted as long as the damage was a result of a crushing force applied to an applicable side surface.

Code all components present on the vehicle, either damaged or not damaged. Use not applicable only if the component is not on vehicle.

VARIABLE GROUP: Component Damage

VARIABLE NAME: 40-45. Left Door Hardware Contact

FORMAT: 1 x 6 columns, numeric, beginning column 54

ELEMENT STRUCTURE: Latch/  
Striker Hinges Sill  
F B F B F B Zone: F = Front  
--- --- --- --- --- --- B = Back  
  
--- --- --- --- --- ---

ELEMENT VALUES: 1 Not damaged  
2 Direct damage, no separation\*  
3 Direct damage, separation\*  
4 Indirect damage, no separation\*  
5 Indirect damage, separation\*  
8 Not applicable (not equipped)  
9 Unknown  
\*Separation must be complete.

SOURCE: Inspection

REMARKS: A continuation of the component contact and damage assessment.

In addition to the damage described previously, were any structural/hardware components contacted or damaged? (NOTE: Contact and damage (direct and induced) must result from a direct application of a crushing force to the side surface between the A-pillar and the last pillar of the passenger compartment.)

Induced damage to concealed components is permitted as long as the damage was a result of a crushing force applied to an applicable side surface.

Code all components present on the vehicle, either damaged or not damaged. Use not applicable only if the component is not on vehicle.

VARIABLE GROUP: Component Damage

VARIABLE NAME: 46-51. Right Door Hardware Contact

FORMAT: 1 x 6 columns, numeric, beginning column 60

ELEMENT STRUCTURE: Latch/  
Striker Hinges Sill  
F B F B F B Zone: F = Front  
--- --- --- --- --- --- B = Back  
  
\_\_\_\_\_  
\_\_\_\_\_

ELEMENT VALUES: 1 Not damaged  
2 Direct damage, no separation\*  
3 Direct damage, separation\*  
4 Indirect damage, no separation\*  
5 Indirect damage, separation\*  
8 Not applicable (not equipped)  
9 Unknown  
\*Separation must be complete.

SOURCE: Inspection

REMARKS: A continuation of the component contact and damage assessment.

In addition to the damage described previously, were any structural/hardware components contacted or damaged? (NOTE: Contact and damage (direct and induced) must result from a direct application of a crushing force to the side surface between the A-pillar and the last pillar of the passenger compartment.)

Induced damage to concealed components is permitted as long as the damage was a result of a crushing force applied to an applicable side surface.

Code all components present on the vehicle, either damaged or not damaged. Use not applicable only if the component is not on vehicle.

VARIABLE GROUP: Intrusion

VARIABLE NAME: 52. Did Intrusion of the Internal Side Surface Result  
From the Side Crushing Force

FORMAT: 1 column, numeric, beginning column 66

ELEMENT VALUES: 1 Yes  
2 No } STOP! Complete external photographs only  
9 Unknown }

SOURCE: Inspection

REMARKS: Intrusion Defined: Intrusion results whenever the internal boundary surface of the passenger compartment is moved inward due to direct damage resulting from the application of a crushing force to the exterior surfaces of the vehicle.

Internal Side Surface: For the purposes of intrusion, the inner side surface extends from the inner door sill to the top of the upper window frame or top edge of the side glass. The roof rail is NOT included. Thus the inner side surface area is increased to include all of the door or panel area.

If the response is No or Unknown, do not complete the rest of the form. However, take external photographs as described earlier.

Discussion of Intrusion Matrix: When intrusion is indicated, the matrix (variables 62-169) is to be completed. The matrix allows for both a description of the intrusion and occupant contact and injury (if any).

One line of the matrix should be completed for each intrusion. An intrusion occurs when a component intrudes into an occupant space. If a component intrudes into more than one occupant space, then there are multiple intrusions and multiple lines are to be used to describe these intrusions. Additionally, more than one component can intrude into an occupant space resulting in multiple intrusions.

For each intrusion, code the Intruding Component, (Column A), Occupant Space Intruded (Column B), Associated Impact (Column C), Number of Occupant Spaces in Seat Row (Column D), as descriptive of the location of the intrusion. Columns E and F permit description of the amount of intrusion. Columns G, H

and I describe occupant contact and injury, if any.

Each intrusion is to be documented whether the space was occupied or not and regardless of occupant contact and injury.

The intrusions are to be coded beginning with occupant space 11 and proceeding across the seat (left to right) and then by seat row (front to rear). If insufficient space is available (i.e., more than 12 intrusions) continue recording on the back of the form.

VARIABLE GROUP: Intrusion

VARIABLE NAME: 53. Was There Catastrophic Intrusion into the  
Passenger Compartment by the Side Surface

FORMAT: 1 column, numeric, beginning column 67

ELEMENT VALUES: 1 Yes\*  
2 No -- continue!  
9 Unknown\*  
\*STOP! Complete both internal and external photographs.

SOURCE: Inspection only

REMARKS: Catastrophic Intrusion is declared when the passenger compartment is compromised through gross ruptures, tears, openings, avulsions and/or excessive passenger compartment compression or separation such that the performance of the side surface had little or no impact on the structural integrity of the passenger compartment. The intrusion is beyond measurement.

If the response is Yes or Unknown, Do Not complete the rest of the form. However, take both internal and external photographs as described earlier.

If the response is No, continue completing the Intrusion variable group.

VARIABLE GROUP: Intrusion

VARIABLE NAME: 54-59. Zone(s) in Which Intrusion(s) Occurred

FORMAT: 1 x 6 columns, numeric, beginning column 68

ELEMENT STRUCTURE:

Front		Back		Rear	
L	R	L	R	L	R
---	---	---	---	---	---
---	---	---	---	---	---

ELEMENT VALUES: Side: L = Left, R = Right

- 1 Intrusion
- 2 No intrusion
- 8 Not applicable, no side zone
- 9 Unknown

SOURCE: Inspection

REMARKS: Code all applicable zones to indicate either intruded or not intruded. Use "8, Not Applicable" only if the zone is not present. The coding should correlate with that of variables 7-12.



VARIABLE GROUP: Intrusion

VARIABLE NAME: 60. Numer of Occupant Spaces in Vehicle

FORMAT: 2 columns, numeric, beginning column 74

ELEMENT VALUES: \_\_ \_\_ -- Code actual value

99 Unknown

SOURCE: Inspection

REMARKS: Count and record the total number of occupant spaces in the vehicle.  
See variable 63 for a definition of occupant space.

VARIABLE GROUP: Intrusion

VARIABLE NAME: 61. Total Number of Intrusions

FORMAT: 2 columns, numeric, beginning column 76

ELEMENT VALUES: \_\_ \_\_ -- Code actual value  
99 Unknown

SOURCE: Total from Intrusion Matrix, Column A

REMARKS: Give the total number of intrusions.

This number can be greater than or equal to the number documented in the 12-row matrix.

VARIABLE GROUP: Intrusion

VARIABLE NAME: 62. Intruding Component

FORMAT: 2 columns, numeric, card no. 2, beginning column 11

ELEMENT VALUES: Column A: Intruding Component Codes for intruded area(s)  
or component(s).

- 01 Window frame
- 02 A pillar--upper
- 03 A pillar--lower
- 04 B pillar--upper
- 05 B pillar--lower
- 06 C pillar--upper
- 07 C pillar--lower
- 08 D pillar--upper
- 09 D pillar--lower
- 10 Door panel or side panel--includes all hardware
- 97 Other side component--(specify) \_\_\_\_\_
- 98 Not applicable
- 99 Unknown

SOURCE: Inspection

REMARKS: The roof rail is not a side component. The door panel and side panel are inclusive. The various hardware components should not be listed separately.

\*Also variables 71, 80, 89, 98, 107, 116, 125, 134, 143, 152, 161

VARIABLE GROUP: Intrusion

VARIABLE NAME: 63. Occupant Space Intruded

FORMAT: 2 columns, numeric, beginning column 13

ELEMENT VALUES: Column B: Occupant Space Intruded A two-digit code denotes occupant seat space. The first digit (left digit) denotes the seat row, with code values from 1-5. The second digit (right digit) denotes the position on the seat and (in some instances) the width of the seat.

Second Digit Codes:

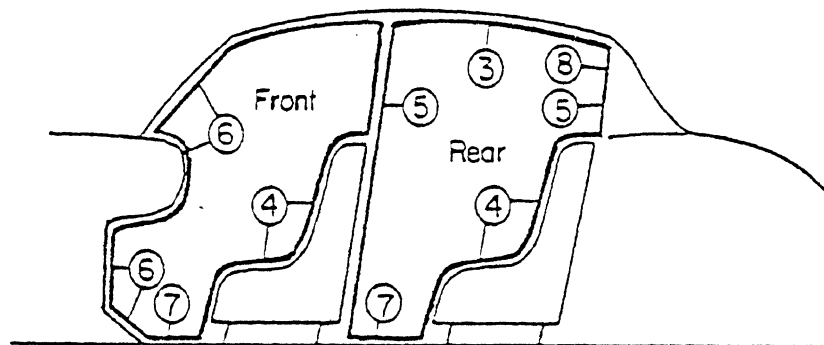
<u>Seat Type</u>	<u>Code Value</u>
Individual seat (bucket)	1 Left 3 Right
Bench: full width 3 passenger	1 Left, 2 Center 3 Right
Bench: full width 4 passenger	1 Left, 2 L. center, 6 R. center, 3 Right
Bench: partial width --left justified	1 Left, 2 Center, 5 Right + aisle space
Bench: partial width --centered	0 L.+space, 2 Center, 5 R.+space
Cargo area	4 Entire vehicle width

SOURCE: Inspection

REMARKS: An individual occupant space is that space (volume) defined by the manufacturer for the seating of an adult occupant and normally available to the occupant. The boundary surfaces are the six planes defined by the appropriate combinations of the following undeformed surfaces: (1) the interior side(s) of the vehicle; (2) a plane extending upwards at the boundary between manufacturer designated seating positions; (3) the headliner (or interior roof surface); (4) the seat-back surface and cushion surface (including cushion edges); (5) the seat-back back surface (extended to the headliner); (6) the instrument-panel surface, windshield, cowl surface and toe pan surface; (7) the floor-pan surface; (8) the rear surface (back panels/back door surface).

\*Also variables 72, 81, 90, 99, 108, 117, 126, 135, 144, 153, 162

In general the entire interior volume of the vehicle is divided into occupant spaces such that the sum of all the occupant spaces defined for that vehicle equals the total interior volume. Thus an intrusion into the vehicle anywhere on a side surface intrudes into some occupant space.



OCCUPANT SPACE BOUNDARIES IN A PASSENGER VEHICLE

This cargo area is: (1) that seat row which is vacant because the seats have been removed; or (2) the area behind the last row of seats which is normally designated and/or designed by the manufacturer for cargo which is integral with the passenger compartment.

Examples of Occupant Space Numbering.

Passenger Car--5 passengers

11		13	X	X
21	22	23	X	X

Van--12 passenger capacity

11			13	X		X
21	22	25		X	X	X
31	32	35		X	X	X
41	42	46	43	X	X	X

VARIABLE GROUP: Intrusion

VARIABLE NAME: 64. Associated Impact

FORMAT: 1 column, numeric, beginning column 15

ELEMENT VALUES: Column C: Associated Impact Code relevant impact from the  
bottom of page 3 of the CSS VEHICLE FORM as follows:

- 1 Most severe impact (V15)
- 2 Secondary impact (V22)
- 3 Other recorded impact (i.e., remaining CDC's  
from top of page 3)
- 4 Other impact (not recorded on page 3)
- 9 Unknown impact

SOURCE: Inspection

REMARKS: Determine, if possible, which impact caused the intrusion and code according to the element values given above. NOTE: The CDC's at the top of page 3 are not coded directly and hence this coding scheme is necessary.

\*Also variables 73, 82, 91, 100, 109, 118, 127, 136, 145, 154, 163

VARIABLE GROUP: Intrusion

VARIABLE NAME: 65. Number of Occupant Spaces in Seat Row

FORMAT: 1 column, numeric, beginning column 16

ELEMENT VALUES: Column D: Number of Occupant Spaces in Seat Row

- 2 Two occupant spaces
- 3 Three occupant spaces
- 4 Four occupant spaces
- 9 Unknown

SOURCE: Inspection

REMARKS: A count of occupant spaces in the seat row. See variable 63 for definition of Occupant Space.

\*Also variables 74, 83, 92, 101, 110, 119, 128, 137, 146, 155, 164

VARIABLE GROUP: Intrusion

VARIABLE NAME: 66. Amount of Intrusion

FORMAT: 2 columns, numeric, beginning column 17

ELEMENT VALUES: Column E: Amount of Intrusion  
(NOTE: Measured laterally in inches.)

\_\_ \_\_ Code actual value  
99 Unknown

SOURCE: Inspection

REMARKS: Measure laterally the amount of intrusion in each occupant space.

\*Also variables 75, 84, 93, 102, 111, 120, 129, 138, 147, 156, 164



VARIABLE GROUP: Intrusion

VARIABLE NAME: 67. Occupant Space Reduction

FORMAT: 1 column, numeric, beginning column 19

ELEMENT VALUES: Column F: Occupant Space Reduction

- 1 No reduction
- 2 Up to 25 percent
- 3 25 percent to 50 percent
- 4 Greater than 50 percent
- 9 Unknown reduction

SOURCE: Inspection

REMARKS: Estimate the amount of reduction in each occupant space resulting from the intrusion. While this is a quesstimate, the measured intrusion divided by the original width of the space should yield an accurate value. It is not required that the original dimension be ascertained, but such may be helpful.

\*Also variables 76, 85, 94, 103, 112, 121, 130, 139, 148, 157, 166

VARIABLE GROUP: Intrusion

VARIABLE NAME: 68. Contacted by Occupant Number

FORMAT: 2 columns, numeric, beginning column 20

ELEMENT VALUES: Column G: Contacted by Occupant Number

00 No contact

— — Number of the occupant contacting the intrusion--use  
occupant number from CSS OCCUPANT FORM, page 1,  
variable 007

97 Contacted, occupant unknown

98 Not applicable (vehicle not occupied)

99 Unknown if contacted

SOURCE: Inspection  
Injury Data

REMARKS: If the intrusion was not contacted by any occupany, code "00 No Contact". If the vehicle was unoccupied at the time of the crash, code "98 Not Applicable". If an occupant contacted (or is suspected of having contacted) an intrusion, code his occupant number as per above. In this scheme, only one occupant can contact an intrusion in an occupant space. The same intruding component can intrude into more than one space, hence multiple intrusions are possible and multiple contacts are permitted--provided the contacts occur in different occupant spaces.

The contacting occupant need not necessarily have been an occupant of the associated space.

\*Also variables 77, 86, 95, 104, 113, 122, 131, 140, 149, 158, 167

VARIABLE GROUP: Intrusion

VARIABLE NAME: 69. Associated Injury #1. CSS Row No.  
70. Associated Injury #2. CSS Row No.

FORMAT: 1 x 2 columns, numeric, beginning column 22

ELEMENT VALUES: Column H: Associated Injury #1.-CSS Row No.  
Column I: Associated Injury #2.-CSS Row No.  
Code the injury (if injured) associated with the specific  
intrusion described on this line.

- 0 No injury
- 1-6 Injury row number as listed at the bottom of page 7 of  
the CSS OCCUPANT FORM
- 7 Other (unlisted) injury
- 8 Not applicable (vehicle not occupied)
- 9 Unknown if injured or unknown injury number

SOURCE: Inspection  
Injury Data

REMARKS: If the occupant contact number (Column G) was "00 No injury", indicating no contact, there can be no injury. An occupant can contact an intrusion and not be injured. If there was injury, up to two injuries can be listed (Columns H and I) for the contacting occupant. Code injuries that had the highest probability of resulting from the intrusion.

\*Also variables 78, 79, 87, 88, 96, 97, 105, 106, 114, 115, 123, 124, 132,  
133

SIDE INTRUSION FORM

1. Primary Sampling Unit Number 1 2

2. Case Number 3 4 5 6

3. Special Study Number 0 4  
7 8

4. Record Number 3  
9

5. Card Number 1  
10

6. Vehicle Number 11 12

Side Surface Zones

(NOTE: Indicate which component is located in each zone to make up the side surface.)

7. 8. 9. 10. 11. 12.

Front Back Rear Zone:  
L R L R L R L=Left, R=Right

---	---	---	---	(1) Door
---	---	---	---	(2) Panel
---	---	---	---	(8) Not an applicable side surface
---	---	---	---	(9) Unknown

FL FR BL BR RL RR

13 14 15 16 17 18

CRUSHING FORCE

13. Angle of Intersecting Longitudinal Axes

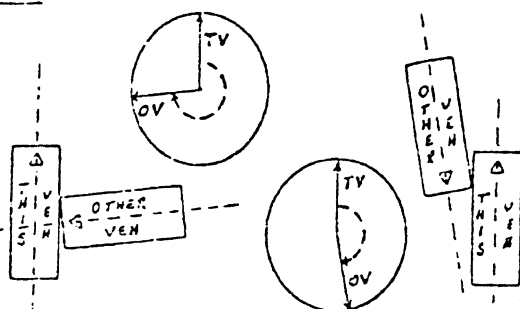
(NOTE: Record the forward longitudinal axis of the other vehicle relative to the forward longitudinal axis of this vehicle at the moment of the initial collision between the two. The forward longitudinal axis of the other vehicle is to be measured clockwise from the forward longitudinal axis of this vehicle. This value is equal to the algebraic difference between the heading angles of the two vehicles.)

\_\_\_\_\_ degrees -- Code to nearest ten degrees.

\_\_\_\_\_ (500) Vehicle-object contact

\_\_\_\_\_ (999) Unknown

19 20 21



LOWER SIDE SURFACE ASSESSMENT

When To Use This Form: Complete this form whenever an external crushing force has been applied to the side surface of the vehicle as a result of a side contact. The force can be from any direction but must crush the exterior side skin inward.

Photographic Instructions:

[Internal]--Photograph each side surface intrusion. Take at least 2 views, so as to best depict the location and magnitude of the intrusion.

[External]--Photograph each side surface zone where the side surface was contacted by a crushing force. Take at least 2 views, so as to best depict the location and magnitude of the crush.

Side Surface Defined: The side surface of the vehicle is defined as the area extending from the A-pillar to the last passenger compartment pillar and from the bottom edge of the door sill/rocker panel (extended) to the belt line. Window glass and upper pillars are not included in this area. The side surface consists of up to three zones (depending upon the vehicle) defined as: (1) front--the areas between the A and B pillars, (2) back--the area between the B and C pillars, and (3) rear--the area between the C and D pillars.

Which Zones Were Contacted by a Crushing Force

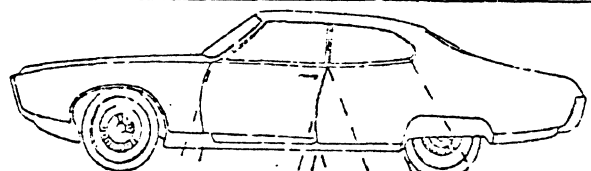
14. 15. 16. 17. 18. 19.

Front Back Rear Zone:  
L R L R L R Side: L=Left, R=Right

---	---	---	---	(1) Contacted
---	---	---	---	(2) Not contacted
---	---	---	---	(8) Not applicable, not a side surface
---	---	---	---	(9) Unknown if contacted

FL FR BL BR RL RR

22 23 24 25 26 27



Left Front Door	1	11	12	13
	2	21	22	23
	3	31	32	33
	4	41	42	43
Left Back Panel	1	11	12	13
	2	21	22	23
	3	31	32	33
	4	41	42	43

\*5=Full width or height of zone.

Location of the Center of the Crushing Force in Each Side Zone Contacted

20. 21. 22. 23. 24. 25.

Front		Back		Rear		Zone:
L	R	L	R	L	R	Side: L=Left, R=Right
---	---	---	---	---	---	(11-43) Center of crush [preceding page]*
---	---	---	---	---	---	(55) Crush distributed over all of zone [no crush center possible]
---	---	---	---	---	---	(98) Not applicable, no side surface zone, or not damaged
---	---	---	---	---	---	(99) Unknown center

\* Select from the table on the preceding page the value most representative of the center of crush.

F	L	F	R	B	L	B	R	R	L	R	R
---	---	---	---	---	---	---	---	---	---	---	---

Depth of Crush to Each Zone

26. 27. 28. 29. 30. 31.

Front		Back		Rear		Zone:
L	R	L	R	L	R	Side: L=Left, R=Right
---	---	---	---	---	---	(1) 0-2 inches
---	---	---	---	---	---	(2) >2-4 inches
---	---	---	---	---	---	(3) >4-6 inches
---	---	---	---	---	---	(4) >6-8 inches
---	---	---	---	---	---	(5) >8 inches
---	---	---	---	---	---	(8) Not applicable, no contact or no side surface
---	---	---	---	---	---	(9) Unknown

COMPONENT DAMAGE

In addition to the damage described above, were any structural/hardware components contacted or damaged? [NOTE: Contact and damage (direct and induced) must result from a direct application of a crushing force to the side surface between the A-pillar and the last pillar of the vehicle.]

Component Damage CODES

- (1) Not damaged,
- (2) Direct damage, no separation\*
- (3) Direct damage, separation\*
- (4) Indirect damage, no separation\*
- (5) Indirect damage, separation\*
- (8) Not applicable [not equipped]
- (9) Unknown

\* Separation must be complete.

Structural Contact

32. 33. 34. 35. 36. 37. 38. 39.

Left Side				Right Side				Pillar:
A	B	C	D	A	B	C	D	
---	---	---	---	---	---	---	---	(1)
---	---	---	---	---	---	---	---	(2)
---	---	---	---	---	---	---	---	(3)
---	---	---	---	---	---	---	---	(4)
---	---	---	---	---	---	---	---	(5)
---	---	---	---	---	---	---	---	(8)
---	---	---	---	---	---	---	---	(9)

See Codes Below

LA LB LC LD RA RB RC RD

46 47 48 49 50 51 52 53

Component Damage CODES

- (1) Not damaged.
  - (2) Direct damage, no separation\*
  - (3) Direct damage, separation\*
  - (4) Indirect damage, no separation\*
  - (5) Indirect damage, separation\*
  - (8) Not applicable [not equipped]
  - (9) Unknown
- \* Separation

Left Door Hardware Contact

40. 41. 42. 43. 44. 45.

Latch/Striker		Hinges		Sill		Zone:
F	B	F	B	F	B	
---	---	---	---	---	---	(1)
---	---	---	---	---	---	(2)
---	---	---	---	---	---	(3)
---	---	---	---	---	---	(4)
---	---	---	---	---	---	(5)
---	---	---	---	---	---	(8)
---	---	---	---	---	---	(9)

See Codes Above

LF LB HF HB SF SB

54 55 56 57 58 59

Right Door Hardware Contact

46. 47. 48. 49. 50. 51.

Latch/Striker		Hinges		Sill		Zone:
F	B	F	B	F	B	
---	---	---	---	---	---	(1)
---	---	---	---	---	---	(2)
---	---	---	---	---	---	(3)
---	---	---	---	---	---	(4)
---	---	---	---	---	---	(5)
---	---	---	---	---	---	(8)
---	---	---	---	---	---	(9)

See Codes Above or Adjacent

LF LB HF HB SF SB

60 61 62 63 64 65

INTRUSION

**Intrusion Defined:** Intrusion results whenever the internal boundary (surface) of the passenger compartment is moved inward due to direct damage resulting from the application of a crushing force as applied to the exterior surfaces of the vehicle.

**Internal Side Surface:** For the purposes of intrusion, the inner side surface extends from the inner door sill to the top of the upper window frame or top edge of the side glass. The roof rail is NOT included.

Zone(s) in which Intrusion(s) Occurred  
(NOTE: Zones were specified in Q 7-12.)

54. 55. 56. 57. 58. 59.

Front	Back	Rear	Zone:
L R	L R	L R	Side: L=Left, R=Right
---	---	---	
---	---	---	(1) Intrusion
---	---	---	(2) No intrusion
---	---	---	(3) Not applicable, no side zone
---	---	---	(9) Unknown

52. Did Intrusion of the Internal Side Surface Result from the Side Crushing Force

- (1) Yes  
 (2) No  
 (9) Unknown

STOP! Complete external photographs only.

66

60. Number of Vehicle Occupant Spaces

--- -- Code actual value.  
 (99) Unknown

74 75

53. Was There Catastrophic Intrusion Into the Passenger Compartment by the Side Surface.

- (1) Yes\*  
 (2) No -- continue!  
 (9) Unknown\*

\* STOP! Complete both internal and external photographs.

67

61. Total Number of Intrusions

(NOTE: This number can be greater than or equal to the number documented below.)

--- -- Code actual value.  
 (99) Unknown

76 77

Code intrusions from left to right, front to rear starting with Occupant Space #11.

Col:	-A-	-B-	-C-	-D-	-E-	-F-	-G-	-H-	-I-	
	Occupant		Number of			Intrusion*		Occupant Contact and Injury		
	Intruding Component	Space Intruded	Associated Impact	Occupant Spaces in Seat Row	Amount of Intrusion (inches)	Occupant Space Reduction	Contact Number by Occupant	Associated Injury #1. CSS Row No	Associated Injury #2. CSS Row No	
1 2°	62. <u>10</u>	<u>11</u> <u>12</u>	63. <u>13</u> <u>14</u>	64. <u>15</u>	65. <u>16</u>	66. <u>17</u> <u>18</u>	67. <u>19</u>	68. <u>20</u> <u>21</u>	69. <u>22</u>	70. <u>23</u>
2	71. <u>24</u>	<u>25</u>	72. <u>26</u> <u>27</u>	73. <u>28</u>	74. <u>29</u>	75. <u>30</u> <u>31</u>	76. <u>32</u>	77. <u>33</u> <u>34</u>	78. <u>35</u>	79. <u>36</u>
3	80. <u>37</u>	<u>38</u>	81. <u>39</u> <u>40</u>	82. <u>41</u>	83. <u>42</u>	84. <u>43</u> <u>44</u>	85. <u>45</u>	86. <u>46</u> <u>47</u>	87. <u>48</u>	88. <u>49</u>
4	89. <u>50</u>	<u>51</u>	90. <u>52</u> <u>53</u>	91. <u>54</u>	92. <u>55</u>	93. <u>56</u> <u>57</u>	94. <u>58</u>	95. <u>59</u> <u>60</u>	96. <u>61</u>	97. <u>62</u>
5	98. <u>63</u>	<u>64</u>	99. <u>65</u> <u>66</u>	100. <u>67</u>	101. <u>68</u>	102. <u>69</u> <u>70</u>	103. <u>71</u>	104. <u>72</u> <u>73</u>	105. <u>74</u>	106. <u>75</u>
6 3°	107. <u>10</u>	<u>11</u> <u>12</u>	108. <u>13</u> <u>14</u>	109. <u>15</u>	110. <u>16</u>	111. <u>17</u> <u>18</u>	112. <u>19</u>	113. <u>20</u> <u>21</u>	114. <u>22</u>	115. <u>23</u>
7	116. <u>24</u>	<u>25</u>	117. <u>26</u> <u>27</u>	118. <u>28</u>	119. <u>29</u>	120. <u>30</u> <u>31</u>	121. <u>32</u>	122. <u>33</u> <u>34</u>	123. <u>35</u>	124. <u>36</u>
8	125. <u>37</u>	<u>38</u>	126. <u>39</u> <u>40</u>	127. <u>41</u>	128. <u>42</u>	129. <u>43</u> <u>44</u>	130. <u>45</u>	131. <u>46</u> <u>47</u>	132. <u>48</u>	133. <u>49</u>
9	134. <u>50</u>	<u>51</u>	135. <u>52</u> <u>53</u>	136. <u>54</u>	137. <u>55</u>	138. <u>56</u> <u>57</u>	139. <u>58</u>	140. <u>59</u> <u>60</u>	141. <u>61</u>	142. <u>62</u>
10	143. <u>63</u>	<u>64</u>	144. <u>65</u> <u>66</u>	145. <u>67</u>	146. <u>68</u>	147. <u>69</u> <u>70</u>	148. <u>71</u>	149. <u>72</u> <u>73</u>	150. <u>74</u>	151. <u>75</u>
11 4°	152. <u>10</u>	<u>11</u> <u>12</u>	153. <u>13</u> <u>14</u>	154. <u>15</u>	155. <u>16</u>	156. <u>17</u> <u>18</u>	157. <u>19</u>	158. <u>20</u> <u>21</u>	159. <u>22</u>	160. <u>23</u>
12	161. <u>24</u>	<u>25</u>	162. <u>26</u> <u>27</u>	163. <u>28</u>	164. <u>29</u>	165. <u>30</u> <u>31</u>	166. <u>32</u>	167. <u>33</u> <u>34</u>	168. <u>35</u>	169. <u>36</u>

°Duplicate columns 1-9, GO TO Card Number: 35

\*Intrusion and reduction are measured laterally.

# INTRUSION CODES

Column A: Intruding Component Codes for intruded area(s) or component(s).

- (01) Window frame
  - (02) A pillar--upper
  - (03) A pillar--lower
  - (04) B pillar--upper
  - (05) B pillar--lower
  - (06) C pillar--upper
  - (07) C pillar--lower
  - (08) D pillar--upper
  - (09) D pillar--lower
  - (10) Door panel or side panel--includes all hardware
  - (97) Other side component--[specify]
- 
- (98) Not applicable
  - (99) Unknown

Column B: Occupant Space Intruded A two digit code denotes occupant seat space. The first digit (left digit) denotes the seat row, with code values from 1-5. The second digit (right digit) denotes the position on the seat and (in some instances) the width of the seat.

Second Digit Codes:

<u>Seat Type</u>	<u>Code Value</u>
Individual seat (bucket)	(1) Left, (3) Right
Bench: full width 3 passenger	(1) Left, (2) Center, (3) Right
Bench: full width 4 passenger	(1) Left, (2) L. center, (6) R. center, (3) Right
Bench: partial width --left justified	(1) Left, (2) Center, (5) Right + aisle space
Bench: partial width --centered	(0) L.+space, (2) Center, (5) R.+space
Cargo area	(4) Entire vehicle width

Example: Passenger Car--5 passengers

11	13	X X
21	22 23	X X X

Example: Van--12 passenger capacity

11	13	X X
21	22 25	X X X
31	32 35	X X X
41	42 46 43	X X X X

Column C: Associated Impact Code relevant impact from the bottom of page 3 of the CSS VEHICLE FORM as follows:

- (1) Most severe impact [V15]
- (2) Secondary impact [V22]
- (3) Other recorded impact [i.e., remaining CDC's from top of page 3]
- (4) Other impact [not recorded on page 3]
- (9) Unknown impact

Column D: Number of Occupant Spaces in Seat Row

- (2) Two occupant spaces
- (3) Three occupant spaces
- (4) Four occupant spaces
- (9) Unknown

Column E: Amount of Intrusion  
(NOTE: Measured laterally in inches.)

- Code actual value
- (99) Unknown

Column F: Occupant Space Reduction

- (1) No reduction
- (2) Up to 25 percent
- (3) 25 percent to 50 percent
- (4) Greater than 50 percent
- (9) Unknown reduction

Column G: Contacted by Occupant Number:

- (00) No contact
- Number of the occupant contacting the intrusion--use occupant number from CSS OCCUPANT FORM, page 1, variable 007
- (97) Contacted, occupant unknown
- (98) Not applicable [vehicle not occupied]
- (99) Unknown if contacted

Column H: Associated Injury #1.-CSS Row No

Column I: Associated Injury #2.-CSS Row No  
Code the injury (if injured) associated with the specific intrusion described on this line.

- (0) No injury
- (1-6) Injury row number as listed at the bottom of page 7 of the CSS OCCUPANT FORM
- (7) Other [unlisted] injury
- (8) Not applicable [vehicle not occupied]
- (9) Unknown if injured or unknown injury number