National Accident Sampling System

Special Studies Number Three

Steering Column

User's Guide
and
Coding Manual

Revised Edition
July, 1979

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Prepared for

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

by

Highway Safety Research Institute
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Technical Report Documentation Page

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
UM-HSRI-79-43		

4. Title and Subtitle	5. Report Date
National Accident Sampling System; Special Studies Number 3: Steering Column, User's Guide and Coding Manual---Revised Edition: July 1979	July 1979
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
Thomas L. McDole, Ph.D.	UM-HSRI-79-43
9. Performing Organization Name and Address	10. Work Unit No. (TRAIS)
Highway Safety Research Institute The University of Michigan Ann Arbor, Michigan 48109	11. Contract or Grant No. DOT-HS-7-01805
	13. Type of Report and Period Covered Task Final 10/01/78 - 07/31/79
12. Sponsoring Agency Name and Address	14. Sponsoring Agency Code
National Highway Traffic Safety Administration U.S. Department of Transportation Washington, D.C. 20590	

15. Supplementary Notes

16. Abstract

This User's Guide describes the National Accident Sampling System (NASS) Special Studies data collection project number three: Steering Column.

Contained herein is the necessary information and instructions to describe the vehicle's passenger compartment steering system and to record on the NASS Steering Column Form the nature and extent of the damage to it following involvement in a crash.

This is a revision of the April 1979 edition.

17. Key Words	18. Distribution Statement
Crash; Steering Column; Measurement; Data Recording; Coding; Data Form; Accident Invesitigation	Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified		

CONTENTS

1.0 PURPOSE

The purpose of this Special Study is to gather data on the performance of the steering system components located within the passenger compartment when the vehicle is involved in a collision.

2.0 STEERING SYSTEM DEFINED

The steering system is defined as the portion of the steering assembly that is located within the passenger compartment, consisting of the following components/subsystems.

1. The column, extending from the toe pan to its termination in the steering wheel hub.
2. Associated mounting brackets, hardware, and foundation.
3. Associated energy-absorbing devices.
4. The steering wheel.

3.0 ORGANIZATION OF THE DATA FORM

For purposes of this data collection, the passenger compartment steering system has been classified into four major subsystems: (1) Wheel; (2) Column; (3) Column Mounting; (4) Foundation.

The Wheel (1) consists only of the rim, spokes, and hub. The Column (2) consists of the steering column, housing jacket, energy-absorbing device, and the toe plate (if any). The column extends from the toe pan at the firewall to the shaft end where the wheel hub attaches. The Mounting (3) consists of the brackets, shear module, clamps, etc., used to attach the column to the foundation or vehicle. The mounting brackets are attached to the column. The Foundation (4) consists of those surfaces or devices to which the column mounting devices are fastened so as to secure the column in the vehicle. These surfaces are typically the instrument panel, toe pan, or other vehicle substructure.

The data form is organized to allow identification and description of these subsystems (Wheel, Column, Mounting, Foundation) and to permit recording of observed damage to each subsystem.

Tabular data accompanying each of the descriptive variables permit ready identification and coding of the device type. However, to further facilitate correct description of the item, compiled reference data have been provided under separate cover. This reference document is described in the following section.

4.0 REFERENCE GUIDE AND EXAMPLE OF COMPILED REFERENCE TABLE

4.1 Introduction

The Reference Guide has been developed to help the investigator accurately describe and measure the passenger compartment steering system. The Guide has two parts. Part I, containing Reference Table 1, summarizes the components of the passenger compartment steering system for most vehicles of interest. It is organized by Make, Model, and Model Year. Part II, containing Reference Tables 2-7, provides data about each component of this steering system. Reference Table 1 is a summary of Tables 2-7 for specific vehicles.

4.2 Use of Reference Tables

The reference tables are organized for use in two ways. The first table gives the pertinent data in summary for the common makes and models. Proper use requires that the investigator identify the make, model, and optional equipment for a certain vehicle, locate that vehicle in Reference Table 1, and then transfer the appropriate data values to the data form while verifying that the vehicle is so equipped.

The second set of tables gives the code values for each specific element of the data form, so that uncommon steering systems not contained in the summary tables may be described. These tables also describe how to make and record certain measurements.

Use of the summary tables is strongly encouraged, because many of the features of a steering system are not readily identifiable by examining a vehicle.

When a data value is not listed in Reference Table 1, or is otherwise indicated as not available, the investigator must examine the vehicle to correctly identify or describe the component.

4.3 Reference Tables

The reference tables are reproduced here for the convenience of the investigator. They are also listed where applicable in the variable section.

RT-1 Compiled Steering Components by Make, Model, Model Year

RT-2 Wheel Code

RT-3 Wheel Profile

RT-4 Wheel EA Type Code

RT-5 Column EA Device Type

RT-6 Column Mounting Method

RT-7 AC Dimension Reference Points

Example. Reference Table 1: Compiled Steering Components

Year 1983 Make NHTSA

Example

				STEERING WHEEL				COLUMN			AC DIMENSION	
Series Name (Ref. Table)	Body Style ///	VIN Body Code* ///	Opt. Strg. Equpt. ///	Wheel Code (2)	Profile (3)	Wheel EA Code (4)	EA Orig. Dimen. ///	EA Device Type (5)	Mount-ing Method (6)	EA Orig. Dimen. ///	Ref. Point (7)	Value ///
Standard 203	2 dr.	31	Std.	22	2	01	998	11	6	8.5	1	66
	4 dr.	32	Std.	22	2	01	998	11	6	8.5	1	69
	S Wagon	33	Std.	22	2	01	998	11	6	8.5	1	112
Delux 203	2 dr.	41	Std.	31	2	01	998	11	6	8.5	1	66
			Tilt	41	2	01	998	41	4	7.0	1	66*
	4 dr.	42	Std.	31	2	01	998	11	6	8.5	1	67
			Tilt	41	2	01	998	41	4	7.0	1	69*
	S Wagon	43	Std.	31	2	01	998	11	6	8.5	1	112
			Tilt	41	2	01	998	41	4	7.0	1	112*
Luxury	4 dr. HT	53	Tilt/ Tel.	11	3	01	998	16	5	5.5	1	998
			Tilt/ Tel. Speed	11	3	01	998	17	5	6.5	1	998
Sports	2 dr.	76	Tilt/ Tel/ Speed	43	1	37	4.5"	01	3	998	1	998

*VIN Body Code:
4th & 5th characters of VIN
.... x x .... etc.
1 2 3 4 5 6

*with tilt wheel at center position

Example

A B C D E F G H I J K L M

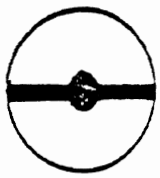
Ref. Table 2--Wheel Code

1 spoke

11 =

2 spokes

21 =



22 =

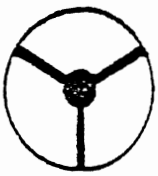
23 =

24 =

3 spokes

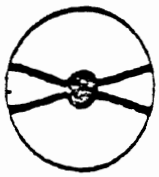
31 =

32 =

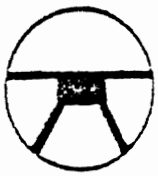


4 spokes

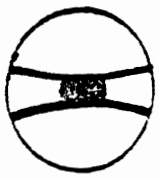
41 =



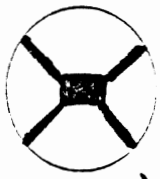
42 =



43 =

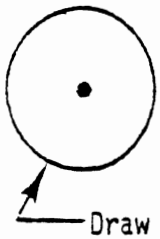


44 =



(GM Air Bag)

97 = Other



Draw in the spoke arrangement on data form.

99 - Unknown spokes and arrangement

Ref. Table 3--Wheel Profile

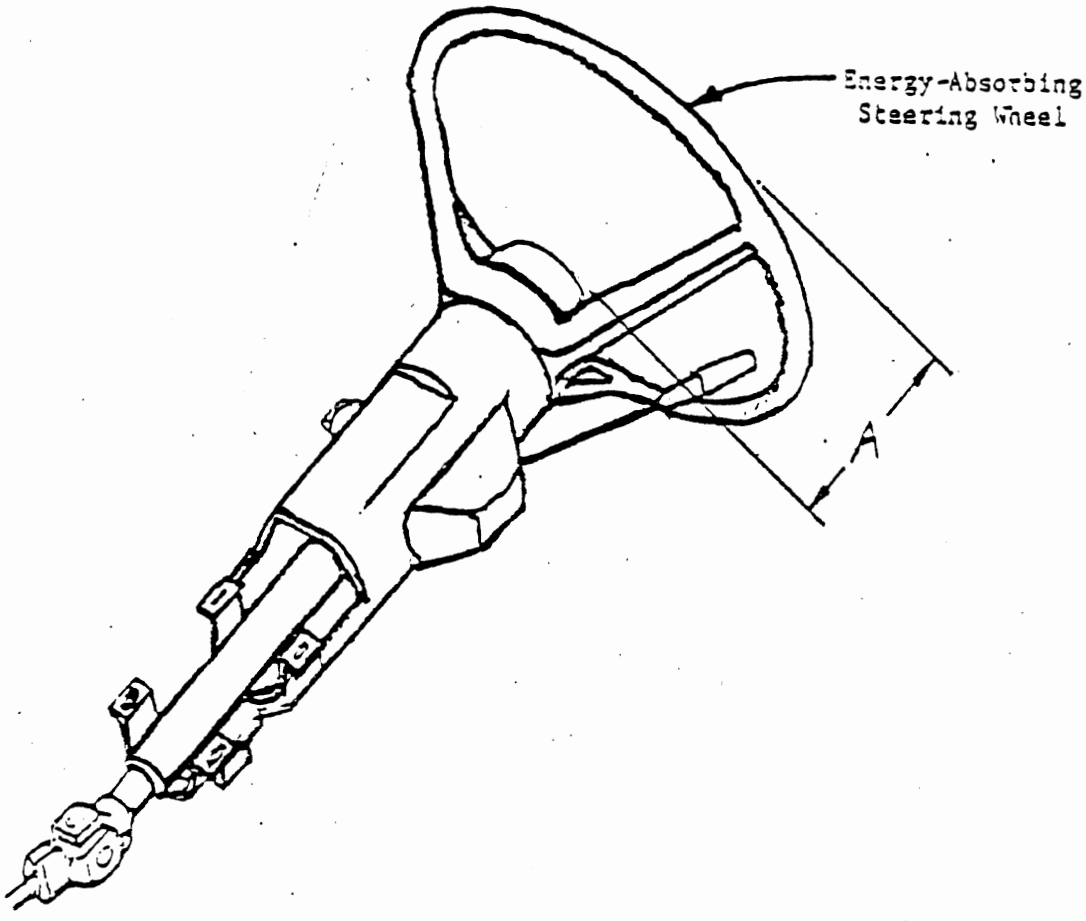
1. Deep dish (≥ 3")
2. Shallow dish (< 3")
3. Flat
4. Other profile*
5. Undetermined - no reference data
9. Unknown profile

*Note on data form.

Ref. Table 4--Wheel EA Type Code

01	Non EA Type*
02	EA Type--Unspecified
21	Dodge Omni
31	Plymouth Horizon
95	Undetermined--no reference data
99	Unknown if EA Wheel

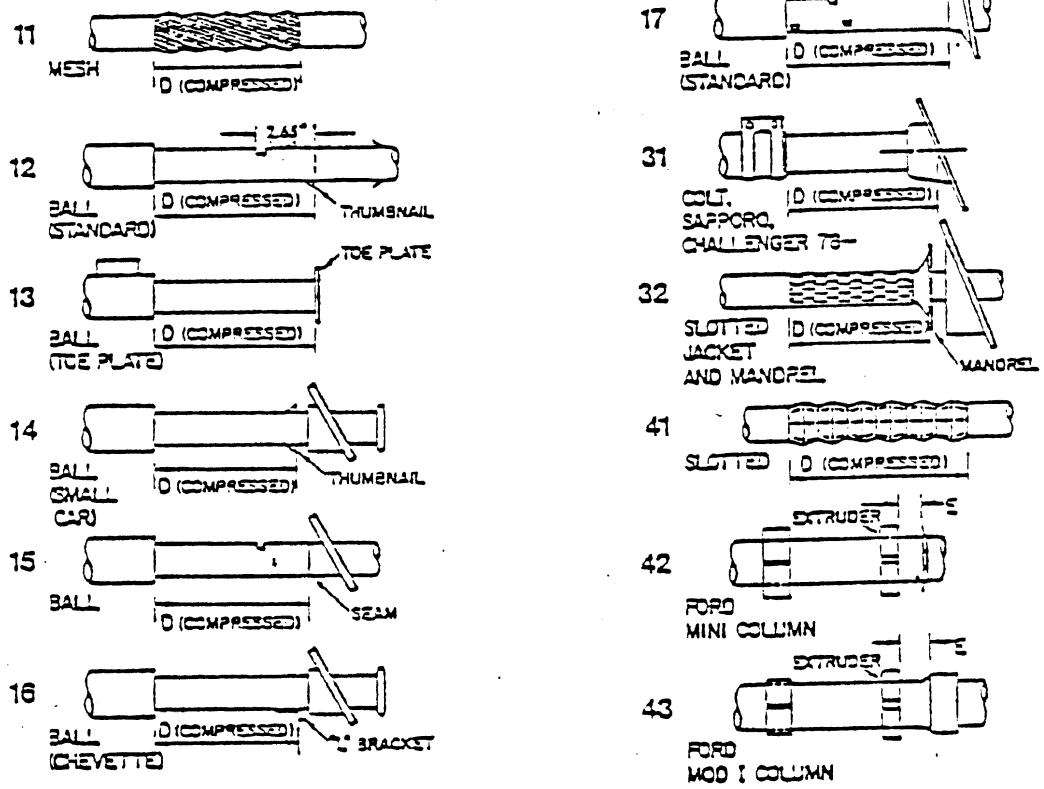
*While most wheels are designed to absorb some energy (but are not called EA wheels), certain wheels are specifically EA and replace the column EA capability.



Ref. Table 5--Column EA Device Type

STEERING COLUMN
ENERGY ABSORBING DEVICES *

01 Non EA Column
02 EA Column Type Unspecified



FRONT OF VEHICLE

90 Other EA Column Type--Note on data forms

95 Undetermined--no reference data

99 Unknown if EA Column

*See Variable 17 for larger drawings

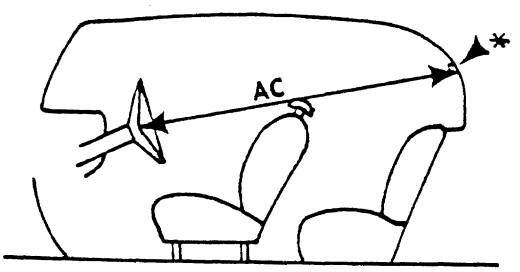
Ref. Table 6--Column Mounting Method *

1 Rigid to Instrument Panel and Toe Pan/Lower Firewall
2 Rigid to Instrument Panel, Lower Bracket
3 Rigid to Instrument Panel, No Lower Attachment
4 Shear Module at Instrument Panel, Rigid at Toe Pan/Lower Firewall
5 Shear Module at Instrument Panel, Lower Bracket
6 Shear Module at Instrument Panel, No Lower Attachment
7 Bracket
8 Other (specify on data form)
9 Unknown Method
0 Undetermined--no reference data

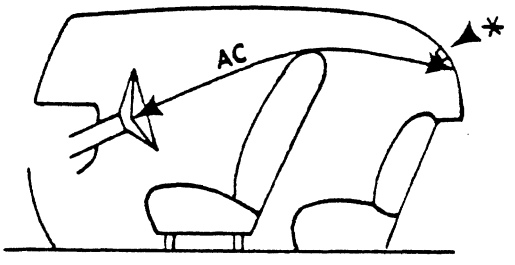
*See Variable 18 for additional details

Ref. Table 7 -- AC Dimension Reference Points

1. Back light glass header - Straight line from wheel hub to reference point (If adjustable headrest, measurement is with headrest down.)



2. Back light glass header - Curved line over seat back from wheel hub to reference point (High back seats, tape measure should rest on top of seat back.)



3. Intermediate reference point - See note in Reference Table I

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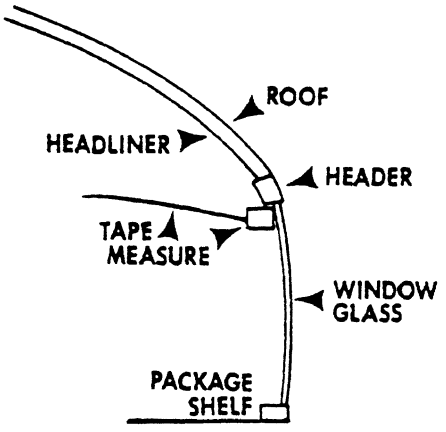
*Back light header detail



5.0 NOTE ON THE USE OF CODE 5* OR 95

All possible effort has been made to ascertain the correct entries for the Compiled Reference Table. In certain instances, values are not available and thus the notation 5 or 95 is used to indicate the unavailability.

Instances of unavailability of the reference data include limited production model vehicles, new models, foreign makes, older model vehicles, etc. The Compiled Reference Table will be up-dated periodically to reflect new model entries and additional data acquisitions.

When such a value (5 or 95) is noted, the investigator should make every effort to ascertain the correct value for the variable (as defined in the individual reference tables) by inspection of the vehicle. This value, obtained by inspection, should be placed on the data form in place of the value 5 or 95. Only when, by inspection, the correct value cannot be ascertained should the code values 5 or 95 be placed on the data form.

6.0 CASE SELECTION

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

General: This special study is to be completed whenever this vehicle has met the initial NASS sample selection, was a towaway, and the initial crash event involved a frontal or side collision. EXCLUDE initial rear impacts (CDC clock directions 04-08) and exclude all rollovers.

Any variation or additional criteria that affect individual PSU's or the above-described general case selection will be provided by NHTSA.

Specific: CHECK with your Zone Center for additional case selection criteria.

*In certain instances 5 is a valid code and hence a substitute value has been listed.

7.0 ADDITIONAL DOCUMENTATION -- PHOTOGRAPHIC

The data form is designed to be a response-only data form with no additional drawing or sketching required.

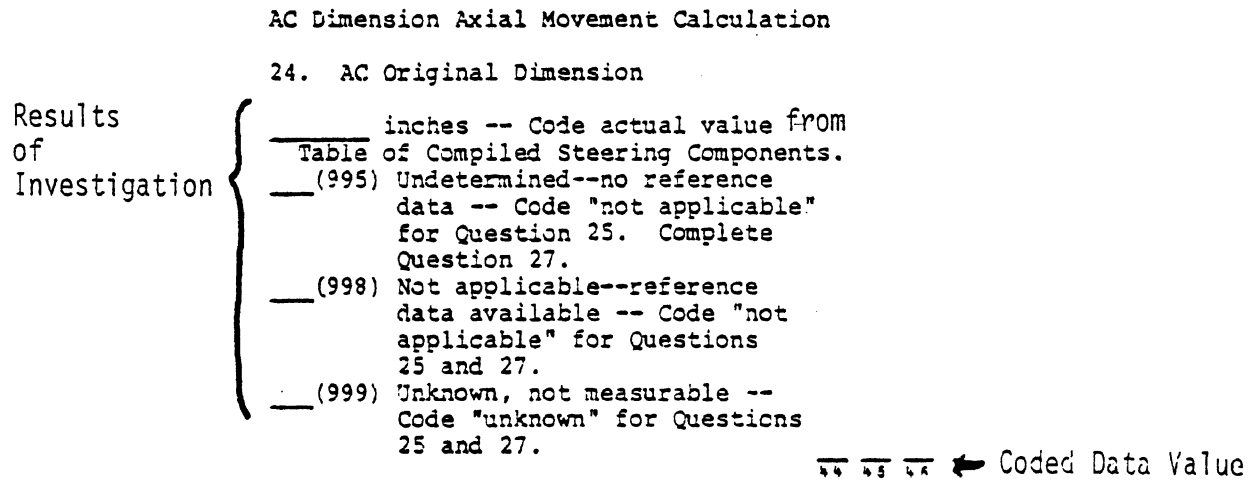
However, to facilitate a complete understanding of the damage pattern, take at least two photographs of the steering column, wheel, energy-absorbing (EA) device, etc., to best depict the location and magnitude of the damage. Photograph the mounting and foundation also. After-market steering wheels should be photographed.

8.0 SUPPLEMENTAL INFORMATION

Additional notes, supplemental drawings, etc., are extremely valuable in 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.

9.0 DATA RECORDING

The data form is designed for ease of data recording by the field investigator. Only a check mark or investigator-supplied numeric value is needed. 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.



To increase understanding of the coding, the element (code) values have been separated from the element (code) structure IN THIS DOCUMENT ONLY.

10.0 VARIABLE CODING AND DESCRIPTION

Each variable's coding structure is displayed on the following pages, accompanied by explanatory notes. The field data form is included in Section 11.

VARIABLE CODING AND DESCRIPTION

VARIABLE GROUP: Form Identification

VARIABLE NAME: 1-5. Form Header and Case Identification

FORMAT: 11 columns, numeric, beginning column 1*

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

SOURCE: Vehicle Forms

REMARKS: This information is obtained from the VEHICLE FORM.

*See data form for layout.

VARIABLE GROUP: Steering System Optional Equipment

VARIABLE NAME: 6. Speed Control

FORMAT: 1 column, numeric, beginning column 12

ELEMENT VALUES: 1 Equipped
2 Not Equipped
9 Unknown

SOURCE: Inspection only

REMARKS: A factory-installed (Original Equipment Manufacturer) speed control may affect the steering column EA device type and/or dimension.

This variable is restricted to only OEM speed controls. After-market devices are not to be included (even if dealer installed).

VARIABLE GROUP: Steering System Optional Equipment

VARIABLE NAME: 7. Tilt Column Feature

FORMAT: 1 column, numeric, beginning column 13

ELEMENT VALUES: 1 Equipped
2 Not Equipped
9 Unknown

SOURCE: Inspection only

REMARKS: The tilt column feature can affect the steering column EA device type and/or dimensions, or affect other dimensional properties related to the steering system.

VARIABLE GROUP: Steering System Optional Equipment

VARIABLE NAME: 8. Telescoping Column Feature

FORMAT: 1 column, numeric, beginning column 14

ELEMENT VALUES: 1 Equipped
2 Not Equipped
9 Unknown

SOURCE: Inspection only

REMARKS: The telescoping column feature can affect the steering column EA device type and/or dimensions, or affect other dimensional properties related to the steering system.

VARIABLE GROUP: Steering Wheel: Device

VARIABLE NAME: 9,. Wheel Configuration

FORMAT: 2 columns, numeric, beginning column 15

ELEMENT VALUES: __ __: Code actual value from those listed in the Table of Compiled Steering Componenets* or from those shown below.

95 Undetermined--no reference data

97 Other: Sketch configuration in the space provided on the reverse side

99 Unknown spokes and arrangement

SOURCE: Inspection

Compiled Reference Table*

Reference Table

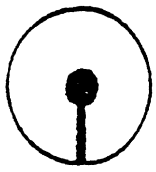
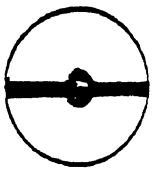
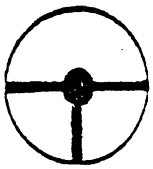
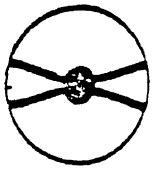
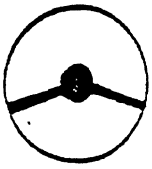
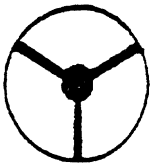
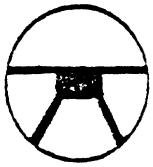
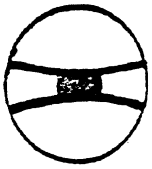
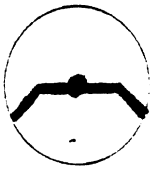
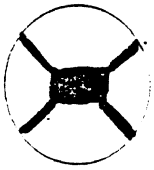
REMARKS: Code the number of spokes and their arrangement. Check the wheel visually and compare the number and arrangement of the spokes with the value given in the Compiled Reference Table.* Insert the correct value.

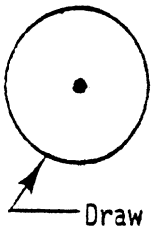
If code 95 is indicated in the Compiled Reference Table, the wheel should be visually inspected to identify the spokes and arrangement. If the configuration cannot be determined visually, then use code 95. If the wheel is an after-market type, note here and on variable 10. Sketch, describe, and photograph the after-market wheel. Code the after-market wheel using the appropriate code from the reference Table.

*Compiled Reference Table issued separately.

Continued

Reference Table -- Wheel Configuration

1 spoke	2 spokes	3 spokes	4 spokes
11 = 	21 = 	31 = 	41 = 
	22 = 	32 = 	42 = 
	23 = 		43 = 
	23 : 		44 =  (GM Air Bag)

97 = Other 

Draw in the spoke arrangement on data form.

99 - Unknown spokes and arrangement

VARIABLE GROUP: Steering Wheel: Device

VARIABLE NAME: 10. Wheel Profile

FORMAT: 1 column, numeric, beginning column 17

ELEMENT VALUES:
1 Deep dish (≥ 3")
2 Shallow dish (< 3")
3 Flat
4 Other profile:

---

5 Undetermined--no reference data
9 Unknown profile

SOURCE: Inspection
Compiled Reference Table
Reference Table - individual

REMARKS: Code the wheel profile. Check the wheel visually and compare the profile of the wheel with the value given in the Compiled Reference Tables. Insert the correct value. Wheels that have a dimension from the plane of the wheel rim to the surface of the hub of three inches or greater are considered deep dish. Others are shallow, unless the rim, spokes, and hub essentially lie in the same plane(i.e., the spokes are not at an angle to the plane of the wheel).

If code 5 is indicated in the Compiled Reference Table, visually inspect the wheel to identify the profile. If the profile cannot be determined visually, then use code 5.

If the wheel is an after-market type, note on the data form (see variable 9).

VARIABLE GROUP: Steering Wheel: Device

VARIABLE NAME: 11. Wheel Energy-Absorbing (EA) Type Code

FORMAT: 2 column, numeric, beginning column 18

ELEMENT VALUES:
- 01 Non-EA wheel:= Code "not applicable" for Questions 12-14
- 02 EA wheel, type unspecified:
- __ Code actual value (see Reference Table of Compiled Steering Components for code applicable to the specific make, model, and model year)
- 90 Other:_____
- 95 Undetermined--no reference data: Code "unknown" for Questions 12 and 13
- 99 Unknown if EA wheel: Code "unknown" for Questions 12-14

SOURCE: Inspection
Compiled Reference Table
Reference Table - individual

REMARKS: While most wheels are designed to absorb some energy, certain wheels are specifically EA and replace the column EA capability. If the wheel is an energy-absorbing type, the column cannot be energy absorbing (under current vehicle design). If this variable is coded 02-95, then variable 17 " Steering Column Energy-Absorbing Device" must be coded 01.

Code the wheel EA type. Check the wheel visually and compare the wheel EA type with the type given in the Compiled Reference Table. Insert the correct value.

If code 95 is indicated in the Compiled Reference Table, visually inspect the wheel energy-absorbing system to attempt to correctly identify the wheel EA type.

Additional coding instructions are given for subsequent questions, based on the response to this item.

VARIABLE GROUP: Steering Wheel: Damage

VARIABLE NAME: 12. Wheel Original Dimension

FORMAT: 3 columns, numeric, beginning column 20

ELEMENT VALUES: __ __.__ (tenths of inches): Code actual value from Table of Compiled Steering Components

998 Not applicable

999 Unknown

SOURCE: Compiled Reference Table
Reference Table - individual

REMARKS: If the wheel was coded as an EA type on the previous variable (11), refer to the Compiled Reference Table to obtain the correct EA dimension value and to note the reference points for measurement.

If the value recorded for variable 11 was 01, code this variable 998.

If the value recorded for variable 11 was 02, 95, 99, code this variable 999.

VARIABLE GROUP: Steering Wheel: Damage

VARIABLE NAME: 13. Wheel Compressed Dimension

FORMAT: 3 columns, numeric, beginning column 23

ELEMENT VALUES: __ __.__ (tenths of inches): Code actual measured value
998 Not applicable
999 Unknown

SOURCE: Inspection only

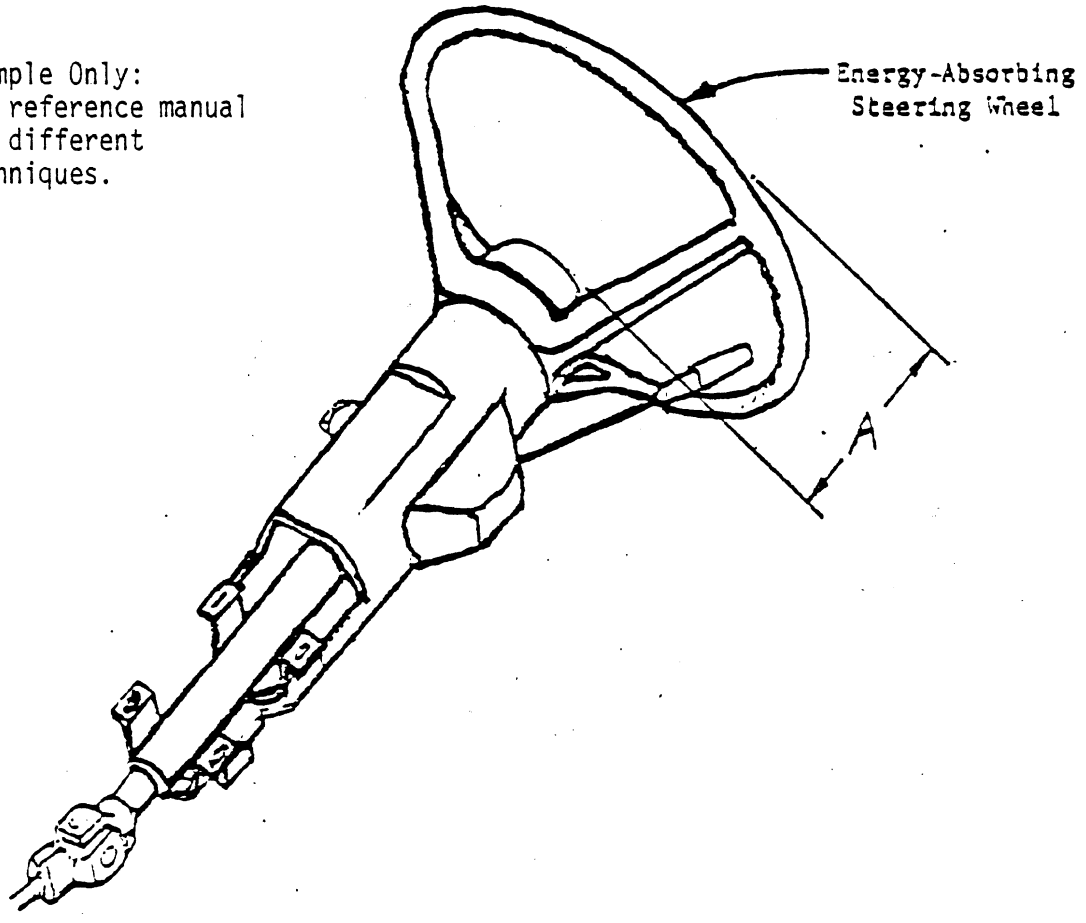
REMARKS: An example of an EA type wheel is shown below. The figure describes the measurement needed to obtain damage dimension. The original dimension is measured in the same manner.

If the value recorded for variable 11 was 01, code this variable 998.

If the value recorded for variable 11 was 02, 95, 99, code this variable 999.

ENERGY-ABSORBING STEERING WHEEL MEASUREMENT

Example Only:
See reference manual
for different
techniques.



VARIABLE GROUP: Steering Wheel: Damage

VARIABLE NAME: 14. Wheel Compression Value

FORMAT: 2 columns, numeric, beginning column 26

ELEMENT VALUES: Calculated Value Code

__ __ inches: Subtract the Quest-on 13 value from the Question 12 value and record the difference

00 No Movement, compression, or collapse

Observed Value Code (cannot be measured):

80 Apparent movement, value undetermined

Estimated Movement:

81 Less than 1 inch
82 Between 1 and 2 inches
84 Between 2 and 4 inches
86 Between 4 and 6 inches
88 Between 6 and 8 inches
90 Greater than 8 inches

Other Codes:

98 Not applicable
99 Unknown

SOURCE: Calculation
Inspection

REMARKS: The value for compression for the wheel EA device can be determined by subtracting the measured dimension from the original dimension. This value (rounded off to whole inches)* is the distance the wheel rim moved during energy dissipation.

When variable 11 is coded 01, the correct entry here is 98.

When the entry to variable 11 is 02 or 95, then the correct response to this variable is either code 99 (unknown) or one of the Observed Value Codes.

*Rules for rounding off values: When the calculated value is 1" or less but greater than zero - the rounded off value should be recorded as 1". For fractional values greater than 1", use the conventional round off procedure: i.e., for fractions of .01 to .49, round off to lower whole value; for fractions of .50 to .99, round off to higher whole value.

Continued

The value for the Wheel Compression cannot be greater than the value for the original EA dimension. Once the rim has been distorted past the plane of the hub, the EA capabilities of the wheel have largely been dissipated as the rigid hub becomes exposed to the occupant. The maximum value that this variable can attain is equal to the value of the original dimension (variable 12).

Observed Value Codes:

While an original dimension may be unknown (and hence a calculation not possible), it may still be possible to observe and quantify the extent of the movement or displacement of the device. The Observed Value Codes are to be used whenever direct measurement is impractical or impossible but where the movement can be observed and estimated--either by eye or through the use of some other means or reference. For example: While reference information is unavailable, the investigator may be able to see movement (by comparison to an identical model nearby or through personal knowledge or past observations) and thus estimate the magnitude of the movement.

Code 80 is used to denote that movement exists but it cannot be quantified further.

Codes 81, 82, 84, 86, 88, and 90 describe value steps of estimated movement. The boundaries are not exact, as these are indeed estimates. Best judgment should be used in assigning a category.

Code 00 is valid in this scheme, since it may be determined that probably no movement occurred--although it cannot be verified by measurement.

The use of the Observed Value Codes is preferable to 99 "unknown" because the codes do convey some information on displacement.

VARIABLE GROUP: Steering Wheel: Damage

VARIABLE NAME: 15. Rim Distortion

FORMAT: 1 column, numeric, beginning column 28

ELEMENT VALUES:
1 No distortion
2 Minor bending--less than 1 inch
3 Severe bending--greater than 1 inch
4 Broken (i.e., separated)
9 Unknown distortion

SOURCE: Inspection only

REMARKS: Place a flat object such as a clipboard across the rim and look to see if any distortion is present. If distortion is present, quantify the magnitude. A precise measurement is not needed (and probably cannot be obtained anyway). Breakage of the wheel rim means a complete severance of the rim at one or more points. Separation of the spoke from the rim is coded under variable 16. Spoke Distortion. A fracture, cracking, or breaking of the plastic or wood material does not qualify unless there is complete separation.

VARIABLE GROUP: Steering Wheel: Damage

VARIABLE NAME: 16. Spoke Distortion

FORMAT: 1 column, numeric, beginning column 29

ELEMENT VALUES:
1 No distortion
2 Minor bending--less than 1 inch
3 Severe bending--greater than 1 inch
4 Broken (i.e., separated)
9 Unknown distortion

SOURCE: Inspection only

REMARKS: By observation and comparison, note whether the spokes of the wheel appear to be deformed. If distortion or deformation is noted, quantify the magnitude. Breakage of the spoke means a complete severance of the spoke, anywhere along its length or at its attachment with the wheel hub, rim, or both. A fracture, cracking, or breaking of the plastic or wood material does not qualify unless there is complete separation.

VARIABLE GROUP: Steering Column: Device

VARIABLE NAME: 17. Energy-Absorbing Device Type

FORMAT: 2 columns, numeric, beginning column 30

ELEMENT VALUES:
- 00 Non-EA column: Code "not applicable for Questions 19-21"
- 02 EA column type unspecified:
- __ Code actual value. (See Table of Compiled Steering Components for code applicable to your specific make, model, and model year. Also, see those listed on reverse side.)
- 90 Other (sketch on reverse side):_____
- 95 Undetermined--no reference data: Code "unknown" for Questions 19 and 20. Complete Question 21.
- 99 Unknown if EA column: Code "unknown" for Questions 19-21.

SOURCE: Inspection
Compiled Reference Table
Reference Table - individual

REMARKS: Code the type of steering column energy-absorbing device. Check the column visually and compare the column EA device type with the type given in the Compiled Reference Table. Insert the correct value. Subtle differences exist between some columns. Check carefully.

If code 95 is indicated in the Compiled Reference Table, visually inspect the column energy-absorbing system to correctly identify the column EA device type. It is usual for a manufacturer to place the same column in each vehicle of the same make/model/body style. While variations do exist (Air Cushion Restraints, etc.) this uniformity can be put to advantage in correctly identifying the column.

Additional coding instructions are given for subsequent questions based on the response to this item.

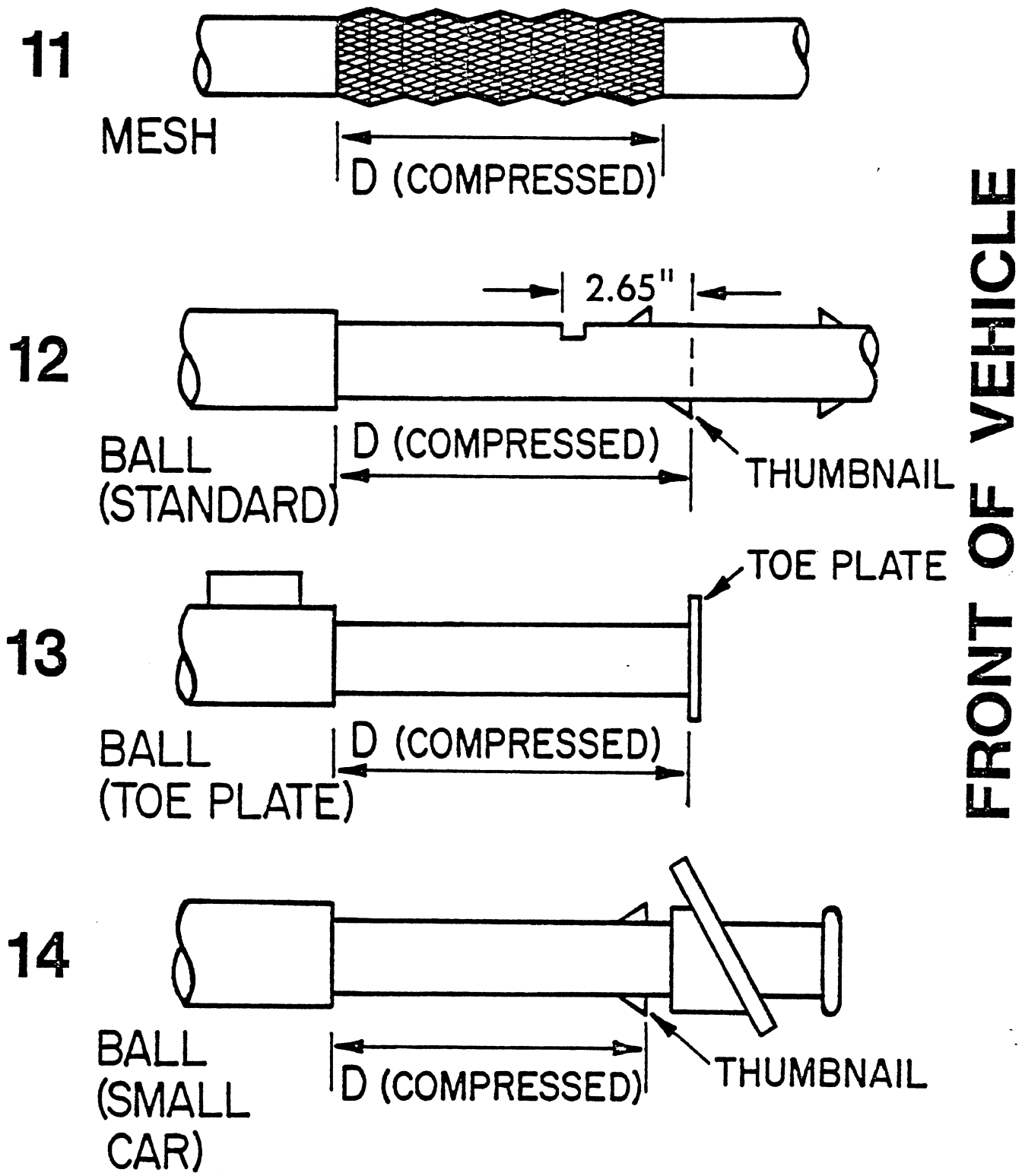
If the vehicle is equipped with an energy-absorbing steering column, the steering wheel cannot be energy absorbing (under current vehicle design). If this variable is coded 02-95, then variable 11 "(steering) wheel energy-absorbing (EA) type code" must be coded 01.

Note: Steering column energy absorbing devices were manditated beginning January 1, 1968 for passenger vehicles. Some manufacturers began installing these devices on certain models in the model year prior to 1968. Application to other vehicle classes has occurred at various other times.

Continued

STEERING COLUMN ENERGY-ABSORBING DEVICES

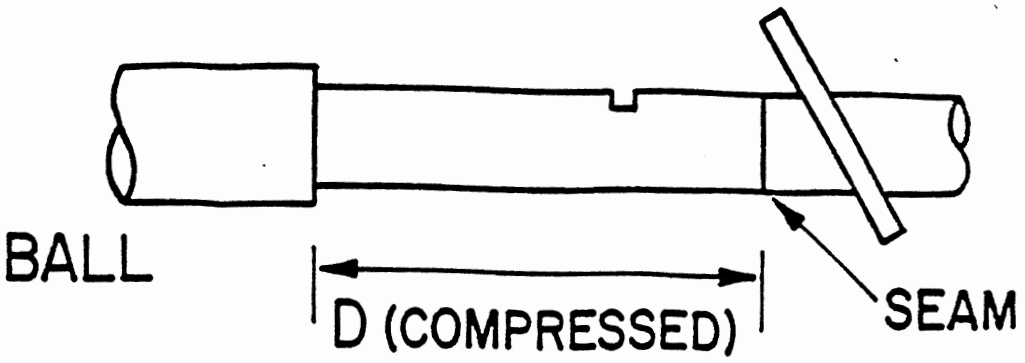
GM Type*



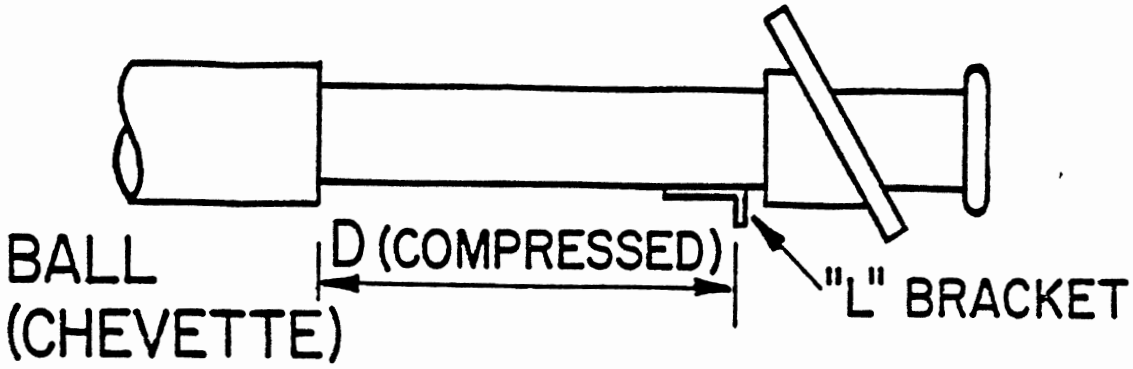
*These may appear on vehicles of other than GM manufacture.

GM Continued

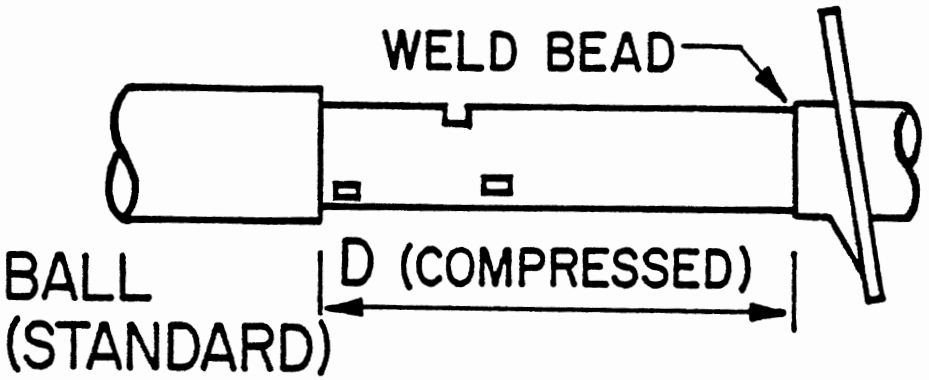
15



16

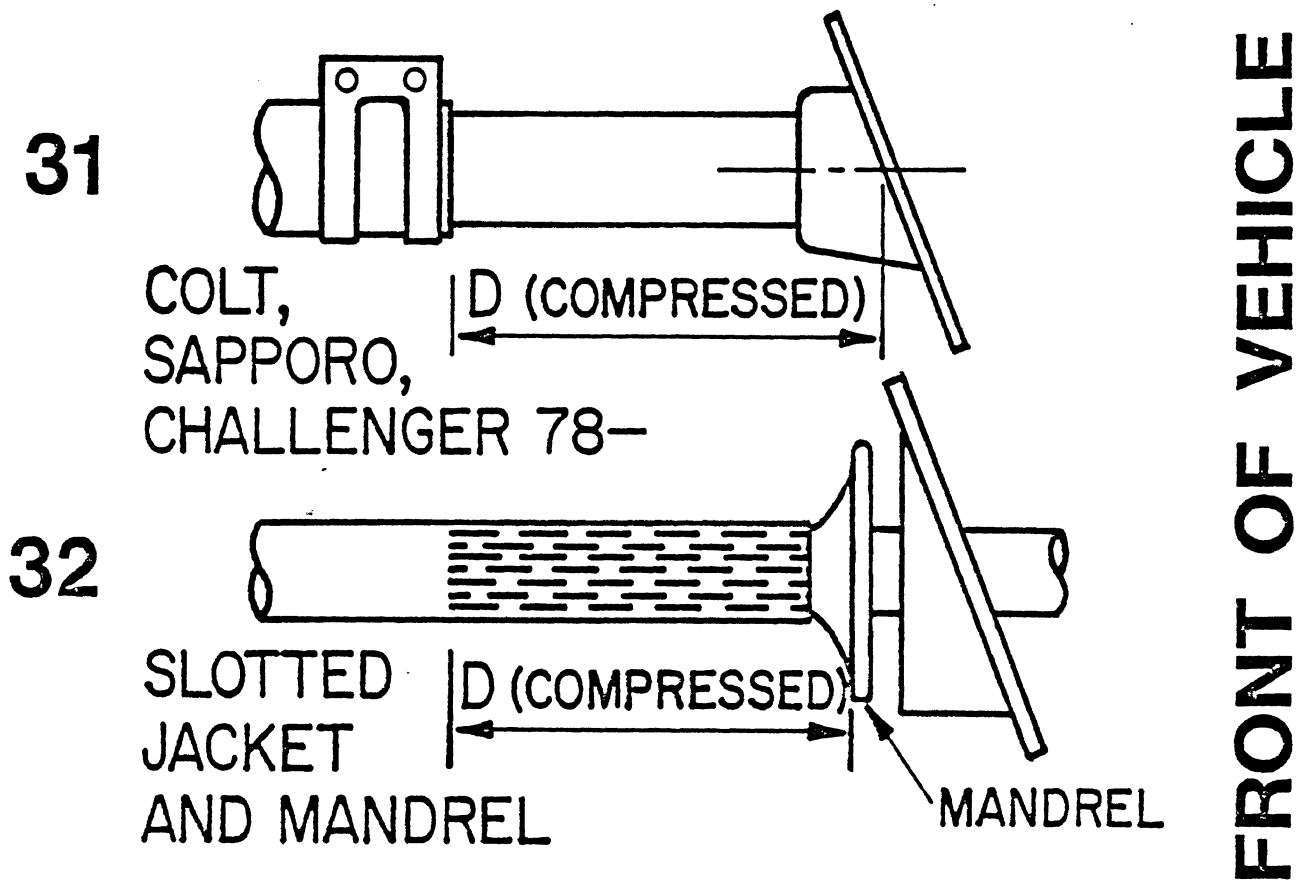


17



Continued

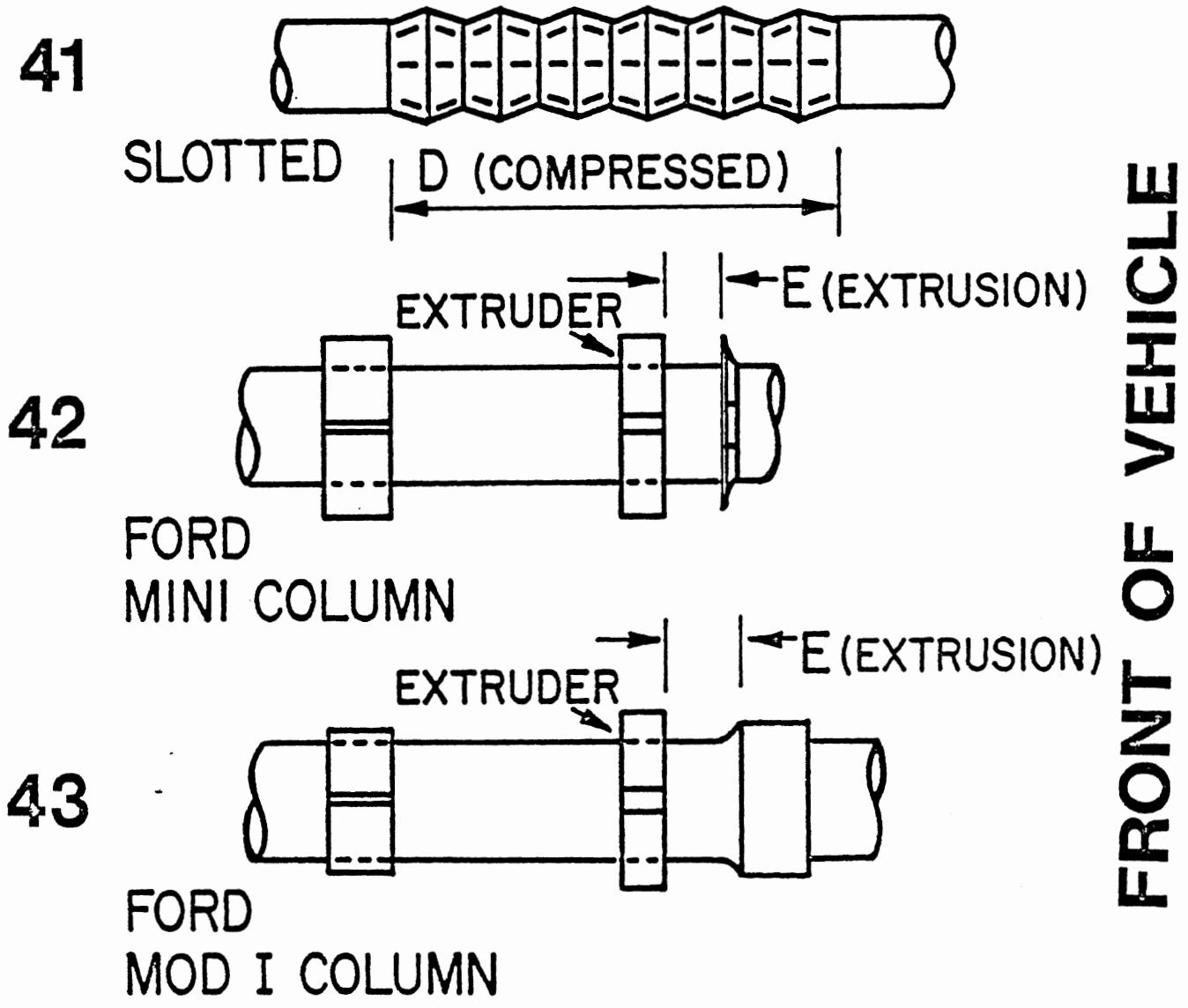
Chrysler Type*



*These may appear on vehicles of other than Chrysler manufacture.

Continued

Ford Type*



*These may appear on vehicles of other than Ford manufacture.

VARIABLE GROUP: Steering Column: Device

VARIABLE NAME: 18. Mounting Method

FORMAT: 1 column, numeric, beginning column 32

ELEMENT VALUES: 0 Undetermined--no reference data

Rigid to Instrument Panel:

1 Rigid at toe pan/lower firewall

2 Lower bracket (attachment)

3 No lower attachment

Shear Module at Instrument Panel:

4 Rigid at toe pan/lower firewall

5 Lower bracket (attachment)

6 No lower attachment

7 Bracket

8 Other:_____

9 Unknown method

SOURCE: Inspection
Compiled Reference Table
Reference Table - individual

REMARKS: Each steering column is mounted to its foundation by one of several methods. Check the mounting method visually and compare the mounting method with the method given in the Compiled Reference Table. Insert the correct value. Note: The mounting method may be obscured by trim or other components. Careful investigation (by using mirrors, etc.), should be utilized to uncover the mounting method. It is usual for a manufacturer to use the same mounting method in each vehicle of the same make/model/body style. While variations do exist (Air Cushion Restraints, etc.) this make-model uniformity can be put to advantage in correctly identifying the correct mounting method.

If code 0 is indicated in the Compiled Reference Table, visually inspect the mounting to correctly identify the mounting method. If variable 17 was coded 01, 95 or 99, code 9 (unknown) for this variable.

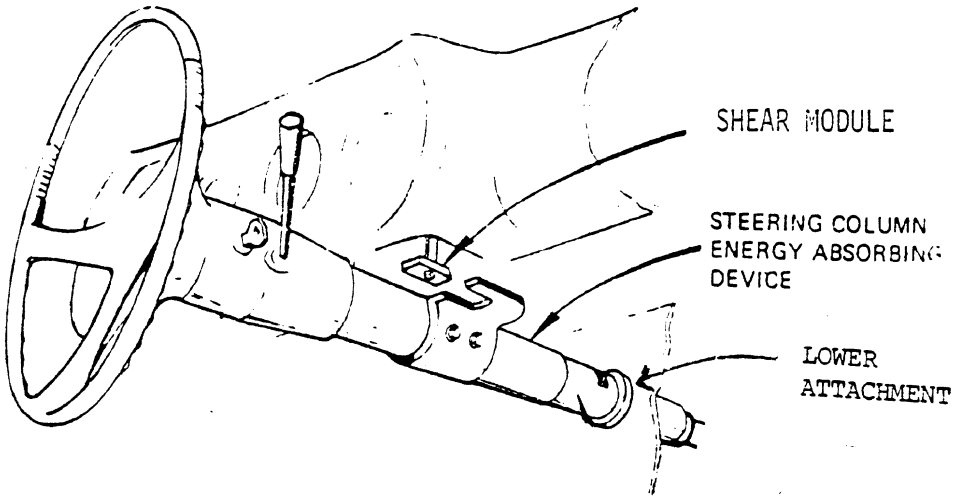
Continued

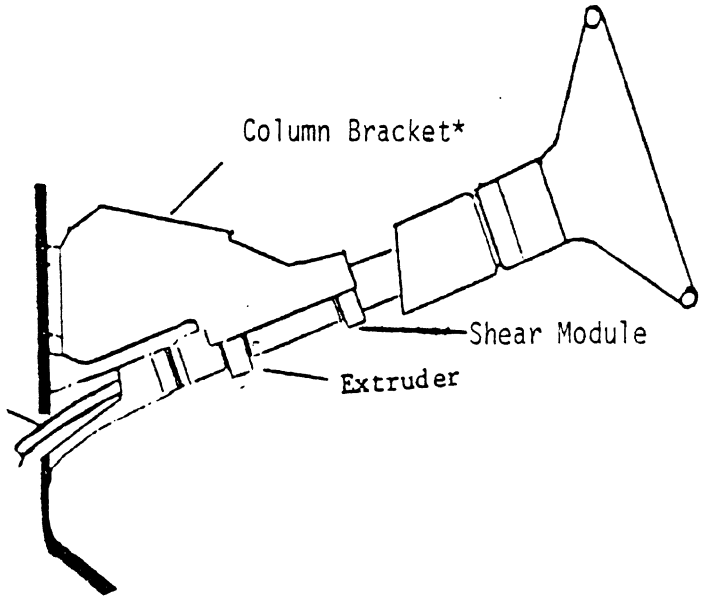
Steering Column Mounting Methods.

Steering columns use either: (1) a shear module, lower mounting; (2) a bracket with which to secure the column in the vehicle; or (3) a rigid connection to the instrument panel. Each mounting method is illustrated and discussed.

1. Shear Module System

The column is attached at its upper end (steering wheel end) by means of a slip joint mount attached to the column and foundation (instrument panel, etc.). The lower end may or may not be secured (mounted or bolted) to the toe pan/dash area or a lower attachment (bracket). This lower attachment may be in the form of a plate, bracket, or other attachment device. The lower bracket attachment is not to be confused with the BRACKET MOUNT which is the sole support for the column and described in part 2 of this variable description.





*Not to be confused with a lower bracket in the shear module system.

The bracket is attached to various portions of the vehicle structure as necessary to accommodate various vehicle designs.

Photo 5 shows typical bracket installation.

3. Rigid Connection

When the steering system uses an energy absorbing steering wheel instead of an energy absorbing column, it is only necessary to fasten the column to the instrument panel. This is accomplished by bolting a bracket to the panel. There is no movement allowed in this type of mount.

Photos 1 and 2 show typical shear module attachments.

Photos 3 and 4 show typical lower attachments methods.

Upon axial loading of the steering wheel/steering column, the shear module allows the column to compress since the shear module is a slip joint. The lower attachment offers resistance to the lower column movement and the energy-absorbing device collapses.

2. Bracket Mount System

The column is held in two places by a bracket (column support) which is attached to the vehicle. The bracket consists of a lower extruder and an upper shear module. In this system, the shear modul does not separate, but serves as a guide for the column when it compresses.

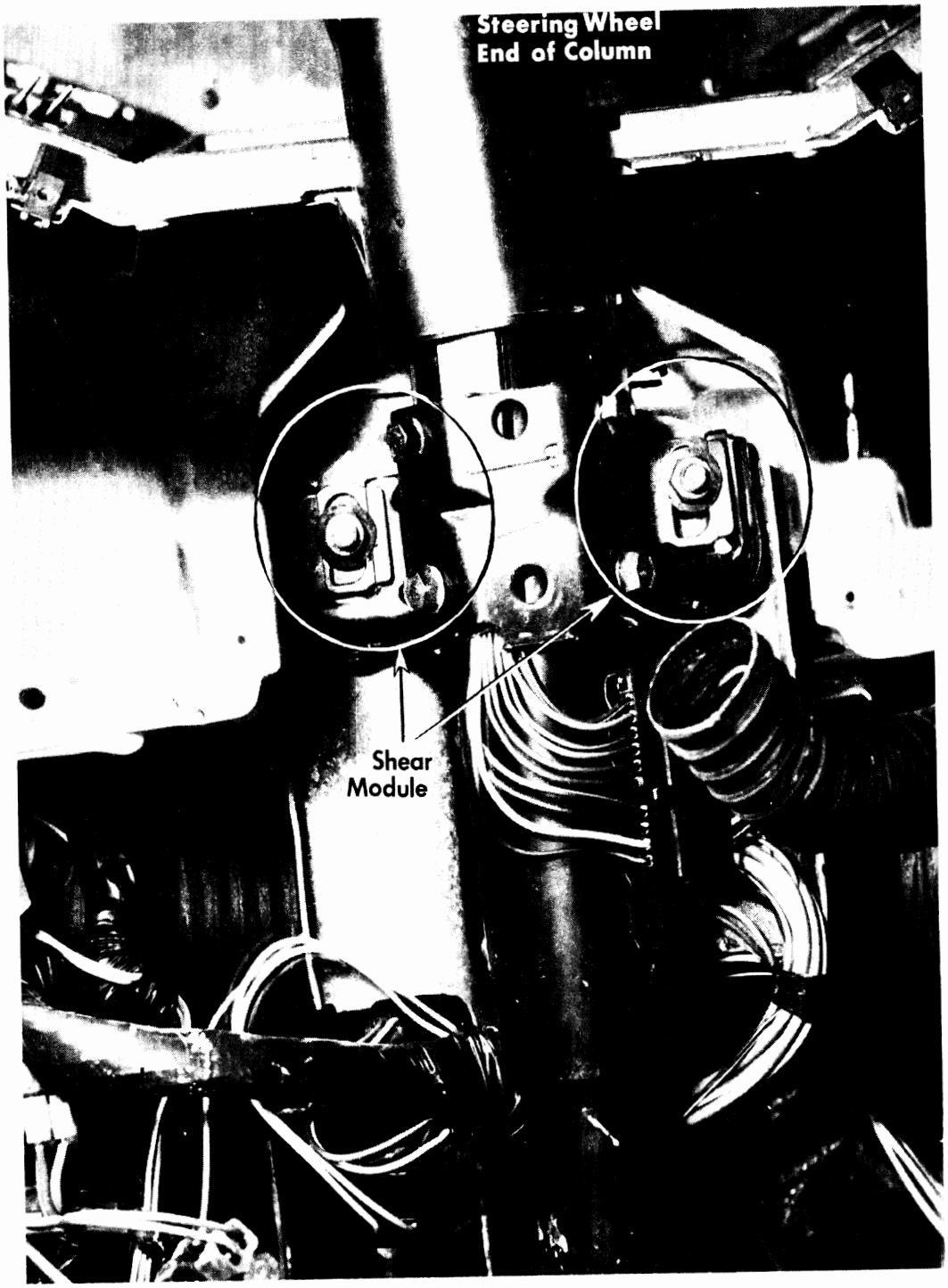


Photo 1. Two-Unit Shear Module (GM)

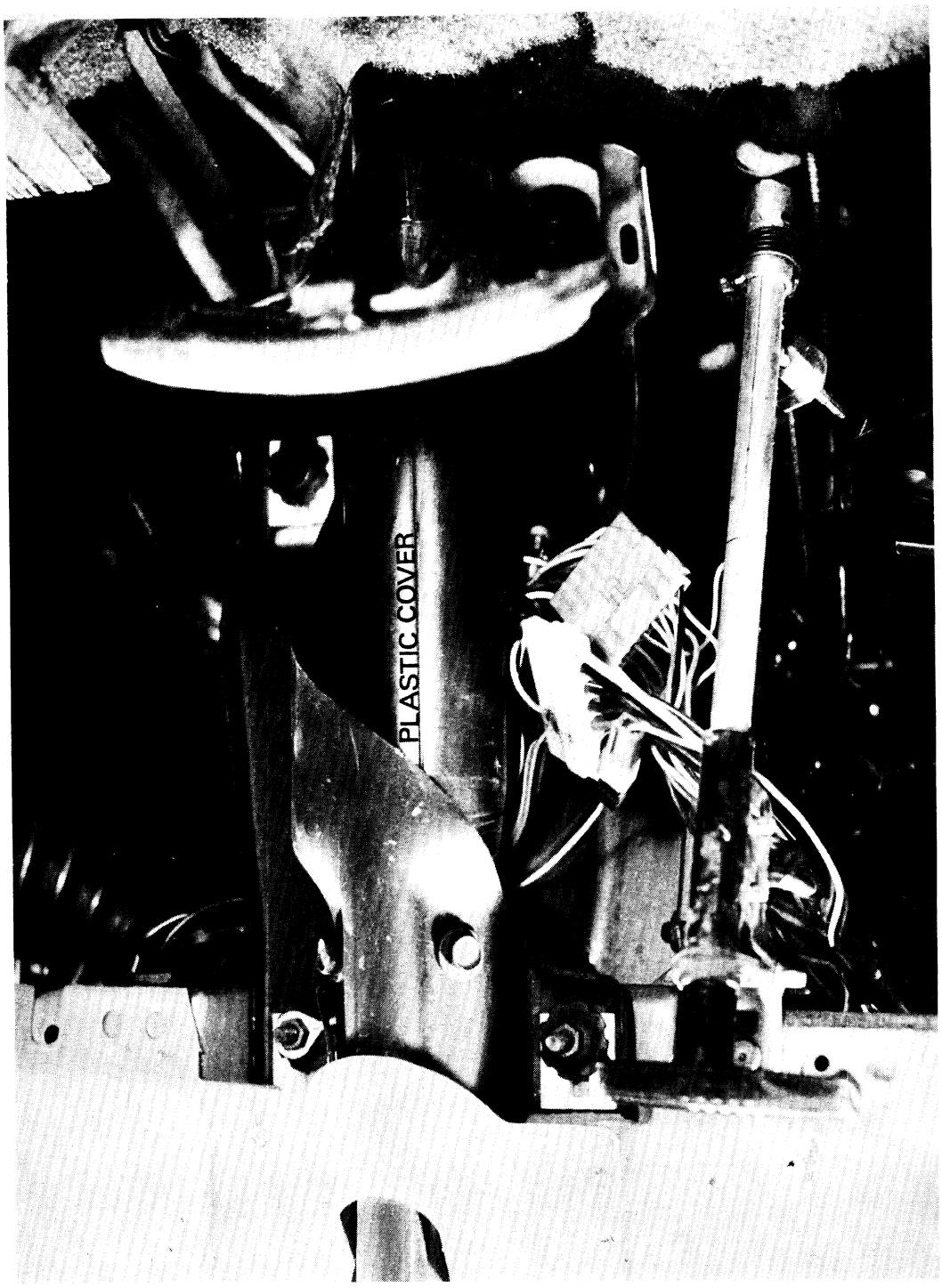


Photo 2. Three-Unit Shear Module (Chrysler)

Photo 3. Lower Attachment--Bolted to Firewall

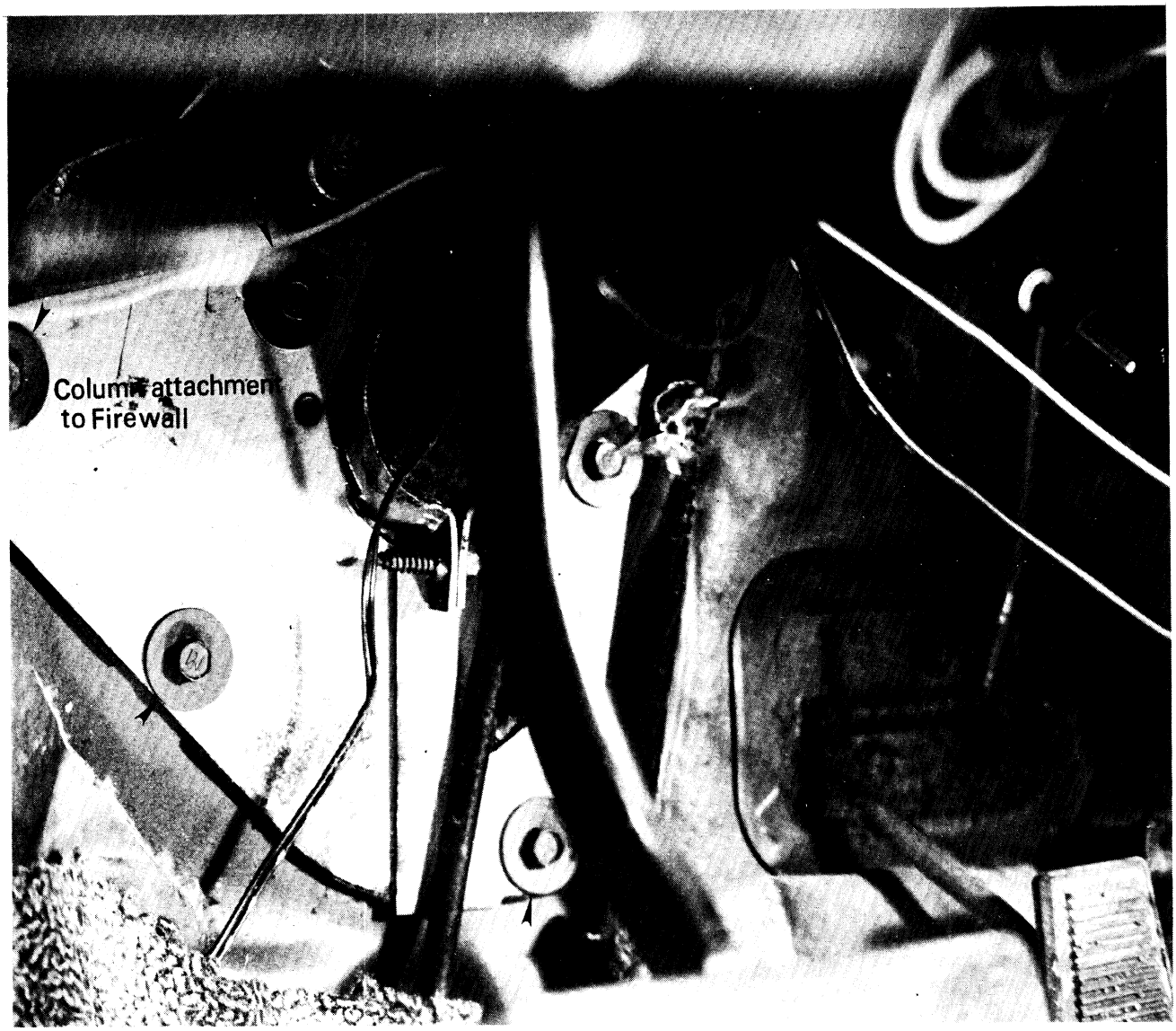
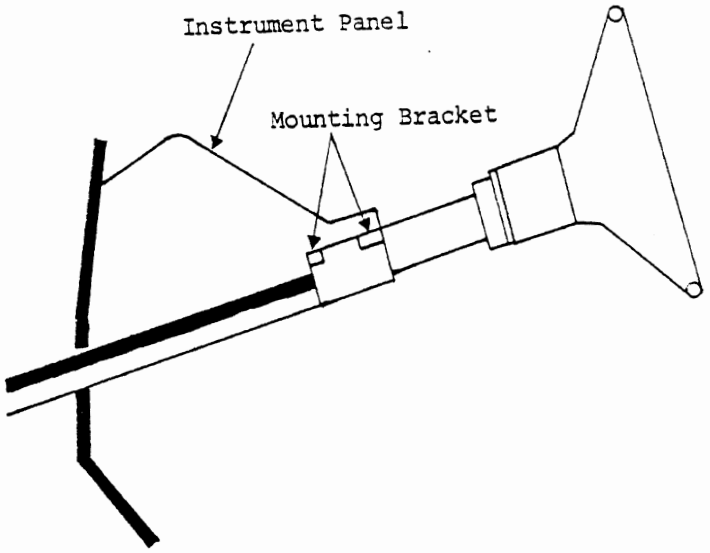


Photo 4. Lower Attachment--Strap and Plate



Rigid Mounting to the Instrument Panel. An alternate method includes the use of a lower bracket (not illustrated).

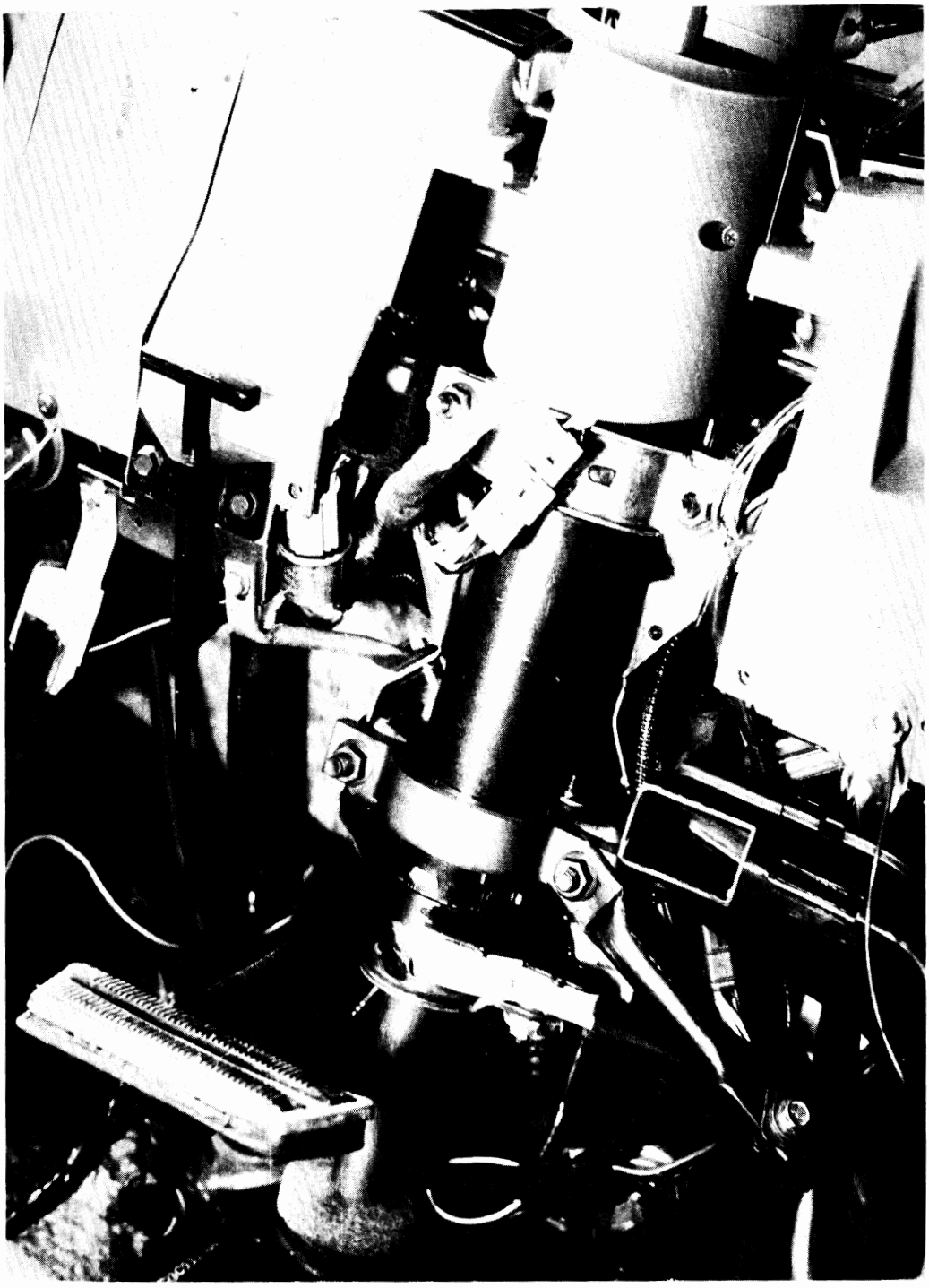


Photo 5. Typical Steering Column Bracket

VARIABLE GROUP: Steering Column: Compression

VARIABLE NAME: 19. Device Original Dimension

FORMAT: 3 columns, numeric, beginning column 33

ELEMENT VALUES: __ __.__ (tenths of inches): Code actual value from Table of Compiled Steering Components

998 Not applicable

999 Unknown

SOURCE: Compiled Reference Table

Reference Table - individual

REMARKS: If the column was coded as an EA type on variable 17, refer to the Compiled Reference Table to obtain the correct EA dimension value and to note the reference points for measurement.

If the value recorded for variable 17 was 01, code this variable 998.

If the value recorded for variable 17 was 02, 95, 99, code this variable 999.

VARIABLE GROUP: Steering Column: Compression

VARIABLE NAME: 20. Device Compression Value

FORMAT: 3 columns, numeric, beginning column 36

ELEMENT VALUES: __ __.__(tenths of inches): Code actual measured value
998 Not applicable
999 Unknown

SOURCE: Inspection only

REMARKS: Refer to the individual column type codes for how to measure (see variable 17). Measure and record the value for compression in using the same technique as for the original dimension value.

If the value recorded for variable 17 was 01, code this variable 998.

If the value recorded for variable 17 was 02, 95, 99, code this variable 999.

VARIABLE GROUP: Steering Column: Compression

VARIABLE NAME: 21. Device Compression Value

FORMAT: 2 columns, numeric, beginning column 39

ELEMENT VALUES: Calculated Value Code

__(inches): Subtract the Question 20 value from the Question 19 value and record the difference*

00 No movement, compression, or collapse

Observed Value Code (cannot be measured):

80 Apparent movement, value undetermined

Estimated Movement:

81 Less than 1 inch
82 Between 1 and 2 inches
84 Between 2 and 4 inches
86 Between 4 and 6 inches
88 Between 6 and 8 inches
90 Greater than 8 inches

Other Codes:

98 Not applicable, not measurable
99 Unknown

SOURCE: Calculation
Inspection

REMARKS: The value for compression for the column EA device can be determined by subtracting the measured dimension from the original dimension. This value (rounded off to whole inches)* is the distance the column moved during energy dissipation. Care should be exercised in measuring columns which do not appear to have moved. Manufacturing tolerances in certain columns can be substantial (1/8" for example) and could be mistaken for movement. Judgment and corollary data should be considered in determining whether such movement is real or an artifact of measurement.

When variable 11 is coded 01, the correct entry here is 98.

When the entry for variable 11 is 02 or 95, the correct response to this variable is either code 99 (unknown) or one of the Observed Value Codes.

*Rules for rounding off values: When the calculated value is 1" or less but greater than zero, the rounded off value should be recorded as 1". For fractional values greater than 1", use the conventional round off procedure: i.e., for fractions of .01 to .49, round off to lower whole value; for fractions of .50 to .99, round off to higher whole value.

Continued

Observed Value Codes:

While an original dimension may be unknown (and hence a calculation not possible) it may still be possible to observe and quantify the extent of the movement or displacement of the device. Hence the Observed Value Codes.

The Observed Value Codes are to be used whenever direct measurement is impractical or impossible but where the movement can be observed and estimated--either by eye or through the use of some other means or reference. For example: While reference information is unavailable, the investigator may be able to see movement (by comparison to an identical model nearby or through personal knowledge or past observations) and thus estimate the magnitude of the movement.

Codes 81, 82, 84, 86, 88, and 90 describe value steps of estimated movement. The boundaries are not exact because these are indeed estimates. Best judgment should be used in assigning a category.

Code 00 is valid in this scheme, since it may be determined that probably no movement exists--although it cannot be verified by measurement.

The use of the Observed Value Codes is preferable to 99 "unknown" because the codes do convey some information on displacement.

VARIABLE GROUP: Steering Column: Compression

VARIABLE NAME: 22. Shear Module: Type of Movement

FORMAT: 1 column, numeric, beginning column 41

ELEMENT VALUES:
1 No movement
2 Displacement only
3 Displacement and separation
4 Not designed to indicate movement
8 Not applicable or no shear module
9 Unknown movement

SOURCE: Inspection only

REMARKS: This variable and the next (variable 22) together describe the shear module movement. This variable describes the type of movement--whether displacement or displacement and separation--when the vehicle is equipped with a shear module mounting system. Refer to variable 18 to determine the applicability of this variable.

If variable 18 is coded 4-6, code this variable 1-3, or 9.

If variable 18 is coded 1-3, code this variable 8.

If variable 18 is coded 7, code this variable 4 or 8.

If variable 18 is coded 0, it may still be possible to determine the direction of movement--by observation.

Displacement means movement from the original position.

Separation means that the column has displaced to such an extent that it has disengaged from its mounting.

VARIABLE GROUP: Steering Column: Compression

VARIABLE NAME: 23. Shear Module: Measured Movement

FORMAT: 2 columns, numeric, beginning column 42

ELEMENT VALUES: Calculated Value Code

__ __(inches): Code actual measured movement. See coding manual for measurement technique(s).*

00 No movement, compression, or collapse

Observed Value Code (cannot be measured):

80 Apparent movement, value undetermined

Estimated Movement:

81 Less than 1 inch
82 Between 1 and 2 inches
84 Between 2 and 4 inches
86 Between 4 and 6 inches
88 Between 6 and 8 inches
90 Greater than 8 inches

Other Codes:

98 Not applicable, not measurable
99 Unknown

SOURCE: Inspection

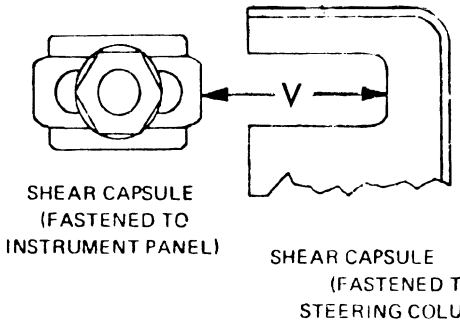
REMARKS: The value of movement for the shear module is determined by measuring the movement within the device. The original dimension is zero (see diagram). Thus the measured dimension becomes the value (rounded to the nearest inch).*

When variable 22 is coded 1-3, a value must be recorded here. Code 1 on variable 22 must be coded 00 on this variable. Code 2 or 3 or variable 22 must have a value recorded here of greater than zero. Codes 4 or 8 on variable 22 are coded as 98 here.

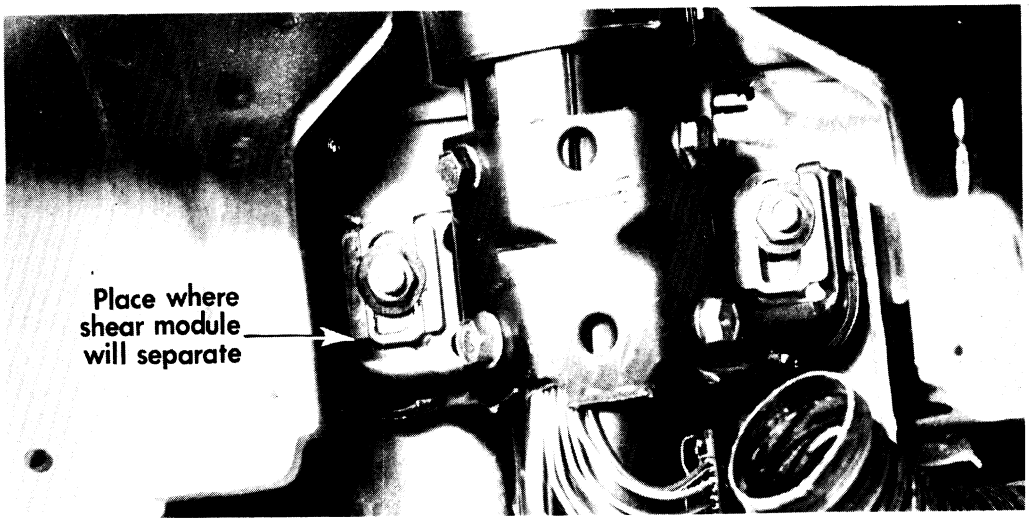
If the shear capsule has separated, hold the column up into its original position and measure the distance the shear module moved. It may be necessary to have assistance to return the column to its original axis.

*Rules for rounding off values: When the calculated value is 1" or less, the rounded off value should be recorded as 1". For fractional values greater than 1", use the conventional round off procedure: i.e., for fractions of .01 to .49, round off to lower whole value; for fractions of .50 to .99, round off to higher whole value.

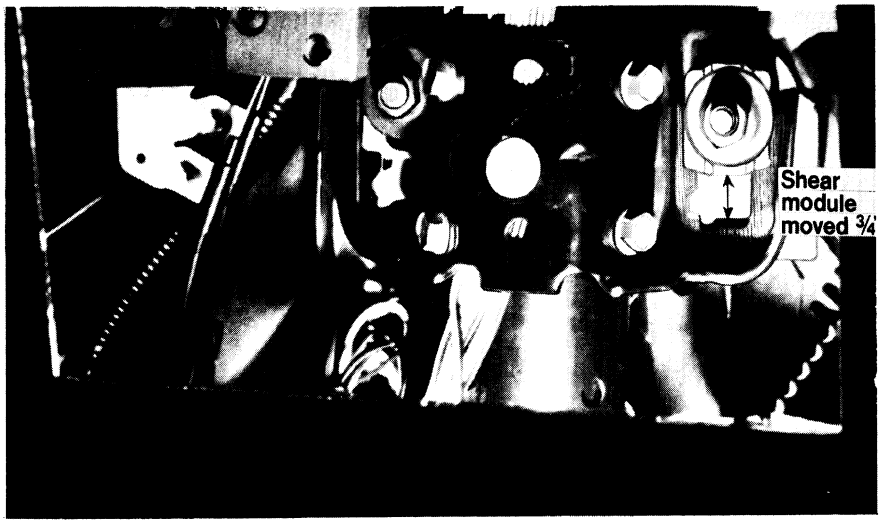
Continued



The following photographs illustrate a shear module before and after movement. The point of movement is indicated, showing a movement of 3/4 of an inch.



Shear Module Before Separation



Shear Module After Separation

Continued

Observed Value Codes:

The Observed Value Codes are to be used whenever direct measurement is impractical or impossible but where the movement can be observed and estimated--either by eye or through the use of some other means or reference. For example: While reference information is unavailable, the investigator may be able to see movement (by comparison to an identical model nearby or through personal knowledge or past observations) and thus estimate the magnitude of the movement.

Code 80 is used to denote that movement exists but it cannot be quantified further.

Codes 81, 82, 84, 86, 88, and 90 describe value steps of estimated movement. The boundaries are not exact because they are indeed estimates. Best judgment should be used in assigning a category.

Code 00 is valid in this scheme, since it may be determined that probably no movement exists--although it cannot be verified by measurement.

The use of the Observed Value Codes is preferable to 99 "unknown" because the codes do convey some information on displacement.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 24. AC Original Dimension

FORMAT: 3 columns, numeric, beginning column 44

ELEMENT VALUES: ___(inches): Code actual value from Table of Compiled Steering Components

995 Undetermined--no reference data: Complete Question 25 if possible; otherwise code "not applicable." Complete Question 27.

998 Not applicable: Code "not applicable" for Questions 25 and 27.

999 Unknown, not measurable: Code "unknown" for Questions 25 and 27.

SOURCE: Compiled Reference Table
Reference Table - individual

REMARKS: Refer to the Compiled Reference Table to obtain the correct AC original dimension.

If the reference table code is 995, the AC original dimension cannot be determined from observation. However, attempt to measure the value for Question 25.

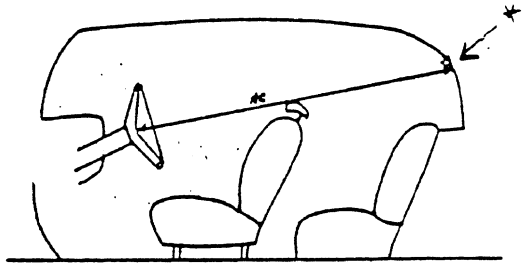
If the column is a telescoping column type (coded 1 on variable 8 "Telescoping Column Feature"), the AC measurement cannot be made; code 999.

If the column has a tilt column feature (coded 1 on variable 7 "Tilt Column Feature"), place the column in the middle position before measuring. If the column cannot be returned to this position, the AC dimension cannot be properly ascertained.

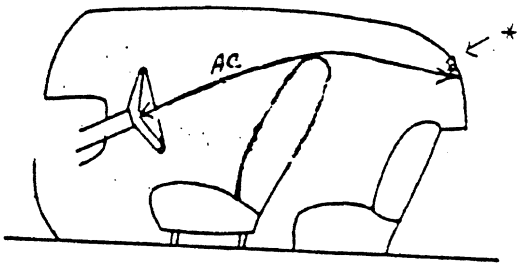
Continued

Ref. Table 7 -- AC Dimension Reference Points

1. Back light glass header - Straight line from wheel hub to reference point (If adjustable head rest, measurement is with headrest down.)



2. Back light glass header - Curved line over seat back from wheel hub to reference point (High back seats, tape measure should rest on top of seat back)



3. Intermediate reference point -- See note in Reference Table 1

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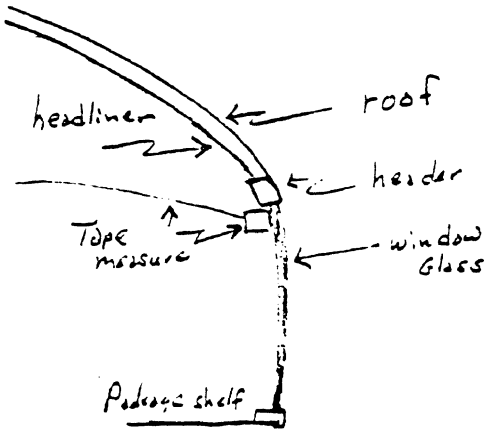
*Back light header detail



VARIABLE GROUP: Column Displacement

VARIABLE NAME: 25. AC Measured Dimension

FORMAT: 3 columns, numeric, beginning column 47

ELEMENT VALUES: ___(inches): Code measured value.
998 Not applicable
999 Unknown

SOURCE: Inspection only

REMARKS: Refer to variable 24 for how to measure. Measure and record the value for the AC dimension using the same technique as for the original dimension value.

If the value recorded for variable 24 was 995, attempt to measure the AC dimension. Use the back glass as a reference point and note both the method used and the lack of reference data (see Question 24). If measurement is impossible, then code 998. It is possible to recover the original dimension later if needed (or when it becomes available) and hence documentation of the value and method of measurement is useful. Make a marginal notation on the data form for later use. If the value recorded for variable 24 was 998, code this variable 998.

If the value recorded for variable 24 was 999, code this variable 999.

Note: If the column has separated from its mounting and is not in the normal axial plane (i.e., column is lying on the seat) and cannot be returned to position for measurement, code 999.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 26. Direction of Axial Movement

FORMAT: 1 column, numeric, beginning column 50

ELEMENT VALUES:
1 No displacement
2 Compression (measured dimension greater than original)
3 Intrusion (measured dimension less than original)
4 Displacement, unknown direction
9 Unknown (NOTE: Includes loose column through mounting separation.)

SOURCE: Inspection

REMARKS: Based on the results of the calculation to obtain a value for variable 27, note whether the value for displacement indicates compression or intrusion.

If there was no displacement (code 00 on variable 27) then the correct response here is 1.

Code 9 denotes either unknown displacement, or displacement which cannot be measured because the column has separated from its mounting and is out of place (lying on the seat).

Technically, the calculations should be used to determine the direction (and magnitude) of movement. When such calculations are impossible, the usual procedure would be to code this variable "unknown" (code 9). However, there may be certain instances where measurement and calculation are impossible, but the correct response (here) is obvious. If so, then code accordingly.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 27. AC Axial Movement

FORMAT: 3 columns, numeric, beginning column 51

ELEMENT VALUES: Calculated Value Code

__ __(inches): Subtract the Question 25 value from the Question 24 value and record the difference*

000 No movement, compression, or collapse

Observed Value Code (cannot be measured):

980 Apparent movement, value undetermined

Estimated Movement:

981 Less than 1 inch
982 Between 1 and 2 inches
984 Between 2 and 4 inches
986 Between 4 and 6 inches
988 Between 6 and 8 inches
990 Greater than 8 inches

Other codes:

998 Not applicable, not measurable
999 Unknown

SOURCE: Calculation
Inspection

REMARKS: The value for the AC dimension axial movement can be determined by subtracting the measured dimension from the original dimension. This value is the distance the column moved during energy dissipation. The value obtained can be positive or negative, depending upon whether the column moved forward or rearward.

When variable 24 is coded 998 or 999, the correct entry here is either 998 or 999.

When the entry for variable 24 is 995, the correct response to this variable is either code 999 (unknown) or one of the Observed Value Codes.

Code 999 should be used when the column has separated from its mounting and is not in its normal axial plane. Code 980 is permissable ONLY when column movement is obvious. An accurate measurement cannot be obtained unless the column can be returned to its original position.

*Rules for rounding off values: When the calculated value is 1" or less but greater than zero, the rounded off value should be recorded as 1". For fractional values greater than 1", use the conventional round off procedure: i.e., for fractions of .01 to .49, round off to lower whole value; for fractions of .50 to .99, round off to higher whole value.

Continued

Observed Value Codes:

While an original dimension may be unknown (and hence a calculation not possible) it may still be possible to observe and quantify the extent of the movement or displacement of the device. Hence the Observed Value Codes.

The Observed Value Codes are to be used whenever direct measurement is impractical or impossible but where the movement can be observed and estimated--either by eye or through the use of some other means or reference. For example: While reference information is unavailable, the investigator may be able to see movement (by comparison to an identical model nearby or through personal knowledge or past observations) and thus estimate the magnitude of the movement.

Code 980 is used to denote that movement exists but it cannot be quantified further.

Code 981, 982, 984, 986, 988, and 990 describes value steps of estimated movement. The boundaries are not exact because they are indeed estimates. Best judgment should be used in assigning a category.

Code 000 is valid in this scheme, since it may be determined that probably no movement exists--although it cannot be verifed by measurement.

The use of the Observed Value Codes is preferable to 999 "unknown" because the codes do convey some information on movement.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 28. Lateral (↔) Column Displacement: Direction

FORMAT: 1 column, numeric, beginning column 54

ELEMENT VALUES:
1 No displacement
2 Right
3 Left
4 Displacement, unknown direction
9 Unknown (NOTE: Includes loose column through mounting separation.)

SOURCE: Inspection only

REMARKS: The lateral steering column displacement is determined by observing the steering wheel end of the column relative to its end near the firewall (or at some intermediate point) and noting if the wheel end of the column has moved left or right. If the mounting has separated, the lateral displacement cannot be accurately determined, hence code 9.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 29. Lateral (↔) Column Displacement: Magnitude

FORMAT: 1 column, numeric, beginning column 55

ELEMENT VALUES:

1	No apparent displacement	
2	Minor, $\leq$ 2 inches	Eyeball
3	Major, > 2 inches	Guestimate
9	Unknown	

SOURCE: Inspection only

REMARKS: The magnitude of the displacement is determined by observing the steering wheel end of the column relative to its end at the firewall (or some intermediate point) and estimating the amount of off-axis movement of the column.

If the mounting has separated, the magnitude of the lateral displacement cannot be accurately determined, hence code 9.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 30. Vertical (↕) Column Displacement: Direction

FORMAT: 1 column, numeric, beginning column 56

ELEMENT VALUES:
1 No displacement
2 Up
3 Down
4 Displacement, unknown direction
9 Unknown (NOTE: Includes loose column through mounting separation)

SOURCE: Inspection only

REMARKS: The vertical steering column displacement is determined by observing the steering wheel end of the column relative to its end near the firewall (or at some intermediate point) and noting if the wheel end of the column has moved up or down. If the mounting has separated, the vertical displacement cannot be accurately determined, hence code 9.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 31. Vertical (↕) Column Displacement: Magnitude

FORMAT: 1 column, numeric, beginning column 57

ELEMENT VALUES:

1	No apparent displacement	
2	Minor, ≤2 inches	Eyeball
3	Major, >2 inches	Guestimate
9	Unknown	

SOURCE: Inspection only

REMARKS: The magnitude of the displacement is determined by observing the steering wheel end of the column relative to its end near the firewall (or some intermediate point) and estimating the amount of off-axis movement of the column.

If the mounting has separated, the magnitude of the vertical displacement cannot be accurately determined, hence code 9.

VARIABLE GROUP: Column Displacement

VARIABLE NAME: 32. Column Mounting Damage **

FORMAT: 1 column, numeric, beginning column 58

ELEMENT VALUES:
1 No damage
2 Upper mounting assembly damaged or distorted*
3 Lower mounting assembly damaged or distorted*
4 Upper and lower mounting assembly damaged or distorted*
5 Bracket mounting assembly damaged or distorted*
6 Other mounting damage:_____
9 Unknown damage

SOURCE: Inspection only

REMARKS: The column mounting devices are those items or hardware attached to the column and used to attach the column to the foundation.

*Damage to the column mounting device occurs as a result of twisting, tearing, bending, distorting, etc., to the mounting assembly. This does not include shear capsule separation, unless by other than normal shear capsule movement.

**Refer to Question 18 for a discussion of column mounting. Codes 2, 3, and 4 are used with the shear module mounting system. Code 5 is used when a bracket mount is used.

VARIABLE GROUP: Foundation and Surrounding Structure Damage

VARIABLE NAME: 33. Toe Pan Area Damage Near Column

FORMAT: 2 columns, numeric, beginning column 59

ELEMENT VALUES:
01 None
02 Displaced or buckled rearward or into occupant space
03 Displaced or buckled forward or away from occupant space
98 Not applicable
99 Unknown if damaged

SOURCE: Inspection only

REMARKS: The foundation is the portion of the vehicle (instrument panel, toe pan, etc.) to which the steering column may be mounted.

The toe pan area near the column can be displaced forward or rearward, and may cause the EA device to compress or the column itself to move.

VARIABLE GROUP: Foundation and Surrounding Structure Damage

VARIABLE NAME: 34. Instrument Panel Vertical Rotation Near Column

FORMAT: 2 columns, numeric, beginning column 61

ELEMENT VALUES:
01 None
06 Rotated or displaced upwards
07 Rotated or displaced downwards
08 Combination of the above (specify):
98 Not applicable
99 Unknown if damaged

SOURCE: Inspection Only

REMARKS: The foundation is the portion of the vehicle (instrument panel, toe pan, etc.) to which the steering column may be mounted.

The steering column can be forced up or down due to a rotation about a lateral axis of the front of the instrument panel. This can also cause the shear capsules to separate (if so equipped).

VARIABLE GROUP: Foundation and Surrounding Structure Damage

VARIABLE NAME: 35. Instrument Panel Buckle Near Column

FORMAT: 2 columns, numeric, beginning column 63

ELEMENT VALUES:
01 None
02 Displaced or buckled rearward or into occupant space
03 Displaced or buckled forward or away from occupant space
04 Displaced left
05 Displaced right
08 Combination of above (specify):

_____

98 Not applicable
99 Unknown if damaged

SOURCE: Inspection only

REMARKS: The foundation is the portion of the vehicle (instrument panel, toe pan, etc.) to which the steering column is mounted.

Buckling of the instrument panel is caused by laterally applied side forces. This can cause the column to move sideways or up or down due to movement, compression, or buckling of the instrument panel.

11.0 FIELD DATA FORM

The field data form is reproduced here for reference purposes.

VARIABLE GROUP: Foundation and Surrounding Structure Damage

VARIABLE NAME: 36. Bracket Mount Surface or Device Damaged *

FORMAT: 2 column, numeric, beginning column 65

ELEMENT VALUES:
01 None
02 Displaced or buckled rearward or into occupant space
03 Displaced or buckled forward or away from occupant space
04 Displaced left
05 Displaced right
06 Rotated or displaced upwards
07 Rotated or displaced downwards
08 Combination of above (specify):

_____

98 Not applicable
99 Unknown if damaged

SOURCE: Inspection only

REMARKS: The foundation is the portion of the vehicle (instrument panel, toe pan, etc.) to which the steering column is mounted.

In some cases, a bracket may be used as a column mounting. This bracket may be attached to some structure other than the toe pan or instrument panel, i.e., the brake pedal mount. If a bracket mount is used, indicate which type of damage occurred to the mounting surface.

If a bracket mount is not used (i.e., shear capsule system used), code 98.

Questions 34 and 35 should be answered as the panel/toe pan movement can influence the bracket mount and column performance.

*See Questions 18 and 32 for a discussion of mounting methods.

NATIONAL ACCIDENT SAMPLING SYSTEM

SPECIAL STUDIES SUBSYSTEM

STEERING COLUMN FORM

1. Primary Sampling Unit Number ___ (1-2)

2. Case Number ___ (3-6)

3. Special Study Number 03 (7-8)

4. Record Number 3 (9)

5. Vehicle Number ___ (10-11)

STEERING SYSTEM OPTIONAL EQUIPMENT

6. Speed Control
(NOTE: Factory installed--not a dealer installed unit.)
___(1) Equipped
___(2) Not equipped
___(9) Unknown
(12)

7. Tilt Column Feature
___(1) Equipped
___(2) Not equipped
___(9) Unknown
(13)

8. Telescoping Column Feature
___(1) Equipped
___(2) Not equipped
___(9) Unknown
(14)

STEERING WHEEL: DEVICE

9. Wheel Configuration (Number of Spokes and Arrangement)
_____ -- Code actual value from those listed in the Table of Compiled Steering Components or from the reverse side.
___(95) Undetermined--no reference data
___(97) Other: Sketch configuration in the space provided on the reverse side
___(99) Unknown spokes and arrangement
(15-16)

10. Wheel Profile
___(1) Deep dish
___(2) Shallow dish
___(3) Flat
___(4) Other profile:
_____
___(5) Undetermined--no reference data
___(9) Unknown profile
(17)

STEERING COLUMN PERFORMANCE ASSESSMENT

When To Use This Form: Complete this form whenever this vehicle was a towaway and the initial crash event involved a frontal or side collision [i.e., exclude initial rear impacts (clock directions 04-08) and exclude rollovers].

Photographic Instructions: Take at least two photographs of the steering column wheel, Energy Absorbing (EA) Device, etc., so as to best depict the location and magnitude of the damage. Photograph the mounting and foundation also, if damaged.

Steering System Defined: That portion of the steering assembly which is located within the passenger compartment consisting of the following components/subsystems.
1. The column, extending from the toe pan to its termination in the steering wheel hub
2. Associated mounting brackets, hardware, and foundation
3. Associated energy absorbing devices
4. The steering wheel

11. Wheel Energy Absorbing [EA] Type Code
(NOTE: While most wheels are designed to absorb some energy, certain wheels are specifically EA and replace the column EA capability.)
___(01) Non-EA wheel -- Code "not applicable" for Questions 12-14.
___(02) EA wheel type unspecified -- Code actual value. (See Table _____ of Compiled Steering Components for code applicable to your specific make, model, and model year.)
___(90) Other:
_____
___(95) Undetermined--no reference data -- Code "unknown" for Questions 12 and 13. Complete Question 14.
___(99) Unknown if EA wheel -- Code "unknown" for Questions 12-14.
(18-19)

STEERING WHEEL: DAMAGE

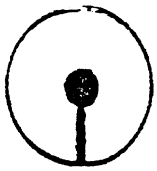
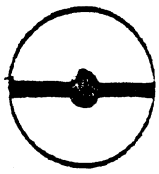
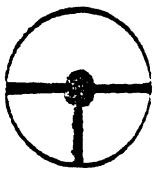
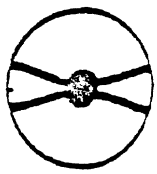
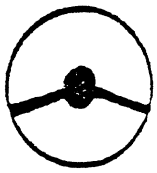
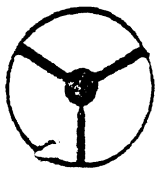
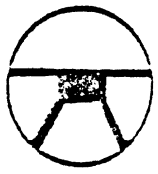
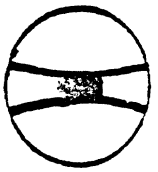
Wheel EA Compression Calculation

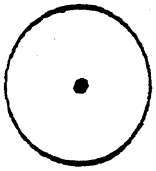
12. Wheel Original Dimension
_____ tenths of inches -- Code actual value from Table of Compiled Steering Components.
___(998) Not applicable
___(999) Unknown
(20-22)

13. Wheel Compressed Dimension
(NOTE: See reference manual for how-to-measure. Example on reverse side.)
_____ tenths of inches -- Code actual measured value.
___(998) Not applicable
___(999) Unknown
(23-25)

NASS Steering Column Reference Diagrams - Part 1

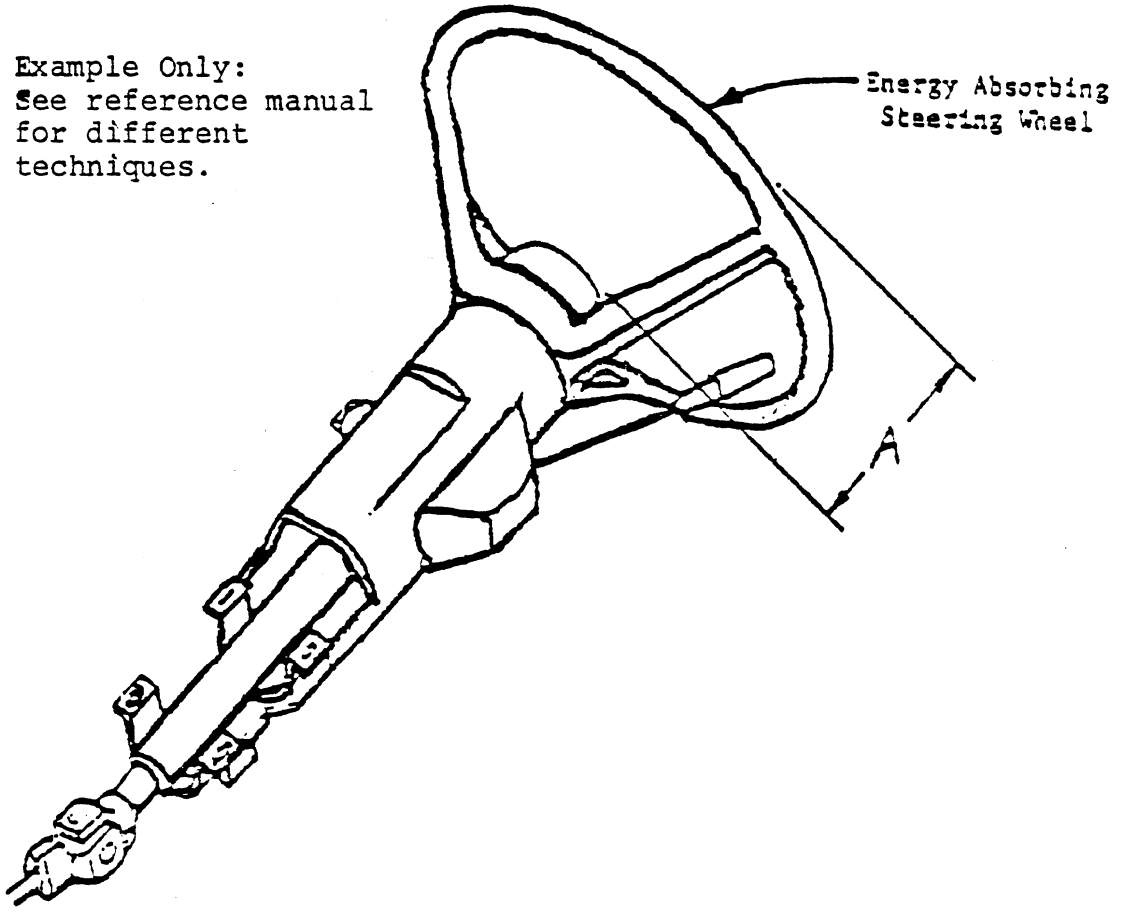
WHEEL CONFIGURATIONS

1 spoke	2 spokes	3 spokes	4 spokes
11 = 	21 = 	31 = 	41 = 
	22 = 	32 = 	42= 
	23 = 		43 = 

97 = Other 

ENERGY ABSORBING STEERING WHEEL MEASUREMENT

Example Only:
See reference manual for different techniques.



14. Wheel Compression Value
(NOTE: Result is rounded to the nearest inch.)

_____ inches -- Subtract the Question 13 value from the Question 12 value and record the difference.
___(00) No movement, compression, or collapse
Observed Value Code (cannot be measured):
___(80) Apparent movement, value undetermined
Estimated movement:
___(81) less than 1 inch
___(82) between 1 and 2 inches
___(84) between 2 and 4 inches
___(86) between 4 and 6 inches
___(88) between 6 and 8 inches
___(90) greater than 8 inches
Other Codes:
___(98) Not applicable,
___(99) Unknown

26 27

15. Rim Distortion

___(1) No distortion
___(2) Minor bending--less than 1 inch
___(3) Severe bending--greater than 1 inch
___(4) Broken (i.e., separated)
___(9) Unknown distortion

28

16. Spoke Distortion

___(1) No distortion
___(2) Minor bending--less than 1 inch
___(3) Severe bending--greater than 1 inch
___(4) Broken (i.e., separated)
___(9) Unknown distortion

29

STEERING COLUMN: DEVICE

17. Energy Absorbing Device Type

___(01) Non-EA column -- Code "not applicable for Questions 19-21.
___(02) EA column type unspecified -- Code actual value. (See Table of Compiled Steering Components _____ for code applicable to your specific make, model, and model year. Also, see those listed on reverse side.)
___(90) Other [sketch on reverse side]:

_____
___(95) Undetermined--no reference data -- Code "unknown" for Questions 19 and 20. Complete Question 21.
___(99) Unknown if EA column -- Code "unknown" for Questions 19-21.

30 31

18. Mounting Method

___(0) Undetermined--no reference data
Rigid to Instrument Panel:
___(1) Rigid at toe pan/lower firewall
___(2) Lower bracket
___(3) No lower attachment
Shear Module at Instrument Panel:
___(4) Rigid at toe pan/lower firewall
___(5) Lower bracket
___(6) No lower attachment

___(7) Bracket
___(8) Other:

_____
___(9) Unknown method

32

STEERING COLUMN: COMPRESSION

Column EA Device Compression Calculation

19. Device Original Dimension

_____ tenths of inches -- Code actual value from Table of Compiled Steering Components.
___(998) Not applicable
___(999) Unknown

33 34 35

20. Device Compressed Dimension

_____ tenths of inches -- Code actual measured value.
___(998) Not applicable
___(999) Unknown

36 37 38

21. Device Compression Value
(NOTE: Result is rounded to the nearest inch.)

_____ inches -- Subtract the Question 20 value from the Question 19 value and record the difference.
___(00) No movement, compression, or collapse
Observed Value Code (cannot be measured):
___(80) Apparent movement, value undetermined
Estimated movement:
___(81) less than 1 inch
___(82) between 1 and 2 inches
___(84) between 2 and 4 inches
___(86) between 4 and 6 inches
___(88) between 6 and 8 inches
___(90) greater than 8 inches
Other Codes:
___(98) Not applicable, not measurable
___(99) Unknown

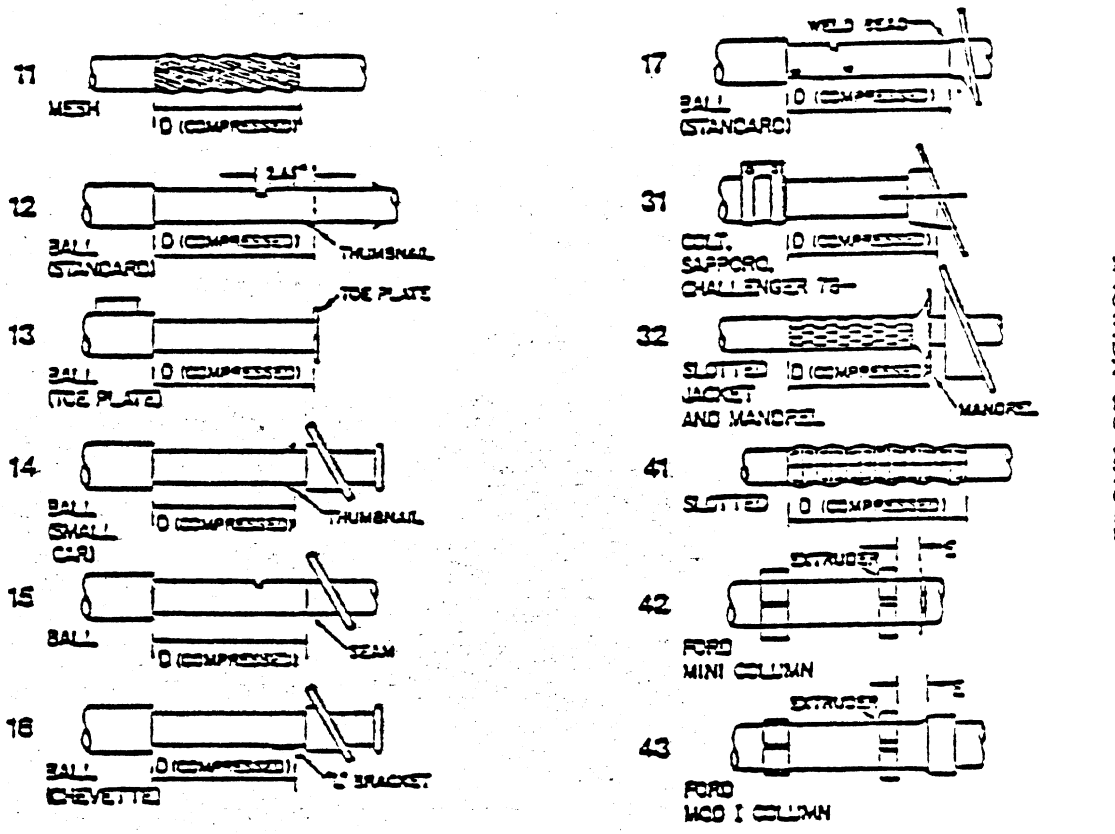
39 40

22. Shear Module: Type of Movement

___(1) No movement
___(2) Displacement only
___(3) Displacement and separation
___(4) Not designed to indicate movement
___(8) Not applicable or no shear module
___(9) Unknown movement

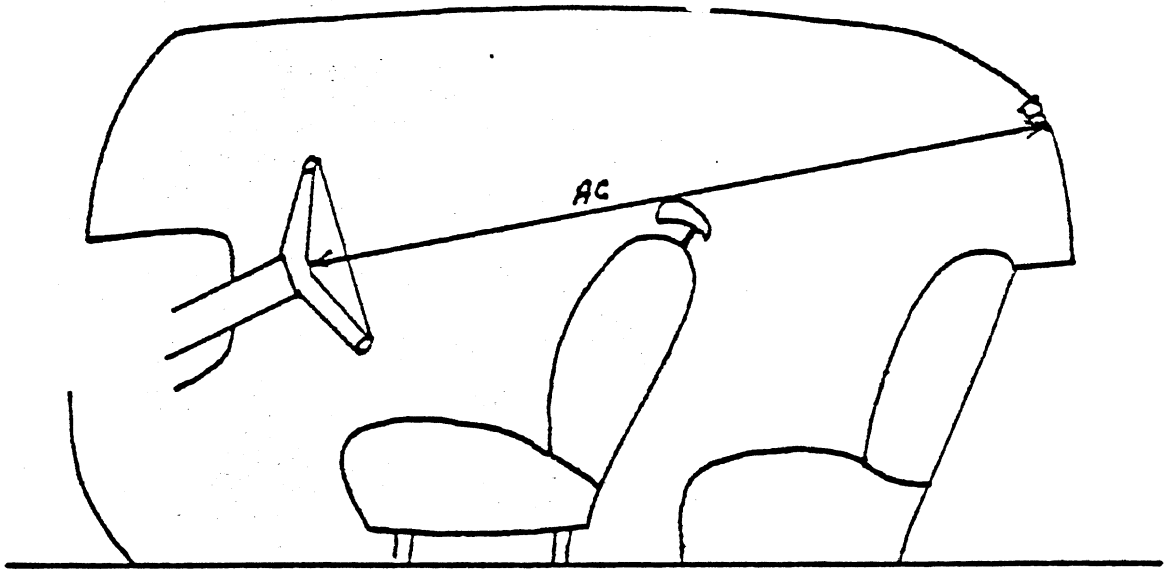
41

STEERING COLUMN ENERGY ABSORBING DEVICES



AC DIMENSION REFERENCE POINT AND MEASUREMENT TECHNIQUE

Measurement to bottom edge of upper backlight trim at glass.



AC Reference Point Codes:
(1) Backlight glass header

AC Measurement Notes: straight line measurement if possible.
(1) If adjustable headrest, measurement is with headrest down.
(2) If high back seat, measurement is over top of seat back.
(3) Vehicles with no back seat, measurement is still taken to window trim.

23. Shear Module: Measured Movement
(NOTE: Result is rounded to the nearest inch.)

_____ inches -- Code actual measured movement. See coding manual for measurement technique(s).
___(00) No movement, compression, or collapse
Observed Value Code (cannot be measured):
___(80) Apparent movement, value undetermined
Estimated movement:
___(81) less than 1 inch
___(82) between 1 and 2 inches
___(84) between 2 and 4 inches
___(86) between 4 and 6 inches
___(88) between 6 and 8 inches
___(90) greater than 8 inches
Other Codes:
___(98) Not applicable, not measurable
___(99) Unknown

42 43

COLUMN DISPLACEMENT

AC Dimension Axial Movement Calculation

24. AC Original Dimension

_____ inches -- Code actual value form Table of Compiled Steering Components.
___(995) Undetermined--no reference data -- Code "not applicable" for Question 25. Complete Question 27.
___(998) Not applicable--reference data available -- Code "not applicable" for Questions 25 and 27.
___(999) Unknown, not measurable -- Code "unknown" for Questions 25 and 27.

44 45 46

25. AC Measured Dimension
(NOTE: See diagram and related notes on reverse side of preceding page.)

_____ inches -- Code actual measured value.
___(998) Not applicable
___(999) Unknown

47 48 49

26. Direction of Axial Movement

___(1) No displacement
___(2) Compression (measured dimension greater than original)
___(3) Intrusion (measured dimension less than original)
___(4) Displacement, unknown direction
___(9) Unknown (NOTE: Includes loose column through mounting separation.)

50

27. AC Axial Movement
(NOTE: Result is rounded to the nearest inch.)

_____ inches -- Subtract the Question 25 value from the Question 24 value and record the difference.
___(000) No movement, compression, or collapse
Observed Value Code (cannot be measured):
___(980) Apparent movement, value undetermined
Estimated movement:
___(981) less than 1 inch
___(982) between 1 and 2 inches
___(984) between 2 and 4 inches
___(986) between 4 and 6 inches
___(988) between 6 and 8 inches
___(990) greater than 8 inches
Other Codes:
___(998) Not applicable, not measurable
___(999) Unknown

51 52 53

28. Lateral (⟷) Column Displacement: Direction
(NOTE: Determined at the steering wheel end.)
___(1) No displacement
___(2) Right
___(3) Left
___(4) Displacement, unknown direction
___(9) Unknown (NOTE: Includes loose column through mounting separation.)

54

29. Lateral (⟷) Column Displacement: Magnitude
(NOTE: See previous note.)
___(1) No apparent displacement
___(2) Minor, ≤ 2 inches] Eyeball
___(3) Major, > 2 inches] Guestimate
___(9) Unknown

55

30. Vertical (↕) Column Displacement: Direction
(NOTE: See note on Question 28.)
___(1) No displacement
___(2) Up
___(3) Down
___(4) Displacement, unknown direction
___(9) Unknown (NOTE: Includes loose column through mounting separation.)

56

31. Vertical (↕) Column Displacement: Magnitude
(NOTE: See note on Question 28.)
___(1) No apparent displacement
___(2) Minor, ≤ 2 inches] Eyeball
___(3) Major, > 2 inches] Guestimate
___(9) Unknown

57

32. Column Mounting Damage
(NOTE: Does not include shear capsule separation, unless by other than normal shear capsule movement.)
___(1) No damage
___(2) Upper mounting assembly *damaged or distorted** (including bracket)
___(3) Lower mounting assembly *damaged or distorted**
___(4) Upper and lower mounting assembly *damaged or distorted**
___(5) Bracket mounting assembly *damaged or distorted**
___(6) Other mounting damage: _____
___(9) Unknown damage
58

* Damage results from twisting, tearing, bending, distorting, etc. to the mounting assembly.

FOUNDATION AND SURROUNDING STRUCTURE DAMAGE

33. Toe Pan Area Damage Near Column
___(01) None
___(02) Displaced or buckled rearward, or into occupant space
___(03) Displaced or buckled forward, or away from occupant space
___(98) Not applicable
___(99) Unknown if damaged
59 60

34. Instrument Panel Vertical Rotation Near Column
___(01) None
___(06) Rotated or displaced upwards
___(07) Rotated or displaced downwards
___(98) Not applicable
___(99) Unknown if damaged
61 62

35. Instrument Panel Buckle Near Column
___(01) None
___(02) Displaced or buckled rearward, or into occupant space
___(03) Displaced or buckled forward, or away from occupant space
___(04) Displaced left
___(05) Displaced right
___(08) Combination of above [specify]: _____
___(98) Not applicable
___(99) Unknown if damaged
63 64

36. Bracket Mount Surface or Device Damaged
(NOTE: If bracket mount used.)
___(01) None
___(02) Displaced or buckled rearward, or into occupant space
___(03) Displaced or buckled forward, or away from occupant space
___(04) Displaced left
___(05) Displaced right
___(06) Rotated or displaced upwards
___(07) Rotated or displaced downwards
___(08) Combination of above [specify]: _____
___(98) Not applicable
___(99) Unknown if damaged
65 66