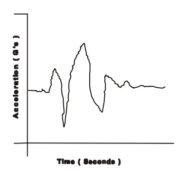
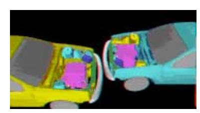
# NHTSA
# Test Reference Guide
**Version 5**

# Volume I : Vehicle Tests



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***Prepared for:***

**U.S. Department of Transportation**
(DOT)

People Saving People
http://www.nhtsa.dot.gov

National Highway Traffic Safety Administration (NHTSA)

Office of the Associate Administrator for Research and Development

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Information Systems and Services, Inc. (ISSI)

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# *Preface*

This guide and its companion guides are to be used to create formatted submissions of data collected from automotive crash tests.

There are four guides:

**Volume I:** NHTSA Vehicle Test Reference Guide
**Volume II:** NHTSA Biomechanical Test Reference Guide
**Volume III:** NHTSA Component Test Reference Guide
**Volume IV:** NHTSA Signal Waveform Generator Test Reference Guide

You are reading Volume I, the NHTSA Vehicle Test Reference Guide.

The first step in creating a data submission is to determine which database to use for your test data. The design and partitioning of each database is centered upon the focus of the testing. Test programs focused on the evaluation of the **occupant** should be submitted to the Biomechanical Database; tests focused on the evaluation of **vehicles** belong in either the Vehicle Database or the Component Database; and tests focused on the evaluation of the **data acquisition system** belong in the Signal Waveform Generator Database. Refer to the flow chart in ***Figure 0-1 Database selection***, on the next page, to determine which database is appropriate for your test.

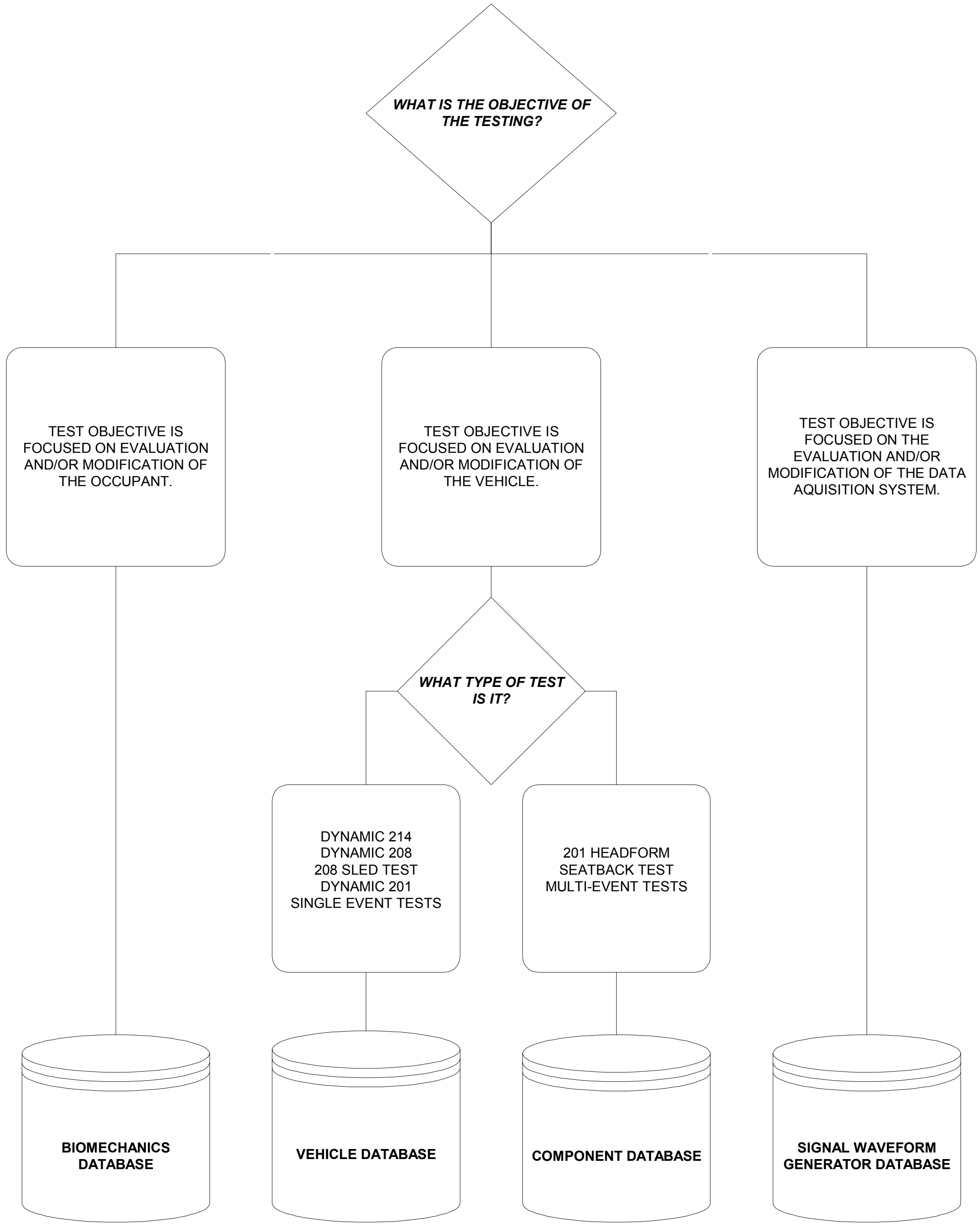



**Figure 0-1 Database selection**

Several examples may help to illustrate where certain types of tests fit into the databases:

- All regulatory tests shall be submitted to the Vehicle Database or Component Database.
- Tests that are performed as part of the new car assessment program shall be submitted to the Vehicle Database.
- Pendulum tests to cadavers shall be submitted to the Biomechanical Database.
- Lateral vehicle-to-vehicle impacts shall be submitted to the Vehicle Database.
- Sled tests with new dummy designs shall be submitted to the Biomechanical Database.
- Tests featuring a car body on a sled designed to evaluate occupant response should be submitted to the Biomechanical Database.
- Tests featuring a car body on a sled designed to evaluate vehicle response should be submitted to the Vehicle Database.
- Tests to record a standard waveform using new car assessment conditioning amplifiers shall be submitted to the Signal Waveform Generator Database.

In many research cases, it will be difficult to determine whether testing is focused on evaluation of the vehicle or evaluation of the occupant. Always check with the COTR in determining which database tests should be submitted. In all cases where the COTR's advice is contrary to this guide, send email to barbara.hennessey@nhtsa.dot.gov.

# Release Notes

This section details changes between the current version of this guide, dated as of March 6, 2001, and the most recent version preceding this guide.

## Content

- The four Test Reference Guides have been substantially merged to consolidate common information into a more easily maintained format. However, they are still distributed separately at this time.
- All guides updated to represent the version 5 schema and coding.
- A flowchart has been incorporated to assist guide users in creating a proper EV5 specification data file.
- New sections added to address video, photos, and contractor reports.
- X-Y measurement / channel data is now permitted when the independent coordinate of a measurement is non-uniformly incremental (non-constant delta between adjacent X values).
- Data coordinate systems information moved to a common appendix in ***Appendix A: Data Coordinate System*** so as to isolate it for easier reading and maintenance.
- New technical support appendix added in ***Appendix C: Technical Support Information***.
- Updated information on Entrée for Windows version 5.

## Codes

- Codes for the Vehicle Test Reference Guide are now only available through the NHTSA Research and Development web site.

# Introduction

## Background

In September of 1966, the National Traffic and Motor Vehicle Safety Act (15 U.S.C. 1381) was signed into law in the United States. The Act specifies that the Secretary of Transportation shall establish appropriate Federal Motor Vehicle Safety Standards that would lead to the reduction of the number of deaths and injuries resulting from motor vehicle accidents. In prescribing standards, the Secretary was to consider: (1) relevant motor vehicle safety data, (2) whether the proposed standard is reasonable, practical, and appropriate for the particular type of motor vehicle equipment for which it is prescribed, and (3) the extent to which such standards contribute to carrying out the purposes of the Act.

In order to meet the above requirements, the National Highway Traffic Safety Administration (NHTSA) has been mandated to develop safety standards. For each proposed regulation, an extensive research program is undertaken to ensure that the proposed standard satisfies the requirements of the Act. For each test conducted for the agency, data is recorded from various transducers mounted to the test dummies or vehicles, high-speed films or videos are recorded to document the event, still pictures of the test setup are taken, and a written report is generated. Since 1978, these data have been loaded into a single data repository, where NHTSA staff and the public can access the data and conduct analysis.

This reference guide has been written for two reasons. The first is to document the format and content requirements for submission of data, film, video, and reports to the NHTSA database. The second is to encourage the adoption of this standardized format so that the exchange of data by the safety research community is readily accomplished and ultimately leads to new and better ways for reducing the fatalities and injuries in motor vehicle accidents.

## Data Organization

Four types of crash test data can be submitted to the NHTSA Vehicle Crash Test database:

- **Electronic Data** (Chapter 2) - General quantitative information about the test setup and results as well as transducer output time-history data.

- **Written Report** (Chapter 3) - A report containing information about the test, such as test setup diagrams and test anomalies. The written report should be submitted in digital form using the Adobe PDF format. Alternatively, a paper copy of the report is acceptable.

- **Pre/Post-Event Images** (Chapter 4) - Pre- or post- event images of the test environment. These may be in the form of film or digital video, time sequenced or still images.

- **Event Images** (Chapter 5) - Film, video, or still images captured during the impact event. The images may be submitted on processed prints from photo-reactive film or on CCD cameras.

Chapters 2 through 5 of this guide provide instructions for formatting of each of the above data types.

## Digital Media Formats

The digital crash test information should be submitted to NHTSA on a CD-ROM, ZIP disk, or 3.5" floppy disk. Multiple tests may be submitted on a single CD-ROM. Multiple CD-ROM's or disks may be submitted for each test. Please see ***Chapter 1 – Media Formats and Layout*** for details on acceptable media and the layout of directories and files on the media.

## Other Media Formats

Other media, including high-speed films, VHS or BETA videotapes, paper reports, or X-Rays should be submitted along with the digital media. If you have data that you wish to submit but which is not specified in this guide, please send email to

nrd.softdev@nhtsa.dot.gov

or contact the NHTSA COTR responsible for your submission.

## Return Policy

Submissions that cannot be processed, or which have too many errors as identified by Entrée for Windows or the loading and checkout programs, will be returned to the contractor to be corrected and resubmitted.

# Chapter 1 : Media Format and Layout

Each submission consists of multiple types of data: descriptive test specification data defined later in this guide, measurement data digitized from the test instrumentation signal traces, a written report of the testing, and still images and video before, during, and after the test event. Several pieces of physical media may be necessary to record all of this information for submission.

## 1.1 Media Types and Layout

All submissions should be written to either 3.5" 1.44 MB DOS (FAT) formatted diskettes, Iomega ZIP 100MB or ZIP 250MB cartridges, or to ISO-9660 CD-ROM with optional Joliet extensions for long file name support.

Each CD-ROM or disk should have a directory structure in accordance with the following:

1) **Parent directory name** - All data for each test submitted on a CD/Disk should be in a directory created in

   \<TSTREF>\

   where <TSTREF> is the value from the field TSTREF in Chapter 2 of this guide. So, if TSTREF = 'IMPACT123', then the directory for all data for this test shall be stored in the directory, \IMPACT123\. Users should avoid illegal filename characters ('\', '*', '?') when choosing a value for TSTREF, so as not to interfere with the directory naming convention. Each piece of media should have a printout listing each TSTREF on the media.

2) **Electronic Data** - In accordance with the format in Chapter's 1 and 2, the EV5 specification file and associated transducer signal files shall be stored in the subdirectory

   \<TSTREF>\DATA

3) **Written Report** - In accordance with Chapter 3, digital reports in PDF format shall be stored in the subdirectory

   \<TSTREF>\REPORT

4) **Pre/Post-Event Images** – In accordance with Chapter 4, still images and video captured before and after the impact event shall be stored in the subdirectory

   \<TSTREF>\PREPOST

5) **Event Images** - In accordance with Chapter 5, still images and video of the impact event, including high speed video files, shall be stored in the subdirectory

\<TSTREF>\EVENT

## 1.2 Data Entry Software

### 1.2-1 Entrée for Windows

NHTSA has developed the Entree for Windows data entry program in order to facilitate preparation of the specification data defined in ***Chapter 2 : Field Specifications and Formats***. Because the program contains built-in data validation, it is highly recommended that specification data be generated using the Entree for Windows program.

In addition to producing new data sets, Entrée for Windows can import ASCII data sets generated by previous versions of Entree, typically of type EV4, EV5, or GR*. Once these files have been imported they can be written to a new data set in the EV5 format.

#### 1.2.1.1 Requirements for Entrée for Windows:

Entree for Windows is a Windows-based application for the Microsoft Windows 95, Windows 98 and Windows NT environments with the following operating requirements:

- Microsoft Windows 95 / 98, Windows NT Workstation 4.0 with Service Pack 6a or later.
- Hardware (CPU, memory, and disk space) according to Microsoft recommendations.
- 24 MB of disk space to install, and 12 MB of disk space during normal use.
- SVGA display adapter with 1024x768 resolution, preferably using font size “small.”
- 3.5" 1.44 MB diskette drive, Iomega ZIP 100MB or 250 MB drive, or a CD-R / CD-RW drive capable of creating ISO-9660 CD-ROMs.

While Entrée may run under Microsoft Windows Millennium or Windows 2000, it has not been tested in those environments.

### 1.2-2 Customer Developed Software

NHTSA provides access to the source code for the Entrée for Windows program as a separately downloadable package on the Entrée web site (See: ***Appendix C-1 Reference Guide Updates and Software Updates***.) This source code package may be used as an educational resource in understanding how the Entrée application works, and the logic used in generating an EV5 data set. However, the source code is not suitable for direct inclusion in customer-developed software.

NHTSA does not provide source code for customers to develop their own software to write data compatible with the EV5 specification. This guide and data sets produced by the Entrée for Windows software may be used to engineer data sets that are conditionally compatible with the specification.

# Chapter 2 : Field Specifications and Formats

## Introductory Information

As a primer to understanding the following sections please review the following information and glossary of terms. We have categorized the data types in the EV5 specification so as to make it easier to model the data and the business logic necessary for validating the data.

### *Glossary of Field Types:*

- **Free Text –** A textual string whose content is not strictly governed by a rule, containing uppercase alphanumeric characters, white-space, and a limited set of special characters including [ ] ( ) , : - + and _. A field of this type may have a maximum length.

- **Coded Value –** A textual string whose content is limited to a predefined set of enumerated values. A field of this type will have a set length and a fixed set of possible valid values that may be assigned to the field.

- **Integer –** An unbounded integer (whole number) value having no minimum or maximum limitations on value, expressed as one optional sign character (- or +) and one or more numeric characters, or digits, in the range from 0 – 9. The absence of a sign character implies a positive value.

- **Bounded Integer –** A specific class of Integer whose content is limited by an upper and lower bound. The representation of a Bounded Integer as a textual string may be limited in length.

- **Real –** An unbounded real (floating point or decimal) value having no minimum or maximum limitations on value, expressed as one sign character (- or +), one or more numeric characters, or digits, in the range from 0 – 9, a decimal point '.', and one or more numeric characters in the range from 0 – 9. The absence of a sign character implies a positive value.

  The representation of a Real as a textual string may be governed by a rule that specifies a total field width, placement of the sign and decimal, and relative sizes and format of the mantissa and exponent. Any alphabetic characters in the textual representation of a Real are in uppercase.

- **Bounded Real –** A specific class of Real whose content is limited by an upper and lower bound.

- **Date –** A textual string whose content represents a calendar date of the format 'DD/MMM/CCYY'. The maximum length of a Date is limited to 11 characters.

  The 'DD' portion of the date is the numeric day of the month, padded to a width of two (2) characters with a leading zero, in the range from 1 – 31.

The ‘MMM’ portion of the date is the three-character uppercase alphabetic abbreviation of the month (e.g. ‘JAN’, ‘FEB’, ‘MAR’, ‘APR’, ’MAY’, ’JUN’, ’JUL’, ‘AUG’, ’SEP’, ’OCT’, ’NOV’, ’DEC’).

The ‘CCYY’ portion of the date is a four-digit year with the century represented in the ‘CC’ position and the year within the century represented as a zero padded value in the ‘YY’ position (e.g. ‘2001’ would be century 20 AD, and year 01 within the century).

## 2.1 Electronic Data

### 2.1-1 Specification Data

The ASCII file for a specific test consists of groups of records from each of the categories listed below:

| RECORD TYPE | GROUP |
|---|---|
| TEST | 1 |
| VEHICLE | 2 |
| BARRIER | 3 |
| OCCUPANT | 4 |
| RESTRAINT | 5 |
| INSTRUMENTATION | 6 |

**Table 2-1 EV5 specification data groups**

For example, a Vehicle test might consist of specification records for TEST, VEHICLE, BARRIER, OCCUPANT, RESTRAINT, and INSTRUMENTATION.

The flowchart in ***Figure 2-1***, below, should be used to determine what record types to include in the specification data file.

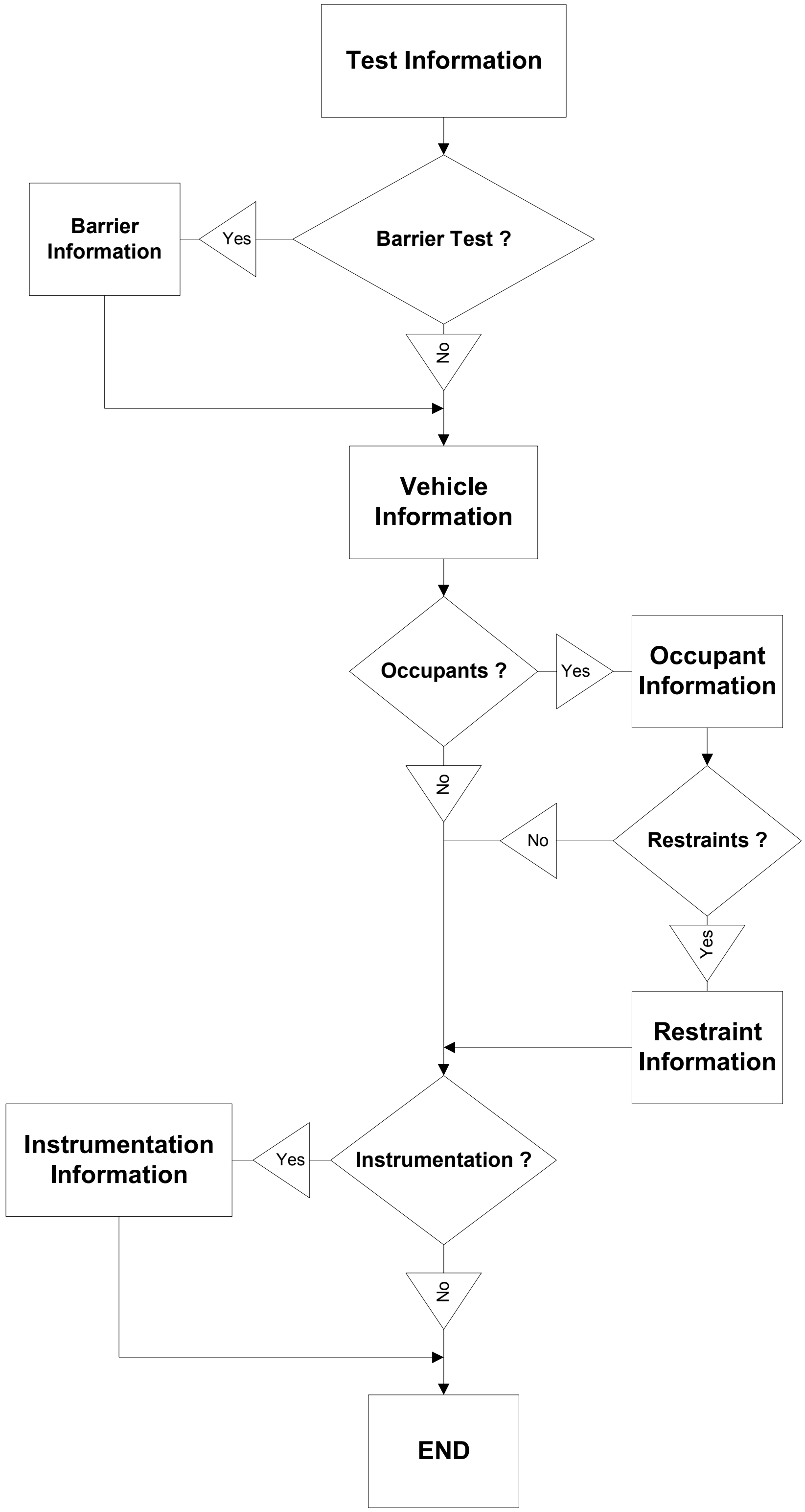



**Figure 2-1 EV5 Vehicle Specification Data Flowchart**

### 2.1.1.1 Record Layout for ASCII Specification File

The fields and their positions in each of the specification data records are listed in the sections following this one, starting with ***Section 2.2 General Test Information***. The first line of the ASCII (.EV5) specification file should be the string

“----- EV5 -----”

or

“-----”+space+ “EV5”+space+“-----”

The specification file should terminate with the line

“----- END -----”

Within the body of the specification file each section should begin with a “key” line indicating the record type for the data group following the key. These keys have the form

“----- KEY -----”

or

“-----”+space+ “KEY”+space+ “-----”

where KEY is appropriate to a particular record type as listed in *Error! Reference source not found.*. (e.g. KEY = TEST or KEY = OCCUPANT, etc.)

Fields within a record are delimited by the pipe character ( | ), records are delimited by a line feed.

Fields for which no information is available should contain one blank character. In other words, an empty field begins after the pipe delimiter of the previous field, and consists of a single blank followed by another pipe delimiter.

All text should be uppercase.

Comments within the specification file are allowable anywhere in the file, but must start on a new line with the # (pound) sign and end with a line feed.

### 2.1.1.2 Specification Data Example: Vehicle

Please note that while the records in this example appear to span lines, in actuality they are continuous and have been wrapped to fit this page.

```
# Source: Entree for Windows v5
# Date: <3/14/2001>
----- EV5 -----
----- TEST -----
V5|NEW CAR ASSESMENT PROGRAM FRONTAL BARRIER IMPACT TEST|TO OBTAIN VEHICLE CRASHWORTHINESS AND OCCUPANT
RESTRAINT PERFORMANCE|8/JUN/00|CAL|DTNH22-96-D-02010|RUN1879|NCA|VTB|CON|DRY|21|OTH|OTH|56.49|0|.0||129|FY 00 NCAP #18 - 2001
CHRYSLER PT CRUISER
----- VEHICLE -----
1|21|16|2001||OT|3C4FY4BB71T283350|4CIF|2.4|AF|1652|2616|4253|1704|1133|UN|UNK|P|NO
COMMENTS|4253|3647|3313|2901|2902|2914|2910|1897|1893|1935|1937|3039|3008|3300|3295|2488|294|412|4146|4148|272|56.49||180|NA|NA|NA|472|5
47|603|597|495|393|12FDEW2|1400|.0|603|3747|3412|3207|2897|2901|2905|2907|1891|1894|1929|1935|3050|3004|3173|3211|2485|272|373|3675|3624|27
2|||2001 CHRYSLER PT CRUISER SPECIAL PURPOSE VEHICLE
----- BARRIER -----
R|LCB|||
----- OCCUPANT -----
1|1|H3||M|||H3|50|MFG: ARL, S/N 245|NO COMMENTS|NO
COMMENTS|415|617|226|305|566|292||176|169|||||RW|AB|OT|AB|NO|DP|NO|1079|65.4|93.3|58.2|-2130|-6997|627.4|8926||||CNTRH2: HEADREST
1|2|H3||M|||H3|50|MFG: VECTOR, S/N: 064|NO COMMENTS|NO
COMMENTS|431|622|222|326|554||95|174|170|||||RW|AB|HW|AB|NO|DP|NO|466.8|65.5|101.5|49.3|-8144|-3695|513.8|9687||||NO COMMENTS
----- RESTRAINT -----
1|1|1|3PT|BC|NA|
1|1|2|ABG|SW|DP|
1|2|1|3PT|BC|NA|
1|2|2|ABG|DP|DP|
----- INSTRUMENTATION -----
1|1|TB|NA|BMPF|NA|SEC|SEC||MFG: TAPESWITCH|8/JUN/00||||-1000|5999|50|AM|P|VEHICLE/ATD TIME CHANNEL
1|2|AC|1|HDCG|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-A57G|28/MAR/00|503|18|56.5|-1000|5999|50|AM|P|P1 HEAD X
1|3|AC|1|HDCG|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AGHF5|28/MAR/00|502|1|.0|-1000|5999|50|AM|P|P1 HEAD Y
1|4|AC|1|HDCG|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AL6K2|28/MAR/00|502|6|.0|-1000|5999|50|AM|P|P1 HEAD Z
1|5|AC|1|HDCG|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31058|26/MAY/00|497|18|56.5|-1000|5999|50|AM|R|P1 HEADRX
1|6|AC|1|HDCG|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31010|26/MAY/00|501|3|.0|-1000|5999|50|AM|R|P1 HEADRY
1|7|AC|1|HDCG|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31034|26/MAY/00|501|7|.0|-1000|5999|50|AM|R|P1 HEADRZ
1|8|LC|1|NEKU|XL|SEC|NWT|4000|MFG: DENTONS/N: LC-076FX|14/FEB/00|8885|7|.0|-1000|5999|50|AM|P|P1 UP NECK FX
1|9|LC|1|NEKU|YL|SEC|NWT|4000|MFG: DENTONS/N: LC-076FY|14/FEB/00|8906|2|.0|-1000|5999|50|AM|P|P1 UP NECK FY
1|10|LC|1|NEKU|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-076FZ|14/FEB/00|13337|17|.0|-1000|5999|50|AM|P|P1 UP NECK FZ
1|11|LC|1|NEKU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-076MX|14/FEB/00|282|9|.0|-1000|5999|50|AM|P|P1 UP NECK MX
1|12|LC|1|NEKU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-076MY|14/FEB/00|282|10|.0|-1000|5999|50|AM|P|P1 UP NECK MY
1|13|LC|1|NEKU|ZL|SEC|NWM|4000|MFG: DENTONS/N: LC-076MZ|14/FEB/00|282|3|.0|-1000|5999|50|AM|P|P1 UP NECK MZ
1|14|AC|1|CHST|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-FB32L|28/MAR/00|499|13|56.5|-1000|5999|50|AM|P|P1 CHEST X
1|15|AC|1|CHST|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AE8W7|28/MAR/00|500|3|.0|-1000|5999|50|AM|P|P1 CHEST Y
1|16|AC|1|CHST|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AL508|28/MAR/00|499|3|.0|-1000|5999|50|AM|P|P1 CHEST Z
1|17|AC|1|CHST|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-P13331|26/MAY/00|495|13|56.5|-1000|5999|50|AM|R|P1 CHESTRX
1|18|AC|1|CHST|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-P13356|26/MAY/00|497|3|.0|-1000|5999|50|AM|R|P1 CHESTRY
1|19|AC|1|CHST|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-P13323|26/MAY/00|495|3|.0|-1000|5999|50|AM|R|P1 CHESTRZ
1|20|DS|1|CHST|XL|SEC|MM|4000|MFG: SERVOS/N: DS-245|6/JUN/00|51|83|.0|-1000|5999|50|AM|P|P1 CHEST DISP
1|21|AC|1|PVCN|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-C14953|28/MAR/00|505|15|56.5|-1000|5999|50|AM|P|P1 PELVIC X
1|22|AC|1|PVCN|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-C14966|28/MAR/00|502|4|.0|-1000|5999|50|AM|P|P1 PELVIC Y
```

1|23|AC|1|PVCN|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-C14968|28/MAR/00|500|5|.0|-1000|5999|50|AM|P|P1 PELVIC Z
1|24|LC|1|FMRL|ZL|SEC|NWT|4000|MFG: GSES/N: LC-723 |1/JUN/00|13347|19|.0|-1000|5999|50|AM|P|P1 LEFT FEMUR Z
1|25|LC|1|FMRR|ZL|SEC|NWT|4000|MFG: GSES/N: LC-419 |1/JUN/00|13357|53|.0|-1000|5999|50|AM|P|P1 RIGHT FEMUR Z
1|26|LC|1|TBLU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-045MX|3/APR/00|394|18|.0|-1000|5999|50|AM|P|P1 L UPTIBIA MX
1|27|LC|1|TBLU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-045MY|3/APR/00|396|41|.0|-1000|5999|50|AM|P|P1 L UPTIBIA MY
1|28|LC|1|TBLL|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-125MX|3/APR/00|283|10|.0|-1000|5999|50|AM|P|P1 L LOTIBIA FZ
1|29|LC|1|TBLL|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-125MY|3/APR/00|396|34|.0|-1000|5999|50|AM|P|P1 L LOTIBIA MX
1|30|LC|1|TBLL|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-125FZ|3/APR/00|11129|17|.0|-1000|5999|50|AM|P|P1 L LOTIBIA MY
1|31|LC|1|TBRU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-038MX|3/APR/00|282|46|.0|-1000|5999|50|AM|P|P1 R UPTIBIA MX
1|32|LC|1|TBRU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-038MY|3/APR/00|282|44|.0|-1000|5999|50|AM|P|P1 R UPTIBIA MY
1|33|LC|1|TBRL|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-124MX|3/APR/00|283|64|.0|-1000|5999|50|AM|P|P1 R LOTIBIA FZ
1|34|LC|1|TBRL|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-124MY|3/APR/00|283|26|.0|-1000|5999|50|AM|P|P1 R LOTIBIA MX
1|35|LC|1|TBRL|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-124FZ|3/APR/00|15560|24|.0|-1000|5999|50|AM|P|P1 R LOTIBIA MY
1|36|AC|1|FTLR|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J32176|5/JUN/00|498|32|56.5|-1000|5999|50|AM|P|P1 L FOOT AFT X
1|37|AC|1|FTLR|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31042|5/JUN/00|503|10|.0|-1000|5999|50|AM|P|P1 L FOOT AFT Z
1|38|AC|1|FTLF|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31009|5/JUN/00|497|60|.0|-1000|5999|50|AM|P|P1 L FOOT FORE Z
1|39|AC|1|FTRR|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31050|5/JUN/00|499|48|56.5|-1000|5999|50|AM|P|P1 R FOOT AFT X
1|40|AC|1|FTRR|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31060|5/JUN/00|503|31|.0|-1000|5999|50|AM|P|P1 R FOOT AFT Z
1|41|AC|1|FTRF|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J32143|5/JUN/00|501|82|.0|-1000|5999|50|AM|P|P1 R FOOT FORE Z
1|42|LC|1|LPBO|NA|SEC|NWT|4000|MFG: LEBOWS/N: LC-706|1/JUN/00|15613|58|.0|-1000|5999|50|AM|P|P1 LBELTLC F
1|43|AC|2|HDCG|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-C15021|2/JUN/00|500|11|56.5|-1000|5999|50|AM|P|P2 HEAD X
1|44|AC|2|HDCG|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-C15007|2/JUN/00|503|2|.0|-1000|5999|50|AM|P|P2 HEAD Y
1|45|AC|2|HDCG|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AH5N0|2/JUN/00|501|7|.0|-1000|5999|50|AM|P|P2 HEAD Z
1|46|AC|2|HDCG|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-P13329|2/JUN/00|502|13|56.5|-1000|5999|50|AM|R|P2 HEADRX
1|47|AC|2|HDCG|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-P13355|2/JUN/00|496|3|.0|-1000|5999|50|AM|R|P2 HEADRY
1|48|AC|2|HDCG|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J32774|2/JUN/00|498|9|.0|-1000|5999|50|AM|R|P2 HEADRZ
1|49|LC|2|NEKU|XL|SEC|NWT|4000|MFG: DENTONS/N: LC-440FX|8/FEB/00|8891|10|.0|-1000|5999|50|AM|P|P2 UP NECK FX
1|50|LC|2|NEKU|YL|SEC|NWT|4000|MFG: DENTONS/N: LC-440FY|8/FEB/00|8908|3|.0|-1000|5999|50|AM|P|P2 UP NECK FY
1|51|LC|2|NEKU|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-440FZ|8/FEB/00|13359|16|.0|-1000|5999|50|AM|P|P2 UP NECK FZ
1|52|LC|2|NEKU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-440MX|8/FEB/00|283|8|.0|-1000|5999|50|AM|P|P2 UP NECK MX
1|53|LC|2|NEKU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-440MY|8/FEB/00|283|21|.0|-1000|5999|50|AM|P|P2 UP NECK MY
1|54|LC|2|NEKU|ZL|SEC|NWM|4000|MFG: DENTONS/N: LC-440MZ|8/FEB/00|282|7|.0|-1000|5999|50|AM|P|P2 UP NECK MZ
1|55|AC|2|CHST|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-A08A|17/DEC/99|503|10|56.5|-1000|5999|50|AM|P|P2 CHEST X
1|56|AC|2|CHST|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-ADL42|17/DEC/99|501|3|.0|-1000|5999|50|AM|P|P2 CHEST Y
1|57|AC|2|CHST|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-A28F|17/DEC/99|502|4|.0|-1000|5999|50|AM|P|P2 CHEST Z
1|58|AC|2|CHST|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-A14077|17/DEC/99|497|9|56.5|-1000|5999|50|AM|R|P2 CHESTRX
1|59|AC|2|CHST|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-A13882|17/DEC/99|502|2|.0|-1000|5999|50|AM|R|P2 CHESTRY
1|60|AC|2|CHST|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-ACCW0|17/DEC/99|497|4|.0|-1000|5999|50|AM|R|P2 CHESTRZ
1|61|DS|2|CHST|XL|SEC|MM|4000|MFG: SERVOS/N: DS-064|9/FEB/00|51|57|.0|-1000|5999|50|AM|P|P2 CHEST DISP
1|62|AC|2|PVCN|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AF480|17/DEC/99|496|29|56.5|-1000|5999|50|AM|P|P2 PELVIC X
1|63|AC|2|PVCN|YL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AC2M6|17/DEC/99|504|10|.0|-1000|5999|50|AM|P|P2 PELVIC Y
1|64|AC|2|PVCN|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-AF5C1|17/DEC/99|506|8|.0|-1000|5999|50|AM|P|P2 PELVIC Z
1|65|LC|2|FMRL|ZL|SEC|NWT|4000|MFG: GSES/N: LC-954 |1/JUN/00|13343|68|.0|-1000|5999|50|AM|P|P2 LEFT FEMUR Z
1|66|LC|2|FMRR|ZL|SEC|NWT|4000|MFG: GSES/N: LC-955 |1/JUN/00|13344|28|.0|-1000|5999|50|AM|P|P2 RIGHT FEMUR Z
1|67|LC|2|TBLU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-016MX|3/APR/00|396|21|.0|-1000|5999|50|AM|P|P2 L UPTIBIA MX
1|68|LC|2|TBLU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-016MY|3/APR/00|394|52|.0|-1000|5999|50|AM|P|P2 L UPTIBIA MY
1|69|LC|2|TBLL|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-123MX|3/APR/00|283|20|.0|-1000|5999|50|AM|P|P2 L LOTIBIA FZ
1|70|LC|2|TBLL|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-123MY|3/APR/00|395|25|.0|-1000|5999|50|AM|P|P2 L LOTIBIA MX
1|71|LC|2|TBLL|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-123FZ|3/APR/00|11117|54|.0|-1000|5999|50|AM|P|P2 L LOTIBIA MY
1|72|LC|2|TBRU|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-023MX|3/APR/00|396|18|.0|-1000|5999|50|AM|P|P2 R UPTIBIA MX
1|73|LC|2|TBRU|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-023MY|3/APR/00|395|51|.0|-1000|5999|50|AM|P|P2 R UPTIBIA MY
1|74|LC|2|TBRL|ZL|SEC|NWT|4000|MFG: DENTONS/N: LC-111MX|3/APR/00|395|4|.0|-1000|5999|50|AM|P|P2 R LOTIBIA FZ

1|75|LC|2|TBRL|XL|SEC|NWM|4000|MFG: DENTONS/N: LC-111MY|3/APR/00|394|35|.0|-1000|5999|50|AM|P|P2 R LOTIBIA MX
1|76|LC|2|TBRL|YL|SEC|NWM|4000|MFG: DENTONS/N: LC-111FZ|3/APR/00|11131|33|.0|-1000|5999|50|AM|P|P2 R LOTIBIA MY
1|77|AC|2|FTLR|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J32184|5/JUN/00|495|54|56.5|-1000|5999|50|AM|P|P2 L FOOT AFT X
1|78|AC|2|FTLR|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31011|5/JUN/00|497|26|.0|-1000|5999|50|AM|P|P2 L FOOT AFT Z
1|79|AC|2|FTLF|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J32185|5/JUN/00|500|31|.0|-1000|5999|50|AM|P|P2 L FOOT FORE Z
1|80|AC|2|FTRR|XL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31101|5/JUN/00|506|9|56.5|-1000|5999|50|AM|P|P2 R FOOT AFT X
1|81|AC|2|FTRR|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31020|5/JUN/00|500|36|.0|-1000|5999|50|AM|P|P2 R FOOT AFT Z
1|82|AC|2|FTRF|ZL|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J31059|5/JUN/00|500|29|.0|-1000|5999|50|AM|P|P2 R FOOT FORE Z
1|83|LC|2|SHBT|NA|SEC|NWT|4000|MFG: LEBOWS/N: LC-711|1/JUN/00|15566|63|.0|-1000|5999|50|AM|P|P2 LBELTLC F
1|84|AC|NA|SELR|XG|SEC|G'S|4000|MFG: ICSS/N: AC-D32|29/FEB/00|502|100|56.5|-1000|5999|50|AM|P|ACC. #1 LEFT REAR X
1|85|AC|NA|SERR|XG|SEC|G'S|4000|MFG: ICSS/N: AC-D61|28/FEB/00|498|40|56.5|-1000|5999|50|AM|P|ACC. #2 RIGHT REAR X
1|86|AC|NA|ENGN|XG|SEC|G'S|4000|MFG: ICSS/N: AC-D74|9/FEB/00|502|74|56.5|-1000|5999|50|AM|P|ACC. #3 ENGINE TOP X
1|87|AC|NA|ENGN|XG|SEC|G'S|4000|MFG: ENTRANS/N: AC-D03|29/FEB/00|500|100|56.5|-1000|5999|50|QD||ACC. #4 ENG. BOTTOM X -> DATA QUESTIONABLE
1|88|AC|NA|BRCR|XG|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-APA30|26/JAN/00|500|42|56.5|-1000|5999|50|AM|P|ACC. #5 RT CALIPER X
1|89|AC|NA|DPLC|XG|SEC|G'S|4000|MFG: ICSS/N: AC-D28|5/JUN/00|501|47|56.5|-1000|5999|50|AM|P|ACC. #6 INSTRUMENT X
1|90|AC|NA|BRCL|XG|SEC|G'S|4000|MFG: ENDEVCOS/N: AC-J18436|27/MAR/00|496|48|56.5|-1000|5999|50|AM|P|ACC. #7 LT CALIPER X
1|91|AC|NA|SELR|XG|SEC|G'S|4000|MFG: ICSS/N: AC-Y13|28/FEB/00|501|61|56.5|-1000|5999|50|AM|P|ACC. #8 LT REAR X(R)
1|92|AC|NA|SERR|XG|SEC|G'S|4000|MFG: ICSS/N: AC-Y17|8/FEB/00|502|86|56.5|-1000|5999|50|AM|P|ACC. #9 RT REAR X(R)
1|93|TB|NA|BAFF|NA|SEC|SEC|99999|MFG: TAPESWITCH|8/JUN/00|99999|999||-400|2999|100|AM|P|LOAD CELL BARRIER TIME CHANNEL
0|94|LC|NA|LCA1|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18849|11/AUG/99|274|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A1
0|95|LC|NA|LCA2|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18871|11/AUG/99|272|2|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A2
0|96|LC|NA|LCA3|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18875|11/AUG/99|267|3|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A3
0|97|LC|NA|LCA4|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46933|11/AUG/99|273|15|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A4
0|98|LC|NA|LCA5|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18882|11/AUG/99|273|26|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A5
0|99|LC|NA|LCA6|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18878|11/AUG/99|267|15|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A6
0|100|LC|NA|LCA7|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 62098|11/AUG/99|250|3|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A7
0|101|LC|NA|LCA8|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46947|11/AUG/99|269|3|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A8
0|102|LC|NA|LCA9|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 15782|11/AUG/99|273|2|.0|-400|2999|100|AM|P|BARRIER LOAD CELL A9
0|103|LC|NA|LCB1|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46949|11/AUG/99|268|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B1
0|104|LC|NA|LCB2|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18860|11/AUG/99|273|4|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B2
0|105|LC|NA|LCB3|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18877|11/AUG/99|273|39|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B3
0|106|LC|NA|LCB4|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18863|11/AUG/99|269|79|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B4
0|107|LC|NA|LCB5|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 62095|11/AUG/99|259|21|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B5
0|108|LC|NA|LCB6|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18869|11/AUG/99|270|59|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B6
0|109|LC|NA|LCB7|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 62086|11/AUG/99|253|54|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B7
0|110|LC|NA|LCB8|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 62096|11/AUG/99|250|4|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B8
0|111|LC|NA|LCB9|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46985|11/AUG/99|275|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL B9
0|112|LC|NA|LCC1|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18856|11/AUG/99|270|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C1
0|113|LC|NA|LCC2|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 62107|11/AUG/99|254|2|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C2
0|114|LC|NA|LCC3|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46962|11/AUG/99|261|18|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C3
0|115|LC|NA|LCC4|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18868|11/AUG/99|275|10|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C4
0|116|LC|NA|LCC5|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18853|11/AUG/99|275|11|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C5
0|117|LC|NA|LCC6|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18859|11/AUG/99|271|7|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C6
0|118|LC|NA|LCC7|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18852|11/AUG/99|270|16|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C7
0|119|LC|NA|LCC8|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18855|11/AUG/99|274|2|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C8
0|120|LC|NA|LCC9|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18865|11/AUG/99|272|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL C9
0|121|LC|NA|LCD1|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18872|11/AUG/99|272|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D1
0|122|LC|NA|LCD2|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46986|11/AUG/99|270|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D2
0|123|LC|NA|LCD3|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46979|11/AUG/99|269|2|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D3
0|124|LC|NA|LCD4|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 15798|11/AUG/99|175|4|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D4
0|125|LC|NA|LCD5|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 46937|11/AUG/99|276|3|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D5

0|126|LC|NA|LCD6|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18876|11/AUG/99|270|4|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D6
0|127|LC|NA|LCD9|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18846|11/AUG/99|275|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D9
0|128|LC|NA|LCD8|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 66960|11/AUG/99|275|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D8
0|129|LC|NA|LCD9|NA|SEC|NWT|1650|MFG: INTERFACE S/N: 18846|11/AUG/99|275|1|.0|-400|2999|100|AM|P|BARRIER LOAD CELL D9
----- END -----

## 2.1-2 Signal Data

Each subsequent file after the specification data file contains unfiltered, digitized measurement data collected from the sensors used in the tests. The order of the measurement files corresponds to the order of the instrumentation records in the instrumentation group specification records. The measurement files are made up of ASCII records of 1 data point each, delimited by a line feed character (ASCII decimal 10, hexadecimal \x0a, octal \012). If X-Y data - measurement data in which the independent X coordinate is non-uniformly incremental - is supplied then each record consists of 1 data point each with the X coordinate listed first, followed by a single tab character, followed by the associated Y coordinate, and ending with a line feed character.

The point specification will allow for any floating-point format, but the preferred format is the C format %12.5E. Thus, each Y-only record will be 12 characters wide (e.g. +1.23456E-01) and each X-Y record will be a maximum of 25 characters wide (e.g. +1.23456E-01<tab>-9.87654E+02). The maximum number of points for one channel is 110,000. There cannot be more than 10,000 data points prior to time zero nor more than 99,999 after time zero.

The name of the ASCII measurement data files should be the same given to the specification file described above (Entree for Windows file with extension .EV5) followed by a numeric file extension. The file extension should be the curve number of the curve contained in the file, padded on the left with zeroes to three characters, and should correspond to the curve number in the instrumentation record in the instrumentation specification group.

If the specification file is named TSTABC.EV5, and there are 35 measurement (curve) files, the measurement data files should be named TSTABC.001 through TSTABC.035.

| | | | |
|---|---|---|---|
| **Right:** | TSTABC.001 | TSTABC.012 | TSTABC.101 |
| **Wrong:** | TSTABC.T0 | TSTABC.12 | TSTABCDAT |

**Table 2-2 Measurement data filename examples**

### 2.1.2.1 Signal Data Example (Y value only)

```
-.206786E-02
0.285321E-01
0.285321E-01
-.632679E-01
0.285321E-01
-.206786E-02
0.285321E-01
-.632679E-01
-.632679E-01
-.206786E-02
0.285321E-01
-.206786E-02
-.326679E-01
-.206786E-02
-.206786E-02
-.206786E-02
-.206786E-02
-.326679E-01
0.285321E-01
```

### 2.1.2.2 Signal Data Example (X and Y values)

```
-0.025000000    0.0
-0.024875002    0.0
-0.024750002    -0.12266
-0.024625001    0.12266
-0.024500001    0.0
-0.024375001    -0.24532
-0.024250000    0.0
-0.024125000    0.0
-0.024000000    -0.12266
-0.023875002    0.0
-0.023750002    0.0
-0.023625001    0.0
-0.023500001    0.12266
-0.023375000    0.0
-0.023250000    0.0
-0.023125000    -0.12266
-0.023000002    0.0
-0.022875002    0.0
-0.022750001    0.24532
-0.022625001    0.0
-0.022500000    0.0
-0.022375000    -0.12266
-0.022250000    -0.12266
```

## 2.2 General Test Information

The data elements defined below constitute the General Test Information group. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.2.1.1 VERNO — Version Number

(Version Number) — Coded Value, 2 characters, pre-defined

The number of this version of the NHTSA Test Reference Guide is a pre-assigned code (V5). This code should be chosen for all vehicle crash tests.

### 2.2.1.2 TITLE — Contract or Study Title

(Title) — Free Text, maximum length 70 characters

TITLE is the title of the contract or study.

### 2.2.1.3 TSTOBJ — Test Objectives

(Test Objectives) — Free Text, maximum length 70 characters

TSTOBJ is a description of the purpose of the test.

### 2.2.1.4 TSTDAT — Test Date

(Test Date) — Date

TSTDAT is the date the test was performed.

### 2.2.1.5 TSTPRF — Test Performer

(Test Performer) — Coded Value, 3 characters

TSTPRF is the code for the name of the organization performing the test.

### 2.2.1.6 CONNO — Contract Number

(Contract Number) — Free Text, maximum length 17 characters

CONNO is the Department of Transportation contract number assigned by the sponsoring organization.

### 2.2.1.7 TSTREF — Test Reference Number

(Test Reference Number) — Free Text, maximum length 10 characters

TSTREF is an alphanumeric code number assigned to the test by the test performer.

### 2.2.1.8 TSTTYP — Test Type

(Test Type) — Coded Value, 3 characters

TSTTYP indicates the type of test conducted, such as NCA for a new car assessment test.

### 2.2.1.9 TSTCFN — Test Configuration

(Test Configuration) — Coded Value, 3 characters

TSTCFN describes the test setup. A vehicle-to-vehicle impact would be coded as VTV, for example.

### 2.2.1.10 TKSURF — Test Track Surface

(Test Track Surface) — Coded Value, 3 characters

TKSURF describes the test track surface. If a test is performed over a photo pit, the type of surface surrounding the pit, which would primarily affect post impact trajectories, is indicated.

### 2.2.1.11 TKCOND — Test Track Condition

(Test Track Condition) — Coded Value, 3 characters

TKCOND describes the test track condition.

### 2.2.1.12 TEMP — Ambient Temperature

(Ambient Temperature) — Bounded Integer, degrees Celsius, -99 to 99

TEMP is the temperature at the test location at the time of the test.

### 2.2.1.13 RECTYP — Type of Recorder

(Type of Recorder) — Coded Value, 3 characters

RECTYP is the type of data recorder being used in the test.

### 2.2.1.14 LINK — Data Link to Recorder

(Data Link to Recorder) — Coded Value, 3 characters

LINK is the type of connection from the transducer to the recorder.

### 2.2.1.15 CLSSPD — Closing Speed

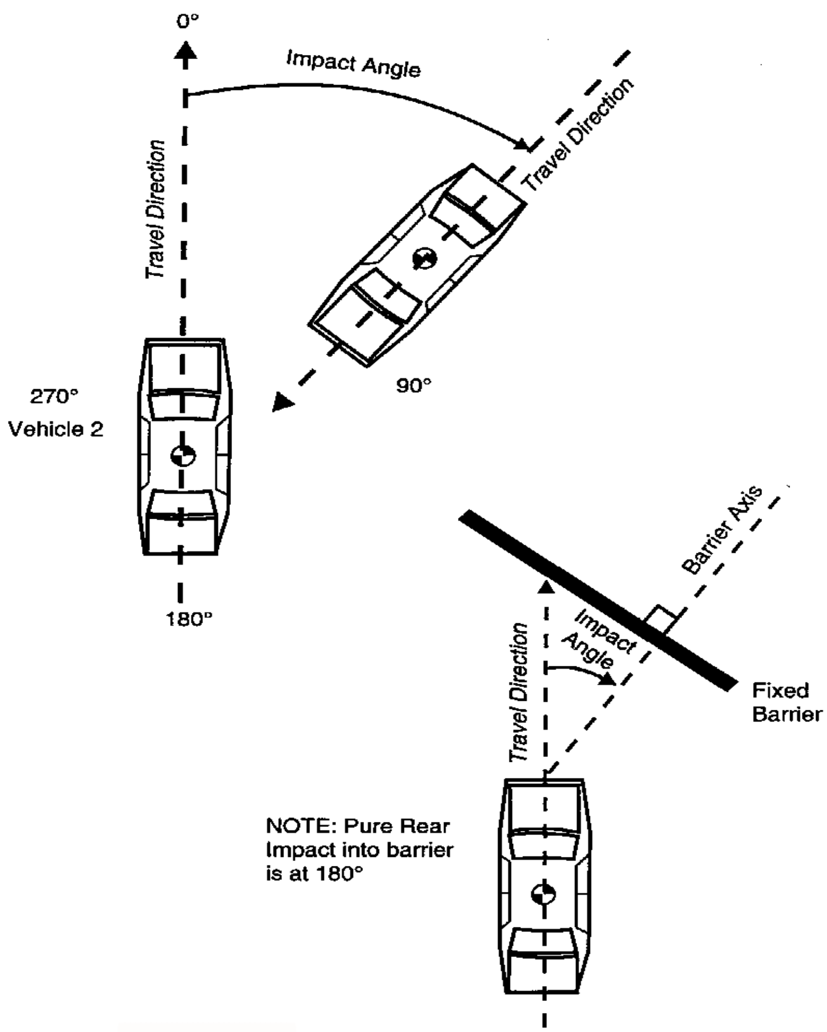
(Closing Speed) — Bounded Real, kilometers per hour, 0 to 200.00

CLSSPD is the actual (measured) closing speed reached by vehicle 1 before impact with a barrier. For two-vehicle impacts, CLSSPD is the velocity of approach of the two centers of gravity before contact

## 2.2.1.16 IMPANG — Impact Angle

(Impact Angle) — Bounded Integer, degrees, 0 to 360

IMPANG is the impact angle, measured as the magnitude of the angle between the longitudinal axis of vehicle 2 and the longitudinal axis of vehicle 1 or a barrier in a clockwise direction. A head-on impact is defined as 0 degrees and is the reference point for angle measurement. All impact angles are between 0 and 359 degrees, except rollover tests, for which IMPANG is coded 999.



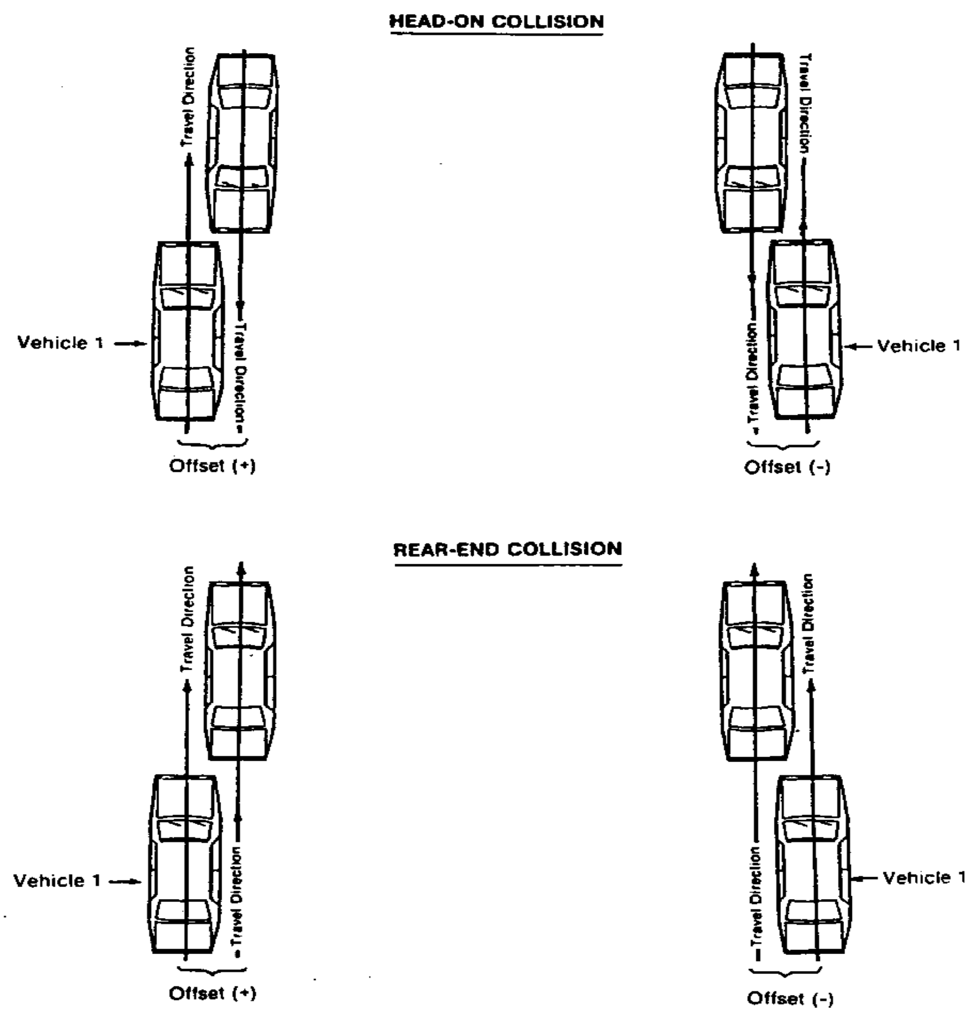

*Impact Angle (IMPANG)*

**Figure 2-2 IMPANG - Impact Angle**

### 2.2.1.17 OFFSET — Offset Distance

(Offset Distance) — Bounded Integer, millimeters, -9,999 to 9,999

OFFSET is the distance between the centerlines of a vehicle and another vehicle, an impactor, or a narrow, fixed object, such as a pole. Offset is applicable only in the case of frontal or rear end collisions and when the longitudinal axes of the vehicles or barrier are parallel. Offsets to the right of the centerline of vehicle 1 are defined to be positive whereas offsets to the left of the centerline of vehicle 1 are defined to be negative. The following figure shows samples of possible offsets. OFFSET is equal to 0.0 in the case of front-to-front or front-to-rear collisions in which no offset occurs. In the case of side impacts, OFFSET is NOT APPLICABLE and should be left blank.




*Offset Distance (OFFSET)*

**Figure 2-3 OFFSET - Offset Distance**

## 2.2.1.18 IMPPNT — Side Impact Point

(Side Impact Point) — Bounded Integer, millimeters, -9,999 to 9,999

IMPPNT is the point on the side of vehicle 2 where it is impacted by the longitudinal centerline of vehicle 1. The point of impact is measured from the center of gravity of vehicle 2.

This distance is positive when the point is in front of the center of gravity and negative when it is behind the center of gravity. The following figures shows an illustrative case, in which vehicle 2 is struck from both sides indicating both positive and negative IMPPNTs.

IMPPNT applies only to side collisions.

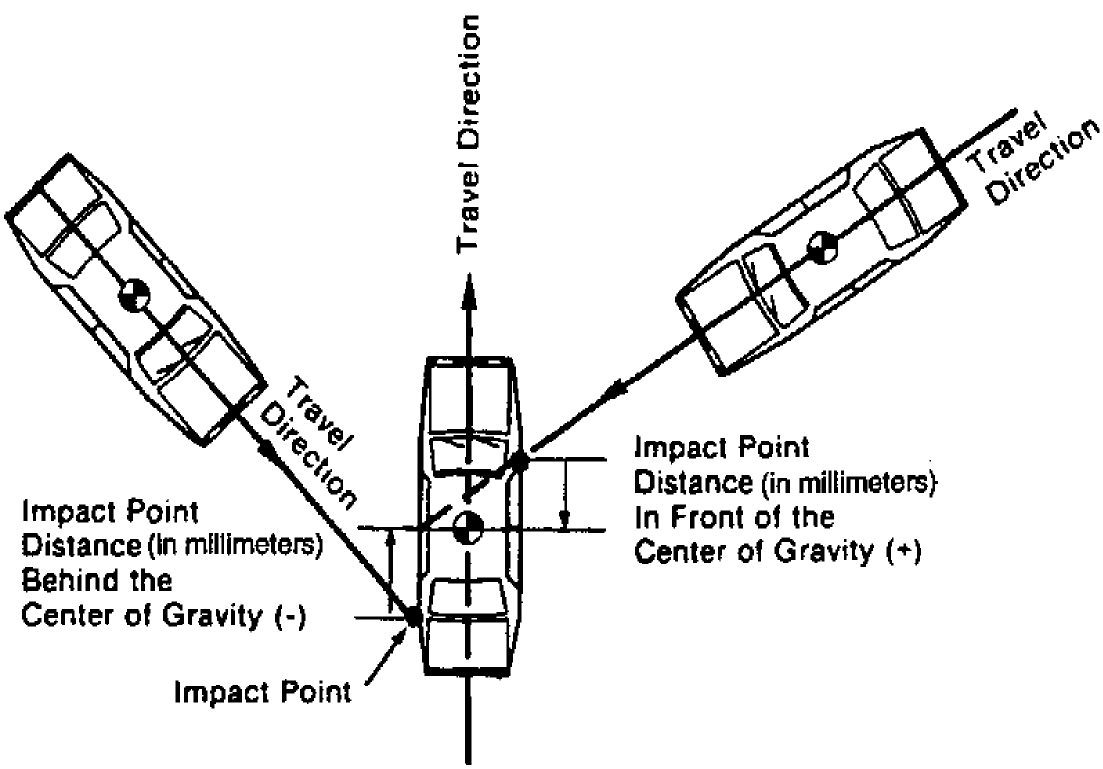



**Figure 2-4 IMPPNT - Side Impact Point**

### 2.2.1.19 TOTCRV — Total Number of Curves

(Number of Curves) — Bounded Integer, -9,999 to 9,999

TOTCRV is the total number of recorded instrument channels (curves) in the test.

### 2.2.1.20 TSTCOM — Test Commentary

(Test Comments) — Free Text, maximum length 70 characters

TSTCOM is the field used to describe any peripheral test information, for which a coded field does not exist, including anomalies or problems. The reason for coding OTHER or NOT APPLICABLE in any of the coded fields in this group should be recorded in this field as well. If no comments are to be made, code the field NO COMMENTS (left justified).

## *2.3 Vehicle Information*

The data elements defined below constitute the Vehicle Information group. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.3.1.1 VEHNO — Test Vehicle Identification Number

(Test Vehicle Number) — Bounded Integer, 1 to 2

VEHNO is the number that identifies the vehicle as 1 or 2. See the Introduction for an explanation of the numbering convention ("Conventions for Coding").

### 2.3.1.2 MAKE — Vehicle Make

(Vehicle Make) — Coded Value, 4 characters

MAKE is the manufacturer of the vehicle; for instance, 01 represents a Chevrolet.

### 2.3.1.3 MODEL — Vehicle Model

(Vehicle Model) — Coded Value, 4 characters

MODEL is the model of the vehicle (e.g. a value of 06 represents an Impala.) A model code cannot be input unless MAKE has a valid input.

### 2.3.1.4 YEAR — Vehicle Model Year

(Vehicle Model Year) — Integer, 4 characters

YEAR is the model year of the vehicle.

## 2.3.1.5 NHTSANO — NHTSA Number

(NHTSA Number) — Coded Value, 6 characters

NHTSANO is the NHTSA test vehicle numbering system, a six-character alphanumeric identifier assigned to NHTSA-owned vehicles for the purpose of tracking them through purchase, testing and disposal. A pre-assigned NHTSA number accompanies all vehicles delivered for testing under NHTSA contract.

The first character is alphabetic; prior to 2001, the first two characters were alphabetic. The first character indicates the purchasing office:

C – Compliance
D – Defects
M – Rulemaking
R – NHTSA Research and Development
T – TSP

The second character indicates the model year:

D – H: 1983
B: 1987
J – N: 1988 – 1992
P: 1993
R – T: 1994 – 1996
V – Y: 1997 – 2000
1 – 3: 2001 – 2003
etc.

The last four characters constitute a manufacturer code, and vehicles purchased go into a sequential order by office.

Examples:

Code 5100: Toyota

Code MX5104B: Fourth Toyota tested by Rulemaking (NCAP) in 1999

### 2.3.1.6 BODY — Body Type

(Body Type) — Coded Value, 2 characters

BODY is the body type of the vehicle. A four-door sedan would be coded as 4S.

### 2.3.1.7 VIN — Manufacturer Vehicle Identification Number

(Manufacturer VIN) — Free Text, maximum length 20 characters

VIN is the identification number of the vehicle that has been assigned by the manufacturer.

### 2.3.1.8 ENGINE — Engine Type

(Engine Type) — Coded Value, 4 characters

ENGINE represents the engine type of the vehicle. 4CEF would represent a four-cylinder inline front engine.

### 2.3.1.9 ENGDSP — Engine Displacement

(Engine Displacement) — Bounded Real, liters, 0.0 to 9,999.9

ENGDSP indicates the engine displacement within the vehicle, measured in liters - for instance, 2.2 LITERS.

### 2.3.1.10 TRANSM — Transmission Type

(Transmission Type) — Coded Value, 2 characters

TRANSM is the type of transmission in the vehicle.

### 2.3.1.11 VEHTWT — Vehicle Test Weight

(Vehicle Test Weight) — Bounded Integer, kilograms, 0 to 99,999

VEHTWT is the measured test weight of the vehicle or the impactor including all payload.

### 2.3.1.12 WHLBAS — Wheelbase

(Wheelbase) — Bounded Integer**,** millimeters**,** 0 to 99,999

WHLBAS is the measured or published value of the vehicle or impactor's wheelbase.

### 2.3.1.13 VEHLEN — Vehicle Length

(Vehicle Length) — Bounded Integer, millimeters, 0 to 99,999

VEHLEN is the measured or published value for the length of the vehicle or impactor.

### 2.3.1.14 VEHWID — Vehicle Width

(Vehicle Width) — Bounded Integer, millimeters, 0 to 9,999

VEHWID is the measured or published maximum width of the vehicle or impactor.

### 2.3.1.15 VEHCG — Vehicle Center of Gravity Distance Behind Front Axle

(Vehicle Center of Gravity) — Bounded Integer, millimeters, 0 to 9,999

VEHCG is the distance from the front axle to the center of gravity, measured along the longitudinal axis to the front axle of the vehicle or impactor. To calculate this distance value, multiply the weight on the rear wheels by the wheelbase and divide the product by the total weight.

### 2.3.1.16 STRSEP — Steering Column Shear Capsule Separation

(Steering Column Shear Capsule Separation) — Coded Value, 2 characters

STRSEP indicates the post-test degree or presence of steering column shear capsule separation in the vehicle. A code of SP would indicate that separation has occurred.

### 2.3.1.17 COLMEC — Steering Column Collapse Mechanism

(Steering Column Collapse Mechanism) — Coded Value, 3 characters

COLMEC is the steering column collapse mechanism of the vehicle. For example, convoluted tube would be coded as CON.

### 2.3.1.18 MODIND — Vehicle Modification Indicator

(Vehicle Modification Indicator) — Coded Value, 1 character

MODIND is the vehicle modification indicator of the vehicle; for instance, P would indicate an unmodified production vehicle.

### 2.3.1.19 MODDSC — Description of Vehicle Modification

(Description of Vehicle Modification) — Free Text, maximum length 70 characters

MODDSC is the description of modifications to the vehicle. Structural, interior, or restraint system modifications are described in this field. If the vehicle has not been modified in any way, enter UNMODIFIED.

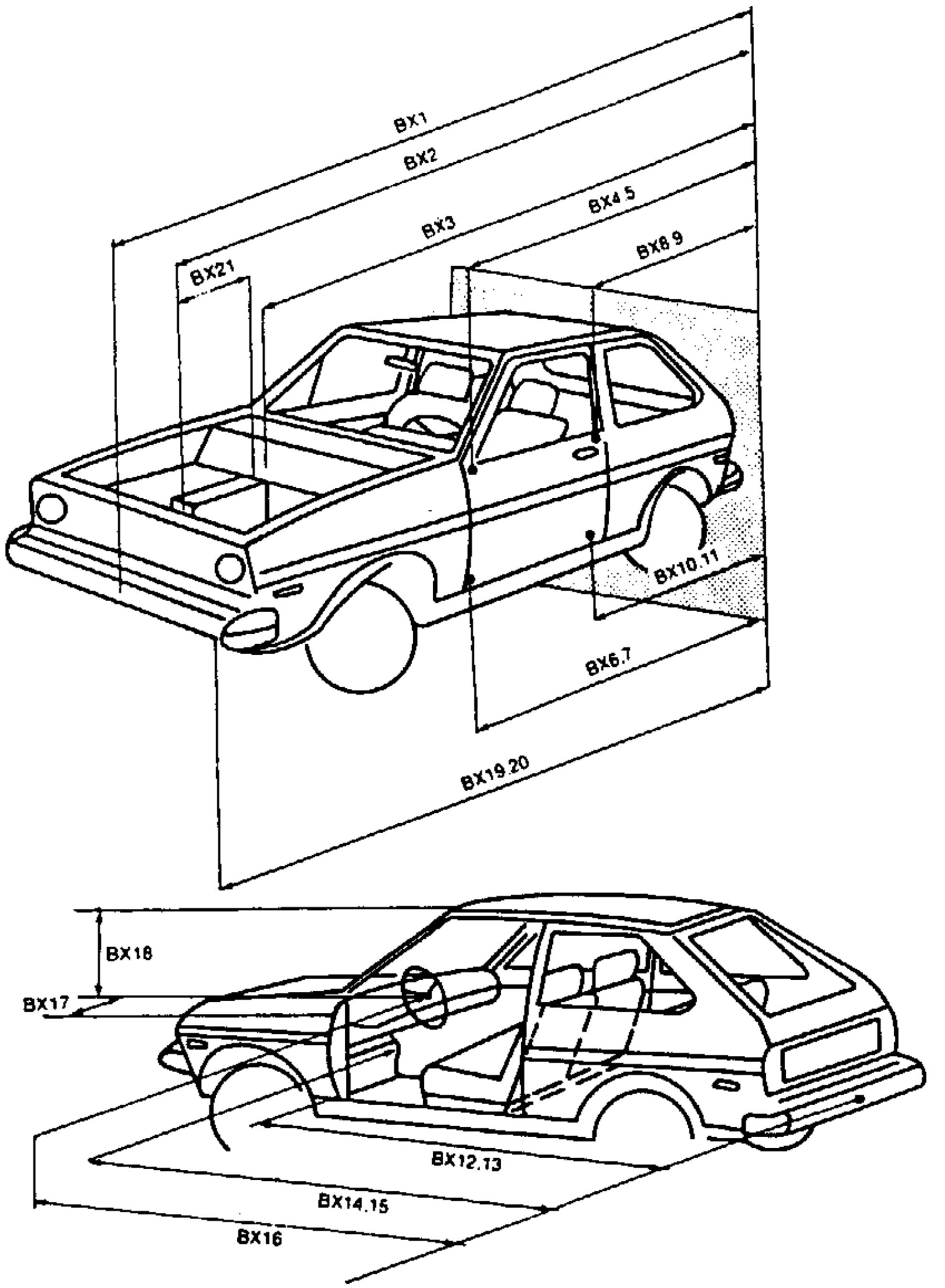
### 2.3.1.20 BX1 - BX21 — Pretest Vehicle Measurement Data

(Pop-up Dialog, Pretest Vehicle measurement Data) — Bounded Integer(s), millimeters, 0 to 9,999

The fields BX1 through BX21 represent a range of vehicle measurements required for determining the extent of damage to the vehicle. The measurements taken before testing are the length of the vehicle and distances between vehicle components:

**BX1** - Total Length of Vehicle at Centerline
**BX2** - Rear Surface of Vehicle to Front of Engine
**BX3** - Rear Surface of Vehicle to Firewall
**BX4** - Rear Surface of Vehicle to Upper Leading Edge of Right Door
**BX5** - Rear Surface of Vehicle to Upper Leading Edge of Left Door
**BX6** - Rear Surface of Vehicle to Lower Leading Edge of Right Door
**BX7** - Rear Surface of Vehicle to Lower Leading Edge of Left Door
**BX8** - Rear Surface of Vehicle to Upper Trailing Edge of Right Door
**BX9** - Rear Surface of Vehicle to Upper Trailing Edge of Left Door
**BX10** - Rear Surface of Vehicle to Lower Trailing Edge of Right Door
**BX11** - Rear Surface of Vehicle to Lower Trailing Edge of Left Door
**BX12** - Rear Surface of Vehicle to Bottom of A Post of Right Side
**BX13** - Rear Surface of Vehicle to Bottom of A Post of Left Side
**BX14** - Rear Surface of Vehicle to Firewall, Right Side
**BX15** - Rear Surface of Vehicle to Firewall, Left Side
**BX16** - Rear Surface of Vehicle to Steering Column
**BX17** - Center of Steering Column to A Post
**BX18** - Center of Steering Column to Headliner
**BX19** - Rear Surface of Vehicle to Right Side of Front Bumper
**BX20** - Rear Surface of Vehicle to Left Side of Front Bumper
**BX21** - Length of Engine Block

***Figure 2-5*** on the next page illustrates these measurements:




*Pretest Measurement Data (BX1 - BX21)*

**Figure 2-5 BX1 - BX21 - Pre-test Vehicle Measurement Data**

### 2.3.1.21 VEHSPD — Vehicle Speed

(Vehicle Speed) — Real, kilometers per hour

VEHSPD is the resultant speed of the vehicle immediately before impact.

### 2.3.1.22 CRBANG — Crabbed Angle

(Crabbed Angle) — Bounded Integer, degrees, 0 to 359

CRBANG is the magnitude of the crabbed angle measured clockwise from the longitudinal axis to the velocity vector of the vehicle. The angle is between 0 degrees and 359 degrees.

The crabbed angle will normally be 0 (forward motion) unless a special test method is employed to introduce an initial yaw. The following figure shows an example of CRBANG in which the direction of travel of the vehicle does not correspond to the longitudinal axis.

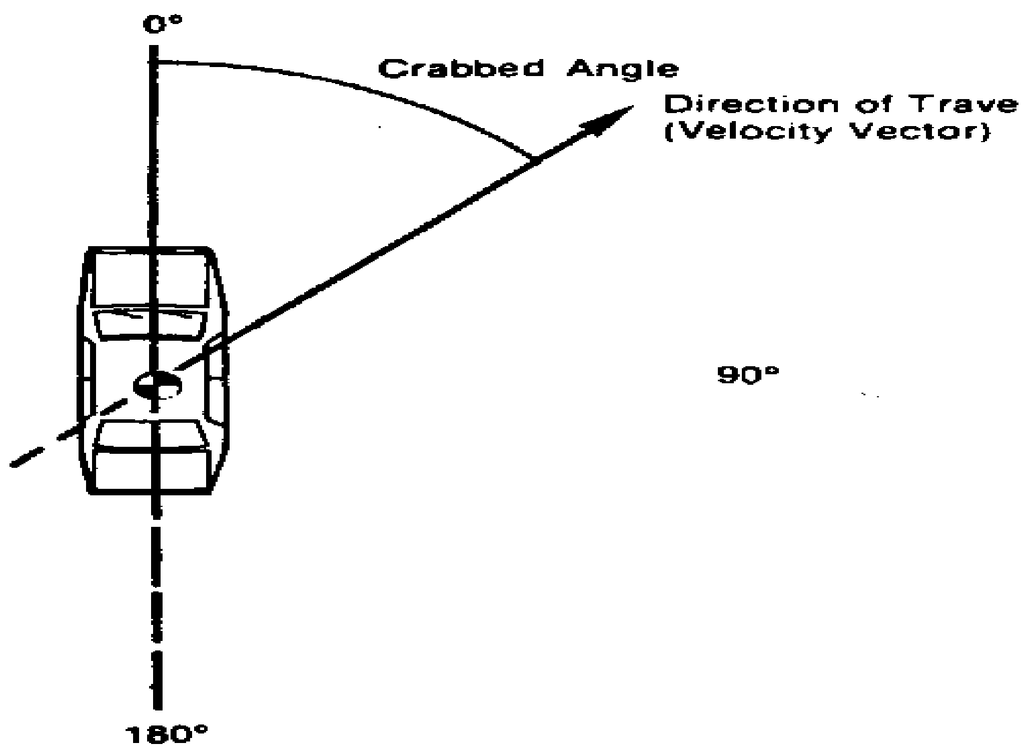



**Figure 2-6 CRBANG - Crabbed Angle**

## 2.3.1.23 PDOF — Principal Direction of Force

(Principal Direction of Force) — Bounded Integer, degrees, 0 to 359

PDOF is the angle (measured clockwise positive) between the vehicle's longitudinal axis and the impulse vector. The angle is between 0 degrees and 359 degrees.

The principal force is the resultant of forces acting on the vehicle at the point of application. The following figure shows an example of the impulse vector resulting from an impact to a forward-moving vehicle from the left side.

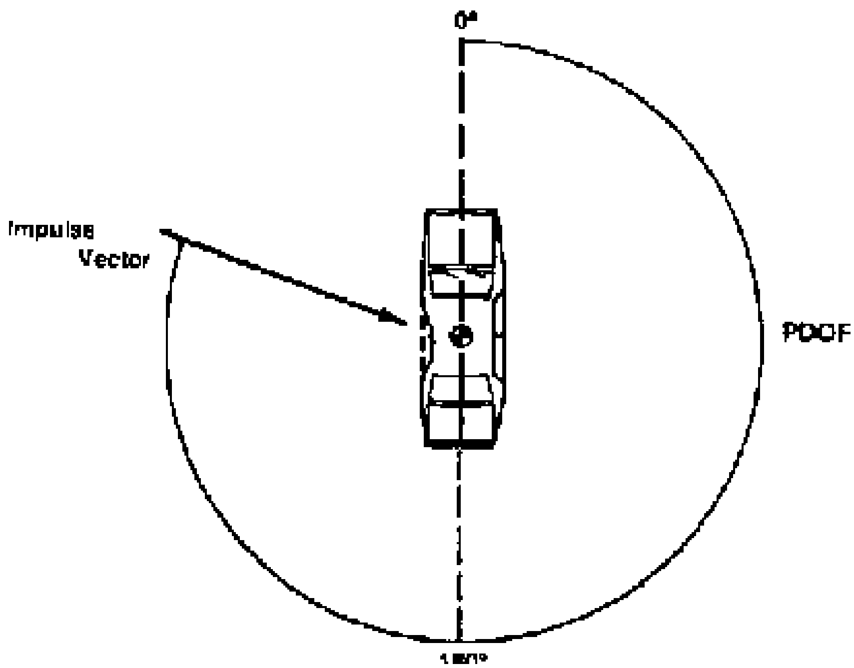



**Figure 2-7 PDOF - Principal Direction of Force**

## 2.3.1.24 BMPENG — Bumper Engagement

(Bumper Engagement) — Coded Value, 2 characters

BMPENG describes the bumper engagement of vehicle 1 and vehicle 2. BMPENG applies only to collisions in which two vehicles moving along the same longitudinal axis collide. A code of DE would indicate direct engagement of the bumpers.

### 2.3.1.25 SILENG — Sill Engagement

(Sill Engagement) — Coded Value, 2 characters

SILENG is the engagement of the side sill (rocker panel area) of vehicle 2 by the bumper of vehicle 1. SILENG applies only to side impacts.

### 2.3.1.26 APLENG — A-Pillar Engagement

(A-Pillar Engagement) — Coded Value, 2 characters

APLENG describes the engagement of the A-pillar of a vehicle that has been impacted from the side. APLENG applies only to side impacts.

### 2.3.1.27 DPD1-DPD6 — Damage Profile Distances

(Damage Profile Distances Pop-up Dialog) — Bounded Integer(s), millimeters, -9,999 to 9,999

***Figure 2-8*** and ***Figure 2-9***, shown on the following pages, illustrate the crush profile of the damaged vehicle. The dimensions of the crush are determined by finding the values of L, D, and the DPDs. L is the length of the damaged area. D is the distance from the midpoint of L to the vehicle center of gravity, measured laterally from the X-axis for frontal damage and longitudinally from the Y-axis for side damage. DPD (damage profile distance) specifies the depth of the crush. (L and D are represented elsewhere in the coding as LENCNT and DAMDST.)

The DPDs are a series of points that define the dimensions of the crush. Equally spaced, the DPDs represent damage profile distance points from which the depth of crush is measured. The depths are measured from the outline that the vehicle would follow were it not damaged to the final crushed position.

***Figure 2-8*** portrays the two dimensional coordinate system employed in estimating the crush dimensions. As an illustrative example, in ***Figure 2-8***, a vehicle has sustained frontal and right side damage.

To determine D for the right side damage, the length of the damage L, is measured and divided in half, to locate the midpoint of the damage; the distance from the midpoint of L to the lateral, or Y, axis is then measured to determine the value of D. To determine D for the frontal damage, L is measured and divided in half-, the distance from the midpoint of L to the longitudinal, or X, axis is measured, yielding the value of D.

***Figure 2-9*** shows DPD dimensions for frontal and right side damage. The DPDs are equally spaced along the length of L (L is divided into five equal parts if six points are necessary to estimate the damage; four points are used if the length of the damage is 400 mm or less.)

For side impacts, the six DPD measurements are numbered from the rear to the front. DPD I corresponds to the beginning of the damage. Unless the damage includes the rear comer of the vehicle, DPD I is 0.0. Unless the damage extends to the front comer, DPD 6 is 0.0. For front and rear damage, the DPD measurements are taken from the vehicle's left to the vehicle's right.

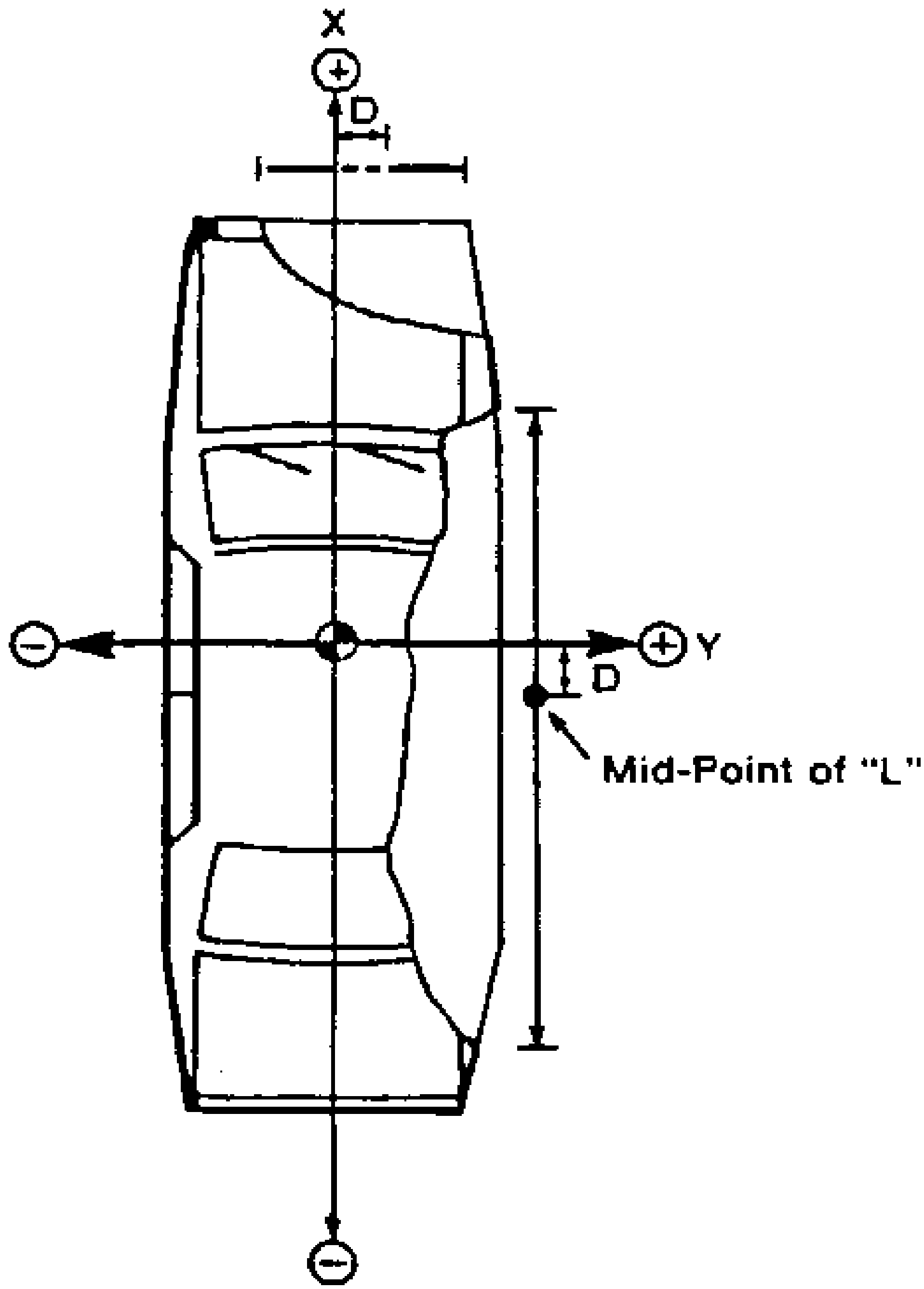



**Figure 2-8 DPD Coordinate System**

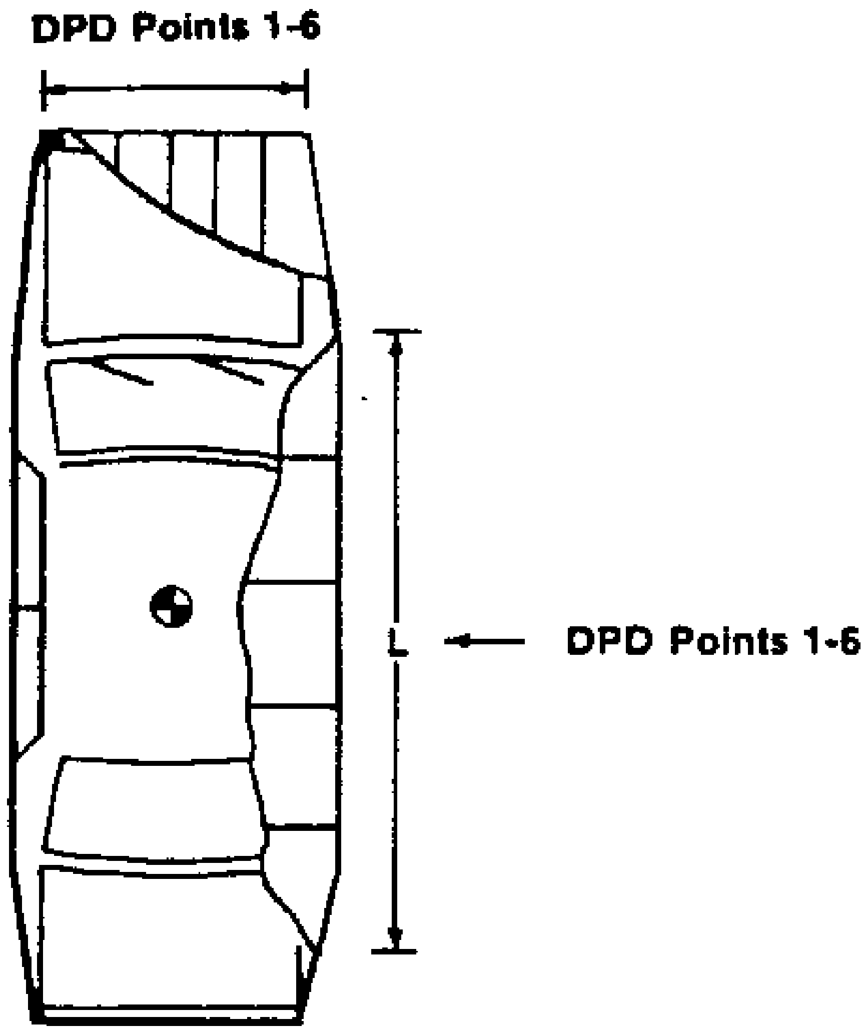



**Figure 2-9 DPD Dimensions for Frontal and Right Side Damage**

### 2.3.1.28 VDI — Vehicle Damage Index

(Collision Deformation Classification) (Vehicle Damage Index) — Free Text, fixed length, 7 characters

VDI is the vehicle damage index.

SAE Recommended Practice (SAE J224a), 'Collision Deformation Classification' uses this index, composed of seven categories of information, as a basis for uniformly classifying the extent of deformation caused in vehicle accidents.

### 2.3.1.29 LENCNT — Total Length of Indentation

(Total Length of Indentation) — Bounded Integer, millimeters, 0 to 99,999

LENCNT is the length of the total contact damage incurred by the vehicle. ***Figure 2-10***, on the next page, shows an example of how the total length of the indentation is the combination of direct and induced damage.

In that example, vehicle 1 impacts vehicle 2. The portion of vehicle 2 that is in direct contact with vehicle 1 represents the direct damage length; while the induced damage is that damage to vehicle 2 that results from the impact but that is not in direct contact with vehicle 1.

This definition for the total length of indentation is used except in the following examples:

If a vehicle impacts a vehicle or barrier at 0 degrees (full-frontal impact), the total length of indentation cannot be greater than the width of the vehicle.

If a narrow object, such as a pole, is impacted by a vehicle and the vehicle 'wraps around' the object such that the total length of indentation is less than the width of the object, then the corrected total length of indentation will be the width of the object.

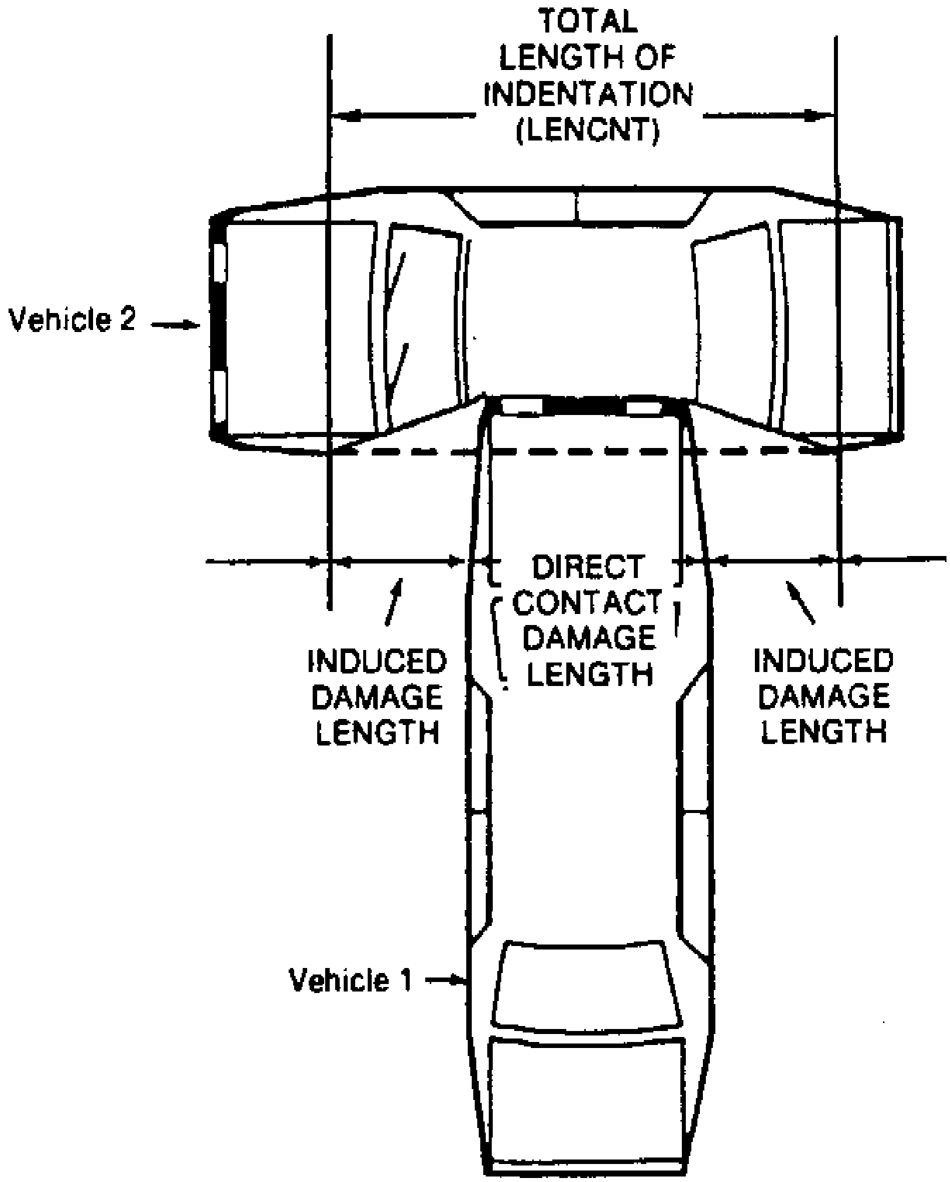



**Figure 2-10 LENCNT – Total Length of Indentation**

#### 2.3.1.30 DAMDST — Distance Between Center of Damaged Area and Center of Gravity Axis

(Damage Distance to Center of Gravity) — Integer, millimeters, 0 to 9,999

DAMDST is the distance between the center of the damaged area and the center of gravity axis. The measurement is made along the longitudinal axis for side damage and along the lateral axis for frontal damage.

If the center-most point of damage is to the right or front of the center of gravity, the distance is positive. If the center-most point of damage is to the left or rear of the center of gravity, the distance is negative. In estimating front or rear damage, assume that the center of gravity lies on the centerline.

#### 2.3.1.31 CRHDST — Maximum Crush Distance

(Maximum Crush Distance) — Bounded Integer, millimeters, 0 to 9,999

CRHDST indicates the maximum static crush distance (damage penetration), regardless of its location

### 2.3.1.32 AX1 - AX21 — Post-test Vehicle Measurement Data

(Post-Test Vehicle Measurement Data Pop-up Dialog) — Integer(s), millimeters

The fields AX1 through AX21 represent a range of vehicle measurements required for determining the extent of damage to the vehicle. The measurements taken after testing involve the length of the vehicle and distances between vehicle components:

**AX1** - Total Length of Vehicle at Centerline
**AX2** - Rear Surface of Vehicle to Front of Engine
**AX3** - Rear Surface of Vehicle to Firewall
**AX4** - Rear Surface of Vehicle to Upper Leading Edge of Right Door
**AX5** - Rear Surface of Vehicle to Upper Leading Edge of Left Door
**AX6** - Rear Surface of Vehicle to Lower Leading Edge of Right Door
**AX7** - Rear Surface of Vehicle to Lower Leading Edge of Left Door
**AX8** - Rear Surface of Vehicle to Upper Trailing Edge of Right Door
**AX9** - Rear Surface of Vehicle to Upper Trailing Edge of Left Door
**AX10** - Rear Surface of Vehicle to Lower Trailing Edge of Right Door
**AX11** - Rear Surface of Vehicle to Lower Trailing Edge of Left Door
**AX12** - Rear Surface of Vehicle to Bottom of A Post of Right Side
**AX13** - Rear Surface of Vehicle to Bottom of A Post of Left Side
**AX14** - Rear Surface of Vehicle to Firewall, Right Side
**AX15** - Rear Surface of Vehicle to Firewall, Left Side
**AX16** - Rear Surface of Vehicle to Steering Column
**AX17** - Center of Steering Column to A Post
**AX18** - Center of Steering Column to Headliner
**AX19** - Rear Surface of Vehicle to Right Side of Front Bumper
**AX20** - Rear Surface of Vehicle to Left Side of Front Bumper
**AX21** - Length of Engine Block

***Figure 2-11*** illustrates the post-test values for AX1 – AX21.

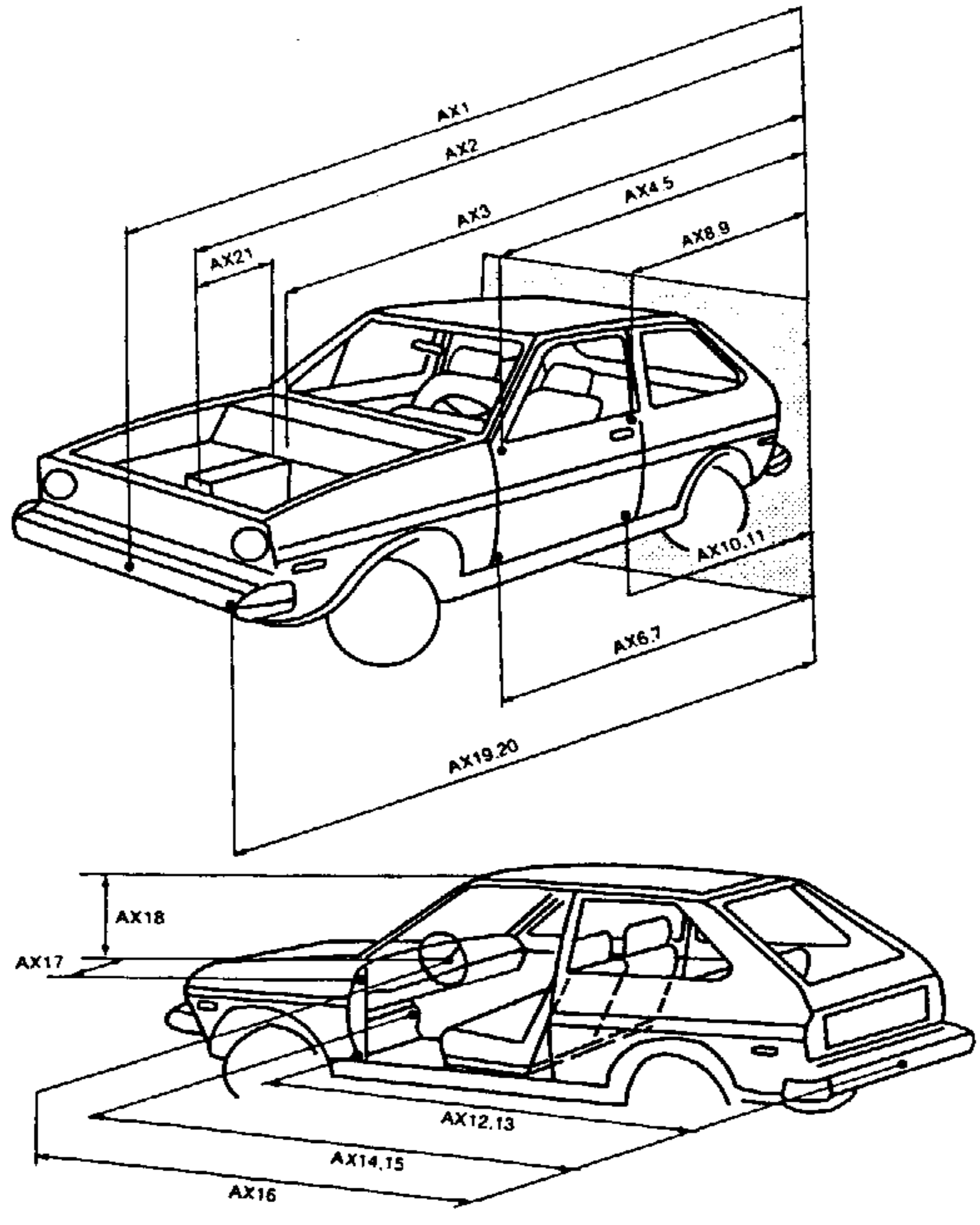



**Figure 2-11 AX1 - AX21 - Post-test Vehicle Measurement Data**

## 2.3.1.33 CARANG — Angle of Moving Test Cart

(Angle of Moving Test Car) — Bounded Integer, degrees, 0 to 359

CARANG is the magnitude of the angle between the surface of a rollover test cart and the ground. The standard angle specified in FMVSS 208 is 23 degrees.

## 2.3.1.34 VEHOR — Vehicle Orientation on Moving Cart

(Vehicle Orientation on Moving Cart) — Bounded Integer, degrees, 0 to 90

VEHOR is the magnitude of the angle of the vehicle orientation in relation to the test cart surface. If the vehicle is positioned sideways on the cart, the magnitude of the angle of orientation is defined as 90 degrees, according to FMVSS 208. The angle is between 0 degrees and 90 degrees, as illustrated in the figure below.

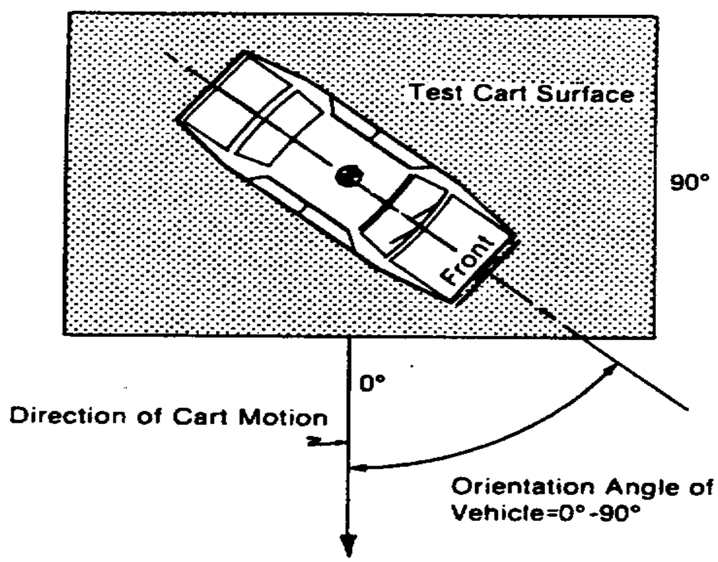



**Figure 2-12 VEHOR - Vehicle Orientation on Moving Cart**

## 2.3.1.35 VEHCOM — Vehicle Commentary

(Vehicle Comments) — Free Text, maximum length 70 characters

VEHCOM is used to describe any special features of the vehicle. The reason for coding any of the coded fields in this group OTHER or NOT APPLICABLE should be recorded in this field as well. If no comments are to be made, enter NO COMMENTS in this field.

## 2.4 Barrier Information

The data elements defined below constitute the Barrier Information group. These elements apply only to a fixed object that doesn't move, such as a bridge rail, a flat angled barrier, a flat barrier, a guard rail, a guard rail terminal; an impact attenuator, a load cell barrier, a luminare, a median barrier, a pole, a rollover ramp, or a sign support. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.4.1.1 BARRIG — Rigid or Deformable Barrier

(Barrier Deformable/Rigid) — Coded Value, 1 character

BARRIG indicates a rigid or deformable barrier.

### 2.4.1.2 BARSHP — Barrier Shape

(Barrier Shape) — Coded Value, 3 characters

BARSHP indicates the type of barrier.

### 2.4.1.3 BARANG — Angle of Fixed Barrier

(Contact Angle) — Bounded Integer, degrees, 0 to 90

BARANG is the magnitude of the angle between the vehicle path and the perpendicular to a barrier that is fixed and flat. If the vehicle path and the perpendicular are the same, the magnitude of the angle is 0. All other possibilities from 0 to 90 degrees are positive.

### 2.4.1.4 BARDIA — Diameter of Pole Barrier

(Pole Diameter) — Bounded Integer, millimeters, 0 to 9,999

BARDIA is the diameter of a pole barrier.

### 2.4.1.5 BARCOM — Barrier Commentary

(Barrier Comments) — Free Text, maximum length 70 characters

BARCOM is further commentary on a particular barrier test procedure. For instance, if the barrier is deformable, a brief indication of the design and force/deflection characteristics could be indicated here. The reason for coding any of the coded fields in this group OTHER or NOT APPLICABLE should be recorded in this field as well. If no comments are to be made, enter NO COMMENTS in this field.

## 2.5 Occupant Information

The data elements defined below constitute the Occupant Information group. This information group may be omitted from the data submission if no occupant was present for the test. The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.5.1.1 VEHNO — Test Vehicle Identification Number

(Test Vehicle Number) — Bounded Integer, 1 to 2

VEHNO is the number that identifies the vehicle containing the test occupant as 1 or 2.

### 2.5.1.2 OCCLOC — Occupant Location

(Occupant Location) — Coded Value, 2 characters

OCCLOC indicates the location of the test occupant in the vehicle. A code of 01 would be entered for a left front seat passenger (driver).

### 2.5.1.3 OCCTYP — Occupant Type

(Occupant Type) — Coded Value, 2 characters

OCCTYP is the type of test occupant, such as the type of dummy or other occupant including a cadaver or human volunteer. A code of SD would be used for an HSRI side impact dummy.

### 2.5.1.4 OCCAGE — Occupant Age

(Occupant Age) — Bounded Integer, 0 to 99

OCCAGE is the age of the non-dummy test occupant that applies to a cadaver or human volunteer.

### 2.5.1.5 OCCSEX — Occupant Sex

(Occupant Sex) — Coded Value, 1 character

OCCSEX is the sex of the test occupant, applicable to all test occupants except child dummies.

### 2.5.1.6 OCCHT — Occupant Height

(Occupant Height) — Bounded Integer, millimeters, 0 to 9,999

OCCHT is the height of the non-dummy test occupant, measured as the test occupant stands.

### 2.5.1.7 OCCWT — Occupant Weight

(Occupant Weight) — Bounded Integer, kilograms, 0 to 999

OCCWT is the weight of the non-dummy test occupant.

### 2.5.1.8 MTHCAL — Method of Calibration

(Method of Calibration) — Coded Value, 2 characters

MTHCAL indicates which method was used to calibrate the dummy test occupant. A standard Part 572 calibration would be coded as P5.

### 2.5.1.9 DUMSIZ — Dummy Size Percentile

(Dummy Size Percentile) — Coded Value, 2 characters

DUMSIZ indicates the size of the dummy test occupant, measured either as a standard size percentile or by age classification for child dummies.

### 2.5.1.10 DUMMAN — Dummy Manufacturer

(Dummy Manufacturer) — Free Text, maximum length 70 characters

DUMMAN is the manufacturer and the serial number of the dummy occupant. The information should be entered as MFG: (manufacturer's name), S/N (dummy serial number).

### 2.5.1.11 DUMMOD — Dummy Modification

(Dummy Modification) — Free Text, maximum length 70 characters

DUMMOD is the description of the modifications to a prototype dummy test occupant. If no modifications were made, enter UNMODIFIED.

#### 2.5.1.12 DUMDSC — Description of the Dummy

(Description of the Dummy) — Free Text, maximum length 70 characters

DUMDSC is the description of the calibration and substitution of parts in a dummy test occupant. If no comments are to be made, enter NO COMMENTS in this field.

### 2.5-2 CLEARANCE DISTANCES - Clearance Distances Between Test Occupant and Vehicle Components

(Clearance Distances) — Bounded Integer(s), millimeters, 0 to 9,999

Clearance distances are the distances between the test occupant and the interior components of the vehicle before the test is conducted. Each dimension is generally defined below and illustrated in ***Figure 2-13*** and ***Figure 2-14*** for front and rear seat test occupants, respectively.

#### 2.5.2.1 HH — Head to Windshield Header

Distance from the point where the nose meets the forehead (between the eyes) to the farthest point forward on the header. (Applicable to front seat occupants only.)

#### 2.5.2.2 HW — Head to Windshield

Horizontal distance from the point where the nose meets the forehead (between the eyes) to the point on the windshield immediately in front of the test occupant. (Applicable to front seat occupants only.)

#### 2.5.2.3 HR — Head to Side Header

The shortest distance from the point where the nose meets the forehead (between the eyes) to the header (or pillar) immediately to the side of the test occupant. (Applicable to front and rear seat occupants.)

#### 2.5.2.4 HS — Head to Side Window

Horizontal distance from the point where the nose meets the forehead (between the eyes) to the point on the window (or pillar) immediately to the side of the test occupant. (Applicable to front and rear seat occupants.)

#### 2.5.2.5 CD — Chest to Dash

Horizontal distance from the chest of the test occupant (near the sternum) to the dash-panel (Applicable to front seat occupants only.)

#### 2.5.2.6 CS — Chest to Steering Wheel

Distance from the chest (near the sternum) to the hub of the steering wheel for a test occupant seated in the driver's position. (Applicable to front seat driver side occupants only.)

#### 2.5.2.7 AD — Arm to Door

Horizontal distance from the midpoint of the upper arm to the door or the side of the vehicle immediately to the side of the test occupant (Applicable to front and rear seat occupants.)

#### 2.5.2.8 HD — Hip to Door

Horizontal distance from the hip (H-point) to the door or the side of the vehicle immediately to the side of the test occupant (Applicable to front and rear seat occupants.)

#### 2.5.2.9 KD — Knees to Dash

The shortest distance from the center of the knee pivot bolt's outer surface to the lower dash panel immediately in front of the test occupant. (Applicable to front seat occupants only.)

#### 2.5.2.10 HB — Head to Seatback

The horizontal distance from the point where the nose meets the forehead (between the eyes) to the seatback immediately in front of the test occupant. (Applicable to rear seat occupant only.)

#### 2.5.2.11 NB — Neck to Seatback

Horizontal distance from the neck to the seatback immediately in front of the test occupant. (Applicable to rear seat occupants only.)

#### 2.5.2.12 CB — Chest to Seatback

Horizontal distance from the chest (near the sternum) to the seatback immediately in front of the test occupant (Applicable to rear seat occupants only.)

#### 2.5.2.13 KB — Knee to Seatback

Horizontal distance from the center of the knee pivot bolt's outer surface to the back of the front seat (Applicable to rear seat occupants only.)

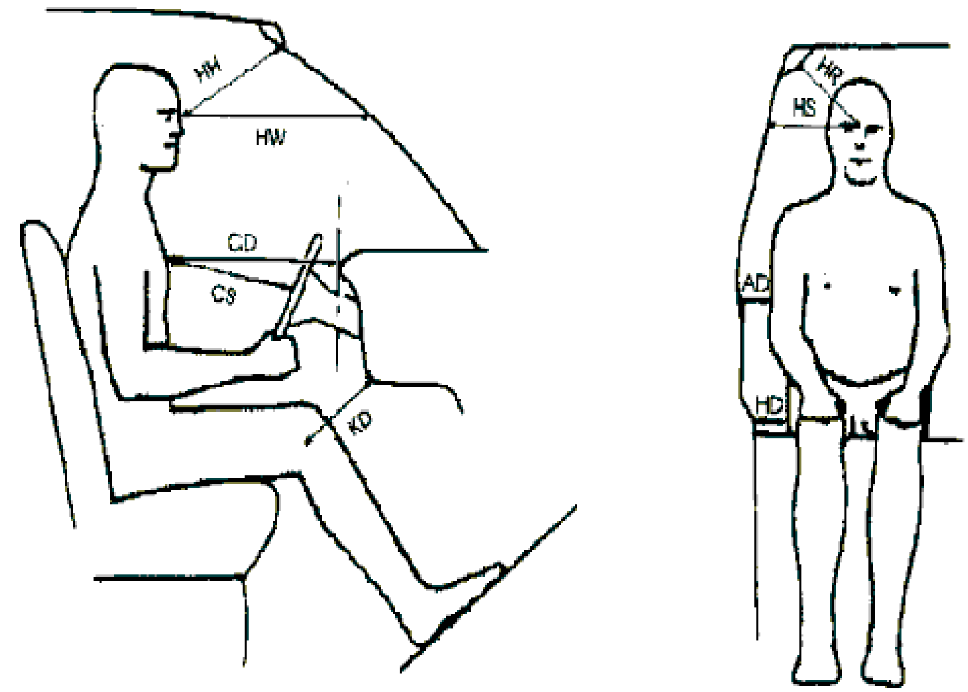



**Figure 2-13 Front Seat Occupant Clearance Distances**

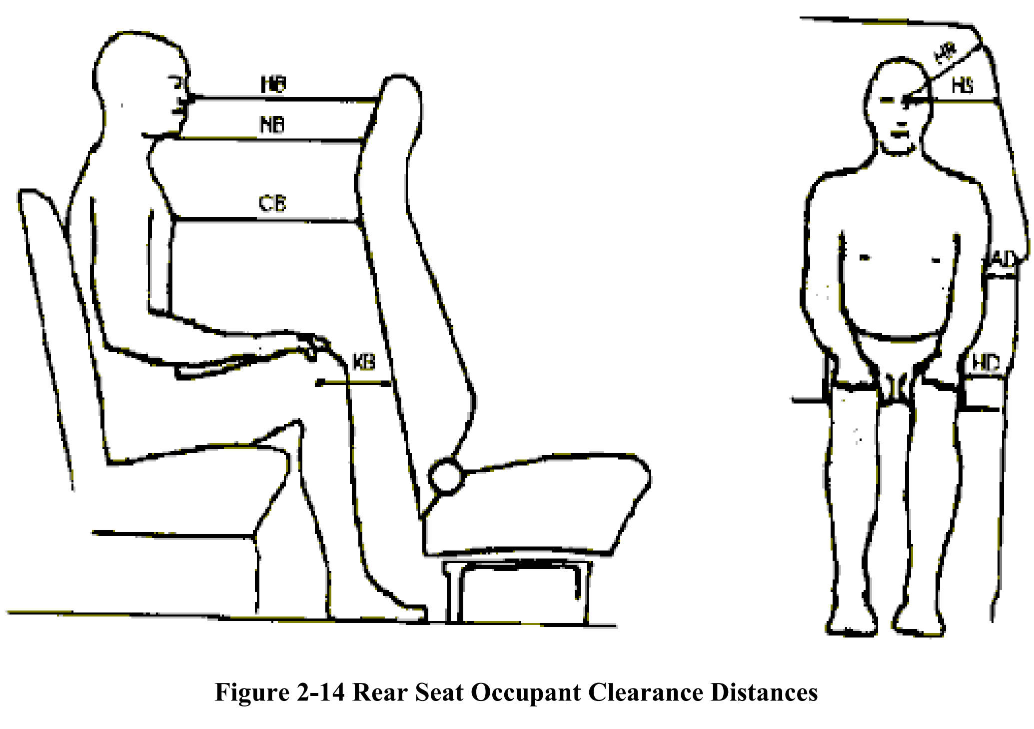



**Figure 2-14 Rear Seat Occupant Clearance Distances**

### 2.5.2.14 SEPOSN — Seat Position

(Seat Position) — Coded Value, 2 characters

SEPOSN is the position of the seat at the initiation of the test.

### 2.5.2.15 CNTRH1 — First Contact Region for Head

(First Head Contact Region) — Coded Value, 2 characters

CNTRH1 is the first point of contact for the test occupant's head.

### 2.5.2.16 CNTRH2 — Second Contact Region for Head

(Second Head Contact Region) — Coded Value, 2 characters

CNTRH2 is the second point of contact for the test occupant's head.

### 2.5.2.17 CNTRC1 — First Contact Region for Chest or Abdomen

(First Chest Contact Region) — Coded Value, 2 characters

CNTRC1 is the first point of contact for the test occupant's chest or abdomen.

### 2.5.2.18 CNTRC2 — Second Contact Region for Chest or Abdomen

(Second Chest Contact Region) — Coded Value, 2 characters

CNTRC2 is the second point of contact for the test occupant's chest or abdomen.

### 2.5.2.19 CNTRL1 — First Contact Region for Legs

(First Leg Contact Region) — Coded Value, 2 characters

CNTRL1 is the first point of contact for the test occupant's legs.

### 2.5.2.20 CNTRL2 — Second Contact Region for Legs

(Second Leg Contact Region) — Coded Value, 2 characters

CNTRL2 is the second point of contact for the test occupant's legs.

### 2.5.2.21 HIC — Head Injury Criterion

(Injury Measures: Head Injury Criterion) — Bounded Integer, 0 to 9,999

HIC is the computed value of the head injury criterion, based on the resultant acceleration pulse for the head center of gravity. In computing this value, the contractor shall use the HIC algorithm supplied by NHTSA.

### 2.5.2.22 T1 — Lower Boundary of HIC Time Interval

(Injury Measures: HIC Time Interval (lower boundary)) — Bounded Real, milliseconds, 0 to 999,999 (max)

T1 is the lower boundary of the time interval over which the HIC was computed.

### 2.5.2.23 T2 — Upper Boundary of HIC Time Interval

(Injury Measures: HIC Time Interval (upper boundary)) — Bounded Real, milliseconds, 0 to 999,999 (max)

T2 is the upper boundary of the time interval over which the HIC was computed.

### 2.5.2.24 CLIP3M — Thorax Region Peak Acceleration Measurement

**(**Peak Loads Pop-Up Dialog: Peak Acceleration of Thorax Region) — Bounded Real, g’s, 0 to 99,999

CLIP3M is the maximum 3-millisecond 'clip' value of the chest resultant acceleration, in g's, after filtering with a Class 180 filter (300 Hz Butterworth, low pass, refer to SAE Standard J211 B). In computing the CLIP3M measurement, the contractor shall use the 'clip' algorithm supplied by NHTSA.

### 2.5.2.25 LFEM — Left Femur Peak Load Measurement

(Peak Loads Pop-Up Dialog: Left Femur) — Bounded Integer, Newtons, -99,999 to 0

LFEM indicates the maximum compression load for the left femur. Listed as a negative number.

### 2.5.2.26 RFEM — Right Femur Peak Load Measurement

(Peak Loads Pop-Up Dialog: Right Femur) — Bounded Integer, Newtons, -99,999 to 0

RFEM indicates the maximum compression load for the right femur. Listed as a negative number.

### 2.5.2.27 CSI — Chest Severity Index

(Injury Measures: Chest Severity Index) — Bounded Integer, 0 to 99,999

CSI indicates the computed value of the chest severity index.

### 2.5.2.28 LBELT — Lap Belt Peak Load Measurement

(Peak Loads Pop-Up Dialog: Lap Belt) — Bounded Integer, Newtons, 0 to 99,999

LBELT indicates the maximum tension load on the lap belt

### 2.5.2.29 SBELT — Shoulder Belt Peak Load Measurement

(Peak Loads Pop-Up Dialog, Shoulder Belt) — Bounded Integer, Newtons, 0 to 99,999

SBELT indicates the maximum tension load on the shoulder belt.

### 2.5.2.30 TTI — Thoracic Trauma Index

(Injury Measures Pop-Up Dialog, Thoracic Trauma Index) — Bounded Real, 0 to 99,999

TTI is the thoracic trauma index value. For a dummy, TTI(d) is computed from the maximum rib and lower spine peak accelerations. In computing this value, the contractor shall use the TTI algorithm supplied by NHTSA.

### 2.5.2.31 PELVG — Pelvic G's

(Injury Measures Pop-Up Dialog, Pelvic G's) — Bounded Real, 0 to 99,999

PELVG, the pelvis injury criterion, is the peak lateral acceleration on the pelvis. It is obtained after filtering with the FIR100 filtering software supplied by NHTSA.

### 2.5.2.32 OCCCOM — Occupant Commentary

(Occupant Comments) — Free Text, maximum length 70 characters

OCCCOM is used to describe any distinguishing features of the test occupant. The reason for coding any of the coded fields in this group OTHER or NOT APPLICABLE should be recorded in this field as well. If no comments are to be made, enter NO.

## 2.6 Occupant Restraints Information

The data elements defined below comprise the Occupant Restraints Information group. Restraint information is required for each test occupant. For unrestrained occupants, RESTYP = NON. Belts should be coded only if they were used in the test. Inflatable restraints should be coded whether the test resulted in deployment or not. If an occupant is protected by three restraints, e.g. a 3-point belt, and front and side air bags, three restraint records should be generated for that occupant.

The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.6.1.1 VEHNO — Test Vehicle Identification Number

(Vehicle Number) — Bounded Integer, 1 to 2

VEHNO is the number that identifies the vehicle containing the test occupant as 1 (striking vehicle) or 2 (target vehicle).

### 2.6.1.2 OCCLOC — Occupant Location

(Occupant Location) — Coded Value, 2 characters

OCCLOC indicates the location of the test occupant within the vehicle. A code of 01 would be entered for a left front seat driver.

### 2.6.1.3 RSTNO — Restraint Number

(Restraint Number) — Bounded Integer, 1 to 9

RSTNO is the sequential number assigned to each restraint system in use for a given occupant at the time of the test. RSTNO = 1 for the first restraint listed for each occupant.

### 2.6.1.4 RSTTYP — Restraint Type

(Restraint Type) — Coded Value, fixed length, 3 characters

RSTTYP is the type of restraint system in use at a given occupant location. Inflatable restraints are considered to be “in use” for occupied seating positions.

### 2.6.1.5 RSTMNT — Restraint Mount

(Restraint Mount) — Coded Value, 2 characters

RSTMNT indicates the interior component(s) to which the restraint is mounted or from which it originates. For a driver frontal air bag, RSTMNT is the steering wheel hub (SH). Side air bags/air belts could be mounted in the seatback (SB), door (DR), or side header (HS).

### 2.6.1.6 DEPLOY — Inflator/Belt Pre-tensioner Deployment

(Inflator/Belt Pre-tensioner Deployment) — Coded Value, 2 characters

DEPLOY describes the deployment performance of inflatable restraints or the firing of the belt pre-tensioner during the test.

### 2.6.1.7 RSTCOM — Restraint Commentary

(Restraint Comments) — Free Text, maximum length 70 characters

RSTCOM is used to describe any distinguishing features of the restraint system. If OTHER is used to code the any of the restraint system fields, descriptive information may be added here. If no comments are to be made, enter NO COMMENTS here.

## 2.7 Instrumentation Information

The data elements defined below constitute the Instrumentation Information group.

Approximately twenty milliseconds of data prior to time zero should come with all measurement data; data shall meet the class 1000 specifications of the SAE J211 recommendation; and all data should be truncated at a common time value to avoid extending the pulse well past the period of significant activity.

The minimum sample rate shall be 10000 Hz. A sample rate should be chosen such that the DELT value does not have to be rounded off.

The information includes the field order index, the variable name, (the application label associated with the variable), and a brief description of the data type and valid data range.

### 2.7.1.1 VEHNO — Test Vehicle Identification Number

(Test Vehicle Number) — Bounded Integer, 0 to 2

VEHNO is the number that identifies the vehicle containing the sensor as 1 or 2. VEHNO should be coded 0 if the sensor is attached to a barrier.

### 2.7.1.2 CURNO — Curve Number

(Curve Number) — Bounded Integer, 1 to 200

CURNO is the sequential number (1,2,3…) assigned to a specific sensor and data curve.

### 2.7.1.3 SENTYP — Sensor Type

(Sensor Type) — Coded Value, 2 characters

SENTYP indicates the type of sensor used for collecting the measurements at the time of the test, such as AC for accelerometer.

### 2.7.1.4 SENLOC — Sensor Location

(Sensor Location) — Coded Value, 2 characters

SENLOC indicates the location of the test occupant or corresponding occupant restraint to which the sensor is attached. SENLOC should correspond to a previously entered value of OCCLOC.

#### 2.7.1.5 SENATT — Sensor Attachment

(Sensor Attachment) — Coded Value, 6 characters

SENATT indicates where the sensor is attached. For example, the code APLR would be entered for an attachment on the right A-pillar.

#### 2.7.1.6 AXIS — Axis Direction of the Sensor

(Axis) — Coded Value, 2 characters

AXIS is the axis direction for sensors measuring vector quantities. The global coordinate systems are vehicle fixed; the local systems are local within the vehicle global system. With respect to the vehicle longitudinal axis, X is positive forward, Y is positive right, (toward the passenger's door) and Z is positive down. These can differ depending on the component. For example, with the steering assembly, positive X is down the column axis and Y is positive right (toward the passenger's door).

AXIS is always applicable when the measurement is a vector quantity (acceleration, force, velocity, and so forth). Refer to ***Appendix A: Data Coordinate System*** for additional information. Note that the head accelerometer array is a local coordinate system. The distance, d, is the length of the arm between HD90 and HD9Y, measured along the Y arm. The reporting of this value of d is described in the INSCOM field. The length of the X arm and the Z arm are reported in the same manner. All signals from anatomical sensors, (HDCG, etc.), are local coordinate systems.

#### 2.7.1.7 XUNITS — Time Units or 'Independent Axis' Units

(X Units) — Coded Value, 3 characters

XUNITS indicates either the unit of time for time series sensor data (e.g. 'SEC'), or the units of the independent coordinate of a non-time series signal (e.g. If a load is applied in a controlled fashion to produce a deflection, the load is the independent coordinate, and the deflection is the dependent coordinate). ***Table 2-3*** lists admissible unit codes.

| UNIT | DESCRIPTION | COMMENT |
|---|---|---|
| CEN | DEGREES CELSIUS | TEMPERATURE |
| DEC | DECIBELS | NOISE |
| DEG | DEGREES | ANGULAR DISPLACEMENT |
| DP2 | DEGREES/SEC $^{2}$ | ANGULAR ACCELERATION |
| DPS | DEGREES/SEC | ANGULAR VELOCITY |
| G'S | G'S | ACCELERATION |
| KPA | KILOPASCALS AB | PRESSURE - ABSOLUTE |
| KPG | KILOPASCALS GA | PRESSURE - GAUGE |
| KPH | KILOMETERS/HOUR | VELOCITY |
| MM | MILLIMETERS | DISPLACEMENT |
| MPM | MICROMET/MET | STRAIN |
| NON | DIMENSIONLESS | DIMENSIONLESS |
| NSC | NEWTON-SECONDS | IMPULSE |
| NWM | NEWTON-METERS | MOMENT |
| NWT | NEWTONS | FORCE |
| OTH | OTHER | OTHER |
| PST | PERCENT STRAIN | STRAIN |
| RMM | RECIPROCAL MM | CURVATURE |
| SEC | SECONDS | TIME |
| VOL | VOLTS | VOLTAGE |

**Table 2-3 XUNITS / YUNITS – Acceptable Values**

### 2.7.1.8 YUNITS — Data Measurement Units

(Y Units) — Coded Value, 3 characters

YUNITS indicates the units used to measure the signal of the sensor data. ***Table 2-3*** lists admissible unit codes.

### 2.7.1.9 PREFIL — Pre-filter Frequency

(Pre-filter Frequency) — Bounded Integer, 0 to 99,999

PREFIL is the cutoff frequency in Hz of a low-pass filter (digital or analog) applied to the signal. This frequency is defined as where filter gain equals 70 percent (-3db.)

### 2.7.1.10 INSMAN — Manufacturer of the Instrument

(Instrument Manufacturer) — Free Text, maximum length 70 characters

INSMAN describes the manufacturer of the instrument. The model and serial number should also be included. The format for this field should be: MFG: manufacturer name, S/N: serial number.

#### 2.7.1.11 CALDAT — Calibration Date

(Calibration Date) — Date

CALDAT is the most recent calibration date of the instrument.

#### 2.7.1.12 INSRAT — Instrument Rating

(Instrument Rating) — Bounded Integer, - 999,999 to 999,999

INSRAT represents the maximum value that can be accurately measured by the recording system for a channel. INSRAT should be in the same units as the data channel, except in the case of barrier load cell data where the units of INSRAT are kilo-newtons.

#### 2.7.1.13 CHLMAX — Channel Maximum Rating

(Channel Maximum Rating) — Bounded Integer, 0 to 999

CHLMAX represents the full-scale value of the data based upon the actual test setup, including signal conditioning, as a percentage of INSRAT, and may exceed 100%.

#### 2.7.1.14 INIVEL — Initial Velocity

(Initial Velocity) — Bounded Real, kilometers per hour, - 200 to 200

INIVEL is the initial (time zero) velocity of the sensor along its axis and applies only to linear accelerometers. If the sensor is a load cell attached to a barrier, the entry for this field should be zero (0.0).

#### 2.7.1.15 NFP — Number of First Point

(First Point) — Bounded Integer, -10,000 to 0

NFP represents the index number of the first point in the data array (less than or equal to 0). Time zero always has an index number of 0. If no data exists prior to time zero, NFP is equal to 0; if 20 data points exist prior to time zero, NFP is equal to -20. There may never be more than 10,000 points before time zero.

### 2.7.1.16 NLP — Number of Last Point

(Last Point) — Bounded Integer, 0 to 99,999

NLP represents the index number of the last point in the data array. If 1,000 points were digitized, and NFP is equal to -100, then NLP is equal to 899. NLP can never be greater than 99,999.

### 2.7.1.17 DELT — Time Increment

(Time Step) — Bounded Integer, microseconds, 0 to 999,999

DELT is the time increment in microseconds between each data point. DELT is assumed to be constant for all data points for a given sensor (uniform sampling frequency).

### 2.7.1.18 DASTAT — Data Status

(Data Status) — Coded Value, 2 characters

DASTAT indicates the status of the data as it appears in the data submission. This field is used to indicate a signal which is invalid (code MN for meaningless), or which becomes questionable or invalid part of the way through a signal (code CF and explained in INSCOM). If a signal is computed, DASTAT is CM. An example of a computed signal would be the resultant acceleration or the rotational acceleration of the head measured with a nine linear accelerometer array.

### 2.7.1.19 CHSTAT — Channel Status

(Channel Status) — Coded Value, fixed length, 1 character

CHSTAT indicates whether the data channel is primary or redundant. If, for example, the dummy is instrumented with a backup tri-axial accelerometer in the head, the redundant channels should be labeled R. The occupant's HIC value would be calculated using the primary head channels, labeled P.

## 2.7.1.20 INSCOM — Instrumentation Commentary

(Instrumentation Comments) — Free Text, maximum length 70 characters

INSCOM is any further commentary on the instrumentation data, including any unusual conditions affecting the data or a reference to a document that describes problems with a particular curve. The reasons for coding any of the coded fields in this group OTHER or NOT APPLICABLE should be recorded in this field as well. If no comments are to be made, enter NO COMMENTS.

For Head 9 array accelerometers, INSCOM contains dimensions that precisely locate the given instrument. The HD90, X-axis accelerometer, will locate the center of the Head 9 array relative to the head CG; then the entry in INSCOM for HD90 would read: CG: X: 33MM, Y: 2.5MM, Z: -5.0 MM.

The X-axis of HD9Y, HD9X, and HD9Z will contain the distance, d (**See:** ***Figure A-3 Nine-Accelerometer Coordinate System***), which is the length of the arm. Units must be shown. For example, if the Y arm is 110 mm long, then the entry in INSCOM for HD9Y, X direction would read: Y-ARM: 110 MM.

# Chapter 3 : Test Report Format

A written report should be generated for each test to be submitted. This report shall be saved on the submission physical media under the directory:

\REPORT\

with the filename

R<TSTREF>.pdf

where <TSTREF> has the same value as TSTREF in ***Section 2.2 General Test Information*** of this guide.

The report shall preferably be in the Adobe PDF document format (www.adobe.com). Alternatively, a report may be submitted in Microsoft Word 97 or Microsoft Word 2000 format if the test site is unable to generate a PDF file.

At a minimum, each report shall contain the following information:

1) A cover page including,

   - Title of Study
   - Test Performer
   - Test Reference Number (EV5 specification file - field TSTREF)
   - Contract Number
   - Test Date

2) In the main body of the test report, the following items shall be included:

   - A text description and diagram/pictures of the test setup.
   - A table of all injury criteria reported in the EV5 specification file.
   - Description of camera views and type of media (film/video).
   - Information which could not be included in the EV5 specification file, and that the test engineer and/or COTR deem appropriate or important to mention.

3) In the report Appendix A, the following information shall be included

   - A diagram describing the coordinate system.
   - A table describing load cell manipulations for positive values.

4) In the report Appendix B, a plot of each curve submitted exactly as it should appear in the database. The plots will be compared with the signal data loaded into the database to ensure that the signals the test laboratory intends to enter into the NHTSA database are not corrupted during the submission and loading process. Each plot should display the maximum and minimum values of the signal and their respective event times.

5) In the report Appendix C, a list of the instrumentation associated with each channel, including transducer, sampling rate, signal conditioning, units and axis.

The COTR or test engineer is encouraged to include any other information that they feel is necessary to make the report meaningful. However, the COTR or test engineer may not eliminate any of five (5) minimum requirements outlined above.

# Chapter 4 : Pre- and Post-Event Images

Images and video captured before and after the test may be submitted whether they are digital images or processed film images.

## 4.1 Digital Images

Digital images and videos of the test before and after the event shall be submitted on the submission media as noted in ***Chapter 1 : Media Format and Layout***. Video files shall be submitted under the directory \PREPOST\VIDEOS. Still images shall be submitted under the directory \PREPOST \PHOTOS. File names should be descriptive. Naming convention is at the discretion of the COTR, with the exception that standard file extensions shall be applied to all files as appropriate to the content type of each file.

As an example, TIFF format image files should be named with a file extension of

***.tif***

while JPEG format image files should be named with a file extension of

***.jpg***

Digital images shall be submitted in one of the following formats: Windows bitmap (BMP), GIF, TIFF, or JPEG.

## 4.2 Processed Film Images

Hardcopy processed film images shall be included as an appendix in the report.

If you have data that you wish to submit but which is not specified in this guide, please send email to barbara.hennessey@nhtsa.dot.gov.

# Chapter 5 : Event Images, Film, and Video

The procedures for the capturing and formatting of images of the impact event are described below. Procedures for images captured by high-speed film and high-speed video are outlined below, as well as generic procedures for other event image types.

## 5.1 High-Speed Film

**NOTE:** This section describes procedures for capturing and submitting high-speed film, not digital video. Refer to ***Section 5.2 High-Speed Digital Video***, below, for high-speed video requirements.

### 5.1-1 Film Image Content

The only content requirements of the high-speed film camera image view specified in this guide are:

1) Somewhere in the image view there should be text denoting the TSTREF field from the EV5 specification file as described in Chapter 2.

2) Some type of visible time mark should be present to indicate time zero for the test. This time zero should correspond with the time zero on the data acquisition system.

3) Somewhere within the image, the time at which the image was captured shall also be displayed. Alternatively, the use of the LED timing mark available on most high-speed cameras is acceptable.

#### 5.1.1.1 Media Format

Processed film should be submitted to NHTSA with the test submission. Multiple camera angles may be submitted on a single reel, or multiple reels may be submitted.

## 5.2 High-Speed Digital Video

**NOTE:** This section describes procedures for capturing and submitting high-speed digital video, not film.

### 5.2-1 Video Image Content

The only content requirements of the high-speed video camera image view specified in this guide are:

1) Somewhere in the image view there should be text denoting the TSTREF field from the EV5 specification file as described in Chapter 2.

2) Some type of visible time mark should be present to indicate time zero for the test. This time zero should correspond with the time zero on the data acquisition system.

3) Somewhere within the image, the time at which the image was captured shall also be displayed.

### 5.2-2 High-Speed Digital Video Information File

The High-Speed Video Information File contains information about the data from each camera used in the test. The file is a delimited text file similar to the EV5 specification file (***Section 2.1-1 Specification Data***) containing the fields listed below. Values for TSTREF, VSCFACTOR, DESC, and COMMENT shall be written to an ASCII text file on single line, each field separated by a pipe ( '|' ) delimiter, in the order listed above. The line shall be terminated by a carriage return. Each line constitutes a single record, and records should be included in the High Speed Video information file for each camera sequence submitted. All entries shall be in uppercase. The High Speed Video Information File shall be named <TSTREF>.HS5.

#### 5.2.2.1 CAMNO — Camera Number

(Camera Number) — Bounded Integer, 0 to 99

#### 5.2.2.2 TSTREF — Test Reference Number

(Test Reference Number) — Free Text, maximum length 10 characters

This should be the same as the TSTREF in the EV5 specification file.

#### 5.2.2.3 VSCFACTOR — Video Frame Number Scale Factor

(Conversion Factor to Scale Video Frame Number) — Real, >=0

This is the scale factor to be applied against the integer frame number of a sequential image file, as described below, in order to convert the integer frame sequence value into a time value in seconds. A value of zero (0) may be entered if sequential frames are not stored at constant intervals of time as with force-deflection data.

#### 5.2.2.4 DESC — View Description

(Camera View Description) — Free Text, maximum length 70 characters

A description of the view of this high-speed video camera (example ‘front left view’, or ‘overhead view’)

#### 5.2.2.5 COMMENT — Camera Commentary

(Camera Commentary) — Free Text, maximum length 70 characters

Comment on this particular camera view.

### 5.2-3 Sequential Image and Movie Submission Format

High-speed video data should be submitted in two formats, sequential raster image files and AVI movies.

#### 5.2.3.1 Sequential Bitmap Image Files

Most high-speed video systems output sequential raster image files, with the frame number denoted within the filename of each file. Each file shall be numbered using the following file naming convention:

F<frame number>.<file format extension>

where

**<frame number>** is the integer sequential frame number of each image. A minus (-) should prefix the <frame number> for images captured before the start of the event.

**<file format extension>** is TIF for TIFF format image files, JPG for JPEG format image files, GIF for GIF format image files, and BMP for Windows bitmap files.

#### 5.2.3.2 AVI Files

For each camera view, AVI movie files shall be generated using a widely available codec agreed upon by the laboratory and the COTR. For help with codec selection, send email to nrd.softdev@nhtsa.dot.gov. Each AVI file shall use the following naming convention:

<TSTREF> C <CAMNO>.avi (no spaces in filename)

### 5.2-4 Media Format

All high-speed video files shall be stored in the directory \EVENT as described in ***Chapter 1 : Media Format and Layout*** of this guide.

The High-Speed Video Information File <TSTREF>.HS5 shall be stored in the directory \EVENT\HSVIDEO on the test submission media with the filename

High-speed video sequential raster image files and AVI movies shall be placed on the test submission media under \EVENT \HSVIDEO\CAMERA<CAMNO>\, where <CAMNO> is a sequential number assigned to each camera, further described in the HIGH-SPEED VIDEO INFORMATION FILE section above.

**Example:**

Test lab ABC conducted test T1234 that had 3 high-speed video cameras collecting images, each having views of an impact event from the top, right side, and front. Each camera captured TIFF images from -40 to +500 milliseconds in increments of one millisecond. The digital test submission media would have the following directories:

\EVENT\HSVIDEO\CAMERA1\
\EVENT\HSVIDEO\CAMERA2\
\EVENT\HSVIDEO\CAMERA3\

The following files would be included (**example only**):

| | |
|---|---|
| \EVENT\HSVIDEO\T1234.HS5 | (High Speed Video Information File) |
| \EVENT\HSVIDEO\CAMERA1\T1234C1.AVI | (AVI Movie File) |
| \EVENT\HSVIDEO\CAMERA1\F-40.TIF | (Sequential Bitmap Image File) |
| … | |
| \EVENT\HSVIDEO\CAMERA1\F0.TIF | (Sequential Bitmap Image File) |
| … | |
| \EVENT\HSVIDEO\CAMERA1\F500.TIF | (Sequential Bitmap Image File) |
| \EVENT\HSVIDEO\CAMERA2\T1234C2.AVI | |
| \EVENT\HSVIDEO\CAMERA2\F-40.TIF | |
| … | |

\EVENT\HSVIDEO\CAMERA2\F0.TIF
…
\EVENT\HSVIDEO\CAMERA2\F500.TIF
\EVENT\HSVIDEO\CAMERA3\T1234C2.AVI
\EVENT\HSVIDEO\CAMERA3\F-40.TIF
…
\EVENT\HSVIDEO\CAMERA3\F0.TIF
…
\EVENT\HSVIDEO\CAMERA3\F500.TIF

The contents of the High Speed Video information file named T1234.HS5 would be:

1|T1234|MILLISECONDS|TOP VIEW|NO COMMENTS
2|T1234|MILLISECONDS|RIGHT SIDE VIEW|NO COMMENTS
3|T1234|MILLISECONDS|FRONT VIEW|NO COMMENTS

## 5.3 Other Event Images

Other event images, such as BETA or VHS tapes, can be included in the test submission packet. Please send email to barbara.hennessey@nhtsa.dot.gov if you have any questions about submitting event images not specified in this guide.

# Appendix A: Data Coordinate System

Starting with Version 4 of the NHTSA Test Reference Guides, all submissions will conform to SAE J211/1 MAR95 Instrumentation for Impact Test. Please refer to SAE J211 for a complete description of the coordinate system and signal polarities for vehicle occupants.

## A-1. Using the Coordinate System Correctly

The rules for determining the sign conventions described below will enable anyone involved in NHTSA-sponsored testing to determine the proper sign and coordinate axis for any measured quantity.

All coordinate systems are orthogonal, three-dimensional, and right handed. The global coordinate systems for the vehicle and the test occupants are shown in ***Figure A-1*** and ***Figure A-2***. The coordinate system for the nine-accelerometer head array is shown in ***Figure A-3***, along with the proper SENATT codes. ***Table A-1*** lists the polarity of the sensor output from various dummy manipulations when using this coordinate system.

## A-2. Vehicle Global Coordinate System

- X is positive forward
- Y is positive right (toward the passenger side door)
- Z is positive down

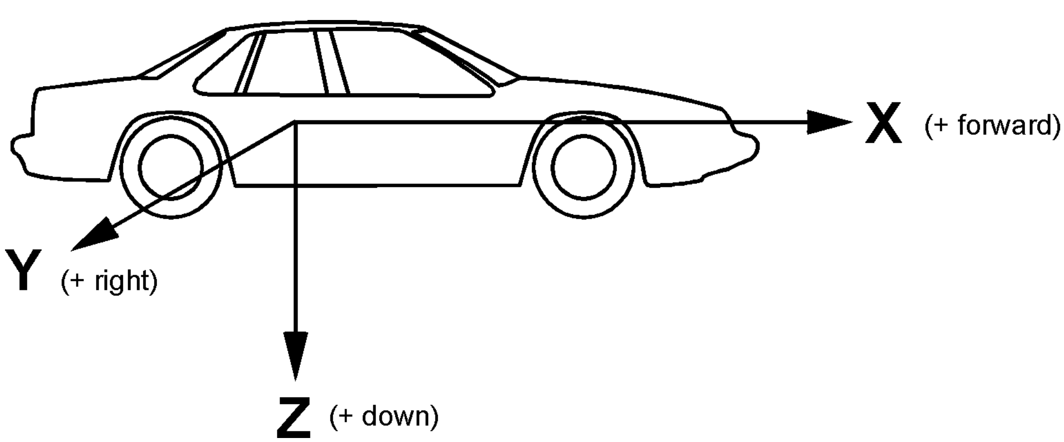



**Figure A-1 Vehicle Global Coordinate System**

## *A-3. Occupant Global Coordinate System*

- X is positive forward (posterior to anterior)
- Y is positive right
- Z is positive down

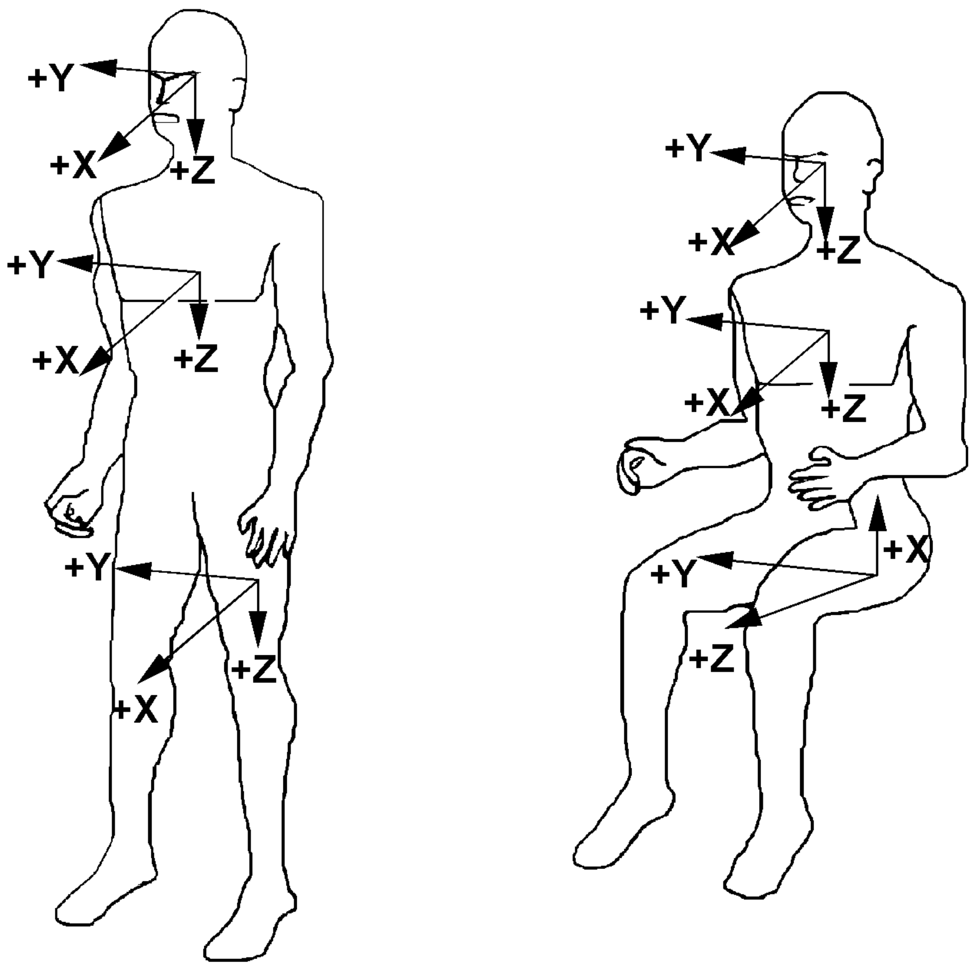



**Figure A-2 Occupant Global Coordinate System**

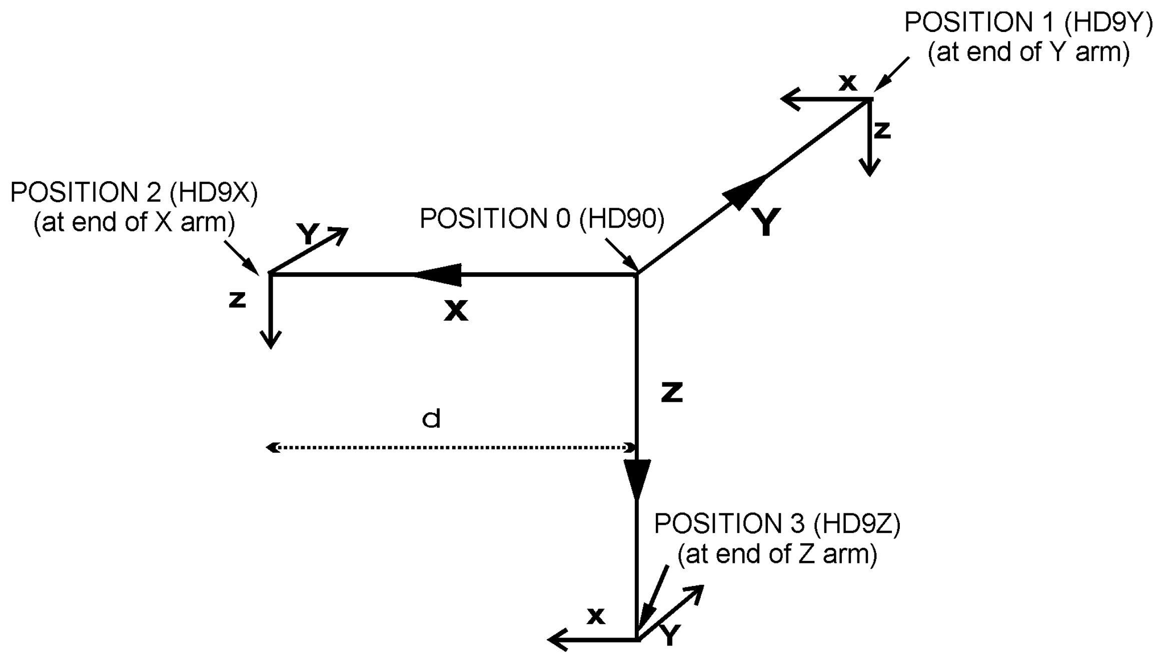



**Figure A-3 Nine-Accelerometer Coordinate System**

**Table A- 1 Dummy Manipulations for Checking Recorded Load Cell Polarity Relative to Sign Convention**

| Load Cell | Measure | Dummy Manipulations | Polarity |
|---|---|---|---|
| Upper and lower neck loads | Fx | Head rearward, chest forward | + |
| | Fy | Head leftward, chest rightward | + |
| | Fz | Head upward, chest downward | + |
| | Mx | Left ear toward left shoulder | + |
| | My | Chin toward sternum | + |
| | Mz | Chin toward left shoulder | + |
| Left shoulder loads (BIOSID) | Fx | Left shoulder forward, chest rearward | + |
| | Fy | Left shoulder rightward, chest leftward | + |
| | Fz | Left shoulder downward, chest upward | + |
| Right shoulder loads (BIOSID) | Fx | Right shoulder forward, chest rearward | + |
| | Fy | Right shoulder rightward, chest leftward | + |
| | Fz | Right shoulder downward, chest upward | + |
| Clavicle loads | Fx | Shoulder forward, chest rearward | + |
| | Fz | Shoulder downward, chest rearward | + |
| Upper and lower lumbar spine | Fx | Chest rearward, Pelvis forward | + |
| | Fy | Chest leftward, pelvis rightward | + |
| | Fz | Chest upward, pelvis downward | + |
| | Mx | Left shoulder toward left hip | + |
| | My | Sternum toward front of legs | + |
| | Mz | Right shoulder forward, left shoulder rearward | + |
| Sacrum load (BIOSID) | Fy | Left H-point pad leftward, chest rightward | + |
| Left iliac load (BIOSID) | Fy | Left iliac rightward, chest leftward | + |
| Right iliac load (BIOSID) | Fy | Right iliac rightward, chest leftward | + |
| Pubic load (side impact) | Fy | Right H-point pad leftward, left pad rightward | (-) |
| Crotch belt loads | Fx | Pubic rearward, pelvis forward | (-) |
| | Fz | Pubic upward, chest downward | (-) |
| Iliac lap belt loads | Fx | Upper iliac spine rearward, chest forward | (-) |
| | My | Upper iliac spine rearward, chest forward | + |
| Left side abdominal load (Eurosid-1) | Fy | Left side of abdomen rightward, chest leftward | + |
| Right side abdominal load (Eurosid-1) | Fy | Right side of abdomen leftward, chest rightward | (-) |
| Femur loads | Fx | Knee upward, upper femur downward | + |

| Load Cell | Measure | Dummy Manipulations | Polarity |
|---|---|---|---|
| (dummy in seated position, femurs horizontal) | Fy | Knee rightward, upper femur leftward | + |
| | Fz | Knee forward, pelvis rearward | + |
| | Mx | Knee leftward, hold upper femur in place | + |
| | My | Knee upward, hold upper femur in place | + |
| | Mz | Tibia leftward, hold pelvis in place | + |
| Knee clevis | Fz | Tibia downward, femur upward | + |
| Upper tibia loads | Fz | Tibia downward, femur upward | + |
| | Mx | Ankle leftward, hold knee in place | + |
| | My | Ankle forward, bottom of knee clevis rearward | + |
| Lower tibia loads | Fx | Ankle forward, knee rearward | + |
| | Fy | Ankle rightward, knee leftward | + |
| | Mx | Ankle leftward, hold knee in place | + |
| | My | Ankle forward, bottom of knee clevis rearward | + |

# Appendix B: Codes

A comprehensive reference for currently acceptable codes for a given coded value may be obtained from the Entrée for Windows program, described briefly in ***Section 1.2-1 Entrée for Windows***, or from the NHTSA Research and Development web site where the very latest updates are available as part of our database publication.

Any use of the code "OTHER" should be explained in an appropriate commentary field.

## VERNO

The special VERNO field is used to identify the version of the reference guide used to code and prepare the content of the data set. It does not refer to the format of the files within the data set.

Example:

It is possible to convert an existing Vehicle data set from the version 3 format, having GR files, into an EV5 format data set. Since the original data set was developed using the version 3 Test Reference Guide VERNO would then have a value of "V3".

| CODE | DESCRIPTION |
|---|---|
| **V5** | Data prepared according to the version 5 guide. |
| **V4** | Data prepared according to the version 4 guide. |
| **V3** | Data prepared according to the version 3 guide. |
| **V2** | Data prepared according to the version 2 guide. |

# Appendix C: Technical Support Information

## C-1. Reference Guide Updates and Software Updates

NHTSA now maintains web sites for the NHTSA Test Reference Guides and the Entree for Windows software. The latest versions of the guides and the software are made available for download from the sites below:

**NHTSA Test Reference Guides**

http://www-nrd.nhtsa.dot.gov/software/test-reference-guides/test-reference-guides.html

**Entree for Windows**

http://www-nrd.nhtsa.dot.gov/software/entree/index.htm

Because the NHTSA Research and Development web site is a constantly evolving resource it may happen that the links noted above do not work correctly. In the event that this does occur please utilize the available ***SEARCH*** feature to search for "NHTSA Test Reference Guides" and "Entrée for Windows".

## C-2. Requesting Assistance

In the event that a user of the Test Reference Guides requires technical support with using the guides, or has questions about the content of the guides, support is offered via Internet e-mail. Simply send a message to the address

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

**ATTN: NHTSA Test Reference Guides**

To request assistance with the Entree for Windows software send an e-mail to

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

**ATTN: Entrée for Windows**

A staff person will acknowledge the request, and we will endeavor to provide a complete response within two (2) business days on a first-come, first-served basis.

## C-3. Reporting a Problem

To report a problem or potential bug in either the guides or the Entree for Windows software, please send an e-mail to

nrd.softdev@nhtsa.dot.gov

with a subject line including the text

**BUG REPORT: NHTSA Test Reference Guides**

or

**BUG REPORT: Entrée for Windows**

for the Test Reference Guides, or Entrée for Windows, respectively.

A staff person will acknowledge the problem report. For simple problems we will endeavor to provide a complete response within five (5) business days on a first-come, first-served basis. In the event that correction of a problem requires more than 5 business days we will notify the user in advance.