*NHTSA Supplemental NCAP Test Reference Guide, Version 1, Volume 1: Vehicle Tests*

*Revision – November 2014*

# NCAP CRASH AVOIDANCE SUPPLEMENT I:

# Forward Collision Warning and

# Lane Departure Warning Test Data

This document supplements the "NHTSA Test Reference Guide, Version 5, Volume 1: Vehicle Tests, Revision – March 2006" by providing information that relates specifically to how NHTSA contractors should enter data derived from the testing of Forward Collision Warning (FCW) and Lane Departure Warning (LDW) systems into Entrée V5 software. Data properly loaded into Entrée V5 will facilitate the loading of that data into NTHSA's Vehicle Database, the database in which FCW and LDW data as well as all other crash avoidance testing data will be stored and made available to the public.

When one opens Entrée V5, the following screen displays.
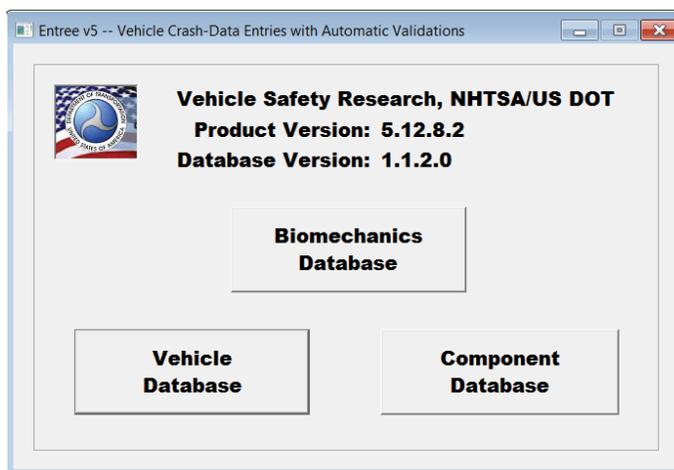


Figure 1: Opening Entrée V5 Screen

Select "Vehicle Database" to begin entering FCW or LDW data. The screen that displays is shown in the General Test Info section below. The General Test Info screen has eight (8) tabs at the top. Each of these tabs, when selected, opens a screen that contains various fields into which data may be entered. This supplement deals only with the screens that appear when the General Test Info, the Vehicle Info, or the Instrumentation Info tabs are selected. These screens are the only screens that are needed to create a file of FCW or LDW data that is formatted for easy loading into the Vehicle Database. This supplement deals only with these three tabs.

Most of the fields in each of the screens that display when the General Test Info, Vehicle Info, or Instrumentation Info tab is selected will be utilized to enter FCW or LDW data. Some fields will be left blank. Most of the field names involved closely match the type of data that will be entered in the field. In some cases, however, the field name does not relate to the data that will be entered in the field. This results from a decision to use available fields to create records of FCW and LDW test data rather than to create additional fields in the Vehicle Database. In addition, even when a field name relates to the type FCW or LDW, the data that will be entered into the field may differ from the data definitions contained in the Test Reference Guide. In yet other cases, the data definitions in this supplement are essentially the same as those the Test Reference Guide with minor modifications. Contractors who enter FCW or LDW

data need to carefully follow the instructions in this supplement. If information in this supplement conflicts with information contained in the Test Reference Guide, the information in this supplement should govern.

## General Test Info Tab

As indicated above, when you select "Vehicle Database" from the opening Entrée V5 screen, the screen that displays is shown below.



Figure 2: General Test Info Tab

Information and instructions for the fields in this screen follow. An easy reference guide with this information in chart form appears at the end of this section.

### 1 Version Number

As shown in Figure 2 above, the Entrée version number, in this case V5 is automatically filled in to this field.

### 2 Test Performer

Select your organization from the drop down list that appears when you click on the "Search" button to the right of the field. A list of various organizations with associated three digit codes will display. Select your organization from the list. The matching three digit code will display in this field. (NOTE: If your organization is not among the organizations listed in the

drop down list, please notify your NHTSA contact immediately so this situation can be corrected.)

## 3  Test Date

An interactive calendar displays when you click on the downward facing triangle to the right of the field. Select the test date from this calendar. The date will automatically fill in the field with the date you select. This field must be filled in with a valid date. It may not be left blank. Be sure that the date you select is the date on which the test was conducted.

## 4  Title

Enter the title of the test for which data is being entered. If there is no formal title, create one that best describes and most closely relates to the test whose data you are entering. This should include a reference to the vehicle and type of technology being tested. This field has a limit of 70 characters.

## 5  Test Objectives

In this field enter the outcome of the test, specifically whether or not the vehicle tested passed or failed the NCAP test procedure involved. This field has a limit of 70 characters. Given the limited information to be entered into this field that limit should seldom if ever be approached unless there is some qualifying information that you deem appropriate to include.

## 6  Test Comments

Indicate in this field how the driver is warned (i.e. visual, audio, and/or haptic) when either a forward collision is imminent (FCW) or a vehicle is drifting out of its lane (LDW). This field has a limit of 70 characters.

## 7  Contract Number

Enter the U.S. Department of Transportation contract number for the testing organization's contract with NHTSA for the test whose data you are entering. The contract number will begin with "DTNH22" and not exceed 17 characters in length (including dashes), which is the limit of the number of characters that may be entered into this field.

## 8  Test Reference Number

Enter the alphanumeric code number assigned to the test by the testing organization. This field has a 16 character limit.

## 9  Test Type

From the drop down list that displays when you select the "Search" button, select "New Car Assessment Test". NCA will display in this field.

## 10 Test Configuration

From the drop down list that displays when you select the "Search" button, select "Lane Departure Warning Performance Test" or "Forward Collision Warning Performance Test" based on the test that was performed. LDW or FCW will display in this field.

### 11 Closing Speed

Enter the wind speed during the test in km/h.

### 12 Impact Angle

Leave this field blank.

### 13 Ambient Temperature

Enter the positive or negative temperature in degrees Celsius at the test location at the time of the test.

### 14 Type of Recorder

Make sure that DDA or OTH is in this field, it should be filled automatically upon opening Entree.

### 15 Data Link to Recorder

Make sure the UMB or OTH is in this field, it should be filled automatically upon opening Entree.

### 16 Offset Distance

Leave this field blank.

### 17 Side Impact Point

Leave this field blank.

### 18 Test Track Surface

Click on the "Search" button to the right of the field. From the drop down list that displays select the test track surface on which the test was conducted. A three character code representing that surface will display in the field.

### 19 Test Track Condition

Click on the "Search" button to the right of the field. From the drop down list that displays select the test track condition when the test was conducted. A three character code representing that condition will display in the field.

### 20 Total Number of Curves

There is no need to enter anything into this field. It automatically updates as data channels are added to Entrée in the Instrumentation Info tab that is discussed below. The Total Number or Curves is the total number of recorded instrument channels (curves) in the test.

The chart that follows summarizes the information above and may be used as a quick reference guide.

## Vehicle Info Tab

When you select the Vehicle Info tab, the following screen will display.

Figure 3: Vehicle Info Tab

# 1   Vehicle Make

Make refers to the manufacturer of the vehicle. Click on the "Search" button and select from among the manufacturers in the drop down list that displays. The two character code representing the manufacturer you select will be entered in the vehicle make field. (Note: There is one manufacturer – Prevost – whose code is three characters. It is unlikely that you will ever select this manufacturer.)

# 2   Vehicle Model

The Vehicle Make field must be filled in before the Vehicle Model field can be filled in. To fill in the Vehicle Model field, click on the "Search" button. A list of models made by the manufacturer in the Vehicle Make field will display. Select from among the vehicle models that displays. A two character code representing the model you have selected will display in the Vehicle Model field.

# 3   Vehicle Model Year

Enter the four digit model year, i.e. 1999, 2000, 2001, etc.

# 4   NHTSA Number

Most vehicles that undergo NCAP crash avoidance testing, which includes those whose FCW or LDW systems are tested, are not assigned a NHTSA Number. This is because the testing

involved is non-destructive so the vehicles are leased rather than purchased so the agency never takes ownership of the vehicles. It is therefore unlikely that you will ever have a NHTSA number that needs to be entered into this field. If a situation does arise in which there is a NHTSA number to be entered into this field, please refer to the material relating to this field in the Test Reference Guide for a complete explanation of the system used to assign six-character alphanumeric identifiers to test vehicles.

## 5  Body Type

Body type refers to the type of vehicle, such as van, convertible, or four-door sedan. Click on the "Search" button and select from among the body types in the drop down list that displays. A two character code representing the body type you have selected will appear in the Body Type field.

## 6  Manufacturer VIN

A VIN (vehicle identification number) is a 17 character alpha numeric identifier that is assigned by the manufacturer to each vehicle it manufactures and that is unique to only one vehicle. The VIN of the test vehicle should be entered in this field. This field has a 20 character limit.

## 7  Engine Type

From the drop down list that displays when you click on the "Search" button, select the engine type in the vehicle that was tested. A four digit alphanumeric code reflecting the engine type you select will appear in the Engine Type field.

## 8  Engine Displacement

Enter in liters the engine displacement of the engine in the test vehicle.

## 9  Transmission Type

From the drop down list that displays when you click on the "Search" button, select the type of transmission in the test vehicle. A two character code associated with the type of transmission you select will display in the Transmission Type field.

## 10 Vehicle Test Weight

Enter the weight of the test vehicle including all payloads in kilograms.

## 11 Vehicle Curb Weight

Leave this field blank.

## 12 Wheelbase

Enter the measured or published value of the test vehicle's wheelbase in millimeters.

## 13 Vehicle Length

For FCW tests only, enter the longitudinal distance from the location of the vehicle's Global Positioning System (GPS) to the front bumper of the vehicle being tested (subject vehicle or SV). For LDW tests, leave this field blank.

## 14 Vehicle Width

For LDW tests only, enter the lateral distance from the vehicle's Global Positioning System (GPS) to the vertical plane of the outer most edge of the vehicle's left front tire. For FCW tests, leave this field blank.

## 15 Vehicle Center of Gravity

For FCW tests only, enter the longitudinal distance in millimeters from the location of the vehicle's Global Positioning System (GPS) to the rear bumper of the principle other vehicle (POV) involved in the test. For LDW tests, leave this field blank.

## 16 Damage Distance to Center of Gravity

Leave this field blank.

## 17 Maximum Crush Distance

Leave this field blank.

## 18 Pretest Vehicle Measurement Data

Add the pretest "zero" measurement in mm into the BX1 field that appears in the new window once the Pretest Vehicle Measurement Data button is clicked. This is the measurement attained from the bumper-to-bumper zeroing procedure for FCW and the front wheel to delimiting lane edge scoring procedure for LCW.

## 19 Description of Vehicle Modification

List the visibility (environmental testing conditions) and vehicle delivery date to the contractor's facility.

## 20 Vehicle Comments

In this field indicate the odometer reading at the time of the test and whether the vehicle tested has an antilock braking system (ABS), automatic cruise control (ACC), and/or a collision mitigation braking system (CMBS). For example, an entry in this field for a vehicle that had all three technologies and 287 miles on the odometer at the time of the test would appear as follows: 287, ABS, ACC, and CMBS. An entry for a vehicle with just ABS and CMBS would appear as follows: 287, ABS, CMBS.

If the vehicle tested has CMBS, please indicate the type – crash imminent braking (CIB), dynamic brake support (DBS), or both CIB and DBS. If the vehicle is equipped with some other type of CMBS, please explain.

## 21 Post-test Vehicle Measurement Data

Leave the fields in this area blank.

## 22 Damage Profile Distances

Leave the fields in this area blank.

## 23  Steering Column Shear Capsule Separation
Leave the field blank.  It will automatically fill in upon saving the EV5 file.

## 24  Steering Column Collapse Mechanism
Leave the field blank.  It will automatically fill in upon saving the EV5 file.

## 25  Vehicle Modification Indicator
Leave the field blank.  It will automatically fill in upon saving the EV5 file.

## 26  Vehicle Speed
Leave this field blank.

## 27  Crabbed Angle
Leave this field blank.

## 28  Principle Direction of Force
Leave this field blank.

## 29  Bumper Engagement
Leave the field blank.  It will automatically fill in upon saving the EV5 file.

## 30  Sill Engagement
Leave the field blank.  It will automatically fill in upon saving the EV5 file.

## 31  A-Pillar Engagement
Leave the field blank. It will automatically fill in upon saving the EV5 file.

## 32  Vehicle Damage Index
Leave this field blank.

## 33  Angle of Moving Test Cart
Leave this field blank.

## 34  Vehicle Orientation on Moving Cart
Leave this field blank.

## 35  Total Length of Indentation
Leave this field blank.

The chart that follows summarizes the information above and may be used as a quick reference guide.

# Instrumentation Info Tab

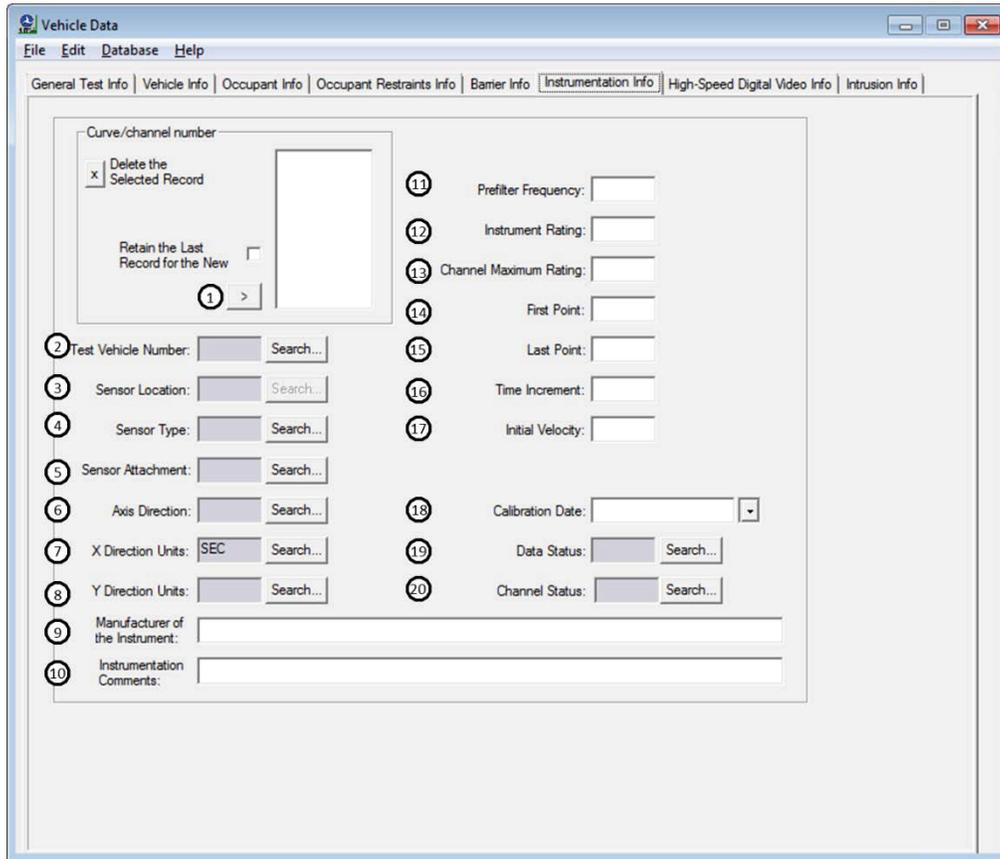When you select the Instrumentation Info tab the following screen will display.



**Figure 4: Instrumentation Info Tab**

## 1  Curve/Channel Number

Data from each data channel that recorded data during a test will receive its own curve number.  This curve number will be associated with an individual txt file that contains Y-value only data.

In the upper left hand corner of the screen that displays when you select the Instrumentation Info tab, there is a box labeled "Curve/channel number."  At the bottom of that box is a button with a ">" in it.  Select that button.  This creates a new record for the Y-value only data that is created from each data channel involved in a test.  A number that will refer to the data channel whose information you are about to enter will appear in the blank white box in the Curve/channel number area.  You are now ready to enter data relating to the particular data channel in each of the fields indicated on this screen.

You will repeat this process for each set of Y-value only data that you enter.  Each additional set of Y-value only data will get a new number in sequence.
Note: If you select "Retain the Last Record for the New," this will……

## 2   Test Vehicle Number

Test Vehicle Number is the number that identifies the vehicle containing the data channels as 1 or 2. Test Vehicle Number should be coded 0 if the sensor is attached to a barrier. Please enter 1 for the subject vehicle.

## 3   Sensor Location

This field will represent the type of test performed. For example T1, T2, and T3 will represent FCW test 1 (POV stationary), 2 (POV suddenly decelerating), and 3 (slower moving POV) respectively. Furthermore, DL and DR will be left and right dashed lane departure test, SL and SR will be left and right solid lane departure test, and BL and BR will be left and right Botts dots lane departure test.

Table 1: Sensor Location nCodes

| NHTSADB_SENLOC | | | |
|---|---|---|---|
| SENLOC | SENLOCD | REFERENCE | SENLOC_COMMENT |
| T1 | FCW type 1: STOPPED LEAD veh test | VEHDB | Vehicle Forward Collision Warning system |
| T2 | FCW type 2: DECELERATING LEAD veh test | VEHDB | Vehicle Forward Collision Warning system |
| T3 | FCW type 3: CONSTANT SPEED LEAD veh test | VEHDB | Vehicle Forward Collision Warning system |
| DL | LDW: LEFT DASHED LANE DEPARTURE | VEHDB | Vehicle Lane Departure Warning system |
| DR | LDW: RIGHT DASHED LANE DEPARTURE | VEHDB | vehicle Lane Departure Warning system |
| SL | LDW: LEFT SOLID LANE DEPARTURE | VEHDB | vehicle Lane Departure Warning system |
| SR | LDW: RIGHT SOLID LANE DEPARTURE | VEHDB | vehicle Lane Departure Warning system |
| BL | LDW: LEFT BOTTS DOTS LANE DEPARTURE | VEHDB | vehicle Lane Departure Warning system |
| BR | LDW: RIGHT BOTTS DOTS LANE DEPARTURE | VEHDB | vehicle Lane Departure Warning system |

## 4   Sensor Type

Click on the "Search" button and select the Sensor Type that applies from the dropdown list of sensors that displays based on its units of measurement.

## 5  Sensor Attachment

Sensor Attachment will be used to organize the channel numbers into individual trials. For example, all channels associated with the first (1) FCW test will have a Sensor Attachment of FC01. All subsequent trials will chronologically increase. Similarly, the LDW test will be chronologically ordered using LD01, LD02… These options can be selected from the dropdown list.

## 6  Axis Direction

The AXIS is utilized to label the individual data channels (see the chart below). The options will be available in the dropdown list.

**Table 2: Axis nCodes**

| NHTSADB_AXIS | | | |
|---|---|---|---|
| **AXIS** | **AXISD** | **REFERENCE** | **AXIS_COMMENT** |
| SS | SV (Subject Vehicle) SPEED | VEHDB | For FCW & LDW tests only |
| PS | POV (Principle Other Vehicle) SPEED | VEHDB | For FCW test only |
| PA | POV ACCELERATION | VEHDB | For FCW test only |
| SA | SV ACCELERATION | VEHDB | For FCW test only |
| LD | Lateral Dist Diff of SV & POV centerline | VEHDB | For FCW test only |
| YW | YAW RATE | VEHDB | For FCW & LDW tests only |
| HY | HEADWAY DISTANCE | VEHDB | For FCW test only |
| CN | CAN alert message | VEHDB | For FCW & LDW tests only |
| AS | AUDIAL SENSOR | VEHDB | For FCW & LDW tests only |
| HS | HAPTIC SENSOR | VEHDB | For FCW & LDW tests only |
| VS | VISUAL SENSOR | VEHDB | For FCW & LDW tests only |
| LV | SV LATERAL VELOCITY | VEHDB | For LDW test only |
| LL | LATERAL DISTANCE TO LANE EDGE in LDW | VEHDB | +: inside lane; -: crossing land edge |
| WA | STEERING WHEEL ANGLE | VEHDB | Filtered (deg) |
| LO | LONGITUDINAL ACCELERATION | VEHDB | Filtered (g) |
| LA | LATERAL ACCELERATION | VEHDB | Filtered and corrected for roll rate(g) |
| YR | YAW RATE | VEHDB | Filtered (deg/sec) |

## 7  X Direction Units

Click on the "Search" button and select "SEC Seconds" from the drop down list of axis directions that displays.

## 8  Y Direction Units

Click on the "Search" button and select from the drop down list that displays the Y Direction units used to measure the signal of the sensor data.

## 9 Manufacturer of the Instrument

In the space provided, indicate where the sensor is located and what type of sensor is measuring the given output for this channel.

## 10 Instrumentation Comments

Provide any miscellaneous comments for the instrument or the instrument record that you think are appropriate and/or necessary. If the trial fails, place FAIL in the instrumentation comment section. This should include any unusual conditions affecting the data or a reference to a document that describes problems with a particular curve and the reason for using OTHER or NOT APPLICABLE in this record. If no comments are to be made, enter NO COMMENTS.

## 11 Pre-filter Frequency

Indicate the frequency at which all channels have been synchronized through down sampling.

## 12 Instrument Rating

Leave this field blank.

## 13 Channel Max. Rating

Leave this field blank.

## 14 Number of First Point

Enter in this field the Number of First Point. The Number of First Point 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. Time zero will be set to the time of the alert activation. For FCW and LDW tests, enter -501. This equals five (5) seconds prior to warning if the sampling frequency is 100 Hz.

Note: If no activation signal is detected, approximate when the alert should have occurred based on TTC or lateral lane position and provide five seconds of data before the approximated value.

## 15 Number of Last Point

Enter in this field the Number of Last Point. Number of Last Point 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. For FCW and LDW tests, enter 500. This equals five (5) seconds post warning if Pre-filter Frequency is 100 Hz.

Note: If no activation signal is detected, approximate when the alert should have occurred based on TTC or lateral lane position and provide five seconds of data after the approximated value.

## 16 Time Increment

Time Increment is the delta T in microseconds between each data point. Time Increment is assumed to be constant for all data points for a given sensor (uniform sampling frequency). Set this field equal to 1/Pre-filter Frequency.

## 17 Initial Velocity

Initial Velocity will be used as the Y-unit value for the specific channel number at the time of the warning (time zero).

## 18 Calibration Date

Calibration Date is the most recent calibration date of the instrument. Use the calendar that displays when you click on "▼" to select the date. *This field must be filled in with a valid date.* **Don't leave it blank, please.**

## 19 Data Status

From the drop down list that appears when you click the "Search" button, select AM for "as measured" if no changes have been made to the data and CM for "computed" if post-processing filtering has been applied.

## 20 Channel Status

From the drop down list that appears when you click the "Search" button, select P for "primary channel."