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Van Tire Pressure Study Data Documentation

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Background

In March 2003, Senator Olympia Snowe introduced the Passenger Van Safety Act of 2003, in the Senate. This bill, S.717, called on the National Highway Traffic Safety Administration (NHTSA) to develop a dynamic test to assess the rollover risk of 15-passenger vans for a consumer information program; test 15-passenger vans at different load levels as part of the rollover resistance program of NHTSA's New Car Assessment Program (NCAP); and test and evaluate stability control and other technological systems that assist drivers in controlling 15-passenger vans under conditions that cause vehicle rollover. A similar bill was introduced by Representative Mark Udall in the House, H.R. 1641. [1 2]

The National Transportation Safety Board (NTSB) has also issued a series of recommendations related to 15-passenger van safety. For example, NHTSA developed a 15-Passenger Van Action Plan to address these recommendations. As part of the plan that relates to analysis, for problem identification, the agency conducted the Van Tire Pressure Study (VTPS) to determine the extent of tire pressure underinflation and tire wear conditions in 12- and 15-passenger vans.

Data Collection Methodology

Field data collection was conducted through the infrastructure of the National Center for Statistics and Analysis (NCSA) National Automotive Sampling System (NASS). [3 4] The NASS consists of teams of field researchers located at Primary Sampling Units (PSUs), and two Zone Centers that supervise and coordinate the activities of those PSUs.

Fourteen field researchers at 12 PSUs as well as researchers at the Zone Centers and NHTSA collected the data for the VTPS. Researchers visited organizations weekdays primarily during business hours. If a researcher contacted the owner of a vehicle by phone before an inspection, the researcher stated the study was related to van maintenance or "safety systems." In order to keep the study from being biased, "tire" and "tire pressure" were not mentioned in the phone contacts with the participants.

The pilot phase of the data collection was conducted from April 26, 2004, through May 14, 2004. Full-scale data collection was conducted from May 17, 2004, through June 25, 2004. The vans inspected in the pilot were included in the final data set for the VTPS.

[1] NHTSA Action Plan for 15-Passenger Van Safety, November 2004 Update.

[2] Thomas Legislative Information on the Internet, Library of Congress, October 2004.

[3] Tire Pressure Special Study: Methodology, NHTSA Research Note, DOT HS 809 315, August 2001.

[4] Tire Pressure Special Study: Data Documentation, August 2001.

Vehicles surveyed included 15-passenger vans, 12-passenger vans, 14-passenger vans, and cargo vans with similar Gross Vehicle Weight Ratings (GVWR) and body styles. Incomplete vans or cutaway vehicles were not included in the study. The differences in their body styles would have made data collection operationally infeasible. A total of 1,242 vehicles were inspected for the survey, of which 937 were 15-passenger vans.

Data collected during the VTPS included daily site information, vehicle identification data, vehicle placard data, and tire identification data for all four tires on the vehicle. A complete description of the data collection process is presented in the NHTSA Research Note, "12 and 15-Passenger Van Tire Pressure Study: Preliminary Results."

Sampling

Although the VTPS was a national study, it was not a probability sample. It was a convenience sample of multiple regions to account for climate and demographic differences. Data collection was distributed in the Eastern, Midwestern, Southwestern, and Western regions of the United States. Estimates of the amount of registered vans in specific targeted states were found using R. L. Polk registration data.

File Structure

VTPS data is presented in two SAS analysis files: the Vehicle file and the Tire file. The Vehicle file contains one record per vehicle and has 1,242 records. The Tire file contains one record per tire and has 4,968 records. The two files can be linked by the variable CASEID, which appears in both files. Both the Vehicle and Tire files contain variables describing tire size. The tire size variables in the Vehicle file refer to the manufacturer's recommended size found on the vehicle placard and have the column names "FRONT_REC_SIZE" and "REAR_REC_SIZE"; the tire size variables in the Tire file refer to the size of the tires observed on the vehicle and have the column name "TYPE."

Tire Size Formats

There are at least three different tire size formats used by tire manufacturers. Each format is composed of multiple components of tire size, and not all formats include the same components. The tire sizes in the VTPS data set are in accordance with three formats, "Metric," "Light Truck High Flotation," and "Light Truck Numeric." All other formats observed in the VTPS were grouped into either an "Unknown" or "Other" category. If more than one type of format was recommended by the manufacturer, the format that matched the format of the tires on the vehicle was recorded. Examples of the three major formats that were observed in the VTPS are shown below. The components, and possible values of each component, are discussed in the following section.

Format	Example	Components	
Metric	LT225/75R16 E	LT	= Light Truck
		225	= Section Width in millimeters
		75	= Aspect Ratio
		R	= Construction Type
		16	= Rim Diameter in inches
		E	= Load Range
Light Truck High Flotation	31X10.50R15LT E	31	= Tire Overall Diameter in inches
		10.50	= Section Width in inches
		R	= Construction Type
		15	= Rim Diameter in inches
		LT	= Light Truck
		E	= Load Range
Light Truck Numeric	8.75R16.LT E	8.75	= Section Width in inches
		R	= Construction Type
		16.5	= Rim Diameter in inches
		LT	= Light Truck
		E	= Load Range

In some cases one or more of the components are missing due to difficulty in reading the sidewall lettering.

Units and Conversions

Data set variables that describe tire pressure and tread depth are shown in kilopascals (kPa), and millimeters (mm), respectively. The NHTSA Research Note, "12- and 15-Passenger Van Tire Pressure Study: Preliminary Results," describes tire pressure and tread depth in pounds-force per square inch (psi), and 32nds of an inch (in), respectively. An approximate conversion from millimeters into inches can be found by multiplying the quantity that is given in millimeters by .03937008. An approximate conversion from pounds-force per square inch to kilopascals can be found by multiplying the quantity that is given in pounds-force per square inch by 6.894757.

Variable List: **Vehicle Variables:**

SAS Name	**SAS Label**
CASEID	CASE IDENTIFICATION NUMBER
CASENUMBER	CASE NUMBER
PSU	PSU
MODELYEAR	VEHICLE MODEL YEAR
MAKE	VEHICLE MAKE
MODEL	VEHICLE MODEL
MILEAGE	VEHICLE MILEAGE
VIN	VIN
AFFILIATION	AFFILIATION OF VEHICLE'S OWNER
BODY_TYPE	VEHICLE BODY TYPE
FLEETNUM	FLEET VEHICLE INSPECTED
FLEETVEH	TOTAL NUMBER OF FLEET VEHICLES
AMBIENT_TEMP	AMBIENT AIR TEMPERATURE
GVWR	GROSS VEHICLE WEIGHT RATING
FRONT_GAWR	GROSS AXLE WEIGHT RATING FRONT
REAR_GAWR	GROSS AXLE WEIGHT RATING REAR
FRONT_REC_TYPE	MANUFACTURER'S FRONT RECOMMENDED TIRE TYPE
FRONT_REC_SIZE	MANUFACTURER'S FRONT RECOMMENDED TIRE SIZE
FRONT_REC_PRESSURE	MANUFACTURER'S FRONT RECOMMENDED TIRE PRESSURE
REAR_REC_TYPE	MANUFACTURER'S REAR RECOMMENDED TIRE TYPE
REAR_REC_SIZE	MANUFACTURER'S REAR RECOMMENDED TIRE SIZE
REAR_REC_PRESSURE	MANUFACTURER'S REAR RECOMMENDED TIRE PRESSURE

Variable List: **Tire Variables:**

SAS Name	**SAS Label**
CASEID	CASE IDENTIFICATION NUMBER
LOCATION	TIRE LOCATION
TMAKE	TIRE MANUFACTURER
TMODEL	TIRE MODEL
TYPE	TIRE SIZE
DAMAGE	TIRE DAMAGE?
PRESSURE	MEASURED PRESSURE
TEMP	MEASURED TIRE TEMPERATURE
TREAD	MEASURED TIRE TREAD DEPTH

SAS Name: CASEID **SAS Label: CASE IDENTIFICATION NUMBER**

Type: Numeric

Length: 8

Remarks: This variable is a unique number that is generated by the data entry application and cannot be changed.

SAS Name: CASENUMBER **SAS Label: CASE NUMBER**

Type: Character

Length: 8

Remarks: The first three digits (xxx) represent the base case number. Vehicles inspected in the same fleet are assigned the same base case number. The last two digits (xx) represent the vehicle within the fleet.

Attributes: xxx - nn Case number

SAS Name: PSU **SAS Label: PSU**

Type: Numeric

Length: 8

Remarks: This variable reports the PSU (Primary Sampling Unit) of the researcher that conducted the vehicle inspection.

Attributes: xxxx PSU number

SAS Name: MODELYEAR **SAS Label: VEHICLE MODEL YEAR**

Type: Numeric

Length: 8

Remarks: Vehicle Model Year

Attributes: xxxx Model year of the vehicle inspected.

SAS Name: MAKE **SAS Label: VEHICLE MAKE**

Type: Numeric

Length: 8

Remarks: Vehicle Make: The vehicle make classifications are in accordance with vehicle make classifications used in other NCSA data systems including the Fatality Analysis Reporting System, General Estimates System and Crashworthiness Data System.

SAS Name: MODEL **SAS Label: VEHICLE MODEL**

Type: Numeric

Length: 8

Remarks: Vehicle Model: The vehicle coding is in accordance with vehicle model classifications used in other NCSA data including the Fatality Analysis Reporting System, General Estimates System and the Crashworthiness Data System.

SAS Name: MILEAGE **SAS Label: VEHICLE MILEAGE**

Type: Numeric

Length: 8

Remarks: The mileage recorded on the odometer of the vehicle.

Attributes:		
	xxxxxx	Amount of miles a vehicle traveled
	-9999	Unknown

SAS Name: VIN **SAS Label: VIN**

Type: Character

Length: 10

Remarks: Vehicle Identification Number: Observed and recorded by the researcher.

The vehicle identification number is a number assigned by the vehicle manufacturer. The VIN contains information on the vehicle such as manufacturer, model year, model, body type, restraint type, etc. For VINs with a length of more than 10 characters, any positions past the 10th character were redacted. The positions that were redacted contain the sequential production number, which can uniquely identify a vehicle.

SAS Name: AFFILIATION **SAS Label: AFFILIATION OF THE VEHICLE'S OWNER**

Type: Character

Length: 61

Remarks: The type of organization that uses the inspected vehicle.

Attributes:
University or College
Church or Community Org.
Vanpool
Military
Camp or Daycare Facility
Local Govt.
Trans. and Limo Service
Hotel
Other - (Specify)
Unknown

SAS Name: BODY_TYPE **SAS Label: VEHICLE BODY TYPE**

Type: Character

Length: 16

Remarks: Vehicle Body Type Category: Observed and recorded by researcher.

Attributes:
12 Passenger Van
14 Passenger Van
15 Passenger Van
Cargo Van

SAS Name: FLEETNUM **SAS Label: FLEET VEHICLE INSPECTED**

Type: Numeric

Length: 8

Remarks: The number assigned to an inspected vehicle in a fleet.

SAS Name: FLEETVEH **SAS Label: TOTAL NUMBER OF FLEET VEHICLES**

Type: Numeric

Length: 8

Remarks: Amount of vehicles in a fleet.

SAS Name: AMBIENT_TEMP **SAS Label: AMBIENT AIR TEMPERATURE**

Type: Numeric

Length: 8

Remarks: Ambient air temperature at the time of tire inspection. Measured and recorded by the researcher for each vehicle inspected.

Attributes: xxx degrees Fahrenheit
-9999 Unknown

SAS Name: GVWR **SAS Label: GROSS VEHICLE WEIGHT RATING**

Type**:** Numeric

Length: 8

Remarks: Gross vehicle weight rating (GVWR). Observed on the vehicle placard by the researcher.

Attributes: xxxxx GVWR in kgs
-9999 Unknown

SAS Name: FRONT_GAWR SAS Label: GROSS AXLE WEIGHT RATING FRONT

Type: Numeric

Length: 8

Remarks: Gross axle weight rating (GAWR), front axle: Observed on the vehicle's placard by the researcher.

Attributes: xxxxx GAWR in kgs, front axle
-9999 Unknown

SAS Name: REAR_GAWR SAS Label: GROSS AXLE WEIGHT RATING REAR

Type: Numeric

Length: 8

Remarks: Gross axle weight rating (GAWR), rear axle: Observed on the vehicle's placard by the researcher.

Attributes: xxxxx GAWR in kgs, rear axle
-9999 Unknown

SAS Name: FRONT_REC_TYPE SAS Label: MANUFACTURER'S FRONT RECOMMENDED TIRE TYPE

Type: Character

Length: 19

Remarks: Tire size format, vehicle manufacture's recommendation. See discussion of the tire sizes in the Introduction for more information.

Attributes: P-Metric (specify)
Light Truck Metric (specify)
Light Truck High Flotation (specify)
Light Truck Numeric (specify)
Other (specify)
Unknown

SAS Name: FRONT_REC_SIZE **SAS Label: MANUFACTURER'S FRONT RECOMMENDED TIRE SIZE**

Type: Character

Length: 13

Remarks: The size shown on the vehicle's placard.

SAS Name: FRONT_REC_PRESSURE **SAS Label: MANUFACTURER'S FRONT RECOMMENDED TIRE PRESSURE**

Type: Numeric

Length: 8

Remarks: Manufacturer's recommended tire pressure, front, cold. Observed on the vehicle placard and recorded by the researcher. If the placard did not specify hot or cold and showed one pressure it was assumed to be cold.

Attributes: xxx kPa
-9999 Unknown

SAS Name: REAR_REC_TYPE **SAS Label: MANUFACTURER'S REAR RECOMMENDED TIRE TYPE**

Type: Character

Length: 19

Remarks: Tire size format, vehicle manufacture's recommendation. See discussion of the tire sizes in the Introduction for more information.

Attributes: P-Metric (specify)
Light Truck Metric (specify)
Light Truck High Flotation (specify)
Light Truck Numeric (specify)
Other (specify)
Unknown

SAS Name: REAR_REC_SIZE **SAS Label: MANUFACTURER'S REAR RECOMMENDED TIRE SIZE**

Type: Character

Length: 13

Remarks: The size shown on the vehicle's placard.

SAS Name: REAR_REC_PRESSURE **SAS Label: MANUFACTURE'S REAR RECOMMENDED TIRE PRESSURE**

Type: Numeric

Length: 8

Remarks: Manufacture's recommended tire pressure, rear, cold. Observed on the vehicle placard and recorded by the researcher. If the placard did not specify hot or cold and showed one pressure it was assumed to be cold.

Attributes: xxx kPa
-9999 Unknown

SAS Name: CASEID **SAS Label: CASE IDENTIFICATION NUMBER**

Type: Numeric

Length: 8

Remarks: This variable is a unique number that is generated by the data entry application program and cannot be changed.

SAS Name: LOCATION **SAS Label: TIRE LOCATION**

Type: Character

Length: 2

Remarks: Tire location describes the specific tire that was inspected on a vehicle.
Tires were inspected in counter clockwise order for each vehicle observation.

Attributes: RF (Right Front)
LF (Left Front)
RR (Right Rear)
LR (Left Rear)

SAS Name: TMAKE **SAS Label: TIRE MANUFACTURER**

Type: Character

Length: 27

Remarks: Tire Manufacturer. Observed and recorded by researcher from the tire's sidewall.

Attributes: xxxxxxxxxxxxxxxxxxxxxxxxxxx Tire manufacturer name
Unknown

Tire Variable Attributes

SAS Name: TMODEL **SAS Label: TIRE MODEL**

Type: Character

Length: 27

Remarks: Tire Model. Observed and recorded by researcher from tire's sidewall.

Attributes: xxxxxxxxxxxxxxxxxxxxxxxxxxx Tire model name
Unknown

SAS Name: TYPE **SAS Label: TIRE SIZE**

Type: Character

Length: 13

Remarks: Tire size format, observed tire. See discussion of tire sizes in the introduction for more information.

SAS Name: DAMAGE **SAS Label: TIRE DAMAGE?**

Type: Character

Length: 58

Remarks: Tire damage, observed tire. The attribute "YES" is selected if the researcher observes tire damage. If the researcher selected "YES," then the remaining characters are used to describe the observed tire damage. The attribute "NO" is selected if there was not any tire damage observed by the researcher.

Attributes: YES - (Specify)
NO

SAS Name: PRESSURE **SAS Label: MEASURED PRESSURE**

Type: Numeric

Length: 8

Remarks: Measured tire pressure, observed tire. Measured and recorded by the researcher. Stored in kilopascals (kPa).

Attributes: xxx kPa
-9999 Unknown

SAS Name: TEMP **SAS Label: MEASURED TIRE TEMPERATURE**

Type: Numeric

Length: 8

Remarks: Measured tire temperature of the observed tire. Measured and recorded by the researcher. Temperature was measured at the juncture of the tread and the sidewall, in line with the valve stem.

Attributes: xxx Degrees Fahrenheit

SAS Name: TREAD **SAS Label: MEASURED TIRE TREAD DEPTH**

Type: Numeric

Length: 8

Remarks: Tread depth, in millimeters, of the observed tire. Measured and recorded by the researcher.

Attributes: xx Millimeters
-9999 Unknown

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