DERIVED VARIABLES DESCRIPTION

INTRODUCTION

Derived variables are variables that are listed in the NHTS 2009 codebook that do not exist in the 2009 NHTS Questionnaire. These variables were derived by:
- renaming variables in the 2009 questionnaire so that the names correspond to those used in earlier NPTS Surveys,
- combining one or more questionnaire variables into a single variable, or
- deriving the variable from external sources other than the survey questionnaire.

The Derived Variables Description is a supporting document for the 2009 National Household Travel Survey (NHTS) which contains descriptions of how each derived variable was calculated.

If the derived variable was derived from a variable in the questionnaire, the description provides the name of the variable that was used to derive the new variable followed in parenthesis by the question number in the questionnaire where the variable is located. If the variable is derived from a variable not in the questionnaire, the variable name is followed by the word "derived" in parenthesis.

The status of a variable as a derived variable is also indicated by the initials DV in the Question column of the NHTS Codebook, and the Question Number column in the NHTS Data Dictionary.

After the alphabetical listing of derived variables, two tables of additional information are included. Table 1 allows the user to cross reference between the NHTS Questionnaire and the dataset in cases where the variable in the questionnaire is different from the name in the dataset. Table 1 lists the cases where the name is different and provides the questionnaire name and the dataset variable name. Table 2 provides information on the sources used to code geographic variables in the NHTS dataset.

NHTS Conventions
For the reader's convenience, the following codes are used in the NHTS dataset. These codes describe how the derived variables were constructed.

      -1 = Appropriate Skip
      -7 = Refused
      -8 = Don't Know
      -9 = Not Ascertained.
And, for Yes/No responses:
      01= Yes
      02= No.

Derived Variables "Not" Included In This Document
Please note that the following derived variables are not included in this document and are described in separate documents. See Publications, 2009 Documentation on the NHTS webpage for a detailed description of each variable.

      Tract and Block Group Variables (Claritas Variables) –A series of 8 variables that describe

the Census Tract or Block Group where the household is located. These variables are: HBHTNRNT, HBHUR, HBPOPDN, HBRESDN, HTEEMPDN, HTHTNRNT, HTPPOPDN, HTRESDN.

BESTMILE – The best estimate of annual miles driven each vehicle, developed by Oak Ridge National Lab. Includes BESTMILE, BEST_EDT, BEST_FLG, and BEST_OUT.

GASPRICE – Weekly regional gasoline price during the week of the household's travel day. Also developed by Oak Ridge National Lab.

MPG and Fuel Cost – A series of 6 variables created by the Energy Information Agency (EIA) and appended to the vehicle file record to describe fuel economy (miles per gallon or MPG) and fuel cost. Includes EPATMPG, EPATMPGF, FUELTYPE, GSCOST, GSTOTCST and GSYRGAL.

This document includes 2009 NHTS Derived Variables and Geography Related Variables which are discussed in subsequent sections of this report.

2009 NHTS DERIVED VARIABLES

ANNMILES – Annualized mile estimate for all vehicles as reported during the person interview. If VEHOWNED is 12 months or more, the annualized mileage is as reported. If VEHOWNED is less than 12 months, use the annualized estimate in ANNMLTYR. If VEHOWNED is -7, -8, or -9, ANNMILES should be -7, -8, or -9.

CDIVMSAR - This variable is derived from variables CENSUS_D and MSACAT. The values of CENSUS_D range from 0 to 9 and the values for MSACAT range from 01 to 04. Concatenating the value of CENSUS_D with MSACAT results in the value of CDIVMSAR.

CENSUS_D - The classification is derived from the household's home address. The 2000 Census Division source used was HTTP://WWW.CENSUS.GOV/GEO/WWW/COB/DV2000.HTML. The categories are:

> 01 = New England (ME, NH, VT, CT, MA, RI)
> 02 = Mid-Atlantic (NY, NJ, PA)
> 03 = East North Central (IL, IN, MI, OH, WI)
> 04 = West North Central (IA, KS, MO, MN, ND, NE, SD)
> 05 = South Atlantic (DE, FL, GA, MD, NC, SC, WV, VA)
> 06 = East South Central (AL, KY, MS, TN)
> 07 = West South Central (AR, LA, OK, TX)
> 08 = Mountain (AZ, CO, ID, MT, NM, NV, UT, WY)
> 09 = Pacific (AK, CA, HI, OR, WA)

CENSUS_R - The classification is derived from the household's home address. The 2000 Census Region source used was HTTP://WWW.CENSUS.GOV/GEO/WWW/COB/RG2000.HTML. The categories are:

> 01 = Northeast (Census Divisions 01 and 02)
> 02 = Midwest (Census Divisions 03 and 04)
> 03 = South (Census Divisions 05, 06 and 07)
> 04 = West (Census Divisions 08 and09).

CNTTDHH and **CNTTDTR** - These variables are the sum of Travel Day person trips, including zero, made by an interviewed household (CNTTDHH) or a household member with a completed interview (CNTTDTR). These counts include trips reported by a subject for which trip detail was obtained from another household member.

These 'count' variables were added to the dataset to make it easier for the user to categorize the number of trips per household and per person, for example creating a table that shows the distribution of households by household income and number of travel day trips (0, 1-2, 3-4, etc.).

These variables should NOT be used to create estimates of trip-making. The household weight applied to CNTTDHH, for instance, does not account for within-household non-response and will not create correct estimates of trips and travel. The only legitimate use of these 'count' variables is to generate distributions of households or persons by number-of-trip-category, such as zero travel day trips, 1-2, 3-4, 5-6, 7 or more.

To obtain **estimates of total trips or total miles** you must use the travel day trip file, where the weight corrects for non-response. To correctly estimate average travel day trips per person or average travel day trips per household, the sum of the trips should be divided by the sum of the persons or household, within classes if they are used. For instance, to estimate 'Person Trips per Household by Household Size' the analyst should obtain the frequency of the number of households in each cell (e.g. the number of 1-person households, 2-person households, etc.) and the number of trips made by all household members in the same class, and divide the trips by the number of households.

DIARY - Indicates whether the travel day diary was completed. Derived by combining categories 02 (was the diary completed?) and 03 (do you have the diary with you now?) in question (G2) into category 02.

DRIVER - Driver status of subject. If Age (C5) is less than 15 then DRIVER = -1. If DRVR (C8) is less than zero or missing and C13_DRVR is less than zero or missing and WHODROVE (G49) is less than zero or missing then DRIVER = -9. If DRVR = 01 or C13_DRVR = 01, or if the subject was reported as the driver on any travel day trip by any household member (WHODROVE (G49) on any household member travel day trip has the subject's person number) then the subject is a driver (DRIVER (derived) = 01). Otherwise DRIVER = 02.

DRVR_FLG - For each Travel Day trip in a POV, indicates whether the person self-reported as a driver or was a passenger in a personally owned vehicle. The CATI variable values of "-1" (appropriate skip) and "01" (self-reported as driver) are modified so that values of "-1" are changed to "02" if the person was a passenger in a personally owned vehicle (POV). For purposes of this derivation, a POV was used if TRPTRANS has a value in the range "01" through "08.

DRVRCNT - The number of drivers in the household. The variable is derived by counting the number of occurrences of DRIVER = 01.

DWELTIME – Calculated time at destination (in minutes), based on trip begin time (STRTTIME) and trip end time (ENDTIME).

ENDTIME -The end time of a travel day trip (ENDHOUR, ENDMINTE, ENDAMPM (G17)) reported in military time (0001 through 2400 hours). If ENDHOUR or ENDMIN or ENDAMPM = -1 then ENDTIME = -1. Otherwise ENDTIME = -9.

FLAG100 – Indicates that 100 percent of household members 18 and older completed the person interview.

FXDWKPL – Indicates that the worker has no fixed workplace.

GCDWORK - Great circle distance in miles between home and work. Calculated using the home address (D4/D5/D8/D9/M11/M12) and work address (E10/E11/E12/E13) provided by the household. A -9 indicates that no distance was calculated.

HH_CBSA - The CBSA code for the household's home address. The field is blank if the household does not fall in a CBSA. The source used was the 2007 TIGER/Line® Shapefiles (file: fe_2007_us_cbsa.shp) and Matchmaker SDK Professional v8.3 from TeleAtlas.

HH_ONTD - Total number of household members on travel day trip including subject. Derived from TRPHHACC + 1.

HHC_MSA -The Metropolitan Statistical Area (MSA) FIPS code or Consolidated Metropolitan Statistical Area (CMSA) FIPS code for the household's home address. This field includes codes for households located in one of the 18 CMSAs (excluding San Juan, PR) or one of the 31 MSAs that have a population of one million or more and are not part of a CMSA. A code is provided for all households in areas of one million or more. (Note that a CMSA, by definition, is an area of one million or more.) The field is set to "-1" if the household does not fall in area with a population of one million or more. The source used for MSAs and CMSAs was the 1999 Metropolitan Areas: Cartographic Boundary Files (file cm99_99.shp).

HHFAMINC - Total household family income for the last 12 months derived from HHFAMINC (M13) and HHINC (M14-M21). If HHINC is missing, the lower or upper range was randomly selected from HHFAMINC (M13).

HHSIZE - Count of eligible household members in the household including 0 – 4 year olds (result code J1) and those with final result code NG. Uses the number enumerated in C8, excluding persons with a final result code beginning with ND or O.

Note: NG refers to household members deployed overseas. ND refers to a household member who was enumerated but was deceased at the time that the extended interview was attempted. O codes are other out of scope, i.e., people originally enumerated as part of the household, but later found to not be a household member, such as someone visiting.

HHSTATE - This is the geocoded state for the household's home address (a two letter abbreviation). HHSTATE is derived from the household's latitude and longitude during geocoding. The source used was Matchmaker SDK Professional v8.3 from TeleAtlas.

HHSTFIPS - State FIPS code for the household's geocoded home address. The source used was Matchmaker SDK Professional v8.3 from TeleAtlas.

HHVEHCNT - The number of vehicles in the household on the date of the household recruitment interview plus any vehicles identified as household vehicles during the retrieval interviews. This is the number of vehicles enumerated in B2, added in G31 and verified in L7. Note any vehicle that is sold between the recruitment and retrieval interviews is included in the household vehicle count. Any vehicle added between the recruitment and retrieval interviews, but not used on the travel day is not included in the HH vehicle count.

Note: HHVEHCNT only includes vehicles for which a vehicle type is reported and the vehicle type is 01-07. Vehicles whose type is Refused, Don't Know, Not Ascertained, Golf Cart or Other (a total of 1207 sample vehicles) are not included in HHVEHCNT. The limitation to vehicle types 01-07 carries through to the calculation of Vehicle Miles of Travel (VMT.)

LIF_CYC - The life cycle code for the household. The variable is derived as follows:

> 01 = Household has one adult, no children and no retired persons.
> 02 = Household has 2 or more adults, no children and no retired persons.
> 03 = Household has one adult and the youngest child is 0 to 5 years old.

04 = Household has 2 or more adults and the youngest child is 0 to 5 years old.
05 = Household has one adult and the youngest child is 6 to 15 years old.
06 = Household has 2 or more adults and the youngest child is 6 to 15 years old.
07 = Household has one adult and the youngest child is 16 to 21 years old.
08 = Household has 2 or more adults and the youngest child is 16 to 21 years old.
09 = Household has one retired adult and no children.
10 = Household has 2 or more adults; at least one is retired and no children.

Classify each household member as adult or child and determine retirement status for adults. Then, use the adult, child and retired classification of each household member to classify the household into one of the 10 categories above.

An adult is defined as a household member that is 18 and over. A child is a household member 21 years or younger. A household member between the ages of 18 and 21 is classified as an adult or child depending on his/her relationship to the household respondent. If age is missing, use the imputed age. A household member is retired if PRMACT = 06 and is not retired if PRMACT > 0, but PRMACT is not equal to 06.

If retirement status (PRMACT) is missing, use age to determine retirement status. If age is 65 or more, consider the person retired. If less than 65, consider the person not retired. Assign these households to Life Cycle categories 01, 02, 09 or 10.

Use the following rules to determine whether the household member is an adult or child:

a. If household member's age is less than 18 years, classify a household member as a CHILD regardless of value of R_RELAT (CATI variable HH_RELAT) (C8) and classify household member's CHILD AGE in the appropriate group 0-5, 6-15, or 16-21.

b. If household member's age is greater than 21 years, classify a household member as an ADULT regardless of value of R_RELAT.

c. If household member's age is 18-21 and R_RELAT = 03 (CHILD), classify household member as CHILD and classify household member's CHILD AGE in 16-21 group.

d. If household member's age is 18-21 and household member is the household respondent (R_RELAT = 01) and any other household member is coded as PARENT to the household respondent (R_RELAT = 04), classify subject household member as CHILD and classify subject's CHILD AGE in 16-21 group. If no other household member is PARENT, classify subject household member as ADULT.

e. If household member is BROTHER/SISTER to the household respondent (R_RELAT=5) and any other household member is coded as PARENT to the household respondent (R_RELAT = 04), classify subject household member as CHILD and classify subject's CHILD AGE in 16-21 group. If no other household member is PARENT, classify subject household member as ADULT.

f. If household member's age is 18-21 and household member is OTHER RELATIVE (R_RELAT = 06) and any other household member is coded as PARENT to the household respondent (R_RELAT = 04), classify subject household member as CHILD and classify

subject's CHILD AGE in 16-21 group. If no other household member is PARENT, classify subject household member as ADULT.

g. If household member's age is 18-21 and household member is a NON-RELATIVE (R_RELAT = 08) to the household respondent, and any other household member is over 21 and is a SPOUSE (R_RELAT = 02) or any other household member is over 21 and is an UNMARRIED PARTNER (R_RELAT = 07), then classify the household member as a CHILD in the 16-21 age group; otherwise classify the household member as an ADULT.

h. If the value of household member's R_RELAT is missing: If age is <18, classify adult status of household member as CHILD and classify CHILD AGE according to age. If age is >21 classify adult status as ADULT. If age is 18-21, and any other household member is coded as PARENT, then classify subject household member as CHILD and CHILD AGE in 16-21 age group. If no other household member is classified as PARENT classify adult status of subject household member as UNKNOWN.

i. Household members with HH_RELAT = 02 (SPOUSE) or 07 (UNMARRIED PARTNER) between the ages of 18 and 21 that are not otherwise classified are classified as ADULTS.

LSTTRDAY - Number of days since last trip before travel day. Derived from LASTRPUT (number) and LASTRPNU (unit) (G15):

> If LASTRPNU = 01 (days)   then LSTTRDAY = LASTRPUT
> If LASTRPNU = 02 (weeks)   then LSTTRDAY = 7 x LASTRPUT
> If LASTRPNU = 03 (months   then LSTTRDAY = 30 x LASTRPUT
> If LASTRPNU = 04 (years)   then LSTTRDAY = 365 x LASTRPUT

MAKECODE - National Accident Sampling System (NASS) vehicle make code. Derived from MAKECODE (B2) and L_MAKE (L7) setting the variable E_MAKE equal to MAKECODE. The National Accident Sampling System codes were developed by NHTSA (National Highway Traffic Safety Administration.)

MODLCODE - NASS vehicle model code. Derived from MODLCODE (B2) and L_MODL (L7) setting the variable E_MODL equal to MODLCODE.

MSACAT - Metropolitan Statistical Area (MSA) category for the household's home address. The source used for MSAs was the 1999 Metropolitan Areas: Cartographic Boundary Files. File ma99_99.shp from http://www.census.gov/geo/www/cob/ma1999.html. The MSACAT variable was derived using information on population and the presence of transit. The variable is derived as follows:

> 01 = MSA or CMSA of 1 million or more with heavy rail.
> 02 = MSA or CMSA of 1 million or more and not in category 1.
> 03 = MSA of less than 1 million.
> 04 = Not in a MSA.

Note: The Federal Highway Administration (FHWA) provided the list of MSAs with heavy rail:
- Atlanta (Metro) 1979
- Baltimore (Metro) 1983

- Boston (Red, Blue, Orange Lines) 1901; also CR (MBTA)
- Chicago ("L") 1892, also CR (Metra)
- Cleveland (Red Line) 1955
- Los Angeles (Red line) 1990; also CR (MetroLink)
- Miami (MetroRail) 1984; also CR (TriRail)
- New York City - Newark (NYCTA IRT, IND-BMT, and SIRT Lines) 1867, (PATH Lines) 1908; also CR (LIRR, Metro North, NJT)
- Philadelphia (PATCO Lindenwold Line) 1969, (SEPTA Market-Frankford, Broad Street) 1908; also CR (NJT, SEPTA)
- San Francisco - Oakland (BART) 1972; also CR (CalTrain)
- Washington, DC (Metro) 1976; also CR (MARC, VRE)

The following cities have commuter rail (regional rail, suburban rail), but not heavy rail; and, therefore, are *not* coded as having heavy rail: 2001:

- New Haven (Shore Line East)
- San Diego (Coaster) 1995
- Syracuse 1994

MSASIZE - Population size category of the Metropolitan Statistical Area (MSA) for the household's home address. The source used was the Total Population by MSA from Census 2000 STF1. The variable is derived as follows:

01 = MSA of less than 250,000.
02 = MSA of 250,000 to 499,999.
03 = MSA of 500,000 to 999,999.
04 = MSA or CMSA of 1,000,000 to 2,999,999.
05 = MSA or CMSA of 3 million or more.
06 = Not in a MSA.

NONHHCNT - Number of non household members on travel day trip. Derived by subtracting TRPHHACC (G44) (household members accompanying respondent on trip) from TRPACCMP (G43) (total number of people accompanying respondent on trip). If G43 = 0, then set NONHHCNT to 0.

Note: The number of non-household member on the trip (NONHHCNT) was asked directly in the 2001 NHTS, but this question was dropped in 2009, so this number is now derived from the difference between the total people on the trip and the household members.

NUMADLT - Count of adults, household members 18 and older in household. Derived by using the age reported in AGE (C8) and AGERANGE (C10) (a value of 01 indicates the age is 18 or older). If both C8 and C10 are missing, use the imputed age. Include persons with final result code NG. Exclude persons with a final result code beginning with ND or O.

Note: NG refers to household members deployed overseas. ND refers to a household member who was enumerated but was deceased at the time that the extended interview was attempted. O codes are other out of scope, i.e., people originally enumerated as part of the household, but later found to not be a household member, such as someone visiting.

NUMONTRP - Total count of people on travel day trip, including subject. Derived from TRPACCMP (G43) (total number of people accompanying respondent on trip) using the rules:
- If TRPACCMP < 0 then NUMONTRP = 1
- Otherwise, NUMONTRP = TRPACCMP + 1.

ONTD_P1 through ONTD_P15 – Specifies which household members were on a particular Travel Day trip. Derived from the person number of household members present on the trip.

PSGR_FLG - Indicates that this respondent was a passenger on a Travel Day trip. If TRPTRANS (G34) has a value of 1-8 and WHODROVE does NOT equal PERSONID then PSGR_FLG = 01. If TRPTRANS (G34) has a value of 1-8 and WHODROVE does equal PERSONID then PSGR_FLG = 02. Otherwise PSGR_FLG = -1.

PUBTRANS – Identifies Transit Trips '01'='Yes' (some part of this trip was on transit) or '02' = 'No'. For NHTS publications, public transit is defined as including modes 09- Local public bus, 10-Commuter bus, 16-Commuter train, 17-Subway/elevated train, or 18- Streetcar/trolley. Other users may use different definitions.

R_SEX - Gender of subject. Derived from SEX (C8). If SEX = M then R_SEX = 01, if SEX = F then R_SEX = 02.

RAIL - Indicates whether the household is located in a MSA with heavy rail (see MSACAT). Derived from MSACAT (derived). If MSACAT is 01, RAIL is 01 (MSA has heavy rail). Else, RAIL is 02.

RESP_CNT - Count of total responding persons in the household, all ages. A responding person is one who completed a person-level interview (either by self or proxy). Derived by counting the number of persons with a final result code beginning with a "C" (MAINRSLT = C1 or C2) meaning Completed Self or Completed Proxy.

SFWGT – Weight for Safe Routes to School data. For households with members from 5 to 15, one household member is randomly selected to have data collected on their travel to and from school.

STRTTIME – Trip begin time in military format. Derived from STRTHR, STRTMIN, and STRTAMPM.

TDAYDATE – The year and month of the household's Travel Day, listed in YYYYMM format. TDAYDATE ranges from March 2008 to April 2009.

TDTRPNUM – The Travel Day Trip Number. Trips for each respondent are numbered consecutively by start time.

TDWKND – Indicates whether the travel day trip was made on a weekend. For NHTS the weekend designation includes trips with a start time of 6pm or later on Friday through trips with a start time up to midnight on Sunday night.

TRACCTM – Time taken to get to a public transportation mode on a travel day trip, converted to minutes. Derived by converting LONGTOHR, LONGTOMN (G36) to minutes. If

LONGTOHR or LONGTOMN = -1 then TRACCTM = - 1, otherwise TRACCTM = -9.

TRAVDAY – Day of the week of the household's assigned travel day.

TREGRTM - Time take to get from public transportation to the trip destination on a travel day trip, converted to minutes. Derived from LONGFRHR and LONGFRMN (G39). If LONGFRHR or LONGFRMN = -1 then TREGRTM = - 1, otherwise TREGRTM = -9.

TRIPPURP – generalized purpose of the trip, home-based and non-home based. Includes:
        HBW = Home-based Work
        HBShop = Home-based Shop
        HBSocRec = Home-based Social/Recreational
        HBO = Home-based Other
        NHB = Non Home-based
This variable is created using information from WHYFROM and WHYTO (G26).

TRPHHACC - Number of household members with respondent on trip. Derived by counting the number of variables WHOACC1 through WHOACC15 (see question G45) that have values greater than or equal to "01".

TRPMILES - Travel day trip distance in miles, whether originally reported in miles or blocks.
Derived from TRIPDIST and TRIPUNIT (G40). If TRIPDIST = 0 then TRPMILES = 0.5. If TRIPDIST and TRIPUNIT are greater than zero then if TRIPUNIT is in blocks, convert 9 blocks to 1 mile else set TRPMILES equal to TRIPDIST in miles. Otherwise, set TRPMILES equal to TRIPDIST. If the trip is reported by more than one household member and there is a discrepancy on the distance, use the data reported by the driver.

TRVLCMIN - The calculated travel time in minutes. Derived from TRVL_HR and TRVL_MIN and is used to compute the start and end time of a trip. (G34)

TRVL_MIN - Time to complete entire travel day trip in minutes. Derived from TRVL_HR and TRVL_MN (G42):

- If TRVL_HR and TRVL_MN equal -1 then TRVL_MIN is set to -1.
- If TRVL_HR equals -1 and TRVL_MN is greater than or equal to 0 then TRVL_MIN = TRVL_MN.
- If TRVL_HR is greater than or equal to 0 and TRVL_MN equals -1 then TRVL_MIN = TRVL_HR * 60 rounded to 1 significant figure.
- If TRVL_HR and TRVL_MN are both greater than or equal to 0 then TRVL_MIN = (TRVL_HR * 60) + TRVLMIN (rounded to 1 significant figure)
- Otherwise, TRVL_MIN = -9.

If the trip is reported by more than one household member and there is a discrepancy, use the data reported by the driver. TRVL_HR and TRVL_MN need to be copied to the trip record for each household member with a completed interview.

TRWAITTM - Time spent waiting for public transportation on travel day trip in minutes. Derived from WAIT_MIN (G37) and WAIT_HR (G37). If WAIT_MIN and WAIT_HR are greater than -1

then TRWAITTM = WAIT_HR * 60 + WAIT_MIN. If WAIT_MIN is greater than -1 and WAIT_HR is less than -1 then TRWAITTM = WAIT_MIN. If WAIT_HR is greater than -1 and WAIT_MIN is less than -1 then TRWAITTM = WAIT_HR * 60. If WAIT_HR and WAIT_MIN both equal -1 then TRWAITTM = -1. Otherwise TRWAITTM = -9.

URBAN - The household's home address is in an urbanized area. The source used is Urban Areas: 2000 Urbanized Areas: Cartographic Boundary Files. File ua00_d00.shp from http://www.census.gov/geo/www/cob/ua2000.html. The categories are:

> 01 = Urban Area, in Urbanized Area
> 02 = Urban Area, in Urban Cluster
> 03 = Urban Area, surrounded by Urban Areas
> 04 = Not in an Urban Area

URBANSIZE - Indication of size of urbanized area in which household is located.

Code	Population of Urbanized Area
01	50,000 – 199,999
02	200,000 – 499,999
03	500,000 – 999,999
04	1 million or more without heavy rail
05	1 million or more with heavy rail
06	Not in an urbanized area

Note: The population information is based on data from the 2000 Census.

URBRUR - Whether the household is in an urban or rural area. URBRUR is based on the value of URBAN: If URBAN = 01, 02, or 03, then URBRUR = 01 (Urban)
If URBAN = 04, then URBRUR = 02 (Rural)

VARSTRAT – The linearization variance stratum used to calculate standard errors.

VEHAGE – The derived age of the vehicle, based on model year (VEHYEAR). Current model year vehicles are considered one (1) year old.

VEHOWNMO - How long the vehicle has been owned, converted to months. Derived from VEHOWNED and OWNUNIT (L8). VEHOWNED is the number variable and OWNUNIT represents days, weeks, months, or years.

VMT_MILE – The miles for trips where a vehicle was driven. Derived from TRPMILES and TRPTRANS= 01-07. VMT_MILE excludes trips in vehicles where Vehicle Type is Refused, Don't Know, Golf Cart, and Other. Value is missing when not a vehicle trip.

WHYFROM - Location from which the trip started. If this is the first trip of the travel day, and the person started from home, then the value of WHYFROM = "01" ("Home"). If this is the first trip of the travel day and the person did not start from home, then the value of WHYFROM is the value of AWAYHOME (G25). If this is the second or subsequent trip of the day, then the value of WHYFROM is the value of WHYTO (G26) for previous trip.

WHYTRP1S - Travel day trip purpose summary. The variable is derived from AWAYHOME or WHYTO as appropriate by "rounding down" to the major category ending in zero, as described in the following list. The code for "Home," however, remains "01":

> 01 = HOME
> 10 = WORK
> 20 = SCHOOL/DAYCARE/RELIGIOUS ACTIVITY
> 30 = MEDICAL/DENTAL SERVICES
> 40 = SHOPPING/ERRANDS
> 50 = SOCIAL/RECREATIONAL
> 60 = FAMILY PERSONAL BUSINESS/OBLIGATIONS
> 70 = TRANSPORT SOMEONE
> 80 = MEALS
> 90 = MISC REASONS

WHYTRP90 -Travel day trip purpose consistent with NHTS/NPTS trend data (originally in the 1990 NPTS). The variable is derived from WHYFROM and WHYTO and assigns the trip and miles to the outbound destination. There is no code for trips to or from "Home" because these trips have been re-coded to the purpose of the outgoing trip(s). The codes are as follows:

> 01 = To and From Work
> 02 = To and From Work Related
> 03 = To and From Shopping
> 04 = To and From Family and Personal Errands
> 05 = To and From School and Church
> 06 = To and From Medical or Dentist
> 07 = To and From Vacation
> 08 = To and From Visiting Friends and Family
> 10 = To and From Other Social and Recreational
> 11 = To and From Other
> 98 = Not Ascertained
> 99= Refused

WKSTFIPS - State FIPS Code for the subject's work address. The source used was the United States Census Bureau State and County: 2000 County and County Equivalent Areas: Cartographic Boundary Files. File co99_d00.shp from http://www.census.gov/geo/www/cob/co2000.htm. A -9 indicates that we were unable to geocode the state where the workplace is located.

Note: Used the most current files for the 2008/2009 calendar year.

WORKER - Indicates whether the subject is a worker. If AGE is less than 16 then WORKER = -1. If PRMACT is less than zero or missing and PAYPROF is less than zero or missing then WORKER = -9. The subject is a worker (WORKER = 01) if either PRMACT (E3) = 01 or 02, or PAYPROF (E4) = 01. Otherwise WORKER = 02.

WORKLOC - The variable indicates whether the subject worked from home, a fixed work place or had some other work arrangement. The variable is derived as follows:

> If WKSTNUM (E10) = -1, -7, -8, or -9 then WORKLOC = WKSTNUM.
> If WKSTNUM = HOME then WORKLOC = 02

If WKSTNUM = NONE then WORKLOC = 03
If WKSTNUM does not equal missing and WKFMHMXX (E20) > 0 then WORKLOC = 04
    else WORKLOC = 01
Otherwise WORKLOC = -9.

The meaning of each positive value is:
    01 = Workplace
    02 = Works Only at Home
    03 = No Fixed Workplace
    04 = Home and Work

WRKCOUNT - The number of household members that are workers. Derived by summing all occurrences of derived variable WORKER = 01 within each household. .

WTHHFIN - Final household weight for households where at least 50 percent of household members 18 and over completed a person interview.

WTPERFIN- Final person weight for households where at least 50 percent of household members 18 and over completed a person interview.

WTTRDFIN - Final travel day trip weight for persons in households where at least 50 percent of household members 18 and over completed a person interview. WTTRDFIN = 365 x WTPERFIN.

YRMLCAP - Flag indicates that the variable YEARMILE (L5) was capped at 200,000 miles. If YEARMILE is less than zero then YRMLCAP = -1. If YEARMILE is greater than or equal to 200,000 then YRMLCAP = 01. Otherwise YRMLCAP = 02.

Renamed Variables and Geography-Related Variables

Table 1 lists CATI variable names and the names of the same variables in the delivery files when they have been renamed for delivery purposes.

Table 2 lists variables associated with geography. Most of these variables are determined by looking up a location collected during the interview in a standard reference source. The table lists the variable name; its descriptive label; the reference source, if any; and the derivation number in this document, if applicable.

Table 1. CATI Variables Renamed For Delivery

CATI Variable Name	Delivery Name
AGE	R_AGE
BASEID	HOUSEID
BIKETRIP	NBIKETRP
DTRIPID	TDCASEID
HH_RELAT	R_RELAT
HHFAMINC	HHFAMINC_C
HOWFRP1-5	TREGRI-5
HOWPUB1-5	TRACC1-5
PERSNUM	PERSONID
REFRSPX	HHRESP
RESPROXY	PROXY
WHENTOUS (M10)	YRTOUS

The following table lists variables associated with geography. Most of these variables are determined by looking up a location collected during the interview in a standard reference source. The table lists the variable name, the descriptive label, and the reference source, if any.

Table 2. Geography-Related Variables

Variable	Question Number	Description	Source
CDIVMSAR	DV_1*	Concatenation of variables CENSUS_D and MSACAT	
CENSUS_D	DV_2*	Census division classification for home address	b
CENSUS_R	DV_3*	Census region classification for home address	c
GCDWORK	DV_12*	Great circle distance between home and work	
HH_CBSA	DV_64*	CBSA FIPS code for household address	a
HHC_MSA	DV_17*	The CMSA or MSA code for the household's home address	e
HHMETDIV	DV_66*	Metro Division FIPS code for household address	f
HHSTATE	DV_19*	State household location	e
HHSTFIPS	DV_20*	State FIPS for household address	e
MSACAT	DV_28*	MSA category for the household home address	
MSASIZE	DV_29*	Population size category of the MSA for the household home address	g
RAIL	DV_38*	MSA heavy rail status for household location	h
URBAN	DV_47*	Home address in urbanized area	i

See Source ValuValues of -1 are instances where no valid value is defined; for example, HHC_MSA = -1 for a household that is not located in a CMSA or MSA of a million or more. Values of -9 indicate that insufficient information was ascertained to code the variable.

Key to Source Codes:
a. 2007 Metropolitan/Micropolitan Statistical Area: 2007 TIGER/LINES. File fe_2007_us_cbsa.shp from http://www.census.gov/cgi-bin/geo/shapefiles/national-files
b. Census Division: 2000 Census Division: Cartographic Boundary Files. File dv99_d00.shp from http://www.census.gov/geo/www/cob/dv2000.html
c. rg99_d00.shp from http://www.census.gov/geo/www/cob/rg2000.html
d. 2007 Combined Statistical Area: 2007 TIGER/LINES. File fe_2007_us_csa.shp from http://www.census.gov/cgi-bin/geo/shapefiles/national-files
e. TeleAtlas' Matchmaker SDK Professional v8.3
f. 2007 Metropolitan Division: 2007 TIGER/LINES. File fe_2007_us_metdiv.shp from http://www.census.gov/cgi-bin/geo/shapefiles/national-files
g. MSA: 1999 Metropolitan Statistical Area: Cartographic Boundary Files. File ma99_99.shp from http://www.census.gov/geo/www/cob/ma1999.html
h. Federal Highway Administration

i. "Urban Areas: 2000 Urbanized Areas: Cartographic Boundary Files. File ua00_d00.shp from http://www.census.gov/geo/www/cob/ua2000.html

j. United States Census Bureau State and County: 2000 County and County Equivalent Areas: Cartographic Boundary Files. File co99_d00.shp from http://www.census.gov/geo/www/cob/co2000.htm

Tract and Block Group Variables
(also known as **Claritas Variables**)

These variables were added to describe the characteristics of the areas where the NHTS were surveyed. This allows the data analyst to look for patterns in travel behavior, not only by individual characteristics, but by neighborhood characteristics. The data user can examine how characteristics such as population density, housing density, renter occupancy rate, and urbanicity of the household location may affect individual travel behavior.

Sources of Tract and Block Group Variables

The data contained in these variables was derived from Decennial Census and American Community Survey data and estimated to 2009 by Nielsen Claritas, Inc. An annual demographic update is developed by this company to serve as a source of estimates of population, households, and housing unit characteristics. These estimates are made at relatively small units of geography, such as census tracts and block groups, which make this update effective for use in supplementing the NHTS data. The update is a comprehensive process that relies on a number of additional data sources, including regional and city planning agencies, federal agencies (e.g., Bureau of Labor Statistics, Bureau of Census, Bureau of Economic Analysis) U.S. Postal Service, the direct mail industry, the real estate industry, and experts in the fields of geographic information systems and mapmaking.

Variable Naming Scheme

The variable names were designed so that:
- many of these variables would fall together in an alphabetic listing, and
- the variable name would help in describing the contents.

The naming scheme is:

First letter -	H for household descriptor
Second letter -	B for block group level data
	T for tract level data
Third letter of	
Household variables -	H for housing characteristic
	P for population characteristic

For example, HTHRESDN is a household descriptor, at the tract level, describing a housing characteristic, specifically, residential density (RESDN).

The last 5 letters of the variable describe the data in the variable, e.g. POPDN = population density.

The set of tract and block group variables derived by Nielsen Claritas are:

Household Descriptor, Block Group Level

HBHRESDN - housing units per square mile
HBHTNRNT - percent renter-occupied housing
HBHUR   - urban/rural code (see below)
HBPPOPDN   - population density (persons per square mile)

Household Descriptor, Tract Level

These are the same as the Block Group variables, but a "T" (tract) replaces the "B" (block group) in the second letter of the variable name.   The first entry on this list is the one additional household descriptor variable at the tract level that is related to the amount of employed people in residence in this census tract:

HTEEMPDN   -employed persons per square mile (i.e., employed persons at their residence location)
HTHRESDN   - housing units per square mile
HTHTNRNT   - percent renter-occupied housing
HTPPOPDN   - population density (persons per square mile)

Urban-Rural Continuum

The remainder of the Appendix describes the urban/rural continuum developed by Nielsen Claritas used in the variable named HBHUR-Urban/rural code, block group. This breakout of urban/rural should not be confused with the variable URBAN, which is the Census-defined urban area status of the sample household.

The categories of the Nielsen Claritas Urban/Rural Continuum, and the distribution of NHTS households within these categories, are presented in the following table, showing the distribution of the weighted and unweighted (number of respondent households) across the urban/rural continuum.

Urban/Rural Continuum – Distribution of Weighted and Unweighted NHTS Sample

	Weighted NHTS Households	Percent of households **weighted**	**Unweighted** NHTS Households	Percent of HHs **unweighted**
Second City	20,632,917	18.24	27,082	18.04
Suburban	27,430,457	24.25	34,991	23.30
Town and Country	45,041,531	39.82	71,126	47.37
Urban	19,964,251	17.65	16,937	11.28
Unassigned	8,899	0.01	9	0.01
Not Ascertained	23,274	0.02	2	0.00
Total	113,101,330	100.00	150,147	100.00
2009 Claritas urban statistics available at the **Block group level** only				

The Urban-Rural Continuum

Claritas, Inc., the predecessor of Nielsen Claritas, developed an urban-rural dimension to incorporate into their lifestyle cluster system, which is used primarily for research and marketing applications. The goal was to establish objective classifications that were less boundary-dependent than previous topologies.

The classification that is reflected in the Urban/Rural variable is based on population density, but not just the density of a specific geography, but the density in context of its surrounding area, or "contextual density". To establish this classification, the United States was divided into a grid to reduce the impact of variation in size (land area) of census tracts and block groups. Density was converted into centiles, that is, the raw numbers (persons per square mile) were translated into a scale from 0 to 99.

Urban
• Urban areas have highest population density scores based on density centiles
• 94% of block groups designated Urban have a density centile score between 75 and 99
• Downtown areas of major cities and surrounding neighborhoods are usually classified as urban

Suburban
• Suburban areas are not population centers of their surrounding communities
• 99% of block groups designated Suburban have a density centile score between 40 and 90
• Areas surrounding urban areas are usually classified as suburban

• Second Cities are population centers of their surrounding communities
• 96% of block groups designated Second City have a density centile score between 40 and 90
• Satellite cities surrounding major metropolitan areas are frequently classified as Second Cities

Town/Rural
• Town/Rural areas include exurbs, farming communities, and various rural areas
• 100% of block groups designated Rural have a density centile between 0 and 20
• 98% of block groups designated Town have a density centile between 20 and 40
• Exurban towns have slightly denser populations than rural areas

NOTE that in the 2009 NHTS, there is one category for Town/Rural containing both types of areas.   To compare with the 2001 NHTS, the user needs to add the Town and Rural categories to make them comparable with the combined category used in the 2009 data.

Nielsen Claritas Urbanization Methodology

Urbanization measures have been developed and refined by Nielsen Claritas over the past 30 years because the U.S. Census Bureau does not provide adequate standard measures. Although the Census does classify areas as being part of a central city, Combined Statistical Area (CSA), or Core Based Statistical Area (CBSA), these measures are insufficient for precise neighborhood classification.

In the 1980s, Nielsen Claritas developed new algorithms using a density grid to classify neighborhoods based on density of population. The density grid was created to cover the entire United States using latitude and longitude coordinates. Each grid cell, and ultimately each census block, was assigned a population center and its density character—using a sophisticated algorithm that searched for peaks (the local maxima) and valleys (minimum density points between maxima) to separate the central city from its suburbs, exurbs, and rural areas.

Nielsen Claritas creates a 2-mile radius around each block group centroid. Using a network of circles in place of the square grid provides a more robust estimate for the block group because, in situations where only a fraction of a block group is included within the radius, the new technique allocates the population of that fraction to the radius. The result is a technique that even allows statisticians to establish the difference between a local maximum (a peak) and a blemish (a high density score that doesn't really belong).

Nielsen Claritas statisticians evaluated many of the individual radii by hand. Fringe areas were assessed to judge the area as more similar to a city or a suburb. In addition, the circle-by-circle reviews allowed Nielsen Claritas to create a touch list of geographies that have special constraints for their density context. For example, if a neighboring block group's two-mile ring requires crossing a bridge or is subject to some other barrier, it would not be included in a given block group's contextual assessment, even though the cell touches the block group of interest.

Assessing all of the block groups in the U.S. one-by-one for barriers that merited being added to the touch list was not a trivial task, but one that Nielsen Claritas deemed necessary for the most precise assignments. For additional information on this urbanization methodology please refer to the *2009 PRIZM Methodology* document., which can be found at http://www.tetrad.com/pub/prices/PRIZMNE_Methodology.pdf

Developing a Best Estimate of Annual Vehicle Mileage
for 2009 NHTS Vehicles

Prepared For
Federal Highway Administration
National Household Travel Survey
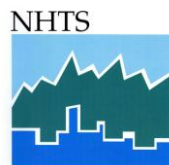
NHTS

Prepared By
Oak Ridge National Laboratory
June 2011

Developing a Best Estimate of Annual Vehicle Mileage for 2009 NHTS Vehicles

1. Introduction

In the 2009 NHTS, the number of miles (VMT) driven by an NHTS household vehicle can be estimated in three different ways. First, one can use the single odometer reading to compute an estimate of annual mileage. Second, a designated household member was asked to report the total number of miles driven in each of the household vehicles (hereafter referred to as "self-reported VMT"). Finally, the amount of annual driving can be estimated based on the amount a vehicle is driven during the designated sample day (i.e., the travel day). Ideally, annualizing the odometer readings would probably generate the most reliable VMT estimate compared to estimates based on the other two approaches. Unfortunately, not all vehicles had an odometer reading recorded. Furthermore, of those that had their odometer reading recorded, the quality of some of the odometer readings is less than desirable. As such, ORNL was asked to estimate the number of miles driven by each of the NHTS vehicles based on the best available data. This estimate is hereafter referred to as the BESTMILE. BESTMILEs are computed only for automobiles, pickup trucks, vans, and sport utility vehicles. The value of the BESTMILE for motorcycles, other trucks, and recreational vehicles (RV) equals the value of the self-reported VMT for those vehicles with such information available. The BESTMILE estimates were developed using Version 2 of the 2009 NHTS data.

The preceding description of BESTMILE applies, for the most part, to both the 2001 and 2009 NHTS surveys. The major difference is that the 2001 NHTS collected two odometer readings while in the 2009 NHTS survey, only a single odometer reading was collected. A summary of relevant variables, and any differences found between the 2001 and 2009 surveys, is presented in Table 1 below. Given this data limitation, the challenge of using the single odometer reading was ultimately one of developing an estimate of annual vehicle mileage that effectively used the available information. At the

same time, since one would presume that the use of two odometer readings is better than one, the ideal method would be comparable to that developed in 2001.

Table 1. Comparison of Variables Relevant to Computing the Best Estimate of Annual Vehicle Mileage, 2001 and 2009 NHTS

Name	Description	2001	2009	Notes
Vehicle-related Variables				
OD_READ(1)	First/only odometer reading	✔	✔	
OD_DAY(1)	Day of odometer reading 1	✔	✔	
OD_MON(1)	Month of odometer reading 1	✔	✔	
OD_YEAR(1)	Year of odometer reading 1	✔	✔	
OD_READ2	Second odometer reading	✔	✘	No second reading in 2009
OD_DAY2	Day of odometer reading 2	✔	✘	No second reading in 2009
OD_MON2	Month of odometer reading 2	✔	✘	No second reading in 2009
OD_YEAR2	Year of odometer reading 2	✔	✘	No second reading in 2009
VEHYEAR	Vehicle model year	✔	✔	
VEHTYPE	Type of vehicle	✔	✔	
ANNMILES	Self-reported VMT per vehicle	✔	✔	
Household-related Variables				
MSASIZE	Size of MSA of Household	✔	✔	
CENSUS_D	Census division of Household	✔	✔	
LIF_CYC	Life cycle of Household	✔	✔	
HHSIZE	Number of persons in Household	✔	✔	
HHVEHCNT	Number of vehicles in Household	✔	✔	
Primary Driver-related Variables				
WHOMAIN	Primary driver of vehicle	✔	✔	
EDUC	Level of education of driver	✔	*	Categories of this variable have been collapsed in 2009.
R_AGE	Age of primary driver	✔	✔	
WORKER	Worker status of primary driver	✔	✔	
R_SEX	Gender of primary driver	✔	✔	

Ultimately the process of estimating BESTMILE for the 2009 vehicles followed much of what was done for the 2001 survey. First, an initial overview of data quality was performed (see Section 2). This process involved assessing the number of sample vehicles that had necessary components of BESTMILE estimation, such as an odometer reading, vehicle year, and information on the primary driver. Next, investigation of how to best use the single odometer reading was performed (Section 3). Once that was

accomplished, the actual calculation of BESTMILE was done (Section 4). This calculation step involved iteration – an estimation method was attempted and subjected to a validation step. The validation step, in the absence of a known, reliable estimate of vehicle miles per vehicle, involved simulation of the method using 2001 vehicle data, comparing results of the new method versus BESTMILE estimates produced for the 2001 dataset. In cases where such validation showed inadequate results, alternate methods were attempted until adequate results were obtained. The estimates were then adjusted to fit a precise time frame - April 1, 2008 to March 31, 2009 (Section 5). Finally, the BESMTILE estimates were screened for outliers and flagged or adjusted where appropriate (Section 6).

2. Data Quality

An initial analysis of 2009 NHTS vehicle data quality and availability was performed. Presence of the single odometer reading, combined with data on the vehicle year, was the primary basis for 2009 quality checks. Other items needed for computation of the BESTMILE variable included primary driver of the vehicle, specific vehicle types[1], and vehicle year. Table 2 summarizes the 2009 data.

---

[1] The out of scope vehicle types included "other trucks," "recreational vehicles," "light electric veh (golf cart)," and vehicles with missing vehicle type information.

Table 2. 2009 NHTS Vehicle Data Quality Checks

Data Quality Checks	Sample Vehicles	%
Total 2009 NHTS Vehicles	**309,163**	**100.0%**
No Odometer Reading	77,469	25.1%
No Vehicle Year	5,412	1.8%
No primary driver associated with the vehicle	21,257	6.9%
Out of Scope Vehicle Types	7,559	2.4%
Vehicles without Data necessary for eventual BESTMILE estimation[2]	12	0.0%
Vehicles with Usable Odometer Data	**197,454**	**63.9%**
Vehicles with Presumed Odometer Rollovers[3]	4,393	1.4%

The percentage of vehicles with BESTMILE based on odometer data (63.9%) was higher than in the 2001 NHTS (47.5%). This reflects the fact the only one odometer reading was taken in the 2009 data, with two required for a vehicle to be considered usable in the 2001 data. Table 3 summarizes the distribution of 2009 NHTS vehicles in terms of the key pieces of data. The structure of this table was the foundation for the differing ways in which BESTMILE was computed for the 2001 NHTS, and shaped computations in the same way for the 2009 NHTS vehicles.

[2] This includes specific variables used in various regression models. For example, a vehicle may have primary driver information, but not have a value for a specific variable, such as EDUC (Education of the driver). Some of this was accounted for in the 2001 models; however, some variables may have specific values in 2009 that are not present in 2001.

[3] If a vehicle was at least 20 years old and the odometer reading was less than 100,000, analysis was performed regarding a possible unrecorded odometer rollover. If adding 100,000 or 200,000 miles to the odometer reading resulted in an average miles per year of less than the 75th percentile of miles per year for vehicles, by age group, for those vehicles at least 20 years old with more than 100,000 miles, then the additional 100,000 or 200,000 miles were added to the odometer reading. The 75th percentile cutoffs were 10,000 miles per year for 20-24 year old vehicles, 7,500 miles for 25-29 year old vehicles, 6,000 miles for 30-39 year old vehicles, and 4,000 miles for vehicles 40 years and older.

Table 3. NHTS Vehicles[4] by Data Required for BESTMILE Estimation

	Usable Data to Estimate Odometer-Based BESTMILE					
	Yes		*No*			
	Usable Self-Reported VMT		**Usable Self-Reported VMT**			
	Yes	*No*	*Yes*		*No*	
	Information on Primary Driver?		**Information on Primary Driver?**		**Information on Primary Driver?**	
	Yes		*Yes*	*No*	*Yes*	*No*
One driver/One vehicle HHs	23,312	651	5,940	62	664	555
Two drivers/two vehicles HHs	71,172	1,915	15,898	9,900	1,089	2,239
Other Drivers=Vehicles HHs	17,275	648	4,949	2,708	448	783
Drivers > Vehicles HHs	10,668	438	2,929	2,823	352	717
Drivers < Vehicles HHs	69,403	1,972	22,984	14,638	1,821	5,456
Subtotal	191,830	5,624	52,700	30,131	4,374	9,750
Subtotal by Usable Data	***197,454***		***96,955***			

---

[4] There were 309,163 vehicles included in the 2009 NHTS survey. However, 14,754 of these vehicles were out of scope for the BESTMILE estimate. The out of scope vehicle types included "other trucks," "recreational vehicles," "light electric veh (golf cart)," and vehicles with missing vehicle type information. BESTMILE for these vehicles was set to the self-estimated annual miles driven, where available.

3. Initial Determination of An Annualized Odometer Estimate (ODOMMILES)

Investigation into how to use a single odometer reading in place of two odometer readings was conducted. As an initial step, 2001 NHTS national sample vehicle data was examined. Average 2001 self-reported mileage shows a slight decline for each year that a vehicle is owned, indicating that vehicle age should play an important role in the process. A new/used question (such as "Did you purchase this vehicle new or used?") was not asked in either 2001 or 2009; however, for purposes of this analysis a vehicle was considered purchased "used" if it was 2 or more years older (as determined through the vehicle model year) than the amount of time it was owned by the household. Similar analysis was conducted on 2009 NHTS vehicle data.

Given data on self-reported miles driven by new/used status and vehicle age, three regressions (one for new vehicles, one for used, and one for all vehicles – for use on vehicles where new/used status is unknown) were run to determine the relationship between vehicle age and annual miles driven. These three regressions, calculated separately but taking the same form, are summarized by Equation (1)[5]:

$$\text{Self - Reported Annual Miles} = \alpha + \beta_1 (VehicleAge) + \beta_2 (VehicleAge)^2 \qquad (1)$$

Predicted values for each regression were computed for each vehicle age, which in the 2001 NHTS data ranges from 1 to 40. The predicted values by age are summarized in Figure 1.

---

[5] Note that regressions for 2001 and 2009, while taking the same form, were computed separately, leading to slightly different parameter estimates between surveys. Admittedly, for both 2001 and 2009, the R-squared values of all models are low (in the .04-.07 range). However, all model terms and the models themselves are statistically significant, and given the large amount of variation among vehicles in both surveys, one would expect R-squared values to be somewhat low.

Figure 1. Average Self-Reported Miles (Smoothed via Regression Modeling) by Vehicle Age and New/Used Status, 2001 NHTS National Sample Vehicles

For each vehicle these predicted values were used to determine the percentage of travel that a given vehicle took in the most recent year, given the vehicle age and its subsequent cumulative mileage. Equation 2 summarizes the percentage of the single odometer reading attributed to the current year mileage for new vehicles[6]:

$$\text{New Mileage Percent}_i = \frac{\text{Estimated Self Reported Miles}_t}{\sum_{i=1}^{t} \text{Estimated Self Reported Miles}_i} \times 100\% \qquad (2)$$

where t is the vehicle age, and the numbers for Estimated Self Reported Miles are estimated using the regression for new vehicles in Equation 1. This percentage is then multiplied by the odometer reading in order to compute the estimated annual mileage (*ODOMMILES*) in the most recent year.

For a more concrete example, assume that we want to determine the miles driven for a new vehicle with an age of 5 and an odometer reading of 75,000. The table below shows the first step in the calculation:

---

[6] This method is also used for vehicles with an unknown new/used status, although the parameter estimates for these vehicles were different from those for new vehicles.

Table 4. Example Computation of Percent Mileage by Vehicle Year for a New Vehicle

Vehicle Year	Annual Miles	Cumulative Miles	Percent of Total
1	15,163	15,163	22.3%
2	14,356	29,520	21.1%
3	13,573	43,093	20.0%
4	12,815	55,908	18.8%
5	12,080	67,987	17.8%

Numbers in the Annual Miles column represent the predicted values from the model computed using Equation (1). Percents for all years are computed using the Cumulative Miles for the last year as a denominator. Since the vehicle is 5 years old, the Year 5 percent of 17.8% is multiplied by 75,000 to obtain the initial estimate for odometer miles (13,326 miles).

Used vehicles present a slightly more complex calculation. The first owner originally purchased the vehicle new, so for the period before the household respondent owned the vehicle, the mileage figures are estimated from the new vehicle regression. At the point at which the current owner (the household respondent) took ownership of the vehicle, the used regression is utilized to generate mileage figures[7]. Equation 3 below summarizes the percentage of the single odometer reading assumed to be the current year mileage for used vehicles:

$$\text{Used Mileage Percent}_i = \frac{\text{Used Vehicle Miles}_t}{\sum_{i=1}^{s-1}\text{New Vehicle Miles}_i + \sum_{i=s}^{t}\text{Used Vehicle Miles}_i} \times 100\% \quad (3)$$

where s is the vehicle age minus the number of years the household has owned the vehicle (more simply, the vehicle age at which the household obtained the vehicle), t is the vehicle age, New Vehicle Miles numbers are estimated using the regression for new vehicles in Equation 1, and Used Vehicle Miles numbers are estimated using the regression for used vehicles in Equation 1.

---

[7] Lack of data precludes adjustments for vehicles with more than one owner before the survey respondent. For purposes of this analysis, a single previous owner is assumed for vehicles determined to be "used."

To modify the previous example, assume that a 5 year-old vehicle with an odometer reading of 75,000 miles has been owned by the household for 2 years. To illustrate the mileages used for each year in terms of Figure 1, the figure below shows which estimates are used for each year the vehicle was in use:

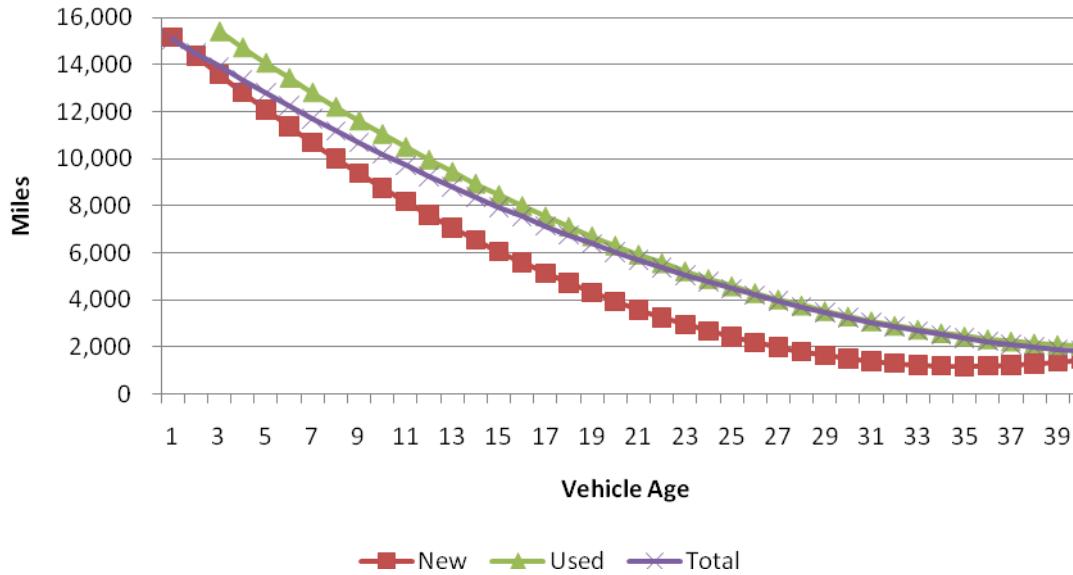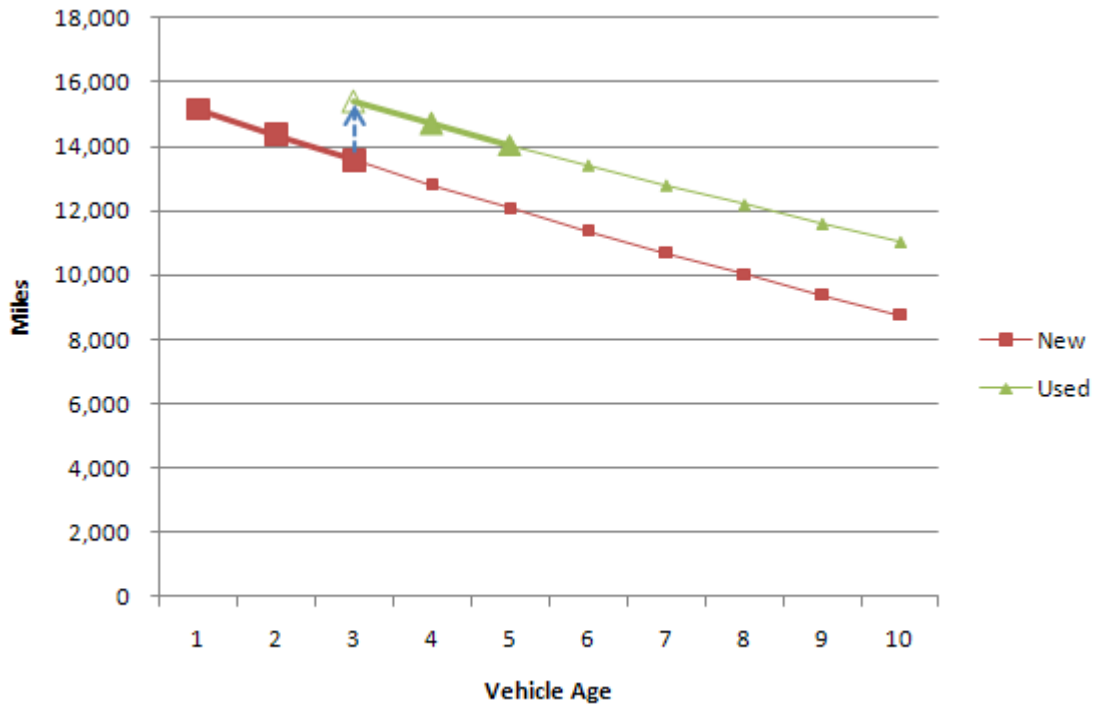**Figure 2. 5 Year-Old Used Car Example of Average Self-Reported Miles (Smoothed via Regression Modeling) by Vehicle Age and New/Used Status, 2001 NHTS National Sample Vehicles**

As described in Equation (3), the first three years use the new vehicle mileage, while the next two shift to the used averages. These are then used to calculate the percentage of mileage driven in the most recent year. Table 5 shows the first step in this calculation.

Table 5. Example Computation of Percent Mileage by Vehicle Year for a Used Vehicle

Owner	Vehicle Year	Annual Miles	Cumulative Miles	Percent of Total
1	1	15,163	15,163	21.0%
(presumably	2	14,356	29,520	20.0%
non-NHTS)	3	13,573	43,093	18.9%
2 (NHTS	4	14,719	57,812	20.5%
respondent)	5	14,062	71,874	19.6%

Numbers in the Annual Miles column for Owner 1 are predicted values from the New Car model computed using Equation (1), and from the Used Car model for Owner 2. Again, since the vehicle is 5 years old, the Year 5 percent of 19.6% is multiplied by 75,000 to obtain the initial estimate for odometer miles (14,674 miles). According to this calculation, the annual miles increase when ownership of the car is transferred and the used car, given the same mileage, was driven more in the most recent year. Intuitively this makes sense. If a person sells a car, that car may be more likely to be either in disrepair or underutilized. A person purchasing a used car, however, will tend to treat that car as if it were new, which it is from their usage perspective.

In 2001 a key component of calculating BESTMILE was the use of a crude daily estimated odometer mileage, taking the difference in the two odometer readings and dividing that by the difference in the dates of when those readings were taken. The calculation of ODOMMILES should be seen as an approximation of this crude method. The ODOMMILES calculation is subject to assumptions in driving patterns – mainly that driving of a given vehicle declines over time - that may lead to bias in the estimates. Thus, ODOMMILES is merely used as a piece in the BESTMILE estimation process, and not an end in itself.

4. Calculation of BESTMILE for Vehicles in the 2009 NHTS

As with the 2001 BESTMILE, estimation of 2009 BESTMILE utilized six different approaches, depending on which data was available for each vehicle. A seventh approach involved merely assigning self-estimated miles to vehicles of out-of-scope types, where no other information was present. Odometer readings are a key part of

Approaches 1 and 4 (detailed later in this section), and the estimate from the previous section (ODOMMILES) was integrated into the BESTMILE methodology for 2009.

Ideally, similar methodology to that used in creating BESTMILE for the 2001 NHTS vehicles would be used for the 2009 BESTMILE estimates in order to ensure comparability of estimates. In order to measure just how compatible 2009 estimates using this new methodology would be, the method was first simulated using 2001 NHTS vehicles. New 2001 BESTMILE estimates were then compared with the original 2001 estimates as a validation step. In cases where the new methods produced results that differed greatly, other alternatives were investigated (and detailed for each approach later in this section).

Approach 1. *For vehicles with a usable odometer reading, self-reported VMT, and information on the primary driver.*

Estimation

There were 191,830 vehicles in this category (Table 3). This approach assumes that the daily driving of a vehicle is a function of:

- the daily driving based on self-reported VMT,
- characteristics of the primary drivers, and
- other household characteristics and geographical attributes.

In the 2001 computation[8], the annualized estimate was computed using Equation (4):

$$Y = X\beta + R,$$
(4)

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[8] More fully described in the *2001 NHTS User's Guide, Appendix J.*

where *Y* was the difference in the two odometer readings divided by the difference in the dates of those readings (essentially a crude daily estimated mileage), *X* is a vector of independent variables, β is the matrix of model parameter estimates, and *R* is the vector of residuals containing the differences between the observed crude daily mileage and the estimates daily mileage. The vector of independent variables, *X*, included annual self-reported VMT (*ANNMILES*), education level (*EDUC*), age class of the primary driver (*R_AGEC*), vehicle age class (*VEHAGEC*), vehicle type (*VEHTYPE*), area size (*MSASIZE*), Census division (*CENSUS_D*), life cycle of the household (*LIF_CYC*), worker status and gender of the primary driver (*WORKER* and *R_SEX*, respectively), and size of the household (*HHSIZE*). The model for the case with an unequal number of drivers and vehicles also used a categorical variable for the driver to vehicle ratio (*DRVEH*).

In order to approximate the data available in 2009, this model substituted *ODOMMILES* (as computed in Section 3) as the dependent variable *Y* in Equation (4). This differs slightly from the 2001 method in that the dependent variable for 2001 was daily rather than annual miles. However, such an adjustment would merely affect parameter estimates but have no effect on predicted values for each vehicle; thus, ODOMMILES was left in annual terms and not divided by 365. In addition, the independent variable *EDUC* was modified to match those levels provided in 2009. If one odometer reading is truly enough to provide an adequate estimate of annual mileage, one would expect similarities in the results when compared to actual 2001 BESTMILE estimates. In addition to demonstrating the similarities of the approaches, such consistency would be desirable for comparison purposes by data users.

Two methods of comparison between the model estimates and the 2001 *BESTMILE* were devised. First, the standard error of the 2001 estimate, available in the *ANULZDSE* variable, was compared to the difference between the new model estimate and the *BESTMILE* value. This difference was classified in terms of the number of standard errors that the new estimate was different from *BESTMILE*. The second method involved the distribution of the percentage difference between the two estimates for each

vehicle, such that one can see, for example, that 25%-50%-75% of new model estimates are no more than a respective percentage away from the *BESTMILE* estimate.

The comparison of results is described in Tables 6a and 6b. Ultimately, using *ODOMMILES* as the dependent variable was extremely poor. Less than 30% of vehicles had estimates within two standard errors of the original *BESTMILE*, with nearly 40% of vehicles having estimates that differed by a factor of 5 or more standard errors. In other terms, with a median difference of 21%, half of all vehicles had differences with the original *BESTMILE* of 21% *or more*.

Table 6a. Distribution of 2001 NHTS Vehicles by Differences between Estimate using *ODOMMILES* as the Dependent Variable and BESTMILE Value, in terms of standard errors of BESTMILE estimates, Approach 1

	% of Vehicles
0-1 StdErrs	15.00%
1-2 StdErrs	13.57%
2-3 StdErrs	12.19%
3-4 StdErrs	11.17%
4-5 StdErrs	9.63%
5+ StdErrs	38.44%

Table 6b. Distribution of the Percentage Differences between Estimate using *ODOMMILES* as the Dependent Variable and BESTMILE Value, 2001 NHTS, Approach 1

Percentile of Vehicles	% Difference from Original BESTMILE
100% Max	194977%
99%	1256%
95%	189%
90%	98%
75% Q3	44%
50% Median	**21%**
25% Q1	9%
10%	3%
5%	2%
1%	0%
0% Min	0%

Alternate models were tried, using a single model instead of multiple models based on the driver-vehicle relationship, for instance. The inclusion of new independent

variables, such as whether a vehicle was new or used, or purchased in the last year, was also investigated. Models using the self-reported VMT for each vehicle (ANNMILES) as the dependent variable were also tried. None of these attempts produced anything other than marginally different results from those in Tables 6a and 6b.

Ultimately, the solution that would best ensure compatibility between results used the existing BESTMILE as the dependent variable, while the right hand side of the equation was populated with independent variables that would be available in the 2009 data, including the ODOMMILES measure computed in Section 3. Using BESTMILE as the dependent variable on first glance may raise some concerns; however, one should note that such a model is not used to make inferences on the statistical validity of relationships between dependent and independent variables. The model is merely being used as an algorithm that relates the 2001 BESTMILE to a set of variables in the 2001 NHTS.

The other obvious problem with using BESTMILE as a dependent variable is that no BESTMILE estimates exist for 2009 data. Thus, the models using 2001 data were "transferred" to the 2009 data in order to create such estimates. In other words, these models were developed using 2001 data, then applied to the 2009 data to produce estimates.

Similar to what was done in the 2001 computations, models were estimated separately for three different types of households, as classified by the driver to vehicle relationship. These types consist of (1) households with one vehicle and one driver, (2) multi-driver households with an equal number of vehicles and drivers, and (3) households with unequal numbers of vehicles and drivers. The models are represented in Equation (4) shown earlier, where Y is the vector of *BESTMILE* estimates from 2001, X is the vector of independent variables, β is the matrix of model parameter estimates, and R is the vector of residuals. The vector of independent variables, X, includes the initial annualized odometer estimate based on the first odometer reading as described in Section

3 (*ODOMMILES*)[9], as well as the other independent variables detailed in the model with ODOMMILES as the *dependent* variable.

Use of a term in all models to account for year-to-year variation was investigated. *Highway Statistics* shows a 0.4% overall decrease in annual miles driven per passenger car between 2001 and 2008 (the latest year for which data is available), with slightly larger decreases in other types of vehicles (Table 7). Overall, annual miles for passenger cars and other 2-axle, 4-tire passenger vehicles fell 1.4% between 2001 and 2008. The self-reported annual miles estimates also dropped between the 2001 and 2009 NHTS surveys, for a much larger overall decline of 8.9%, with drops between 6% and 15% depending on vehicle type (Table 7). Since the declining self-reported mileage is a component in the modeling process, such information will ultimately influence the final estimates in a downward fashion, thus eliminating any need for a year-to-year term.

Table 7. Comparison of 2001 and 2009 Average Miles per Vehicle,
Highway Statistics **and NHTS**

	2001	2009*	% diff
Highway Statistics			
Passenger Cars	11,831	11,788	-0.4%
Other 2-Axle, 4-Tire Vehicles	11,204	10,951	-2.3%
Passenger Cars & Other 2-Axle, 4-Tire Vehicles	11,593	11,432	-1.4%
NHTS ANNMILES (Self-Reported Mileage)			
Automobile/car/station wagon	10,695	10,054	-6.0%
Van (mini, cargo, passenger)	12,717	11,030	-13.3%
Sports utility vehicle	12,722	11,584	-8.9%
Pickup truck	11,729	9,891	-15.7%
All	11,078	10,088	-8.9%

 * The most recent data for Highway Statistics is for the year 2008. Data can be found at http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.cfm.

Comparison of 2001 Method vs. 2009 Method Using 2001 Vehicles

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[9] Models with the single unadjusted odometer reading, as well as population density data and data from the travel day were also investigated, but were found to be less adequate in estimating 2001 BESTMILE. Note that use of ODOMMILES differs between what was used to calculate BESTMILE for the 2001 dataset. However, ODOMMILES was found to be the best bridge between the 2001 approach and the data available in 2009.

The model approach with BESTMILE as the dependent variable produced a close estimate of the 2001 *BESTMILE*. In order to compare just how close, the 2001 data where Approach 1 was used in the original *BESTMILE* computation was split into two equal groups. The model for the 2009 method was fitted to the data in the first group, and then estimates were computed for the vehicles in the second group. These estimates were then compared to the *BESTMILE* variable (computed using the 2001 method) in the 2001 NHTS dataset. This process was then reversed, with the model fitted to the second group of vehicles, and estimates using that model produced for the first group.

For the first group of data, 86.9% of all vehicles had estimates based on the new models that were within 2 standard errors of the *BESTMILE* estimate found in the 2001 NHTS dataset, with 96.2% within three standard errors (Table 8a). For the second group of data, these numbers were 86.9% within two standard errors and 96.4% within three standard errors (Table 8a). In terms of percentage differences, 50% of vehicles had new estimates that had a difference of 4.5% or less when compared to the *BESTMILE* estimate for both groups of data (Table 8b). 75% of all vehicles had differences of 10% or less for the both groups of vehicles (Table 8b).

Table 8a. Distribution of 2001 NHTS Vehicles by Differences between Estimate using One Odometer Reading and BESTMILE Value, in terms of standard errors of BESTMILE estimates, Approach 1

	Group 1	Group 2
0-1 StdErrs	57.16%	57.25%
1-2 StdErrs	29.73%	29.66%
2-3 StdErrs	9.31%	9.48%
3-4 StdErrs	2.16%	2.39%
4-5 StdErrs	0.70%	0.64%
5+ StdErrs	0.94%	0.58%
% 0-2 SEs	**86.89%**	**86.91%**
% 0-3 SEs	**96.20%**	**96.39%**

Table 8b. Distribution of the Percentage Differences between Estimate using One Odometer Reading and BESTMILE Value, 2001 NHTS, Approach 1

	Group 1	Group 2
100% Max	207891%	14558%
99%	403%	408%
95%	47%	47%
90%	24%	24%
75% Q3	10%	10%
50% Median	**4.5%**	**4.6%**
25% Q1	2%	2%
10%	1%	1%
5%	0%	0%
1%	0%	0%
0% Min	0%	0%

Given that the estimates from the new modeling scheme so closely match those of the *BESTMILE* variable on the 2001 dataset, this modeling approach, using both groups of data above, was used to compute 2009 *BESTMILE* estimates. Note that the initial annualized odometer estimate (*ODOMMILES*) for 2009 vehicles was computed based on Equations (2) and (3), which were re-calculated using 2009 data.

Residuals

In estimating 2001 *BESTMILE*, the residual from Equation (4) was retained since the goal was to create annualized estimates, as opposed to predictions completely free from random noise. Based on the assumption that the residuals from these new models based on 2001 data would be similar in distribution to residuals for 2009 data (assuming 2009 data could be used to create such as model), the residuals for vehicles from these new models were randomly assigned to the 2009 NHTS vehicles (referred to hereafter as "pseudo-residuals")[10].

If, after adding the pseudo-residual, the estimated ŷ was less than 0 or greater than 200,000 miles per year[11], then a second randomly assigned residual was used. In this process for the 2001 *BESTMILE* computation, a third randomly assigned residual was used if the second residual also resulted in a ŷ less than 0 or greater than 200,000 miles

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[10] All sampling was done with replacement.
[11] Cutting off mileage at 200,000 miles per year has been standard in the NHTS/NPTS series. This amounts to approximately 550 miles per day, which is a practical maximum for a single driver.

per year[12]. However, after this point, if ŷ was still outside this range, then *BESTMILE* was set at 0 or 200,000. The percentage of total values in 2001 set to 0 or 200,000 after pseudo-residual assignment was approximately 0.2-0.5% depending on the modeling approach used. A comparable percentage in the 2009 ŷ estimates was obtained only when using an additional fourth residual, when needed. Thus, for Approach 1 and all other approaches in 2009, a fourth pseudo-residual was used in cases where necessary.

Approach 2. *For vehicles with self-reported VMT, and information on the primary driver, but <u>without</u> a usable odometer reading.*

<u>Estimation</u>

In the 2001 calculation of *BESTMILE*, the equivalent to Equation (4) was used to estimate vehicles with self-reported VMT and information on the primary driver but without usable odometer readings. In terms of estimation of 2009 *BESTMILE*, this subset of vehicles can be calculated using Equation (4), excluding the annualized single odometer reading term (*ODOMMILES*). The same setup was used as in Approach 1, with an initial model fitted using 2001 NHTS vehicles in two groups. As with Approach 1, pseudo-residuals were assigned, with the process repeated if the resulting ŷ was below 0 or above 200,000 annual miles per vehicle.

<u>Comparison of 2001 Method vs. 2009 Method Using 2001 Vehicles</u>

The results of calculations for these models for 2001 vehicles using the 2009 approach are in Table 9a and 9b, and are comparable to, and even slightly better than, the results in Approach 1.

Table 9a. Distribution of Vehicles by Differences between Estimate using One Odometer Reading and BESTMILE Value, in terms of standard errors of BESTMILE estimates, Approach 2

	Group 1	Group 2
0-1 StdErrs	65.07%	63.63%
1-2 StdErrs	28.70%	29.04%

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[12] Note that if the sole purpose was to find a residual that led to an estimate within 0 to 200,000, a more efficient method could have been chosen. However, the main point was to assure that assignment of residuals was random in nature.

2-3 StdErrs	5.56%	6.28%
3-4 StdErrs	0.63%	0.97%
4-5 StdErrs	0.03%	0.08%
5+ StdErrs	0.01%	
% 0-2 SEs	**93.77%**	**92.67%**
% 0-3 SEs	**99.33%**	**98.95%**

Table 9b. Distribution of the Percentage Differences between Estimate using One Odometer Reading and BESTMILE Value, Approach 2

	Group 1	Group 2
100% Max	158033%	34617%
99%	410%	414%
95%	40%	42%
90%	19%	21%
75% Q3	8%	9%
50% Median	**3.8%**	**4.0%**
25% Q1	2%	2%
10%	1%	1%
5%	0%	0%
1%	0%	0%
0% Min	0%	0%

Approach 3. *For vehicles with self-reported VMT, but <u>without</u> a usable odometer reading and information on the primary driver.*

<u>Estimation</u>

There were 30,131 vehicles in this category (Table 3). Although the single odometer reading was missing for these vehicles, the strong relationship between self-reported VMT and odometer readings (and thus, the *BESTMILE* estimate from 2001) suggested the following estimation approach:

$$BESTMILE_i = \hat{\alpha} + \hat{\beta} * ANNMILES_i + R_i \qquad (5)$$

where $\hat{\alpha}$ is the intercept and $\hat{\beta}$ is the estimated coefficient for *ANNMILES*. The pseudo-residuals were assigned in similar fashion to Approaches 1 and 2.

<u>Comparison of 2001 Method vs. 2009 Method Using 2001 Vehicles</u>

This method contains no changes in terms of variable availability from 2001 to 2009. Thus, the 2009 method is identical to the 2001 method, and produced the same results when applied to 2001 vehicles.

Approach 4. *For vehicles with a usable odometer reading and information on the primary driver, but <u>without</u> self-reported VMT.*

<u>Estimation</u>

There were 5,624 vehicles in this category (Table 3). The estimation model was similar to Equation (4), except for the omission of the self-reported VMT term. In order to remain consistent with the approach used in creating the 2001 *BESTMILE*, the DRVEH variable was included in the model in lieu of estimating separate models for households with different ratios of vehicles to drivers.

Modeling similar to that in Approach 1 was performed. First, using ODOMMILES as a dependent variable was attempted, with results similar to those in Tables 6a and 6b. Thus, modeling with BESTMILE as a dependent variable was attempted with reasonable success, with the added benefit of being consistent with modeling in Approach 1.

<u>Comparison of 2001 Method vs. 2009 Method Using 2001 Vehicles and Pseudo-Residuals</u>

The standard error results of calculations for these models for 2001 vehicles using the 2009 approach in Table 10a are nearly identical to the results in Approach 1. The distribution of the percent differences (Table 10b), however, indicate that this approach is not as transferable, with 50% of all vehicles having values more than 12 to 14% different from 2001 values.. This may indicate that the self-reported estimate heavily influences prior approaches, and the lack of this variable hurts comparisons with 2001 estimates. However, given that less than 2% of all 2009 NHTS vehicles fall into this group, such an approach may be acceptable.

Table 10a. Distribution of Vehicles by Differences between Estimate using One Odometer Reading and BESTMILE Value, in terms of standard errors of BESTMILE estimates, Approach 4

	Group 1	Group 2
0-1 StdErrs	55.02%	59.91%
1-2 StdErrs	31.03%	29.07%
2-3 StdErrs	10.27%	7.80%
3-4 StdErrs	2.45%	2.07%
4-5 StdErrs	0.69%	0.38%
5+ StdErrs	0.54%	0.77%
% 0-2 SEs	**86.05%**	**88.98%**
% 0-3 SEs	**96.32%**	**96.78%**

Table 10b. Distribution of the Percentage Differences between Estimate using One Odometer Reading and BESTMILE Value, Approach 4

	Group 1	Group 2
100% Max	408290%	36289%
99%	1847%	1767%
95%	257%	230%
90%	113%	106%
75% Q3	39%	34%
50% Median	**17.9%**	**15.3%**
25% Q1	7%	6%
10%	3%	2%
5%	1%	1%
1%	0%	0%
0% Min	0%	0%

Approach 5. *For vehicles with usable information on the primary driver, but <u>without</u> odometer readings and self-reported VMT.*

Estimation

There were 4,374 vehicles in this group (Table 3). The estimation model again was similar to Equation (4), except for the exclusion of both self-reported VMT and the annualized single odometer term (*ODOMMILES*). As with all approaches, pseudo-residuals were assigned to develop the final BESTMILE estimate.

Comparison of 2001 Method vs. 2009 Method Using 2001 Vehicles

The only change between the 2001 and 2009 methods for this approach is the differing levels of the EDUC variable, which resulted in a negligible amount of difference between 2001 and 2009 methods.

Approach 6. *For vehicles with no driving information except that collected on the travel day.*

Estimation

The 9,750 remaining vehicles of usable vehicle types had no usable odometer readings, self-reported VMT, or information on the primary driver. Of these, 2,811 were used on the travel day. Thus, for these 2,811 vehicles, the total miles driven on the travel day were adjusted by simple annualization and probability factors. Equation (6) shows how the *BESTMILE* estimate for these vehicles was computed:

$$BESTMILE = 365 \text{ x (Miles driven on the travel day)} \qquad (6)$$
$$\text{x } Prob \text{ (vehicle was driven on weekday)}$$
$$\text{x } [Mean \text{ (miles driven in a day)}]/[Mean \text{ (miles driven on a weekday)}]$$

where *Prob* (vehicle was driven on weekday) is the weighted proportion of vehicles driven on a *weekday* travel day to all vehicles (essentially, the *probability* that a vehicle was driven on a weekday); and [*Mean* (miles driven in a day)]/[*Mean* (miles driven on a weekday)] is a factor to adjust the average of miles per vehicle for vehicles driven on a *weekday* travel day to average miles for any day of the week. A similar approach was used for vehicles that were driven on a travel day that was on a *weekend*. This is the same computation as was done for the 2001 *BESTMILE* variable.

This method contains no changes in terms of variable availability from 2001 to 2009. Thus, the 2001 method is identical to the 2009 method, with both methods producing exactly the same results when applied to 2001 vehicles.

Approach 7. *For vehicles not assigned a BESTMILE estimate using the other*
approaches, or for out of scope vehicle types

All remaining vehicles with a self-reported mileage estimate (ANNMILES) were simply assigned values of BESTMILE equal to ANNMILES. This includes out of scope vehicles as well, and accounts for 13,961 vehicles.

5. Adjustment to a Fixed Time Frame

In the 2001 BESTMILE computations, the estimates were adjusted in the modeling stage such that they represented annual travel from May 1, 2001 to April 30, 2002. This time frame was selected because it contained the largest proportion of odometer readings compared to all other possible time spans beginning on the first day of a given month. For the 2009 estimates, the time frame of April 1, 2008 to March 31, 2009 used for the 2009 BESTMILE estimates was chosen since the majority of the survey (and thus the majority of odometer readings) was conducted during this time.

Given that the time frame adjustment in 2001 relied on the two odometer readings and their dates, and that the 2009 survey lacked this information, the adjustment was performed differently in 2009. An adjustment factor was computed for each vehicle based upon the date of the household's travel day. This adjustment factor was then applied to the final BESTMILE estimate – not in the modeling stage – and before any screening was performed. Information from *Traffic Volume Trends* (Table 11) compiled by FHWA was used as the basis for this adjustment. The numbers highlighted in green represent those in the chosen time frame.

Table 11. Monthly VMT Estimates (in millions) from Traffic Volume Trends[13]

Month	2007	2008	2009
Jan		233,276	226,296
Feb		221,006	219,145
Mar	259,343	252,297	249,159
Apr	252,398	252,220	252,853
May	267,240	261,345	
Jun	265,336	255,894	
Jul	267,019	261,785	
Aug	271,474	261,095	
Sep	246,265	238,790	
Oct	261,623	256,368	
Nov	245,955	236,902	
Dec	240,776	242,493	

Since the purpose of the adjustment factor was to adapt a BESTMILE estimate so that it reflects the April 2008 to March 2009 time period, this time period's total VMT (2,961,492 million miles) was used as a fixed numerator in the adjustment for all vehicles. The denominator was computed separately for each vehicle using VMT from Table 11 which reflected the year ending with each vehicle's travel day. The adjustment can be summarized by Equation 7 below:

$$\text{BESTMILE}_{\text{adjusted}} = \text{BESTMILE}_{\text{original}} * \frac{\text{TVT VMT from Apr. 1, 2008 to Mar. 31, 2009}}{\text{TVT VMT from X to Y}} \, , \qquad (7)$$

where X is the date a year prior to the travel day plus one, and Y is the travel day date. Thus, the adjustment factor will always have one year's worth of VMT in both the denominator and the numerator, and the adjustment factor will be exactly 1 for vehicles where the travel day is March 31, 2009.

As an example on how travel days that were not the last day of the month were handled, say a household's travel day falls on September 13, 2008. The denominator of the adjustment factor would be computed using 13/30 of September 2008's TVT VMT

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[13] http://www.fhwa.dot.gov/policyinformation/travel/tvt/history/, accessed Nov. 23, 2010.

according to Table 11, 17/30 of September 2007's TVT VMT, and the entire amount of VMT from October 2007 to August 2008. Table 12 illustrates this example.

Table 12. Computation of the Denominator of the Adjustment Factor for a Vehicle with a September 13, 2008 Travel Day

Month	Fraction	TVT VMT (millions)	Denominator VMT (millions)
Sep-07	17/30	246,265	139,550
Oct-07	1	261,623	261,623
Nov-07	1	245,955	245,955
Dec-07	1	240,776	240,776
Jan-08	1	233,276	233,276
Feb-08	1	221,006	221,006
Mar-08	1	252,297	252,297
Apr-08	1	252,220	252,220
May-08	1	261,345	261,345
Jun-08	1	255,894	255,894
Jul-08	1	261,785	261,785
Aug-08	1	261,095	261,095
Sep-08	13/30	238,790	103,476
TOTAL			**2,990,298**

So if a vehicle with a Sep. 13, 2008 travel day had a BESTMILE value of 12,000, the adjustment factor would be 2,961,492/2,990,298, or 0.990, and the adjusted BESTMILE would then be 12,000*0.990, or 11,884 miles.

The adjustment factors ranged from 0.97 to 1.0. At first glance this appears odd – one would expect that adjustment factors would range from a number below 1 to a number above 1. However, the time period from April 2008 to March 2009 was an unusual one in historical terms, with VMT actually declining year over year. Table 13 below shows the differences in monthly TVT VMT using the chosen time frame as a base (meaning April 2007 numbers are compared with April 2008 numbers, for example). As one can see, the April 2008 to March 2009 numbers are always lower than the same month's VMT for a previous or subsequent year, with the sole exception being December 2007 vs. 2008. However, since the adjustment factor uses a yearly total, this December

difference was always negated by the larger drops in VMT in other months before and after.

Table 13. Differences in Monthly VMT Estimates (in millions) from Traffic Volume Trends, Using April 2008 to March 2009 as a Basis of Comparison

Month	2007	2008	2009
Jan		(6,980)	0
Feb		(1,861)	0
Mar	(10,184)	(3,138)	0
Apr	(178)	0	(633)
May	(5,895)	0	
Jun	(9,442)	0	
Jul	(5,234)	0	
Aug	(10,379)	0	
Sep	(7,475)	0	
Oct	(5,255)	0	
Nov	(9,053)	0	
Dec	1,717	0	

Once the adjustments were made, screening of the results was completed.

6. Screening of BESTMILE Estimates

Table 14 below shows a comparison similar to Table 7, adding the eventual results of BESTMILE computations for 2001 and 2009 datasets. As a whole, the estimates are much closer to *Highway Statistics* estimates, and reflect the trends of *Highway Statistics* more closely than the self-reported mileage. This suggests that the BESTMILE does indeed improve upon available data to provide better estimates for a given vehicle, particularly when considering that the self-reported mileage numbers were not universally adjusted downward to account for the time frame, as explained in Section 5.

Table 14. Comparison of 2001 and 2009 Average Miles per Vehicle,
Highway Statistics **and NHTS Self-Reported (ANNMILES) and Best Available**
(BESTMILE) Estimates

	2001	2009*	% diff
Highway Statistics			
Passenger Cars	11,831	11,788	-0.4%
Other 2-Axle, 4-Tire Vehicles	11,204	10,951	-2.3%
Passenger Cars & Other 2-Axles, 4-Tire Vehicles	11,593	11,432	-1.4%
NHTS ANNMILES (Self-Reported Mileage)			
Automobile/car/station wagon	10,695	10,054	-6.0%
Van (mini, cargo, passenger)	12,717	11,030	-13.3%
Sports utility vehicle	12,722	11,584	-8.9%
Pickup truck	11,729	9,891	-15.7%
All	11,078	10,088	-8.9%
NHTS BESTMILE			
Automobile/car/station wagon	11,609	11,118	-4.2%
Van (mini, cargo, passenger)	13,400	12,255	-8.5%
Sports utility vehicle	13,905	12,590	-9.5%
Pickup truck	12,473	11,240	-9.9%
All	11,979	11,176	-6.7%

 * The most recent data for Highway Statistics is for the year 2008. Data can be found at
http://www.fhwa.dot.gov/policy/ohpi/hss/hsspubs.cfm.

Once calculation of the best estimates was completed, the estimates were checked
for reasonableness at the individual vehicle level. Once again, the lack of two odometer
readings prohibits most of the adjustments done in the 2001 NHTS from being done to
the 2009 data. Negative best estimates were set to zero, and estimates over 200,000 miles
were capped at 200,000. An additional new check comparing the single odometer
reading to the best estimate was also performed. If the annualized best estimate was
greater than the odometer reading, and the vehicle age was greater than 1, the best
estimate was set to the initiate annual estimate (*ODOMMILES*) computed in Section 3.
These adjustments are summarized in Table 15.

In order to identify outliers, each *BESTMILE* estimate was compared to the initial
annual estimate (*ODOMMILES*) as well as the self-reported estimate (*ANNMILES*).
Outlier codes were then assigned based on subjective criteria. If *BESTMILE* was
different from either *ODOMMILES* or *ANNMILES* by a factor of 4, with an absolute
difference of more than 10,000 miles, an outlier code was assigned. These codes are
found in Table 16.

Table 15. Adjustments to *BESTMILE*

Adjustment Code	Frequency	Percent	Criteria	Adjustment
No Code	303,000	98.01%	No adjustment	
1	5,330	1.72%	*BESTMILE* > Odometer Reading, *BESTMILE* > Self-Reported VMT, and Vehicle Age > 1	*BESTMILE* set to *ODOMMILES* value
2	350	0.11%	*BESTMILE* > Odometer Reading and Vehicle Age > 1 (for vehicles without Self-Reported VMT)	*BESTMILE* set to *ODOMMILES* value
3	405	0.13%	*BESTMILE* < 0	*BESTMILE* = 0
4	7	0.00%	*BESTMILE* > 200,000	*BESTMILE* = 200,000
5	71	0.02%	*BESTMILE* > 200,000 after Adjustment #1 or #2	*BESTMILE* = 200,000
Total	**309,163**	**100.00%**		

Table 16. Outlier Codes for *BESTMILE*

BEST_OUT	Frequency	Percent	Criteria
No Code	287,805	93.09%	
1	6,392	2.07%	$BESTMILE < \dfrac{ODOMMILES}{4}$ and $\mid BESTMILE - ODOMMILES \mid > 10,000 miles$
2	1,321	0.43%	$BESTMILE < \dfrac{ANNMILES}{4}$ and $\mid BESTMILE - ANNMILES \mid > 10,000 miles$
3	3,033	0.98%	$BESTMILE < ODOMMILES * 4$ and $\mid BESTMILE - ODOMMILES \mid > 10,000 miles$
4	10,612	3.43%	$BESTMILE < ANNMILES * 4$ and $\mid BESTMILE - ANNMILES \mid > 10,000 miles$
Total	**309,163**	**100.00%**	

Methodologies for estimating fuel consumption using the 2009 national household travel survey

Prepared For

Federal Highway Administration

Prepared By

Energy Information Administration

March 2011

ESTIMATION METHODOLOGIES

INTRODUCTION

The National Household Travel Survey (NHTS) is the nation's inventory of local and long distance travel. Between April 2008 and April 2009, roughly 150 thousand households[1] were interviewed about their travel, based on the use of over 300 thousand vehicles, most of which are light-duty vehicles. Using confidential data collected during those interviews, coupled with EIA's retail fuel prices, external data sources of test fuel economy[2], and historical procedures for modifying test fuel economy to on-road, in-use fuel economy, EIA has gratefully extended this inventory to include the energy used for travel, thereby continuing a data series that was discontinued by EIA in 1994 due to resource constraints.[3] This documentation report presents the methods used for each eligible sampled vehicle to

1. Provide three fundamental inputs crucial to developing annual household vehicles energy consumption and expenditures information: composite fuel economy, retail fuel prices, and in-possession vehicle-miles traveled[4];

2. Adjust imputed composite fuel economy to calculate an on-road fuel economy;

3. Adjust on-road fuel economy to calculate an in-use fuel economy based on actual household driving characteristics; and,

4. Derive annual energy consumption and motor fuel expenditure information from exogenous inputs.

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[1] The NHTS collected travel data from the civilian, non-institutionalized population of the United States. People living in medical institutions, prisons and in barracks on military bases were excluded from the sample. However, telephone numbers in dormitory rooms, fraternity and sorority houses were included so long as no more than 10 people shared the same telephone number.

[2] Federal law requires automobile manufacturers to determine the fuel economy of new vehicles offered for sale in the U.S. This information is provided on a fuel economy label affixed to each vehicle's window to help consumers make informed decisions regarding fuel economy when purchasing a new vehicle. While these labels may vary somewhat in appearance, they must all provide the same information. Note that EPA reformulated its procedures beginning with 2008 model year vehicles.

[3] EIA, in 2005, and for the first time, conducted modeling of the 2001 NHTS to augment it with energy and energy-related statistics that were considered high-value to the transport, policy and statistical communities (see http://www.eia.doe.gov/emeu/rtecs/contents.html), all of which agrees with EIA's mission to report energy statistics supporting sound policy making.

[4] EIA, for the 2001 NHTS, modified the annual vehicle-miles traveled estimates; however, those modifications were not possible for the 2009 NHTS. See documentation from the Oak Ridge National Laboratory on developing the BESTMILE variable.

Such methods allow EIA to calculate estimates on the amount of and expenditures for energy consumed by the nation's vehicles operated for residential transportation. These estimates also include number and types of vehicles per household, and for each vehicle: annual miles traveled, gallons of fuel consumed, types of fuel used, price paid for fuel, and fuel economy (gasoline mileage). Hereafter, these procedures and data are generally referenced as the "EIA Supplement."

DISCLAIMER AND JUSTIFICATION

EIA has justified its augmentation of the 2009 NHTS as part of its core responsibilities to report on energy and energy-related statistics

> **In-Scope Households and Vehicles**
>
> Unlike the 2001 NHTS, for which EIA's modeling efforts focused on light-duty vehicles, all 2009 NHTS sampled vehicles are considered in-scope for this report. During 2008 and 2009, the NHTS interviewed the members of 150,147 households that had 309,163 vehicles at some point during the survey period.
>
> For the definition of a light-duty residential passenger vehicle used in prior household vehicle reports, see *vehicle* in the "Glossary" of this report.

and to support decision-making policies of the nation that rely on the timely availability and accuracy of energy statistics. Had these results come from information supplied by respondents to the NHTS directly, there would be no reason for EIA to model energy statistics or to provide an explicit warning to users about the uncertainty of these data. Because NHTS did not collect information on fuel economy, retail fuel price, or fuel type, EIA rightly cautions readers that, for every single one of the over 300 thousand sampled vehicles, all energy and energy-related statistics in this report and associated tables, public-use files, and future analyses are constructed from imputed information.

Unlike the 2001 NHTS, EIA attempted to impute energy and energy-related information for all sampled vehicles in the 2009 NHTS. In the 2001 NHTS, only light-duty passenger vehicles were imputed with energy-related information because EIA excluded motorcycles, mopeds, large trucks, and buses in an effort to continue its past residential transportation series, which was discontinued in 1994. To maintain consistency among the relevant transportation series, users are cautioned to use the proper vehicle type filters.[5]

The calculation of energy-related statistics – vehicle fuel consumption and expenditures – in this report occurred in several steps. Multiple steps were required because respondents, when completing their NHTS survey questionnaires, were not directly asked to report information necessary to derive their vehicle's on-road, in-use fuel economy, nor were they asked to provide the type or price of the fuel that was used to power their vehicle(s). Without all of these critical components, there is no way to determine exactly a vehicle's consumption of and expenditures for transportation fuel. With the use of confidential NHTS data and other external data sources, however, EIA's imputation procedures modeled these policy-needed measures for most sampled vehicles (see "In-Scope Households and Vehicles" text boxes for details).

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[5] Due to the different nature of the NHTS and RTECS programs, users are cautioned about combining the RTECS and NHTS data sets into a single time series.

DATA SOURCES

To derive vehicle-miles traveled (VMT); assign and adjust vehicle fuel economy (given in terms of miles per gasoline equivalent gallon (MPG); compute vehicle fuel consumption, and assign fuel prices to calculate vehicle fuel expenditures, EIA relied on administrative data from several federal agencies. These statistical procedures relied on confidential data from the U.S. Federal Highway Administration's (FHWA) 2009 National Household Travel Survey (NHTS); the EIA's 1985, 1988, and 1991 Residential Transportation Energy Consumption Survey (RTECS)[6]; the U.S. Environmental Protection Agency's (EPA) fuel economy test results[7]; and the EIA's retail pump price series[8] for 2008 and 2009.

PROCEDURES AND DEFINITIONS

EIA's purpose in partnering with the U.S. Department of Transportation was to enhance the use and usefulness of the January 2010 release of the 2009 NHTS public-use file, augmenting it with energy-related data for use by policy and decision-makers. Figure B1 depicts the estimation of those energy-related statistics: VMT, vehicle fuel economy, vehicle fuel consumption, and vehicle fuel expenditures. These steps were initially applied to each vehicle reported by households in the national sample of the NHTS. However, item nonresponse (mostly of crucial vehicle characteristics), incomplete fuel economy and sales data (generally for those vehicles having a gross vehicle weight rating heavier than 8,500 lbs), and the goal to update national estimates that conceptually compare to those found in EIA's previous residential transportation studies – 1985, 1988, 1991, and 1994 RTECS – mostly guided the scope of EIA's augmented vehicle data. The effect of those inter-dependent challenges resulted in methodologies and greater focus on light-duty passenger vehicles in households that are nationally weighted as "100-percent-household" by the NHTS.

First, annual VMT (as contained in the BESTMILE variable) was derived by the U.S. Department of Energy's Oak Ridge National Laboratory (see the NHTS User's documentation of BESTMILE provided by Oak Ridge National Laboratory (ORNL)). Moreover, because vehicles are acquired and disposed of by sample households during the survey year, the annual VMT were subsequently adjusted to reflect the period of the survey year in which the household "owned or used" the vehicle.[9] Second, the annual on-road fuel economy, reported in terms of MPG, was estimated using questionnaire responses[10], EPA fuel economy test results, and the period between

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[6] This series was discontinued after EIA conducted the 1994 Residential Transportation Energy Consumption survey.

[7] Fuel economy test values and vehicle production sales data were received from the U.S. Department of Transportation, National Highway and Traffic Safety Administration for model year's 1978 through 2008. Note that 2009 model year information was not available at the time of this release.

[8] Energy Information Administration. Forms EIA-782A, "Refiners'/Gas Plant Operators' Monthly Petroleum Product Sales report," and EIA-782B, "Resellers'/Retailers' Monthly Petroleum Product Sales Report." Form EIA-888, "On-Highway Diesel Fuel Price Survey." Form EIA-895, "Monthly Quantity and Value of Natural Gas Report." Form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions."

[9] See BESTMILE variable documentation provided by U.S. Department of Energy's Oak Ridge National Laboratory (ORNL).

[10] FHWA collected make (MAKECODE), model (MODLCODE), model year (VEHYEAR), and 8 categories of vehicle type (VEHTYPE), as given in *Section B: Vehicle Data* of the 2009 NHTS questionnaire. The collection of Vehicle Identification Numbers (VIN) would have provided a more accurate and richer source of vehicle characteristics. It is not known whether VINs will be collected in future survey cycles of the NHTS.

April 1, 2008 and March 31, 2009 that the vehicle was in use.[11] The MPG values were adjusted to account for the difference between EPA test values and on-road, in-use values. Third, estimated vehicle fuel consumption was derived by dividing the prorated VMT (i.e., BESTMILE variable) by the estimated MPG. Then, multiplying the vehicle's fuel consumption by its fuel price, on a monthly basis, derives motor fuel expenditures. Unfortunately, the NHTS did not collect the vehicle's motor fuel prices via fuel purchase diaries. Instead, each NHTS vehicle was assigned a retail price based on its imputed fuel type. All price information was obtained from the EIA's fuel price series.

The following sections of this appendix describe the estimation procedures used for calculating a vehicle's monthly VMT, MPG, fuel consumption, fuel price, and fuel expenditure.

The following terms are used throughout this report:

Fuel Economy Term	**Definition**
EPA Composite MPG	The EPA dynamometer test procedure, performed on pre-production prototype vehicles, yields separate test values for EPA city and highway MPG. These city and highway MPG are often combined to form the "composite" MPG, as reported to EIA by the National Highway Traffic Safety Administration's (NHTSA) Corporate Fuel Economy Program (CAFE).
On-Road MPG	A Composite MPG that was adjusted to account for the shortfall between the test value and the fuel economy actually obtained on the road. The adjustment did not take into account the driving patterns of individual drivers and seasonal differences.
In-Use MPG	MPG that were adjusted for seasonal differences and annual miles driven. Vehicles that are driven relatively few miles during the year are assumed to be driven mostly on short trips that involve frequent stops. Vehicles that are driven relatively many miles are assumed to be driven mostly on long trips where few stops are needed.
MPG Shortfall	A measure of the difference between actual on-road MPG and the EPA laboratory test MPG, expressed as the ratio of test MPG to on-road MPG.

EPA test fuel economy value data are restricted to vehicles that are used to derive Corporate Average Fuel Economy under Title V of the Motor Vehicle Information and Cost Savings Act (15 U.S.C. 1901, et seq.) with subsequent amendments and Subtitle VI (49 U.S.C. 329). Corporate Average Fuel Economy (CAFE) is the sales-weighted average fuel economy, expressed in miles per gallon, of a manufacturer's fleet of passenger cars or light trucks with a gross vehicle weight rating (GVWR) of 8,500 lbs. or less, manufactured for sale in the United

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[11] For 2009 model year vehicles, the NHTS calculates odometer-based VMT (BESTMILE) for the entire 12-month time period.

States, for any given model year.[12] Fuel economy is defined as the average mileage traveled by a vehicle per gallon of gasoline (or equivalent amount of other fuel) consumed as measured in accordance with the testing and evaluation protocol set forth by the U.S. Environmental Protection Agency (EPA).

Manufacturers also perform their own fuel economy tests of new vehicle models and submit the results to EPA. EPA is responsible for conducting its own tests or verifying the manufacturers' dynamometer tests. EPA also is responsible for compiling the production data from manufacturers' reports and furnishing CAFE results to NHTSA.

Fuel economy test data from the manufacturers and EPA serves as the starting point for both CAFE values and real-world fuel economy imputations. For CAFE program purposes, the test data are adjusted upward to account for any credits for dual-fuel alternative fuel vehicles (AFV) and dedicated AFV; and these values, for passenger cars only, are also adjusted upward for credits available to manufacturers to account for test procedure changes since the CAFE program was established. For NHTS and this report, such credits and their associated upward adjustments were removed, if so indicated by NHTSA.

Table B1. Sample Counts of Vehicles in EIA's Supplement for 2009 NHTS by Type and Model Year

Vehicle Type	NHTS Vehicle Type Code	Model Year of Vehicle				Total
		Pre-1978	1978 - 2008	2009 and 2010	Not Ascertained	
Automobile*	01	3,752	144,740	1,615	4,486	154,593
Van*	02	136	23,278	47	811	24,272
Sport Utility Vehicle*	03	312	52,719	344	1,385	54,760
Pickup Truck*	04	1,589	56,475	158	2,562	60,784
Other Truck	05	148	894	2	108	1,152
Recreation Vehicle*	06	105	1,989	5	94	2,193
Motorcycle	07	477	8,763	70	892	10,202
Other (e.g., golf cart)	08	2	245	0	45	292
Not Ascertained		21	528	3	363	915
Total		**6,542**	**289,631**	**2,244**	**10,746**	**309,163**

Source: U.S. Department of Transportation, Federal Highway Administration, *2009 National Household Travel Survey*, January 2010 release. (Washington, DC). *Note: All NHTS sampled vehicles are displayed; however, EIA's primary focus is *light-duty residential passenger vehicles*, which fits with EIA report's definition of a *vehicle* (see "Glossary" for details).

Since the NHTS is a national survey, it collected data from a nationally representative sample of households to derive statistically reliable travel estimates at the national, region (4) and division (9) levels. Sample data in the NHTS are generally not adequate to provide state or smaller area-specific estimates. Indeed, NHTS recommends limited analysis below census

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[12] These vehicles are conceptually consistent with 2009 NHTS sample vehicles having a vehicle type of "01" (Automobile), "02" (Van), "03" (Sport Utility Vehicle), "04" (Pickup Truck). EPA does not provide test data for vehicles such as the Ford Excursion, Hummer H1 and Hummer H2 because they have a GVWR greater than 8,500 lbs. However, EIA experts made minor additions to account for these vehicles, either in unit or in total.

divisions. However, the 2009 NHTS sample includes several jurisdictions where additional sample households were purchased and subsequently interviewed. The jurisdictions that purchased these additional samples are referred to as the "add-on" areas (see http://nhts.ornl.gov/index.shtml for details).[13] The responses to these add-on samples are contained on the Public-Use version of the 2009 NHTS and considered property of the respective add-on sponsor. These additional sample cases were included in developing the energy consumption and expenditures data.

Figure B1. Estimation Schematic
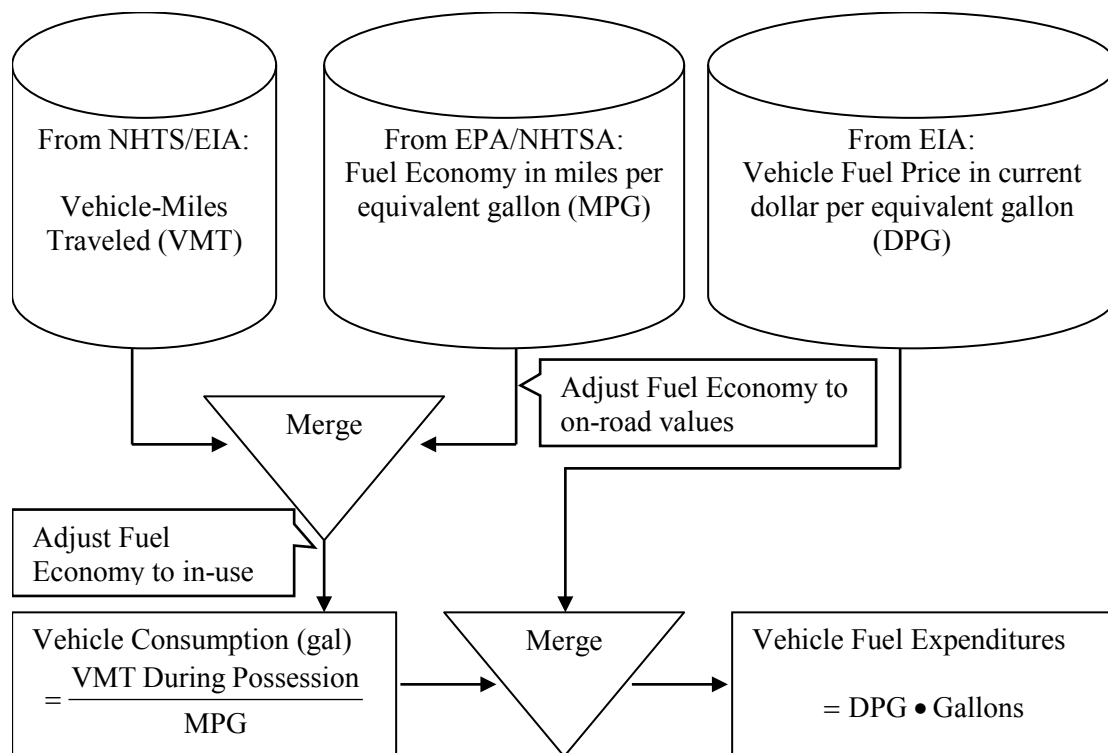
Note: NHTS – National Household Travel Survey, EPA – U.S. Environmental Protection Agency, EIA – Energy Information Administration, and NHTSA – National Highway Transportation Safety Administration.

VEHICLE MILES TRAVELED

In the 2009 NHTS, the number of miles (VMT) driven by an NHTS household vehicle can be estimated in three different ways. First, one can use the single odometer reading to compute an estimate of annual mileage. Second, a designated household member was asked to report the total number of miles driven in each of the household vehicles (hereafter referred to as "self-reported VMT"). Finally, the amount of annual driving can be estimated based on the amount a vehicle is driven during the designated sample day (i.e., the travel day). Ideally, annualizing the odometer readings would probably generate the most reliable VMT estimate compared to estimates based on the other two approaches. Unfortunately, not all vehicles had an odometer reading recorded. Furthermore, of those that had their odometer reading recorded, the quality of some of the odometer readings is less than desirable. As such, ORNL was asked to estimate the number of

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[13] See http://www.bts.gov/external_links/government/metropolitan_planning_organizations.html for a complete list.

miles driven by each of the NHTS vehicles based on the best available data. This estimate is hereafter referred to as the BESTMILE or annual VMT. BESTMILEs are computed only for automobiles, pickup trucks, vans, and sport utility vehicles. The value of the BESTMILE for motorcycles, other trucks, and recreational vehicles (RV) equals the value of the self-reported VMT for those vehicles with such information available. The BESTMILE estimates were developed using Version 2.0 of the 2009 NHTS data and conducted by U.S. Department of Energy's Oak Ridge National Laboratory (ORNL), Engineering Science Technology Division, Center for Transportation Analysis.

The percentage of vehicles with BESTMILE based on odometer data (63.9 percent) was higher than in the 2001 NHTS (47.5 percent). This reflects the fact the only one odometer reading was taken in the 2009 data, with two required for a vehicle to be considered usable in the 2001 data. Table 3 (in ORNL's documentation) summarizes the distribution of 2009 NHTS vehicles in terms of the key pieces of data. The structure of this table was the foundation for the differing ways in which BESTMILE was computed for the 2001 NHTS, and shaped computations in the same way for the 2009 NHTS vehicles.

There were 309,163 vehicles included in the 2009 NHTS survey. However, as indicated by ORNL's documentation, 14,754 of these vehicles were out-of-scope for the BESTMILE estimate. The out-of-scope vehicle types include "other trucks," "recreational vehicles," "light electric vehicle (golf cart)," and vehicles with missing vehicle type information. BESTMILE for these vehicles was set to the self-estimate for annual miles driven, where available.

IN-POSSESSION VEHICLE-MILES TRAVELED

Because the 2009 NHTS did not collect two odometer readings[14], EIA could not extend the logic of computing a vehicle's VMT by estimating the period of time that the vehicle was in the household's possession. This effort was possible with the 2001 NHTS.

With the 2001 NHTS modeled information this was done in multiple steps using public-use data provided by FHWA. Once annual VMT were obtained either through the work completed by ORNL or the two approaches (i.e., standard annualization or multiple regressions) undertaken by EIA, each vehicle's annual VMT value was adjusted to correspond to the time period that the vehicle was in the possession of the sample household during the survey year, which started on May 1, 2001 and ended on April 30, 2002. Using a vehicle's acquisition and disposition dates, as derived from NHTS interview contact and odometer reading dates or other relevant contact information on survey follow-up procedures[15], an in-possession VMT value was calculated based on standard monthly driving fractions, F_j.[16] By simply multiplying the annual VMT by the sum of the monthly driving fraction, prorated as needed, a *VMT during possession* was computed. These *VMT-during-possession* values formed the basis of analyses on energy consumption and

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[14] Only one odometer reading was collected for each sample vehicle in the 2009 NHTS.

[15] Follow-up contacts with NHTS respondents were undertaken within a set procedure, according to correspondences with NHTS contractor, Mark Freedman of Westat.

[16] To ensure that the distribution of average monthly vehicle miles traveled given in Table B2 reflected 2001 driving patterns, EIA compared those fractions with the 2001 FHWA's highway-based values. No significant differences were found; however, the events occurring in September 2001 and soon thereafter may have unknown contributions to travel behavior patterns not shown here.

expenditures for residential passenger vehicle use in EIA's report *Household Vehicles Energy Use: Latest Data & Trends*.[17] Hence, caution must be used when making comparison between 2001 and 2009 household vehicles' energy and energy-related statistics from the NHTS programs.

<div align="center">

VEHICLE FUEL ECONOMY

</div>

Fuel economy (MPG) must be estimated for each NHTS sample vehicle in order to estimate each vehicle's fuel consumption for the survey year. Then, fuel consumption is estimated by dividing BESTMILE[18] by the MPG.[19] The NHTS neither obtained actual fuel consumption data nor on-road MPG from fuel purchase diaries maintained by the respondents. Because NHTS did not require these data or diaries, MPG values were estimated using EPA laboratory test MPG that were adjusted to account for differences between actual on-road MPG and the EPA test MPG. This difference is known as MPG "shortfall." Lax, 1987[20]; Mintz, 1993[21]; and Reichert, 2000[22], investigated the feasibility of using shortfall-adjusted MPG in a household survey. The Lax study verified that the method yielded unbiased MPG, when using a database from a 1984 fuel purchase diary study performed by NPD Research, Inc. The adequacy of current shortfall adjustment methods is sufficient for late 1980 through early 1993's motor vehicle model years also (RTECS Technical Note 5).[23] For the 2009 NHTS, the adequacy of shortfall adjustments has been presumed for 1978 through 2008's motor vehicle model years.[24,25]

The NHTS sample vehicles were assigned EPA test MPG from the NHTSA Corporate Average Fuel Economy files. Each record of the NHTSA files contained an EPA Composite MPG (i.e., an unadjusted 45 percent highway and 55 percent city weighted estimate) for each unique combination of vehicle attributes within a given manufacture, model/carline, type and

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[17] See http://www.eia.doe.gov/emeu/rtecs/nhts_survey/2001/index.html, accessed on December 7, 2010

[18] NHTS public-use data, which was released on January 2010, assumes a fixed 12-month period (starting on April 1, 2008 and ending March 31, 2009). No modifications were made to compute the fraction of the year in which the household had "actual" possession of the vehicle.

[19] The 2009 NHTS was conducted from April 2008 to March 2009. Unfortunately, that timing turned out to be problematic due to the rapid rise in the cost of transportation fuels.

[20] Lax, D. 1987. "Feasibility of Estimating In-Use Vehicle Fuel Efficiency from Household Survey Data." Research performed under contract for ORNL/DOE/EIA. Energy and Environmental Analysis Inc., Arlington, VA.

[21] Mintz, M., A. Vyas, and L. Conley, 1993. "Differences Between EPA-Test and In-Use Fuel Economy: Are the Correction Factors Correct?" Transportation Research Record 1416, pp. 124-130, Transportation Research Board, National Research Council, Washington, DC.

[22] Reichert, J. 2000. "Change in Method for Estimating Fuel Economy for the Residential Transportation Energy Consumption Survey," Energy Information Administration on www.eia.doe.gov/emeu/rtecs/contents.html.

[23] Harrison, I.M. "VMT 1991 Patterns," Residential Transportation Energy Consumption Survey Technical Note 5, unpublished document. (Washington, DC).

[24] Manufacturers may choose reformed or unreformed fuel economy testing standard beginning in Model Year 2008.

[25] Office of Transportation and Air Quality, "Fuel Economy Labeling of Motor Vehicle Revisions to Improve Calculation of Fuel Economy Estimates." EPA420-R-06-017, December 2006.

model year. These attributes included (1) number of cylinders, (2) cubic inches of engine displacement (CID), (3) type of transmission (manual or automatic), and (4) fuel metering (gasoline, diesel, electric, natural gas, duel-, or flexible-fuel vehicle).[26] Each record of the NHTSA files also contained the number of vehicles sold, in thousands of vehicles, for each unique combination of attributes. The vehicle attributes available to assign a Composite MPG for sample vehicles were the ones collected for each NHTS vehicle. Specifically, NHTS queried respondents on their vehicle's make, model, vehicle type, and model year attributes. Hence, merging, assigning and statistical linking to NHTSA's Corporate Average Fuel Economy files were restricted to those four vehicle attributes.[27] If, in the future, NHTS were to collect Vehicle Identification Numbers (VIN), then these linking procedures might be performed on a more robust set of vehicle attributes.[28]

NHTSA files served multiple purposes. In addition to assigning a Composite MPG, the NHTSA files were used to impute "missing" vehicle attributes: vehicle class, fuel metering and engine type for purposes of assigning an appropriate fuel price. Based on the limited set of vehicle attributes obtained from the NHTS questionnaire, several records from the NHTSA files were usually found to be potential "matches" to a given sample vehicle. A matching record was chosen from among the several applicable ones, with probability proportional to sales, using the sales figures on the NHTSA files. Once chosen, a record provided (1) EPA Composite MPG, (2) fuel metering, and (3) engine type. Although more attributes were available for selection, EIA limited its matched attributes to those required to assign an appropriate fuel price to a sample vehicle. Of the 309,163 eligible vehicles, EIA selected a matching record for 288,507 vehicle, or 93 percent. This matching routine commonly resulted in 1-to-many record linkages (see Figure C1 for more details). For the remaining 7 percent of in-scope sample vehicles, EIA employed expert knowledge, historical information from the U.S. Department of Transportation's *Highway Statistics* report series, average estimates from prior RTECS programs and assigning average on-road, in-use MPG values.

For post-1978 model year light-duty vehicles, the EPA Composite MPG is just the starting point for fuel economy computations. For the 2009 NHTS, EIA employs a sequential adjustment procedure in which the EPA Composite MPG are adjusted first to an on-road MPG, and then to an in-use MPG. For pre-1978 light-duty vehicles and non-light-duty vehicles, averages for on-road, in-use fuel economy are obtained from prior RTECS program histories and table VM-1 released by the U.S. Department of Transportation's *2008 Highway Statistics* report, respectively.

THE EPA COMPOSITE MPG

Beginning in the early 1970's, EPA measured fuel economy from tests that were conducted on a dynamometer to simulate actual driving conditions.[29] By 1975, EPA had incorporated

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[26] NHTSA file records do not include whether the vehicle's emissions control package met Federal or California standards.

[27] In the 2009 NHTS, information was collected on hybrid vehicles. When applicable, this variable served as a fifth vehicle attributed used in statistical linking.

[28] VINs may be decoded to yield the vehicle attributes, by use of the Highway Loss Data Institute's "Vindicator" software.

[29] And starting with 2008 model year light-duty vehicles, NHTSA accepts either the "reformed or unreformed" test fuel economy data (see http://www.nhtsa.gov/fuel-economy for details).

separate "city" and "highway" driving cycles into the test. The city and highway MPG were combined to form a "composite" MPG that was then weighted according to sales of the production vehicles in order to assess compliance with Corporate Average Fuel Economy (CAFE) standards. The EPA Composite MPG is based on the assumption of a "typical" vehicle-use pattern of 55 percent city driving and 45 percent highway driving, and has become a convenient single fuel economy measure for analytical and regulatory purposes.

The EPA Composite MPG[30] is defined as:

$$MPG_{(EPA\ 55/45)} = \frac{1}{0.55 \bullet \dfrac{1}{MPG_{(EPA\ city)}} + 0.45 \bullet \dfrac{1}{MPG_{(EPA\ hwy)}}} \tag{1}$$

where:

$MPG_{(EPA\ 55/45)}$ denotes the composite MPG; $MPG_{(EPA\ city)}$ denotes the fuel economy when vehicle use pattern is city driving only; and, $MPG_{(EPA\ hwy)}$ denotes the fuel economy when vehicle use pattern is highway driving only.

Because separate city and highway fuel economy estimates were not available on the NHTSA files, a single "shortfall" adjustment factor was derived, approximating the adjustments given in the following sections.

FUEL ECONOMY SHORTFALL

Fuel economy shortfall occurs when the fuel economy that is actually obtained while using the vehicle is lower than the EPA test results. Reasons for this shortfall are (1) a result of the differences between EPA test vehicles and the vehicles actually in use and (2) the differences between EPA procedures for simulated driving conditions and actual driving conditions. For example, EPA test vehicles are prototypes that do not contain the wide variety of power-consuming accessories often found on vehicles sold to consumers. The test procedures also do not simulate the actual driving conditions that affect fuel economy such as speed and acceleration of individual drivers, road conditions, weather, and traffic. In the 2009 NHTS, adjustments for this fuel economy shortfall were made to the composite MPG ($MPG_{(EPA\ 55/45)}$) that were assigned to the sample vehicles.

Fuel economy shortfall was expressed in terms of the "Gallons per Mile Ratio" or GPMR:

$$GPMR_i = \frac{MPG_{i\,(EPA55/45)}}{MPG_i} \tag{2}$$

where:

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[30] Specifically, the following formulas, as stated in Part 600, Subpart F, §600.207-86, §600.208-77, §600.209-85, §600.510-86 of the 7-1-1994 edition of the 40 CFR, are identified for these calculations.

GPMR$_i$ denotes Gallons per Mile Ratio for the ith vehicle; MPG$_i$ denotes the on-road MPG or in-use MPG for the ith vehicle, depending on the analysis; and, MPG$_{i\,(EPA\,55/45)}$ denotes the EPA Composite MPG applicable to the ith vehicle.

Figure B2. Miles per Gasoline Equivalent Gallon Adjustments, post-1978 Light-Duty Vehicles

EPA Composite MPG

↓

Adjusted for Fuel Efficiency Shortfall Using Combined Discount Factor

↓

Composite On-Road MPG

↓

Adjusted for Individual and Seasonal Circumstances

↓

Final On-Road, In-Use MPG
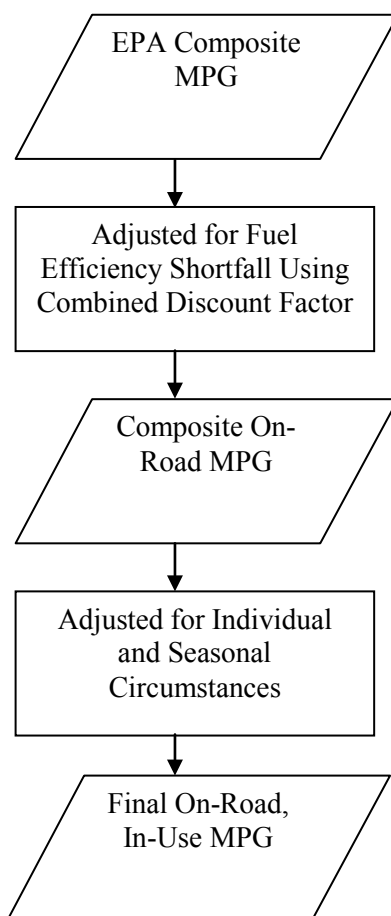
If GPMR$_i$ = 1 then there is no perceived shortfall. If GPMR$_i$ > 1 then there is a shortfall for vehicle *i*. That is, the on-road or in-use fuel economy is less than the fuel economy indicated by the EPA Composite MPG. Note that GPMR$_i$ can represent shortfall with respect to either the on-road or in-use MPG$_i$, depending on the analysis being performed. GPMR$_i$ is commonly chosen as a measure of shortfall as opposed to MPG$_i$ for the following reasons:

- A shortfall adjustment is most often thought of as a correction factor, or multiplicative constant, rather than as an additive correction. GPMR$_i$ satisfies this convention.

- Shortfall is usually dependent on a vehicle's fuel economy level. That is, shortfall is usually higher at high levels of MPG$_{(EPA\,55/45)}$ than at low levels of MPG$_{(EPA\,55/45)}$. Therefore, it is more informative to express the amount of shortfall relative to MPG$_{(EPA\,55/45)}$ rather than as an absolute quantity.

- GPMR$_i$ is a linear function of MPG$_{(EPA\ 55/45)}$ and can be modeled using ordinary least squares linear regression.

- GPMR$_i$ is a transformation that stabilizes error variances for the purposes of least squares linear regression.

THE ON-ROAD MPG

On-road MPG is a composite MPG that was adjusted to account for the shortfall between the EPA fuel economy and the actual fuel economy obtained on the road.

The EPA developed two general procedures for adjusting MPG$_{(EPA\ 55/45)}$ to an on-road value. One procedure bases the size of the adjustment on specific technology features of the vehicle. The other procedure uses just two MPG discount factors, one to adjust the EPA highway estimate, the other to adjust the city estimate. These two factors are used for all vehicles, regardless of technology class. For our purposes, we approximated the earlier procedure with a single adjustment factor.

Either of these procedures could have been approximated to adjust MPG$_{(EPA\ 55/45)}$ to an on-road MPG value for use in the 2009 NHTS. Since both procedures were unbiased for trucks, the choice as to which to employ in the 2009 NHTS should be based on their performance with cars. According to the 1994 RTECS, the adjustment based on discount factors seemed to be less biased than the Technology-Specific Adjustment. Further, the discount factors are also less expensive since they do not require collection or imputation of information on fuel delivery system and drive-train. Because of these reasons the Discount Factors Adjustment Method was selected for approximation.

SHORTFALL ADJUSTMENT BASED ON DISCOUNT FACTORS

EPA's discount factors have widespread appeal because of their simplicity (Hellman and Murrell, 1985[31]; Hellman and Murrell, 1984[32]). The factors are 10 percent for city MPG and 22 percent for highway MPG. That is, for any vehicle i,

$$MPG_{i(on\text{-}road,\ EPA\ city)} = 0.90 \bullet MPG_{i(epa\ city)}$$

$$MPG_{i(on\text{-}road,\ EPA\ hwy)} = 0.78 \bullet MPG_{i(EPA\ hwy)}$$

$$(3)$$

These discount factors are the ones used to produce the "window sticker" MPG figures seen on vehicles on dealer lots, and are used to produce the DOE/EPA Gas Mileage Guide.[33] The analysis behind the development of these factors was performed on a conglomerate database with data from Ford Motor Company, General Motors, Chrysler Corporation, DOE, and EPA. The database contained approximately 38,000 vehicle records with model years from 1979 through 1981 with some 1982 models included. The database contained predominately American-made

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[31] Hellman, K.H., and Murrell, J.D. 1985. "On the Stability of the EPA MPG Adjustment Factors." Society of Automotive Engineers Technical Paper Series, SAE Paper No. 851216, Warrendale, PA.

[32] Hellman, K.H., and Murrell, J.D. 1984. "Development of Adjustment Factors for the EPA City and Highway MPG Values." Society of Automotive Engineers Technical Paper Series, SAE Paper No. 840496, Warrendale, PA.

[33] Notably, starting with 2008 model year light-duty vehicles, EPA has modified the method for deriving fuel economy.

vehicles, but also included foreign vehicles as well. The technology mix was dominated by rear-wheel drive and carbureted vehicles, but contained some vehicles with front-wheel drive or fuel injection. Vehicle records contained make, model, year, vehicle characteristics, the MPG as measured on the road, $MPG_{(EPA\ city)}$, and $MPG_{(EPA\ highway)}$. The database also included the driver's perceptions of the proportion of their travel that was mostly urban (so called "city fraction"), and their average miles driven per day (AMPD).

Fuel economy shortfall is affected by the vehicle use pattern: frequent starts and short trip lengths characterize city-driving pattern, while highway-driving pattern is characterized by infrequent starts and long trips. AMPD is a good surrogate variable for representing these different driving patterns.

The city-driving pattern was characterized by AMPD from 5 to 22 miles per day, while the highway-driving pattern was characterized by AMPD's from 15 to 105 miles per day (Hellman and Murrell, 1984). City fraction and AMPD were used to split the data into two sets, one for development of the city discount factor, the other for development of the highway factor. The "city" and "highway" data sets were each stratified by vehicle technology classes. Linear regression was performed within each stratum. GPMR was regressed on city fraction, AMPD, $MPG_{(EPA\ 55/45)}$, odometer reading, and average temperature. The fitted models were then weighted and combined across vehicle technology strata, to produce a single "city" shortfall model and a single "highway" shortfall model. The weights were used to increase the influence of those models that represented technology mixes expected to become more prominent in the future (e.g., front-wheel drive and fuel-injected vehicles). The discount factors were derived from the two weighted models set at average or typical values of the independent variables.

For each NHTS vehicle, if and only if separate city and highway MPG were available, discounted city and highway on-road MPG may be computed and then combined to form an on-road 55/45 composite as follows:

$$MPG_{(on\text{-}road,\ 55/45)} = \frac{1}{0.55 \bullet \dfrac{1}{MPG_{(on\text{-}road,\ EPA\ city)}} + 0.45 \bullet \dfrac{1}{MPG_{(on\text{-}road,\ EPA\ hwy)}}} \qquad (4)$$

Then, a shortfall ratio based on EPA discount factors would be computed for each NHTS vehicle as follows:

$$GPMR_{i(on\text{-}road)} = \frac{MPG_{i(EPA\ 55/45)}}{MPG_{i(on\text{-}road,55/45)}} \qquad (5)$$

Unfortunately, separate on-road city and highway test MPG were not available from the NHTSA Corporate Average Fuel Economy files. Although a literature review reveals that shortfalls vary for particular vehicles or groups of vehicles, we have used a combined shortfall estimate of 15 percent, equating to a $GMPR_{i(on\text{-}road)}$ of 1/0.85, which may also be written to reveal that $MPG_{i(on\text{-}road,\ 55/45)} = 0.85 \bullet MPG_{i(EPA55/45)}$.[34]

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[34] Hellman, K.H. and Murrell J.D., June 1982. "Why Vehicles Don't Achieve EPA MPG On the Road and How That Shortfall Can Be Accounted For," Society of Automotive Engineers Technical Paper Series, SAE Paper 820791.

THE IN-USE MPG

In-use MPG are MPG that are adjusted for individual driving circumstances. The on-road adjustments to MPG$_{(EPA\ 55/45)}$ discussed in the previous sections were "general" in that they did not take into account any effects on fuel economy that are due to the driver's individual circumstances. They, instead, utilized general attributes such as the technology features of the vehicle and average driving conditions. Fuel economy shortfall estimates can be refined for an individual vehicle by taking into account the following "in-use" effects.

- Urban versus rural driving pattern. That is, frequent starts and short trips as opposed to infrequent starts and longer trips. As mentioned in the previous section, a useful single variable for representing this effect is AMPD. High AMPD's usually represent mileage accumulated on the highway.

- Traffic congestion, which increases with population density.

- Seasonal temperature variations, especially for gasoline-carbureted vehicles.

- Humidity, which together with temperature affects air-conditioner use.

- Differences among geographic areas of the country.

- Altitude.

- Wind.

- Road gradient and road surface conditions.

Additionally, the seasonal change in gasoline composition and the mechanical condition of the sample vehicles affect on-road fuel economy. Both of these effects are unknown. More importantly, EIA has made no attempt to account for these unknown effects.

However, this appendix does address some of the individual vehicle influences. In general, the first four items are considered the most significant in-use influences (Crawford, 1983).[35] In the cited study, shortfall variations as high as 25 percent or more occurred over the range of typical AMPD. Shortfall was 16 percent higher in urban areas than in completely uncongested areas, and was 12 percent higher in suburban areas. Shortfall varied seasonally (i.e., monthly) by 7 percent in the South and by 13 percent in the North.

Regression models were developed (Crawford, 1983) for use in adjusting GPMR$_{i(on-road)}$ to an in-use shortfall employing measurements of several in-use effects as the independent variables.

The regressions yielded a shortfall adjustment that was an additive one, which may be written as follows:

$$GPMR_{ij(in-use)} = GPMR_{i(on-road)} + \delta_{ij} \tag{6}$$

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[35] Crawford, R. 1983. "Seasonal and Regional MPG as Influenced by Environmental Conditions and Travel Patterns." Research performed under contract for U.S. DOE. Energy and Environmental Analysis, Inc., Arlington, VA.

where GPMRij(in-use) denotes the in-use shortfall ratio estimate for the ith vehicle during the jth month (j = 1, 2, … 12); GPMRi(on-road) denotes the combined shortfall ratio fixed for the ith vehicle; and, δ_{ij} denotes the adjustment calculated for the ith vehicle during month j, from the a regression model.

One regression model from the Crawford reference that is appropriate for use in NHTS is as follows:

$$
\begin{aligned}
\delta_{ij} = 3.296 \bullet &\left[\left(\frac{1}{AMPD_{ij}} \right) - \left(\frac{1}{35.6} \right) \right] + \\
NORTH \bullet &\left[0.050 \bullet \sin\left(\frac{j\pi}{6} \right) + 0.075 \bullet \cos\left(\frac{j\pi}{6} \right) \right] + \\
SOUTH \bullet &\left[0.030 \bullet \sin\left(\frac{j\pi}{6} \right) + 0.031 \bullet \cos\left(\frac{j\pi}{6} \right) \right]
\end{aligned}
\tag{7}
$$

where $AMPD_{ij}$ = Average Miles per Day for vehicle *i* and month *j*, typically 35.6 (i.e., 13,000 miles per year); NORTH = 1 if the household is in the North, otherwise NORTH = 0 if the household is not in the North; and, SOUTH = 1 if the household is in the South, otherwise SOUTH = 0 if the household is not in the South.

This regression model was chosen because the independent variables that are important in explaining shortfall were readily available from the 2009 NHTS data, using BESTMILE and the distribution of average monthly vehicle miles travel fractions found in Table B2. The model had two components. One component involved $AMPD_{ij}$ and represented the influence of individual driving patterns for a given vehicle and month. The other component represented the change in shortfall that occurred throughout the seasons, due to the annual temperature cycle. The original regression equation also contained a minor term that accounted for the influence of air-conditioner use during hot, humid weather. This term was dropped in the estimations because it involved the rather complex computation of "Discomfort Index" from NOAA weather records, and the slight additional precision was judged insufficient to warrant the additional processing expense. Additional terms representing geographic regional effects, and the natural logarithm of population density (people per square mile, to represent the influence of traffic congestion) were not considered because of the computational cost.

Once a GPMR$_{ij(in-use)}$ was estimated it was used to estimate the final in-use fuel economy for vehicle *i* and month *j* as follows:

$$
MPG_{ij(in-use)} = \frac{MPG_{i(EPA\,55/45)}}{GPMR_{ij(in-use)}}
\tag{8}
$$

The regression equation had separate seasonal components for the "North" and "South" because the difference between the winter shortfall and the summer shortfall was greater in the North than in the South. This difference can be seen in the model parameters. To define the North and South geographic areas the continental United States were divided into 97 two-digit ZIP Code regions. In the original model, these regions were grouped to form two aggregate regions

("North" and "South") according to average winter and summer temperatures, and seasonal shortfall trends.

ANNUAL VEHICLE FUEL CONSUMPTION

In the 2009 NHTS, annual consumption was calculated by dividing the annual VMT (i.e., BESTMILE variable) by the annual MPG. The derivation of the "annualized" VMT is given in the NHTS User's Guide.

The $MPG_{ij(in-use)}$ shown in the above section about fuel economy estimation procedures were final estimates of monthly in-use fuel economies for vehicle i, and could have been used for estimating monthly fuel consumptions and expenditures, if monthly VMT were known. Unfortunately, NHTS only collected data from which ORNL annualized VMT. Nevertheless, the 2009 NHTS still made use of the $MPG_{ij(in-use)}$ by disaggregating the annualized VMT of sample vehicles into monthly VMT, using monthly VMT driving fractions from the standard distribution in Table B2.[36]

Table B2. Distribution of Average Monthly Vehicle-Miles Traveled Fractions

Month$_j$	Average VMT per Vehicle	F$_j$	Alternate F$_j$
January	688	0.0728	0.0765
February	697	0.0738	0.0740
March	771	0.0816	0.0842
April	783	0.0829	0.0851
May	832	0.0880	0.0882
June	847	0.0896	0.0864
July	868	0.0919	0.0884
August	872	0.0923	0.0882
September	800	0.0847	0.0806
October	802	0.0849	0.0865
November	756	0.0800	0.0800
December	734	0.0777	0.0819
Total	9,450	1.0000	1.0000

Source: 1984 Petroleum Marketing Index (PMI) Survey, NPD Research Inc. The survey is a demographically and geographically balanced-quota sample of 4,100 households. Respondents maintained fuel purchase diaries for an average of 10 months. As part of the survey, information was collected on the characteristics of trips taken in vehicles during a designated day. Trip lengths were recorded as respondent perception rather than from odometer readings. The distribution of monthly mileage fractions has been obtained from this survey.

The annual consumption for vehicle i can be thought of as the sum of the individual monthly consumptions:

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[36] Following the quality controls used in past RTECS surveys, EIA investigated the possibility that monthly travel patterns had changed based on a comparison of estimates between those found in Table B2 and the highway usage estimates from the Federal Highway Administration's *Traffic Volume Trends* data. The differences were negligible; thus, EIA applied the F$_j$ distribution given in Table B2 in order to compute annualized VMT. Some would argue that a update of Table B2 is needed; unfortunately, a reasonable travel diary study has not been conducted to EIA's knowledge that would provide such an update.

$$C_i = \sum_{j=1}^{12} c_{ij} \qquad (9)$$

where C_i denotes annual consumption of vehicle fuel for the ith vehicle, in gasoline equivalent gallons and c_{ij} denotes consumption of vehicle motor fuel for the ith vehicle during the jth month.

Because the VMT values – as computed by ORNL and discussed in the NHTS User's Guide – in the version 2.0 public-use file provided by NHTS assume each vehicle was available for the *entire* 12-month period of the survey year[37], consumption and expenditure values for vehicle use are over-estimated. To eliminate, where possible, such over-estimation, EIA would require the acquisition and disposition dates for each sampled vehicle. Because such information is not available in the 2009 NHTS, EIA is unable to make this adjustment. In the 2001 NHTS, EIA did provide another public-use file in which the annual consumption for vehicle *i* can be thought of as the sum of the monthly consumption values, where the period covered equals the possession time of vehicles. Thus, in the 2001 NHTS, the starting and ending months refer to the possession time of vehicle *i* by the household.

Consumption for each month may be expressed in terms of monthly VMT and monthly in-use fuel economy:

$$c_{ij} = \frac{m_{ij}}{mpg_{ij}}, \ \forall \ j = 1, 2, \ldots, 12 \qquad (10)$$

where m_{ij} denotes VMT for the ith vehicle during the jth month and mpg_{ij} denotes fuel economy in miles per gasoline equivalent gallon for the ith vehicle during the jth month. Now, Equation 10 can be rewritten as:

$$C_i = \sum_{j \in used} \frac{m_{ij}}{mpg_{ij}} \qquad (11)$$

ORNL provided the annualized VMT estimate for NHTS that was used to calculate monthly VMT values. Given that value, a monthly VMT was derived for each annualized vehicle VMT as:

$$m_{ij} = M_i \bullet f_{(i, j)} \qquad (12)$$

where M_i denotes for the ith vehicle, calculated using odometer readings and procedures discussed in Appendix J and f_{ij} denotes the average fraction of "annual" VMT that was driven during the jth month, estimate for the ith vehicle. For all sample vehicles, $f_{(i,j)}$ is a function of the average fractions, F_j, found in Table B2.

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[37] For the 2009 estimates, the time frame of April 1, 2008 to March 31, 2009 used for the 2009 BESTMILE estimates was chosen because the majority of the survey (and thus the majority of odometer readings) was conducted during this time.

There is no single distribution of average monthly VMT fractions, $f_{(i,j)}$. Rather, there was a family of distributions, depending on which particular months a vehicle was owned or used by a household. Because the monthly VMT fractions for a given vehicle i always sums to one – no matter the timeframe in which the vehicle was owned or used by the household – the following identity is always true:

$$\sum_{j \in used} f(i,j) = 1, \forall = 1,2,3,\ldots,n \tag{13}$$

The ith vehicle's $f_{(i,j)}$ were derived from F_j values found in Table B2 as follows:

$$f(i,j) = \frac{F_j}{\sum_{j \in used} F_j} \tag{14}$$

If we assume that each and every vehicle is owned or used by its sampled household, then substituting $mpg_{ij} = MPG_{ij(in\text{-}use)}$ and m_{ij} from Equation 12 into Equation 11 yields the following estimate of annual consumption for the ith vehicle:

$$C_i = \sum_{j=1}^{12} \frac{M_i \bullet F_{ij}}{MPG_{ij(in\text{-}use)}} \tag{15}$$

The public-use file disseminated by NHTS (version 2.0) makes the above assumption on the timeframe for vehicle use. While the NHTS public-use file provides estimates based on the assumption that each and every sample vehicle was present in the sample household for 12 months, EIA's had hope to create an alternate estimator for consumption, $C_i^{(EIA)}$, in which acquired and disposed vehicles during the survey period are accounted for. Unfortunately, that was not possible; therefore, *used* in this estimator includes 12 months of travel and is written as:

$$C_1^{(EIA)} = \sum_{j \in used} \frac{M_i \bullet f(i,j)}{MPG_{ij(in\text{-}use)}} \tag{16}$$

To simply calculations, a single "annualized" fuel economy, analogous to the "annualized" MPG_i from previous EIA surveys of the residential transportation sector, was estimated as:

$$MPG_{i(annualized)} = \frac{MPG_{i(EPA\ 55/45)}}{\sum_{j \in used} f(i,j) \bullet GPMR_{ij(in\text{-}use)}} \tag{17}$$

Thus, annual consumption equals:

$$C_i = \frac{M_i}{MPG_{i(annualized)}}. \tag{18}$$

ANNUAL VEHICLE FUEL EXPENDITURES AND PRICE

VEHICLE FUEL EXPENDITURES

In the 2009 NHTS, fuel expenditures were calculated by multiplying the vehicle-fuel consumption by the price of the vehicle fuel. The 2009 NHTS did not collect vehicle fuel prices via fuel purchase diaries. Instead, each NHTS sample vehicle was assigned a price based on imputed engine type and fuel metering values obtained from the NHTSA Corporate Average Fuel Economy files for model years 1978-2008. For pre-1978 model year vehicles, otto engine and gasoline were imputed for engine type and fuel metering, respectively. Fuel prices, by month, were obtained from the following Energy Information Administration survey questionnaires:

- Form EIA-888[38] "On-Highway Diesel Fuel Price Survey."

- Form EIA-878[39] "Motor Gasoline Price Survey."

- Form EIA-895[40] "Monthly Quantity and Value of Natural Gas Report."

- Form EIA-826[41] "Monthly Electric Utility Sales and Revenue Report with State Distributions."

It is important to define the transportation fuels included in each of these prices. See the following sections for further details on transportation fuel prices.

It is also important to point out that the NHTS did not collect information on the use of alternate fuels. Because of that omission, it was not possible to properly assign fuel consumption for dual-fuel (or flexible-fuel) vehicles. While these supplemental data do not explicitly account for alternative fuel use, the supplemental NHTS data should allow for a user to freely assign an alternative fuel use fraction. For example, one common assumption is to assign an operating scenario where 50 percent of the time the vehicle runs on alternative fuel (e.g., E85) and 50 percent of the time on conventional fuel (i.e., gasoline). Using the supplemental data and VMT estimate, in conjunction with EIA's fuel economy adjustment methodology, a user may make their own assignment of alternative fuel use. Because allowances have been made for self-

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[38] The Form EIA-888 survey collects data on the National and Petroleum Administration for Defense (PAD) District level cash price of self-serve, motor vehicle diesel fuel. The data are used to monitor changes in motor vehicle diesel fuel prices and to report to the Congress and others when requested. Respondents are a scientifically selected sample of companies owning retail outlets which sell motor vehicle diesel fuel.

[39] The sample for the Motor Gasoline Price Survey was drawn from a frame of approximately 115,000 retail gasoline outlets. The gasoline outlet frame was constructed by combining information purchased from a private commercial source with information contained on existing EIA petroleum product frames and surveys. Outlet names and relevant zip codes were obtained from the private commercial data source. Additional information was obtained directly from companies selling retail gasoline to supplement information on the frame. The individual frame outlets were mapped to counties using their zip codes. The outlets were then assigned to the published geographic areas as defined by the EPA program area, or for conventional gasoline areas, as defined by the Census Bureau's Standard Metropolitan Statistical Areas (SMSA) by using their county assignment.

[40] Monthly and annual production data are collected from the appropriate agencies of the natural gas producing States.

[41] Form EIA-826 collects information from regulated and unregulated companies that sell or deliver electric power to end users, including electric utilities, energy service providers, and distribution companies..

estimating alternate fuel use and, more importantly, the NHTS collected no data to verify any method for assigning alternative fuel use, all consumption and expenditures supplemental data are based on a dedicated use of motor gasoline, diesel, natural gas, or electricity. That is, all flexible-fuel vehicles are assumed to operate on 100 percent gasoline. Thus, estimates for flexible-fuel vehicles are accurate to the extent that this assumption is valid.

Unfortunately, respondents were not asked the type of fuel purchased for their transportation demands. Further, respondents were not queried on the grade of their purchased fuels. Thus, fuel type was imputed to a sample vehicle based on its representative "match" with the selected vehicle from the NHTSA files. A matching record was chosen from among the several applicable ones, with probability proportional to sales, using the sales figures on the NHTSA files. Once chosen, a record provided (1) EPA Composite MPG, (2) fuel metering, and (3) engine type. The latter two items provided enough information to impute a fuel type to a "matched" sample vehicle.

The EIA price series are published by month, by State, 5 PAD districts (PADD), and by type and grade of fuel. For the 2009 NHTS, annual fuel expenditures, E_i, was estimated by multiplying monthly gasoline prices by monthly consumption to produce monthly expenditures, summing over the monthly expenditures derived annual expenditures.

GASOLINE PRICES

Gasoline prices were determined from EIA's Form 888 "Motor Gasoline Price Survey." The sample for the Motor Gasoline Price Survey was drawn from a frame of approximately 115,000 retail gasoline outlets. The gasoline outlet frame was constructed by combining information purchased from a private commercial source with information contained on existing EIA petroleum product frames and surveys. Outlet names and relevant zip codes were obtained from the private commercial data source. Additional information was obtained directly from companies selling retail gasoline to supplement information on the frame. The individual frame outlets were mapped to counties using their zip codes. The outlets were then assigned to the published geographic areas as defined by the EPA program area, or for conventional gasoline areas, as defined by the Census Bureau's Standard Metropolitan Statistical Areas (SMSA) by using their county assignment.

To estimate average prices, sample weights were constructed based on the sampled outlet's number of pumps, a proxy for sales volume. These weights are applied each week to the reported outlet gasoline prices to obtain averages for the specific formulations, grades and geographic areas. Weights used in aggregating grades, formulations and geographic areas were derived using volume data from the EIA "Monthly Report of Prime Suppliers Sales of Petroleum Products Sold for Local Consumption," and demographic data from the Bureau of the Census and Department of Transportation on population, number of gasoline stations and number of vehicles.

The below is an excerpt from the glossary of the *Petroleum Marketing Monthly*, as reported by EIA, which identifies the composition of the motor gasoline sales.

Motor Gasoline (Finished): A complex mixture of relatively volatile hydrocarbons with or without small quantities of additives, blended to form a fuel suitable for use in spark-ignition engines. Motor gasoline, as defined in ASTM Specification D-4814 or Federal Specification VV-G-1690B, is characterized as having a boiling range of 122 to 158 degrees Fahrenheit at the 10 percent recovery point to 365 to 374 degrees Fahrenheit at the 90 percent recovery point. "Motor Gasoline" includes conventional gasoline; all types of oxygenated gasoline, including gasohol; and reformulated gasoline, but excludes aviation gasoline.

Conventional Gasoline: Motor gasoline not included in the oxygenated or reformulated gasoline categories. Excludes reformulated gasoline blendstock for oxygenate blending (RBOB).

Oxygenated Gasoline: Finished motor gasoline, other than reformulated gasoline, having an oxygen content of 2.7 percent or higher by weight and required by the U.S. Environmental Protection Agency (EPA) to be sold in areas designated by EPA as carbon monoxide (CO) nonattainment areas. Note: Oxygenated gasoline excludes oxygenated fuels program reformulated gasoline (OPRG) and reformulated gasoline blendstock for oxygenate blending (RBOB). Data on gasohol that has at least 2.7 percent oxygen, by weight, and is intended for sale inside CO nonattainment areas are included in data on oxygenated gasoline. Other data on gasohol are included in data on conventional gasoline.

Reformulated Gasoline: Finished motor gasoline formulated for use in motor vehicles, the composition and properties of which meet the requirements of the reformulated gasoline regulations promulgated by the U.S. Environmental Protection Agency under Section 211(k) of the Clean Air Act. Note: This category includes oxygenated fuels program reformulated gasoline (OPRG) but excludes reformulated gasoline blendstock for oxygenate blending (RBOB).

Further, EIA classifies gasoline by octane ratings, where each type of gasoline (conventional, oxygenated, and reformulated) is classified by three grades:

1) Regular Gasoline: Gasoline having an antiknock index (i.e., octane rating) greater than or equal to 85 and less than 88. Note: Octane requirements may vary by altitude.

2) Midgrade Gasoline: Gasoline having an antiknock index (i.e., octane rating) greater than or equal to 88 and less than or equal to 90. Note: Octane requirements may vary by altitude.

3) Premium Gasoline: Gasoline having an antiknock index (i.e., octane rating) greater than 90. Note: Octane requirements may vary by altitude.

Figure B3. Area Map for Reformulated Gasoline
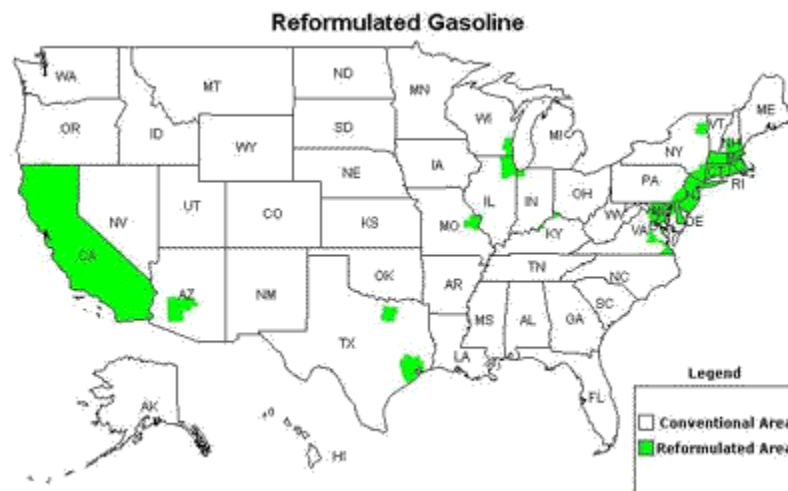
Source: Energy Information Administration, website
www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/reformulated_map.html.

DIESEL FUEL PRICES

Prices published by the EIA supplier surveys are at the retail level for diesel fuel. The form EIA-888 survey collects data on the National and Petroleum Administration for Defense (PAD) District[42] level cash price of self-serve, motor vehicle diesel fuel. The data are used to monitor changes in motor vehicle diesel fuel prices and to report to the Congress and others when requested. Respondents are a scientifically selected sample of companies owning retail outlets that sell motor vehicle diesel fuel. Prices are published on http://tonto.eia.doe.gov/oog/info/wohdp/diesel.asp by EIA.

EIA conducts weekly Computer Assisted Telephone Interview surveys that collect prices at the outlet level. The EIA-888 collects prices of diesel fuel from truck stops and service stations across the country each Monday morning. Average prices of diesel fuel through outlets at the five Petroleum Administration for Defense District (PADD) levels, regions of the country, sub-PADD levels, and the state of California are released by the end of the day through Listserv, the Web, Fax, and telephone hotline.

Because the NHTS did not collect the type or grade of diesel consumed in each sample vehicle, diesel price was assigned to a diesel-powered vehicle based on a monthly fuel price represented by a PAD that includes the State in which the sample vehicle resides, according to

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[42] PAD District 1 (East Coast) is composed of the following three subdistricts: Subdistrict 1A (New England): Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, Vermont. Subdistrict 1B (Central Atlantic): Delaware, District of Columbia, Maryland, New Jersey, New York, Pennsylvania. Subdistrict 1C (Lower Atlantic): Florida, Georgia, North Carolina, South Carolina, Virginia, West Virginia. PAD District 2 (Midwest): Illinois, Indiana, Iowa, Kansas, Kentucky, Michigan, Minnesota, Missouri, Nebraska, North Dakota, South Dakota, Ohio, Oklahoma, Tennessee, Wisconsin. PAD District 3 (Gulf Coast): Alabama, Arkansas, Louisiana, Mississippi, New Mexico, Texas. PAD District 4 (Rocky Mountain): Colorado Idaho, Montana, Utah, Wyoming. PAD District 5 (West Coast): Alaska, Arizona, California, Hawaii, Nevada, Oregon, and Washington.

NHTS, with the notable exception of the state of California where assignment was completed within state geographic boundaries.

Figure B4. Map of Petroleum Administration for Defense Districts
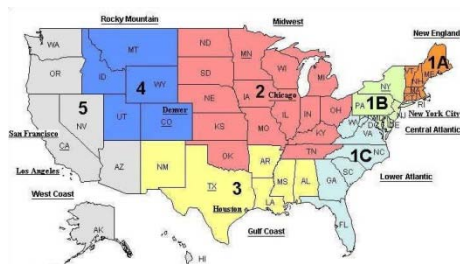
OTHER FUEL TYPE PRICES

Unfortunately, in the 2009 NHTS, all alternative-fuel vehicles were imputed as dedicated gasoline vehicles. That imputation rule was applied because (1) NHTS did not collect fuel type information on its survey questionnaire and (2) the majority of owners of vehicles capable of being powered by methanol, ethanol, and other alternative fuels are consuming blended motor gasoline since alternative fueling stations do not serve large areas of the nation.[43]

While the NHTS cannot delineate gasohol use, this appendix does address dedicated compressed natural gas (CNG) and electric vehicles.[44] For CNG, retail prices were obtained from form EIA-895, "Monthly Quantity and Value of Natural Gas Report". The EIA-895 collects monthly information from the applicable State agencies that collect data concerning natural gas production. Data are published in several of EIA's monthly and annual reports. For electricity, retail prices were obtained from form EIA-826, "Monthly Electric Utility Sales and Revenue Report with State Distributions." Form EIA-826 collects information from regulated and unregulated companies that sell or deliver electric power to end users. While three customer groups were available, residential customers were selected to represent electric prices because this group most accurately reflected the retail electric price for NHTS households. State and regional summaries of these data are published by EIA and used by public and private analysts.

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[43] U.S. Department of Energy, Energy Efficiency and Renewable Energy, Alternative Fuels Data Center reports that over 7 thousand fueling stations dispense alternative fuels (see listing details on http://www.eere.energy.gov/afdc/infrastructure/station_counts.html, updated on November 11, 2010).

[44] Propane vehicles are not included in the NHTSA files. Thus, no propane-fuel vehicles are found in the additions made by EIA to NHTS data.

QUALITY OF THE DATA

INTRODUCTION

This section discusses several issues relating to the quality of the National Household Travel Survey (NHTS) data and to the interpretation of conclusions based on these data. In particular, the focus of our discussion is on the quality of specific data items, such as the fuel economy and fuel type, that were imputed to the NHTS via a cold-decking imputation procedure. This imputation procedure used vehicle-level information from the NHTSA Corporate Average Fuel Economy files for model year's 1978 through 2008.[45] It is nearly impossible to quantify directly the quality of this imputation procedure because NHTS does not collect the necessary fuel economy information for comparison. At best, we have indirect evidence on the quality of our imputations, which is addressed in the following sections. Indeed, such an imputation procedure could be vastly improved with the collection of Vehicle Identification Number (VIN), fuel type and retail fuel price for each sample vehicle. However, those collections may represent an unreasonable burden on NHTS respondents.

The quality of the data collection and the processing of the data affect the accuracy of estimates based on survey data. All the statistics published in this appendix, such as total vehicle-miles traveled (VMT), are estimates of population values. These estimates are based on observations from a randomly chosen subset of the entire population of occupied housing units. Consequently, the estimates always differ from the true population values. Because the NHTS is a sample survey, data from the survey are subject to various sources of nonsampling and sampling error.

Nonsampling error is a measure of variability due to the execution and processing of the survey. These errors can include: population undercoverage during sampling; questionnaire wording and format; response bias and variance; interviewer error; coding and/or keypunching error; and nonresponse bias. Nonsampling errors are treated in several sections of this appendix. The main section pertains to the imputation procedures used for "missing" fuel economy, fuel type, and fuel economy adjustments. In the previous sections, fuel economy adjustments were addressed. This section deals mainly with imputing fuel economy or $MPG_{i(EPA\ 55/45)}$ to each appropriate sample vehicle.

NONSAMPLING ERROR

Nonsampling errors are due to the conduct of the survey, and include both random errors and systematic errors or biases. The magnitudes of nonsampling biases cannot be estimated from the sample data. Thus, avoidance of systematic biases is a primary objective of all stages of survey design. Subsequent to conducting a survey, problems of unit nonresponse and item nonresponse need to be addressed.

In surveys with complex questionnaires and procedures, such as the NHTS, the final dataset reflects fundamental approaches taken in the data collection and editing processes. For the 2009 NHTS, two approaches may have had considerable impact on the resulting data.

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[45] 2009 model year information was not available at the time of release of NHTS version 2.0 data.

The first is the reluctance to impute data. If the respondent did not answer an item, its value was generally not imputed, (i.e., determine what the logical response would be given the response to other items). Carefully performed imputation has its place in many statistical surveys, however Westat and U.S. DOT determined that imputation would be limited in the NHTS data. If data were imputed, an imputation/edit flag was set for the variable to indicate the values that were imputed. The treatment in the NHTS of these types of errors is discussed in the NHTS User's Guide.

Supplemental data, by definition, are 100 percent imputed. Thus, it is important that EIA thoroughly present the approach used to impute energy-related supplemental NHTS data (see EIA's Appendix B).

UNIT NONRESPONSE

Unit nonresponse is the type of nonresponse that occurs when no data are available for an entire sampled household. The respondent being unavailable or the respondent's refusal to cooperate causes most unit nonresponse cases. See the NHTS User's Guide for further details on unit nonresponse.

IMPUTATION PROCEDURES FOR SUPPLEMENTAL DATA

Imputation procedures fill in the gaps of "missing" data. Item nonresponse occurs when the respondents do not know the answer or refuse to answer a question, or when an interviewer does not ask a question or does not record an answer. Or, as in the case of this appendix, item nonresponse occurs when a question was not asked, such that imputation procedures are required to address the need to append supplemental data to a pre-existing file from other external, but related, files. As already mentioned, NHTS took a conservative approach to item nonresponse. For supplemental data, in an effort to facilitate "full-sample" data analyses, imputations were made to provide the most probable responses when responses were "missing." For linking supplemental data, a pseudo cold-decking imputation was employed. Figure C1 depicts the cold-deck approach, using NHTS make, model, model year, and vehicle type information to "match" with eligible donors from the NHTSA CAFE files.

Figure C1. Schematic for Linking or Matching a NHTS Sample Vehicle to Eligible EPA/NHTSA Vehicles

Matching: 1 to Many

Volkswagen, Jetta, 2001, Auto, ??.?

MPG 55/45

1

Many

Volkswagen, Jetta, 2001, Auto, 44.8
Volkswagen, Jetta, 2001, Auto, 26.3
Volkswagen, Jetta, 2001, Auto, 52.6
Volkswagen, Jetta, 2001, Auto, 29.4
Volkswagen, Jetta, 2001, Auto, 29.2
Volkswagen, Jetta, 2001, Auto, 25.1
Volkswagen, Jetta, 2001, Auto, 31.7
Volkswagen, Jetta, 2001, Auto, 31.4
Volkswagen, Jetta, 2001, Auto, 31.3
Volkswagen, Jetta, 2001, Auto, 29.5

Source: EPA/NHTSA.

Select One

Note: EPA – Environmental Protection Agency, NHTSA – National Highway Transportation Safety Administration.

COLD-DECK PROCEDURE

Because the fuel economy for a sampled vehicle could not be unequivocally determined by its NHTS-collected descriptors, a cold-deck imputation procedure was employed to "match" a NHTSA file record to a sample vehicle. A matching record was chosen from among the several applicable ones, with probability proportional to sales, using the sales figures on the NHTSA files. Once chosen, a record provided (1) EPA Composite MPG, (2) fuel metering, and (3) engine type. Although more attributes were available for selection, EIA limited its "donated" vehicle attributes to those required to assign an appropriate fuel price to a sample vehicle. This matching routine commonly resulted in a 1-to-many record linkage (see Figure C1 for an example).

Cold-deck procedures make use of a fixed set of values, which covers all of the perspective data items. These values can be constructed with the use of historical data, subject-matter expertise, or a combination of both. Such a procedure is an attempt to create a "perfect" questionnaire in order to fill in the missing data gaps or, in this case, append supplemental data. If these procedures are completed properly and with limited bias, imputation has the ability to derive a complete and accurate record that (1) contains an audit trail for evaluation purposes; and (2) ensures that the imputed records are internally consistent.

Multiple paths were used to "match" recipient NHTS sample vehicles to eligible donor NHTSA file record vehicles. Because matching used a combination of four common linking variables – vehicle manufacturer, vehicle model, vehicle model year, and vehicle type – several

"matching" paths were followed.   These paths are denoted (i.e., internally audited) with imputation flags, which are defined for each vehicle as follows:

- 01 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using four linking variables: vehicle manufacturer, vehicle model, vehicle model year, and vehicle type.

- 02 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using four linking variables: vehicle manufacturer, vehicle model, adjusted by adding one year to the reported vehicle model year, and vehicle type.

- 03 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using four linking variables: vehicle manufacturer, vehicle model, adjusted by subtracting one year from the reported vehicle model year, and vehicle type

- 04 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using four linking variables: vehicle manufacturer, vehicle model, adjusted by adding two years to the reported vehicle model year, and vehicle type.

- 05 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using four linking variables: vehicle manufacturer, vehicle model, adjusted by subtracting two years from the reported vehicle model year, and vehicle type.

- 06 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model and vehicle type.

- 07 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model, and reported vehicle model year.

- 08 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model, and adding one year to the reported vehicle model year.

- 09 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model, and subtracting one year from the reported vehicle model year.

- 10 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model, and adding two years to the reported vehicle model year.

- 11 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using three linking variables: vehicle manufacturer, vehicle model, and subtracting two years from the reported vehicle model year.

- 12 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using two linking variables: vehicle manufacturer and vehicle model.

- 13 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records using two linking variables: vehicle style and vehicle model.

- 14 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records linked using vehicle style, and adjusted by adding one year from reported model year.

- 15 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records linked using vehicle type, and adjusted by subtracting one year from reported model year.

- 16 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records linked using vehicle type, and adjusted by adding two years from reported model year

- 18 denotes a NHTS sample vehicle that had multiple model names "matching" to eligible NHTSA file records linked using vehicle type.

- 99 denotes a NHTS sample vehicle that was internally hot-decked to match with its average on-road, in-use fuel economy value as defined by one or more vehicle characteristics, such as make, model, model year, and vehicle type. Some of these vehicles are based on EIA expert analysis using subject matter experience, in conjunction with past RTECS and Table VM-1 of U.S. Department of Transportation's *Highway Statistics* report series. These flagged values become more meaningful with pre-1978 model year vehicles since NHTSA's CAFE database excludes pre-1978 model years. EIA, therefore, recommends that users take extreme caution when making inferences concerning pre-1978 model year vehicles from this report.

Due to the errors in respondents reporting accurate model year or, to a lesser extent, due to deficiencies in the NHTSA files, it was necessary to incrementally increase or decrease (not simultaneously increase and decrease) the model year for "matching" to successively larger range of years. If, for example, an eligible match was not found for a NHTS sample vehicle having the following attributes: Volkswagen, Scirocco, 1990, Automobile. Toggling of model years, by a single year increase followed by a single year decrease of the reported model year, resulted in a match with a Volkswagen, Scirocco, 1988, Automobile. In this example, the Volkswagen, Scirocco, 1990, Automobile, while seemingly a respondent reporting error, would receive an imputation flag of "05" due to the "match" with the NHTSA file record corresponding to a Volkswagen, Scirocco, 1988, Automobile.

Please note, in Table C1, the total record count is 296,602, which is short of the total in the NHTS database at 309,163. In EIA's Residential Transportation Energy Consumption Survey (RTECS) program, which went away after the 1994 study, EIA only sampled "light-duty vehicles," which is defined as "light-duty vehicles and recreational vehicles." So, by aggregating under that definition, one should generate the Table C1 estimates.

Table C1. Distribution of NHTS Sample Light-Duty Vehicles by Fuel Economy Imputation Flag, 2009

Imputation Flag for MPG(EPA 55/45)	Number of Vehicles in NHTS Sample
01	252,393
02	4,322
03	3,283
04	2,335
05	749
06	14,369
07	6,435
08	251
09	259
10	182
11	117
12	1,020
13	2,642
14	21
15	82
16	8
18	39
99	8,095
Total	**296,602**

Source: U.S. Department of Transportation, Federal Highway Administration, *National Household Travel Survey 2009*, augmented release by the Energy Information Administration, (Washington, DC).

While the distribution of imputation flags is helpful, further evidence is needed to quantify the quality of this procedure. To make the "match" distribution display more revealing, values from the above figure are tabulated to present range categories of donor vehicles in Table C2. Smaller ranges correlate with increased certainty of assigned fuel economy values.

Table C2. Distribution of All NHTS Sample Vehicles "Matched" by Range of Donor Vehicles

Range of Eligible Donor Vehicles	Number of Vehicles in NHTS Sample	Cumulative Percentage of Sampled Vehicles
1	30,985	10.7%
2	39,332	24.4%
3	20,457	31.5%
4	38,415	44.8%
5	18,825	51.3%
6	21,137	58.6%

Table C2. Distribution of All NHTS Sample Vehicles "Matched" by Range of Donor Vehicles

Range of Eligible Donor Vehicles	Number of Vehicles in NHTS Sample	Cumulative Percentage of Sampled Vehicles
7	10,875	62.4%
8	16,412	68.1%
9	8,935	71.2%
10 or more*	91,229	100.0%
Total	**296,602**	**100.0%**

Source: U.S. Department of Transportation, National Household Travel Survey 2009, National and Add-on releases, Federal Highway Administration, January 2011. (Washington, DC).*Note: To ensure consistency with Table C1, "10 or more" category includes those vehicles assigned a "99" fuel economy imputation flag.

QUALITY OF SPECIFIC SUPPLEMENTAL DATA ITEMS

COLD-DECK PROCEDURE: SENSITIVITY ANALYSIS

Although the accuracy and robustness of the cold-deck procedure and subsequent fuel economy adjustments are not quantifiable because we lack both fuel purchase and mileage diaries for calculating a vehicle's actual on-road, in-use fuel economy, we can assess the sensitivity of the cold-deck procedure in an effort to measure its robustness.

Because we use a single value imputation approach, multiple imputations is one approach available for investigating the uncertainty of our imputed values. Indeed, imputing a single value may result in estimating measures of precision (e.g., standard errors) that are too small because a single value ignores the uncertainty found in selecting from a listing of donated values. Rather than perform a series of multiple imputations, we have assumed that each sample vehicle's list of eligible donors represents a complete set of values for its "missing" unadjusted fuel economy variable. Therefore, the uncertainty associated with the imputation procedure may be assessed by imputing a pre-determined subset of values; that is, ones that represent the extremes and average of eligible donors. P5 and P95 – the 5th and 95th percentiles of sales-weighted fuel economy, respectively – represent our extreme distribution values, while the average value corresponded to the sales-weighted average of the eligible donor vehicles. Using Figure C1 as an example, we calculate: P5 = 25.1, P95 = 44.8 and a sales-weighted average of 30.8 miles per gallon.

By separately totaling the consumption of transportation fuel for each of these 3 outcomes and, then, comparing them to our single-value total, it is not surprising that we find that

- applying sales-weighted fuel economy values for each light-duty vehicle yields a energy consumption total 1 percent less than the single-value total;

- applying 5th percentile values for each light-duty vehicle yields an energy consumption total 8 percent more than the single-value total; and,

- applying 95th percentile values to each light-duty vehicle yields an energy consumption total 8 percent less than the single-value total.

Clearly, applying extreme distribution values – P5 and P95 – to each and every eligible sample vehicle results in biased energy-related estimates. While these extreme values are not

acceptable to a researcher, such biased estimates illustrate the upper and lower uncertainty bounds associated with cold-deck estimates. Given these bounds, along with survey sampling and non-sampling errors, the use and usefulness of an enhanced 2009 National Household Travel Survey should be evaluated against a researcher's project requirements.

VEHICLE FUEL PRICE AND EXPENDITURES

In the 2009 NHTS, fuel price data were not collected via fuel purchase diaries, compared to previous EIA studies (e.g., RTECS). Instead, fuel prices were determined from EIA price series. Unfortunately, there is no way to validate the price methodology used to assign a monthly price paid for transportation fuel because EIA lacks the necessary fuel purchase diaries from NHTS repondents.

The Bureau of Labor Statistics (BLS) *Retail Pump Average Gasoline Prices* and the Lundberg Survey, Inc. offer alternate price series. However, there was a general consistency with using a price series from one statistical agency.

GASOLINE EQUIVALENT GALLON

The following table provides the gasoline equivalent gallon conversion used in this appendix. All conversion values, to the extent possible, have been made to mirror the conversion values used in deriving equivalent-gallon fuel economy estimates found in the NHTSA CAFE files.

Table C3. Gasoline Equivalent Gallon Conversion Values

Transportation Fuel	Gasoline Equivalent Gallon
Diesel	1 diesel gallon = 1 gasoline equivalent gallon
Electricity	33,705 Watt-hours = 1 gasoline equivalent gallon
Compressed Natural Gas	121.5 cubic feet = 1 gasoline equivalent gallon

Sources: 40 CFR Parts 80, 85, 86, 88, and 600 and 10 CFR Part 474.

GREET MODEL

Of course, there are other conversion factors available, depending on the various fuel-specific factors. For the Greenhouse Gases, Regulated Emissions, and Energy Use in Transportation (GREET) model, the U.S. Department of Energy, Argonne National Laboratory uses the following:

Table C4. Lower and Higher Heating Values for Select Transportation Fuels Based on the GREET Model

Transportation Fuel	LHV (net) Btu per gallon	HHV (gross) Btu per gallon	Density Grams per gallon	Carbon Content (% by wt)	Sulfur Content (ppm by wt)
Conv.Gasoline	115,500	125,000	2,791	85.5%	200
Ref. Gasoline	112,265	121,456	2,795	82.9%	30
Diesel	128,500	138,700	3,240	87.0%	250
Methanol	57,000	65,000	2,996	37.5%	0
Ethanol	76,000	84,500	2,996	52.2%	0

Table C4. Lower and Higher Heating Values for Select Transportation Fuels Based on the GREET Model

Transportation Fuel	LHV (net) Btu per gallon	HHV (gross) Btu per gallon	Density Grams per gallon	Carbon Content (% by wt)	Sulfur Content (ppm by wt)
LPG	84,000	91,300	2,000	82.0%	0
Natural gas	928	1,031	21	74.0%	7
Electricity	3,412	Btu/kWh			

Source: M. Wang, GREET 1.5 -- *Transportation Fuel-Cycle Model*, Volume 1: Methodologies, Development, Use, and Results, Center for Transportation Research, Argonne National Laboratory, ANL/ESD-39, Vol.1, Aug. 1999. M. Wang, GREET 1.5 -- Transportation Fuel-Cycle Model, Volume 2: Appendices of Data and Results, Center for Transportation Research, Argonne National Laboratory, ANL/ESD-39, Vol.2, Aug. 1999. Notes: 1) Gasoline results are for the mix of 70% conventional gasoline and 30% reformulated gasoline. 2) LPG results are for the mix of 40% LPG produced from crude and 60% from natural gas. 3) Electricity results are for the current average electricity generation mix.

EIA strongly encourages a consistent use of heating values.

Weekly Gasoline Prices, 2009 NHTS

Weekly gasoline (Regular, all Formulations) prices from EIA[1] were added to the 2009 NHTS. These prices were assigned based on the Petroleum Administration for Defense Districts (PADD) designation for a given NHTS household. These districts are similar to Census regions in that each state is assigned to a given region, but the regions drawn up in such a way as to maximize gasoline distribution, and are described in Figure 1. Retail prices are given by EIA for each Monday; thus, the prices were assigned for each household based on the closest Monday to their travel day. If a household had a travel day on a Friday, Saturday, or Sunday, the following Monday was used, while those with travel days on Tuesdays, Wednesdays, and Thursdays were assigned the Monday prior to the travel day.
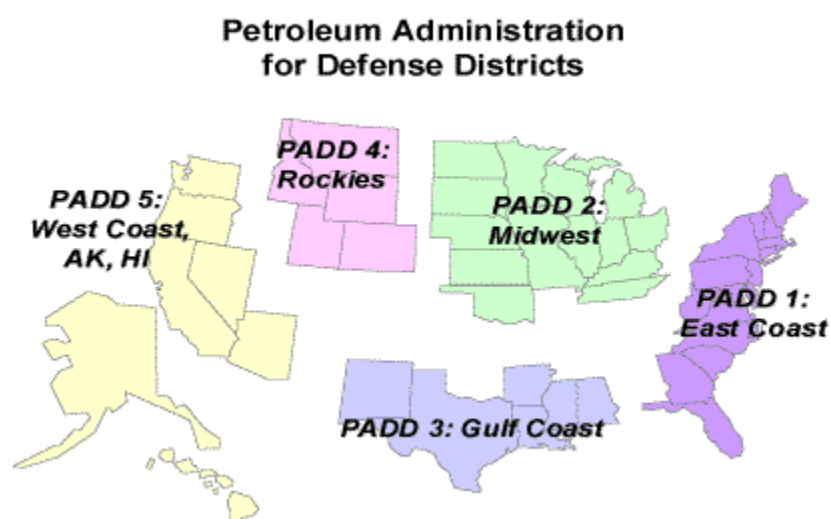
Figure 1: Petroleum Administration for Defense Districts (PADD) Regions (Source: EIA - http://www.eia.doe.gov/pub/oil_gas/petroleum/analysis_publications/oil_market_basics/paddmap.htm)

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[1] http://www.eia.doe.gov/oil_gas/petroleum/data_publications/wrgp/mogas_history.html and http://www.eia.gov/oog/ftparea/wogirs/xls/pswrgvwall.xls ,
accessed 4/15/11

VEHICLE MAKE, VEHICLE MODEL

Format:

VEHICLE MAKE   – 2 numeric
VEHICLE MODEL – 3 numeric

Element Values:

MAKE: Blanks
              01-03, 06-10, 12-14, 18-25, 29-65, 69-**77**, 80-89, 90-94, 98-99

MODEL: Blanks
              001-999

Remarks:

SEE REMARKS UNDER VEHICLE IDENTIFICATION NUMBER – V12

ALPHABETICAL LISTING OF MAKES

FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*	FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*
54	Acura	187	(ACUR)	71	Ducati	253	(DUCA)
31	Alfa Romeo	187	(ALFA)	10	Eagle	205	(EGIL)
03	AM General	188	(AMGN)	91	Eagle Coach	267	
01	American Motors	189	(AMER)	29-398	Excaliber	250	(EXCL)
69-031	Aston Martin	250	(ASTO)	69-035	Ferrari	251	(FERR)
32	Audi	190	(AUDI)	36	Fiat	205	(FIAT)
33	Austin/Austin Healey	191	(AUST)	12	Ford	206	(FORD)
				82	Freightliner	259	(FRHT)
29-001	Avanti	250	(AVTI)	83	FWD	260	(FWD)
98-802	Auto-Union-DKW	269	(AUTU)	69-398	Gazelle	252	(GZL)
69-042	Bentley	251	(BENT)	92	Gillig	268	
69-052	Bertone	251	(BERO)	23	GMC	210	(GMC)
90	Bluebird	267	(BLUI)	25	Grumman	212	(GRUM)
34	BMW	191	(BMW)	72	Harley- Davidson	253	(HD)
69-032	Bricklin	250	(BRIC)				
80	Brockway	257	(BROC)	69-036	Hillman	251	(HILL)
70	BSA	253	(BSA)	98-806	Hino	270	(HINO)
18	Buick	193	(BUIC)	37	Honda	213	(HOND)
19	Cadillac	194	(CADI)	29-398	Hudson	250	(HUDS)
98-903	Carpenter	270		55	Hyundai	215	(HYUN)
29-002	Checker	250	(CHEC)	08	Imperial	216	(CHRY)
20	Chevrolet	195	(CHEV)	58	Infiniti	216	(INFI)
06	Chrysler	199	(CHRY)	84	International Harvester	261	(INTL)
69-033	Citroen	250	(CITR)				
98-904	Collins Bus	270		38	Isuzu	217	(ISU)
64	Daewoo	201	(DAEW)	88	Iveco/Magirus	264	(IVEC)
60	Daihatsu	201	(DAIH)	39	Jaguar	219	(JAGU)
35	Datsun	231	(DATS)	69-037	Jensen	251	(JENS)
69-034	DeLorean	250	(DELO)	02	Jeep	219	(AMER)
29-398	Desoto	250	(DESO)	02	Kaiser-Jeep	219	(AMER)
69-048	Desta	251		73	Kawasaki	254	(KAWK)
81	Diamond Reo or Reo	258	(DIAR)	85	Kenworth	262	(KW)
				63	Kia	220	(KIA)
98-905	DINA	270	(DINA)	69-058	Koenigsegg	252	
98-803	Divco	269	(DIVC)	69-053	Lada	251	(LADA)
07	Dodge	201	(DODG)	69-038	Lamborghini	251	(LAMO)

FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*	FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*
40	Lancia	221	(LNCI)	98-807	Scania	270	(SCAN)
62	Land Rover	221	(LNDR)	69-044	Simca	251	(SIM)
59	Lexus	222	(LEXS)	69-398	Singer	252	(SIN)
13	Lincoln	223	(LINC)	65	Smart	241	
69-039	Lotus	251	(LOTU)	69-057	Spyker	252	
86	Mack	263	(MACK)	61	Sterling	241	(STLG)
69-061	*Mahinda*	*252*		98-809	Sterling	270	(STLG)
69-040	Maserati	251	(MASE)	29-001	Studabaker	250	(STU)
69-056	Maybach	252	(MAYB)	29-398	Stutz	250	(STUZ)
41	Mazda	223	(MAZD)	48	Subaru	242	(SUBA)
93	MCI	268	(MCIN)	69-045	Sunbeam	251	(SUNB)
42	Mercedes-Benz	225	(MERZ)	53	Suzuki	243	(SUZI)
14	Mercury	227	(MERC)	69-059	Tesla	252	
56	Merkur	229	(MERK)	94	Thomas Built	268	(THMS)
98-906	Mid Bus	270		49	Toyota	244	(TOYT)
69-054	Mini-Cooper	252		50	Triumph	246	(TRIU)
43	MG	229	(MG)	69-046	TVR	251	(TVR)
52	Mitsubishi	229	(MITS)	98-808	UD	270	(UD)
69-055	Morgan	252	(MORG)	98-908	Van Hool	270	
69-041	Morris	251	(MORR)	*77*	*Victory*	*255*	*(VCTY)*
74	Moto-Guzzi	254	(MOGU)	30	Volkswagen	247	(VOLK)
84	Navistar	261	(NAVI)	51	Volvo	248	(VOLV)
98-902	Neoplan	270	(NEOP)	98-804	Western Star	269	(WSTR)
35	Nissan	231	(NISS)	89	White/Autocar	266	(WHIT)
75	Norton	255	(NORT)	89	White/GMC	266	(WHGM)
21	Oldsmobile	233	(OLDS)	02	Willys-Jeep	219	(AMER)
18	Opel	194	(OPEL)	76	Yamaha	255	(YAMA)
98-907	Orion	270	(ONTR)	*69-060*	*Yes*	*252*	
98-805	Oshkosh	269	(OSHK)	57	Yugo	250	(YUGO)
29-398	Packard	250	(PACK)				
29-003	Panoz	250	(PANZ)				
87	Peterbilt	265	(PTRB)				
44	Peugeot	234	(PEUG)				
09	Plymouth	235	(PLYM)				
22	Pontiac	237	(PONT)				
45	Porsche	238	(PORS)				
69-049	Reliant (British)	251	(RELA)				
46	Renault	239	(RENA)				
69-042	Rolls Royce	251	(ROL)				
47	Saab	240	(SAA)				
29-004	Saleen	250					
24	Saturn	240	(STRN)				

*   **Reference:** Code Manual, Fifth
Educational National Crime Information
Center U.S. Department of Justice,
Federal Bureau of Investigation Section 4
– Vehicle Make Codes

NUMERICAL LISTING OF MAKES

FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*	FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*
01	American Motors	189	(AMER)	41	Mazda	223	(MAZD)
02	Jeep	219	(AMER)	42	Mercedes-Benz	225	(MERZ)
02	Kaiser-Jeep	219	(AMER)	43	MG	229	(MG)
02	Willys-Jeep	219	(AMER)	44	Peugeot	234	(PEUG)
03	AM General	188	(AMGN)	45	Porsche	238	(PORS)
06	Chrysler	199	(CHRY)	46	Renault	239	(RENA)
07	Dodge	201	(DODG)	47	Saab	240	(SAA)
08	Imperial	216	(CHRY)	48	Subaru	242	(SUBA)
09	Plymouth	235	(PLYM)	49	Toyota	244	(TOYT)
10	Eagle	205	(EGIL)	50	Triumph	246	(TRIU)
12	Ford	206	(FORD)	51	Volvo	248	(VOLV)
13	Lincoln	223	(LINC)	52	Mitsubishi	229	(MITS)
14	Mercury	227	(MERC)	53	Suzuki	243	(SUZI)
18	Buick	193	(BUIC)	54	Acura	187	(ACUR)
18	Opel	194	(OPEL)	55	Hyundai	215	(HYUN)
19	Cadillac	194	(CADI)	56	Merkur	229	(MERK)
20	Chevrolet	195	(CHEV)	57	Yugo	250	(YUGO)
21	Oldsmobile	233	(OLDS)	58	Infiniti	216	(INFI)
22	Pontiac	237	(PONT)	59	Lexus	222	(LEXS)
23	GMC	210	(GMC)	60	Daihatsu	201	(DAIH)
24	Saturn	240	(STRN)	61	Sterling	241	(STLG)
25	Grumman	212	(GRUM)	62	Land Rover	221	(LNDR)
30	Volkswagen	247	(VOLK)	63	Kia	220	(KIA)
31	Alfa Romeo	187	(ALFA)	64	Daewoo	201	(DAEW)
32	Audi	190	(AUDI)	65	Smart	241	
33	Austin/Austin Healey	191	(AUST)	70	BSA	253	(BSA)
				71	Ducati	253	(DUCA)
34	BMW	191	(BMW)	72	Harley-Davidson	253	(HD)
35	Datsun	231	(DATS)				
35	Nissan	231	(NISS)	73	Kawasaki	254	(KAWK)
36	Fiat	205	(FIAT)	74	Moto-Guzzi	254	(MOGU)
37	Honda	213	(HOND)	75	Norton	255	(NORT)
38	Isuzu	217	(ISU)	76	Yamaha	255	(YAMA)
39	Jaguar	219	(JAGU)	*77*	*Victory*	*255*	*(VCTY)*
40	Lancia	221	(LNCI)	80	Brockway	257	(BROC)

FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*	FARS MAKE CODE	MAKE	MAKE/ MODEL TABLE PAGE #	NCIC CODE*
81	Diamond Reo or Reo	258	(DIAR)	69-044	Simca	251	(SIM)
				69-045	Sunbeam	251	(SUNB)
82	Freightliner	259	(FRHT)	69-046	TVR	251	(TVR)
83	FWD	260	(FWD)	69-048	Desta	251	
84	International Harvester	261	(INTL)	69-049	Reliant (British)	251	(RELA)
				69-052	Bertone	251	(BERO)
84	Navistar	261	(NAVI)	69-053	Lada	251	(LADA)
85	Kenworth	262	(KW)	69-054	Mini-Cooper	252	
86	Mack	263	(MACK)	69-055	Morgan	252	(MORG)
87	Peterbilt	265	(PTRB)	69-056	Maybach	252	(MAYB)
88	Iveco/Magirus	264	(IVEC)	69-057	Spyker	252	
89	White/Autocar	266	(WHIT)	69-058	Koenigsegg	252	
89	White/GMC	266	(WHGM)	69-059	Tesla	252	
90	Bluebird	267	(BLUI)	*69-060*	*Yes*	*252*	
91	Eagle Coach	267		*69-061*	*Mahinda*	*252*	
92	Gillig	268		69-398	Gazelle	252	(GZL)
93	MCI	268	(MCIN)	69-398	Singer	252	(SIN)
94	Thomas Built	268	(THMS)	98-802	Auto-Union-DKW	269	(AUTU)
29-001	Avanti	250	(AVTI)				
29-001	Studabaker	250	(STU)	98-803	Divco	269	(DIVC)
29-002	Checker	250	(CHEC)	98-804	Western Star	269	(WSTR)
29-003	Panoz	250	(PANZ)	98-805	Oshkosh	269	(OSHK)
29-004	Saleen	250		98-806	Hino	270	(HINO)
29-398	Desoto	250	(DESO)	98-807	Scania	270	(SCAN)
29-398	Excaliber	250	(EXCL)	98-808	UD	270	(UD)
29-398	Hudson	250	(HUDS)	98-809	Sterling	270	(STLG)
29-398	Packard	250	(PACK)	98-902	Neoplan	270	(NEOP)
29-398	Stutz	250	(STUZ)	98-903	Carpenter	270	
69-031	Aston Martin	250	(ASTO)	98-904	Collins Bus	270	
69-032	Bricklin	250	(BRIC)	98-905	DINA	270	(DINA)
69-033	Citroen	250	(CITR)	98-906	Mid Bus	270	
69-034	DeLorean	250	(DELO)	98-907	Orion	270	(ONTR)
69-035	Ferrari	251	(FERR)	98-908	Van Hool	270	
69-036	Hillman	251	(HILL)				
69-037	Jensen	251	(JENS)	*	**Reference:** Code Manual, Fifth		
69-038	Lamborghini	251	(LAMO)		Educational National Crime Information		
69-039	Lotus	251	(LOTU)		Center U.S. Department of Justice,		
69-040	Maserati	251	(MASE)		Federal Bureau of Investigation Section 4		
69-041	Morris	251	(MORR)		– Vehicle Make Codes		
69-042	Bentley	251	(BENT)				
69-042	Rolls Royce	251	(ROL)				

PASSENGER CARS

MAKE: **Acura**   **(54)**   **(ACUR)**

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Integra	GS, LS, RS, GS-R, Type R	1986-2001, 9999	03-05,07,09
032	Legend	L, LS, GS, Special Edition, GS-R	1986-95,9999	02,04,08
033	NSX	NSX-T	1991-2005, *2009*, 9999	02
034	Vigor		1992-94,9999	04
035	TL	3.2, *3.7, SH-AWD*	1996-*2009*, 9999	04
036	RL	3.5, *3.7*	1996-*2009*, 9999	04
037	CL	2.2, 2.3, 3.0, 3.2, Type S	1997-2003, 9999	02
038	RSX	2.0, Type S	2002-06,9999	03
039	TSX		2004-*09*,9999	04
398	Other (automobile)		1986-*09*,9999	02-05,07-09
399	Unknown (automobile)		1986-*09*,9999	02-05,07-09
LIGHT TRUCKS				
401	SLX		1996-2000, 9999	14
402	*RDX*		2007-*09*,9999	14
421	MDX		2001-*09*,9999	15
499	Unknown (light truck)		1996-*2009*, 9999	19
999	Unknown (ACURA)		1986-*2009*, 9999	49

MAKE: **Alfa Romeo**   **(31)**   **(ALFA)**

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Spider (Spyder)	Roadsters, Veloce, Quadrifoglio, Duetto, Graduate, 1600/1750/1900/ 2000 roadsters, Giulia, Giulietta, Giulietta Veloce, Tipo	1933-94,9999	01-02,09
032	Sports Sedan	4-door sedans (except 164); Milano, Giulietta, Super, Berlina, Alfetta, Giulia 1750/1900/2000/2600 sedans, Alpha 90	1933-89,9999	04

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
033	Sprint/Special	2-door coupes; Alfetta GT, Monteal, 1750/1900/2000/2600 GTV, Sprint GT, GT Veloce, Giulia, Giulietta, Super, GTA, GTV, GTZ, TZ2	1933-80,9999	02
034	GTV-6		1981-86,9999	02
035	164 (Alpha 164)	LS, Q, Quadrifoglio	1990-95,9999	04
036	***8c***	***Competizione, Spyder***	***2009***	***01, 03***
398	Other (automobile)	Alfa, Montreal	1933-95, ***2009***, 9999	01-04,08-09
399	Unknown (automobile)		1933-95, ***2009***, 9999	01-04,08-09

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
401	Dispatcher	Post Office (Jeep)	1965-94,9999	14
402	Hummer	H3 (Base, Luxury, Adventure), x***, Alpha***	2006-***09***,9999	14
421	Hummer (SUV from 1993-2003; see 431 for 2004 on) (for Pickup, see model 481)	Slantback-HMSB, H1, H2	1993-2003, 9999	15
431	Hummer (2004 on; see model 421 for 1993-2003)	H1 (Base, Luxury, Adventure), H2 (Base, Luxury, Adventure), Limousine	2004-***09***,9999	16
466	Dispatcher	DJ-series-Post Office Van	1965-91,9999	22
481	Hummer (Pickup) (for SUV see model 421 for 1993-2003; see 431 for 2004 on)	H1, H2(Base, Luxury, Adventure, Limited Edition), Alpha	2002-***09***,9999	31
482	***Hummer***	***H3T (Adventure, Luxury, Alpha)***	***2009***	***31***
498	Other (light truck)		1940-***2009***, 9999	14-16,19,22, 31-33, 39-42, 45, 48
499	Unknown (light truck)		1940-***2009***, 9999	14-16, 19, 22, 31-33, 39-42, 45, 48-49

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
884	Medium/Heavy Truck	Military off-road	1965-94,9999	60-64,71-72,78
898	Other (medium/heavy truck)		1965-94,9999	60-64,71-72,78
BUSES				
983	Bus: Rear engine, Flat front	Transit	1965-94,9999	52
988	Other (bus)		1965-94,9999	50-52,58-59
989	Unknown Bus Type		1965-94,9999	50-52,58-59
998	Other (vehicle)		1965-94,9999	91-93,97
999	Unknown (AM GENERAL)		1965-*2009*, 9999	49,79,99

| MAKE: | American Motors* | (01) | | (AMER) |

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Rambler/American	Rogue, 220, 330, 440, Scrambler Deluxe, Custom, Super, Classic, Brougham	1954-69,9999	01-02,04,06, 08-09
002	Rebel/Matador/Marlin	550, 660, 770, Classic Brougham Barcelona	1964-78,9999	01-02,04,06, 08-09
003	Ambassador	800, 880, 990, SST, DPL, Brougham, DDL, Limited	1958-74,9999	02,04,06,08-09
004	Pacer	D/L, X, Limited	1975-80,9999	02-03,06,09
005	AMX	(2-seater only)	1968-70,9999	02-03,09
006	Javelin	SST, AMX (1971-1974)	1968-74,9999	02-03,09
007	Hornet/Concord	SST, Sportabout, AMX (1975-1978) Limited, DL, SC-360	1970-83,9999	01-04,06,08-09
008	Spirit/Gremlin	Limited, DL, GT (1983 on), Custom, X, AMX (1979 on)	1970-83,9999	02-03,09
009	Eagle	Concord based, 30 Series	1980-88,9999	01-04,06,08-09
010	Eagle SX-4	Spirit/Gremlin based 50 Series	1981-84,9999	02-03,09
398	Other (automobile)		1940-88,9999	01-04,06,08-09
399	Unknown (automobile)		1940-88,9999	01-04,06,08-09

* NOTE: Alliance, Encore, Premier (including L, DL, and Limited) is coded under Renault (46).

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Super 90		1966-72,9999	02,04,06,08-09
032	100	S, CS, LS, GL, Quattro (1989-on)	1970-77; 1989-94,9999	02,04,06,08-09
033	Fox		1973-79,9999	02,04,06,08-09
034	4000	Quattro, Coupe, Coupe GT, CS, S	1980-93,9999	02,04,08
035	5000	Quattro, CS, S, CS Turbo Quattro, T	1978-93,9999	04,06,09
036	80/90	Quattro, Coupe Quattro	1988-95,9999	04
037	200	Turbo Quattro	1989-92,9999	04,06,09
038	V-8 Quattro	100 series	1990-94,9999	04
039	Coupe Quattro	4000 series	1990-91,9999	02-03,09
040	S4/S6	Quattro, Avant Quattro (Wagon), 4.2 Saloon, Avant (2.7), RS4, Special Edition, V10, *5.6*	1992-95; 2000-*09*,9999	01,04,06,09
041	Cabriolet (1994-1998)		1994-98,9999	01
042	A6	Avant Quattro Wagon (3.0L), Quattro (2.7T, 4.2), FrontTrak (2.8, 3.0L), RS6, 3.2, S Line	1995-*2009*, 9999	04,06,09
043	A4	Avant Wagon (1.8T, 2.0T, 2.8, 3.0, 3.2), Avant Quattro Wagon, FrontTrak (1.8, 2.8, 3.0),Quattro (1.8T, 2.0T, 3.0, 3.2), Special Edition, S Line	1996-*2009*, 9999	01,04,06,09
044	A8	4.2 Quattro, L, W12	1997-*2009*, 9999	04
045	TT	FWD, Quattro AWD, 180, 225 Quattro Roadster, FrontTrak (180), 1.8L, *2.0,* 3.2L, S Line, *RS*	2000-*09*,9999	01-03, 09
046	S8	4.2 Quattro, *5.2*	2001-03; 2007-*09*, 9999	02,04
047	Allroad	QuattroWagon, 2.7T, 4.2	2001-05,9999	06
048	A3	2.0T/FSI, 3.2 S Line	2006-*09*,9999	05
049	A5	*3.2*	2008-*09,9999*	02
050	R8	4.2	2008-*09,9999*	01-02
051	A7		2008-*09,9999,*	04
052	S5	*4.2*	2008-*09,9999*	02
053	*A2*		*2009*	*05*
053	*RS5*		*2010*	*02*

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
398	Other (automobile)		1970-***2010***, 9999	01-06, 08-09
399	Unknown (automobile)		1970-***2010***, 9999	01-06, 08-09
LIGHT TRUCKS				
401	Q7	3.6/4.2 Premium, Hybrid	2007-***09***,9999	14
402	Q5	***3.2***	2008-***09,9999***	14
499	Unknown (light truck)		2007-***09***,9999	14
999	Unknown (AUDI)		1966-***2010***, 9999	49, 99

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Marina	GT	1973-75,9999	01-04,08-09
032	America		1968-72,9999	02
033	Healey Sprite	Mark II, MKIV/Princess (Special Order)	1958-70,9999	01,04,09
034	Healey 100/3000	M, S, Mark III	1953-67,9999	01
035	Mini/Mini Cooper/Mini Moke	850, S	1960-69,9999	01-02,06,09
398	Other (automobile)	A35, A40, Westminster, Cambridge, Somerset, Seven, Hereford, Sports, Sheerline, Atlantic, Countryman, Dorset, Devon	1947-75,9999	01-04,06,08-09
399	Unknown (automobile)		1947-75,9999	01-04,06,08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	1600/1800/2000/2002	Ti, Tii, Tilux, TR, CS, 1600-2, SA, Turbo, A, 1500, 2600, 501, 502	1955-76,9999	01-04,08-09
032	Coupe (before 1975)	2800CS, 3.0CS, 3.0csi, 3.0csl, 3200, 503, 507, M1, 1802, 2000c/cs, 2002	1956-76,9999	01-03,09
033	Bavarian Sedan	2500, 2800, 2.8 Barvarian	1969-74,9999	04

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
034	3-series	3.0s/si, 318i/is/ti/ic, 320i, 323iS/iC/i/Ci,325e/es/i/iS/ii/ C/Ci/Cic/xi/iT/xiT, Sport Wagon (iT/xiT), 328i/iS/ti/ iC/Ci/xi, *xDrive*, 330i/Ci/ Cic/xi, 335i/xi, *xDrive*, M3	1971-*2009*, 9999	01-04,06,08-09
035	5-series	524i,525i/xi,528i/iT/xi, *xDrive,* 530i/iT/xi,533i, 535i/xi,*xDrive,* 550i 540/i/iA/iT, TD Sport Wagon,525i/iT, (wagon 1992-93), M5, 545i, 550i	1975-*2009*, 9999	04,06,09
036	6-series	630, 633, 635, csi, M6, L6, 645Ci, 650i, Neiman Marcus Edition	1976-89, 2004-*09*,9999	01, 02
037	7-series	733i, 735i, L7, 740i/L/iL/iA /Li Protection,750 i/iL/Li Protection,745i/Li,760i/Li, Alpina B7, Individual	1978-*2009*, 9999	04
038	8-series	840Ci/cia, 850i/iS/Ci/Cia	1991-97,9999	02
039	Z3	2.3/2.8/2.5i/3.0i Roadster, MRoadster, MCoupe, 2.8/3.0i Coupe	1996-2003, 9999	01-03, 09
040	Z8		2000-03,9999	01
041	V5		2007-08,9999	06
042	Z4	2.5i, 3.0i/si, Z4M	2003-*09*,9999	01
043	1-Series	128i, 135i	2008-*09,9999*	01, 02
044	*X6*		*2008-09,9999*	*05*
398	Other (automobile)		1955-*2009*, 9999	01-04,06,08-09
399	Unknown (automobile)		1955-*2009*, 9999	01-04,06,08-09
LIGHT TRUCKS				
401	X5	3.0i/si, 4.0is, 4.4i, 4.6is, 4.8is	2000-*09*,9999	14
402	X3	2.5i, 3.0i/*xDrive*, 4.8is	2004-*09*,9999	14
499	Unknown (light truck)		2000-*09*,9999	14

MAKE:	BMW (Cont.)	(34)		(BMW)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
703	125-349cc		1948-66,9999	80
705	450-749cc		1950-2003; 2006-*09*,9999	80
706	750cc and over		1969-***2009***, 9999	80
709	Unknown cc		1948-***2009***, 9999	80
999	Unknown (BMW)		1948-***2009***, 9999	99

MAKE:	Buick	(18)		(BUIC)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Special/Skylark	GS (350, 400, 455), Deluxe GS California, Sport Wagon, Custom Roadmaster (1946-59)	1946-73,9999	01-04,06,08-09
002	LeSabre/Centurion/ Wildcat	Estate Wagon, Invicta, Custom, Limited, T-Type, Ltd, C.M.I, LE, Celebration Edition, Best Seller	1959-2005, 9999	01-02,04,06, 08-09
003	Electra/Electra 225/Park Avenue (1991-on)	Limited, Park Avenue, Ultra, Base, Prestige, SE	1959-2005, 9999	01-02,04,06, 08-09
004	Roadmaster	Estate Wagon, Limited	1991-96,9999	04,06,09
005	Riviera	S-Type, T-Type, Coupe Anniversrary Edition, Silver Arrow	1963-93; 1995-99,9999	01-02,09
007	Century	Luxus, T-Type, FWD (82-on), Custom, Regal (72-77), Limited, LE, SE, Base	1954-2005, 9999	01-02,04,06, 08-09
008	Apollo/Skylark	Skylark (75), S/R	1973-76,9999	02-04,08-09
010	Regal (RWD only)	Turbo, Luxus, Grand National GNX, T-Type	1978-88,9999	02,04,06,08-09
012	Skyhawk	S-Type, Roadhawk, T-Type, GT	1975-80; 1982-89,9999	02-04,06,08-09
015	Skylark (76-85)	S/R, S, Limited, Sport, T-Type	1975-85,9999	02-04,08-09
018	Somerset/Skylark	Skylark (86-on), Sommerset, GS, Regal, Custom, Limited, T-Type	1985-98,9999	02,04,08
020	Regal (FWD)	Limited, Custom, Gold, Grand Sport GS, LS, Sport	1987-2004, 9999	02,04,08

MAKE:	Buick (Cont.)	(18)		(BUIC)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
021	Reatta		1988-91,9999	01-02,09
022	LaCrosse	CX, CXL, CXS, Super	2005-*09*,9999	04
023	Lucerne	CX, CXL V6, CXL V8, CXS	2006-*09*,9999	04
024	Enclave	CX, CXL	2008-*09,9999*	06
031	Opel Kadett		1965-72,9999	02,04,06,08-09
032	Opel Manta	1900, Luxus, Ralley, Sports Coupe	1966-75,9999	02,04,06,08-09
033	Opel GT		1969-75,9999	02
034	Opel Isuzu	Deluxe, Sport	1976-79,9999	02,04,08
398	Other (automobile)		1965-*2009*, 9999	01-04,06,08-09
399	Unknown (automobile)		1950-*2009*, 9999	01-04,06,08-09
LIGHT TRUCKS				
401	Rendezvous	CX, CXL, Ultra, Plus	2002-07,9999	14
402	Rainier	CXL, CXL Plus	2004-07,9999	14
441	Terraza	CX, CXL	2005-07,9999	20
499	Unknown (light truck)		2002-07,9999	14, 20
999	Unknown (BUICK)		1946-*2009*, 9999	49

MAKE:	Cadillac	(19)		(CADI)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
003	Deville/Fleetwood (except Limousine)	Coupe de Ville, Sedan de Ville, Fleetwood Brougham, Fleetwood 60 Special, d'Elegance, Concours, DHS, DTS	1940-2005, 9999	01-02,04,08-09
004	Limousine	Fleetwood 75, Formal, Deville-based, DTS	1940-*2009*, 9999	12
005	Eldorado	Biarritz, El-doro, Touring Coupe, ESC, ETC	1967-2003, 9999	01-02,09
006	Commercial Series	Ambulance/Hearse, Professional	1940-*2009*, 9999	09-12
009	Allante'		1987-93,9999	01-02,09
014	Seville	Elegante, STS, SLS	1976-2004, 9999	04
016	Cimarron	D'Oro	1982-88,9999	04
017	Catera	Sport	1997-2001, 9999	04

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
018	CTS*/CTC*	Luxury, Luxury Sport, V-Series, 2.8L, 3.6L	2003-*10*,9999	*02,* 04*, 06*
019	XLR	Neiman Marcus Edition, V-Series, Standard, Plantinum	2004-*09*,9999	01
020	SRX	V6, V8, **Sports Package**	2004-*09*,9999	06
021	STS	V6,V8, V-Series, Luxury, Premium, Standard, **Platinum**	2005-*09*,9999	04
022	DTS	Luxury I, II, III, V8, Performance, **Platinum**	2006-*09*,9999	04
398	Other (automobile)		1965-*2010*, 9999	01-02,04,06, 08-09,12
399	Unknown (automobile)		1950-*2010*, 9999	01-02,04,06, 08-09,12
LIGHT TRUCKS				
401	*BRX*		*2009*	*14*
421	Escalade/ESV (from 2004 on; see 431 for 2003)	4WD, 2WD, Standard, Platinum, Limousine, Hybrid	1999-2000; 2002-*09*,9999	15
431	Escalade ESV		2003	16
480	Escalade EXT (from 2002 -2006; for 2007 on see 481)	4WD, 2WD	2002-06,9999	31
481	Escalade EXT (from 2007 on; see 480 for 2002-2006)	4WD, 2WD	2007-*09*,9999	31
499	Unknown (light truck)		1999-2000; 2002-*09*,9999	49
999	Unknown (CADILLAC)		1940-*2010*, 9999	49

| MAKE: | Chevrolet | (20) | | (CHEV) |

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Chevelle/Malibu (thru '83)	Classic, Councours, Laguna**, S-3, Greenbriar, Estate, 300, SS-396/454, Deluxe	1963-83,9999	01-02,04,06, 08-09
002	Impala/Caprice	Biscayne, Belair, Super Sport, Classic, Classic Brougham, Townsman, Brookwood, Kingswood, LS, LT, LTZ, Sport, SS	1955-96; 2000-*09*,9999	01-02,04,06, 08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
004	Corvette	Stingray, C5, Z06, Z06-R 50th Anniversary Edition, Commemorative Edition, Indy Pace Car, ZR1	1953-82; 1984-*2009*, 9999	01-03,09
006	Corvair	Monza, Corsa, 500, Yenko	1960-69,9999	01-02,04,06, 08-09
007	El Camino	Royal Knight, SS	1958-94,9999	10
008	Nova (-'79)	Chevy II, LN, LE, Concours, SS-350/396, Rally	1962-79,9999	01-04,06,09
009	Camaro	SS, RS, LT, Berlinetta, Iroc-Z, Z28	1967-2002, *2010,* 9999	01-03,09
010	Monte Carlo (thru '88)	LS, SS, Aerocoupe, Landau, Z34	1970-88,9999	02
011	Vega	GT, Cosworth	1971-77,9999	02-04,06,08-09
012	Monza	Spyder, 2 + 2, Towne Coupe	1974-80,9999	02-04,06,08-09
013	Chevette	S, Scooter, CS	1976-87,9999	03-05,07,09
015	Citation	X-11, Citation II	1980-85,9999	02-05,07,09
016	Cavalier	CS, RS, Z24, LS, Sport, Special Value Package	1982-2005, 9999	01-04,06,08-09
017	Celebrity	CS, Eurosport, VR	1982-90,9999	02,04,06,08-09
019	Beretta/Corsica	GT, GTZ, LT, LTZ, PX, QX, KX, LX, MX, Z26	1982-96,9999	02,04-05,08-09
020	Lumina	Z-34, Euro, LTZ, LS	1990-2001, 9999	02,04,06,08-09
022	Cobalt	LS, LT, LTZ, SS, SS Supercharged, Sport	2005-*09*,9999	02,04
023	HHR	LS, 1LT, 2LT, **SS, Panel**	2006-*09*,9999	06
024	*Traverse*	*LS, LT, LTZ*	*2009*	*06*
031	Spectrum		1985-89,9999	02-05,08-09
032	Nova/Geo Prism/Prism	CL, NUMMI-built vehicles, LSi	1985-2002, 9999	02-05,07-09
033	Sprint/Geo Sprint	(Cultus - foreign)	1985-89,9999	03,05,07
034	Geo Metro/Metro	Lsi, Xfi	1989-2001, 9999	01,03-05,07,09
035	Geo Storm	Gsi	1985-93,9999	02-03,09
036	Monte Carlo (1995 on)	FWD, LS, Z34, LS, LT, LTZ, SS, Sport Edition	1995-2007, 9999	02
037	Malibu/Malibu Maxx	Base, LS, LT, LTZ, SS*,* Hybrid	1997-*2009*, 9999	04-06
038	SSR	Signature Series, LS, LS5, 1SS, 2SS, 3SS	2004-06,9999	10

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
039	Aveo/Aveo 5	Base, LS, LT, Special Value	2004-*09*,9999	04-05
398	Other (automobile)	Fleetmaster, Fleetline, Styline Special, One-fifty, Bel-Air, Del Ray, Biscayne	1930-*2010*, 9999	01-11
399	Unknown (automobile)		1930-*2010*, 9999	01-11

**Nomad, Malibu , Laguna and other similar terms may be used on all models as a reflection of trim type.

LIGHT TRUCKS

Model	Codes	Includes	Model Years	Body Types
401	S-10 Blazer/TrailBlazer (2002 only; for 2003 on, see 403)	S-10 p/u based,LS,LT,ZR2 TrailBlazer, Xtreme, ZR2, LS, LT, LTZ, EXT	1982-2005, 9999	14
402	Geo Tracker/Tracker	Lsi, LT, ZR2	1989-2004, 9999	14
403	TrailBlazer (from 2003 on; for 2002, see 401)	LS, LT, LTZ, North Face Edition, EXT, SS (LS/LT)	2003-*09*,9999	14
404	Equinox	LS, LT, LTZ, Sport	2005-*09*,9999	14
421	Fullsize Blazer/Tahoe	K-series, fullsized p/u based, LS, LT, LTD, LTZ, 4WD, Z71, Hybrid	1969-*2009*, 9999	15
422	Suburban (from 2004 on; see 431 for 1950-2003)	LS, LT, LTZ, Z71	2004-*2009*, 9999	15
431	Suburban (from 1950-2003;see 422 for 2004 on)	all models (C1500/2500, K1500/2500), LS, LT, Z71	1950-2003, 9999	16
441	Astro Van	Minivan, Cargo, Passenger, LT, LS, Conversion	1985-2005, 9999	20
442	Lumina APV	Minivan, MPV	1990-96,9999	20
443	Venture	Cargo, Passenger, Plus, LS, LT, Value, Value Plus, Extended, W. B. Edition, Entertainer	1997-2005, 9999	20
444	Uplander	Base, LS, LT, LT(AWD), LT Entertainer	2005-08,9999	20
461	G-series van	Beauville,Chevy Van, Sport Van, G10-G30, Express, G1500/2500/3500, LT, LS	1957-*2009*, 9999	21-22,28-29
466	P-series van		1965-99,9999	22,28-29

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
470	Van derivative	Parcel Van, Hi-cube	1965-*2009*, 9999	28-29
471	S-10/T-10 Pickup	4 x 4, Fleetside, Extended, Crew, LS, S-10, Xtreme, ZR2, ZR5, electric pickup*	1982-2005, 9999	30,32,40,42
472	LUV	Imported pickup	1972-91,9999	30,32,40,42
473	Colorado	Z71, Z85, Sport, LS, LT, Work*, Value*	2004-*09*,9999	30
481	C, K, R, V-Series pickup/Silverado	C10-C30, K10-K30, R10-R30, V10-V30, Silverado: 1500 (C-K, HD), 2500 (C-K, HD), 3500 (CK), ST, LS, LT, Z71, Fleetside, Sportside, CrewCab, SS, Hybrid*, LTZ, WT*	1940-*2009*, 9999	31-32,39-40,42
482	Avalanche	1500/2500 Premium, North Face Edition, Z71, Z66, LS, LT*, LTZ*	2002-*09*,9999	31
498	Other (light truck)		1940-*2009*, 9999	14-16,19-22, 28-32, 39-40,42, 45,48
499	Unknown (light truck)		1932-*2009*, 9999	14-16,19-22, 28-32, 39-40,42, 45, 48-49

* Electric Vehicle, Be sure to code Related Factors-Vehicle Level, Code "36"

MOTOR HOME				
850	Motor Home	Truck-based	1949-*2009*, 9999	65,73
MEDIUM/HEAVY TRUCKS				
880	Medium/Heavy Pickup (pickup-style only – over 10,000 lbs)		1953-*2009*, 9999	67
881	Medium/Heavy – CBE	C50/60/65; M60/65; H70/80/90; J70/80/90; Bison 90; Kodiak (C4500) all other CBE	1955-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	T60/65, all other COE low entry	1960-*2009*, 9999	60-64,66, 71-72,78

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS (Cont.)				
883	Medium/Heavy – COE high entry	Titan 90, all other COE high entry	1971-80,9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1951-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1949-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)	S-60 series	1967-*2009*, 9999	50-52,58-59
988	Other (bus)		1965-*2009*, 9999	50-52,58-59
998	Other (vehicle)		1934-*2010*, 9999	91-93,97
999	Unknown (CHEVROLET)		1933-*2010*, 9999	49,79,99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
009	Cordoba	Crown, 300, LS	1975-83,9999	02
010	New Yorker (thru 78)/ Newport/5th Avenue/ Imperial (1979-83) (excludes all FWD)	Town and Country, Brougham, Custom, Royal, 300 (thru 1971) Frank Sinatra editions (FS), Royal Limo, Windsor Wagon/ Ambulance	1946-89,9999	01-02,04,06, 08-09,11-12
014	New Yorker/E-Class/ Imperial (1990-93)/ Fifth Avenue	FWD vehicles, Turbo, Salon	1980-93,9999	02,04,08
015	Laser	Turbo, XE, XT	1984-86,9999	03
016	LeBaron	Premium, Salon (RWD), Landau, LX, Town and Country cars and wagon, Medallion, FWD except GTS or GTC Sport Coupe	1977-94,9999	01-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
017	LeBaron GTS/GTC	GT, GTS-Turbo, GTC-Sport Coupe	1982-95,9999	01-09
031	TC (Maserati Sport)	Turbo Convertible	1988-91,9999	01-03,09
035	Conquest	TSI, Turbo	1987-89,9999	03
041	Concorde	LX, LXi, Limited	1993-2004, 9999	04
042	LHS	New Yorker (1994-on)	1994-97; 1999-2001, 9999	04
043	Sebring	JX, JXi, LX, LXi,GTC, TSi, Limited, Plus, Platinum, Touring, Signature Series	1995-***2009***, 9999	01-02,04,08-09
044	Cirrus	LX, LXi	1995-2000, 9999	04
050	Executive	Sedan and Limo	1983-87,9999	04,09,11-12
051	300M/300/300C	Special, Platinum, Touring, Limited, SRT, Signature Series, SRT8, LX, SRT, Heritage, Great American, ***Walter P. Chrysler Executive Series,***	1999-***2009***, 9999	04
052	PT Cruiser	Base, Touring, Limited, GT, Turbo, Dream Cruiser, Platinum, Series 4, Signature Series, Street Cruiser, Pacific Coast Highway, LX, Sunset Blvd.	2001-***09***,9999	01,06
053	Prowler (2002 on) (1997,1999-01 see Plymouth)	Roadster, Black Tie Edition	2002	01
054	Pacifica	Premium, Luxury, Touring, Signature Series, LX	2004-08,9999	06
055	Crossfire	Limited, SRT6, Standard	2004-08,9999	01,02
398	Other (automobile)		1946-***2009***, 9999	01-09,11-12
399	Unknown (automobile)		1946-***2009***, 9999	01-09,11-12
LIGHT TRUCKS				
421	Aspen	Limited, Signature, ***Hybrid***	2007-***09***,9999	15

MAKE:	Chrysler/DaimlerChrysler (Cont.)(06)			(CHRY)

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
441	Town and Country	Minivan, SX, LX, LXi, Ltd., SWB, LWB, AWD, FWD, eL, eX, Touring, Platinum, Signature Series	1990-***2009***, 9999	20
442	Voyager (2000 on; 1984-00 see Plymouth)	Base, Popular, Value*,* LX, eC	2000-03,9999	20
499	Unknown (light truck)		1990-***2009***, 9999	15, 20,29
999	Unknown (CHRYSLER)		1946-***2009***, 9999	49

MAKE:	Daewoo	(64)		(DAEW)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Lanos	S, SE, SX, Sport	1999-2002, 9999	03-04,09
032	Nubira	SX, CDX, SE	1999-2002, 9999	04-06,09
033	Leganza	SE, SX, CDX	1999-2002, 9999	04
398	Other (automobile)		1999-2002, 9999	03-07,09
399	Unknown (automobile)		1999-2002, 9999	03-07,09

MAKE:	Daihatsu	(60)		(DAIH)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Charade		1988-94,9999	03-04,09
LIGHT TRUCKS				
401	Rocky		1990-92,9999	14
999	Unknown (DAIHATSU)		1990-94,9999	49

MAKE:	Dodge	(07)		(DODG)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Dart	170, 270, Custom, GT, Swinger, Demon, 340, 360, Special, Sport, Special Edition	1960-76,9999	01-02,04,06, 08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
002	Coronet/Magnum/ Charger (thru 1978)	Brougham, Custom, Superbee, 500, Crestwood, Deluxe, XE, R/T, 440, SE, Police	1964-79,9999	01-02,04,06, 08-09
003	Polara/Monaco/ Royal Monaco	Custom, Special, Police, Taxi, Crestwood, Brougham	1964-78,9999	01-02,04,06, 08-09
004	Viper	RT/10, GTS, ACR, SRT-10	1992-***2009***, 9999	01-02,09
005	Challenger	R/T, T/A, Rallye	1970-74,9999	01-02,09
006	Aspen	Custom, Special Edition, Police, R/T, Sport	1976-80,9999	02,04,06,08-09
007	Diplomat	Medallion, S, Salon, SE	1977-89,9999	02,04,06,08-09
008	Omni/Charger (1983 on)	024, DeTomaso, Miser, Charger 2.2, GLH, Custom, Shelby, GLHS, America, Expo, SE	1978-90,9999	03,05,07
009	Mirada		1980-83,9999	02
010	St Regis	Police, Taxi	1979-81,9999	04
011	Aries (K)	Custom, SE, LE	1981-89,9999	02,04,06,08-09
012	400	LS	1982-83,9999	01-02,04,08-09
013	Rampage (car-based pickup)	2.2, GT, Sport	1982-84,9999	10
014	600	ES, Turbo, SE	1983-88,9999	01-02,04,08-09
015	Daytona	Turbo Z, C/S Competition, Shelby Z/CSX, Pacifica, IROC R/T	1984-93,9999	03
016	Lancer	Pacifica, Turbo, ES, Shelby	1985-89,9999	02-09
017	Shadow	ES, Turbo, America	1987-94,9999	01-03,05,07,09
018	Dynasty		1988-93,9999	02,04,08
019	Spirit	ES, Shelby, R/T	1989-95,9999	01-02,04,08-09
020	Neon	Competition, Highline, SE, ES, ACR R/T, SRT-4, SXT	1995-2005, 9999	02,04,08
021	Magnum	SE, SXT, R/T, SRT8	2005-08,9999	06
024	Charger	Daytona, SRT8, R/T, SE, SXT, SuperBee	2006-***09***,9999	04
025	Caliber	SE, SXT, R/T, SRT4***, Sport***	2007-***09***,9999	05
026	Avenger	SE, SXT, R/T	2008-***09,9999***	04
027	Journey	SE, SXT, R/T	2009-***09,9999***	06
028	Challenger	SRT8, ***SE, R/T***	2008-***09,9999***	02
033	Challenger	all import	1978-83,9999	02
034	Colt (includes 2WD Vista)	GT, Custom, Carousel, Premier, Deluxe, E, DL, GTS, Turbo, RS	1974-94,9999	02-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
035	Conquest	Turbo	1984-89,9999	03
039	Stealth	RT, ES	1991-96,9999	02-03,09
040	Monaco		1990-92,9999	02,04,08
041	Intrepid	ES, R/T, S, SE, SXT	1993-2004, 9999	04
042	Avenger	ES	1995-2000, 9999	02
043	Stratus	ES, SE, R/T, Plus, SXT	1995-2007, 9999	02,04,08
398	Other (automobile)		1946-*2009*, 9999	01-10,12
399	Unknown (automobile)		1946-*2009*, 9999	01-10,12
LIGHT TRUCKS				
401	RaiderSport	Sport	1986-94,9999	14
402	Durango (1998-2003 only; see model 422 for 2004 on)	Sport, R/T, SLT, SXT, Plus	1998-2003, 9999	14
403	Nitro	SLT, SXT, R/T	2007-*09*,9999	14
421	Ramcharger		1974-93,9999	15
422	Durango (2004 on; see 402 for 1998-2003 models)	ST, SLT, Limited, SXT, Adventurer, Hybrid	2004-*09*,9999	15
441	Vista Van	4x4 (Only)	1984-91,9999	20
442	Caravan/Grand Caravan	Mini Ram Van, 112 & 19 WB, SE, ES, LE, Sport, EX, eC, eL, AWD, Sport, EPIC-elec* SXT, C/V, Special Edition	1984-*2009*, 9999	20
461	B-Series Van/Ram Van/ Ram Wagon	Sportsman, Royal, Maxiwagon, Ram, B1500-B3500, Tradesman, Ram Maxivan (1500, 2500, 3500), Ram Wagon (1500, 2500, 3500) Conversion, Cargo Van (1500: van, non-maxi van, maxi van; 2500: non-maxi, maxi van; 3500: non-maxi), Dodge Wagon (1500, 2500, 3500)	1963-2003, 9999	21,28,40-42,48
462	Sprinter	Cargo, Passenger	2004-*09*,9999	21,28
470	Van Derivative	Kary Van, Parcel Van	1971-*2009*, 9999	28-29
471	D50, Colt pickup, Ram 50/Ram 100		1979-93,9999	30,32

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
472	Dakota	R/T, Limited Edition, Quad Cab, Club Cab, Plus, SLT, ST, SXT, Sport, Laramie, TRX	1987-*2009*, 9999	30-33,39,40
481	D, W-Series pickup	Custom, Royal, Ram, Miser, D100-D350, W100-W350	1955-93,9999	31-32,40,42
482	Ram Pickup	1500,2500,3500, Quad Cab, SLT, SLT+, ST, SRT-10, Laramie, Rumble Bee, Power Wagon, Daytona, TRX Off-Road*, Sport*	1994-*2009*, 9999	31-32,40,42
498	Other (light truck)		1979-*2009*, 9999	14-15,19,20-22, 28-33,39-42,45, 48
499	Unknown (light truck)		1949-*2009*, 9999	14-15,19,20-22, 28-33,39-42,45, 48-49

* Electric Vehicle. Be sure to code Related Factors-Vehicle Level Code "36."

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck-based	1952-*2009*, 9999	65,73
MEDIUM/HEAVY TRUCKS				
880	Medium/Heavy Pickup (pickup-style only – over 10,000 lbs)		1953-*2009*, 9999	67
881	Medium/Heavy – CBE		1966-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1967-77,9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1967-77,9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1962-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-77,9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1930-*2009*, 9999	60-64,66, 71-72,78

MAKE:	Dodge (Cont.)	(07)		(DODG)

Model	Codes	Includes	Model Years	Body Types
BUSES				
981	Bus**: Conventional (Engine out front)	(not van based)	1966-77,9999	50-52,58-59
988	Other (bus)		1965-77,9999	50-52,58-59

**Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
998	Other (vehicle)		1965-*2009*, 9999	91-93,97
999	Unknown (DODGE)		1952-*2009*, 9999	49,79,99

MAKE:	Eagle*	(10)		(EGIL)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
034	Summit (excludes wagon)	DL, LX, ES, ESi	1989-96,9999	02-04,08-09
037	Talon	FWD, Tsi, Tsi-FWD, Esi	1990-98,9999	02-03,09
040	Premier	LX, ES, ES Limited	1988-92,9999	02,04,08
041	Vision	Esi, Tsi	1993-97,9999	04
044	Medallion	DL, LX	1988-89,9999	04,06,09
045	Summit Wagon	FWD, AWD, DX, LX (Mitsubishi)	1992-96,9999	06
398	Other (automobile)		1988-98,9999	02-04,06,08-09
399	Unknown (automobile)		1988-98,9999	02-04,06,08-09

*Note: Eagle model listed under American Motors.

MAKE:	Fiat	(36)		(FIAT)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	124 (Coupe/Sedan)	Sport	1967-75,9999	01-02,04,06, 08-09
032	124 Spider/Racer	Spider 2000/1500	1968-83,9999	01-02,09
033	Brava/131		1975-82,9999	02,04,06,08-09
034	850 (Coupe/Spider)		1967-73,9999	01-02,09
035	128		1972-79,9999	01-02,04,06, 08-09
036	X-1/9		1975-83,9999	01-02,09
037	Strada		1979-83,9999	03,05,07

MAKE:	Fiat (Cont.)	(36)		(FIAT)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
398	Other (automobile)	600, 1100	1967-83,9999	01-09
399	Unknown (automobile)		1967-83,9999	01-09
MEDIUM/HEAVY TRUCKS				
882	Medium/Heavy – COE low entry		1967-83,9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1967-83,9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1967-83,9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1967-83,9999	60-64,66, 71-72,78
998	Other (vehicle)		1967-83,9999	91-93,97
999	Unknown (FIAT)		1967-83,9999	99

MAKE:	Ford	(12)		(FORD)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Falcon	FuturaSprint, GT, Futura	1960-70,9999	02,04,06,08-09
002	Fairlane	Torino (1968-70), 500, Brougham	1955-70,9999	01-02,04,06, 08-09
003	Mustang/Mustang II	Mach(I), Boss, Grande, Cobra (SVT), Ghia, SVO, GT *(Premium, Base, Cal Spec. Pkg.)*, LX, Shelby *(GT500, GT500KR)*, Deluxe, Premium, Bullitt, *V6 (Base, Premium, Pony)*	1964-*2009*, 9999	01-03,09
004	Thunderbird (all sizes)	Landau, Heritage, Turbo coupe, Elan, Fila, Sport, LX, SC, Deluxe, Premium, Pacific Coast Edition, 50th Anniversary Edition	1955-98; 2002-05,9999	01-02,04,08-09
005	LTD II	S, Squire, Brougham	1977-79,9999	02,04,06,08-09
006	LTD/Custom/Galaxy (all sizes)	XL, Landau, Ranch Wagon, Country Squire, S, 500, Brougham, XL, GT	1963-86,9999	01-02,04,06, 08-09
007	Ranchero	Falcon/Fairlane based Torino/LTD II based	1960-79,9999	10

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
008	Maverick	Grabber	1969-78,9999	02,04,08
009	Pinto	Pony, MPG, ESS	1971-80,9999	02-03,06,09
010	Torino/Gran Torino/Elite	GT, Cobra, Sport, Squire, Brougham	1971-76,9999	01-02,04,06, 08-09
011	Granada	ESS, Ghia	1975-82,9999	02,04,06,08-09
012	Fairmont	Futura, Sport Coupe	1978-83,9999	02,04,06,08-09
013	Escort/EXP/ZX2	L, GL, GLX, SS, GT, LX, LXE, SE, ZX2, Deluxe, Preimium, Standard	1981-2003, 9999	02-09
015	Tempo	L, GL, GLX, Sport, 4X4	1984-94,9999	02,04,08
016	Crown Victoria	LX, LTD Crown Victoria, LX Sport	1981-*2009*, 9999	02,04,06,08-09
017	Taurus/Taurus X	MT-5, L, GL, LX, SHO, G, SE, SVG, SES, SEL, Limited, Eddie Bauer	1986-*2009*, 9999	04,06,09
018	Probe	GL, LX, GT	1988-97,9999	03
021	Five Hundred	SE, SEL, Limited	2005-07,9999	04
022	Freestyle	SE, SEL, Limited	2005-07,9999	06
023	Fusion	I4 S/SE/SEL, V6 SE/SEL	2006-*09*,9999	04
024	Edge	SE, SEL, SEL Plus, *Limited*	2007-*09*,9999	06
025	Flex	SE, SEL, Limited	2009	06
031	English Ford	Cortina, Anglia, Zephyr/ Zodiac Mark III	1946-70,9999	02,04,06,08-09
032	Fiesta	Sport, Ghia	1978-80,9999	03
033	Festiva	L, GL	1988-93,9999	03
034	Laser		1993-94,9999	02-03,09
035	Contour	Sport, LX, SE, SVT	1994-2001, 9999	04
036	Aspire		1994-97,9999	03,05,07
037	Focus	ZX3, LX, SE, ZTS, SVT, ZX4, ZX4, ST, ZX5, ZXW, S, SES, *SEL*	2000-*09*,9999	02-06,09
038	GT		2004-06,9999	01
398	Other (automobile)	Deluxe, Ford Six, Mainline, Crestline, Futura, Galaxie, Model A	1924-*2009*, 9999	01-11
399	Unknown (automobile)		1924-*2009*, 9999	01-11

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
401	Bronco (thru 1977)/ Bronco II/Explorer/ Explorer Sport	Eddie Bauer, XL, XLT, Explorer, (1990 on) Eddie Bauer, Limited, XL, XLT, XLS, Explorer Sport (Value, Choice Premium), NBX, Adrenalin, Ironman	1966-77; 1983-*2009*, 9999	14
402	Escape	XLS(Value, Sport, V6 Choice/Premium), XLT (Choice, Premium, Sport), Hybrid, No Boundaries, Limited	2001-*09*,9999	14
421	Bronco-fullsize (1978-on)	Eddie Bauer, Custom, XL, XLT	1978-96,9999	15
422	Expedition	EL, XLS, XLT (4x4,4x2), Eddie Bauer (4x4,4x2), NBX, Sport, NBX, Limited, King Ranch, Funk Master Flex Edition	1996-*2009*, 9999	15
423	Excursion	XLT, Limited (LTD), Ultimate, Premium, XLS, Eddie Bauer	2000-05,9999	15
441	Aerostar	XLT, Cargo Van	1985-97,9999	20
442	Windstar	GL, LX, XLT, Splash, Cargo Limited, SE, SEL	1995-03,9999	20
443	Freestar	Base, LX, SE, S, SEL, SES, Limited	2004-07,9999	20
444	***Transit Connect***		***2010***	***20***
461	E-Series Van/Econoline	Econoline (E150-E450), Clubwagon (XL, XLT), Chateau, (XL,XLT), Parcel Van, Econoline Wagon E150 (XL/XLT); E350 Xl/XLT), E250 (EXT)	1960-*2009*, 9999	21-22,28,29
470	Van Derivative		1960-*2009*, 9999	28-29
471	Ranger	Supercab, 4x4, STX, SL, SLT, Splash, XL (Standard/ Super Cab), XLT, Tremor (Standard/Super Cab/Off-Road/FX4), Edge (Regular/ Super Cab), EV* (electric), Level II, Sport	1982-*2009*, 9999	30-32,40,42

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
472	Courier	Imported pickup	1972-91,9999	30-32,39,40,42
473	Explorer Sport Trac	2WD/4WD, Value, Choice, Premium, XLS, XLT, Adrenalin, Limited	2001-*09*,9999	30
481	F-Series pickup	F100, F150-F350, (XL, XLT, Crew Cab, Super Cab, Regular Cab, Lariat, Super Duty, Flareside, Styleside, SVT Lightning, Fireside, Harley-Davidson Edition, King Ranch, SuperCrew, STX, Heritage Edition, Sport Edition, FX4*,* FX2), F450 (10,000 GVWR and under) (see model 880 for F450 >10,000 GVWR), Amarillo Package, *Platinum, Cabela's*	1940-*2009*, 9999	31-32,39,40,42
498	Other (light truck)		1972-*2010*, 9999	14-16,20, 28-32,40-42, 45, 48
499	Unknown (light truck)		1928-*2010*, 9999	14-16,19-22, 28-32,39-42,45, 48-49

* Electric Vehicle, Be sure to code Related Factors-Vehicle Level, Code "36"

MOTOR HOME

Model	Codes	Includes	Model Years	Body Types
850	Motor Home	Truck-based, F-550	1956-*2009*, 9999	65,73

MEDIUM/HEAVY TRUCKS

Model	Codes	Includes	Model Years	Body Types
880	Medium/Heavy Pickup (pickup-style only – over 10,000 lbs)	Super Duty 350, F450/550, Lariat	1953-*2009*, 9999	67
881	Medium/Heavy – CBE	F-5 thru F-8, L-series, FT-series, Super Duty F-Series: 450/550/650/750/800 (does not include pickup style)	1953-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	C/CT series, LCF	1964-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	C/CLT series, LCF	1967-*2009*, 9999	60-64,66, 71-72,78

MAKE:	Ford (Cont.)		(12)		(FORD)

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS (Cont.)				
884	Medium/Heavy – Unknown engine location		1956-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1956-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)	B-series (not van based)	1964-*2009*, 9999	50,52,58-59
988	Other (bus)		1940-*2009*, 9999	50,52,58-59
998	Other (vehicle)		1940-*2010*, 9999	91-93,97
999	Unknown (FORD)		1940-*2010*, 9999	49,79,99

** Use code "981" (bus) if the frontal plane or the engine location is unknown.**

MAKE:	GMC		(23)		(GMC)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
007	Caballero		1965-87,9999	10
008	Acadia	SLE, SLT	2007-*09*,9999	06
399	Unknown (automobile)		1965-*2009*, 9999	06, 10
LIGHT TRUCKS				
401	Jimmy/Typhoon/Envoy	S-15 based, (100.5 WB), T15, SLE, SL, SLS, SLT, XL, XUV, Denali	1983-*2009*, 9999	14
402	*Terrain*	*SLE, SLT*	*2009*	*14*
421	Fullsize Jimmy/Yukon	Fullsize pickup based, K5, K18, SL, SLE, SLT, SLS, Diamond Edition, Yukon Denali, Denali, Hybrid	1969-*2009*, 9999	15
422	Suburban/Yukon XL (2004 on; see 431 for 1950- 2003)	Yukon XL (Denali -1500-2500), *SLE, SLT, Hybrid*	2004-*09*,9999	15

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
431	Suburban/Yukon XL (1950-2003 only; see 422 for 2004 on)	all models, SLE, C16, C26, K16, K26, C1500-2500, K1500-2500, Yukon XL (Denali -1500-2500)	1950-2003, 9999	16
441	Safari (Minivan)	SLT, SLX, SLE, M15, L15, SL	1985-2005, 9999	20
461	G-series van/Savana	Rally Van, Vandura, G15-G35, Savana (G1500-3500) SLT, Extended, SLE, LS, LT, Uplifter, *WT*	1965-*2009*, 9999	21-22,28-29
466	P-series van		1965-*2009*, 9999	22,28-29
470	Van derivative	Hicube, Magna Van, Value Van, Parcel Van	1965-*2009*, 9999	28-29
471	S15/T15/Sonoma	4 X 4, Syclone, SL, SLS, SLE, Extended/Crew Cab, ZR2, ZRX, ZR5	1982-2004, 9999	30,32,40,42
472	Canyon	Base, SLE, SL, SLT, Z71, Z85, Work Truck	2004-*2009*, 9999	30
481	C, K, R, V-series pickup/ Sierra	Excluding Yukon, C15-C35, K15-K35, R15-R35, V15-V35, Sierra, C/K1500, 2500, 3500, Sportside, X81, SL, Special, SLE, Classic, Extended Cab, Denali, 1500HD/2500HD, C3, Hybrid*, SLT, Work Truck, 5SA*	1940-*2009*, 9999	31-32,39-40,42
498	Other (light truck)		1930-*2009*, 9999	14-16,20-22, 28-29, 40, 42, 45, 48
499	Unknown (light truck)		1951-*2009*, 9999	14-16,19-22, 28-29,39-40, 42,45,48-49
MOTOR HOME				
850	Motor Home		1950-*2009*, 9999	65,73
MEDIUM/HEAVY TRUCKS				
880	Medium/Heavy Pickup (pickup-style only – over 10,000 lbs)		1953-*2009*, 9999	67

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS (Cont.)				
881	Medium/Heavy – CBE	W5000/6000/7000 series, Kodiak Brigadier/General models, Top Kick	1967-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	W6000/W7000, all other COE, low entry, W/WT Series	1968-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	Astro 95, all other COE, high entry, T Series	1969-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1948-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1967-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1930-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)	B6000	1950-*2009*, 9999	50-52,58-59
988	Other (bus)		1965-*2009*, 9999	50,58-59
998	Other (vehicle)		1965-*2009*, 9999	91-93,97
999	Unknown (GMC)		1940-*2009*, 9999	49,79,99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
401	LLV	Postal vehicle	1987-2004, 9999	22
441	Step-in van	Multi-stop, step van	1987-2004, 9999	22
498	Other (light truck)		1987-2004, 9999	22
499	Unknown (light truck)		1987-2004, 9999	22

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1987-2004, 9999	60-64,66, 71-72,78
882	Medium/Heavy - COE low entry		1987-2004, 9999	60-64,66, 71-72,78
883	Medium/Heavy - COE high entry		1987-2004, 9999	60-64,66, 71-72,78
884	Medium/Heavy - engine location unknown		1987-2004, 9999	60-64,66, 71-72,78
890	Medium/Heavy - entry position unknown		1987-2004, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1987-2004, 9999	60-64,66, 71-72,78
BUSES				
983	Bus: Flat front, rear engine	Transit	1950-2004, 9999	50-52,58-59
988	Other (bus)		1950-2004, 9999	50-52,58-59
999	Unknown (GRUMMAN/GRUMMAN-OLSON)		1950-2004, 9999	79,99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Civic/CRX, del Sol	1300, 1500, CVCC, DX, EX, VX, CX, FE, CRX, CRX Si, S, Si, HF, LX, 4WD Wagon, GX (NGV), HX, VTEC, VP, Si, Civic, Hybrid, Special Edition, *EX-L, DX-VP, LX-S*	1973-*2009*, 9999	02-09
032	Accord	LX (V-6, ULEV), LXI, DX, CVCC,SE-i,LX-i,V-6, SJE, SME, SMH, SMK, EX (Wagon, ULEV, V-6), SE (ULEV), Special Edition, Hybrid, Value Package, *LX-S, LX-P, EX-L*	1976-*2009*, 9999	02-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILE (Cont.)				
033	Prelude	S, Si, VTEC, SNF, SH, SE	1979-2001, 9999	02
034	600	Coupe, Sedan	1968-72,9999	02
035	S2000	Roadster, CR	2000-**2009**, 9999	01
036	EV Plus*	*Electric vehicle (EV+)	1997-2000, 9999	03
037	Insight	*(Gasoline-Electric), MT/CVT	2000-06, **2010,** 9999	03**, 05**
038	FCX	Hydrogen vehicle, **Clarity**	2004-**2009**, 9999	03
039	Fit	Base, Sport	2006-**2009**, 9999	05
040	**Stream**		**2010**	**06**
398	Other (automobile)		1968-**2010**, 9999	01-09
399	Unknown (automobile)		1968-**2010**, 9999	01-09
LIGHT TRUCKS				
401	Passport	LX, EX, DX, EX-L	1994-2002, 9999	14
402	CR-V	LX, EX, Special Edition (SE), SC, EX-L	1997-**2009**, 9999	14
403	Element	DX, EX, EX-P, LX, SC	2003-**2009**, 9999	14
421	Pilot	EX, EX-L, LX, SE, Value Package**, Touring**	2003-**2009**, 9999	15
441	Odyssey	LX, EX, EX-L (Res, NAVI), Touring	1995-**2009**, 9999	20
471	Ridgeline	RT, RTL, RTS, RTX	2006-**2009**, 9999	30
499	Unknown (light truck)		1994-**2009**, 9999	14-15, 20, 30,49
MOTORCYCLES				
701	0-50 cc		1978-**2009**, 9999	80-81,83,88-89
702	51-124 cc		1965-**2009**, 9999	80-81,83,88-89
703	125-349 cc		1965-**2009**, 9999	80,83,88-89
704	350-449 cc		1965-**2009**, 9999	80,83,88-89

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES (Cont.)				
705	450-749 cc		1970-*2009*, 9999	80,83,88-89
706	750 cc or greater		1970-*2009*, 9999	80,82-83,88-89
709	Unknown cc		1965-*2009*, 9999	80-81,83,88-89
ALL TERRAIN VEHICLES				
732	51-124cc	includes all ATVs/ATCs/TRXs	1972-*2009*, 9999	90
733	125-349cc	designed solely for off-road use and have 3 or 4 wheels.	1972-*2009*, 9999	90
734	350cc or greater		1998-*2009*, 9999	90
739	Unknown cc		1972-*2009*, 9999	90
998	Other (vehicle)	Go Carts	1968-*2010*, 9999	97
999	Unknown (HONDA)		1965-*2010*, 9999	49,99

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Pony	Pony Excel (Foreign)	1979-88,9999	02-03,09
032	Excel	GL, GLS, GS	1984-94,9999	03-05,07,09
033	Sonata	GL, GLS, LX, SE, Limited	1989-*2009*, 9999	04
034	Scoupe	LS, Turbo	1991-95,9999	02
035	Elantra	GLS, GL, GT, Limited, SE, *Touring*	1992-*2009*, 9999	04-06,09
036	Accent	L, GL, GS, GSi, GT, GLS, SE	1995-*2009*, 9999	03-05,07,09
037	Tiburon	FX, GT, GS, SE, Limited	1997-*2009*, 9999	02-03,09
038	XG300(2001)/ XG350(2002 on)	L	2001-05,9999	04
039	Azera	SE, Limited, GLS	2006-*09*,9999	04
040	Equus		2008	04
041	*Genesis*	*3.8, 4.6*	*2009*	*04*

MAKE:	Hyundai (Cont.)	(55)		(HYUN)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
398	Other (automobile)		1984-*2009*, 9999	02-09
399	Unknown (automobile)		1984-*2009*, 9999	02-09
LIGHT TRUCKS				
401	Santa Fe	GL, GLS, LX, Limited, SE	2001-*09*,9999	14
402	Tucson	GL, GLS, LX, Limited, SE	2005-*09*,9999	14
403	Veracruz (2007 only)	GLS, Limited, SE	2007	14
421	Veracruz (2008 on; see 403 for 2007 only)	GLS, Limited, SE	2008-*09,9999*	15
441	Entourage	GLS, Limited, SE	2007-*09*,9999	20
499	Unknown (light truck)		2001-*09*,9999	14, 20
999	Unknown (HYUNDAI)		1979-*2009*, 9999	49

MAKE:	Imperial	(08)		(CHRY)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
010	Imperial	LeBaron, Mark Cross, Crown Imperial	1954-75,9999	01-02,04,08-09
398	Other (automobile)		1965-75,9999	01-09
399	Unknown (automobile)		1965-75,9999	01-09

MAKE:	Infiniti	(58)		(INFI)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	M30		1990-92,9999	01-02,09
032	Q45	Standard Touring, Q45t, Luxury , Sport, Premium	1990-2006, 9999	04
033	G20	G20t, Touring, Standard, Luxury	1991-96; 1999-2002, 9999	04
034	J30		1993-97,9999	04
035	I30	Standard, Touring, Luxury	1996-2001, 9999	04
036	I35	Touring, Luxury	2002-04,9999	04
037	G35/G37	x, 6MT, Journey, Sport	2003-*2009*, 9999	*01,*02,04

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
038	M35/M45	Sport, x,	2003-**09**,9999	04
039	FX35/FX45/**FX50**		2003-**09**,9999	06
040	EX35	Journey	2008-**09,9999**	06
398	Other (automobile)		1990-**2009**, 9999	01-02,04,06, 08-09
399	Unknown (automobile)		1990-**2009**, 9999	01-02,04,06, 08-09
LIGHT TRUCKS				
401	QX4	Luxury	1997-2003, 9999	14
421	QX56		2004-**09**,9999	15
499	Unknown (light truck)		1997-**2009**, 9999	14-15
999	Unknown (INFINITI)		1990-**2009**, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	I-Mark	S, RS, Turbo, DOHC	1981-90,9999	02-04,08-09
032	Impulse	Turbo, RS	1983-92,9999	02-03,09
033	Stylus		1991-94,9999	04
398	Other (automobile)		1981-94,9999	02-04,08-09
399	Unknown (automobile)		1981-94,9999	02-04,08-09
LIGHT TRUCKS				
401	Trooper/Trooper II	Deluxe, LS, S, LTD	1984-2002, 9999	14
402	Rodeo/ Rodeo Sport	S, LS, LSE	1991-2004, 9999	14
403	Amigo		1989-94; 1998-2000, 9999	14
404	VehiCROSS	VXO	1999-2001, 9999	14
405	Axiom	XS	2002-04,9999	14
421	Ascender	LS, S, Limited, Luxury	2003-08,9999	15
441	Oasis	S, LS	1996-99,9999	20
471	P'up (pickup)	4 X 4	1976-95,9999	30,32

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
472	Hombre	S, XS, XS Space Cab	1996-2000, 9999	30,32,40,42
473	i-280/i-290	S, LS, Luxury	2006-2008, 9999	30
474	i-350/i-370	LS, Limited, S	2006-2008, 9999	30
498	Other (light truck)		1981-2008, 9999	14-15,20,30,32, 40, 42
499	Unknown (light truck)		1981-2008, 9999	14-15,20,30,32, 39-40,42,48-49
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1981-2004, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	NOR, NPR,NQR, N Series	1981-***2009, 9999***	60-64,66, 71-72,78
883	Medium/Heavy – COE, high entry	FRR, FRRI, FSR, FTR, FVR, F Series	1981-***2009***, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1981-***2009***, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1981-***2009***, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1981-***2009***, 9999	60-64,66, 71-72,78,97
BUSES				
981	Bus**: Conventional (Engine out front)		1981-***2009***, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1981-***2009***, 9999	50-52,58-59
983	Bus: Rear engine Flat front		1981-***2009***, 9999	50-52,58-59
988	Other (bus)		1981-***2009***, 9999	50-52,58-59

** Use code "981" (bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
999	Unknown (ISUZU)		1981-***2009***, 9999	49,79,99

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	XJ-S, XK8 Coupe	S, SC, GT, H.E.	1976-***2009***, 9999	01-02,09
032	XJ/XJ6/12/XJR/XJ8/ XJ8L Sedan/Coupe	Mk II, Mk X, XJ,3.85, 3.8, 340/420 Sedan; XJ8(LWB, L,Vanden Plas, Sport); XJ6(L), C, L, Vanden Plas, III, GT, Super 8, Limited Edition, ***Portfolio***	1949-***2009***, 9999	02,04,08
033	XK-E	V12, Roadster, 120,140, 150, 2+2	1946-74,9999	01-03,09
034	S-Type	3.0, 4.0, 4.2, Base, Sport, L, R, VDP Edition	2000-08,9999	04
035	XKR/***XK***	Victory Edition, ***Portfolio***	2000-***09***,9999	01-03,09
036	X-Type	2.5, 3.0, Sport, VDP Edition	2002-08,9999	04,06
037	XF	4.2 Luxury, Premium Luxury, Supercharged,	2008-***09,9999***	04
398	Other (automobile)		1949-***2009***, 9999	01-04,06,08-09
399	Unknown (automobile)		1949-***2009***, 9999	01-04,06,08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Compass	Base, Sport, Limited	2007-***09,9999***	06
LIGHT TRUCKS				
401	CJ-2/CJ-3/CJ-4	Military	1940-66,9999	14
402	CJ-5/CJ-6/CJ-7/CJ-8	Scrambler, Renegade, Golden Eagle, Laredo, Wrangler	1967-93,9999	14
403	YJ series/Wrangler	Wrangler (SE, Sport, Sahara, X, Rubicon), Unlimited	1986-95; 1997-***2009***, 9999	14
404	Cherokee (1984-on)	Limited, Laredo, Pioneer, Sport, Grand Cherokee, TSi, Briarwood, Country, RHD, SE, Classic, Overland, Special Edition, SRT8	1984-***2009***, 9999	14

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
405	Liberty	Sport, Limited Edition, Renegade, Columbia Edition, Rocky Mountain Edition, CRD, Special Edition, Latitude	2002-*09*,9999	14
406	Commander	Base, Limited, Overland**,** Sport, Rocky Mountain	2006-*09*,9999	14
407	Patriot	Sport, Limited	2007-*09*,9999	14
421	Cherokee (thru 1983)	Wide Track, Chief, Commando, Jeepster	1969-83,9999	15
431	Grand Wagoneer	Custom, Brougham Limited, Wagoneer	1971-91; 1993, 9999	15
481	Pick-up	J-10, J-20, Honcho	1940-93,9999	31-32,40,42
482	Comanche	Chief	1986-92,9999	31-32,40,42
498	Other (light truck)		1940-*2009*, 9999	14-15,19,31-32, 40-42,45,48-49
499	Unknown (light truck)		1940-*2009*, 9999	14-15,19,31-32, 39-42,45,48-49
999	Unknown (JEEP)		1940-*2009*, 9999	49

*   Note that Jeep DJ-series are coded under MAKE 03, MODEL 466

** Willys Jeep can be coded 401, or 999.

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Sephia	RS, LS, GS	1994-01,9999	04
032	Rio/Rio5	Cinco (Wagon), LX, SX	2001-*09*,9999	04-06,09
033	Spectra/Spectra5	GS, GSX, GX, LS, LX, EX, SX	2000-*09*,9999	04,05,09
034	Optima	LX, SE, V6, EX**, *SX***	2001-*09*,9999	04
035	Amanti		2004-*09*,9999	04
036	Rondo	***EX, LX***	2008-***09,9999***	06
037	***Soul***		***2009***	***06***
399	Unknown (automobile)		1994-*2009*, 9999	04-06,09
LIGHT TRUCKS				
401	Sportage	EX, LX, 4WD, Limited	1995-03, 2005-*09*,9999	14

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
402	Sorento	EX, LX	2003-*09*,9999	14
421	*Borrego*	*EX, LX*	*2009*	*15*
441	Sedona	EX, LX	2002-*09*,9999	20
499	Unknown (light truck)		1995-*2009*, 9999	14, 20
999	Unknown (KIA)		1994-*2009*, 9999	49

MAKE: Lancia   (40)   (LNCI)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Beta Sedan – HPE	Zagato	1976-82,9999	02,04,06,08-09
032	Zagato		1976-82,9999	01-02,09
033	Scorpion	(Mote Carlo- Europe Only)	1977	02
398	Other (automobile)	Stratos, Fulvia, Flavia, Appia, Aurelia, Aprilia	1946-82,9999	01-09
399	Unknown (automobile)		1946-82,9999	01-02,04,06, 08-09

*NOTE: Lancia did not import in 1980. 1982 - last year imported.

MAKE: Land Rover   (62)   (LNDR)

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
401	Discovery	SD, SE, SE7, LE, LSE, Series II, Kalahari Edition, S, HSE, G-4 Edition	1994-2004, 9999	14
402	Defender	90	1993-95; 1997, 9999	14
403	Freelander (2004 on; see 422 for 2002-03.)	HSE, SE, S, SE3, G4 Edition	2004-2005, 9999	14
421	Range Rover	County, County SE, Great Divide, Hunter, LSE, County LWB, 4.0SE, 4.6HSE, S, SE, HSE, Westminster Limited Edition, Supercharged, Sport	1987-*2009*, 9999	15
422	Freelander (2002-03 only; see 403 for 2004 on)	HSE, SE, S, SE3	2002-03,9999	15

MAKE:	Land Rover (Cont.)	(62)		(LNDR)

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
423	LR3	HSE, SE	2005-*09*,9999	15
424	LR2	i6, TD4	2007-*09*,9999	15
498	Other (light truck)	Land Rover (1948-1990), Range Rover (before 1987)	1948-*2009*, 9999	14-15
499	Unknown (light truck)		1948-*2009*, 9999	14-15,19

MAKE:	Lexus	(59)		(LEXS)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	ES-250/300/330/350	Black Diamond Edition*, Premium Plus, Ultra Luxury*	1990-*2009*, 9999	04
032	LS	400/430/460/L/600h/L	1990-*2009*, 9999	04
033	SC-400/300	2-Door Coupe	1992-2000, 9999	02
034	GS-300/350/400/430/ 450h	Hybrid	1993-*2009*, 9999	04
035	IS-250/300/350/500	SportCross, Sport, F	2001-*09*,9999	04-05
036	SC-430	Special Edition, Pebble Beach	2002-*09*,9999	01
398	Other (automobile)		1990-*2009*, 9999	01-02,04-05
399	Unknown (automobile)		1990-*2009*, 9999	01-02,04-05, 08
LIGHT TRUCKS				
401	RX300	2WD, 4WD	1999-03,9999	14
402	GX470	*Sport*	2003-*09*,9999	14
403	RX330/350/400h	Hybrid, Thundercloud, *Mark Levinson Package*	2004-*09*,9999	14
421	LX450/470/570		1996-*2009*, 9999	15
499	Unknown (light truck)		1996-*2009*, 9999	14-15, 19
999	Unknown (LEXUS)		1990-*2009*, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Continental (thru '81)/ Town Car	Continental, (thru '81), Signature/Designer Series, Town Car ('81 on, body 04 only), Cartier, Executive, L, Premium, Ballistic Protection Edition, Ultimate, Designer Series	1940-*2009*, 9999	01-02,04,08-09, 11-12
002	Mark	I, II, III, IV, V, VI, VII, VIII LSC, Signature/Designer Series	1956-98,9999	01-02,04,08-09
005	Continental ('82 on)	Signature/Designer Series, Luxury	1982-2002, 9999	02,04,08,12
011	Versailles		1977-80,9999	04
012	LS	Convenience, Premium, Sport, Luxury, Ultimate	2000-06,9999	04
013	Zephyr/MKZ		2006-*09*,9999	04
014	MKX		2007-*09*,9999	06
015	MKS		2008-*09,9999*	04
016	*MKT*		*2010*	*06*
398	Other (automobile)	Cosmopolitan, Capri, Premiere	1940-*2010*, 9999	01-12
LIGHT TRUCKS				
401	Aviator	Premium, Luxury, Ultimate, Kitty Hawk Edition	2003-06,9999	14
421	Navigator	2WD, 4WD, Premium, Luxury, Ultimate, *L*	1997-*2009*, 9999	15
481	Blackwood		2002	31
482	Mark LT	2WD, 4WD	2006-08,9999	31
499	Unknown (light truck)		1997-*2009*, 9999	49
999	Unknown (LINCOLN)		1990-*2010*, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	RX2		1970-74,9999	02,04,06,08-09
032	RX3		1970-78,9999	02,04,06,08-09
033	RX4		1974-78,9999	02,04,06,08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
034	RX7	S, GS, GSL, SE	1979-96,9999	01-03,09
035	323/GLC/Protégé/ Protégé5	DX, Protégé (1990-on), DX, LX, ES, Mazdaspeed	1977-2003, 9999	03-07,09
036	Cosmo		1976-78,9999	02
037	626	GT,GS,GSL,SE,DX,LX,ES	1979-2002, 9999	02,04-05,08-09
038	808		1972-77,9999	02,04,06,08-09
039	Mizer		1976	02,04,06,08-09
040	R-100		1950-72,9999	02
041	616/618		1968-72,9999	02,04,08
042	1800		1968-72,9999	04,06,09
043	929		1988-95,9999	04
044	MX-6	Turbo, LS, M-Edition	1988-97,9999	02
045	Miata/MX-5	Miata (LS), SE, SV, Mazdaspeed, Sport, Touring, Grand Touring, Club Special*, Special Edition*	1990-97; 1999-*2009*, 9999	01
046	MX-3	GS	1992-95,9999	02
047	Millenia	L, S, P, Millennium Edition	1995-02,9999	04
048	MP3	Limited Edition	2001	04
049	RX-8	Sport AT, Shinka, Touring, Grand Touring, *R3*	2003-*09*,9999	04
050	Mazda6	i, s, Grand Touring, Sport, Mazdaspeed6, Grand Sport*, SV*	2003-*09*,9999	04-06,09
051	Mazda3	i, s, SP23, Sport, Touring, Grand Touring, *Touring Value,* Mazdaspeed3	2004-*10*,9999	04-06,09
052	Mazda5	Sport, Touring, Grand Touring	2006-*09*,9999	06
053	CX-7	Sport, Touring, Grand Touring	2007-*09*,9999	05
054	CX-9	Sport, Touring, Grand Touring	2007-*09*,9999	06
398	Other (automobile)	1200, 616	1950-*2010*, 9999	02-03,09
399	Unknown (automobile)		1950-*2010*, 9999	01-09
LIGHT TRUCKS				
401	Navajo		1991-94,9999	14

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
402	Tribute	DX, DX-V6, LX-V6, ES-V6, ES, LX, i, s, Hybrid, Sport, Grand Touring**, Touring**	2001-**09**,9999	14
441	MPV	LX, ES, DX, All Sport, LX-SV	1989-98; 2000-06,9999	20
471	Pickup/ B-Series Pickup	B2000, B2200, B2300, SE-5, LX, SE (2WD, 4WD), SX, DS, Cab Plus, B2500/B2600/ B3000/B4000, Dual Sport Cab	1972-**2009**, 9999	30,32,40,42
498	Other (light truck)		1965-**2009**, 9999	14,20,30,32, 40,42
499	Unknown (light truck)		1965-**2009**, 9999	14,20,30,32, 39-40,42,48-49
999	Unknown (MAZDA)		1950-**2010**, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	200/220/230/240/ 250/260/280/300/ 320/420	Sedan and 5-passenger "C" only; SE,CD,D,SD,TD,TE, CE,E; DOES NOT include 280 SE (1975 on) or 300 SD-see code 037;C-Class up to 1993, E-Class up to 1997	1950-97,9999	01-02,04,06, 08-09,12
032	230/280 SL	2-seater only	1964-71,9999	01-02,09
033	300/350/380/450/500/ 560 SL	2-seater only; 300/500 SL (1990 on)	1972-94,9999	01-02,09
034	350/380/420/450/560 SLC		1973-94,9999	02
036	300*/*380/420/450/500/ 560/SEL & 500/560, 600 SEC & 300/350 SDL		1973-94,9999	02,04,06,08,09
037	300/380/450 SE	280 S, 280 SE (1975 on), 300 SD Sedan/350 SD	1968-94,9999	01-02,04,08-09
038	600, 6.9 Sedan	Pullman	1978-87,9999	04,12
039	190	D, E, 2.3, 2.5	1984-93,9999	04,06,09
040	300	CE Cabriolet	1993-94,9999	01
041	400/500E		1992-94,9999	01-02,04,06,08, 09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
042	C Class (94 on)	C220/C230 (Kompressor)/ C240/C280/C320/C300/ C350/C36/C43, C32/55/*63* AMG	1994-*2009*, 9999	02,04,06,09
043	S Class (95 on)	S320/350/420/430/450/500/ 550/600, S55/63/65 (AMG)	1995-*2009*, 9999	02,04,08
044	SL Class (95 on)	SL 320/500/550/600, Silver Arrow Edition, SL55/65/*63* AMG	1995-*2009*, 9999	01,02
045	SLK	SLK230/280/*300*/320/350, Kompressor, SLK 32/55 (AMG), Special Edition	1998-*2009*, 9999	01
046	CL Class	CL 500/550/600, CL55/63/ 65 AMG	1998-*2009*, 9999	02
047	CLK	CLK 320/350/430/500/550, Cabriolet, CLK 55/63/*65* AMG	1998-*2009*, 9999	01-02
048	E Class (97 on)	300/TD, 320 (Wagon) 350/420/430/500/550, 55/63 AMG, E320CDI	1996-*2009*, 9999	04,06,09
049	SLR	McLaren, 722 Edition	2005-*09*,9999	01-02
050	R Class	R320/350/500, R63 AMG	2006-*09*,9999	06
051	CLS Class	CLS500/550, CLS55/63 AMG	2006-*09*,9999	04
398	Other (automobile)		1946-*2009*, 9999	01-12
399	Unknown (automobile)		1946-*2009*, 9999	01-12
LIGHT TRUCKS				
401	M/ML Class	ML320/350/430/500/550, ML55/63 (AMG), Special Edition	1998-*2009*, 9999	14
402	G Class	G500, G55 (AMG)	2002-*09*,9999	14
403	*GLK Class*	*220/280/320/350*	*2010*	*14*
421	GL Class	GL320/450/550	2007-*09*,9999	15
461	Sprinter	(2004 on see "Freightliner" and "Dodge")	2002-03,9999	21-22,28-29
470	Van derivative	Kurbstar	1982-*2009*, 9999	28-29
498	Other (light truck)		1946-*2010*, 9999	14-16,19,21-22, 31-32,40-42, 45,48

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
499	Unknown (light truck)		1946-*2010*, 9999	14-16,19,21-22, 28-29, 31-32, 40-42,45, 48-49
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1965-91,9999	60-64,78
882	Medium/Heavy – COE low entry		1965-91,9999	60-64,78
883	Medium/Heavy – COE high entry		1965-91,9999	60-64,78
884	Medium/Heavy – Unknown engine location		1965-91,9999	60-64,78
890	Medium/Heavy – COE entry position unknown		1965-91,9999	60-64,78
898	Other (medium/heavy truck)		1965-91,9999	60-64,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-91,9999	50-52,58-59
988	Other (bus)		1965-91,9999	50-52,58-59
989	Unknown (bus)		1965-91,9999	91-93,97
998	Other (vehicle)		1965-*2010*, 9999	49,79,99
999	Unknown (MERCEDES BENZ)		1950-*2010*, 9999	49,79,99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
002	Cyclone	GT, CJ, Spoiler	1964-70,9999	01-02,09
003	Capri-domestic (1967 see 008)	RS, Turbo, GS, Black Magic, 5.0	1979-86; 1989-94,9999	01,03,09
004	Cougar/XR7 (1967-1997)	Villager, Brougham, RS, LS, GS, Eliminator, XR-7	1967-97,9999	01-02,04,06, 08-09
006	Marquis/Monterey (car version; for van version 2004 on see code 444) /Grand Marquis	Marauder (prior to 2003, 2003 on see code 039), Montclair, X-100, 5-55, Parklane, S-55, Custom, Brougham Grand Marquis (GS, LS), Medalist, Turnpike, Colony Park, GS, LS, LSE, Limited Edition, Palm Beach Edition	1952-*2009*, 9999	01-02,04,06, 08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
008	Comet	Caliente, Capri (1967), GT, Voyager, 202, 404, Villager Wagon	1960-79,9999	01-02,04,06, 08-09
009	Bobcat	Runabout, Villager Wagon	1975-80,9999	03,06,09
010	Montego (prior to 1976; for 2005 on see code 020)	GT, MX, Villager, Brougham, Comet (1968-1970)	1968-76,9999	01-02,04,06, 08-09
011	Monarch	Ghia	1975-80,9999	02,04,08
012	Zephyr	GS, Z-7	1978-83,9999	02,04,06,08-09
013	Lynx/LN7	L, LS, GS, RS, XR-3	1981-87,9999	03,05-07,09
015	Topaz	L, LS, GS, 4x4, XR5, LTS, Sport	1984-94,9999	02,04,08
017	Sable	LS, GS (Premium), GS Plus, Platinum Edition, Premier, Base	1986-2005, 2008-*09*,9999	04,06,09
020	Montego (2005 on)	Luxury, Premier	2005-07,9999	04
021	Milan	I-4, V6 (Base/Premier)	2006-*09*,9999	04
031	Capri-foreign	Capri II, 2+2	1970-77,9999	03
033	Pantera-foreign	deTomaso	1972-74,9999	01-10
036	Tracer	L, GL, LTS, GS, LS	1988-99,9999	03-06,09
037	Mystique	GS, LS	1995-2000, 9999	04
038	Cougar (1999-2002)	V-6, I-4, S, Sport, CR, XR	1999-2002, 9999	02-03,09
039	Marauder	M75, 300A	2003-04,9999	04
398	Other (automobile)		1962-*2009*, 9999	01-10
399	Unknown (automobile)		1952-*2009*, 9999	01-10
LIGHT TRUCKS				
401	Mountaineer	Convenience, Luxury, Premier (4.0/4.6L)	1996-*2009*, 9999	14
402	Mariner	Convenience, Luxury, Premier, Hybrid	2005-*09*,9999	14
443	Villager	LS, GS, Nautica, Estate, Sport, Sport Plus, Popular	1993-2002, 9999	20
444	Monterey (van version; for car version prior to 2004 see code 006)	Convenience, Luxury, Premier	2004-07,9999	20
498	Other (light truck)		1993-*2009*, 9999	14,20
499	Unknown (light truck)		1993-*2009*, 9999	49
999	Unknown (MERCURY)		1950-*2009*, 9999	49

MAKE:	Merkur		(56)		(MERK)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	XR4Ti	Turbo	1985-89,9999	03
032	Scorpio	Turbo	1988-90,9999	05
398	Other (automobile)		1985-90,9999	03-05,07,09
399	Unknown (automobile)		1985-90,9999	03-05,07,09

MAKE:	MG		(43)		(MG)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Midget	GAN I/II/III/4/5, MK I, MK II, MKIII	1962-80,9999	01
032	MGB	MK I/II/IV, 600 Limited, V-8	1955-80,9999	01-02,09
033	MGB	GT, MK III	1967-74,9999	02-03,09
034	MGA	1500, 1600, YT,TC,TD/II, MK I/II, A	1945-62,9999	01-02,09
035	TA/TC/TD/TF	Y-Type, 430, TDC	1945-62,9999	01-02,09
036	MGC	GT	1968-69,9999	01-02,09
037	Magnette/Sports Sedans	ZB,ZA/YA/YB, MK III, MK IV, 1100, 1300	1945-66,9999	02,04,08
398	Other (automobile)		1945-80,9999	01-04,08-09
399	Unknown (automobile)		1945-80,9999	01-04,08-09

MAKE:	Mitsubishi		(52)		(MITS)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Starion	2+2, LE, Turbo, ESI	1982-89,9999	03
032	Tredia	L, LS, Turbo	1982-88,9999	04
033	Cordia	L, Turbo	1982-88,9999	03
034	Galant	ECS, Sigma (thru 88), ES, LS, DE, GTS-V6, I-4, Special Edition, Ralliart, *Sport Edition*	1985-*2009*, 9999	04
035	Mirage	L, Turbo,GS,LS,DS,DE,ES	1985-2002, 9999	02-04, 08-09
036	Precis		1987-94,9999	03, 05, 07

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
037	Eclipse	GS, DOHL, Turbo, GS-T, GSX, Spyder, RS, GT, GTS, GS, Remix Edition, SE	1990-*2009*, 9999	01-03, 09
038	Sigma	(prior '89 see 034)	1989-90,9999	04
039	3000 GT	SL, VR-4, Spyder	1991-99,9999	01-03,09
040	Diamante	LS, ES, LE,VR-X	1992-2004, 9999	04,06,09
045	Expo Wagon	LRV, Sport	1992-95,9999	06
046	Lancer/Lancer Sportback/ *Lancer Evolution*	ES, LS, O-Z, Rally, Evolution VII/VIII/IX/X, Sport, Ralliart LS, MR Edition, DE, *GSR, GTS*	2002-*09*,9999	04-06,09
047	Outlander	ES, LS, SE, XLS, Limited	2003-*09*,9999	06
398	Other (automobile)	500, 1000, Debonair, Galant (1969)	1960-*2009*, 9999	01-09
399	Unknown (automobile)		1960-*2009*, 9999	01-09
LIGHT TRUCKS				
401	Montero/Montero Sport	Sport, LS, SR, XLS, ES, LTD, 20th Anniversary Edition	1983-2006, 9999	14
402	Endeavor	LS, *SE,* XLS, Limited	2004-*09*,9999	14
441	Mini-Van	LS	1987-90,9999	20
471	Pickup	Mighty Max, SPX, 4x4	1983-96,9999	30,32,40,42
472	Raider	LS, Durocross, XLS	2006-*09*,9999	31
498	Other (light truck)		1983-*2009*, 9999	14,20,30-32,40,42
499	Unknown (light truck)		1983-*2009*, 9999	14,20,30-32,40,42, 48-49
MEDIUM/HEAVY TRUCKS				
882	Medium/Heavy – COE low entry	FUSO FE/FG/FH/FK/FM	1983-*2009*, 9999	60-64,66,71-72,78
898	Other (medium/heavy truck)		1983-*2009*, 9999	60-64,66,71-72,78

MAKE:	Mitsubishi (Cont.)	(52)		(MITS)

Model	Codes	Includes	Model Years	Body Types
BUSES				
981	Bus**: Conventional (Engine out front)		1981-2004, 9999	50-52,58-59
982	Bus: Front engine, Flat Front		1981-2004, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1981-2004, 9999	50-52,58-59
988	Other (bus)		1981-2004, 9999	50-52,58-59

** **Use code "981"(bus) if the frontal plane or the engine location is unknown**

999	Unknown (MITSUBISHI)		1983-*2009*, 9999	49,79,99

MAKE :	Nissan/Datsun	(35)		(NISS) - (DATS)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	F-10		1977-78,9999	03,05-07,09
032	200SX/240SX	SE, SE-R, LE	1977-98,9999	01-03,09
033	210/1200/B210	110 series, Honeybee	1971-82,9999	02-04,06,08-09
034	Z-car, ZX	240/260/280Z&ZX, 300 ZX, 2+2, Turbo	1970-96,9999	01-03,09
035	310	SPL	1979-82,9999	02-03,05,07,09
036	510	PL,WPL	1968-73; 1978-81,9999	02-09
037	610	PL, HL	1973-76,9999	02-04,06,08-09
038	710	PL	1974-77,9999	02-04,06,08-09
039	810/Maxima	SE (Titanium Special), GXE, GLE, 3.5SE/SL/SEL */S/SV*, Platinum Edition	1977-*2009*, 9999	04,06,09
040	Roadster	SPL311, SRL311, 1500, 1600, 2000, convertible, Fairlady	1950-70,9999	01
041	311/411	1000, Bluebird, PL311/ PL312/PL410/PL411/ RL411	1959-67,9999	04,06,09
042	Stanza	XE	1982-93,9999	03-07,09
043	Sentra	E, XE, GXE, SE, SE-R (Spec V), GLE, CA, 2.5LE, 1.8, 1.8S, 2.0/S/SL, Special Edition, SE-R, Platinum Edition	1982-*2009*, 9999	02,04,06,08-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
044	Pulsar	NX, EXA (1986 on)	1983-90,9999	02-03,05,07,09
045	Micra		1987-94,9999	01-05,07-09
046	NX 1600/2000	T-bar coupe	1991-94,9999	02-03,09
047	Altima	XE, GXE, SE, GLE, 2.5 S/SL, 3.5 S/SE/SL, SE-R, Hybrid	1993-*2009*, 9999	02, 04
048	350Z/*370Z*	Enthusiast, Performance, Touring, Track, Base, 35th Anniversary, Grand Touring, Nismo	2003-*09*,9999	01-02,09
049	Murano	SE, SL, S*, LE*	2003-*09*,9999	06
050	Versa	1.8S, 1.8SL	2007-*09*,9999	04-05
051	Rogue	S, SL	2008-*09*,9999	06
052	*Cube*		*2010*	*06*
053	*GT-R*	*Base, Premium*	*2009*	*02*
398	Other (automobile)	110 sedan, K110	1955-*10*,9999	01-10
399	Unknown (automobile)		1955-*10*,9999	01-10
LIGHT TRUCKS				
401	Pathfinder	MPV, 4X4, XE, LE, SE, S, Off-Road	1986-*2009*, 9999	14
402	Xterra	XE (I-4), SE, (S/C), SE-R, Spec V, X, S, Off-Road	2000-*09*,9999	14
421	Pathfinder Armada	LE, SE, SE Off-Road	2004-*09*,9999	15
441	Van	XE, GXE	1987-91,9999	20
442	Axxess		1989-90,9999	20
443	Quest	XE, GXE, SE, GLE, 3.5 S/SE/SL, Special Edition	1993-2002; 2004-*09*,9999	20
444	Altra EV*	(electric vehicle*)	1998-2005, 9999	20
471	Datsun/Nissan Pickup 1955-1997)	120,620 series, King Cab, Hardbody, XE, SE	1955-97,9999	30,32,40,42
472	Frontier (1998 on)	XE, SE, S/C (Regular Cab, King Cab, Desert Runner, Crew Cab), Open-Sky, SVE, Nismo, *Pro-4X, LE*	1998-*2009*, 9999	30,32,40,42
473	Titan (from 2004-06; see 481 for 2007 on)	E, LE, SE, XE	2004-06,9999	31

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
481	Titan (from 2007 on; see 473 for 2004-06)	LE, SE, XE, PRO-4X	2007-*09*,9999	31
498	Other (light truck)	Patrol (1960)	1955-*2009*, 9999	14-15,20,30-32
499	Unknown (light truck)		1955-*2009*, 9999	14-15,20,30-32, 39-40,42,48-49

* Electric Vehicle. Be sure to code Related Factors-Vehicle Level Code "36."

MEDIUM/HEAVY TRUCKS				
883	Medium/Heavy – COE high entry		1986-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1986-*2009*, 9999	60-64,66, 71-72,78
999	Unknown (NISSAN/DATSUN)		1950-*2010*, 9999	49,79,99

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Cutlass (RWD-only)	Supreme, S, LS, Salon, Brougham Vista Cruiser, F85 (thru 1972), Rallye 350, Hurst Olds, 442, Calais (thru 1985), Classic (88)	1960-88,9999	01-02,04,06, 08-09
002	Delta 88/LSS	Royale, Custom, Delta, Jetstar 88, Delmont 88, Starfire (Thru 1966), Custom Cruiser, Jetfire, Eighty-Eight (LS, 50th Anniv. Edition)	1949-99,9999	01-04,06,08-09
003	Ninety-Eight/Regency	Luxury, Futuramic, Brougham	1949-99,9999	01-02,04,08-09
005	Toronado	XS,XSR, Trofeo, Brougham Custom	1966-92,9999	02
006	Commercial Series	Ambulance/Hearse	1940-2003, 9999	09-12
012	Starfire	SX, GT, ST	1975-80,9999	01-03,09
015	Omega	X-body type, Brougham	1973-85,9999	02-04,08-09
016	Firenza	S, LS, SX, Cruiser, GT	1982-88,9999	03-06,07,09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
017	Ciera	Cutlass Ciera, Cutlass Cruiser, Brougham, ES, I (International)	1982-96,9999	01-02,04,06, 08-09
018	Calais	GT, ES, 500	1985-91,9999	02,04,08
020	Cutlass (FWD)	Supreme (Excludes Ciera),GLS, GL	1988-99,9999	01,02,04,08-09
021	Achieva/Alero	SC, SL, GX, GL (1,2,4), GLS	1992-2004, 9999	02,04,08
022	Aurora	3.5L, 4.0L,Collector's Series	1995-99; 2001-03,9999	04
023	Intrigue	GL, GX, GLS	1997-2002, 9999	02,04,08
398	Other (automobile)	66/68/70/90, Dynamic 70	1930-2004, 9999	01-12
399	Unknown (automobile)		1930-2004, 9999	01-12
LIGHT TRUCKS				
401	Bravada	2WD, 4WD, Collector's Series	1991-94; 1996-2004, 9999	14
441	Silhouette	GL, GLS, Series I, Series II, GS Premier Edition, Collector's Series	1990-2004, 9999	20
499	Unknown (light truck)		1932-2004, 9999	14,20,49
999	Unknown (OLDSMOBILE)		1932-2004, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	304		1971-72,9999	04-06,09
032	403	Station Wagon	1955-67,9999	01,04,06,09
033	404	Station Wagon	1961-70,9999	01,04,06,09

MAKE:	Peugeot (Cont.)	(44)		(PEUG)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
034	504/505	STI, STX, Turbo, S, STI, STX, GL, GLS Liberte, Station Wagon, DSL, DL, GLX	1970-91,9999	04-06,09
035	604	SL, D	1977-84,9999	04
036	405	Mi-16, DL, S	1989-91,9999	04,06,09
398	Other (automobile)	202, 203	1945-91,9999	01-09
399	Unknown (automobile)		1945-91,9999	01-09
MOTORCYCLES				
701	0-50 cc		1965-83,9999	81
702	51-124cc		1965-83,9999	81
709	Unknown cc		1965-83,9999	81
999	Unknown (PEUGEOT)		1960-91,9999	99

MAKE:	Plymouth	(09)		(PLYM)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Valiant/Scamp/Duster (thru 1976)	100, 200, Brougham, Signet, Custom, Special, 340, 360, Twister	1960-76,9999	01-02,04,06, 08-09
002	Satellite/Belvedere	Belvedere I/II, GTX, Roadrunner (through 1974), Brougham, Sebring, Sebring Plus, Superbird	1951-74,9999	01-02,04,06, 08-12
003	Fury (Fury Gran thru '78)	I, II, III, Roadrunner (1975), Suburban, Salon, VIP, Sport	1957-78,9999	01-02,04,06, 08-09
004	Gran Fury ('80 on)	Sedan, Coupe, Salon	1980-89,9999	02,04,06,08-09
005	Barracuda	Formula, S, 340, Gran Coupe, AAR, Cuda	1964-74,9999	01-02,09
006	Volare'	Custom, Premier, Roadrunner (1976 on), Police	1976-80,9999	02,04,06,08-09
007	Caravelle	Turbo, SE	1985-88,9999	04
008	Horizon/Turismo	TC-3, Turismo 2.2, Miser, America, Custom, SE, Duster (1985 on), Expo	1978-90,9999	03,05,07
011	Reliant (K)	SE, LE, Reliant America, Limited	1981-89,9999	02,04,06,08-09
013	Scamp-(car-based p/u)	GT, 2.2	1982-84,9999	10

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
017	Sundance	RS, Turbo, Sundance Duster, America	1987-94,9999	03,05,07
020	Neon (2002 and on, see Dodge)	Sport, Competition, Highline	1995-2001, 9999	02,04,08
031	Cricket		1971-72,9999	04,06,09
032	Arrow	GS, GT, Fire Arrow	1976-80,9999	03
033	Sapporo	all imported	1978-83,9999	02-03,09
034	Champ/Colt import (includes 2WD Vista)	Turbo, Custom, GL, SE, DL, E Station wagon (1984 on)	1979-94,9999	02-09
035	Conquest	TSI	1984-87,9999	03
037	Laser	RS, Turbo	1989-94,9999	02-03,09
038	Breeze		1996-2000, 9999	04
039	Prowler (2002 and on, see Chrysler)	Roadster, Black Tie Edition	1997;1999-2001,9999	01
398	Other (automobile)	Regant, Fleet, Savoy, Concord, Cambridge	1930-95,9999	01-12
399	Unknown (automobile)		1965-2001, 9999	01-12
LIGHT TRUCKS				
421	Trailduster		1974-93,9999	15
441	Vista Van	4X4 (only)	1987-94,9999	20
442	Voyager (minivan) (2000 and on, see Chrysler)	SE, LX, Grand Voyager, SE Expresso, EPIC-electric*	1984-2001, 9999	20
461	Van-fullsize (B-series)	Voyager (thru 1983), Sport, Premier	1965-95,9999	21
471	Arrow pickup (foreign)		1975-91,9999	30,32
498	Other (light truck)		1965-2001, 9999	15,20-21,28-29, 30,32,42,45,48
499	Unknown (light truck)		1974-2001, 9999	15,20-21,29, 30, 32, 48-49
* Electric Vehicle. Be sure to code Related Factors-Vehicle Level Code "36."				
998	Other (vehicle)		1965-2001, 9999	91-93,97
999	Unknown (PLYMOUTH)		1957-2001, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Lemans/Tempest (thru 1970)	Safari, T-37, Luxury, Grand Sport, GTO (thru 1973), GT-37, Sprint, Judge, Grand AM (73-75), Grand Lemans	1961-81,9999	01-02,04,06, 08-09
002	Bonneville/Catalina/ Parisienne	Brougham, Grand Safari, Safari, Grandville, 2+2, Executive, Starchief, SE, SSE, SSEi, G, SLE, GXP	1954-2005, 9999	01-02,04,06, 08-09
005	Fiero	2M4, 2M6, GT, SE	1984-89,9999	02
008	Ventura/GTO	II, SJ, Sprint, GTO (74-77), Custom, Base, LS2	1971-77; 2004-06,9999	02-04,09
009	Firebird/Trans AM	Esprit, Formula, GTA, Redbird, Yellowbird, Skybird, SE, Bandit, TransAm	1967-2002, 9999	01-03,09
010	Grand Prix (RWD)	J, LJ, SJ, Brougham, 2+2, GT, STE, SE	1962-87,9999	01-02,09
011	Astre	Safari, SJ, Custom	1975-77,9999	02-03,06,09
012	Sunbird (thru 1980;1985 on see model 016)	Safari, Sport, Formula	1976-80,9999	01-09
013	T-1000/1000	2T	1981-87,9999	03,05,07
015	Phoenix	LJ, SJ	1977-84,9999	02-05,07-09
016	Sunbird (1985-1994)/ J-2000/Sunfire (1995 on)	LE, SE, GT, 2000 Convertible, 2J, S, SE, GT, 1SA, 1SB, 1SC, 1SV	1982-2005, 9999	01-09
017	6000	STE, SE, LE	1982-91,9999	02,04,06,08-09
018	Grand AM	SE, LE, GT, GT1, SE1, SE2, SC/T Package	1973-2005, 9999	02,04,08
019	G5	Base, GT	2007-**09**,9999	02
020	Grand Prix (FWD)	LE, SE, STE, GT, McLaren Turbo, GTP, Limited Edition, 40th Anniversary Edition, GXP	1988-2008, 9999	01-02,04,08-09
022	G6	Base, GT, GTP, Value Leader**, GXP**	2005-**09**,9999	01-02,04
023	Solstice	GXP	2006-**09**,9999	01-**02**
024	G8	GT, **GXP**	2008-**09**,9999	04
025	***G3***		***2009***	***04,05***
026	***G8-ST***		***2010***	***10***
031	Lemans (1988-on)	LE, SE, Tempest Canadian)	1988-93,9999	01-09

MAKE:	Pontiac (Cont.)	(22)		(PONT)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
032	Vibe	GT, AWD, **HB**	2003-**09**,9999	06
398	Other (automobile)	Torpedo, Streamliner, Chieftain Star Chief, Super Chief	1946-**2010**, 9999	01-10
399	Unknown (automobile)		1926-**2010**, 9999	01-10
LIGHT TRUCKS				
401	Aztek	GT, SE, 1SA, 1SB, 1SC, Rally Edition	2001-05,9999	14
403	Torrent	GXP	2006-**09**,9999	14
441	Trans Sport/ Montana/SV6	SE, Montana, Extended, Versatrak, 1SV, 1SA, 1SX, 1SY, 1SE, Chrome Sport,	1990-2006, 9999	20
499	Unknown (light truck)		1990-**2009**, 9999	14, 20, 49
999	Unknown (PONTIAC)		1951-**2010**, 9999	49

MAKE:	Porsche	(45)		(PORS)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	911/996	L, S, E, T, SC, Carrera (2, 4, Cabriolet, Targa), GT, Slopenose, 4S, Targa, Speedster, Turbo, B series, S-Coupe, Cabriolet (S), GT2, GT3 (RS), Carrera GT	1965-**2009**, 9999	01-02,09
032	912	1600, E, T	1966-69; 1976,9999	01-02,09
033	914	1.7, 1.8, 2.0, S, 914/4/6	1970-76,9999	01
034	924	Turbo, S	1977-88,9999	01-03,09
035	928	S, S4, GT, GTS	1978-95,9999	02-03,09
036	930	Turbo	1979	02
037	944	Turbo, S, S2	1983-91,9999	01-03,09
038	959	Not Imported to U.S.	1989-94,9999	01-03,09
039	968		1992-95,9999	01,02,09
040	986/Boxster	Boxster, Boxster Cabriolet, S Roadster, S Anniversary, Limited Edition	1997-**2009**, 9999	01

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
041	Cayman	S	2006-**09**,9999	02
398	Other (automobile)	Spyder, Speedster (prior to '65), 356 (A,B,C) Grund, America, Super, 1500	1948-**2009**, 9999	01-03,09
399	Unknown (automobile)		1948-**2009**, 9999	01-03,09
LIGHT TRUCKS				
421	Cayenne	Turbo, S, Titanium, GTS	2003-**09**,9999	15
999	Unknown (PORSCHE)		1965-**2009**, 9999	99

| MAKE: | Renault | (46) | | (RENA) |

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	LeCar	R-5, R5TL, GTL, TL, DLX	1976-83,9999	02-05,07-09
032	Dauphine/10/R-8 Caravelle	all models, R-1190, R8 -1100	1955-71,9999	01-02,04,08-09
033	12	R-12L, R-12TL/GTL	1972-77,9999	04,06,09
034	15	R-15TL	1973-76,9999	02-03,09
035	16	R-16, R-1152	1969-72,9999	06
036	17	R17, Gordini Coupe, R17TL	1972-80,9999	01-02,09
037	18i/Sportwagon	R18i, Deluxe, DLX	1981-86,9999	04,06,09
039	Alliance/Encore GTA, Convertible	L, DL, Limited, X-37	1983-87,9999	01-05,07-09
041	Alpine	GT, GTA Coupe, Not imported to U.S.	1971-90,9999	02-03,09
044	Medallion **	DL, LX	1987	04,06,09
045	Premier**		1987	04
398	Other (automobile)	Juvaquatre, 4CV, Fregate, Domaine	1946-90,9999	01-11
399	Unknown (automobile)		1946-90,9999	01-11

** Note: Medallion and Premier listed under Eagle after 1987.**

MAKE:	Saab	(47)		(SAA)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	99/99E/900	S,GL, GLE, L, LE, 2CM, 4CM Turbo, Cabriolet, 2EM, 4EM, CM, SE	1969-98,9999	01-05,07-09
032	Sonnett	II, III, 97	1967-74,9999	02
033	95/96	V-4, M, S, M-S, Special	1959-73,9999	02,06,09
034	9000	S, Turbo, CS, CD, CDE, E, AERO,CSE	1985-98,9999	04,05,09
035	9-3	SE (Hot), Viggen, Linear Arc, Vector, Aero, 2.0T, SportCombi	1999-*2009*, 9999	01,*03-07*,09
036	9-5	SE, Aero, 2.3T, Set, Arc, Linear, Aero, SportCombi, 2.5T, *Turbo X*	1999-*2009*, 9999	02,04,06,08,09
037	9-2x	Linear, Aero	2005-06,9999	05
038	*9-4X*		*2009*	*06*
398	Other (automobile)	Monte Carlo 850, GT850, GT750, 92/93	1950-*2009*, 9999	01-09
399	Unknown (automobile)		1950-*2009*, 9999	01-09
LIGHT TRUCKS				
401	9-7x	Arc, Linear, 4.2i, 5.3i, Altitude Edition, Aero	2005-*2009*, 9999	14
999	Unknown (SAAB)		1950-*2009*, 9999	49

MAKE:	Saturn	(24)		(STRN)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	SL	SL, SL1, SL2	1991-2002, 9999	04
002	SC	SC1, SC2	1991-2002, 9999	02
003	SW	SW1, SW2	1993-2001, 9999	06
004	EV1/EGV1*	Electric Vehicle (Gen II)	1997-2003, 9999	02
005	LS	LS, LS1, LS2, L100/L200/ L300, L300-1/2/3	2000-05,9999	04
006	LW	LW1, LW2, LW200/ LW300- 1/2/3	2000-04,9999	06
007	Ion	Quad-coupe, 1/2/3, Red Line	2003-07,9999	04

MAKE:	Saturn (Cont.)	(24)		(STRN)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
008	Sky	Red Line	2007-**09**,9999	01
009	Aura	XE, XR, *Hybrid*	2007-**09**,9999	04
010	Outlook	XE, XR	2007-**09**,9999	06
011	Astra	XE, XR, Sport	2008-**09,9999**	03,05
* Electric Vehicle. Be sure to code Related Factors-Vehicle Level Code "36."				
398	Other (automobile)		1991-**2009**, 9999	02,04,06,08-09
399	Unknown (automobile)		1991-**2009**, 9999	02,04,06,08-09
LIGHT TRUCKS				
401	Vue	Red Line, 4, V6, Green Line**,** XE, **XR-4, XR-V6**	2002-**09**,9999	14
441	Relay	2, 3	2005-07,9999	20
499	Unknown (light truck)		2002-**09**,9999	14, 20
999	Unknown (SATURN)		1991-**2009**, 9999	49

MAKE:	Smart	(65)	

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Fortwo	Pure, Passion	2008-**09,9999**	01, 02
398	Other (automobile)		2008-**09,9999**	01,02,09
399	Unknown (automobile)		2008-**09,9999**	01,02,09

MAKE:	Sterling	(61)		(STLG)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	827	Li, SL, S, SLI	1987-91,9999	04-05,09
398	Other (automobile)	825, S, SL, Oxford Edition	1987-91,9999	04-05,09
399	Unknown (automobile)		1987-91,9999	04-05,09

MAKE:	Subaru	(48)		(SUBA)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Loyale (1990 on)/DL/ FE/G/GF/GL/GLF/ STD	4-wheel drive, S, 1300, 1400, 1600, 1800, A15L, A44L, Touring Wagon, Turbo	1972-94,9999	02-09
032	Star	FF -1 Star, 1100	1971	02,04,06,08-09
033	360		1958-70,9999	02
034	Legacy/Outback(prior to 2003 only; see 045 for 2003 on)	L, LS, LSI, 4WD, Outback (Limited, Ltd, Sport, VDC, L.L. Bean Edition), GT, Brighton, Sport Utility Sedan (Ltd.), 30th Anniv. Outback, H-6, 35th Anniv., 2.5, 2.5i/GT, spec. B, 3.0R, Limited	1990-***2009***, 9999	04-06,09
035	XT/XT6	4WD Turbo, convertible, DL, GL	1985-91,9999	01-02,09
036	Justy	DL, GL, 4WD	1987-94,9999	03,05,07
037	SVX	LS, LSL, XR, LSi	1992-97,9999	02
038	Impreza	L, LS, Brighton, Outback Sport, RS, L-Sport, LX, 2.5i/ RS/TS, WRX, WRX Sport/STI/ TR, Limited Edition, ***Premium***	1993-***2009***, 9999	02,04-06,08-09
039	RX		1986-89,9999	03-04,09
043	Brat	DL, GL	1978-87,9999	10
044	Baja	Sport, Turbo	2003-07,9999	10
045	Outback (2003 on; see 034 for prior to 2003)	H6-VDC, 35th Anniversary Edition, 2.5, 2.5i, 2.5XT, 3.0R, Special Edition, VDC Limited, Sport, L.L. Bean Edition, 3.0R	2003-***09***,9999	04-06,09
398	Other (automobile)		1968-***2009***, 9999	01-10
399	Unknown (automobile)		1968-***2009***, 9999	01-10
LIGHT TRUCKS				
401	Forester	L, S, 2.5X, 2.5XS, 2.5XT, L.L. Bean Edition, Limited, Sport***, Premium***	1997-***2009***, 9999	14
402	B9 Tribeca	Base, Limited, ***Special Edition***	2006-***09***,9999	14
499	Unknown (light truck)		1997-***2009***, 9999	14
999	Unknown (SUBARU)		1958-***2009***, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Swift/SA310	GTi, GTX, GLX, GA, GT, GL	1989-2001, 9999	03-05,07,09
032	Esteem	GL, GLX, GLX+	1995-2002, 9999	04,06,09
033	Aerio	S,G,LX,SX (Wagon), Luxury	2002-07,9999	04,06,09
034	Forenza	S, LX, EX, Premium, Convenience, Popular	2004-08,9999	04,06,09
035	Verona	S, LX, EX, Luxury	2004-06,9999	04
036	Reno	S, LX, EX, Premium, Convenience	2005-08,9999	05
040	SX4	Base, Sport, Convenience, Touring	2007-*09*,9999	05
398	Other (automobile)	800 Fronte, Alto	1981-*2009*, 9999	03-07,09
399	Unknown (automobile)		1981-*2009*, 9999	03-07,09
LIGHT TRUCKS				
401	Samurai	Standard, Deluxe, JL	1986-96,9999	14
402	Sidekick/Vitara/ Vitara V6	JS, JX, JLX, JLS, Sport, Grand Vitara (1999-2002 only; see model 404 for 2003 on) (JS, JLX, JLS, Ltd.) XL-7 (2002 only; see model 405 for 2003 on) LX	1989-2004, 9999	14
403	X-90		1996-98,9999	14
404	Grand Vitara (2003 on; see model 402 for models prior to 2003)	JS, JLX, JLS, Limited, GX, LX, XV6, Premium, XSport, Luxury	2003-*09*,9999	14
405	XL-7 (2003 on; see 402 for 2002 model year)	Standard, Touring, Limited, GX, LX, Premium, Luxury	2003-*09*,9999	14
481	*Equator*		*2009*	*31*
498	Other (light truck)	Jimmy	1981-*2009*, 9999	14, *31*
499	Unknown (light truck)		1981-*2009*, 9999	14, *31*
MOTORCYCLES				
701	0-50cc		1970-*2009*, 9999	80-81,83,88-89

Model	Codes	Includes	Model Years	Body Types

MAKE: Suzuki (Cont.) **(53)** **(SUZI)**

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES (Cont.)				
702	51-124cc		1970-*2009*, 9999	80-81,83,88-89
703	125-349cc		1969-*2009*, 9999	80,83,88-89
704	350-449cc		1970-93; 2000-*09*,9999	80,83,88-89
705	450-749cc		1969-*2009*, 9999	80,83,88-89
706	750cc-over		1970-*2009*, 9999	80,83,88-89
709	Unknown cc		1969-*09*,9999	80-83,88-89
ALL TERRAIN VEHICLES				
731	0-50cc	includes all ATVs designed solely for	1969-87; 2002-04,9999	90
732	51-124cc	off-road use and have 3 or 4 wheels.	1969-2004, 9999	90
733	125-349cc		1969-*2009*, 9999	90
734	350cc or greater		1969-93; 1999-*2009*, 9999	90
739	Unknown cc		1969-*2009*, 9999	90
999	Unknown (SUZUKI)		1969-*2009*, 9999	49,99

MAKE: Toyota **(49)** **(TOYT)**

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Corona	Mark II, Custom, 1900, 2000, Deluxe	1966-83,9999	02,04,06,08-09
032	Corolla	1100, 1200, 1600, SR-5, LE, DX, CE, Deluxe, Custom, FX, FX16, Sport, GTS, VE, S, XRS, *XLE*	1969-*2009*, 9999	02-09
033	Celica	1900, 2000, GT, ST, GTS, VE, GT-S	1971-2005, 9999	01-03,09
034	Supra	Celica Supra, Soarer, Turbo	1979-98,9999	03
035	Cressida		1978-92,9999	04-06,09
036	Crown	2300, 2600, Toyopets	1958-71,9999	02,04,06,08-09
037	Carina	2000	1972-73,9999	02
038	Tercel	Corolla Tercel, 4WD, EZ, DX, LE, DLX, CE	1980-98,9999	02-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
039	Starlet		1981-84,9999	03
040	Camry	LE, Deluxe, XLE, DLX, SE, All-Trac, CE, SE, Limited Edition, LE, Hybrid,	1983-***2009***, 9999	02,04-06,08-09
041	MR-2/MR Spyder	Super Charged	1984-95; 2000-05,9999	01-02,09
042	Paseo	Turbo, T-bar	1992-97,9999	01-02,09
043	Avalon	XL, XLS, Limited, Touring	1995-***2009***, 9999	04
044	Solara	Camry Solara (SE, SLE, Sport)	1999-***2009***, 9999	01-02,09
045	ECHO		2000-05,9999	02,04,09
046	Prius *	*Electric hybrid, Touring	2001-***09***,9999	04,05
047	Matrix	Base, XR, XRS, STD, ***S***	2003-***09***,9999	06
048	Scion xA	RS 1.0	2004-07,9999	05
049	Scion xB	1.0, 2.0 Series	2004-***09***,9999	06
050	Scion tC	1.0 Series	2005-***09***,9999	03
051	Yaris	Liftback, S	2007-***09***,9999	03-05
052	Scion xD		2008-***09***,9999	05
398	Other (automobile)	2000 GT Coupe (1960s), Sports 800, Vipor, Tiara	1960-***2009***, 9999	01-10
399	Unknown (automobile)		1960-***2009***, 9999	01-10
LIGHT TRUCKS				
401	4-Runner	SR5, Limited, Sport	1984-***2009***, 9999	14
402	RAV4*	L, EVs-electric*, Sport, Limited	1996-***09***,9999	14
403	Highlander	Limited, Hybrid, Sport	2001-***09***,9999	14
404	FJ Cruiser	Baja 1000, FJ, SE, ***TRD***	2007-***09***,9999	14
421	Land Cruiser	4WD	1964-***2009***, 9999	15
422	Sequoia	SR5, Limited, Platinum	2001-***09***,9999	15
441	Minivan (1984-90)/ Previa (1991 on)	LE, Cargo, DX, XLE	1984-97,9999	20
442	Sienna	CE, LE, XLE, Symphony, Limited	1998-***2009***, 9999	20
471	Pickup	SR-5,Extra Cab, Sport, LN44, Chinook, Wonder Wagon	1974-95,9999	30-32,40,42
472	Tacoma	SR5, Xtracab, Limited, PreRunner, Side Step, Double Cab, S-Runner, X-Runner	1995-***2009***, 9999	30,32,40,42
481	T-100	DX, SR5, Limited, Xtracab	1993-98,9999	31-32,40,42

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS (Cont.)				
482	Tundra	SR5 (Access Cab), LTD, (Access Cab), Double Cab, Darrell Waltrip Special Edition, CrewMax	1999-**2009**, 9999	31-32,40,42
498	Other (light truck)		1970-**2009**, 9999	14-15,19-20, 29-30,32,39
499	Unknown (light truck)		1973-**2009**, 9999	14-15,19-20,30-32, 39-40,42,48-49
999	Unknown (TOYOTA)		1966-**2009**, 9999	49

MAKE: **Triumph** **(50)** **(TRIU)**

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Spitfire	I, II, III, IV, 1500	1962-81,9999	01,02,09
032	GT-6	MK3	1967-73,9999	01,02,09
033	TR4	TR2, TR3, TR4A	1958-68,9999	01,02,09
034	TR6		1969-76,9999	01,02,09
035	TR7/TR8		1975-81,9999	01,02,09
036	Herald	Vitesse	1960-74,9999	01-02,06,09
037	Stag		1971-73,9999	01,02,09
398	Other (automobile)	1800,2000,Mayflower, Renown,1200	1946-81,9999	01-02,04,08-09
399	Unknown (automobile)		1946-81,9999	01-02,04,08-09
MOTORCYCLES				
701	0-50cc		1965-83,9999	80
702	51-124cc		1965-83,9999	80
703	125-349cc		1950-74,9999	80
704	350-449cc		1950-71,9999	80
705	450-749cc		1950-83; 2000-**09**,9999	80
706	750cc or greater		1950-74; 1983-**2009**, 9999	80
709	Unknown cc		1950-**2009**, 9999	80
799	Unknown (motored cycle)		1950-**2009**, 9999	80
999	Unknown (TRIUMPH)		1950-**2009**, 9999	99

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Karmann Ghia		1954-75,9999	01-02,09
032	Beetle 1300/1500	Flat windshield, 94.5 WB	1948-77,9999	01-02,09
033	Super Beetle	Curved windshield 95.3 WB	1971-80,9999	01-02,09
034	411/412	Squareback/Fastback	1971-74,9999	03-04,09
035	Squareback/Fastback	Type 3, 1600	1965-74,9999	02
036	Rabbit	L, GTI, Sport, LS, Custom, DL, Deluxe, *S*	1975-84, 2007-*09*, 9999	01,03,05-07,09
037	Dasher		1974-81,9999	03,05-07,09
038	Scirocco	16V	1975-88,9999	02
040	Jetta	Jetta III, GL (TDI, 1.9L, 2.0L), GLI (VR6), GLS (1.8T,1.8L/l.9L/2.0L/2.8L/ TDI/VR6),GT, Carat, TDI, GLX (VR6/2.8L), Turbo Diesel, Wolfsburg Edition, 2.5L *S/SE/SEL*, Value Edition. 2.0T, 3.6	1981-*2009*, 9999	02,04,06,08
041	Quantum	Synco	1982-88,9999	02,04,06,08-09
042	Golf/Cabriolet/Cabrio/ GTI	Golf II, GTI (GLS, GLX 1.8T/2.8L), GT, GL(1.8T/ VR6/2.0L/1.9L/ TDI), Golf III, GLS (1.8T/1.8L/1.9L/ 2.0/TDI), Wolfsburg, Cabrio (GL, GLS, GLX), 20th Anniversary, R32, MkV	1985-*2009*, 9999	01,03,05-07, 09
043	Rabbit Pickup	car-based pickup	1980-83,9999	10
044	Fox	GL	1987-94,9999	02,04,06,08-09
045	Corrado		1989-94,9999	02
046	Passat	GL,GLS(1.8T,Synchro,V6), TDI,GLX(1.8T, 2.0T, W8, Synchro,V6), 4MOTION, 3.6 GL, Value Edition, *CC*	1990-*2009*, 9999	04,06,09
047	New Beetle	GL GLS TDI, 1.8T/1.8L/ 1.9L/2.0L/2.5/2.5L Syncro/ V6, GLX (1.8T), Turbo S	1998-*2009*, 9999	01,03,09
048	Phaeton	3.2L, 4.2L, V6, V8,W12	2003-06,9999	04
051	Eos	2.0T, 3.2L, Komfort, Lux, VR6	2007-*09*,9999	01
398	Other (automobile)		1965-*2009*, 9999	01-10
399	Unknown (automobile)		1956-*2009*, 9999	01-10

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
401	The Thing (181)		1973-75,9999	14
402	Tiguan	***S, SE, SEL***	2008-***09,9999***	14
421	Touareg/Touareg 2	V6, V8, V10, ***VR6 FSI***	2003-***09***,9999	15
441	Vanagon/Camper	Bus, Kombi, Van	1955-91,9999	20
442	Eurovan	GLS, MV, Camper, Weekender Package	1992-04,9999	20
443	***Routan***	***S, SE, SEL Premium/RSE***	***2009***	***20***
498	Other (light truck)		1967-80,9999	14-15,20
499	Unknown (light truck)		1965-***2009***, 9999	14-15,20,49
998	Other (vehicle)		1965-***2009***, 9999	91-93,97
999	Unknown (VOLKSWAGEN)		1956-***2009***, 9999	49

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	122	S	1958-68,9999	02,04,06,08-09
032	140/142/144/145 *	S, E, GL, GLS, Deluxe	1968-74,9999	02,04,06,08-09
033	164	S, E	1970-75,9999	04
034	240 series*/DL/GL/GLT	242, 244, 245, DL, GL, GLT, Deluxe	1975-93,9999	02,04,06,08-09
035	260 series/GLE	264,265,262, c, Volvo Coupe, Volvo Diesel	1976-82,9999	02,04,06,08-09, 12
036	1800	E, S, ES, P1800	1960-73,9999	02,06,09
037	PV544	PV444	1947-65,9999	04,06,09
038	760/780	GLE, Turbo, Bertone Coupe	1983-92,9999	02,04,06,08-09, 12
039	740	GLE, GT, Turbo, GL, SE	1983-92,9999	04,06,09
040	940	GLE, Turbo, SE	1991-95,9999	04,06,09,12
041	960		1992-97,9999	04,06,09,12
042	850	GLT, Turbo, T-5, GTAS, GTMS Cross Country	1993-97,9999	04,06,09
043	70 Series	C70 (LT, HT,T5), S70 (GLT, T5, AWD) V70 (R, SC Cross Country, GLT, T-5, XC-70, M, 2.4T, 2.4, 2.5T, T-6, R, ***3.2***) LPT, HPT	1998-***2009*** ,9999	01-02,04,06,09
044	90 Series	S90, V90	1998	04,06,09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
045	80 Series	S80 (2.9, T6, Executive, Premier) 2.5, 2.5T, 3.2, V8	1999-*2009*, 9999	04
046	40 Series	S40,V40,LSE, 2.5i, T5, 2.4i, ***R-Design***	2000-*09*,9999	04,06,09
047	60 Series	S60 (2.4T, 2.4, 2.5 AWD, T5), 2.4M, 2.5T, R, T5	2001-*09*,9999	04
048	V50	2.4i, T5, ***R-Design***	2005-*09*,9999	06
049	C30	1.0, 2.0, T5, ***R-Design***	2008-*09,9999*	03
398	Other (automobile)		1958-*2009*, 9999	01-12
399	Unknown (automobile)		1958-*2009*, 9999	01-12
LIGHT TRUCKS				
401	XC90	2.5T(AWD), T6(AWD), V8, ***3.2, R-Design***	2003-*09*,9999	14
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1981-93; 1996-*2009*, 9999	60-64,66,78
882	Medium/Heavy – COE low entry		1981-93; 1996-2004, 9999	60-64,66,78
883	Medium/Heavy – COE high entry		1981-93; 1996-2004, 9999	60-64,66,78
884	Medium/Heavy – Unknown engine location		1981-93; 1996-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1981-93; 1996-*2009*, 9999	60-64,66,78
898	Other (medium/heavy truck)		1981-93; 1996-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1981-2005, 9999	50-52,58-59
988	Other (bus)		1965-2005, 9999	50-52,58-59

** **Use "981" (bus) if the frontal plane or the engine location is unknown.**

999	Unknown (VOLVO)		1958-*2009*, 9999	79,99

MAKE: Yugo   (57)   (YUGO)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	GV/GVL/GVX	All models, Cabriolet	1986-92,9999	01-03,09

MAKE: Other Domestic Manufacturers   (29)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
001	Studabaker/Avanti	Lark, Gran Turismo, Hawk, Cruiser, all associated subseries, light pick-up, Studebaker XUV/XUT, Lister	1940-91; 2001-07,9999	01-02, 04, 06, 08-09, 16, 31, 39
002	Checker	Marathon, Superba, Taxi, Aerobus	1965-82,9999	04, 06, 09, 12
003	Panoz	Esperante (Magnussen Edition), GTS, GTLM	2000-*09*,9999	01-02, 09
004	Saleen	S7	2001-*09*,9999	02
398	Other (automobile)	Desoto, Excaliber, Stutz, FiberFab, Hudson, Packard, Consulier, Gatsby, Auburn, Phaeton, Citicar, Clenet	1940-91,9999	01-13
399	Unknown Make		1940-*2009*, 9999	01-13, 16, 39

MAKE: Other Import   (69)

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
031	Aston Martin	Lagonda, Vantage, Volante, Saloon, DB Mark III, DB4, DB4GT, DB5, DB6, DB7 (Heritage, Vantage, Volante), V12 Vanquish S, V8, DB9, Rapide, DBS	1950-*2009*, 9999	01-09
032	Bricklin		1965-91,9999	02
033	Citroen		1965-91,9999	02-09
034	DeLorean		1981-83,9999	02

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
035	Ferrari	F355 (Berlinetta, GTS, Spider, F1), F430, F456 (GTA, M, GT, MGTA), F550 (Maranello, Barchetta Pininfarina), 360/430 (Spider, Modena, Challenge) Maranello, Berlinetta, MGT (Vintage), Enzo, Challenge Stradale, 575M, 612 Scaglietti, Superamerica, 599 GTB, California	1965-*2009*, 9999	01-05,07-09
036	Hillman		1965-91,9999	01-09
037	Jensen	Healy-Interceptor, 541R	1965-91,9999	01-05,07-09
038	Lamborghini	Countach, 5000S, Jalpa, Diablo, Miura, Murciélago (LP640), Galladoro	1965-*2009*, 9999	01-02,04,08-09
039	Lotus	Europe, Espirit (V8, GT-3, V8-GT) Elise, Exige, *Evora*	1967-*2010*, 9999	01-02,04,08-09
040	Maserati	Biturbo, Ghibli, 3200 GT, Quattroporte, Spyder GT, Sports GT, Executive GT, 90th Anniversary, MC12, GranSport, GranTurismo	1965-99; 2002-*09*,9999	01-05,07-09
041	Morris	Minor	1965-91,9999	01-10
042	Rolls Royce/Bentley	Rolls Royce: Cloud/Shadow series, Silver Spur, Silver Dawn, Silver Spirit, Silver Seraph, Corniche, Park Ward); Bently: (Arnaze, Azure, Continental, Mulliner), Phantom, Brooklands	1926-*2009*, 9999	01-02,04,08-09
044	Simca		1965-91,9999	01-09
045	Sunbeam		1965-91,9999	01-02,04,08-09
046	TVR		1965-91,9999	01-02,09
048	Desta		1985-99,9999	14-15,19
049	Reliant		1960-91,9999	01-09
052	Bertone	X/19	1989-91,9999	01-02,09
053	Lada		1965-91,9999	01-09

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Cont.)				
054	Mini-Cooper	Mark I,II,III, S, SE, Sport, MC40, Traveller	1961-74; 2002-**09**,9999	01,03, 06
055	Morgan (2003 on; Prior to 2003 see 398)	Aero 8, Plus 8, V6	2003-**09**,9999	01
056	Maybach	57, 57S, 62	2003-**09**,9999	04
057	Spyker	C8, Base, T, Laviolette, Double 12R, Double 12S	2005-**09**,9999	01-02
058	Koenigsegg	CC8S, CCR, CCX	2007-**09**,9999	01
059	Tesla		2008	01
060	*Yes*	*Roadster*	*2009*	*01*
061	*Mahinda*	*Scorpio (Lx, Sle, Vls, Vlx)*	*2010*	*14*
398	Other (automotive)	Morgan (Prior to 2003; 2003 on see 055), Singer, Gazelle	1965-91,9999	01-13
399	Unknown Make		1928-**2010**, 9999	01-10,19

MOTORED CYCLES

Note: Refer to Passenger Car section of this table for motored cycles produced by automobile manufacturers (BMW, Honda, Peugeot, Suzuki, Triumph)

MAKE:	BSA	(70)		(BSA)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
701	0-50cc		1950-72,9999	80-81,83,88-89
702	51-124cc		1950-72,9999	80-81,83,88-89
703	125-349cc		1950-72,9999	80,83,88-89
704	350-449cc		1950-72,9999	80,83,88-89
705	450-749cc		1950-72,9999	80,83,88-89
706	750cc or greater		1950-72,9999	80,83,88-89
709	Unknown cc		1950-72,9999	80,83,88-89

MAKE:	Ducati	(71)		(DUCA)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
701	0-50cc		1958-65,9999	80-81,88-89
702	51-124cc		1958-65,9999	80-81,88-89
703	125-349cc		1958-65,9999	80,88-89
704	350-449cc		1958-65,9999	80,88-89
705	450-749cc		1958-93; 1997-2006, 9999	80,88-89
706	750cc or greater		1958-*2009*, 9999	80,88-89
709	Unknown cc		1958-*2009*, 9999	80-83,88-89

MAKE:	Harley-Davidson	(72)		(HD)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
701	0-50cc		1965-66,9999	80-81
702	51-124cc		1948-78,9999	80-81,88-89
703	125-349cc		1948-88,9999	80,88-89
704	350-449cc		1969-74,9999	80,88-89
705	450-749cc		1971-78,9999	80,88-89
706	750cc or greater		1932-*2009*, 9999	80,82,88-89
709	Unknown cc		1932-*2009*, 9999	80,82,88-89

MAKE:	Kawasaki	(73)		(KAWK)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
701	0-50cc		1965-82,9999	80-81,83,88-89
702	51-124cc		1965-*2009*, 9999	80-81,83,88-89
703	125-349cc		1965-*2009*, 9999	80,83,88-89
704	350-449cc		1975-98; 2003-04; 2006-*09*, 9999	80,83,88-89
705	450-749cc		1972-*2009,* 9999	80,83,88-89
706	750cc or greater		1972-*2009*, 9999	80,83,88-89
709	Unknown cc		1965-*2009*, 9999	80-83,88-89
ALL TERRAIN VEHICLES				
731	0-50cc		2003-*09*,9999	90
732	51-124cc	includes all ATVs	1970-88; 2003-*09*,9999	90
733	125-349cc	designed solely for	1970-*2009*, 9999	90
734	350cc or greater	off-road use and have 3	1970-*2009*, 9999	90
739	Unknown cc	or 4 wheels.	1970-*2009*, 9999	90

MAKE:	Moto-Guzzi	(74)		(MOGU)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
704	350-449cc		1965-76,9999	80,88-89
705	450-749cc		1965-87; 2004-*09*,9999	80,88-89
706	750cc or greater		1965-*2009*, 9999	80,88-89
709	Unknown cc		1965-*2009*, 9999	80,88-89

MAKE:	Norton	(75)		(NORT)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
704	350-449cc		1950-76,9999	80,83,88-89
705	450-749cc		1950-76,9999	80,83,88-89
706	750cc or greater		1950-76,9999	80,83,88-89
709	Unknown cc		1950-76,9999	80,83,88-89

MAKE:	*Victory*	*(77)*		*(VCTY)*

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
706	*750cc or greater*		*1998-2009, 9999*	*80,88-89*
709	*Unknown cc*		*1998-2009, 9999*	*80,88-89*

MAKE:	Yamaha	(76)		(YAMA)

Model	Codes	Includes	Model Years	Body Types
MOTORCYCLES				
701	0-50cc		1979-*2009*, 9999	80-81,83,88-89
702	51-124cc		1972-*2009*, 9999	80-81,83,88-89
703	125-349cc		1969-*2009*, 9999	80,83,88-89
704	350-449cc		1972-*2009*, 9999	80,83,88-89
705	450-749cc		1971-*2009*, 9999	80,83,88-89
706	750cc or greater		1974-*2009*, 9999	80,83,88-89
709	Unknown cc		1969-*2009*, 9999	80,88-89
ALL TERRAIN VEHICLES				
731	0-50cc	includes all ATVs designed solely for off-road use and have 3 or 4 wheels.	1965-91, 2005-*09*, 9999	90
732	51-124cc		1965-*2009*, 9999	90
733	125-349cc		1965-*2009*, 9999	90
734	350cc or greater		1993-*2009*, 9999	90

Model	Codes	Includes	Model Years	Body Types
ALL TERRAIN VEHICLE (Cont.)				
739	Unknown cc		1965-*2009*, 9999	90
998	Other (Vehicle)	Snowmobiles	1965-*2009*, 9999	91

TRUCKS

MAKE:	Brockway	(80)		(BROC)

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1965-77,9999	60-64,66, 71-72,78
882	Medium/Heavy - COE low entry		1965-77,9999	60-64,66, 71-72,78
883	Medium/Heavy - COE high entry		1965-77,9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1965-77,9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-77,9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-77,9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-77,9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-77,9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-77,9999	50-52,58-59
988	Other (bus)		1965-77,9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.**

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-77,9999	65,73
998	Other (vehicle)		1965-77,9999	91-93,97
999	Unknown (BROCKWAY)		1965-77,9999	99

MAKE:	Diamond Reo or Reo	(81)		(DIAR)

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE	DC101,C116	1954-75,9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1954-75,9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	C054-C088	1954-75,9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1954-75,9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1954-75,9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1954-75,9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1954-75,9999	50-52,58-59
982	Bus: Front engine, Flat front		1954-75,9999	50-52,58-59
983	Bus: Rear engine, Flat front		1954-75,9999	50-52,58-59
988	Other (bus)		1954-75,9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1954-75,9999	65,73
998	Other (vehicle)		1954-75,9999	91-93,97
999	Unknown (DIAMOND REO or REO)		1954-75,9999	99

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
461	Sprinter/Advantage	2500 (HC/SHC), 3500 (HC/SHC)	2002-*09*, 9999	21-22,28-29
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1965-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1968-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1963-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-2004, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-2004, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-2004, 9999	50-52,58-59
988	Other (bus)		1965-2004, 9999	50-52,58-59
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1963-*2009*, 9999	91-93,97
999	Unknown (FREIGHTLINER)		1963-*2009*, 9999	99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1965-2001, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1965-2001, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1965-2001, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1965-2001, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-2001, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-2001, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-2001, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-2001, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-2001, 9999	50-52,58-59
988	Other (bus)		1965-2001, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-2001, 9999	65,73
998	Other (vehicle)		1965-2001, 9999	91-93,97
999	Unknown (FWD)		1965-2001, 9999	99

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
421	Scout	Scout II, Utility pickup, SS-2, Roadster, 800 series, Traveler, Terra Traveltop,	1962-80,9999	15
431	Travelall	1010-1210, 100-200	1963-75,9999	16
466	Multistop Van	Metro RM, MS1510, 120-160, MS1210	1960-84,9999	22,28-29
481	Pickup	R-100-500, 900A-1500C/D, 1010-1510	1951-76,9999	31,33
498	Other (light truck)		1960-84,9999	15-16,22,28-29
499	Unknown (light truck)		1951-84,9999	15-16,19,22, 28-29
MEDIUM/HEAVY TRUCK				
881	Medium/Heavy – CBE	Loadstar/Fleetstar, Paystar, CBE Transtar, 4200, S-series Mixer, 8100, 8500, 9100, 9200, 9300, 9400, 9900, CXT, RXT, MXT	1963-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	CO, VCO, DCO, 190-1950, Cargostar, LFM, 5370 (Garbage), CF500/600	1973-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	DCO, DCOT, UCO, VCOT, 405-series, COE Transtar, Unistar, Conco 707B, 9600	1961-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1948-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1964-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)	Fire truck - R140-R306, CO 8190	1955-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)	R153-1853 Loadstar, 1603-1853	1953-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front	173FC, 183FC	1972-*2009*, 9999	50-52,58-59
983	Bus**: Rear engine, Flat front	183RE, 193RE-transit	1965-*2009*, 9999	50-52,58-59
988	Other (bus)		1953-*2009*, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1954-*2009*, 9999	91-93,97
999	Unknown (INTL. HARVESTER/ NAVISTAR)		1951-*2009*, 9999	79,99

MAKE:	Kenworth	(85)		(KW)

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE	520, 540, T400, T600,T800, C500-550, W900, T300	1947-*2009*, 9999	60-64,66, 71-72, 78
882	Medium/Heavy – COE low entry	L700	1972-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	K100, K100E, K300	1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1954-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1964-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-2004, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-2004, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-2004, 9999	50-52,58-59
988	Other (bus)		1965-2004, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1965-*2009*, 9999	91-93,97
999	Unknown (KENWORTH)		1965-*2009*, 9999	99

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1968-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1965-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1977-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1956-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1972-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1971-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-2004, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1976-2004, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-2004, 9999	50-52,58-59
988	Other (bus)		1965-2004, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1965-*2009*, 9999	91-93,97
999	Unknown (MACK)		1965-*2009*, 9999	99

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE	LCF	1980-91,9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	FL, FS	1980-91,9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1980-91,9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1980-91,9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1980-91,9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1980-91,9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1980-91,9999	50-52,58-59
982	Bus: Front engine, Flat front		1980-91,9999	50-52,58-59
983	Bus: Rear engine, Flat front		1980-91,9999	50-52,58-59
988	Other (bus)		1980-91,9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1980-91,9999	65,73
998	Other (vehicle)		1980-91,9999	91-93,97
999	Unknown (IVECO/MAGIRUS)		1980-91,9999	99

* Magirus stopped production in 1985; Iveco stopped production in 1991.

MAKE:	Peterbilt	(87)		(PTRB)

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE	357-379, 387, 385	1974-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	270	1965-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry	362, 320	1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1961-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1964-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78
BUSES				
981	Bus**: Conventional (Engine out front)		1965-2004, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-2004, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-2004, 9999	50-52,58-59
988	Other (bus)		1965-2004, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1965-*2009*, 9999	91-93,97
999	Unknown (PETERBILT)		1965-*2009*, 9999	99

Model	Codes	Includes	Model Years	Body Types

MEDIUM/HEAVY TRUCKS

Model	Codes	Includes	Model Years	Body Types
881	Medium/Heavy – CBE		1965-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1968-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1963-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78

BUSES

Model	Codes	Includes	Model Years	Body Types
981	Bus**: Conventional (Engine out front)		1965-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1965-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-*2009*, 9999	50-52,58-59
988	Other (bus)		1965-*2009*, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

MOTOR HOME

Model	Codes	Includes	Model Years	Body Types
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)		1963-*2009*, 9999	91-93,97
999	Unknown (WHITE/AUTOCAR-WHITE/GMC)		1963-*2009*, 9999	99

BUSES

NOTE: Refer to the PASSENGER CAR section for buses manufactured by Chevy, Dodge, Ford, GMC, Grumman, Isuzu, Mercedes, Mitsubishi and Volvo. Refer to the TRUCK section for buses manufactured by Brockway, Diamond Reo, Freightliner, FWD, International Harvester, Kenworth, Mack, Peterbilt, and White/Autocar-White/GMC. Refer to the OTHER MAKE section for buses manufactured by Neoplan, Carpenter Industries, DINA, Mid Bus, Orion, and Van Hool. Hino and Scania buses are located under OTHER MAKE (Medium/Heavy Trucks) since those manufacturers also make trucks.

Bluebird		90		(BLUI)
Model	**Codes**	**Includes**	**Model Years**	**Body Types**
LIGHT TRUCKS				
461	Van Based	van-based school bus, shuttle bus	1927-*2009*, 9999	21
BUSES				
981	Bus**: Conventional (Engine out front)		1927-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1927-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1927-*2009*, 9999	50-52,58-59
988	Other (bus)		1927-*2009*, 9999	50-52,58-59
999	Unknown (BLUEBIRD)		1927-*2009*, 9999	99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Eagle Coach		91		
Model	**Codes**	**Includes**	**Model Years**	**Body Types**
BUSES				
981	Bus**: Conventional (Engine out front)		1948-2001, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1948-2001, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1948-2001, 9999	50-52,58-59
988	Other (bus)		1948-2001, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Gillig			92	

Model	Codes	Includes	Model Years	Body Types
BUSES				
981	Bus**: Conventional (Engine out front)		1932-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1932-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1932-*2009*, 9999	50-52,58-59
988	Other (bus)		1932-*2009*, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.**

MCI			93	(MCIN)

Model	Codes	Includes	Model Years	Body Types
BUSES				
981	Bus**: Conventional (Engine out front)		1963-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1963-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1963-*2009*, 9999	50-52,58-59
988	Other (bus)		1963-*2009*, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.**

Thomas Built			94	(THMS)

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
461	Van Based	van-based school bus, shuttle bus	1936-*2009*, 9999	21
BUSES				
981	Bus**: Conventional (Engine out front)		1936-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1936-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1936-*2009*, 9999	50-52,58-59
988	Other (bus)		1936-*2009*, 9999	50-52,58-59
999	Unknown (THOMAS BUILT)		1936-*2009*, 9999	99

** Use code "981"(bus) if the frontal plane or the engine location is unknown.**

OTHER MAKE

MAKE:	Other Make *		(98)	

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES (Unknown if DOMESTIC or FOREIGN)**				
398	Other (automobile)	Solectra (electric: Force)	1945-*2009*, 9999	01-13

** **Do not use Other Make (98) if Other Domestic (29) or Other Import (69) is applicable.**

Model	Codes	Includes	Model Years	Body Types
LIGHT TRUCKS				
498	Other (light truck)	Solectra (electric: Citivan Flash)	1960-*2009*, 9999	14-16,19-22, 28-33,39-42, 45, 48
MOTORCYCLES				
701	0-50cc	(Includes: ATK, Beta, Buell, Ducati, Cagiva, Cobra Trike, Husqvarna, Jawa, KTM, Maely, Riva, Strociek, Aprilia, MV Agusta, Bimota, Husaberg, Indian Scout, Indian, Laverda, ***BMC***, Big Dog, Titan, Twin Eagle, Viza Viper)	1965-*2009*, 9999	80-81,88-89
702	51-124cc		1965-*2009*, 9999	80-83,88-89
703	125-349cc		1965-*2009*, 9999	80-83,88-89
704	350-449cc		1965-*2009*, 9999	80-83,88-89
705	450-749cc		1965-*2009*, 9999	80-83,88-89
706	750cc or greater		1965-*2009*, 9999	80-83,88-89
709	Unknown cc		1945-*2009*, 9999	80-83,88-89
ALL TERRAIN VEHICLES				
731	0-50cc	includes all ATVs designed solely for off-road use and have 3 or 4 wheels. Includes: Polaris	1965-*2009*, 9999	90
732	51-124cc		1965-*2009*, 9999	90
733	125-349cc		1965-*2009*, 9999	90
734	350cc or greater		1965-*2009*, 9999	90
739	Unknown cc		1965-*2009*, 9999	90
MEDIUM/HEAVY TRUCKS				
802	Auto-Union-DKW		1965-88 9999	60-64,66, 71-72,78
803	Divco		1963-88,9999	60-64,66, 71-72,78
804	Western Star		1965-*2009*, 9999	60-64,66, 71-72,78
805	Oshkosh	(includes trucks & buses)	1965-*2009*, 9999	50,52-59,60-64, 66,71-72,78

Model	Codes	Includes	Model Years	Body Types
MEDIUM/HEAVY TRUCKS (Cont.)				
806	Hino	(includes trucks & buses)	1985-*2009*, 9999	50-52,58,59,60-64, 66,71-72,78
807	Scania	(includes trucks & buses)	1986-2004, 9999	50-52,58,59,60-64, 66,71-72,78
808	UD		1986-*2009*, 9999	60-64,66, 71-72,78
809	Sterling		1998-*2009*, 9999	60-64,66, 71-72,78
881	Medium/Heavy – CBE	DINA	1965-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry	DINA	1965-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1965-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)**	e.g., Marmon, Ward LaFrance	1945-*2009*, 9999	60-64,66, 71-72,78
BUSES				
902	Neoplan		1950-*2009*, 9999	50-52,58-59
903	Carpenter		1923-2000, 9999	21,50-52,58-59
904	Collins Bus		1967-*2009*, 9999	21
905	DINA		1989-2004, 9999	50-52,58-59
906	Mid Bus		1963-*2009*, 9999	21
907	Orion		1978-*2009*, 9999	50-52,58-59
908	Van Hool		1947-*2009*, 9999	50-52,58-59
981	Bus***: Conventional (Engine out front)		1965-*2009*, 9999	50-52,58-59
982	Bus: Front engine, Flat front		1976-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-*2009*, 9999	50-52,58-59

Model	Codes	Includes	Model Years	Body Types
BUS (Cont.)				
988	Other (bus)	**** (see following page)	1945-*2009*, 9999	50-52,58-59
MOTOR HOME				
850	Motor Home	Truck-based	1965-*2009*, 9999	65,73
998	Other (vehicle)	(e.g., farm vehicle, snowmobile, go-cart, golf carts)	1940-*2009*, 9999	91-93,97
999	Unknown (OTHER MAKE)		1940-*2009*, 9999	49,79,99

*   **Occurs when make is not explicitly listed here.**

**   **Do not use Other Make (98) if Other Domestic (29) or Other Import (69) is applicable.**

***   **Use code "981" (bus) if the frontal plane or the engine location is unknown.**

****   **Prior to 1999, MCI buses were coded Other Make/Other Bus. Starting in 1999, MCI has its own Make Code 93.**

UNKNOWN MAKE

MAKE: Unknown Make   **(99)**

Model	Codes	Includes	Model Years	Body Types
AUTOMOBILES				
399	Unknown (automobile)		1945-*2009*, 9999	01-13
LIGHT TRUCKS				
499	Unknown (light truck)		1945-*2009*, 9999	14-16,19-22, 28-33,35,39-42, 45, 48
MOTORCYCLES				
701	0-50cc		1965-*2009*, 9999	80-83,88-89
702	51-124cc		1965-*2009*, 9999	80-83,88-89
703	125-349cc		1965-*2009*, 9999	80-83,88-89
704	350-449cc		1965-*09*,9999	80-83,88-89
705	450-749cc		1965-*2009*, 9999	80-83,88-89
706	750cc or greater		1965-*2009*, 9999	80-83,88-89
709	Unknown cc		1945-*2009*, 9999	80-83,88-89
ALL TERRAIN VEHICLES				
731	0-50cc	includes all ATVs designed solely for	1965-*2009*, 9999	90
732	51-124cc	off-road use and have 3 or 4 wheels.	1965-*2009*, 9999	90
733	125-349cc		1965-*2009*, 9999	90
734	350cc or greater		1965-*2009*, 9999	90
739	Unknown cc		1965-*2009*, 9999	90
MEDIUM/HEAVY TRUCKS				
881	Medium/Heavy – CBE		1965-*2009*, 9999	60-64,66, 71-72,78
882	Medium/Heavy – COE low entry		1965-*2009*, 9999	60-64,66, 71-72,78
883	Medium/Heavy – COE high entry		1965-*2009*, 9999	60-64,66, 71-72,78
884	Medium/Heavy – Unknown engine location		1965-*2009*, 9999	60-64,66, 71-72,78
890	Medium/Heavy – COE entry position unknown		1965-*2009*, 9999	60-64,66, 71-72,78
898	Other (medium/heavy truck)		1965-*2009*, 9999	60-64,66, 71-72,78

Model	Codes	Includes	Model Years	Body Types
BUSES				
981	Bus**: Conventional (Engine out front)		1965-*2009*, 9999	50-52,58-59
982	Bus: Front engine. Flat front		1976-*2009*, 9999	50-52,58-59
983	Bus: Rear engine, Flat front		1965-*09*,9999	50-52,58-59
988	Other (bus)		1945-*2009*, 9999	50-52,58-59
989	Unknown (bus)		1945-*2009*, 9999	50-52,58-59

** Use code "981"(bus) if the frontal plane or the engine location is unknown.

Model	Codes	Includes	Model Years	Body Types
MOTOR HOME				
850	Motor Home	Truck based	1965-*2009*, 9999	65,73
998	Other (vehicle)	(e.g., farm vehicle, snowmobile, go-cart)	1943-*2009*, 9999	91-93,97
999	Unknown (as to automobile, motored cycle, light truck or truck)		1945-*2009*, 9999	49,79,99