Vehicle Identification Numbers: Decoding the VIN

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Overview

The “VIN” acronym stands for Vehicle Identification Number. This is an alpha-numeric code created by vehicle manufacturers and affixed permanently to all vehicles that they produce. The VIN is unique to each vehicle and contains information to describe and identify the vehicle. On current automobiles sold in the US, the VIN is located on the dashboard, in a position visible through the windshield, as well as on the driver side door jam. If you own a car, you have probably also noticed the VIN is recorded on the title, insurance, and registration of your vehicle.

VINs and VIN decoding data have become integral information that a number of industries and organizations depend on. VINs are a valuable tool for law enforcement in identifying stolen vehicles. They are necessary for consumers and governmental agencies to identify or track vehicles, as well as to tie accident and maintenance records to individual vehicles. Additionally, VIN decoding has become a fundamental part of the business processes for most automotive companies and allied industries. To give just a few examples, the information contained in the VIN is used to decode inventory for sale, to provide faster and more accurate insurance and lending quotes, and to aid in shipping and rail vehicle transport logistics.

While most people associate vehicle identification numbers with cars, they are used in the US and internationally for all variety of vehicles and equipment, including motorcycles, heavy trucks, and buses. Even snowmobiles, trailers, and equipment such as tractors and back-hoes have a VIN assigned to them during the manufacturing process. In this paper, our focus will be on understanding VINs mainly as they apply to Passenger Vehicles (Including Multi-Passenger Vehicles or MPVs) and Light Duty Vehicles. To understand what a VIN is, and how it can be used, we need to look at how Vehicle Identification Numbers came into use and evolved into their current format.

Pre-1981 VINs

According to the NHTSA, American automobile manufacturers started assigning VINs to the vehicles they produced in 1954. While previously serial numbers were assigned to all vehicles, from this point forward more details and description of vehicles were captured by the VIN. The length and composition of VINs was not standard and their use was not
regulated. As time passed, use of VINs (if not the format and information contained in them) became an industry standard for automotive and vehicle manufacturers across the globe. Each manufacturer created their own system and applied it to their own brands. Most manufacturers captured basic details like year, make, and model.

As decades passed, more and more information was commonly captured by the VIN. This information included engine, drivetrain, body type, country of origin, and even manufacturing plant. In 1969, a more systematic VIN system was put in place requiring that the VIN be permanently affixed to the vehicle and that patterns not be repeated within a 10 year period. In the 1970’s, US automotive manufacturers adhered to a 10 digit standard that lasted up through the 1980 model year.

The Modern VIN

In the late 1970’s, the International Organization for Standardization (ISO) issued two documents with the intent of standardizing the VINs assigned to vehicles on a global level. These documents, known as ISO 3779 and ISO 3780 (Available for purchase at www.iso.org), were a set of recommendations for the global community to follow. They introduced the modern 17 digit VIN standard and the three digit World Manufacturer Identifier (WMI) section at the beginning of the VIN. ISO 3779 and ISO 3780 are followed by current manufacturers in the European Union. These documents were only recommendations and guidelines for the international community to follow not strictly enforced regulations.

Shortly after this, in 1978, the NHTSA (National Highway Traffic Safety Administration) created a US VIN standard that was more stringent and was required for all “over-the-road” vehicles. With some adjustment and additions, this is the standard the US and North America currently operate under (FMVSS 115, 49CFR Part 565). All vehicles, destined for US markets, are required to follow this VIN standard. It was enforced beginning with model year 1981 vehicles and covered 30 model years.

Like the ISO Standard, the NHTSA required the VIN to be 17 digits and reserved the first three digits for the World Manufacturer Identification number. Letters I, O, and Q are not permitted in either standard. From the start, the NHTSA VIN standard required certain information be captured and breaks down the VIN to six distinct sections. In addition
to the ISO recommendations, the NHTSA required year and manufacturing plant to be recorded in the 10th and 11th digits of the VIN. The NHTSA standard also required the inclusion of a check digit in the 9th position. (See Table "NHTSA and ISO Standard Comparison"). A further requirement of the VIN Standard was that a VIN pattern not be repeated for any two vehicles within a 30 year period.

In 1996, the VIN standard was updated to require manufacturers to assign a unique VIN to each truck, trailer, bus, motorcycle, and incomplete vehicle it produced. It was again updated, in 2008, to cover an additional 30 years of vehicle models.

As the VIN standard approached 30 years in use, there was concern as to how future model years would be identified uniquely with the current standard. In April 2008, the NHTSA adopted a final rule amending the existing standard, so the current 17 digit VIN system could continue to be used for another 30 years. This ruling made four notable changes to the VIN requirements for all light duty and passenger vehicles manufactured for sale in the US:

1. The vehicle’s “Make” can only be identified after looking at the WMI (Positions 1-3) as well as another position in the VDS (Positions 4-8) determined by the manufacturer.
2. Starting with MY2010, VIN positions 4-6 can now be alphabetic or numeric for all vehicles. Previous to this, the standard required positions 4 and 5 to be alphabetic, and position 6 to be numeric, for passenger and light duty vehicles.
3. Previous to MY2010, the year was determined solely by the 10th digit. All 30 available unique digits had been used in the year position of the VIN by MY2009. Since these digits would start being reused in MY2010, another digit needed to be

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factored in to uniquely identify the model year. To accomplish this, a ruling was made for passenger cars and light duty vehicles only. In addition to reading the 10th digit, one must read the 7th digit. If the 7th digit is numeric, the model year referred to in position 10 of the VIN is within 1980–2009. If the 7th digit is a letter the model year range of the VIN is 2010–2039.

4. For buses, motorcycles, trailers, incomplete vehicles, low speed vehicles, and vehicles with a GVWR above 10,000 lb/4,500 kg model year may no longer be identified within a 30-year range. VIN patterns assigned from MY1980–2009 can be repeated beginning with MY2010.

The remainder of this article will focus on the components of a VIN created to meet the NHTSA standard for the passenger and light duty vehicle segment. A “light duty vehicle” is defined by the NHTSA as having a Gross Vehicle Weight Rating (GVWR) less than or equal to 10,000lbs/4536kg.

**Components of a VIN**

**Positions 1-3: WMI (World Manufacturer Identifier)**

The WMI is an alpha-numeric, three digit code that occupies positions one through three of the VIN. It identifies the manufacturer and country of origin of the vehicle. For US companies, these codes are assigned and maintained by the Society of Automotive Engineers (SAE). SAE, in turn, coordinates with other international governing bodies to assure that the codes assigned are unique and consistently applied.

The first digit of the WMI tells you the general geographic area of manufacturer. The second digit, designates the country of origin. The third digit designates the manufacturer. For manufacturers producing < 500 vehicles annually, the third digit will be “9” and the WMI will not uniquely identify them. In these cases, the 12th-14th digits will also be assigned by SAE to uniquely identify the manufacturer. In addition, from 1981 to 2009 the NHSTA standard required the third digit to indicate the category of vehicle (For example: passenger vehicle, multi-passenger vehicle (MPV), light duty truck, or incomplete vehicle).
Positions 4-8: VDS (Vehicle Descriptor Section)

The fourth to eighth digits are set aside to capture descriptive elements of the vehicle. This is the meat of the VIN from a decoding standpoint. Almost all of the valuable information encoded in a VIN is found here. However, many of the elements of the vehicle captured in the VDS are left to the manufacturer. Complicating things further, each manufacturer has a unique system of encoding information into the VIN. The amount and type of information captured in the VDS varies from manufacturer to manufacturer. However, there are some common vehicle attributes that almost always are captured:

- Model
- Engine—often identified by the 8th digit*
- Doors/Body Type/Cab Type
- Drivetrain
- Airbag/Restraint system
- GVWR Range for Light Duty and heavier vehicles only. **

* The 8th digit is consistently used by American manufacturers, as well as many foreign manufacturers, to capture the vehicle’s engine.
** Traditionally captured in the 4th digit

In addition, the following details may often be determined based on the VIN:

- Trim
- Emissions Standards
- Wheelbase
- Transmission (~50%)

In 2008, the NHTSA approved a ruling for all light duty/passenger vehicles that effected how the VDS is used for model year 2010 forward. First, vehicle manufacturers would be required to use the 4th digit to identify the category of vehicle, rather then the WMI. Second, the 7th digit would be used along with the year digit to determine model year. The 7th digit is numeric before MY2010 and alphabetic starting in MY 2010.
Position 9: The Check Digit / Vehicle Checksum

The ninth digit of the VIN is used to provide a check digit. It is generated, by the manufacturer, by performing a calculation on all other digits in the VIN. As a result, the check digit can be used to verify the validity of an encountered VIN using the same calculation. The check digit can be any number between one and nine, as well as “X” which represents the number ten for calculation purposes.

The check digit is often used in law enforcement to determine if a vehicle's VIN number has been tampered with. It is used in VIN decoders, along with a check for characters I, O, and Q, to determine if a VIN is valid. It is required for all vehicles in North America and is utilized extensively but not required in Europe and abroad. Here is a link to further information on how to [use the check digit to validate a VIN](#).

Position 10: Model Year

The model year is required to be captured in the 10th digit for all US vehicles. There are 30 characters approved for use in position 10. The characters not approved for use are I, O, Q, U, Z, and 0. In addition to the 10th digit, consideration of the 7th digit is required to determine the exact model year. As stated earlier, the 7th digit is numeric before MY2010 and alphabetic starting in MY2010.

Position 11: The Manufacturing Plant

The eleventh digit is used to identify the specific plant and plant location that the vehicle was manufactured in.

Position 12-17: The Serial Number

This portion of the VIN is often referred to as the vehicle’s serial number. Large manufacturers (≥ 500 vehicles annually) use these last six digits of the VIN to sequentially number similar vehicles that they produce. Manufacturers producing <500 vehicles of a given type are assigned a shared WMI (The WMI will end in 9) and are further assigned a second three-digit pattern that occupies digits 12-14. These smaller manufacturers can only be identified by using both the WMI and this three-digit code. Only the last three digits will be used by these smaller manufacturers to sequentially number their vehicles.
Positions 1-8, 10, & 11: The VIN Pattern

The VIN Pattern is the informational portion of the VIN that is used by most VIN decoding solutions. Manufacturers have information tied to the full 17 digit VIN that identifies the vehicle with all optional equipment installed within the production process. However, this “As Built” information is closely guarded by manufacturers and generally not available for third party use. As such, VIN decoding done within business applications outside of OEM use is based off of the “VIN Pattern” or “VIN Squish” and does not consider the serial number portion of the VIN.

Vehicle Identification Numbers, and how they are used, have evolved greatly over the last 60 years. For Light Duty and Passenger Vehicles in the US, the updated NHTSA Regulations, adopted in 2008, allow the current VIN system and requirements to stay in effect through 2039. After reading this article you should have a solid understanding of what this regulation requires. Further, you should understand the kind of information that the VIN contains, as well as where, within the VIN, to find that information. This should give you a good start in evaluating your businesses VIN decoding needs.

I hope the basic VIN information in this article has helped you better understand how you can utilize automotive data to meet the needs of your business. However, you have likely noticed that some of the vehicle information, which is most valuable to your business, is not encoded in the VIN. In addition to providing straight VIN decoder solutions, established automotive data suppliers, like DataOne Software, can tie much more information to a VIN than what is directly encoded. Through delivered database tables or web based VIN decoder API’s, a solution is available to provide you with the automotive data and intelligence your business requires.

If you are looking for an automotive data or VIN decoding solution, contact us today to discuss how our products can meet your needs!

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Email: sales@dataonesoftware.com

Form: Request For Information