



The Ins and Outs of Vehicle Identification Numbers

VINs are generated at the time of order placement by a manufacturer. You can find a car's VIN in three major locations: on the driver-side doorjamb, on the firewall in the engine bay and beneath the windshield on the driver side.

A Vehicle Identification Number, known as a VIN, is a set of 17 numbers and letters that uniquely identifies a vehicle such as a car, truck, motorcycle or RV motor home. It provides a means to track a vehicle from its "cradle" (the factory) to its "grave" (the junk yard).

According to the NHTSA, the early VINs came in a wide array of configurations and variations, depending on the individual manufacturer. Beginning with model year 1981, the NHTSA required that all over-the-road-vehicles sold must contain a 17-character VIN. This standard established a fixed VIN format.

VINs are used for vehicles designed for routine road circulation, such as:

- cars
- light duty trucks
- heavy duty trucks
- safety vehicles (fire engines)
- hybrid and electric vehicles
- recreational vehicles
- towed vehicles, trailers, fifth wheels
- motorcycles
- scooters
- mopeds
- all-terrain vehicles

Since 1954, American automobile manufacturers have used a VIN to describe and identify motor vehicles. The National Highway Traffic Safety Administration (NHTSA) began requiring standardized VINs in 1981 for all road vehicles, for a few key purposes:

- assisting law enforcement authorities in tracing and recovering parts from stolen motor vehicles
- deterring thieves from selling stolen vehicles and parts
- assisting consumers in tracking the performance, recall and purchase history of used vehicles

A VIN also is a useful piece of information for the manufacturers and dealers:

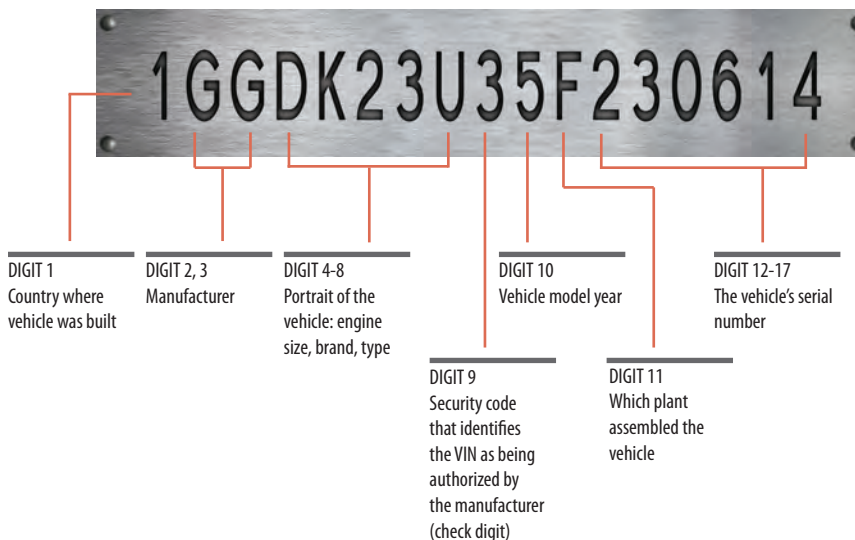
- Track of the vehicle's warranty, preauthorization and claims using the VIN
- The NHTSA receives reports about vehicles using the VIN
- Dealers can use the VIN to retrieve information and history about the vehicle

What's In a VIN?

A VIN is made up of several smaller components that indicate vehicle-specific information.

SOURCES:

- NHTSA
- DMV.ORG
- CFR 49
- Society of Automotive Engineers



Creating a VIN in CuroGens' Vehicle Management System (VMS) for Microsoft Dynamics® AX

The rest of this paper illustrates the process of creating a VIN including decisions that need to be made by the manufacturer and the steps to reflect those decisions in VMS.



CuroGens' Vehicle Management System (VMS) for Microsoft Dynamics® AX provides a highly customized and comprehensive solution for companies that manufacture products with a Vehicle or Hull Identification Number sold through dealer networks.

VMS is an integrated, adaptable business management solution that enables manufacturers and dealers to track units such as motor vehicles, watercraft and all-terrain vehicles throughout their lifecycle.

The system works like and with familiar Microsoft software — automating and streamlining financial, customer relationship and supply chain processes in a way that helps drive business success.

Step 1: Determine the VIN Components

Before assigning VINs to vehicles, the manufacturer has to decide the component parts and order of the information in the VIN. Every VIN contains codes that indicate specific information about the vehicle, plus a check digit that allows an algorithm to verify the validity of the VIN. However, the order of those segments can vary between manufacturers, between models, or even between model years of a vehicle.

The segments of the VIN typically include:

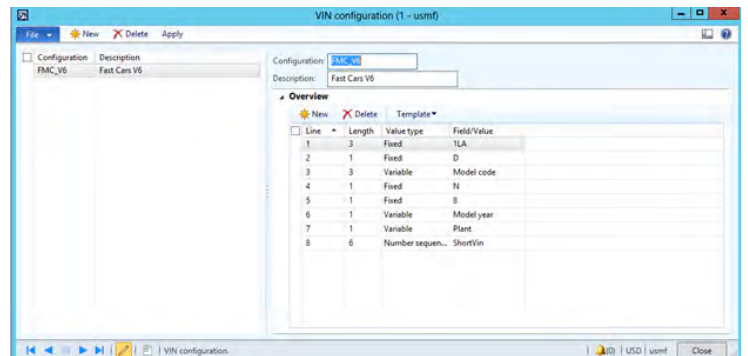
- World Manufacturer Identifier (WMI) : The WMI is 3 characters long. The first character identifies the country the vehicle was produced in, the second identifies the manufacturer, and the third may identify the vehicle classification, such as truck, car, or RV.
- Restraint or Gross Vehicle Weight Rating (GVWR) : This segment either signifies the restraint type, such as seatbelts or airbags, or indicates the gross vehicle weight rating, such as ½ ton.
- Model: This segment identifies the model of the vehicle.
- Engine type: This segment indicates the engine type.
- Check Digit: The check digit is 1 character long. It is calculated based on the values of the other segments in the VIN.
- Model Year: This segment indicates the model year of the vehicle.
- Factory ID: This segment identifies the plant where the vehicle was manufactured.
- Sequential Number (short VIN): The short VIN is 6 characters long. It is a sequential (serial) number that differentiates vehicles where the values of all the other segments are the same.

Step 2: Create a VIN Configuration

Next, the manufacturer creates a configuration for the VIN in VMS and enters a row for each component decided in the previous step.

For each component, the manufacturer decides:

- Line : The "line" is the term for the numerical order of the segment.
- Length : The length is the number of characters in that segment. The total number of characters for all segments must equal 17.
- Value type: The value in a component can be:
 - Fixed – The value is the same for large groups of vehicles from this manufacturer. For example, the WMI is often set up as a fixed value.
 - Variable – The value varies from vehicle to vehicle depending on the specific characteristic of the vehicle. For example, the Model is set up as a variable value.
 - Number sequence – The value is sequential from one vehicle to the next. For example. The short VIN is set up as a number sequence.



Vehicle information	
Configuration:	FMC_V6
Model code:	x
# of Axles:	2
Vehicle type:	None
Warranty type:	3 yr 36k

- Field/Value: The Field/Value varies depending on the value type. If the Value type is:
 - Fixed, then the manufacturer enters the value.
 - Variable, then the manufacturer enters the criteria that the system uses to choose the value. For example, if the manufacturer enters Model code, then the system retrieves the Model code value from the Vehicle information for the particular vehicle and includes it in the VIN.
 - Number sequence, then the manufacturer selects a previously defined number sequence code.

Step 3:
Enter Release Product Details

Any component with a Value type that is Variable needs to have vehicle-specific criteria to use to retrieve the correct value for the component.

In the previous example, the system retrieved the Model code from the Vehicle information to populate the Model component of the VIN. Obviously, the Model code has to exist in the Vehicle information first in order for VMS to retrieve it.

The manufacturer can create the VIN Configuration before the Model code exists, so this step to create the actual values for the Variable type fields is required before VMS can assign a VIN.

Step 4:
Generate the Check Digit

When the manufacturer creates the vehicles, VMS retrieves the components of the VIN based on the configuration and the specific information for the vehicle and uses those components to calculate the check digit.

The following table illustrates the steps involved in calculating the check digit.

	WMI			Restraint/ GVWR	Model			Engine Type	Model Year	Factory ID	Sequential Number						
VIN components	1	Z	V	D	T	8	0	N	E	5	0	0	0	0	0	0	1
Transliteration	1	9	5	4	3	8	0	5	5	5	0	0	0	0	0	0	1
Weight	8	7	6	5	4	3	2	10	9	8	7	6	5	4	3	2	
Product	8	63	30	20	12	24	0	50	45	40	0	0	0	0	0	0	2

The algorithm to generate the check digit involves:

1. Replacing any letters in the VIN with corresponding digits. This process is called “transliteration.” Notice that in the table above, numbers in the original VIN components remain the same in the Transliteration row, but letters have been replaced with a number.
2. Multiplying each digit by a Weight that is assigned to its particular position. For example, the first digit is multiplied by 8, the third digit is multiplied by 6. Notice that the product appears in the Product row.
3. Adding together all the products. In our example, the sum is 294.
4. Evaluating that sum modulo 11 (dividing the sum by 11 to find the remainder). In our example, 294 mod 11 evaluates to 8 (294 ÷ 11 = 26 remainder 8).

The value is the check digit unless the value is 10. In that case the check digit is the letter X. The system inserts the check digit in the ninth place in the VIN. In our example, the VIN is 1ZVDT80N8E5000001.

Step 5:
Success!

The system assigns the completed VIN to the manufactured vehicle.

Note: The logic that creates the check digit is automatically included in VMS and does not need to be configured by the manufacturer.

ABOUT CUROGENS

Harnessing the power of Microsoft Dynamics® AX, SharePoint and .NET platforms, CuroGens provides technology solutions for global companies across the motor vehicle, automotive and manufacturing industries to help them save time, streamline processes and generate revenue.

Solutions include:

- Dynamics AX Vehicle Management System (VMS)
- Dynamics AX SharePoint Document Connector (SDC)
- Dynamics AX Upgrade Assessor (DUA)

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