HPtuners

VCM EDITOR

USER DEFINED PARAMETER GUIDE

27 May 2022

REVISION HISTORY

Date	Revisions
May 2022	User Defined Parameter Guide: Initial Release

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TABLE OF CONTENTS

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INTRODUCTION

User Defined Parameters is an optional feature that can be **purchased** on the HP Tuners website.

If you have information on parameters (switches, scalars, and/or tables) that we do not have defined currently in VCM Editor, this feature makes it possible to add them yourself and edit them in VCM Editor immediately.

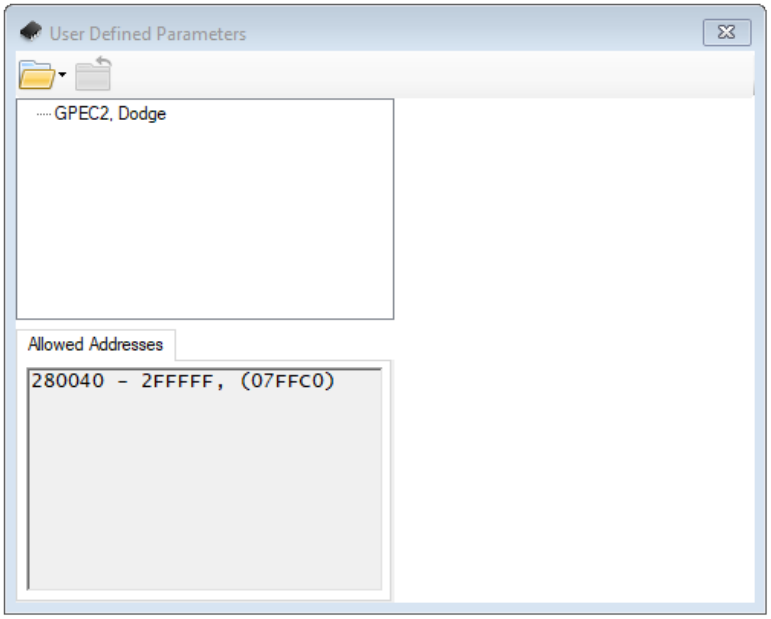
> **NOTE:** Parameters added must be supported by the operating system on the controller being tuned. You are simply telling VCM Editor about parameters that it does not have any information on yet. Adding a parameter that is NOT supported by the controller's operating system will have no effect because the controller won't use it.

When using this feature, parameters must be defined in TunerPro, which can be downloaded at:

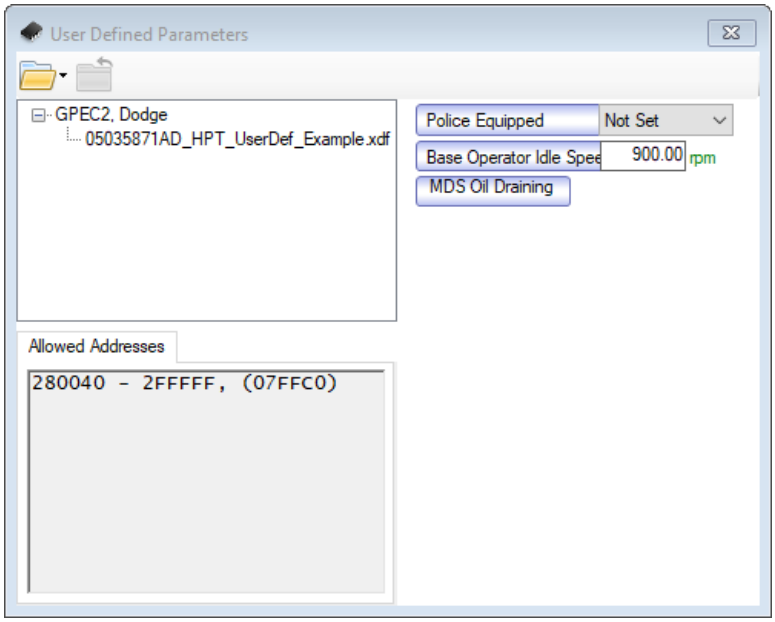
http://www.tunerpro.net/downloadApp.htm

PROCEDURE

1. Use TunerPro to define the parameters to be added.
   a. Open TunerPro.
   b. Configure the **XDF header info**.
   c. **Define each parameter** you wish to add.
   d. In the menu bar, select **XDF > Save XDF**.
2. In VCM Editor, open the .HPT file to which you want to add parameters.
3. In the menu bar, select **Edit > User Defined Parameters**.



4. Click  .
5. Select the TunerPro (.XDF) file that contains the parameters you wish to import.
6. Click **Open**. Your parameters will be imported into VCM Editor.



If you would like parameters added to VCM Editor permanently, email HP Tuners support to request that they be added.

> **NOTE:** Not all controllers supported by VCM Suite support User Defined Parameters, please **start a support ticket** for more information.

WHAT ARE THE "ALLOWED ADDRESSES" IN THE USER DEFINED PARAMETERS WINDOW?

The allowed addresses are address ranges that you are allowed to define parameters in. If you try to define a parameter outside these ranges, they will not import and you will not be allowed to edit them.

PURCHASING THE USER DEFINED PARAMETERS FEATURE

The User Defined Parameters feature can be purchased from the HP Tuners website:

1. Log into your account on **www.hptuners.com**.
2. On the My Account page, select **My Devices**.

3. The My Devices page lists all of your **registered** interface devices. Select the **Purchase** link for the desired device.

4. Click **Add to cart** and proceed to checkout.

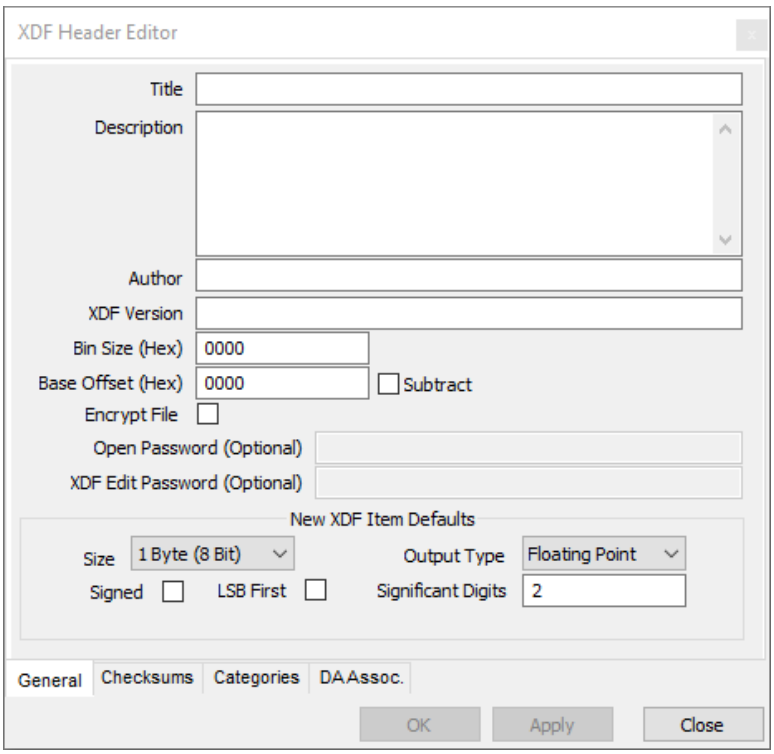
5. Once checkout is completed, connect the device to a USB port on your computer.
6. Open VCM Editor.
7. In the menu bar, select **Help > Resync Interface**. This will apply the feature license to VCM Editor.

The User-Defined Parameters should now be available for you to use.

XDF HEADER CONFIGURATION

Before you define parameters in TunerPro, you will need to set up the XDF header. Typically, only two header parameters need to be configured:

- Some controllers require a **base offset** for all parameters. For example, if you define the parameter at address: 0x1ABCDE, however the location of the parameter is actually at 0x801ABCDE. This would require an offset of +0x80000000. Although it's possible to enter this for each individual parameter defined, the XDF header allows you to specify it for all parameters in the current XDF file.
- A number must be entered for the **bin size**. It does not have to be the actual size of the bin (VCM Editor will ignore this value). It merely has to be a larger number than the highest parameter address that will be entered (the address you will actually enter + the base offset).



EDITING THE XDF HEADER

1. Open TunerPro.
2. In TunerPro's menu bar, select **XDF > View/Edit XDF Header Info**.
3. Enter your **Bin Size**.
4. Enter your **Base Offset** (if needed).
5. Click **OK**.

MANUALLY ADJUSTING THE BASE OFFSET

If you need to define a base offset of **0x80000000** or higher in TunerPro V5.00.8944 or older, you must edit the base offset manually in a text editor (For example: Notepad or Notepad++).

To manually adjust the offset in a text editor:

1. Open your .XDF file in the text editor.
2. Find the <baseoffset> field in the XDFHEADER (always near/at the top)
3. Enter your new offset value in DECIMAL, not hexadecimal.

> **NOTE:** For example, to specify an offset of 0x80000000, enter **2147483648** in the baseoffset field.

4. If the offset is negative, add a "-" before the offset.

> **NOTE:** For example, **-2147483648**.

5. Save your XDF.

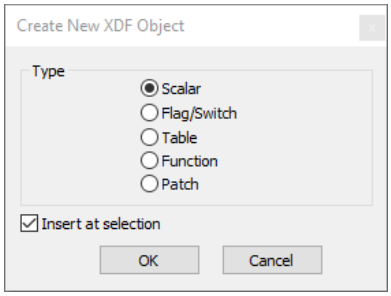
DEFINING PARAMETERS

If you have the optional User Defined Parameters feature, three types of parameters can be added to VCM Editor:

- **Scalar:** a numerical value. For example, a temperature or a speed.
- **Flag/Switch:** a simple True/False value.
- **Table:** a table.

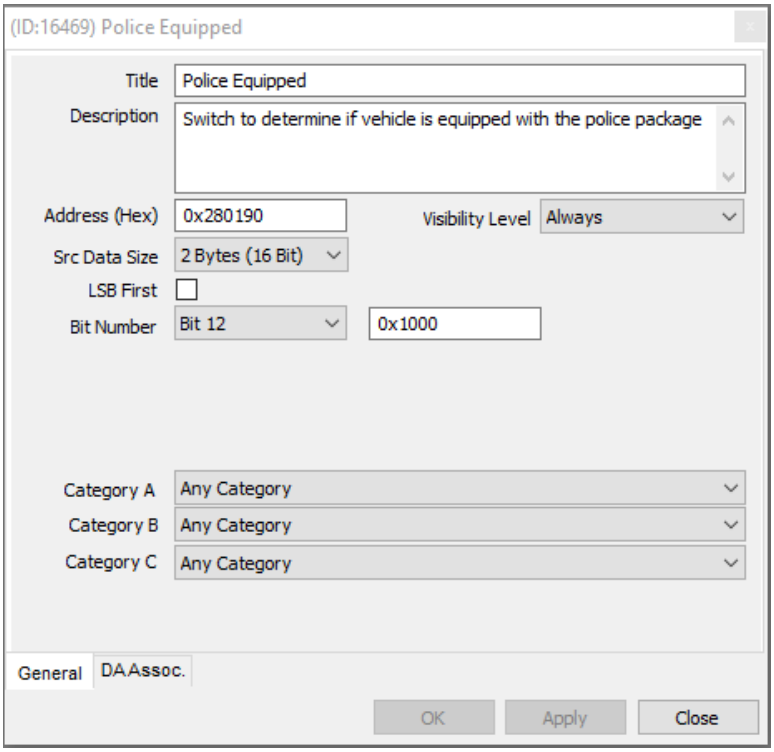
Once you have installed TunerPro and configured the **XDF header info**, follow these steps to define a new parameter:

1. In TunerPro's menu bar, select **XDF > Create New XDF Parameter**.



2. Select the type of parameter to add (Scalar, Flag/Switch or Table):
3. Click **OK**. A form with configuration information for the new parameter appears.
4. Fill out the fields in the form as needed for the new parameter. See the appropriate configuration section below for more information.
5. Click **OK**.

SWITCH CONFIGURATION



To configure a new switch in TunerPro, fill out the following fields:

- **Title.** The name entered here will be displayed as the parameter name in VCM Editor.
- **Description (optional).** A description that can be used for your reference in TunerPro. VCM Editor will not display this description.
- **Address.** The address of this parameter within the binary file.

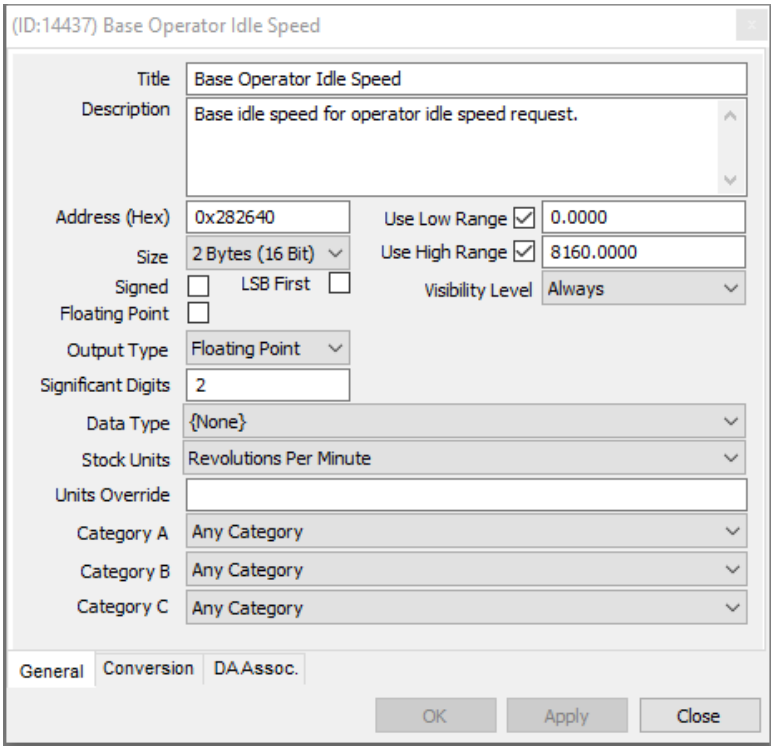
> **NOTE:** If you have defined a Base Offset in the **XDF header**, the actual address used will be the address entered here plus the base offset.

- **Src Data Size**. Although switches are stored as single bits, the address specified above will point to a larger (1, 2, or 4 byte) field that contains the switch. Specify the size (in bytes) of the data field that contains this switch.

- **Bit Number.** The bit in the src data field that contains this switch. For example in the image above, the Police Equipped switch is encoded in bit 12 of the 16 bit src data field.

> **NOTE:** Visibility Level and Categories will be ignored by VCM Editor.

SCALAR CONFIGURATION



To configure a new scalar in TunerPro, fill out the following fields on the General tab:

- **Title.** The name entered here will be displayed as the parameter name in VCM Editor.
- **Description (optional).** A description that can be used for your reference in TunerPro. VCM Editor will not display this description.
- **Address.** The address of this parameter within the bin file.

> **NOTE:** If you have defined a Base Offset in the **XDF header**, the actual address used will be the address entered here plus the base offset.

- **Size**. The size (in bytes) of this data.
- **Signed.** Check this box if the value is signed (supports both positive and negative values) .

- **Floating Point.**If you are adding a 4-byte parameter, checking this box indicates that the parameter is stored as a floating point value. Leaving the box unchecked indicates that the value is stored as a 4-byte integer.

  > **NOTE:** The **Output Type** field also includes a Floating Point option. But the option in that field does not specify how the value is stored. It specifies how the value is displayed.

- **LSB First.** If this is a multibyte field (Size is 2 or more bytes), the state of this box indicates whether the value in this field is encoded with the least significant byte first (checked) or the most significant byte first (unchecked).

  > **NOTE:** This setting depends on the processor used in the vehicle controller. Some processors store multibyte data with the least significant byte first. Others store this data with the most significant byte first.

- **Stock Units.** The units for this parameter. (Is this value a speed in rpm? a temperature in degrees Celcius? etc.)
- **Use Low Range.** Specifies the lowest value that may be entered for this scalar. (If you enter "6" in this field, you won't be able to specify a value of "5" for this scalar in VCM Editor.)
- **Use High Range.** Specifies the highest value that may be entered for this scalar. (If you enter "100" in this field, you won't be able to specify a value of "102" for this scalar in VCM Editor.)

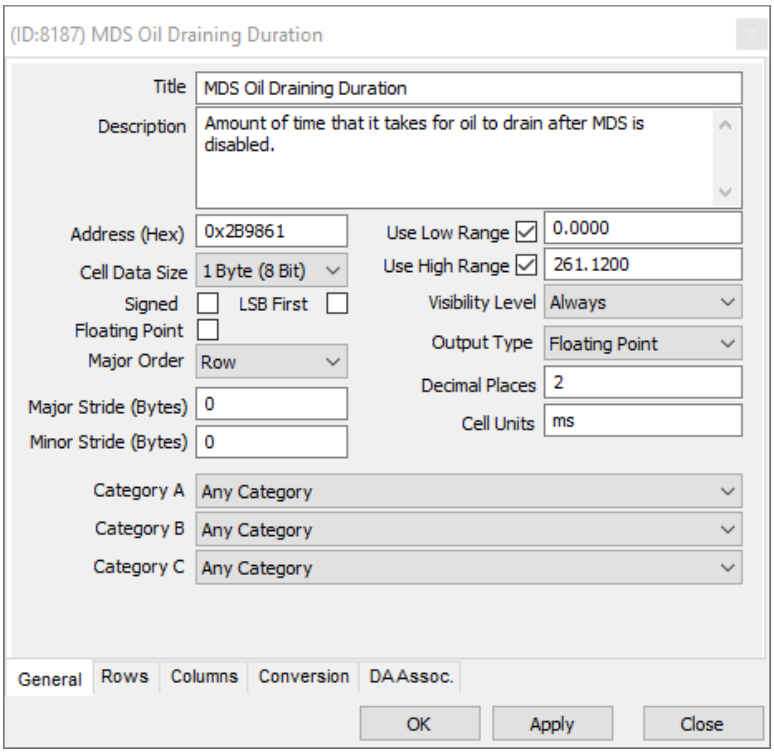
> **NOTE:** Visibility Level and Categories will be ignored by VCM Editor.

You will also need to enter an **Expression** on the Conversion tab. This is the Conversion Equation used to transform the raw stored value for this paramaeter to the value that will be displayed in VCM Editor. See *Conversion Equations* (Page 26) for more information.

TABLE CONFIGURATION

To configure a new table in TunerPro, it is necessary to enter general information about the table and information about the table's row axis and column axis.

TABLE INFORMATION (GENERAL TAB)



- **Title.** The name entered here will be displayed as the table name in VCM Editor.
- **Description (optional).** A description that can be used for your reference in TunerPro. VCM Editor will not display this description.
- **Address.** The address of this parameter within the bin file.

> **NOTE:** If you have defined a Base Offset in the **XDF header**, the actual address used will be the address entered here plus the base offset.

- **Cell Data Size.** The size (in bytes) of the value in each cell of the table.

- **Signed.** Check this box if cell values are signed (support both positive and negative values) .
- **Floating Point.**If cells in this table are each 4-bytes, checking this box indicates that cells are stored as floating point values. Leaving the box unchecked indicates that cells are stored as 4-byte integers.

> **NOTE:** The **Output Type** field also includes a Floating Point option. But the option in that field does not specify how cell data is stored. It specifies how the data is displayed.

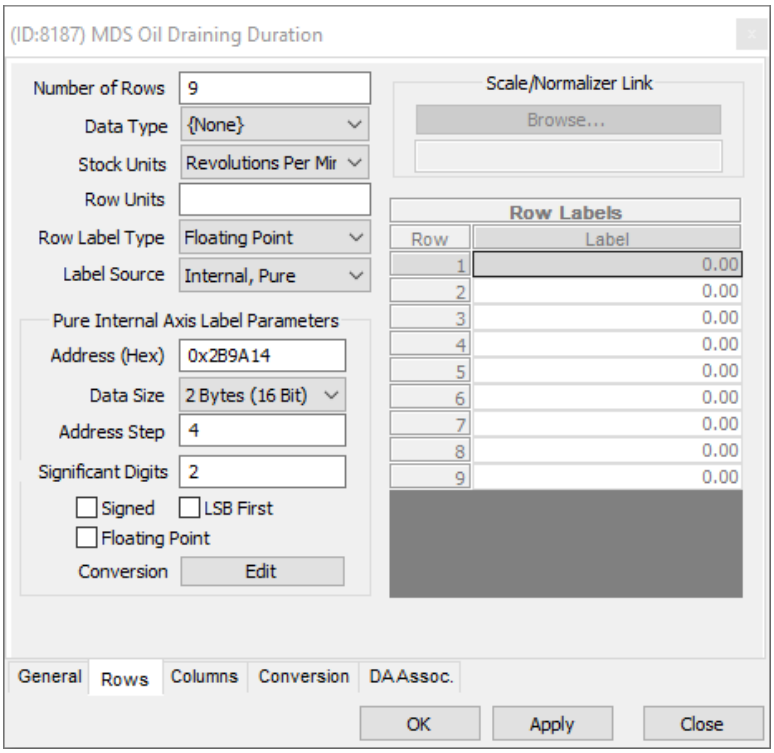
- **LSB First.** If Cell Data Size is 2 or more bytes, the state of this box indicates whether cell values are encoded with the least significant byte first (checked) or the most significant byte first (unchecked).

> **NOTE:** This setting depends on the processor used in the vehicle controller. Some processors store multibyte data with the least significant byte first. Others store this data with the most significant byte first.

- **Cell Units (optional).** See *What Units Do I Enter for Tables?* (Page 24).
- **Use Low Range.** Specifies the lowest value that can be entered in any table cell. (If you enter "5" here, you won't be able to enter a value of "4" in any cell in the table.)
- **Use High Range.** Specifies the highest value that can be entered in any table cell. (If you enter "250" here, you won't be able to enter a value of "257" in any cell in the table.)

> **NOTE:** Visibility Level and Categories will be ignored by VCM Editor.

ROW AXIS INFORMATION (ROWS TAB)



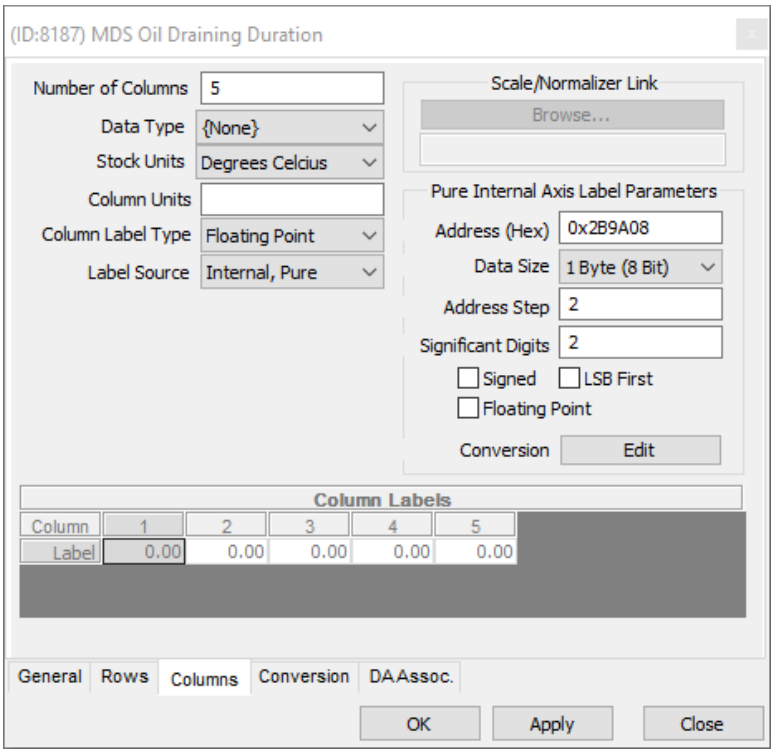
- **Number of Rows.** The number of rows in the table.
- **Stock Units.** The type of unit for the labels on the row axis.
- **Label Source.** Specifies where the values for the row labels are defined:
  - External (Manual). Row label values are specified in the table to the right. (Fill out the values in this table).
  - Internal, Pure. Row label values are defined in the binary file. Use the fields in the Pure Internal Axis Label Parameters group to specify where in the binary file these values are located.
  - Linked, Scale. The row label values are determined by a scaling table already defined in the XDF file. Use the Browse button in the Scale/Normalizer Link group to select the table to be used.

> **NOTE:** At this time, only **External (Manual)**, **Internal, Pure**, and **Linked, Scale** are supported by VCM Editor.

If you selected **Internal, Pure** in the Label Source field, the following fields are also required:

- Address
- Data Size
- Address Step
- Signed, Floating Point, and LSB checkboxes
- Click **Edit** to specify the Conversion Equation that will be used to transform the raw stored row label values to the values that will be displayed in VCM Editor. See *Conversion Equations* (Page 26) for more information.

COLUMN AXIS INFORMATION (COLUMNS TAB)



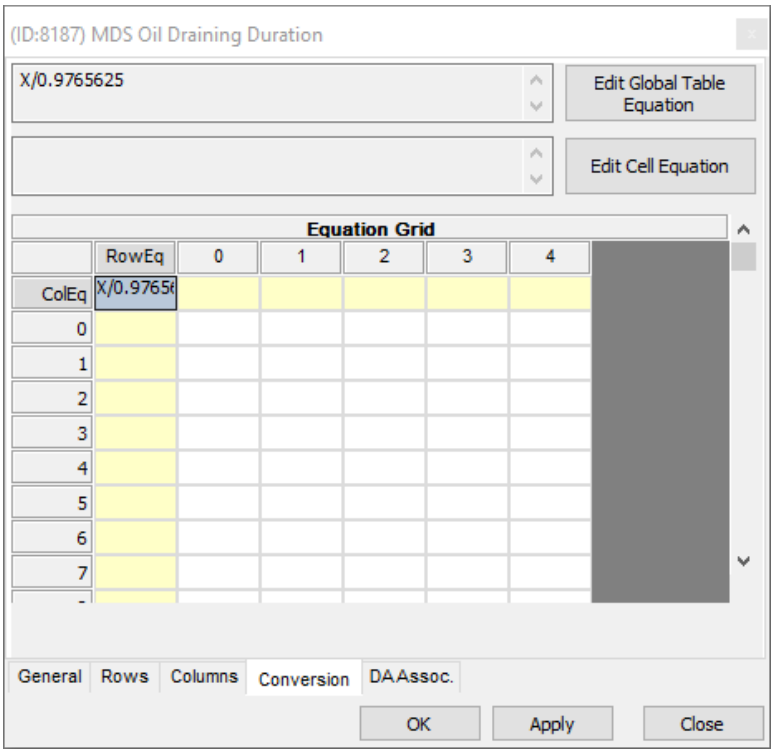
- **Number of Columns.** The number of columns in the table.
- **Label Source.** Specifies where the values for the column labels are defined:
  - External (Manual). Column label values are specified in the table below. (Fill out the values in this table).
  - Internal, Pure. Column label values are defined in the binary file. Use the fields in the Pure Internal Axis Label Parameters group to specify where in the binary file these values are located.
  - Linked, Scale. The column label values are determined by a scaling table already defined in the XDF file. Use the Browse button in the Scale/Normalizer Link group to select the table to be used.

> **NOTE:** At this time, only **External (Manual)**, **Internal, Pure**, and **Linked, Scale** are supported by VCM Editor.

If you selected **Internal, Pure** in the Label Source field, the following fields are also required:

- Address
- Data Size
- Address step
- Signed, Floating Point, LSB flags
- Click **Edit** to specify the Conversion Equation that will be used to transform the raw stored column label values to the values that will be displayed in VCM Editor. See *Conversion Equations* (Page 26) for more information.

TABLE CONVERSION EQUATION (CONVERSION TAB)



Use this tab to define conversion equations for the table cell data. At a minimum, you must have a global equation. Conversion equations that apply to individual cells, rows, or columns can also be defined.

- To define a global equation that will be used for all cells in the table, click the **Edit Global Table Equation** button.
- To define an equation that will be used for all cells in a specific row or column, select the yellow box at the left end of the row or at the top of the column. Then, click the **Edit Cell Equation** button. For the selected row or column, this equation will be used INSTEAD OF the global table equation.
- To define an equation that will be used only for a specific cell, select the desired cell. Then, click the **Edit Cell Equation** button. For the selected cell, this equation will be used INSTEAD OF the global table equation and any row or column equation defined.

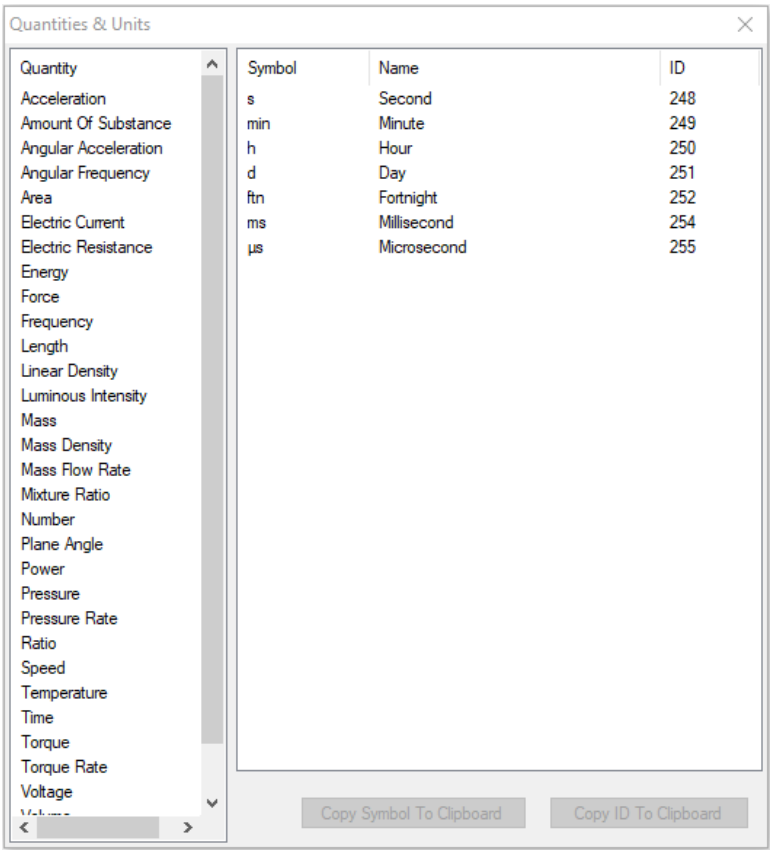
See *Conversion Equations* (Page 26) for more information.

WHAT UNITS DO I ENTER FOR TABLES?

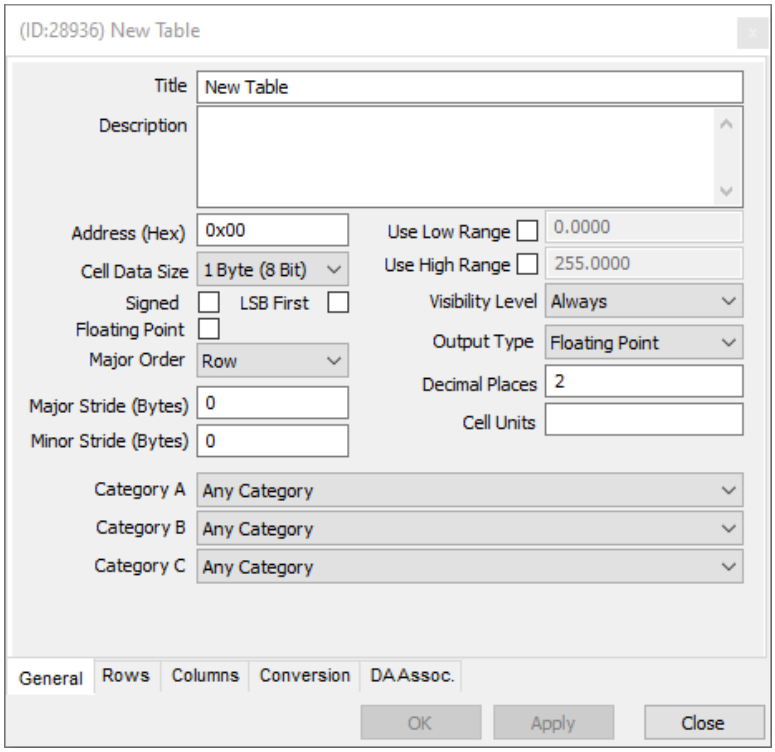
In the instances where there is no drop down selection for units (main table cells), you will need to enter a valid unit into the **Cell Units** text box.

To find valid units for import:

1. Open VCM Scanner.
2. Go to **Tools > Quantities & Units**.



3. Copy the Symbol OR Name into the **Cell Units** box in TunerPro.



For all other parameter types (Scalars, Axis') that have an available **Stock Units** drop-down, please select your unit from the drop-down.

CONVERSION EQUATIONS

Vehicle controllers sometimes apply a mathematical transformation to certain scalar parameters and table data in order to store them more efficiently. For example, a parameter whose values are integers between -50 and 200 could easily be stored in a single byte (range 0-255) if 50 is added to the value prior to storage. If the controller performs this type of transformation on the parameter you are defining, you must enter the math performed as a "conversion equation".

More specifically, the conversation equation is the math that needs to be performed to transform the stored value read from the vehicle to the value that should be displayed in VCM Editor. For the example parameter above, you would specify **X - 50** as the conversion equation in order to obtain the original value.

> **NOTE:** When the value is written back to the vehicle, VCM Editor will automatically apply the inverse of the conversion equation defined in order to obtain the stored version of the value. (In the case of our example parameter, it would add 50.)

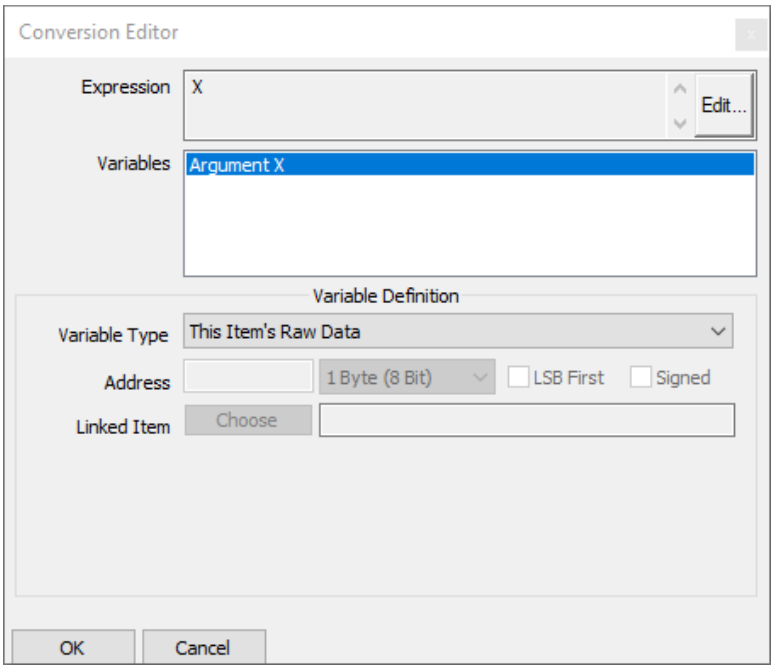
For scalar parameters, you can enter the conversion equation on the Conversion tab.

For tables, there are three different places to enter conversion equations:

- A conversion equation that transforms the row labels can be defined by clicking the **Edit** button on the Rows tab. (This equation is used only for labels whose source is Internal, Pure.)
- A conversion equation that transforms the column labels can be defined by clicking the **Edit** button on the Columns tab. (This equation is used only for labels whose source is Internal, Pure.)
- Conversion equations that transform the cell data can be defined on the Conversion tab.

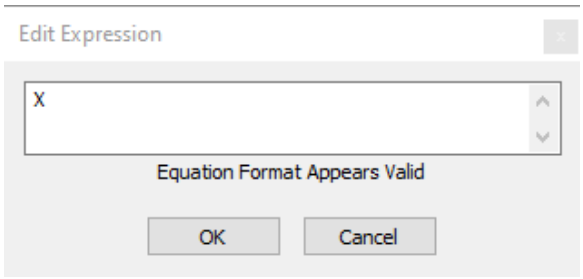
USING THE CONVERSION EDITOR

The interface for defining a conversion equation is essentially the same for scalar values as it is for table cell data or row and column labels.



The current conversion equation appears in the **Expression** box. Follow these steps to change it:

1. Click **Edit**. The Edit Expression window appears.



2. Type the equation you wish to enter.

> **NOTE:** Letters entered will be interpreted as variables, which must be defined in the remaining steps. So, if you enter **X + Y - 5,** the editor will create a variable for X and a variable for Y.

> **NOTE:** The Conversion Editor topic in Tuner Pro's help system includes comprehensive lists of operators and functions that can be used here.

> **NOTE:** By default, the expression is just **X**, where X is defined as the raw stored value. So, the value you would see in VCM Editor would be the same as the value stored.

3. Click **OK**.
4. For each variable listed in the **Variables** box, define the variable by doing the following:
   a. Select the variable to be defined.
   b. In the **Variable Type** dropdown, select one of the following:
      - **This Item's Raw Data.** Set the variable equal to the raw stored value of the XDF item being configured.
      - **Other XDF Item's Output.** Set the variable equal to the output of another flag or scalar already defined in this XDF file.
      - **Raw Data at Address.** Set the variable equal to a value stored at a known address in the controller's memory.
   c. If you selected Other XDF Item's Output, click the **Choose** button to display a list of XDF items already defined in this XDF file. Then, select the item you want to use and click **OK**.
   d. If you selected Raw Data at Address, enter the **Address** of the data to be used and select its size in bytes. Also, use the checkboxes to indicate whether the data is **LSB First** and/or **Signed**.