Status Variables

Question:

What is a Status Variable and how can I use it in my configuration?

Answer:

In the device configuration through Race Studio 3, the Status Variable creation allows merging more truthfulness conditions that, if satisfied, modify the variable itself, the status of which changes from 0 to 1, or from False to True, from Off to On and so on. This status variation will be associated with one or more actions, that must activate when the status variable changing is recognized.

Further examples are present at the end of this document, while here below the steps to configure a status variable are explained:

Open Race Studio 3, create a new configuration or open an existing one. After its main channels have been set, enter the "Status Variables" tab.

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- Click "Add New Variable" to create a new Status Variable (following image).
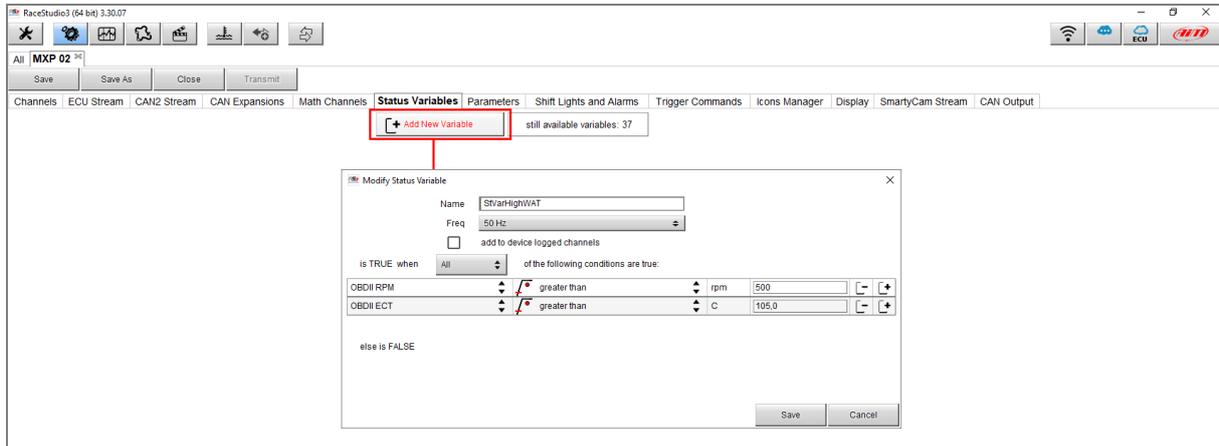
- After a name has been inserted, the Variable sampling frequency must be set. **The Status Variable sampling frequency must be equal to/greater than the highest sampling frequency of every single channel involved.**
- Choose if the Status Variable must be recorded (tick the box "add to device logged channels"), thus adding it to the channels list of Race Studio Analysis "Measure Graph" tab.
- Choose if the Status Variable is true when All/Any of the set conditions are satisfied.
- Set the Status Variable truthfulness conditions, configuring each channel's conditions; to add more channels, press the button "⊞" next to each bar.

When settings are done, click "Save" to save the Status Variable and return to the main tab. Passing the mouse pointer on each Status Variable box, it is possible to have a preview of its details: a gear button appears (⚙), to modify the variable properties, as well as an "X" button (✕), to delete it.

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Once created, the Status Variable can be used in the configuration sections and it can be checked online through the Live Measures function of Race Studio 3.
To make practical examples and to understand how the Status Variables can be useful, we'll analyze some short examples.

- An alarm LED, a message, an alarm icon, are thought to activate and disable when certain conditions are verified. These activations are not stored into recorded data: **to record what has been shown to the driver**, or to know the precise moment in which activations happened, a status variable must be created, to be associated with the alarm, the icon, the message and so on.
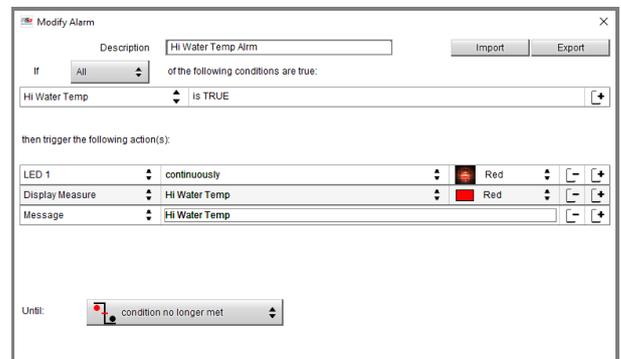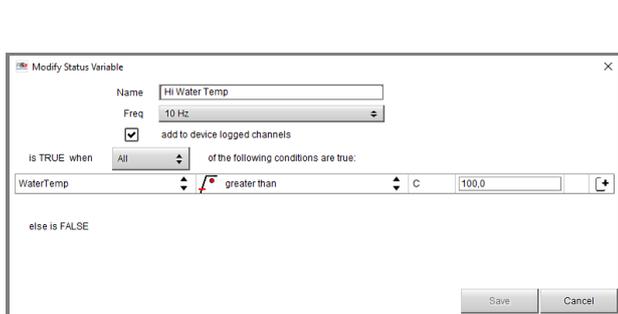
- Alarm icons (Icons Manager) are meant to activate according to one or more conditions regarding a single channel (i.e.: when the water temperature is lower than 70°C, blue icon; when higher than 98°C, red icon). **If you want to associate icons to the combination of more channels or events contemporarily**, it is mandatory to use the Status Variable (following left picture).
An example can be the braking system malfunctioning icon: this must turn on both when the park brake is active, and when brakes oil level is low (following right picture).
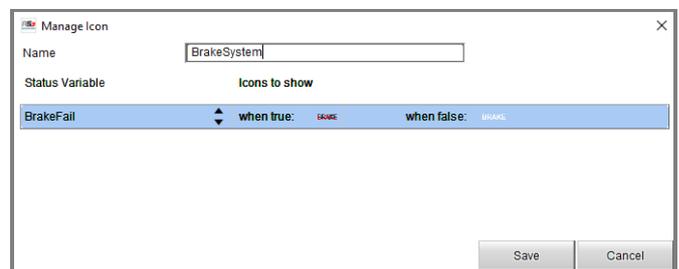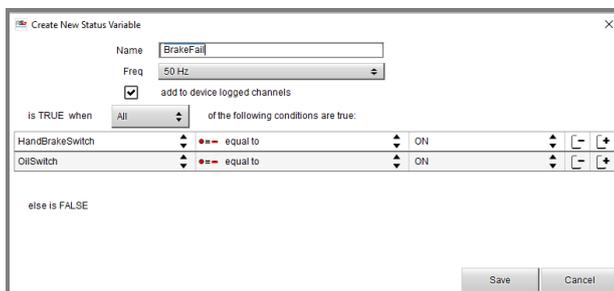
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- Alarm LEDs, popup messages (Popup Color Msg), messages (Message), measure fields coloring (Display measures) and digital outputs (Output Signal) functions are associated to one or more conditions that can be verified in two exclusive modes:
  ANY (logic OR) – it verifies when at least one condition is true;
  ALL (logic AND) – it verifies when all the conditions are contemporarily true.
  If **AND and OR combinings** must be set, it is necessary to use Status variables, through which all the basic conditions must be defined, that will be compared. An example could be a generic alarm, or the activation of an engine protection strategy (i.e.: Limp Mode), to be sent to the ECU through an output Signal or a CAN Output.

  The alarm enabling condition of single events must be set for the Status Variable. These are compared into the alarms tab, to verify that at least one of them is active. Following images show the basic conditions – low oil pressure, low fuel pressure, high water temperature (left images) – that are compared into the Shift Lights and Alarms tab (right image) to turn LEDs on (LED1 and LED4), write a message and send an output command.
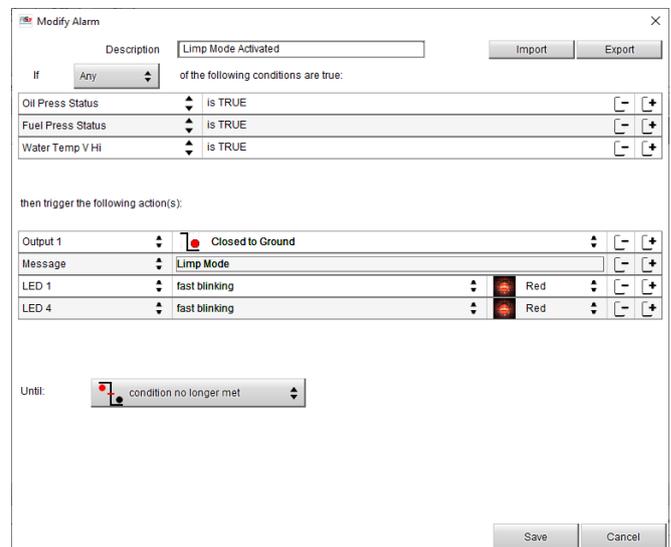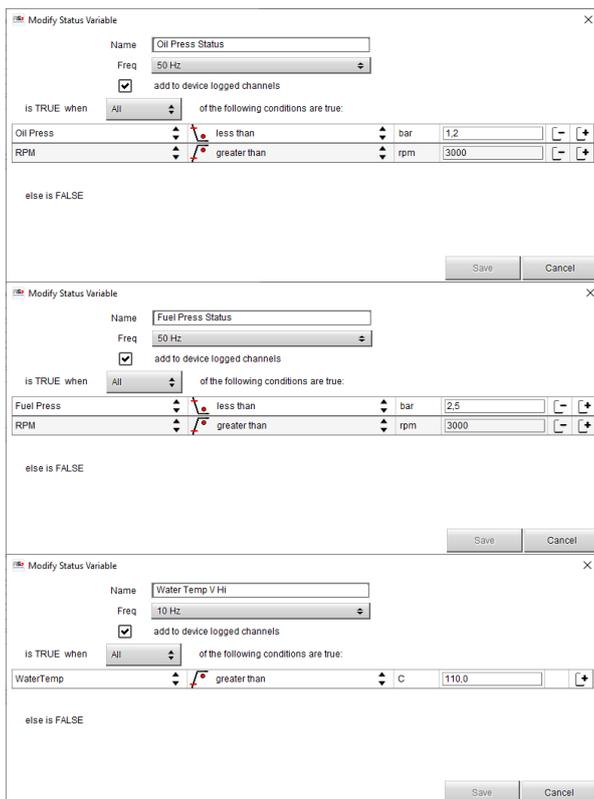
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- Some ECU channels, available through CAN protocols selection, are managed as bitfields, that means a sequence of bits in which each one indicates the activation of a specific function. These fields are normally managed by alarms, icons or messages. Status variables can be used if **you want to use a display field to check the status of a bit that is included into the bitfield.**
The following example is relevant to the Pit Limiter activation bit, included in a generic channel (StrFunction), dedicated to the strategies managed by the ECU, as shown in the first following image. A "Pit Limiter" Status variable must be added (second following image) that extracts that specific bit from the channel and uses it into the display field, as pointed by the light-blue square (third image).