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# Diagnostics: KTS diagnostics made 'ESI'

This sseries of technical articles from Bosch focuses on how to get the best out of its ESI[tronic] 2.0 software, which is used in conjunction with the KTS range of diagnostic tools for vehicle fault diagnosis and service function procedures.

Actual values (AVs) are the variable data parameters that have been processed by the ECU and are an essential source of information for automotive system diagnosis and analysis. They're a useful representation of the state of a system at the ECU based on the data collected from the sensors or switch input signals and component outputs on the vehicle. The technician can use Bosch ESI 2.0 to display the info in a variety of helpful formats and save the results for subsequent viewing and comparisons.

Once you have connected the Bosch KTS to the vehicle and selected the relevant system, ESI 2.0 will offer you 'Actual values' in the function selection screen, if the ECU in question supports this type of data transfer.

It is useful to understand that an AV can either be a numerical value of measurement, such as 'Control module supply voltage: 12.9 volts', or alternatively an input or output condition like 'Drivers door status: Door open'. The system provides a data stream which is constantly refreshing on the screen so the technician can view any changes in condition that are recognised by the ECU and visible in ESI 2.0.

These days, modern vehicle ECUs can support hundreds of AV parameters. To help the technician select the right AV more quickly, ESI 2.0 simplifies the process by providing an 'actual value group' selection screen in some cases. This groups parameters together and allows the technician to view either all of the supported AVs or only values connected to a particular component group or function. This will narrow down the list so you can find the data that you need faster.

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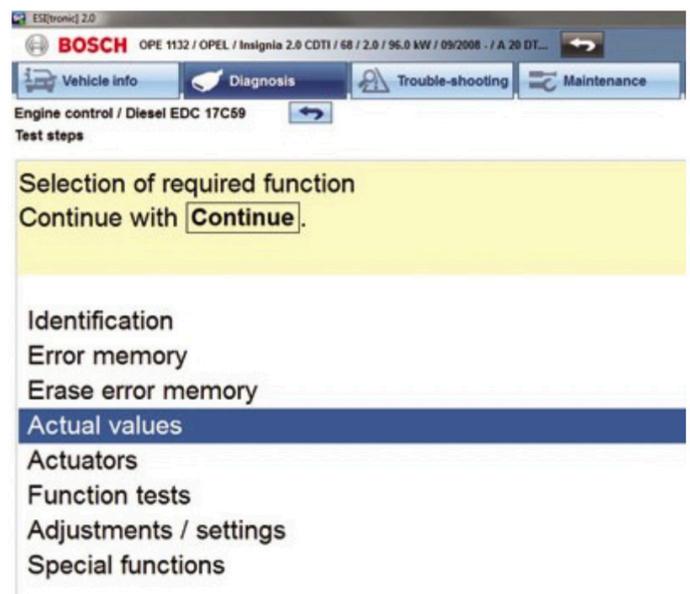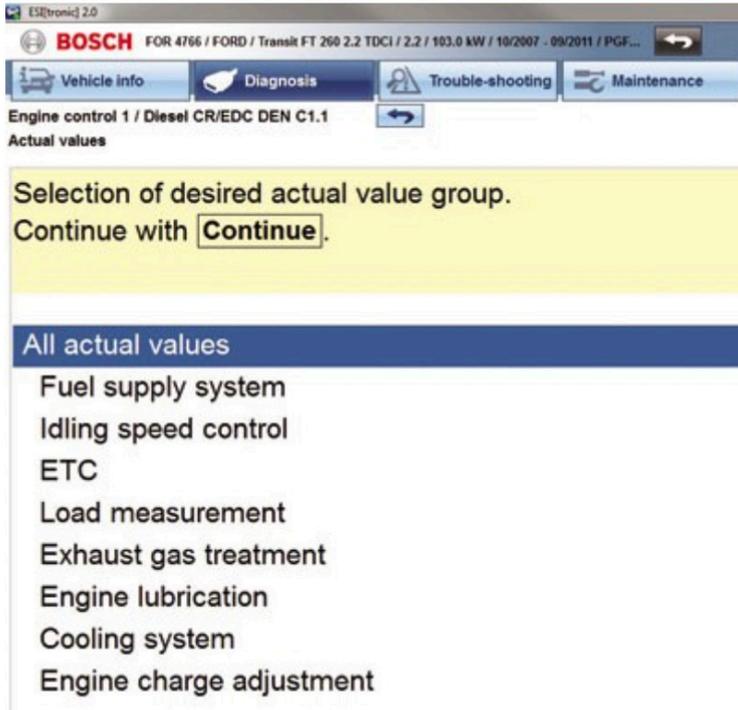
Another highly useful feature that was added to the ESI 2.0 software in the 2015/2 DVD update is an 'Actual value' search bar. This is a brilliant way to quickly search the list of AV's for any 'key words' that you are looking for. By typing into the search field the AV list is instantly filtered to only show values that contain the text you have entered.
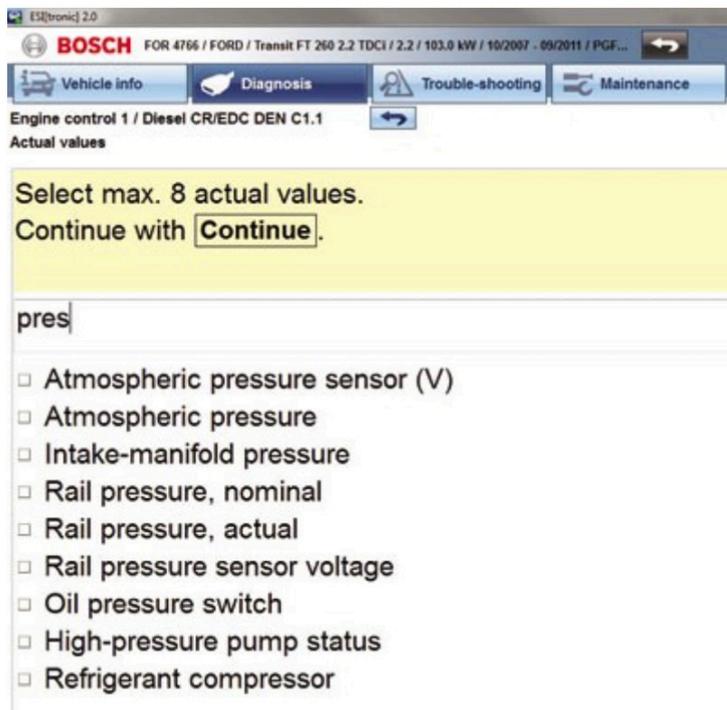
With Bosch ESI 2.0, a technician can choose from one selection list any of the required AVs to be displayed for comparison purposes. Up to eight different AVs can be displayed together and a 'tick' symbol in the box on the left confirms your selected values. If you're using a computer with a keyboard, a handy tip for selecting values from the list is to use the up and down cursor keys to scroll through the list and the space bar or left/right cursor keys to select or de-select the highlighted value name. Once you've made your selection, clicking 'continue'

or pressing the F12 or enter key, will give you the values on screen in a text format. Each AV will have the name, value, unit and possibly a hint such as "Allow engine to idle" displayed. At this point, you'll probably see the value changing as the parameter data is refreshed.
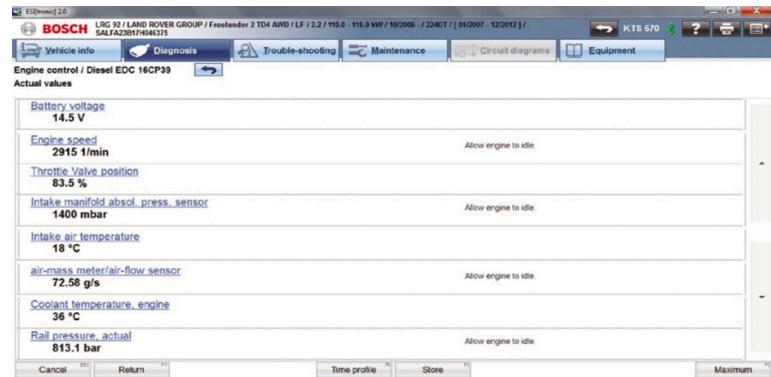
Using the 'Store F2' soft key at any time will add the data on screen to the job protocol that was covered in a previous issue.

Pressing the F3 soft key when viewing the AVs, after some time has elapsed, will allow the operator to cycle through the Maximum, Minimum & Current values collected since the data stream was started – a very helpful tool if you're looking for a value that is operating outside of its expected threshold. For example, if the turbo of an engine system was over-boosting on a road test then you will see, via the F3 maximum key, that the tolerance boost value was exceeded at some point, without having to constantly monitor the changing value stream. This is a momentary value that could have otherwise been missed. You'll also notice that on the right hand side of the screen there are up and down arrows that will enable you to scroll to the next or previous values from the AV list.

Expected values

Sometimes when investigating a fault on a vehicle there may be a physical symptom present but no diagnostic trouble codes stored. In this case, you could be looking at the AVs of the system for any anomalies. One more new feature in ESI 2.0 is that when the AV name is shown as a blue underlined hyperlink, you can click this to see the functional description of the associated component and be shown what values should be expected according to the conditions.

One of our preferred features of AVs in ESI 2.0 is the 'F5 – Time profile' soft key that will change the display of AVs to a colourful graphical format that plays across the screen. Now you can manipulate the data presented to best suit your requirements. If you haven't already done so, test this out to see how handy it is. The time base can be adjusted between 5 to 60 seconds to zoom in or out of the graph on screen. Pressing the 'pause' key will stop the data collection at that point and the buffer memory will store up to the last six minutes or so of data, depending on how many values were selected.

The technician now has the option to play back the capture in a sequence or scroll through the data screen-by-screen and then zoom into millisecond detail if needed.
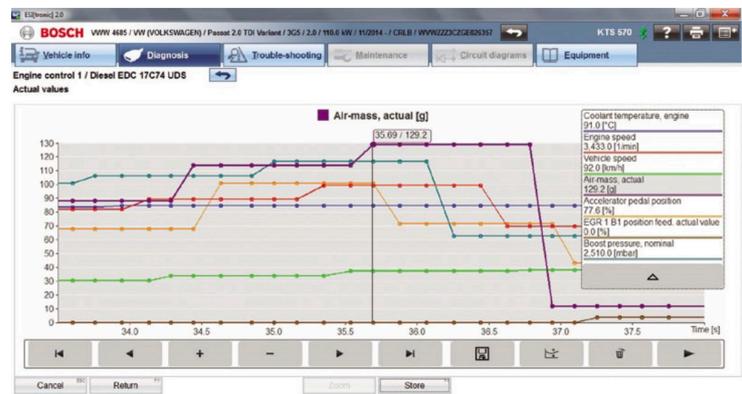
Again up to eight AVs can be included in the time profile and each one selected will be listed in the pop-up box that will identify the colour coding of data traces. Clicking one of the AV names in this list will highlight that value in the graph and change the 'y' axis scale and unit accordingly.

It is easier to identify a problem when you can clearly see the relationship between components in operation together. Depending upon the system and fault that you're investigating in ESI 2.0, the applicable values can be viewed together in one graph. An example of this would be the accelerator pedal position, air mass meter flow, EGR valve actuation and boost pressure on a Common Rail diesel engine during acceleration. Clicking 'F4 store' during an AV time profile will take a static screen capture of the data graphing on screen and add it onto the protocol report which can be saved and printed off for reference.

Along the bottom you will notice an icon that looks like a floppy disk symbol, called 'Data recording', which will save a flight recorder style file of the current time profile data collection. The technician can save, open, review and play back the data recording at any time. This is handy if you're searching for an intermittent fault and wanted to first record the event occurring out on the road, and later view and analyse the results back in the workshop. The file at that point will be saved in the 'Recordings' tab (found in the 'Main menu' under the 'Protocols' section) (see Fig7).

You can also add important info, such as customer and vehicle reference, to be able to later identify the job associated with the file.

The 'Actual value' display features described in this article can be highly useful in automotive system diagnostics by allowing you the versatility to view and store the data from the vehicle in different ways. This is another great reason why Bosch KTS and ESI 2.0 are such an essential tool and system combination to use when performing vehicle maintenance and repair in the workshop environment.

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