

# PCAN-Diag FD J1939 Add-in

## User Manual



# Relevant Products

Product designation	Firmware	Part number
PCAN-Diag FD	from version 1.4.2	IPEH-003069
PCAN-Diag FD J1939 Add-in		IPES-004069
PCAN-Diag FD J1939 Add-in: 2 Years Maintenance Extension		IPES-004069-E

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PEAK-System Technik GmbH  
Leydheckerstraße 10  
64293 Darmstadt  
Germany

Phone: +49 6151 8173-20

Fax: +49 6151 8173-29

[www.peak-system.com](http://www.peak-system.com)

[info@peak-system.com](mailto:info@peak-system.com)

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# 1 Introduction

SAE J1939 describes communication in utility vehicles via CAN. Using PGs (Parameter Groups) and SPs (Suspect Parameters), the standard defines messages and data for the transmission of diagnostic and control information.

The J1939 Add-in for the PCAN-Diag FD extends the functional range of the diagnostic device by the support for the SAE J1939 standard. The CAN data traffic is interpreted according to the included J1939 database and is represented in a way that is understandable for the user. In addition, the add-in includes functions such as the decoding of multi-packet messages, address claiming, and the handling of diagnostic information.

The J1939 Add-in is activated with a device-bound license file which can also be purchased afterwards for a PCAN-Diag FD. Updates for the included J1939 database are included for a period of 2 years. An extension for further 2 years can be purchased separately.

## 1.1 Properties of the J1939 Add-in

- Support of the SAE J1939 standard
- Representation of J1939 data interpreted according to PG and SP definitions
- SAE J1939 database with all definitions and the included parameters
- Definition of up to 20 custom PGs
- Decoding of multi-packet messages with payload data up to 1785 bytes
- Support for address claiming
- Display of DM and DTC diagnostic data



The database can only be used with the PCAN-Diag FD J1939 Add-in.

# 2 Licensing

In order to use the J1939 Add-in on your device, you must have purchased a separate license for it and set up the device accordingly, if not already done at delivery.

## License Properties

- Binding to the serial number of a PCAN-Diag FD
- Permanent use of the J1939 Add-in on that device
- Possibility to update the database for J1939 up to 2 years after license purchase
- Delivery in form of a license file `license.dat`

## 2.1 Activate License

(if purchased separately)

1. Establish a USB connection between the PCAN-Diag FD and your computer (via USB-Kabel and using the *USB Connection* main menu item).  
The PCAN-Diag FD is mounted as mass storage device on the computer, here with drive letter X as example.
2. Copy the `license.dat` file that you received when purchasing the license to the following directory on the PCAN-Diag FD:  
`X:\License`  
If the directory does not exist, create it beforehand.
3. Download the current file package for the PCAN-Diag FD from the internet using the following download link:  
[www.peak-system.com/quick/DLP3069](http://www.peak-system.com/quick/DLP3069)
4. Unpack the complete contents of the downloaded `PCAN-Diag_FD.zip` file to the following directory on the PCAN-Diag FD:  
`X:\PCAN-Diag FD`  
Allow existing files to be overwritten during the process.

5. Close the connection between PCAN-Diag FD and computer by clicking the push-dial on the PCAN-Diag FD in order to exit the info window.
6. Restart the PCAN-Diag FD by turning it off and on again.
7. To verify, go to the *Support > Installed Add-ins* function.

If the license is installed correctly, the following text is displayed:  
*J1939 - valid until Dec 2022* (date according to the license period)

# 3 Starting the J1939 Add-in

Prerequisite: J1939 Add-in is activated (check via *Support > Installed Add-ins*)

Start: *CAN Data > J1939*



If the J1939 entry is not available, the J1939 Add-in is not activated in the device (see: 2 *Licensing* on page 5).

The start-up time of the 1939 Add-in is about 15 seconds.

You are then in the menu of the J1939 Add-in (title bar *CAN Data/J1939*). All further menu indications in the descriptions of the J1939 Add-in refer to this starting point.

# 4 Settings

*Settings* menu item

The settings refer to the functionality in the J1939 Add-in.

## **Monitor mode**

If enabled, the PCAN-Diag FD regards all J1939 messages on the bus, if disabled, only globally addressed messages.

This setting is ineffective as long as the PCAN-Diag FD has an address (J1939 menu > *Claim Address*). In that case globally or directly to the PCAN-Diag FD addressed messages are considered.

Default setting: enabled

## **Preferred address**

The address set here is used as soon as the *Claim Address* command is executed in the J1939 menu.

Default value: 240

## **Table header**

If enabled, the J1939 data view (*Show Data*) displays the title line with the column identifiers.

Default setting: enabled

## **PGN display format / SPN display format**

Toggles between decimal and hex display of PGN and SPN respectively in the J1939 data view (*Show Data*).

Default setting: "hex"

## **Request device name**

If enabled, a name request with the PG 60928 is transmitted to all J1939 participants when the J1939 data view (*Show Data*) is opened. This ensures that the PCAN-Diag FD



knows all J1939 devices, because it is often connected to the CAN bus after the initialization of the devices.

Participants that support the address protocol and do not have an address yet, claim an address after the name request by the PCAN-Diag FD.

Default setting: enabled

### **Show CAN errors**

If enabled, information about error frames is shown in the J1939 data view in the *CAN Errors* area. This may be an indicator of general CAN communication problems.

Default setting: enabled

### **J1939 database**

If several J1939 databases with different publication dates are available, it is possible to switch between them.

Only J1939 databases covered by the specified time frame of the J1939 Add-in license can be used.

If available, PEAK-System will release a new J1939 database as part of a package update for the PCAN-Diag FD. Previous databases remain.

Default database: db\_2020\_07

### **User database**

As soon as a user-defined J1939 database is available in the project, the version stored in the database is displayed here.

The PCAN-Diag FD only regards the JSON file with the following directory path and file name on the internal memory card:

```
\PCAN-Diag FD\Projects\{Project Name}\j1939_user_pg.json
```

Related topic: *6 User-defined Database for J1939* on page 12

# 5 J1939 Data View

Menu item *Show Data*

The list shows all received J1939 data of the J1939 devices (*Device x*) and additionally status information from the PCAN-Diag FD (*Device Status*). Individual entries can be expanded by clicking with the push dial, so that corresponding contents of the elements are displayed.

By default, J1939 messages explicitly addressed to other devices are also displayed (monitor mode). If the PCAN-Diag FD has claimed an address, only those incoming messages are shown that are addressed globally or directly to the PCAN-Diag FD.

## **Table Header**

The table header refers to the J1939 messages in the list (expanded Device entries). The line can be hidden via *Settings* (J1939 menu) > *table header*.

*PG Name* and *PGN*:

Name and short name of the PG

*Count*:

Number of messages received since the data view was opened or since the list was last cleared.

*Period*:

Period between the reception of the last two messages of the PG.

For the SP data below a PG, the table header has no meaning.

## **Device Status**

Below *CAN Errors* the CAN error frames are shown that the PCAN-Diag FD (*Device*) has recognized.

## **Device x**

In the initial view, the list shows all J1939 participants with an address from which J1939 data has been received. List entries can be expanded with a click so that additional contents appears, i.e. the respective PGs and SPs.

A long key press on a device entry shows a window with the decoded name information of the corresponding J1939 participant.

***CLEAR* Hotkey**

The list is cleared and then refilled with received J1939 data.

***PREV* and *NEXT* Hotkeys**

With *NEXT*, the start of the displayed list is moved to the next device or the next parameter group (PG). *PREV* is used to reach previous elements. This speeds up navigation within the list.

# 6 User-defined Database for J1939

A user-defined database for J1939 can be deposited in PCAN-Diag FD in addition to the one provided by PEAK-System.

## Properties of the User-Defined Database

- Up to 20 self-defined PGs
- Complements the general J1939 database
- Self-defined PG replaces an existing one having the same number
- Definition of the database is done in a JSON file

## 6.1 Creating a Definition File

The definition file is a text file in the JSON format. A sample file is located in a standard project on the PCAN-Diag FD:

```
\PCAN-Diag FD\Projects\J1939_user_pg\j1939_user_pg.json
```

Use this file as a template and/or reference for your own file.

### General Rules

Keep the following points in mind when editing your JSON file:

- Each Object `{...}` must have the same structure as in the sample file.
- No Property (`Key:Value`) within an object may be omitted.
- If a Property is not relevant then use `null` as its value (see sample file).

## 6.2 Entries Description

The following explanations refer to entries with particularities.

**"version":**

This Property holds an arbitrary string with a maximum length of 16 characters. This string is displayed e.g. in the J1939 Settings of the PCAN-Diag FD as soon as user-specific definitions are used. Usually the string contains a version number, e.g. "1.0.2".

**"enum\_list":**

This Array [...] contains Enum definitions, i.e. strings for specific values or ranges of values. A reference to an Enum definition is done later in a definition for a Suspect Parameter (SP).

**"pg\_list":**

This array [...] contains Parameter Group objects (PGs). A maximum of 20 PGs may be defined. Each PG Object can contain an Array of Suspect Parameters ("sp\_list").

**"source":**

Value 254 for the source address means "from any source". Using another source address, incoming J1939 messages are only interpreted from the device with the given address.

**"sp\_list":**

This array [...] contains Suspect Parameter objects (SPs) within a PG object. The number of SPs is not limited.

**"datatype":**

This property indicates the data type of a Suspect-Parameter (SP). The value is usually 0, which corresponds to the Unsigned data type. Value ranges with negative numbers are determined via the "offset" property.

## 6.3 Including a Definition File in the Project

The J1939 Add-in of the PCAN-Diag FD recognizes a user-defined database if the corresponding definition file exists in the directory of the current project, in specific at the following location with fixed file name:

```
\PCAN-Diag FD\Projects\{Project Name}\j1939_user_pg.json
```

You have two possibilities to include the definition file in the project.

### Direct Copying via USB Connection

1. Establish a USB connection between your computer and the PCAN-Diag FD, physically via cable and logically via the main menu item *USB Connection* (if this is not done automatically).
2. Copy the prepared definition file onto the PCAN-Diag FD into the directory specified above. The file must have the given name.
3. In Windows, log off the USB device "PCAN-Diag FD" and then terminate the USB connection.

### Inclusion in the PCAN-Diag FD Editor

1. On your computer, start the PCAN-Diag FD Editor for Windows.
2. Load the desired project or create a new project and save it locally on your computer.
3. Switch to the *Custom PGs* tab.
4. Click the *Import* button at the tab's bottom and select a previously created definition file (\*.json). The file name is arbitrary, except for the file name extension.

The definitions from the selected file are listed on the tab for information purposes.



One definition file can be loaded per project.

5. Once you have completely configured your project besides importing the definition file, transfer it to the PCAN-Diag FD with *Transfer to*.

During this process the definition file is automatically copied to the PCAN-Diag FD with the correct name at the designated place.

You can check the correct inclusion of the definition file in the project by checking in the J1939 Add-in in *Settings* whether the string previously specified for "version" : in the definition file appears at *User database*.

# 7 J1939 Address

The PCAN-Diag FD can claim a J1939 address in the connected J1939 network. This yields the following possibilities:

- Display and management of J1939 diagnostic messages (DM) via the menu item *Diagnostic Messages*.
- In the message view (menu item *Show Data*) display of J1939 messages that are addressed to the J1939 address of the PCAN-Diag FD, in addition to global J1939 messages.



The monitor mode of the J1939 Add-in (menu item *Settings*) is ineffective while the device has an address.

## 7.1 Claim Address

1. For address claiming, the preferred address 240 is preset in the PCAN-Diag FD. If you want to use another preferred address for the PCAN-Diag FD in the J1939 network, switch to the *Settings* menu and set the desired J1939 address under *Preferred address*. Save the settings with the *OK* hotkey (temporarily) or with *SAVE&OK* (permanently).
2. Select *Claim Address*.  
If the address request was successful, the *Release Address* menu item appears.

## 7.2 Change of the Address Status

An already claimed address is withdrawn by the following actions:



- manually via the menu item *Release Address X* (X = previously claimed address).
- when the same address is claimed by another device with higher priority in the J1939 network.

The menu item *Claim Address* appears again.



Before reclaiming an address, change the address to be requested in the settings if necessary (see previous section).

# 8 Diagnostic Messages

Menu item *Diagnostic Messages*

The menu item is only available after an address for the PCAN-Diag FD has been claimed with *Claim Address*.

For various diagnostic messages, a view with the received diagnostic information can be displayed in each case. The view shows the diagnostic information of one J1939 device. Changing the view to the next J1939 device is done with the *NEXT DEV* hotkey.

## 8.1 Screen for a Diagnostic Message

The screen shows the diagnostic information of the corresponding diagnostic message for the J1939 device with the specified source address.

### **Warning Lamp Line on Top**

The line shows the warning lamp status last transmitted by the currently displayed J1939 device. The four warning lamps have the following meaning:

- *MIL*: Malfunction Indicator Lamp
- *RSL*: Red Stop Lamp
- *AWL*: Amber Warning Lamp
- *Prot*: Protect Lamp

Possible status of a warning lamp (rising priority):

- Lamp Off (gray)
- Lamp On
- Slow Flash
- Fast Flash

### **Info Line *DMxx***

The info line indicates the current diagnostic message and the source address from the J1939 device whose diagnostic information is displayed. During the first 5 seconds after the last reception of the diagnostic message, the info line is yellow, then white.

### **List**

The list contains the diagnostic information that was last transmitted by the J1939 device with the specified diagnostic message.

## **8.2 Hotkeys**

### ***REQUEST***

Requests the diagnostic information of the current diagnostic message from all J1939 devices.

For this the PCAN-Diag FD transmits a request message:

- PGN 59904
- Data: PGN of the current diagnostic message
- Source: current J1939 address of the PCAN-Diag FD
- Destination: all

### ***CLR LIST***

Clears the list's contents. After receiving the diagnostic message anew, the list is filled again.

### ***NEXT DEV***

The view changes to the next J1939 device that has provided diagnostic information.