

# PCAN-Router Pro

4-Channel CAN Router with Data Logger

User Manual v1.0.3



## Products taken into account

Product Name	Model	Part number
PCAN-Router Pro	4 High-speed CAN channels, Wake-up ready; other CAN transceiver modules on request	IPEH-002212

Product names mentioned in this document may be the trademarks or registered trademarks of their respective companies. They are not explicitly marked by “™” and “®”.

© 2011 PEAK-System Technik GmbH

PEAK-System Technik GmbH  
Otto-Roehm-Strasse 69  
64293 Darmstadt  
Germany

Phone: +49 (0)6151 8173-20  
Fax: +49 (0)6151 8173-29

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

Document version 1.0.3 (2011-12-12)

# Contents

<b>1</b>	<b>Introduction</b>	<b>5</b>
1.1	Properties at a Glance	5
1.2	Prerequisites for Operation	6
1.3	Scope of Supply	7
<b>2</b>	<b>Connectors</b>	<b>8</b>
2.1	Power (Voltage Supply)	8
2.2	CAN 1 to CAN 4, D-Sub 9-pin	8
2.3	CompactFlash Card	9
<b>3</b>	<b>Hardware Adjustments</b>	<b>10</b>
3.1	Using an Alternative CAN Transceiver Module	11
3.2	Adjusting the Termination for a CAN Bus	12
3.3	Setting the Router ID for the Configuration	13
3.4	Replacing the Button Cell for the Real-Time Clock (RTC)	14
<b>4</b>	<b>Installing Software</b>	<b>16</b>
<b>5</b>	<b>Operation</b>	<b>18</b>
5.1	Activating the PCAN-Router Pro	18
5.2	Default Bit Rates of the CAN Channels	18
5.3	Shipping Configuration	19
5.3.1	Structure of the Status Messages	20
5.4	Setting the Real-Time Clock	22
5.5	Status LEDs	26
5.6	Wake-up	27
5.6.1	Wake-up via CAN	27
5.6.2	Wake-Up Externally by High Level	27
5.6.3	Wake-Up by Real-Time Clock (RTC)	27

<b>5.7</b>	<b>Sleep Mode</b>	<b>28</b>
<b>6</b>	<b>Logging CAN Data onto a CompactFlash Card</b>	<b>29</b>
6.1	Preparing a CompactFlash Card	29
6.2	Preparing a Configuration for Data Logging	30
6.3	Using Logged Data	32
<b>7</b>	<b>Firmware Update</b>	<b>33</b>
<b>8</b>	<b>Technical Specifications</b>	<b>34</b>
<b>Appendix A</b>	<b>CE Certificate</b>	<b>36</b>
<b>Appendix B</b>	<b>Dimension Drawing</b>	<b>37</b>
<b>Appendix C</b>	<b>Contents of a CompactFlash Card</b>	<b>38</b>
<b>Appendix D</b>	<b>Router Resources</b>	<b>39</b>

# 1 Introduction

The PCAN-Router Pro links the data traffic from up to four High-speed CAN buses. As well as pure forwarding, the CAN data can be processed, manipulated and, for example, filtered in a number of different ways. A virtual fifth CAN channel is used for recording data traffic to a CompactFlash card. The behavior of the PCAN-Router Pro can be freely configured using a Windows program.

## 1.1 Properties at a Glance

- └ 4 High-speed CAN channels via plug-in transceiver modules (wake-up capable); optionally available are modules for Low-speed, Single-wire, opto-decoupled High-speed, and High-speed without wake-up function
- └ CAN connection D-Sub 9-pin
- └ Comprehensive configuration with the Windows software PPCAN-Editor 2
- └ Various function blocks for data processing and manipulation
- └ Configurable beeper
- └ Configurable status LEDs
- └ CAN data and error frames recorded to a CompactFlash card
- └ Conversion of logging data to miscellaneous output formats using Windows software
- └ Wake-up function using a separate input or the CAN bus
- └ Battery-buffered real-time clock (RTC), can also be used for wake-up
- └ Voltage supply 8 - 30 V, overvoltage and reversed polarity protection

- └ Aluminum profile casing with mounting flange
- └ Option for mounting on top hat rails
- └ Customized firmware available on request
- └ Extended operating temperature range of -40 to +85 °C (-40 to +185 °F)

## 1.2 Prerequisites for operation

- └ Voltage supply 8 – 30 V DC (e.g. car battery)
- └ For configuring via CAN:
  - Computer with CAN interface of the PCAN series (e.g. PCAN-USB)
  - CAN cabling with correct termination
  - Windows 7/Vista/XP (32/64-bit) for the configuration program
- └ For converting logged CAN data:
  - Computer with card reader for CompactFlash cards
  - Windows 7/Vista/XP (32/64-bit) for the converter program
  - Sufficient space for data on the hard disk (up to 5 times of the initial file size from the CompactFlash card, e.g. 1 GByte + 4 GByte)

## 1.3 Scope of Supply

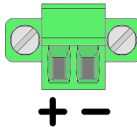
- └ PCAN-Router Pro in an aluminum casing
- └ Mating connector for the power supply
- └ Configuration software PPCAN-Editor 2 for Windows 7/Vista/XP (32/64-bit)
- └ Converter software for Windows 7/Vista/XP (32/64-bit)
- └ Industrial CompactFlash card (min. 1 GByte)
- └ Documentation in PDF format

## 2 Connectors

### 2.1 Power (Voltage Supply)

The operation of the PCAN-Router Pro requires a voltage source with a nominal 12 V direct current voltage, 8 to 30 V are possible. The input is electronically protected against reverse polarity and overvoltage.

The connection is done with the supplied **mating connector** for fastening cable strands. The polarity is as follows:

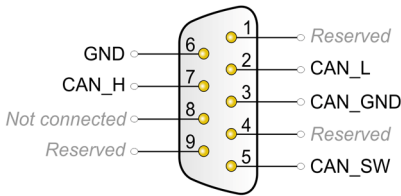


**Note:** After applying the supply voltage, the PCAN-Router Pro needs a wake-up signal in order to start operation. If the router is equipped with at least one CAN transceiver module with wake-up functionality (standard), this happens automatically. See section 5.6 *Wake-up* on page 27.

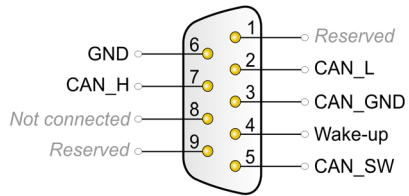
### 2.2 CAN 1 to CAN 4, D-Sub 9-pin

A CAN bus is connected to a 9-pin D-Sub port. The assignment of the CAN signals is depending on the used CAN transceiver module (see table below).

The CAN ports CAN 3 and CAN 4 additionally provide an external wake-up function (see section 5.6.2 on page 27).



Pin assignment of the ports  
CAN 1 and CAN 2



Pin assignment of the ports  
CAN 3 and CAN 4

Module name	Transmission standard	Special function	Used CAN lines
CAN-HS	High-speed CAN ISO 11898-2		CAN_L, CAN_H
CAN-HS opto	High-speed CAN ISO 11898-2	Galvanic isolation up to 300 V for the CAN interface	CAN_L, CAN_H
CAN-HS-1041 (standard)	High-speed CAN ISO 11898-2	Wake-up via CAN	CAN_L, CAN_H
CAN-LS	Low-speed CAN ISO 11898-3	Wake-up via CAN	CAN_L, CAN_H
CAN-LS-SW	Single-wire CAN SAE J2411	Wake-up via CAN	CAN_SW

## 2.3 compactFlash card

To log the CAN data traffic (trace) you can use CompactFlash cards (CF cards) with a maximum capacity of 2 GByte.

The CF slot is placed on the rear of the PCAN-Router Pro. The CF card is properly inserted if it flushes with the rear panel.

**Note:** When you want to insert or eject a CompactFlash card, the PCAN-Router Pro must be off or in sleep mode (Power LED off). Else the card is not detected or data gets lost.

About the **use** of a CF card see chapter 6 *Logging CAN Data onto a CompactFlash Card* on page 29.

## 3 Hardware Adjustments

You can adjust some hardware settings on the board of the PCAN-Router Pro:

- └ Using an alternative CAN transceiver module (on request)
- └ Adjusting the termination for a CAN bus
- └ Setting the Router ID for the configuration
- └ Replacing the button cell for the real-time clock

The adjustments are described in the following sections.

- ▶ Do the following to **open the casing** of the PCAN-Router Pro in order to access the possibilities for adjustments:

Along the top edge of the casing remove two screws on each the front and the rear of the PCAN-Router Pro. Afterwards take off the upper casing part.

Now you can access the elements of the board.

During **reassembling** later on take care about the light guides in the casing part.

### 3.1 Using an Alternative CAN Transceiver Module

For each of the four CAN connections an alternative CAN transceiver module can be inserted on request.

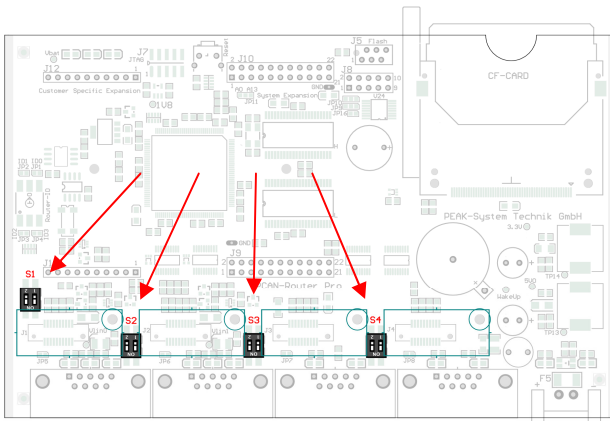
Following modules are available:

Module name	Transmission standard	Special function	Used CAN lines	Standard bit rate
CAN-HS	High-speed CAN ISO 11898-2		CAN_L, CAN_H	500 kbit/s
CAN-HS opto	High-speed CAN ISO 11898-2	Galvanic isolation up to 300 V for the CAN interface	CAN_L, CAN_H	500 kbit/s
CAN-HS-1041 (standard)	High-speed CAN ISO 11898-2	Wake-up	CAN_L, CAN_H	500 kbit/s
CAN-LS	Low-speed CAN ISO 11898-3	Wake-up	CAN_L, CAN_H	125 kbit/s
CAN-LS-SW	Single-wire CAN SAE J2411	Wake-up	CAN_SW	33.3 kbit/s

The PCAN-Router Pro automatically detects the type of the inserted CAN transceiver module and adjusts the **default bit rate** for the CAN channel. The bit rate can be changed by a configuration.

## 3.2 Adjusting the Termination for a CAN Bus

Depending on the used CAN transceiver module you can activate or change the CAN bus termination for each CAN connection CAN 1 to CAN 4 with **switch blocks S1 to S4**. Switches 1 and 2 on a switch block always must have the same position. By default the switches are in OFF position (upper position according to the orientation of the figure).



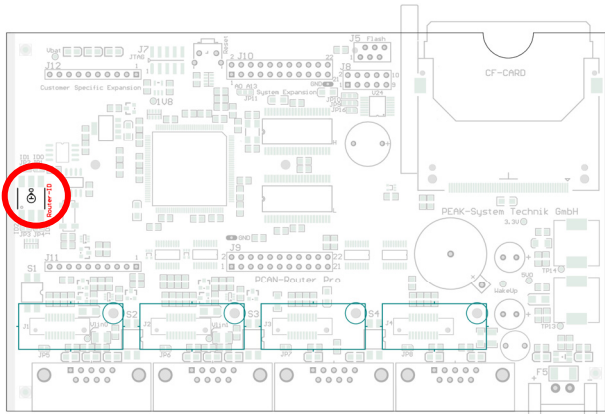
Positions of the switch blocks for CAN termination;  
ON at lower switch position

Type of transceiver	Termination at switch position *	
	OFF (upper pos., default)	ON (lower pos.)
High-speed CAN (ISO 11898-2)	none	120 $\Omega$ between CAN_L and CAN_H
Low-speed CAN (ISO 11898-3)	4.7 k $\Omega$ for CAN_L and CAN_H	1.1 k $\Omega$ for CAN_L and CAN_H
Single-wire CAN (SAE J2411)	9.1 k $\Omega$ for CAN_SW	2.1 k $\Omega$ for CAN_SW

\* Both switches of a switch block


### 3.3 Setting the Router ID for the Configuration

The board of the PCAN-Router Pro has a rotary switch with 16 positions to determine the Router ID (0 - F hex = 0 - 15).



Position of the rotary switch for the Router ID

When the PCAN-Router Pro is started the configuration with the number from the internal memory is loaded which matches the specified Router ID. In addition, the Router ID gives the PCAN-Router Pro a unique identification during the PPCAN communication (configuration transfer). For the transmission of CAN messages during normal operation this Router ID is not relevant.

 **Note:** The rotary switch position F is reserved for the firmware update (start of the bootloader) on the PCAN-Router Pro with serial number 100 and above.

 This is how you change the Router ID of a PCAN-Router Pro:

1. Change the position of the rotary switch with a small slot screwdriver.

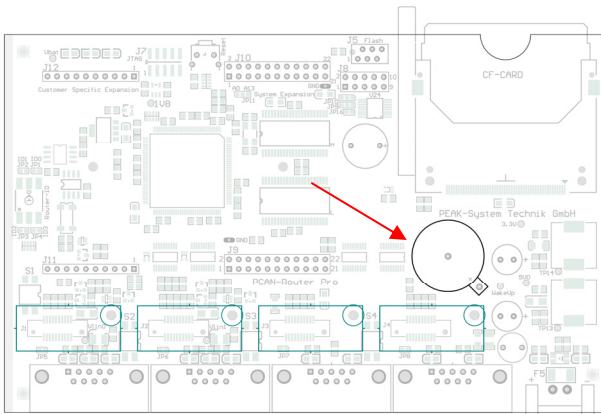
- Restart the PCAN-Router Pro by briefly cutting off the power supply.

After the restart the changed Router ID will be active. Before the restart changes made at the rotary switch will have no influence on operation.

During operation with a configuration the LED  $\mu$ C Status blinks green every second. If a configuration for the set Router ID does not exist, the LED blinks twice as fast.

### 3.4 Replacing the Button Cell for the Real-Time Clock (RTC)

The real-time clock (RTC) integrated in the PCAN-Router Pro is supplied by a button cell of the IEC type CR 1620 (3 V), as long as the device is not active (without voltage supply or in sleep mode).



Position of the button cell for the real-time clock

A new button cell lasts several years. If the internal clock indicates an unexpected time, take out the button cell and measure its voltage. This should be around the nominal 3.0 Volts. If the measured

voltage is lower than 2.5 Volts, you should replace the button cell with a fresh one.

Find more details about recalling and setting the time in sections 5.3 *Shipping Configuration* on page 19 and 5.4 *Setting the Real-Time Clock* on page 22.

## 4 Installing Software

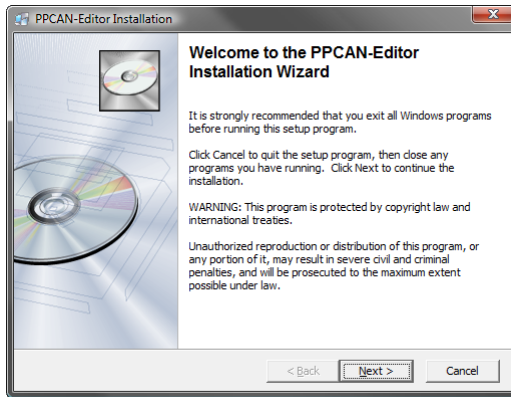
Create configurations for the operation with the supplied software PPCAN-Editor for Windows. This chapter covers the installation procedure for the program. Please find information about the creation of a configuration in the program help of the PPCAN-Editor.

▶ This is how to install the PPCAN-Editor:

1. Only Windows XP: Make sure that you are logged in as user with administrator privileges.

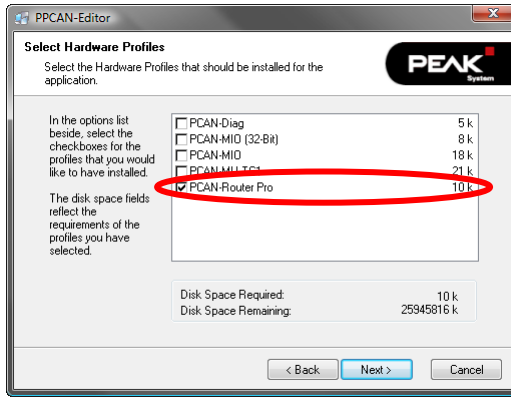
When you use the PPCAN-Editor later you can also work as a user with limited rights.

2. Start the setup program from the supplied CD, directory Tools/PPCAN-Edit.



Startup screen of the installation program for the PPCAN-Editor

3. Follow the instructions of the setup program until you come to the step **Select Hardware Profiles**. At this point select the entry "PCAN-Router Pro" so that the PCAN-Router Pro will be supported by the PPCAN-Editor.



Choice of the hardware profile for the PCAN-Router Pro

4. Follow the remaining instructions of the setup program.

You can then launch the PPCAN-Editor, create a configuration, and send it to the PCAN-Router Pro. Find relevant information in the help of the PPCAN-Editor.



**Note:** The PPCAN-Editor uses the **CAN ID 7E7h** for communication with the PCAN-Router Pro. Do not use this CAN ID for communication on CAN channels that are enabled for configuration (by default all CAN channels; I/O Function Special Out, I/O Number "Configuration ID 07e7h enable")

## 5 Operation

### 5.1 Activating the PCAN-Router Pro

After applying a supply voltage, the PCAN-Router Pro does a reset and is initially inactive (sleep mode).

The standard equipment of the PCAN-Router Pro provides High-speed CAN transceiver modules with **wake-up function**. Therefore it is instantly activated (Power LED on).

If customized equipment does **not include a CAN transceiver module with wake-up function**, the PCAN-Router Pro can be activated with a connection between the positive terminal of the supply voltage and pin 4 of port CAN 3 or CAN 4.

### 5.2 Default Bit Rates of the CAN Channels

In order to ensure the communication with the PCAN-Router Pro, default bit rates are preset for CAN channels according to the used CAN transceiver module.

Module name	Transmission standard	Default bit rate
CAN-HS	High-speed CAN ISO 11898-2	500 kbit/s
CAN-HS opto	High-speed CAN ISO 11898-2	500 kbit/s
CAN-HS-1041 (standard equipment)	High-speed CAN ISO 11898-2	500 kbit/s
CAN-LS	Low-speed CAN ISO 11898-3	125 kbit/s
CAN-LS-SW	Single-wire CAN SAE J2411	33.3 kbit/s

The default bit rate is enabled if the current configuration in the PCAN-Router Pro does not provide another bit rate. In a configura-

tion the bit rate can be set independently for each CAN channel. This is done with the I/O function *70h (Special Out)/CAN Baud*.



**Tip:** If the communication with the PCAN-Router Pro is prevented because you do not know the bit rates of the CAN channels that have been changed by the current configuration, you can set the Router ID to a position without configuration (see section 3.3 on page 13). Then the default bit rate is enabled.

## 5.3 Shipping Configuration

At delivery, the PCAN-Router Pro contains an example configuration. You can change its elements (e.g. the CAN IDs) or use them as basis for own configurations.

For editing the shipping configuration in the PPCAN-Editor it is contained on the provided CD as file `ShippingConfig.ppproj`.

This configuration has following properties:

- └ All incoming messages from the four CAN channels are written to an inserted CompactFlash card.
- └ No forwarding is done between the four CAN channels.
- └ The LEDs for the CAN ports blink during CAN traffic; LEDs 1, 3, 5, and 7 (green) for incoming, LEDs 2, 4, 6, and 8 (red) for outgoing CAN messages.
- └ Via CAN channel 1 status CAN messages are provided for request (RTR) containing information related to the logging function and the CompactFlash card (see following tables).
- └ Optionally: The battery-buffered real-time clock (RTC) can be set and recalled via CAN channel 1 (see section 5.4 *Setting the Real-Time Clock* on page 22).

### 5.3.1 Structure of the Status Messages

CAN property	Message GetTraceStatus_R
ID	7F0h
Data length	4 bytes
Transmit cycle time	none (0 ms)
RTR	yes
Format	Intel (Little Endian)
Data	See following table

Position (byte:bit)	Length (bits)	Name of data variable	Description
0:0	1	NoCardPresent	No CF card inserted in the PCAN-Router Pro (For a card detection a reset (power cycle) is needed.)
0:1	1	PartitionError	CF card does not contain a partition or more than one
0:2	1	FAT16Error	CF card isn't formatted with the file system FAT16
0:3	1	RootError	Root directory cannot be found
0:4	1	RootDirError	Root directory cannot be opened
0:5	1	FileNotFound	File <code>trace.btr</code> does not exist
0:6	1	FileOpenError	File <code>trace.btr</code> cannot be opened
0:7	1	FileSeekError	Start of file <code>trace.btr</code> cannot be found
1:0	1	FileStartError	First sector of file <code>trace.btr</code> cannot be determined
1:1	1	EndOfFileError	Trace file is completely filled with CAN messages (linear record mode)
1:2	1	RunAllocationError	Maximum number of records is reached

CAN property	Message GetTraceInfo_R
ID	7F1h
Data length	8 bytes
Transmit cycle time	none (0 ms)
RTR	yes
Format	Intel (Little Endian)
Data	See following table

Position (byte:bit)	Length (bits)	Name of data variable	Description
0:0	32	CFTraceFileMsgFree	Number of CAN messages still fitting into the trace file
4:0	32	CFTraceQueueOverruns	Number of CAN message not being processed by the CF card queue due to overload

## 5.4 Setting the Real-Time Clock


The PCAN-Router Pro comprises a battery-buffered real-time clock (RTC). The clock is accessed with the I/O functions *70h (Special Out) > RTC* and *F0h (Special In) > RTC*.

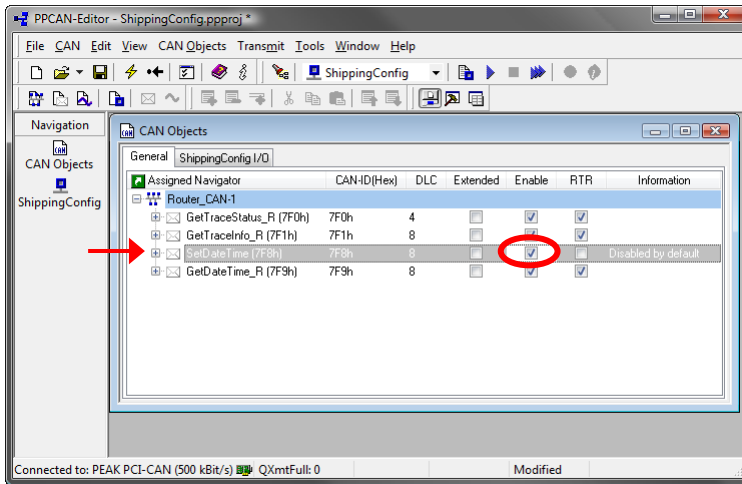
The shipping configuration for the PCAN-Router Pro contains entries you can enable and adjust, in order to set the time with a CAN message. Those entries are deactivated by default to prevent an accidental adjustment per CAN.

The following gives instructions about

- └ the adjustment of the shipping configuration and the transfer to the PCAN-Router Pro, and
- └ the transmission of a CAN message with the Windows program PCAN-View in order to set the time.

PCAN-View is supplied with a CAN interface of the PCAN series (e.g. PCAN-USB).

- ▶ Do the following to adjust the shipping configuration and to transfer this to the PCAN-Router Pro:
  1. Under Windows start the PPCAN-Editor.
  2. Use **File > Open** or  to open the file `ShippingConfig.ppproj` from the supplied CD.
  3. In the window **CAN Objects** on the tab **General** select the symbol entry **Router\_CAN-1 > SetDateTime (7F8h)**.



4. If desired, you can change the CAN ID of the symbol entry.
5. Enable the symbol entry by checking the corresponding field **Enable**.
6. Make sure that a CAN connection exists between the computer and the PCAN-Router Pro, and furthermore, that the PPCAN-Editor has access to this connection (display in the status bar).

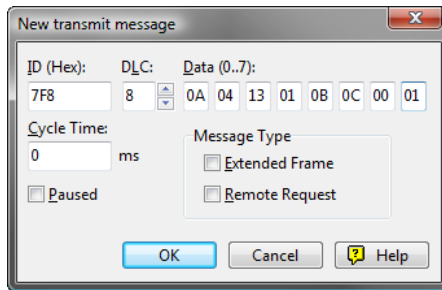


7. With **Transmit > Send Configuration** or  send the altered configuration to the PCAN-Router Pro.

During transfer the LED  $\mu$ C Status blinks green with short light phase.

- ▶ Do the following to set the time with PCAN-View and the shipping configuration for the PCAN-Router Pro:
  1. Under Windows start the program PCAN-View and establish a connection to the CAN bus that is connected with the PCAN-Router Pro, CAN channel 1.
  2. On the **Transmit** panel insert the CAN message 7F8h with 8 data bytes for data, time, and the RTC update bit (see example below). Note that these are hexadecimal values. Since the message must only be received once by the PCAN-Router Pro, a cyclic transmission isn't set.

Example for Monday, 2010-04-19, 11:13:00:



Data bytes: year month day weekday hour minute second RTC update bit

3. Transmit this message once manually, e.g. by pressing the space bar.

Date and time of the real-time clock in the PCAN-Router Pro are now set to the information contained in the data bytes.



**Tip:** You can recall the current date and time with another CAN message having the ID 7F9h and being transmitted as remote request frame (data bytes: see table below).

Data structures of the CAN messages for the real-time clock (shipping configuration):

Function	CAN ID	Data bytes	Remarks
Setting RTC	7F8h	YY MM DD WW hh mm ss 01	Last byte = RTC update bit
Reading RTC	7F9h	YY MM DD W0 cc ss mm hh	Weekday on upper 4 bits

Y = year (2-digit), M = month, D = day, W = weekday (1 = Monday),  
h = hour, m = minute, s = second, c = hundredth

## 5.5 Status LEDs


LED	State	Meaning
Power	Off	If a supply voltage is applied, the PCAN-Router Pro is in sleep mode and must be activated by a wake-up signal. See following section 5.6.
	Green static	A supply voltage exists and the PCAN-Router Pro is active.
µC Status	Green slow blinking (1 Hz)	Normal operation with the configuration which is allocated to the currently specified Router ID.
	Green quick blinking (2 Hz)	No or no valid configuration is available for the currently specified Router ID. Changing the Router ID: section 3.3 on page 13 Transferring a configuration to the PCAN-Router Pro: see program help of the PPCAN-Editor
	Green quick blinking with short light phase (2 Hz)	Configuration transfer to/from the PCAN-Router Pro via CAN (ID 7E7h)
	Red	Reset Due to the shortness of the reset signal, this status is barely viewable.
CF Card	Orange blinking	Write access onto the CompactFlash card
LED 1 LED 3 LED 5 LED 7	Configurable (green)	Freely configurable, access via I/O functions <i>00h (Dout Level) &gt; LED CAN</i>
LED 2 LED 4 LED 6 LED 8	Configurable (red)	

## 5.6 wake-up

If the PCAN-Router Pro is in sleep mode (supply voltage is applied, Power LED off), a wake-up signal is needed for starting operation.

The following subsections show the possibilities for the activation (wake-up) of the PCAN-Router Pro.

### 5.6.1 wake-up via CAN

 **Note:** This function is only available if a CAN transceiver module with wake-up function is present for the used CAN channel. This is the case with standard equipment.

When on a CAN channel a message is received, the PCAN-Router Pro turns on. Within a wake-up time of 165 ms further incoming CAN messages are not processed.

### 5.6.2 wake-Up Externally by High Level

On **ports CAN 3 and CAN 4** a High level can be applied to **pin 4** to activate the PCAN-Router Pro.

An external wake-up signal gets necessary if none of the CAN transceiver modules in the PCAN-Router Pro has a wake-up function.



**Tip:** One possibility for a wake-up signal is terminal 15 “Ignition” in a motor vehicle.

### 5.6.3 wake-Up by Real-Time Clock (RTC)

The PCAN-Router Pro is activated at the alarm time set previously.

An alarm is set via CAN. To do so, the I/O function *70h (Special Out) > RTC Set Alarm* must be assigned to a CAN variable in the used configuration.

## 5.7 Sleep Mode

In sleep mode the voltage supply is turned off for a majority of the electronics in the PCAN-Router Pro and the current consumption is reduced to 470  $\mu$ A at 12 V. The Power LED is off.

To put the PCAN-Router Pro from active status to sleep mode, in a configuration you need to define a CAN message with a symbol that is assigned to the I/O function *70h (Special Out) > SelfHold*. Selfhold is activated by default.

If no CAN transceiver module with wake-up function is present in the PCAN-Router Pro and no external wake-up signal is present, the sleep mode also occurs in the following cases:

- └ after applying a supply voltage (reset)
- └ after a transient voltage drop (reset)


## 6 Logging CAN Data onto a CompactFlash Card


### 6.1 Preparing a CompactFlash Card

To log CAN data with the PCAN-Router Pro the contents of a CompactFlash card (CF card) must be prepared in a certain way.

What you need:

- └ a Computer with card reader for CF cards
- └ a CF card with a maximum of 2 GByte capacity (enclosed: 1-GByte card, already prepared)

 **Important note:** Already existing data on the CF card will be lost when following the described procedure.

 Do the following to prepare a CF card:

1. Insert the card into the card reader of the computer.
2. With the appropriate program of the operating system format the card using the **file system FAT (FAT16)**.
3. Create a file `trace.btr` in the root directory of the CF card, which contains empty bytes (00h). The file size must be a multiple of 512 bytes.


For a start the file `trace.btr` is available in different sizes on the provided CD. Decompress the respective ZIP archive directly to the root directory of the CF card.

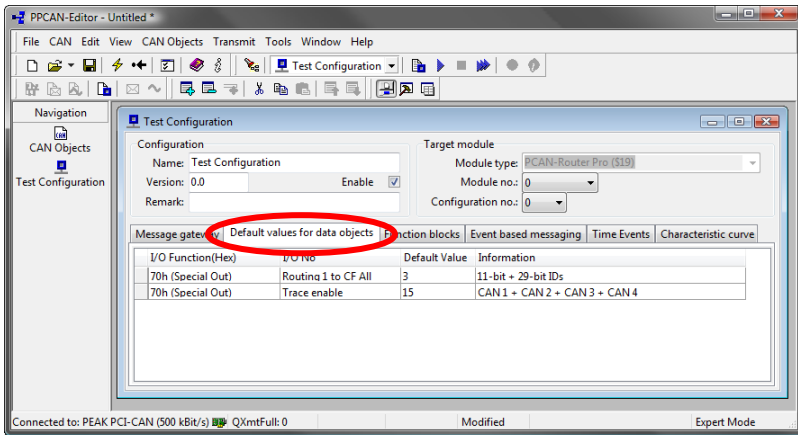
4. Log off the CF card from the operation system (e.g. under Windows with the Eject command) and remove the card from the card reader of the computer. Then, insert the CF card into the slot on the rear of the PCAN-Router Pro.

The CF card is properly inserted if it flushes with the rear panel.

**Note:** When you want to insert or eject a CompactFlash card, the PCAN-Router Pro must be off or in sleep mode (Power LED off). Else the card is not detected or data gets lost.

## 6.2 Preparing a Configuration for Data Logging

In the configuration program PPCAN-Editor the data logging is set up in the module-specific configuration (  icon) on the **Default values for data objects** tab.



The entries for the data logging are created in the module-specific configuration.

Create the following entries (see also figure):

Field	Selection/Input	Explanation
I/O Function	70h (Special Out)	Special functions of the PCAN-Router Pro
I/O No	Routing 1 to CF All	Forward all CAN messages from CAN channel 1 to the CF card. Alternatively, you can select the CAN channels 2, 3, or 4, or create additional entries for these CAN channels.
Default Value	3	2-bit value, CAN frames with 11-bit and/or 29-bit ID are forwarded to the CF card (here: both ID types) Bit 0 (1) = 11-bit ID Bit 1 (2) = 29-bit ID

Field	Selection/Input	Explanation
I/O Function	70h (Special Out)	Special functions of the PCAN-Router Pro
I/O No	Trace Enable	The logging function must be enabled for the desired CAN channels.
Default Value	15	4-bit value, a set bit enables the logging function for the corresponding CAN channel (here: all four CAN channels) Bit 0 (1) = CAN 1 Bit 1 (2) = CAN 2 Bit 2 (4) = CAN 3 Bit 3 (8) = CAN 4

Further logging possibilities with the I/O function *70h (Special Out)*:

- └ *Routing 1 to CF Explicit*: Only CAN messages with the given 11-bit ID
- └ *Routing 1 to CF Exclude*: All CAN messages with 11-bit ID excluding those with the given 11-bit ID

## 6.3 Using Logged Data

The logged CAN data on the CompactFlash card (CF card) is binary coded in the file `trace.btr`. For further use you must convert the data in an appropriate format. To do so, a Windows program is available on the provided CD.

To view the data in the PCAN-Explorer or to playback the CAN messages in the program PCAN-Trace use the `trc` format. The different format versions are suitable for the following programs:

- └ Version 1.1: all versions of the PCAN-Explorer and the program PCAN-Trace (one trace file per CAN channel)
- └ Version 1.3: PCAN-Explorer from version 5 (a single trace file for all CAN channels)

▶ To convert the logged CAN data proceed as follows:

1. Eject the CF card from the PCAN-Router Pro and insert it into the card reader of the computer.
2. Start the converter program from the supplied CD, directory `Tools/PEAK-Converter`.
3. As source select the file `trace.btr` from the CF card.
4. Enter a destination file and select the desired format version (see above).

## 7 Firmware Update

An update of the firmware for the PCAN-Router Pro can be done via a connected CAN bus. Prerequisite is a computer with a CAN interface of the PCAN series.

Ask our technical support for the current firmware version and instructions for updating:

- ↳ E-mail: [support@peak-system.com](mailto:support@peak-system.com)
- ↳ Phone and postal address: see on page 2.

The configurations saved on the device are kept at a firmware update, provided that the general format of configurations does not change with the new firmware. Note the readme file to the new firmware version.

If the configuration format has changed, after a firmware update and a restart of the PCAN-Router Pro the LED **µC Status** blinks with higher frequency (2 Hz, compared to 1 Hz during normal operation). After that you need to re-transfer the accordingly adjusted configuration(s) to the PCAN-Router Pro with the PPCAN-Editor.

## 8 Technical specifications

Power supply													
Supply voltage	12 V DC, 8 - 30 V possible												
Current consumption (at 12 V)	Idling: 65 mA Maximum: 95 mA (4 channels to CF card) Sleep mode: 470 $\mu$ A												
Wake-up time	165 ms												
Data logging													
Medium	CompactFlash card, max. 2 GByte												
Maximum size of a trace	2 GByte												
Storage requirement	512 bytes per 25 CAN messages (independent of the message lengths)												
Recording format	Proprietary binary format (*.btz), conversion options with the provided Windows program: - PCAN-Trace (*.trc) - Vector Trace (*.asc) - comma-separated values (*.csv)												
CAN													
Standard transceiver	High-speed CAN ISO 11898-2 with wake-up function (TJA1041)												
Other transceivers (on request)	High-speed CAN ISO 11898-2 (TJA1040) with galvanic isolation Low-speed CAN ISO 11898-3 (TJA1054) with wake-up function Single-wire CAN SAE J2411 (TH8056) with wake-up function												
Wake-up time	165 ms												
Termination	Setup with switches on the board <table border="1"> <thead> <tr> <th>CAN</th> <th>OFF</th> <th>ON</th> </tr> </thead> <tbody> <tr> <td>High-speed</td> <td>none</td> <td>120 <math>\Omega</math></td> </tr> <tr> <td>Low-speed</td> <td>4.7 k<math>\Omega</math></td> <td>1.1 k<math>\Omega</math></td> </tr> <tr> <td>Single-wire</td> <td>9.1 k<math>\Omega</math></td> <td>2.1 k<math>\Omega</math></td> </tr> </tbody> </table>	CAN	OFF	ON	High-speed	none	120 $\Omega$	Low-speed	4.7 k $\Omega$	1.1 k $\Omega$	Single-wire	9.1 k $\Omega$	2.1 k $\Omega$
CAN	OFF	ON											
High-speed	none	120 $\Omega$											
Low-speed	4.7 k $\Omega$	1.1 k $\Omega$											
Single-wire	9.1 k $\Omega$	2.1 k $\Omega$											
CAN ID reserved for configuration transfer	7E7h												

<b>Measures</b>	
Size (casing)	190 x 29 x 104 mm (7 1/2 x 1 1/8 x 4 1/8 inches) (W x H x D) See also dimension drawing Appendix B on page 37
Weight	570 g (20 oz.)

<b>Environment</b>	
Operating temperature	-40 - +85 °C (-40 - +185 °F)
Temperature for storage and transport	-40 - +100 °C (-40 - +212 °F)
Relative humidity	15% - 90%, not condensing
EMC	EN 61326-1:2006 EC directive 2004/108/EG EN 55011:2007 + A2:2007
Ingress protection (IEC 60529)	IP20

# Appendix A CE Certificate

PCAN-Router Pro IPEH-002212 – EC Declaration of Conformity  
PEAK-System Technik GmbH



## Notes on the CE Symbol

The following applies to the PCAN-Router Pro product  
IPEH-002212

## EC Directive

This product fulfills the requirements of EC directive  
2004/108/EG on "Electromagnetic Compatibility" and is  
designed for the following fields of application as per the  
CE marking:

## Electromagnetic Immunity/Emission

DIN EN 61326-1; publication date: 2006-10  
Electrical equipment for measurement, control and laboratory use – EMC requirements –  
Part 1: General requirements (IEC 61326-1:2005);

German version EN 61326-1:2006

## Declarations of Conformity

In accordance with the above mentioned EU directives,  
the EC declarations of conformity and the associated  
documentation are held at the disposal of the competent  
authorities at the address below:

### PEAK-System Technik GmbH

Mr. Wilhelm  
Otto-Roehm-Strasse 69  
64293 Darmstadt  
Germany

Phone: +49 (0)6151 8173-20

Fax: +49 (0)6151 8173-29

info@peak-system.com

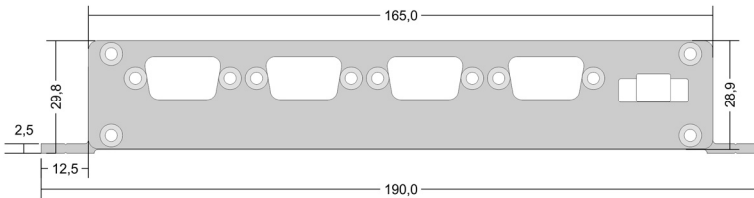
A handwritten signature in black ink, appearing to read "Uwe W. Sch...".

Signed this 22<sup>nd</sup> day of April 2010

## Appendix B Dimension Drawing



Top view (measures in mm)



Front view (measures in mm)

The figures do not show the original size.

## Appendix C Contents of a CompactFlash Card

Contents of a CompactFlash card being prepared for data logging:

- └ File system FAT16 (often just called FAT)
- └ File `trace.btr` in the root directory (file name extension `.btr` = binary trace)
- └ File size: a multiple of 512 bytes (min. 1024 bytes), not fragmented
- └ File contents: empty bytes (00h)

The size and the time stamp of the file `trace.btr` are not altered by the PCAN-Router Pro at data logging.

Capacity of CAN messages of the file `trace.btr`:

$$\text{CAN messages} = \left( \frac{\text{Bytes}_{\text{trace.btr}}}{512} - 1 \right) \cdot 25$$

## Appendix D Router Resources

The table lists all the logical resources of the PCAN-Router Pro, arranged by I/O functions (column “I/O Function”) and the pertinent I/O numbers (column “I/O Number”).

I/O Function	I/O Number	Number of bits	Value range	Function
DOut Level (00h)	LED CAN x	1		CAN status LEDs 1 - 8 (= 1a - 4b)
Special Out (70h)	Selfhold	1	0: Off, 1: On	When turned on (wake-up), automatically set to 1. To switch off the module set to 0.
	CAN x Mode	3	0 - 5	Operation mode CAN transceiver x 0: Normal (all transceivers) 1: WakeUp (AU5790) 2: PowerDown (AU7590, TJA1040, TJA1041, TJA1054) 3: ListenOnly (TJA1040, TJA1041, TJA1054) 4: HighSpeed (AU5790) 5: Standby (TJA1040, TJA1041, TJA1054)
	Beeper Pattern	32	Value from bit pattern (see right)	Tonal rhythm for beeper, resulting from a bit pattern (makes a 32-bit value): tttttttt tttttttt tttttttt 00c11111 t: Sequence of 24 segments each 100 ms, where the beeper makes a sound (bit set) c: 0 = play sequence once, 1 = play sequence continuously 1: Number of sequence segments t that are played (0 - 24)
	Routing x to y All	2	0 - 3	Forwarding of all CAN messages from CAN channel x to CAN channel y Bit 1 set: CAN messages with 11-bit ID (standard frame) Bit 2 set: CAN messages with 29-bit ID (extended frame)
	Routing x to y Explicit	11	11-bit CAN ID	Forwarding of CAN messages with the given 11-bit CAN ID
	Routing x to y Exclude	11	11-bit CAN ID	Forwarding of all CAN messages with 11-bit CAN ID except the specified 11-bit CAN ID
	Routing x to CF	2	0 - 3	Forwarding all CAN messages from CAN channel x to the CF card. Prerequisite: I/O function <i>Special Out (70h) &gt; Trace Enable</i> Bit 1 set: CAN messages with 11-bit ID (standard frame) Bit 2 set: CAN messages with 29-bit ID (extended frame)
	Routing x to CF Explicit	11	11-bit CAN ID	Forwarding of CAN messages with the given 11-bit CAN ID to CF card Prerequisite: I/O function <i>Special Out (70h) &gt; Trace Enable</i>
	Routing x to CF Exclude	11	11-bit CAN ID	Forwarding of all CAN messages with 11-bit CAN ID except the specified 11-bit CAN ID to CF card Prerequisite: I/O function <i>Special Out (70h) &gt; Trace Enable</i>
	Trace Enable	4	Value from bit pattern (see right)	Enable logging function for one or more CAN channels Prerequisite for the execution of I/O function <i>Special Out (70h) &gt; Routing x to CF [Explicit/Exclude]</i> Each of the four bits represents a CAN channel (CAN 1 - CAN 4).
Trace Disable	4	Value from bit pattern (see right)	Disable logging function for one or more CAN channels Each of the four bits represents a CAN channel (CAN 1 - CAN 4).	

I/O Function	I/O Number	Number of bits	Value range	Function
	Trace Clear	1	0, 1	Erases the contents of the trace file
	Trace Buffer Type	2	1, 2	Determines the mode for logging: 1 = linear: The logging stops when the trace file is full (default). 2 = circular: When the trace file is full, the logging restarts at the beginning.
	Configuration ID 7E7h enable	4	Value from bit pattern (see right)	Determines for each CAN channel if it can receive configuration messages via the CAN ID 7E7h (on for all channels by default). At least one CAN channel must be selected for reception. Each of the four bits represents a CAN channel (CAN 1 - CAN 4).
	RTC Set Year		0 - 99	Declarations for date and time to set the battery-buffered real-time clock Note: All declarations must be transmitted to the router. Initialization with the I/O function <i>Special Out (70 h) &gt; RTC Write</i>
	RTC Set Month		1 - 12	
	RTC Set Day of Month		1 - 31	
	RTC Set Day of Week		1 = Mo ... 7 = Su	
	RTC Set Hour		0 - 23	
	RTC Set Minute		0 - 59	
	RTC Set Second		0 - 59	
	RTC Write	1	0, 1	
	RTC Set Alarm	32	Value from bit pattern (see right)	Sets the alarm time for activating the PCAN-Router Pro when it is in sleep mode Bit pattern: --MMMMM MMDDDDh hhhmmmm mmsssss M = month, D = day of month, h = hour, m = minute, s = second
	Logging error frames enable	4	Value from bit pattern (see right)	Determines for each CAN channel if occurring error frames are recorded with the enabled logging function. Each of the four bits represents a CAN channel (CAN 1 - CAN 4).
	CAN x bitrate raw	16	0x0000 - 0xFFFF	Sets the CAN bit rate for CAN channel x by the register values for the CAN controller (compatible to SJA1000 at 16 MHz)
	CAN bitrate: xy		0 - 3 (CAN channel 1 - 4)	Sets a CAN bit rate xy for the given CAN channel
	None			No function Can be used as place-holder if the corresponding input or output has no function.
Const (CCh)	(Diverse values)			Diverse constants Read only; can be used as input constants
Positive Const (CDh)	0 to 255			Positive constants Read only; can be used as input constants
Negative Const (CEh)	0 to -255			Negative constants Read only; can be used as input constants
Special In (F0h)	Conf Ver Main	8	0 - 255	Main version number of the configuration
	Conf Ver Sub	8	0 - 255	Secondary version number of the configuration

I/O Function	I/O Number	Number of bits	Value range	Function
	FW Ver Main	3	0 - 7	Main version number of the firmware
	FW Ver Sub	5	0 - 31	Secondary version number of the firmware
	FW Build No	8	0 - 255	Build version number of the firmware
	Module ID	4	0 - 15	Router ID Position of the corresponding rotary switch on the board of the PCAN-Router Pro (see section 3.3 on page 13)
	Tx Msg Count CAN x	32		Number of transmitted CAN messages on CAN channel x
	Rx Msg Count CAN x	32		Number of received CAN messages on CAN channel x
	RTC Time	32	Value from bit pattern (see right)	Read current time from the real-time clock Bit pattern: hhhhhhhh mmmmmmmm ssssssss cccccccc h = hours, m = minutes, s = seconds, c = hundreds
	RTC Date	32	Value from bit pattern (see right)	Read current date from the real-time clock Bit pattern: WWW- - - - DDDDDDDD MMMMMMMM YYYYYYYY W = day of week, D = day of month, M = month, Y = year
	RTC Alarm	32	Value from bit pattern (see right)	Read set alarm time from the real-time clock Bit pattern: --MMMMM MMDDDDDh hhhmmmm mmsssss M = month, D = day of month, h = hour, m = minute, s = second
	Main Cycles	32		Gives the average duration for a computation cycle of the firmware (since the last polling)
	Main Cycles Max	16	0 - 65535	Gives the maximum duration for a computation cycle of the firmware
	Debug Cycles	16		Mean duration based on 1000 calculation cycles
	Rx Traffic Indicator CAN x	1	0, 1	Indicates the reception of CAN messages (monoflop 100 ms)
	Rx Error Counter CAN x	8	0 - 255	Counter of the CAN controller for reception errors
	Tx Error Counter CAN x	8		Counter of the CAN controller for transmission errors
	Bus Error Counter CAN x	32		Counter of the CAN controller for bus errors
	Rx Queue Overrun CAN x	32		Counter for overrun of the reception queue
	Error Warning CAN x	32	0 - 2 <sup>32</sup> -1	Counter of the CAN controller for warning errors
	Error Passive CAN x	32		Counter of the CAN controller for passive errors
	Data Overrun CAN x	32		Counter of the CAN controller for data overrun errors
	Tx Traffic Indicator CAN x	1	0, 1	Indicates the transmission of CAN messages (monoflop 100 ms)

I/O Function	I/O Number	Number of bits	Value range	Function
	Trace Status	16	Value from bit pattern (see right)	Status of logging to CompactFlash card Bit meaning: 0: No CF card inserted in the PCAN-Router Pro (For a card detection a reset (power cycle) is needed.) 1: CF card does not contain a partition or more than one 2: CF card isn't formatted with the file system FAT16 3: Root directory cannot be found 4: Root directory cannot be opened 5: File <code>trace.btr</code> does not exist 6: File <code>trace.btr</code> cannot be opened 7: File pointer cannot be set to the start of the file 8: First sector of file <code>trace.btr</code> cannot be determined 9: Trace file is completely filled with CAN messages (linear record mode) 10: Maximum number of records is reached 11 - 15: (Not used)
	Trace File Msg Free	32	0 - $2^{32}-1$	Number of CAN messages still fitting into the trace file
	Trace Queue Overruns	32		Number of CAN message not being processed by the CF card queue due to overload
	None			No function Can be used as place-holder if the corresponding input or output has no function.
32-bit Variable (FFh)	0 to 255	32	0 - $2^{32}-1$ or $-2^{31} - +2^{31}-1$	256 disposable 32-bit variables; interpretation as Signed or Unsigned depending on context