



# **FMS OEM CHIP V7**

## **Digital tachograph and driver's card remote download**

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## Description of function

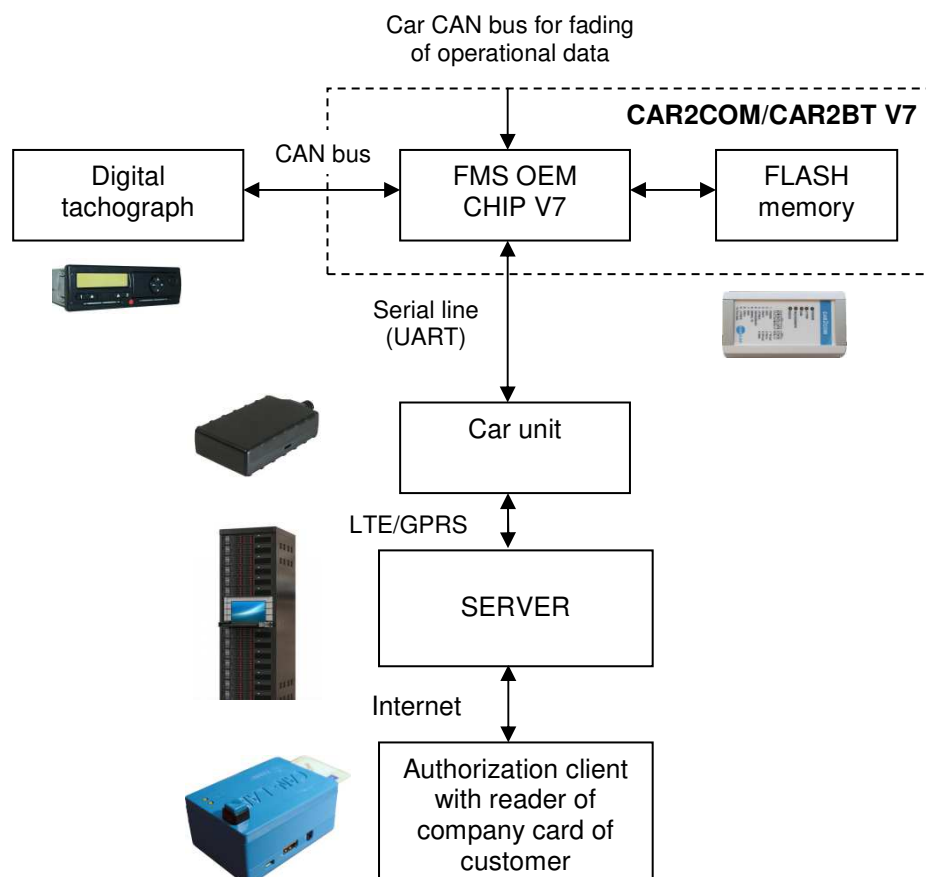
From FW 030 version, FMS OEM CHIP V7 and products based on it are equipped with function of digital tachograph and driver's cards download. Optionally, it is possible to use primary or secondary CAN for download, so it is possible to simultaneously read car data. FLASH memory connected to FMS OEM CHIP is used for download that is used also for saving of configuration or firmware update. In case of activation of tachograph download function fitting of memory with 256 Mbits (32MB-256Mbit) is required. FW 030 version supports CYPRESS (Spansion) FL256SAIF00 type of memory. If needed, it is possible to add support for other memories.

Downloading has 3 phases:

- Authorization of company card
- Download of tachograph and drivers' cards (if inserted) and saving into FLASH memory
- Download of files from FLASH memory

Firstly, data are downloaded into internal memory, so it is possible just to download data into this FLASH memory (e.g. abroad), repeatedly, and after that, when price of data transmission is more favorable, download data to server.

For data, there is 31 MB reserved in FLASH memory. FW supports saving up to 16 records/files. During communication, indexes of records are numbered as 0 to 15. Records are split into sections of 64 kB.



Function of tachograph download can be added to the car unit by integration of FMS OEM CHIP or by using external unit connected to car unit by serial line, e.g. CAR2COM V7 made by our company, or own external unit with FMS OEM CHIP V7.

## Support of tachograph download function

FMS OEM CHIP supports tachograph download, if:

- There is loaded FW version that has linked support of download, standard FW doesn't contain support (price)
- There is connected supported memory 32MB (256Mbit) to FMS OEM CHIP.

If any of these conditions is not met, following reaction command \$PCAN,V,..... command occurs:

**\$PCAN,V,NOT\_SUP,\*3A**

### Setting

#### *CAN port*

**\$PCAN,V,CNP,0,\*27**

**\$PCAN,V,CNP,1,\*26**

Command sets the CAN port designed for tachograph download: 0-primary, 1-secondary CAN interface.

**\$PCAN,V,CNP,?,\*28**

Request about set CAN port. Reaction is in the same format as command with setting.

#### *RLE compression*

**\$PCAN,V,RLE,0,\*21**

**\$PCAN,V,RLE,1,\*20**

This command allows activation of simple RLE compression. There are often blocks of same values in records, so it is possible to reduce amount of transmitted data by using of this option.

Data in this form:

**\$PCAN,V,GRD,A00005470,56565656565656565656565656565656,\*70**

Are sent as:

**\$PCAN,V,GRD,A00005470,R56,\*21**

It means that the block has the same value, which is 56 h.

**\$PCAN,V,RLE,?,\*2E**

Request about state of RLE compression switching. Reaction is in the same format as command with setting.

#### *Split mode*

**\$PCAN,V,SPL,0,\*35**

**\$PCAN,V,SPL,1,\*34**

Using this command, you can switch off/on split mode regime. In this regime, CCC commands (see chapter "Tachograph data driver's card data download to FLASH") for company card are split into sections of max. 128 data bytes.

### ***\$PCAN,V,SPL,?,\*3A***

Request about split mode setting. Reaction is in the same format as command with setting.

In this regime, type "CCC" data messages for authorization of company card is split into blocks of max. 128 data bytes. Packet length is 128 data bytes \*2 + heading + checksum. Each data byte requires 2 bits in packet – hexadecimal data in text format.

Data in packet

*\$PCAN,V,CCC,<data>,\*checksum*

is split into parts:

*\$PCAN,V,CC0,<data-128 bytes>,\*checksum*

*\$PCAN,V,CC1,<data-128 bytes>,\*checksum*

*\$PCAN,V,CC2,<data-128 bytes>,\*checksum*

*\$PCAN,V,CCL,<data-1to128 bytes>,\*checksum*

CC0 packet contains first 128 data bytes. CC1, CC2, CC3 packets contain other data with 128 bytes. Last packet is marked CCL (last). It contains 1 to 128 data bytes.

For example, if 133 bytes are transmitted, CC0 packet is sent with 128 bytes and CCL with 5 bytes. For data with length of 268 bytes, CC0 and CC1 packets with 128 bytes and CCL packet with 12 bytes are sent.

In reverse direction, it is possible to send data as necessary and count checksum continuously during sending of data to serial line. In this direction, there is no need to split data. FW in FMS OEM CHIP accepts data till receipt of checksum with delimiter "\*" and contains sufficient memory for received data.

### ***Checksum switch off***

***\$PCAN,D,DSU,\*36***

This command is designed only for tuning "on table". It is valid till FMS OEM CHIP reset. It switches off checksum control. During testing communication from terminal it is not necessary to recount and rewrite checksum within command editing. However, checksum field is required in command, but it is not controlled if it is correct.

### ***Library parameters reading for tachograph download***

***\$PCAN,V,GPR,\*23***

Message with parameters is a response for this command. In case of FW 030, only one parameter is a response: maximum amount of records that can be saved into FLASH, thus: *\$PCAN,V,GPR,16,\*08*

### ***Wakeup pin control***

***\$PCAN,V,WUP,0,\*28***

***\$PCAN,V,WUP,1,\*29***

Wake-up pin switches on power via opto-isolator. This pin can be used for waking up of tachograph by connection to wake-up pin of tachograph. Enter value 1 to switch it on. It shall be done before initiation of download.

Wake-up pin is deactivated automatically after finishing of download, interruption by command or interruption by timeout expiration.

***\$PCAN,V,WUP,?,\*27***

Request about state of wake-up pin. Reaction is in the same format as command with setting.

## **Reading of files downloaded from FLASH memory and work with records**

***Erase store***

***\$PCAN,V,ERS,\*22***

It erases flash memory area, where tachograph data is saved. Memory of splitting of blocks, as well as individual data blocks are erased. It takes up to 60 seconds. When finished, processing is confirmed by sending command. In this regime, FMS OEM CHIP accepts maximum one incoming command, however, it responds after processing of Erase store command.

***Erase record***

***\$PCAN,V,ERC,2,\*2C***

It erases data of record 2. When record is downloaded e.g. on server, it is possible to erase record. FMS OEM CHIP confirms receiving and processing of command by sending command back. If erasing of record with index bigger than maximum number of records is requested, following response is sent: ***\$PCAN,V,ERC,ERR,\*5B***

***List of used records***

***\$PCAN,V,LUR,\*2D***

Overview of used records; response e.g.:

***\$PCAN,V,LUR,3,0:1,2:2,7:1,\*23***

Number of used records is 3. Record 0 with tachograph file, record 1 contains file from driver's card in the first slot. Record 7 contains again tachograph file.

***Get record info***

***\$PCAN,V,GRI,4,\*22***

Request about data of record 4. Records 0 to 15 are available. Record is tachograph or driver's card file.

***Response***

***\$PCAN,V,GRI,4,1,100821,1514735167,\*35***

Record 4 represents tachograph data (data type value 1). Size of record is 100821 bytes and time mark is 1514735167. Time mark is classic unix time in seconds from 1 January 1970, UTC. In this case time mark represents 31 December 2017, 15:46:07.

File type is stated this way:

- 1 – tachograph file
- 2 – driver's card – first slot
- 3 – driver's card – second slot
- 255 – record is empty

If the record is empty, following chain occurs:

**\$PCAN,V,GRI,EMPTY,\*43**

If there is number of record out of range, following message occurs:

**\$PCAN,V,GRI,ERR,\*53**

Following request is at disposal for tuning:

**\$PCAN,V,GRB,2,\*2F**

For example with following response:

**\$PCAN,V,GRB,2,B10,10:0,11:1,8:2,\*5C**

It says that data is saved from block 10 (64kB blocks) and it follows in block 11 and 8. However, this command is not applicable in reality, it serves only for control of data within FW tuning.

There is also CHR command that searches table of blocks no matter of information about file saving and counts number of blocks allocated for given record.

**\$PCAN,V,CHR,0,\*23**

**\$PCAN,V,CHR,0,EMPTY,0,\*46**

Zero blocks and empty area.

**\$PCAN,V,CHR,1,\*22**

**\$PCAN,V,CHR,1,USED,1,\*14**

One block.

Control of file system:

**\$PCAN,V,CHD,\*29**

0- OK

1- one record with zero length found

2- block with index of empty record found.

### **Create demo data**

**\$PCAN,V,CDD,\*25**

**\$PCAN,V,CDD,2,\*25**

These two commands create test data in FLESH memory that can be used for "fine tuning" of data downloading from FLASH "on the table".

### **Reading of record data**

**\$PCAN,V,GRD,0,A0000000,S0010,\*38**

The command requires FMS OEM CHIP for data from record 0 from 00000000 address with length of 16 bytes. Address and length of required data is stated in hexadecimal format and it requires fixed length. Length of address is 8 and length of data is 16 characters plus identification sign A or S. Address is stated in respect to beginning of file, it has no relation to organization of data in FLASH memory.

### **Response**

**\$PCAN,V,GRD,A0000000,000102030405060708090A0B00000000,\*74**

Data is also in hexadecimal format, response contains address and actual data. Length of data and index of record are not stated in the response. Decoding of data

is made from "comma" sign found before checksum. Address is related to position of given record, it is not address in memory.

If data of empty record is requested, following response occurs:

**\$PCAN,V,GRD,5,EMPTY,\*57**

Record from tachograph or card is read gradually by incrementation of address (file position), when EMPTY response occurs, there is a signal that read is at the end of file-record.

If error occurs during decoding of request, following response occurs:

**\$PCAN,V,GRD,1,ERR,2,\*5D**

1- record number

2- error code

Error codes

1 – data does not exist, e.g. behind the end of file in non-existing 64kB block.

2 - data does not exist, behind length of file

3 – entry of length of requested data not found

4 – entry of data address not found

5 – requested record index bigger than maximum number of records

6 – excessive length of requested data, it is not possible to generate them into output buffer

## Tachograph and driver's card data download to FLASH and authorization of company card

**Unit switch off not allowed**

From FW 1.75 version

**\$PCAN,V,PWR,1,\*2E**

It is suitable to download driver's card and tachograph when the car is standing, therefore it is possible to block FMS OEM CHIP /CAR2COM switch off in case of disconnecting of key signal. For example, if data download is planned on server, it is suitable to send this command before, during the ride.

This setting has no effect on unit settings. If power is "hard" disconnected, the unit doesn't keep this command in memory.

**\$PCAN,V,PWR,0,\*2F**

This command restores key switch off after disconnection of key signal.

**Set begin time**

**\$PCAN,V,SBT,<data>,\*checksum**

Sending of time, from which data is downloaded. It is also in unix format.

**Set remote download**

**\$PCAN,V,SRD,<data>,\*checksum**

Sending of ATR from company card. ATR is gained by [SCardStatus](#).

**Company card command**

***\$PCAN,V,CCC,<data>,\*checksum***

Command for company card, processing and response using [SCardTransmit](#). Response is sent into FMS OEM CHIP via the same message.

In case of Linux, it is possible to use API PCSC lite with the same interface as in case of Windows.

ATR and CCC data is read and interchanged with company card (authorization unit).

During the download, status messages are sent to serial line that provide information about progress of downloading or potential error during downloading:

***Download status***

This data is send by unit itself to provide information about download status.

***\$PCAN,V,DST,<code>,\*checksum***

**CODE:**

**Open tachograph file**

**OTF,x**

Creation of record for tachograph file, parameter "x" represents number of record.

**OTF,ERR**

Error during tachograph record creation – maximum number of saved records reached.

**O1F,x / O1F,ERR / O2F,x / O2F,ERR**

Analogically for files of first and second slot with driver's card.

**Close tachograph file**

**CTF / C1F / C2F**

It informs about given file download finishing.

**TDT**

It informs about beginning of "Technical data" data block download at tachograph file.

**EFD**

It informs about beginning of "Events and faults" data block download at tachograph file.

**DSD**

It informs about beginning of "Detailed speed" data block download at tachograph file.

**TMO**

Timeout – data download was interrupted. Actually downloaded record is cancelled and downloading is finished. This situation occurs for example in case of download of driver's card, when it is not inserted.



### ***Request into unit*** ***\$PCAN,V,DST,\*25***

Unit sends following response:

### ***\$PCAN,V,DST,RUN,0,\*5C***

If download is not running or downloading was interrupted due to various reasons,  
or

### ***\$PCAN,V,DST,RUN,1,\*5D***

If downloading / authorization is running.

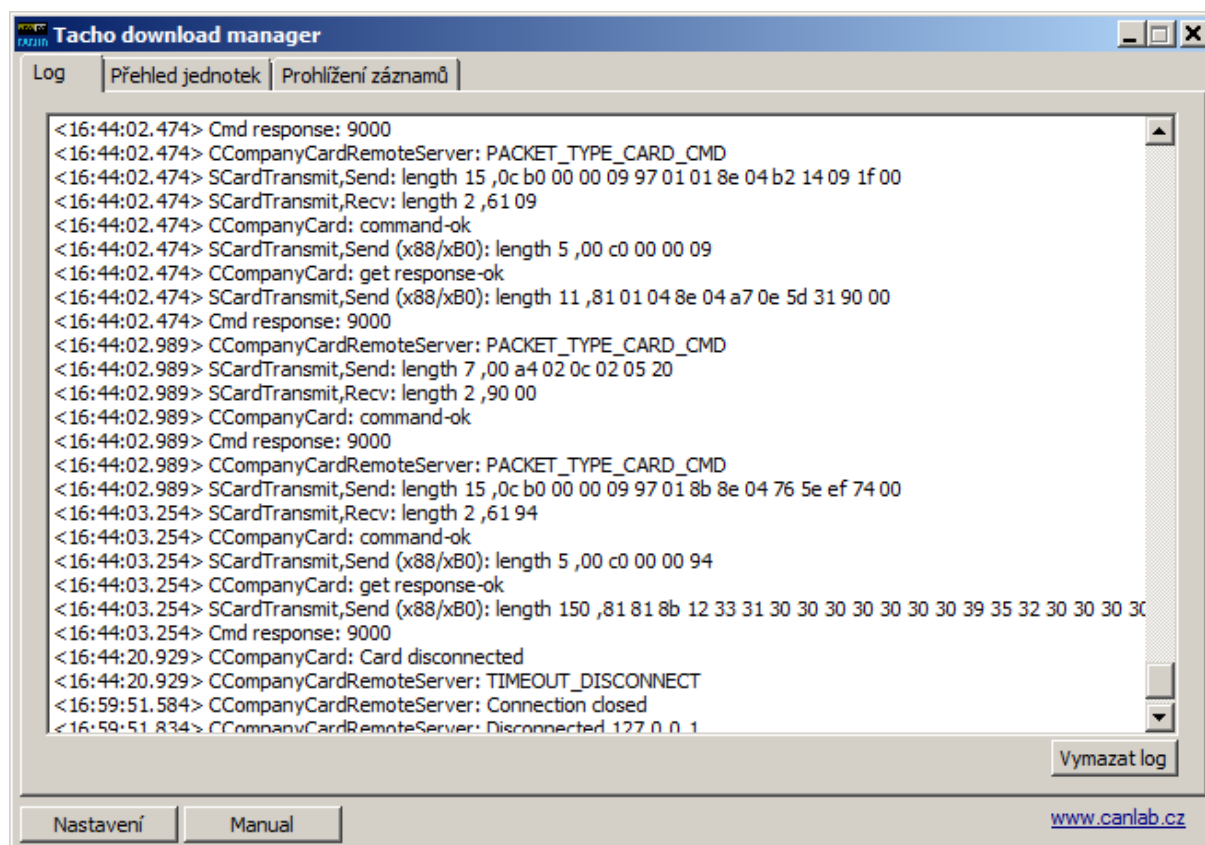
### ***Stop downloading***

### ***\$PCAN,V,STP,\*31***

It interrupts data download from tachograph and switches engine for download into initial status.

## **Authorization SW of company card**

SW for authorization of company card can be gained for free as part of FMS chip. SW receives requests via TCP. We send packet format on demand.



Authorization client can be added in the form of application for OS Windows or as independent unit. This independent unit can be located at customer and it is connected to server that communicates with car unit.

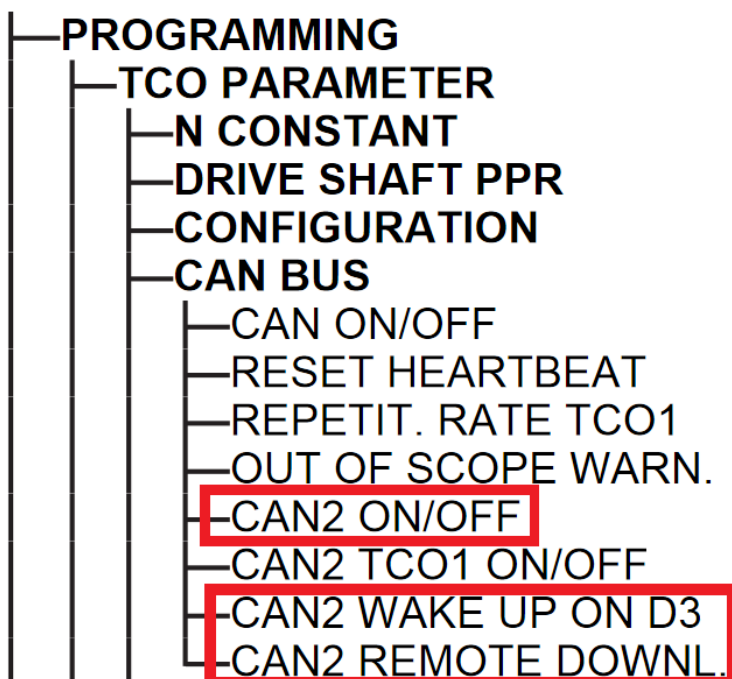
This unit can be also used for direct downloading of data from drivers' cards.

We can provide SW ESM Analyzer for offence assessment and inspection of tachograph data and card data. For more information see [www.canlab.cz](http://www.canlab.cz).

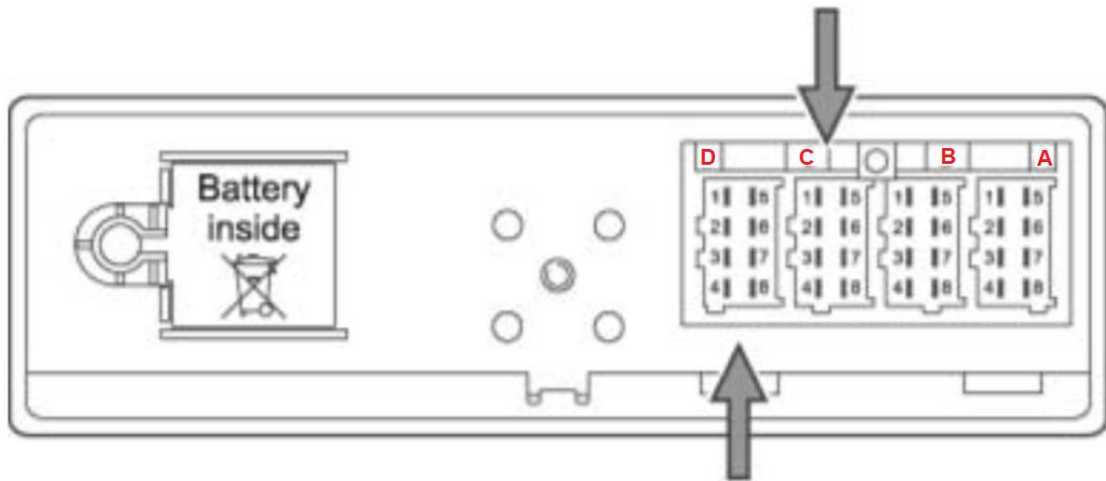


## Model connection of VDO tachograph

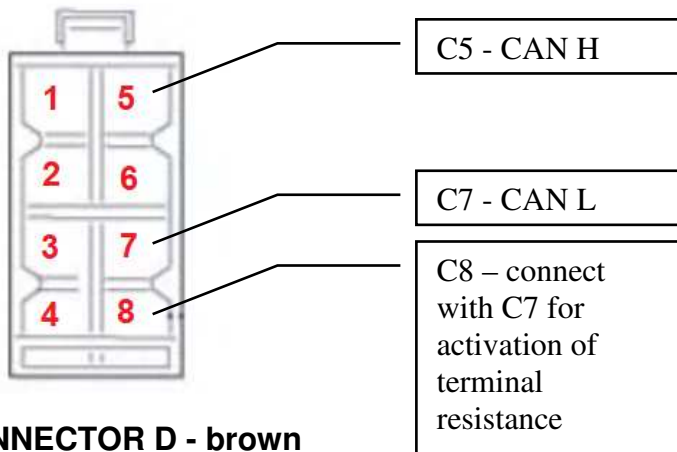
For remote tachograph data download, it is necessary to switch on CAN 2 at C connector in tachograph settings, than allow remote download using CAN2, and in case of 1.3b and 1.4 tachograph version allow CAN2 D3 WAKE UP. This setting can be done only by authorized operator installing and controlling the tachograph.



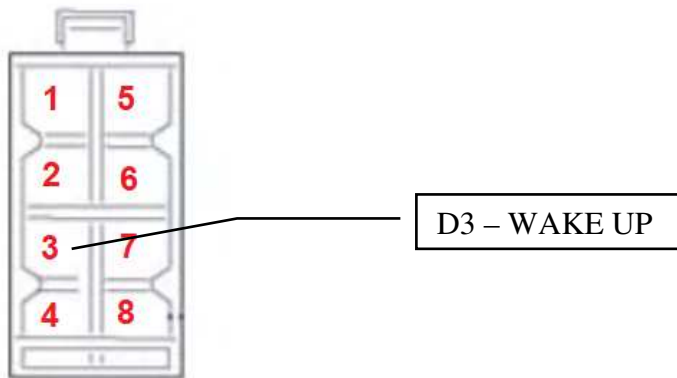
It is possible to determine, if tachograph is compatible with function of remote download by various online tools (Google: tachograph remote download check) or you can send request to [info@canlab.cz](mailto:info@canlab.cz). For verification of compatibility you have to provide tachograph type number that can be found on the tachograph label or under the tachograph role or on tachograph printout. Format of the number is: 1381.XXXXXXXXXX.



**CONNECTOR C - red**

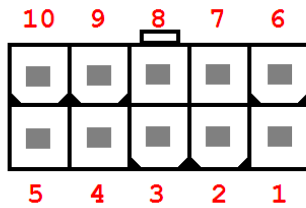


**CONNECTOR D - brown**

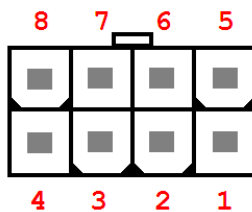


For activation of terminal resistance at CAN bus you can connect C7 pin with C8 pin at tachograph.

## CAR2COM



Pin	Description
1	Voltage 8-36V
2	Digital output, voltage on
3	CAN H
4	J1708 A
5	Tachograph A – signal (D8-inoferinterface)
6	Signal 15 (startup-shutdown)
7	GND
8	CAN L
9	J1708 B
10	Tachograph B – GND (has to be connected, unit has opto-isolator)



Pin	Description
1	RX UART (incoming data)
2	CAN 2, high (secondary CAN)
3	GND
4	UART 2 RX
5	TX UART (outgoing data)
6	CAN 2, low (secondary CAN)
7	GND
8	UART 2 GND (has to be connected, unit has opto-isolator)

Downloading is realized by secondary CAN, therefore it is necessary to set it by following command:

**\$PCAN,V,CNP,1,\*26**

On secondary CAN it is necessary to set correctly speed of CAN and NONACTIVE regime LISO:

**\$PCAN,2,SET,C8,EXT,\*72**

If CAN is connected from tachograph to secondary CAN at CAR2COM, connection is made according to following picture.

