CANcardX

and

CANcabs

User´s Guide

Version 2.1

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Contents

1 CANcardX

1.1 Introduction

CANcardX is a PC card according to the PC-Card-standard (PCMCIA) with the powerful microcontroller SAB-C161O from Siemens and two can controllers SJA1000 from Philips. The SJA1000 handles CAN messages with 11 bit as well as 29 bit identifiers. The reception and analysis of remote frames is possible without restrictions. CANcardX is able to detect and to generate error frames on the bus.

CANcardX provides two completely independent CAN channels with two separate connections. To get more flexibility, the CAN transceivers are integrated into the connection cables.

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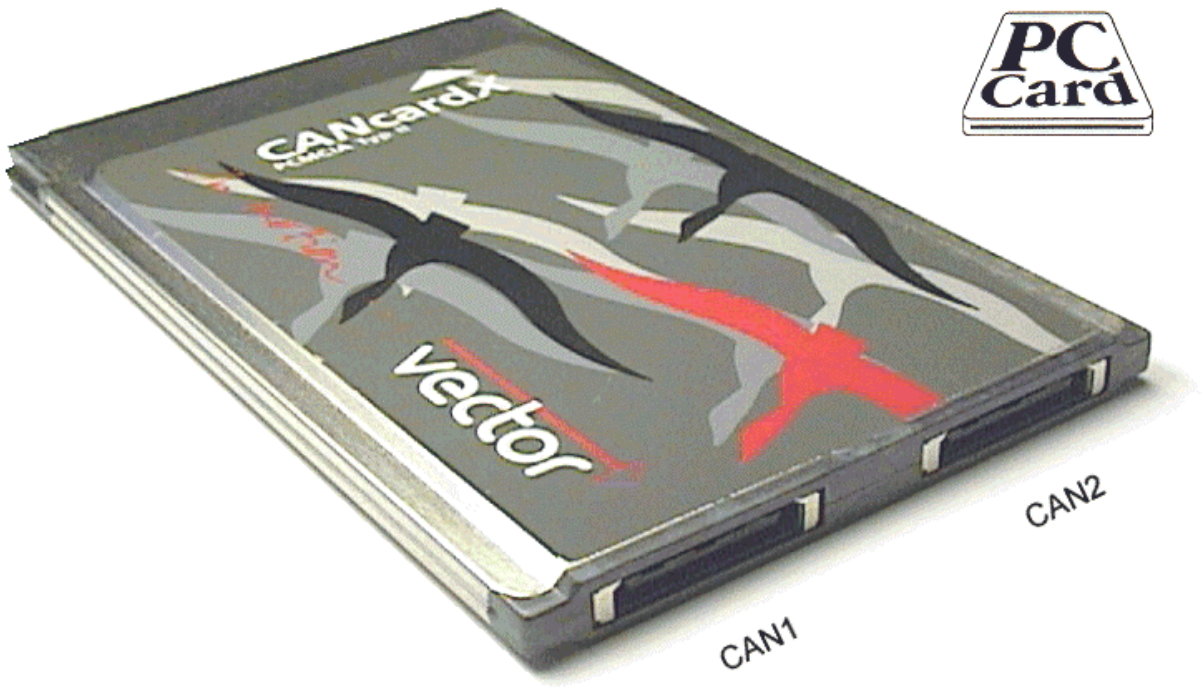

Figure 1: A CANcardX with its two I/0 Ports.

1.2 Installation

The CANcardX may be inserted in any free PC-Card (PCMCIA) slot that is capable of accommodating Type II or Type III cards. You don't have to switch the power off before inserting or removing the card (Note: This is not valid for Windows NT.).

For details concerning the installation process please take a look at the Installation Manual and the file “readme.txt”, which is on the driver CD.

With the “CAN Driver Configuration“-Tool (Start -> Settings -> Control Panel -> CAN Hardware) CANcardX can be configured; also information about CANcardX, its channels and other CAN hardware as well as the Virtual CAN Bus are displayed.

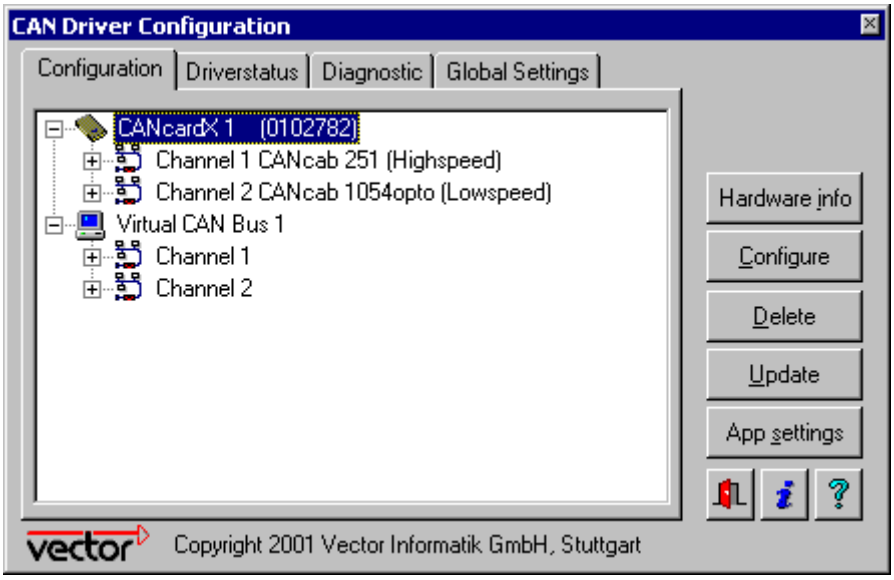

Figure 2: CAN Driver Configuration

1.3 Connect the card to the CAN network

The two independent I/0 ports are shown in figure 1 above. You connect the card to the CAN network by means of special cables called CANcabs.

1.4 Technical Data

CAN channels:	2 (V2.0B extended format)
CAN transceiver:	integrated in the CANcabs
CAN controller:	2 Phillips SJA 1000
Microcontroller:	Siemens SAB-C161O
Max. baud rate:	1 Mbit/s
Time resolution:	50 µs
ErrorFrame	
- Detection:	yes
- Generation:	yes
Hardware requirement:	IBM PC AT or 100% compatible; PC-Card Slot Type II
PC interface:	PC-Card Version 2.0 (PCMCIA)
Current consumption:	110 mA by CANcardX, typically 30 mA by CANcab 251
Software requirement:	Windows 98 / ME / 2000 / NT / XP
Configuration:	Plug & Play (Not valid for Windows NT)
Dimensions:	PC-Card Type II (approx. 85 mm x 64 mm x 5 mm)
Weight:	approx. 34 g
Temperature range:	operation: 0...55 °C, transport and storage: -40 ... 125 °C
Relative humidity:	15 % ... 95 %, not condensing

2 CANcabs

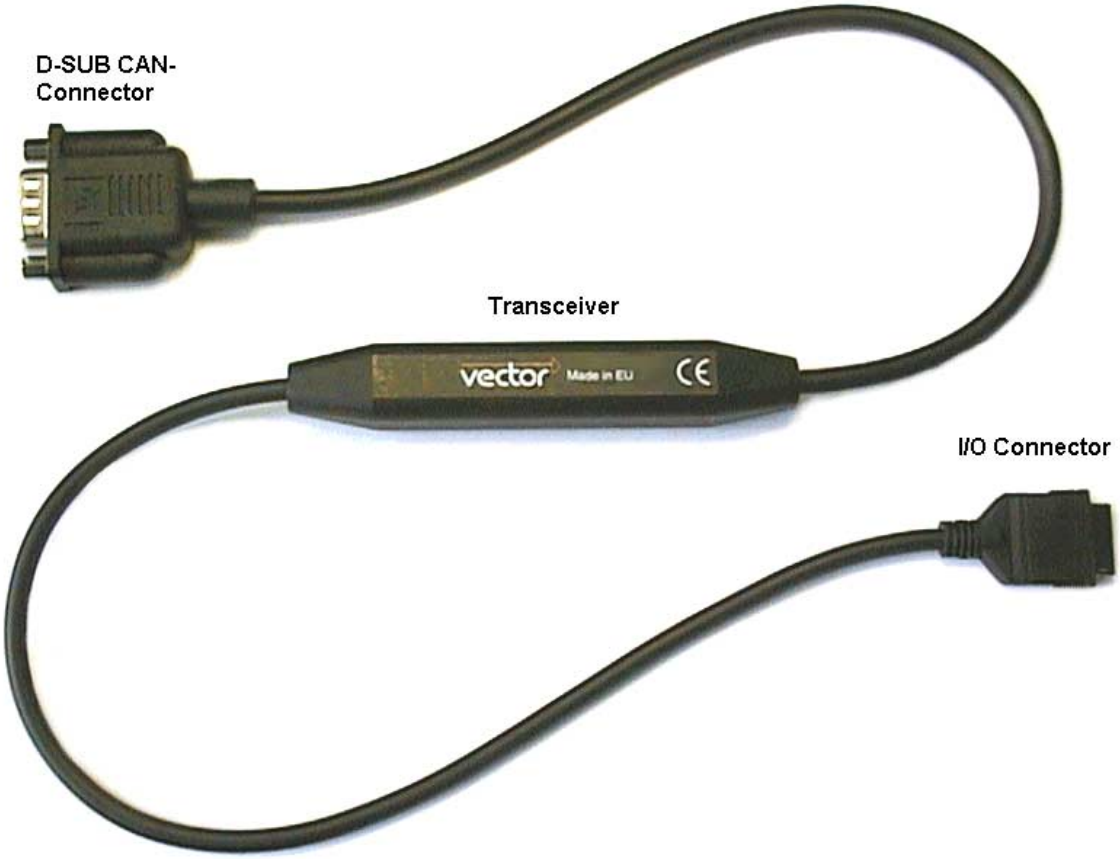

Figure 3: CANcab with transceiver, I/O connector and D-Sub CAN connector

General Technical Data (unless expressly specified otherwise):

Dimensions:	100 x 16 x 16 mm (4.0 x 0.6 x 0.6 in.)
Case:	plastic ABS
Weight:	approx. 100 g (3.5 oz)
Cable length:	approx. 30 cm (1 ft.) on both ends
Connection:	PC-side: 15-pole plug to the CANcardX
	Bus-side: 9-pole D-Sub plug (DIN 41652)

2.1 Overview CANcabs

CANcab	Transceiver	Description
251	PCA82C251	Highspeed with standard D-Sub 9 connector
251opto	PCA82C251	Highspeed with opto coupler and standard D-Sub 9 connector
251fibre	PCA82C251	Highspeed with opto coupler and standard D-Sub 9 connector. Two device parts, that are connected with a two wire fiber-optic transmission link.
1041opto	TJA1041	Highspeed with opto coupler and standard D-Sub 9 connector
1050	TJA1050	Highspeed with standard D-Sub 9 connector
1050opto	TJA1050	Highspeed with opto coupler and standard D-Sub 9 connector
1054	TJA1054	Lowspeed with standard D-Sub 9 connector
1054opto	TJA1054	Lowspeed with opto coupler and standard D-Sub 9 connector
10011opto	B10011S	For truck applications, with opto coupler and standard D-Sub 9 connector
5790 c	AU5790	Single Wire CAN Transceiver with standard D-Sub 9 connector
5790opto c	AU5790	Single Wire CAN Transceiver with opto coupler and standard D-Sub 9 connector
Eva	Customer specific	Evaluation kit for customer specific assembly of the CANcab with bus transceiver by prefabricated breadboard PCB

More information and an updated list of all available CANcabs can be found under http://www.vector-informatik.de.

2.1.1 CANcab I/O-Connector

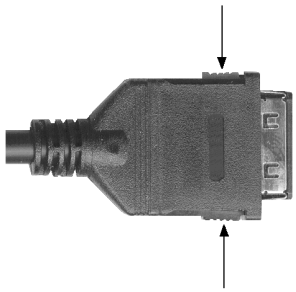

Figure 4: The I/0 connector on a CANcab. The tabs are marked with arrows.

Important note:

Push firmly to insert the connector of the CANcab into CANcardX.

To remove the connector, push both tabs (see figure 4) as deep as possible and pull out the connector.

Warning:

Pulling out the connectors by force with only one tab unlocked will lead to damages.

Vector assumes no guarantee for damages caused by improper use of CANcabs.

2.1.2 CANcab D-Sub Connector

Figure 5: The CANcab D-Sub connector.

The CAN bus is connected to the CANcab by the 9-pole D-Sub connector (see figure 5).

D-Sub terminal assignment for the different CANcabs:

DS *)	CC **)	Function for the different CANcabs								
		251 1050	251opto 1050opto DNopto	251 fibre	1041 opto	252, 1053, 1054	1054 opto	10011 opto	5790 c (Single Wire)	5790 c opto
1	-									
2	Green	CAN Low	CAN Low	CAN Low	CAN Low	CAN Low	CAN Low	CAN Low	N.C.	N.C.
3	Brown	GND	V_{GND}	V_{GND}	V_{GND}	GND	V_{GND}	V_{GND}	GND	V_{GND}
4	Orange	RL	N.C.	N.C.	Split	RL	N.C.	RL	R100	R100
5	Black	Shield	Shield	Shield	Shield	Shield	Shield	Shield	Shield	Shield
6	-									
7	Red	CAN High	CAN High	CAN High	CAN High	CAN High	CAN High	CAN High	CAN High	CAN High
8	-									
9	Yellow	N.C.	N.C.	VB+ 6-36 V	VB+ optional 11-18 V	N.C.	VB+ optional 11-18 V	VB+ optional 16-32 V	$V_{\_Batt}$	VB+ optional 11-18 V

*) DS: D-Sub pin number

**) CC: Cable Color

Shield:	shield
GND:	mass
$V_{\_Batt}$:	battery voltage (+12 V referred to GND, extern)
N.C.:	not connected
RL:	reserved lines, may not to be connected to any cable
VB+:	positive supply voltage, optically decoupled
V_{GND}:	galvanic decoupled mass
R100:	If the single wire CANcab is used in a high-speed net, there has to be a termination resistor between CAN High and GND. This termination resistor is enabled in Fast Mode by the CANcab itself, if CAN High (pin 7) and pin 4 are connected by a bridge.

2.2 Highspeed CANcabs

The Highspeed CANcabs are fully compatible with the ISO 11898-2 standard. They are suitable for baud rates up to 1 MBaud.

Bus levels for Highspeed CANcabs:

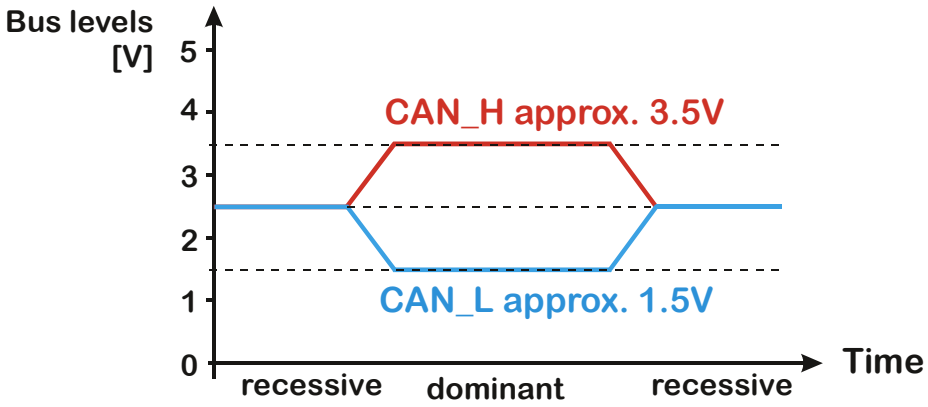

Figure 6: Bus levels for Highspeed CANcabs

2.2.1 CANcab 251, 1050, 251opto and 1050opto

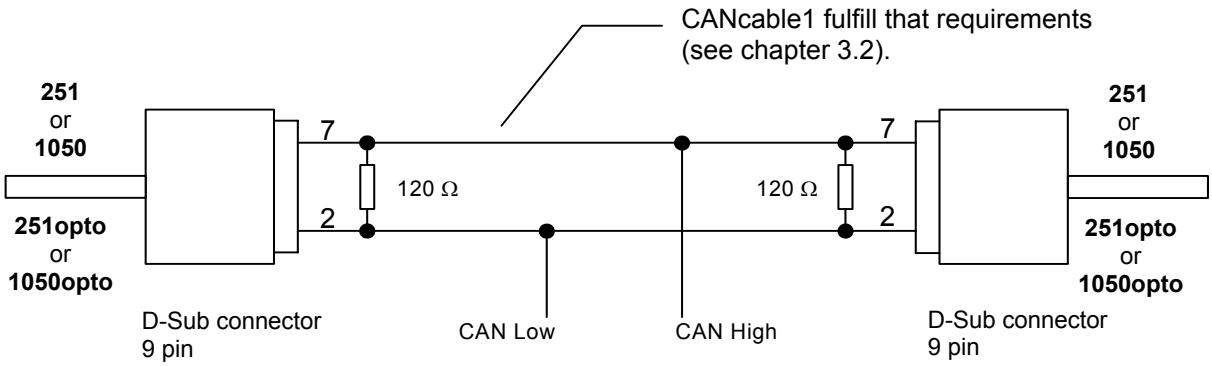

Figure 7: Test setup for CANcab 251,1050, 251opto and 1050opto

At CANcab 251 pin 4 must not used.

Opto version of the CANcabs 251 and 1050:

The CANcabs 251 and 1050 are also available in an opto version, which comes up with a galvanic isolation between the CANcardX and the CAN Bus. The galvanic isolation of the transceiver voltage supply is realized by a DC/DC-converter.

Technical Data:

Current supply:	through Vector CANcardX
current consumption:	approx. 30 mA (typically)
Transceiver:	Philips 82C251 or TJA1050
Maximum baud rate:	1 Mbit/s

Additionally for the opto versions:

Opto coupler:	HP 7101 or compatible (typically delay time approx. 30 ns)
Isolation voltage:	50 V (low voltage directive)

2.2.2 CANcab 1041opto

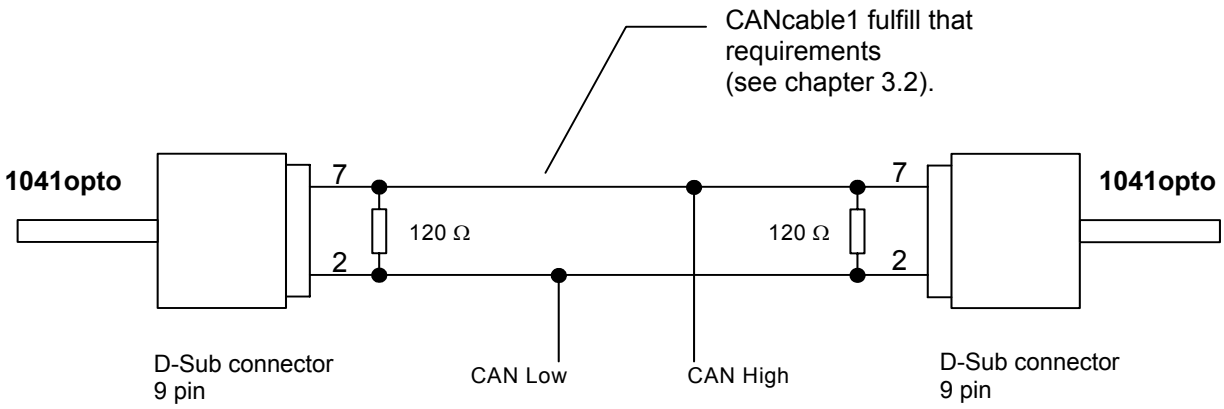

Figure 8: Test setup for CANcab 1041opto

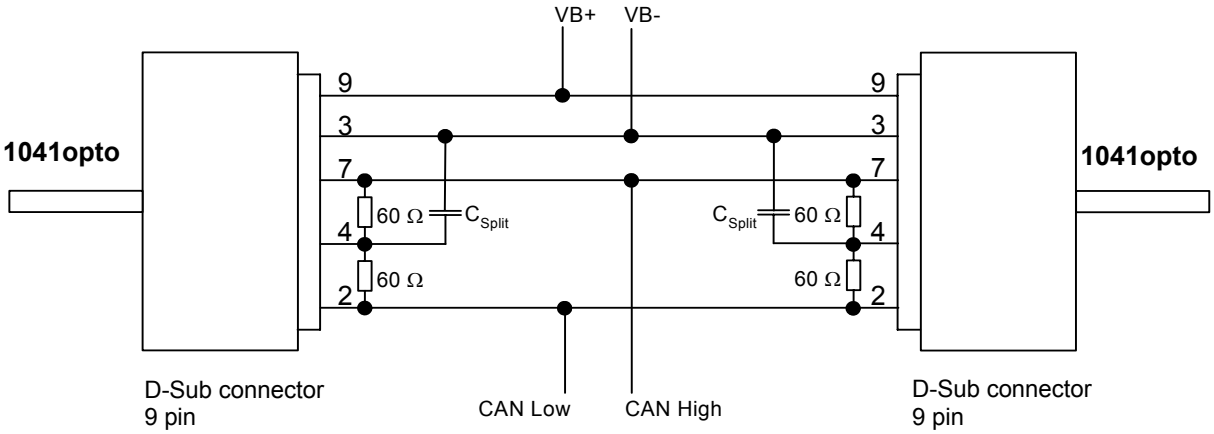

Figure 9: Test setup for CANcab 1041opto with external voltage supply and Split-Termination

The Split-Termination

The Split-Termination concept is shown in figure 9. In Normal-Mode, this concept achieves that the common mode signal at the middle tap of the two 60 Ohm resistors is closed to ground through a capacitor. This set up results in a stabilization of the recessive voltage to 2.5 V. In other modes, pin 4 is high resistance and the Split-Termination is switched off.

4.7 nF are recommended for the capacitor (C_{Split}).

The serial resistor, which is recommended in some applications, is not necessary because a “lost Ground” situation only takes place if the CANcab is damaged.

The CANcab 1041opto comes up with a galvanic isolation between the CANcardX and the CAN Bus. The galvanic isolation of the transceiver voltage supply is realized by a DC/DC-converter. That voltage supply is approx. 10 V. It is possible to use an external voltage supply on pin 9, if that voltage is between 11 - 18V. Therefore the transceiver under voltage detection is not possible. This is valid for V_{Batt} and V_{CC}.

Programming the Normal- and Sleep-Mode:

The CANcab 1041opto supports Normal-Mode and Sleep-Mode.

These modes can be enabled either by calling the function “ncdSetChannelTransceiver” of the CAN Driver Library (see CAN Driver Library Documentation) or by calling the function “setPortBits” in a CAPL-program for CANalyzer / CANoe. For this function you have to take care that the channel number is the logical one which is used by CANalyzer / CANoe according to the assignment in CAN Driver Configuration.

The function “setPortBits” has a 8 bit parameter. For Lowspeed CANcabs these 8 bits have the following meaning:

Bit 0 and 1:	Linemode of channel 1 CANcabs
Bit 2 and 3:	Linemode of channel 2 CANcabs

The bits 4 – 7 are reserved and must be set to “0“.

To enable one mode, the parameter has to contain one of the following bit combinations:

channel 1 / channel 2	bit 1 / bit 3	bit 0 / bit 2
Normal-Mode	0	1
Sleep-Mode	1	0
no change	1	1
no change	0	0

The following example demonstrates how to use the function “setPortBits” in a CAPL program for CANalzyer / CANoe to change the mode of CANcab 1041opto.

```
variables {
}

on key '1'
{
  write ("CAN1 Highpeed: Normal Mode");
  setPortBits(0x01);
}

on key '2'
{
  write ("CAN1 Highpeed: Sleep Mode");
  setPortBits(0x02);
}

on key '3'
{
  write ("CAN2 Highspeed: Normal Mode");
  setPortBits(0x04);

}
on key '4'
{
  write ("CAN2 Highspeed: Sleep Mode");
  setPortBits(0x08);

}
```

Technical Data:

Power supply:	through Vector CANcardX or external 11 – 18 VDC
Current consumption:	approx. 35 mA (typically)
Transceiver:	Philips: TJA1041
Maximum baud rate:	1 Mbit/s
Minimum baud rate:	40 kbit/s
Opto coupler:	HP 7101 or compatible (typically delay time approx. 30 ns)
Isolation voltage:	50 V (low voltage directive)

2.2.3 CANcab 251fibre

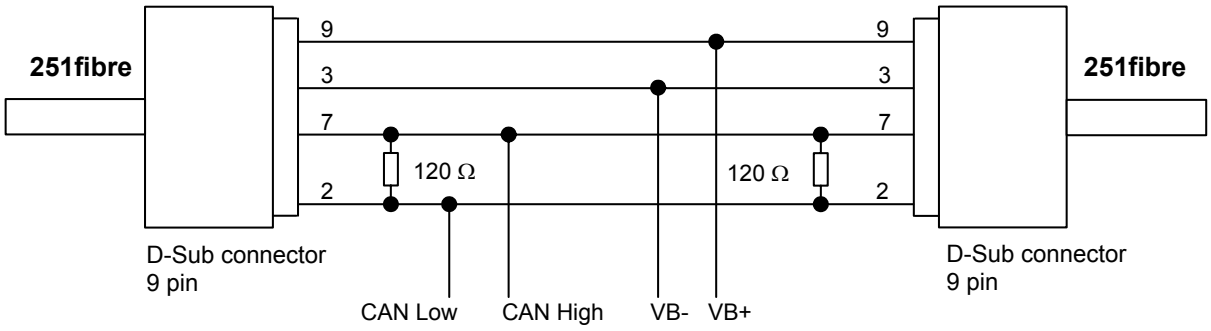

Figure 10: Test setup for CANcab 251fibre

Hardware:

The CANcab 251fibre consist of two device parts, that are connected with a two wire fiber-optic transmission link. One part is connected to the CANcardX I/O-connector the other part through a 9 pin Sub-D connector to the CAN Bus. The CANcab 251fibre can be used with a plastic fiber wire up to a transmission distance of 50 m and with a glass fiber wire up to 500 m. For the fiber optic connector is used a HFBR 0508. For the LWL- coupler are used the following modules: HP HFBR1528 / HFBR2528.

Voltage Supply:

The voltage supply from the bus takes place externally (6 – 36 VDC).

Technical Data:

Dimensions:	76 x 30 x 22 mm (3.0 x 1.2 x 0.9 in.)
Weight:	150 g (5.3 oz.)
Housing:	aluminum black anodized
Maximum length:	50 m (1 mm POF), 500 m (200 um HCS)
Power supply:	PC-side: Supply through Vector CANcardX Bus-side: External supply (6 – 36 VDC)
Current consumption:	PC-side: 50 mA at 250kBit/s, 100 mA at 1 Mbit/s Bus-side: 50 mA (typically)
fiber optic connector:	Hewlett-Packard Type HFBR 0508
Transceiver:	Philips 82C251 or compatible
LWL- coupler:	HP HFBR1528 / HFBR2528
Total delay time:	360 ns (typically) + 2 x 5 ns/m fiber optics conductor
Maximum baud rate:	1 Mbit/s

Testing Standards:

Emission:	EN50081-2: 1993
	EN 55011:1998 class A radiated
Immunity:	EN61000-6-2:1999
	EN61000-4-2:1995 Air discharges 8 KV; Contact discharges 4KV
	EN61000-4-3:1996 Amplitude 10 V/m
	EN61000-4-4:1995 Capacitive injection 2 KV
	EN61000-4-6:1996 Amplitude 10 V

2.3 Lowspeed CANcabs

The Lowspeed CANcabs are fully compatible with the ISO 11898-3 standard. They are suitable for baud rates up to 125 kBaud.

Bus levels in Normal-Mode:

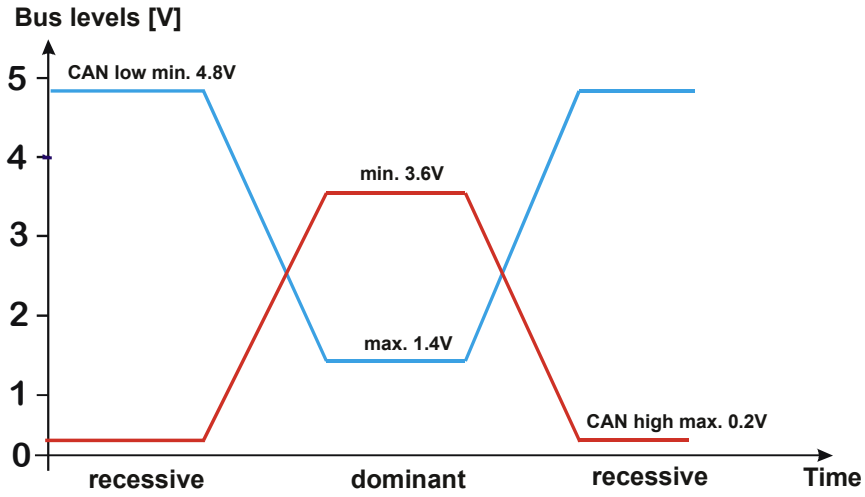

Figure 11: Bus levels in Normal-Mode for Lowspeed Transceivers

Bus levels for Standby- / Sleep-Mode:

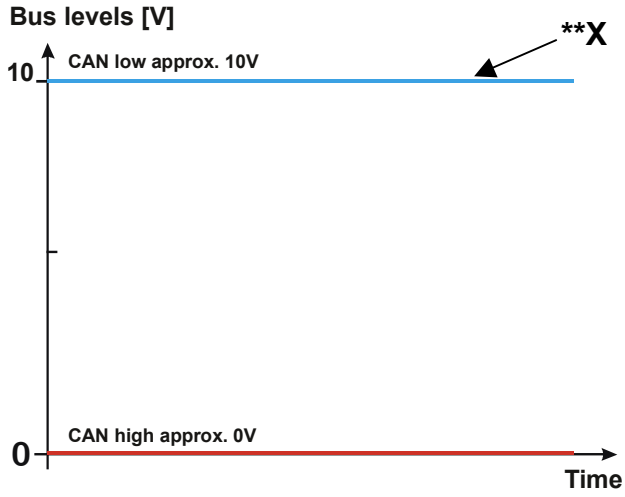

Figure 12: Bus levels for Standby- / Sleep-Mode for Lowspeed Transceivers

****X: That voltage value is subject of many factors, therefore it is possible that this value could vary in practice.**

2.3.1 CANcab 1054, 1054opto, 1053 and 252

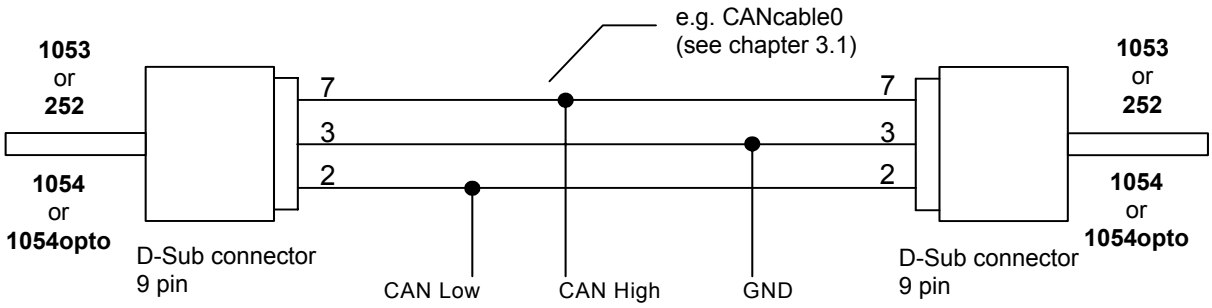

Figure 13: Test setup for CANcab 1054, 1054opto, 1053 and 252

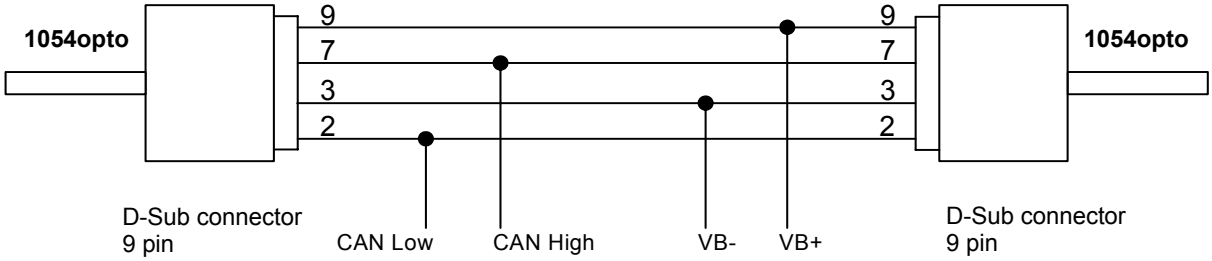

Figure 14: Test setup for CANcab 1054opto (Bus voltage supply)

Opto version of the CANcab 1054:

The CANcab 1054 is also available in an opto version, which comes up with a galvanic isolation between the CANcardX and the CAN Bus. The galvanic isolation of the transceiver voltage supply is realized by a DC/DC-converter. It is practicable that the voltage supply from the bus takes place externally (11 – 18 VDC). This should be done especially, if current measurements of ECUs are executed and the CAN Bus is in Sleep-Mode.

If all CAN Bus ECUs are in Sleep-Mode, the ECU transceivers put the CAN Low line through the resistors R_{TL} to $+V\_{Batt}$. If these transceivers use different voltage supplies, shunt currents exist. Therefore, in Sleep-Mode measurements, could be corrupted.

Without external supply the voltage is approx. 10 V.

Programming the Normal- and Sleep-Mode:

The CANcab 1054(opto) supports Normal-Mode and Sleep-Mode.

These modes can be enabled either by calling the function “ncdSetChannelTransceiver“ of the CAN Driver Library (see CAN Driver Library Documentation) or by calling the function “setPortBits“ in a CAPL-program for CANalyzer / CANoe. For this function you have to take care that the channel number is the logical one which is used by CANalyzer / CANoe according to the assignment in CAN Driver Configuration.

The function “setPortBits“ has a 8 bit parameter. For Lowspeed CANcabs these 8 bits have the following meaning:

Bit 0 and 1:	Linemode of channel 1 CANcabs
Bit 2 and 3:	Linemode of channel 2 CANcabs

The bits 4 – 7 are reserved and must be set to “0“.

To enable one mode, the parameter has to contain one of the following bit combinations:

channel 1 / channel 2	bit 1 / bit 3	bit 0 / bit 2
Normal-Mode	0	1
Sleep-Mode	1	0
no change	1	1
no change	0	0

The following example demonstrates how to use the function “setPortBits” in a CAPL program for CANalzyer / CANoe to change the mode of two lowspeed CANcabs.

```
variables {
}

on key '1'
{
  write ("CAN1 Lowspeed: Normal Mode");
  setPortBits(0x01);
}

on key '2'
{
  write ("CAN1 Lowspeed: Sleep Mode");
  setPortBits(0x02);
}

on key '3'
{
  write ("CAN2 Lowspeed: Normal Mode");
  setPortBits(0x04);

}
on key '4'
{
  write ("CAN2 Lowspeed: Sleep Mode");
  setPortBits(0x08);

}
```

Technical Data:

Power supply:	through Vector CANcardX
Current consumption:	20 mA (typically)
Transceiver:	Philips PCA82C252, TJA1053, TJA1054
Maximum baud rate:	125 kbit/s
Minimum baud rate:	40 kbit/s

Additionally for the opto versions:

Power supply:	through Vector CANcardX or external 11 – 18 VDC
Opto coupler:	HP 7101 or compatible (typically delay time approx. 30 ns)
Isolation voltage:	50 V (low voltage directive)

2.4 CANcab special versions

2.4.1 CANcab 10011opto (Truck and Trailer)

The CANcab 10011opto is fully compatible with the ISO 11992-1 standard. The special features of a circuit containing this device allow transmission, which is insensitive to electromagnetic interference that can appear particularly in truck applications. The CAN driver B10011S is developed for a speed of up to 250 kbits/s. If a fault occurs on one of the wires, the operation can be switched from Double-Wire to Single-Wire Mode. Only the CAN Driver Library supports the Single-Wire mode.

Bus levels:

The logic recessive state is specified by the following voltage levels of CAN_H and CAN_L:

$$V_{CAN\_H} = 1/3\ V_s$$
$$V_{CAN\_L} = 2/3\ V_s$$

The logic dominant state is specified by the following voltage levels of CAN_H and CAN_L:

$$V_{CAN\_H} = 2/3\ V_s$$
$$V_{CAN\_L} = 1/3\ V_s$$

V_s: supply voltage of the data link units connected to the bus.

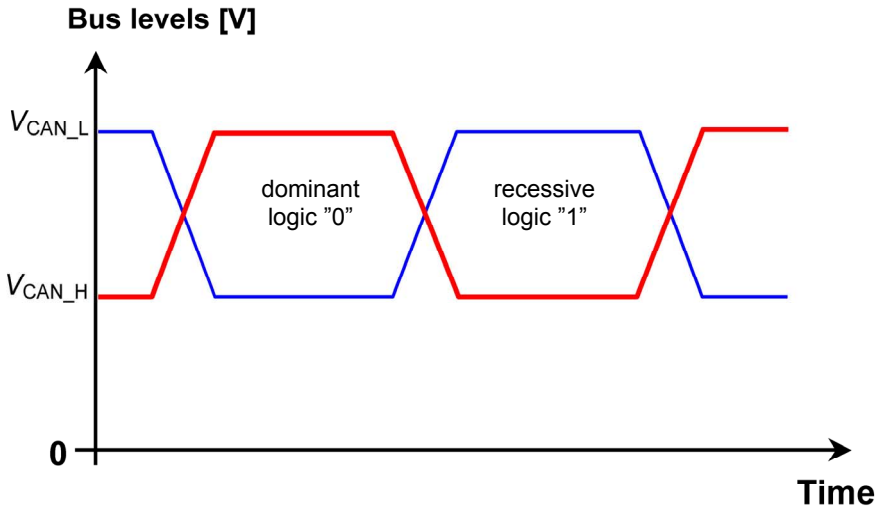

Figure 15: Truck and Trailer Specification of dominant and recessive

The differential voltage V_{diff} is:

$$V_{diff} = V_{CAN\_L} - V_{CAN\_H}\ .$$

This results in a value of:

$V_{diff} = 1/3\ V_s$ recessive state
$V_{diff} = -1/3\ V_s$ dominant state

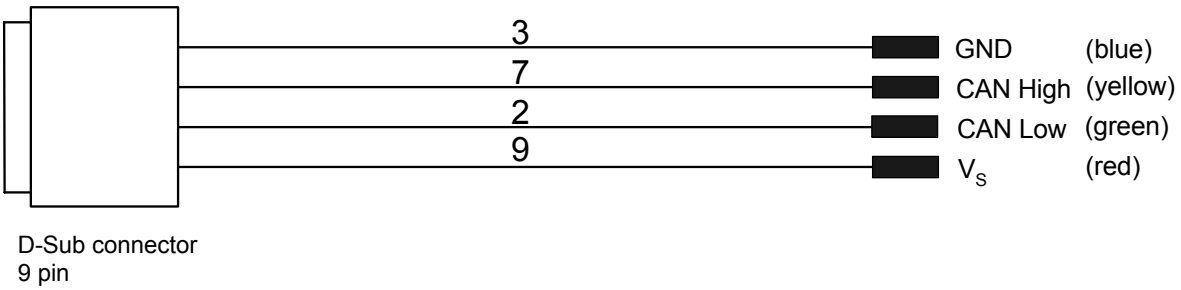

Figure 16: CANcableTnT

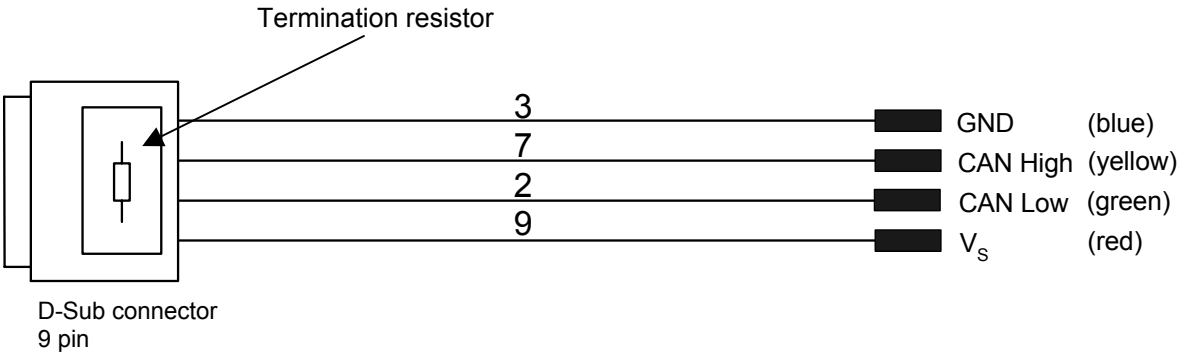

Figure 17: CANcableTnT Term

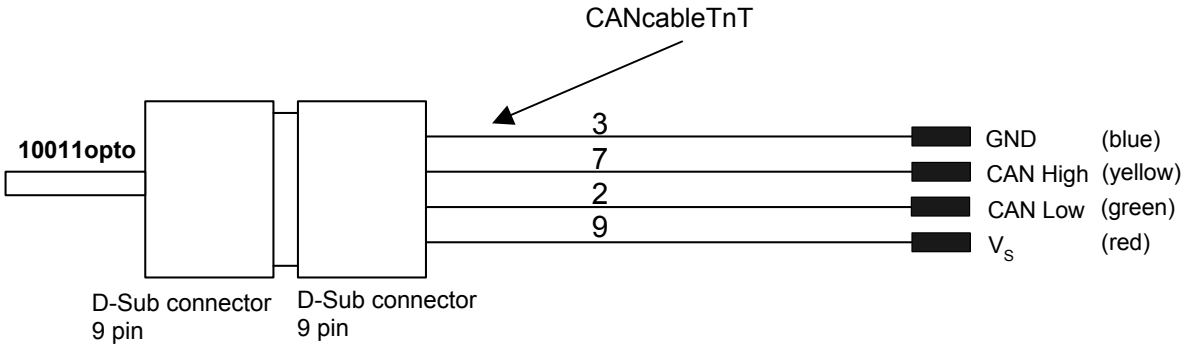

Figure 18: Test setup for CANcab 10011opto with CANcableTnT connected

Hardware:

The CANcab 10011opto is shipped with a CANcableTnT. The CANcableTnT consists of a 9 pin D-Sub connector and on the other side of four banana connectors. The 9 pin D-Sub connector is applied for a link to the CANcab 10011opto. The four banana connectors are used for the connection of the external voltage supply and the CAN Bus. There is also a CANcableTnT version with a termination resistor (CANcableTnT Term).

A Truck and Trailer system consists only of two nodes. Both nodes should be terminated. If it is necessary to measure two real ECUs the CANcableTnT is needed. If there is only one node to measure, the CANcableTnT Term is needed.

Voltage supply:

The ISO/CD 11992-1 prescribes at least a 16 V voltage supply (V_S) for 24 V systems. The internal voltage supply of the CANcab 10011opto is able to provide that 16 V, if the TEMIC termination is used.

The recessive and dominant Bus levels depend on the voltage supply. Therefore it is recommended to use the CANcab with an external voltage supply. The Bus levels are only in this case correct.

The internal voltage supply is sufficient if only the functionality of the CANcab is important.

The external voltage supply should be between 16 V and 36 V.

Technical Data (Set consists of CANcab 10011 opto and CANcable TnT):

Power supply:	16 – 32 VDC (typically 120 mA)
Transceiver:	Temic B10011S
Opto coupler:	HP 7101 or compatible (typically delay time approx. 30 ns)
Isolation voltage:	50 V (low voltage directive)
Maximum baud rate:	250 kbit/s

2.4.2 CANcab 5790 c and 5790opto c (Single Wire)

Bus levels of the different Transceiver-Modes:

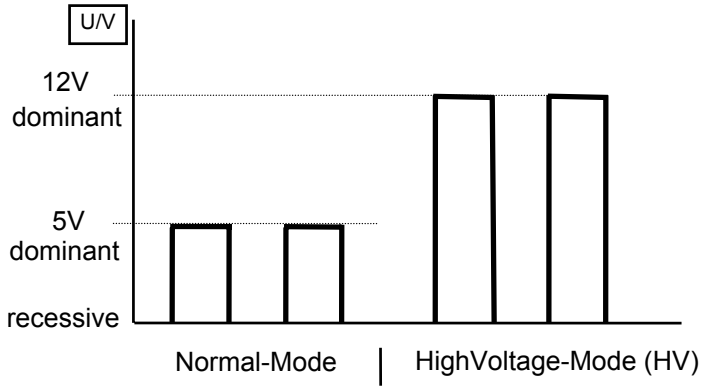

Figure 19: Bus levels of the Normal- and HighVoltage-Mode

The single wire CANcab 5790 c and 5790opto c contains the transceiver AU5790 c.

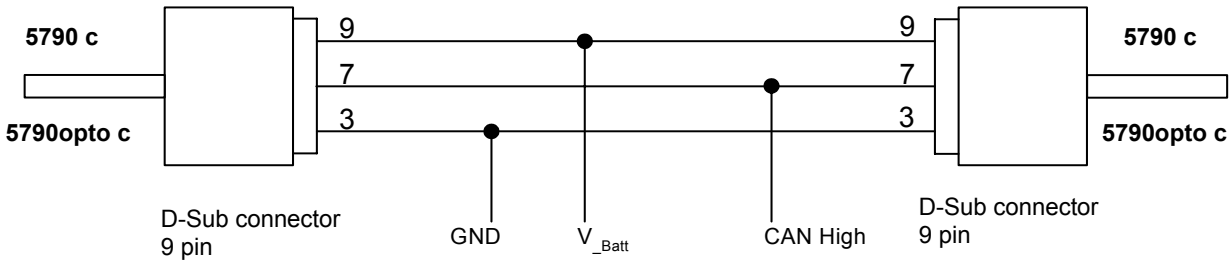

Figure 20: Test setup for CANcab 5790 c and 5790opto c (Single Wire)

To get a communication between the several nodes you have to connect pin 7 to CAN High, pin 9 to +12 V and pin 3 to GND. If you want to use the Single Wire CAN-cab in Highspeed-Mode (Fast-Mode, see below), additionally on ONE node pin 4 of D-Sub connector has to be connected to pin 7 (CAN high). Please note that in this case short circuits and excess voltages can destroy the CANcab.

If pin 4 (R100) is connected to pin 7 (CAN High) of the D-Sub connector, a 100 Ohm resistor is switched on in the CAN High line. That resistor is automatically removed, if the CANcab is changed into the Normal-Mode. To realize termination resistors with higher values, it is possible to switch a resistor (R_R) between pin 7 and pin 4. The over all resistor is calculate by R_R+100 Ohm.

Programming the different Transceiver-Modes:

The different transceiver modes can be enabled either by calling the function “ncdSetChannelTransceiver“ of the CAN Driver Library (see CAN Driver Library Documentation) or by calling the function “setPortBits“ in a CAPL-program for CANalyzer / CANoe. For this function you have to take care that the channel number is the logical one which is used by CANalyzer / CANoe according to the assignment in CAN Driver Configuration. Further on, setting the mode explicitly for one channel is not possible, you always have to set the modes for both channels (which can be different modes of course).

The function “setPortBits“ contains a 8 bit parameter with the following, single wire CANcab specific meaning:

Bit 0 and 1:	linemode of CANcab on channel 1
Bit 2 and 3:	linemode of CANcab on channel 2
Bit 4:	high priority for channel 1
Bit 5:	high priority for channel 2
Bits 6 and 7:	reserved, must be set to “0“

There are 4 different linemodes, coded as below:

chanel 1 / chanel 2	bit 1 / bit 3	bit 0 / bit 2
Sleep-Mode	0	0
HighVoltage-Mode	0	1
Fast-Mode	1	0
Normal-Mode	1	1

For normal data interchange the Normal-Mode with baud rates up to 40 kBaud is used. A Fast-Mode, which allows only a limited number of bus nodes (e.g. for flash programming), with baud rates up to 100 kBaud is supported. The HighVoltage-Mode is used to send HighVoltage-WakeUp messages (12 V); in Sleep-Mode the transceiver is switched off.

Additionally there is a High Priority flag to clear all transmit buffers.

The following example demonstrates how to send a HighVoltage-WakeUp message on logical CAN channel 1.

```
variables {
       message 0x100 msg;
}

on start
{
       msg.CAN = 1;
       msg.DLC = 0;
}

on key 'w'
{
       // Switch channel 1 transceiver to HighVoltage Mode,
       // channel 2 Transceiver to Normal Mode.
       setPortBits(0x0D);

       // Send a HighVoltage WakeUp message.
       output(msg);

       // Switch both transceivers back to Normal Mode.
       setPortBits(0x0F);

}

on message *
{
       output(this);
}
```

Opto version of 5790c CANcab:

The CANcab 5790c is also available in an opto version, which comes up with a galvanic isolation between the CANcardX and the CAN Bus. The galvanic isolation of the transceiver voltage supply is realized by a DC/DC-converter. It is practicable that the voltage supply from the bus takes place externally (10 – 18 VDC). That voltage is used at a Wake-Up message as a level for a dominant state.

Without external supply the voltage is approx. 10 V.

Technical Data:

Power supply:	10 – 18 VDC
current consumption:	5 mA at 5 V, 50 mA at 12 V
Transceiver:	Philips AU5790
Maximum baud rate:	Low-speed: 40 kbit/s High-speed: 100 kbit/s

Additionally for the opto versions:

Opto coupler:	HP 7101 or compatible (typically delay time approx. 30 ns)
Isolation voltage:	50 V (low voltage directive)

2.4.3 CANcab EVA (Evaluation Kit)

The CANcab EVA is an evaluation kit which allows the user to built up the connection between the CANcardX and the CAN bus (the bus driver) customer-specific.

With the help of a prefabricated breadboard PCB the CANcab can be equipped with bus transceiver customer-specific.

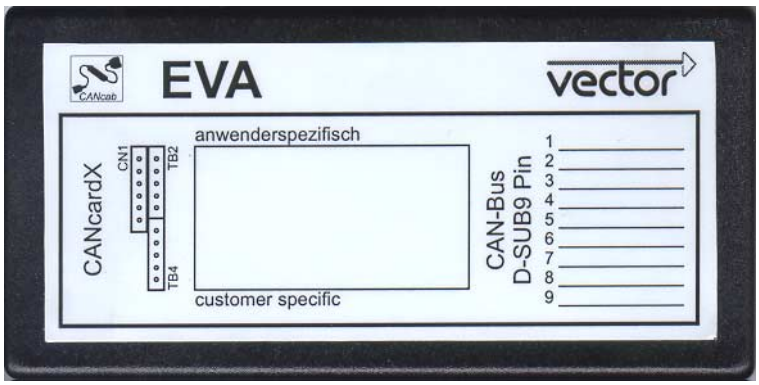

Figure 21: CANcab EVA (closed)

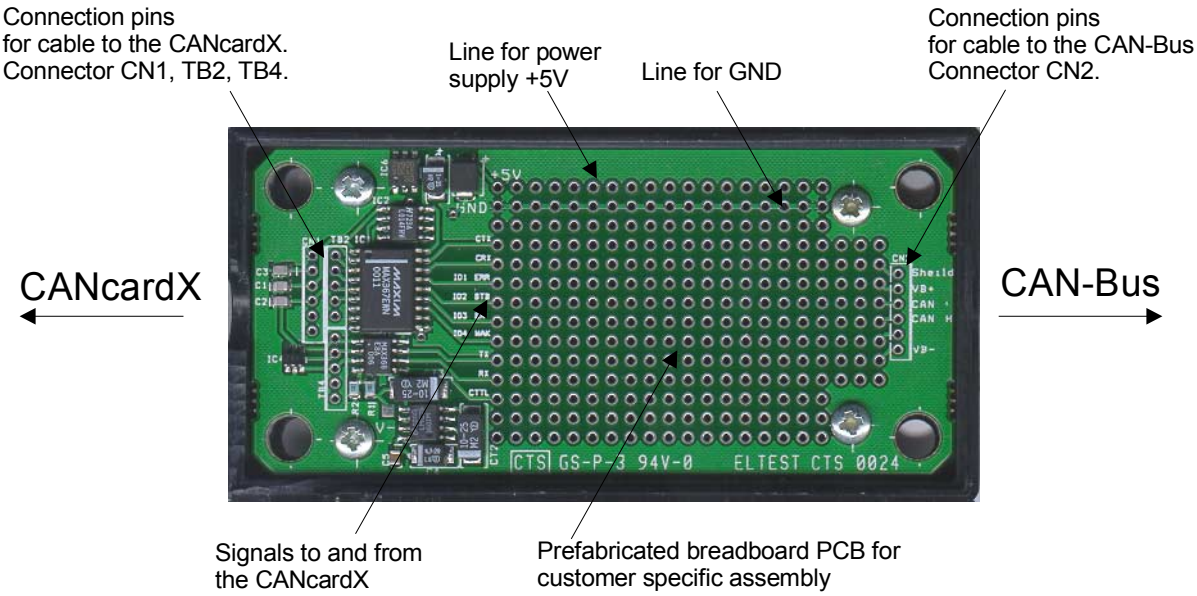

Figure 22: CANcab EVA (open)

3 Cables

3.1 CANcable0

CAN connection cable 0.3 m, with two 9-pin D-Sub socket connectors on both sides; without terminating resistor.

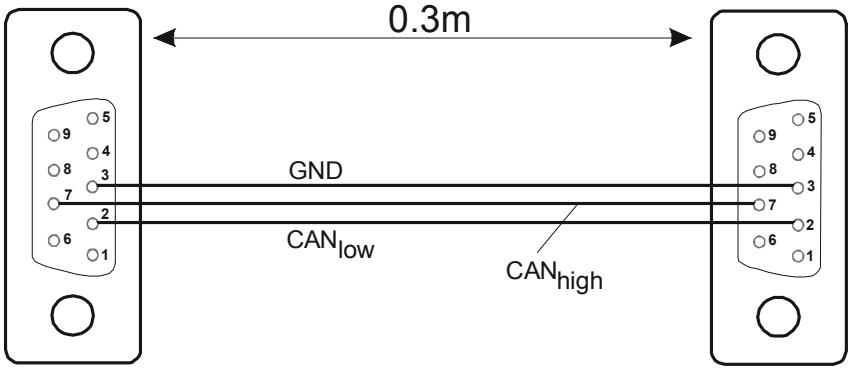

Figure 23: CANcable0

3.2 CANcable1

CAN connection cable 0.3 m, with two 9-pin D-Sub socket connectors on both sides; two parallel 120 ohm terminating resistors between pin 2 and 7.

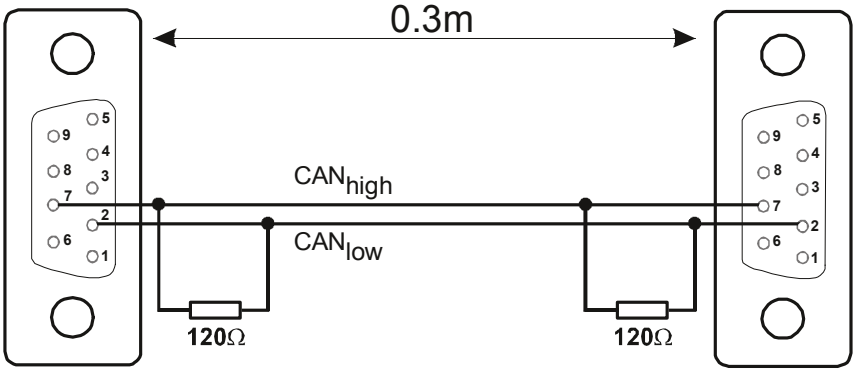

Figure 24: CANcable1

3.3 CANcableY

Y connection cable. With one 9-pin D-Sub socket connector at one end and two 9-pin D-Sub socket connectors at the other end. Incl. gender changer. Cable length 2 m. Without terminating resistors.

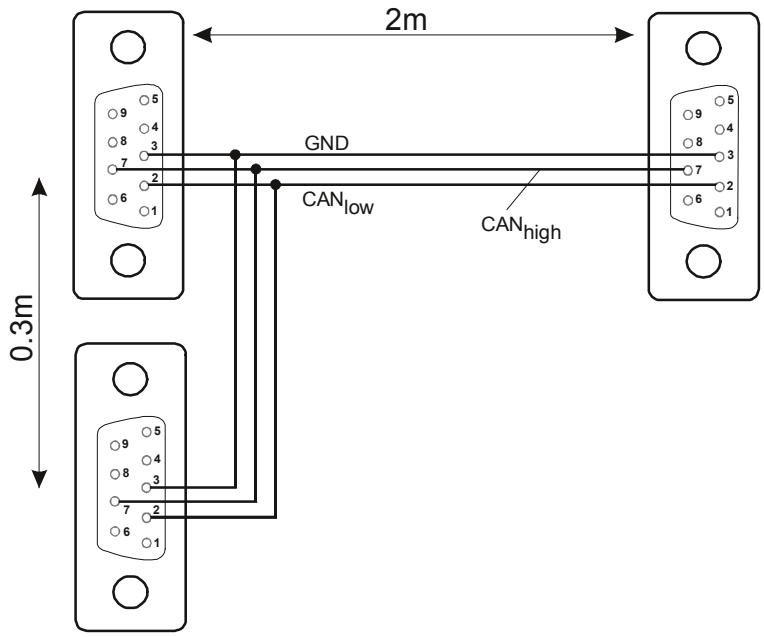

Figure 25: CANcableY

3.4 CANterm120

CAN adaptor with one 9-pin D-Sub plug connector and one 9-pin D-Sub socket connector. 120 ohm terminating resistor between pin 2 and 7. For CAN high speed busses.

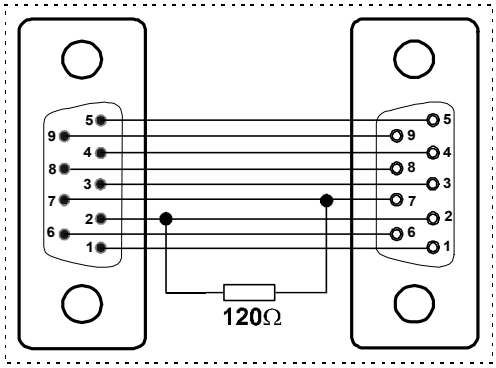

Figure 26: CANterm120

3.5 CANcableA

CAN connection cable 0.5 m, one end with 9-pin D-Sub socket connector, the other end stripped; for clamping; without terminating resistors.

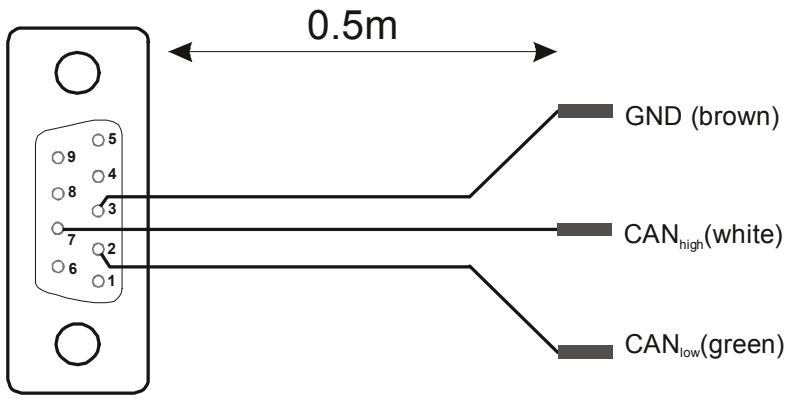

Figure 27: CANcableA

4 Important Hints

Do not apply excessive force when inserting the CANcardX into the computer.

Do not remove the CANcardX by pulling on the CANcabs.

Always make sure that the I/O connectors are firmly seated.

Both tabs on the I/O connector must be firmly pressed when removing a CANcab.

5 Declaration of Conformity

CE

DECLARATION OF CONFORMITY

This declaration applies to products identified as follows:

Product type:	PCMCIA CAN-Adapter
Product name:	CANcardX

We hereby declare that this product conforms to the following standards:

Conducted Emission:	EN 55022: 1994, Class B
Radiated Emission:	EN 55022: 1994, Class A
ESD:	EN 50082-2: 1995
	EN 61000-4-2: 1995
Conducted and Radiated Immunity:	EN 50082-2: 1995
Fast Transients/Bursts (+/-2kV):	EN 50082-2: 1995
	EN 61000-4-4: 1995

This declaration is provided for the manufacturer

Vector Informatik GmbH
Ingersheimer Straße 24
70499 Stuttgart

by its authorized quality management representative

Peter Lampert

Quality Management

Stuttgart, 1. January 2001

Peter Lampert

Quality Management