EXXOtest ®

Case USB-MUX-4C2L
4 CAN - 2 LIN/ISO

Installation guide

INDEX

1 Aim of this document and bibliography

1.1 <u>Aim</u>

The aim of this document is to give the user the information required to install and set up the case USB-MUX-4C2L

1.2 <u>Bibliography</u>

PHILIPS : SJA1000 Standalone controller – data sheet

PHILIPS : PCA81C251 CAN transceiver for 24 V system – data sheet

PHILIPS : TJA1054 – Fault tolerant CAN transceiver – data sheet

PHILIPS : AU5790– Single wire CAN transceiver – data sheet

LIN : MELEXIS TH8061

PHILIPS : 26C92 – Dual universal asynchronous receiver / transmitter (DUART)

2 Presentation

2.1 General presentation

The Case USB-MUX-4C2L allows to interface a PC type computer to a CAN high speed, CAN low speed / fault tolerant, CAN single wire and LIN bus. The board has the following connections:
- 1 CAN high speed channel (Standard ISO 11898) or 1 CAN low speed – fault tolerant connection, this channel is chosen through the software.
- 1 CAN high speed channel
- 1 CAN low speed channel
- 1 CAN low speed channel or 1 CAN single wire channel
- 2 LIN/ ISO9141 channel s

The simultaneous access to these 6 channels is possible.

This case feeds directly off the USB port or off an external power supply if the USB's were not enough. You can choose the type of power supply by using a switch situated at the back.

2.2 Diagram
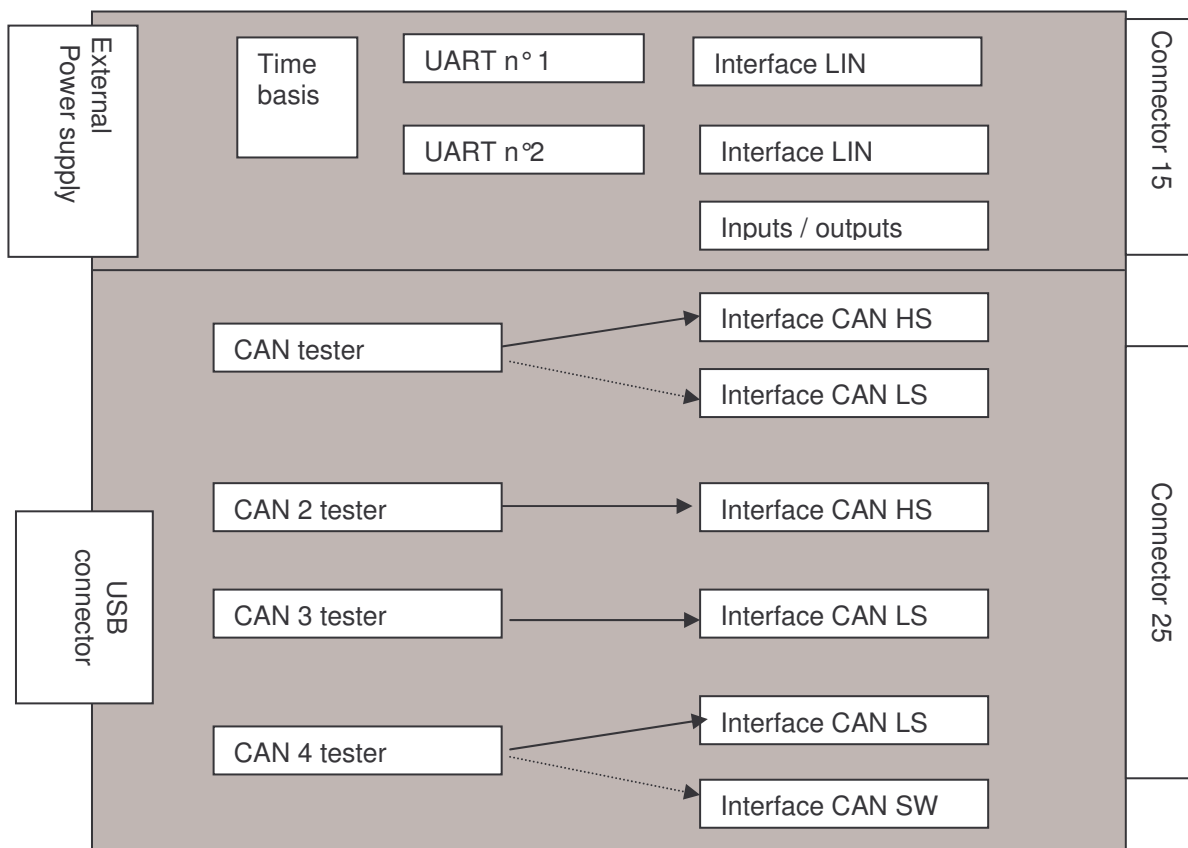
2.3 **Main characteristics of the CAN connection**

2.3.1 <u>Protocol controller : PHILIPS SJA1000</u>   **- 5 -**

- Standard CAN 2.0B
- Standard identifier 11 bits; extended 29 bits
- Transmission / reception of data up to 8 bytes
- Request for distant transmission (RTR)
- Baud rate up to 1 Mbit/sec
- Spy mode (no acknowledgement or error frame)
- Reading of counters of internal errors
- Detailed information in case of bus error

2.3.2 <u>High speed line interface: PHILIPS PCA82C251</u>

- Standard ISO 11898–24V
- Baud rate up to 1 Mbit/sec
- Connection up to 110 stations on the bus
- Transmission in differential mode
- Short circuit to ground and > 24V battery
- Adjustment of the termination resistor between CANH and CANL via a staple.
- Adjustment by software of the signal slope (vertical edges or horizontal edges)

2.3.3 <u>Low speed line interface: PHILIPS TJA1054</u>

- Baud rate up to 125 Kbit/sec
- Connection up to 32 stations on the bus
- Transmission in differential mode
- Possibility to operate on 1 wire
- Detection and treatment of degraded modes
    o Short-circuit to ground
    o Short-circuit to VCC
    o Short-circuit to the battery
    o Short-circuit between CANH and CANL

2.3.4 <u>Single wire line interface: PHILIPS AU5790</u>

- Baud rate up to 33 Kbit/sec
- Connection up to 32 stations on the bus
- Transmission over 1 wire

2.4 Main characteristics of the LIN connection

2.4.1 Line interface: MELEXIS TH8061

- Specification LIN Rev 1.2
- Transmission rate 2400, 9600 and 19200 bauds.
- Configuration of the pull-up resistor in master or slave mode through software

Diagram of the transmitter/receiver line

+VBAT

R1
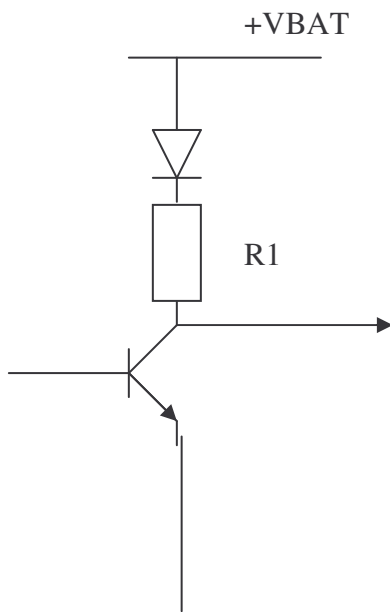
Set up type	R1
LIN master mode	1 K
LIN slave mode	30 K

2.5 Characteristics of inputs / outputs all or nothing   - 7 -

Diagram of inputs

```
      +5V
       │
      ◁△  BAT54
       │
       │    100 ko
 ──────┼───┤▭├──◄──────────────────
      ◁△
       │    BAT54          Input connector
       │
       ▽
      GND
```

Diagram of outputs

```
                              22 ohms
 FMMT493        ┌──────────┤▭├────────►
           ───┤◄                    Output connector
               └►
               │
               ▽
              GND
```
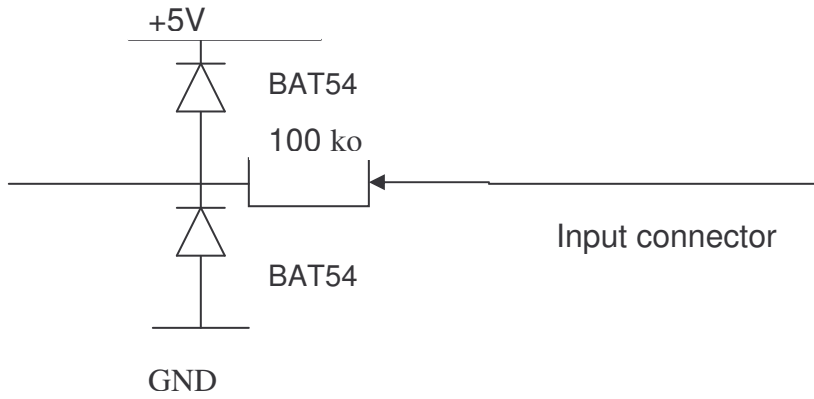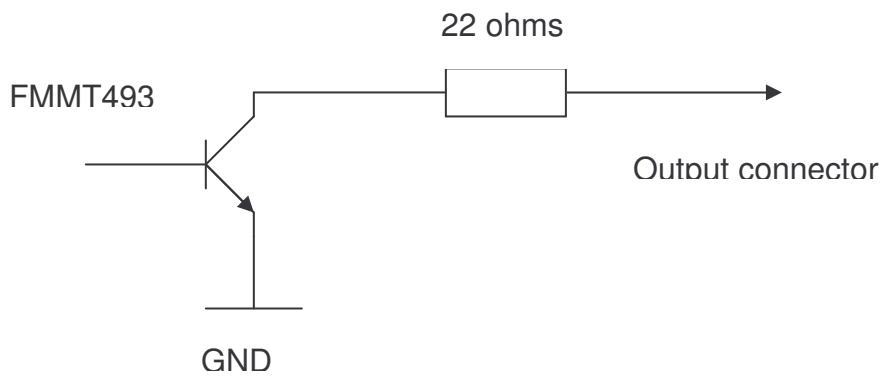
3 Technical Specifications

3.1 <u>Technical characteristics</u>
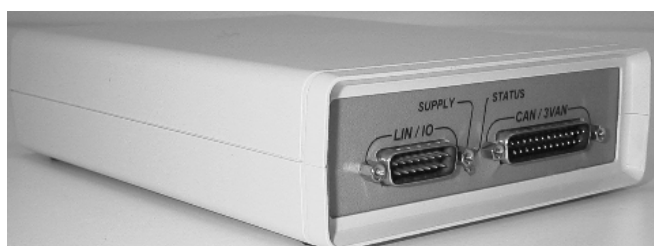
Presentation	PC interface case for USB bus including : - 1 CAN high speed connection or CAN low speed / fault tolerant - 1 CAN high speed connection - 1 CAN low speed / fault tolerant connection - 1 CAN low speed or single wire connection - 2 LIN connections
Controller	CAN : 4 PHILIPS SJA1000 controllers LIN : 1 DUART 26C92
Line interface	. CAN high speed : PCA82C251 . CAN low speed : TJA1054 . CAN single wire AU5790 . LIN : MELEXIS (Master or slave)
Digital inputs / outputs	2 0-12V inputs 2 open collector outputs
Connector	1 connector DB25 1 connector DB15
PC Interface	Bus USB 12 Mbit/sec
Dimensions	190 x 140 x 45 mm
Power supply	Provided by USB bus or 12V external power supply through Jack plug– 300 mA if required
Consumption	300 mA
Storage temperature	-40 to +85°c
Operating temperature	0 to 70°c
Isolation	Not isolated

4 Configuration

4.1 Diagram of external peripherals

DB15 connector

USB connector

LED

USB-MUX-C3VL

Power supply selection

DB25 connector

Power supply
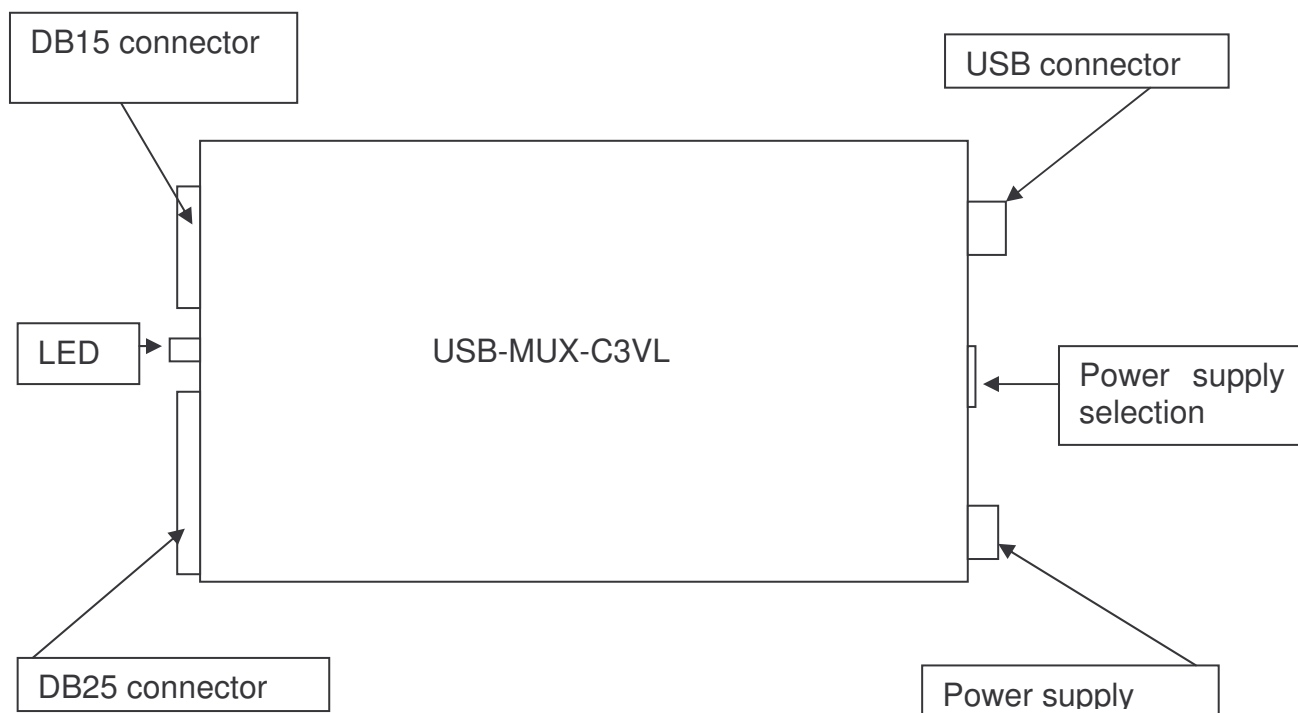
4.2 DB15 connector (LIN connection, inputs/outputs and CAN single wire)

Pin	Name	Designation
1	LINA	Line K of LIN bus n°1
2	RTS2	Output n°1
3	GND	Ground
4	RTS1	Output n°0
5	LINBSTAT	Open collector output representing status of VREG output of the line interface
6	TX_232	Connection series RS232 – line TX

7	RX_232	Connection series RS232 – Line RX
8	+LINA	External power supply VBAT for LIN bus
9	GND	Ground
10	LINB	Line K of LIN bus n°2
11	CTS2	Input n° 1
12	CTS1	Input n° 0
13	CANDSW	Line CAN of CAN 1 wire bus
14	LINASTAT	Open collector output representing status of the VREG output of the line interface
15	+LINB	External power supply VBAT for LIN bus n°2

4.3 <u>DB25 Connector (CAN high speed and low speed connections)</u>

Pin	Name	Designation
1	CANLS_L1	Line CANL of CAN low speed bus n°1
2	CANLS_H1	Line CANH of CAN low speed bus n°1
3	+CAN1	External power supply +CAN of CAN low speed bus n°1
4	CANLS_L3	Line CANL of CAN low speed bus n°3
5	CANLS_H3	Line CANH of CAN low speed bus n°3
6	+CAN3	Power supply +CAN of CAN low speed bus n°3
7	CANLS_L4	Line CANL of CAN low speed bus n°4
8	CANLS_H4	Line CANH of CAN low speed bus n°4
9	+CAN4	Power supply +CAN of CAN low speed bus n°4
10	CANLS_L1	Line CANL of CAN low speed bus n°1
11	CANLS_H1	Line CANH of CAN low speed bus n°1
12	CANHS_L1	Line CANL of CAN high speed bus n°1
13	CANHS_H1	Line CANH of CAN high speed bus n°1
14	GND	Ground
15	ST_REG1	Open collector command relay (reawakening=grounding)
16	SCLK	Liaison I2C
17	GND	Masse
18	ST_REG3	Open collector command relay (reawakening=grounding)
19	SDA	I2C connection
20	GND	Ground
21	ST_REG4	Open collector command relay (reawakening=grounding)
22	CANHS_L2	Line CANL of CAN high speed bus n°2
23	CANHS_H2	Line CANH of CAN high speed bus n°2
24	GND	Ground
25	GND	Ground

4.4 <u>LED Supply</u>

This LED indicates the presence of a power supply in the case

4.5 <u>LED Status</u>

This LED indicates the operating status of the case

LED status	Meaning
Off	No power supply or case not in operation *In the case of a power supply provided by the USB port, this means that the power supply voltage it provides is not powerful enough.. An external power supply must then be used to feed the case.*
On	Case not in operation
Blinking slowly (1 sec)	Indicates that the case is under voltage and not connected to the USB bus
Blinking medium (0.5 sec)	Indicates that the case is under voltage and connected to the USB bus (recognised by the PC)
Blinking fast (0.1 sec)	Indicates that the case is under voltage, that it is connected to the USB bus (recognised by the PC) and that an application is connected to it.

4.6 <u>USB connector</u>

USB standard connector type B

Pin	Name	Designation
1	VBUS	Power supply +5V
2	D-	Communication signal
2	D+	Communication signal
4	GND	Ground

4.7 <u>External power supply connector</u>

Power supply [10 – 36] volts – 300 mA
Connector JACK 2,5mm

4.8 <u>Power supply selection switch</u>

User can use an external power supply or through the USB.

Installation

4.9 **Installation for Windows 9x8**

4.9.1 Installation procedure

1 – Use external power supply to feed the USB-MUX case
2 – Connect the USB bus coming from the PC to the USB case

3 – Detection of the case

After the connection, Windows detects the « plug & play » peripherals and says that a new device has been found. The following window appears:
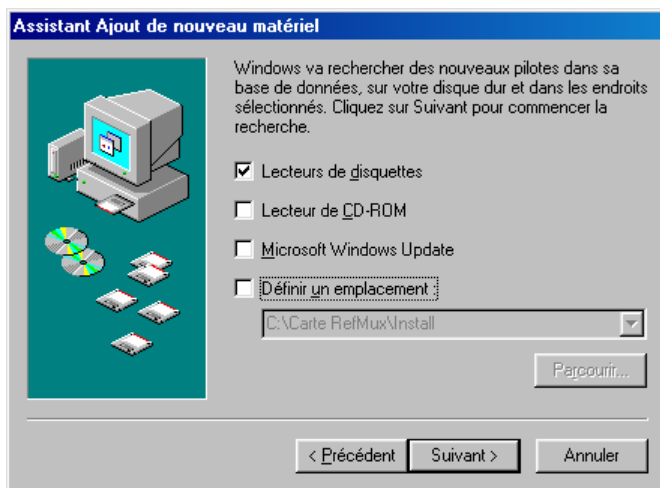
Click on NEXT

4 – Finding drivers

Select the best among recommended drivers.

Click on NEXT

5 – Accessing drivers

Insert installation diskette or CD Rom, then select chosen drive and the USB9x directory.
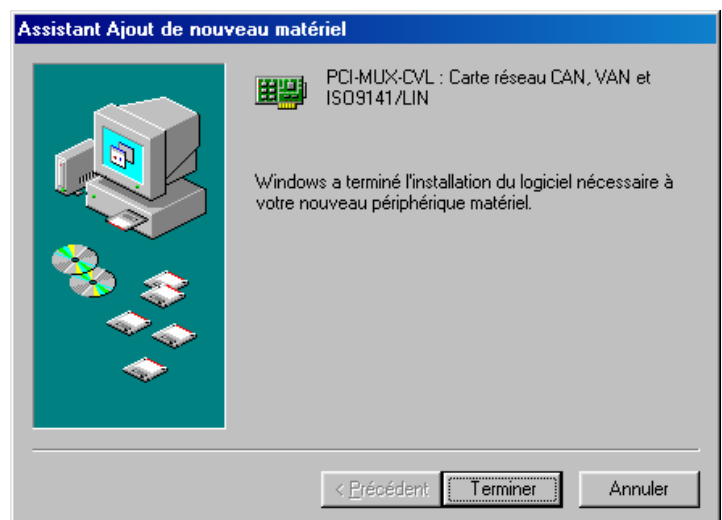
Click on NEXT

6 – Start installation.

The name of the installation file is recognised (usb_mux.inf).

Click on NEXT

7 – Installation complete
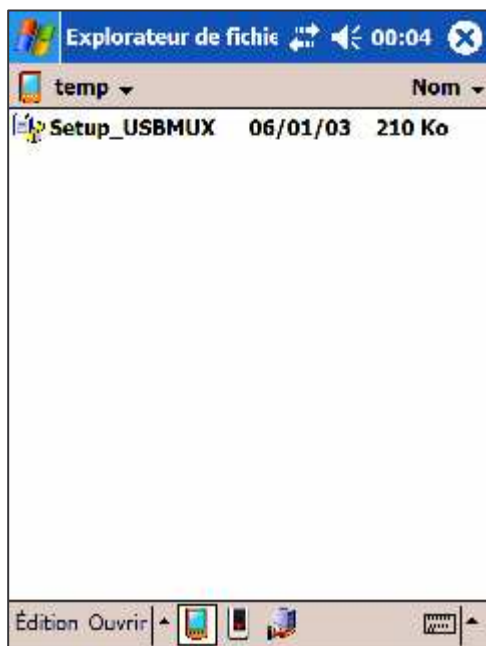
4.9.2 List of installed files

Name	Destination	Comments
muxdll.dll	windows\system	Dynamic library MUX-DLL
mux_kp.sys	windows\system\vmm32	Driver USB-MUX board
windrvr.sys	windows\system\vmm32	Driver for OS WIN 98
wdpnp.sys	windows\system\vmm32	Driver for OS plug and play
wdreg.exe	windows\system\vmm32	Recording utility

4.10 <u>Installation for Windows CE/Mobile with ARM processor</u>

4.10.1 <u>Installation procedure</u>

1 – Insert the installation CD into your computer,

2 – Copy installation files *[CD :]\ Usb-WinCE(ARM)\Setup_USBMUX.CAB* into a temporary folder of your pocket PC.

3 – Run « *Setup_USBMUX.CAB »* on your Pocket PC

4 – Plug case USB-MUX-XXXX onto your Pocket PC and enter the driver name : « exxotest ».

5 – Installation completed.

### 4.10.2 List of installed files on your Pocket PC

File name	Folder	Comment
muxdll.dll	.\windows	Dynamic library MUX-DLL
exxotest.dll	.\windows	Card's driver USB-MUX
USBINTFC.dll	.\windows	USB's driver

5 Annex

5.1 Internal configuration

The configuration described in this chapter is merely informative. It is strictly not advisable to open the case.

5.1.1 Implantation diagram

JP1   JP2   JP4   JP5   JP6   JP3

JP8   JP9   JP7.
                      JP7.
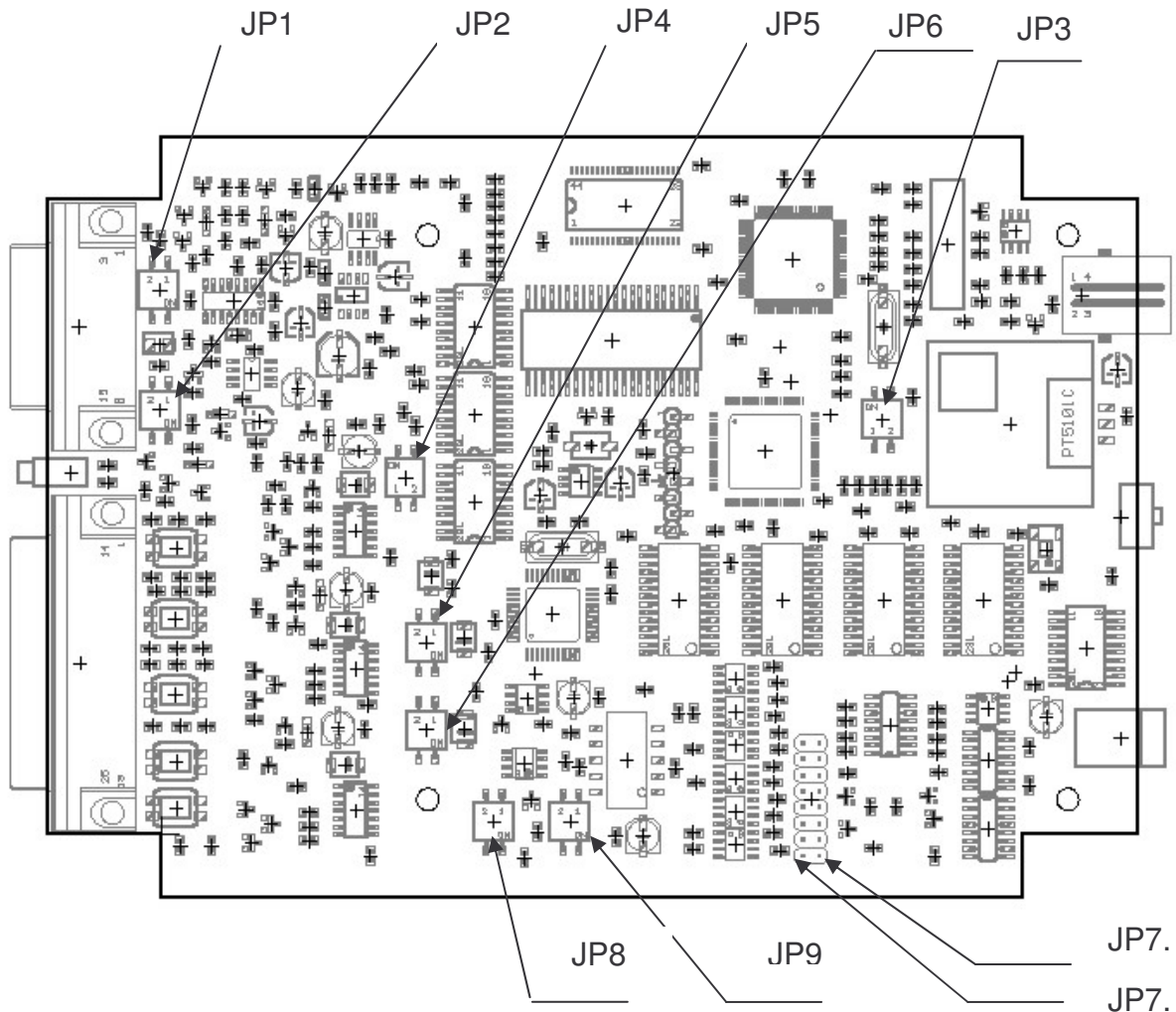
JP4/JP5/JP6	CAN LS	Selects the origin of the power supply of the line interface (internal or external battery)
JP8/JP9	CAN	Configuration of the termination resistor
JP1/JP2	LIN	Selects the origin of the power supply of the line interface (internal or external battery)
JP3		Reserved
JP7		Daughter board connector

5.1.2 <u>CAN Configuration of the termination resistor</u>

The CAN high speed standard recommends the attachment of the termination resistor to the ends of the CAN bus (C.F. diagram).

CANH

120 Ohm   120 Ohm

CANL
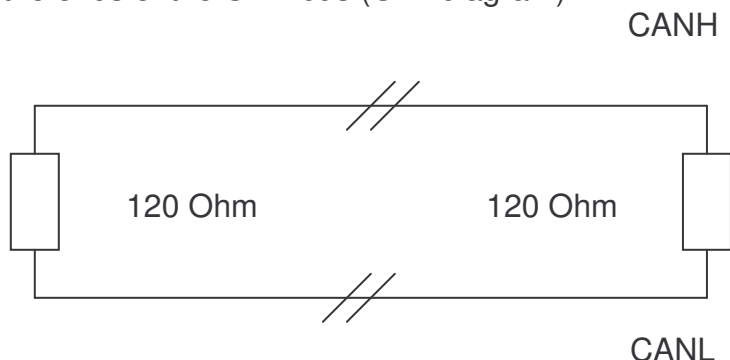
The PCI-MUX boards allow user to get the following configurations:
- Setting up without termination resistor: used when the board is connected to an already configured bus.
- Setting up with termination resistor: used when the board is connected to an end of the CAN bus.

5.1.2.1 Set up without termination resistor (default)

CAN HS 1 Bus	CAN HS 2 Bus
JP8.1 OFF	JP9.1 OFF
JP8.2 ON	JP9.2 ON

5.1.2.2 Set up with 120 Ohm termination resistor

CAN HS 1 Bus	CAN HS 2 Bus
JP8.1 ON	JP9.1 ON
JP8.2 ON	JP9.2 ON

5.1.3 CAN LS : Power supply of the physical interface

The power supply of the physical interface CAN low speed can either be the 12V from the PC or from an external battery. The choice of power supply from external battery is generally reserved for applications with consumption management (stand by / reawakening).

5.1.3.1 Set up with internal power supply (default)

CAN1 Bus	CAN2 Bus	CAN3 Bus
JP4.1 ON	JP5.1 ON	JP6.1 ON
JP4.2 OFF	JP5.2 OFF	JP6.2 OFF

5.1.3.2 Set up with external power supply

The power supply is done via the +CANx pins of the DB25 connector

CAN1 Bus	CAN2 Bus	CAN3 Bus
JP4.1 OFF	JP5.1 OFF	JP6.1 OFF
JP4.2 ON	JP5.2 ON	JP6.2 ON

5.1.4 LIN : Power supply of the physical interface

The LIN's physical interface power supply comes either from the case's power supply or from the power supply provided by an external battery. The choice of power supply from an external battery is recommended since we are dealing with an « idle » level transmitted over the line.

5.1.4.1 Set up with internal power supply

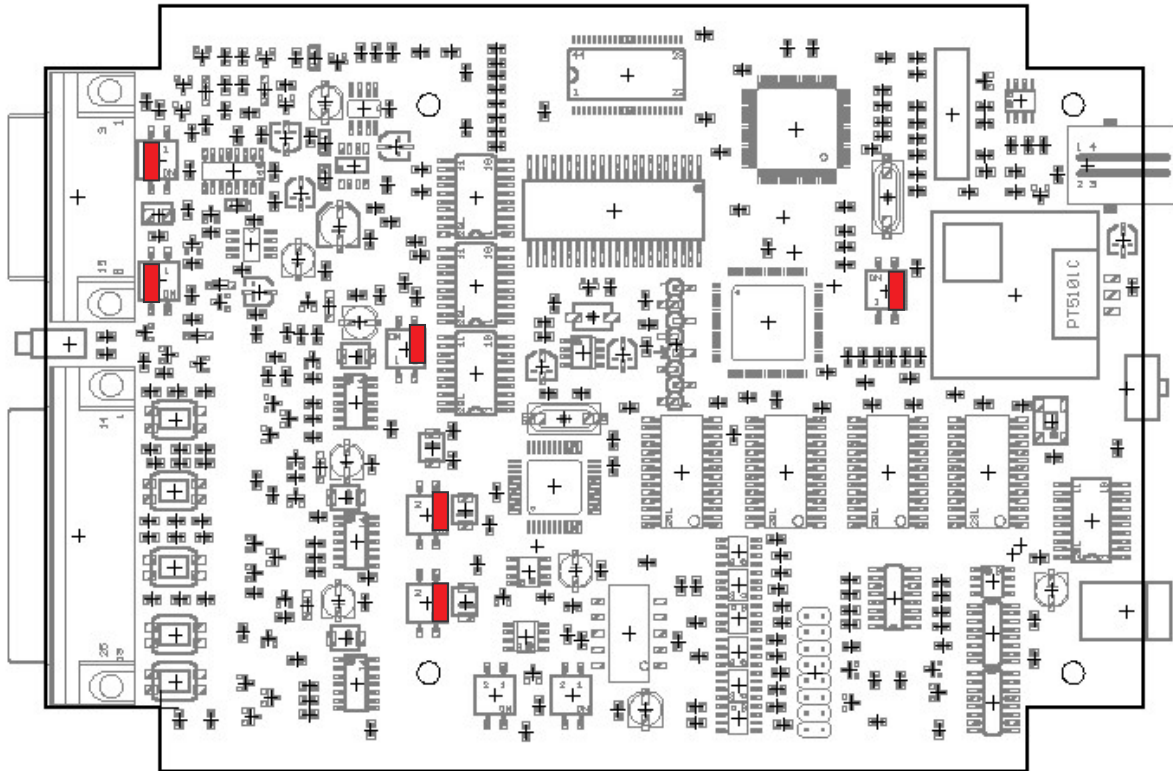| LIN 1 Bus	LIN 2 Bus
JP1.1 ON	JP2.1 ON
JP1.2 OFF	JP2.2 OFF

5.1.4.2 Set up with external power supply (default)

The power supply is done via the +LINx pin of the DB15 connector

LIN 1 Bus	LIN 2 Bus
JP1.1 OFF	JP2.1 OFF
JP1.2 ON	JP2.2 ON

5.1.5 Delivery configuration

▮ Switch in position ON

5.1.6 JP7 daughter board connector

Pin	Name	Designation
1	+5V	Power supply +5V coming from the mother board
2	+CAN1	External power supply +CAN of CAN LS bus n°1 (Pin 3 from DB25)
3	MISO	Line MISO of the SPI connection (replace R20 with MISO # MOSI)
4	CANATX0	Output TX from CAN 1 protocol controller
5	MOSI	Line MOSI from the SPI connection (replace R20 with MISO # MOSI)
6	CANARX0	Input RX from CAN 1 protocol controller
7	SCLK	Line SCLK from the SPI connection
8	CANHS_H1	Line CANH from CAN high speed bus n°1 (Pin 13 from DB25)
9	OUTPUT3	Digital output n°3
10	CANHS_L1	Line CANL from CAN high speed bus n°1 (Pin 12 from DB25)
11	INPUT3	Digital input n°3
12	CANLS_H1	Line CANH from CAN low speed bus n°1 (Pin 11 from DB25)
13	LINB_TXD	Output TX from UART n°2
14	CANLS_L1	Line CANL from CAN low speed bus n°1 (Pin 10 from DB25)
15	LINB_RXD	Input RX from UART n°2
16	GND	Ground

List of successive editions

Version	Date	Author	Modifications
01	07/2002	PC	Document creation
02	03/2003	PC	Addition of daughter board connector
03	11/2003	AV	Modifications 1st page
04	10/2004	CV	Add installation procedure for Windows CE/Mobile