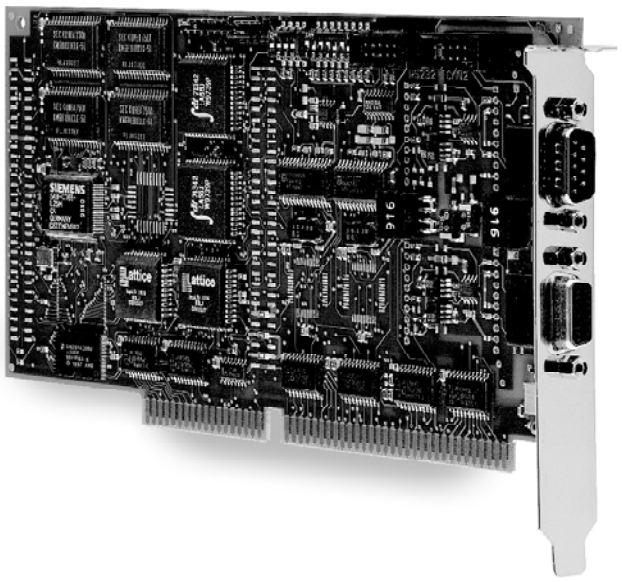
Hardware Manual

iPC-I 165

Intelligent PC/CAN Interface



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1 Introduction

1.1 Overview

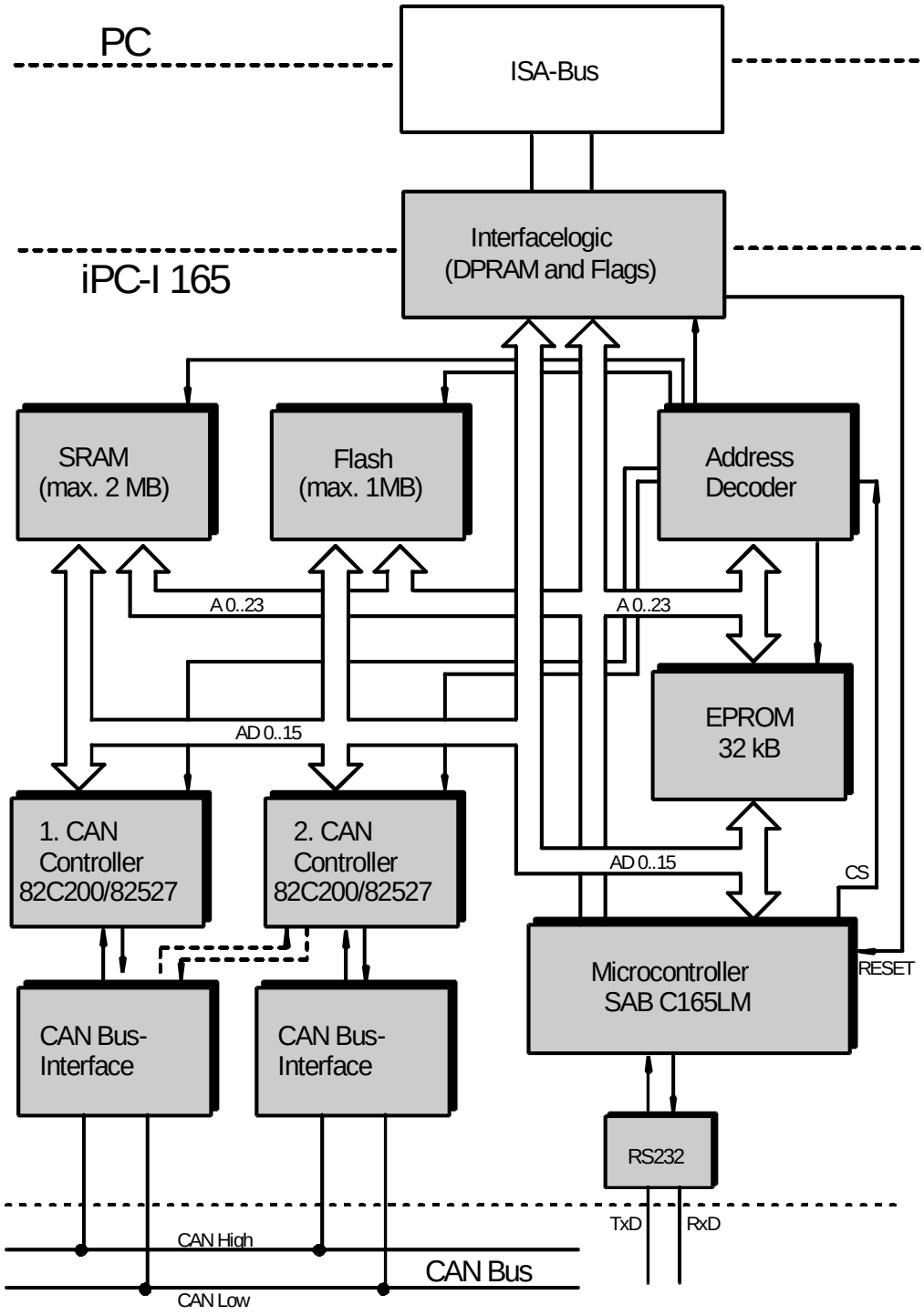
With the IXXAT PC/CAN interface iPC-I 165 you have purchased a high-quality electronic component which has been developed and manufactured according to the latest technological standards.

The aim of this manual is to help you familiarize yourself with your interface, also referred to in the following as iPC-I 165. Please read this manual before beginning with the installation.

1.2 Features

- Design as ISA board
- 16 bit memory mapped access (12 Kbytes address space are required)
- Base address configurable via DIP switch (from C000h to FE00h in 16k steps)
- PC interrupts configurable via jumper (IRQ 3, 4, 5, 7, 9, 10, 11, 12, 14, 15)
- Microcontroller Siemens SAB C165 clocked with 20 MHz
- One ore two CAN lines with Philips SJA1000 and/or INTEL 82527 clocked with 16 MHz
- 8 Kbytes Dual-Port-RAM, 16 semaphore registers
- 512 Kbytes RAM (optional up to 2 Mbytes)
- 512 Kbytes Flash (optional up to 1 Mbytes)
- CAN bus connector according to ISO/IS 11898 on board (optional galvanic decoupled); alternative bus interfaces can be realized via piggy-back board
- Optional CAN protection circuits on-board
- Optional developer equipment with reset button, LED and DIP switch for special functions
- Download of INTEL HEX files into the SRAM or FLASH
- EMC safe design of circuit board (6 layer PCB)

1.3 Block diagram



2 Installation

2.1 Hardware installation

For all work on the PC and interface, you must be statically discharged. The work must be carried out on an earthed, anti-static work-mat.

Carry out the following work in sequence:

(1) Establish a free memory segment on the PC of at least 16 kbyte in the range < 1MB (ISA memory range) and a free IRQ. For this, read the manual of your PC.

(2) Set this memory segment and the IRQ on the interface, as described in Section 3.1.

(3) Switch off the PC and remove the mains plug.

(4) Open the PC according to the instructions of the PC-manufacturer and determine a suitable plug-in space.
The interface is designed according to the PC-standard and can be easily built into the computer. Do not use force when plugging in.

(5) Ensure that the interface is held safely in place in the PC.

(6) If your interface is assembled with 2 separate CAN circuits, you must fix the additional slot plate and plug in the header on the interface (see Section 3.2).

(7) Close the PC; the hardware installation is now completed.

2.2 Software installation

To operate the interface, a driver is required. For the installation of the CAN driver VCI please read the VCI installation manual.

3 Configuration

3.1 Settings on the interface

The diagram Fig. 3-1 shows the positions of the plugs and jumpers on the interface board.

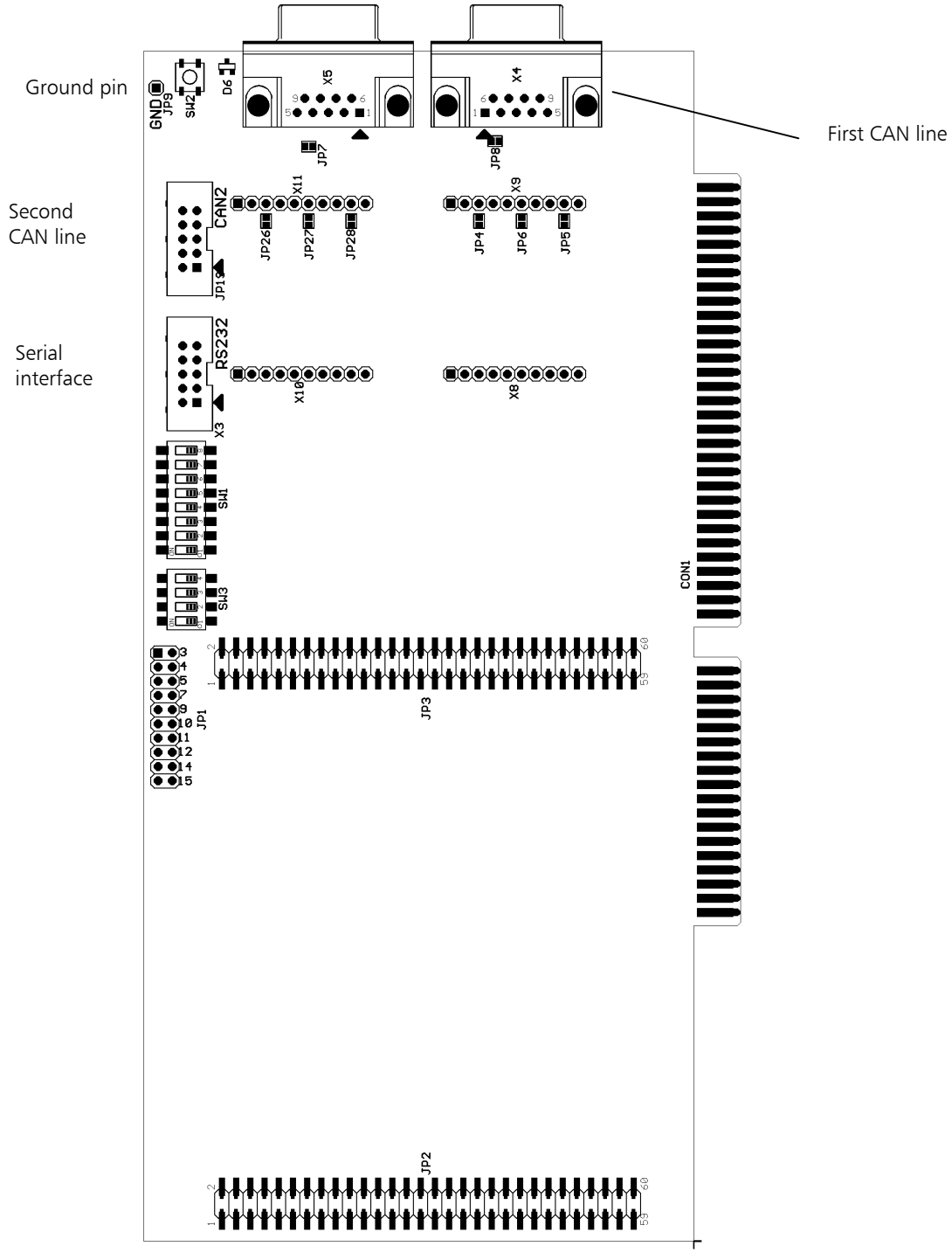


Fig. 3-1: iPC-I 165 interface board

3.1.1 Setting the base address

To set the base address the switches 1 to 4 of the DIP switch SW1 are used. The following table shows the possible settings (default = factory setting).

Base address	SW1 1	SW1 2	SW1 3	SW1 4
C000h	ON	ON	ON	ON
C400h	ON	ON	ON	OFF
C800h	ON	ON	OFF	ON
CC00h	ON	ON	OFF	OFF
D000h (default)	ON	OFF	ON	ON
D400h	ON	OFF	ON	OFF
D800h	ON	OFF	OFF	ON
DC00h	ON	OFF	OFF	OFF
E000h	OFF	ON	ON	ON
E400h	OFF	ON	ON	OFF
E800h	OFF	ON	OFF	ON
EC00h	OFF	ON	OFF	OFF
F000h	OFF	OFF	ON	ON
F400h	OFF	OFF	ON	OFF
F800h	OFF	OFF	OFF	ON
FC00h	OFF	OFF	OFF	OFF

The address zone of the interface must not overlap with any other system components in the PC.

3.1.2 Setting the PC interrupt

The required interrupt is set with the jumper board JP1 by connecting the jumper pair belonging to the requested IRQ.

Only <u>one</u> interrupt may be selected for the iPC-I 165!

If no interrupt is required, no pin may be bridged on JP1. The factory setting of the interface is IRQ 5.

It should be ensured that no other system component is occupying the selected interrupt, except for cards which work with shared interrupts.

In PC systems it is possible that several cards share an interrupt. Further information on this subject can be found in the hardware manuals for the PC. The iPC-I 165 supports shared interrupts by enabling the level of the interrupt impulses to be adjusted with switch 2 of the DIP switch SW3. For shared interrupts the DIP switch SW3-2 must be set to OFF position.

IRQ level	SW3 2
Low impulse (default)	OFF
High impulse	ON

3.1.3 16 bit access mode

By setting the switch 5 of DIP switch SW1 to OFF, the 16 bit access for the iPC-I 165 can be activated. Then iPC-I 165 will be accessed with 16 bit bus cycles from the ISA bus. If the 16 bit access is switched off the interface is accessed with 8 bit wide bus cycles.

Access mode	SW1 5
16 bit (default)	OFF
8 bit	ON

3.1.4 Zero wait states

By setting the switch 6 of DIP switch SW1 to OFF, a shortened ISA bus cycle (0 wait states) can be activated. If SW1-6 is set to ON, the PC performs a standard bus cycle.

Wait states	SW1 6
No wait states	OFF
With wait states (default)	ON

3.1.5 Bootstrap loader

With switch 7 of DIP switch SW1 set to ON, the integrated bootstrap loader of the SAB C165 is activated after a hardware reset. The bootstrap loader is described in detail in the user manual of the SAB C165.

Bootstrap loader	SW1 7
Not activated (default)	OFF
Activated	ON

3.1.6 Reserved switches

Switch 8 of DIP switch SW1 must remain in OFF position, otherwise the board will try to execute program code on the EEPROM (which is not available anymore at the actual version of the iPC-I 165).

If the DIP switch SW3 is assembled, only the switch 2 (interrupt level) may be changed by the user. Switches 1, 3 and 4 of DIP switch SW3 must remain in OFF position.

If one of these switches is changed the board may not work properly!

3.1.7 Providing current supply via CAN plug

With the solder jumpers JP4, JP5, JP6, JP26, JP27 and JP28, the VCC (5V) or GND signals can be connected to the CAN plug of the two CAN circuits. For this, the jumpers given in the following table have to be closed.

Plug connector Pin(X9 / X11) - Signal	Default setting	CAN line 1	CAN line 2
3 - GND	Closed	JP4	JP26
6 - GND	Open	JP6	JP27
9 - VCC	Open	JP5	JP28

If the bus transceiver is electrically isolated, GND and VCC are also connected electrically isolated from the interface to the plug board via the solder jumpers.

3.1.8 Bus termination resistors

The iPC-I 165 has termination resistors for the CAN bus. By closing the solder jumper JP8 (1st CAN) resp. JP7 (2nd CAN) these resistors are connected to the CAN high and CAN low line. The value of the resistors is 120 Ohm. By default the termination resistors are not connected.

3.1.9 Reset button and LED

The developer version of the iPC-I 165 is delivered with reset button SW2 and LED D6. The LED is controlled by the microcontroller port P3.13 (LED on = bit set to 1).

3.2 Design of the CAN plugs

3.2.1 CAN bus connector

One (common) or two independent bus connectors according to ISO/IS 11898 can be installed on the iPC-I 165. The signals of the 1st bus connector are provided by the 9 pole sub-D plug/sleeve. If two independent bus connectors are installed the signals for the CAN bus of the 2nd bus connector are provided by the connector JP19. Both of the CAN interfaces can be optionally galvanic decoupled from the CAN bus.
As another option a version without any bus connector on the board is available. In this case the signals are provided by separate connectors (X8 / X9 for the 1st CAN, X10 / X11 for the 2nd CAN circuit).

As an option for iPC-I 165 a CAN protection circuit is available. The circuit keeps disturbances and short spikes on CAN lines away from the electronics of the iPC-I 165.

The first CAN line is connected to the 9 pole pin/sleeve X4/X5 via the plug connectors X8 and X9. If both CAN controllers are installed and connected together then they will be connected via these plug, too.

The second CAN line is connected to JP19 via the plug connectors X10 and X11.

If the ISO/IS 11898 bus interface is already installed on-board, the plug connectors X8/X9 and X10/X11 are not present.

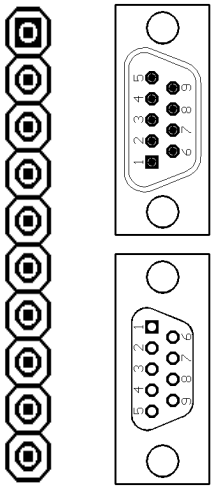
The signals of the CAN controllers 1 and 2 and four port pins of the microcontroller are available at X8/X10.

Pin No. X8/X10	Signal
1	VCC
2	GND
3	Port 3.10*
4	RX0
5	RX1
6	TX1
7	TX0
8	Port 5.2
9	Port 3.11*
10	Port 5.3

* If the serial interface is installed the port pins 3.10 and 3.11 may not to be used by a plug on board!

X9 leads the signals of the 1st bus connector to the 9 pole pin X5 and to the 9 pole sleeve X4.

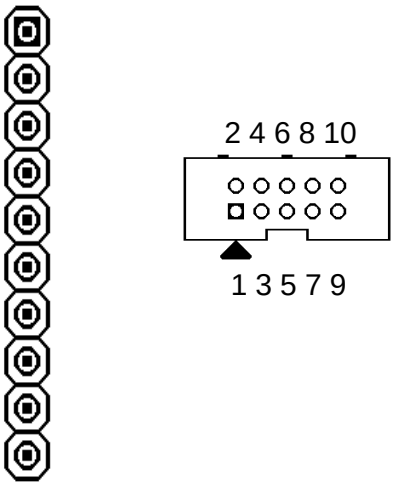
Pin No. X9	Pin No. X4 / X5	Signal
1	1	-
2	2	CAN Low
3	3	GND (via JP4)
4	4	-
5	5	-
6	6	GND (via JP6)
7	7	CAN High
8	8	-
9	9	VCC (via JP5)
10		-



With electrically isolated bus transceivers the signals GND and VCC are also electrically isolated from the GND and VCC signals of the interface.

X11 leads the signals of the second bus connector to the 10 pole connector JP19.

Pin No. X11	Pin No. JP19	Signal
1	1	-
2	3	CAN Low
3	5	GND (via JP26)
4	7	-
5	9	-
6	2	GND (via JP27)
7	4	CAN High
8	6	-
9	8	VCC (via JP28)
10	10	-



With electrically isolated bus transceivers the signals GND and VCC are also electrically isolated from the GND and VCC signals of the interface.

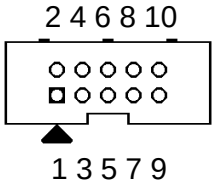
If the CAN protection circuit is installed on the board the signals CAN low and CAN high of X9 (X11) are connected to X4/X5 (JP19) via the protection circuit.

The pin assignment of the SUB D9 connector/sleeve connected to JP19 is equal to the pin assignment of the first CAN line (see page before).

3.2.2 Serial RS232 interface

A serial interface according to RS232C standard might be available on the iPC-I 165. The signals TxD, RxD and GND are on connector X3. The interface is accessed by the integrated serial interface of the SAB C165 on the port pins P3.10 and P3.11.

Pin No. X3	Signal
1	-
2	-
3	RxD
4	TxD
5	-
6	-
7	-
8	-
9	GND
10	-



Appendix

Appendix A

Technical Data

The following data refer to the basic configuration of the iPC-I 165 (one Philips SJA1000 CAN controller, one bus connector according to ISO/IS 11898, 512 Kbytes RAM, 512 Kbytes Flash)

Dimensions	107 x 212 mm (without connectors) 16 mm overall high
Weight	approximately 160 g
Operating temperature range	0 - 50 °C
Supply voltage	5 V DC ± 5%
Input current	typ: 250 mA max: 800 mA
EMC test	DIN EN 55022:05.1995 class B DIN EN 55022 A1/12.1995 DIN EN 61000-3-2:03.1996 DIN EN 61000-3-3:03.1996 DIN EN 50082-2:02.96

EMC test

The PC/CAN interface iPC-I 165 has to be used only in a CE compliant PC. The case of the PC should be sealed up against high frequency electrical noise. Use only shielded cables for connecting the PC/CAN interface to the CAN bus and connect the cable shield to the connector case. The connector case has to be sealed up against high frequency electrical noise. All unused connectors of the PC/CAN interface have to be closed with a cover which is sealed up against high frequency electrical noise and ESD.

Appendix B

Delivery settings

In the following the configuration of the iPC-I 165 is stated as it is at the time of delivery. In case of special versions of the interface settings can be different.

base address	D000h	DIP	SW1-1	ON
		DIP	SW1-2	OFF
		DIP	SW1-3	ON
		DIP	SW1-4	ON
16 bit access mode	on	DIP	SW1-5	OFF
0 wait states	off	DIP	SW1-6	ON
bootstrap loader	off	DIP	SW1-7	OFF
program start	Flash	DIP	SW1-8	OFF
PC interrupt	IRQ5	JP1 IRQ 5 closed		
IRQ level	low impulse	DIP	SW3-2	OFF
reserved switches	all OFF	DIP	SW3-1	OFF
		DIP	SW3-3	OFF
		DIP	SW3-4	OFF

Appendix C

Supply sources for data sheets

Dual-port-RAM IDT 71342LA:
http://www.idt.com

CAN controller Philips SJA1000:
http://www.philips-semiconductors.com

CAN controller Intel 82527:
http:/www.intel.com

Microcontroller Infineon SAB C165:
http://www.infineon.com