Users Manual

PCI-IntelliCAN

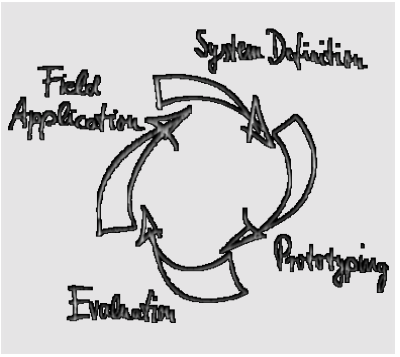
IXXAT Company of the ACTIA group

Systems, Support & More

Welcome to ***I+ME*** ACTIA !

Before acquainting you with your new ***I+ME*** Hardware we would first like to thank you for purchasing our product. We are extremely pleased that you have chosen to place your trust in ***I+ME*** ACTIA and will do our best to satisfy whatever needs you may have. The following is a brief explanation highlighting our background, areas of expertise and general product lines. This products and the list of our world-wide branch offices show that you have found a competent partner in ***I+ME*** ACTIA.

Since its foundation in 1986, ***I+ME*** ACTIA has made quite a name for itself. Our employees are dedicated to producing high-quality solutions in the field bus and multiplexed systems sectors. The knowledge of our experts allows to develop a spectrum of products which have been used in the automotive field as well as in general industrial environments. Our products can be used in all phases of system development: system definition, prototyping, evaluation and field application.



I+ME ***Informatik und MikroElektronik***

Whether your professional background is into industry-process-control or development and test tools, we offer six product groups to fulfill your sophisticated needs. Tried and tested under the most severe conditions the automotive industry has to offer, our products have proved themselves again and again.
Our six products groups are:

1 CAN System Test & Design Tools

Support of various user application phases: Learning, prototyping, testing and evaluation of networked systems. Comfortable Real-Time simulation of message transfer characteristics in CAN networks. Tools for mobile diagnosis and tests.

2 CAN PC Interfaces

Easy interfacing between PCs, Laptops, notebooks and networks with automotive fieldbus – protocols. Available for all PC standard interfaces such as ISA-slot, PCI, backplane, RS232, Centronics and PCMCIA. Development of applications under DOS/Windows according to Real-Time requirements is supported

3 CAN Industrial I/O

NiPC is an intelligent hardware concept for sensor / actuator interfacing. A modular architecture allows the flexible change target micro controllers for process control.

4 CAN System Application Software

Enabling Real-Time system modeling, testing of networked systems as well as application support. Offering basic services for network communication which is applicable for various processors and programming languages. Facilitating the application interface for distributed industrial process control according to the CAL standard by CiA. Support of Windows 3.1, Windows 95 & NT.

5 CAN System Know How

Promoting the understanding of various network protocols in practice. Understanding of CAN networks with CAL in practice. Developing HW/SW solutions for customer specific problems. We offer CAN / CAL workshops and in-house seminars to enable CAN users to benefit from I+ME ACTIA's extensive knowledge.

6 Automotive Diagnostics

Assistance during the development phases. Diagnostic tools for quality control in production lines as well as after sales diagnostic, control and servicing tools are provided to manufacturers, suppliers and dealers of the car industry by I+ME ACTIA.

If you have any questions concerning our products or you look for specific solutions within our product groups,

don’t hesitate to call us and benefit from I+ME’s extensive knowledge - your need is our desire.

Our merger with the french corporation ACTIA in 1995 allowed us to become a powerful supplier for the European automotive industry. ACTIA products include diagnostic systems for automotive service and maintenance as well as development and production of high-quality on-board electronics. joining forces with ACTIA has enabled I+ME to better service it’s international customers not only in Europe, but throughout the world.

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Manual

PCI IntelliCAN

Content

External documentation:

Administration of document

General document version 1.02

Your I+ME *PCI-IntelliCAN* Overview,
Systemrequirements, Delivery contents and s.o.

1 Introduction

1.1 Your I+ME PCI-IntelliCAN

The *PCI-IntelliCAN* board is specially designed for PCs with PCI slots. Intended for real-time data acquisition and processing applications by using a fast 16-bit micro-controller, it also allows a PC to easily interface with PCI and automotive networks. The *IntelliCAN* is a universal hardware platform for real-time network design and test tools and can be supported by either Windows 9x or Windows NT.

I+ME ACTIA is always eager to fulfill the needs of our customers. If problems should occur, please refer to t**roubleshooting**. If the problem persists, then feel free to contact our after-sales support hotline using the following number:

After-sales service

I+ME ACTIA GmbH
Rebenring 33
D-38106 Braunschweig
Germany

Tel: ++ 49 (531) 38 701 38
Fax: ++ 49 (531) 38 701 88

e-mail: info@ime-actia.de

1.2 System Requirements

Your system must need the following minimum requirements:

- Pentium 133 MHz processor or higher
- PCI Slot
- Windows NT, Windows 9x

I+ME ACTIA is always dedicated to developing solutions for our customers' problems, and if you have any questions about compatibility with other software or hardware combinations (e.g. OS/2 or Macintosh), then please contact our marketing department at the following number:

Marketing and Sales

I+ME ACTIA GmbH
Rebenring 33
D-38106 Braunschweig
Germany

Tel: ++ 49 (531) 38 701 12
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e-mail: info@ime-actia.de

1.3 Delivery Contents

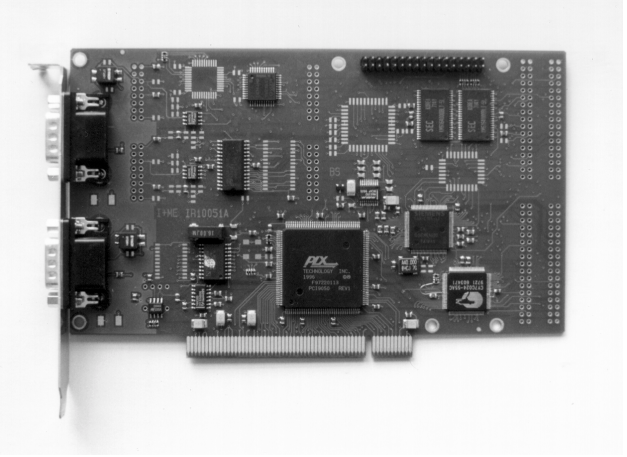
Your *PCI-IntelliCAN* Duo Channel delivery package includes:

Order Code: IME 1401 402

- 1 PCI Board
- 1 Users Manual
- Sample code (in C) for programming of SAB C165
- PC-Applications for Windows
- Windows NT driver or Windows 9x driver

You can olso order a *PCI-IntelliCAN* Single Channel set under ...

Order Code: IME 1401 401



1.4 Additional Products

In addition to the delivery contents, it is possible to order more products that enhance the functionality of your *PCI-IntelliCAN*. The following components and options can be purchased through any I+ME affiliated distributor (see **Welcome to I+ME ACTIA**) or from I+ME directly

- Chip setup software
- Various physical interfaces
- Galvanic decoupling

For new products and developments please call:

Marketing and Sales

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e-mail: info@ime-actia.de

1.5 Technical Specifications

Dimensions	108mm x 155mm
PC Addresses	Via PCI
PC Interrupts	Via PCI
Processor	SAB C165
Oscillator Frequency	On-board Crystal (CAN @ 16 MHz)
On-Board Memory	8 kB DPRAM 512 kB SRAM (opt. 1 MB) 128 kB Flash (opt. 512 kB)
Physical Interface	CAN:ISO 11898
CAN Interface	9 pin SubMinD for CAN I (CiA/DS 102 male) 9 pin SubMinD for CAN II (CiA/DS 102 male)
Galvanic Decoupling	Optional for both CAN channels
Temperature Range	0° .... +70°C
Socket for I/O	4 x analog inputs 4 x digital input or output 2 x UART / 1 x serial port sync. / 1 x serial port async. direct link to micro-controller

Your I+ME *PCI-IntelliCAN* installation.
Hardware and software installation are described.

2 Installation

2.1 Installation under Windows NT

2.1.1 Install the hardware

First you have to take care about the right installation of the *PCI-IntelliCAN* hardware in your PC. Please follow also the instructions of your PC hardware supplier.

Before opening your PC make sure that the PC is **disconnected** from your **powersupply**.

You have to plugin the *PCI-IntelliCAN* board into a free PCI slot. After **plugin** your ***PCI-IntelliCAN*** board the hardware is ready for operation.

Close your **PC** and turn power on. The next step is to install the software.

2.1.2 Installing the software

Driver installation:

1 Insert the CD. The setup programm will start automatic, if not please start the program “START.EXE” in root path.
2 Go to "Software Installation"
3 Choose your operating system, **is important**.
4 Choose your hardware component at the selection box then press "Start Installation". If the file is started (*.com file), follow the steps on the screen. If necessay type in the password.
5 If password is correct software will be installed successful.

Application installation:

1. Insert the CD. The setup programm will start automatic, if not please start the program “START.EXE” in root path.
2. Go to "Software Installation"
3. Choose your operating system, **is important**.
4. Choose PcCANControl component at the selection box then press "Start Installation". If the file is started (*.com file), follow the steps on the screen. If necessay type in the password.
5. Start PcCANControl, select “create a new project” and the *NetPorty II* hardware, at this case “Porty2-COM1” or “Porty2-COM2”. After the selection the necessary *NetPorty II* software is activated on your PC. For further information see also chapter about PcCANControl.

2.1.3 Deinstalling under Windows NT

Remember if the software should be deinstalled, please use normal Windows deinstallation service. You found it under...
START/SETTINGS/CONTROLPANEL/ADD/REMOVE PROGRAM
(START/EINSTELLUNGEN/SYSTEMSTEUERUNG/SOFTWARE)

2.2 Installation under Windows 9x

At Windows 9x the installation procedure is a little extravagant.

1. Insert the CD. The setup programm will start automatic, if not please start the program “START.EXE” in root path.
2. Go to "Software Installation"
3. Choose your operating system, **is important**.
4. Choose your hardware component at the selection box then press "Start Installation". If the file is started (*.com file), follow the steps on the screen. If necessay type in the password. This application will copy only all necessary files to the hard disk, no installation of driver is done at this time. Please follow the requests (e.g. password) of the installation program.
5. Turn off the PC and **plug in** the **PCI-IntelliCAN** card. Before opening your PC make sure that the PC is **disconnected** from your **powersupply**.
6. Start your PC again. Windows 9x detect the new hardware and ask you about the new driver. Please choose the **driver** on your harddisk. You found it **under C:\ime_LX\LX9xxxxx\...** (default). All necessary files you found under these directory. Follow the instructions on screen.
7. Reboot the system again to start up the new driver.
8. If the system is started again the installation is finished.

Start **PcCANControl** and select the **PCI-IntelliCAN**. After the selection is activated the software is installed. For further information see also chapter Application.

The components which make up your *PCI-IntelliCAN* and the way they work together for CAN access.

3 Hardware

3.1 Functional description

The I+ME *PCI-IntelliCAN* is equipped with the 16-bit SAB C165 microcontroller. The controller's clock frequency is 20 MHz.

The *PCI-IntelliCAN* is equipped with 512 kB of SRAM. The SRAM is selected by the micro-controller's CS 1 and driven in 16-bit non-multiplexed mode.

3.1.1 Special memory areas

In addition to the SRAM, the *PCI-IntelliCAN* contains a 8 KB Dual Port RAM (DPRAM), used for data exchange between the SAB C165's core and the PC. The DPRAM is selected by CS 0 and driven in 16-bit non-multiplexed mode. To avoid collisions during the access of the DPRAM, the bus cycles are delayed by the DPRAM's ready signal.

The DPRAM can be used for interrupt signals in the following ways:

- A PC write access to the address 1FFEH of the DPRAM can be used to cause an interrupt at the C165's P2.15 line.

- The C165 write access to the address 1FFCH of the DPRAM causes an interrupt at the PCI chip. A reset of these interrupts is caused by a read access to the DPRAM addresses from the opposite sides.

3.1.2 Flash memory areas

In addition to the SRAM and the DPRAM, the *PCI-IntelliCAN* contains a 128 kB Flash for storage of firmware or user specific programs. The memory is selected by the microcontroller's CS 2 and driven in 16-bit non-multiplexed mode.

3.2 Memory Mapping

The mapping of the *PCI-IntelliCAN* memory components is user-defined and has a wide range of possible addresses. DPRAM is mapped in the PC address range. The mapping of the DPRAM, CAN controller, and SRAM in the SAB C165 address space are all configurable. The mapping of the *PCI-IntelliCAN*'s memory (DPRAM and reset logic) in the PC address range is controlled through the PCI host adapter.

The mapping of the memory components and the CAN in the SAB C165 address area is controlled through the SAB C165 external bus interface. For more information about the functionality of the SAB C165 external bus interface, see **Literature** at the end of this manual.

3.3 Reset Control

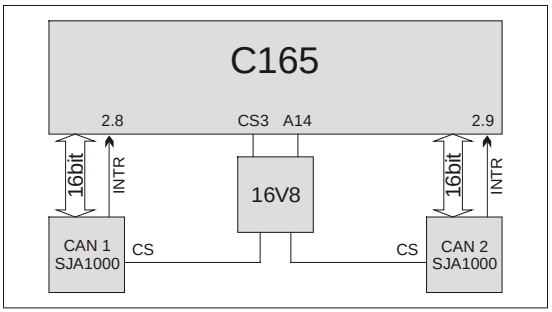
The reset of the SAB C165 is controlled through a port of the PCI chip that can be set or reset by the PC-SW with IO accesses to the PCI chip.

3.4 CAN Controller

The *PCI-IntelliCAN* also includes two CAN controller SJA1000.

The first CAN chip is controlled via the CS 3 line of the SAB C165 and driven in 16-bit multiplexed mode.
The first CAN controller's interrupt output signal is connected to the SAB C165's P2.8 line.

The second CAN chip is controlled via the CS 3 line of the SAB C165 and driven in 16-bit multiplexed mode.
The second CAN controller's interrupt output signal is connected to the SAB C165's P2.9 line.



Adresses : CAN1 = CS3_BASE
CAN2 = CS3_BASE + 0x4000

3.5 Serial Interfaces

Asynchronous Serial Interface

The RxD and TxD lines of the internal SAB C165 UART are connected to the *PCI-IntelliCAN* feature connector and can be used for customer specific applications. For more information about the SAB C165 asynchronous serial interface, see **Literature** at the end of this manual.

Synchronous Serial Interface

The SCLK[1], MRST[2] and MTSR[3] lines of the internal SAB C165 serial synchronous interface are connected to the feature connector and can be used for the connection to external devices. For more information about the SAB C165 synchronous serial interface, see **Literature** at the end of this manual.

3.6 PCI Interface

The *PCI-IntelliCAN* uses a PCI standard interface (Release 2.1). The *PCI-IntelliCAN* has 256 bytes of attribute memory containing information for the PCI chip information. After the configuration of the *PCI-IntelliCAN*'s software driver, the following resources are available :

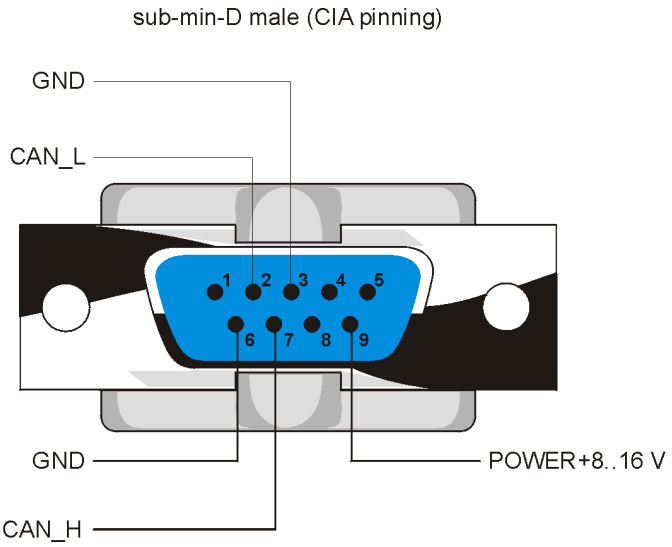
- 1 x 16 kB block at the memory range
- 1 x IRQ

[1] SCLK: Serial Clock
[2] MRST: Master Receive Slave Transmit
[3] MTSR: Master Transmit Slave Receive

3.7 CAN Interface

The physical interface of the *PCI IntelliCAN* consists of two transceivers. They are linked on two 9-pin sub-min-D male connectors. (CAN1 and CAN2)

Both physical interfaces are standard ISO11898 physical interfaces. The picture below shows the pinning of these connectors.



Pins 1, 4, and 8 are not connected on the board.

3.8 Physical Circuit Diagram

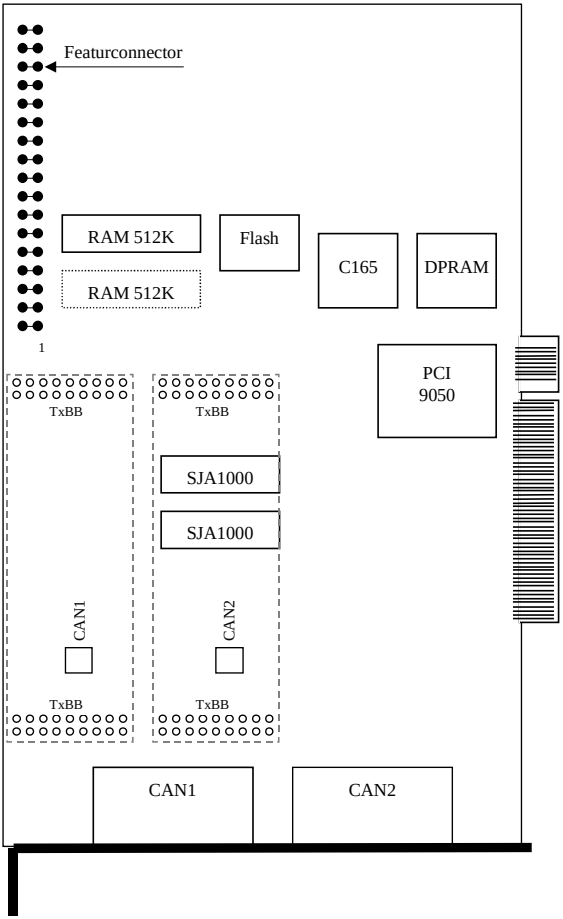
The following picture (see 3.9) shows the circuit diagram of the physical interface. It is possible to adapt user specific physical interfaces via I+ME's **T**ransceiver **B**aby **B**oards (TxBB).

3.8.1 Feature Connector

The Feature connector of the *PCI IntelliCAN* board is used to adapt additional signal to the *PC IntelliCAN.*

GND	1	2	SCLK
GND	3	4	MTSB
GND	5	6	MBSI
Vcc	7	8	Vcc
Vcc	9	10	Vcc
GND	11	12	TxD_O
GND	13	14	RxD_D
GND	15	16	I/O_8
I/O_0	17	18	I/O_1
I/O_2	19	20	I/O_3
I/O_4	21	22	I/O_5
I/O_6	23	24	I/O_7
AVcc	25	26	AGND
AIN_0	27	28	AIN_1
AIN_2	29	30	AIN_3
AIN_4	31	32	AIN_5
AIN_6	33	34	AIN_7

3.9 Physical Layout



	first	**second**
CAN Hardwareconnect:	CAN1	CAN2
CAN Softwareconnect	CAN0	CAN1

Common problems and how to solve them. How to get in touch with our after-sales support experts if you so desire.

4 Troubleshooting & Techn. Support

4.1 What to do if you have problems

First and foremost, please read **Installation** very closely and make sure that you performed your installation exactly as described.

For developers:
The Key is often used in developing environments in combination with the API and/or DLL. If the PcCANControl software is functioning properly, then there is no problem with general CAN access. You should check your usage of the API of DLL.

If the PcCANControl software is not functioning, please consult the list of common problems below and their possible solutions.

4.1.1 Solutions for all parts ...

The system crashes after choose the hardware at PcCANControl:

The selected memory area is not free, or the selected interrupt is being used by another application. Make sure that no conflicts exist on your system. If you get a blue screen under Win NT it is most likely that a memory or IRQ conflict is occur.

PcCANControl launches correctly, but CAN access is not possible:

Check the transceiver cable and CAN connectors. If a connector is not correctly plugged, connect it right. If the sub-min-D connectors at the end of the cables are hot, remove the Key and call I+ME.
*If you use **higher baudrates**, remember to protect the end of line with **resistors** [120Ohm]*

4.1.2 Solutions for PCMCIA

The system crashes after the installation of the Key client:

The selected memory area is not free, or the selected interrupt is being used by another application. Refer to Installation.

The system crashes when the Key is inserted or removed:

The selected memory area is not free, or the selected interrupt is being used by another application. Refer to Installation.

Windows will not launch after the installation of the client and services:

Make sure that there is a memory area reserved in the SYSTEM.INI file. The selected memory area is not free, or the selected interrupt is being used by another application. Refer to Installation.

The acknowledge sound after inserting or removing the Key is sounded twice:

There are two services installed on your system. One can be found in the CONFIG.SYS and the other in the device manager. In the device manager, under the topic PCMCIA, you can disable one of the services.

The Key is not inserted and PcCANControl starts with the message: I+ME CARD not available or drive not ready.

Insert the Key.

The Key is inserted and PcCANControl starts with the message: I+ME CARD not available or drive not ready.

*Some aspect of the resource allocation is wrong. Refer to **Installation** for more information.*

4.1.3 Non-Supported PCMCIA Drives

In the current version there are some PCMCIA drives which are incompatible with the *PCMCIA Key*. Today, as a general rule, some PCI connected drives result in compatibility problems. The following is a list of known incompatible drives and any laptops which are known to use these drives.

Drive	Known Laptops Using Drive
Cirrus Logic PCIC compatible	SIEMENS NIXDORF Scenic Mobile 700 COMPAQ Armada

4.1.4 Solutions for NetPorty II

You start PcCANControl but the connection doesn't work correct:

For parallel port usage it is necessary to have the EPP-loader-firmware (BOOTLOAD.H86) in the NetPorty II -Flash-EPROM. All Porty's are delivered with this loader!

You have overwrite the delivered EPP-Loader by your own firm*ware.*

In this case it is possible to download the EPP-firmware again into the NetPorty II -Flash. This software is a Win32-Console-Application and runs under Win95 and WinNT.

How to use:

- *Connect your NetPorty II with one serial port.*
- *If you do not use COM1 please change it into the file L.BAT.*
- *Start L.BAT.*
  If you get an error messages like "BSL: no response from the target hardware" it is possible that you have used the wrong COM port.
- *If you get the message below "-- COMx Loading bootload.h86..Ready" without any error message in the next line, all activities are correct finished*
- *Leave the software with pressing the ESC key, sometimes Alt X does not work.*

***Info**:*

The program LDFSER.EXE is a loader that burns firmware in the Porty-Flash and also it is a serial monitor The serial parameter are 115200,8,n,1. I+ME also can deliver a loader to start firmware in the RAM and a little firmware demo (Keil-C). Please contact us if you want to develop your own firmware.

The NetPorty II doesn't work under parallel port:

Use the right EPP mode on BIOS. It can be only one of the EPP modes work with one Win-System together. In past we find out that EPP 1.7 is necessary for Win9x and EPP 1.9 is necessary for Win NT. Please try out the right mode.

Using a printer and NetPorty II under Win NT:

If you use NetPorty II under NT note that you are not able to print!

Using a printer and NetPorty II under Win 9x:

If you use NetPorty II under Win9x the normal printer driver is active but it can make problems while printing with the active driver.! One way to solve this problem is to load the firmware into the flash of the NetPorty II.

Troubleshooting &
Techn. Support
What to do if you have problems

If you encounter difficulties which are not discussed in the manual, or if you need more help than is offered in **Installation** and **Troubleshooting**, please call our after-sales service. Our experts will do their best to solve whatever problem you might have.

For better understanding...

5 Glossary

Glossary

Adapter
A piece of hardware which contains one or more PCMCIA sockets.The Adapter contains the interface between the Socket Controller and the Host System.

AUTOEXEC.BAT
A set of commands in the form of a batch file program that are automatically executed by DOS to help configure your system when you *Boot-Up* your computer.

BIOS
An abbreviation for Basic Input/Output System. A set of instructions/routines stored in ROM. These routines work closely with hardware devices (memory chips, disk drives and monitor) to input and output interrupt requests indicating when a device is ready to accept or send data.

CONFIG.SYS
A system configuration command file that contains installable device drivers, memory management commands and control files that DOS accesses and uses when your system starts up.

DPRAM
Dual Ported Random Access Memory. The data for communication between PC and CANcard are exchange via a DPRAM.

I/O
An abbreviation for lnput Output. Refers to the sending (input) and receiving (output) of data through an 110 channel in the CPU. *Example:* The keyboard inputs data to the 110 channel in the CPU that in turn is output to the monitor.

IRQ
An abbreviation for Interrupt Request. A signal sent by a device and routed through the BIOS indicating when a device is ready to accept or send data.

PCMCIA
Personal Computer Memory Card International Association, a trade association of leading hardware and software vendors, established to adopt a set of standards pertaining to adapter slots and PC cards for portable PC accessories.

Slot
A receptacle on a micro, portable, laptop or palmtop computer that is used to insert and operate PCMCIA PC Cards. Also referred to as a *Socket.*

Socket
Same as *Slot* (see above).

Socket-Controller
A PC system hardware component that manages the operation of PCMCIA sockets in conjunction with system software.

SYSTEM.INI
A Windows initialization file (similar to the CONFIG.SYS file for DOS) that contains Windows device drivers, commands and settings you can use to customize Windows for your system's hardware.

Upper-Memory
Memory area within the PC address space between 640 KB and 1 MB. This area is used by hardware devices like graphics controller. The DPRAM of the CANcard is located in the Upper Memory.

For more informations ...

6 Literature

Literature

[1] SAB 80C167CR User Manual
Siemens AG.

[2] SAB C167CR Description of the
On-chip CAN-Module
Siemens AG.

[3] CiA DS 102-1CAN in Automation e.V