

PCA
to
PCD

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How to change from the PCA- to the PCD family?

Introduction

The PCA family of our programmable logical controllers exists since 1979. In 1986 the new generation, the PCD family was introduced. The production of the PCA family was stopped in the following steps:

PCA2 family	1993
PCA0 family	1995
PCA1 family	1997

Please note that we can only repair these systems as long as the required components are available on the market.

In addition to that, the knowledge about these systems is about to fade.

Because of the fact that the PCD family is programmed by a new (but similar) instruction set and program structure, a program written for the PCA can't be used for a PCD controller without adaptations. For the upload of an old program from a PCA and modify it to be suitable for a PCD, knowledge about both controller families is needed.

The programming tools for the PCD are more compact, faster and easier to handle but they aren't compatible any more with the PCA family.

Availability

Please contact the SAIA representation of your country to check if the software, cables, chips and modules mentioned in this document are still available.

Procedure

The following points are to be considered if a change from PCA system to PCD system is planned:

- **Program**
The program has to be modified. This shouldn't be a problem for engineering offices, which are working with both systems. The PCA instructions are similar to the PCD instructions.
- **Hardware**
The CPU, memory, I/O-modules and Racks have to be replaced. The only exceptions are the I/O-Modules, analogue modules as well as the power supply of a **PCA2**. These parts can be used in a PCD6 system and the cable work needn't to be redone. Remark: PCD6 I/O-modules are equipped with a different connection plug than PCA2 I/Os.

➤ **Consultation for updating your system**

Of course we'll consult you if you aren't sure about the combination of the different modules/parts. For that we have at least to know the following details:

- Type of PCA e.g. PCA1.M41 and additional mounted modules
(a photo or a description of the module can help us to figure out what module it is)
- the surface the system can take
- Amount of digital I/O's
- Amount of analogue I/O's (voltage, currency, resolution?)
- What communication ports are needed? (e.g. connection to other PLC's or to displays)
- Are there special modules built in? What function do they have?
(e.g. positioning of stepper motors)

An additional possibility is the consulting of an experienced engineering office.
We have got an address list for such engineering offices from Switzerland that we send you on request.

What is needed for to program a PCA controller?

Points to be considered

- **Programming**
IL programming knowledge as well as the knowledge how to operate a PCA system.
- **Manuals**
Since there are no more printed manuals for the PCA family available, we have scanned several manuals and provide them on our support site (www.sbc-support.ch). Unfortunately, we can't provide them in all languages. You can find them under 'Product Pages > PCA'.
- **Software**
PCA-assembler for MS-DOS (not for Windows!)
- **Computer**
For to use the PCA-assembler, a computer with bi-directional parallel port as well as DOS as operating system is needed.
The programming unit „P740 P2“ from Siemens is according to our customers often used and well suitable.

To test whether your computer it is suitable for programming a PCA there is a small test program available on our support site. You only have to create a test plug for the parallel port to run this software successfully.
This program as well as its manual is available under „Product Pages > PCA“.

- **Connection computer <> PCA**
A special cable (PCA2.K43) is needed to connect the computer to a PCA. On the side for the PC connection (25 pin D-SUB) there is a small box containing some electronic components.
On the other side a male D-SUB plug with 25 pins is mounted. This is the plug for the connection to the PCA. For some types of PCA an additional switch, which allows to select different operation modes (PCA0.P01), is needed.



Programming cable PCA2.K43

Suitable for:
PCA1.M10/.M11/.M12
PCA1.M130/.M135
PCA1.M141/.M146/.M147
PCA2.M10/.M11/.M22/.M30/.M31/.M32



PCA0.P01

For the following PLC's
the additional switch
PCA0.P01 is needed:

PCA0.M12/.M14
PCA1.M151/.M156

The Switch has to be
connected with the
programming cable
PCA2.K43.



➤ **Memory**

EPROM chips (21 VDC programming voltage!) suitable for PCA-family:

2716 /	24 pins	1k program code lines
2732A /	24 pins	2k program code lines
2764 /	28 pins	4k program code lines



EPROM

RAM chips:

6116 /	24 pins	1k program code lines
6264 /	28 pins	4k program code lines
8464 /	28 pins	4k program code lines



RAM

EPROM-emulators (battery-supported RAM):
 (R91 – R96 are SAIA-specific designations)

R91 /	24 pins	1k program code lines
R92 /	24 pins	2k program code lines
R95 /	28 pins	4k program code lines
R96 /	28 pins	4k program code lines



EPROM emulator

If on a PCA PLC an EPROM is mounted and the program has to be changed, a second RAM chip is needed to test the modified program. The RAM should at least have the same size as the EPROM already mounted on the print of the PCA.

For controllers of the type PCA2.M10 or .M11/.M12/.M30/.M31/.M32, so called memory support cards are used. The EPROM / RAM chips are carried by these cards. The universal cards PCA2.R28 or .R29 are the most suitable cards. After a successful change of the program an EPROM has to be burned. This EPROM is finally mounted on the PCA again.



Memory support card

PCA2.M10 or .M11 /.M12 /.M30 /.M31 /.M32:
 With these types of PCA2, equipped with the memory support cards mentioned above it is possible to copy the content of the memory mounted above the CPU to the memory mounted below the CPU without any special tools.

For all other PCA controllers an EPROM burner (not a product of SAIA) is needed. The HEX file in INTEL format is generated by the PCA assembler (installed on PC) and burned with the software belonging to the burner.

Procedure to modify a PCA program using PCA assembler

System requirements

- Computer running on DOS operating system
- 640KB main memory
- Bi-directional parallel port
- Hard disk with enough space for user program.
- ca. 1MB free space on HD for PCA assembler
- programming cable PCA2.K43 and possibly switch between operating modes (PCA0.P01)

The bi-directional parallel port of your computer can be tested using a D-SUB connector with 25 pins (some of them connected) and the program PCAPTEST.exe. You can find the instructions for this test on our support site (www.sbc-support.ch) under 'product pages > PCA'.

If you are using a recent PC, it is recommended to set the mode for the parallel port in the BIOS setup to 'ECP' or 'NORMAL'.

Software requirements

- MS-DOS operating system (at least V6.0 recommended)
- All files belonging to the PCA assembler (listed on the next page)
- ASCII-Editor for program changes

Remark concerning the installation of the PCA assembler

According to our experience we recommend to make a bootable floppy disk to start up the PC with MS-DOS and use the hard disk. If the hard disk isn't formatted with the file system FAT16 or FAT32, the following procedure won't work as the disk is not seen by DOS. The advantage of booting your PC directly from the floppy disk is that you don't have to change anything except of the boot sequence in the BIOS (first boot device has to be the floppy drive)

Attention:

The PCA assembler won't work on any Windows version since the assembler needs to access the parallel port directly, which isn't possible in a DOS window.

Recommendations for the installation of the PCA assembler

If the PCA assembler is installed on a hard disk, all files have to be copied into one directory (e.g. with the name 'PCAS').

If the PCA assembler (as well as MS-DOS and ASCII-Editor) is installed on a floppy, the content of the floppy could look like the list shown on the next page.

Because there isn't enough space on the floppy disk for all work- and program files, we recommend not to work directly from the disk.

If there is no other way (e.g. if you are using a hard disk formatted with NTFS), set up several disks and delete some files of the assembler packet on each. This allows working only from floppy disks.

For editing the program code, an ASCII-Editor is needed. You can use any editor, the only restriction is that all source files must end with a '^Z'. Most of the editors will insert this ending automatically. If this isn't the case, the PCA assembler won't find the end of the file and will continue to assemble the rest of the hard disk...

Required files for PCA assembler

COMMAND.COM	MS-DOS	PCAHLP.017	Menu of help files
CONFIG.SYS	MS-DOS	PCAHLP.018	Menu of help files
DRVSPACE.BIN	MS-DOS		
IO.SYS	MS-DOS		
KEYB.COM	MS-DOS	PCAS.EXE	PCA assembler
KEYBOARD.SYS	MS-DOS	PCAS.001	PCA assembler
MSDOS.SYS	MS-DOS	PCAS.002	PCA assembler
AUTOEXEC.BAT	MS-DOS	PCAS.003	PCA assembler
QEDIT.EXE	ASCII-Editor from Samware	PCAS.004	PCA assembler
QHELP.VCH	ASCII-Editor help	PCLINK.EXE	PCA linker
		PCLINK.001	PCA linker
LIESMICH	Read me	PCLINK.002	PCA linker
PCKEY.PWD	Licence key for PCA assembler	PCLINK.003	PCA linker
PCAPTEST.EXE	Test program for parallel port	PCDNLD.EXE	PCA download
PCAPTEST.TXT	Description of parallel port test program	PCUPLD.EXE	PCA upload
PGUINI.COM	Initialisation of parallel port for PCA2.K43	PCDIS.EXE	PCA disassembler
PCA.EXE	PCA software menu	CI.EXE	Communication interface as software version
PCAMENU.DAT	Settings of PCA menu	P10.EXE	programming tool PCA2.P10 as software
PCAHLP.001	Menu of help files	PCXRF.EXE	Cross referenz list generator
PCAHLP.002	Menu of help files	PCSPLIT.EXE	Program for Splitting files
PCAHLP.003	Menu of help files	PCCOMP.EXE	Program for comparing files
PCAHLP.004	Menu of help files	PCFILE.EXE	File manager of PCA menu
PCAHLP.005	Menu of help files	PCPROM.EXE	EPROM PCA2.P16, PGS49 support
PCAHLP.006	Menu of help files	PCFLOW.EXE	Flow diagram generator
PCAHLP.007	Menu of help files	PCLIST.EXE	Listing generator
PCAHLP.008	Menu of help files	ONLINE.EXE	Online access (only newer PCA CPU's)
PCAHLP.009	Menu of help files	PCADATA.EXE	PCA resources up- und download
PCAHLP.010	Menu of help files	PCADATA.DOC	PCA resources up- und download
PCAHLP.011	Menu of help files	PCADATA.HLP	PCA resources up- und download
PCAHLP.012	Menu of help files	PCADATA.TXT	PCA resources up- und download
PCAHLP.013	Menu of help files	PCTEXT.EXE	Textliste generator
PCAHLP.014	Menu of help files	PCCONV.EXE	INTEL-HEX-file generator
PCAHLP.015	Menu of help files	PCCONVST.EXE	
PCAHLP.016	Menu of help files	RTA.COM	

Suggestion for content of file „AUTOEXEC.BAT“ on a floppy disc:

```

keyb sg,,keyboard.sys
path=C:\PCASS;
set PCA=C:\PCASS;
C:\PCASS\PGUINI.EXE ; initialises the parallel port
  
```


Steps to do for a program modification

Connect to your PCA controller with the PC (using the cable PCA2.K43).

Boot the PC (from your floppy disk).

After the boot process of the PC (DOS prompt is displayed), the RUN-LED of the connected CPU has to blink. If this isn't the case, the program PGUINI.exe isn't running or either the cable or a port on one of the devices is defective.

The easiest way to edit the program to be changed is to work in the folder of the PCA assembler (e.g. PCAS\). This way you don't have to edit many commands/parameters in the 'AUTOEXEC.bat, CONFIG.sys and you don't have always to enter the full path of the files.

Start the PCA assembler using the command 'PCA'. This will display the PCA menu.

Upload the program to be changed from the PCA. For that select 'Upload/Download' from the menu. By pressing the 'Space' bar, you can choose whether you want to upload or to download a program.

(On the upper part of the screen the specification for a program download to the PCA are shown. At the moment you don't have to care about these options.)

Enter the details for the program upload from the PCA (file name, start address and end address of the program).

Attention: The end address must not be greater than the size of the memory mounted on the PCA!

The maximum values for the end addresses are:

1 kB = 1023

2 kB = 2047

4 kB = 4095

2 * 4 kB = 8191

Disassemble the uploaded program (select 'Disassembler' from the Menu). After the disassembling, rename the generated file by using 'File handling' from the menu to 'Name.src'.

This is important because the PCA assembler only will assemble '*.src' files.

It is recommended to save a copy of the uploaded program as a backup.

Now you can edit the uploaded program. Please refer to the PCA assembler manual.

Addresses

Support site:

www.sbc-support.ch

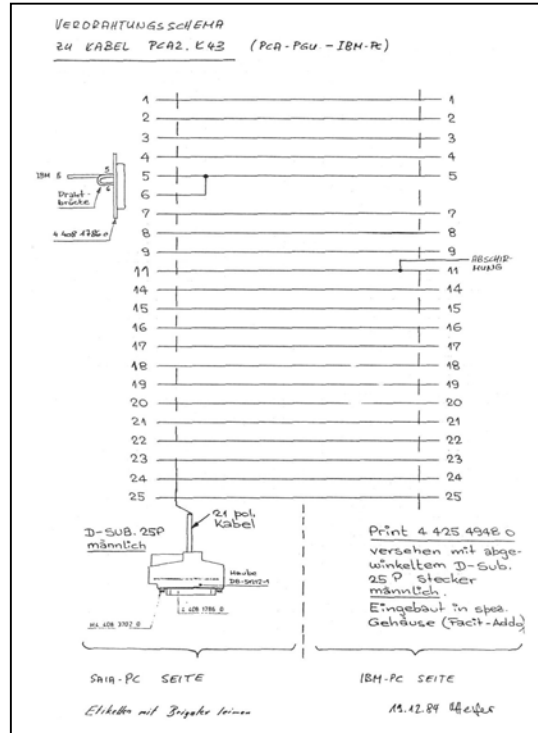
MailTo:

pcdsupport@saia-burgess.com

Schemes

Scheme of the PCA2.K43

Programming cable



Scheme of the PCA0.P01

Switch between the different operation modes

