

Manual

SO-HARD
SOFT- AND HARDWARE ENGINEERING

SH-ARC PCI

ARCNET - Adapter for the PCI Bus

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CE



Contents

1 Introduction	3
2 Features.....	3
3 Function.....	5
3.1 Network Interface Settings.....	5
3.2 Access.....	5
3.3 COM2002x Configuration.....	7
3.4 LED Indicators.....	7
3.5 Dip Switch Settings.....	8
4 Interfaces.....	10
4.1 Coax Interface	10
4.2 RS485 Interface	10
5 Technical Specifications.....	12
5.1 General.....	12
5.2 ARCNET.....	12
5.3 PCI Functionality.....	12
5.4 Coax Interface.....	12
5.5 RS485 Interface according AUG.....	13
5.6 RS485 Interface, FARC E3 compatible.....	13
6 Troubleshooting	14
7 Support.....	15
8 References.....	15
9 Limited Warranty.....	16
10 CE Declaration of Conformity	17
11 INDEX.....	18

1 Introduction

The SH-ARC PCI is an ARCNET card for use in PCs with a PCI bus[4]. The controller used is the COM20020[1] or COM20022[2] (named below COM2002x). The card features a 32-Bit data bus and thus, enables high transfer rates. There are two ARCNET interfaces available although they cannot be used at the same time.

2 Features

PCI Bus

- 32 Bit Bus
- PCI 2.1 compatible
- PLX9052 chip by PLX
- PCI compatible mechanical assembly
- Mapping of the COM 2002x registers into the I/O space of the PC

RS485 Interface

- 9-pin Sub-D connector
- Optically decoupled
- Bit rate 19.5 kBit/s - 10 MBit/s
- Integrated termination via dip switch
- Protective circuit

Coax Interface

- BNC jack
- Suitable for RG-62 coax cable (93 Ohm impedance)
- Bit rate 2.5 MBit/s (10 Mbit/s, when transceiver is available)
- Protective circuit

ARCNET

- COM20020 or COM20022 controller
- Coax transceiver protected against invalid bitrate and mode
- LED for backplane mode on/off
- LED for ARCNET receiver activity
- LED for ARCNET transmitter activity
- LED for host access indication
- Automatic switchover between RS485 and coax interface

Miscellaneous

- DOS enabler for use under MS-DOS (register compatible to FARC E3 and other adapters equipped with the COM20020 controller)
- driver for Windows NT
- CE mark guarantees proper function in industrial environments (see notes in chapter Interfaces/RS485 interface)
- optional: PC/104 add-on module

3 Function

3.1 Network Interface Settings

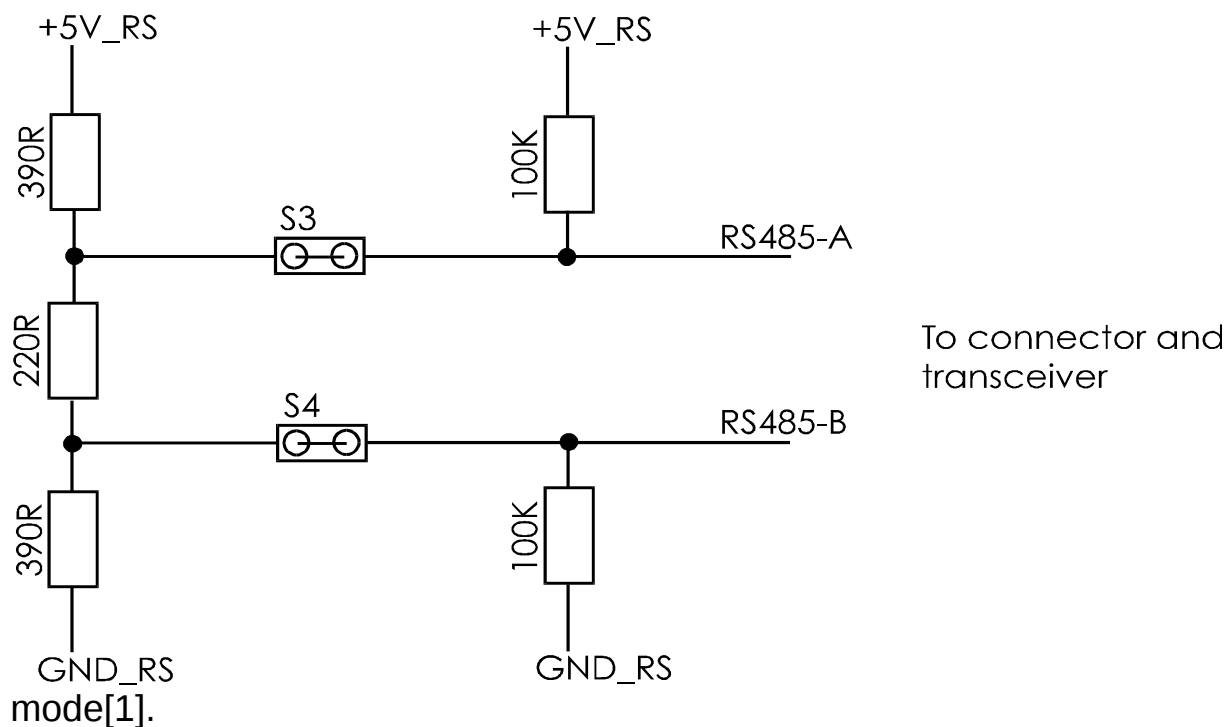
The switchover from RS485 to coax and vice versa is effected automatically. The RS485 interface is always active on the transmitter side, so is the coax interface if the COM2002x is configured in an appropriate way. Only one network line (coax or twisted pair cable) may be connected at the same time.

3.1.1 Coax Interface

No manual settings are needed, but the interface is only activated if a valid Bit rate (2.5 - 10 MBit/s) is selected and the controller COM2002x is operated in Non-Backplane mode[1].

3.1.2 RS485-Interface

The termination can be turned on (S3, S4 ON) or off (S3, S4 OFF). Default is ON. The COM2002x has to be operated in Backplane



The interface operates at all data rates.

3.2 Access

The SH-ARC PCI adapter is mapped automatically into the I/O or the memory space by the BIOS of the host computer. The operating system is able to retrieve start addresses and the interrupt used with the aid of BIOS functions. The necessary parameters are:

DEVICE ID = 0x9050h
 VENDOR ID = 0x10B5h
 CLASS CODE = 0x068000h
 SUBSYSTEM ID = 0x00 (not used)
 SUBSYSTEM VENDOR ID = 0x00 (not used)

Note: If there are any other PCI cards used in system, which use a PCI-Parameter-combination *identical* to the one described above, you have to use card-specific information (i.e. serial number, controller type) to differentiate between the cards. Software routines written in C are available on disk to read out this data.

For MSDOS a software is included which provides all necessary data in form of an environment variable. For further information refer to the Readme file on the floppy disk shipped with the adapter.

A Windows NT driver is included as well.

3.2.1 Address space

Following 4 address spaces are available:

PCI Base Adress Registers	LOCAL SPACE	COM 20020	COM20022	Register
2	0	MEM / 16BIT / 512 Byte		only COM2002x data register
3	1	IO / 16 BIT / 16 Byte		all COM2002x registers in 2 byte intervals
4	2	IO / 8BIT / 8 Byte		all COM2002x registers
5	3	MEM / 8BIT / 512 Byte		only COM2002x data register

Local Space 2[3] provides an interface compatible with all ISA bus adapters equipped with the COM20020 controller.

Local Space 1 enables the use of the COM20022[2] 16-Bit mode. In the COM20022 the 16-Bit mode is only implemented for the data register. All other registers remain 8 Bits wide. For these registers the 8 high Bits are insignificant during 16-Bit accesses by the host PC.

The Local Space 0 and 3 are intended for very fast data transfers from PC to the SH-ARC PCI adapter. Please contact SoHard GmbH if you want to use this mode in your own applications. The Windows NT driver already supports this operation mode.

3.3 COM2002x Configuration

The COM2002x controller[1] has to be initialized in the following way:

3.3.1 Setup Register

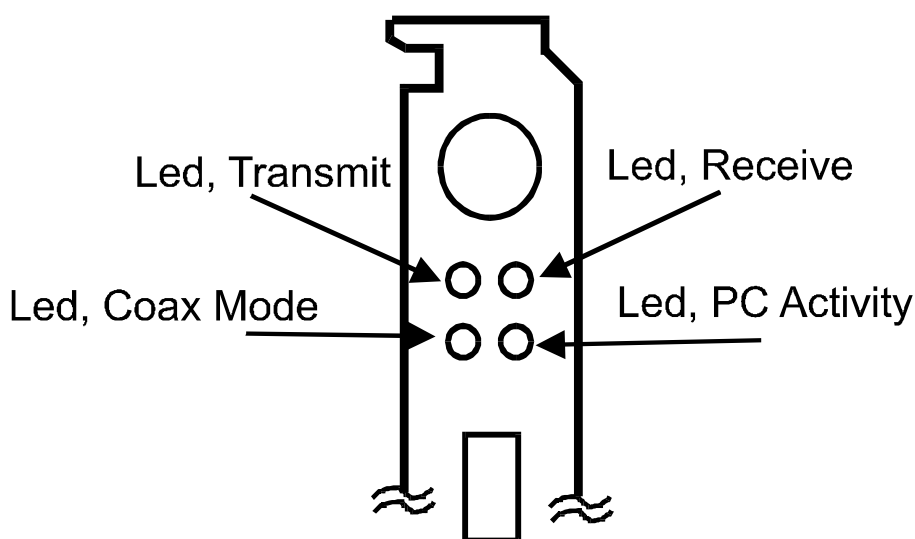
Bit Description	Bit No.	Value	Comment
Slow Arbitration Bit	0	0 for Bit rate <= 2.5 MBit/s 1 for Bit rate >= 5 MBit/s	
Pulse1 Mode	1	1	Push-pull driver activated in backplane mode

3.3.2 Access Mode

The COM2002x is operated in non-multiplexed mode. After a reset, shifting to this mode is effected by controller unit accesses [1] **which have to be performed by the software. If this initialization is not performed, the COM2002x will not function properly.**

In case of using the SoHard NT Driver or DOS Enabler, the initialization is automatically performed.

3.4 LED Indicators



LED, PC Activity (red):

This LED indicates all I/O accesses to the SH-ARC PCI adapter by the host PC. Every access is prolonged with the aid of a digital one-shot

multivibrator (time constant of approximately 1 msec) and thus, made visible.

LED, Coax Mode (green):

This LED is activated if the ARCNET controller is configured for a Bit rate valid for the coax interface (2.5 MBit/s - 10 MBit/s), the controller is transmitting and in default mode (= non Backplane). When the LED is inactive, no data are sent via the coax interface. Note: The HIT is specified only for operation at 2.5 Mbit/s.

LED, Receive (yellow):

This LED indicates activity on the ARCNET receiver channel. The signal is prolonged with the aid of a digital one-shot multivibrator and thus, made visible. Because the signal is received again by both the coax interface and the RS485 interface, the LED is also activated by the transmitter signal. The LED continuously lights when the ARCNET is in stable operation. The brightness depends on the Bit rate selected. During reconfigurations [1] the LED periodically flickers.

LED Transmit (yellow):

This LED indicates activity on the transmitter channel. The signal is prolonged with the aid of a digital one-shot multivibrator and thus, made visible. The brightness depends on the Bit rate selected, on the length of the packets transmitted and on the number of connected ARCNET nodes.

3.5 Dip Switch Settings

The SH-ARC PCI Adapter is Plug & Play capable and does not provide the possibility to select address or interrupt manually.

The only item with manually changeable settings is the RS485 interface. There are four switches which can be accessed from outside.

S3	S4	Function	Comment
ON	ON	Termination for RS485 enabled	Default setting
OFF	OFF	Termination for RS485 disabled	
ON	OFF	invalid	
OFF	ON	invalid	

S 1	S2	Function	Comment
ON	ON	GND_RS and AGND connected and wired to GND_SEL	See chapter „Interfaces“
OFF	OFF	GND_SEL not connected	Default setting
OFF	ON	AGND wired to GND_SEL	
ON	OFF	GND_RS wired to GND_SEL	

AGND is the bracket potential. GND_RS is the ground of the electrically decoupled RS485 circuit.

The pinning of the Sub-D Connectors is shown in chapter „Interfaces“.

We recommend not to change the Default setting for S1 and S2.

4 Interfaces

4.1 Coax Interface

Connector type: BNC jack, insulated

Pin Assignment:

Pin	Description	Meaning
1	Shield	Shield of coax cable
2	Center	Center of coax cable

4.2 RS485 Interface

There are two types of the SH-ARC PCI which differ in connector type and pin assignment. Both are described below.

Important Notice: In order to meet the CE specifications, the cable connected to the SUB-D connector/jack must have a shielding braid, which has to be connected to the connector with low impedance.

4.2.1 RS485-Interface according AUG (9 pin SUB-D male)

Assignment according AUG standard[5]

Connector type: 9 pin SUB-D male

Pin Assignment :

Pin	Description	Meaning
1	GND_SEL	Can be connected to AGND (S1=ON) and/or GND_RS via S2. (see chapter Dip Switch Settings)
2	nc	Reserved for additional power supply
3	DATA-B	Data line B (more negative than DATA-A when in idle state)
4	nc	Reserved for direction control
5	GND_RS	Data reference potential, supply
6	+5V_RS	Isolated +5V Supply for RS485 Interface. The maximum Current must not exceed 25 mA.
7	nc	Reserved for additional power supply
8	DATA-A	Data line A (more positive than DATA-B when in idle state)
9	nc	Reserved for additional power supply
Shield	AGND	Shield

AGND is the bracket potential. GND_RS is the ground of the electrically decoupled RS485 circuit.

4.2.2 RS485-Network Interface (9 Pin SUB-D female)

Assignment compatible to FARC E3 ARCNET adapter by SoHard.

Connector type: 9 pin SUB-D female

Pin Assignment:

PIN	Description	Meaning
1	GND_RS	Data reference potential, supply
2	nc	reserved
3	DATA-A	Data line A (more positive than DATA-B when in idle state)
4	DATA-B	Data line B (more negative than DATA-A when in idle state)
5	GND_SEL	Can be connected to AGND and/or GND_RS. (see chapter Dip Switch Settings)
6	nc	reserved
7	nc	reserved
8	nc	reserved
9	+5V_RS	Isolated +5V Supply for RS485 Interface. The maximum current must not exceed 25 mA.
Shield	AGND	Shield

AGND is the bracket potential. GND_RS is the ground of the electrically decoupled RS485 circuit.

5 Technical Specifications

5.1 General

Temperature range (operation): 0°C to +55°C
Temperature range (storage): -20°C to +85°C
Power consumption: < 10W

Dimensions (without connectors): width 125mm, height 21 mm, depth 175mm

Weight: max. 0.5 kg (incl. packaging)

5.2 ARCNET

Compatibility: ANSI/ATA 878.1
Data rates: 19,531/ 39,063/ 78,125/ 156,25/
312,5/ 625 kbps
1.25 / 2.5 / 5 / 10 Mbps

5.3 PCI Functionality

Compatibility: PCI 2.1
Power supply: +5V/-12V

5.4 Coax Interface

Data rate: 2.5 Mbps
Input impedance: $\geq 10 \text{ k}\Omega$ (with $f= 5 \text{ MHz}$)
Output voltage: min. 16V_{ss} on terminated 93 Ω line
Output signal shape: Sinus Dipuls 200ns according
ANSI/ATA 878.1
Cabling: RG62 with $Z=93\Omega$ recommended
Connector: BNC jack, insulated

5.5 RS485 Interface according AUG

Compatibility:	AUG (Arcnet User Group)[5]
Data rate:	19.5 kbps bis 10Mbps
Input level threshold	+/- 200mV
Polarity idle level:	positive
Input impedance:	via dip switch configurable, approx. 150 Ohm (with DC-Biasing)
DC-Biasing:	configurable via dip switch 390Ohm +5V/390Ohm 0V
Transmission level:	min +/- 3,0V
Connector:	9 pin SUB-D connector

5.6 RS485 Interface, FARC E3 compatible

Compatibility:	FARC E3 ARCNET Adapter by SoHard
Data rate:	19.5 kbps to 10Mbps
Input level threshold:	+/- 200mV
Polarity, idle level:	positive
Input impedance:	via dip switch configurable, approx. 150 Ohm (with DC-Biasing)
DC-Biasing:	configurable via dip switch 390Ohm +5V/390Ohm 0V
Diff. Transmission level:	min +/- 3,0V
Connector:	9 pin SUB-D jack

6 Troubleshooting

- **Adapter is not mapped into the PC Address Range.**

Possible Cause: The computer BIOS does not support the required hardware mechanism (The PCIBIOS program, shipped with the adapter, reports for "Hardware Mechanism" a value unequal 1 or 11).

Solution: Update the BIOS

- **Adapter is accessible, but no Interrupts are generated.**

Possible cause: An insufficient number of interrupt lines is reserved for PCI in the computers BIOS setup. (The PCIBIOS program, shipped with the adapter, reports for "Interrupt" the value 0) Solution: Configure more interrupts for PCI in the BIOS setup.

- **Transmission Activity LED indicates Reconfigurations.**

Possible causes:

- Only one node is present in the network
- The network is not properly terminated
- At RS485 connections DATA-A and DATA-B are exchanged

- **Green LED does not light**

Possible causes:

- The COM2002x is operated at an invalid Bit rate
- The COM2002x is in backplane mode
- The COM2002x is not activated on the transmitter side

7 Support

If you experience any problems during adapter setup or operation please refer to the chapter "Troubleshooting" before contacting SoHard.

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8 References

Reference	Document
[1]	Data Sheet COM20020, SMC, dated May 25th, 1997
[2]	Data Sheet COM20022, SMC, dated March, 21st 1997
[3]	Data Sheet PCI 9052, PLX, Rev 1.0
[4]	PCI Local Bus Specification 2.1
[5]	AUG (Arcnet User Group) ARCNET Hardware Manual
[6]	Data Sheet Serial EEPROM NM93CS46N, April 1996, NATIONAL SEMICONDUCTOR

9 Limited Warranty

SoHard GmbH warrants that every product and all components are free from defects in workmanship and materials under normal use and service. The warranty period is one year from the date of purchase. The warranty is limited to the original purchaser and cannot be transferred.

If a product does not operate as warranted during the applicable warranty period, SoHard GmbH shall, at its option, repair the defective product or component or deliver to the customer an equivalent product or component. Repaired or replaced products or components are delivered in exchange of the defective products or components with the option of SoHard GmbH whether the delivered products or components are new or as new. All products that are replaced will become the property of SoHard GmbH.

This limited warranty excludes damage due to accidents, catastrophes, negligence, inadequate use or changes of the product or component made by the customer.

Warranty service may be obtained by delivering the defective product or component accompanied by a copy of the dated proof of purchase, to SoHard GmbH. It has to be ensured that the package is appropriate for safe shipment. After expiration of the warranty period (one year from the date of purchase) no warranty services can be obtained whatsoever.

The repaired or replaced item will be shipped to the customer. Carrier and terms of shipment are concern of SoHard GmbH. If there are special requirements of the customer in terms of shipment or a destination outside of Germany, Austria, Switzerland and the eastern european countries the shipment will be carried out at the expense of the customer.

The warranty described above is the only warranty SoHard grants for ist products. There is no warranty, neither explicit nor implicit, that SoHard GmbH products can be used commercially, the usability for specific applications or that third party rights are not violated. SoHard GmbH makes no warranty that the operation of a accompanying software will be uninterrupted and error free. SoHard GmbH shall not be responsible whatsoever for damage by chance, special or intentional damage and costs and failures due to the use and operation of the product, covered by this warranty.

(Some governments don't allow the disclaim for damage by chance or subsequent damage in connection with this type of product. In this case above limitations are void.)

10 CE Declaration of Conformity

DECLARATION OF CONFORMITY
According to ISO/IEC Guide 22 and EN 45014

Name of Supplier: **SoHard GmbH**

Address of Supplier: **Bussardstr. 19
D-90766 Fürth
Germany**

declares that the Product

Product name: **SH ARC PCI**

Product Type: **SH ARC PCI**

is in conformity with the following product specifications:

Safety: **EN60950: 1992
+ A1: 1993 + A2: 1993
+ A3: 1995 + A4: 1997**

EMC: **EN 50081-2: 1994-03
EN 50082-2: 1997-11**

Fürth, 21.09.1998

(Wolfgang Grund, Managing Director)

11 INDEX

9		Output Signal Shape	12
93Ohm	12	Output Voltage	12
A		P	
Addresses	15	PCI BaseAdres	
ANSI	12	Register	6
ARCNET Functionality	12	PCI-Funktionalität	12
ATA 878.1	12	Pin Assignment	10
AUG	10, 11	Polarity	13
B		Power Consumption	12
Backplane-Mode	5	Protective Ground	10
BNC	12	S	
C		Setup Register	7
Cabling	12	Shield	10, 11
CE Specifications	10	SoHard GmbH	15
CLASS CODE	6	SUB-D connector	10
COAX	5, 12	Support	15
COAX-Interface	10	T	
COM20020	15	Technical Support	15
COM20022	15	Terminating Resistor	12
Compatibility	12	Termination	5
Connector	13	Transmission Level	13
D		V	
Data Rate	12	VENDOR ID	6
DATA-A	10	W	
DATA-B	10	Weight	12
DC-Biasing	13		
DEVICE ID	6		
Dimensions	12		
Duplex	13		
E			
eMail	15		
F			
Features	3		
I			
Idle Level	13		
Input Impedance	12, 13		
L			
LED	7		
LOCAL SPACE	6		
M			
MSDOS	6		
N			
Network Interface			
Settings	5		
Non-Multiplexed-Mode	7		
O			

