DIN EN ISO 9001:2000
certified

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Attention!
Product discontinuation
due to EC RoHS directive
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Technical description

ADDICOM PA 7500

4-port serial interface

9th edition 06/2004

Product information

This manual contains the technical installation and important instructions for correct commissioning and usage, as well as production information according to the current status before printing.
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CE

Declaration of Conformity

This declaration is valid for the following product:

ADDICOM APCI-7500
4-port serial interface with/without isolation
modular structure through SI modules,
for the PCI bus

It is made by

ADDI-DATA GmbH
Meß- und Steuerungstechnik
Dieselstraße 3
D-77833 Ottersweier

in sole responsibility and is valid on the understanding that the product is competently installed, used and maintained, according to the respective security regulations as well as to the manufacturer's instructions regarding its intended use.

This declaration states that the product complies with following EC Directives:

- **EWGRL 336/89 of 3.05.1989**
- **EWGRL 31/92 of 28.04.1992**
- **EWGRL 68/93 of 22.07.1993**

This declaration is valid for all units manufactured according to the regulations and procedures of the quality management system (DIN EN ISO 9001 certification)

Following norms have been applied to test the product
regarding electromagnetic compatibility:

- **EN55011/03.91**
- **EN55022/08.94**
- **EN50082-2/03.95**

We point out that

- the conformity and herewith the permission of use expire if the user alters the product without consulting with the manufacturer.
- non-skilled users are to have the operational area of the product and the requirements resulting from it checked prior to putting into operation.
- by using this product in appliances coming under the EC EMC Directive, the user is to make sure they are conform to its regulations prior to putting into operation.
- by using this product in machines / installations coming under the EU Machine Directive, The user is to make sure they are conform to its regulations prior to putting into operation

A copy of the EMC tests is at your disposal on request.

15th October 1995

Antonio Agnetti
Legally valid signature of the manufacturer

WARNING

The following risks result from improper implementation and from use of the board contrary to the regulations:

- **Personal injury**

- **Damage to the MSX-Box, PC and peripherals**

- **Pollution of the environment**

- **Protect yourself, the others and the environment!**

- **Read carefully the safety precautions (yellow leaflet).**

  If this leaflet is not with the documentation, please contact us and ask for it.

- **Observe the instructions of the manual.**

  Make sure that you do not forget or skip any step. We are not liable for damages resulting from a wrong use of the board.

- **Used symbols:**

IMPORTANT!
designates hints and other useful information.

WARNING!
It designates a possibly dangerous situation.
If the instructions are ignored the board, PC and/or peripheral may be destroyed.

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1 DEFINITION OF APPLICATION

1.1 Intended use

The board **PA 7500** must be inserted in a PC with PCI 5V/32-bit slots, which is used as electrical equipment for measurement, control and laboratory pursuant to the norm IEC 61010-1.

1.2 Usage restrictions

The PA 7500 board must not to be used as safety related part for securing emergency stop functions.

The PA 7500 board must not be used in potentially explosive atmospheres.

1.3 General description of the board

The board **PA 7500** provides the personal computer (PC) with a 4-port asynchronous serial interface for the communication with external devices. The operating mode of the interface depends on the SI modules installed. The operating modes have different features regarding electromagnetic compatibility.

The board supports serial communication through four asynchronous serial ports.

Table 1-1: Intended purpose depending on the operating mode

Module[1]	Operating mode	Port configuration	Distance between transmitter and receiver [2]	Environment
PM232	RS232	modem control signals connected on the board or externally to the connector	30 m	industry
PM232-G	RS232	modem control signals connected on the board or externally to the connector	30 m	noisy industrial environment
PMTTY	20 mA Current loop	current flows in rest state	1 km	very noisy industrial environment
PM422	RS422		1.2 km	noisy industrial environment
PM422-G	RS422		1.2 km	very noisy industrial environment
PM485	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or data bit	1.2 km	noisy industrial environment
PM485-G	RS485	automatic transmitter control	200 m	industry
		transmitter control DTR, RTS or data bit	1.2 km	very noisy industrial environment

The use of the board according to its intended purpose includes observing all advises given in this manual and in the safety leaflet.

Uses beyond these specifications are not allowed. The manufacturer is not liable for any damages which would result from the non-observance of this clause.

[1] **PMxxx-G**: ex. PM232-G means module for the mode RS 232 with option G (optical isolation)
PMTTY means module for the mode 20 mA current loop. Is in its standard version with galvanic isolation

[2] The max. lengths are for standard interface cables

If the **PA 7500** is used with isolated and non-isolated SI modules, then the creeping distance of 3.2 mm is not ensured anymore.

For all operating modes use only connection cables with twisted pairs.

The housing of the peripheral connector:
- is to be firmly screwed together with the shield of the cable
- is to assure a low-resistance connection (< 100 mΩ) between the shield and the housing of the PC.

The shield of the cable is to be earthed on both sides.

Make sure that the board remains in its protective blister pack **until it is used**.

Do not remove or alter the identification numbers of the board.
If you do, the guarantee expires.

2 USER

2.1 Qualification

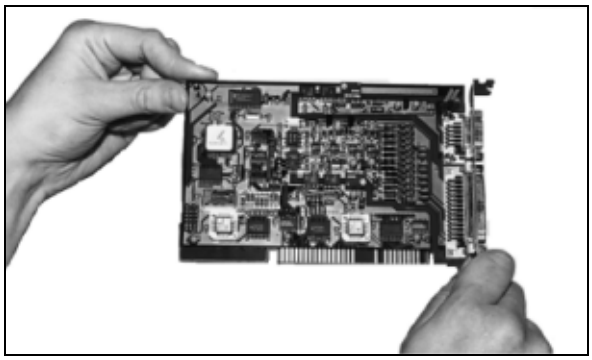
Only persons trained in electronics are entitled to perform the following works:
- installation
- use,
- maintenance.

2.2 Personal protection

Consider the country-specific regulations about:
- the prevention of accidents
- electrical and mechanical installations
- radio interference suppression.

3 HANDLING OF THE BOARD

Fig. 3-1: Correct handling



4 TECHNICAL DATA

4.1 Electromagnetic compatibility (EMC)

The PC is to comply with the norm IEC61326 for measurement, control and laboratory use and with the specifications for EMC protection.

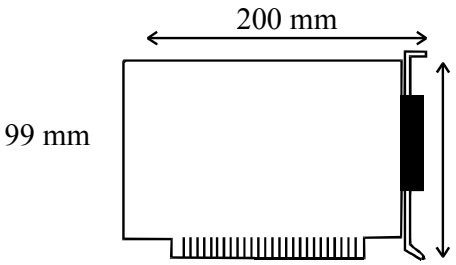
The board has been subjected to EMC tests in an accredited laboratory. The board complies with the limit values set by the norms IEC61326 as follows:

	True value	Set value
ESD (Discharge by contact/air)	4/8 kV	4/8 kV
Fields	10 V/m	10 V/m
Burst	4 kV	2 kV
Conducted radio interferences	10 V	10 V

4.2 Physical set-up of the board

The board is assembled on a 4-layer printed circuit card.

Dimensions:



Weight: ..... approx. 165 g
Installation in: ..... AT/XT slot
Connection to the peripheral: ..... 37-pin SUB-D male connector

4.3 Limit values

Max. altitude: ..... 2000 m
Operating temperature: ..... 0 to 60°C
Storage temperature: ..... -25 to 70°C
Relative humidity: ..... 30% to 99% non condensing

Minimum PC requirements:
Bus speed: ..... 8 MHz
Operating system: ..... Windows NT, 98, 2000, XP

Energy requirements:
- Operating voltage of the PC: ..... 5 V ± 5%
- Current consumption (without load): ..... typ. see table ± 10%

	PA 7500
+ 5 V from PC	320 mA

Add to this data the current consumption of the used modules according to the following table:

	PMxxx[1]	PMxxx-G
RS 232	21 mA	48 mA
RS 422	5 mA	42 mA
RS 485	5 mA	54 mA
20 mA	51 mA	-

4.3.1 RS232

CCITT recommandation: V.24
US norm EIA: ..... RS 232

Without optical isolation (PM232)

Max. transfer rate: ..... 115.2 kBaud

With optical isolation (PM232-G)

Max. transfer rate: ..... 115.2 kBaud
ESD protection ..... 15 kV
Creeping distance: ..... 3.2 mm
Test voltage: ..... 1000 VAC
Short-circuit protection

4.3.2 RS422, RS485

CCITT recommandation: V.11
US norm EIA: RS422, RS485

Without optical isolation (PM422, PM485)

Max. transfer rate: ..... 115.2 kBaud
Transorb diodes: ..... 400 W
Absorption power: 1ms
Short-circuit protection: ..... PTC

[1] Module **PMTTY or MXTTY (20 mA)** is optically isolated as a standard.

With optical isolation (PM422-G, PM485-G)

Max. transfer rate: ..... 115.2 kBaud
Transorb diodes: ..... 400 W
Absorption power: 1ms
Creeping distance: ..... 3.2 mm
Test voltage: ..... 1000 VAC
Short-circuit protection: ..... PTC

4.3.3 20mA current loop

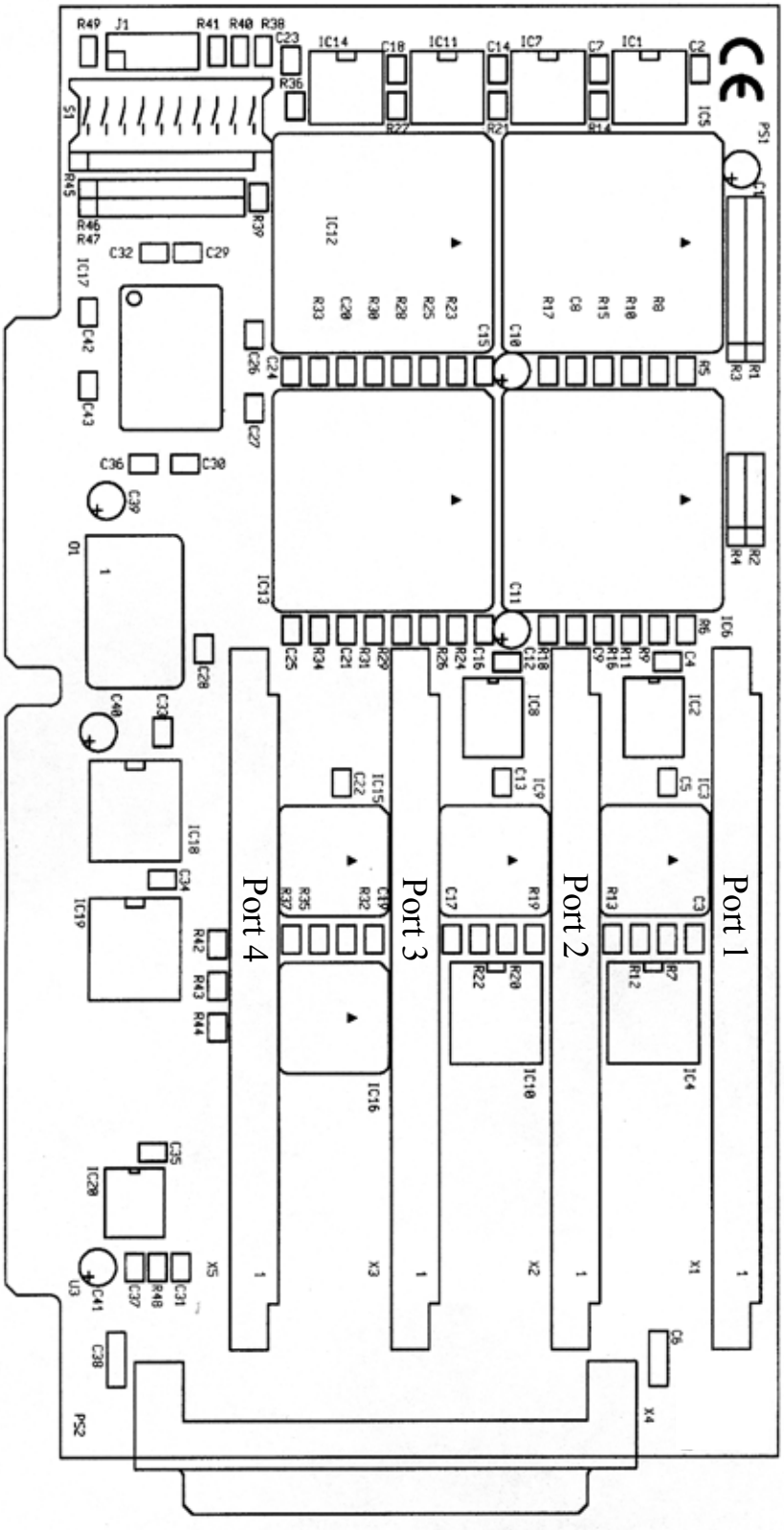
PMTTY
Max. Baud rate: ..... 19.2 kBaud
Transorb diodes: ..... 400 W
Absorption power: 1ms
Creeping distance: ..... 3.2 mm
Test voltage: ..... 1000 VAC
Load: ..... 500 Ω
Voltage reversal and short-circuit protection through
Transorb diodes

The basic board has a transfer rate of max. 115.2 kBd in its standard delivery (with standard quartz). If you wish to transmit at 1MBaud, the basic board has to be configured again by our services. Please contact us.

RS 485: transfer at 1 MBaud only works when the transmitter is controlled through DTR, RTS or data bit.

4.4 Component scheme

Fig. 4-1: Component scheme



5 SETTING THE BOARD

IMPORTANT!
The board can be set in 2 different modes:
- through the **block of DIP switches S1** for setting the base address and selecting the common interrupt line (XT lines)
- in **Plug & Play mode**
  - with 4 single interrupts (XT/AT lines)
  - or with common interrupt under Windows XP/2000.

The board is configured in the first mode in its standard delivery.

5.1 Mode 1: Settings through DIP switches

IMPORTANT!
This mode is to be set **before installing the board** in the PC.

Fixed settings:
TTY: current flow in rest state
RS 485: without echo; automatic transmitter control
RS 232: modem control signals external on connector

The block of DIP switches is used to configure the base address and the interrupt line of the board.

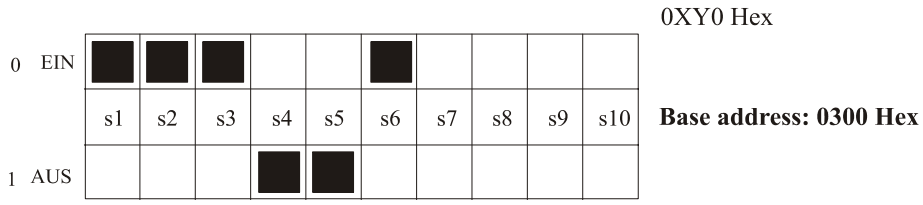
5.1.1 Setting the base address through DIP switches

The 4 ports of the board require an address range of 32 I/O addresses (8 I/O addresses for each port) in the I/O address space of the PC.

The base address can be set between 0200H and 03E0H or between 0600H and 07E0H within the I/O address space of the PC.

The base address is set to 0300 H at delivery.

Fig. 5-1: Configuration of the base address at delivery



When you set the base address to 0300H the configuration is the following:
- Port 1: 0300H to 0307H
- Port 2: 0308H to 030FH
- Port 3: 0310H to 0317H
- Port 4: 0318H to 031FH

WARNING!
If the base address set is wrong, the board and/or the PC may be seriously damaged.

- Make sure**, that the base address is free.**
- **Check if the address range required by the board is not already used by the PC or by boards already installed in the PC.**

Windows NT

To check it open the window under Start/Programs/Administrative tools (common)/Windows NT diagnostics. Click on "I/O Port".

Windows XP/2000/98

To check it start the device manager under Start/Settings/Control Panel/ System/Hardware. Set the view to "resources by type".

If the set base address and the required address range for the board are not displayed, they are then free. If they are already occupied by another device, you have to set a new base address through the block of DIP switches of the board.

Setting a new base address

You can select another base address as the one set at delivery.

The following calculation helps you finding the correct setting for the wished base address.

Base address is written as follows: 0**XY**0H

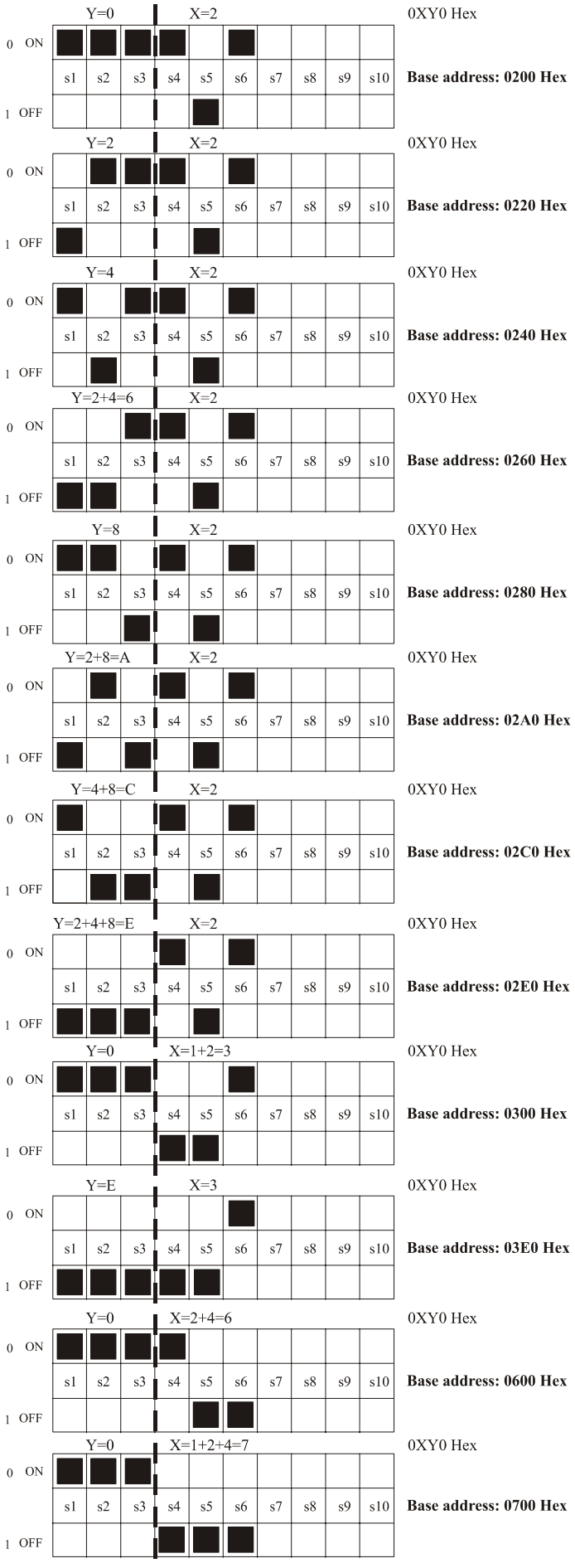
Each switch can have 2 different switching states:
1: OFF
0: ON

X = W_{s6}[1] x 4 + W_{s5} x 2 + W_{s4} x 1
Y = W_{s3} x 4 + W_{s2} x 2 + W_{s1} x 1

The following base addresses can be set through the block of DIP switches.

[1] W_{s6} = Switching state of the switch s6, either 0 or 1.

Fig. 5-2: Possible configurations of the base address



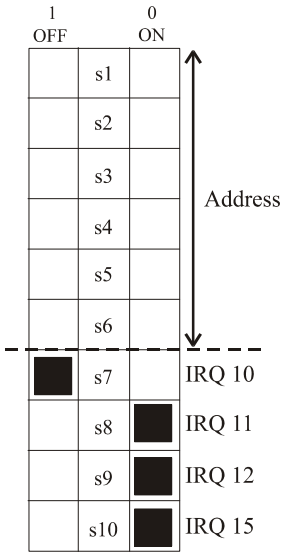
5.1.2 Setting the IRQ line

The selection of the interrupt line is made through the DIP switches s7 to s10.

IMPORTANT!
The configuration through DIP switches sets the interrupt of all serial ports on the same interrupt line (only IRQ10, IRQ11, IRQ12 and IRQ15 are available).

The set interrupt line is IRQ10 at delivery (switch s7 set to OFF, See Fig. 3-1).

Fig. 5-3: Configuration of the interrupt line



IRQ10, IRQ11, IRQ12 and IRQ15 are shareable; you can configure more than one PA 7500 board to the same interrupt line.

5.1.3 Registers of the serial port and common interrupt

Table 5-1: Registers of the serial ports

Base Address	IORD	IOWR
Base Address + 0	receive Buffer	Transmit register
Base Address + 1	Interrupt enable register	
Base Address + 2	Interrupt identification register	FIFO control
Base Address + 3	Line control register	
Base Address + 4	Modem control register	
Base Address + 5	Line status register	
Base Address + 6	Modem status register	
Base Address + 7	common interrupt identification register	Scratch register

Base address: first address of each address port.

There is an additional status register for identification of the common interrupt source located on each serial port address.

Table 5-2: Identification register of the common interrupt

	D7	D6	D5	D4	D3	D2	D1	D0
common interrupt identification register	1	1	1	1	Port 4	Port 3	Port 2	Port 1

Data bits from 7 to 4 are always “1“.
Port x = „1“ Port x has an interrupt enabled (x = 4 ... 1).
Port x = „0“ Port x has no interrupt enabled (x = 4 ... 1).

5.2 Mode 2: Plug & Play Mode

In the first mode (configuration through DIP switches), only the XT interrupt lines are available.

The mode 2 allows setting further IRQ lines as single or common interrupt.

♦ **To use the PA 7500 in Plug & Play Mode, set all DIP switches to "0" (on).**

♦ **Insert the board (see chapter 6) and start the PC again.**

5.2.1 Setting the base address in Plug & Play mode

Under Windows XP/2000, the base address is automatically set by the BIOS.

Under Windows NT the Plug & Play Mode is configured through the ADDIREG registration program. Click on "Insert" and select the PA 7500P&P.

5.2.2 Single interrupt in Plug & Play Mode

IMPORTANT!
For the Plug & Play mode 4 interrupt lines are to be free if the board has to be run with single interrupts.

The single interrupt is automatically set by the Plug & Play BIOS or operating system for each serial port.

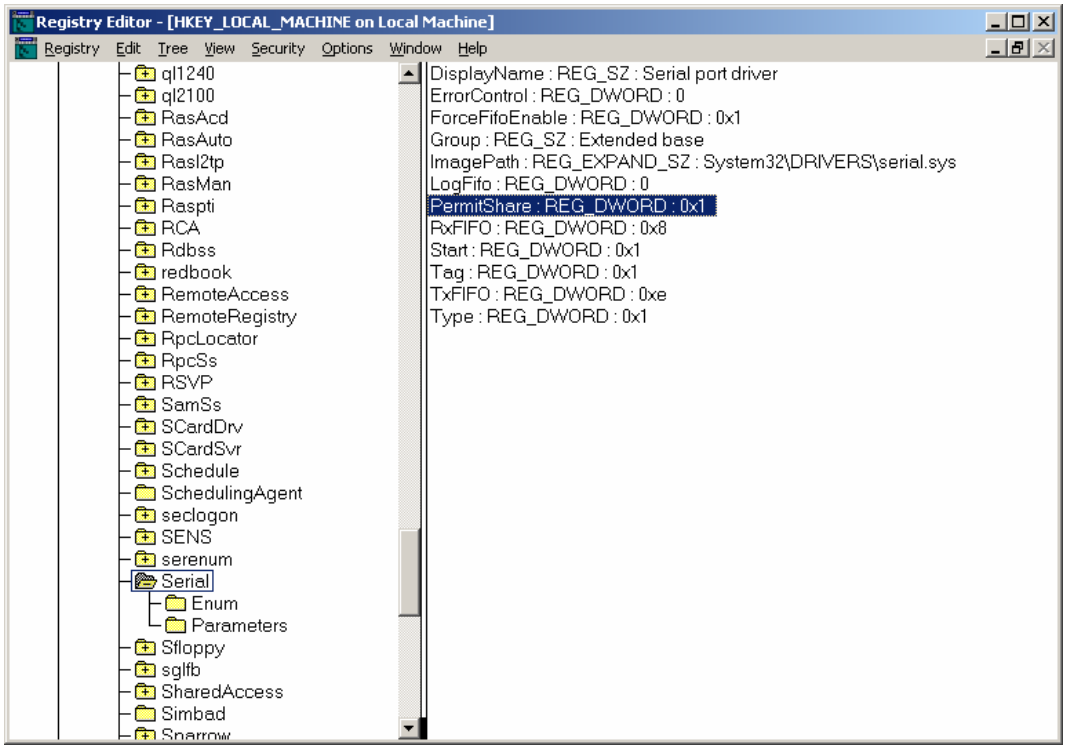
5.2.3 Common interrupt in Plug & Play mode under Windows XP/2000

IMPORTANT!
This function is only available for Windows XP/2000.

♦ **Under Start/run" start "regedt32".**

♦ **In the window "HKEY Local Machine" under "SYSTEM\CurrentControlSet\Services\Serial", set the "PermitShare" to "1" by double click.**

Fig. 5-4: COM setting in regedt32



Through this command, the common interrupt function is set for the board.

Follow the instructions below and repeat them for each port of the board (COM1 to COM4).

♦ **Start the device manager of your operating system under "Start/ /Settings/Control Panel/System/Hardware/Device Manager.**

The different COM of the board are displayed in "Communication ports".

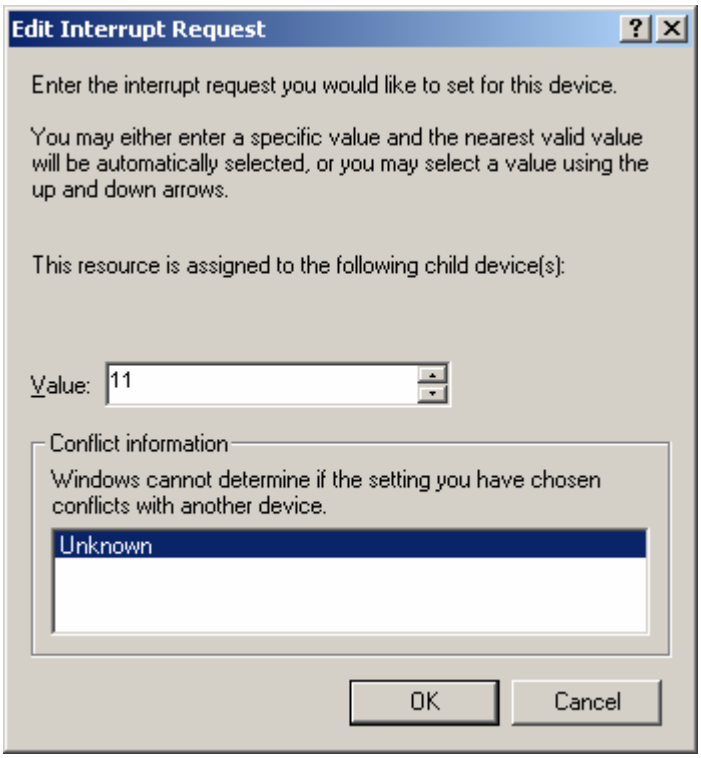
♦ **Select the first port of the board.**

The COM properties are displayed by clicking twice or with the right mouse click

♦ **In the "resources" tab deactivate "Use automatic settings".**

♦ **Note the set IRQ line for the COM 1.**

Fig. 5-5 : Display of the set IRQ



Carry out the following steps for the 3 other ports.

- **In the "resources" tab deactivate "Use automatic settings".**
- **Select: Settings based on "Basic configuration 0001"**
- **Set the same interrupt line as for the first port.**
- **Confirm all modifications which the device manager noticed.**
- **Start the PC again.**

6 INSTALLATION OF THE BOARD

IMPORTANT!
Do observe the safety precautions (yellow leaflet)!

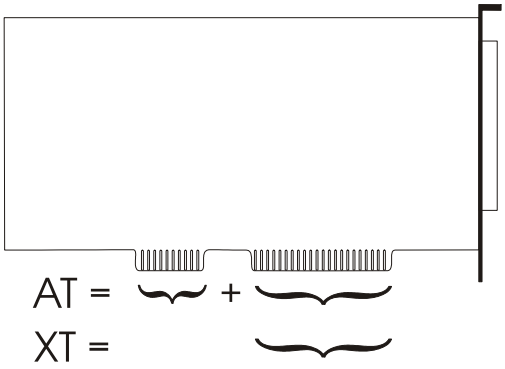
6.1 Opening the PC

- **Switch off your PC and all the units connected to the PC**
- **Pull the PC mains plug from the socket.**
- **Open your PC as described in the manual of the PC manufacturer.**

6.2 Selecting a free slot

Insert the board in a free ISA slot.

Fig. 6-1: ISA slot



Remove the back cover of the selected slot according to the instructions of the PC manufacturer. Keep the back cover. You will need it if you remove the board

Discharge yourself from electrostatic charges.

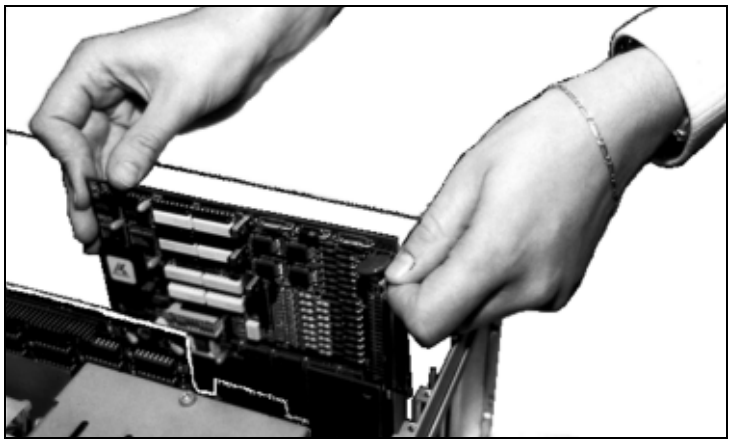
Take the board out of its protective blister pack.

Fig. 6-2: Opening the blister pack

6.3 Plugging the board into the slot

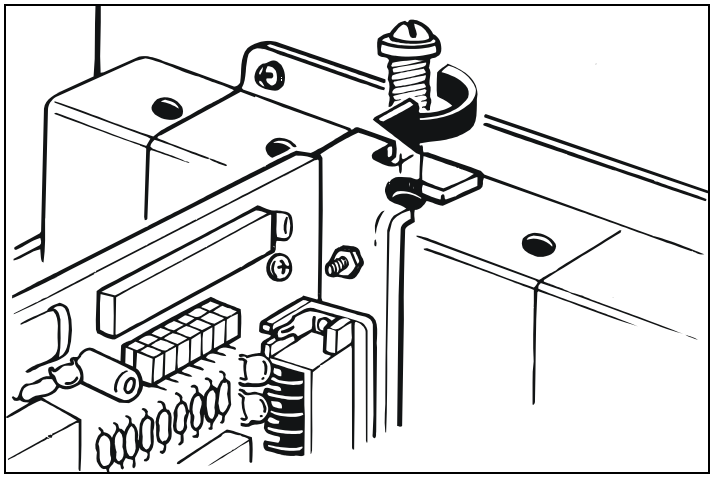
♦ Insert the board **vertically into the chosen slot.**

Fig. 6-3: Inserting the board



♦ Fasten the board **to the rear of the PC housing with the screw which was fixed on the back cover.**

Fig. 6-4: Fastening the board at the back cover



♦ **Tighten all the loosen screws.**

6.4 Closing the PC

♦ **Close your PC as described in the manual of the PC manufacturer.**

7 SOFTWARE

In this chapter you will find a description of the delivered software and its possible applications.

IMPORTANT!
Further information for installing and uninstalling the different drivers is to be found in the delivered description **"Installation instructions for the ISA bus".**

A link to the corresponding PDF file is available in the navigation pane (Bookmarks) of Acrobat Reader.

The board is supplied with a driver CD-ROM (CD 1) containing:
- ADDICOM programming samples with API function for the ADDI-DATA boards in 32 bits.
- ADDIREG for Windows NT 4.0

IMPORTANT!
If you run the board under Windows XP/2000/98, the ADDIREG configuration program shall not be used.

The device manager of Windows XP/2000/98 sets the configuration of the inserted board.

7.1 Configuration under Windows NT

IMPORTANT!
First insert the board to be registered, before you start ADDIREG.

If the board is not inserted in the PC, the registration cannot be tested.

When starting ADDIREG, the following window is displayed:

Fig. 7-1: ADDIREG registration program (example)

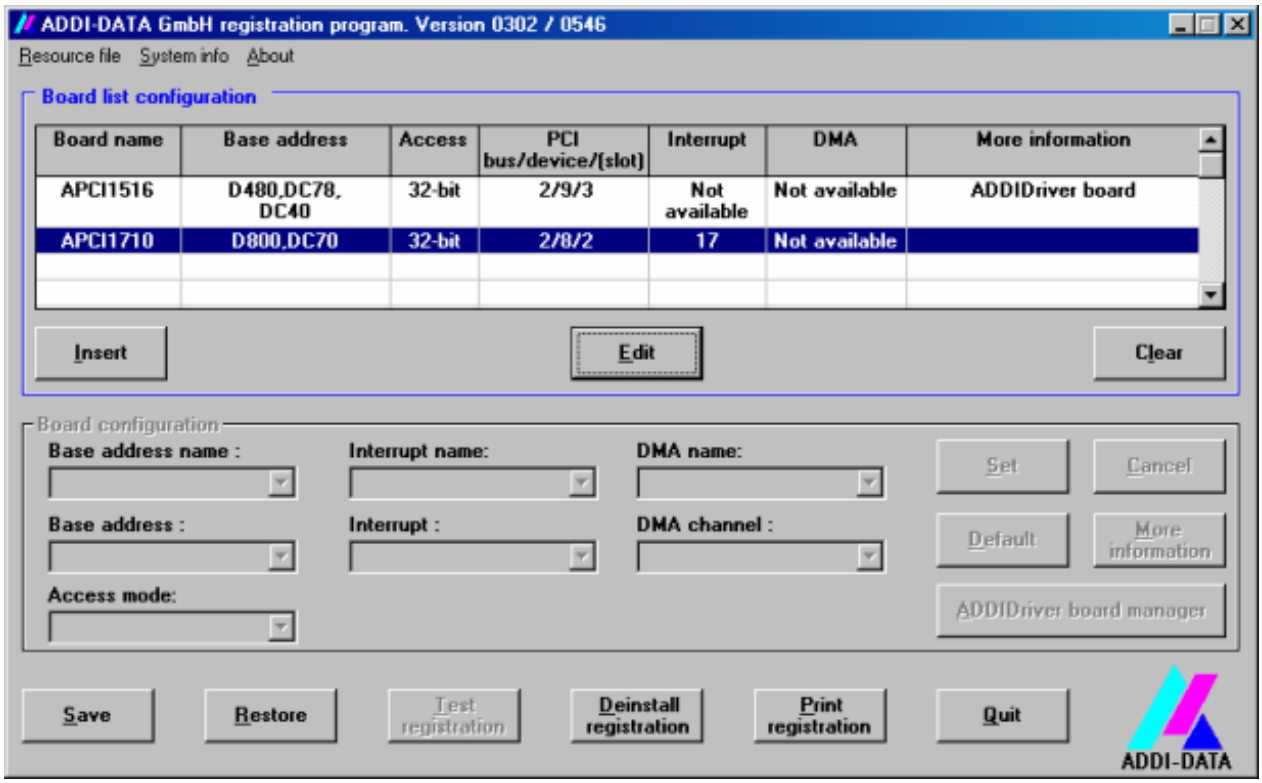


Table:

Board name:
Names of the different registered boards (e.g.: APCI-1710). When you start the program for the first time, no board is registered in this table.

Base address:
Selected base address of the board. For PCI boards the base address is allocated through BIOS.

Access:
Selection of the access mode for the ADDI-DATA digital boards.
Access in 8-bit or 16-bit or 32-bit mode.

PCI bus/device/(slot):
Number of the used PCI bus, slot, and device. If the board is no PCI board, the message "NO" is displayed.

Interrupt:
Used interrupt of the board. If the board supports no interrupt, the message "Not available" is displayed. **For PCI boards the interrupt is allocated through BIOS.**

DMA (ISA boards only):
Indicates the selected DMA channel or "Not available" if the board uses no DMA or if the board is no ISA board.

More information:
Additional information like the identifier string or the installed COM interfaces. It also displays whether the board is programmed with ADDIDRIVER or if a **PCI DMA** memory is allocated to the board.

Text boxes:

Base address name:
Description of the used base addresses for the board. Select a name through the pull-down menu. The corresponding address range is displayed in the field below (Base address).

Interrupt name:
Description of the used IRQ lines for the board. Select a name through the pull-down menu. The corresponding interrupt line is displayed in the field below (Interrupt).

DMA name (for ISA boards only):
When the board supports 2 DMA channels, you can select which DMA channel is to be changed.

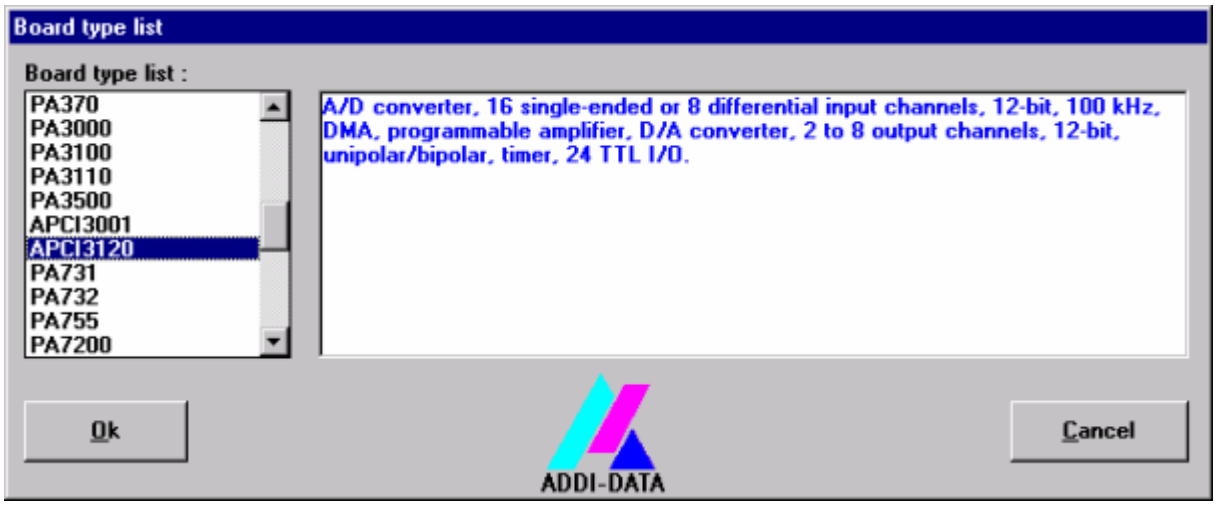
DMA channel (for ISA boards only):
Selection of the used DMA channel.

Buttons:

Edit:
Selection of the highlighted board with the different parameters set in the text boxes.

Insert:
When you want to insert a new board, click on "Insert". The following dialog window appears:

Fig. 7-2: Board list under ADDIREG



All boards you can register are listed on the left. Select the wished board. (The corresponding line is highlighted).
On the right you can read technical information about the board(s).
Activate with "OK"; You come back to the former screen.

Clear:
You can delete the registration of a board. Select the board to be deleted and click on "Clear".

Set:
Sets the parameterized board configuration. The configuration should be set before you save it.

Cancel:
Reactivates the former parameters of the saved configuration.

Default:
Sets the standard parameters of the board.

More information
You can change the board specific parameters like the identifier string, the COM number, the operating mode of a communication board, etc... (See 7.1.1)
If your board does not support these information, you cannot activate this button.

IMPORTANT!
The configuration is only set once you activated it with OK **and** confirm through "Set" and then "Save" in the main window of ADDIREG.

Save:
Saves the parameters and registers the board.

Restore:
Reactivates the previous parameters and registration.

Test registration:
Controls if there is a conflict between the board and other devices installed in the PC. A message indicates the parameter which has generated the conflict. If no conflict has occurred, "Test of device registration OK" is displayed.

Deinstall registration:
Deinstalls the registrations of all boards listed in the table and deletes the entries of the boards in the Windows Registry.

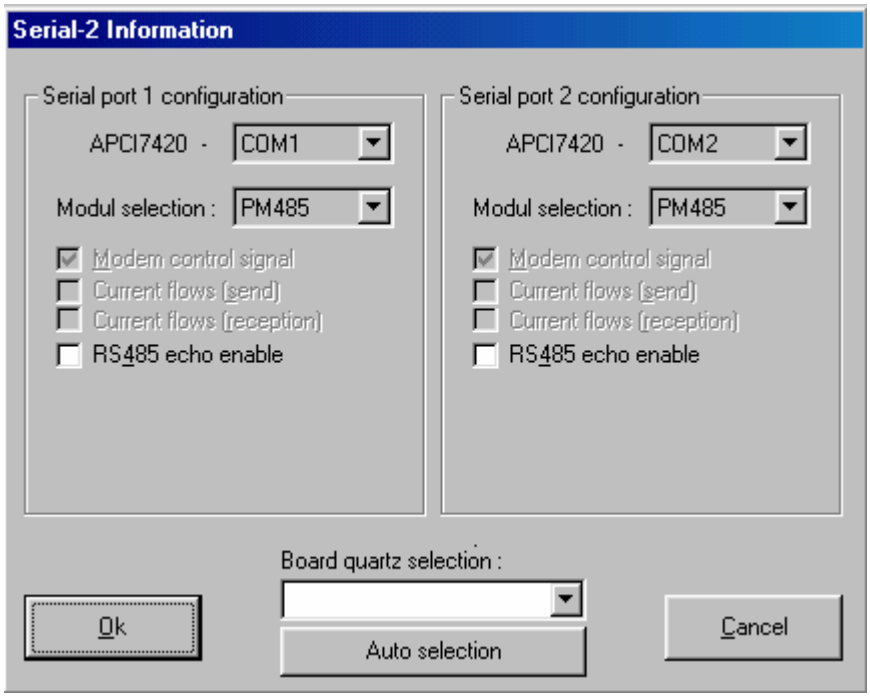
Print registration:
Prints the registration parameter on your standard printer.

Quit:
Ends the ADDIREG program.

7.1.1 "More information" dialog box for serial interfaces

The following figure is the example of 2 serial interfaces. If you use the standard driver for Windows, you can select the COM number.
Several options like "Module selection" and the different parameters can only be activated if the functions are available.

Fig. 7-3: Communication board



IMPORTANT!
You can change the quartz frequency only if you have required the option "Quartz modification" on your board.

In "Board quartz selection" you can adapt the quartz frequency (in Hz).
The ADDI-DATA boards are set with a standard quartz frequency of 1843200 Hz.

7.1.2 Registering a new board

IMPORTANT!
To register a new board, you must have administrator rights. Only an administrator is allowed to register a new board or change a registration.

♦ **Call up the ADDIREG program.**

The Fig. 7-1 is displayed on the screen.

♦ **Click on "Insert". Select the wished board.**

♦ **Click on "OK".**

The default address, interrupt and the other parameters are automatically set in the lower fields. The parameters are listed in the lower fields. If the parameters are not automatically set by the BIOS, you can change these parameters. Click on the wished scroll function(s) and choose a new value.

♦ **Activate your selection with click.**

♦ **Once the wished configuration is set, click on "Set".**

♦ **Save the configuration with "Save".**

You can test if the registration is "OK".
This test controls if the registration is right and if the board is present.
If the test has been successfully completed you can quit the ADDIREG program.
The board is initialised with the set parameters and can now be operated. In case the registration data is to be modified, it is necessary to boot your PC again.
A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

7.1.3 Changing the registration of a board

IMPORTANT!
To register a new board, you must have administrator rights. Only an administrator is allowed to register a new board or change a registration.

♦ **Call up the ADDIREG program.**

♦ **Select the board to be changed.**

The board parameters (Base address, DMA channel, ..) are listed in the lower fields.

♦ **Click on the parameter(s) you want to set and open the scroll function(s).**

♦ **Select a new value. Activate it with a click.**

♦ **Repeat the operation for each parameter to be modified.**

♦ **Once the wished configuration is set, click on "Set".**

♦ **Save the configuration with "Save".**

You can test if the registration is "OK". This test controls if the registration is right and if the board is present. If the test has been successfully completed you can quit the ADDIREG program.

The board is initialised with the set parameters and can now be operated. In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

Registration test

Under "Test registration" you can test if the registration is "OK".
This test controls if the registration is right and if the board is present. If the test has been successfully completed you can quit the ADDIREG program. The board is initialised with the set parameters and can now be operated.

In case the registration data is to be modified, it is necessary to boot your PC again. A message asks you to do so. When it is not necessary you can quit the ADDIREG program and directly begin with your application.

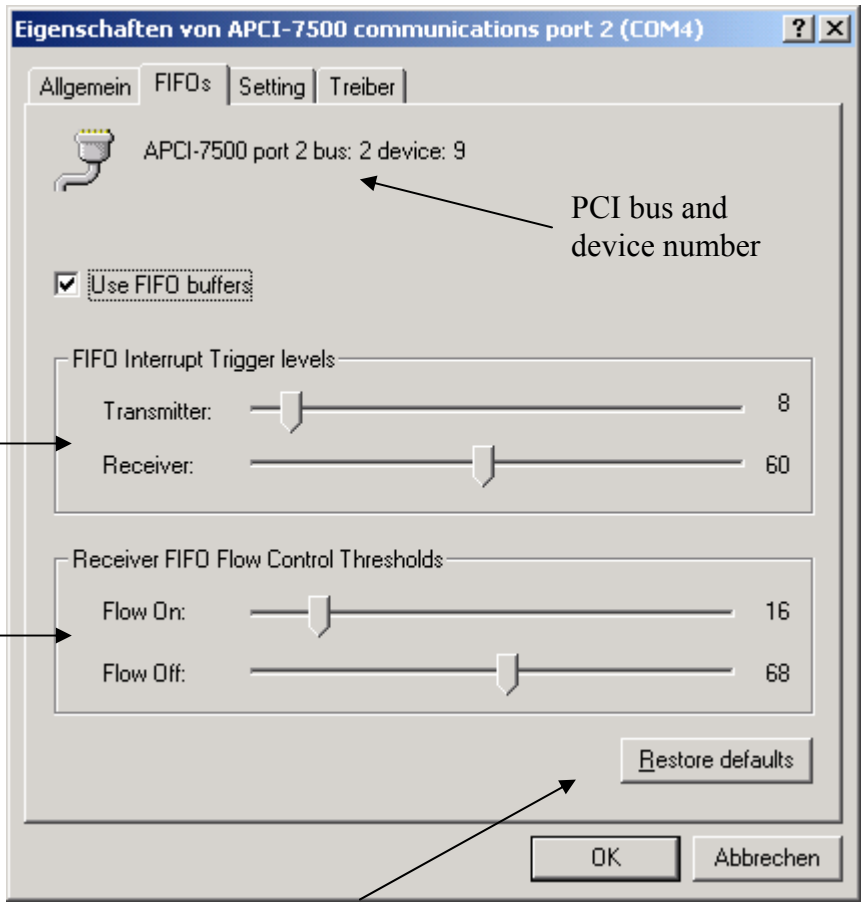
7.2 Configuration under Windows XP/2000/98

In the Windows device manager you can set the different interfaces according to your requirements through double click.

Start the device manager of your operating system under Start/(Settings)/Control panel/System

In the "FIFO" register the following settings are possible:

Fig. 7-4: FIFO settings with the Device Manager



Management of the transmitter and receiver buffer

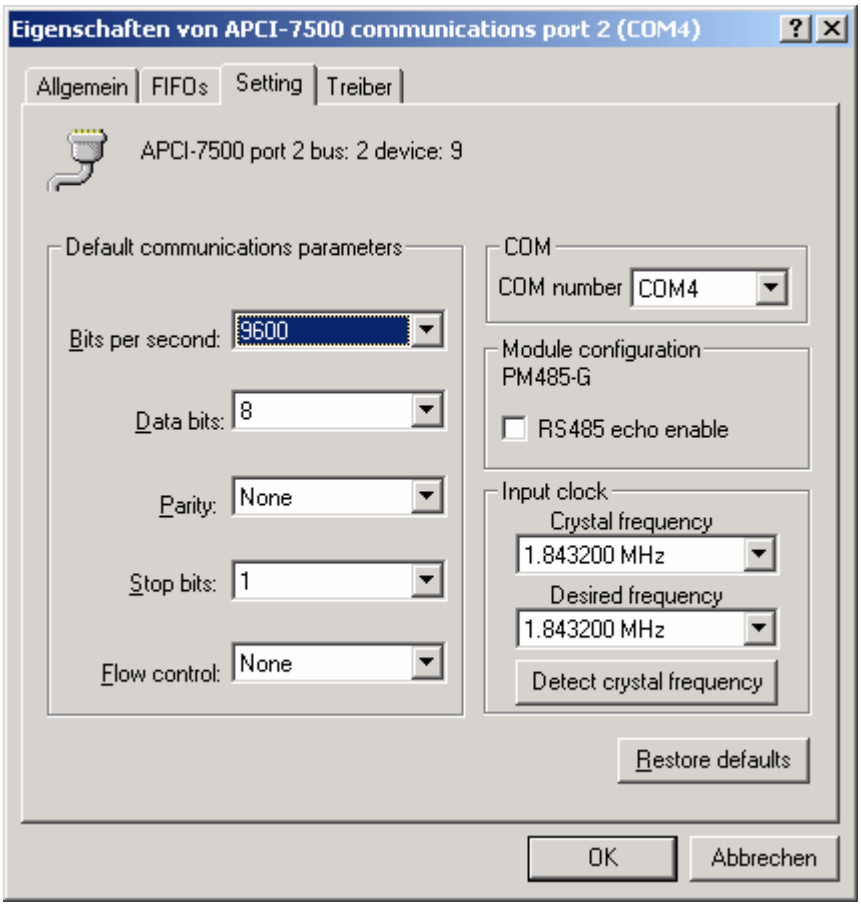
Data flow control

Reset the standard settings

In "Setting" you adapt the operating mode to the used interface.

You can select the quartz frequency for example and decide whether the modem control signals for RS232 are internally connected.

Fig. 7-5: Setting example with the Device Manager: RS485



7.3 Board test

You can test if you board is not correctly installed with a shorting plug and the test software MTTTY.

The setup file for the test software MTTTY is supplied on the CD-ROM under CD/MMTTY. The program is described in the chapter 9.

7.4 Questions and software downloads on the web

Do not hesitate to e-mail us your questions.
per e-mail: info@addi-data.de or
hotline@addi-data.de

Free downloads of standard software

You can download the latest version of the software for the board **PA 7500**

http://www.addi-data.de or
http://www.addi-data.com.

8 CONNECTING THE PERIPHERAL

8.1 Connector pin assignment

Fig. 8-1: 37-pin SUB-D male connector

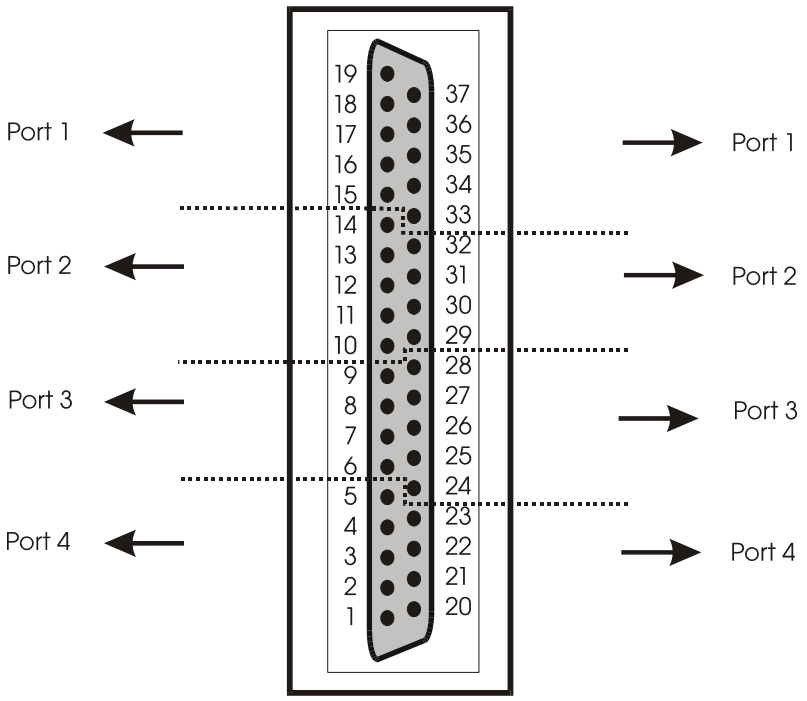


Table 8-1: Pin assignment of the 37-pin SUB-D connector

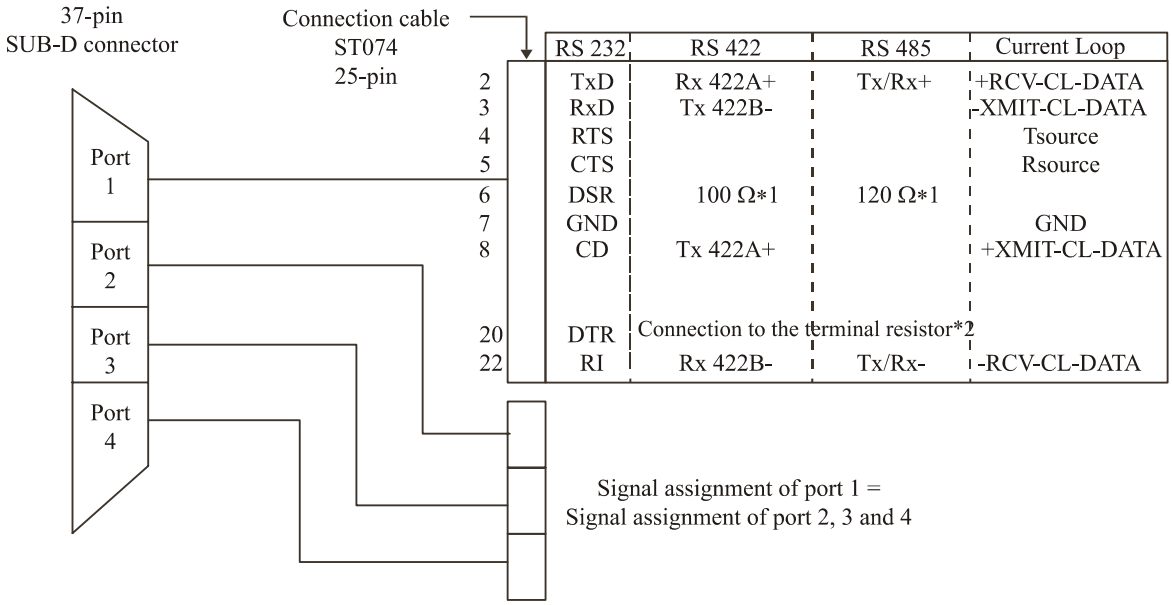
	RS232	Current Loop	RS422	RS485	Pin	Pin	RS485	RS 422	Current Loop	RS232
					19	37	GND	GND	GND	GND
	RI	-RCV-CL-DATA	RB	Tx/Rx-	18	36	Rab (1)			DTR
Port 4	CTS	Rsource			17	35	Tx/Rx+	RA	+RCV-CL-DATA	TxD
	RTS	Tsource			16	34		TB	-XMIT-CL-DATA	RxD
	DSR		100 Ω	120 Ω	15	33		TA	+XMIT-CL-DATA	CD
	GND	GND	GND	GND	14	32	Tx/Rx-	RB	-RCV-CL-DATA	RI
	DTR		Rab (1)		13	31			Rsource	CTS
Port 3	TxD	+RCV-CL-DATA	RA	Tx/Rx+	12	30			Tsource	RTS
	RxD	-XMIT-CL-DATA	TB		11	29	120 Ω	100 Ω		DSR
	CD	+XMIT-CL-DATA	TA		10	28	GND	GND	GND	GND
	RI	-RCV-CL-DATA	RB	Tx/Rx-	9	27	Rab (1)			DTR
	CTS	Rsource			8	26	Tx/Rx+	RA	+RCV-CL-DATA	TxD
Port 2	RTS	Tsource			7	25		TB	-XMIT-CL-DATA	RxD
	DSR		100 Ω	120 Ω	6	24		TA	+XMIT-CL-DATA	CD
	GND	GND	GND	GND	5	23	Tx/Rx-	RB	-RCV-CL-DATA	RI
	DTR		Rab (1)		4	22			Rsource	CTS
Port 1	TxD	+RCV-CL-DATA	RA	Tx/Rx+	3	21			Tsource	RTS
	RxD	-XMIT-CL-DATA	TB		2	20	120 Ω	100 Ω		DSR
	CD	+XMIT-CL-DATA	TA		1					

TA: Tx422+ RA: Rx422+
TB: Tx422- RB: Rx422-

IA: CTS+ CA: RTS+
IB: CTS- CB: RTS-

8.2 Connection cables

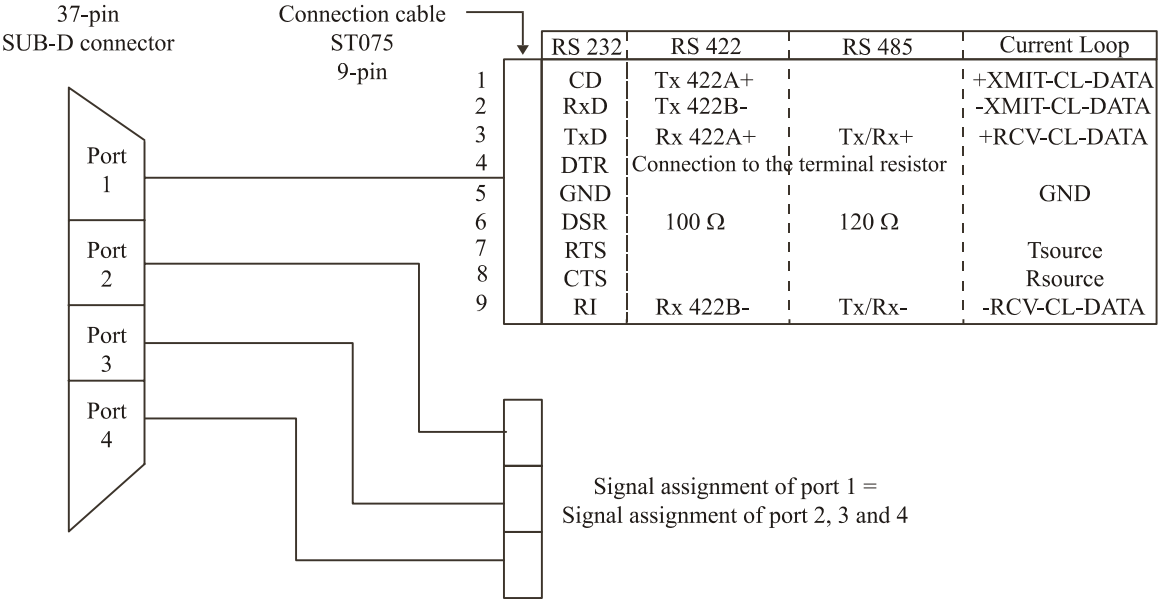
Fig. 8-2: Connection cable ST074



* 1 Resistor integrated on the SI module

* 2 Cable connection to 100 Ω / 120 Ω terminates the RS 422 / 485 lines with 100 Ω/ 120 Ω resistor.

Fig. 8-3: Connection cable ST075



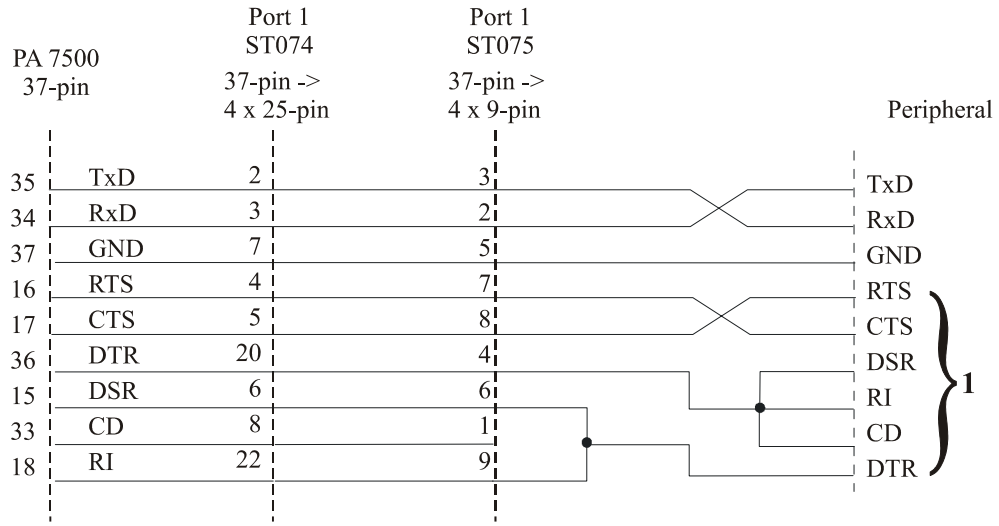
* 1 Resistor integrated on the SI module

* 2 Cable connection to 100 Ω / 120 Ω terminates the RS 422 / 485 lines with 100 Ω/ 120 Ω resistor.

8.3 Connection examples

8.3.1 RS232 cabling

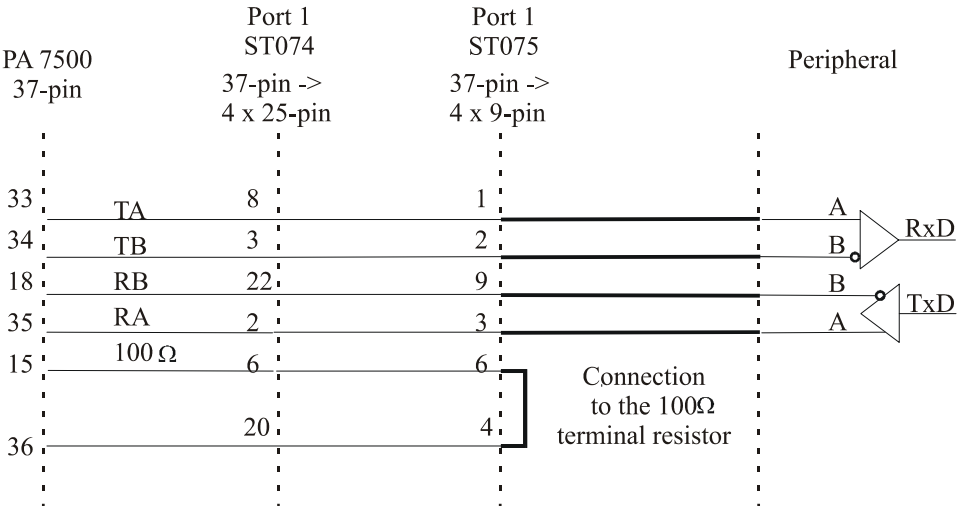
Fig. 8-4: RS232 cabling



1 If the modem control signals are not used, they must be either connected on the board (settings through ADDIREG) or externally driven to the connector via solder bridge.

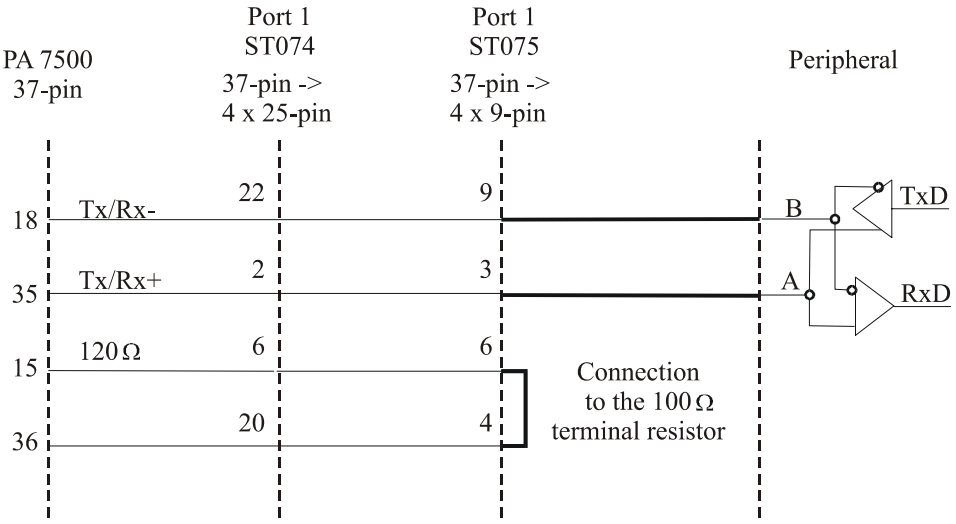
8.3.2 RS422 cabling

Fig. 8-5: RS422 cabling



8.3.3 RS485 cabling

Fig. 8-6: RS485 cabling



8.3.4 20 mA Current Loop cabling

Active / passive : When a transmitter and a receiver communicate, one of them has to supply the necessary current. If the transmitter supplies the current, it is active. The receiver is passive. In reverse, if the receiver supplies the current, it is active.

Fig. 8-7: active reception, active transmission

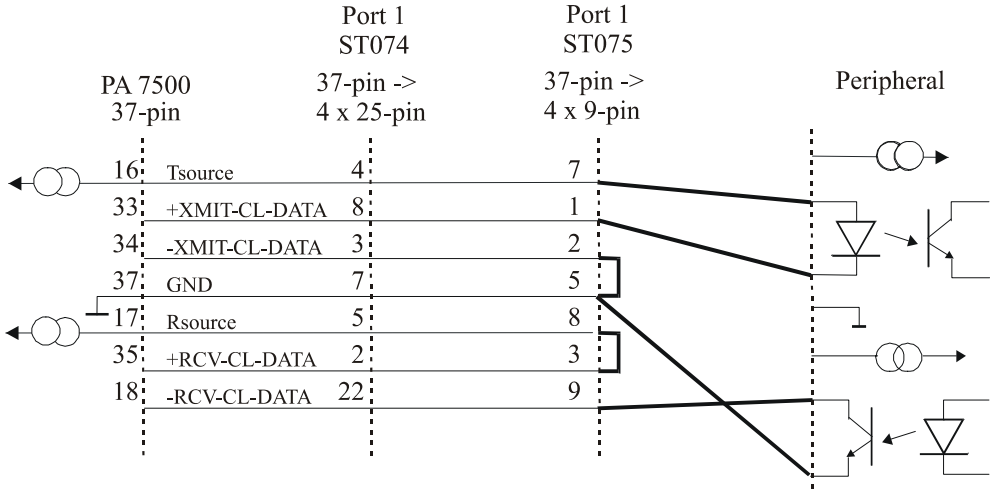


Fig. 8-8: active reception, passive transmission

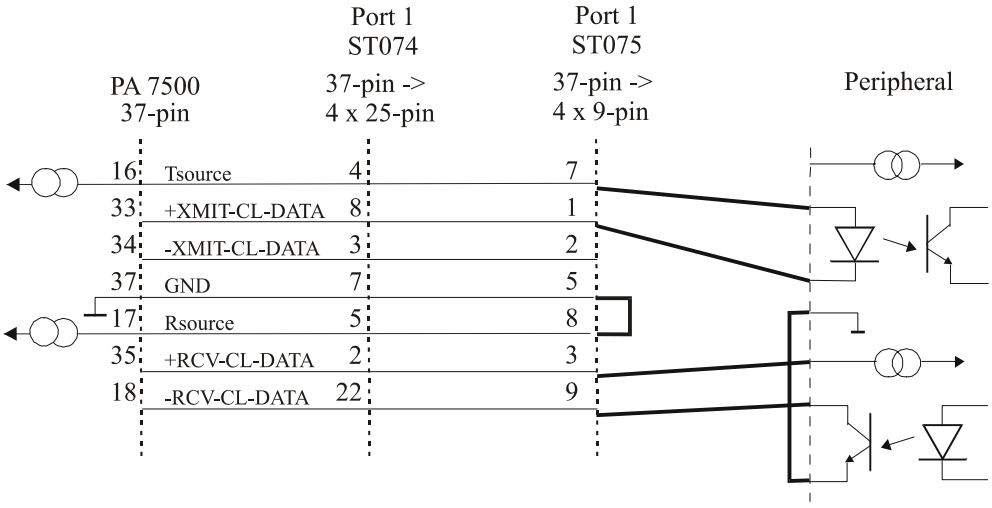


Fig. 8-9: passive reception, active transmission

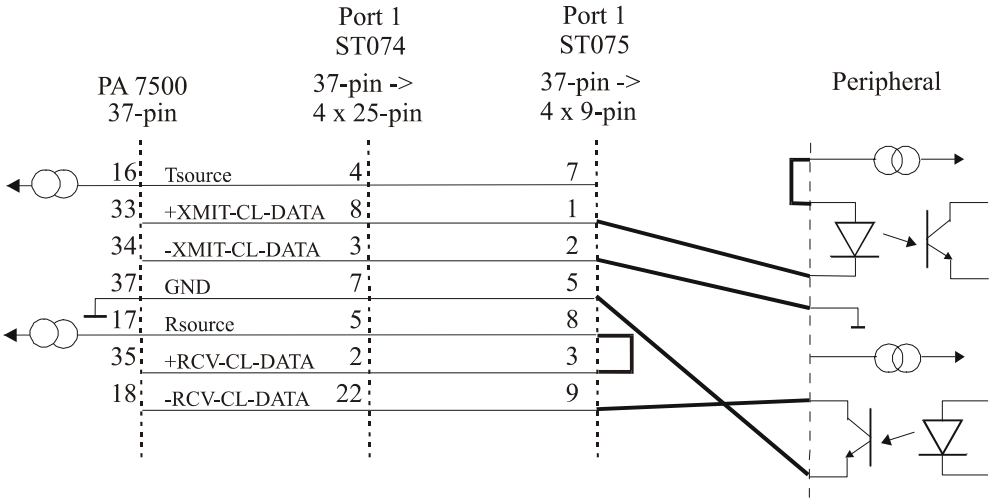
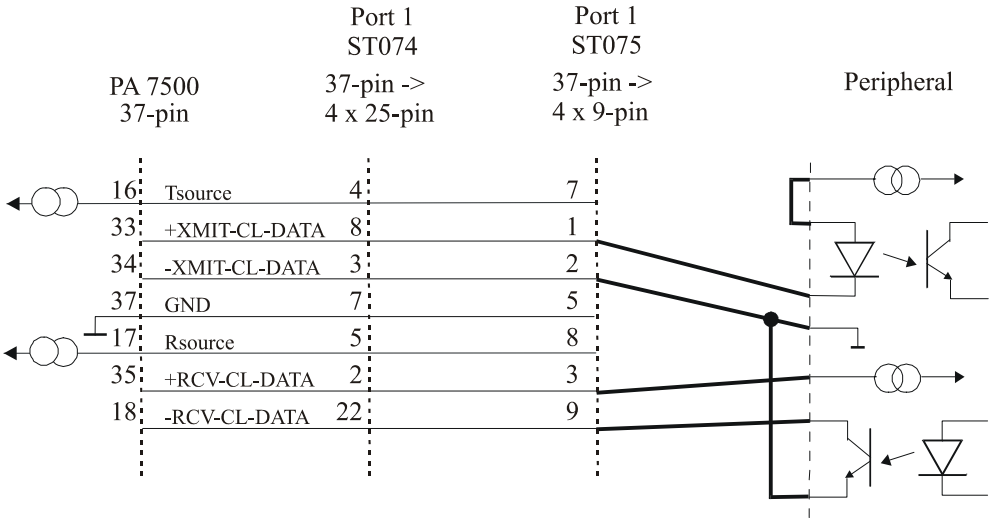


Fig. 8-10: passive reception, passive transmission



9 TESTING THE BOARD

9.1 Connecting a shorting plug

When using the shorting plug described below and the test program **MTTTY** you can carry out a self-test on the board.

Please note the signal connection of the different ports through the 9-pin shorting plug for the test.

Fig. 9-1: Connection of the shorting plug for the RS232 mode

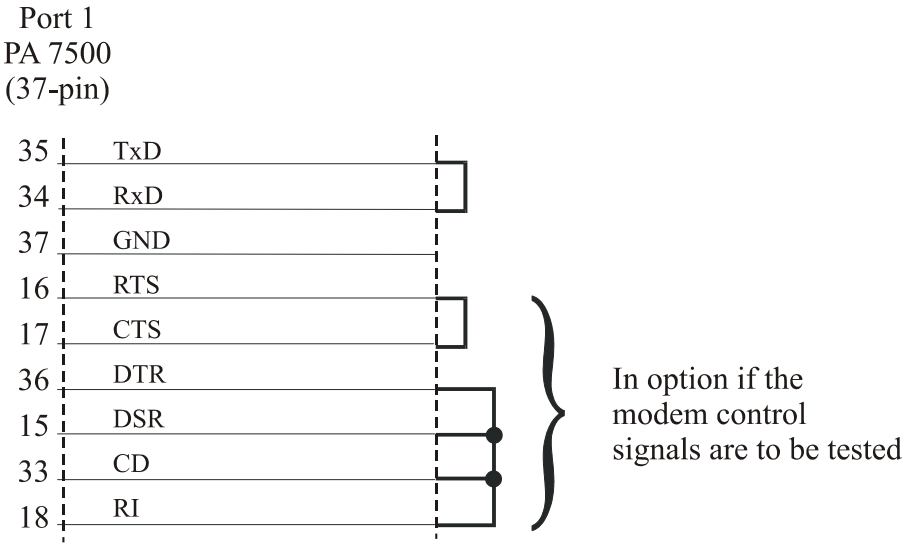


Fig. 9-2: Connection of the shorting plug for the RS422 mode

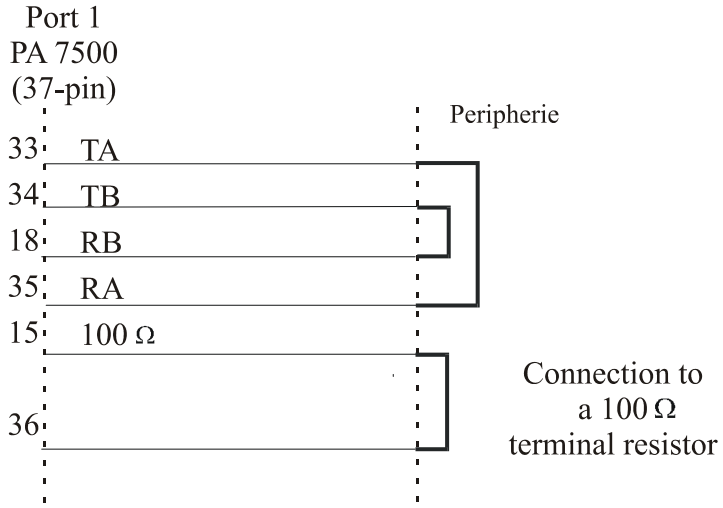


Fig. 9-3: Connection of the shorting plug for the 20 mA current loop active transmission/passive reception

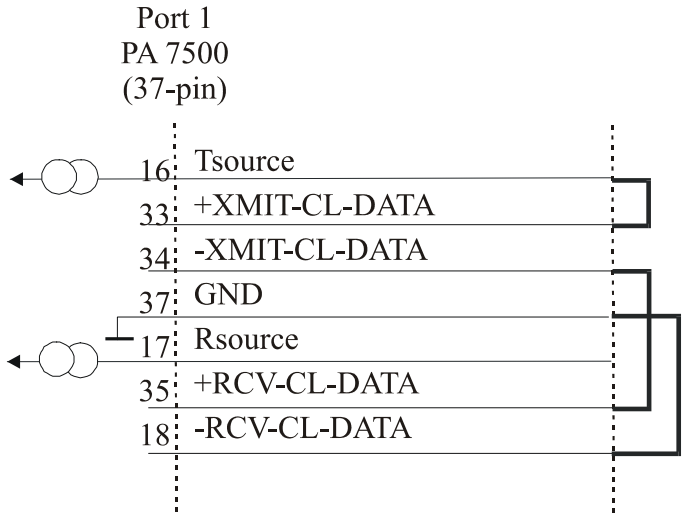
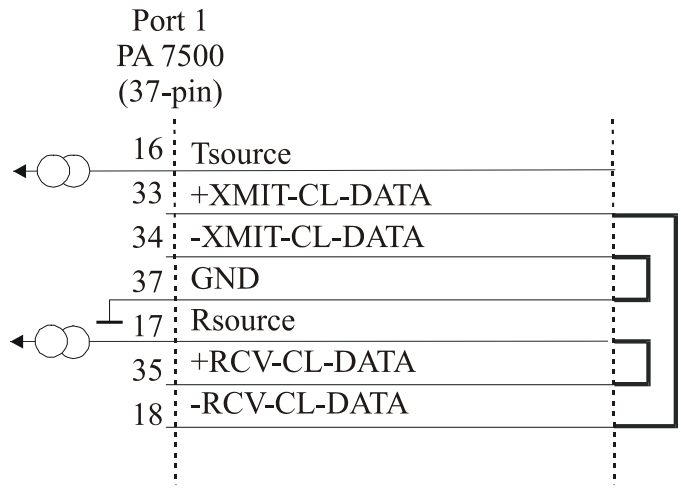


Fig. 9-4: Connection of the shorting plug for the 20 mA current loop passive transmission/ active reception



9.2 Testing the board with the MTTTY program

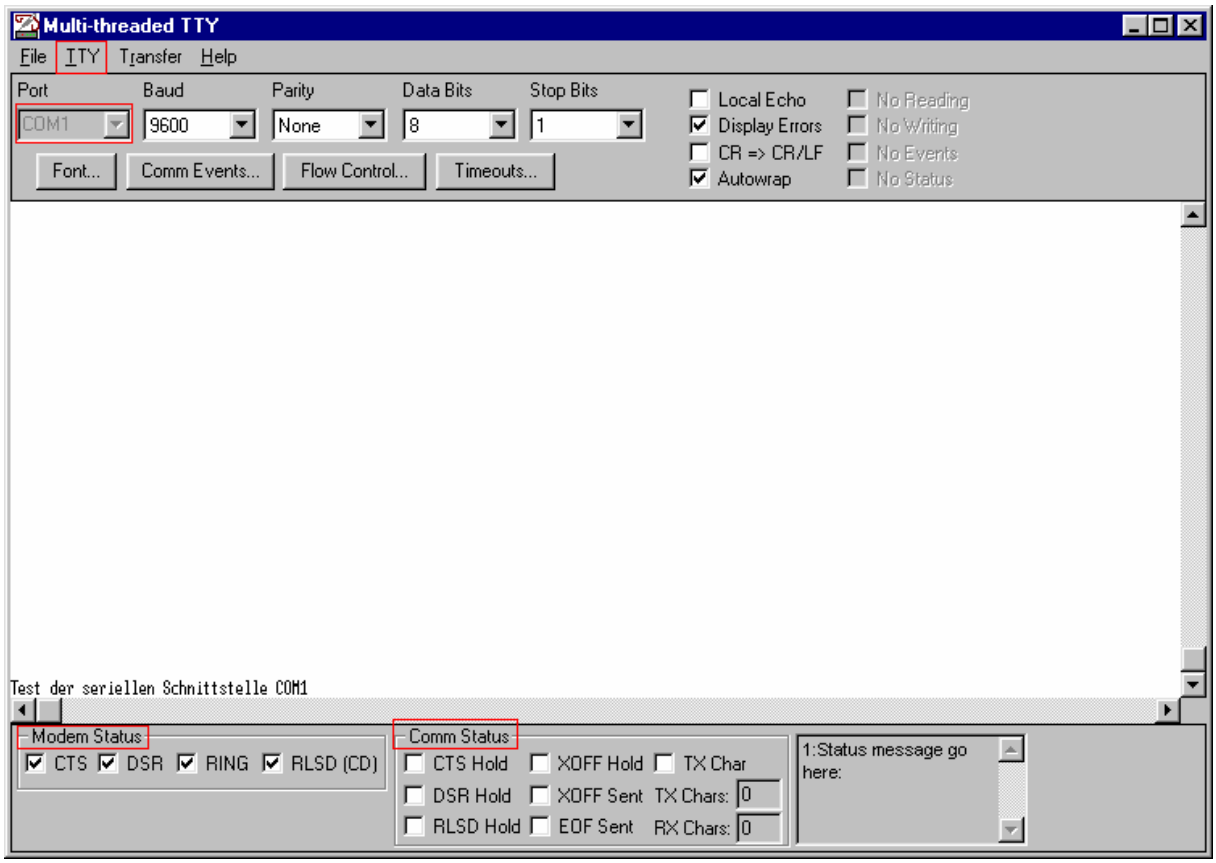
RS422, RS232 and 20 mA Current Loop

♦ **Install the program on your PC.**

The program is delivered on the ADDI-DATA driver CD-ROM CD1. Under CD/MTTTY start the setup.exe file.

The following windows opens.

Fig. 9-5: The MTTTY program



♦ **Select the right COM interface under "Port".**

♦ **Connect it with "File/Connect".**

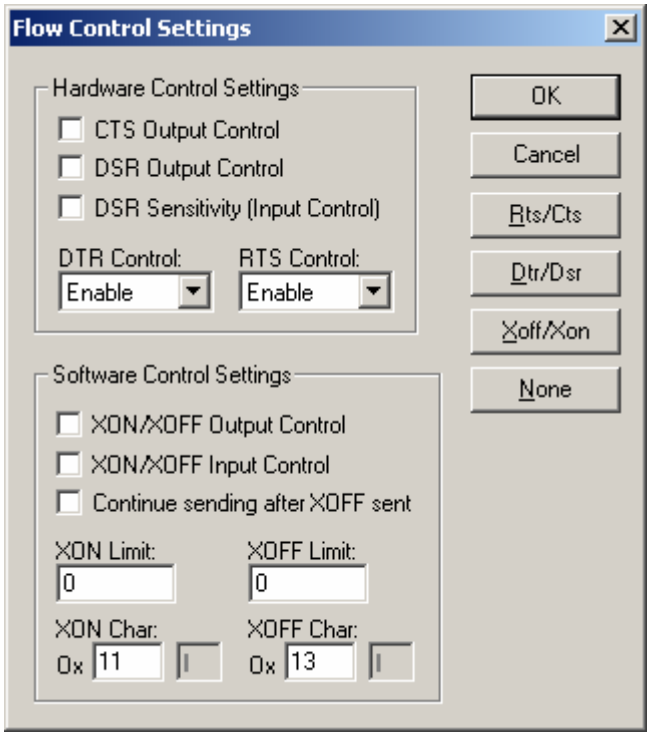
If the shorting plug is connected, each key stroke (= Data transmission) must result in the corresponding key character displayed on the screen (= Data reception). If the test is successfully carried out, the board works.

Once the port is initialised the state of the "Modem Control Signals" can be read in ***Modem Status***. If the RTS signal is set, the CTS state is displayed under Modem Status. For DTR the 3 other fields are set.

In the above menu under "TTY/Flow Control" you can configure the Handshake of the Modem Control Signals according to your application (See figure below). The settings are displayed in the field "Comm Status".

The field at the bottom right of the main window is a text field for error or state indication messages.

Fig. 9-6: Handshake configuration for the board test



RS485

IMPORTANT!
For testing the RS485 mode, the shorting plug is not used.

This operating mode must be first set through ADDIREG or in the Device Manager of Windows 2000.

♦ **In the ADDIREG main window click on "More Information".**

The window for the communication board (See Fig. 7-4) is displayed.

♦ **Select "RS485 ECHO enable" for the required COM and click on OK.**

♦ **In main windows confirm the configuration with "Set" and "Save".**
or
♦ **In Device Manager of Windows 2000 select "RS485 ECHO enable" in the "Setting register" and confirm with "OK".**

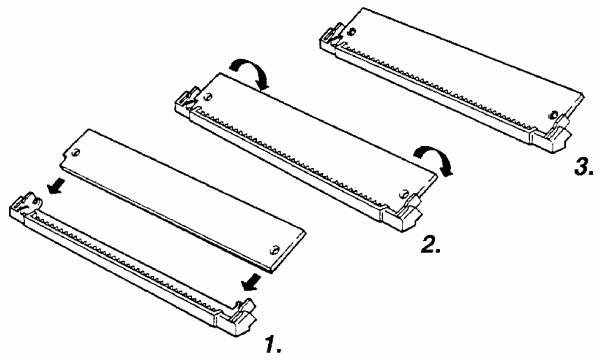
Start MTTTY and test through key stroke if the interface works correctly.

10 REPLACING THE SI MODULES

IMPORTANT!
We advise you to send us the board if a module is to be replaced.

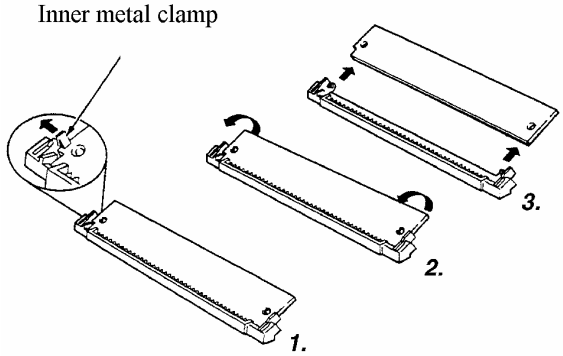
If you wish to effect the replacement yourself, consider the following:
- Observe the possible combinations according to the intended purpose of the board.
- Do observe the *Security advises.*
- Insert/remove the module carefully according to the following illustrations.

Fig. 10-1: Inserting the SI module



1. Hold the SI-module so that its connector is directed toward the guide rail in the centre of the socket.
2. Pull the SI-module downward until it clicks in place.
3. The SI-module is installed on the board. If the module is not properly installed, take it out and install it again.

Fig. 10-2: Removing a SI module



4. Bend the inner metal clamp carefully apart, until the SI-module can be removed from the socket.

5. Remove the SI-module from the socket.