PCL-846/847

4-Port RS-422/485
Interface Card

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Contents

CHAPTER 1

Introduction

Description

PCL-846/847 series cards provide four independent RS-422/485 serial ports on a card. Each port has a 16C550 UART with an on-chip 16-byte FIFO buffer for reliable, high-speed serial I/O. The UART buffers data into 16-byte packets before putting it on the bus. This drastically reduces the CPU load and avoids data loss when the system is busy and cannot process the interrupt quickly. The UART is especially useful for high speed serial I/O under Windows.

PCL-846 cards differ from PCL-847 cards in that they utilize on-board optical isolators to protect your PC and equipment against damage from ground loops, increasing system reliability in harsh environments. To further increase reliability, PCL-846B/847B cards include surge protection technology, protecting your system from abrupt high voltage surges (up to 2000 V). The PCL-846/847 series has passed the CE test for environmental specifications.

An RS-485 Network with Automatic Data Flow Control Using RS-232 Software

The RS-485 mode automatically senses the direction of incoming data and switches its transmission direction accordingly. This feature means your network looks and acts just like an RS-232 network. Application software written for half duplex RS-232 can be used without modification. Moreover, you can simply and quickly build an RS-485 network with just two wires.

Features

- Four independent RS-422/RS-485 serial ports
- Transmission speeds up to 921.6 Kbps
- Shared/Independent IRQ settings between each of the 4 serial ports
- Wide IRQ selection: 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
- Supports standard DOS COM1, COM2, COM3, and COM4
- Supports DOS/Windows 3.1 (PC-ComLIB), Windows 95, Windows NT (ICOM Utility)
- Provides 1000 V_{DC} isolation (PCL-846A/846B only)

- Provides 2000 V_{DC} surge protection (PCL-846B/847B)
- Space reserved for termination resistors
- Supports 2 wire or 4 wire operation
- Supports Tx, Rx, RTS, and CTS signals
- Automatic RS-485 data flow control or RTS control
- RS-422 on Auto/RTS/On mode

Specifications

- **Ports**: 4
- **UART**: 4 x 16C550 with 16-byte FIFO
- **Speed**: 50 ~ 921.6 Kbps
- **Parity**: none, even, odd
- **Signal support**:
  TxD+, TxD-, RxD+, RxD-, CTS+, CTS-, RTS+, RTS- and GND
- **I/O address:** From 200H to 3F8H
- **IRQ**: 3, 4, 5, 6, 7, 9, 10, 11, 12 or 15
- **Isolation voltage**: 1000 V_{DC} (PCL-846A/846B only)
- **Surge protection**: 2000 V_{DC} (PCL-846B/847B)
- **Power consumption**: PCL-847; +5 V @ 460 mA typical, 570 mA max.
  PCL-846; +5 V @ 970 mA typical, 1200 mA max.
- **Cables**: 30-cm male DB-37 to four male DB-9 (DTE)
- **Operating temperature**: 0 ~ 60° C (32 ~ 140° F) (refer to IEC-68-1.2.3)
- **Storage temperature**: -25 ~ 80° C (-13 ~ 176° F)
- **Dimensions**: 185 mm x 100 mm (7.3" x 3.9")
- **MTBF**: PCL-847A → 126630 hrs at 25° C Ground, Fixed environment
  PCL-847B → 120992 hrs at 25° C Ground, Fixed environment
  PCL-846A → 105014 hrs at 25° C Ground, Fixed environment
  PCL-846B → 101107 hrs at 25° C Ground, Fixed environment
- For technical support and service please visit our support website at
  http://support.advantech.com
  and visit the "Industrial Automation Support" and "FAQ" sections.

Card Jumper Layout

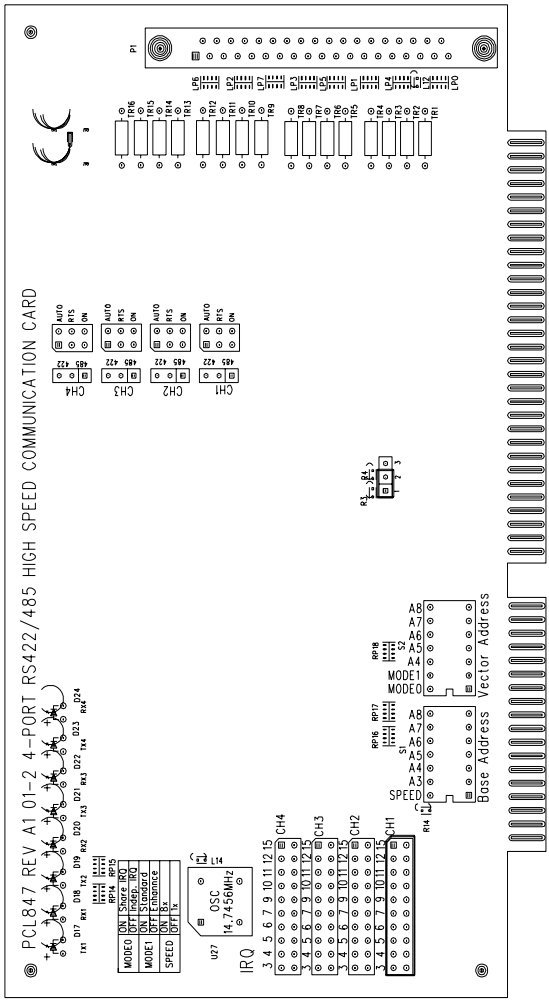


Figure 1-1: PCL-847 switch and jumper layout

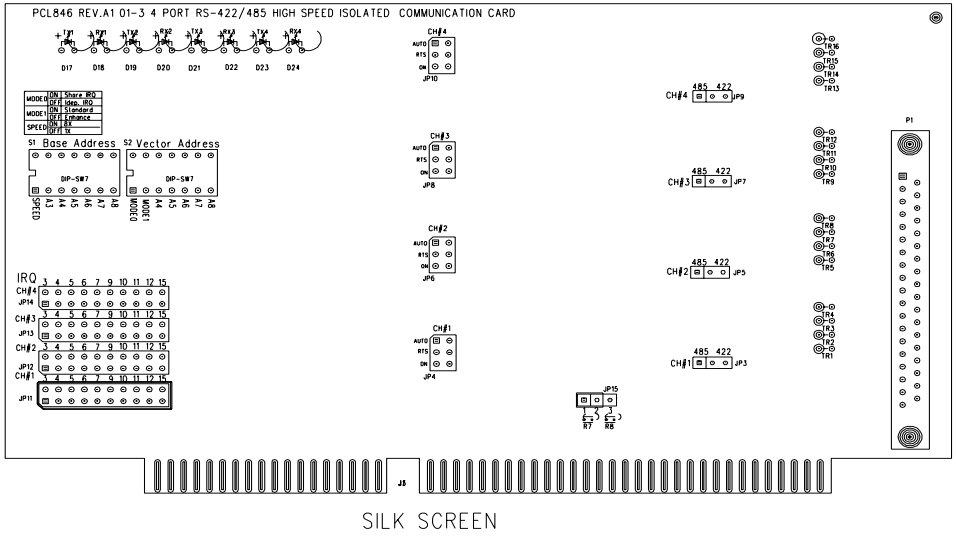


Figure 1-2: PCL-846 switch and jumper layout

CHAPTER 2

Hardware Installation

Initial Inspection

Depending on the option you ordered, in addition to this manual, you should find the following items inside the shipping container:

- PCL-846(A/B) or 847(A/B) 4-port RS-422/485 card
- One 30-cm male DB-37 to four male DB-9 cable
- One diskette with PCLS-802 PC-ComLIB software
- One PC-ComLIB user's manual
- One diskette with Windows 95/98/NT drivers (Icom Utility)
- PCL-846/847 manual

We have carefully inspected the PCL-846/847 mechanically and electrically before shipping. It should be free of marks and scratches and in perfect working order on receipt.

As you unpack the PCL-846/847, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or it fails to meet specifications, notify our service department or your local sales representative immediately. Also notify the carrier. Retain the shipping carton and packing material for inspection by the carrier. After inspection we will make arrangements to repair or replace the unit.

Remove the PCL-846/847 from its protective packaging by grasping the rear metal panel. Keep the anti-vibration packing. Whenever you remove the card from the PC, store it in this package for protection.

Warning! *Discharge your body's static electric charge by touching the back of the grounded chassis of the system unit (metal) before handling the board. You should avoid contact with materials that hold a static charge such as plastic, vinyl and styrofoam. Handle the board only by its edges to avoid static damage to its integrated circuits. Avoid touching the exposed circuit connectors.*

Card Installation

Warning! *Turn off your PC's power supply whenever you install or remove the PCL-846/847 or its cables. Static electricity can easily damage computer equipment. Ground yourself by touching the chassis of the computer (metal) before you touch any boards.*

1. Turn off the computer. Turn the power off to any peripheral devices (such as printers and monitors).
2. Disconnect the power cord and any other cables from the back of the computer. Turn the PC if necessary to gain access to the cables.
3. Remove the PC's cover (refer to your user's guide if necessary).
4. Locate the expansion slots or passive backplane (at the rear of the PC) and choose any unused slot.
5. Remove the screw that secures the expansion slot cover to the PC (save the screw to secure the interface card retaining bracket). Remove the anti-vibration card clamp if supplied.
6. Carefully grasp the upper edge of the PCL-846/847 card. Align the hole in the retaining bracket with the hole on top of the expansion slot. Align the gold striped edge connector with the expansion slot socket. Press the board firmly into the socket.
7. Replace the screw in the expansion slot retaining bracket. Replace anti-vibration card holder.
8. Replace the PC's cover. Connect the cables you removed in step 2.
9. Attach the DB-37 cable to the connector on the bracket. Turn the computer power on.

The board is now installed in the computer. See Chapter 3 for information on cabling.

Card Configuration

The ports on the PCL-846/847 card have jumpers and DIP switches which require configuration before the card is used. DIP switches set the port I/O addresses and speed modes. Jumpers set the port IRQs.

Default Settings

The board is shipped with default settings. If you need to change these settings, however, see the following sections. Otherwise, you can simply install the card. Note that you will need to disable your CPU card's on-board COM ports, if any, or set them to alternate addresses / IRQs.

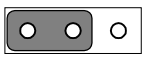
PCL-846/847 Default Configuration

Setting	Default function
JP11	IRQ 12
Speed mode	1x
IRQ mode	Share
Base address	Address 300H
Vector address	Interrupt 280H
Address mode	Enhance

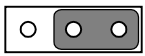
RS-422/485 Selection (JP3, JP5, JP7, JP9)

You can set each port individually for either RS-422 (the default) or RS-485 operation. Jumper JP3 configures Port 1, JP5 configures Port 2, JP7 configures Port 3, and JP9 configures Port 4. The figure below shows the jumper settings. See the layout drawings on pages 4 and 5 for help locating the jumpers.

RS-422/485



RS-422 (default)

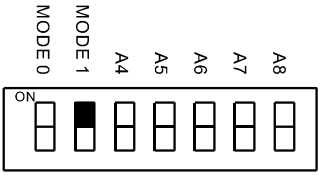


I/O Address and Interrupt Setup

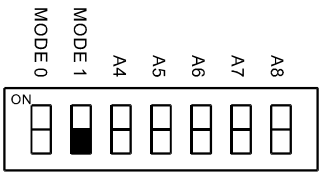
Next, you will need to select an I/O base address, and port IRQ (interrupt request) numbers for the PCL-846/847 .

Mode Setup (base address setting, S2)

The card base address can be set using the DIP switches on the card. The DIP switch labelled "MODE 1" will set the card to standard or enhanced mode, as shown below.



Standard Mode (S2)



Enhanced Mode (S2, default)

Standard Mode

In this mode, each of the four ports has a pre-assigned address, as shown below.

Port 1	Ch1	base address	3F8
Port 2	Ch2	base address	2F8
Port 3	Ch3	base address	3E8
Port 4	Ch4	base address	2E8

Enhanced Mode

In the enhanced mode, the card base address is set by the user. Select an address which is not already being used by another card in the system. If you are installing more than one PCL-846/847 card in your system, set the cards to different base addresses. DIP switches on S1 control each card's base address, as shown below.

Port base address (S1)						
Base Address	**A_3**	**A_4**	**A_5**	**A_6**	**A_7**	**A_8**
200-21F	●	●	●	●	●	●
208-227	○	●	●	●	●	●
. . . . .						
2E8-307	○	●	○	○	○	●
. . . . .						
***300-31F**	●	●	●	●	●	○
. . . . .						
3E0-3FF	●	●	○	○	○	○

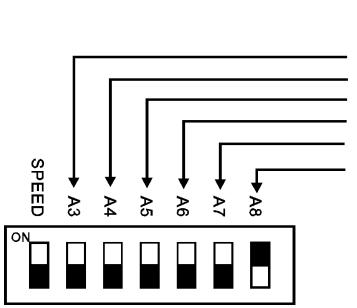
●: on ○ : off *= default

Default Settings

Mode	**Enhanced**	**Mode**
Port 1	IRQ12	Address 300H
Port 2	IRQ12	Address 308H
Port 3	IRQ12	Address 310H
Port 4	IRQ12	Address 318H

The following example shows how to set the card base address to 2F8.

The switch sum is set to 2F8: 200 + 80 + 40 + 20 + 10 + 8 (HEX).

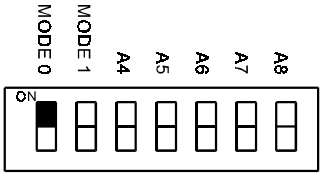


Base Address Value	Decimal Value	Hex Value
A3	8	8
A4	16	10
A5	32	20
A6	64	40
A7	128	80
A8	256	100
A9*	512	200

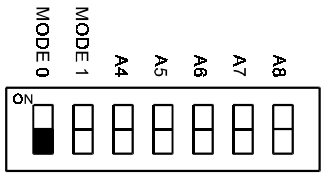
Note: On the PCL-846/847, the address line A9 does not appear on the DIP switch, as it is permanently hardwired to hex 200.

Interrupt Level (IRQ) Setting (S2, JP11, JP12, JP13, JP14)

The card's IRQ mode can be set using S2. Please note that the DIP switch on S2 labelled MODE 0 is for setting the mode, as shown below.



Shared IRQ Mode (default)



Independent IRQ Mode

Independent IRQ Mode (JP11-JP14)

In this mode, each of the four ports can have IRQ channels set individually. For each port, select an IRQ which is not already in use by another card in the system. The mapping of jumpers to ports is as shown below.

Port 1 → JP11

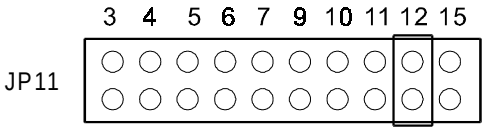
Port 2 → JP12

Port 3 → JP13

Port 4 → JP14

Shared IRQ Mode (JP11)

Select an IRQ which is not already in use by another card in the system. If you are installing more than one PCL-846/847, set them to different IRQ numbers. Jumper Bank JP11 controls the card IRQ. Simply place the jumper on the desired interrupt level as shown in the following figure.



Interrupt Status Register Setup (S2, Vector address)

This feature on the PCL-846/847 is utilized in the IRQ sharing mode only. When data arrives at one of the four ports, it generates an interrupt in the interrupt register. The PC software can read this, and identify immediately which port generated the interrupt. This saves time, and makes programming easier.

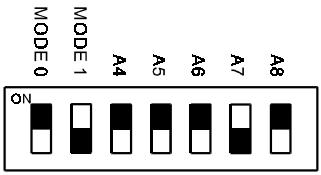
When a data bit of the interrupt status register is set to 0, the corresponding port is selected to generate an interrupt in DOS and WIN 3.x, the corresponding interrupt register for Win 95/NT is 1. If

the bit is 1, then no interrupt is generated. The following table shows the correspondence between the status register bit which gets set to 0 and the port assigned to generate an interrupt.

Interrupt Status Register S2

Bit	Function
0	Port 1
1	Port 2
2	Port 3
3	Port 4
4	Not Used
5	Not Used
6	Not Used
7	Not Used

A user may change the interrupt status registers' address using the DIP switch S2. Please note that the address decoder will occupy a continuous, 16-byte string of registers starting from the switch setting. For example, if you set the switch to 210H, then the contents of the registers from 210H to 21FH will all be decoded. The various DIP switch settings (S2) and their corresponding interrupt status register addresses are shown in the table on the following page. The figure below shows the default setting of switch S2.



S2 280H (default)

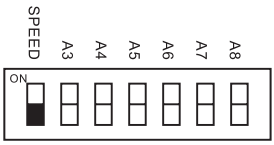
A4	A5	A6	A7	A8	Interrupt Register
ON	ON	ON	ON	ON	200H
OFF	ON	ON	ON	ON	210H
ON	OFF	ON	ON	ON	220H
OFF	OFF	ON	ON	ON	230H
ON	ON	OFF	ON	ON	240H
OFF	ON	OFF	ON	ON	250H
ON	OFF	OFF	ON	ON	260H
OFF	OFF	OFF	ON	ON	270H
ON	ON	ON	OFF	ON	280H
OFF	ON	ON	OFF	ON	290H
ON	OFF	ON	OFF	ON	2A0H
OFF	OFF	ON	OFF	ON	2B0H
ON	ON	OFF	OFF	ON	2C0H
OFF	ON	OFF	OFF	ON	2D0H
ON	OFF	OFF	OFF	ON	2E0H
OFF	OFF	OFF	OFF	ON	2F0H
ON	ON	ON	ON	OFF	300H
OFF	ON	ON	ON	OFF	310H
ON	OFF	ON	ON	OFF	320H
OFF	OFF	ON	ON	OFF	330H
ON	ON	OFF	ON	OFF	340H
OFF	ON	OFF	ON	OFF	350H
ON	OFF	OFF	ON	OFF	360H
OFF	OFF	OFF	ON	OFF	370H
ON	ON	ON	OFF	OFF	380H
OFF	ON	ON	OFF	OFF	390H
ON	OFF	ON	OFF	OFF	3A0H
OFF	OFF	ON	OFF	OFF	3B0H
ON	ON	OFF	OFF	OFF	3C0H
OFF	ON	OFF	OFF	OFF	3D0H
ON	OFF	OFF	OFF	OFF	3E0H
OFF	OFF	OFF	OFF	OFF	3F0H

Speed Mode Selection

The PCL-846/847 employs a unique speed option that allows the user to choose either normal speed mode (1x) or high speed mode (8x). This high speed mode is selected using switch S1.

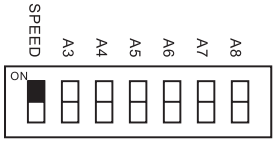
Normal Speed Mode (S1, default)

To select a baud rate commonly associated with COM ports , such as 2400, 4800, 9600. . .115.2 Kbps, set the switch labelled "SPEED" to off, as shown:



High Speed Mode (S1)

To increase the normal baud rates by eight times, (e.g. if 115.2 Kbps is set, the baud rate wil be increased to 921.6 Kbps), set the switch labelled "SPEED" to on, as shown:



Enable Mode Selection (JP4, JP6, JP8, JP10)

Jumpers JP4, JP6, JP8 and JP10 set the driver enable mode selections of ports 1, 2, 3, and 4 respectively. If a jumper is set to "AUTO," the driver automatically senses the direction of the data flow and switches the direction of transmission. No handshaking is necessary.

If a jumper is set to "RTS" (request to send), a high RTS signal will enable the driver. Otherwise, the driver output will remain in high impedance status.

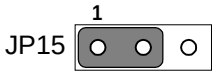
If a jumper is set to "ON," the driver is always enabled, and always in high or low status. The user must select a mode before beginning RS-422 applications.

CHAPTER 3

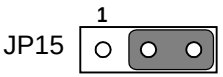
Software Installation

Operating Environment Selection

Set jumper 15 (JP15) to correspond with your desired software operating environment. Connect the left two pins of JP15 to operate in DOS or Windows 3.1 mode, as shown below. Connect the right two pins to operate in Windows 95 or Windows NT mode .



DOS, Windows 3.1



Windows 95, Windows NT

Driver Installation for DOS Users

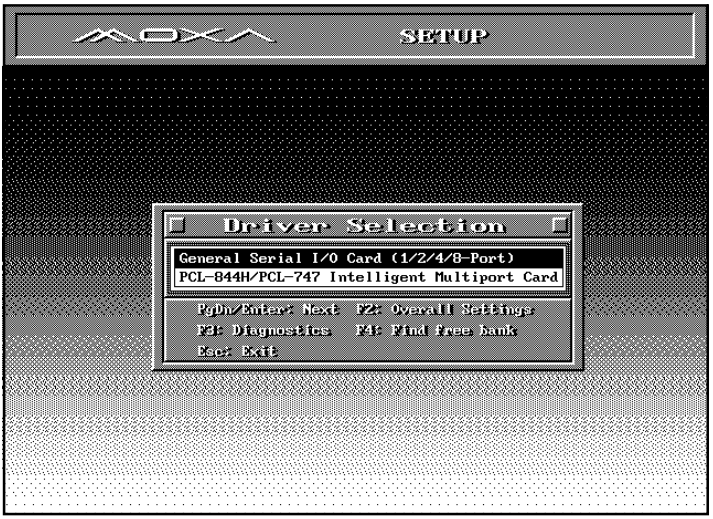
Make a duplicate copy of the driver diskette in case the original disk becomes lost or damaged. Copy the files to a subdirectory on your hard disk if you wish.

The PCL-846/847 comes with the PC-ComLIB software package. PC-ComLIB provides software drivers for DOS which supports most common languages, including C, PASCAL, BASIC, Quick BASIC, Assembly and Clipper. PC-ComLIB also includes the DataScope data viewer, terminal emulator and self-diagnostics utilities for easy troubleshooting and debugging. Please see the PC-ComLIB manual for detailed information.

Card setup

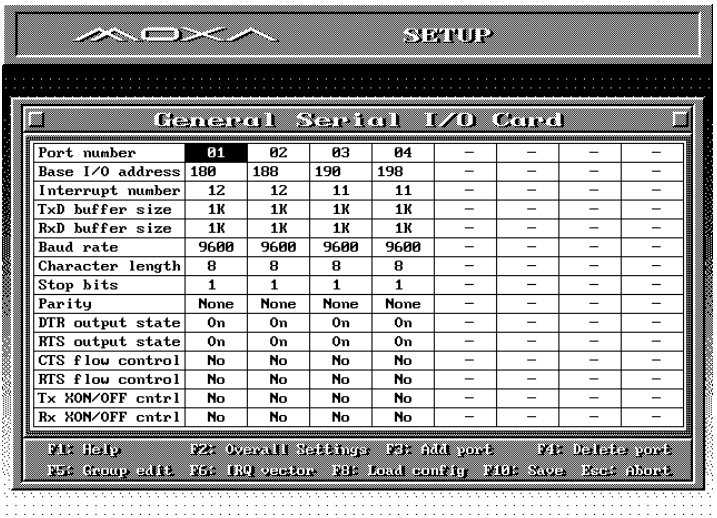
The PCL-846/847's driver determines the configuration of the installed cards by reading a data file, `GEN-DRV.CNF`. When you first install the PCL-846/847, and each time you change the card's address and IRQ, you will need to run the card setup program to save the settings to the configuration file.

Program files should be installed to the hard disk. Insert the driver disk in your computer, type DOSINST from the A: (or B:) prompt and press enter. Once the files have been installed, type SETUP from the \COMLIB\BIN prompt and press ENTER. You will then see the screen on the following page.



Driver selection screen

After the screen shows up, move the cursor bar (using the arrow keys or the mouse) to the general serial board field and press ENTER. The screen shown below will appear.

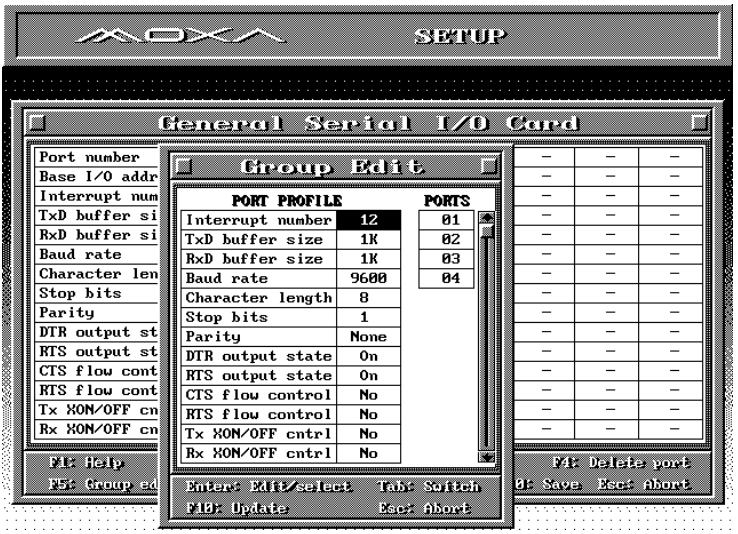


Setup screen

Here you can set the configuration for each of the PCL-846/847 cards installed in the system. Set the IRQ, base address, baud rate, buffer size and port number to match the card's configuration. Do this by moving the highlight to the field you want to set up. Press ENTER and a menu will appear, allowing you to select the correct setting. The setup program also controls the port number assignments for each card. When you use a driver function in your program, you will identify the ports by these assignments. After you have set the IRQ, base address, baudrate, buffer size and port assignments, press F10 to save the settings or ESC to return to the previous page.

Note: Make sure that the base address and IRQ selected do not conflict with any other cards you may have installed in your system.

If any of your ports have the same setup, you can define them all at one time by pressing F5 to bring up the Group Setup screen shown below.



Group Edit menu

When you are finished setting up the ports, press the ESC key to return to the previous windows. Press F10 to save the new configuration or ESC to quit without saving. The setup program will then create a new configuration data file `GEN-DRV.CNF`.

DOS driver installation

You must install the PCL-846/847 card driver (GEN-DRV.EXE) before you run any application programs, including the DataScope utilities. If you are installing the driver for the first time, you will need to run the setup program (described in the previous section) to save the initial status of the PCL-846/847.

Because the driver is a TSR (Terminate and Stay Resident) program, you can execute it at any time – you do not have to install it in the CONFIG.SYS file.

To install the PCL-846/847 card driver change to the directory or floppy disk containing the driver files and type GEN-DRV. You should soon see the following message:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Setup driver...

Device driver setup O.K.
```

If the driver can not detect any card or the GEN.DRV configuration file is not in the same directory as the driver, the following message will be displayed:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Setup driver...

None serial port found!!
```

Driver removal

To remove the driver TSR program, just type GEN-DRV/q from the DOS prompt. The following message will appear:

```
PC-ComLIB Serial Communication Driver (Ver x.xx)
Release driver...

Device driver release O.K.
```

Programming

The following code fragment illustrates how the library functions can simplify card programming, reducing setup time and avoiding bugs. The following C program shows a simple data transfer test. It uses a PC-ComLIB function call to send data between Port 1 and Port 2 at a rate of 57.6 Kbps.

```
/* Execute the PC-ComLIB TSR driver first*/
#include<head-c.h>
main()
{
  /*Setup PORT1 & PORT2 : baud = 57600 data = 8
  stop = 1 no parity*/
  sio_ioctl(1,B57600,BIT_8|P_NONE|STOP_1);
  sio_ioctl(2,B57600,BIT_8|P_NONE|STOP_1);

  /*Enable communication ports*/
  sio_open(1);
  sio_open(2);

  /*Transmit data on Port 1*/
  sio_write(1," Hello ",7);
  delay(200)

  /*Receive data on Port 2, store in buf1*/
  sio_1input(2,buf1,7,13);

  /*Print received data*/
  printf("%s\n",buf1);

  /*Disable communication ports*/
  sio_close(1);
  sio_close(2);
}
```

See the PC-ComLIB user's manual for information on programming and linking your application programs with the driver libraries.

Driver Installation for Windows 3.1 Users

Windows 3.1 provides a versatile and easily configurable interface that supports up to four COM ports with a standard driver. The PC-ComLIB Standard Windows COMM Driver, along with PCL-846/847, allow users to install up to six serial ports under Windows 3.1.

The Standard Windows COMM Driver supports Microsoft Windows COMM API (Application Programming Interface) such as OpenComm(), ReadComm(), and WriteComm(). Application software like Windows Terminal program, LabVIEW, FIX, and pcANYWHERE for Windows, or other programs that support Windows COMM API calls can communicate to outside world via PCL-846/847 multiport boards.

Installing the Standard Windows COMM Driver

1. Insert the PC-ComLIB diskette into the floppy drive A: (or B:).
2. In Windows File Manager, execute A:\WININST (or B:\WININST).

A **Driver Installation** window will appear.

Driver Installation window

3. Choose the board type, driver type, and the working directory to which the software will be copied when using PCL-846/847.

A maximum of 6 ports is supported if the existing standard COM ports (COM1 and COM2) are included. For example, you can set one serial port on the motherboard for COM1 (0x3F8, IRQ4), while designating COM2-5 on IRQ3 for the four ports on a PCL-846/847 card.

Note: If using a serial mouse, it must be installed on either COM1 (0x3F8, IRQ4) or COM2 (0x2F8, IRQ3), and must have its own dedicated IRQ.

The utility TTY, which can manipulate ports from COM1 to COM9, is included to help users monitor and debug RS-232 communications under Windows 3.x . It is a simple example program capable of sending and receiving data after each port is opened with selected communication parameters. As Windows 3.x features multitasking, multiple windows for the ports can appear simultaneously under TTY. However, Terminal, the application provided by Windows is limited for the use of COM1 to COM4.

After completing the installation, restart Windows. An additional line, "comm.drv=sercomm.drv", will appear for the PCL-846/847 in the [boot] section of the Windows SYSTEM.INI file. In addition, a Windows group "PC-ComLIB Standard COMM Driver" will be generated for reconfiguration, driver removal, etc. At this point, you are ready to execute applications that support Windows COMM API calls.

ICOM Utility Setup for Windows 95/98/ NT Environments

This section discusses the ICOM utility software package installation, configuration and upgrade/ removal procedure for both the Windows 95/98 and NT environments.

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Utility Installation

Follow the installation procedure below to install the PCL-846/847 under Windows 95/98/NT:

1. Run **Setup.exe** on the driver diskette.
2. Select "**Advantech Icom Utility**" to install and configure the board, following the on-line instructions.
3. After the Advantech Icom Utility configuration panel pops up, please refer to the software help file for more details.
4. Following completion of the installation, restart Windows 95.

Following completion of installation, please restart your system as prompted.

Once the board and driver have been installed and the system restarts successfully, users can execute any ready-made applications, such as HyperTerminal to transmit/receive data, or Remote Access Service to provide dial-up networking capability.

Configuration:

Enter the configuration program to install the device driver, or click the Taskbar [**Start**] button, then select the [**Programs**] menu, then the [**Advantech Icom Utility**] menu and then [**Icom**].

When the configuration panel pops up,

click the [**Add Board**] button to add a board.

Click the [**Delete**] button to remove a board.

Board Type: PCL-846 or PCL-847

Base COM: Specifies the COM number of the first port. Subsequent ports are mapped to subsequent COM numbers. For instance, if the first port is mapped to COM10, then the second port is mapped to COM11 sequentially.

Base Address (200H~3F8H): Specifies the base address of the first port. Subsequent base addresses are mapped to subsequent COM numbers. For instance, if the first port is mapped to 300H, then the second port is mapped to 308H sequentially.

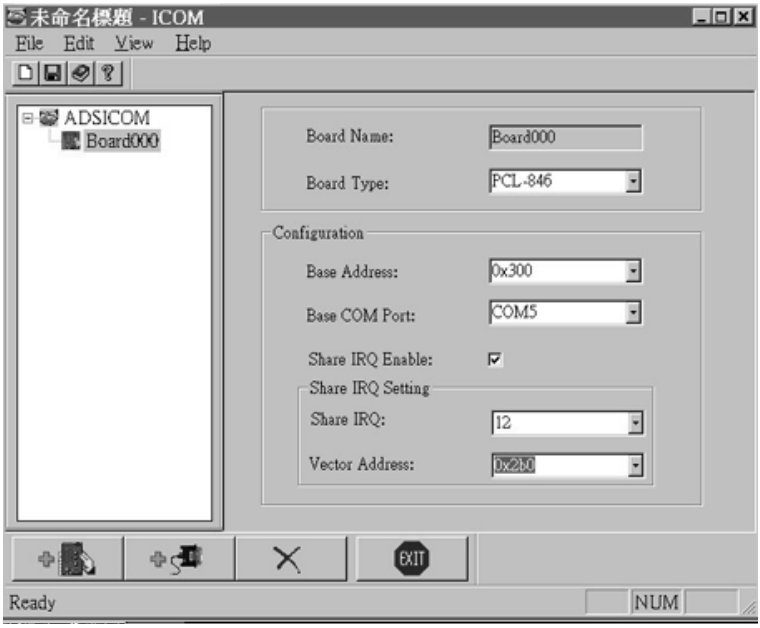
PCL-846/847 series cards can be installed together in a single system as long as the system memory resources are sufficient and available in a system. Different boards should be assigned different IRQs.

Click the [**Share IRQ Enable**] button to set the share IRQ function.

Share IRQ: 3, 4, 5, 6, 7, 9, 10, 11, 12, 15

Vector Address: 200H ~ 3F0H

After you finish the installation, you can click [**Exit**] and restart your system. Unless the system is restarted, the latest configuration will not take effect.



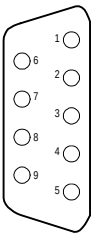
CHAPTER 4

Wiring

Pin assignments

The following figures show the pin assignments for the card's DB-9 connectors in RS-422 and RS-485 modes.

RS-422
RS-485



Pin	description (DB-9 male)
1	TX-(DATA-) or send data - (DTE)
2	TX+(DATA+) or send data + (DTE)
3	RX+ or receive data + (DTE)
4	RX - or receive data - (DTE)
5	GROUND
6	RTS - or ready to ssend -
7	RTS+ or ready to send +
8	CTS+ or clear to send +
9	CTS- or clear to send -

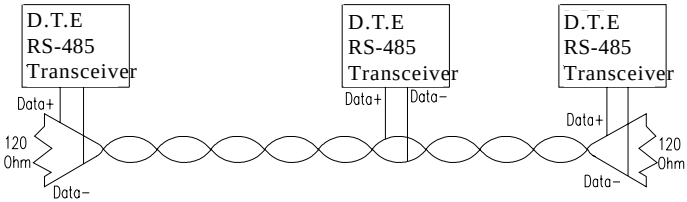
RS-422 signal wiring

The RS-422 interface wiring is based on one-to-one principles. The transmit lines on one side connect to the receive lines on the other side, and vice versa. With RS-422, you can transmit and receive data simultaneously (full duplex). The connections are as follows:

PCL-846/847 DTE (Male DB-9)		Terminal DTE
Pin	**Signal**	**Signal**
1	TxD-	RxD-
2	TxD+	RxD+
3	RxD+	TxD+
4	RxD-	TxD-
5	GND	GND
6	RTS-	CTS-
7	RTS+	CTS+
8	CTS+	RTS+
9	CTS-	RTS-

RS-485 signal wiring

The RS-485 standard supports half-duplex communication. This means that just two wires are needed to both transmit and receive data. Handshaking signals (such as RTS, Request To Send) are normally used to control the direction of the data flow and to switch the transmission accordingly. In RS-485 mode, the PCL-846/847 automatically senses the direction of the data flow and switches the transmission direction — no handshaking is necessary. This means a user can build an RS-485 network with just two wires. This RS-485 control is completely transparent to the user. The Software written for half duplex RS-232 works without the need for any modification.



RS-485 wiring topology

Wiring connections are as follows:

PCL-846/847 DTE (male DB-9)		Terminal DTE
Pin	**Signal**	**Signal**
2	DATA+	DATA +
1	DATA-	DATA -

Termination resistor setup

You can install termination resistors if necessary for impedance matching. The card has mounting spaces for termination resistors, but no resistors are installed at the factory. Depending on your application you may need to solder in a single resistor to handle the DATA+/ DATA- pair (and a corresponding resistor on the other end of the connection). The value of the resistor should equal the characteristic impedance of the signal wires (approximately 120 Ohms).

Termination resistors TR1 ~ 4 handle Port 1
Termination resistors TR5 ~ 8 handle Port 2
Termination resistors TR9 ~ 12 handle Port 3
Termination resistors TR13 ~ 16 handle Port 4

	Port 1	Port 2	Port 3	Port 4
RS-422	TR1, TR2, TR3, TR4	TR5, TR6, TR7, TR8	TR9, TR10, TR11, TR12	TR13, TR14, TR15, TR16
RS-485	TR1	TR5	TR9	TR13

APPENDIX A

PC I/O Address Reference

PC I/O Address Usage

The following table indicates the PC I/O address usage assignment. To prevent conflicting settings of the PCL-846/847 with other devices or I/O cards, you are recommended to refer this table.

I/O Address	Device
000 - 00F	DMA (8237A)
020 - 021	8259A IRQ Controller
040 - 043	8253/8254 Timer/Counter
060 - 063	PPI 8255A
070 - 071	Real-Time Clock
080 - 08F	DMA Page Register
0A0 - 0BF	8259A Interrupt Chip
0C0 - 0DF	Second DMA Controller 8237A
0F0 - 0FF	Math Coprocessor
1F0 - 1F8	AT Fixed Disk
200 - 20F	Game I/O
278 - 27F	Parallel Printer Adaptor #2
2F8 - 2FF	Serial Adaptor (COM 2)
320 - 32F	XT Fixed Disk
378 - 37F	Parallel Printer Adaptor #1
380 - 38F	SDLC Binary Communication Adaptor
3A0 - 3AF	Master Binary Communication Adaptor
3B0 - 3BF	Monochrome/Parallel Adaptor
3D0 - 3DF	Color Graphics Adaptor
3F0 - 3F7	Diskette Controller
3F8 - 3FF	Serial Adaptor (COM 1)

APPENDIX

B

Quick Reference

➢ **Switch Setting**

· **IRQ** Mode

DIP 1 (**MODE 0**) of **S2** is used to set the IRQ mode of this card.

DIP1 : **ON** (Upper) position ➔ **Shared IRQ** mode

DIP1 : **OFF** (Lower) position ➔ **Independent IRQ** mode

· **STANDARD/ ENHANCED** Mode

DIP 2 (**MODE 1**) of **S2** is used to set the Standard/enhanced mode of this card.

DIP1 : **ON** (Upper) position ➔ **STANDARD** mode

DIP1 : **OFF** (Lower) position ➔ **ENHANCED** mode

➢ **Software Operating System Mode**

Connect the left two pins of **JP15** to use DOS, Windows 3.1

Connect the right two pins of **JP15** to use Windows 95, NT

· **SPEED** Mode

DIP 1 (**SPEED**) of **S1** is used to set the speed mode of this card.

DIP1 : **ON** (Upper) position ➔ **High Speed Mode** or ´ **8x Mode**
(Frequency of Oscillator Crystal = 14.7456 MHz)

DIP1 : **OFF** (Lower) position ➔ **Normal Speed Mode or 1x Mode**
(Frequency of Oscillator Crystal = 1.8432 MHz)

- **STANDARD/ ENHANCED** Mode

STANDARD MODE: In this mode, the I/O addresses and IRQ levels of each port are set to their default values, as shown below. (Disable BIOS settings of on-board COM1 ~ COM4 ports)

Port No.	I/O Address	COM Port No.	IRQ Level (*)	
			Independent IRQ	Share IRQ
Port 1	3F8h	COM1	JP11	JP11
Port 2	2F8h	COM2	JP12	JP11
Port 3	3E8h	COM3	JP13	JP11
Port 4	2E8h	COM4	JP14	JP11

ENHANCED MODE: In this mode, the I/O addresses and IRQ levels of each port are set as shown below. Make sure that the I/O addresses of the original system (refer to Appendix A) will never conflict with the PCL-846/847 card's **[Base Address] ~ [Base Address + 1F]**.

Port No.	I/O Address	IRQ Level (*)	
		Independent IRQ	Share IRQ
Port 1	Base Address + 00h	JP11	JP11
Port 2	Base Address + 08h	JP12	JP11
Port 3	Base Address + 10h	JP13	JP11
Port 4	Base Address +18h	JP14	JP11

➢ **Enable mode selection:** (JP4, JP6, JP8, JP10)

- **Auto:** automatically senses the direction of data flow
- **RTS:** high RTS signal enable
- **ON:** always high or low status for RS-422 mode