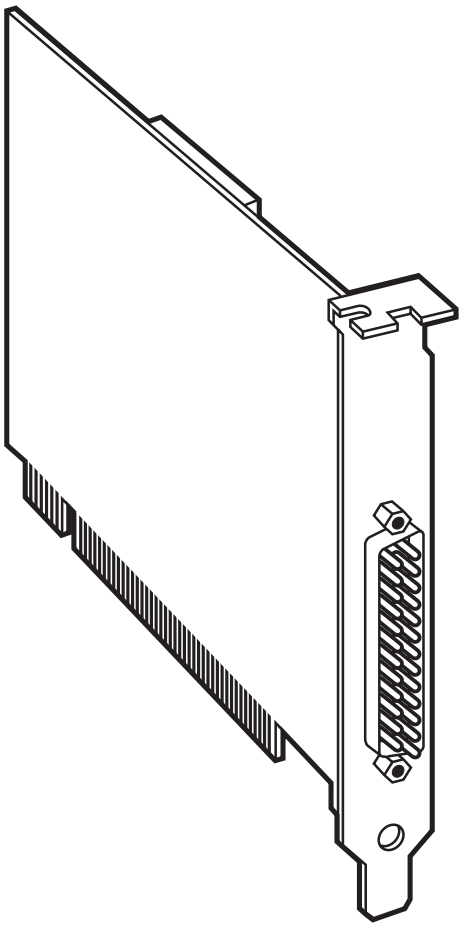
BLACK BOX®
NETWORK SERVICES

MARCH 2001
IC250C

PCI Multiprotocol Sync/Async Adapter



CUSTOMER SUPPORT INFORMATION

Order **toll-free** in the U.S.: Call **877-877-BBOX** (outside U.S. call **724-746-5500**)
FREE technical support 24 hours a day, 7 days a week: Call **724-746-5500** or fax **724-746-0746**
Mailing address: **Black Box Corporation**, 1000 Park Drive, Lawrence, PA 15055-1018
Web site: **www.blackbox.com** • E-mail: **info@blackbox.com**

FEDERAL COMMUNICATIONS COMMISSION
AND
INDUSTRY CANADA
RADIO FREQUENCY INTERFERENCE STATEMENTS

This equipment generates, uses, and can radiate radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio communication. It has been tested and found to comply with the limits for a Class A computing device in accordance with the specifications in Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such interference when the equipment is operated in a commercial environment. Operation of this equipment in a residential area is likely to cause interference, in which case the user at his own expense will be required to take whatever measures may be necessary to correct the interference.

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

This digital apparatus does not exceed the Class A limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of Industry Canada.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

EMC DIRECTIVE STATEMENT

CE Products bearing the CE label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by European Commission.

To obey these directives, the following European standards must be met:

- **EN55024 Class A:** Limits and methods of measurement of immunity characteristics of information technology equipment.
- **EN50082-1:** Electromagnetic compatibility—Generic immunity standard Part 1: Residential, commercial, and light industry.
- **EN60950 (IEC950):** Safety of information technology equipment, including electrical business equipment.

NORMAS OFICIALES MEXICANAS (NOM)
ELECTRICAL SAFETY STATEMENT

INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
7. El aparato eléctrico debe ser montado a la pared o al techo sólo como sea recomendado por el fabricante.
8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.
11. El aparato eléctrico deberá ser connectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.

12. Precaución debe ser tomada de tal manera que la tierra fisica y la polarización del equipo no sea eliminada.

13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.

14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.

15. En caso de existir, una antena externa deberá ser localizada lejos de las lineas de energia.

16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.

17. Cuidado debe ser tomado de tal manera que objectos liquidos no sean derramados sobre la cubierta u orificios de ventilación.

18. Servicio por personal calificado deberá ser provisto cuando:

    A: El cable de poder o el contacto ha sido dañado; u

    B: Objectos han caído o líquido ha sido derramado dentro del aparato; o

    C: El aparato ha sido expuesto a la lluvia; o

    D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o

    E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Contents

1. Specifications

Indicators: None

Connectors: (1) DB25 male

Temperature Tolerance**:** *Operating:* 32 to 122°F (0 to 50°C); *Storage:* -4 to +158°F (-20 to +70°C)

Relative Humidity: 10 to 90% noncondensing

Mean Time Between Failures (MTBF): Greater than 150,000 hours

Power: *From the PCI slot:* +5 VDC; *Rating:* 350 mA

Size: *Including goldfingers:* 3.5"H x 4.75"L (8.9 x 12.1 cm); *Excluding goldfingers:* 3.2"H x 4.75"L (8.1 x 12.1 cm)

Weight: 0.2 lb. (0.1 kg)

2. Introduction

2.1 Overview

The PCI Multiprotocol Sync/Async Adapter provides the PC with a single-channel multiprotocol serial interface using the Zilog Z85230 (ESCC), which is suitable for the most popular communication protocols including HDLC/SDLC, X.25, Bi-Sync, Mono-Sync, and asynchronous. Contact Black Box Technical Support for the most up-to-date drivers.

The Adapter also uses the Sipex-505 multiprotocol electrical interface chip, so the Adapter complies with EIA/TIA-530/530A, EIA/TIA-232E, EIA/TIA-485, and ITU V.35.

2.2 What the Package Includes

- PCI Multiprotocol Sync/Async Adapter
- (3) 3-½" diskettes: (1) ABC Developer's Toolkit, (2) SeaMAC Windows drivers
- This user's manual

If anything is missing or damaged, contact Black Box at 724-746-5500.

3. Installation

NOTE

You must install the software BEFORE installing the card in the PCI slot of your computer.

3.1 Operating System Installation

For installation, please use the accompanying software diskettes.

1. From the Windows Start menu, click **Run**.
2. Type **a:\setup** and click **OK**.

OR

1. Click on the **My Computer** icon and open the drive containing the installation disk.
2. Click on the **Setup** icon.

3.2 System Installation

You can install the PCI Multiprotocol Sync/Async Adapter in any of the PCI expansion slots on your computer. Follow these steps.

1. Turn off the PC's power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the PCI Adapter into the slot. Make sure the Adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

3.3 Cabling Options

Call Black Box Technical Support at 724-746-5500 for cabling options.

4. Technical Description

The PCI Multiprotocol Sync/Async Adapter uses the Zilog 85230 Enhanced Serial Communications Controller (ESCC). This chip features programmable baud rate, data format, and interrupt control.

4.1 Features

- One channel of synchronous or asynchronous communications using the Zilog Z85230 chip.
- Programmable electrical interface selection EIA/TIA-232/530/530A/485 and ITU V.35.
- Programmable options for transmit clock as input or output.
- Software programmable baud rate.

Internal Baud Rate Generator

The baud rate of the ESCC is programmed under software control. The standard oscillator supplied with the board is 7.37278 MHz. However, other oscillator values can be substituted to achieve different baud rates.

4.2 Control and Status Registers Definition

The control and status registers occupy 16 consecutive I/O locations. The following tables provide a functional description of the bit positions.

Base	Mode	D7	D6	D5	D4	D3	D2	D1	D0
+4	RD	0	IRQST	0	0	0	0	0	DSRA
+4	WR	X	X	X	0	X	X	X	X
+5	RD	485CLK	ECHOA	SYNCA_ RTS	SYNCA_ CTS	AM3	AM2	AM1	AM0
+5	WR	485CLK	ECHOA	SYNCA_ RTS	SYNCA_ CTS	AM3	AM2	AM1	AM0
+6	RD	0	0	0	0	RLA	LLA	TSETLA	RXCOPTA
+6	WR	X	X	X	X	RLA	LLA	TSETSLA	RXCOPTA
+14	RD	SD7	SD6	SD5	SD4	SD3	SD2	SD1	SD0
+15	RD	SD15	SD14	SD13	SD12	SD11	SD10	SD9	SD8

Field	Description	
IRQST	SCC interrupt status	**1=No interrupt pending on ESCC** 0=Interrupt pending on ESCC
DSRA	DSRA	**1=DSRA not active** 0=DSRA active
LLA	Local Loopback	1=LL set **0=LL not set**
RLA	Remote Loopback	1=RL set **0=RL not set**
TSETSLA	TSET clock source	1=Received TXC as source **0=TRXCA as source**
RXCOPTA	RXCOPTA	1=Selects SCC PCLK for PTXCA **0=Selects received RXC for RTXCA**
SYNCA_RTS	SYNCA_RTS	1=SYNCA connected to RTS **0=SYNCA is high**
SYNCA_CTS	SYNCA_CTS	1=SYNCA connected to RTS **0=SYNCA is high**
485CLK	TSET switches with TXD	1=CLK switches **0=no CLK switching**
ECHOA	ECHO enable	1=echo disabled **0=echo enabled**
AM0-AM3	I/O mode select. See table for valid interface options.	**0=High impedance**
SD0-SD15	Optional security feature. Unique value per customer or application.	**Default value=FFFF**

NOTE

Default values are listed in bold.

4.3 Interface Selection

The PCI Multiprotocol Sync/Async Adapter supports a variety of electrical interfaces. Refer to **Section 4.2** for this bit description. There is line termination on RXD, RXC, and TXC in the following modes: RS-530, RS-530A, RS-485T, and V.35.

HEX	M3	M2	M1	M0	Interface Mode
0	0	0	0	0	All signals are high impedance
1	0	0	0	1	*not supported*
2	0	0	1	0	RS-232
3	0	0	1	1	*not supported*
4	0	1	0	0	RS-485T with 120-ohm termination
5	0	1	0	1	RS-485 without termination
6, 7, 8, 9	0	1	1	0	*not supported*
A	1	0	1	0	single-ended loopback
B	1	0	1	1	differential loopback
C	1	1	0	0	*not supported*
D	1	1	0	1	RS-530
E	1	1	1	0	V.35
F	1	1	1	1	RS-530A

4.4 25-Pin Connector Signal Layouts (DB25 Male)

4.4.1 RS-232 Signals

NOTE

Base+5 (from Section 4.2**), M3-M0=2, 0010 (both from** Section 4.3**)**

Signal	Name	Pin #	Mode
GND	Ground	7	
RD	Receive Data	3	Input
CTS	Clear to Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
TM	Test Mode	25	Input
TXC	Transmit Clock	15	Input
RXC	Receive Clock	17	Input
TSET	Transmit Signal Element Timing	24	Output
DTR	Data Terminal Ready	20	Output
TD	Transmit Data	2	Output
RTS	Request to Send	4	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

4.4.2 V.35 SIGNALS

NOTE

Base+5, M3-M0=E, 1110

Signal	Name	DB25	V.35	Mode
GND	Ground	7	B	
RDB RX+	Receive Positive	16	T	Input
RDA RX-	Receive Negative	3	R	Input
TXCB TXC+	Transmit Clock Positive	12	AA	Input
TXCA TXC-	Transmit Clock Negative	15	Y	Input
RXCB RXC+	Receive Clock Positive	9	X	Input
RXCA RXC-	Receive Clock Negative	17	V	Input
TDB TX+	Transmit Positive	14	S	Output
TDA TX-	Transmit Negative	2	P	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	W	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	U	Output
CTS	Clear to Send	5	D	Input*
DSR	Data Set Ready	6	E	Input*
DCD	Data Carrier Detect	8	F	Input*
DTR	Data Terminal Ready	20	H	Output*
RTS	Request to Send	4	C	Output*
LL	Local Loopback	18		Output*
RL	Remote Loopback	21		Output*

NOTE

All modem control signals are single-ended (unbalanced) with RS-232 signal levels.

4.4.3 RS-530 (RS-422)

NOTE

Base+5, M3-M0=D, 1101

Signal	Name	Pin #	Mode
GND	Ground	7	
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
CTSB CTS+	Clear to Send Positive	13	Input
CTSA CTS-	Clear to Send Negative	5	Input
DCDB DCD+	Data Carrier Detect Positive	10	Input
DCDA DCD-	Data Carrier Detect Negative	8	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
RTSB RTS+	Request to Send Positive	19	Output
RTSA RTS-	Request to Send Negative	4	Output
DTRB DTR+	Data Terminal Ready Positive	23	Output
DTRA DTR-	Data Terminal Ready Negative	20	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
DSRB DSR+	Data Set Ready Positive	22	Input
DSRA DSR-	Data Set Ready Negative	6	Input
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

4.4.4 RS-530A

NOTE

Base+5, M3-M0=F, 1111

Signal	Name	Pin #	Mode
GND	Ground	7	
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
CTSA CTS-	Clear to Send Negative	5	Input
DCDA DCD-	Data Carrier Detect Negative	8	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
RTSA RTS-	Request to Send Negative	4	Output
DTRA DTR-	Data Terminal Ready Negative	20	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

4.4.5 RS-485 OR RS485T

NOTE

Base+5, M3-M0=4, 0100 (with termination)
Base+5, M3-M0=5, 0101 (without termination)

Signal	Name	Pin #	Mode
GND	Ground	7	
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output
LL	Local Loopback	18	Output
RL	Remote Loopback	21	Output

Appendix A. Electrical Interface

A.1 RS-232

The most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232.

The IBM® PC computer defined the RS-232 port on a DB9 connector. Subsequently, the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the *9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*.

Both implementations are widely used and will be referred to as RS-232 in this manual. RS-232 is capable of operating at data rates of up to 20 kbps at distances less than 50 ft. (15.2 m). The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 kbps over very short distances.

The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single-ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denote a binary 1 (mark).

The RS-232 and the EIA/TIA-574 specification define two types of interface circuits, Data Terminal Equipment (DTE) and Data-Circuit Terminating Equipment (DCE). The PCI Multiprotocol Sync/Async Adapter is a DTE interface.

A.2 RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits.

RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single-ended interface—for example, RS-232—defines the logic levels as the difference in voltage between a single signal and a common ground connection.

Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Mbps and can have cabling up to 4000 ft. (1219.2 m).

RS-422 also defines driver and receiver electrical characteristics that will allow one driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

A.3 RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party-line or multidrop applications.

The output of the RS-422/485 driver is capable of being Active (enabled) or Tri-State (disabled). This capability allows multiple ports to be connected in a multidrop bus and selectively polled. RS-485 allows cable lengths up to 4000 ft. (1219.2 m) and data rates up to 10 Mbps.

The signal levels for RS-485 are the same as those defined by RS-422. RS-485 has electrical characteristics that allow for 32 drivers and 32 receivers to be connected to one line. This interface is ideal for multidrop or network environments. RS-485 tri-state driver (not dual-state) will allow the electrical presence of the driver to be removed from the line. Only one driver may be active at a time and the other driver(s) must be tri-stated.

RS-485 can be cabled in two ways: two-wire and four-wire mode. Two-wire mode does not allow for full-duplex communication, and requires that data be transferred in only one direction at a time. For half-duplex operation, the two transmit pins should be connected to the two receive pins (TX+ to RX+ and TX- to RX-). Four-wire mode allows full-duplex data transfers.

RS-485 does not define a connector pinout, a set of modem control signals, or a physical connector.

A.4 RS-530/530A

RS-530 (also known as EIA-530) compatibility means that RS-422 signal levels are met, and the pinout for the DB25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pinout, and define a full set of modem control signals that can be used for regulating flow control and line status.

The major difference between RS-530 and RS-530A lies in the modem control signals. In RS-530, all signals are differential. In RS-530A, signals DTR, DSR, and DCD are single-ended.

The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The PCI Adapter is a DTE interface.

A.5 V.35

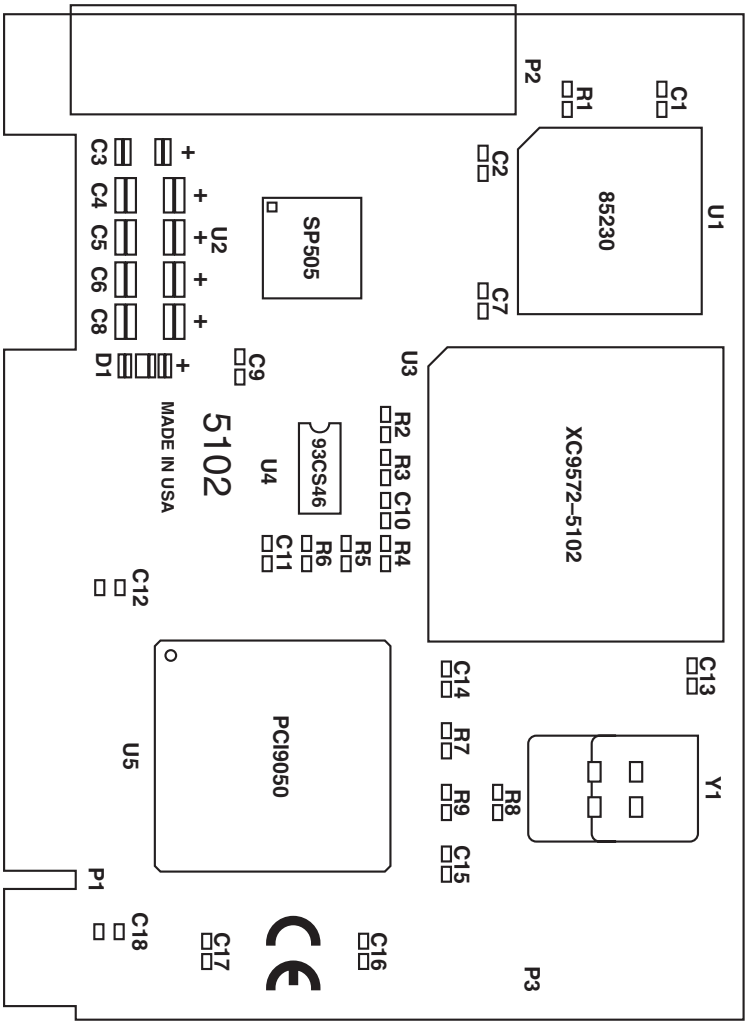
V.35 is a standard defined by ITU (formerly CCITT) that specifies an electrical, mechanical, and physical interface. This interface is used extensively by high-speed digital carriers such as AT&T® Dataphone® Digital Service (DDS).

ITU V.35 is an international standard that is often referred to as *Data Transmission at 48 kbps Using 60- to 108-kHz Group-Band Circuits*. ITU V.35 electrical characteristics that are a combination of unbalanced voltage and balanced current mode signals. Data and clock signals are balanced current mode circuits. These circuits typically have voltage levels from +0.5 volts to -0.5 volts (1-volt differential). The modem control signals are unbalanced signals and are compatible with RS-232.

The physical connector is a 34-pin connector that supports 24 data, clock, and control signals. The physical connector is defined in the ISO2593 standard.

The ITU V.35 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The PCI Adapter is a DTE interface.

Appendix B. Board Layout



Appendix C. Troubleshooting

C.1 Using the Developers' Toolkit Software

The Developers' Toolkit software is supplied with the PCI Multiprotocol Sync/Async Adapter and will be used in the troubleshooting procedures. Using this software and following these simple steps can eliminate most common problems without calling for technical support.

1. Identify all I/O adapters currently installed in your system. This includes the on-board serial ports, controller cards, sound cards, etc. The I/O addresses used by these adapters, as well as the IRQ (if any), should be identified.

2. Make sure that the PCI Adapter is securely installed in a PCI slot.

3. Use the supplied software and this users' manual to verify that the PCI Adapter is configured correctly. The supplied software contains an easy-to-use diagnostic program called "SSCMP" that will verify if the adapter is configured properly.

4. Windows® users can used the installed programs in the Black Box folder to verify operation.

C.2 Calling Black Box

If you determine that your PCI Multiprotocol Sync/Async Adapter is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box at 724-746-5500.

Before you do, make a record of the history of the problem. We will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

C.3 Shipping and Packaging

If you need to transport or ship your PCI Multiprotocol Sync/Async Adapter:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Adapter for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Material Authorization (RMA) number.

1000 Park Drive • Lawrence, PA 15055-1018 • 724-746-5500 • Fax 724-746-0746