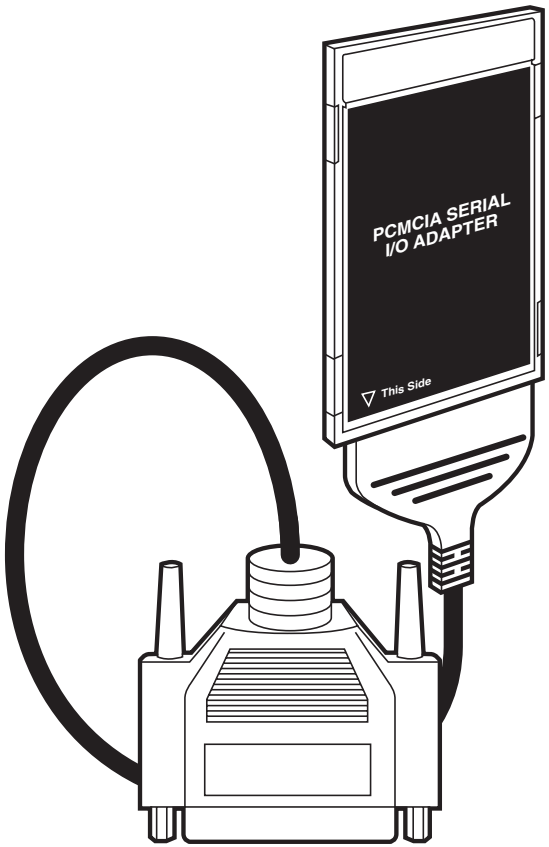
BLACK BOX®
NETWORK SERVICES

NOVEMBER 2000
IC117A-R2

PCMCIA Serial I/O 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 the European Commission.

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

- EN55022 Class A: "Limits and methods of measurement of radio interference 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

Communications Chip—Zilog 85233 ESCC

Hardware Requirements—PC, notebook, or laptop with a PCMCIA Type II slot and a 3.5" floppy drive

Protocol—Synchronous

Speed—Up to 200 kbps

Interface—Programmable, electrical interface EIA/TIA-232/530/530A/485 and ITU V.35

Connectors—Interface cable (included): DB25 male to PCMCIA Type II dongle

MTBF—150,000 hours

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

Power—Supply line: +5 VDC, Rating: 170 mA

Size—PCMCIA Type II

Weight— <1 lb. (<0.5 kg)

2. Introduction

2.1 Overview

In the last few years, the portable and notebook market has grown by leaps and bounds. Most early laptops and notebooks handled I/O expansion through proprietary expansion slots. These slots provided limited expansion for specific peripherals such as modems and fax peripherals. Mass-storage peripherals were factory installed and could not be easily changed. Interconnectivity through local area networks offered limited performance through slow parallel-port network interfaces.

During this time period, two standards organizations (JEIDA and PCMCIA) were working on the standardization of memory IC cards. These cards were designed as strictly non-volatile silicon storage. JEIDA was the first to propose the 68-pin connector standard for memory cards. In 1989, PCMCIA adopted the JEIDA 68 pin standard and worked with JEIDA on further developments.

As the notebook market grew, the need for a standard I/O bus increased. The PCMCIA groups saw an opportunity to meet this need with an expanded version of the 68-pin interface. Further development occurred and within one year, release 2.0 of the standard was completed. Release 2.0 was a major update to Release 1.0 and included full hardware support for I/O devices. Release 2.0 coincided with JEIDA's 4.1 release and is identical.

The PCMCIA Serial I/O Adapter provides your portable PC with a single-channel multi-protocol serial interface using the Zilog Z85233 (ESCC), which is suitable for the most popular communication protocols including HDLC/SDLC, X.25, Bi-Sync, Mono-Sync, and asynchronous.

The Adapter uses the Sipex-505 multi-protocol electrical interface chip, so it's compliant with EIA/TIA-530/530A, EIA/TIA-232E, EIA/TIA-485, and ITU V.35.

2.2 What's Included

The Adapter is shipped with the following items.

- PCMCIA Serial I/O Adapter
- DB25 cable assembly
- Impact-resistant carrying case (jewel case)
- (3) 3-½" software diskettes containing the Developers' Toolkit Software

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

3. Installation

NOTE

You must install the software BEFORE you install the hardware!

3.1 Software Installation

You must load Card and Socket Services on the system prior to installing the PCMCIA Serial I/O Adapter. Card and Socket Services are supplied by the PCMCIA slot provider (the computer manufacturer or the PC adapter manufacturer). These may be third-party add-on Card and Socket services (for example, CardSoft's CardWizard), or they may be included with your current operating system (for example,Windows 95, 98, 2000, or Windows NT).

Socket Services are the lowest level of the PCMCIA software hierarchy. They provide a standard interface to the higher-level drivers and isolate the socket controller's specific hardware details. They also provide the "BIOS" interface to the socket controller hardware. Socket Services are typically hidden under Card Services and are rarely directly accessible by application software.

Card Services provide the interface to application software and drivers. They are responsible for allocating card resources and ensuring that card resources do not interfere with other existing system resources. Card Services are typically implemented as a driver. Almost all PCMCIA-type cards require some sort of software driver. In the case of the PCMCIA Serial I/O Adapter, the generic Card Services driver supplied with the computer system should provide adequate support for most applications.

3.2 Hardware Installation

Connecting the Adapter to the computer requires no special technical skills. Follow these two simple steps:

1. Follow the directions given for your operating system found on the supplied software.

2. Simply slide the card into a PCMCIA Type II compliant slot on the PC. The PCMCIA slot is keyed so that you cannot install the Adapter backwards or upside down. Use a minimal amount of pressure when installing the card. Do not force the card into the slot. Forcing the card could damage the Adapter or the PCMCIA slot. After you've installed the card into the PCMCIA slot,

connect the I/O cable to the card. The cable is also keyed to prevent it from being installed incorrectly.

Installation is complete.

3.3 Cabling Options

For cabling interface options, call Black Box Technical Support at 724-746-5500.

4. Technical Description

The PCMCIA Serial I/O Adapter uses the Zilog 85233 Enhanced Serial Communications Controller (ESCC). This chip features programmable baud rate, data format, and interrupt control. Refer to the ESCC users' manual for details on programming the 85233 ESCC chip.

4.1 Features

- One channel of synchronous or asynchronous communications using the Zilog 85233 chip.
- Programmable electrical interface selection EIA/TIA-232/535/530A/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.

4.2 Control and Status Registers

The control and status registers occupy 16 consecutive locations. The tables in this section provide a functional description of the bit positions. When reading the tables, please note that "X" means "do not care."

Table 4-1. Control and status registers

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	X	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	TSET SLA	RX COPTA
+7	RD	SD7	SD6	SD5	SD4	SD3	SD2	SD1	SD0

Table 4-1 (continued). Control and status registers

Field	Description		
IRQST	ESCC interrupt status:	1=No interrupt pending on ESCC	0=interrupt pending on ESCC
DSRA	DSRA:	1=DSRA is not active	0=DSRA is active
TSETSLA	TSET clock source:	1=Received TXC as source	0=TRXCA as source
RXCOPTA	RXCOPTA:	1=Selects ESCC PCLK for RTXCA	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 CTS	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. .		0=High impedance
SD0-SD7	Optional security feature. Unique value per customer or application. Default value = FF		

NOTE: Default values are listed in bold.

4.3 Interface Selection

The PCMCIA Serial I/O 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.

Table 4-2. Interface selection

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 Pin Connector Signal Layouts (DB25 Male)

4.4.1 RS-232 Signals

Table 4-3. RS-232 signals

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

4.4.2 V.35 Signals

Table 4-4. V.35 signals

Signal	Name	DB25	V.35	Mode
GND	Ground	7	B	
RDV 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 +	11	W	Output
TSETA TSET-	Transmit Signal Element Timing -	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

NOTE

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

4.4.3 RS-530 (RS-422)

Table 4-5. RS-530 (RS-422) signals

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

4.4.4 RS-530A

Table 4-6. RS-530A signals

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

4.4.5 RS-485 OR RS-485T

Table 4-7. RS-485 or RS-485T signals

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
RDA TX-	Transmit Negative	2	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output

Appendix A. Troubleshooting

A.1 Troubleshooting Tips

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

1. Identify all I/O adapters currently installed in your system. This includes your 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 the Adapter is securely installed in a PCMCIA slot.

3. Use the supplied software and this manual to verify that the Adapter is configured correctly. The supplied software contains a diagnostic program "SSDMP" that will verify if an adapter is configured properly.

4. Windows users can use the installed programs to verify operation.

A.2 Calling Black Box

If you determine that your 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.

A.3 Shipping and Packaging

If you need to transport or ship your 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.

Appendix B. Electrical Interfaces

B.1 RS-232

RS-232 is quite possibly the most widely used communication standard. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. It is defined by the EIA as the Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange. The mechanical implementation of RS-232 is on a 25-pin D-sub connector. RS-232 is capable of operating at data rates 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) denotes a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification defines two type of interface circuits: Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Adapter has a DTE interface.

B.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 are typically more immune to noise or voltage spikes that may occur on the communication lines. 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 4000 feet (1219.2 m) long. 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.

B.3 RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for party-line or multi-drop 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 multi-drop bus and selectively polled. RS-485 allows cable lengths up to 4000 feet (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 multi-drop 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 pin-out or a set of modem control signals. RS-485 does not define a physical connector.

B.4 RS-530/530A

RS-530 (also known as EIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out, 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 interface signals. In RS-530 all signals are differential; In RS-530A signals DTR, DSR, 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 PCMCIA Serial I/O Adapter is a DTE interface.

B.5 V.35

V.35 is a standard defined by ITU (formerly CCITT) that specifies an electrical, mechanical, and physical interface that 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 refereed to as Data Transmission at 48 kbps Using 60 - 108 KHz Group-Band Circuits. ITU V.35 electrical characteristics 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 ISO-2593 standard. ITU V.35 specification defines two types of interface circuits: Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Adapter is a DTE interface.

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