



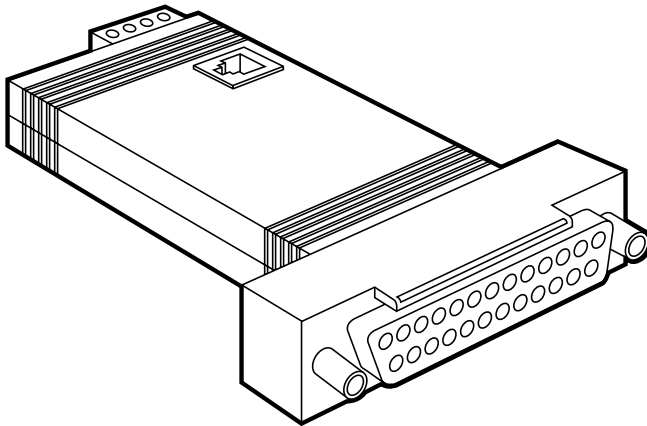
© Copyright 1998. Black Box Corporation. All rights reserved.

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



PI320A-R3	PI322A-R3	PI324A-R2	PI326A
PI320AE-R3	PI322AE-R3	PI324AE-R2	PI326AE
PI321A-R3	PI323A-R2	PI325A-R2	PI327A
PI321AE-R3	PI323AE-R2	PI325AE-R2	PI327AE

PC Parallel Extender III Serial Distance Extender II Universal I/O Distance Extender



**CUSTOMER
SUPPORT
INFORMATION**

Order toll-free in the U.S. 24 hours, 7 A.M. Monday to midnight Friday: 877-877-BBOX
FREE technical support, 24 hours a day, 7 days a week: Call 724-746-5500 or fax 724-746-0746
Mail order: **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 classe A prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.

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 conectado 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 física 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 líneas de energía.
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 objetos líquidos 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: Objetos 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.

Contents

1. Specifications	5
2. Introduction	6
3. Installation	7
3.1 Serial Extenders	7
3.2 Connectors	8
3.3 Pinning	9
3.4 Jumpers	9

1. Specifications

Transmission Distance —	Up to 4000 feet (1219.2 m)
Interfaces —	<i>Parallel:</i> IBM® PC Parallel Interface compatible, IEEE Std. 1284-1994 compliant operation supporting Compatibility and Nibble Modes; <i>Serial:</i> EIA RS-232-C, CCITT V.24, V.28, ISO 2110
Flow Control —	Serial to serial will pass X-ON/X-OFF or hardware; Parallel applications are hardware only
Data Format —	<i>Serial Data:</i> 7 data bits, even or odd parity or 8 data bits, no parity; <i>Parallel Data:</i> 8 data bits (host to peripheral)
Connectors —	(1) DB25 female, (1) 4-position terminal block, (1) RJ-11, (1) DC power jack
Switches —	<i>Serial and Serial Universal versions:</i> (1) 8-position DIP switch and (1) Slide DTE/DCE switch; <i>Parallel versions:</i> (1) 4-position DIP switch; <i>Parallel Universal versions:</i> (1) 4-position DIP switch and (1) Slide Input/output switch
Power —	<i>Models with an “A” suffix:</i> Wallmount-type power supply, 9-volt DC, 500 mA, 115 VAC, UL® and CSA approvals; <i>Models with an “AE” suffix:</i> Wallmount-type power supply, 9-volt DC, 1000 mA, 90 to 240 VAC, 50/60 Hz, UL and CSA approvals
Size —	1"H x 2.3"W x 3.7"D (2.5 x 5.8 x 9.4 cm)
Weight —	1.4 lb. (0.6 kg), includes power supply

2. Introduction

These multi-purpose units have the ability to remote your receiving device up to 4000 feet (1219.2 m) from the sending device. There are two basic types of Extenders: serial and parallel. Each serial or parallel Extender comes in 115- and 230-V input, output, and universal models. The Extenders are available in kits (parallel-parallel or serial-serial), or you can order them separately to accommodate a mixed application.

Each of the universal modules can be set to be either an input or an output device. The non-universal modules are preset during assembly as transmitting (input) devices or receiving (output) devices. The serial modules are switch-selectable for either DTE or DCE application, eliminating the need for special cables and preventing confusion in installation. Connecting the units together has been made easier by using straight-through Category 5 cable, connected to either the RJ-11 jack or the 4-screw terminal block.

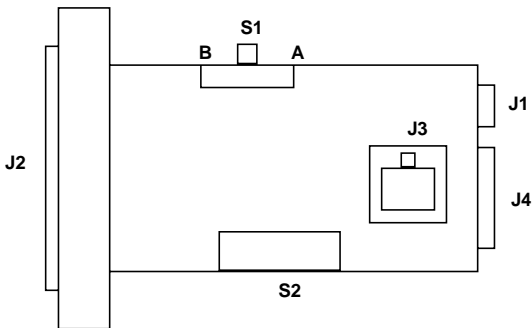
3. Installation

Before you begin, make sure all equipment is off and the Extenders are not powered on.

3.1 Serial Extenders

In serial-to-serial applications, use the charts on page 11 to set switch S2 for baud rate, transmission speed, and termination. Set S1 for either DCE to connect to a PC, or DTE to connect to a modem. Attach the two devices with appropriate cable. All connections are straight-through: pin 1 to pin 1, pin 2 to pin 2, etc. Once all connections are made, connect DB25 cables to the equipment and power up the converters. Now power can be applied to your equipment.

For testing purposes, a self-test has been incorporated into the serial converter. To enable the test, S2-4 needs to be placed in the up (open) position. When this is done, the self-test will be transmitted to the serial port. If a PC is the receiving device, a terminal-emulation program will need to be running.



3.1.1 CONNECTORS

J1—DC Power Jack (9 VDC @ 500 mA)

DISTANCE EXTENDERS

J2—DB25 Female RS-232

Pin/Signal	DCE Interface Function (S1-A)	DTE Interface Function (S1-B)
2 Transmitted Data	Input	Output
3 Received Data	Output	Input
4 Request To Send	Connected to pin 5	Connected to pin 5
5 Clear To Send	Connected to pin 4	Connected to pin 4
6 Data Set Ready	Output	Input
7 Common	Ground	Ground
8 Data Carrier Detect	Open	Open
9 + (optional)	7 to 12 VDC @ 250 mA	7 to 12 VDC @ 250 mA
20 Data Terminal Ready	Input	Output
22 Ring Indicator	Open	Open

DCE stands for Data Carrier Equipment (can connect to a PC).

DTE stands for Data Terminal Equipment (configured the same as a PC).

NOTE

The Serial Line Extender may be powered with either Jack J1 or pin 9 of Jack J2.

J3—RJ-11 (6-position 6-conductor)

Position	Function	Input Device Transmit (S2-5 UP)	Output Device Receive (S2-5 DOWN)
1	Unused	No connection	No connection
2	Pair 2+	Receive +	Transmit +
3	Pair 1+	Transmit +	Receive+
4	Pair 1-	Transmit-	Receive-
5	Pair 2-	Receive-	Transmit-
6	Unused	No connection	No connection

J4—Four-Position Terminal Block

Position	Function	Input Device (S2-5 UP)	Output Device Receive (S2-5 DOWN)
1	Pair 2+	Receive+	Transmit+
2	Pair 1+	Transmit+	Receive+
3	Pair 1-	Transmit-	Receive-
4	Pair 2-	Receive-	Transmit-

NOTE

When connecting an input-configured device to an output-configured device, the interconnecting cable should be straight-through (position 1 to position 1, position 2 to position 2, etc.). This is true for both the J3 (RJ-11) and the J4 (4-position terminal block) connectors.

3.1.2 SWITCHES*S1: 2-Position Slide Switch*

See the description of J2.

Position	Function
A	Configure as DCE for connection to PC serial port.
B	Configure as DTE to simulate PC serial-port output.

DISTANCE EXTENDERS

S2: 8-Position DIP Switch (Up is open, Down is closed)

Position	Function	Description
1	Baud Rate Select	(see Baud-Rate Table, below)
2	Baud Rate Select	(see Baud-Rate Table, below)
3	Baud Rate Select	(see Baud-Rate Table, below)
4	Test Mode Enable	Up: Test mode enabled Down: Normal operation
5 (see the note below)	Transmitting/Receiving	Up: Transmitting (Input) Device Down: Receiving (Output) Device
6	Transfer Rate	Up: Fast (up to 1000 feet) Down: Standard (up to 4000 feet)
7	Terminate Pair 1	Up: No line termination Down: 120-ohm line termination
8	Terminate Pair 2	Up: No line termination Down: 120-ohm line termination

NOTE

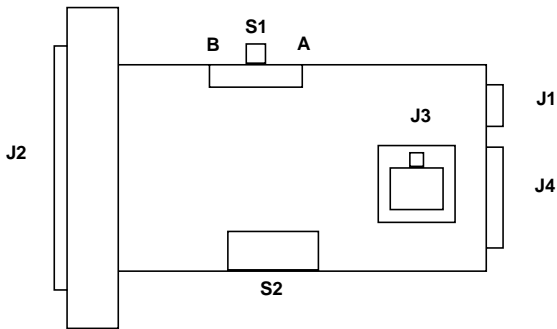
S2-5 configures the device as a Transmitting (Input) Device or a Receiving (Output) Device (see description of jacks J3 and J4). An Input Device can only communicate with an Output Device. On non-universal modules, the function of S2-5 is fixed during assembly; these modules are preset as transmitting (input) or receiving (output) devices.

Baud-Rate Table

Baud Rate (in Kbps)	S2-3	S2-2	S2-1
115.2	Down	Down	Down
57.6	Down	Down	Up
38.4	Down	Up	Down
28.8	Down	Up	Up
19.2	Up	Down	Down
14.4	Up	Down	Up
9.6	Up	Up	Down
2.4	Up	Up	Up

3.2 Parallel Extenders

In parallel-to-parallel applications, use the chart on page 15 to set switch S2 for transmission speed and termination. On the Universal Extenders, set S1 for either Transmitting (Input) Device to connect to a PC, or Receiving (Output) Device to connect to a printer. On non-universal modules, the function of S1 is fixed during assembly; S1 is not present on these modules. Attach the two devices with appropriate cable; all connections are straight-through (pin 1 to pin 1, pin 2 to pin 2, etc.). Once all connections are made, connect DB25 cables to your equipment and power up the converters. Now power can be applied to your equipment.



3.2.1 CONNECTORS

J1—DC Power Jack (9 VDC @ 500 mA)

DISTANCE EXTENDERS

J2—DB25 Female IBM® Parallel Port

Pin/Signal	Input Device Function (S1-A)	Output Device Function (S1-B)
1	nStrobe	Output
2	Data 1	Output
3	Data 2	Output
4	Data 3	Output
5	Data 4	Output
6	Data 5	Output
7	Data 6	Output
8	Data 7	Output
9	Data 8	Output
10	nAck	Input
11	Busy	Input
12	PErrror	Input
13	Select	Input
14	nAutoFd	Output
15	nFault	Input
16	nInit	Output
17	nSelectIn	Output
18	Ground	Ground
19	Ground	Ground
20	Ground	Ground
21	Ground	Ground
22	Ground	Ground
23	Ground	Ground
24	Ground	Ground
25	Ground	Ground

Input Device intended to be connected to a PC. Output Device intended to be connected to a printer (configured like a PC parallel port).

Non-universal modules are preset during assembly as transmitting (input) devices or receiving (output) devices.

J3—RJ-11 (6-position 6-conductor)

Position	Function	Input Device (S1-A)	Output Device (S1-B)
1	Unused	No connection	No connection
2	Pair 2+	Receive +	Transmit +
3	Pair 1+	Transmit +	Receive+
4	Pair 1-	Transmit-	Receive-
5	Pair 2-	Receive-	Transmit-
6	Unused	No connection	No connection

J4—Four-Position Terminal Block

Position	Function	Input Device (S1-A)	Output Device (S1-B)
1	Pair 2+	Receive+	Transmit+
2	Pair 1+	Transmit+	Receive+
3	Pair 1-	Transmit-	Receive-
4	Pair 2-	Receive-	Transmit-

NOTE

When connecting an input-configured device to an output-configured device, the interconnecting cable should be straight-through (for example position 1 to position 1, position 2 to position 2, etc.). This is true for both the J3 (RJ-11) and the J4 (4-position terminal block) connectors.

Non-universal modules are preset during assembly as transmitting (input) devices or receiving (output) devices.

DISTANCE EXTENDERS

3.2.2 SWITCHES

S1: 2-Position Slide Switch (Universal Extenders Only)

See the description of J2.

Position	Function
A	Configure as Input Device for connection to PC.
B	Configure as Output Device for connection to printer.

NOTE

S1 configures the device as an Input Device or an Output Device (see description of jacks J2, J3, and J4). An Input Device can only communicate with an Output Device. On non-universal modules, the function of S1 is fixed during assembly; these modules are preset as transmitting (input) devices or receiving (output) devices.

S2: 4-Position DIP Switch (Up is open, Down is closed)

Position	Function	Description
1	Unused	
2	Transfer Rate	Up: Fast (up to 1000 feet) Down: Standard (up to 4000 feet)
3	Terminate Pair 1	Up: No line termination Down: 120-ohm line termination
4	Terminate Pair 2	Up: No line termination Down: 120-ohm line termination

3.3 Mixed Operation

In a serial-to-parallel application or a parallel-to-serial application, the same setup is necessary for each unit as described above. It is important to note only hardware handshaking can be used when mixing units. Each unit must be set as either a transmitter (input device) or a receiver (output device).

3.3.1 PARALLEL TO PARALLEL

1. One device must be configured as a transmitting (input) device, and one device must be configured as a receiving (output) device.
2. The transfer rate must be the same between the transmitting and receiving devices.

3.3.2 SERIAL TO SERIAL

1. One device must be configured as a transmitting (input) device, and one device must be configured as a receiving (output) device.
2. The transfer rate must be the same between the transmitting and receiving devices.
3. Each device must be configured as a DCE or DTE as appropriate for the interfacing equipment.
4. The baud rate of each device must be set the same as the interfacing equipment.

3.3.3 PARALLEL INPUT TO SERIAL OUTPUT

1. The parallel device must be configured as a transmitting (input) device, and the serial device must be configured as a receiving (output) device.
2. The transfer rate must be the same between the transmitting and receiving devices.
3. The serial device must be configured as a DCE or DTE as appropriate for the interfacing equipment.
4. The baud rate of the serial device must be set the same as the interfacing equipment.
5. The parallel-port SelectIn signal is used to control the serial Data Terminal Ready (DTR) signal, and the serial Data Set Ready (DSR) signal is used to control the parallel-port Busy signal.

DISTANCE EXTENDERS

3.3.4 SERIAL INPUT TO PARALLEL OUTPUT

1. The serial device must be configured as a transmitting (input) device, and the parallel device must be configured as a receiving (output) device.
2. The transfer rate must be the same between the transmitting and receiving devices.
3. The serial device must be configured as a DCE or DTE as appropriate for the interfacing equipment.
4. The baud rate of serial device must be set the same as the interfacing equipment.
5. The serial Data Terminal Ready (DTR) signal is used to control the parallel-port SelectIn signal, and the parallel-port Busy signal is used to control the serial Data Set Ready (DSR) signal.

4. Troubleshooting

If the unit fails to operate:

1. Is the unit powered on? If so, check to see if the power supplies are plugged into a working AC outlet.
2. Check to see if the inter-connect wire is straight-through.
3. Make sure that one unit is set up to be transmitting and the other receiving.

4.1 Calling Black Box

If you determine that your Extender is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact Black Box Technical Support 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.

4.2 Shipping and Packaging

If you need to transport or ship your Extender:

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

DISTANCE EXTENDERS

TRADEMARKS USED IN THIS MANUAL

IBM is a registered trademark of International Business Machines Corporation.

UL is a registered trademark of Underwriters Laboratories Incorporated.

All applied-for and registered trademarks are the property of their respective owners.

NOTES

NOTES