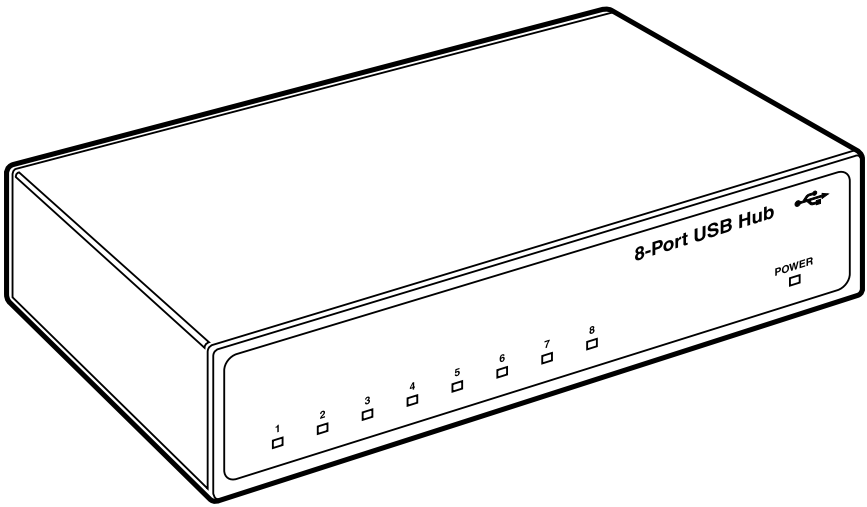
JUNE 2003
IC1023A
IC1024A
IC1025A

8-Port USB Hub



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 B 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.

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.

TRADEMARKS USED IN THIS MANUAL

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Contents

1. Specifications

Speed: RS-232: Up to 460.8 kbps; RS-422/485: Up to 921.6 kbps

Standards: USB version 1.1

MTBF: Greater than 150,000 hours

Connectors: (8) DB9 female, (1) USB

Indicators: (9) LEDs: (8) Port activity, (1) Power

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

Relative Humidity: Up to 90%, noncondensing

Power: From the USB interface

Size: 2.1"H x 5.9"W x 8.7"D (5.3 x 15 x 22.1 cm)

2. Introduction

2.1 Overview

The 8-Port USB Hub equips the PC with eight USB to asynchronous serial ports. Use these ports to connect serial devices to your PC; no system resources (I/O ports or IRQs required)! Models are available with different electrical interfaces: RS-232 (IC1023A), RS-422/485 (IC1024A), and RS-232/422/485 (IC1025A). All models are hot-swappable and include LED status indicators for power and port activity.

The hub has eight USB UARTs. These chips feature programmable baud rate, data format, 128-byte dual-port TX buffer, and 384-byte dual-port RX buffer. The RS-232/422/485 transceiver supports data rates up to 921.6 kbps for RS-422/485 and 460.8 kbps for RS-232.

2.2 What the Package Includes

- (1) 8-Port USB Hub
- (1) USB cable for connecting to an upstream host/hub
- (1) CD-ROM with installation software
- This users' manual

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

3. Installation

3.1 Installing the Software

Insert the included CD-ROM into your PC. Choose **Install Software**, then install **SeaCOM**.

3.2 System Installation

The screen captures in this manual are taken from a Windows® 98 installation. Your particular operating system may differ slightly from what is shown based on your version of Windows.

The 8-Port USB Hub can be connected to any upstream type "A" port, either at the PC host or an upstream hub. The hub is hot-pluggable, so there's no need to power down your computer before installation.

Once you've connected the hub to an upstream host or hub, the **New Hardware Found** wizard will locate the appropriate drivers. (These drivers were installed during the SeaCOM software setup procedure.) Once the drivers are found, a new window will indicate the installation of eight new ports.

If you view the system's Device Manager, you should have new COM ports in the Ports (COM & LPT) Device Class. (See Figure 3-1.)

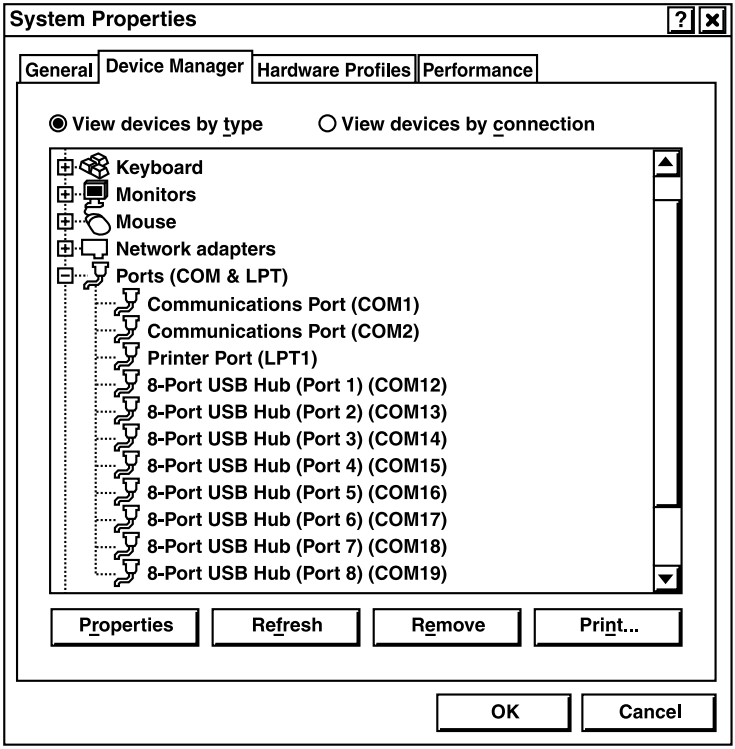

Figure 3-1. System Properties screen, Device Manager tab.

You can access your new COM ports by using the assigned COM identifiers as shown above (in this case, COM12 through COM19). However, this assignment will vary from system to system.

At this point, the hardware is recognized and ready to use. Go to **Chapter 4** for configuration information.

4. Configuration

The 8-Port USB Hub arrives with the following configuration:

- IC1023A: Contains no user-configurable components.
- IC1024A and IC1025A: RS-422 4-wire full-duplex mode selected. Transmitter always enabled. Receiver always enabled and terminated; biased as follows:

  120-ohm terminator between RX+ and RX-.

  1-Kohm pull-up on RX+.

  1-Kohm pull-down on RX-.

To change the configuration on the IC1024A or IC1025A, start by opening the box. To do this, remove the four screws that attach the two halves of the box.

Each port can be individually configured for the specific electrical interface. IC1024A supports RS-422/485, and IC1025A supports RS-232/422/485. Select the interface via the DIP switch associated with each port.

Each DIP switch (SW1, SW2, SW3, and SW4) has a total of 12 positions and configures two ports. Six positions are designated for each port. The default mode of RS-422 4-wire full duplex is shown in Figure 4-1.

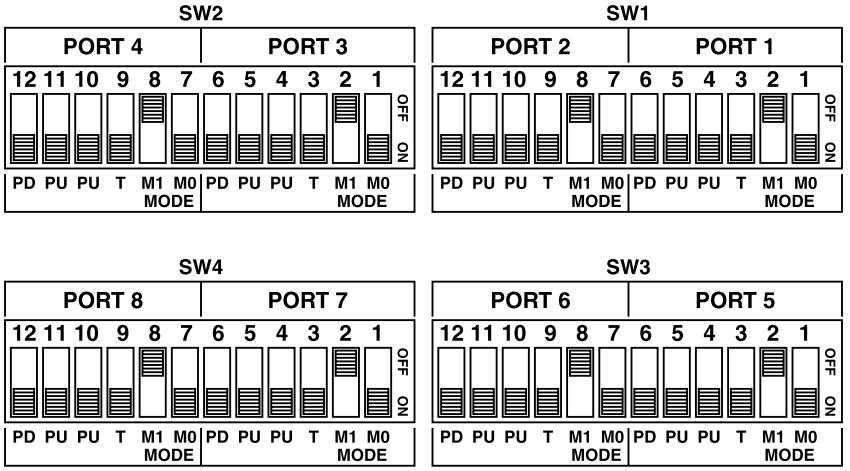

Figure 4-1. DIP-switches SW1 through SW4 in default mode.

The first two positions for each port (1 and 2 or 7 and 8) are used to select the electrical interface mode. In RS-422 mode, the transmitter and receiver are always enabled. "485 WE" refers to RS-485 mode with receiver echo. In this mode, the receiver is enabled only when no data is being transmitted. "485 NE" refers to RS-485 mode with no receiver echo. In either RS-485 mode, the transmitter is only enabled during data transmission. Refer to Table 4-1 for specific switch settings.

NOTE

This chart also appears on the board's silkscreen.

Table 4-1. Electrical interface mode selection.

Mode	M1 (Position 2 or 8)	M0 (Position 1 or 7)
232	OFF	OFF
422	OFF	ON
485 WE	ON	OFF
485 NE	ON	ON

The last four positions for each port (3–6 or 9–12) are used to select the line termination and bias settings. See Table 4-2 for specific switch settings of the three supported electrical interface modes.

NOTE

This chart also appears on the board's silkscreen.

PD (Position 6 or 12)	1-Kohm pull-down resistor connected to RX-. RS-232 mode = Always OFF. RS-422 mode = Always ON. RS-485 mode = ON if not provided by another device on the bus.
PU (Position 5 or 11)	5.1-Kohm pull-up resistor connected to CTS+. RS-232 mode = Always OFF. RS-422 mode = Always ON. RS-485 mode = Always ON.
PU (Position 4 or 10)	1-Kohm pull-down resistor connected to RX+. RS-232 mode = Always OFF. RS-422 mode = Always ON. RS-485 mode = ON if not provided by another device on the bus.
T (Position 3 or 9)	120-ohm terminating resistor connected between RX+ and RX-. RS-232 mode = Always OFF. RS-422 mode = Always ON. RS-485 mode = ON if physically located at one end of the bus.

Table 4-2. Interface biasing.

Mode	PD (Position 6 or 12)	PU (Position 5 or 11)	PU (Position 4 or 10)	T (Position 3 or 9)
232	OFF	OFF	OFF	OFF
422	ON	ON	ON	ON
485	ON	ON	ON	ON*

*If end of 485 bus.

NOTE

There are no provisions for looping TX+ to RX+ and TX- to RX- for 2-wire RS-485 mode. These connections must be made inside the DB9 connector. Refer to the RS-422 pinout diagram in Appendix A for the appropriate pin numbers.

5. Troubleshooting

5.1 Calling Black Box

If you determine that your 8-Port USB Hub 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.

5.2 Shipping and Packaging

If you need to transport or ship your 8-Port USB Hub:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the 8-Port USB Hub for repair, make sure you include everything that came in the original package. Before you ship, contact Black Box to get a Return Authorization (RA) number.

Appendix A. Connector Pin Assignments

RS-422/485

Table 5-1. RS-422/485 DB9 male.

Signal	Name	Pin #	Mode
GND	Ground	5	—
TX+	Transmit Data Positive	4	Output
TX-	Transmit Data Negative	3	Output
RTS+	Request to Send Positive	6	Output
RTS-	Request to Send Negative	7	Output
RX+	Receive Data Positive	1	Input
RX-	Receive Data Negative	2	Input
CTS+	Clear to Send Positive	9	Input
CTS-	Clear to Send Negative	8	Input

RS-232

Table 5-2. RS-232 DB9 male.

Signal	Name	Pin #	Mode
GND	Ground	5	—
TX	Transmit Data	3	Output
RTS	Request to Send	7	Output
DTR	Data Terminal Ready	4	Output
RX	Receive Data	2	Input
CTS	Clear to Send	8	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	1	Input
RI	Ring Indicator	9	Input

Appendix B. Electrical Interface

B.1 RS-232

Quite possibly 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 defined the RS-232 port on a DB9 connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange. Both implementations are in widespread use. 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 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. 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 8-Port USB Hub is a DTE device.

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 allows for longer cable lengths. RS-422 is rated up to 10 Mbps and can have cabling 4000 ft. (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 has electrical characteristics that allow 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 the 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 or a set of modem control signals. RS-485 does not define a physical connector.

Appendix C. Asynchronous Communication

Serial data communication implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communication is the standard means of serial data communication for PC compatibles and PS/2® computers. The original PC was equipped with a communication (or COM) port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. Character boundaries for asynchronous communications are defined by a starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8). The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5, or 2). An extra bit used for error detection is often appended before the stop bits.

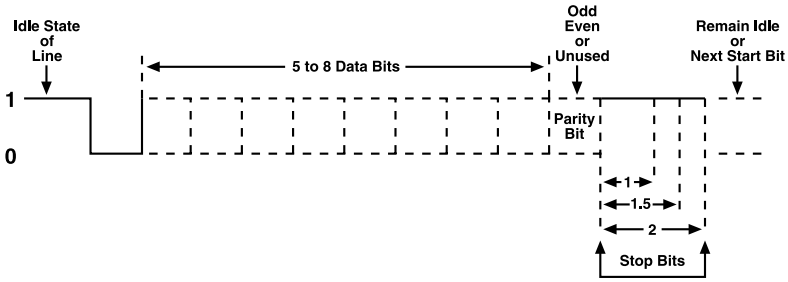

Figure C-1. Asynchronous communication bit diagram.

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communication is sent consecutively, it is easy to generalize asynchronous communication by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the

character. The data rate and communication parameters for asynchronous communication have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (9600, N, 8, 1).

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