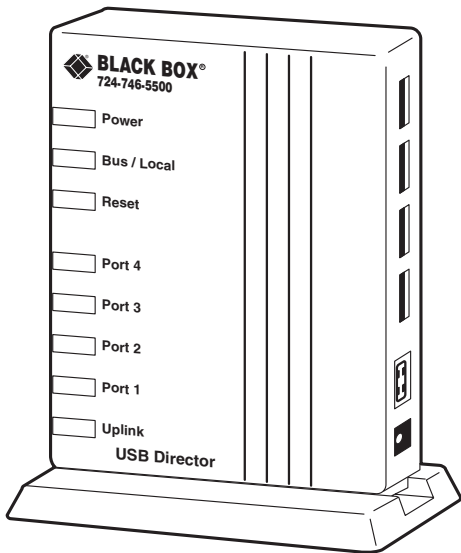




## USB Director/4-Port Hub



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### 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](http://www.blackbox.com) • E-mail: [info@blackbox.com](mailto:info@blackbox.com)

**FEDERAL COMMUNICATIONS COMMISSION****AND****INDUSTRY CANADA****RADIO FREQUENCY INTERFERENCE STATEMENTS**

*Class B Digital Device.* This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.

- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult an experienced radio/TV technician for help.

### **Caution:**

**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 B 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 radio électriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par Industrie Canada.*

## **UL Listing**

This product is UL® listed.

## **CE** European Union Declaration of Conformity

This is to certify that this device is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN55022: 1987 Class B (CISPR 22:1985/BS6527:1988). This product also complies with ISO/IEC Guide 22 and EN45014. It conforms to the following EMC specifications:

- EN55022(1988)/CISPR-22(1985) class B
- IEC 1000-4-2(1995) 4kV CD, 8kV AD
- IEC 1000-4-3(1995) 3 V/m
- IEC 1000-4-4(1995) 1kV (power line), 0.5 kV (signal line)
- IEC 100-4-6(1995) 3 Vrms

This product complies with the requirements of the Low Voltage Directive 73/23/EEC and the EMC Directive 89/336/EEC.

**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 objetos 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: 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.

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UL® is a registered trademark of Underwriters Laboratories Incorporated.

Velcro® is a registered trademark of Velcro USA Inc.

*Any other trademarks mentioned in this manual are acknowledged to be the property of the trademark owners.*

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# 1. Specifications

**Software Requirements** — USB-enabled operating system such as Windows® 95 OSR2.1 or later, Windows 98, or Windows NT® 5.0, Windows 2000, any Macintosh operating system with USB support

**Cable Wiring** —  $90 \Omega \pm 15\%$  unshielded or shielded for low-speed devices;  $90 \Omega \pm 15\%$  shielded for full-speed devices

**Maximum Individual Cable Length** — Full-speed device: 5 meters (16.4 ft.) shielded cable; Low-speed device: 3 meters (9.8 ft.) unshielded/shielded cable

**Wiring Topology** — Tiered star, point-to-point connection

**Access Method** — Differential and bi-directional per USB spec 1.0; 12 Mbps full speed and 1.5 Mbps low speed; The hub supports both full and low speeds. The hub is considered a full-speed device.

**Maximum Hubs in Daisychain** — Five (six cables, end-to-end maximum)

**Maximum Devices** — 127

**Standards Conformance** — USB specification 1.0

**Certifications** — CE, FCC Class B, VCCI Class B, EN 55022 Class B (CISPR 22)

**Safety** — UL, cUL, TUV/GS

**Temperature Tolerance** — Operating: 32 to 104°F (0 to 40°C); Storage: -4 to +167°F (-20 to +75°C)

**Humidity Tolerance** — 5 to 95% noncondensing

**Hub Power Requirements** — IC165A: 110 VAC, 60 Hz; IC165AE: 220 VAC, 50 Hz; Both models: Bus-powered: 2.5 watts, 5 V @ ½ amp via USB cable; Self-powered: 11 watts, 5.25 V @ 2.1 amps via optional power supply; Hub power usage: 0.5 watt, 5 V @ ¼ amp

**Optional External 14-Watt Power Supply** — +5.25 VDC @ 2.5 amp, 90- to 140-VAC or 90- to 240-VAC, 60/50 Hz

**Indicators** — LEDs: (1) Power, (1) Bus/Local Power, (1) Reset, (1) each Ports 1 through 4, (1) Up Link

**Connectors** — (4) USB Type A connectors for device ports; (1) USB Type B connector for uplink port

**Size** — 4.7"H x 3.8"W x 1.1"D (11.9 x 9.7 x 2.8 cm)

**Weight** — 0.5 lb. (0.2 kg)

## 2. Introduction

### 2.1 Overview

The USB Director/4-Port Hub is a medium-speed and standalone universal serial bus (USB) hub. The USB Director/4-Port Hub supplies four additional USB ports to attach devices and/or additional hubs. The hubs can easily be daisychained, up to five hubs deep in series, in any combination that does not exceed 127 devices, including the hubs. No additional software is required to support the Hub.

Two models are available: the IC165A includes a 110-VAC power supply and the IC165AE comes with a 220-VAC power supply.

The Hub is compatible with the USB Version 1.0 specification and supports the power-saving Suspend, Resume, and Remote wake-up operations.

#### **NOTE**

**The USB specification does not allow for a bus-powered hub to drive another bus-powered hub. That is, two bus-powered hubs must be separated with a self-powered hub.**

The USB Director/4-Port Hub is a dual-powered device that can be powered via the uplink connection (bus-powered) or via an optional power supply (self-powered). When bus-powered, the four downstream ports support “low-power” devices rated at less than  $\frac{1}{2}$  watt ( $\frac{1}{10}$  amp @ 5 VDC) each, such as a camera, printer, scanner, or another hub. “Low-power” devices can also plug into these ports. The power switchover is automatic when the optional power supply is plugged into the hub.

Each downstream port supports either full-speed (12 Mbps) and/or low-speed (1.5 Mbps) signaling automatically.

The hub and each downstream port are overcurrent and short-circuit protected.

## 2.2 System Requirements

To use the hub, you’ll need:

- A PC or Macintosh computer that supports the Universal Serial Bus (USB).
- Operating system with a generic USB hub driver.

(A generic hub driver is supplied with the latest version of Microsoft Windows 95 also known as OSR2.1 or later, Windows 98, Windows NT, or Windows 2000. Call Technical Support at 724-746-5500 if you're using Windows 2000.

### **2.3 What the Package Includes**

Your package should include the following items. If anything is missing or damaged, please call Black Box at 724-746-5500.

- USB Director—4-Port Hub
- Hub Stand
- External power adapter
- 2-m USB cable (Type A connector to Type B connector)
- This users' guide

## 2.4 Hardware Description

The USB Director/4-Port Hub has one connector for upstream connection to a host, and four port connectors for downstream connections to the devices. It also has a power connector for the optional power supply, eight LED indicators for status information, and a stand for mounting (see **Figure 2-1**).

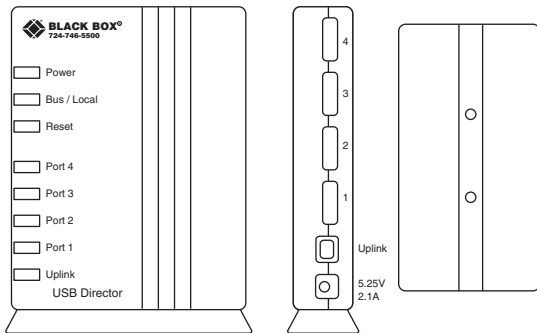


Figure 2-1. Hub, Front and Side View, and Stand.

## 2.5 Typical Application

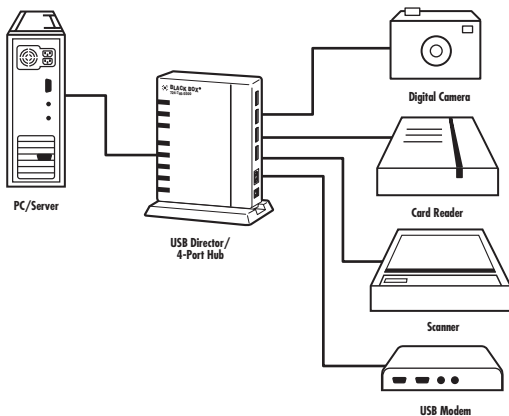


Figure 2-2. Typical Application.

## 3. Installation

### 3.1 Initial Checkout

#### 3.1.1 BUS-POWERED CHECKOUT

While the host PC is powered on, connect a USB cable between the host's USB type A receptacle and the Hub's type B receptacle (uplink connection). The Hub's power indicator, bus-powered, and the uplink port LED will turn on. Then the host PC will locate and run the generic hub driver supplied with its operating system. The hub driver will identify the USB Director—4-Port Hub and enable each of its four ports. The individual port's LED will turn on, indicating that power is applied to its connector.

When the initial checkout is complete, USB low-power devices can be attached to the hub. Refer to the instructions supplied with each USB device for their individual operation.

#### 3.1.2 OPTIONAL SELF-POWERED CHECKOUT

Perform the initial bus-powered checkout described in **Section 3.1.1**. Then connect the optional power adapter into an AC outlet and plug the adapter's DC power



cable into the Hub's power connector. The hub will go through a reset and operate in the bus-powered mode; however, the bus-powered LED will be off. When the optional power adapter is connected, USB high-power devices can be attached to the Hub. Refer to the instructions supplied with each USB device for their individual operation.

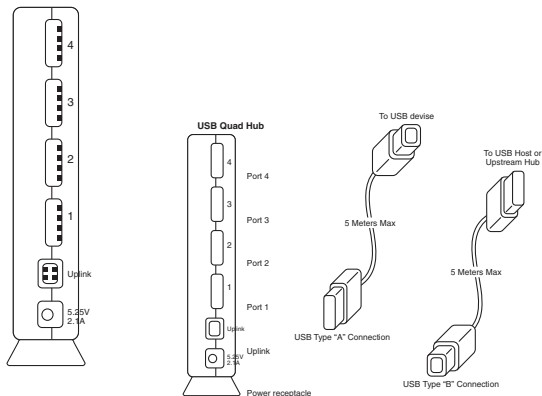
### **3.2 Hub Mounting**

To stand the hub upright on a desk or shelf, slide the stand onto the base of the hub. To lay the hub flat, slide the stand onto the back of the hub. To mount the hub directly onto a wall, the side of or under a desk (any vertical or horizontal surface), first secure the stand to the desired location with two small screws (or any other technique such as Velcro® strips) and slide the hub on to the bracket.

### **3.3 Cable Connections**

The standard USB cables are designed to ensure that they plug into the correct receptacle. Each cable has a connector that goes upstream toward the host end (Type A) and a connector that goes toward the downstream device end (Type B). The maximum length of

the cable is 16.4 ft. (5 m) for full-speed connections and 9.8 ft. (3 m) for low-speed connections. **Figure 3-1** shows the cable connections.



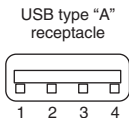
**Figure 3-1.** Cable Connections.

### NOTE

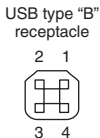
**Low-speed connections can use unshielded or shielded cable, but full-speed connections must use shielded cable.**

## CONNECTOR PINOUTS

**Figures 3-2** and **3-3** and **Table 3-1** illustrate the pinouts of the USB type A receptacle and USB type B receptacle.



**Figure 3-2. USB Type "A" Receptacle.**



**Figure 3-3. USB Type "B" Receptacle.**

**Table 3-1. Connector Pinouts**

Pin Number	Signal
1	+5 VDC
2	- Data
3	+ Data
4	Ground

### 3.4 Power Controls

When the hub is connected to the USB connection, it initially draws less than  $\frac{1}{10}$  of an amp from the host connection. Each port is enabled one at a time. Initially, all attached devices are only allowed to draw  $\frac{1}{10}$  amp or less each.

When the hub is identified, it tells the host whether it is bus-powered or self-powered. If the hub is bus-powered, the device driver should only allow low-power devices to be enabled. If the hub is self-powered, the device driver can allow low-power and/or high-power devices to be attached.

#### NOTE

**Early device drivers may not enforce these power limits. However, the USB Director/4-Port Hub is designed to automatically protect the host connection and the hub itself from overcurrent conditions if they exist.**

## 4. Operation

The USB Director/4-Port Hub is an extension of the host's USB bus. You only have to plug it into the host USB connector to operate. The hub is hot-pluggable; you can plug it in at any time, even when the host PC is powered on. When attached, the operation is automatic. The host software will detect that a device has been attached to the USB bus, query the device to identify it, and load the appropriate driver. The hub driver will then enable the hub and each of the ports. If the hub detects a device attached to the port, it will notify the host. The host will then communicate with the device to identify it and load its device driver. (This function may vary depending upon the individual device.)

The Hub has power on/off, overcurrent reporting, and suspend/resume controls for the hub as well as for each of the individual ports. The host can send a command to turn on or off the hub, and individual port, or a device attached to the port. Suspend is a global or individual device command that sets the device or hub into a low-power mode where it is virtually powered off (<500 microamps), yet allows a device to request a remote wakeup. A wakeup will be responded to with

a resume command from the host that takes the device out of suspend.

The Hub is supported by the Microsoft® Windows® generic USB hub driver supplied with the latest version of Microsoft Windows 95 also known as OSR2.1, Windows 98, and Microsoft Windows NT 5.0.

#### NOTE

**If you're using Windows 2000, call Technical Support at 724-746-5500.**

### Status Indicators

The USB Director/4-Port Hub has eight LEDs, including (3) unit power LEDs ([2] green, [1] amber), (4) downstream port power and status LEDs (green), and (1) uplink power and activity status dual LED (green/red). **Table 4-1** describes the LEDs and their functions.

**Table 4-1. LED Functions**

LED	Position	Function
POWER	ON (green) OFF	Power ON. No power or low input voltage (< 3.5 VDC).
BUS/LOCAL	ON (green) OFF	Bus-powered. Local power (self-powered).
RESET	ON (amber)  OFF	Reset or uplink disconnected or host powered off. Not reset/Host connection established.
PORTS 1–4	ON (green)  OFF	Individual port power. Enabled by the host and +5 VDC applied. Disabled by host because of device status or overcurrent (NOTE 1), thermal trip (NOTE 2), or short circuit (NOTE 3), or low input voltage.
<b>NOTE</b>		
<ol style="list-style-type: none"> <li>Overcurrent trip point set between 0.6 and 1.5 amps, 0.6 amp continuous current per port maximum.</li> <li>Power vs. time algorithm for thermal trip point.</li> <li>1.5-amp short-circuit current limiting.</li> </ol>		
UPLINK Green LED	ON (green) Blinking green	Uplink power is ON. Port TX or RX activity.

**Table 4-1 (continued). LED Functions**

<b>LED</b>	<b>Position</b>	<b>Function</b>
<b>UPLINK (continued) Red LED</b>	<b>ON (red)</b>	<b>A bus-powered overcurrent condition exists.</b>
	<b>OFF</b>	<b>Port disconnected or low input voltage.</b>

**NOTE**

All LEDs are normally turned off when suspend mode is activated. Exceptions to this are when error conditions exist before entering suspend mode.



## 5. Troubleshooting

### 5.1 Power Problems

If an overcurrent condition of  $> \frac{1}{2}$  amp is sensed at a port by the hub, that port's power will be limited ( $< \frac{1}{10}$  amp). The condition will be reported back to the host, the host will shut off the port, and the port LED will be off.

If a port LED is off, an overcurrent condition may exist on that port and/or the port that has been turned off by the host. To clear this condition, disconnect the device causing the fault and reset the hub by unplugging and replugging the uplink connection. All downstream devices will be reset.

If the hub is self-powered, you should see the reset LED come on while the host connection is disconnected. If in self-powered mode, you can also unplug the power connection and plug it back in to create a reset.

In bus-powered mode, if the hub has an overcurrent condition or if the sum of the current being drawn by all of the devices and the hub exceeds  $\frac{1}{2}$  amp, the hub will shut itself down and the uplink port red LED will turn

on. If the uplink port red LED is on, disconnect all of the devices and reset the hub as described on the previous page. Then plug the devices in one at a time and run their applications, noting when the failure reoccurs.

#### NOTE

**If a device is unplugged while in suspend mode, its configuration information will be reset. To reconfigure, simply reset the Hub.**

## 5.2 Other Problems

The following is a list of symptoms, possible causes, and suggested solutions.

*Symptom:* Reset (amber) LED is on.

*Cause:* Uplink (host) connection is lost.

*Solutions:*

1. Upstream cable is disconnected. Reconnect.
2. Upstream hub or host is powered off. Make sure all upstream hubs are powered on.

**Symptom:** Hub host port red LED is on.

**Cause:** Overcurrent condition exists.

**Solutions:**

1. Disconnect port 1 through 4 devices one at a time until the LED goes off.
2. If all devices are removed and the LED is still on, reset the hub.

*To reset the hub, unplug its uplink connection and plug it back in.*

If the LED is still on, the unit is defective and should be replaced.

3. If the LED is now off, reconnect the devices one at a time until the failure reoccurs. The last device connected to the unit is drawing too much current.

*Symptom:* A single port LED is off.

*Cause:* The port has been disabled by the host. An overcurrent condition may exist on that port or the device driver identified a problem with the device and turned it off.

*Solutions:*

1. Disconnect the device. If the LED does not come on, reset the hub.

*To reset the hub, unplug its uplink connection and plug it back in.*

If the LED turns on, you can reattach the device.

2. If the LED did not come back on after the hub reset, you might need to reset or reboot the host PC.

**NOTE**

These power controls are left up to the individual device drivers. Since it is early in the development cycle, and some of the USB device drivers do not support all of the controls, this may be the only ways of clearing the fault.

*Symptom:* All LEDs are off.

*Cause:* The hub has been disconnected, powered off, or put into suspend mode.

*Solutions:*

1. Host is in suspend mode. Press any key on the keyboard or move the mouse to exit suspend mode.
2. Upstream cable is disconnected. Reconnect.
3. Upstream hub or host is powered off. Make sure all upstream hubs are powered on.

*Symptom:* Power LED is on and all port LEDs are off.

*Cause:* The hub has not been enabled by the host.

*Solutions:*

1. USB driver not loaded. Reset the hub to cause the driver to be loaded.

*To reset the hub, unplug its uplink connection and plug it back in.*

2. Upstream cable is disconnected. Reconnect.
3. Make sure all upstream hubs are powered on.

### 5.3 Calling Black Box

If you determine that your USB Director/4-Port Hub 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.

### 5.4 Shipping and Packaging

If you need to transport or ship your USB Director/4-Port Hub:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the USB Director/4-Port Hub 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.

## NOTES



## NOTES



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