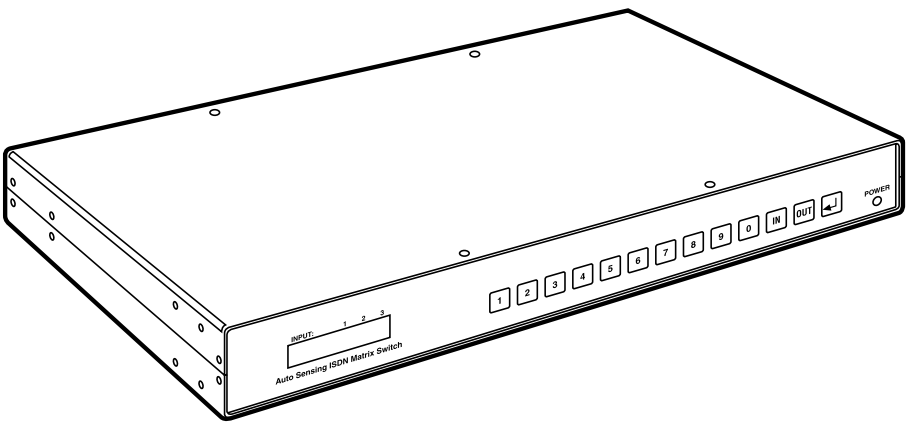




# Autosensing ISDN Matrix Switch



**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

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.*

## FCC Requirements for Telephone-Line Equipment

1. The Federal Communications Commission (FCC) has established rules which permit this device to be directly connected to the telephone network with standardized jacks. This equipment should not be used on party lines or coin lines.
2. If this device is malfunctioning, it may also be causing harm to the telephone network; this device should be disconnected until the source of the problem can be determined and until the repair has been made. If this is not done, the telephone company may temporarily disconnect service.
3. If you have problems with your telephone equipment after installing this device, disconnect this device from the line to see if it is causing the problem. If it is, contact your supplier or an authorized agent.
4. The telephone company may make changes in its technical operations and procedures. If any such changes affect the compatibility or use of this device, the telephone company is required to give adequate notice of the changes.
5. If the telephone company requests information on what equipment is connected to their lines, inform them of:
  - a. The telephone number that this unit is connected to.
  - b. The ringer equivalence number.
  - c. The USOC jack required: RJ-11C.
  - d. The FCC registration number.

Items (b) and (d) can be found on the unit's FCC label. The ringer equivalence number (REN) is used to determine how many devices can be connected to your telephone line. In most areas, the sum of the RENs of all devices on any one line should not exceed five (5.0). If too many devices are attached, they may not ring properly.

6. In the event of an equipment malfunction, all repairs should be performed by your supplier or an authorized agent. It is the responsibility of users requiring service to report the need for service to the supplier or to an authorized agent.

## Certification Notice for Equipment Used in Canada

The Industry Canada label identifies certified equipment. This certification means that the equipment meets certain telecommunications-network protective, operation, and safety requirements. Industry Canada does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring associated with a single-line individual service may be extended by means of a certified connector assembly (extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized maintenance facility—in this case, Black Box. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

### CAUTION

**Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.**

The LOAD NUMBER (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device, to prevent overloading. The termination on a loop may consist of any combination of devices, subject only to the requirement that the total of the load numbers of all the devices does not exceed 100.

**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.

### TRADEMARKS USED IN THIS MANUAL

UL is a registered trademark of Underwriters Laboratories Incorporated.

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

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# 1. Specifications

**Compliance:** FCC Class A, CE, UL®

**Connectors:** Input: (3) 8-pin RJ-45 female; Output: (12) 8-pin RJ-45 female;  
RS-232 Input: (1) DB9 connector for serial communication (manual mode only);  
(1) power connector

**Interface:** Input: (3) BRI (Basic Rate Interface) ISDN T interfaces to be connected to NT1s (Network Terminal 1); Output: (12) BRI (Basic Rate Interface) ISDN S interfaces to be connected to TEs (Terminal Equipment)

**User Controls:** Keypad: 13 front-panel keys; Computer: RS-232 serial communication, DB9 female connector (RS-232 input has first priority; when the RS-232 input is used, the keypad on the ISDN Matrix Switch is disabled for the duration of the PC command)

**Display:** (1) Front-panel 16-character LCD display

**Indicators:** (1) LED: Power

**Enclosure:** Aluminum, dark gray, medium-texture finish

**Power:** 110 VAC/60 Hz or 220 VAC/50 Hz

**Size:** 1.6"H x 17"W x 8.5"D (4.1 x 43.2 x 21.6 cm)

**Weight:** 4.5 lb. (2 kg)

## 2. Introduction

Use the Autosensing ISDN Matrix Switch for switching and routing BRI (Basic Rate Interface) ISDN lines.

### 2.1 Features

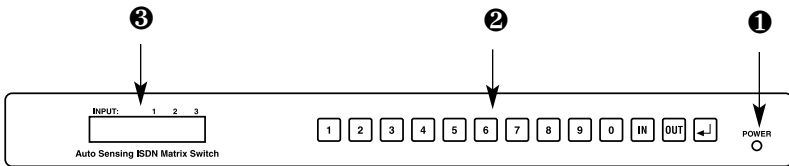
- Simple and quick switching of ISDN BRI lines.
- Instantly “move” BRI lines.
- Routes three ISDN lines to twelve possible outputs.
- Three modes of operation for manual, 128-kbps automatic, or 384-kbps automatic switching.
- RS-232 controllable.
- Front-panel keypad control.
- On-demand automatic line routing and re-routing (user-selectable).
- LCD readout of active line pairing reflects current input and output assignments.
- Active Data Lock—The ISDN Matrix Switch locks any routing command that involves an active line until the call has been disconnected.

### 2.2 What the Package Includes

You should have received the following items:

- (1) Autosensing ISDN Matrix Switch
- (1) Power cord
- (1) 3.5" diskette containing RS-232 interface software
- This users' manual

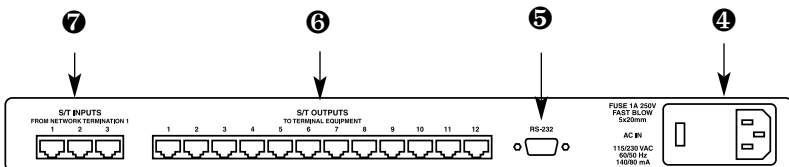
## 2.3 Front Panel



**Figure 2-1. The front panel.**

- ❶ Power: The red LED lights when the switch is powered.
- ❷ Keypad: Use the 13 keys to change the switch's settings.
- ❸ LCD panel: The 16-character display shows the current input and output assignments, line busy status, keypad entries, and error messages.

## 2.4 Rear Panel

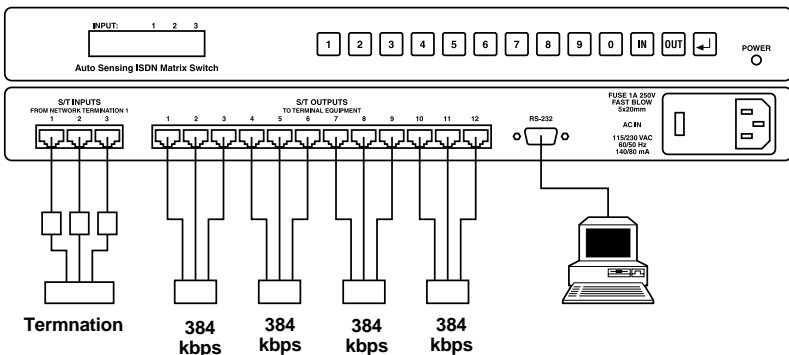


**Figure 2-2. The rear panel.**

- ❹ AC In: AC power input module. It contains the AC inlet connector, fuse, and line-voltage selector. The line-voltage selector allows the switch to operate on either 110-VAC or 220-VAC power.
- ❺ RS-232 input: The DB9 female connector is used for serial communication (manual mode only).
- ❻ Outputs: Twelve 8-pin RJ-45 female connectors to be connected to TEs (Terminal Equipment) via twisted-pair cable.
- ❼ Inputs: Three 8-pin RJ-45 female connectors to be connected to NT1s (Network Terminal 1) via twisted-pair cable.

## 3. Setup

1. Make sure the line-voltage selector is set to match the AC power available in your area. The LCD display indicates the current setting. To change the voltage setting, pry open the cover of the AC inlet using a small flat-head screwdriver. Take the voltage selector out and re-insert it in the appropriate direction. The desired VAC label on the voltage-selector switch should be pointing toward the cover. Do not try turning the voltage-selector switch while it is in the module.
2. Connect the necessary inputs to the NT1s using straight-through twisted-pair cable.
3. Connect the necessary outputs to the videoconferencing equipment using straight-through twisted-pair cable.
4. If you want to control the switch using a computer, the RS-232 port on the Autosensing ISDN Matrix Switch must be connected to the serial port of the PC via a serial cable (not included).
5. Plug in the AC power cord and check for the Power LED.
6. The LCD module should display `OUTPUT:00 00 00`.
7. The unit is now operational. Make the appropriate connections using either the keypad or the computer.



**Figure 3-1. Typical setup configuration.**

# 4. Operation

## 4.1 Modes of Operation

The Autosensing ISDN Matrix Switch has three modes of operation: Mode 0, Mode 1, and Mode 3.

### **MODE 0—MANUAL**

- Upon powerup, it's the default mode.
- The keypad and RS-232 are fully functional. Consult **Section 4.3** for more information.

### **MODE 1—128 KBPS AUTOSENSE (1 BRI LINE)**

- Only Input 1 is used; Input 2 and Input 3 are ignored.
- Limited keypad and RS-232 control.
- Every two seconds the switch scans the outputs in ascending order (this is also the output priority\*):

Output 1→Output 2→...Output 11→Output 12

\*Unless there's a line busy indication on the current output, in which case it has the highest priority and cannot be switched away.

- Under no line busy conditions, if an activation signal is detected on one of the outputs, the switch stops scanning the rest of the outputs. If the detected output is not the same as the current output, the switch makes the appropriate connection. However, if a signal is not detected on any of the 12 outputs, the switch returns to its default configuration.

### **MODE 3—384 KBPS AUTOSENSE (3 BRI LINES)**

- Limited keypad and RS-232 control.
- Every two seconds the switch scans the outputs in ascending order:

Output 1→Output 2→...Output 11→Output 12

- Under no line busy conditions, if an activation signal is detected on one of the outputs, the switch stops scanning the rest of the outputs. It determines the group number, and if it is different than the current group number, the switch makes the appropriate connections. However, if a signal is not detected on any of the 12 outputs, the switch returns to its default configuration.
- The 12 outputs are divided into four groups in the following manner:

Group 1: Outputs 1, 2, and 3

Group 2: Outputs 4, 5, and 6

Group 3: Outputs 7, 8, and 9

Group 4: Outputs 10, 11, and 12

- Group priority is defined in the following way\*:

Group 1 → Group 2 → ... Group 3 → Group 4

\*Unless there's a line busy indication in one of the groups, in which case that group has the highest priority and cannot be switched away.

## 4.2 User Instructions

When the Autosensing ISDN Matrix Switch is powered, the LCD displays the following:

```
OUTPUT:00 00 00
```



This indicates that all of the inputs are disconnected (none of the three inputs are connected to any of the outputs).







To select a mode, press the appropriate number key (  ,  , or  ) on the keypad. Pressing the  key displays the current mode setting.

By pressing the  key, the LCD displays: MANUAL MODE?

By pressing the  key, the LCD displays: 1LINE AUTO MODE?













By pressing the  key, the LCD displays: 3LINE AUTO MODE?

To acknowledge the request, press the  key; otherwise, to cancel the request, press the  key. Pressing any other key will result in `FORMAT ERROR`. However, if there is videoconferencing in progress (indicated by a star in front of the lines being used) then you can't change the switch's operating mode. Attempting to do so will result in the LCD displaying `LINE BUSY` and the request will be ignored.

When the switch is not in manual mode, control of the keypad and RS-232 is severely disabled. The only functioning keys on the keypad are the following: , , , , and . These keys are used to switch modes when there's no line busy indication.  can also be used to check the current mode setting. Pressing any other key will display the warning `IN AUTO MODE!`. Similar limitations exist for the RS-232 control. See **Section 5.3** for more information.

## 4.3 Manual Mode Instructions

Making or changing connections in manual mode (using the keypad) is quite easy. Follow the five steps listed below.

- Step 1: Press the  key. The LCD displays `IN`.
- Step 2: Press the input number key. The only valid keys are , , or . The input number must be entered as a single digit. The LCD displays `IN (#)`.
- Step 3: Press the  key. The LCD displays `IN (#) OUT`.
- Step 4: Press the output number key(s). The only valid keys are  through . Numbers that are less than ten can be entered directly as a single digit (for example, 8) or as a double digit, where the number is preceded by a zero (for example, 08). To select outputs 10 through 12, the  key should be pressed followed by the , , or  key. The LCD displays either `IN (#) OUT (#)` or `IN (#) OUT(##)`.
- Step 5: Press . This will execute the command. The LCD displays either `IN (#) OUT (#) ENTER` or `IN (#) OUT (##) ENTER`.

## NOTES

1. Unless you press a key on the keypad, the LCD displays the current status: OUTPUT: ## ## ##.

2. If a valid key is pressed, the LCD displays the keypad entry for two seconds. If the next valid key is not pressed within this time duration, the LCD switches back to displaying the current status. However, the previously entered information is not lost. The switch will save the current partial valid keypad entry for 30 seconds. If more than 30 seconds have elapsed since a valid key was pressed, the switch erases the partial entry from memory. As a result, you must start all over again.

3. The  key also functions as a clear key. When the  key is pressed, the partial entry is erased from memory and the LCD is cleared for two seconds. However, if the  key is pressed while the entry memory is blank, the LCD will display `In`, meaning that it's the beginning of a new valid entry.

4. Error messages are displayed for only two seconds.

5. If an invalid key is pressed, the LCD displays `FORMAT ERROR` and the partial entry is erased from memory. Format Error is a syntax error that occurs when the user deviates from the two valid keypad entry formats ( #  #  or  #  ## ). Either the entry sequence is wrong or the numbers are out of range. It can also occur for invalid mode selection.

6. Only one input can be connected to each output. If you try to connect an input to an output that is already taken, the LCD displays `OUTPUT TAKEN` and ignores the request. The only valid output that all three inputs can share is 0, the disconnect state. Entering 0 or 00 as the output number for any of the three inputs disconnects the input.

7. The Autosensing ISDN Matrix Switch is safeguarded to ensure no disruption of video transmission. Data Lock eliminates any chance of call disconnection by "locking" active lines so that no command can interrupt current calls. If you try to disconnect or re-route an input on which a call is in progress, the LCD displays `LINE BUSY` and disregards the request. In addition, if a particular line is busy, the LCD displays a star in front of the corresponding output when showing the current status. The line busy status indicator on the LCD is updated every two seconds.



# 5. RS-232 Interface Program

## 5.1 Description

The RS-232 port on the Autosensing ISDN Matrix Switch is a DB9 female connector. The RS-232 port must be connected to the serial port of the PC via a straight-through serial cable (not included). You will need a PC—not a dumb terminal—to use the RS-232 Interface software with the serial port. This product will not work with terminal emulation software such as HyperTerminal or other common terminal emulation software.

## 5.2 Communication Parameters

Before you install the software, make sure that your communication parameters are set as follows: asynchronous, serial, 9600 baud rate, no parity bit, 1 start bit, 8 data bits, and 1 stop bit.

To access the ISDN Matrix Switch Controller 1.1 program, simply put the floppy diskette into the disk drive and select **ISDNBLACKBOX.EXE**. This brings up the screen shown in Figure 5-1.

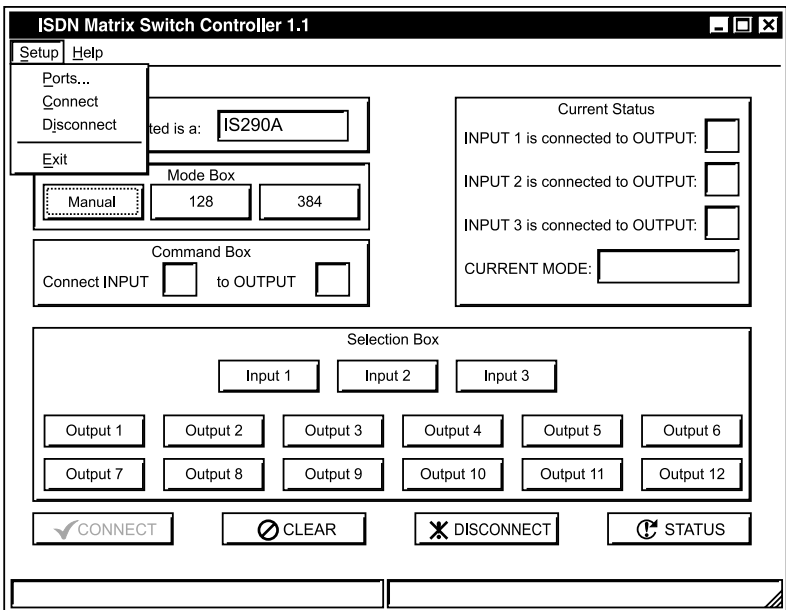


Figure 5-1. ISDN Matrix Switch Controller 1.1 screen.

## 5.3 Setup Menu

You have four options that you can select from the Setup pull-down menu. These options include Ports, Connect, Disconnect, and Exit.

When you select **Ports**, a screen appears that has the options COM 1, COM 2, COM 3, and COM 4. Select the desired COM port.

### 5.3.1 MODE OF OPERATION

From the Setup menu, select **Connect**. Click on the items in the Mode Box to change the operating mode of the Autosensing ISDN Matrix Switch. Select from manual mode, 128 kbps automatic mode, or 384 kbps automatic mode.

### 5.3.2 SELECTION BOX

Click on the options in the Selection Box to make/change a connection on the Autosensing ISDN Matrix Switch.

From this screen, you can select which input ports are connected to the output ports. For example, in the selection box shown on the screen, if you choose **Input 1**, then **Output 3** and click the **Connect** button, input port 1 will connect to output port 3. Continue selecting input and output port connections until all of the desired port connections are made.

To disconnect ports, select the **Disconnect** option and click on the **Disconnect** button.

Continue selecting port connections until you have connected or disconnected all of the desired ports.

Click on the **Clear** button to clear the options from the screen.

Click on the **Status** button to check the status of the connected ports.

### 5.3.3 CURRENT STATUS

Items in the Current Status box display the current status of the Autosensing ISDN Matrix Switch. It will reveal the current connections and the current operating mode (manual, 128, or 384).

### 5.3.4 EXITING THE SETUP MENU

From the Setup menu, select **Disconnect**. This disconnects the switch's RS-232 port. To exit the Setup menu, select **Exit** from the pull-down menu.

# Appendix. Troubleshooting

## A.1 Calling Black Box

If you determine that your Autosensing ISDN Matrix Switch 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.2 Shipping and Packaging

If you need to transport or ship your Autosensing ISDN Matrix Switch:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Autosensing ISDN Matrix Switch 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.



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