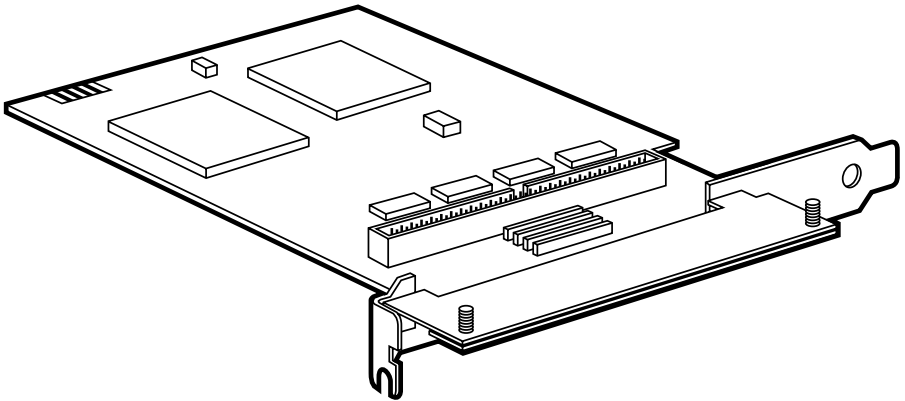




Relay/Digital I/O Card—32



**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.



This product fulfills the requirements of EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission. 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 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

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

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1. Specifications

Mean Time Between Failures (MTBF): > 150,000 hours

Connector: (1) 50-pin IDC male

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

Humidity: 10 to 90%, noncondensing

Power: Supply line: +5 VDC; Rating: 500 mA

Size: Including goldfingers: 3.3"H x 4.7"L (8.4 x 11.9 cm);
Excluding goldfingers: 3"H x 4.7"L (7.6 x 11.9 cm)

Weight: 3.2 oz. (90.7 g)

2. Introduction

2.1 Overview

The Relay/Digital I/O Card—32 provides PC-based control and automation of equipment, such as sensors, switches, satellite systems, and other industrial automation systems. The card gives the PC four 8-bit ports. Each of the four ports' status is user-selectable as input or output by simply writing a control word to the port register. You can customize the combination of inputs and outputs as needed.

2.2 What the Package Includes

The card ships with the following items:

- Relay/Digital I/O Card—32
- Relay/Digital I/O software (on a CD-ROM)
- This users' manual

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

2.3 Features

- 32 channels (four ports of eight channels each) of digital I/O configurable as inputs or outputs.
- Supports all PCI interrupts.

2.4 Software

The card comes with Windows® 98/Me/XP, Windows NT®, and Windows 2000 drivers, with a consistent and straightforward application program interface (API). This software supports popular development environments, including Visual C++, Visual Basic, and Delphi. It also includes a utility for configuring the driver parameters under Windows 98/Me/XP, Windows NT, and Windows 2000.

The Relay/Digital I/O Card—32 also supports DOS, QNX, and Linux®.

3. Installation

3.1 Card Setup

The Relay/Digital I/O Card—32 is a plug-and-play adapter. All card resources (I/O address, IRQ selection) are auto-assigned by either your system BIOS or your plug-and-play operating system.

3.2 Operating-System Installation

Please install the proper software for your adapter before installing the hardware. Refer to the supplied software for the correct operating-system installation procedure.

3.3 System Installation

You can install the card in any of the PCI expansion slots. Follow these steps:

1. Turn off the power to the PC. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available PC slot and remove the blank slot cover.
4. Gently insert the card into the slot. Make sure that the card is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord. Installation is complete.

Once you install the card, refer to Tables 3-1 and 3-2. Table 3-1 describes where in memory each port is located. Use it along with Table 3-2 to define base addresses for the input/output ports. See the example in **Section 3.4** for more information.

3.4 Register Descriptions

Table 3-1. Address registers.

| Address | Mode | D7 | D6 | D5 | D4 | D3 | D2 | D1 | D0 |
|---------|---------|-------|-------|------|------|------|------|------|------|
| Base+0 | RD/WR | PAD7 | PAD6 | PAD5 | PAD4 | PAD3 | PAD2 | PAD1 | PAD0 |
| Base+1 | RD/WR | PBD7 | PBD6 | PBD5 | PBD4 | PBD3 | PBD2 | PBD1 | PBD0 |
| Base+2 | RD/WR | PCD7 | PCD6 | PCD5 | PCD4 | PCD3 | PCD2 | PCD1 | PCD0 |
| Base+3 | RD/WR | PDD7 | PDD6 | PDD5 | PDD4 | PDD3 | PDD2 | PDD1 | PDD0 |
| Base+4 | RD/WR | {0} | {0} | {0} | {0} | DIRD | DIRC | DIRB | DIRA |
| Base+5 | RD/WR | IRQEN | IRQST | {0} | {0} | {0} | {0} | IRC1 | IRC0 |
| Base+6 | RD Only | {0} | {0} | {0} | {0} | {0} | {0} | {0} | {0} |
| Base+7 | RD Only | {0} | {0} | {0} | {0} | {0} | {0} | {0} | {0} |

NOTE

All ports are set to input after reset or power up. Interrupt source is Base+0 bit D0. When selecting the Interrupt mode, always disable interrupts before changing or setting states. This will help prevent inadvertent or unexpected interrupts. When using the high- and low-level interrupts, a change in the input's state must occur before the interrupt can be cleared. The device providing the input to Base+0, bit D0, must do this.

PAD0-7=Port A (Base+0)

PBD0-7=Port B (Base+1)

PCD0-7=Port C (Base+2)

PDD0-7=Port D (Base+3)

DIRA-D=Port A-D direction control (Base+4)

0=input

1=output

IRC0-1=Interrupt Mode select (Base+5)

| | | |
|------|------|--|
| IRC1 | IRC0 | |
|------|------|--|

| | | |
|---|---|-----------|
| 0 | 0 | Low level |
|---|---|-----------|

| | | |
|---|---|------------|
| 0 | 1 | High level |
|---|---|------------|

| | | |
|---|---|--------------|
| 1 | 0 | Falling edge |
|---|---|--------------|

| | | |
|---|---|-------------|
| 1 | 1 | Rising edge |
|---|---|-------------|

IRQEN=enable interrupts (Base+5)

0=disabled

1=enabled (disabled after reset or power up)

IRQST=interrupt status (Base+5)

1=interrupt pending (reading the bit clears interrupt)

3.5 I/O Connector Pinout (50-pin IDC)**Table 3-2. IDC connector pinout.**

| Description | Pin Number |
|--------------------|-------------------|
| Port A | |
| A0 | 47 |
| A1 | 45 |
| A2 | 43 |
| A3 | 41 |
| A4 | 39 |
| A5 | 37 |
| A6 | 35 |
| A7 | 33 |
| Port B | |
| B0 | 31 |
| B1 | 29 |
| B2 | 27 |
| B3 | 25 |
| B4 | 23 |
| B5 | 21 |
| B6 | 19 |
| B7 | 17 |
| Port C | |
| C0 | 15 |
| C1 | 13 |
| C2 | 11 |
| C3 | 9 |
| C4 | 7 |
| C5 | 5 |
| C6 | 3 |
| C7 | 1 |

Table 3-2 (continued). IDC connector pinout.

| Description | Pin Number |
|--------------------|-----------------------|
| Port D | |
| D0 | 2 |
| D1 | 4 |
| D2 | 6 |
| D3 | 8 |
| D4 | 10 |
| D5 | 12 |
| D6 | 14 |
| D7 | 16 |
| GND | All even pins from 18 |
| +5V | 49 |

Appendix A. Troubleshooting

A.1 Troubleshooting Tips

Following the steps listed below can eliminate most common problems.

1. Install the software *first*. After installing the software, then add the hardware. This places the required files in the correct locations.
2. Identify all I/O adapters currently installed in your system, including your onboard serial ports, controller cards, sound cards, etc. Identify the I/O addresses used by these adapters as well as the IRQ (if any).
3. Make sure that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address and may not be allowed to share IRQs.
4. Make sure that the Relay/Digital I/O Card—32 is securely installed in a motherboard slot.

A.2 Calling Black Box

If you determine that your Relay/Digital I/O Card—32 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 Relay/Digital I/O Card—32:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the Relay/Digital I/O Card—32 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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