

**IPG/7000**

**Hardware**

**Manual**



Document number 80-001066-1

Revision D

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# Agency Notifications

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## FCC

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

The IPG/75xx models are approved for connection to the telephone network under:

1. Industry Canada Standards, CS-01, CS-02 and CS-03 and in accordance with the Industry Canada terminal attachment program.
2. ACTA FCC Part 68.
3. TIA-968-A

## CUSTOMER INFORMATION

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"NOTICE: This equipment meets the applicable Industry Canada Terminal Equipment Technical Specifications. This is confirmed by the registration number. The abbreviation, IC, before the registration number signifies that registration was performed based on a Declaration of Conformity indicating that Industry Canada technical specifications were met. It does not imply that Industry Canada approved the equipment."

"NOTICE: The Ringer Equivalence Number (REN) for this terminal equipment is 0.1. The REN assigned to each terminal equipment provides an indication of the maximum number of terminals allowed to be connected to a telephone interface. The termination on an interface may consist of any combination of devices subject only to the requirement that the sum of the Ringer Equivalence Numbers of all the devices does not exceed five."

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# Table of Contents

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|   |           |
|---|-----------|
| <b>CHAPTER 1: OVERVIEW</b> .....                | <b>3</b>  |
| <b>IPG Features</b> .....                       | <b>4</b>  |
| <b>Description of IPG Models</b> .....          | <b>5</b>  |
| <b>Using the IPG</b> .....                      | <b>5</b>  |
| <br>  |           |
| <b>CHAPTER 2: INSTALLING THE HARDWARE</b> ..... | <b>7</b>  |
| <b>Overview</b> .....                           | <b>7</b>  |
| <b>Planning the installation</b> .....          | <b>7</b>  |
| <b>IPG Panel Connectors</b> .....               | <b>8</b>  |
| <b>Connecting Devices to the IPG</b> .....      | <b>9</b>  |
| POS Terminal Ports.....                         | 9         |
| Dialup Modem Port.....                          | 9         |
| Serial Ports .....                              | 10        |
| <i>IPG/7000 DCE RS-232 Operation</i> .....      | 10        |
| <i>IPG/7000 DTE RS-232 Operation</i> .....      | 12        |
| Ethernet LAN .....                              | 14        |
| <b>Starting the IPG</b> .....                   | <b>15</b> |
| <br>  |           |
| <b>CHAPTER 3: TROUBLESHOOTING</b> .....         | <b>17</b> |
| <b>Status LED</b> .....                         | <b>17</b> |
| <b>Serial/Terminal/Modem Port LEDs</b> .....    | <b>18</b> |
| <b>Ethernet LED</b> .....                       | <b>18</b> |
| <br>  |           |
| <b>APPENDIX: SPECIFICATIONS</b> .....           | <b>19</b> |
| <b>IPG Hardware Specifications</b> .....        | <b>19</b> |
| <b>Environmental Specifications</b> .....       | <b>19</b> |
| <b>Product Dimensions</b> .....                 | <b>20</b> |
| <b>Model Numbers</b> .....                      | <b>20</b> |
| <b>Ethernet cabling specifications</b> .....    | <b>20</b> |



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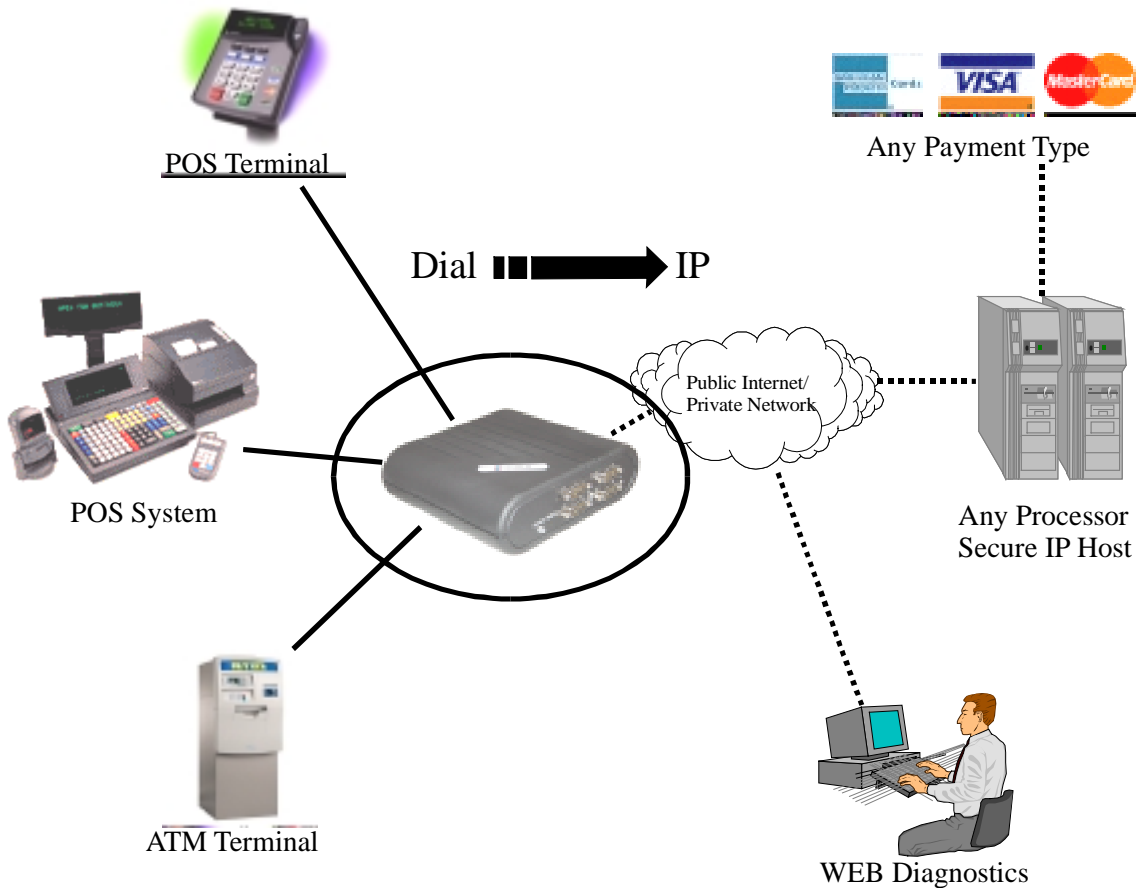
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# Chapter 2: Overview

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Systemtech Internet Payment Gateways convert dial-up payment transactions to high-speed IP transactions at the merchant location and re-route them over any public or private IP connection. The gateways connect POS payment terminals, POS systems, check readers, and ATMs to payment processing networks over the public Internet using secure IP/SSL transactions. Merchants preferring private IP networks, can use the Systemtech solutions to re-route dial-up transactions through existing satellite, frame, or other wide-area links. Merchants benefit from higher-speed payment transactions, and recurring cost savings from the elimination of dedicated dial-up or lease lines.



## IPG Features

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The IPG offers the following features and benefits:

- Easy web-based set up and configuration
- Open systems communications for multi-site data networks
- Up to 4 RJ-11 POS Terminal (phone line) ports
- Up to 2 DB25-Female serial ports (with screw-down connectors)
- RS-232 DCE/DTE software configurable on all serial ports
- Optional dialup modem port
- High-speed serial connections (up to 230.4K baud)
- Standard single RJ-45, 10/100 Base-TX Ethernet port
- IP packet routing
- SSL encryption
- Can be used in a variety of data communications applications
- Operating system independent
- Complete remote diagnostics
- LEDs for each port, signaling port status and error conditions
- Industry standard interoperability
- Supports NativeCOM, allowing serial ports to appear as local Windows COM ports
- Supports generic TCP/IP access to serial ports without requiring special protocols or processing
- Standard support for LPR/LPD network printing under Windows and UNIX
- Telnet and reverse-telnet support for a variety of UNIX operating systems

## Description of IPG Models

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The IPG 7000 series is available with a number of different models. These products are functionally equivalent except for the numbers of ports.

| Model    | Optional Modem | Number of POS Terminal Ports | Number of Serial Ports |
|----------|----------------|------------------------------|------------------------|
| IPG/7101 | No             | 0                            | 1                      |
| IPG/7110 | No             | 1                            | 0                      |
| IPG/7111 | No             | 1                            | 1                      |
| IPG/7120 | No             | 2                            | 0                      |
| IPG/7122 | No             | 2                            | 2                      |
| IPG/7501 | Yes            | 0                            | 1                      |
| IPG/7502 | Yes            | 0                            | 2                      |
| IPG/7511 | Yes            | 1                            | 1                      |
| IPG/7520 | Yes            | 2                            | 0                      |
| IPG/7522 | Yes            | 2                            | 2                      |
| IPG/7540 | Yes            | 4                            | 0                      |
| IPG/7542 | Yes            | 4                            | 2                      |

## Using the IPG

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Using the IPG requires three steps:

1. Hardware installation
2. Configuration
3. Operation

Hardware installation is documented in this manual.

Refer to the **IPG Administrator's Guide** for configuration and operation.



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# Chapter 3: Installing the Hardware

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This chapter describes installing the IPG hardware, including:

- Planning the installation
- Checking cables and connectors
- Sample configurations

## Overview

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Installing the IPG hardware includes the following steps:

**1. Plan the installation**

**2. Connect the IPG port server to your network**

The most common connection method is through the 10/100 Base-TX RJ-45 connector (which is labeled LAN) to your Ethernet LAN, using a standard straight-through Ethernet cable to a hub/switch.

**3. Connect your peripheral device(s) to the IPG device server**

Attach each peripheral device (e.g., POS terminal, cash register, card reader, modem) to a phone line port (RJ-11 connector on the front) or serial port (DB-25 connector).

**4. Plug the AC power supply adapter into the IPG**

## Planning the installation

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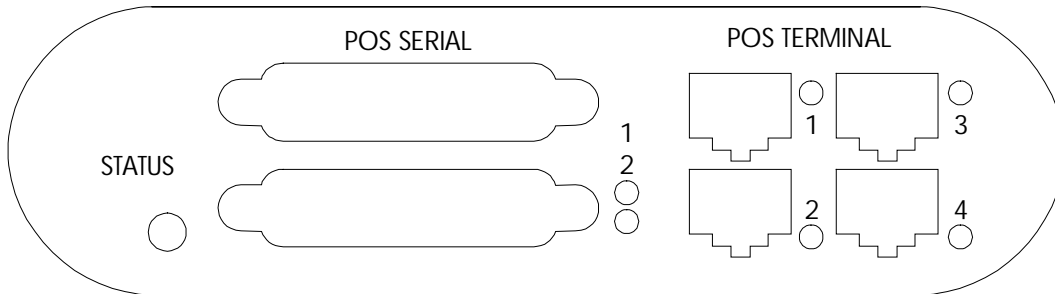
Before installing the IPG device server, consider the following:

- How will you configure your network—what types of devices will you connect and where will they be located? Identify the distances at which each device will be located from the IPG server.
- Verify that the locations selected for devices do not exceed cable specifications.
- To conform to UL safety rules, the unit may be tabletop mounted or wall mounted. If wall mounted, the front and rear connector plates should be oriented facing up or down, not to the left or right.
- Is there an acceptable source of AC power available near each device's proposed location?

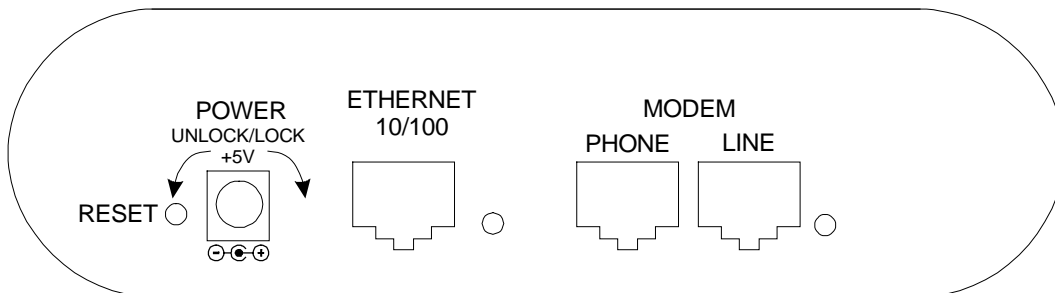
## IPG Panel Connectors

The following figures show the connectors and LED locations for the IPG models. There are:

- zero, one or two DB-25 Female serial ports
- zero, one, two or four RJ-11 telephone (terminal) ports”)
- an optional modem with two RJ-11 ports (“Line” and “Phone”)
- one Ethernet port.



### IPG Front Panel Connectors



### IPG Rear Panel Connectors

The Unit Status LED indicates the overall status of the device. The Port Status LEDs indicate the status of each serial, terminal or modem port. The LAN LED indicates the status of the Ethernet connection. For information on interpreting the LED color and pattern displays, see **Troubleshooting**.

The reset button can be used to reboot the unit or to restore the factory default configuration on the unit. Depressing and releasing the button will reboot the unit.

Depressing and holding the "Reset" button in for about 5 seconds will restore the default (factory) configuration to the unit and then reboot the unit.

## Connecting Devices to the IPG

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### POS Terminal Ports

The POS Terminal ports are phone lines designed to function just like standard wall-jack analog phone lines. They are designed primarily to connect POS (Point Of Sale) terminals, with internal modems, to the IPG, which then routes data from the devices over the network. The IPG mimics the phone company, answering incoming calls and routing them to an internal modem attached to each phone line, or generating calls from an internal modem to an attached device.

The terminal lines and internal modems communicate up to 2400 baud and support the following standards:

- Bell 212A
- ITU-T V.22
- ITU-T V.22bis
- V.22 FastConnect (Hypercom)

### Dialup Modem Port

The dialup modem port is designed primarily as an alternative way to connect the IPG to the Internet through a dial-up Internet Service Provider. The modem supports speeds up to 14,400 baud and supports the following standards:

- Bell 212A
- ITU-T V.14
- ITU-T V.22
- ITU-T V.22bis
- V.22 FastConnect (Hypercom)
- ITU-T V.32
- ITU-T V.32bis
- ITU-T V.42
- ITU-T V.42bis

The modem port labeled “Line” should be plugged into the wall jack for an analog phone line. You may plug an optional phone handset into the port labeled “Phone”.

## Serial Ports

In the RS-232 definition, a pair of devices, one a terminal (Data Terminal Equipment or DTE) and one a modem (Data Communication Equipment or DCE), are designed to plug directly in to each other. The IPG RS-232 serial ports may each be independently configured via software, to operate in DCE (modem) or DTE (terminal) mode. The following sections describe the pinouts and cabling options associated with these different modes.

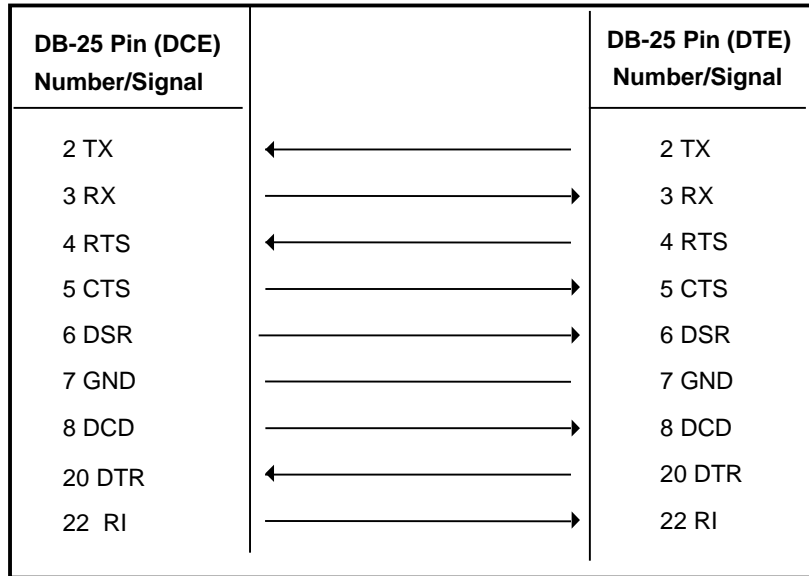
### *IPG/7000 DCE RS-232 Operation*

Data Communication Equipment (DCE) mode is generally used to communicate with a terminal device. This includes terminals, PC serial ports, printers and, generally, most devices other than modems. When in DCE mode, the IPG/7000 port server family uses the following pinouts:

| <b>DB-25<br/>Pin<br/>Number</b> | <b>RS-232<br/>Name</b> | <b>Direction</b> | <b>Signal Function</b>  |
|---------------------------------|------------------------|------------------|---|
| 2                               | TX                     | I                | Serial data in, from remote device to IPG                     |
| 3                               | RX                     | O                | Serial data out, from IPG to remote device                    |
| 4                               | RTS                    | I                | Flow control, to enable IPG to send data                      |
| 5                               | CTS                    | O                | Flow control, to enable remote device to send data            |
| 6                               | DSR                    | O                | Signals remote device that the IPG is attached and powered on |
| 7                               | GND                    |                  | Signal ground   |
| 8                               | DCD                    | O                | Signals remote device that IPG has a valid connection         |
| 20                              | DTR                    | I                | Signals IPG that the remote device is attached and powered on |
| 22                              | RI                     | O                | Ring Indicator  |

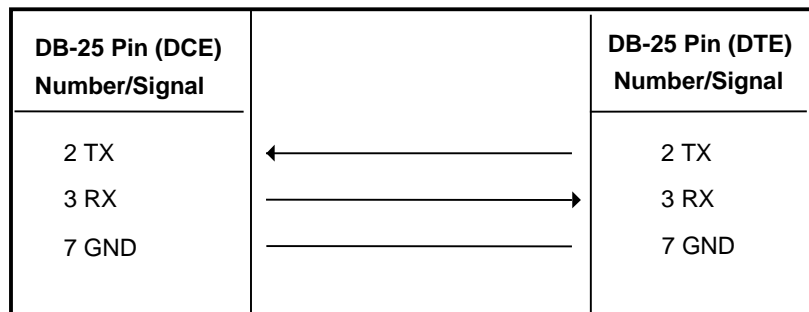
**Table 3-1: EIA-232 DB-25 DCE Pinouts**

Figure 3-2 shows a cable to connect most devices to the IPG/7000.



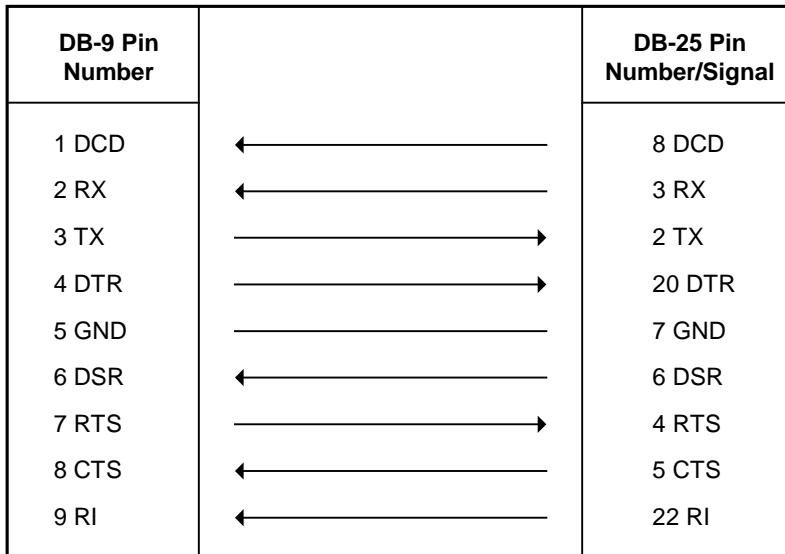
**Figure 3-2: DB-25 to DB-25 Full Cable**

The IPG/7000 does not require the use of all 9 wires. Only the RX, TX, and GND signals are essential. DTR/DSR and RTS/CTS are only necessary for flow control. DCD is used to indicate a connection and RI is only required for connections that need a ring indicator. Figure 3-3 shows a minimal 3-wire cable using only RX (pin 2, data in), TX (pin 3, data out), and GND (pin 5, ground).



**Figure 3-3: DB-25 to DB-25 3-wire Cable**

To connect the IPG in DCE mode to a standard PC COM port, use a standard modem cable as shown in Figure 2-4.



**Figure 3-4: DB-25 (DCE) to DB-9 Terminal Cable**

### ***IPG/7000 DTE RS-232 Operation***

Data Terminal Equipment (DTE) mode is generally used to communicate with a modem. When in DTE mode, the IPG/7000 port server family uses the following pinouts:

| DB-25 Pin Number | RS-232 Name | Direction | Signal Function  |
|------------------|-------------|-----------|--|
| 2                | TX          | O         | Serial data out, from IPG to remote device                   |
| 3                | RX          | I         | Serial data in, from remote device to IPG                    |
| 4                | RTS         | O         | Flow control, to enable remote device to send data           |
| 5                | CTS         | I         | Flow control, to enable IPG to send data on TX               |
| 6                | DSR         | I         | Signals module that remote device is attached and powered on |
| 7                | GND         |           | Signal ground  |
| 8                | DCD         | I         | Signals module that remote device has a valid connection     |
| 20               | DTR         | O         | Signals remote device that IPG is attached and powered on    |
| 22               | RI          | I         | Ring Indicator   |

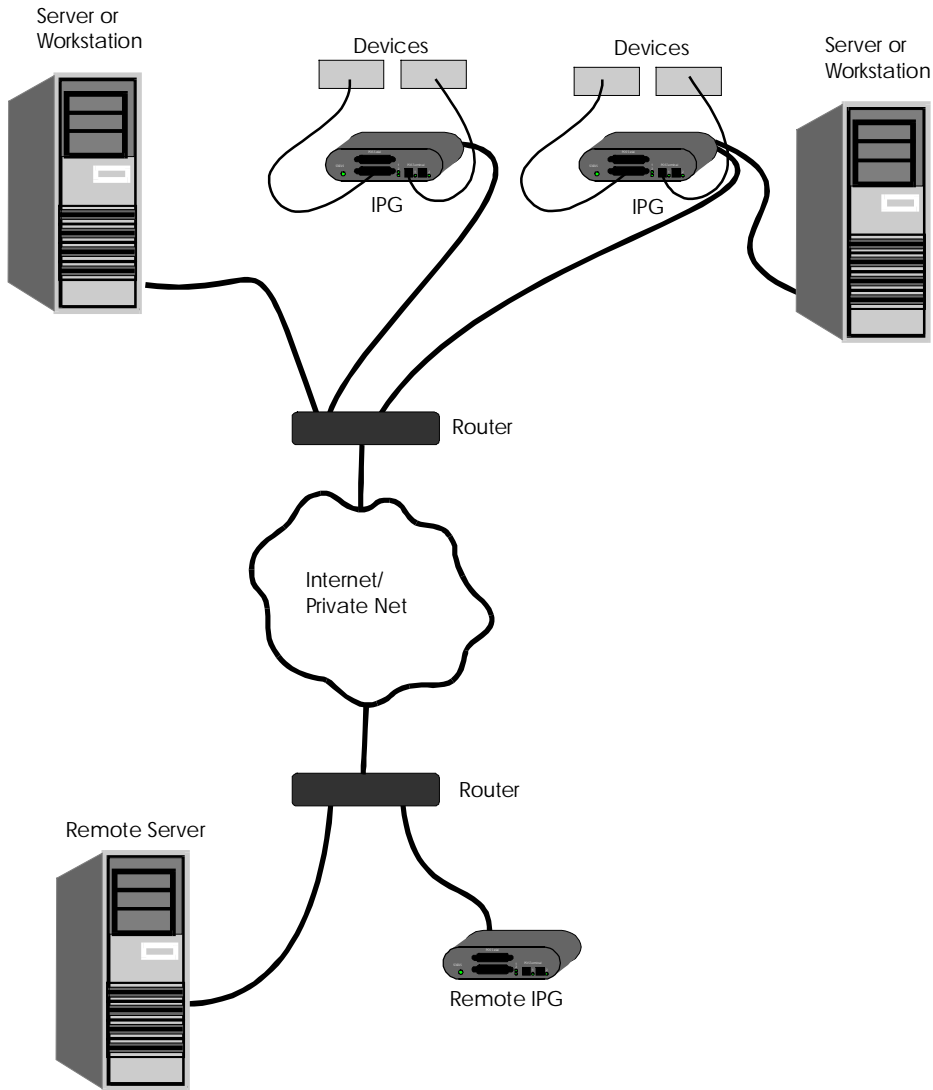
### **Table 3-5: EIA-232 DB-25 DTE Pinouts**

The same, straight-through cables used in DCE mode may be used to connect to DB25 devices (see Figure 3-2 and Figure 3-3) in DTE mode. Modems should be configured to switch their carrier detect signal (CD) on and off in response to making and breaking telephone connections. This insures that the IPG/7000 terminates user sessions when they disconnect.

When using NativeCOM or reverse telnet, the serial port should be configured as DTE.

## Ethernet LAN

The IPG is connected to your LAN using an Ethernet port. The Ethernet port on the IPG is a standard 10/100 Base-TX RJ-45 jack. It can be connected to an Ethernet hub/switch via a standard, straight-through Ethernet cable.



## Starting the IPG

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When the IPG is powered up, the LEDs indicate the status of the units and its ports. The following LED colors and patterns will be displayed during normal startup, if no errors are detected.

- **Status LED** – initially this LED will be yellow, but will quickly turn green. If the status LED is solid green, then the IPG doesn't have a permanent IP address and is trying to obtain one from a DHCP server. If the LED is blinking green, it means the IPG has obtained an IP address and is ready to use. Red indicates a fatal error.
- **Ethernet LEDs** – these LEDs will normally be either off or green. A green LED means that a good ethernet link has been established and the unit is on the network. The LED will blink green to show network activity.
- **Serial/POS Terminal/Modem port LEDs** – these LEDs will normally be either off or green. Off indicates a port that is not in use. Green indicates a port that is in use. The green LED will blink when data is transmitted or received. It will blink 2 times per second when data is continuously transmitted or received.

If any of the LEDs turn red, an error condition was detected. For a full description of the LED patterns, see **Troubleshooting**.



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# Chapter 4: Troubleshooting

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The IPG has several LED indicators: **Unit Status**, **Ports** (serial, POS terminal or modem), and **Ethernet**.

The LEDs use red, yellow, and green blinking combinations to indicate the status of each of the IPG's major components.

## Status LED

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The status LED indicates the overall status of the IPG. See Table 4-1.

| Status LED Condition     | Meaning  |
|--------------------------|--|
| Solid Green              | The unit is running, but it needs an IP address. It is trying to obtain one from DHCP/BOOTP.   |
| Blinking Green           | The unit has an IP address and is operating normally   |
| Alternating Green/Red    | If the "reset" button is being held in, this LED sequence means that the factory default configuration is about to be restored. If you do not want to restore the factory default, release the button before the sequence changes to Green/Yellow.<br><br>Otherwise this means a serious system error occurred. See the system log for more details. |
| Alternating Green/Yellow | If the "reset" button is being held in, this LED sequence means that the factory default configuration will be restored. You may release the button.<br><br>Otherwise, this means that the current configuration is corrupt and that the factory default configuration is being used.  |
| Blinking Yellow          | The unit is booting.   |
| Solid Red                | Fatal error.   |
| Off                      | No power, or the unit is inoperative   |

**Table 4-1: Status LED Conditions**

## Serial/Terminal/Modem Port LEDs

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Each port has a Port LED that describes port activity. Table 4-2 describes the various Port LED states.

| Port LED Condition | Meaning   |
|--------------------|---|
| Off                | Port is closed or no power.   |
| Solid Green        | Port is open, but idle  |
| Blinking Green     | Port is open, and data is being transmitted or received. When data is being continuously transferred, this LED will blink approximately 2 times per second. |
| Red Blinks         | Data errors will cause periodic red blinks. Persistent red blinks may imply a configuration problem (incorrect baud rate, parity settings, etc.)            |
| Solid Red          | Port hardware has failed  |

**Table 4-2: Port LED Conditions**

## Ethernet LED

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The Ethernet port LED describes the state of the network connection on that port. Table 4-3 describes the various Ethernet LED states.

| Ethernet LED Condition | Meaning                                    |
|------------------------|--|
| Solid Green            | Ethernet link is good                      |
| Green Blink            | Network traffic was detected               |
| Red                    | Ethernet error                             |
| Off                    | The Ethernet cable is bad or not connected |

**Table 4-3: Ethernet LED Condition**

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# Appendix: Specifications

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## IPG Hardware Specifications

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- ARM7 50MHz CPU
- 1MB to 8Mbytes in-circuit boot flash and program memory
- 8 to 32 Mbytes SDRAM
- 10/100 Mbps Ethernet connection over 10/100 Base-TX physical lines
- Up to two asynchronous RS232 serial ports with modem control and surge suppression
- Asynchronous port data rates of up to 230.4 Kbps
- DB-25 Female physical connectors
- Serial ports software configurable for DCE or DTE
- Up to four phone lines (labeled “POS Terminal”) with internal modems. Support for phone and modem standards:
  - Bell 212A
  - ITU-T V.22
  - ITU-T V.22bis
  - V.22 FastConnect (Hypercom)
- Optional dialup modem port - all of the standards supported by Terminal ports plus:
  - ITU-T V.14
  - ITU-T V.32
  - ITU-T V.32bis
  - ITU-T V.42
  - ITU-T V.42bis
- External 110 or 240 VAC power supply provides +5V DC regulated to IPG
- Status LEDs for each port

## Environmental Specifications

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- Operating temperature range: 0 to 50°C
- Storage temperature range: -10 to 70°C
- Humidity range: 10% to 90% noncondensing

## Product Dimensions

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The IPG models measure:

6 inches x 5.65 inches x 2.0 inches (152 mm x 144 mm x 51 mm)

## Model Numbers

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| <u>Model</u> | <u>Optional Modem</u> | <u>Number of Terminal Lines</u> | <u>Number of Serial Ports</u> |
|--------------|-----------------------|---------------------------------|-------------------------------|
| IPG/7101     | No                    | 0                               | 1                             |
| IPG/7110     | No                    | 1                               | 0                             |
| IPG/7111     | No                    | 1                               | 1                             |
| IPG/7120     | No                    | 2                               | 0                             |
| IPG/7122     | No                    | 2                               | 2                             |
| IPG/7501     | Yes                   | 0                               | 1                             |
| IPG/7502     | Yes                   | 0                               | 2                             |
| IPG/7511     | Yes                   | 1                               | 1                             |
| IPG/7520     | Yes                   | 2                               | 0                             |
| IPG/7522     | Yes                   | 2                               | 2                             |
| IPG/7540     | Yes                   | 4                               | 0                             |
| IPG/7542     | Yes                   | 4                               | 2                             |

## Ethernet cabling specifications

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This section describes guidelines for using 10/100 Base-TX twisted-pair cabling:

- Recommended cable is category 5 (CAT5 or CAT5E) unshielded solid copper twisted pair
- Ethernet cable pairs **must** be properly twisted: pins 1 and 2 must be a twisted pair, and pins 3 and 6 must be a twisted pair
- Maximum distance of a segment—from concentrator to node—is 100 meters (328 feet)
- Maximum of 5 segments between any two nodes

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# Index

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**1**  
10/100 Base-TX, cabling specifications, 21

**3**  
3-wire diagram  
IPG/7000, 11

**A**  
asynch port  
specifications, 19

**C**  
cable diagram  
terminal, DB-9 to DB-25, 11  
cabling, specifications, 21  
configuration planning, 7

**D**  
DB-25 serial port  
diagram, 8  
DB-25 to DB-25 3-wire terminal cable diagram, 11  
DB-9 to DB-25 terminal cable diagram, 11  
default configuration, 8

**E**  
ethernet network  
cabling specifications, 21

**F**  
factory default configuration, 8  
front panel, diagram, 8

**I**  
installation, hardware, 7

**L**  
LAN  
connecting IPG to, 14  
LED  
diagram, 8  
overview, 17  
start up, 15

**M**  
modem signals  
CD, 13

**P**  
panel, diagram, 8  
port, DB-25  
diagram, 8

**R**  
red LED, 15  
restoring default configuration, 8  
RJ-11 modem port  
diagram, 8  
RJ-11 phone port  
diagram, 8  
RJ-45 port  
diagram, 8

**S**  
sessions, terminating on modem disconnect, 13  
specifications, 19  
start up, 15

**T**  
terminal, cable diagram, DB-9 to DB-25, 11  
troubleshooting  
LED indicators, 17  
twisted-pair, cabling specifications, 21