OMG-PCI-DIO32
32 Channel Digital I/O Board
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WARNING: These products are not designed for use in, and should not be used for, patient-connected applications.
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Introduction

Overview

The OMG-PCI-DIO32 provides the PC with four 8-bit ports that can be defined independently as input or output.

What's Included

The OMG-PCI-DIO32 is shipped with the following items. If any of these items is missing or damaged, contact the supplier.

- OMG-PCI-DIO32 Adapter
- Software CD

Installation

Card Setup

The OMG-PCI-DIO32 is a fully compliant PCI ‘Plug and Play’ adapter. All card resources (i.e. I/O address, IRQ selection) are auto-assigned by either your system BIOS or your ‘Plug and Play’ operating system.

Software Installation

For proper operation install software first. To install the software place the CD in your CD-ROM tray and the auto-run program will start. If auto-run is not available browse the CD and choose “index.htm”. Choose Install Software at the beginning of the CD. Select the Digital I/O software drivers and install SeaIO prior to installing hardware.

Linux Users

Refer to the installation instructions at the beginning of the CD for details on installing the digital I/O cards in Linux.
System Installation

The OMG-PCI-DIO32 can be installed in any of the PCI expansion slots.

1. Turn off PC power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an available PCI slot and remove the blank metal slot cover.
4. Gently insert the OMG-PCI-DIO32 into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord. Installation is complete.
Technical Description

The OMG-PCI-DIO32 provides 32 channels of digital I/O configurable as inputs or outputs, which can be utilized for PC based control and automation of equipment. Uses include sensors, switches, satellite antenna control systems, video and audio studio automation, security control systems, and other industrial automation systems.

The OMG-PCI-DIO32’s 32 channels consist of 4 ports of I/O, each port configurable as either input or output, to suit the task at hand. The status of each of the 4 ports is user selectable as input or output by simply writing a control word to the port register. This gives the user the ability to customize the combination of inputs and outputs as needed.

Features

• 32 Channels of Digital I/O configurable as inputs or outputs
• Implemented as 4 ports of 8 channels each of I/O providing flexible operation
• Terminal Block and cable kit available to simplify field wiring requirements
• Supports all PCI interrupts

Windows Software

The OMG-PCI-DIO32 ships with the SeaI/O suite of Windows 98/NT/ME/2000 drivers. SeaI/O provides the user with a consistent and straightforward API, allowing the developer to concentrate on the details of the application as opposed to low level driver development. Popular development environments, including Visual C++, Visual Basic, and Delphi, are supported for application development. SeaI/O includes a utility for configuring the driver parameters under Windows, further simplifying installation. Sample applications are included to facilitate rapid application development.

Linux Software

The OMG-PCI-DIO32 ships with software for Linux, including a kernel-mode driver, API, and the SeaIOTst diagnostic tool. The kernel-mode driver is provided as a module, so future driver upgrades may be performed with minimal (usually zero) downtime. The Linux API is identical to its Windows counterpart, facilitating quick and easy ports of existing SeaI/O-aware applications to the Linux operating system. All source code for the Linux software suite is provided under the GNU Public License (GPL v2.0), to assist in "roll-your-own"-type applications.
3rd Party Software Support

Third party software support for many HMI/MMI and other process control software is included on the product installation CD. For the most up to date information on third party software support, please visit http://www.omega.com.
### 50 pin ribbon cable pin out

<table>
<thead>
<tr>
<th>Description</th>
<th>Pin #</th>
<th>Port A</th>
<th>Description</th>
<th>Pin #</th>
<th>Port C</th>
</tr>
</thead>
<tbody>
<tr>
<td>A0</td>
<td>47</td>
<td></td>
<td>C0</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>A1</td>
<td>45</td>
<td></td>
<td>C1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>A2</td>
<td>43</td>
<td></td>
<td>C2</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>A3</td>
<td>41</td>
<td></td>
<td>C3</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>A4</td>
<td>39</td>
<td></td>
<td>C4</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>A5</td>
<td>37</td>
<td></td>
<td>C5</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>A6</td>
<td>35</td>
<td></td>
<td>C6</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>A7</td>
<td>33</td>
<td></td>
<td>C7</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Port B</td>
<td></td>
<td></td>
<td>Port D</td>
<td></td>
<td></td>
</tr>
<tr>
<td>B0</td>
<td>31</td>
<td></td>
<td>D0</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>B1</td>
<td>29</td>
<td></td>
<td>D1</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>B2</td>
<td>27</td>
<td></td>
<td>D2</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>B3</td>
<td>25</td>
<td></td>
<td>D3</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>B4</td>
<td>23</td>
<td></td>
<td>D4</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>B5</td>
<td>21</td>
<td></td>
<td>D5</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>B6</td>
<td>19</td>
<td></td>
<td>D6</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>B7</td>
<td>17</td>
<td></td>
<td>D7</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>GND</td>
<td></td>
<td></td>
<td>All Even pins from 18</td>
<td></td>
<td></td>
</tr>
<tr>
<td>+5V</td>
<td></td>
<td>49</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 1-50 Pin Ribbon Cable Pin Out*
Electrical Characteristics

The Table below provides the electrical characteristics of each Input/Output. Each port is buffered with a 74LS245 octal bi-directional transceiver. Each input is capable of sinking up to 24 mA, while each output can source up to 15 mA.

<table>
<thead>
<tr>
<th>Recommended Operating Conditions</th>
<th>Min</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Input</td>
<td>0 V</td>
<td>5.25 V</td>
</tr>
<tr>
<td>Source</td>
<td></td>
<td>15 mA</td>
</tr>
<tr>
<td>Sink</td>
<td></td>
<td>24 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Electrical Characteristics</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>High Level Input Voltage</td>
<td>Min 2 V</td>
<td></td>
</tr>
<tr>
<td>Low Level Input Voltage</td>
<td>Max 0.8 V</td>
<td></td>
</tr>
<tr>
<td>High Level Output Voltage</td>
<td>Min 2 V at 15 mA</td>
<td>Typically 3.4 V at 3 mA</td>
</tr>
<tr>
<td>Low Level Output Voltage</td>
<td>Max 0.55 V at 24 mA</td>
<td></td>
</tr>
</tbody>
</table>

*Figure 2-Electrical Characteristics*
Pull Ups

Ten pin bussed resistor packs are installed to provide pull-ups to the input ports. These are installed on all ports. The pull-up resistor packs are rated at 10K ohms. Figure 2 below provides the bussed resistor and corresponding port. The resistors insure that no line is floating which is not connected. This provides consistent biasing on all un-terminated lines.

<table>
<thead>
<tr>
<th>Bussed</th>
<th>Corresponding</th>
</tr>
</thead>
<tbody>
<tr>
<td>RP1</td>
<td>Port A</td>
</tr>
<tr>
<td>RP2</td>
<td>Port B</td>
</tr>
<tr>
<td>RP3</td>
<td>Port C</td>
</tr>
<tr>
<td>RP4</td>
<td>Port D</td>
</tr>
</tbody>
</table>
Programming

Application Programmers Interface (API)

Most modern operating systems do not allow direct hardware access. The SeaIO driver and API have been included to provide control over the hardware in Windows and Linux environments.

The purpose of this section of the manual is to help the customer with the mapping of the API to the actual inputs for the OMG-PCI-DIO32 specifically. Complete documentation of the API can be found in its accompanying help file.

Presetting an Output Port:

Each port has an output register associated with it. This register may be written and retains its value whether the port is configured as an input or an output. To preset the value of an output port the program should write to the port when it is configured as an input then configure it as an output. Inputs cannot be written to with relative addressing, absolute addressing must be used. See Relative Addressing vs. Absolute Addressing below.

Interrupts:

Interrupt sampling can be set up in the API. Port A bit zero is the interrupt source (pin 47). Refer to the API section in the SeaI/O help file for more detailed information.

Port Configuration:

Each eight-bit port can be configured as inputs or outputs. The API provides a set adapter state call to access the control words. For this device, one control word is used.

<table>
<thead>
<tr>
<th>Control Word</th>
<th>Port A – Bit 0</th>
<th>Port B – Bit 1</th>
<th>Port C – Bit 2</th>
<th>Port D – Bit 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>input</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td></td>
<td>output</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The control panel also allows you to configure the device. Your program can over ride the control panel configuration when executed, but the control panel configuration will be the default on power up. The default settings are based on the settings in the control panel application when last changed and saved after re-booting.
Relative Addressing vs. Absolute Addressing
The SeaIO API makes a distinction between “absolute” and “relative” addressing modes. In absolute addressing mode, the Port argument to the API function acts as a simple byte offset from the base I/O address of the device. For instance, Port #0 refers to the I/O address base + 0; Port #1 refers to the I/O address base + 1.
Relative addressing mode, on the other hand, refers to input and output ports in a logical fashion. With a Port argument of 0 and an API function meant to output data, the first (0th) output port on the device will be utilized. Likewise, with a Port argument of 0 and an API function designed to input data, the first (0th) input port of the device will be utilized.
In all addressing modes, port numbers are zero-indexed; that is, the first port is port #0, the second port is #1, the third #2, and so on.
Given Port A, Port D are inputs and Port B, Port C are outputs, the Tables below he Absolute address, and the relative address. The absolute address will be the same for any configuration, while the relative address will depend on the particular configuration.
### Port Addressing

Figures 3 and 4 show the API Port/bit reference numbers for Absolute and Relative Addressing.

- **R** = Read
- **W** = Write
- **R/W** = Read or Write

<table>
<thead>
<tr>
<th>Port</th>
<th>API Port # Absolute Address (function)</th>
<th>API Port # Relative Address (function)</th>
<th>Port Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>0 ( R/W )</td>
<td>0 ( R )</td>
<td>Input Port</td>
</tr>
<tr>
<td>B</td>
<td>1 ( R/W )</td>
<td>0 ( W )</td>
<td>Output Port</td>
</tr>
<tr>
<td>C</td>
<td>2 ( R/W )</td>
<td>1 ( W )</td>
<td>Output Port</td>
</tr>
<tr>
<td>D</td>
<td>3 ( R/W )</td>
<td>1 ( R )</td>
<td>Input Port</td>
</tr>
</tbody>
</table>

*Figure 3-API Port/Bit Reference*
### Addressing Continued

<table>
<thead>
<tr>
<th>API Bit # Absolute Address (function)</th>
<th>API Bit # Relative Address (function)</th>
<th>Port Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ( R/w )</td>
<td>0 ( R )</td>
<td>A0 - Input</td>
</tr>
<tr>
<td>1 ( R/w )</td>
<td>1 ( R )</td>
<td>A1 - Input</td>
</tr>
<tr>
<td>2 ( R/w )</td>
<td>2 ( R )</td>
<td>A2 - Input</td>
</tr>
<tr>
<td>3 ( R/w )</td>
<td>3 ( R )</td>
<td>A3 - Input</td>
</tr>
<tr>
<td>4 ( R/w )</td>
<td>4 ( R )</td>
<td>A4 - Input</td>
</tr>
<tr>
<td>5 ( R/w )</td>
<td>5 ( R )</td>
<td>A5 - Input</td>
</tr>
<tr>
<td>6 ( R/w )</td>
<td>6 ( R )</td>
<td>A6 - Input</td>
</tr>
<tr>
<td>7 ( R/w )</td>
<td>7 ( R )</td>
<td>A7 - Input</td>
</tr>
<tr>
<td>8 ( R/w )</td>
<td>0 ( W )</td>
<td>B0 - Output</td>
</tr>
<tr>
<td>9 ( R/w )</td>
<td>1 ( W )</td>
<td>B1 - Output</td>
</tr>
<tr>
<td>10 ( R/w )</td>
<td>2 ( W )</td>
<td>B2 - Output</td>
</tr>
<tr>
<td>11 ( R/w )</td>
<td>3 ( W )</td>
<td>B3 - Output</td>
</tr>
<tr>
<td>12 ( R/w )</td>
<td>4 ( W )</td>
<td>B4 - Output</td>
</tr>
<tr>
<td>13 ( R/w )</td>
<td>5 ( W )</td>
<td>B5 - Output</td>
</tr>
<tr>
<td>14 ( R/w )</td>
<td>6 ( W )</td>
<td>B6 - Output</td>
</tr>
<tr>
<td>15 ( R/w )</td>
<td>7 ( W )</td>
<td>B7 - Output</td>
</tr>
<tr>
<td>16 ( R/W )</td>
<td>8 ( W )</td>
<td>C0 - Output</td>
</tr>
<tr>
<td>17 ( R/W )</td>
<td>9 ( W )</td>
<td>C1 - Output</td>
</tr>
<tr>
<td>18 ( R/W )</td>
<td>10( W )</td>
<td>C2 - Output</td>
</tr>
<tr>
<td>19 ( R/W )</td>
<td>11(W )</td>
<td>C3 - Output</td>
</tr>
<tr>
<td>20 ( R/W )</td>
<td>12(W )</td>
<td>C4 - Output</td>
</tr>
<tr>
<td>21 ( R/W )</td>
<td>13( W )</td>
<td>C5 - Output</td>
</tr>
<tr>
<td>22 ( R/W )</td>
<td>14(W )</td>
<td>C6 - Output</td>
</tr>
<tr>
<td>23 ( R/W )</td>
<td>15( W )</td>
<td>C7 - Output</td>
</tr>
<tr>
<td>24 ( R/W )</td>
<td>8 ( R )</td>
<td>D0 - Input</td>
</tr>
<tr>
<td>25 ( R/W )</td>
<td>9 ( R )</td>
<td>D1 - Input</td>
</tr>
<tr>
<td>26 ( R/W )</td>
<td>10 ( R )</td>
<td>D2 - Input</td>
</tr>
<tr>
<td>27 ( R/W )</td>
<td>11 ( R )</td>
<td>D3 - Input</td>
</tr>
<tr>
<td>28 ( R/W )</td>
<td>12 ( R )</td>
<td>D4 - Input</td>
</tr>
<tr>
<td>29 ( R/W )</td>
<td>13 ( R )</td>
<td>D5 - Input</td>
</tr>
<tr>
<td>30 ( R/W )</td>
<td>14 ( R )</td>
<td>D6 - Input</td>
</tr>
<tr>
<td>31 ( R/W )</td>
<td>15 ( R )</td>
<td>D7 - Input</td>
</tr>
</tbody>
</table>
Figure 4-API Port/Bit Reference
Direct Hardware Control

In systems where the users program has direct access to the hardware (DOS) the table below gives the mapping and functions that the OMG-PCI-DIO32 provide. The address of each eight-bit port is calculated as shown in the table on the following page, the cards base address plus an offset.

Reading the Inputs:
The inputs are active high. If an input is driven high (2V to 5.25 V) it will read as a logical one (1), if driven low (0V to 0.8V) it will read as a logical zero (0). If an input is not driven it will read as a one (1) due to the 10K ohm pull up resistors on each port.

Reading the Outputs:
The value that is currently being used to drive the outputs will be returned.

Presetting an Output Port:
Each port has an output register associated with it. This register may be written and retains its value whether the port is configured as an input or an output. To preset the value of an output port the program should write to the port when it is configured as an input then configure it as an output.

Writing the Outputs:
The outputs are active high. Writing a one (1) corresponds to 5V while writing a zero (0) corresponds to 0V, at the output.

Port Configuration:
Each port can be configured as an input or an output by writing to its direction control bit, refer to the table below.

Interrupts
Interrupts can be set up as shown on the following page. Port A1 bit zero is the interrupt source(pin 47).
Register Description (for direct hardware control)

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

**Figure 5-Register Description**

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 prior to changing or setting states. This will help prevent inadvertent or un-expected interrupts from occurring. When using the high and low level interrupts, a change in state of the input 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).
Specifications

Environmental Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Operating</th>
<th>Storage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Range</td>
<td>0º to 50º C</td>
<td>-20º to 70º C</td>
</tr>
<tr>
<td></td>
<td>(32º to 122º F)</td>
<td>(-4º to 158º F)</td>
</tr>
<tr>
<td>Humidity Range</td>
<td>10 to 90% R.H. Non-Condensing</td>
<td>10 to 90% R.H. Non-Condensing</td>
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</tbody>
</table>

Power Consumption

<table>
<thead>
<tr>
<th>Supply line</th>
<th>+5 VDC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rating</td>
<td>500 mA</td>
</tr>
</tbody>
</table>

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Board Length</td>
<td>4.72 inches (12.00 cm.)</td>
</tr>
<tr>
<td>Board Height including Goldfingers</td>
<td>3.30 inches (8.39 cm.)</td>
</tr>
<tr>
<td>Board Height excluding Goldfingers</td>
<td>2.975 inches (7.56 cm.)</td>
</tr>
</tbody>
</table>
Appendix A - Troubleshooting

Following these simple steps can eliminate most common problems without the need to call Technical Support.

1. Install software **first**. After installing the software then proceed to adding the hardware. This places the required installation files in the correct locations.

2. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc. The I/O addresses used by these adapters, as well as the IRQ (if any) should be identified.

3. Ensure 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 the adapter is securely installed in a motherboard slot.
Appendix B - How To Get Assistance

Please refer to Troubleshooting Guide prior to calling Technical Support.

1. Read this manual thoroughly before attempting to install the adapter in your system.

2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.

3. Omega Engineering maintains a Home page on the Internet. Our home page address is www.omega.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.

4. Technical support is available Monday to Friday from 8:30 a.m. to 6:00 p.m. eastern time. Technical support can be reached at 1-800-DAS-IEEE.

RETURN AUTHORIZATION MUST BE OBTAINED FROM OMEGA BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING OMEGA CUSTOMER SERVICE AND REQUESTING AN AUTHORIZED RETURN (AR) NUMBER.
Appendix D - Compliance Notices

Federal Communications Commission Statement
FCC - This equipment has been tested and found to comply with the limits for Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference. In such case the user will be required to correct the interference at his own expense.

EMC Directive Statement
Products bearing the CE Label fulfill the requirements of the EMC directive (89/336/EEC) and of the low-voltage directive (73/23/EEC) issued by the European Commission.

To obey these directives, the following European standards must be met:

- **EN55022 Class A** - “Limits and methods of measurement of radio interference characteristics of information technology equipment”
- **EN55024** - “Information technology equipment Immunity characteristics Limits and methods of measurement”
- **EN60950 (IEC950)** - “Safety of information technology equipment, including electrical business equipment”

**Warning**
This is a Class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Always use cabling provided with this product if possible. If no cable is provided or if an alternate cable is required, use high quality shielded cabling to maintain compliance with FCC/EMC directives.
OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **13 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal **one (1) year product warranty** to cover handling and shipping time. This ensures that OMEGA’s customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components which wear are not warranted, including but not limited to contact points, fuses, and triacs.

**OMEGA is pleased to offer suggestions on the use of its various products. However, OMEGA neither assumes responsibility for any omissions or errors nor assumes liability for any damages that result from the use of its products in accordance with information provided by OMEGA, either verbal or written. OMEGA warrants only that the parts manufactured by it will be as specified and free of defects. OMEGA MAKES NO OTHER WARRANTIES OR REPRESENTATIONS OF ANY KIND WHATSOEVER, EXPRESS OR IMPLIED, EXCEPT THAT OF TITLE, AND ALL IMPLIED WARRANTIES INCLUDING ANY WARRANTY OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE HEREBY DISCLAIMED. LIMITATION OF LIABILITY: The remedies of purchaser set forth herein are exclusive, and the total liability of OMEGA with respect to this order, whether based on contract, warranty, negligence, indemnification, strict liability or otherwise, shall not exceed the purchase price of the component upon which liability is based. In no event shall OMEGA be liable for consequential, incidental or special damages.**

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**RETURN REQUESTS/INQUIRIES**

Direct all warranty and repair requests/inquiries to the OMEGA Customer Service Department. BEFORE RETURNING ANY PRODUCT(S) TO OMEGA, PURCHASER MUST OBTAIN AN AUTHORIZED RETURN (AR) NUMBER FROM OMEGA’S CUSTOMER SERVICE DEPARTMENT (IN ORDER TO AVOID PROCESSING DELAYS). The assigned AR number should then be marked on the outside of the return package and on any correspondence.

The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR **WARRANTY** RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR **NON-WARRANTY** REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA:

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product.

OMEGA’s policy is to make running changes, not model changes, whenever an improvement is possible. This affords our customers the latest in technology and engineering.

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