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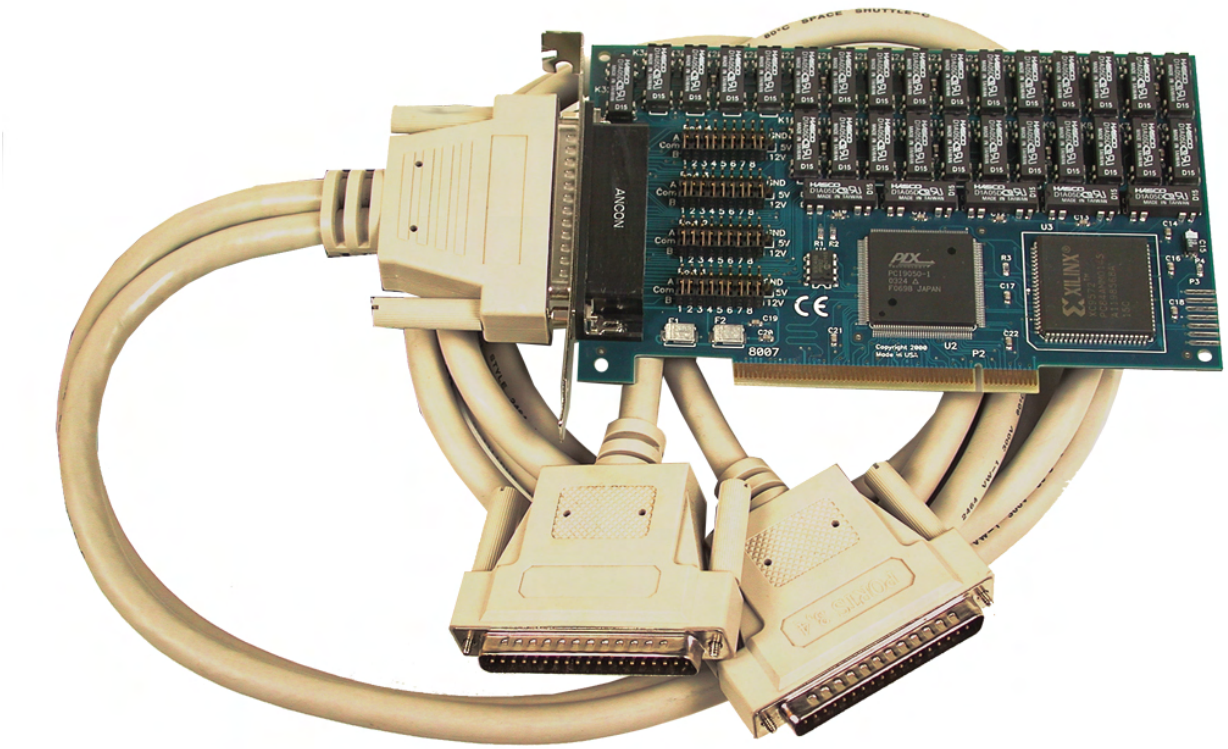
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Find the *Sealevel Systems REL-32.PCI* at our website: *Click HERE*

REL-32.PCI User Manual



Part Number 8007

SEALEVEL SYSTEMS INCORPORATED

www.sealevel.com PO Box 830 Liberty, SC 29657 864.843.4343

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Introduction

The REL-32.PCI provides 32 reed relays that can switch power, data or other electronic signals for control applications. The outputs provide high quality, long life, low current (10 Watt maximum), dry contact switch closures. Reed relays are well suited for low current applications. The relays are normally open, and will close when energized. The REL-32.PCI is PCI 2.1 bus compliant.

The REL-32.PCI is designed to be used with a variety of Operating Systems including Windows 98/NT/ME/2000/XP, Linux and DOS. The SeaI/O API (Application Programmer Interface) included on CD with the REL-32.PCI provides a variety of useful high-level function calls implemented as a Windows dynamic link library (DLL) and as a Linux kernel module and library. In addition to the API, SeaI/O includes sample code and utilities to simplify software development.

Other Sealevel PCI Digital I/O Products

PIO-24.PCI	(P/N 8008)	- 24 TTL Inputs/Outputs
PIO-32.PCI	(P/N 8010)	- 32 TTL Inputs/Outputs
PIO-48.PCI	(P/N 8005)	- 48 TTL Inputs/Outputs
PIO-96.PCI	(P/N 8009)	- 96 TTL Inputs/Outputs
DIO-16.PCI	(P/N 8002)	- 8 Reed Relay Outputs/8 Opto-isolated Inputs
REL-16.PCI	(P/N 8003)	- 16 Reed Relay Outputs
DIO-32.PCI	(P/N 8004)	- 16 Reed Relay Outputs/16 Opto-isolated Inputs
ISO-16.PCI	(P/N 8006)	- 16 Opto-isolated Inputs
PLC-16.PCI	(P/N 8011)	- 8 Form C Relay Outputs/8 Opto-isolated Inputs

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Before You Get Started

What's Included

The REL-32.PCI is shipped with the following items. If any of these items is missing or damaged please contact Sealevel for replacement.

- **REL-32.PCI Adapter**
- **CA172 6' DB78M to dual DB37M Cable**
- **Sealevel SeaI/O Software CD**

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the REL-32.PCI to real-world signals. All items can be purchased from our website (http://www.sealevel.com) or by calling (864) 843-4343.

- **DB-37 Male to DB-37 Female 6' Cable (Part Number CA112)**
  - This cable extends the DB-37 connector on the CA172 cable an additional six feet and is pinned one-to-one.
- **DB-37 Male/Female Terminal Block (Part Number TB02-KT)**
  - Break out serial and digital connectors to 37 screw terminals for easy field connection. The TB02 terminal block is designed with both DB-37 male and female connectors, therefore; it can be used with any DB-37 board regardless of the board's port gender.
- **Cable and Terminal Block Kit (Part Number KT101)**
  - For convenient and easier ordering, the KT101 includes the TB02-KT terminal block and CA112 cable in a single kit.

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Software Installation

Windows 98/ME/NT/2000/XP Installation

Do not install the Adapter in the machine until the software has been fully installed.

1. Start Windows.
2. Insert the Sealevel Systems CD in to your CD drive.
3. If 'Auto-Start' is enabled for this drive the software will automatically launch. Otherwise, point your browser to the 'Index.htm' on the root directory of the CD
4. Select 'Install Software'.
5. Select the Part Number for your adapter from the listing.
6. Select 'Windows 98/ME/NT/2000/XP'. The setup file will automatically detect the operating environment and install the proper components. Next (depending on your browser) select the 'Run this program from its current location' or 'Open' option. Follow the information presented on the screens that follow.
7. A screen may appear with the declaration: "The publisher cannot be determined due to the problems below: Authenticode signature not found." Please select the 'Yes' button and proceed with the installation. This declaration simply means that the Operating System is not aware of the driver being loaded. It will not cause any harm to your system.
8. During setup the user may specify installation directories and other preferred configurations. This program also adds entries to the system registry that are necessary for specifying the operating parameters for each driver. An uninstall option is also included to remove all registry/INI file entries from the system.

Windows NT Card Installation: After accomplishing the above steps, bring up the Control Panel and double-click on the SeaIO Devices icon. To install a new card, click "Add Port". Repeat this procedure for as many SeaIO cards as you wish to install.

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Linux Installation

Note: You MUST have "root" privileges to install the software and drivers.

1. Login as "root".
2. Mount the CDROM by typing:

   mount -t iso4860 /dev/hdc /cdrom

   Note Your cdrom may not be /dev/hdc it could be /dev/hda, /dev/hdb, /dev/hdd, or if you have a SCSI drive /dev/sda, /dev/sdb, /dev/sdc, etc. You may mount the CDROM to any location, the /cdrom is just a common example.
3. Next change to the directory where you mounted the CDROM:

   Ex. cd /cdrom/software/SeaIO/Other/linux

   Note: The syntax is case sensitive.
4. Copy seaio .tar.gz to your home directory by typing:

   cp seaio .tar.gz ~
5. Change to your home directory by typing:

   cd
6. Unmount the drive and then Unzip and Untar the drivers and software by typing:

   umount /cdrom

   tar -xvzf seaio .tar.gz
7. Change to the SeaIO directory by typing:

   cd SeaIO
8. Now compile and prepare the drivers for use:

   make install
9. With the system off and unplugged, install your SeaIO PCI card.
10. Plug system back in and boot Linux.

    Login as "root".
11. Load the driver by typing:

    SeaIO -load

    The driver has enabled the card and is ready to use, and you now have the option to run a test utility on it. Skip to section "Using the test software" if you wish to do so at this time.

    To set up Linux to automatically load the driver; refer to a Linux manual concerning your specific distribution for help.

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Physical Installation

The adapter can be installed in any 5V PCI expansion slot.

Do not install the Adapter in the machine until the software has been fully installed.

1. **Turn off PC power. Disconnect the power cord.**
2. Remove the PC case cover.
3. Locate an available 5V PCI slot and remove the blank metal slot cover.
4. Gently insert the PCI adapter into the slot. Make sure that the adapter is seated properly.
5. After the adapter has been installed, the cables should be routed thru the opening in the bracket. This bracket also features a strain relief function that should be used to prevent un-expected cable removal.
6. Replace the screw you removed for the blank and use it to secure the adapter into the slot. (This is required to ensure FCC Part 15 compliance.)
7. Replace the cover.
8. Connect the power cord

The REL-32.PCI is now ready for use.

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Programming the REL-32.PCI

Sealevel's SeaI/O software is provided to assist in the development of reliable applications for the Sealevel Systems family of digital I/O adapters. Included on the SeaI/O CD are driver functions for use in accessing the I/O as well as helpful samples and utilities.

Programming for Windows

The SeaI/O API (Application Programmer Interface) provides a variety of useful high-level function calls implemented in a Windows dynamic link library (DLL). The API is defined in the help file (Start/Programs/SeaIO/SeaIO Help) under "Application Programmers Interface". This help file also includes detailed information dealing with installation / removal of the software and information about latency, logic states, and device configuration.

For C language programmers we recommend using the API to access the REL-32.PCI. If you are programming in Visual Basic, using the ActiveX control included with SeaI/O is advised.

Samples and Utilities

A variety of sample programs and utilities (both executable and source code) are included with SeaI/O. Further documentation on these samples can be found by selecting "Start/Programs/SeaIO/Sample Application Description". Information about where the files are physically stored on your disk is also included in this same file.

Programming for Linux

SeaI/O for Linux consists of two major parts: a kernel module and a library. The kernel module is a simple IO pass-through device, allowing the library to handle the more sophisticated functions provided to SeaI/O users. It is provided in a 'tarball' format and can easily be compiled and included in the kernel build.

Digital I/O Interface

The REL-32.PCI provides four parallel Reed Relay output ports. The ports are organized as 1, 2, and 3, 4.

Output Ports (Reed Relay)

Reed relays provide very high quality, long life, low power, dry contact switch closures. Reed relays are not suited for high current applications, and can be destroyed by capacitive or inductive load switching. The relays are normally open, and close when energized.

Connector and Jumper Pin Out

Each relay has two sides, an A-side and B-side. Each side is connected to two places: the cable, and the jumpers on the top of the board. The tables on the following pages provide the pin outs for the two DB-37 cable ends and the onboard jumpers.

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Jumper Setup Options

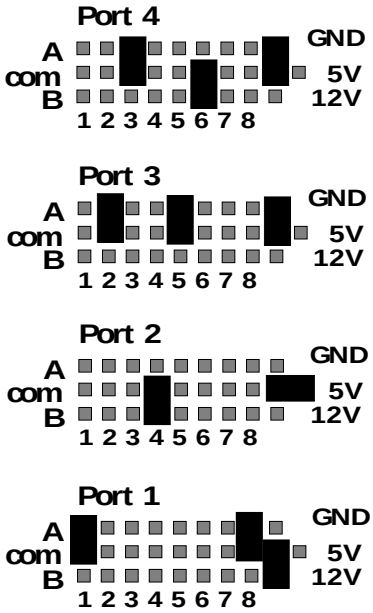
The common on each port may be tied to ground, 5, or 12 volts. Either side of each relay may then be tied to the common. The 8007 is shipped with all of the jumpers necessary for all possible configurations. The jumpers are parked on the B-side and are inactive until configured by the user. An example configuration is shown below:

Port 4: The common is tied to ground (GND).
The A-side of port-4 relay 3 (K27) is tied to the common.
The B-side of port-4 relay 6 (K30) is tied to the common.

Port 3: The common is tied to ground (GND).
The A-side of port-3 relay 2 (K18) is tied to the common.
The A-side of port-3 relay 5 (K21) is tied to the common.

Port 2: The common is tied to 5 volts.
The B-side of port-2 relay 4 (K12) is tied to the common.

Port 1: The common is tied to 12 volts.
The A-side of port-1 relay 1 (K1) is tied to the common.
The A-side of port-1 relay 8 (K8) is tied to the common.



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Output Ports (Reed Relay) Pin Assignments

Via standard 6' cable, DB-78 Male to dual DB-37 Male connectors, Part Number CA172. The DB-37 connectors are labeled "Ports 1,2" and "Port 3,4".

	Port 1					Port 2			
	Relay A Side		Relay B Side			Relay A Side		Relay B Side	
Relay	Port 1 - A	Pin	Port 1 - B	Pin	Relay	Port 2 - A	Pin	Port 2 - B	Pin
K1	1	2	1	20	K9	1	10	1	28
K2	2	3	2	21	K10	2	11	2	29
K3	3	4	3	22	K11	3	12	3	30
K4	4	5	4	23	K12	4	13	4	31
K5	5	6	5	24	K13	5	14	5	32
K6	6	7	6	25	K14	6	15	6	33
K7	7	8	7	26	K15	7	16	7	34
K8	8	9	8	27	K16	8	17	8	35

	Port 3					Port 4			
	Relay A Side		Relay B Side			Relay A Side		Relay B Side	
Relay	Port 3 - A	Pin	Port 3 - B	Pin	Relay	Port 4 - A	Pin	Port 4 - B	Pin
K17	1	2	1	20	K25	1	10	1	28
K18	2	3	2	21	K26	2	11	2	29
K19	3	4	3	22	K27	3	12	3	30
K20	4	5	4	23	K28	4	13	4	31
K21	5	6	5	24	K29	5	14	5	32
K22	6	7	6	25	K30	6	15	6	33
K23	7	8	7	26	K31	7	16	7	34
K24	8	9	8	27	K32	8	17	8	35

Power and Ground Pin Assignments

Via standard 6' cable, DB-78 Male to dual DB-37 Male connectors, Part Number CA172.

Ground	18, 36, 37
+ 5 Volts	19
+ 12 Volts	1

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Optional DB-37 Female Pin Assignment

In order to maintain compatibility with the existing ISA interface adapter (Sealevel Item# 3098), an optional 6' cable is offered with DB-78 Male to dual DB-37 Female connectors, Part Number CA173. The DB-37 connectors are labeled "Side A" and "Side B".

Side A			Side B		
Pin	**Function**	**Jumper**	**Pin**	**Function**	**Jumper**
1	Ground	N/A	1	Ground	N/A
2	Relay 2A	PORT 1-A2	2	Relay 2B	PORT 1-B2
3	Relay 4A	PORT 1-A4	3	Relay 4B	PORT 1-B4
4	Relay 6A	PORT 1-A6	4	Relay 6B	PORT 1-B6
5	Relay 8A	PORT 1-A8	5	Relay 8B	PORT 1-B8
6	Relay 10A	PORT 2-A2	6	Relay 10B	PORT 2-B2
7	Relay 12A	PORT 2-A4	7	Relay 12B	PORT 2-B4
8	Relay 14A	PORT 2-A6	8	Relay 14B	PORT 2-B6
9	Relay 16A	PORT 2-A8	9	Relay 16B	PORT 2-B8
10	Relay 18A	PORT 3-A2	10	Relay 18B	PORT 3-B2
11	Relay 20A	PORT 3-A4	11	Relay 20B	PORT 3-B4
12	Relay 22A	PORT 3-A6	12	Relay 22B	PORT 3-B6
13	Relay 24A	PORT 3-A8	13	Relay 24B	PORT 3-B8
14	Relay 26A	PORT 4-A2	14	Relay 26B	PORT 4-B2
15	Relay 28A	PORT 4-A4	15	Relay 28B	PORT 4-B4
16	Relay 30A	PORT 4-A6	16	Relay 30B	PORT 4-B6
17	Relay 32A	PORT 4-A8	17	Relay 32B	PORT 4-B8
18	12 V	N/A	18	12 V	N/A
19	5 V	N/A	19	5 V	N/A
20	Relay 1A	PORT 1-A1	20	Relay 1B	PORT 1-B1
21	Relay 3A	PORT 1-A3	21	Relay 3B	PORT 1-B3
22	Relay 5A	PORT 1-A5	22	Relay 5B	PORT 1-B5
23	Relay 7A	PORT 1-A7	23	Relay 7B	PORT 1-B7
24	Relay 9A	PORT 2-A1	24	Relay 9B	PORT 2-B1
25	Relay 11A	PORT 2-A3	25	Relay 11B	PORT 2-B3
26	Relay 13A	PORT 2-A5	26	Relay 13B	PORT 2-B5
27	Relay 15A	PORT 2-A7	27	Relay 15B	PORT 2-B7
28	Relay 17A	PORT 3-A1	28	Relay 17B	PORT 3-B1
29	Relay 19A	PORT 3-A3	29	Relay 19B	PORT 3-B3
30	Relay 21A	PORT 3-A5	30	Relay 21B	PORT 3-B5
31	Relay 23A	PORT 3-A7	31	Relay 23B	PORT 3-B7
32	Relay 25A	PORT 4-A1	32	Relay 25B	PORT 4-B1
33	Relay 27A	PORT 4-A3	33	Relay 27B	PORT 4-B3
34	Relay 29A	PORT 4-A5	34	Relay 29B	PORT 4-B5
35	Relay 31A	PORT 4-A7	35	Relay 31B	PORT 4-B7
36	Ground	N/A	36	Ground	N/A
37	Ground	N/A	37	Ground	N/A

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DB-78 Female Pin Assignment

This table shows the pin assignments via the card edge connector.

	Port 1					Port 2			
	Relay A Side		Relay B Side			Relay A Side		Relay B Side	
Relay	Port 1 - A	Pin	Port 1 - B	Pin	Relay	Port 2 - A	Pin	Port 2 - B	Pin
K1	1	2	1	20	K9	1	10	1	28
K2	2	3	2	21	K10	2	11	2	29
K3	3	4	3	22	K11	3	12	3	30
K4	4	5	4	23	K12	4	13	4	31
K5	5	6	5	24	K13	5	14	5	32
K6	6	7	6	25	K14	6	15	6	33
K7	7	8	7	26	K15	7	16	7	34
K8	8	9	8	27	K16	8	17	8	35

	Port 3					Port 4			
	Relay A Side		Relay B Side			Relay A Side		Relay B Side	
Relay	Port 3 - A	Pin	Port 3 - B	Pin	Relay	Port 4 - A	Pin	Port 4 - B	Pin
K17	1	39	1	57	K25	1	47	1	65
K18	2	40	2	58	K26	2	48	2	66
K19	3	41	3	59	K27	3	49	3	67
K20	4	42	4	60	K28	4	50	4	68
K21	5	43	5	61	K29	5	51	5	69
K22	6	44	6	62	K30	6	52	6	70
K23	7	45	7	63	K31	7	53	7	71
K24	8	46	8	64	K32	8	54	8	72

Power and Ground Pin Assignments

Via DB-78 Female card edge connector.

Ground	18, 36, 37, 55, 73, 74
+ 5 Volts	19, 56
+ 12 Volts	1, 38

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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 REL-32.PCI provides.

Function Available	Port	Address Hex	Port Type
R/W	1	Base + 0	Relay 1- Relay 8
R/W	2	Base + 1	Relay 9 - Relay 16
R/W	3	Base + 2	Relay 17 - Relay 24
R/W	4	Base + 3	Relay 25 - Relay 32

R/W = Read or Write

Reading the Outputs

The relay ports return the ones complement of the value that is currently being used to drive the relays. When using the API the value is returned not the complement of the value.

Writing the Outputs

The relays on a standard 8007 are normally open. To close a relay a one must be written to the appropriate bit.

Register Description

Address	Mode	D7	D6	D5	D4	D3	D2	D1	D0
Base+0	R/W	P1D7	P1D6	P1D5	P1D4	P1D3	P1D2	P1D1	P1D0
Base+1	R/W	P2D7	P2D6	P2D5	P2D4	P2D3	P2D2	P2D1	P2D0
Base+2	R/W	P3D7	P3D6	P3D5	P3D4	P3D3	P3D2	P3D1	P3D0
Base+3	R/W	P4D7	P4D6	P4D5	P4D4	P4D3	P4D2	P4D1	P4D0

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Electrical Characteristics

Features

- 32 SPST Reed relays
- Two DB-37 Male connectors (CA172 cable)
- Highly reliable 10 VA DIP reed relays utilized
- Multiple adapters can reside in same computer
- PCI 2.1 Bus compliant

Specifications

Output Relays

- Contact Max Power Rating: 10 W
- Contact Voltage Maximum: 100 VDC/VAC
- Contact Current Maximum: .5A AC/DC RMS
- Contact Resistance, Initial: .15 Ω
- Rated Life:
  - Low Load: 200 Million Closures
  - Maximum Load: 100 Million Closures
- Contact Speed:
  - Operate: .5 mS
  - Release: .5 mS
  - Bounce: .5 mS
- Maximum Operating Speed: 600 Hz

Temperature Range

- Operating: 0°C – 70°C
- Storage: -50°C – 105°C

Power Requirements

- +5VDC @ 560 mA

Physical Dimensions

- PCB Length: 6.60” (16.764 cm)
- PCB Height: 4.20” (10.668 cm, including Gold fingers)

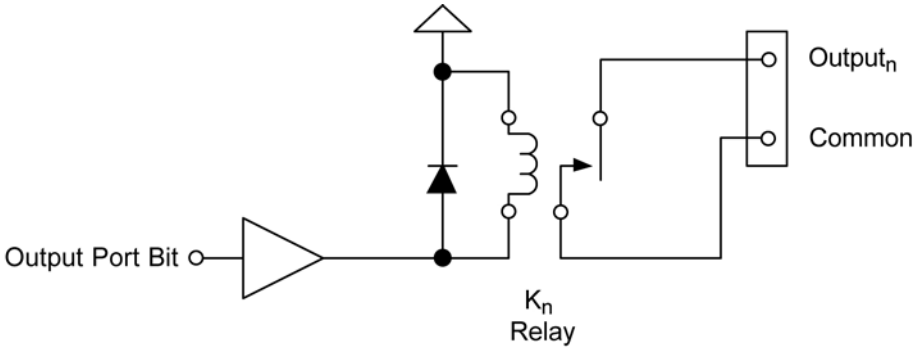
Manufacturing

All Sealevel Systems Printed Circuit boards are built to UL 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

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Example Circuits

Output Circuit



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Appendix A - Troubleshooting

Following these simple steps can eliminate most common problems.

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

3. Use Device Manager under Windows to verify proper installation.

4. Use the SeaIO Control Panel applet or the Device Manager's property page for card identification and configuration.

5. If these steps do not solve your problem, please call Sealevel Systems' Technical Support, (864) 843-4343. Our technical support is free and available from 8:00AM-5PM Eastern Time Monday through Friday. For email support contact mailto:support@sealevel.com.

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Appendix B - How To Get Assistance

Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed please see below.

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.

Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp

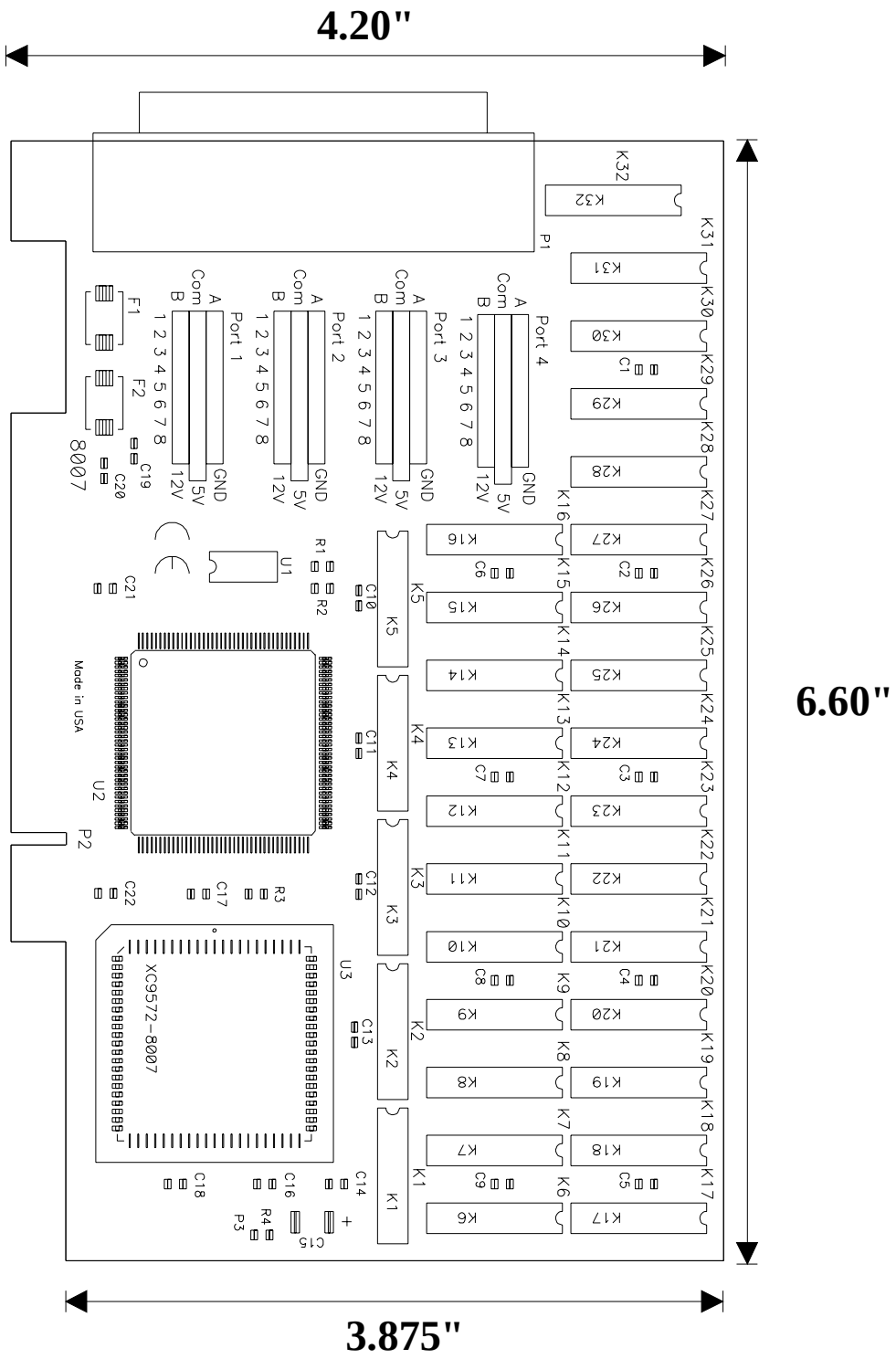
Sealevel Systems maintains a Home page on the Internet. Our home page address is http://www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.

Technical support is available Monday to Friday from 8:00 a.m. to 5:00 p.m. eastern time. Technical support can be reached at (864) 843-4343.

RETURN AUTHORIZATION MUST BE OBTAINED FROM SEALEVEL SYSTEMS BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING SEALEVEL SYSTEMS AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

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Appendix C – Silk Screen – 8007 PCB



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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 the users expense.

EMC Directive Statement

CE

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 to prevent or correct the interference.

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.

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Warranty



Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured products. We are able to offer this warranty due to our control of manufacturing quality and the historically high reliability of our products in the field. Sealevel products are designed and manufactured at its Liberty, South Carolina facility, allowing direct control over product development, production, burn-in and testing.

Sealevel Systems, Inc. (hereafter "Sealevel") warrants that the Product shall conform to and perform in accordance with published technical specifications and shall be free of defects in materials and workmanship for life. In the event of failure, Sealevel will repair or replace the product at Sealevel's sole discretion. Failures resulting from misapplication or misuse of the Product, failure to adhere to any specifications or instructions, or failure resulting from neglect or abuse are not covered under this warranty.

Warranty service is obtained by delivering the Product to Sealevel and providing proof of purchase. **Return authorization must be obtained from Sealevel Systems before returned merchandise will be accepted. Authorization is obtained by calling Sealevel Systems and requesting a Return Merchandise Authorization (RMA) number.** The Customer agrees to insure the Product or assume the risk of loss or damage in transit, to prepay shipping charges to Sealevel, and to use the original shipping container or equivalent. Warranty is valid only for original purchaser and is not transferable.

Sealevel Systems assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Sealevel Systems will not be liable for any claim made by any other related party.

This warranty applies to Sealevel manufactured Product. Product purchased through Sealevel but manufactured by a third party will retain the original manufacturer's warranty.

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Technical Support is available Monday - Friday from 8 a.m. to 5 p.m. Eastern time

Trademarks

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