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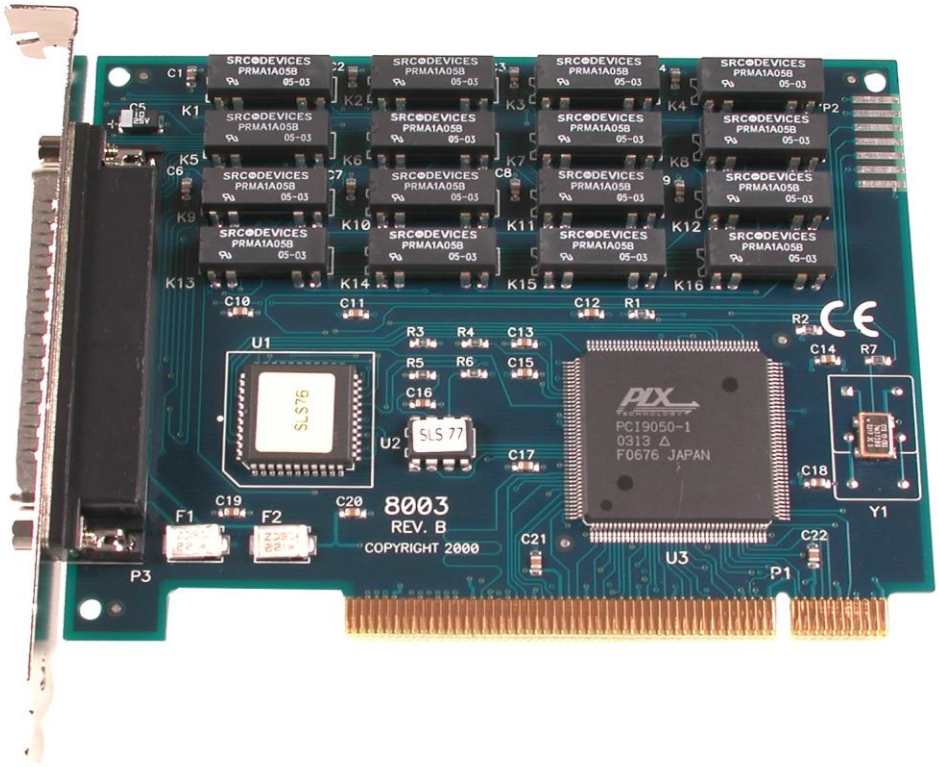
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REL-16.PCI

User Manual | 8003



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Introduction

Overview

The REL-16.PCI provides 16 reed relay outputs. The outputs offer 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 board is PCI bus specification 2.1 compliant.

The REL-16.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) software 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

Model No.	Part No.	Description
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
DIO-32.PCI	(P/N 8004)	- 16 Reed Relay Outputs/16 Opto-isolated Inputs
ISO-16.PCI	(P/N 8006)	- 16 Opto-isolated Inputs
REL-32.PCI	(P/N 8007)	- 32 Reed Relay Outputs
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-16.PCI is shipped with the following items. If any of these items are missing or damaged, please contact Sealevel for replacement.

- **REL-16.PCI Adapter**

Advisory Conventions



Warning
The highest level of importance used to stress a condition where damage could result to the product, or the user could suffer serious injury.



Important
The middle level of importance used to highlight information that might not seem obvious or a situation that could cause the product to fail.



Note
The lowest level of importance used to provide background information, additional tips, or other non-critical facts that will not affect the use of the product.

Optional Items

Depending upon your application, you are likely to find one or more of the following items useful for interfacing the REL-16.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 REL-16.PCI to 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.

Installation

Operating System Installation

For Windows Users

Begin by locating, selecting, and installing the correct software - SeaIO Software.

SeaIO Software can also be downloaded from the 8003-product page: REL-16.PCI Product Page

Other Operating Systems

Refer to the appropriate section of the Serial Utilities Software.



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

LINUX INSTALLATION

Refer to Linux Archives - Sealevel. This link contains valuable information on installing your serial adapter in the various Linux releases. Also included is a series of files explaining proper Linux syntax and typical Linux serial implementations.

For additional software support, 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.

INSTALLATION, CONTINUED

Hardware 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

Installation is finished.

Programming the REL-16.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. The software also includes 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-16.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-16.PCI provides two parallel reed relay output ports. The ports are organized as ports A, B, C, and D. In order to maintain compatibility with the existing ISA interface adapter (Sealevel Item# 3095), ports C and D (Base address+2 and 3) are the reed relay output port addresses.

Output Ports (Reed Relay)

Reed relays provide very high quality, long life, low current (10 Watt maximum), dry contact switch closures. Reed relays are not suited for high current applications, and can be destroyed by inductive load switching, where a spark occurs across the contacts internally. The relays are normally open, and close when energized.

PROGRAMMING THE REL-16.PCI, CONTINUED

Output Ports (Reed Relay) Pin Assignments

Port C Bit	Relay	P3 Pin
C0	K1	2,20
C1	K2	3,21
C2	K3	4,22
C3	K4	5,23
C4	K5	6,24
C5	K6	7,25
C6	K7	8,26
C7	K8	9,27
D0	K9	10,28
D1	K10	11,29
D2	K11	12,30
D3	K12	13,31
D4	K13	14,32
D5	K14	15,33
D6	K15	16,34
D7	K16	17,35
Ground	18,36,37	
+ 5 Volts	19	
+ 12 Volts	1	

Direct Hardware Control

In systems where the user's program has direct access to the hardware (i.e., DOS) the table below gives the mapping and functions that the REL-16.PCI provides.

Function Available	Port	Port Address	Port Type
	A	Base + 0	Unused
	B	Base + 1	Unused
R/W	C	Base + 2	Output Port
R/W	D	Base + 3	Output Port

R/W = Read or Write

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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 actual value is returned not the complement of the value.

Writing the Outputs

The output ports are the only ports that can be written. The relays on a standard REL-16.PCI 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	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+1		{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+2	R/W	PCD7	PCD6	PCD5	PCD4	PCD3	PCD2	PCD1	PCD0
Base+3	R/W	PDD7	PDD6	PDD5	PDD4	PDD3	PDD2	PDD1	PDD0
Base+4	R	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+5	R	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+6	R	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}
Base+7	R	{0}	{0}	{0}	{0}	{0}	{0}	{0}	{0}

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Electrical Characteristics

Features

- 16 SPST relays
- DB-37 Male connector
- Highly reliable 10 VA DIP reed relays
- Multiple adapters can reside in same computer
- PCI 2.1 Bus compatible

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Specifications

Output Relays

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

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0° to 70° C	-50° to 105° C

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.

Power Requirements

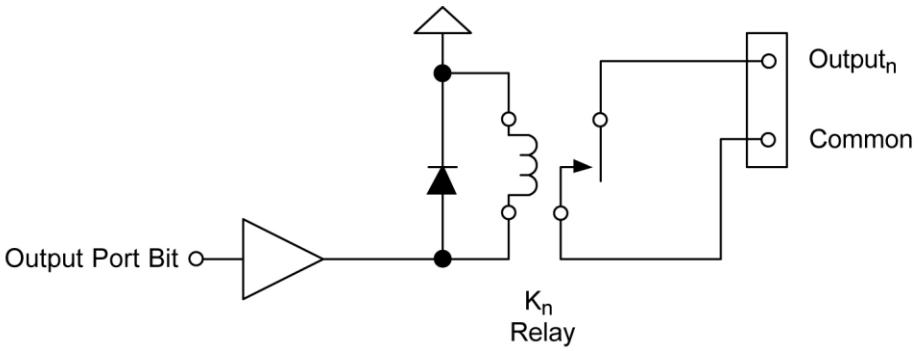
Supply Line	+5 VDC
Rating	360 mA

Physical Dimensions

Board length	5.00 inches (12.700 cm)
Board Height including Goldfingers	3.90 inches (9.906 cm)

Example Circuits

Output Circuit



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Appendix A – Troubleshooting

Sealevel Software is supplied with the Sealevel Systems adapter and will be used in the troubleshooting procedures. By using this software and following these simple steps, most common problems can be eliminated 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. 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 Seal/O Control Panel applet or the Device Manager's property page for card identification and configuration.

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.

Appendix B – How To Get Assistance

Please refer to: Appendix A -- Troubleshooting Guide prior to calling Technical Support.

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.

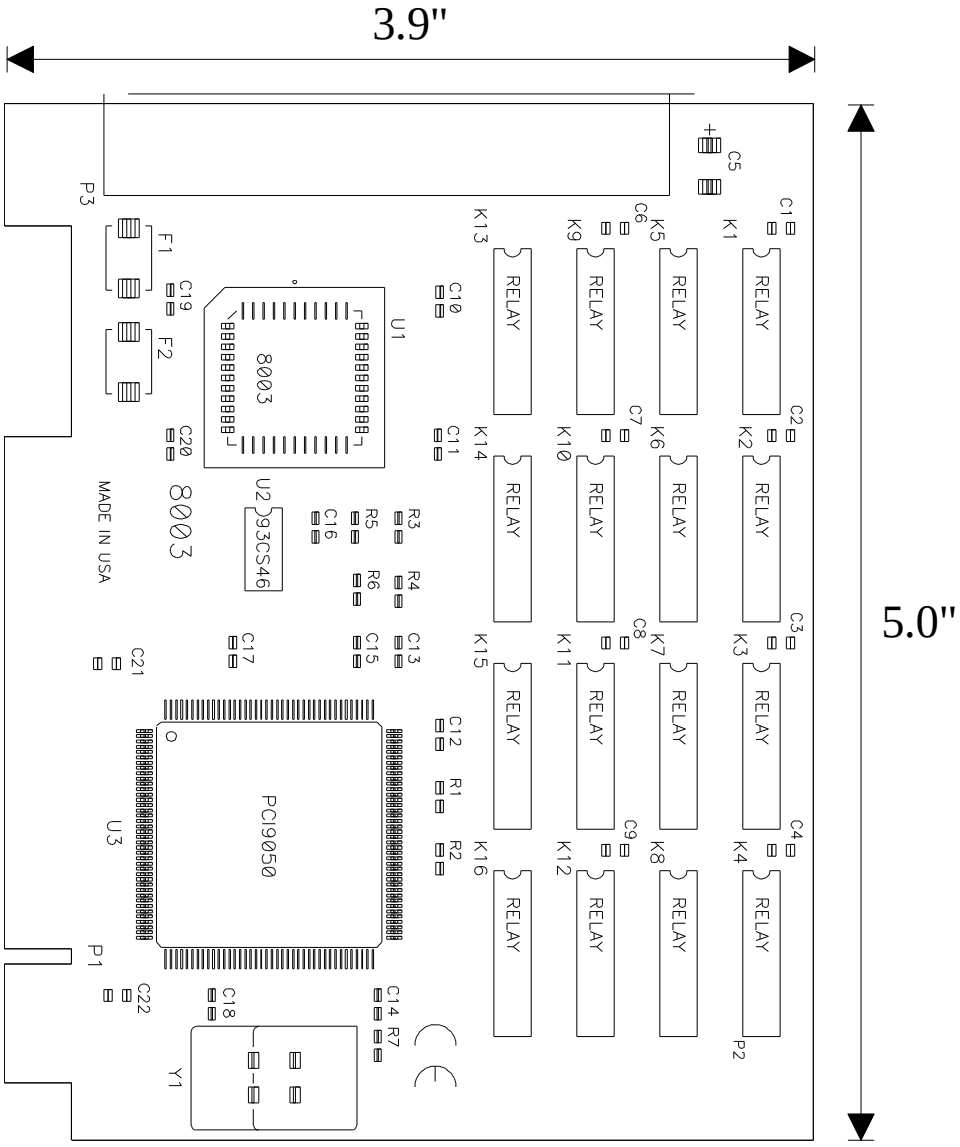
Sealevel Systems provides an FAQ section on its web site. Please refer to this to answer many common questions. This section can be found at http://www.sealevel.com/faq.asp.

Sealevel Systems maintains a web page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our web site.

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.

Appendix C – Silk Screen – 8003 PCB



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Appendix D – Compliance Notices

Federal Communications Commission (FCC) Statement



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 user's 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".



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.

Warranty

Sealevel's commitment to providing the best I/O solutions is reflected in the Lifetime Warranty that is standard on all Sealevel manufactured I/O 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 achieved ISO-9001:2015 certification in 2018.

Warranty Policy

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 the warranty period. 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, abuse, accidents, or acts of nature are not covered under this warranty.

Warranty service may be obtained by delivering the Product to Sealevel and providing proof of purchase. Customer agrees to ensure 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.

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

Non-Warranty Repair/Retest

Products returned due to damage or misuse and Products retested with no problem found are subject to repair/retest charges. A purchase order or credit card number and authorization must be provided in order to obtain an RMA (Return Merchandise Authorization) number prior to returning Product.

How to obtain an RMA (Return Merchandise Authorization)

If you need to return a product for warranty or non-warranty repair, you must first obtain an RMA number. Please contact Sealevel Systems, Inc. Technical Support for assistance:

Available	Monday – Friday, 8:00AM to 5:00PM EST
Phone	864-843-4343
Email	support@sealevel.com

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