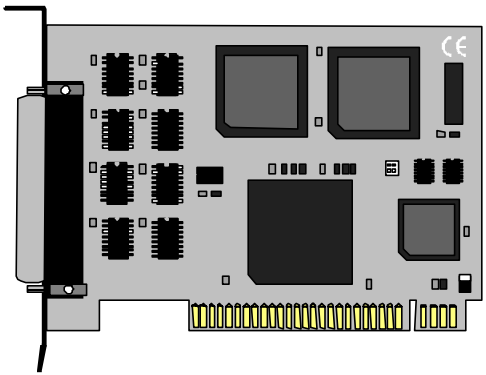
SEALEVEL
SYSTEMS INCORPORATED

REL-16™

USER'S MANUAL

Part Number 3095



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Introduction

Overview

The **REL-16** provides 16 reed relays that can latch power, data or other electronic signals for control applications. The **REL-16** is PC compatible and fits any half length ISA or EISA slot. Addressing, data and control signals are TTL compatible.

The **REL-16** is simple to operate. By writing instruction bytes to the I/O port addresses, the reed relays are energized or de-energized.

What's Included

The **REL-16** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **REL-16** Interface Adapter
- Relay/Digital I/O Software
- User manual

Factory Default Settings

The **REL-16** factory default settings are as follows:

Base Address	IRQ
300	5

To install the **REL-16** using factory default settings, refer to Installation on page 3.

For your reference, record installed **REL-16** settings below:

Base Address	IRQ

Card Setup

The **REL-16** contains several jumper straps for each port which must be set for proper operation.

Address Selection

The **REL-16** occupies a total of 2 I/O locations. The DIP-switch (SW1) is used to set the base address for these locations. Be careful when selecting the base address as some selections conflict with existing PC ports. The following table shows several examples that usually do not cause a conflict.

Address	Binary	Switch Settings							
		1	2	3	4	5	6	7	8
100-104	01 0000 00xx	Off	On	On	On	On	On	On	On
104-108	01 0000 01xx	Off	On	On	On	On	On	On	Off
200-204	10 0000 00xx	On	Off	On	On	On	On	On	On
280-283	10 1000 00xx	Off	On	Off	On	On	On	On	On
284-287	10 1000 01xx	Off	On	Off	On	Off	On	On	Off
2EC-2EF	10 1110 11xx	Off	On	Off	Off	Off	On	Off	Off
300-303	11 0000 00xx	Off	Off	On	On	On	On	On	On
320-323	11 0010 00xx	Off	Off	On	On	Off	On	On	On
388-38B	11 1000 10xx	Off	Off	Off	On	On	On	Off	On
3A0-3A3	11 1010 00xx	Off	Off	Off	On	Off	On	On	On
3A4-3A7	11 1010 01xx	Off	Off	Off	On	Off	On	On	Off

Figure 1 - Address Selection Table

The following illustration shows the correlation between the DIP-switch setting and the address bits used to determine the base address. In the example below, address 302 is selected as the base address. Address 302 in binary is XX 11 0000 00XX where X = a non-selectable address bit and address bit A9 is always a 1.

Figure 2 - DIP-Switch Illustration

Note: Setting the switch 'On' or 'Closed' corresponds to a '0' in the address, while leaving it 'Off' or 'Open' corresponds to a '1'.

Installation

The **REL-16** can be installed in any ISA PC expansion slot. The **REL-16** contains a DIP-switch (SW1) which must be set prior to installation.

1. Turn off PC power. Disconnect the power cord.
2. Remove the PC case cover.
3. Locate an two available slots and remove the blank metal slot covers.
4. Gently insert the **REL-16** into the slot. Make sure the adapter is seated properly.
5. Replace the cover.
6. Connect the power cord.

Installation is complete.

Software Installation

For Windows Users

Choose **Install Software** at the beginning of the CD and select the **Digital I/O** software drivers and install **SeaIO**.

Technical Description

The **REL-16** provides two output (I/O) ports. The ports are organized as ports A and B and are reed relay output ports. Assuming an I/O address of 302 Hex the following table shows the Port Addresses.

Base Address	Hex	Decimal	Mode
	300	768	Unused
	301	769	Unused
Port A Address	302	770	Output Port (Reed Relays)
Port B Address	303	771	Output Port

Please note that ports A and B are output ports with read-back capability, meaning that they can be written (output) to and then read back as inputs. What ever was written will always be read back (binary complement). This allows for bits to be set or reset without altering the state of the other port bits.

Features

- Selectable I/O port addressing from 100H - 3FFH
- 2 sets SPST relays with each set having 8 relays
- DB-37 male connector for relay outputs
- Highly reliable 10 VA DIP reed relays utilized
- 8 bit slot connector
- Multiple adapters can reside in same computer
- All address, data and control signals are TTL compatible

Output Ports (Reed Relay)

The output ports on the REL-16 relay output are connected to 16 dip reed relays. 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. Each relay can be individually energized by writing a "1" to the proper port bit.

Relay Specifications

- Contact Power Ratings: 10 Watts Maximum
- Contact Voltage Maximum: 100 Volts DC or AC Maximum
- Contact Current Maximum: .5 Amps DC or AC RMS
- Contact Resistance, Initial: .15 Ohms
- Rated Life:
  Low Load: 200 Million Closures
  Maximum Load: 100 Million Closures
- Contact Speed:
  Operate: .5 m Sec
  Release: .5 m Sec
  Bounce: .5 m Sec
- Maximum Operating Speed: 600 Hertz

Output Ports (Reed Relay) Pin Assignments (P2)

Port C Bit	Relay	P2 Pin	Port D Bit	Relay	P2 Pin
0	K16	2,20	0	K8	10,28
1	K15	3,21	1	K7	11,29
2	K14	4,22	2	K6	12,30
3	K13	5,23	3	K5	13,31
4	K12	6,24	4	K4	14,32
5	K11	7,25	5	K3	15,33
6	K10	8,26	6	K2	16,34
7	K9	9,27	7	K1	17,35
Ground	18,36,37				
+ 5 Volts	19				
+ 12 Volts	1				

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 relays for the 3095 specifically. Complete documentation of the API can be found in its accompanying help file.

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 (0^{th}) 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 (0^{th}) 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.

Tables : API Port/bit reference numbers for Absolute and Relative Addressing
R = Read
W = Write
R/W = Read or Write

Port	API Port # Absolute Address (function)	API Port # Relative Address (function)	Port Type
	0		Unused
	1		Unused
A	2 (R/W)	0 (W)	Output Port (Reed Relays)
B	3 (R/W)	1 (W)	Output Port

API Bit # Absolute Address (function)	API Bit # Relative Address (function)	Port Bit
16 (R/W)	0 (W)	A0
17 (R/W)	1 (W)	A1
18 (R/W)	2 (W)	A2
19 (R/W)	3 (W)	A3
20 (R/W)	4 (W)	A4
21 (R/W)	5 (W)	A5
22 (R/W)	6 (W)	A6
23 (R/W)	7 (W)	A7
24 (R/W)	8 (W)	B0
25 (R/W)	9 (W)	B1
26 (R/W)	10 (W)	B2
27 (R/W)	11 (W)	B3
28 (R/W)	12 (W)	B4
29 (R/W)	13 (W)	B5
30 (R/W)	14 (W)	B6
31 (R/W)	15 (W)	B7

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 3095 provides, a base address of 300 was used. If a different base address is used then the port addresses are calculated as shown in the table.

Reading the Outputs (relays) (direct) :

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 (relays) (direct) :

The output ports are the only ports that can be written. The relays on a standard 3095 are normally open. To close a relay a one must be written to the appropriate bit.

R = Read
W = Write
R/W = Read or Write

Function Available	Port	Address Hex	Address Decimal	Port Type
		300 (Base + 0)	768	Unused
		301(Base + 1)	769	Unused
R/W	A	302 (Base + 2)	770	Output Port (Reed Relays)
R/W	B	303 (Base + 3)	771	Output Port

Specifications

Environmental Specifications

Specification	Operating	Storage
Temperature Range	0º to 50º C (32º to 122º F)	-20º to 70º C (-4º to 158º F)
Humidity Range	10 to 90% R.H. Non-Condensing	10 to 90% R.H. Non-Condensing

Power Consumption

Supply line	+12 VDC	+5 VDC
Rating	50 mA	800 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	4.9 inches	(12.45 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.906 cm)

Note: Please see Appendix D for board layout and dimensions.

Appendix A - Troubleshooting

1. Identify all I/O adapters currently installed in your system. This includes your on-board serial ports, controller cards, sound cards etc.
2. Configure your Sealevel Systems adapter so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.
3. Make sure the Sealevel Systems adapter is securely installed in a motherboard slot.
4. The following are known I/O conflicts:
    - The 278 and 378 settings may conflict with your printer I/O adapter.
    - 3B0 cannot be used if a Monochrome adapter is installed.
    - 3F8-3FF is typically reserved for COM1:
    - 2F8-2FF is typically reserved for COM2:
    - 3E8-3EF is typically reserved for COM3:
    - 2E8-2EF is typically reserved for COM4:

Appendix B - How To Get Assistance

Please refer to Appendix A - Troubleshooting 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. 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

Appendix D - Schematic

Appendix E - 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.

Warranty

Sealevel Systems, Inc. provides a lifetime warranty for this product. Should this product fail to be in good working order at any time during this period, Sealevel Systems will, at it's option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

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.

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