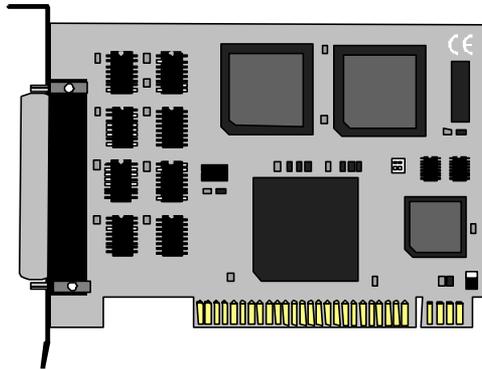


*REL-32<sup>TM</sup>*  
*USER'S MANUAL*  
*Part Number 3098*



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## Introduction

### Overview

The **REL-32** provides 32 reed relays that can latch power, data or other electronic signals for control applications. The **REL-32** is PC compatible and fits any ISA or EISA slot. Addressing, data and control signals are TTL compatible.

The **REL-32** 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-32** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- **REL-32** Relay Interface Adapter
- 3.5" DIO Diskette
- User manual

### Factory Default Settings

The **REL-32** factory default settings are as follows:

<b>Base Address</b>
300

To install the **REL-32** using factory default settings, refer to Installation on page 5.

For your reference, record installed **REL-32** settings below:

<b>Base Address</b>

## Card Setup

The **REL-32** contains several jumper straps for each port which must be set for proper operation.

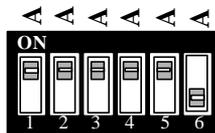
### Address Selection

The **REL-32** occupies 4 consecutive 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		SW1 Switch Position Setting					
	A8	A3	6	5	4	3	2	1
280-283	0	1 0 0 0 0	On	Off	On	On	On	On
288-28A	0	1 0 0 0 1	On	Off	On	On	On	Off
2A0-2A3	0	1 0 1 0 0	On	Off	On	Off	On	On
328-32B	1	0 0 1 0 1	Off	On	On	Off	On	Off
330-333	1	0 0 1 1 0	Off	On	On	Off	Off	On

*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 300 is selected as the base address. Address 300 in binary is XXX 100000 XXX 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".

### Relay addressing

Base + 0	D0 - D7 =	Switch 1 - Switch 8
Base + 1	D0 - D7 =	Switch 9 - Switch 16
Base + 2	D0 - D7 =	Switch 17 - Switch 24
Base + 3	D0 - D7 =	Switch 25 - Switch 32

## Options Header

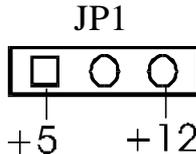
P1	Function	P2	Function	P3	Function
1	Switch 1B	1	Common 1	1	Switch 1A
2	Switch 2B	2	Common 1	2	Switch 2A
3	Switch 3B	3	Common 1	3	Switch 3A
4	Switch 4B	4	Common 1	4	Switch 4A
5	Switch 5B	5	Common 1	5	Switch 5A
6	Switch 6B	6	Common 1	6	Switch 6A
7	Switch 7B	7	Common 1	7	Switch 7A
8	Switch 8B	8	Common 1	8	Switch 8A
9	Switch 9B	9	Common 2	9	Switch 9A
10	Switch 10B	10	Common 2	10	Switch 10A
11	Switch 11B	11	Common 2	11	Switch 11A
12	Switch 12B	12	Common 2	12	Switch 12A
13	Switch 13B	13	Common 2	13	Switch 13A
14	Switch 14B	14	Common 2	14	Switch 14A
15	Switch 15B	15	Common 2	15	Switch 15A
16	Switch 16B	16	Common 2	16	Switch 16A
17	Switch 17B	17	Common 3	17	Switch 17A
18	Switch 18B	18	Common 3	18	Switch 18A
19	Switch 19B	19	Common 3	19	Switch 19A
20	Switch 20B	20	Common 3	20	Switch 20A
21	Switch 21B	21	Common 3	21	Switch 21A
22	Switch 22B	22	Common 3	22	Switch 22A
23	Switch 23B	23	Common 3	23	Switch 23A
24	Switch 24B	24	Common 3	24	Switch 24A
25	Switch 25B	25	Common 4	25	Switch 25A
26	Switch 26B	26	Common 4	26	Switch 26A
27	Switch 27B	27	Common 4	27	Switch 27A
28	Switch 28B	28	Common 4	28	Switch 28A
29	Switch 29B	29	Common 4	29	Switch 29A
30	Switch 30B	30	Common 4	30	Switch 30A
31	Switch 31B	31	Common 4	31	Switch 31A
32	Switch 32B	32	Common 4	32	Switch 32A
33	GND	33	Common 1	33	5V/12V
34	GND	34	Common 2	34	5V/12V
35	GND	35	Common 3	35	5V/12V
36	GND	36	Common 4	36	5V/12V

*Figure 3 - Options Header P1, P2 and P3*

**Note:** The **REL-32** is shipped with jumpers connecting the first 36 pins of headers P1 and P2. This connects the B-side of the relay banks to ground, which appear at the on-board DB-37.

## Header JP1

Header JP1 provides a means of connecting +5 VDC and +12 VDC from the PC bus, to the Options Header. The center pin of this header is connected to P3 pins 33-36.



*Figure 4 - Header JP1 (Factory Default +5V)*

## Optional Cable Connector P4

Discrete access to both sides of all relays is provided by attaching the optional cable (CA-108) to pin header P4 with the colored edge of the ribbon cable attached to pin one. Removing all the jumpers connecting row P1 to P2 places the A-side of each relay at the on-board DB-37 and the B-side at the optional cable's DB-37.

## Installation

The **REL-32** can be installed in any of the PC expansion slots. The **REL-32** 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 available slot and remove the blank metal slot cover.
4. Gently insert the **REL-32** into the slot. Make sure the adapter is seated properly.
5. Cabling:
  - The **REL-32** has an optional cable (CA-108) that may be installed prior to use. This cable is keyed and can only be installed one way. Please do not try to force this cable as damage to the adapter may occur.
6. Replace the cover.
7. 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-32** Relay Output Adapter provides four parallel input/output (I/O) ports. The ports are organized as ports A, B, C and D and are reed relay output ports.

### Features

- Selectable I/O port addressing from 200H - 3F8H
- 4 sets SPST relays with each set having 8 relays
- DB-37 female 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

## Connector Pin Assignments

DB-37A	Function	Common	DB-37B	Function	Common
1	Ground	N/A	1	Ground	N/A
2	Switch 2A	1	2	Switch 2B	1
3	Switch 4A	1	3	Switch 4B	1
4	Switch 6A	1	4	Switch 6B	1
5	Switch 8A	1	5	Switch 8B	1
6	Switch 10A	2	6	Switch 10B	2
7	Switch 12A	2	7	Switch 12B	2
8	Switch 14A	2	8	Switch 14B	2
9	Switch 16A	2	9	Switch 16B	2
10	Switch 18A	3	10	Switch 18B	3
11	Switch 20A	3	11	Switch 20B	3
12	Switch 22A	3	12	Switch 22B	3
13	Switch 24A	3	13	Switch 24B	3
14	Switch 26A	4	14	Switch 26B	4
15	Switch 28A	4	15	Switch 28B	4
16	Switch 30A	4	16	Switch 30B	4
17	Switch 32A	4	17	Switch 32B	4
18	Common 2	N/A	18		
19	Common 4	N/A	19		
20	Switch 1A	1	20	Switch 1B	1
21	Switch 3A	1	21	Switch 3B	1
22	Switch 5A	1	22	Switch 5B	1
23	Switch 7A	1	23	Switch 7B	1
24	Switch 9A	2	24	Switch 9B	2
25	Switch 11A	2	25	Switch 11B	2
26	Switch 13A	2	26	Switch 13B	2
27	Switch 15A	2	27	Switch 15B	2
28	Switch 17A	3	28	Switch 17B	3
29	Switch 19A	3	29	Switch 19B	3
30	Switch 21A	3	30	Switch 21B	3
31	Switch 23A	3	31	Switch 23B	3
32	Switch 25A	4	32	Switch 25B	4
33	Switch 27A	4	33	Switch 27B	4
34	Switch 29A	4	34	Switch 29B	4
35	Switch 31A	4	35	Switch 31B	4
36	Common 1	N/A	36	Common 1	N/A
37	Common 3	N/A	37		

Figure 5 - DB-37 Connector Pin Assignments

In the **REL-32** adapter's default setting, all relay connections appear at the on-board DB-37.

**Note:** Off-board and on-board pin connections are identical except that commons 2, 3, and 4 do not appear on the B-side connector.

## 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 3098 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<sup>th</sup>) 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<sup>th</sup>) 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.

Due to the fact that the 3098 has no inputs the relative and absolute address for each relay are the same.

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
A	0 (R/W)	0 (R)	Relay 1- Relay 8
B	1 (R/W)	1 (R)	Relay 9 - Relay 16
C	2 (R/W)	2 (R)	Relay 17 - Relay 24
D	3 (R/W)	3 (R)	Relay 25 - Relay 32

API Bit # Absolute Address (function)	API Bit # Relative Address (function)	Relay
0 (R/w)	0 (R)	K1
1 (R/w)	1 (R)	K2
2 (R/w)	2 (R)	K3
3 (R/w)	3 (R)	K4
4 (R/w)	4 (R)	K5
5 (R/w)	5 (R)	K6
6 (R/w)	6 (R)	K7
7 (R/w)	7 (R)	K8
8 (R/w)	8 (R)	K9
9 (R/w)	9 (R)	K10
10 (R/w)	10 (R)	K11
11 (R/w))	11 (R)	K12
12 (R/w)	12 (R)	K13
13 (R/w)	13 (R)	K14
14 (R/w)	14 (R)	K15
15 (R/w)	15 (R)	K16
16 (R/W)	16 (R)	K17
17 (R/W)	17 (R)	K18
18 (R/W)	18 (R)	K19
19 (R/W)	19 (R)	K20
20 (R/W)	20 (R)	K21
21 (R/W)	21 (R)	K22
22 (R/W)	22 (R)	K23
23 (R/W)	23 (R)	K24
24 (R/W)	24 (R)	K25
25 (R/W)	25 (R)	K26
26 (R/W)	26 (R)	K27
27 (R/W)	27 (R)	K28
28 (R/W)	28 (R)	K29
29 (R/W)	29 (R)	K30
30 (R/W)	30 (R)	K31
31 (R/W)	31 (R)	K32

## Direct Hardware Control

In systems where the users program has direct access to the hardware (DOS) the table below gives the mapping and functions which the 3098 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 value that is currently being used to drive the relays.

### Writing the Outputs (relays) (direct) :

The relays on a standard 3098 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
R/W	A	300 (Base + 0)	768	Relay 1 - Relay 8
R/W	B	301 (Base + 1)	769	Relay 9 - Relay 16
R/W	C	302 (Base + 2)	770	Relay 17 - Relay 24
R/W	D	303 (Base + 3)	771	Relay 25 - Relay 32

## Specifications

### Environmental Specifications

Specification	Operating	Storage
Temperature Range	0° to 50° C (32° to 122° F)	-20° to 70° C (-4° to 158° 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	13.33 inches	(33.85 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. Sealevel Systems maintains a forum on CompuServe providing utilities and new product information. This forum is accessed by typing "GO Sealevel" at the command prompt.
4. 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.**

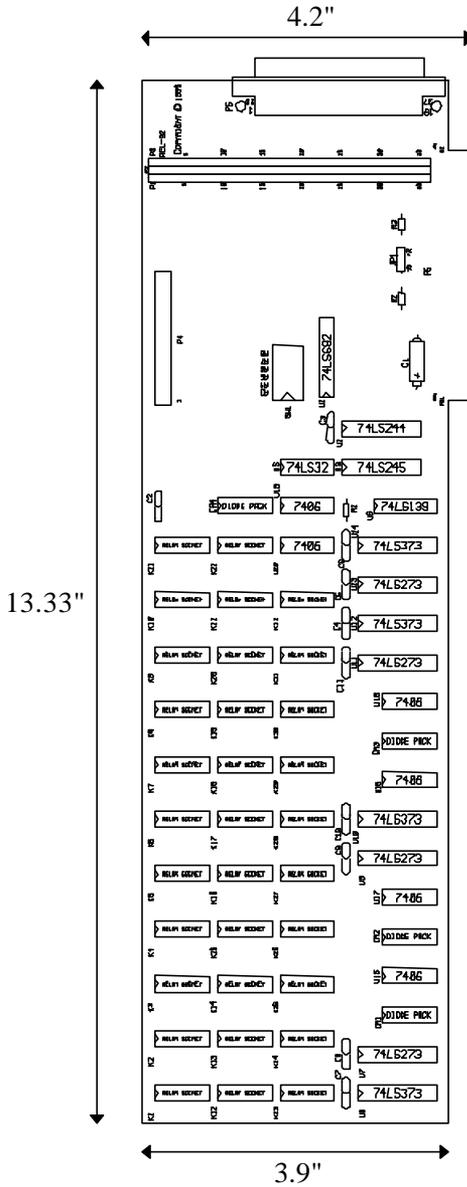
## Appendix C - Electrical Interface

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 mSec
  - Release: .5 mSec
  - Bounce: .5 mSec
- Maximum Operating Speed: 600 Hertz

# Appendix D - Silk-Screen



## **Appendix E - Schematic**











## 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.

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