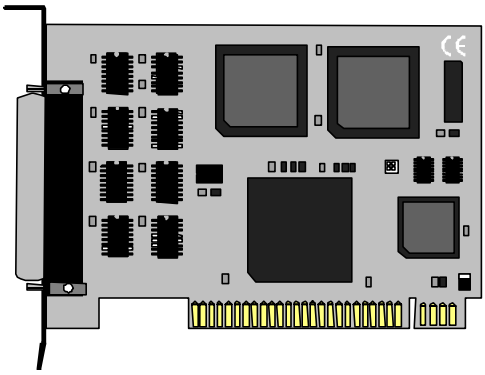
SEALEVEL
SYSTEMS INCORPORATED

SPIO™

USER'S MANUAL

Part Number 4038



Sealevel Systems, Inc
155 Technology Place
P.O. Box 830
Liberty, SC 29657

Phone: (864) 843-4343
Fax: (864) 843-3067
www.sealevel.com

Contents

INTRODUCTION **1**
OVERVIEW 1
WHAT'S INCLUDED 1
FACTORY DEFAULT SETTINGS 1

CARD SETUP **2**
ADDRESS SELECTION 2
PORT ENABLE / DISABLE 2
SSPCIO SOFTWARE UTILITY 3
IRQ SELECTION 4
IRQ AND PORT CONFIGURATION OPTIONS 4
IRQ Mode Options 4
Port Configuration Options 5

INSTALLATION **6**
OPERATING SYSTEM INSTALLATION 6

TECHNICAL DESCRIPTION **7**
FEATURES 7
CONNECTOR PIN ASSIGNMENTS 7

SPECIFICATIONS **8**
ENVIRONMENTAL SPECIFICATIONS 8
POWER CONSUMPTION 8
MEAN TIME BETWEEN FAILURES (MTBF) 8
PHYSICAL DIMENSIONS 8

APPENDIX A - TROUBLESHOOTING **9**

APPENDIX B - HOW TO GET ASSISTANCE **10**

APPENDIX C - ELECTRICAL INTERFACE **11**
CENTRONICS AND BI-DIRECTIONAL PARALLEL PORTS 11

APPENDIX D - SILK-SCREEN **12**

APPENDIX E - SCHEMATIC **13**

APPENDIX F - COMPLIANCE NOTICES **15**
FEDERAL COMMUNICATIONS COMMISSION STATEMENT 15
EMC DIRECTIVE STATEMENT 15

WARRANTY **16**

Figures

Figure 1 - Address Selection Table **2**

Figure 2 - DIP-Switch SW2 Illustration.....2
Figure 3 - Header E1, IRQ Selection. (IRQ7 Selected).....4
Figure 4 - Header E3, IRQ and Port Configuration Options 5

© 1997d Sealevel Systems, Incorporated. All rights reserved.

Introduction

Overview

The Sealevel Systems **SPIO** provides one Centronics parallel port for printers with bi-directional capability for general purpose parallel I/O.

What's Included

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

- (1) **SPIO** Parallel Interface Adapter
- Sealevel CD containing Sealevel Systems products and software.
- User manual

Factory Default Settings

The **SPIO** factory default settings are as follows:

	Base Address	IRQ
Port 1	378	7

To install the **SPIO** using factory default settings, refer to the section on Installation in this manual.

For your reference, record installed **SPIO** settings below:

	Base Address	IRQ
Port 1		

Card Setup

The **SPIO** contains several options which must be set for proper operation.

Address Selection

The parallel port on the **SPIO** occupies 4 consecutive I/O locations DIP-switch (SW2) is used to set the base address for these locations.

Address	Binary	SW2 Switch Position Setting						
Hex	(A9)A8 A2	1	2	3	4	5	6	7
3BC-3BF	(1) 1101111XX	Off	Off	On	Off	Off	Off	Off
378-37B	(1) 1011110XX	Off	On	Off	Off	Off	Off	On
278-27B	(1) 0011110XX	On	On	Off	Off	Off	Off	On
300-303	(1) 1000000XX	Off	On	On	On	On	On	On
2B0-2B3	(1) 0101100XX	On	Off	On	Off	Off	On	On
270-273	(1) 0011100XX	On	On	Off	Off	Off	On	On

Figure 1 - Address Selection Table

Note: Address line A9 is always a “1” .

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, the address 378 Hex through 37B Hex is selected. 378 Hex =11 0111 0XXX in binary representation.

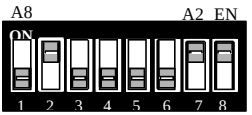


Figure 2 - DIP-Switch SW2 Illustration

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

Port Enable / Disable

The Parallel port on the **SPIO** can be enabled or disabled with switch position 8 on the DIP-switch. The port is enabled with the switch "On" or "Closed" and disabled when "Off" or "Open". If any port is disabled, be sure to also disable the interrupt request for that port by removing the IRQ jumper (see Figure 3).

SSPCIO Software Utility

The enclosed diskette contains the utility program, SSPCIO.COM which displays the current settings of COM1: - COM4: and LPT1: - LPT3: as contained in the BIOS data area.

The syntax for invoking this program is :

SSPCIO

Below is a sample output from SSPCIO. It shows that COM1: is assigned to 3F8 Hex with COM2: - COM4: unassigned. Also, it shows LPT1: assigned to 3BC Hex, LPT2: assigned to 378 Hex and LPT3: is unassigned.

Sealevel(R) Display COM: and LPT: Program version 1.0

(c)Copyright Sealevel Systems, Inc. 1995

Current COM: and LPT: assignments

COM1: 3F8	LPT1: 3BC
COM2: Not Used	LPT2: 378
COM3: Not Used	LPT3: Not Used
COM4: Not Used	

Note: If addresses 378 and 278 are selected and address 3BC is selected as the address for the SPIO, it will automatically become LPT1:. During the Power On Self Test, the BIOS will automatically assign (i.e. load into the I/O address table) the printer ports by address in the following order: 3BC Hex as LPT1:, 378 Hex as LPT2:, and 278 Hex as LPT3:. This is a BIOS function and typically cannot be changed.

IRQ Selection

The **SPIO** has an interrupt selection jumper which should be set prior to use, if an interrupt is required by your application software. Consult the user manual for the application software being used to determine the proper setting. Header E1 selects the interrupt request for the **SPIO**. If LPT1: is selected, this jumper must be on the IRQ7 setting. If no interrupt is desired, remove the jumper.

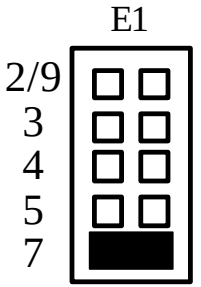


Figure 3 - Header E1, IRQ Selection. (IRQ7 Selected)

Note: The actual silk-screen for the **SPIO** may have a "2" in place of the IRQ "2/9" selection.

IRQ and Port Configuration Options

IRQ Mode Options

Placing the jumper on "**N**" selects the **N**ormal, single interrupt per adapter mode. Placing the jumper on the "**M**" position selects the **M**ulti interrupt mode. The Multi interrupt mode allows you to share the IRQ signal(s) with other adapters that support multiple interrupts. (See Figure 4 for jumper illustration)

Port Configuration Options

Placing the jumper in the "**N**" normal setting configures the **SPIO** as an output-only normal PC printer port. Position "**B**" (for **B**i-directional mode) allows the port to be run in Bi-directional mode with software control of the port's input/output mode.

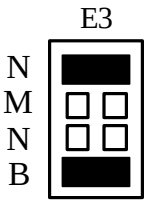


Figure 4 - Header E3, IRQ and Port Configuration Options

With the "**B**" position selected, the following assembly language software will toggle the input/output mode. A base address of 378 Hex is assumed for this example. **Not all bits are read/write**

To set input mode:

```
MOV DX,37AH ;Set DX to point to control register
IN AL,DX    ;Get old port data
OR AL,20H   ;OR in bit D5 to turn output port Off
OUT DX,AL   ;Output new value
```

To set output mode:

```
MOV DX,37AH ;Set DX to point to control register
IN AL,DX    ;Get old port data
AND AL,0DFH ;AND in bit D5 to turn output port On
OUT DX,AL   ;Output new value
```

Note: The SPIO powers up reset as a normal output-only printer port, even if jumper selection "B" is selected.

Installation

The **SPIO** can be installed in any of the PC expansion slots. The **SPIO** contains several jumper straps for each port which must be set for proper operation.

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 **SPIO** into the slot. Make sure that the adapter is seated properly.
5. Replace the cover.
6. Connect the power cord.

Installation is complete.

Operating System Installation

Install as a standard parallel port following your operating system's instructions.

Technical Description

The **SPIO** provides one Centronics compatible parallel port for printers and bi-directional (IBM Extended Mode) capability for general purpose parallel I/O. The **SPIO** supports edge-triggered interrupts and a readable interrupt-pending status.

Features

- IBM/Centronics compatible parallel printer port
- IBM Extended Mode (bi-directional) compatible
- User selectable (via DIP-switch) addresses of LPT1-3:, any other I/O address or disabled
- Interrupt requests IRQ 2/9, 3, 4, 5, 7
- Interrupts can be shared with other "Share-able" interrupts
- Provides a DB-25 female connector with the industry standard Centronics parallel printer pin-out

Connector Pin Assignments

Signal Name	Pin #	Direction
-Strobe	1	Input / Output
Data Bit 0	2	Input / Output
Data Bit 1	3	Input / Output
Data Bit 2	4	Input / Output
Data Bit 3	5	Input / Output
Data Bit 4	6	Input / Output
Data Bit 5	7	Input / Output
Data Bit 6	8	Input / Output
Data Bit 7	9	Input / Output
-ACK	10	Input
Busy	11	Input
PE	12	Input
SLCT	13	Input
-Auto Feed	14	Output
-Error	15	Input
-INIT	16	Output
-SLCT IN	17	Output
Ground	18-25	N/A

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	+5 VDC
Rating	160 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	6.5 inches	(16.51 cm)
Board Height including Goldfingers	4.2 inches	(10.66 cm)
Board Height excluding Goldfingers	3.9 inches	(9.91 cm)

Please see Appendix D for board layout and dimensions.

Appendix A - Troubleshooting

A PCIO Diskette is supplied with the Sealevel Systems adapter and will be used in the troubleshooting procedures. By using this diskette and following these simple steps, most common problems can be eliminated without the need to call Technical Support.

1. 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.

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 using a unique IRQ. While the Sealevel Systems adapter does allow the sharing of IRQs, many other adapters (i.e. SCSI adapters & on-board serial ports) do not. The IRQ is typically selected via an on-board header block. Refer to the section on Card Setup for help in choosing an I/O address and IRQ.

4. Make sure the Sealevel Systems adapter is securely installed in a motherboard slot.

5. The following are known I/O conflicts:

    - 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 Home page on the Internet. Our home page address is www.sealevel.com. The latest software updates, and newest manuals are available via our FTP site that can be accessed from our home page.
4. 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.
5. 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

Centronics and Bi-Directional Parallel Ports

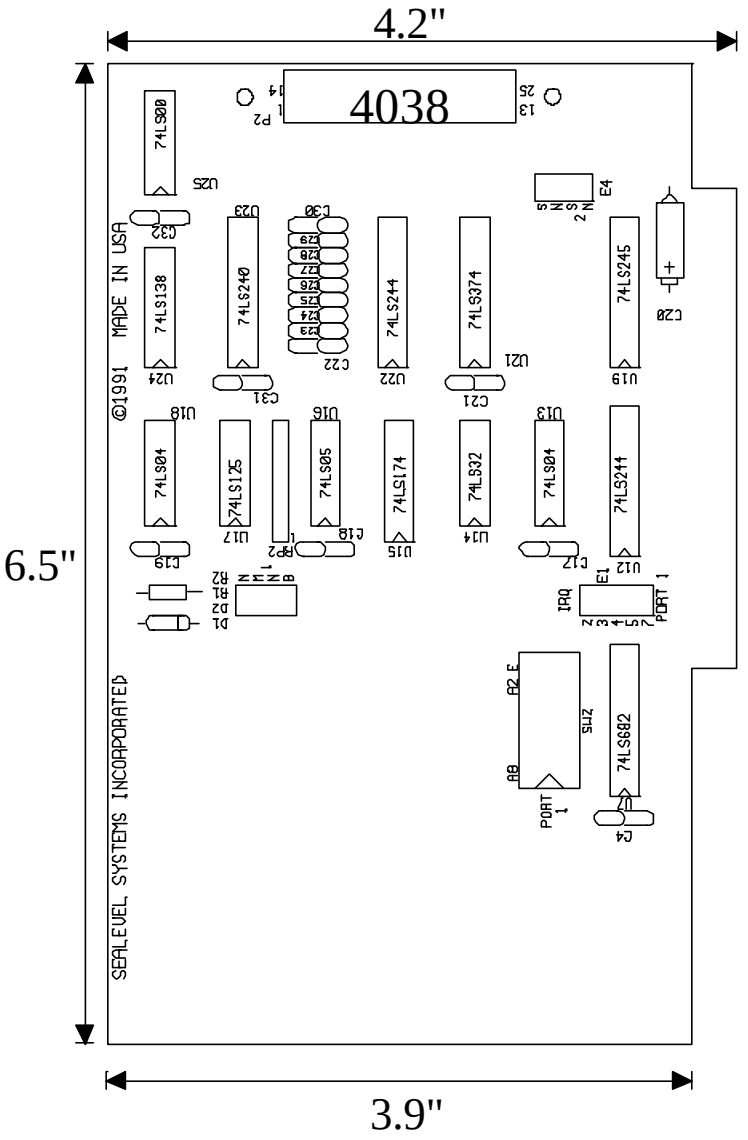
In the early days of the IBM PC a decision was made to use the popular "Centronics" style interface as the interface of choice for the parallel printer. Centronics was a prominent manufacturer of "daisy wheel" printers and of the then new "dot matrix" style printers originally designed for Mini and Mainframe computers. The only difference between the PC interface and the Centronics interface was the use of a DB-25 style connector on the PC side of the interface. This was done because the designers felt that the Amphenol style interface common to the Centronics printers would not fit well on a PC bracket. The choice of a female connector was made to avoid confusion with the RS-232 port which was male.

The parallel printer port can be used as a general purpose set of TTL compatible digital input and output points. When not in the bi-directional mode the adapter provides an 8 bit output port at the base address, a 4 bit input/output port at base+1 address, and a 5 bit input port at the base+2 address.

The 8 bit register (bits D0-D7) always powers up in an output only mode and is directly connected to the output pins (these pins are defined in the Card Setup section). An out instruction written to this register will write directly to the output pins. A one-bit written to the port will result in a "high" TTL level (5VDC) at the connector pin. The output of the port can be read back with an "in" instruction to this register as well. The purpose of this input register in the output only mode is to verify that the output register was written correctly.

The 8 bit output port is typically an output only port on standard Centronics Parallel ports. This however changed with the IBM PS/2 series of personal computers. The PS/2 offered a bi-directional mode of operation that made the 8 bit output port 'switch-able' to an 8 bit input port via a software "switch". The bi-directional mode the 8 bit output port can be changed from output to input and vice versa by setting bit D5 in the base +3 address (see Card Setup section for software examples).

Appendix D - Silk-Screen



Appendix E - Schematic

Appendix F - 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.

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.

Sealevel Systems, Incorporated
155 Technology Place
P.O. Box 830
Liberty, SC 29657 USA
(864) 843-4343 FAX: (864) 843-3067
Homepage:www.sealevel.com
email: Internet: support@sealevel.com

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

Trademarks

Sealevel Systems, Incorporated acknowledges that all trademarks referenced in this manual are the service mark, trademark, or registered trademark of the respective company.

SPIO is a trademark of Sealevel Systems, Incorporated.