SEALEVEL®
SYSTEMS INCORPORATED

ROUTE 5b®
USER MANUAL

Part # 5010

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Introduction

Overview

The ***ROUTE 56*** adapter provides the PC with a single channel high-speed multi-protocol serial interface suitable for the most popular communication protocols. This sync/async card provides an ideal solution for high-speed applications including LAN/WAN connectivity. Utilizing the Z16C32 (IUSC™) on chip DMA controller eliminates bus bandwidth constraints that are placed on typical PC interface adapters, allowing data rates to reach 10M bps in burst mode. By utilizing the Z16C32's 32 byte FIFO buffer coupled with 256K of on board memory, higher data rates are achieved without increasing processor overhead.

What's Included

The ***ROUTE 56*** is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- ***ROUTE 56*** Adapter card
- ***ROUTE 56*** Developers Toolkit Software
- ***ROUTE 56*** User manual

Factory Default Settings

The ***ROUTE 56*** factory default settings are as follows:

Base Address	Default Electrical Interface
300	RS-530/422

To install the ***ROUTE 56*** using factory default settings, refer to Installation on page 4.

For your reference, record installed ***ROUTE 56*** settings below:

Base Address	Default Electrical Interface

Card Setup

The ***ROUTE 56*** contains several jumper straps for each port, which must be set for proper operation.

Address Selection

The ***ROUTE 56*** adapter occupies a total of four consecutive I/O locations. A DIP-switch 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						
Hex	A9 A8 A0	1	2	3	4	5	6	7
238-23B	1 0001110XX	On	On	On	Off	Off	Off	On
300-303	1 1000000XX	Off	On	On	On	On	On	On
304-307	1 1000001XX	Off	On	On	On	On	On	Off
310-313	1 1000100XX	Off	On	On	On	Off	On	On
314-317	1 1000101XX	Off	On	On	On	Off	On	Off
320-323	1 1001000XX	Off	On	On	Off	On	On	On
3A0-3A3	1 1101000XX	Off	Off	On	Off	On	On	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. Assume 300 Hex to 303 Hex is the desired base address. 300 Hex = (1) 1 0000 0X in Binary.

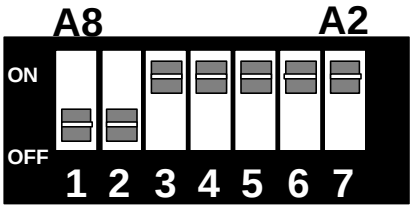


Figure 2 - DIP-Switch Illustration

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

Interface Selection

Headers E2, E3 and E4 must be set prior to installing the ***ROUTE 56*** in your computer chassis. These headers choose the electrical/mechanical interface options for the ***ROUTE 56*** (i.e. RS-232, RS-530, V.35). Refer to the illustration below for guidance in configuring the ***ROUTE 56***.

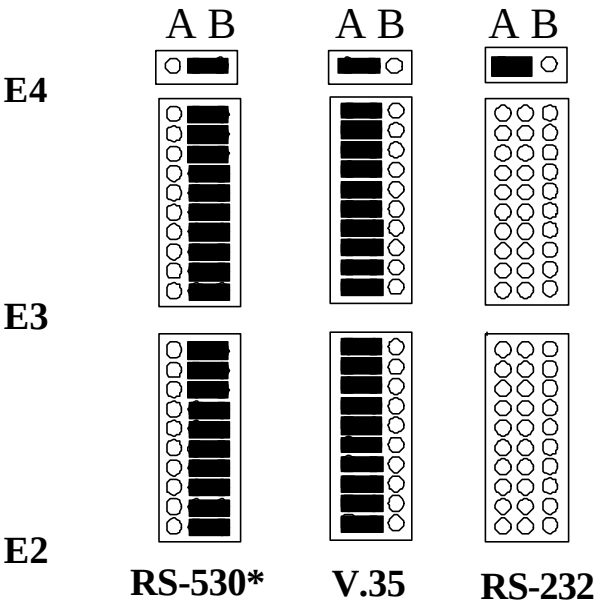


Figure 3 - Header E2, E3 & E4 Interface Selection Headers.

* Factory Default

Note: The Electrical Interface must be set in the IUSC's Port Control Register (PCR) prior to the interface being active. Refer to the ***ROUTE 56*** Developers Toolkit Diskette for detailed instructions and examples in setting the PCR.

Installation

The ***ROUTE 56*** can be installed in any of the 16-bit expansion slots. The ***ROUTE 56*** 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 ***ROUTE 56*** into the slot. Make sure the adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

Installation is complete.

The ***ROUTE 56*** has a number of cabling options available. These options include:

- **CA-103** - This cable provides a high quality shielded cable with the V.35 mechanical specification met on one end and a DB-25S (female) on the other end. V.35 has a mechanical specification that is impossible to place on a PC bracket and requires this adapter cable.
- **CA-104** - This cable provides a 6' extension for use with RS-232, RS-530/422 and MIL-188.
- **CA-107** - RS-530 (DB-25P) to RS-449 (DB-37P) cabling adapter. RS-530 is replacing RS-449 in Telecom applications, but there is still a very large base of installed equipment that uses the RS-449 pin-out. Both standards use RS-422 to define the electrical specifications and are interchangeable via this adapter cable.

Technical Description

The Sealevel Systems ***ROUTE 56*** adapter was designed for seamless integration into any ISA based system. The ***ROUTE 56*** adapter requires a 80286 or higher CPU, one IRQ, a 4 byte block of I/O address and a 16K block of memory address. The memory range of this adapter can be configured to reside in the lower 1 Megabyte of memory and appear to the system as a bank switched 16K window or the on-board memory can be used by the system as a 256K linear address block in the upper 4 Megabytes of memory. When using either address configuration, the ***ROUTE 56*** adapter's memory range can be disabled allowing multiple adapters to share the same block of memory.

Features

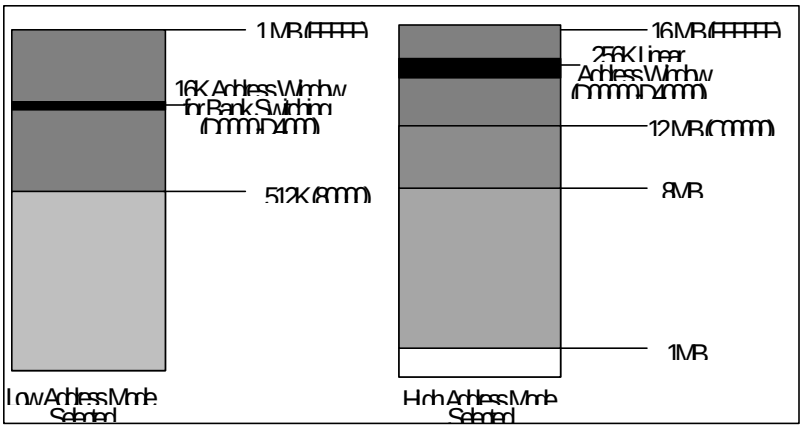
- Single channel high speed sync/async wide area network (WAN) interface
- RS-232, RS-422/449, EIA-530, V.35 and X.21 serial interface capability with versatile cabling options
- Multiple protocols supported including: PPP (point-to-point protocol), Frame Relay, X.25, high-speed Async, Bisync, Mono-Sync, HDLC, SDLC and MIL-188
- Ideal for Fractional T1, T1, E1, and ISDN applications
- On-board Z16C32 (IUSC™) with built in DMA controller and 32 byte FIFO buffer
- Up to 10 Mbps burst mode
- 256K of on-board RAM
- Link list DMA supported
- 16-bit data path
- Off loads communication processing

IUSC™

The ***ROUTE 56*** adapter is based on a single Zilog Z16C32 IUSC (**I**ntegrated **U**niversal **S**erial **C**ontroller). Application and driver software access the IUSC registers through the first 256 bytes of on-board RAM. Register access to the IUSC can be disabled via I/O registers allowing the first 256 bytes of RAM to be used for buffer storage. The IUSC has a built-in DMA controller that allows high-speed data transfers directly to and from the 256K block of on-board memory. The IUSCs built-in DMA controller supports 4 different modes of DMA transfer: Single Buffer, Pipelined, Array, and Link List. An on-board 16MHz oscillator clocks the IUSC.

RAM

The ***ROUTE 56*** has 256K of on-board SRAM, which can be configured, as "low" or "high" addressing. When in low addressing mode, the 256K bytes of SRAM appear to the host processor in the 2nd 512K bytes of the host's memory address range, (Segment 8000 to F000). In addition, the 256K of SRAM appears to the host in a 16K bank-switched window. The address of the 16K window and the page is software selectable. When in high addressing mode, the entire 256K bytes of SRAM are accessible to the host processor simultaneously in the Linear Address Range C00000 to FFFFFF. The IUSC always views the 256K of SRAM as linear memory. The SRAM can be selectively disabled through software. The SRAM must be addressed in a section that does not conflict with system DRAM.



Control / Status Registers

The control / status registers occupy 4 consecutive bytes in the AT I/O range. The following tables provide a functional description of the bit positions.

Address		D7	D6	D5	D4	D3	D2	D1	D0
Base+0	RD/WR	MEMEN	IUSCEN	X	X	P17	P16	P15	P14
Base+1	WR	INT2	INT1	INT0	MA21/18	MA20/17	MA19/16	MA18/15	MA14
Base+2	WR	HIAD	WSEN	EN16	IRQMODE	X	X	X	X
Base+3	RD	X	X	INTPEND	RESTAT	16BIT	X	X	X
Base+3	WR	Reset for entire board							

Field	Description
MEMEN	1 = Host access to RAM enabled; 0 = Host access to RAM disabled.
IUSCEN	1 = Disable Host access to IUSC; 0 = Enable Host access to IUSC.
P17-P14	Page selector / Valid in "LOW" addressing mode only.
INT2-INT0	Interrupt: 000 = None; 001 = IRQ3; 010 = IRQ4; 011 = IRQ9; 100 = IRQ10; 101 = IRQ11; 110 = IRQ12; 111 = IRQ15.
MA21/18-MA18/15	For "HIGH" addressing mode: These bits select the base memory address of the 256K of SRAM. For "LOW" addressing mode: These bits and MA14 select the base memory address of the 16K bank-switched window of SRAM.
MA14	In "LOW" addressing mode this bit and MA21/18-MA18/15 select the base memory address of the 16K bank-switched window of SRAM. In "HIGH" addressing mode this bit is not used.
HIAD	"HIGH" addressing mode enable: 1 = "HIGH" addressing mode enable;0 = "LOW" addressing mode enable.
WSEN	Wait State Enable: 1 = disable wait states(Zero wait states); 0 = enable wait states.
EN16	Enable 16-bit operations with the IUSC and SRAM: 1 = enable 16-bit operations; 0 = disable 16-bit operations.
IRQMODE	IRQ mode: 1 = ISA IRQ mode; 0 = EISA IRQ mode.(wire OR low level)
INTPEND	IUSC interrupt status: 1 = No interrupt pending on IUSC; 0 = Interrupt pending on IUSC.
RESTAT	Reset status: 1 = On-board reset inactive; 0 = On-board reset active.
16BIT	1 = Card resides in 16-Bit slot; 0 = Card resides in 8-Bit slot.

25 Pin Connector Signal Layouts

RS-232 Signals

Signal	Name	Pin #	Mode
GND	Ground	7	
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
TM	Test Mode	25	Input
RI	Ring Indicator	18	Input
TXC	Transmit Clock	15	Input
RXC	Receive Clock	17	Input
TSET	Transmit Signal Element Timing	24	Output
DTR	Data Terminal Ready	20	Output
TD	Transmit Data	2	Output
RTS	Request To Send	4	Output

V.35 Signals

Signal	Name	DB-25	V.35	Mode
GND	Ground	7	B	
RDB RX+	Receive Positive	16	T	Input
RDA RX-	Receive Negative	3	R	Input
TXCB TXC+	Transmit Clock Positive	12	AA	Input
TXCA TXC-	Transmit Clock Negative	15	Y	Input
RXCB RXC+	Receive Clock Positive	9	X	Input
RXCA RXC-	Receive Clock Negative	17	V	Input
TDB TX+	Transmit Positive	14	S	Output
TDA TX-	Transmit Negative	2	P	Output
TSETB TSET+	Transmit Signal Element Timing +	11	W	Output
TSETA TSET-	Transmit Signal Element Timing -	24	U	Output
CTS	Clear To Send	5	D	Input *
DSR	Data Set Ready	6	E	Input *
DCD	Data Carrier Detect	8	F	Input *
RI	Ring Indicator	18	J	Input *
DTR	Data Terminal Ready	20	H	Output *
RTS	Request To Send	4	C	Output *

* **Note:** All modem control signals are single ended (un-balanced) with RS-232 signal levels.

EIA- 530, RS-422 and MIL 188 Signals

Signal	Name	Pin #	Mode
GND	Ground	7	
RDB RX+	Receive Positive	16	Input
RDA RX-	Receive Negative	3	Input
CTSB CTS+	Clear To Send Positive	13	Input
CTSA CTS-	Clear To Send Negative	5	Input
DSRB DSR+	Data Set Ready Positive	22	Input
DSRA DSR-	Data Set Ready Negative	6	Input
DCDB DCD+	Data Carrier Detect Positive	10	Input
DCDA DCD-	Data Carrier Detect Negative	8	Input
TXCB TXC+	Transmit Clock Positive	12	Input
TXCA TXC-	Transmit Clock Negative	15	Input
RXCB RXC+	Receive Clock Positive	9	Input
RXCA RXC-	Receive Clock Negative	17	Input
RI-	Ring Indicator	18	Input
TM	Test Mode	25	Input
TDB TX+	Transmit Positive	14	Output
TDA TX-	Transmit Negative	2	Output
RTSB RTS+	Request To Send Positive	19	Output
RTSA RTS-	Request To Send Negative	4	Output
DTRB DTR+	Data Terminal Ready Positive	23	Output
DTRA DTR-	Data Terminal Ready Negative	20	Output
TSETB TSET+	Transmit Signal Element Timing Positive	11	Output
TSETA TSET-	Transmit Signal Element Timing Negative	24	Output

Specifications

Environmental Specifications

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

Power Consumption

Supply line	-5VDC	+5 VDC
Rating		2.1A

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	8.25 inches	(20.955 cm.)
Board Height including Goldfingers	4.80 inches	(12.192 cm.)
Board Height excluding Goldfingers	4.50 inches	(11.430 cm.)

Appendix A - Troubleshooting

A Developers Toolkit 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 IRQ's, many other adapters (i.e. SCSI adapters and on-board serial ports) do not. The IRQ is typically selected via an on-board header block. Refer to the section on Card Setup and the Control/Status port for help in choosing an I/O address and IRQ.

4. Make sure the Sealevel Systems adapter is securely installed in a 16-bit slot.

5. Use the supplied diskette and User Manual to verify that the Sealevel Systems adapter is configured correctly. The supplied diskette contains a diagnostic program "SSDR56" that will verify if an adapter is configured properly. This diagnostic program is written with the user in mind and is easy to use. Refer to the "README.txt" file on the supplied diskette for detailed instructions on using "SSDR56".

6. 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 - Electrical Interface

RS-232

Quite possibly the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often referred to as RS-232 or EIA/TIA-232. It is defined by the EIA as the *Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange*. The mechanical implementation of RS-232 is on a 25 pin D sub connector. RS-232 is capable of operating at data rates up to 20 Kbps at distances less than 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 Kbps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single ended or unbalanced interface, meaning that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denotes a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

RS-422

The RS-422 specification defines the electrical characteristics of balanced voltage digital interface circuits. RS-422 is a differential interface that defines voltage levels and driver/receiver electrical specifications. On a differential interface, logic levels are defined by the difference in voltage between a pair of outputs or inputs. In contrast, a single ended interface, for example RS-232, defines the logic levels as the difference in voltage between a single signal and a common ground connection. Differential interfaces are typically more immune to noise or voltage spikes that may occur on the communication lines. Differential interfaces also have greater drive capabilities that allow for longer cable lengths. RS-422 is rated up to 10 Megabits per second and can have cabling 4000 feet long. RS-422 also defines driver and receiver electrical characteristics that will allow 1 driver and up to 32 receivers on the line at once. RS-422 signal levels range from 0 to +5 volts. RS-422 does not define a physical connector.

RS-530

RS-530 (a.k.a. EIA-530) compatibility means that RS-422 signal levels are met, and the pin-out for the DB-25 connector is specified. The EIA (Electronic Industry Association) created the RS-530 specification to detail the pin-out, and define a full set of modem control signals that can be used for regulating flow control and line status. The RS-530 specification defines two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

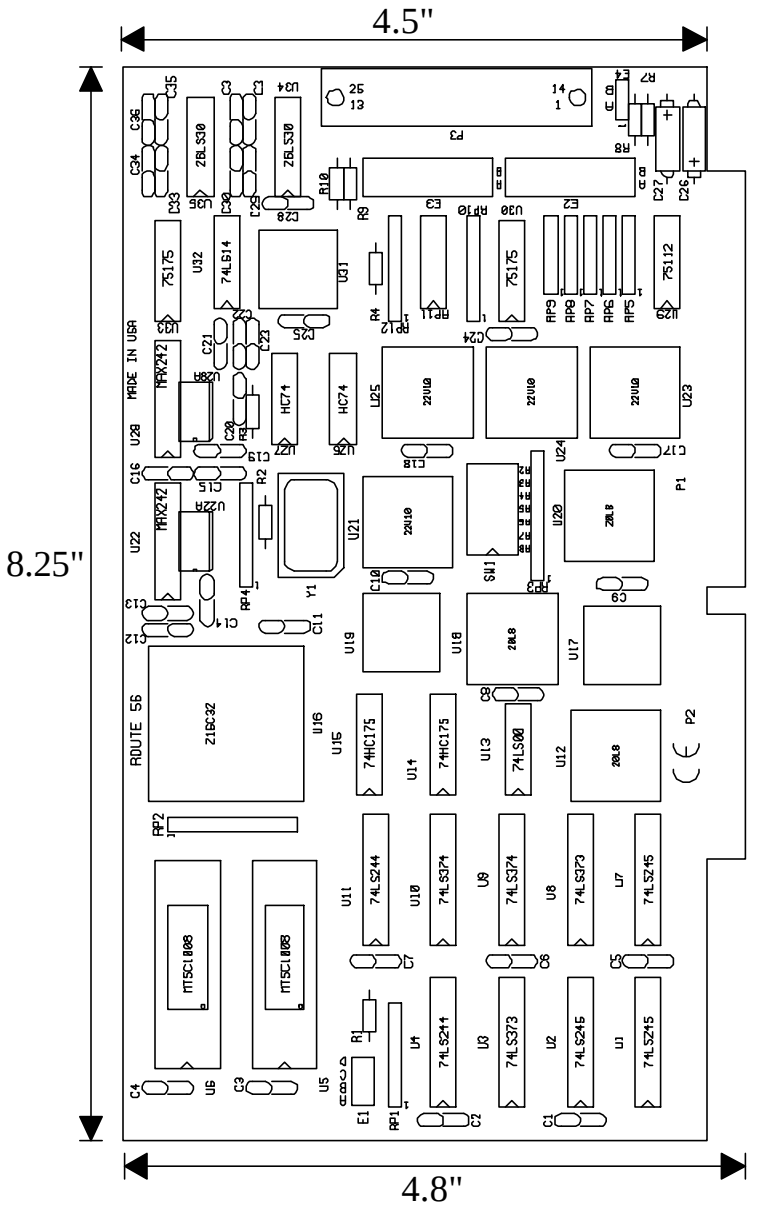
V.35

V.35 is a standard defined by ITU (formerly CCITT) that specifies an electrical, mechanical, and physical interface that is used extensively by high-speed digital carriers such as AT&T Dataphone Digital Service (DDS). ITU V.35 is an international standard that is often refereed to as *Data Transmission at 48 Kbps Using 60 - 108 KHz Group-Band Circuits*. ITU V.35 electrical characteristics are a combination of unbalanced voltage and balanced current mode signals. Data and clock signals are balanced current mode circuits. These circuits typically have voltage levels from 0.5 Volts to -0.5 Volts (1 Volt differential). The modem control signals are unbalanced signals and are compatible with RS-232. The physical connector is a 34 pin connector that supports 24 data, clock and control signals. The physical connector is defined in the ISO-2593 standard. ITU V.35 specification defines two type of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The Sealevel Systems adapter is a DTE interface.

MIL-188

This communications standard comes is two varieties, MIL-188/C and MIL-188/114. Both of these interfaces are military standards that are defined by the US Department of Defense. MIL-188/114 is a differential interface and MIL-188/C is a unbalanced or single ended interface. Both MIL-188 interfaces are implemented on a RS-530 connector. MIL-188/C and MIL-188/114 have signal levels from +6 volts to -6 volts and are ideal for long distances at high speeds.

Appendix D - Silk-Screen



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"
- **EN50082-1** - "Electromagnetic compatibility - Generic immunity standard" Part 1 : Residential, commercial and light industry
- **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. warrants this product to be in good working order for a period of one year from the date of purchase. 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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Monday - Friday

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