



***INDUSTRIAL COMPUTER SOURCE***<sup>®</sup>

# **Model IDE Series Product Manual**

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***INDUSTRIAL COMPUTER SOURCE***<sup>®</sup>

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## FORWARD

This product manual provides information to install, operate and or program the referenced product(s) manufactured or distributed by Industrial Computer Source. The following pages contain information regarding the warranty and repair policies.

Technical assistance is available at: **1-800-480-0044**.

**Manual Errors, Omissions and Bugs:** A "Bug Sheet" is included as the last page of this manual. Please use the "Bug Sheet" if you experience any problems with the manual that requires correction.

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## Guarantee

A thirty day money-back guarantee is provided on all **standard** products sold. **Special order products** are covered by our Limited Warranty, *however they may not be returned for refund or credit.*

### Refunds

In order to receive a full refund on a product purchase price, the product must not have been damaged by the customer or by the common carrier chosen by the customer to return the goods, and the product must be returned complete (meaning all manuals, software, cables, etc.) within 30 days of receipt and in as-new and resalable condition. The **Return Procedure** must be followed to assure prompt refund.

### Restocking Charges

Product returned *after* 30 days, and *before* 90 days, of the purchase will be subject to a **minimum** 20% restocking charge and any charges for damaged or missing parts.

Products not returned within 90 days of purchase, or products which are not in as-new and resalable condition, are not eligible for credit return and will be returned to the customer.

### Limited Warranty

One year limited warranty on all products sold with the exception of the "Performance Series" I/O products, which are warranted to the original purchaser, for as long as they own the product, subject to all other conditions below, including those regarding neglect, misuse and acts of God. Within one year of purchase, Industrial Computer Source will repair or replace, at our option, any defective product. At any time after one year, we will repair or replace, at our option, any defective "Performance Series" I/O product sold. This does not include products damaged in shipment, or damaged through customer neglect or misuse. Industrial Computer Source will service the warranty for all standard catalog products for the first year from the date of shipment. After the first year, for products not manufactured by Industrial Computer Source, the remainder of the manufacturer's warranty, if any, will be serviced by the manufacturer directly.

The **Return Procedure** must be followed to assure repair or replacement. Industrial Computer Source will normally return your replacement or repaired item via UPS Blue. *Overnight delivery or delivery via other carriers is available at additional charge.*

The limited warranty is void if the product has been subjected to alteration, neglect, misuse, or abuse; if any repairs have been attempted by anyone other than Industrial Computer Source or its authorized agent; or if the failure is caused by accident, acts of God, or other causes beyond the control of Industrial Computer Source or the manufacturer. Neglect, misuse, and abuse shall include any installation, operation, or maintenance of the product other than in accordance with the owners' manual.

No agent, dealer, distributor, service company, or other party is authorized to change, modify, or extend the terms of this Limited Warranty in any manner whatsoever. Industrial Computer Source reserves the right to make changes or improvements in any product without incurring any obligation to similarly alter products previously purchased.



**Shipments not in compliance with this Guarantee and Limited Warranty Return Policy will not be accepted by Industrial Computer Source.**

## Return Procedure

For any Limited Warranty or Guarantee return, please contact Industrial Computer Source's Customer Service at **1-800-480-0044** and obtain a Return Material Authorization (RMA) Number. All product(s) returned to Industrial Computer Source for service or credit **must** be accompanied by a Return Material Authorization (RMA) Number. Freight on all returned items **must** be prepaid by the customer who is responsible for any loss or damage caused by common carrier in transit. Returns for Warranty **must** include a Failure Report for each unit, by serial number(s), as well as a copy of the original invoice showing date of purchase.

To reduce risk of damage, returns of product must be in an Industrial Computer Source shipping container. If the original container has been lost or damaged, new shipping containers may be obtained from Industrial Computer Source Customer Service at a nominal cost.

## Limitation of Liability

In no event shall Industrial Computer Source be liable for any defect in hardware or software or loss or inadequacy of data of any kind, or for any direct, indirect, incidental, or consequential damages in connection with or arising out of the performance or use of any product furnished hereunder. Industrial Computer Source liability shall in no event exceed the purchase price of the product purchased hereunder. The foregoing limitation of liability shall be equally applicable to any service provided by Industrial Computer Source or its authorized agent.

Some *Sales Items* and *Customized Systems* are **not** subject to the guarantee and limited warranty. However in these instances, any deviations will be disclosed prior to sales and noted in the original invoice. ***Industrial Computer Source reserves the right to refuse returns or credits on software or special order items.***

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# Chapter 1: Description

The IDExxSSI series is a family of ruggedized, embedded solid state disk drive intended for use in harsh environments. Available capacities range from 4 Mbytes to 160 Mbytes in a standard 3.5" disk form factor.

The IDExxSSI series is 100% compatible with the IDE and ATA (AT Attachment) interface standards, requiring no additional or special driver software to run existing software applications.

## IDExxSSI series features:

Up to 160 Mbytes of solid-state storage (Master/Slave)

Ruggedized for harsh environment use

Fully MS-DOS compatible

Operating temperature -20 to +71 C

Fast Access times

Noiseless

MTBF > 200,000 hours

Low power consumption

+5 v only interface

Built-in error detection and correction

Block size of 512 bytes

ModelNumber	Formatted Bytes	Capacity Sectors	Emulation Values		
			Cylinders	Heads	Sectors/Trk
IDE04SSI	4,030,464	7,872	123	2	32
IDE10SSI	10,485,760	20,480	320	2	32
IDE20SSI	20,971,520	40,690	640	2	32
IDE40SSI	41,943,040	81,920	640	4	32
IDE80SSI	83,886,080	163,840	640(*)	4(*)	32(*)
IDE160SSI	83,886,080	163,840(*)	640/640	8/8	32/32

(\*) - per drive. IDE160SSI is internally configured as two 80MB IDE Master/Slave units.

**Table 1:** Hard Drive Specifications

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## Chapter 2: Specifications

Data Transfer Rate	3.75 Mbytes/sec 850 Kbytes/sec 150 Kbytes/sec	(burst) (typical-reading) (typical-writing)
Seek Time	<2 msec	(typical)
Data Transfer Latency	<2 msec	(typical)
Power Consumption +5Vdc ±5%		0.3A max
	+12Vdc ±5%	0.3A max @ -40°C (T=2 ONLY)
Dimensions	4.00"W x 1.00"H x 5.75"D	see Figure 1.
Weight	500 grams	max
Environmental		
Operating Temp.	-20C to +70C	
Storage Temp.	-40C to +85C	
Humidity	5 to 95 % non-condensing	
Shock	Operating 40g, 9msec, 3 axis	
Vibration	PSD 0.04g <sup>2</sup> /Hz, MIL-STD-810-E	
Altitude	15,000m (50,000ft)	
Reliability		
MTBF	>200,000 hours	
Data Reliability	< 1 non-recoverable error in 10 <sup>**13</sup> bits read	
Endurance	> 100,000 cycles	
Connectors:	40 Pin IDE	
Pinout	Table 1	Table 2
Maximum cable length:	18 inches (45 cm.)	

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## Chapter 3: Installation

The IDExxSSI series can be mounted in any orientation from the bottom or sides using #6-32 screws. The IDExxSSI series fit standard 3.5" half height disk drive mounting bays. See figure 1.

The host is connected to the IDExxSSI series via a Pin IDE:

The maximum cable length is 18 inches (45 cm.)

BIOS SETUP; For AT applications it is necessary to specify the hard disk type. Where possible, Industrial Computer Source recommends the use of a BIOS which allows a user-defined option, with the following parameters listed in Table 1.

If the user-defined option is not available, a drive type that closely matches the IDExxSSI may be selected. Do not select a drive type with parameters larger than those of the IDExxSSI unit.

The IDExxSSI series has been tested in a system configured as follows:

Processor:	80286
ROM BIOS:	AMI (09/15/89)
Drive C:	Type 47 (user defined) Heads: as above Sectors/track: 32 Cylinders: see above Size: appropriate to model #
DOS:	MS-DOS 4.01
IDE interface:	Seagate ST08A JP2 OFF Drive Address = 1F0 - 1F7 JP4 ON Floppy Drive Enabled JP5 1-2 Enable Interrupt JP 6 OFF I/O Ready
Formatting:	The IDExxSSI series Solid-State Memory System is pre-formatted and does not require a low level format to be done on installation.
Drive ID:	The IDExxSSI drive is shipped from Industrial Computer Source configured as unit 0. Any users wishing to install the IDExxSSI as unit 1 should contact Industrial Computer Source and request a copy of the DOS utility used to reconfigure the IDE SB internal setup parameters. The IDE160SSI unit is comprised of two solid state mass storage systems configured as a master (unit 0) and slave (unit 1) combination. No other IDE drive can be installed when using the IDE160SSI.

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**Pin Assignments**

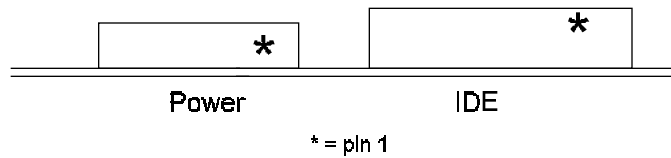
1 -Reset	2 GND
3 Data 7	4 Data 8
5 Data 6	6 Data 9
7 Data 5	8 Data 10
9 Data 4	10 Data 11
11 Data 3	12 Data 12
13 Data 2	14 Data 13
15 Data 1	16 Data 14
17 Data 0	18 Data 15
19 GND	20 Key pin
21 reserved (2)	22 GND
23 -DIOW	24 GND
25 -DIOR	26 GND
27 IORDY (2)	28 reserved
29 -DMACK (2)	30 GND
31 +INTRQ	32 -IOCS16
33 DA1	34 -PDIAG *
35 DA0	36 DA2
37 -CS1FX-	38 -CS3FX
39 -DASP *	40 GND

- Notes: 1. Active Low signals have a “-” prefix;  
 2. Optional signals as per AT Attachment specification  
 3. \* indicates drive intercommunication signals

**Model -01 Mini Power Connector**

- 1 + 5 V
- 2 + 5 V Return
- 3 +12 V Return
- 4 +12 V

**Table 2:** Model -01 IDE Connector



**Figure 2:** DB50 Connector



# Chapter 5: IDE (ATA) Command Set

Commands are issued to the 91000100 SSD by loading the required registers in the command block with the necessary parameters, and then writing the command code to the Command Register. There are three classes of commands:

Class 1	Drive sets BSY within 400 nsec.
Class 2	Drive sets BSY within 400 nsec, sets up the sector buffer for a write operation, sets DRQ within 700 nsec and clears BSY within 400 nsec of setting DRQ.
Class 3	Drive sets BSY within 400 nsec, sets up the sector buffer for a write operation, sets DRQ within 20msec and clears BSY within 400 nsec of setting DRQ.

The following table summarizes the IDE (ATA) Command codes supported by the 91000100 Solid state, IDE compatible disk drive:

## IDE (ATA) COMAND CODE TABLE LEGEND

TYP:	M	Mandatory command
	O	Optional command
	V	Vendor unique

### Parameters:

CY	Cylinder register
DH	Drive/head register (note 1)
FR	Features register
SC	Sector count register
SN	Sector Number register

### Drive/Head Register:

Y	Drive & head parameters used.
D	Drive parameter only
D*	Addressed to Drive 0, but both drives (0 & 1) execute, if present.

Command	Code	Parameters					No Type
		FR	SC	SN	CY	DH	
Check Power Mode	E5H	-	-	-	-	D	
Erase Sectors	C0H	-	Y	Y	Y	Y	1
Execute Drive Diagnostics	90H	-	-	-	-	D	
Format Track	50H	-	Y	-	Y	Y	
Identify Drive	ECH	-	-	-	-	D	
Idle	E3H	-	Y	-	-	D	
Idle Immediate	E1H	-	-	-	-	D	
Initialize Drive Parameters	91H	-	Y	-	-	Y	
Read Buffer	E4H	-	-	-	-	D	
Read Multiple	C4H	-	Y	Y	Y	Y	
Read Long Sector (w/retry)	22H	-	-	Y	Y	Y	
Read Long Sector (wo/retry)	23H	-	-	Y	Y	Y	
Read Sectors (w/retry)	20H	-	Y	Y	Y	Y	
Read Sectors (wo/retry)	21H	-	Y	Y	Y	Y	
Read Verify (w/retry)	40H	-	Y	Y	Y	Y	
Read Verify (wo/retry)	41H	-	Y	Y	Y	Y	
Recalibrate	1XH	-	-	-	-	D	
Request Sense	03H	-	-	-	-	D	3
Seek	7XH	-	-	Y	Y	Y	
Set Features	EFH	Y	-	-	-	D	
Set POR Options	E7H	-	Y	Y	Y	D	2
Set Multiple Mode	C6H	-	Y	-	-	D	
Set Sleep Mode	E6H	-	-	-	-	D	
Stand By	E2H	-	-	-	-	D	
Stand By Immediate	E0H	-	-	-	-	D	
Translate Sector	87H	-	Y	Y	Y	Y	3
Wear Level	F5H	-	-	-	-	Y	1
Write Buffer	E8H	-	-	-	-	D	
Write Long Sector (w/retry)	32H	-	-	Y	Y	Y	
Write Long Sector (wo/retry)	33H	-	-	Y	Y	Y	
Write Multiple (w/erase)	C5H	-	Y	Y	Y	Y	
Write Multiple (wo/erase)	CDH	-	Y	Y	Y	Y	1
Write Sectors (w/retry)	30H	-	Y	Y	Y	Y	
Write Sectors (wo/retry)	31H	-	Y	Y	Y	Y	
Write Sectors (wo/erase)	38H	-	Y	Y	Y	Y	1

**Table 3:** IDE (ATA) Command Codes

Drive Parameters	CY	Cylinder Register
	DH	Drive/Head Register (see below)
	FR	Features Register
	SC	Sector Count Register
	SN	Sector Number Register
	Y	Drive & Head parameters used
	D	Drive parameter used only
	B	Addressed to Drive 0, but both drives execute, if present

- Notes
1. Vendor Unique command providing additional functionality
  2. Vendor Unique command limited to early SSI IDE drives
  3. Vendor Unique command available in later SSI IDE drives

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## BUG REPORT

While we have tried to assure this manual is error free, it is a fact of life that works of man have errors. We request you to detail any errors you find on this BUG REPORT and return it to us. We will correct the errors/problems and send you a new manual as soon as available. Please return to:



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Product: **IDE Series**

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Please list the page numbers and errors found. Thank you!

