



INDUSTRIAL COMPUTER SOURCE[®]

Model ACB104 Series Product Manual

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INDUSTRIAL COMPUTER SOURCE

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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: Installation

The ACB104 is installed by carefully inserting bus connector J1 so that it aligns pin 1 to pin 1 (pin 1 is labeled on the silk-screen as **B1**) of the expansion connector on a PC/104™ compatible card. Mounting hardware (nylon stand-offs and screws) is provided to insure a good mechanical connection. Extreme care should be taken when installing this board so as not to cause damage to the connectors. Before the board is installed, connect your I/O cable to P1. Please note that P1 is not keyed so care should be taken that pin 1 of the cable aligns with pin 1 of the connector (pin 1 is labeled on the silk-screen and the cable will have a colored stripe). Refer to Section 2 and 3 for information on setting the address and jumper options before connecting P1.

Chapter 2: Address Selection

The ACB104 board occupies 8 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 ports. The following table shows several examples that usually do not cause a conflict. SW1 sets the I/O address for the ACB-104 board.

Address	Binary	Switch	Position	Settings						
Hex	A9	A0	1	2	3	4	5	6	7	
280-287	1010000XXX	Off	On	Off	On	On	On	On	On	On
2A0-2A7	1010100XXX	Off	On	Off	On	Off	On	On	On	On
2E8-2EF	1011101XXX	Off	On	Off	Off	Off	Off	On	Off	Off
2F8-2FF	1011111XXX	Off	On	Off	Off	Off	Off	Off	Off	Off
3E8-3EF	1111101XXX	Off	Off	Off	Off	Off	Off	On	Off	Off
300-307	1100000XXX	Off	Off	On	On	On	On	On	On	On
328-32F	1100101XXX	Off	Off	On	On	Off	On	On	Off	Off
3F8-3FF	1111111XXX	Off	Off	Off	Off	Off	Off	Off	Off	Off

Typically COM1: = 3F8h; COM2: = 2F8h; COM3: = 3E8h; COM4: = 2E8h.

Figure 1: Address options

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 300 Hex through 307 Hex is selected. 300 Hex = 11 0000 0XXX in binary representation.

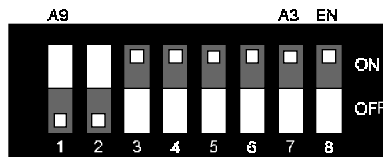


Figure 2: Dip-switch Illustration

Note that 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 ACB104 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” (refer to Figure 2). If the port is disabled, be sure to also disable the interrupt request for that port by removing the IRQ jumper (refer to Figure 3).

Chapter 3: Option Selection

The board contains several jumper straps for the port which must be set for proper operation.

IRQ Selection

E3- Selects the interrupt request for the ACB104. If no interrupt is desired, remove the jumper.

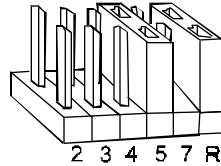


Figure 3: Header E3 (IRQ Selection)

Position “R” is provided so that you can install a jumper that connects a 1K ohm pull-down resistor to the output of a high-impedance tri-state driver which carries the IRQ signal. Because the IRQ line is driven low only by the pull-down resistor, you can have two or more boards which share the same IRQ signal. Position “R” installed is the default setting and should be left on unless multiple cards are sharing a single IRQ. If multiple cards are sharing a single IRQ then only one pull-down resistor is needed in the circuit.

DMA Selection

E1 - Selects DMA mode of operation. The ACB104 can be operated in half duplex or full duplex DMA modes. Full Duplex Means that DMA can be used for simultaneous transmit and receive. Half duplex DMA means that you can either transmit, or receive with DMA but not simultaneously. The various options for E1 jumper settings are as follows:

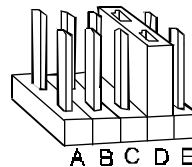


Figure 4: Header E1 (DMA Selection)

No DMA	E1 Position “A” & “B” not installed
Half Duplex Dma Channel 1	E1 Position “A” i.c. Only
Half Duplex Dma Channel 3	E1 Position “B” installed Only
Full Duplex	E1 Position “A” & “B” Installed
DMA Permanently Enabled	E1 Position “D” Installed
DMA Enabled through Software	E1 Position “C” Installed
RS-485 Mode	E1 Position “E” Installed

Figure 5: DMA Jumper Table E1

The DMA Can be selectively enabled or disabled through software but, **E1** position “**C**” must be selected to enable this option The software enable feature uses Channel B RTS to enable or disable the DMA drivers on the ACB104. Please refer to the SCC Users Manual and the supplied Developers Toolkit Diskette for examples of enabling DMA with software. To permanently enable DMA set the jumper to position “**D**”

NOTE:

In full duplex mode, Transmit always uses DMA Channel 3, DTR/REQA and receive uses DMA Channel 1, W/REQA. Please refer to the toolkit diskette for further information.

ACB104 485 Mode Only

RS-485 is backwardly compatible with RS-422, however optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being Active (on) or Tri-State (off). This capability allows multiple PC's (or other RS-422/485 devices) to be connected in a multi-drop bus and selectively polled. Half-duplex two-wire operation is also possible by connecting TX+ to RX+ and TX- to RX- (in the connector hood). The enable to the driver is connected to the SCC Request To Send (RTS) line. This is done by installing the “**E**” jumpers on E1. The unused signals can be left disconnected or floating, as they have pull-up/pull-down resistors to provide an *ON* (or true) condition if not connected.

Transmit Clock Selection

E2 - Selects the signal that is connected to the SCC TRXCA pin. This pin can be programmed as either an **Input** or an **Output**. Please refer to the 8530 Technical Manual (User supplied) for information on programming the TRXCA pin as either an input or an output.

- I If selection “**I**” is used the SCC TRXC Pin should be programmed as an input. This allows the TXC Pin(S) to input the Transmit Clock Signal.
- 0 If selection “**O**” is selected then the SCC TRXC Pin should be programmed as an output. The Transmit Clock is then routed to the TSET Pins on the DB-25 as an output signal.

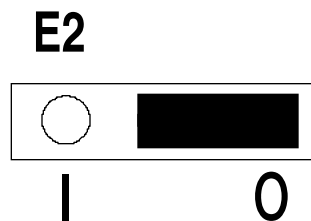


Figure 6: Transmit Clock Option

Chapter 4: Technical Description

The Sealevel ACB104 Advanced Communications Board provides the PC/104 platform with one high speed Sync / Async port. The ACB104 can be used in a variety of sophisticated communications applications such as SDLC, HDLC, X.25, and high speed async.

Features Include:

- One Channel of Sync / Async communications using 8530 chip.
- DMA supports data rates greater than 1 million bps (bits per second).
- Selectable port address, IRQ level (2,3,4,5,7), and DMA Channel (1 or 3).
- Jumper options for Transmit Clock source.
- High speed Enhanced Serial Communications Controller (85C30,85230) compatible.
- Uses PC/104 compatible stack through connector for universal mounting.
- 5 Volt DC operation.
- DB-25P cable provided for ease in connecting.

The ACB104 utilizes the Zilog 8530 Serial Communications Controller (SCC). This chip features programmable baud rate, data format interrupt control, as well as DMA control. Refer to the 8530 Technical Manual, the Zilog Datacom I/C Handbook and the supplied Toolkit Diskette for details on programming the SCC chip.

Direct Memory Access

Direct Memory Access (DMA) can be used to transfer data at very high rates. This requires additional programming and a very good understanding of the operation of the PC's DMA controller. The software examples provided on diskette demonstrate the setup and use of DMA. Refer to the supplied software toolkit for application examples (with source code) to help in your initial software development.

Internal Baud Rate Generator

The baud rate of the SCC is programmed under software control. The standard oscillator supplied with the board is 4.9152 Megahertz (MHZ). Other values may be substituted to achieve a different baud rate by replacing the oscillator (Y1) with a new part.

Communication Standards Technical Reference

The DB-25 male connectors meet the EIA-530 and the RS-232 specification for DTE devices. The following sections contain a brief summary of RS-422, EIA-530, RS-485 and RS-232.

RS-422

RS-422 allows very long distance (5000 feet at 9600 baud) communications with virtually error free differential drive characteristics. This is the same electrical standard used with RS-449. Unfortunately this standard did not have a mechanical standard. This allowed every manufacturer to use any pin arrangement and shell size that they saw fit.

EIA-530

EIA-530 compatibility means that RS-422 signal levels are met, and that the pinout of the DB-25 connector is specified. The EIA (Electronic Industry Association) created the EIA-530 specification to detail the pin-out. EIA-530 is very similar to RS-449, which calls for RS-422 signals on a DB-37 connector. The EIA-530 is broken into two interfaces: DTE and DCE, much like RS-232. In addition to the asynchronous modem control signals on a standard PC serial port, EIA-530 specifies I.C signals. The ACB104/422 has an EIA-530 DTE interface.

RS-485

RS-485 is backwardly compatible with RS-422; however, it is optimized for partyline or multi-drop applications. The output of the RS-422/485 driver is capable of being **Active** (enabled) or **Tri-State** (disabled). This capability allows multiple ports to be connected in a multi-drop bus and selectively polled. Half-duplex two-wire operation is also possible by connecting TX+ to RX+ and TX- to RX- in your cable hood. The enable to the driver is connected to the SCC Request To Send (RTS) line for RS-485 communications. This allows the RS-485 driver to be Tri-Stated when inactive on a multi-drop polled network. Your software must “know how” to enable the driver when it is answering a poll. To permanently enable the driver (normal RS-422 point to point mode) remove jumper “E” at E1. *Failure to correctly set this jumper can cause transmitter contention problems, preventing operation by any nodes on the network.*

RS-232

RS-232 has been the defacto standard for PC communications since the introduction of the IBM PC. This electrical / mechanical standard is met by the ACB104/232 for interfacing standard RS-232 modems, gateways, channel banks, CSUs, DSUs and a variety of other common communication equipment.

EIA 530, RS-422 / 485 Connector Pin-Outs

	Name		Pin#	Mode
GND	Ground	7		
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
TSETB	TSET+ Transmit Signal Element Timing Positive.	11		Output
TSETA	TSET- Transmit Signal Element Timing Negative	24		Output
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
RXCB	RXC+ Receive Clock Positive	9		Input
RXCA	RXC- Receive Clock Negative	17		Input
TXCB	TXC+ Transmit Clock Positive	12		Input
TXCA	TXC- Transmit Clock Negative	15		Input

RS-232 Connector Pin-Outs

	Name	Pin #	Mode
GND	Ground	7	
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
RXC	Receive Clock	17	Input
TXC	Transmit Clock	15	Input
TSET	Transmit Signal Element Timing	24	Output
TD	Transmit Data	2	Output
RTS	Request To Send	4	Output

Chapter 5: Specifications

Environmental Specification

Operating

0 - 50 Degrees C -20 - 70 Degrees C

Storage

32 - 122 Degrees F -40 - 100 Degrees F

Humidity Range

0- 90% R.H. 0- 90% R.H.

Performance

MTBF > 150,000 Hours

MTTR < .25 Hours

Turnaround For Repair - 5 Working Days

Manufacturing

- IPC 610-A Class-III standards adhered to with a 0.1 visual A.Q.L. and 100% Functional Testing.
- Boards are built to U.L. 94V0 rating and are 100% Electrically tested. Boards are solder mask over bare copper or solder mask over tin nickel.
- Board conforms to PC/104 size requirements.

Power

Supply Line +5

Rating (mA) 270 mA

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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