INDUSTRIAL COMPUTER SOURCE®

Model ACB2
Product Manual

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6260 SEQUENCE DRIVE, SAN DIEGO, CA 92121-4371 (619) 677-0877 (FAX) 619-677-0895

INDUSTRIAL COMPUTER SOURCE EUROPE *TEL (1) 69.18.74.40 FAX (1) 64.46.40.42* • ***INDUSTRIAL COMPUTER SOURCE (UK) LTD*** *TEL 01243-533900 FAX 01243-532949*

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*. *EPROMs, RAM, Flash EPROMs or other forms of solid electronic media are not returnable for credit - but for replacement only. Extended Warranty available. Consult factory.*

Refunds

In order to receive 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 re-saleable 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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August 1997

Chapter 1: Installation

The ACB2 can be installed in any of the PC expansion slots, including J8 on the "XT" and Portable. Remove the PC case, remove the blank metal slot cover, and insert the board. Replace the screw, replace the cover, and installation is complete.

NOTE

Be sure to set the address and jumper options before installation.

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Chapter 2: Address Selection

Dipswitch S1-(location U14) - is used to set the address for the ACB2. Be sure that only one switch position is closed.

Note:

If more than one switch is closed the board will be non-functional.

Leaving all eight switches open will disable the port.

Switch Position	Serial Port Address	Comment
S1-1	238-23F Hex	
S1-2	2B8-2BF Hex	
S1-3	338-33F Hex	
S1-4	3B8-3BF Hex	
S1-5	278-27F Hex	
S1-6	2F8-2FF Hex	Use only if no COM2: installed
S1-7	378-37F Hex	
S1-8	3F8-3FF Hex	Use only if no COM1: installed

Figure 1: Dipswitch/Address Options

Potential Conflicts

- 278-27F Hex & 378-37F Hex settings may conflict with your printer
- 3B8-3BF Hex cannot be used if the Monochrome Adapter is installed
- The 238-23F Hex setting may conflict with a Bus Mouse
- 3F8& 2F8 Hex are the typical addresses for COM1: and COM2:

The relative I/O addresses of the ACB2 are as follows:

- Base+0 Channel A Data Port
- Base+1 Channel A Control Port
- Base+2 Channel B Data Port
- Base+3 Channel B Control Port

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Chapter 3: Option Selection

The ACB2 contains five jumper fields and two sets of driver/receiver chips which must be set for proper operation.

The RS-232 option is selected when the RS-232 driver and receiver are installed at locations U17 (1488) and U11 (1489) and the RS-422 chips removed (U6 and U7). The RS-422 option is installed when the RS-422 chips are installed at U6 (75173) and U7 (75174) and the RS-232 chips are removed. Only install one driver/receiver pair, never both.

E1, E9 - Selects the interrupt request for the port. IRQ3, IRQ4, or IRQ5 can be selected, depending on jumper position. If no interrupt is desired, remove the jumper.

Jumpering E9 selects IRQ5. Jumpering from the center of E1 to E4 selects IRQ4 and from the center of E1 to E3 selects IRQ3.

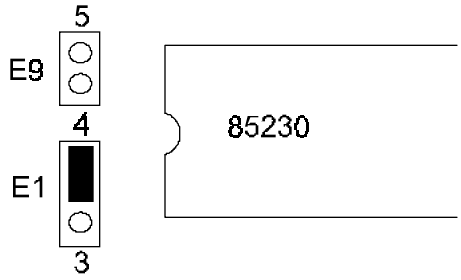

Figure 2: Interrupt Jumper E1, E9
(Shown with IRQ 4 selected)

E2 - Selects whether the RS-485 driver is enabled by the SCC signal Request To Send (RTS) or always enabled. With the jumper installed, RTS enables the driver. Removing the jumper enables the driver regardless of RTS. Refer to Chapter 4 for a description of RS-485.

E3 - The Direct Memory Access (DMA) Channel select can be selected as Channel 1 or Channel 3. See the assembly drawing for jumper position. If DMA is not used, these jumpers should be removed.

Figure 3: DMA Channel Selection

E4 - This jumper block allows the user to configure the ACB2 clock and miscellaneous I/O pins. Please refer to the following illustration for aid in configuring this header.

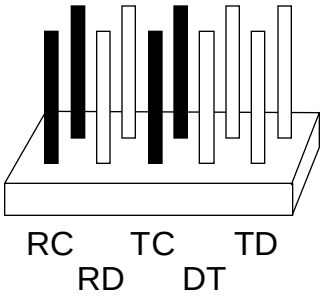

Figure 4: J2 Pin Selection

Input Pins

Choose only one of the following: (pin 6 RS-232, pins 8 & 9 RS-422)

RC Selects RxC pin as an input to the DB-25 connector

RD Selects RDB pin as an input to the SCC*

Output Pins

Choose only one of the following: (pin 20 RS-232, pins 20 & 21 RS-422)

TC Selects the TxC pin as an output to the DB-25 connector

DT Selects the DTR pin as an output to the DB-25 connector

TD Selects the TDB pin as an output to the DB-25 connector

*** Note:** While the ACB2 is designed as a single port implementation of the Serial Communication Controller (SCC), the "B" channel Received Data (RDB) and Transmit Data (TDB) are brought out to the DB-25 through Header E4. This will allow the use of the second port on the SCC in a user definable two port application.

E7- Selects whether the DMA Tri-State drivers are enabled, disabled or whether the RTS (Request To Send) from Channel B is used to enable the DMA. THE "A" position selects the Always Enabled mode. The "B" position selects RTSB Enable. Please refer to the Zilog Technical Reference for aid in programming WR5 for RTSB. Removing the jumper disables the drivers and no DMA can be performed.

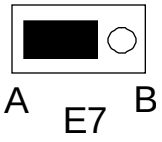

Figure 5: DMA Enable

Chapter 4: Technical Description

The Industrial Computer Source ACB2 Advanced Communications Board provides the PC/XT/AT with one high speed Sync/Async port. The ACB2 can be used in a variety of sophisticated communications applications such as SDLC, HDLC, X.25, and High Speed Async.

Features include:

- SYNC / ASYNC Communications using 85230 chip
- DMA supports data rates greater that one million bits per second (bps)
- Selectable Port Address, IRQ Level (3,4,5), and DMA Channel (1,3)
- RS-232 or RS-422/485 Interface
- Supports TD, RD, RTS, CTS, TXC, RXC Signals
- Jumper Options for clock source
- Software programmable baud rate
- Software Tool kit provided
- Short Card, DB-25 Male Connector
- Enhanced Serial Communications Controller optional (85230)

Technical Reference

The ACB2 utilizes the Zilog 85230 Enhanced Serial Communications Controller (SCC). This chip features programmable baud rate, data format interrupt control, as well as DMA control. Refer to the 85230 Technical Manual, the Zilog Datacom I/C Handbook and the toolkit diskette for details on programming the SCC chip. The following paragraphs contain a brief summary of RS-422, RS-485 and RS-232.

RS - 232

Probably the most widely used communication standard is RS-232. This implementation has been defined and revised several times and is often refered to as RS-232C or EIA-232. The most common implementation of RS-232 is on a standard 25 pin D sub connector, although the IBM PC-AT computer defined the RS-232 port on a 9 pin D sub connector. Both implementations are in wide spread use. RS-232 is capable of operating at data rates up to 20 Kbps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4 Kbits per second over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. RS-232 is a single ended interface. This means that a single electrical signal is compared to a common signal (ground) to determine binary logic states. A voltage of +12 volts (usually +8 to +10 volts) represents a binary 0 and -12 volts (-8 to 10 volts) denotes a binary 1.

RS-422

RS-422, unlike RS-232 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-485

RS-485 is backwardly compatible with RS-422, however, it is optimized for party line 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 at E2. Failure to correctly set this jumper can cause transmitter contention problems, preventing operation by any nodes on the network.

Direct Memory Access

In many instances it is necessary to transmit and receive data at greater rates than would be possible with simple port I/O. In order to provide a means for higher rate data transfers, a special function called Direct Memory Access (DMA) was built into the original IBM PC. The DMA function allows the ACB2 (or any other DMA compatible interface) to read or write data to or from memory without using the Microprocessor. This function was originally controlled by the Intel 8237 DMA controller chip, but may now be a combined function of the peripheral support chip sets (i.e. Chips & Technology or Symphony chip sets).

During a DMA cycle the DMA controller chip is driving the system bus in place of the Microprocessor, providing address and control information. When an interface needs to use DMA it activates a DMA request signal (DRQ) to the DMA controller, which in turn sends a DMA hold request to the Microprocessor. When the Microprocessor receives the hold request it will respond with an acknowledge to the DMA controller chip. The DMA controller chip then becomes a Bus Master providing the necessary control signals to complete a Memory to I/O or I/O to Memory transfer. When the data transfer is started an acknowledge signal (DACK) is sent by the DMA controller chip to the ACB2. Once the data has been transferred to or from the ACB2, the DMA controller returns control to the Microprocessor.

To use DMA with the ACB2 requires a thorough understanding of the PC DMA functions . The software tool kit provided demonstrates the setup and use of DMA with several source code and high level language demo programs. Please refer to the 85230 specification, the PC Technical Reference and the 8237 DMA controller chip specification for more information.

Baud Rates

The baud rate of the SCC is programmed under software control. The standard oscillator supplied with the board is 7.3728 Megahertz (Mhz). Other values may be substituted to achieve a higher or different baud rate , if required, by replacing the oscillator (U9) with a different part. Refer to the SCC Technical manual and the toolkit diskette for baud rate divisors and programming information.

RS-422

SIGNAL	NAME	PIN#	MODE
GND	Ground	7	Input RS-422
RX+	Receive Positive	12	Input RS-422
RX-	Receive Negative	13	Input RS-422
CTS+	Clear To Send Positive	10	Input RS-422
CTS-	Clear To Send Negative	11	Input RS-422
RXC+	Receive Clock Positive	8	Input RS-422
RXC-	Receive Clock Negative	9	Input RS-422
TX+	Transmit Positive	24	Output RS-422
TX-	Transmit Negative	25	Output RS-422
RTS+	Request To Send Positive	22	Output RS-422
RTS-	Request To Send Negative	23	Output RS-422
TXC+	Transmit Clock Positive	20	Output RS-422
TXC-	Transmit Clock Negative	21	Output RS-422
DTR+	Data Terminal Ready Positive	20	Output RS-422
DTR-	Data Terminal Ready Negative	21	Output RS-422

RS-232

SIGNAL	NAME	PIN#	MODE
RD	Receive Data	3	Input RS-422
CTS	Clear To Send	5	Input RS-422
RXC	Receive Clock**	6	Input RS-422
TD	Transmit Data	2	Output RS-422
RTS	Request To Send	4	Output RS-422
TXC	Transmit Clock**	20	Output RS-422
DTR	Data Term Ready	20	Output RS-422

How to remain CE Compliant

In order for machines to remain CE compliant, only CE compliant parts may be used. To keep a chassis compliant it must contain only compliant cards, and for cards to remain compliant they must be used in compliant chassis. Any modifications made to the equipment may affect the CE compliance standards and should not be done unless approved in writing by Industrial Computer Source.

The Model ACB2 is designed to be CE Compliant when used in an CE compliant chassis. Maintaining CE Compliance also requires proper cabling and termination techniques. The user is advised to follow proper cabling techniques from sensor to interface to ensure a complete CE Compliant system. The ACB2 requires the use of double shielded cable to maintain compliance with the EMC directive. Industrial Computer Source does not offer engineering services for designing cabling or termination systems. Although Industrial Computer Source offers accessory cables and termination panels, it is the user's responsibility to ensure they are installed with proper shielding to maintain CE Compliance.

Chapter 5: Specifications

Environmental

Specification	Operating	Storage
Temperature Range	0° to 50° C 32° to 122° F	-20° to 70° C -40° to 100° F
Humidity Range	0 to 90% R.H Non-Condensing	0 to 90% R.H Non-Condensing

Performance

MTBF > 150,000 Hours

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.

Power

Supply Line	+12	-12	+5
Rating (mA)	50mA	50mA	275mA

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Appendix A: J2 Connector Pinout

RS-422

Signal	Name	Pin#	Mode
GND	Ground	7	
RX+	Receive Positive	12	Input RS-422
RX-	Receive Negative	13	Input RS-422
CTS+	Clear to Send Positive	10	Input RS-422
CTS-	Clear to Send Negative	11	Input RS-422
RXC+	Reveice Clock Positive	8	Input RS-422
RXC-	Receive Clock Negative	9	Input RS-422
TX+	Transmit Positive	24	Output RS-422
TX-	Transmit Negative	25	Output RS-422
RTS+	Request to Send Positive	22	Output RS-422
RTS-	Request to Send Negative	23	Output RS-422
TXC+	Transmit Clock Positive	20	Output RS-422*
TXC-	Transmit Clock Negative	21	Output RS-422*
DTR+	Data Terminal Ready Positive	20	Output RS-422*
DTR-	Data Terminal Ready Negative	21	Output RS-422*

RS-232

Signal	Name	Pin#	Mode
RD	Receive Data	3	Input RS-232
CTS	Clear to Send	5	Input RS-232
RXC	Receive Clock**	6	Input RS-232
TD	Transmit Data	2	Output RS-232
RTS	Req. to Send	4	Output RS-232
TXC	Transmit Clock**	20	Output RS-232*
DTR	Data Terminal Ready	20	Output RS-232*

* **Note:** These pins are determined by the Header E4 position setting. (Refer to Figure 4)

** **Note:** These pins are not normally clock lines. Pins 15 and 17 are the normal RS-232 clock lines. If your equipment utilizes these clock signals, connect the TXC to pin 20, and the RXC to pin 6.

Declaration of Conformity

INDUSTRIAL COMPUTER SOURCE®

6260 Sequence Drive
San Diego, CA 92121-4371
(800) 523-2320

Industrial Computer Source declares under its own and full responsibility that the following products are compliant with the protection requirements of the 89/336/EEC directives.

Only specific models listed on this declaration and labeled with the CE logo are CE compliant.

ACB2

Conformity is accomplished by meeting the requirements of the following European harmonized standards:

EN 50082-1:1992	EMC Generic Immunity Standard
EN 55022:1987	Limits & Methods of measurement of interference characteristics of IT Equipment
EN 60 950	Safety of Information Technology Equipment Including Electrical Business Equipment

Information supporting this declaration is contained in the applicable Technical Construction file available from:

INDUSTRIAL COMPUTER SOURCE EUROPE®

Z.A. de Courtaboeuf
16, Avenue du Québec
B.P. 712
91961 LES ULIS Cedex

August 28, 1997
San Diego, CA

Mr. Steven R. Peltier
President & Chief Executive Officer

BUG REPORT

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Manual Revision: **00750-101-26C**

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