



INDUSTRIAL COMPUTER SOURCE®

Model HS-RS232DP 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.

NOTE

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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 resaleable 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: Introduction

Overview

The HS-RS232DP provides the PC with 2 Asynchronous serial ports. The HS-RS232DP also provides a jumper to select clocking modes that allow much higher data rates than those typically associated with RS-232. These data rates are accomplished by using high-speed drivers and receivers designed to handle these higher rates, up to a maximum 460Kbps. The HS-RS232DP can be configured as COM1: through COM4:, providing a versatile interface for common RS-232 needs (i.e. modem, mouse and plotters) as well as higher speed applications (i.e. ISDN, V.34 modems etc.).

What's Included

The HS-RS232DP is shipped with the following items. If any of these items are missing or damaged, contact the supplier.

- HS-RS232DP Serial I/O Adapter
- 3.5" Serial Utility Diskette
- User Manual

Factory Default Settings

The HS-RS232DP factory default settings are as follows:

Port #	Base Address	IRQ
Port 1	3F8	4
Port 2	2F8	3

To install the HS-RS232DP using factory default settings, refer to Installation on page 6.

For your reference, record installed HS-RS232DP settings below:

Port #	Base Address	IRQ
Port1		
Port2		

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 HS-RS232/DP 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. 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 2: Card Setup

The HS-RS232DP contains several jumper straps which must be set for proper operation.

Address Selection

Each serial port on the HS-RS232DP occupies eight consecutive I/O locations, and looks to the PC as a standard serial port. A DIP switch (SW1) is used to set the port address options for the HS-RS232DP. Be careful when selecting the port addresses as some selections may conflict with existing ports. The following table shows the addressing options available with the standard PAL. If you do not see an address option that suits your needs, please contact Industrial Computer Source about a custom PAL option.

Port1	Port2	SW1	SW1	SW1	SW1
J2	J3	1	2	3	4
3F8	2F8	On	On	On	Off
3E8	2E8	On	On	Off	On
2F8	2E8	On	On	Off	Off
2F8	3E8	On	Off	On	On
3220	3228	On	Off	On	Off
4220	4228	On	Off	Off	On
5220	5228	On	Off	Off	Off
5220	4220	Off	On	On	On
280	290	Off	On	On	Off
300	308	Off	On	Off	On
310	318	Off	On	Off	Off
280	288	Off	Off	On	On
290	298	Off	Off	On	Off
300	280	Off	Off	Off	On
Disabled	Disabled	Off	Off	Off	Off

Table 1: Address Selection Table

Note: Each COM: port in your system should have a unique address. Typically COM1: - COM4: addresses are 3F8, 2F8, 3E8 & 2E8 Hex. If a COM1: & COM2: are already present, use the second addressing option, this will provide the typical addresses for COM3: & COM4: .

Refer to Appendix A for common address contentions.

Port Enable / Disable

Port 2 on the HS-RS232DP can be enabled or disabled with the jumper at E6 for applications requiring only one port. The port is enabled with the jumper installed and disabled when removed. If Port 2 is disabled, be sure to disable the interrupt request for that port by removing the IRQ jumper at E2. When the port is disabled only the Port 1 address from the selection is valid (See Figure 1).

IRQ Selection

Headers E1 and E2 select the interrupt request for each serial port (E1 - Port 1, E2 - Port 2). If COM1: is selected, the corresponding jumper must be on the IRQ4 setting. If COM2: is selected, the corresponding jumper must be on IRQ3.

Note: Most communications software applications default COM3: to IRQ4 and COM4: to IRQ3. This requires the sharing of interrupts between COM1: and COM3:, and between COM2: and COM4:. While this is the default, it is not always the preferred setting. Check your software configuration instructions to determine the most appropriate IRQ selection.

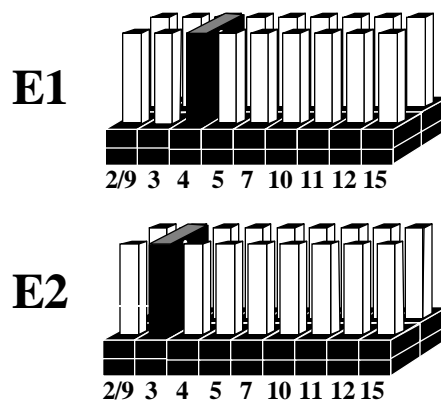


Figure 1: Header E1 and E2, IRQ Selection

Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting, and setting the appropriate selections at E3. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper.

Interrupt Modes

Header E3 selects the interrupt mode for each port. Each port must be set in the correct mode to insure proper installation.

'N' indicates the (N)ormal, single interrupt per port mode. 'S' Indicates the (S)hared interrupt mode, which allows more than one port to access a single IRQ. Any two or more ports can share a common IRQ by placing the jumpers on the same IRQ setting, and setting the appropriate selections at E1. Consult your particular software for IRQ selection. If no interrupt is desired, remove the jumper. 'R' indicates the inclusion of a 1K ohm pull-down resistor required on one port when sharing interrupts.



Figure 2: Header E3, Normal IRQ Mode

Set the jumpers to 'S' for shared interrupt mode on all blocks sharing an IRQ except one. Set that port block for 'R'. This provides the pull-down resistor circuit that makes sharing of IRQs possible. If you are using more than one HS-RS232DP or a compatible adapter in a bus you should only have one port set to 'R'. The following example shows both ports sharing a single IRQ.

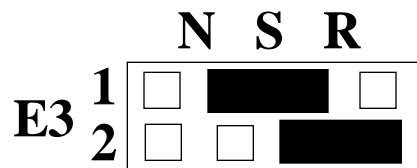


Figure 3: Header E3, Shared IRQ Mode

Set the jumper to 'S' if you are using more than one HS-RS232DP in a bus or you wish to completely remove the pull-down resistor for hardware compatibility. **Setting the adapter in this configuration when it is not accompanied by a pull-down resistor will prevent the ports from triggering an interrupt.**

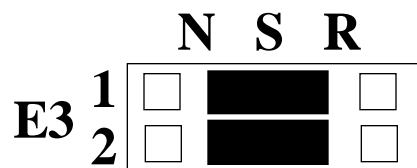


Figure 4: Header E3, Sharing IRQ's with another adapter

Clock Modes

The HS-RS232DP employs a unique clocking option that allows the end user to select from divide by 4, divide by 2 and divide by 1 clocking modes. These modes are selected at Headers E4 and E5. To select the Baud rates commonly associated with RS-232 (i.e. 2400, 4800, 9600, 19.2, ... 115.2K Bps) place the jumper in the divide by 4 mode. To double these rates up to a maximum rate for 230.4K bps place the jumper in the divide by 2 position. To select the maximum data rate (460.8K bps) place the jumper in the divide by 1 position. In the example below, Port 1 (E4) is selected for the divide by 4 rate to support a common RS-232 application (i.e. serial mouse) and Port 2 (E5) is selected to support a high speed application in the divide by 1 mode (i.e. ISDN or digital link).

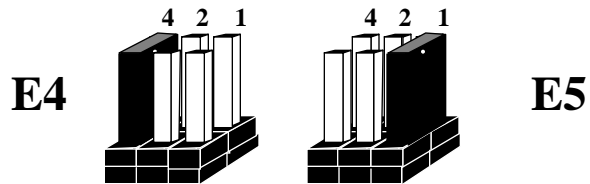


Figure 5: Headers E4 and E5, Clocking Modes

Chapter 3: Installation

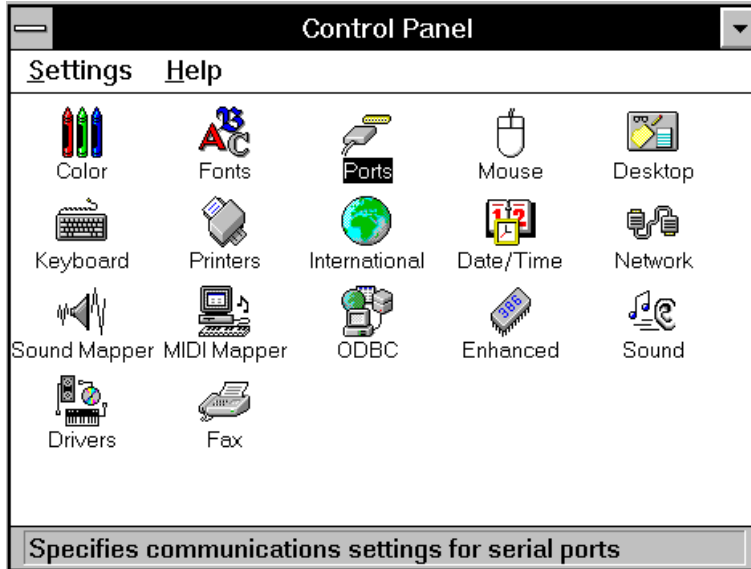
The HS-RS232DP can be installed in any of the PC expansion slots, but to access the 'AT' or (E)ISA IRQs (10, 11, 12, 15) it must be installed in one of the 16 bit slots. The HS-RS232DP contains several jumper straps for each port which must be set for proper operation prior to installing the adapter into the computer.

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 HS-RS232DP into the slot. Make sure that the adapter is seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

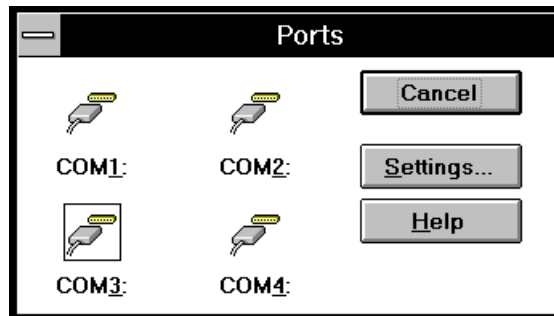
Installation is complete.

Windows 3.x (including WFW 3.11) Installation

To configure the HS-RS232DP under Windows 3.1 start by opening the ‘**Control Panel**’. The Control Panel is typically found in the ‘**Main**’ Program Group. The next step is to open the ‘**Ports**’ selection under the **Control Panel**.

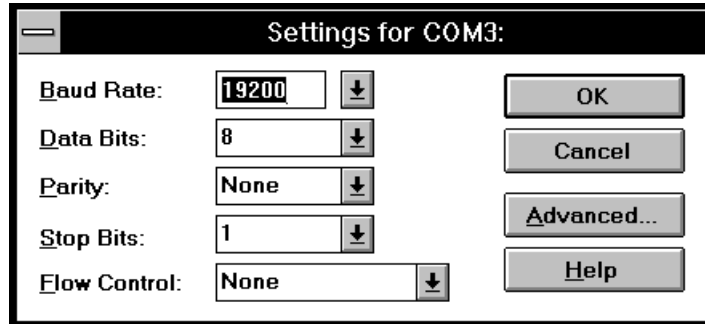


Select the port you wish to configure. Once you have selected the port, click on the ‘**Settings**’ button.

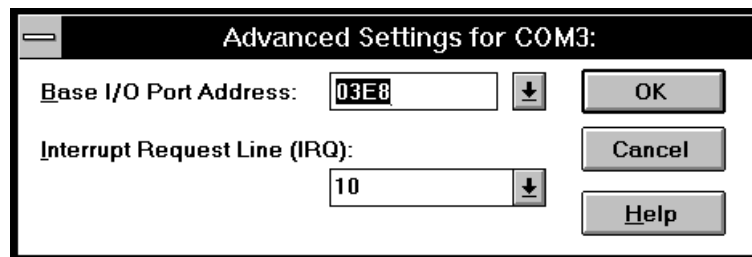


The next step is to select the appropriate Baud rate, Data Bits, Parity, Stop Bits and Flow control.

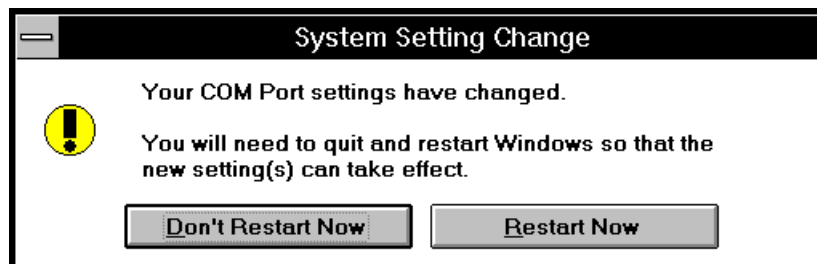
Note: The Baud rates selected here will only be true if the HS-RS232DP's clocking jumper is placed in the divide by 4 mode. If the jumper is in the divide by 2 mode these data rates will be doubled (i.e. 19.2 K bps selected = 38.4 K bps). If the jumper is in the divide by 1 mode these data rates will be multiplied by 4 (i.e. 19.2 K bps selected = 76.8 K bps).



If you wish to select an IRQ or address different than the default click on the 'Advanced' button.



Select 'OK' for all windows after you have made your selection. The following message should appear:



If you wish to configure another COM: Port setting, select the 'Don't Restart Now' button and repeat this procedure until you have configured all new ports. To make the changes take effect immediately select the 'Restart Now' button.

Windows 95 and Windows NT Installation

Please refer to the Application Note section of the Serial Utilities Diskette for current information on the installation of the HS-RS232DP in these operating systems.

HS-RS232DP Software Drivers

Refer to the accompanying diskette for included drivers installation and setup.

Chapter 4: Technical Description

The HS-RS232DP utilizes the 16C650 UART. This chip features programmable baud rate, data format, interrupt control and a 32 byte input and output FIFO.

Features Include:

- Addressable as COM1: - COM4: and other selectable address combinations.
- Speeds up to 460.8 K bps available via enhanced hardware drivers and receivers.
- Multiple clocking modes insuring compatibility with existing software products.
- 'Shareable' IRQs allow more than one port to share a single IRQ
- IRQs 2-5, 7, 10, 11, 12, 15 supported

Connector Pin Assignments

Name		Pin #	Mode
TD	Transmit Data	3	Output
RTS	Request To Send	7	Output
DTR	Data Term Ready	4	Output
GND	Ground	5	
RD	Receive Data	2	Input
DCD	Data Carrier Detect	1	Input
DSR	Data Set Ready	6	Input
CTS	Clear To Send	8	Input
RI	Ring Indicator	9	Input

Note: These assignments meet EIA/TIA/ANSI-574 DTE for DB-9 type connectors.

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Chapter 5: Specifications

Environmental Specifications

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

Manufacturing

- IPC 610-A Class-III standards are adhered to with a 0.1 visual A.Q.L. and 100% Functional Testing.
- The printed circuit boards are built to U.L. 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.

Power Consumption

Supply line:	+12 VDC	-12 VDC	+5 VDC
Rating:	50 mA	50 mA	195 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length:	5.4 inches	(13.72 cm)
Board Height including Goldfingers:	3.5 inches	(8.89 cm)
Board Height excluding Goldfingers:	3.2 inches	(8.13 cm)

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Appendix A: Troubleshooting

A Serial Utility Diskette is supplied with the 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 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 adapter is using a unique IRQ. While the 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 adapter is securely installed in a motherboard slot.
5. Use the supplied diskette and User Manual to verify that the adapter is configured correctly. The supplied diskette contains a diagnostic program 'SSD' 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' file on the supplied diskette for detailed instructions on using 'SSD'.
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:
7. Please refer to your included diskette for any post production manual updates and application specific information.
8. Always use the diagnostic software when Troubleshooting a problem. This will eliminate the software issue from the equation.

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Appendix B: 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. The IBM PC computer defined the RS-232 port on a 9 pin D sub connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard is defined as the *9-Position Non-Synchronous Interface between Data Terminal Equipment and Data Circuit-Terminating Equipment Employing Serial Binary Data Interchange*. Both implementations are in wide spread use and will be referred to as RS-232 in this document. 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 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. The RS-232 and the EIA/TIA-574 specification define two types of interface circuits, Data Terminal Equipment (DTE) and Data Circuit-Terminating Equipment (DCE). The HS-RS232DP is a DTE device.

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Appendix C: Asynchronous Communications

Serial data communications implies that individual bits of a character are transmitted consecutively to a receiver that assembles the bits back into a character. Data rate, error checking, handshaking, and character framing (start/stop bits) are pre-defined and must correspond at both the transmitting and receiving ends.

Asynchronous communications is the standard means of serial data communication for PC compatibles and PS/2 computers. The original PC was equipped with a communication or COM: port that was designed around an 8250 Universal Asynchronous Receiver Transmitter (UART). This device allows asynchronous serial data to be transferred through a simple and straightforward programming interface. Character boundaries for asynchronous communications are defined by a starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8). The end of the character is defined by the transmission of a pre-defined number of stop bits (usually 1, 1.5 or 2). An extra bit used for error detection is often appended before the stop bits.

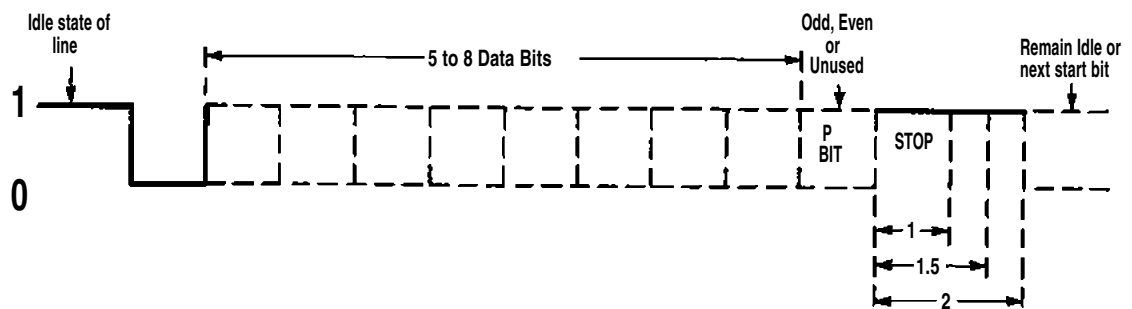
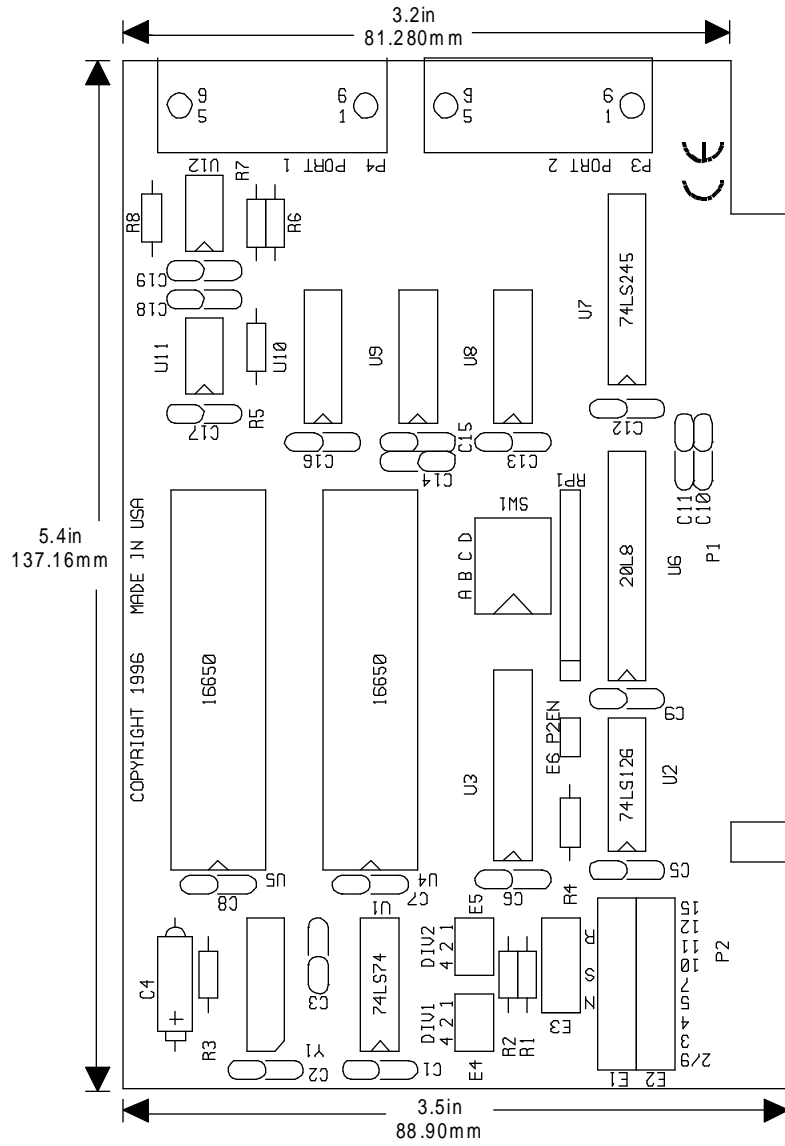


Figure 6: Asynchronous Communications Bit Diagram

This special bit is called the parity bit. Parity is a simple method of determining if a data bit has been lost or corrupted during transmission. There are several methods for implementing a parity check to guard against data corruption. Common methods are called (E)ven Parity or (O)dd Parity. Sometimes parity is not used to detect errors on the data stream. This is referred to as (N)o parity. Because each bit in asynchronous communications is sent consecutively, it is easy to generalize asynchronous communications by stating that each character is wrapped (framed) by pre-defined bits to mark the beginning and end of the serial transmission of the character. The data rate and communication parameters for asynchronous communications have to be the same at both the transmitting and receiving ends. The communication parameters are baud rate, parity, number of data bits per character, and stop bits (i.e. 9600,N,8,1)

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Appendix D: Silk-Screen



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Appendix E: Compliance Notices

Federal Communications Commission Statement

This equipment has been tested and found to comply with the limits for Class B 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 residential installation. 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. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna
- Increase the separation between the equipment and receiver
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected
- Consult the dealer or an experienced radio/TV technician for help

Caution

Industrial Computer Source is not responsible for any radio or television interference caused by unauthorized modifications of this equipment or the substitution of attachment of connecting cables and equipment other than those specified by Industrial Computer Source. Such unauthorized modifications, substitutions, or attachments may void the user's authority to operate the equipment. The correction of interference caused by such unauthorized modifications, substitutions, or attachments will be the responsibility of the user.

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 directives.

Canadian Radio Interference Regulations

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet Appareil numérique de la classe B respecte toutes les exigences de Règlement sur le matériel du Canada

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 B - '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'

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 EMC directives.

Declaration of Conformity



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.

HS-RS232/DP

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:



Z.A. de Courtaboeuf
16, Avenue du Québec
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September 10, 1997
San Diego, CA

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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