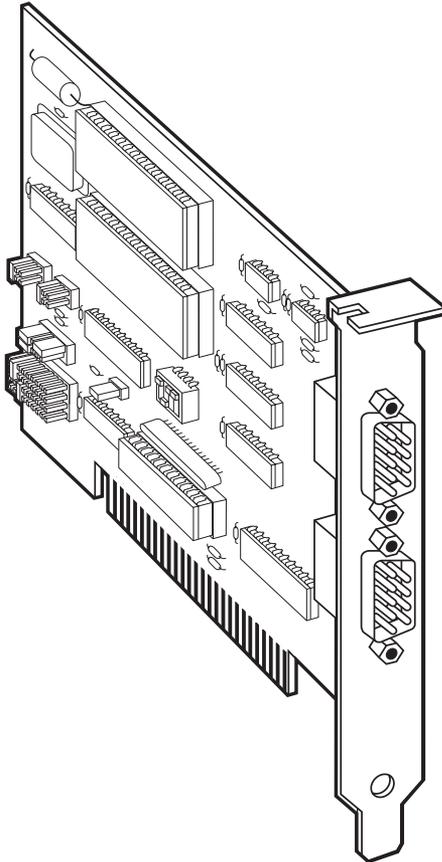




RS-232 HS



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Class B Digital Device. This equipment has been tested and found to comply with the limits for a Class B computing device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. This equipment generates, uses, and can radiate radio frequency energy, and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. If this equipment does cause harmful interference to radio or telephone reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

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- Consult an experienced radio/TV technician for help.

Caution:

Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

To meet FCC requirements, shielded cables and power cords are required to connect this device to a personal computer or other Class B certified device.

This digital apparatus does not exceed the Class B limits for radio noise emission from digital apparatus set out in the Radio Interference Regulation of the Canadian Department of Communications.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de classe B prescrites dans le Règlement sur le brouillage radioélectrique publié par le ministère des Communications du Canada.

NORMAS OFICIALES MEXICANAS (NOM)

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INSTRUCCIONES DE SEGURIDAD

1. Todas las instrucciones de seguridad y operación deberán ser leídas antes de que el aparato eléctrico sea operado.
2. Las instrucciones de seguridad y operación deberán ser guardadas para referencia futura.
3. Todas las advertencias en el aparato eléctrico y en sus instrucciones de operación deben ser respetadas.
4. Todas las instrucciones de operación y uso deben ser seguidas.
5. El aparato eléctrico no deberá ser usado cerca del agua—por ejemplo, cerca de la tina de baño, lavabo, sótano mojado o cerca de una alberca, etc..
6. El aparato eléctrico debe ser usado únicamente con carritos o pedestales que sean recomendados por el fabricante.
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8. Servicio—El usuario no debe intentar dar servicio al equipo eléctrico más allá a lo descrito en las instrucciones de operación. Todo otro servicio deberá ser referido a personal de servicio calificado.
9. El aparato eléctrico debe ser situado de tal manera que su posición no interfiera su uso. La colocación del aparato eléctrico sobre una cama, sofá, alfombra o superficie similar puede bloquea la ventilación, no se debe colocar en libreros o gabinetes que impidan el flujo de aire por los orificios de ventilación.
10. El equipo eléctrico deber ser situado fuera del alcance de fuentes de calor como radiadores, registros de calor, estufas u otros aparatos (incluyendo amplificadores) que producen calor.

11. El aparato eléctrico deberá ser conectado a una fuente de poder sólo del tipo descrito en el instructivo de operación, o como se indique en el aparato.
12. Precaución debe ser tomada de tal manera que la tierra física y la polarización del equipo no sea eliminada.
13. Los cables de la fuente de poder deben ser guiados de tal manera que no sean pisados ni pellizcados por objetos colocados sobre o contra ellos, poniendo particular atención a los contactos y receptáculos donde salen del aparato.
14. El equipo eléctrico debe ser limpiado únicamente de acuerdo a las recomendaciones del fabricante.
15. En caso de existir, una antena externa deberá ser localizada lejos de las líneas de energía.
16. El cable de corriente deberá ser desconectado del cuando el equipo no sea usado por un largo periodo de tiempo.
17. Cuidado debe ser tomado de tal manera que objetos líquidos no sean derramados sobre la cubierta u orificios de ventilación.
18. Servicio por personal calificado deberá ser provisto cuando:
 - A: El cable de poder o el contacto ha sido dañado; u
 - B: Objetos han caído o líquido ha sido derramado dentro del aparato; o
 - C: El aparato ha sido expuesto a la lluvia; o
 - D: El aparato parece no operar normalmente o muestra un cambio en su desempeño; o
 - E: El aparato ha sido tirado o su cubierta ha sido dañada.

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Products bearing the CE label fulfill the requirements of the EMC directive (89/336/EWG) and of the low-voltage directive (73/23/EWG) 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 FCC/EMC directives.

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1. Specifications

Communication Chip —	IC130C: 16650 UART; IC177C: 16950 UART
Connectors —	(2) DB9 M, (1) PC-card edge, 16-bit
Diagnostics —	(2) 3.5-inch asynchronous utility disks
Manufacturing —	IPC 610-A Class-III standards are adhered to with a 0.1 visual A.Q.L. and 100% functional testing. All boards are built to UL® 94V0 rating and are 100% electrically tested. These printed circuit boards are solder mask over bare copper or solder mask over tin nickel.
MTBF —	>150,000 hours
Operating Temperature —	32 to 122°F (0 to 50°C)
Storage Temperature —	-4 to +158°F (-20 to +70°C)
Relative Humidity Tolerance —	10 to 90%, noncondensing
Power Consumption —	+12 VDC @ 50 mA, -12 VDC @ 50 mA, +5 VDC @ 195 mA
Size —	3.5"H x 5.4"L (8.9 x 13.7 cm)

2. Introduction

2.1 Overview

The RS-232 HS provides the PC with 2 asynchronous serial ports. It also provides a jumper to select clocking modes that allow much higher data rates than those typically associated with RS-232. With its high-speed drivers and receivers, the RS-232 HS can handle rates up to 460 Kbps. The RS-232 HS can be configured as COM1: through COM4:, providing a versatile interface for common RS-232 needs (such as a modem, mouse, or plotter) as well as higher-speed applications (like ISDN, V.34 modems, etc.).

The IC130C uses the 16650 UART chip, which features programmable baud rate, data format, interrupt control, and a 32-byte input and output FIFO. The IC177C uses the 16950 UART, which features a 128-byte FIFO.

In addition, the RS-232 HS supports IRQs 2–5, 7, 10, 11, 12, and 15. And shareable IRQs allow more than one port to share a single IRQ.

2.2 Package Contents

If any of the items listed below are missing or damaged, call Black Box at 724-746-5500.

- RS-232 HS
- (2) 3.5-inch serial utility diskettes
- This user's manual

2.3 Factory-Default Settings

The RS-232 HS's factory-default settings are listed below.

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

If you want to install the RS-232 HS using the factory-default settings, you can skip the next two chapters. Turn to **Chapter 5**.

3. Connector Pin Assignments

NOTE

These assignments meet EIA/TIA/ANSI-574 DTE for DB9 connectors.

Signal	Name	Pin #	Mode
TD	Transmit Data	3	Output
RTS	Request To Send	7	Output
DTR	Data Terminal 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

4. Card Setup

For your reference, record the installed RS-232 HS's settings here.

Port #	Base Address	IRQ
1		
2		

The RS-232 HS contains several jumpers (straps) which must be set for proper operation. The factory-default settings are shown in **Section 2.3**; if you want to use the defaults, you can skip this chapter.

4.1 Address Selection

Each serial port on the RS-232 HS 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 RS-232 HS. Be careful when selecting the port address—some selections conflict with existing PC ports. The table on the next page shows the addressing options available with the standard PAL. If you do not see an address option that suits your needs, contact your supplier about a custom PAL option.

Port 1 J2	Port 2 J3	SW1 1	SW1 2	SW1 3	SW1 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

NOTE

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

Refer to *Chapter 6, Troubleshooting*, for common address conflicts.

4.2 Port Enable/Disable

Port 2 on the RS-232 HS 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 the table above.)

4.3 IRQ Selection

Headers E1 and E2 select the interrupt request for each serial port (E1 for Port 1 and E2 for 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.

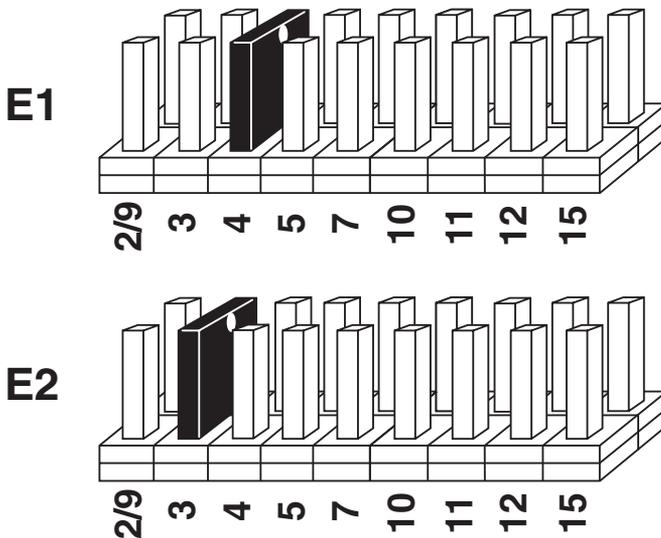


Figure 4-1. Header E1 and E2, IRQ Selection.

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 software for IRQ selection. If no interrupt is desired, remove the jumper.

4.4 Interrupt Modes

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

N indicates the normal, single-interrupt-per-port mode. **S** indicates the shared-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 1-Kohm pull-down resistor required on one port when sharing interrupts.

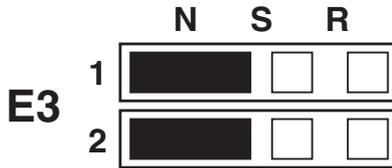


Figure 4-2. Header E3, Normal IRQ Mode.

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 RS-232 HS or a compatible adapter in a bus, only have one port set to **R**. The following example shows both ports sharing a single IRQ.

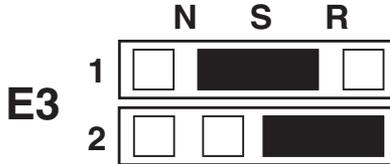


Figure 4-3. Header E3, Shared IRQ Mode.

Set the jumper to **S** if you are using more than one RS-232 HS in a bus or if 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.*

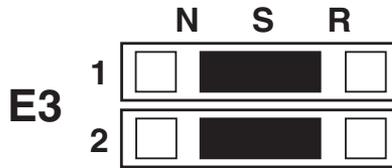


Figure 4-4. Header E3, Sharing IRQs with another adapter.

4.5 Clock Modes

The RS-232 HS 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 (such as 2400, 4800, 9600, 19,200...115,200 bps) place the jumper in the “divide by 4” mode. To double these rates up to a maximum rate for 230.4 Kbps, place the jumper in the “divide by 2” position. To select the maximum data rate (460.8 Kbps), 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 (for example, a serial mouse) and Port 2 (E5) is selected to support a high-speed application in the “divide by 1” mode (such as on ISDN or digital link).

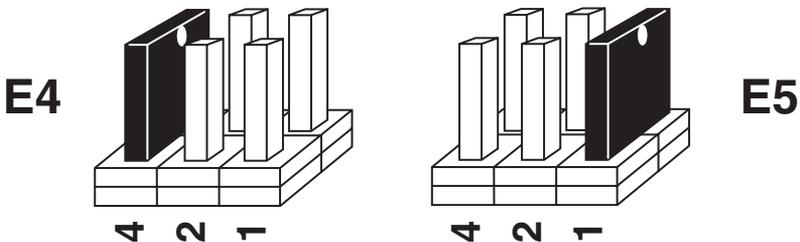
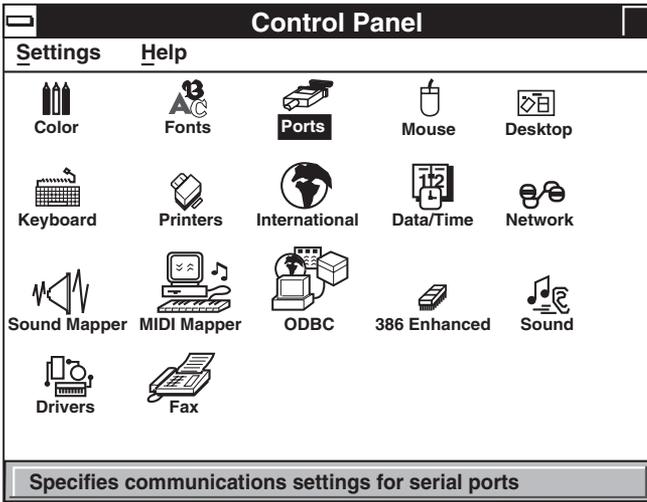


Figure 4-5. Headers E4 and E5, Clocking Modes.

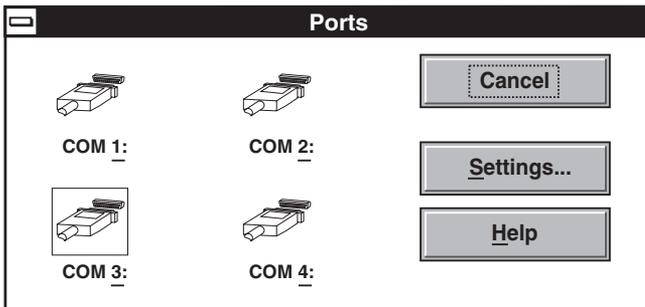
5. Installation

5.1 Windows® 3.x (Including Windows for Workgroups 3.11) Installation

To configure the RS-232 HS under Windows 3.1, open the Control Panel, which is typically found in the Main Program Group. Next, open the **Ports** selection under the Control Panel.



Select the port you want 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 accurate if the RS-232 HS'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 (for example, 19.2 Kbps would equal 38.4 Kbps). If the jumper is in the "divide by 1" mode, these data rates will be multiplied by 4 (for example, 19.2 Kbps would equal 76.8 Kbps).

Settings for COM3:

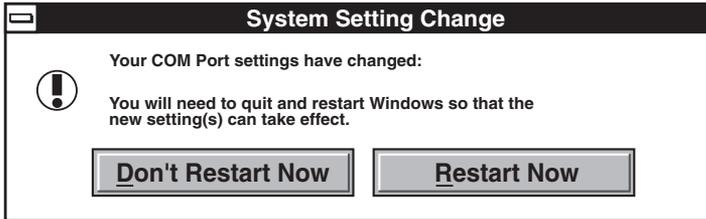
<u>B</u> aud Rate:	19200	↓	<input type="button" value="OK"/> <input type="button" value="Cancel"/> <input type="button" value="Advanced..."/> <input type="button" value="Help"/>
<u>D</u> ata Bits:	8	↓	
<u>P</u> arity:	None	↓	
<u>S</u> top Bits:	1	↓	
<u>F</u> low Control:	None	↓	

If you want to select an IRQ or address different from the default, click on the **Advanced** button.

Advanced Settings for COM 3:

<u>B</u> ase I/O Port Address	03E8	↓	<input type="button" value="OK"/> <input type="button" value="Cancel"/>
<u>I</u> nterupt Request Line (IRQ):	10	↓	

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



If you want 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.

5.2 Windows 95/98 and Windows NT Installation

If you are installing an ISA adapter in DOS, OS/2, or QNX, please refer to the appropriate directory on the Serial Utilities Disk for instructions.

WINDOWS 95/98 USERS

For the ISA card, run setup on the Serial Utilities Diskette before installing the card. Make note of the resources that Windows assigns the adapter and set the adapter to match those resources. Power down the computer and install the adapter.

If you wish to change any resources assigned to the adapter, refer to the help file installed in the Black Box folder in the Start, Programs menu.

WINDOWS NT

For the ISA card, run setup on disk two of the Serial Utilities Diskettes before installing the card. After installing the software, refer to the help file that automatically comes up for installation instructions.

5.3 RS-232 HS Software Drivers

Refer to the serial utility diskette for included drivers, installation, and setup.

5.4 Hardware Installation

The RS-232-HS 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 RS-232 HS has several jumpers (straps) for each port which must be set for proper operation before you install the RS-232 HS in the computer.

1. Turn off the PC's power. Disconnect the power cord.
2. Remove the cover of the PC case.
3. Locate an available slot and remove the blank metal slot cover.
4. Gently insert the RS-232 HS into the slot. Make sure it's seated properly.
5. Replace the screw.
6. Replace the cover.
7. Connect the power cord.

6. Troubleshooting

6.1 Solving Common Problems

A serial utility diskette, used for troubleshooting, is included with your RS-232 HS. By using this diskette and following these simple steps, most common problems can be eliminated.

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 RS-232 HS so that there is no conflict with currently installed adapters. No two adapters can occupy the same I/O address.
3. Make sure the RS-232 HS is using a unique IRQ. While the RS-232 HS does allow the sharing of IRQs, many other adapters (such as SCSI adapters and on-board serial ports) do not. The IRQ is typically selected via an on-board header block. Refer to *Chapter 4, Card Setup*, for help in choosing an I/O address and IRQ.
4. Make sure the RS-232 HS is securely installed in a motherboard slot.
5. Use the supplied diskette and user manual to verify that the RS-232 HS is configured correctly. The supplied diskette contains a diagnostic program, "SSD," that will verify if an adapter is configured properly. 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, instead of trying to troubleshoot with some other application. That way you can be sure the problem isn't in your software.

6.2 Calling Your Supplier

If you determine that your RS-232 HS is malfunctioning, do not attempt to alter or repair the unit. It contains no user-serviceable parts. Contact your supplier.

Before you do, make a record of the history of the problem. Your supplier will be able to provide more efficient and accurate assistance if you have a complete description, including:

- the nature and duration of the problem.
- when the problem occurs.
- the components involved in the problem.
- any particular application that, when used, appears to create the problem or make it worse.

6.3 Shipping and Packaging

If you need to transport or ship your RS-232 HS:

- Package it carefully. We recommend that you use the original container.
- If you are shipping the RS-232 HS for repair, make sure you include everything that came in the original package. Before you ship, contact your supplier to get a Return Materials Authorization (RMA) number.

Appendix A: 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 subminiature connector and subsequently the EIA/TIA approved this implementation as the EIA/TIA-574 standard. This standard has been 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 widespread use and will be referred to as RS-232 in this appendix.

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, depending on line conditions and cable lengths. The RS-232 HS uses special drivers and receivers to boost the data rate as high as 460 Kbps.

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 RS-232 HS is a DTE device.

Appendix B: 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 (usual 1, 1.5, or 2). An extra bit used for error detection is often appended before the stop bits.

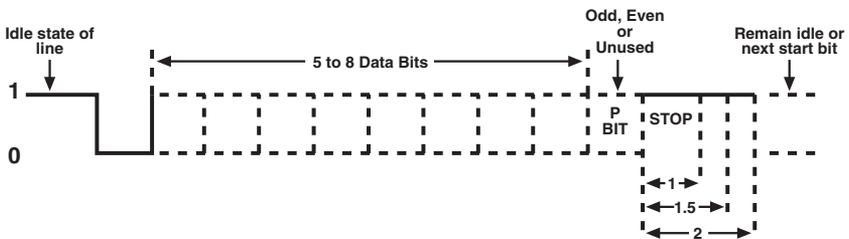
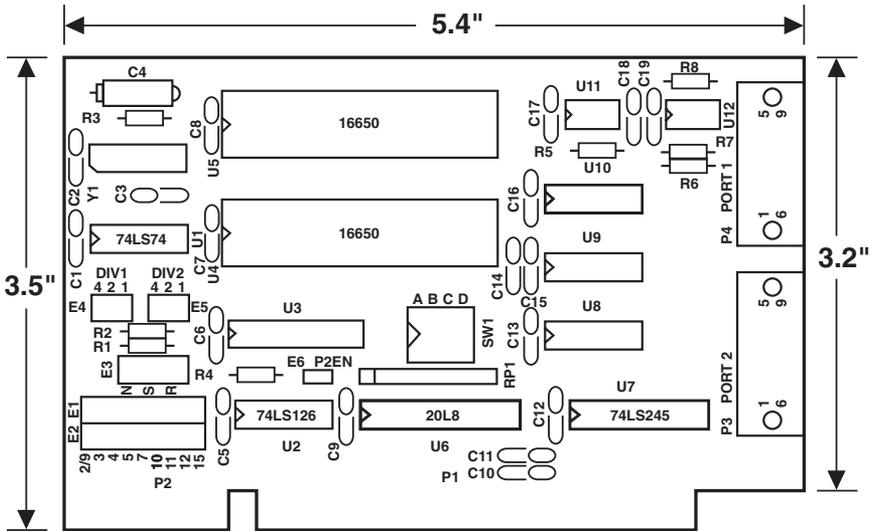


Figure B-1. Asynchronous Communications Bit.

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 (for example, 9600, N, 8, 1).

Appendix C: Board Layout





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