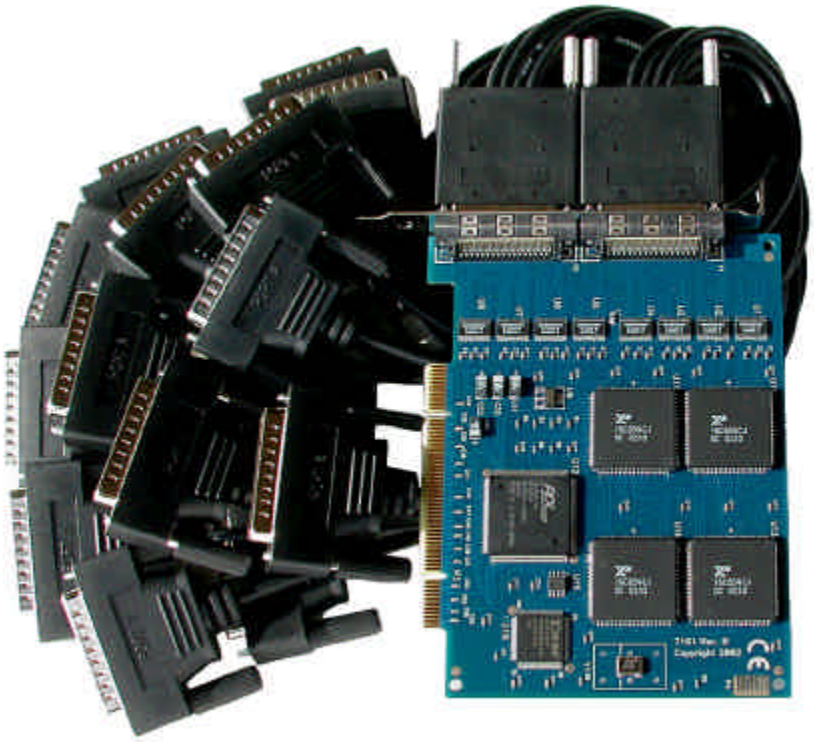
IC1600C
Users Manual



Part Number IC1600C

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Introduction

Overview

The Black Box **IC1600C** provides the PC with sixteen RS-232 asynchronous ports. The **IC1600C** allows for connection to any device utilizing the RS-232 electrical interface, such as modems, data-entry terminals, and plotters.

What's Included

The **IC1600C** is shipped with the following items. If any of these items is missing or damaged, contact the supplier.

- **IC1600C** Serial I/O Adapter
- (2) Micro MDB-68 to eight DB-25 'Spider Cable'
- CD

Address and IRQ selection

The **IC1600C** is automatically assigned I/O addresses and IRQs by your motherboard BIOS. Adding or removing other hardware may change the assignment of I/O addresses and IRQs.

Installation

Operating System Installation

For Windows Users

Start by choosing **Install Software at the beginning of the CD. Choose Asynchronous COM: Port Software, SeaCOM.**

Other Operating Systems

Refer to the appropriate section of the Serial Utilities Software.

System Installation

The **IC1600C** is a universal PCI implementation and can be installed in any 5V or 3.3V slot of the PCI expansion slots.

1. When running Windows 9x/NT install software before installing adapter.
2. Turn off PC power. Disconnect the power cord.
3. Remove the PC case cover.
4. Locate an available PCI slot and remove the blank metal slot cover.
5. Gently insert the **IC1600C** into the slot. Make sure that the adapter is seated properly.
6. Replace the screw.
7. Replace the cover.
8. Connect the power cord.

Installation is complete.

Technical Description

The Black Box **IC1600C** provides a PCI interface adapter with 16 RS-232 asynchronous serial ports for industrial automation and control applications.

The **IC1600C** utilizes the 16C854 UART. This chip features programmable baud rates, data format, interrupt control and industry leading 128-byte transmit and receive FIFOs.

Connector Pin Assignments

DB-25 (RS-232 DTE) (DB-25 Male)

Signal	Name	Pin #	Mode
GND	Ground	7	
TD	Transmit Data	2	Output
RTS	Request To Send	4	Output
DTR	Data Terminal Ready	20	Output
RD	Receive Data	3	Input
CTS	Clear To Send	5	Input
DSR	Data Set Ready	6	Input
DCD	Data Carrier Detect	8	Input
RI	Ring Indicator	22	Input

Technical Note: Please terminate any control signals that are not going to be used. The most common way to do this is connect RTS to CTS and RI. Also, connect DCD to DTR and DSR. Terminating these pins, if not used, will help insure you get the best performance from your adapter.

DB-68 (Micro MDB-68 Female)

Port #	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
TD	1	9	19	27	35	43	53	61
RI	2	10	20	28	36	44	54	62
DCD	3	11	21	29	37	45	55	63
DTR	4	12	22	30	38	46	56	64
RTS	5	13	23	31	39	47	57	65
DSR	6	14	24	32	40	48	58	66
RD	7	15	25	33	41	49	59	67
CTS	8	16	26	34	42	50	60	68
GND	17	17	18	18	51	51	52	52

Both cables are interchangeable and can be used on either connector. The top connector supports Ports 1-8 and the bottom connector supports Ports 9-16.

Specifications

Environmental Specifications

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

Power Consumption

Supply line	+5 VDC
Rating	450 mA

Mean Time Between Failures (MTBF)

Greater than 150,000 hours. (Calculated)

Physical Dimensions

Board length	5.5 inches	(13.97 cm)
Board Height including Goldfingers	4.2 inches	(10.668 cm)

Appendix A - Troubleshooting

Serial Utility test software is supplied with the Black Box adapter and will be used in the troubleshooting procedures. By using this software 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 Black Box 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 Black Box adapter is using a unique IRQ 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 Black Box adapter is securely installed in a motherboard slot.

5. When running DOS, Windows 3.x or other operating systems refer to the Serial Utilities software for that operating system and the User Manual to verify that the Black Box adapter is configured correctly. The supplied software contains a diagnostic program 'SSD' that runs under DOS and 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 DIAG.txt file in the dos\diag directory for detailed instructions on using 'SSD'.

6. For Windows 95/98 and Windows NT, the diagnostic tool 'WinSSD' is installed in the SeaCom folder on the Start Menu during the setup process. First find the ports using the Device Manager, then use 'WinSSD' to verify that the ports are functional.

7. Always use the Black Box diagnostic software when troubleshooting a problem. This will help eliminate any software issues and identify any hardware conflicts.

Appendix B - How To Get Assistance

1. Begin by reading through the Trouble Shooting Guide in Appendix A. If assistance is still needed please see below.
2. When calling for technical assistance, please have your user manual and current adapter settings. If possible, please have the adapter installed in a computer ready to run diagnostics.
3. Visit Black Box's website at www.blackbox.com for the latest software updates and newest manuals.
4. Technical support can be reached at (724) 746-5500.

RETURN AUTHORIZATION MUST BE OBTAINED FROM BLACK BOX BEFORE RETURNED MERCHANDISE WILL BE ACCEPTED. AUTHORIZATION CAN BE OBTAINED BY CALLING BLACK BOX AND REQUESTING A RETURN MERCHANDISE AUTHORIZATION (RMA) NUMBER.

Appendix C - 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-C/D/E or EIA/TIA-232-C/D/E. It is defined as "*Interface between Data Terminal Equipment and Data Circuit- Terminating Equipment Employing Serial Binary Data Interchange*". The mechanical implementation of RS-232 is on a 25-pin D sub connector. 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 has 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 20K bps / 50 ft. The absolute maximum data rate may vary due to line conditions and cable lengths. RS-232 often operates at 38.4K bps over very short distances. The voltage levels defined by RS-232 range from -12 to +12 volts. 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. A voltage of +12 volts (usually +3 to +10 volts) represents a binary 0 (space) and -12 volts (-3 to -10 volts) denote a binary 1 (mark). The RS-232 and the EIA/TIA-574 specification define two types of interface circuits **D**ata **T**erminal **E**quipment (**DTE**) and **D**ata **C**ircuit-Terminating **E**quipment (**DCE***).* The Black Box Adapter is a DTE interface.

Appendix D - 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. A starting bit followed by a pre-defined number of data bits (5, 6, 7, or 8) defines character boundaries for asynchronous communications. 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.

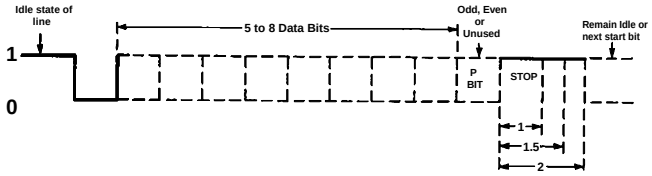
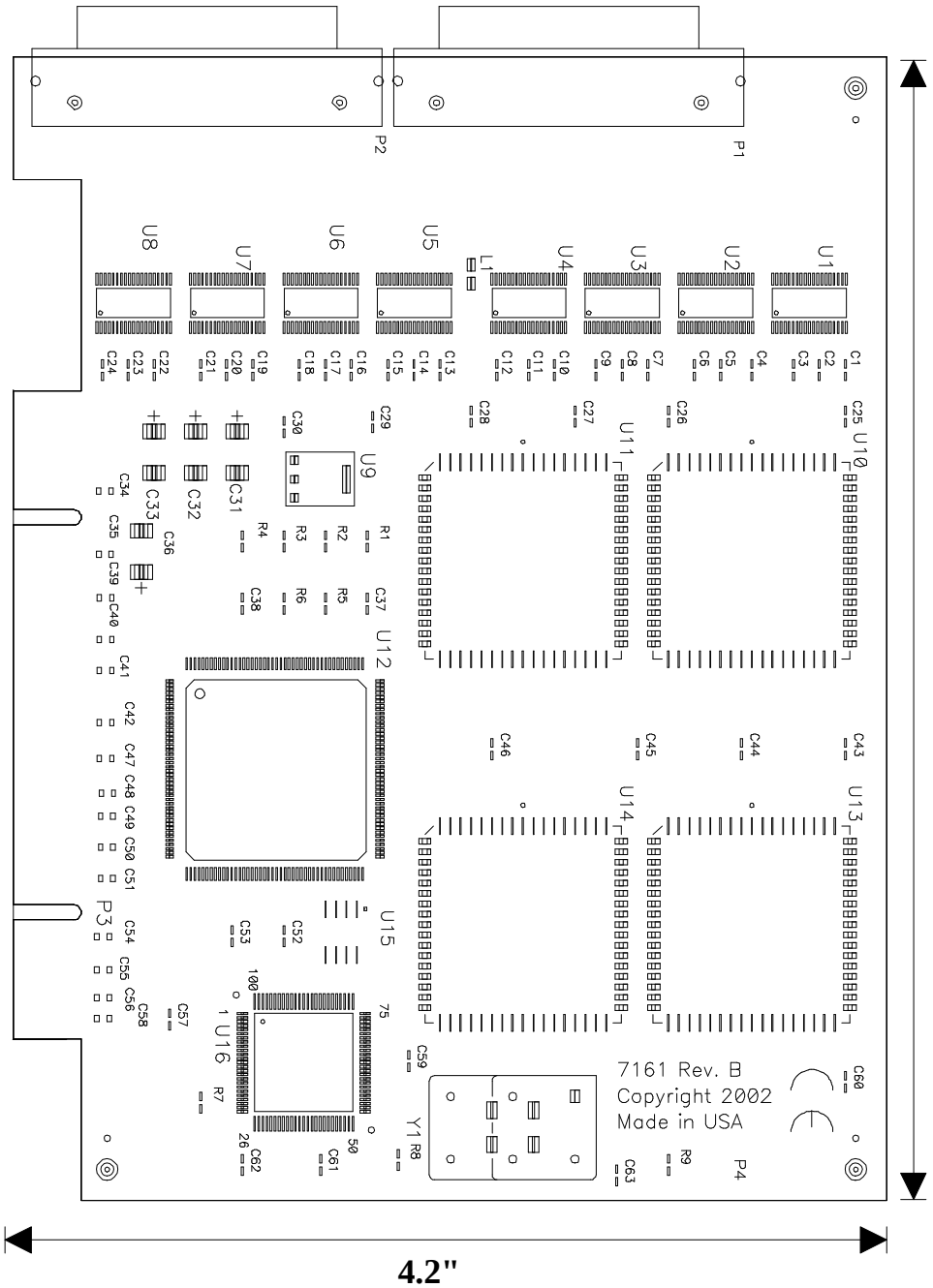


Figure 1 - Asynchronous Communications Bit Diagram

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 refereed 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).

Appendix E - Silk-Screen



Appendix F - Compliance Notices

Federal Communications Commission Statement

FCC - This equipment has been tested and found to comply with the limits for Class A 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 commercial environment. 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. Operation of this equipment in a residential area is likely to cause harmful interference in such case the user will be required to correct the interference at his own expense.

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 A** - "Limits and methods of measurement of radio interference characteristics of information technology equipment"
- **EN55024** - 'Information technology equipment Immunity characteristics Limits and methods of measurement"
- **EN60950 (IEC950)** - "Safety of information technology equipment, including electrical business equipment"

Warning

This is a Class A Product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

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.

Warranty

Black Box provides a limited lifetime warranty. Should this product fail to be in good working order at any time during this period, Black Box will, at it's option, replace or repair it at no additional charge except as set forth in the following terms. This warranty does not apply to products damaged by misuse, modifications, accident or disaster.

Black Box assumes no liability for any damages, lost profits, lost savings or any other incidental or consequential damage resulting from the use, misuse of, or inability to use this product. Black Box will not be liable for any claim made by any other related party.

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