User's Guide

iPORT™

Windows to I²C Bus Host Adapter with iPort Utility Pack Software

MCC
Micro Computer Control
Small Area Network Specialists

www.mcc-us.com

Introduction

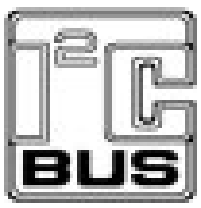
The MCC iPort (#MIIC-201) Windows to I^2C Host Adapter, when used with appropriate Windows application software, allows a PC to become an I^2C Master or Slave device, transmitting or receiving I^2C messages between the PC and one or more I^2C devices across an I^2C Bus.

This user's guide describes the installation and operation of the iPort (#MIIC-201) Windows to I^2C Host Adapter and iPort Utility Pack Software for Windows.

MCC products are licensed to use the I²C Bus.

Purchase of Philips I²C components conveys a license under the Philips I²C patent to use the components of the I²C system, provided the system conforms to the I²C specifications defined by Philips.

I²C is a trademark of Philips Corporation.



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Part 1

Model MIIC-201

Windows to I^2C Bus Host Adapter

Model MIIC-201
Windows to I²C Bus Host Adapter

User's Guide

Overview

The MCC **iPort** (#MIIC-201) Windows to I²C Host Adapter, when used with appropriate Windows application software, allows a PC to become an I²C Master or Slave device, transmitting or receiving I²C messages between the PC and one or more I²C devices across an I²C Bus.

Product Features:

- Turn your Windows-Based PC's Serial Port into an I²C Port.
- Get on the I²C Bus in Seconds.
- Supports Bus Master and Slave, Transmit and Receive.
- Includes our I²C Message Manager and Message Center Windows Applications.
- Compatible with 3.3v to 5v I²C at up to 100Kbps.
- Build your own custom I²C applications with our I²C Software Development Kit.

The iPort system consists of the following components:

1.iPort Adapter
This adapter plugs into an RS-232 Port on a Windows based PC and generates I^2C Bus signals.

2. iPort Utility Pack Software
This software package, included with each iPort, includes the iPort Message Manager and Message Center applications to easily send and receive I^2C Bus messages.

3. iPort Software Development Kit for Windows
This optional software package includes, the iPort DLL (Dynamic Linked Library), a programmer's guide, and sample programs. This package is needed if you are developing a custom Windows software application for the iPort adapter.

Packing Slip

This package includes the following items:

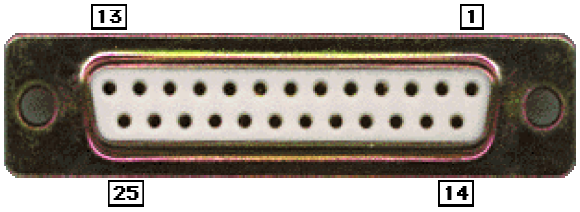
•iPort (#MIIC-201) Windows to I^2C Host Adapter.
•4 Foot I^2C Interface Cable. (CAB4)
•Serial Port Cable, 9F/25M, 1 Foot Long (#C9F25M1)
•iPort User's Guide.
•iPort Utility Pack for Windows software diskette.
•Power Supply
Standard 120VAC, 60Hz, USA Plug (#MWT-5VA)
European 220VAC, 50Hz, European Plug (#MWT-5VAE)
International 120/220/240VAC, 50-60Hz, Int.Plug selection (#MWT-5VAI)

System Requirements

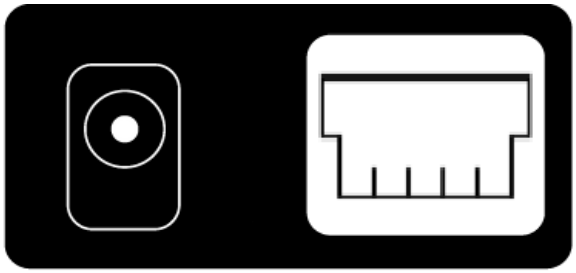
a. Host computer with Windows 95 or higher
b. 1 free RS-232 Serial Port

Interconnects

The I²C Bus Host Adapter includes three interconnections:



RS-232 Serial Port Connector



1. RS-232 Serial Port Connector

This connector provides connection to the serial port on the PC. Use the #C9F25M1 cable to adapt the iPort to 9-pin serial ports.

DB-25 Serial Port Pinout

DB-25 Pin 2, Transmit Data from the Host Computer to the iPort
DB-25 Pin 3, Receive Data from the iPort to the Host Computer.
DB-25 Pin 4, Request to Send from the Host Computer to iPort.
DB-25 Pin 5, Clear to Send from the iPort to the Host Computer.
DB-25 Pin 7, Ground between Host Computer and iPort

DB-9 Serial Port Pinout

iPort implements the RS-232 interface using the following pins:

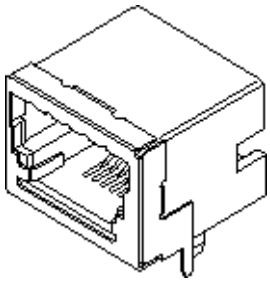
DB-9 Pin 3, Transmit Data from the Host Computer to the iPort
DB-9 Pin 2, Receive Data from the iPort to the Host Computer.
DB-9 Pin 7, Request to Send from the Host Computer to iPort.
DB-9 Pin 8, Clear to Send from the iPort to the Host Computer.
DB-9 Pin 5, Ground between Host Computer and iPort

2. +5VDC Power Jack

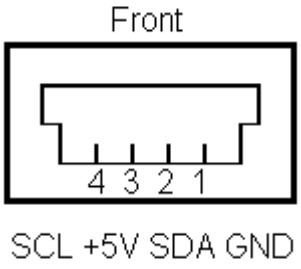
The iPort Host Adapter can be powered in one of two ways, from the power jack, or from the I^2C interface connector. If the unit is powered from the provided +5VDC Wall Transformer, approximately 250ma of regulated +5VDC is available at the I^2C interface connector to power external devices. If the iPort is powered from the I^2C connector, the unit requires 50ma of regulated +5VDC.

3. I^2C Interface Connector

The iPort Host Adapter includes a four wire, positive locking, modular connector (see Appendix A for more info on these parts) for interfacing to an external I^2C Bus. Lines provided include I^2C Clock (SCL), Data (SDA), Ground, and +5VDC.



Receptacle Connector



An I^2C Interface Cable (White=SCL, Red=+5VDC, Green=SDA, Black=Ground) is provided to connect to a external I^2C Bus. Since there is no standard I^2C Bus connector, you may want to cut off one end of the cable and add a connector compatible with your target system.

Additional I^2C Interface Cables (4 ft., 8ft., or 16 ft.) and above mentioned modular connectors are available from MCC. Clip Lead cables are also available. (see Appendix A)

Hardware Configuration

Pull-up Resistors

The iPort Host Adapter includes a slide switch used to enable or disable internal I^2C Bus 1.8K ohm Pull-Up resistors. Every I^2C Bus system must have at least one Pull-Up on the SCL and SDA lines. Use this switch to configure the iPort appropriately for your system.

Connecting to a 3.3v System

1. Shut off iPort internal pull-ups. (See Pull-up Resistor section)
2. Use external pull-ups to 3.3 volts.

The iPort uses a 5 volt device. 3.3v is high enough for the iPort to see a Logical 1.

Connecting to an SMBus System

1. Shut off iPort internal pull-ups. (See Pull-up Resistor section)
2. Use external SMBus rated (approx. 15k ohm) pull-up resistors.

Hardware Set-Up

1.Attach your iPort(#MIIC-201) to an open ComPort on your computer. If your ComPort has a DB9 connector, use DB-9F to DB-25M Serial Port Adapter Cable included with your iPort to connect.

2.Connect the power supply provided or see Interconnect Section +5VDC Power Jack.

3.Connect I^2C/ACCESS.bus Cable to iPort and your I^2C device. If your device does not have the matching connector(#15830064) you can cut the end of the cable and attach the individual wires to your device or you can purchase our clip-lead cable (#CABCL).

Part 2

iPort Utility Pack for Windows

V5

iPort Utility Pack for Windows

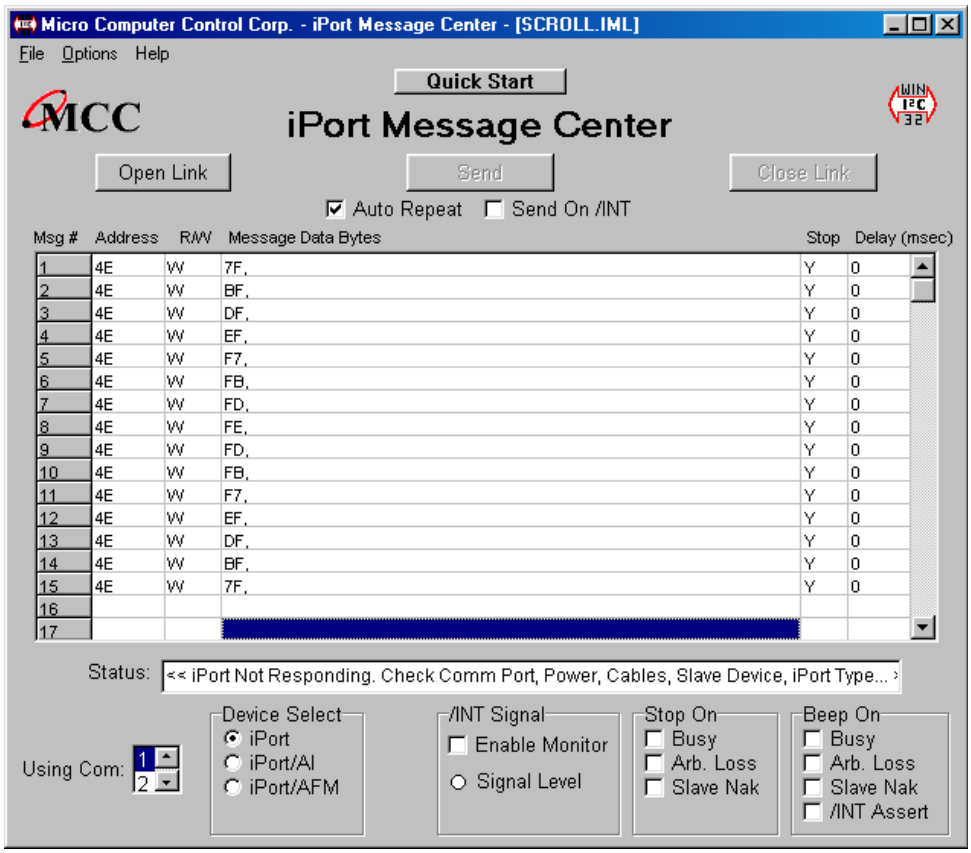
1. Introduction to Utility Pack

This product includes two (2) Windows applications (Message Manager and Message Center) that help a user get started sending and receiving I^2C Bus messages quickly.

iPort Message Center

The iPort Message Center operates with all versions of the iPort I^2C Bus Host Adapter. With this program you can create, save, and execute scripts of the following modes of I^2C Bus message activity:

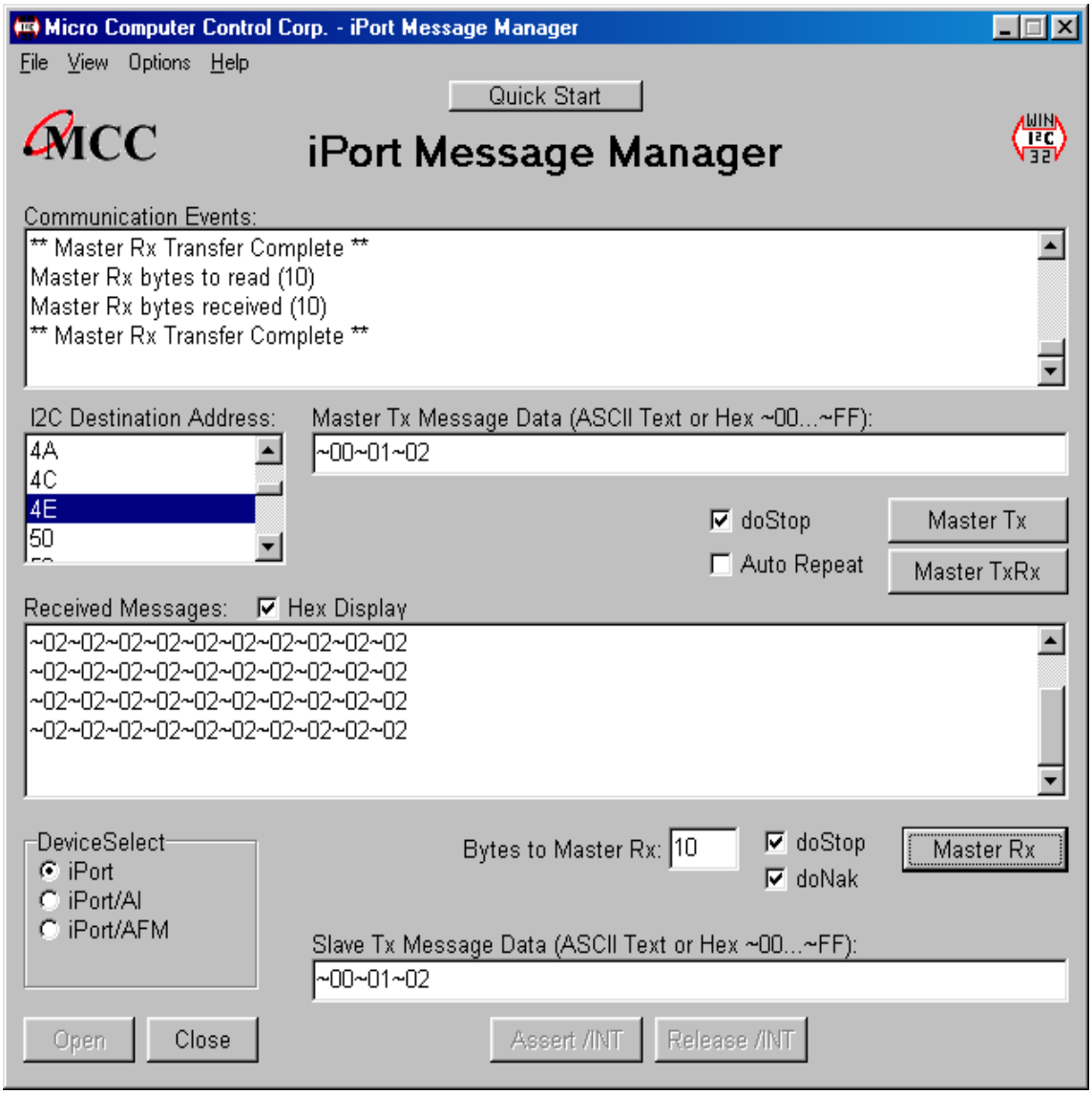
- Master Transmit
- Master Receive



iPort Message Manager

The Message Manager operates with all versions of the iPort I^2C Bus Host Adapter. Using this program you can perform all four (4) modes of I^2C Bus messages activity, including:

- Master Transmit
- Master Receive
- Slave Transmit
- Slave Receive



2. System Requirements

a. One of the following:

1. iPort (#MIIC-201) Windows to I^2C Bus Host Adapter.
2. iPort/AI (#MIIC-202) RS-232 to I^2C Bus Host Adapter with ASCII Interface
3. iPort/AFM (#MIIC-203) RS-232 to I^2C Bus Host Adapter with ASCII Fast Mode Interface.

b. Windows 95 or higher
c. 1 free RS-232 Serial Port.

3. Software Installation

Windows 95 and Above:

1. Insert software distribution diskette into floppy drive.

2. Select Start│Run. Type “A:SETUP.EXE”.

3. Follow instructions on screen.

iPort Message Center for Windows

Introduction to Message Center

The iPort Message Center supports I^2C Master Transmit and Receive activities for all versions of the iPort I^2C Bus Host Adapter. With this program you can create, save, and execute scripts of I^2C Master messages.

The MCC iPort Message Center Software, when used with an MCC iPort allows a PC to become an I^2C Master transmitter or receiving device, sending I^2C messages between the PC and one or more I^2C devices across an I^2C Bus.

The iPort Message Center is designed to be a simple application for experimenting with I^2C messages. It provides methods to:

1. Edit a list of I^2C Master Transmit or Receive Messages.

2. Save and/or Load a list of I^2C Master messages to/from disk.

3. Transmit the current list of I^2C Master messages, with the option to auto repeat upon completion, or send on $\overline{INT}$ assert (low). (iPort/AFM only)

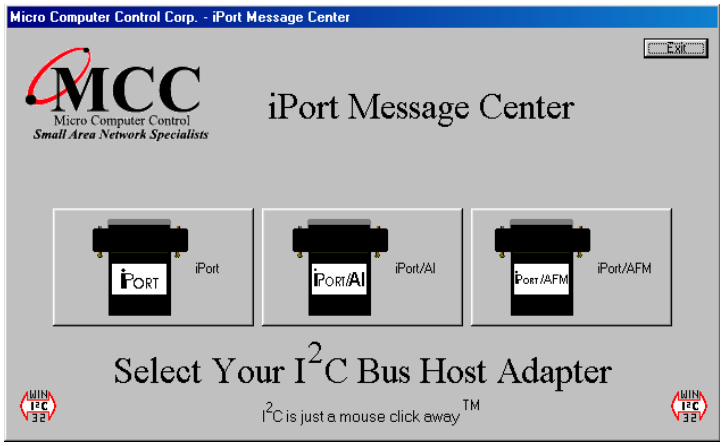
Each iPort Message Center I^2C message can include up to 32 bytes of 8-bit data, with an optional time delay at the completion of each message.

I²C Message Operations

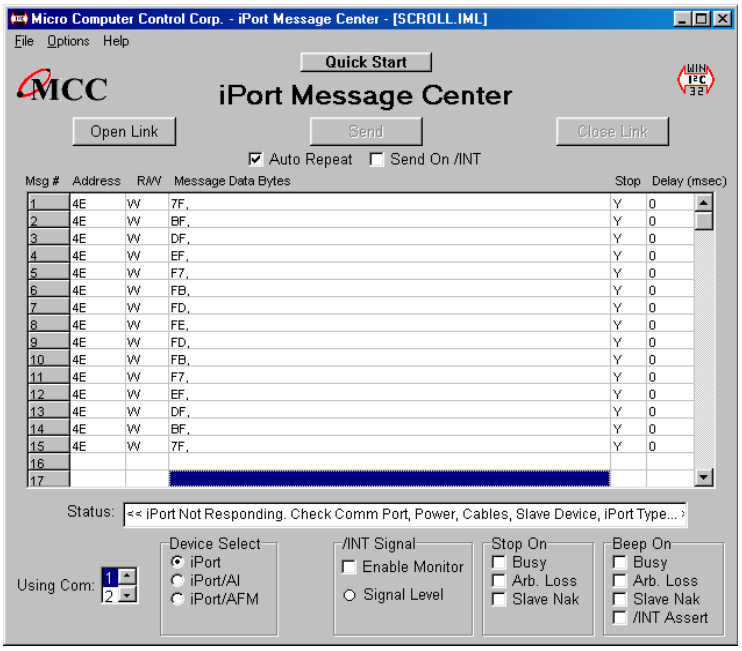
In order to communicate with another I²C device, a user must take the following steps:

1. Start │Programs │iPort Utility Pack│iPort Message Center

2. Select which device you are operating with by choosing the corresponding image (Opening Screen), or the correct checkbox on the main application.



Opening Screen



Main Application

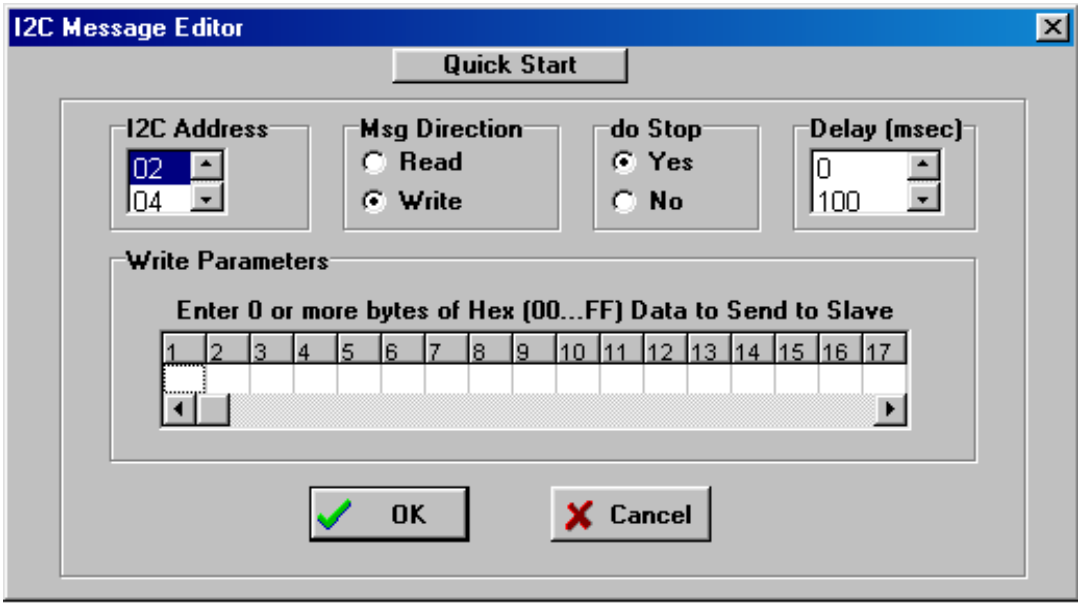
The Main Application screen is opened by selecting an image on the Opening Screen.

3. Select the PC ComPort where the iPort is connected to your computer.

4. Use the Options menu to override default Baud Rate and I^2C Bus Clock rate settings.

5. Establish a link to the iPort with the Open button. The iPort Message Center software sets the iPort's own I^2C Slave address to 0xFE.

6. To open an existing message list, click File|Open List on the menu bar. To enter or edit a message List, open the "I^2C Message Editor" screen, by double clicking on a message row in the spreadsheet.



Now you can:

a. Set the I^2C address (i.e. 4C, 4E, etc.)
b. Set Msg Direction (Read or Write)
c. Do stop (yes or no, Repeated starts)
d. Set time delay (delay in msec, controls speed of activity).
e. Write message data (from 00 to FF) or read count.
f. Click OK.

Repeat above steps for additional messages.

You can insert a new message between existing messages by clicking once on message below where you want to insert, press the “Insert” button on your keyboard, this will bring up the I^2C Message Editor screen, set all information and click OK.

7. On the main screen, click on Send to transmit the current list of I^2C Master messages, with the option to auto repeat upon completion, or send on $\overline{INT}$ assert (low). (iPort/AFM only)

Once the link has opened successfully, you are now an active I^2C node. Messages are entered into the message spreadsheet and are transmitted upon clicking the Send button. Data received as part of a Master Receive message replaces the 0xFF placeholders in the message spreadsheet control.

If you get a “Slave Not Acknowledging” message in the Communications Events window, this could mean you have the wrong address in the I^2C Destination Address, or the device is not answering to its address.

iPort Message Manager Software for Windows

Introduction to Message Manager

The MCC iPort Message Manager Software, when used in conjunction with an MCC iPort allows a PC to become an I^2C Master or Slave device, transmitting or receiving I^2C messages between the PC and one or more I^2C devices across an I^2C Bus.

The iPort Message Manager is designed to be a simple application for experimenting with I^2C messages. It provides methods to:

1. Set the device's I^2C Slave address, General Call Enable, and other operating parameters.

2. Master Transmit ASCII text or Hex [~00...~FF] data to a specified I^2C Slave Receiver device.

3. Master Receive data from a specified I^2C Slave Transmitter device.

4. Perform Master Read after Write operation.

5. Slave Transmit data to a requesting I^2C Master Receive device.

6. Display Slave Receiver data.

7. Assert or release the $\overline{INT}$ signal (iPort/AFM only).

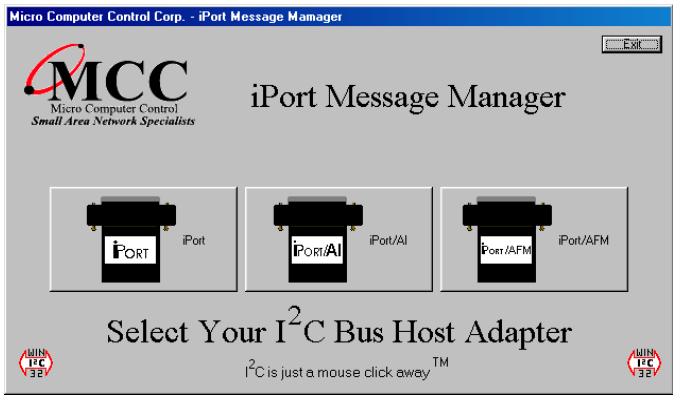
Each iPort Message Manager I^2C message can include up to 23 bytes of 8-bit ASCII binary data, although the iPort itself is capable of sending or receiving I^2C messages up to 64K bytes in length.

I²C Message Operations

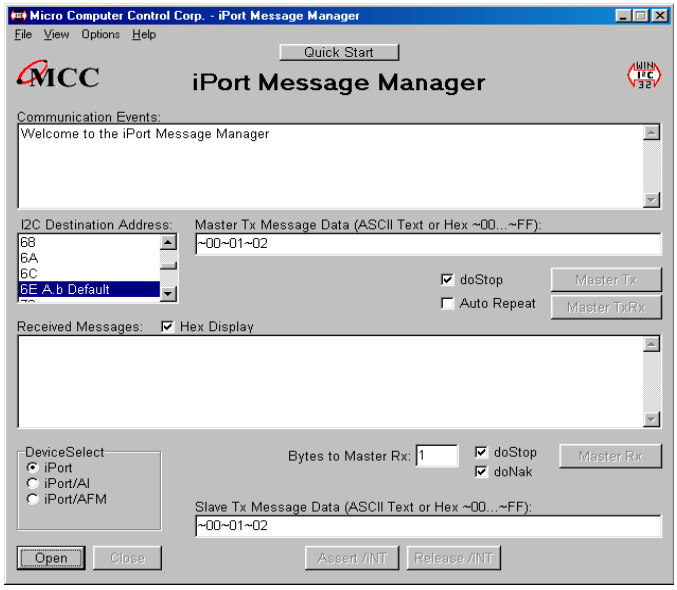
In order to communicate with another I²C device, a user must take the following steps:

1. **Starting the program**:
   Start │Programs │iPort Utility Pack │ iPort Message Manager

2. **Select iPort Device**
   Select which device you are operating with by choosing the corresponding image (Opening Screen), or the correct checkbox on the main application.



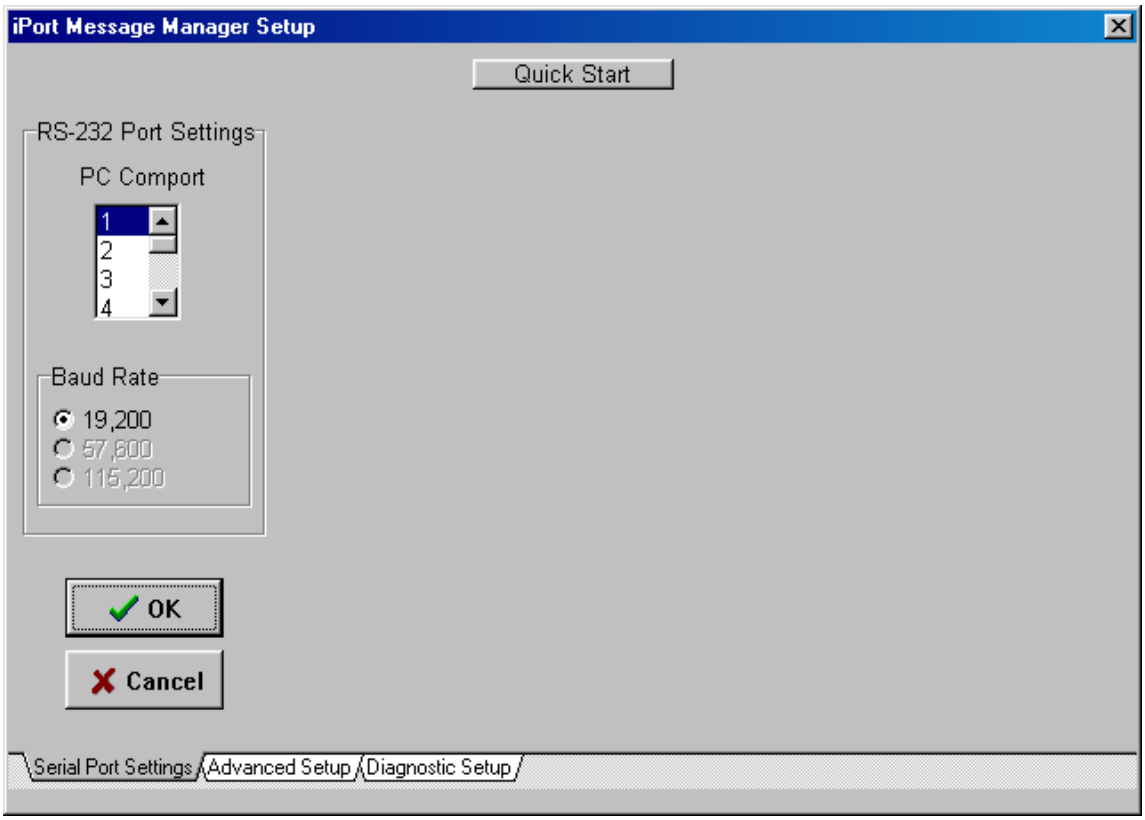
Opening Screen



Main Application

The Main Application screen is opened by selecting an image on the Opening Screen.

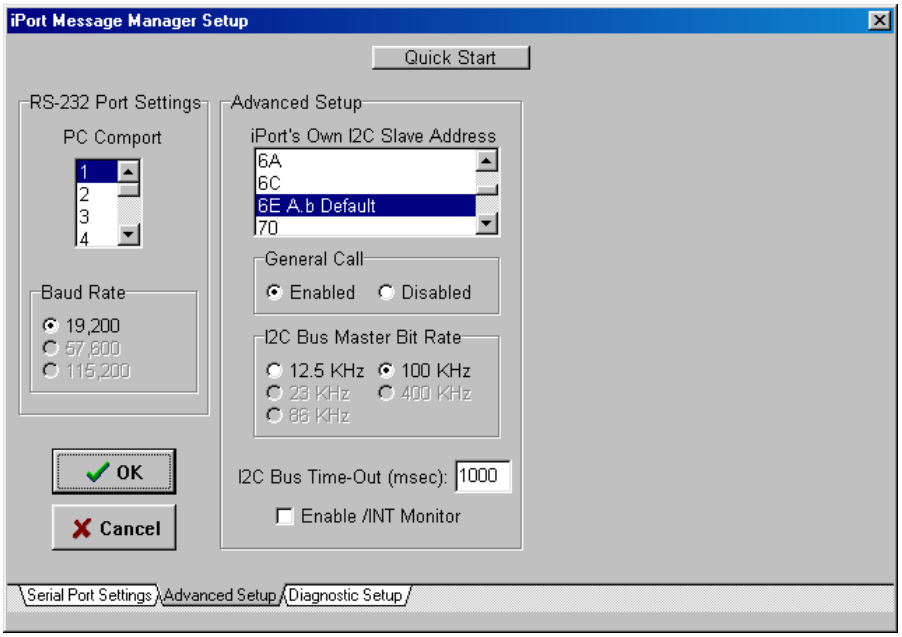
3. **Establish iPort Link**
   On the Message Manager main screen, click the Open button to view the Set Up Screen. You now have three options of set-up for the Message Manager, Basic Set-up, Advanced Set-up, and Diagnostic Set-up.



Basic Set Up Screen

Basic Set-up

Select the PC ComPort attached to your iPort and the baud rate, then click OK. The Communications Events window on the Main Screen should report "I^2C Open Successful". If this message does not appear, check the iPort connections and power.



Advanced Set Up Screen

Advanced Set-up

On the Advanced Set-up screen you can set the following parameters:

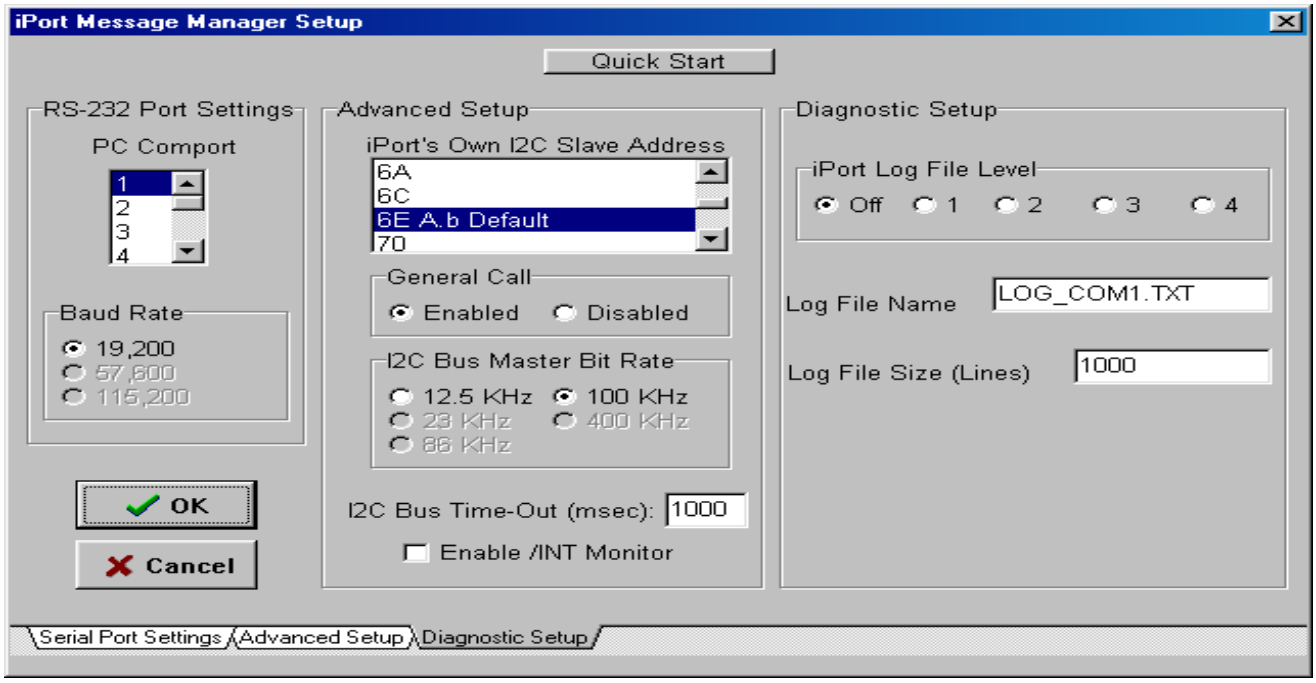
1. iPort I^2C Slave Address
   Select iPort's I^2C slave address. iPort will acknowledge messages sent to this address.

2 iPort General Call
   Enabled allows iPort to respond to the I^2C general call address (00). General call is used to broadcast an I^2C message to multiple devices.

3. I^2C Bus Master Bit Rate (iPort, iPort/AFM)
   The speed of the Bus will run. 100KHz is standard mode, 400kHz is fast mode. Use other rates if you are having trouble talking to a very slow slave device.

4. I^2C Bus TimeOut (Msec) (iPort, iPort/AFM)
   Control how long iPort will wait before reporting an I^2C Bus intra-message timeout. (0=None, 1...32767 msec)

5. Enable $\overline{\text{INT}}$ monitor (iPort/AFM only)
   Enables monitoring of the $\overline{\text{INT}}$ signal state. $\overline{\text{INT}}$ state changes are reported in the main screen Communications Events window.



Diagnostic Set Up Screen

Diagnostic Set-up (iPort Only)

On the Diagnostic Set-up screen you can set the following parameters:

1. iPort Log File Level
   Select iPort logging level.1 gives minimal info, 4 is verbose. Use the log file to troubleshoot communication problems.

2. Log File Name
   iPort log file name if enabled.

3. Log File Size (Lines)
   iPort log file length if enabled.

4. Set the Destination Slave Address

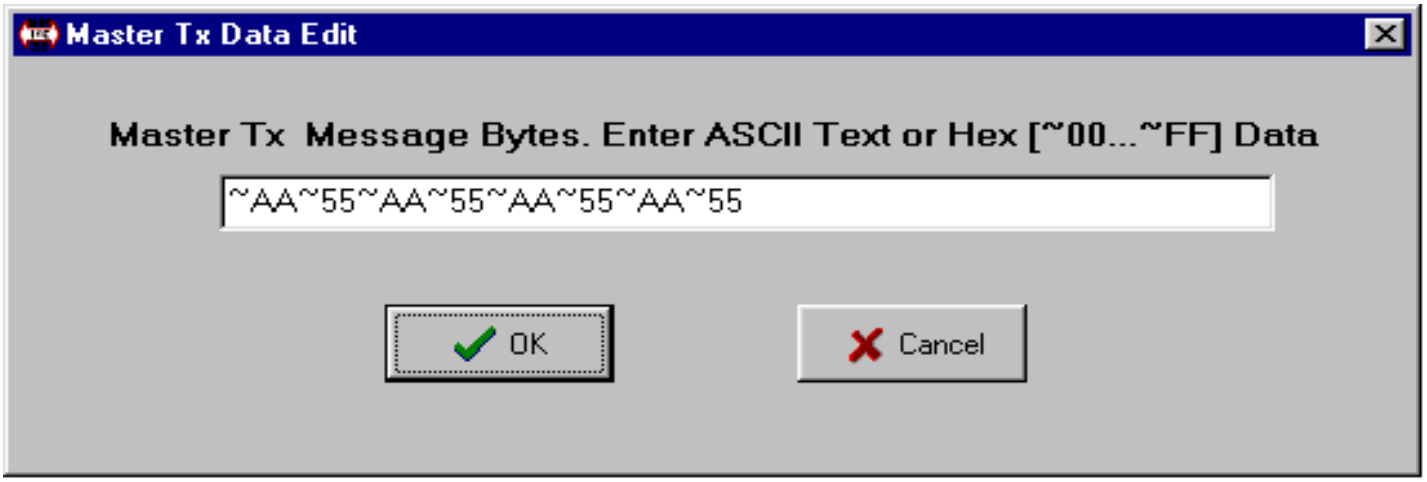
On the main screen, use the I^2C Destination Address list control to set the slave address of the device you want to communicate with.

Additional operating information is available by viewing the Status and Log File. (Option available only for the iPort).

Sending Messages

Master Operations

1. **To Master Transmit Data**
   On the main screen, set the Master Tx Message Bytes edit box to the data you want to send by single clicking on the box. For example: To send a 0x05(hexadecimal) to the device, enter ~05 in the edit box. Click Ok and then the Master TX button to send the message. The Communications Events window on the main screen should report “Master TX Complete”. If this message does not appear, check the slave device address, connections, and power.

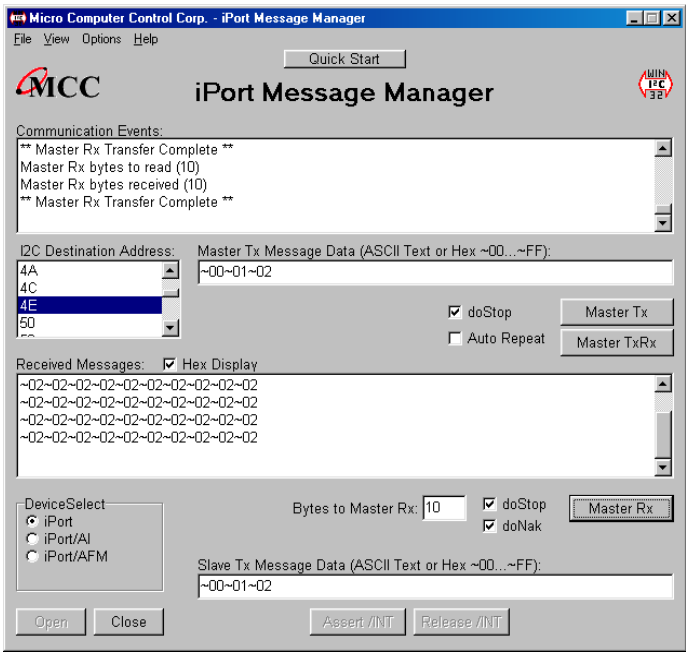


Example: to send message 0x01, 0x02, 0x03, type in ~01~02~03.

You have the option to Auto Repeat a transmitted message upon completion by checking the Auto Repeat box. Also you may do a DoStop which will perform repeated starts automatically.

2. **To Master Receive Data**

On the main screen, use the I²C Destination Address list control to set the slave address of the device you want to communicate with.



Main Application Screen

On the lower part of the main screen, set the Bytes to MasterRx edit box to the number of bytes you want to read. For example: Set this to 1 to read a single byte. Click on the Master RX button to receive the message. Data received from the slave is displayed in the Received Messages text box on the main screen. The Communications Events window should report “Master RX Transfer Complete”. If this message does not appear, check the slave device address, connections, and power.

If you get a “Slave Not Acknowledging” message in the Communications Events window, this could mean you have the wrong address in the I²C Destination Address, or the device is not answering to its address.

You have the option to Auto Repeat a transmitted message upon completion by checking the Auto Repeat box. Also you may do a DoStop which will perform repeated starts automatically. Another option you have is to do “DoNak”, which allows you to Ack or Nak the last byte coming from a Slave Transmitter. Some Slave Transmitter Devices require a Nak on the final byte going across the bus. (Option only available for the windows iPort).

Slave Operations

To Slave Transmit a message:

Enter data to be transmitted in the Slave Tx Message Bytes control by single clicking. Binary data bytes are entered using a three character Hex-Equivalent format (~00 ... ~FF), you may also type in ASCII text. These bytes are automatically transmitted when a Slave Transmit Request is received from a Master device.

To Slave Receive a message:

Data bytes received from a Master Transmitter are automatically displayed in the Received Message window. Received binary data is displayed using a three character Hex-Equivalent format (~00 ... ~FF). By selecting the Hex-Display checkbox, the data is displayed as Hexadecimal data .

Uninstalling iPort Utility Pack

Click, Start | Programs | iPort Utility Pack | uninstall.

Follow the on screen instructions.

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Distribution of the MCC iPort Utility Pack software (IMSGCTR.EXE) and any other computer files supplied as part of the MCC iPort Utility Pack, is strictly limited to employees of the Purchasing Company.

Violation of any of the above provisions automatically terminates the Purchaser's license.

Life Support Applications

MCC Products are not designed for use in life support appliances, devices, or systems where the malfunction of a MCC Product can reasonably be expected to result in a personal injury.

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MCC warrants, as the sole warranty, that the disks on which the Software is furnished will be free of defects in materials and workmanship under normal use and conditions for a period of thirty (30) days from the date of purchase. No distributor, dealer, or any other entity or person is authorized to expand or alter this Agreement.

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For the latest product information, application notes,
and ***free*** software updates
visit our Web Site at: **http://www.mcc-us.com**

Appendix A

Interface Connector and Plug Information

MCC uses two (2) different connectors and plug assemblies. These parts are all compatible with one another and are interchangeable.

Connectors

Molex SEMCONN ACCESS.bus Receptacle Connector
Molex Part # 15-83-0064

AMP SDL (Shielded Data Link) Connectors for ACCESS.bus
AMP Part # 4-943197-1

Plugs

Molex SEMCONN ACCESS.bus Plug
Molex Part # 15-83-1564

AMP SDL (Shielded Data Link) Plug for ACCESS.bus

Bush	Amp Part # 520851-1
Ferrule	Amp Part # 520433-1
SDL (Shell)	Amp Part # 520461-1
SDL (Shell)	Amp Part # 520460-1
SDL	Amp Part # 4-520424-1

Additional Cables Available

MCC Part #	CAB4	I^2C Interface Cable, 48inches (4ft)
MCC Part #	CAB8	I^2C Interface Cable, 96 inches (8ft)
MCC Part #	CAB16	I^2C Interface Cable, 192 inches (16ft)
MCC Part #	CABCL	I^2C and SMBus Clip Lead Cable