instrumentation and software for research

MED-PC®

RESEARCH CONTROL & DATA ACQUISITION SOFTWARE
SOF-735
USER'S MANUAL

DOC-010
Rev. 1.6

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notes

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CHAPTER 1 | OVERVIEW

Four separate applications make up the MED-PC® package. Each application is designed to handle a specific task as easily as possible.

MED Test verifies hardware function independent of MED-PC. This includes an interface card test, Programmable Audio Generator (ANL-926) test, and tests for SmartCtrl™ interface modules (DIG-716B test shown), Standard modules, SuperPort™ modules and much more.

Hardware Configuration Utility is used to build a configuration file that tells MED-PC how many boxes are connected, how many inputs and outputs are available to each box, and how are they identified. This utility guides the user step by step through this procedure. It is used to set or update such user controlled parameters as file format, automatic file naming strategy and structure, automatic back up frequency, and data file path.

Trans IV translates and compiles selected MedState Notation™ procedures into DLL files that may be executed by MED-PC. This application also serves as a text editor with a detailed help index to MedState Notation programming. Error checking code activated during translation clearly points to simple format type errors.

MED-PC® is the run time or operating system of MED-PC. It allows the user run up to 16 test chambers with up to one million data elements per chamber. A single test chamber could have up to 80 inputs and 80 outputs. Interface cabinets for 8 or 16 modules are available.

The MED-PC Load Wizard is specially designed for first time users. It takes the operator through a series of screens for loading and starting one or more boxes. This is helpful when first learning the MED-PC system. This feature may be disabled at any time, and boxes may be loaded from file menu selections, buttons on the tool bar, or customized macros with optional user-defined dialog boxes for the operator.

General Computer Environment

OS Compatibility: Windows XP, Vista (32 and 64-bit), Windows 7 (32 and 64-bit)
The minimum recommended system is as follows:

- 2.0 GHz Processor or higher with an available PCI slot or USB port
- 1 full height PCI slot
- 512 MB of RAM
- CD-ROM Drive
- Keyboard and mouse

CHAPTER 2 | HARDWARE

If connecting the interface cabinet to existing chambers, refer to the support documentation supplied with the interface modules that were purchased (Standard modules, SuperPort™, or SmartCtrl™) for detailed instructions.

New systems purchased from MED Associates will have connections pre-configured and include instructions for completing the hardware setup. Please refer to these instructions for setting up the hardware.

Hardware Configuration

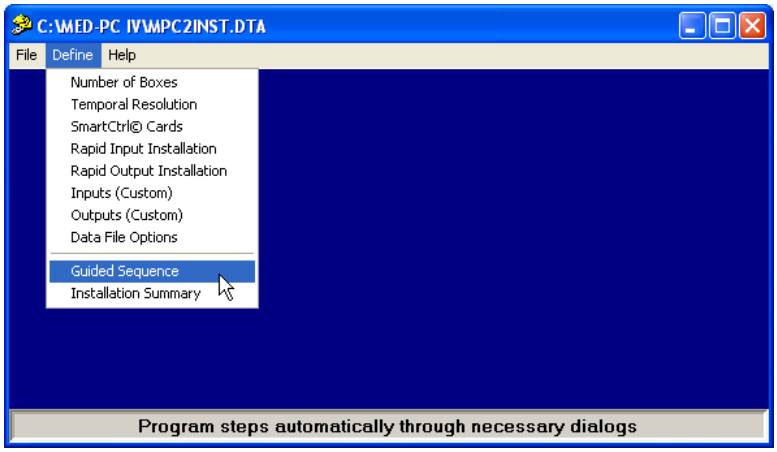
In order to use Med-PC with the specific hardware that was purchased, it is necessary to complete a one-time hardware configuration. The **Hardware Configuration Utility** may be accessed at any time when adding hardware to an existing system. For the initial hardware configuration, it is easiest to use the **Guided Sequence** from the **Define** dropdown menu.

If the computer being used was purchased from MED Associates, Inc. as part of a system, the Hardware Configuration has already been completed. The individual menus may be checked to view the default settings. Do not change the number of boxes or specific input and output definitions unless additional boxes or different interface cards have been added to the interface.

Hardware Configuration Utility - New Installations

Open the Hardware Configuration Utility and select **Define** | **Guided Sequence** from the menu bar, as shown in Figure 2.1.

Figure 2.1 - Hardware Configuration - Define Menu

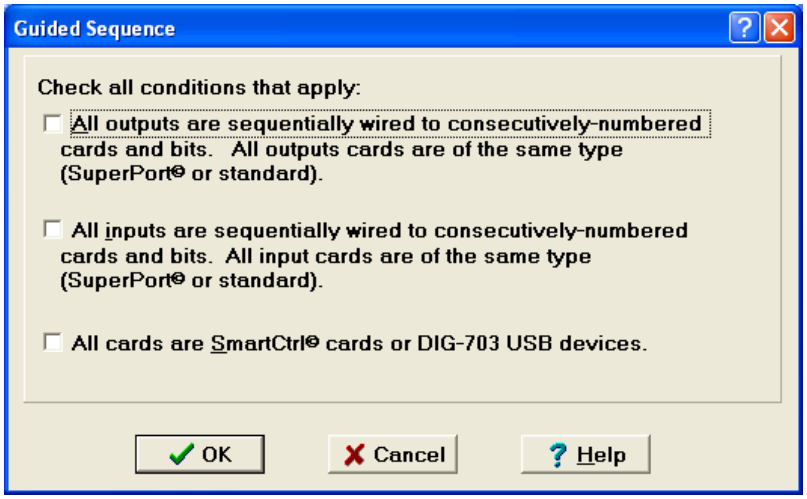


Guided Sequence

Three check boxes are found on the first screen of the Guided Sequence as shown in Figure 2.2. If all "Standard" or all SuperPort modules are used in the system, and the system was wired by MED Associates, Inc., check the first two boxes. If the interface contains all SmartCtrl™ modules or a DIG-703 USB Interface, check the third box only.

If none of the boxes are checked, it will be necessary to define individual inputs and outputs according to the way they are wired. Click **OK** when ready to proceed, or **Cancel** to return to the main Hardware Configuration window.

Figure 2.2 - Hardware Configuration - Guided Sequence



Number of Boxes

When the screen in Figure 2.3 appears, enter the number of boxes (1-16) to be configured and click **OK** to continue.

Figure 2.3 - Hardware Configuration - Number of Boxes

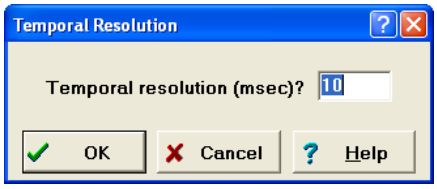
Temporal Resolution

The recommended Temporal Resolution is 10 milliseconds. When using a DIG-703 USB, the minimum resolution available is 10 ms. Lower resolutions are only possible with the DIG-704PCI card. All timed values will be based on a multiple of the value of the Temporal Resolution.

Note: A 1-millisecond setting is possible but should not be used casually. Please contact MED Associates, Inc. for more information on using a 1-millisecond resolution.

After entering the Temporal Resolution (Figure 2.4), click **OK** to continue.

Figure 2.4 - Hardware Configuration - Temporal Resolution



The next window to appear depends on the selections made on the Guided Sequence window (Figure 2.2) at the start of the hardware configuration.

If the SmartCtrl box was checked, proceed to the **DIG-703 USB & SmartCtrl Installation** section that follows.

If the Standard/SuperPort boxes were checked, skip to the **Rapid Input and Output Installation** section.

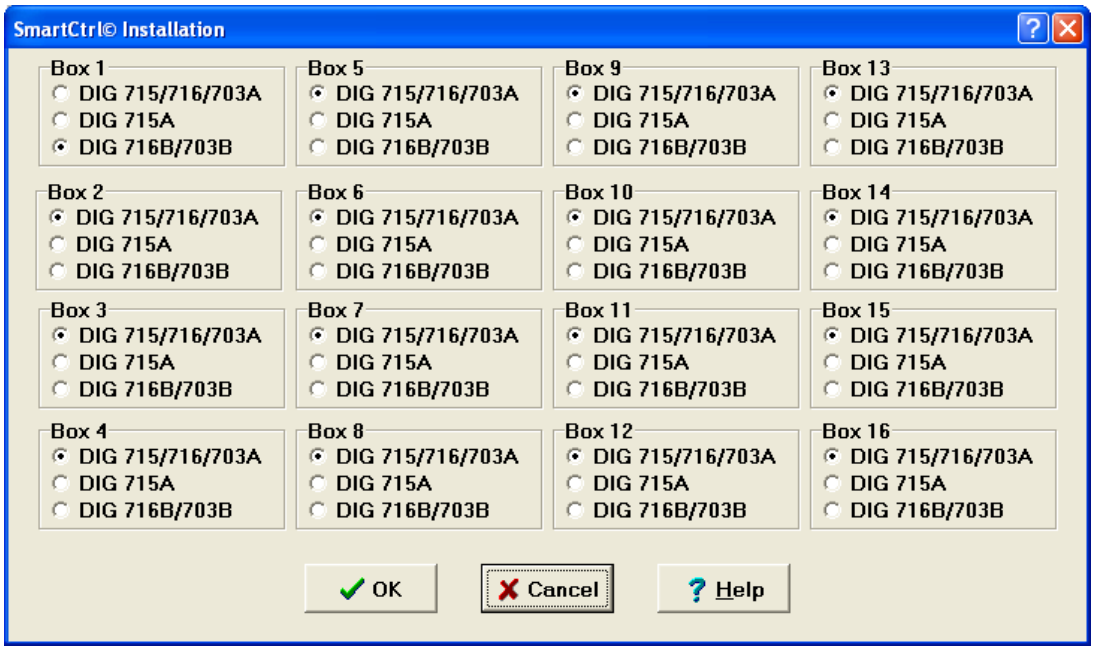
If no boxes were checked skip to **Input and Output Definition** section.

DIG-703 USB & SmartCtrl™ Installation

For every active box, select the type of SmartCtrl Card installed.

The dialog shown would automatically install the number of boxes entered on the Number of Boxes screen (Figure 2.3). It is not necessary to use any other menu option pertaining to output or input installation unless non-SmartCtrl cards are also installed. Select **OK** and proceed to the **Data File Options** window shown in Figure 2.10.

Figure 2.5 - Hardware Configuration - SmartCtrl™ Installation



If the input or output table for a SmartCtrl is viewed, notice that it uses a unique combination of both Standard and SuperPort encoding. Inputs are coded like any other Standard module starting with port 780, offset -1, input 1; while outputs are coded like a SuperPort starting with port 792, offset 0, output 1. The second SmartCtrl card will start at port 781, offset -1, input 1 for the first input and port 792, offset 2, output 1 for the first output even though all possible inputs or outputs were not used up on the first box. For more information on the SmartCtrl modules, see the SmartCtrl or Interface Modules manual supplied with the interface.

Rapid Input and Output Installation

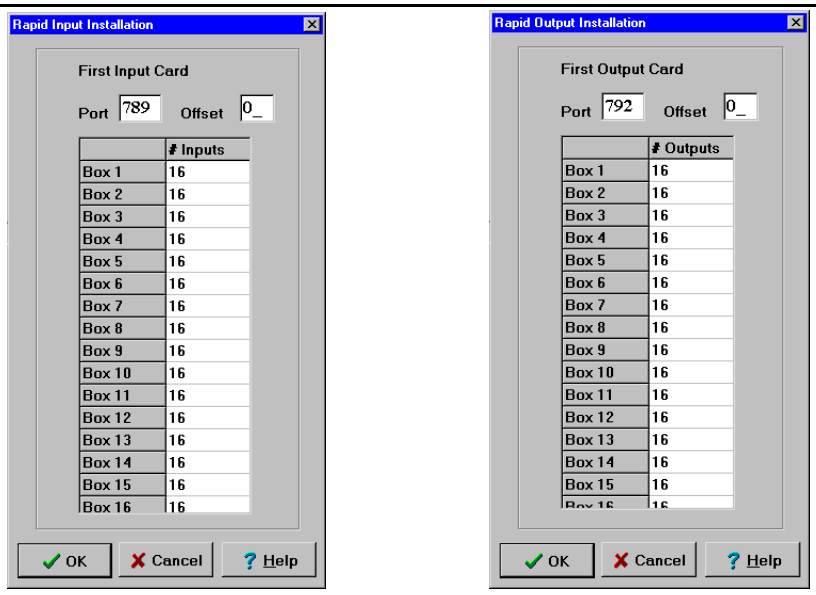
If both the input and output boxes for Standard or SuperPort modules in the Guided Sequence window were checked, the Rapid Input Installation Window (Figure 2.6), will appear next, followed by the Rapid Output Installation Window (Figure 2.6).

Use the rapid installation form to install inputs (or outputs) to boxes only if all inputs (or outputs) for consecutive boxes are wired to successive input numbers of successive input or output cards respectively. This option speeds installation because it is unnecessary to supply explicit information about the port and input locations of each input or output. This information is inferred from the address of the first input (output) card and the number of inputs (outputs) assigned to each box. All inputs (outputs) will be assigned to successive ports and inputs or successive offsets and outputs. The starting factory address for all Standard modules (modules with 8 inputs or outputs) is port 780, offset -1, and input/output 1.

The starting address for SuperPort™ Input modules is port 789, offset 0, input 1, and the starting address for SuperPort Output modules is port 792, offset 0, output 1. In each case, inputs or outputs will be assigned consecutively (1, 2, 3, 4, 5, 6, 7, 8). For Standard modules the next eight inputs or outputs are assigned to the next port number (in this case port 781). For SuperPort modules, the next eight inputs or outputs are assigned to the next offset (in this case offset 1). Again, a sequential sequence is used to assign input/output values. It is not critical to know binary numbering to use MED-PC; although it may be helpful if multiple outputs will be turned on at the same time when talking to the hardware from an external program. Further information on binary numbering is provided in Appendix D.

When finished with these windows, click **OK** and proceed to the **Data File Options** window shown in Figure 2.10.

Figure 2.6 - Rapid Input and Rapid Output Installation



Input and Output Definitions

If no boxes were checked in the guided sequence window, the Input Definitions Window (Figure 2.7) will appear next, followed by the Output Definitions Window (Figure 2.8).

Custom installation makes it possible to establish any possible interface configuration. This method is required if inputs or outputs have not been wired sequentially. This is particularly useful if an interface card is being added to an existing configuration. For example, custom installation allows for assigning all pellet dispensers to one card, all aversive stimulators to another card, and so on. The port, offset, and input value of each input and output will need to be known to complete the input and output definitions. If MED Associates wired the system, a detailed wiring table is provided.

If adding hardware to an existing system, first load the existing configuration file by selecting **File** | **Open**. To add to the configuration, select **Define** | **Inputs (Custom)** or to add to the output configuration, select **Define** | **Outputs (Custom)**.

Figure 2.7 - Hardware Configuration - Input Definitions

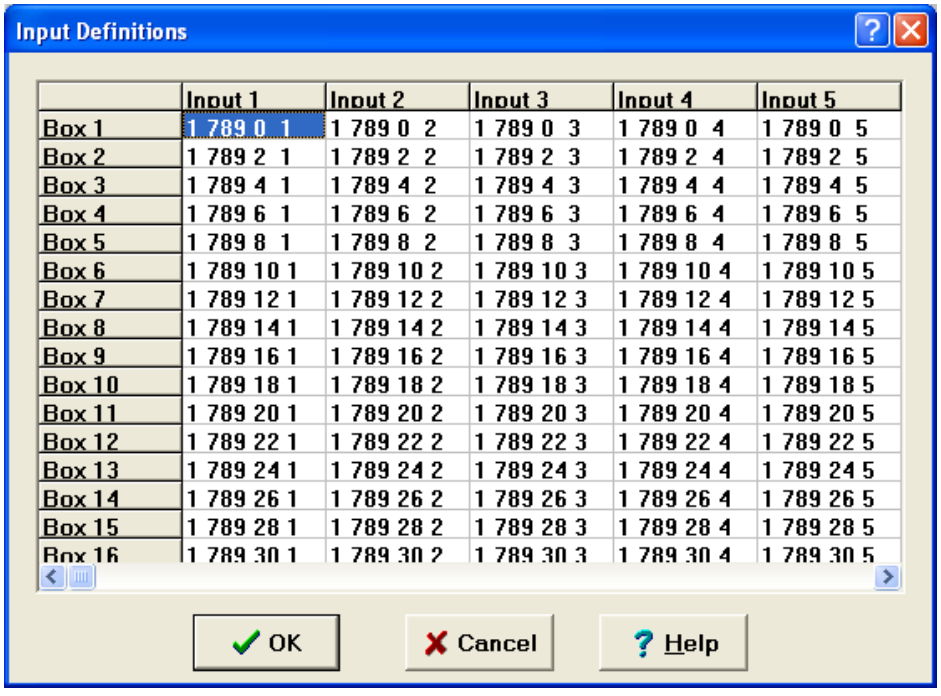
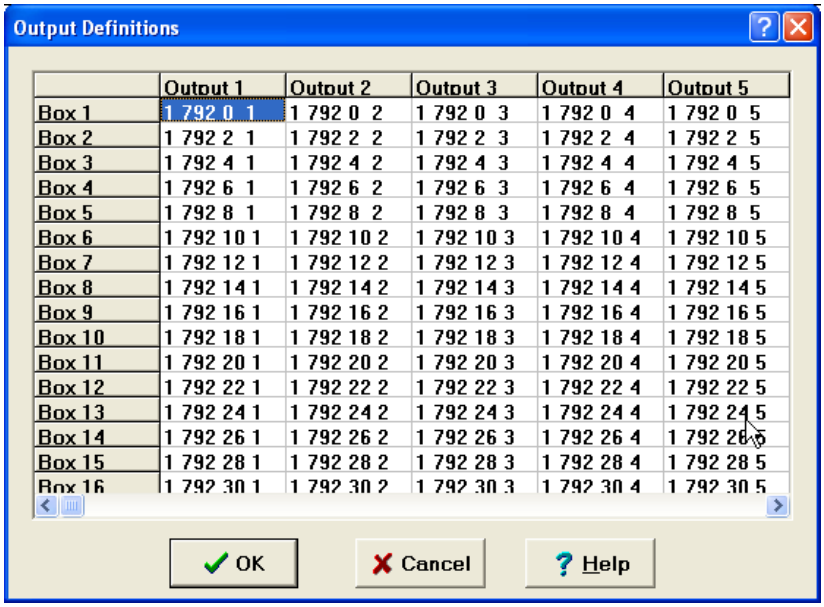
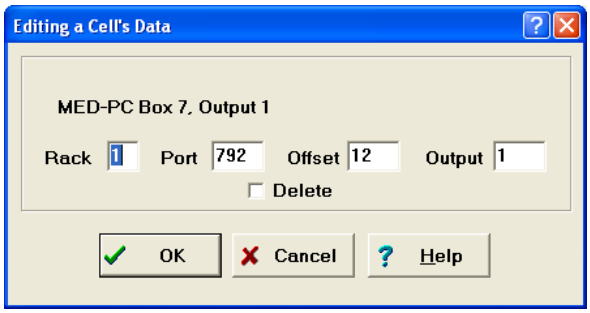


Figure 2.8 - Hardware Configuration - Output Definitions



Inputs or outputs must be defined consecutively — do not leave a blank cell between two cells that contain information. In other words, it is not possible to define outputs 1 and 3 while leaving the cell corresponding to output 2 blank. To enter or edit a cell entry, double click any cell in the Input or Output Tables shown in Figure 2.7 or Figure 2.8 to produce the screen display in Figure 2.9.

Figure 2.9 – Hardware Configuration – Editing an Input or Output Cell



Enter the following information; click **OK**:

Rack: A rack number (1-4). Many systems have only 1 rack, in which case "1" should be entered.

Port: A port address (780-795).

Offset: -1 for a Standard card or SmartCtrl Input definition.
0 to 254 for any SuperPort or SmartCtrl Output definition

Input: A hardware Input or Output number.

NOTE: The Output Offset number is used for creating the Hardware Configuration file in the Hardware Configuration Utility. The Offset Jumpers are used for changing the offsets on the cards themselves.

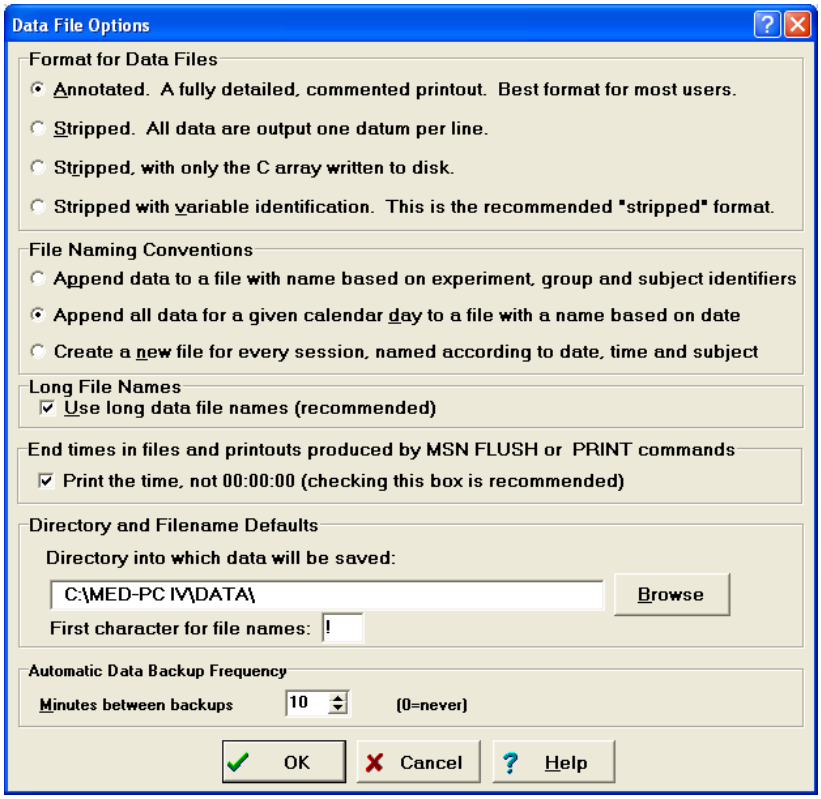
This information is provided by MED Associates, Inc. on a wiring chart or table supplied with all wired systems. If wiring the system, refer to Appendix G for additional information.

When finished with these windows, click **OK** to proceed to the **Data File Options** window shown in Figure 2.10.

Data File Options

After completing the input and output configurations, it is necessary to complete several data-related fields, shown in Figure 2.10.

Figure 2.10 - Hardware Configuration - Data File Options



Format for Data Files

It is recommended that this setting be left at the default **Annotated** option. Examples of all four formats may be found in Appendix F.

File Naming Conventions

Options	Definitions
Append data to a file with name based on experiment, group and subject identifiers	If this option is selected, be sure to complete one or more of the identifier fields when opening a session, otherwise, all data will be saved to !0E0.0 (short name) or !_Subject_0_Experiment_0.Group_0 (long name).
Append all data for a given calendar day to a file with name based on date	This selection will base the file name on the date the session was opened, not necessarily on the date the session is closed or when the data is flushed. A session opened on May 7, 2009 will result in the following file names, !090507 (short file name without y2kcompliance), !20090507 (short file name – y2kcompliant), or !2009-05-07 (long file name with or without the y2kcompliant directive in the code).
Create new file for every session, named according to date, time and subject	This selection will base the file name on information entered at the time the session was opened. It is much more specific than either previous selection and will result in a single file for each animal, each day. The file name for an animal with subject ID, "A235m" run at 4:53 PM on May 7, 2001 will be !B507G50.A23 (short file name) or !2001-05-07_16h53m.Subject A235m (long file name).

Long File Names

Examples of long file names have been given above. The use of the less ambiguous names produced with this option is recommended.

End Times in Files and Printouts

With this option checked (recommended) multiple flushes will be time stamped in the data file.

Directory and File Name Defaults

The default directory is C:\MED-PC IV\DATA. This may be changed to any legal path and directory, however changing this information does not automatically create new directories. They must be created separately as "new folders" in the Windows system. Creating two configuration files with different data file options is a good way to separate the data of multiple users. Each file may have it's own desktop short cut with the configuration file defined in the target line. See Command Line Options in the MED-PC online help index for more information.

First Character for Filenames

This field requires entry of an arbitrary character that will be used in constructing filenames for data collected during experimental sessions. The purpose of using an arbitrary character to begin filenames is to facilitate locating data files in large directories. It is best to choose an unusual character, such as MED-PC's default, **!**. Some characters, such as **\,** may not be used because they have special meaning within the operating system. The input field will automatically verify that an acceptable character is used.

Automatic Data Backup Frequency

MED-PC will automatically save data while a session is open. The data will be saved to directory C:\MED-PC IV\BACKUPS with a file name based on the date, time, subject, and box that the experiment is running in. These files are not intended as permanent data and any backup files that are greater than 7 days old are automatically deleted by MED-PC. The recommended save frequency is 10 minutes. This will retain most of the data, especially in long sessions, in the event of an unexpected computer failure. Frequencies less than 10 minutes may degrade the performance of other functions, such as screen updates, depending on the speed and resources of the computer. If a backup file is not desired, simply set the frequency value to 0.

When this form is complete, click **OK** and select **File** | **Save** to save the configuration in the default file **C:\MED-PC IV\MPC2INST.DTA**. Multiple configurations may be saved and executed with a command line option. See the **/INSTALL=** option in **Appendix E**.

Copying MSN Procedures From Older Versions of MED-PC

Existing procedures should be usable as is with few exceptions. Simply copy the MSN code (*.MPC) files from the **C:\WMPC\MPC** folder to the **C:\MED-PC IV\MPC** folder.

Using Inline Pascal and BKGRND Features

First time users of MED-PC require no knowledge or background in Pascal; however, be aware of the advanced programming capabilities of this software language which allow the user to add Pascal routines as a simple in-line statement, as a call to the User.pas file, or as a background procedure. This capability is often used by MED Associates, Inc. to provide custom features or patches to other equipment users wish to integrate in to their MED-PC behavioral control system.

CHAPTER 3 | RUNNING MED-PC

This chapter is designed to be an introduction to some of the features of the runtime application. The on screen help provides detailed information. Before MED-PC can be run, a procedure must be created. If this has not already been done, refer to the **MED-PC Programmer's Manual** for a brief overview of MedState Notation and to create the procedure in Tutorial #1. Return to this manual to run the procedure after it has been translated and compiled.

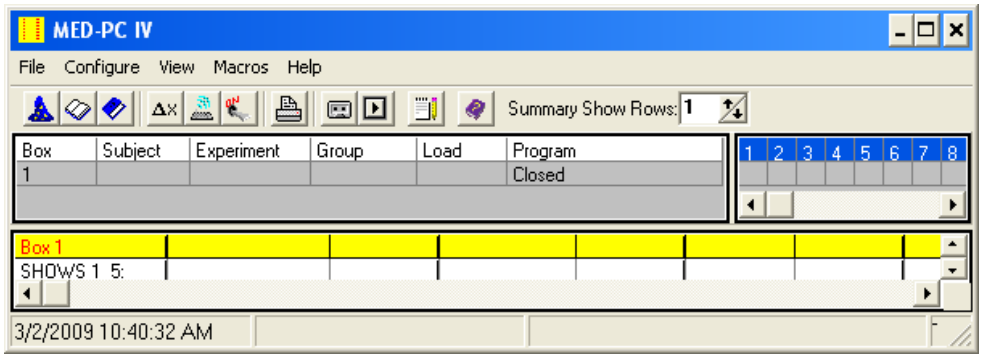
The first time that MED-PC is run the Load Wizard will appear. In the future, it can be disabled by deselecting the selection box in the lower left hand corner.

When the screen in Figure 3.1 appears, click **Next** to proceed. Screens will appear that allow the user to add optional information to the data file. If a procedure was written with a variable alias, an easy-to-read change variables screen will be automatically presented that requires no knowledge by the operator of the actual variable assigned to the function under control.

Once the wizard is complete, a runtime screen, shown in Figure 3.2 will appear. If the wizard is deselected, launching MED-PC will lead directly to the runtime screen.

Figure 3.1 - Load Wizard Welcome Screen

Figure 3.2 - MED-PC Runtime Screen



The screen in Figure 3.2 illustrates the task bar just under the menu line, where the icons are located. From left to right these buttons launch the wizard, open a session, close a session, change variables, issue keyboard signals, turn an output on, print, record a macro, play a macro, display the event log, open the help file, and increase/decrease the number of Show fields per box.

The maximum number of Show fields per box is determined by the number of Boxes that are currently being displayed:

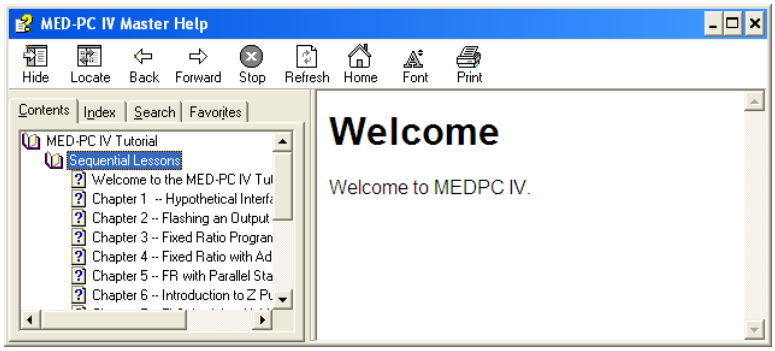
Number of Boxes	Max Show Rows
1	40
2	20
3	13
4	10
5	8
6	6
7 – 8	5
9 – 10	4
11 – 13	3
14 – 16	2

MED-PC On Screen Help

Select **Help** | **Help** for assistance with the runtime system. This help file may also be accessed quickly by pressing the F1 key or clicking the Help icon on the tool bar.

Select **Help** | **Master Help** to launch the MED-PC online tutorial shown in Figure 3.3. Note that this tutorial is completely separate from and goes far beyond the printed tutorial in the **MED-PC Programmer's Manual**.

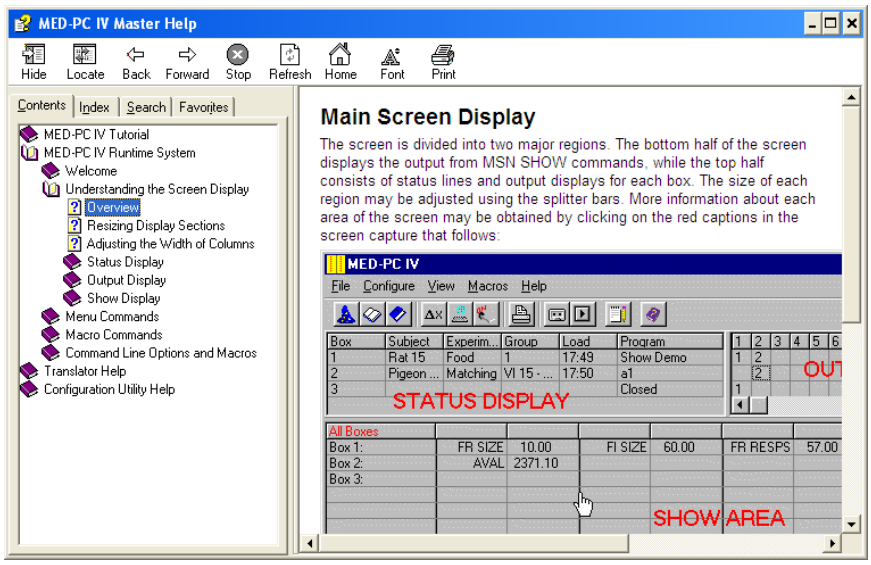
Figure 3.3 - Master Help - MED-PC Tutorial



When the screen in Figure 3.3 is first opened, the MED-PC Tutorial folder is closed. Click the  to reveal two new folders, **Sequential Lessons** and **Schedule Examples and Special Techniques**. Reading the contents of both folders is highly recommended. The Runtime System, Translator, and the Installation and Configuration Utility may also be launched from this menu.

Just one example from the MED-PC Runtime System Help is shown in Figure 3.4.

Figure 3.4 - Master Help - Understanding the Screen Display : Overview



Use the scroll bars on the right half of the Master Help screen to view the full size illustration of the run time screen with each area identified.

If unable to find help using the list of contents above, click the index tab to enter a key word search for the topic of interest. If still unable to locate a subject, contact MED Associates for further assistance.

Additional information may also be found in the Appendices that follow.

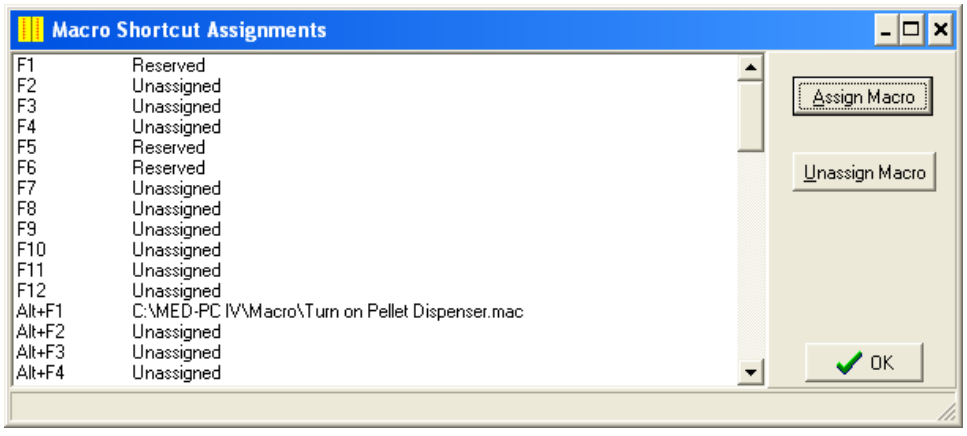
MED-PC Macro Menu

The macro feature is one of the key aspects of the system, and no user should ignore this feature. Macros are text files that automate sequences of operator actions. A common use for macros is to automate the loading of a set of boxes, along with the setting of key session parameters. Virtually any command that can be issued from the keyboard can also be issued from a macro file. Users of MED-PC are strongly encouraged to use macros, rather entering long sequences of commands. This greatly speeds up many routine tasks and dramatically simplifies the use of the system. Consequently, **the use of macros dramatically reduces errors**. For a detailed discussion on how to create macros please see the **MED-PC Programmer's Manual**.

Assign Macros to Shortcut Key Combinations

To access this dialog select **Macros** | **Assign Macros to Shortcut Key Combinations**. This dialog may be used to create special keystroke combinations, known as "shortcuts," to launch macros. This can be done to simplify the use of MED-PC or to decrease the time required to perform time-critical tasks. For example, shaping lever pressing, it may be useful to create a macro to operate the pellet dispenser in Box 1. The macro could then be assigned to a shortcut key, such as Alt+F1, using this dialog. In the future it would then be possible to operate the pellet dispenser in Box 1 by pressing Alt+F1. The keystroke shortcut would be faster and easier than using the menu system and file dialog to select and execute the macro.

Figure 3.5 – Macro Shortcut Assignments Window



Appendix A | System Setup

The steps in this chapter must only be completed if the computer being used was not purchased as part of the MED-PC package from MED Associates. If the computer was purchased as part of the package, all of these tasks were completed prior to shipping.

DIG-704PCI Interface Card Installation

Follow the directions supplied with the computer for cover removal and card installation. Remember to shut down the computer and disconnect it from the AC power prior to removing the cover.

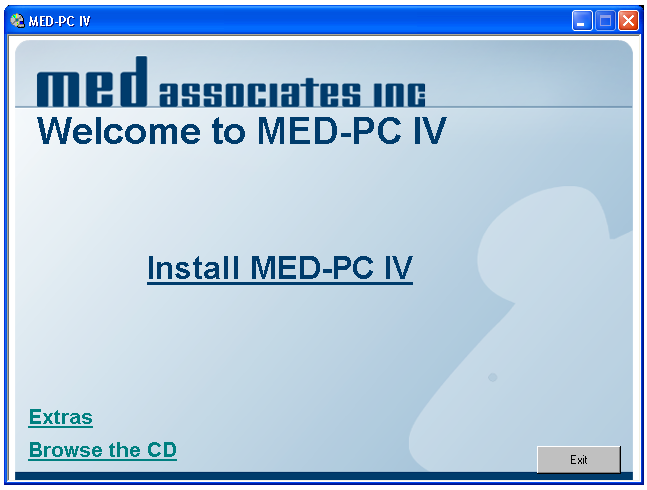
Driver and Software Installation

If the computer being used was purchased from MED Associates, Inc., the tasks covered in this chapter have already been completed.

Before beginning the installation, phone, fax or e-mail Med Associates with the registration information in order to receive the software installation password. This password will be necessary during the installation process.

Insert the MED-PC CD into the CD-ROM drive and the screen shown in Figure 3.6 will appear. Click **Install MED-PC IV** and the screen shown in Figure 3.7 will appear.

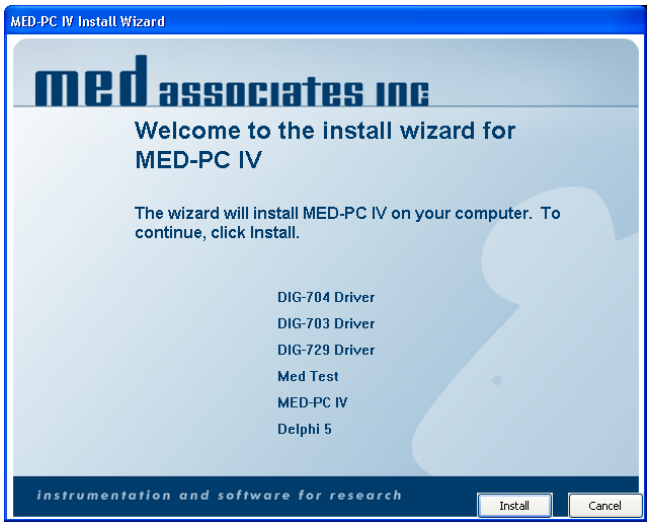
Figure 3.6 - MED-PC Installation Screen



Click **Install** to begin installation. A successful installation will be indicated by a green check mark and a red X will indicate an unsuccessful installation. If any portion of the installation is unsuccessful, please contact MED Associates Customer Support.

Follow the steps to complete the installation, entering the desired User Name, Company Name and Password when prompted. When driver and software installation is complete, the screen shown in Figure 3.8 will appear.

Figure 3.7 – MED-PC Install Wizard



The installation of the drivers, MED Test, MED-PC and the Delphi compiler is now complete. Click **Finish** to close this screen. The MED-PC Version CD may be removed from the drive and stored it in a safe place.

Figure 3.8 – Installation Complete

Testing the Interface Card

MED Test is a hardware test utility provided with all MED-PC based systems. Open MED Test and select **Misc Modules** | **Interface Card**. With the default settings in place click **Start Test**. The results window will display "testing…" for approximately 10 seconds with a "pass/fail" report.

If this test fails, shut down the computer, disconnect the AC power and reseat the interface card either in the same or a different slot. If the card fails again, contact MED Associates, Inc.

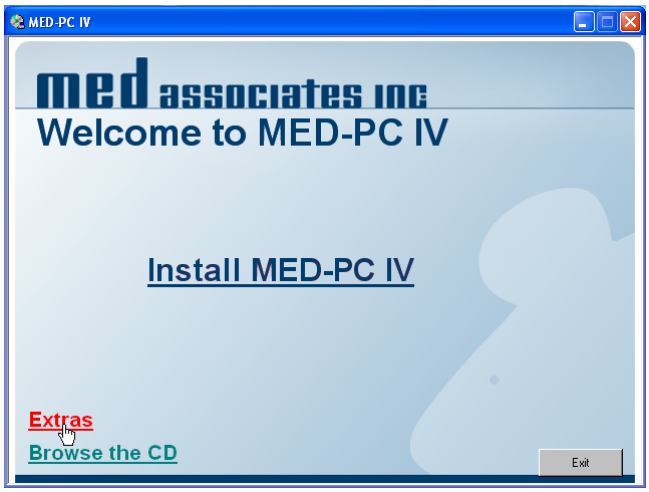
Appendix B | Installing MED-PC on Laptops or in Emulation Mode

It is sometimes desirable to install MED-PC on a laptop or on a computer where no actual hardware exists. This allows the user to develop MSN programs while the actual hardware/software is in use.

Installing in Emulation Mode from the CD Menu Options

The easiest way to install MED-PC in Emulation Mode is with the installation CD. Insert the MED-PC CD into the CD-ROM drive and when the main screen appears click **Extras** and the screen shown in Figure 3.10 will appear.

Figure 3.9 - Select Extras

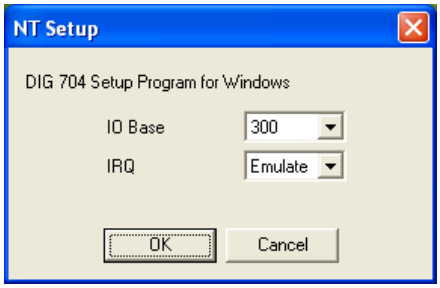


Click **To install MED-PC IV in Emulation mode** to start the installation process. The CD will install Delphi, MED-PC, and the DIG-704 ISA driver.

Figure 3.10 - Select MED-PC IV in Emulation Mode

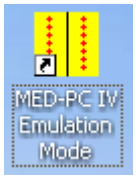
When the screen shown in Figure 3.11 appears, click the **OK** button to select the default values and let the software complete the rest of the installation normally.

Figure 3.11 - Install the DIG-704 ISA Driver in Emulation Mode



When the installation is complete, a shortcut for starting MED-PC IV in Emulation Mode will be placed on the desktop (Figure 3.12).

Figure 3.12 - MED-PC IV Emulation Mode Desktop Shortcut

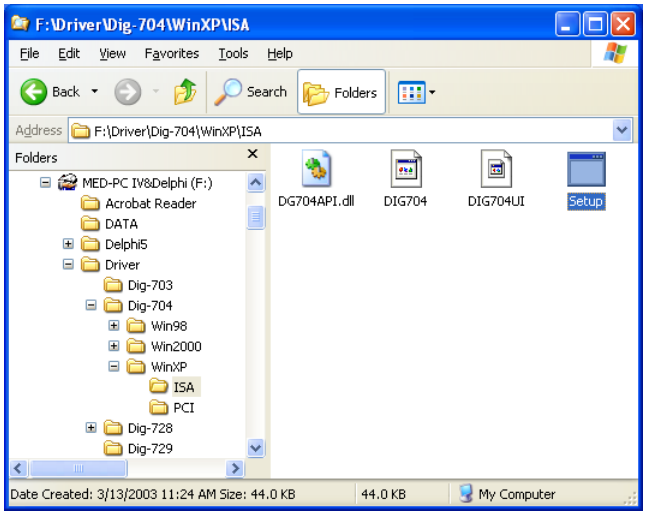


Installing in Emulation Mode Manually

If the CD does not have an option to install MED-PC in Emulation Mode it is still possible to do the installation, but it will take a few more steps:

1. Install MED-PC and Delphi from the CD.
2. Browse the CD and go to the Driver | DIG-704 | Win XP | ISA folder and run the **Setup** program (Figure 3.13).

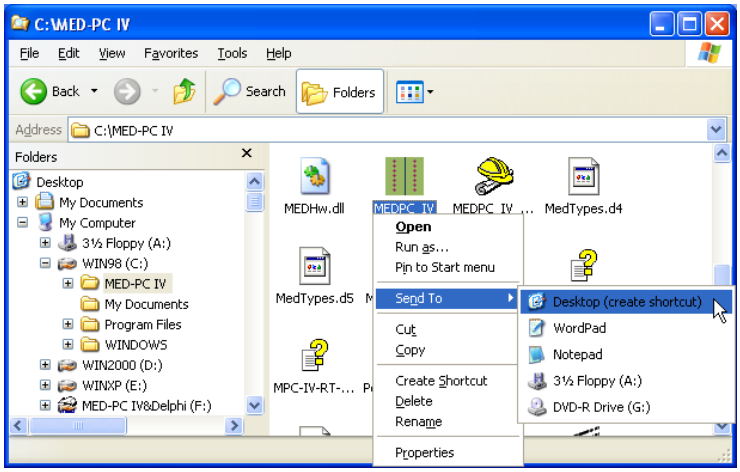
Figure 3.13 - Run the DIG-704 ISA Setup Program



3. When the screen shown in Figure 3.11 appears just click on the **OK** button to select the default values.

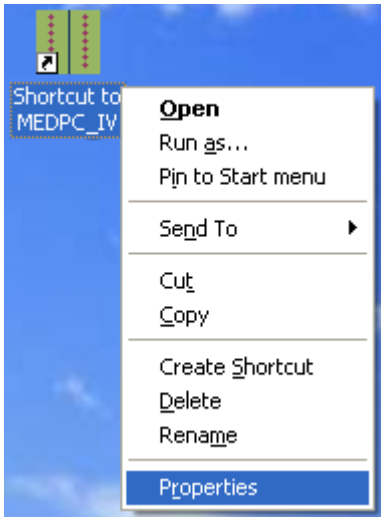
4. After the driver has finished installing browse to the C:\MED-PC IV folder and find the MEDPC_IV program. Right click on the program file and select **Send to** | **Desktop (create shortcut)** (Figure 3.14).

Figure 3.14 - Create a Desktop Shortcut



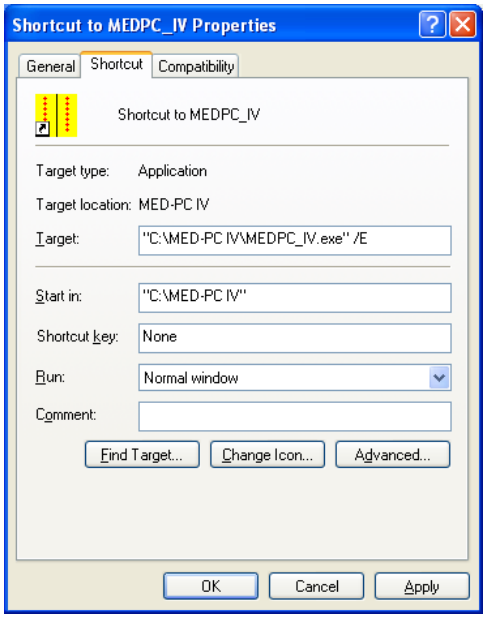
5. Right click on the new desktop shortcut and select **Properties** (Figure 3.15).

Figure 3.15 - Select Properties



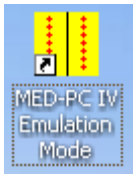
6. Modify the Shortcut by adding a **/E** to the Target (Figure 3.16) and save the changes. The **/E** tells MED-PC IV to start in Emulation Mode.

Figure 3.16 – Add /E to the Target



7. As a final step it is recommend that the new Desktop Shortcut be renamed MED-PC IV Emulation Mode (Figure 3.17).

Figure 3.17 - Rename Shortcut to MED-PC IV Emulation Mode



Appendix C | System Setup for Multiple Racks

MED-PC Build 45 or later can support up to four separate racks of SuperPort, SmartCtrl, or Standard Cards at the same time. This feature is only supported with the use of DIG-704 PCI cards. Systems using DIG-704 ISA cards must upgraded to PCI cards in order to utilize this feature.

DIG-704PCI Card(s) Installation

Install the DIG-704PCI cards, following the directions supplied with the computer for cover removal and card installation. Remember to shut down the computer and disconnect it from the AC power prior to removing the cover.

After installing all of the DIG-704 PCI cards into the computer, turn the computer on and complete the driver and software installation described in Appendix A.

Setting up Hardware

Setting up the hardware in multiple racks is slightly different than setting up a system with just one rack. When using one rack, each card in the rack must have a different Port and/or Offset. When using two or more racks each card in the same rack must still have a different Port and/or Offset, but cards in different racks can be set to the same Port and/or Offset. For example:

	Rack 1	Rack 2	Rack 3	Rack 4
Box 1	SmartCtrl	SmartCtrl	SuperPort Input	SuperPort Input
Port	780	780	789	789
Offset	0	0	0	0
Box 2	SmartCtrl	SmartCtrl	SuperPort Output	SuperPort Output
Port	781	781	792	792
Offset	2	2	0	0
Box 3	SmartCtrl	SmartCtrl	SuperPort Input	SuperPort Input
Port	782	782	789	789
Offset	4	4	2	2
Box 4	SmartCtrl	SmartCtrl	SuperPort Input	SuperPort Input
Port	783	783	792	792
Offset	6	6	2	2

In the above example Racks 1 and 2 are setup using SmartCtrl cards and Racks 3 and 4 are setup using SuperPort cards. Notice that in Rack 1 and Rack 3 each card has its own unique Port and/or Offset, but that Rack 1 and Rack 2 use the same Ports and Offsets. The advantage of this is that Rack 1 and Rack 2 are interchangeable. The same is true for Rack 3 and 4. This is the recommended default setup that should be used.

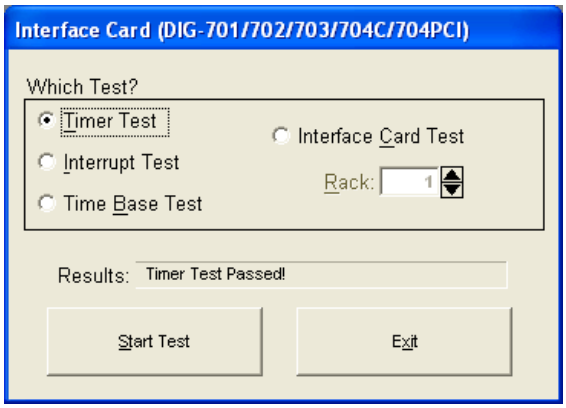
It is still acceptable to have SmartCtrl, SuperPort, and Standard cards all in the same rack. The general idea is to have each rack look as closely as possible like the other racks so that they can be swapped if necessary.

Testing the Interface Cards

Open the MED Test program. Start the Interface Card Test by selecting **Misc Modules | Interface Card**. The screen shown in Figure 3.18 will appear. Run both the Timer Test and the Interrupt Test. Both tests should indicate that they passed.

Run the Interface Card Test for each PCI Card/Rack that is being setup by incrementing the Rack number and clicking **Start Test**. The Interface Card Test should indicate that it has passed for each PCI Card/Rack in the system.

Figure 3.18 – Interface Card Test Screen

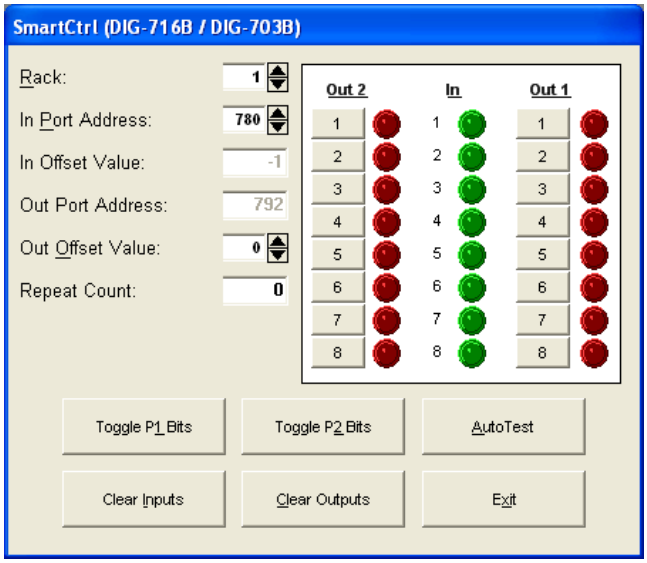


Determining Which PCI Card is Connected to Which Rack

Now it is necessary to determine which PCI card is connected to which Rack. This is important because it will affect the hardware configuration in MED-PC. The example shows how to do this with SmartCtrl cards, but the steps would be similar with SuperPort or Standard cards.

First open the appropriate test window in MED Test, for example select **SmartCtrl** | **DIG-716B** | **DIG-703B**. The screen shown in Figure 3.19 will appear. Notice in the upper left hand corner that there is a parameter called Rack. This parameter allows the user to select which PCI Card/Rack to "talk" to.

Figure 3.19 – SmartCtrl Rack Test



Begin with Rack 1 and turn on some of the outputs and/or read some of the inputs from the SmartCtrl card. If the recommended default settings were used, then the first SmartCtrl card will start at In Port Address 780, Out Offset Value 0. When an output is turned on on the MED Test screen, the corresponding output should turn on for the corresponding SmartCtrl card. The reverse is also true for the inputs.

When it is determined which Rack is Rack 1, it is suggested that it be labeled Rack 1. It is also suggested that both ends of the gray ribbon cable be labeled Rack 1. Repeat this process for Racks 2 through 4.

Hardware Configuration

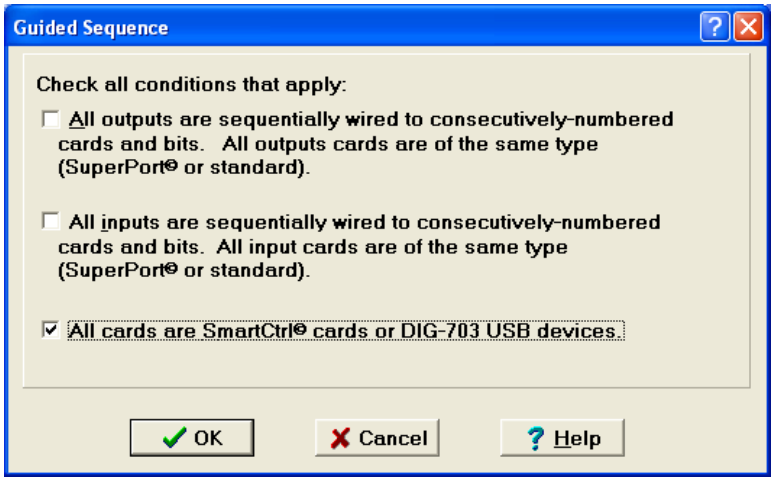
Setting up multiple racks in the MED-PC Hardware Configuration Utility requires a few more steps than setting up just one rack. The Guided Sequence that the program provides assumes that one rack is being used, so some of the configuration settings will need to be changed manually.

Example 1

This first example shows how to setup multiple SmartCtrl cards in multiple Racks.

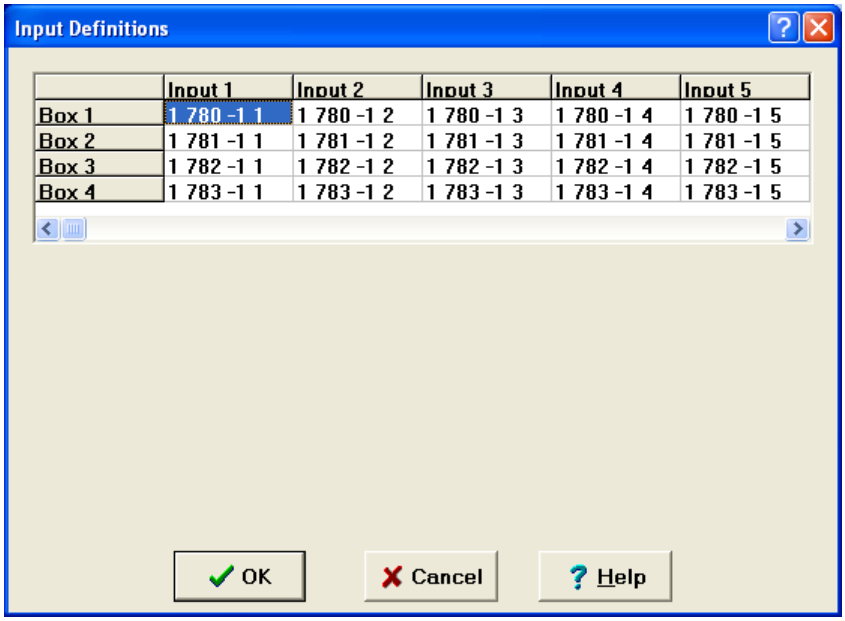
Start the MED-PC Hardware Configuration Utility and select **Define** | **Guided Sequence**. The screen shown in Figure 3.20 will appear. Select the **All cards are SmartCtrl© cards or DIG-703 USB devices** option and then click on the **OK** button.

Figure 3.20 - Guided Sequence Screen



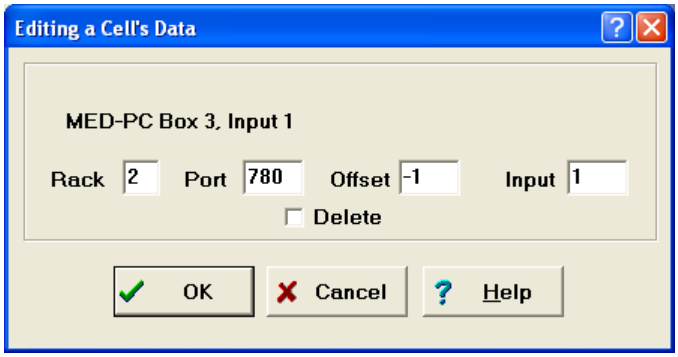
Follow the sequence for setting up the desired number of SmartCtrl cards. Each window and the valid inputs for each window are described in the **Error! Reference source not found.** of this manual. When finished with the Guided Sequence select **Define** | **Inputs Custom**. Notice in Figure 3.21 all of the Boxes are setup on Rack 1 and that each SmartCtrl card is setup on a different Port. In this example the Rack and Port numbers for Boxes 3 and 4 must be changed. To change the input information for a cell just double click on that cell and the screen shown in Figure 3.22 will appear.

Figure 3.21 – Custom Input Definitions



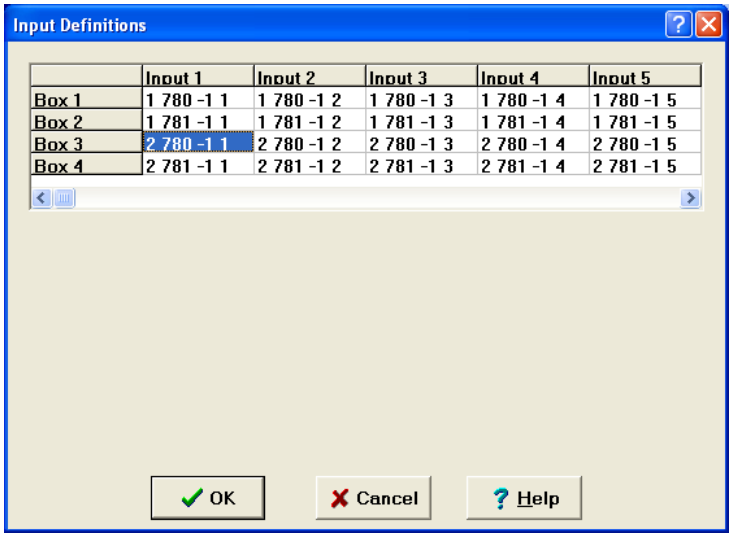
Change the Rack and Port number to match the Rack and Port number of the card being set up (in this example Box 3, Input 1 needs to be on Rack 2, Port 780) and then click the **OK** button.

Figure 3.22 - Editing an Input Cell's Data



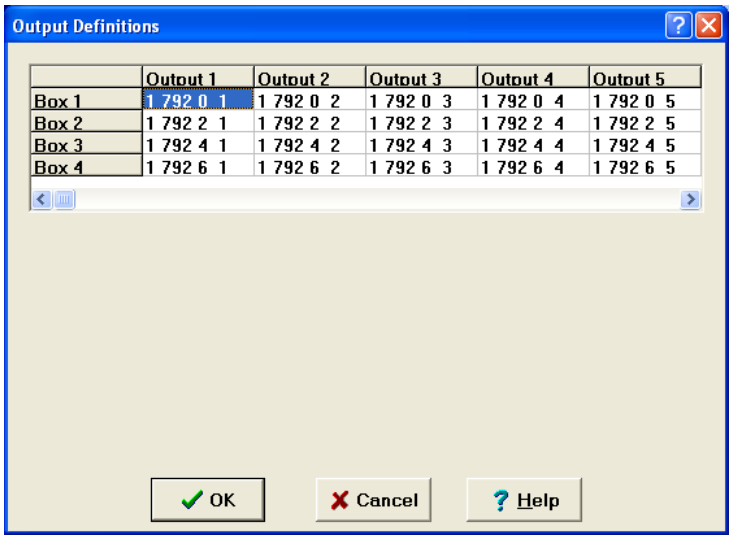
Repeat this for each of the inputs that need to be changed. When finished both Racks will be setup so that they look identical to each other, as shown in Figure 3.23. The only difference between Boxes 1 & 2 and 3 & 4 is the Rack number.

Figure 3.23 - Input Definitions Completed



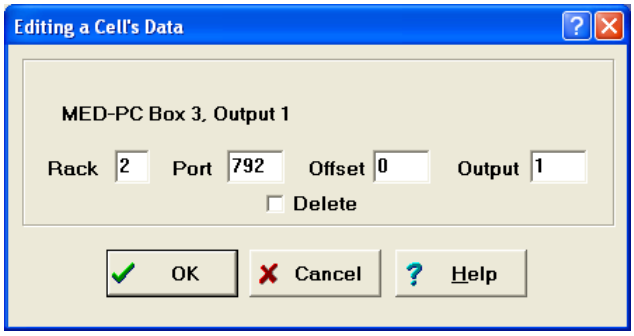
The same steps must be completed for the outputs. To change the outputs select **Define | Outputs Custom**. Again notice in Figure 3.24 that all of the Boxes are setup on Rack 1 and that each SmartCtrl card is setup on a different Offset. In this example the Rack and Offset numbers for Boxes 3 and 4 must be changed. To change the output information for a cell just double click on that cell and the screen shown in Figure 3.25 will appear.

Figure 3.24 - Custom Output Definitions



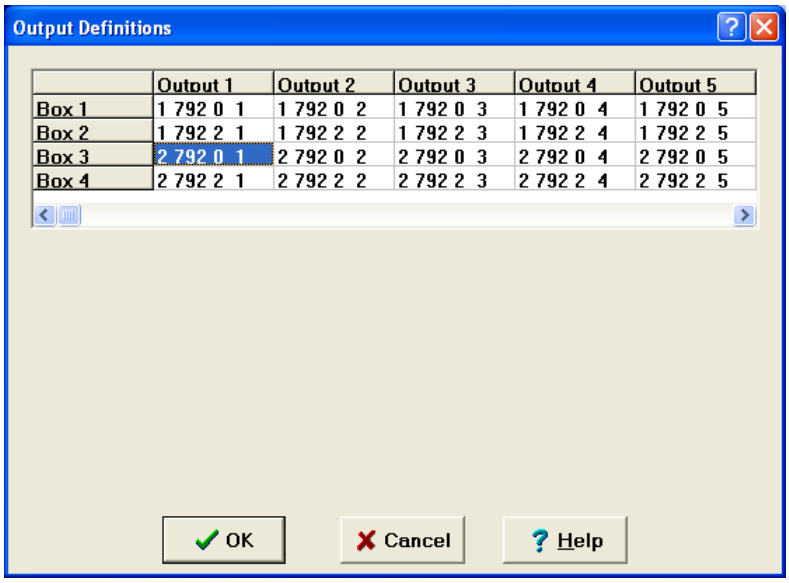
Change the Rack and Offset number to match the Rack and Offset number of the card being set up (in this example Box 3, Output 1 needs to be on Rack 2, Offset 0) and then click on the **OK** button.

Figure 3.25 - Editing an Output Cell's Data



Repeat this for the each of the outputs that need to be changed. When finished both Racks will be setup so that they look identical to each other, as shown in Figure 3.26. The only difference between Boxes 1 & 2 and 3 & 4 is the Rack number.

Figure 3.26 - Custom Output Definitions Completed



To save changes go to **File** | **Save** and then **File** | **Exit**. Now when MED-PC is started, it will properly list four boxes and talk to all four SmartCtrl cards in both Racks, enabling the user to load and run programs in all four boxes without any further modifications.

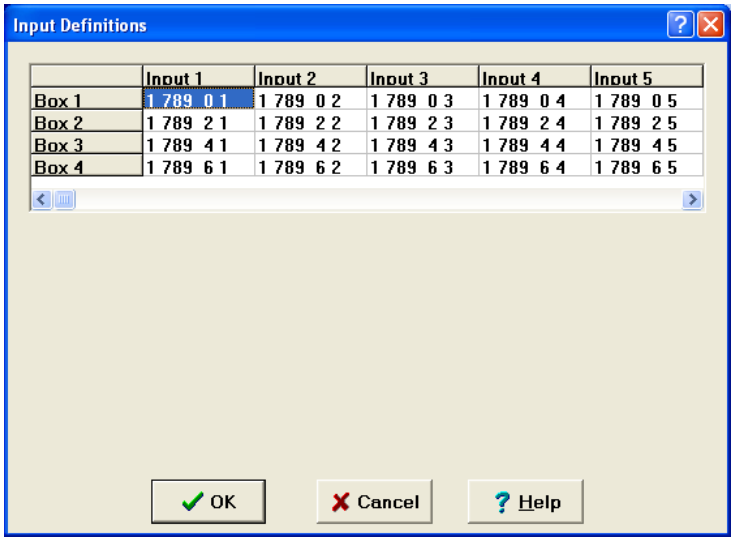
Example 2

The second example shows how to setup multiple SuperPort cards in multiple Racks. Begin by selecting **Define** | **Guided Sequence**. The screen shown in Figure 3.20 will appear. Select the **All Outputs and Inputs are sequentially wired options** and then click the **OK** button.

Follow the sequence for setting up the desired number of SuperPort cards. Each window and the valid inputs for each window are described in the **Error! Reference source not found.** of this manual. When finished with the Guided Sequence select **Define** | **Inputs Custom**.

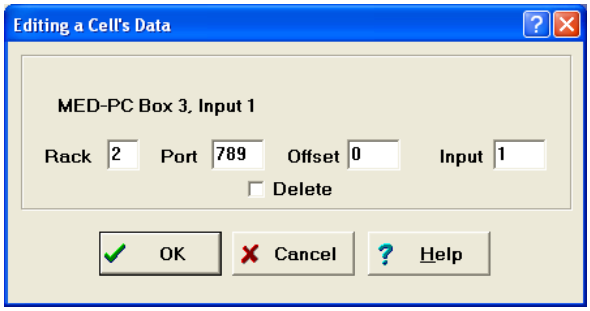
Notice in Figure 3.27 that all of the Boxes are setup on Rack 1 and that each SuperPort card is setup on a different Offset. In this example the Rack and Offset numbers for Boxes 3 and 4 must be changed. To change the input information for a cell just double click on that cell, and the screen shown in Figure 3.28 will appear.

Figure 3.27 - Custom Input Definitions



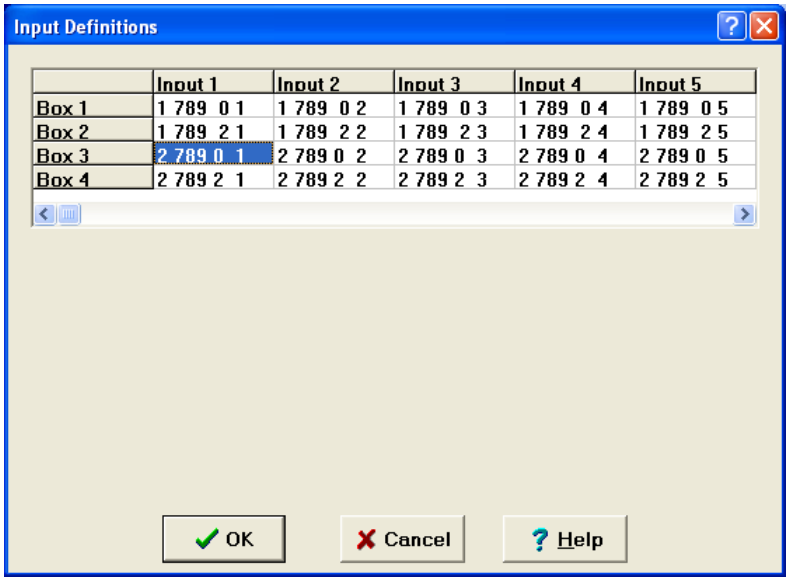
Change the Rack and Offset number to match the Rack and Offset number of the card that being set up (in this example Box 3, Input 1 needs to be on Rack 2, Offset 0) and then click the **OK** button.

Figure 3.28 - Editing an Input Cell's Data



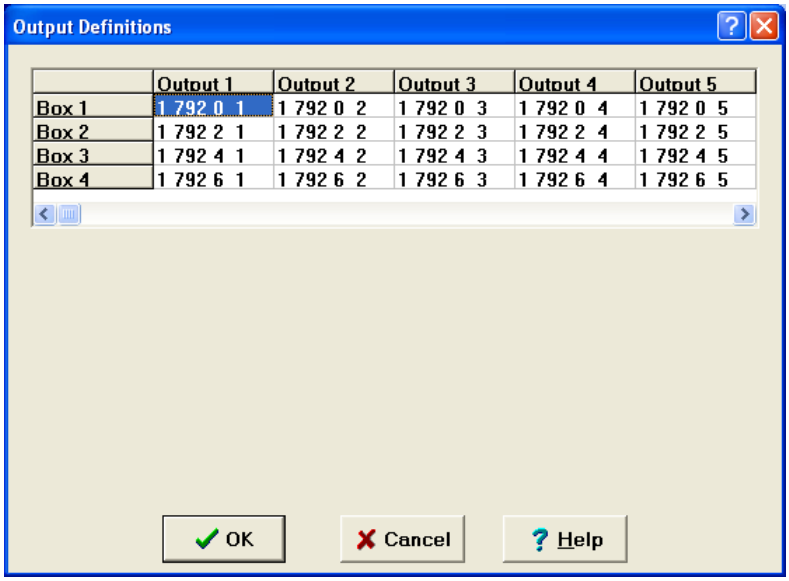
Repeat this for the each of the outputs that need to be changed. When finished both Racks will be setup so that they look identical to each other, as shown in Figure 3.29. The only difference between Boxes 1 & 2 and 3 & 4 is the Rack number.

Figure 3.29 - Custom Input Definitions Completed



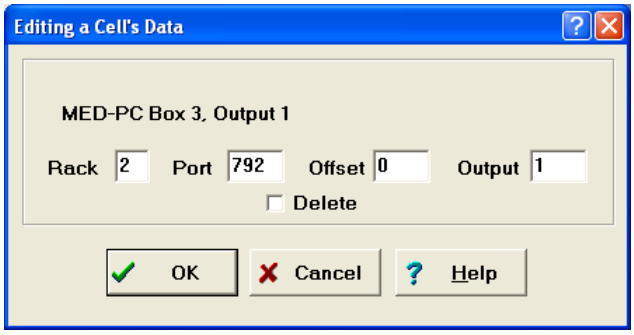
To change the outputs select **Define | Outputs Custom**. Again notice in Figure 3.30 that all of the Boxes are setup on Rack 1 and that each SuperPort card is setup on a different Offset. In this example the Rack and Offset numbers for Boxes 3 and 4 must be changed. To change the output information for a cell just double click on that cell and the screen shown in Figure 3.31 will appear.

Figure 3.30 - Custom Output Definitions



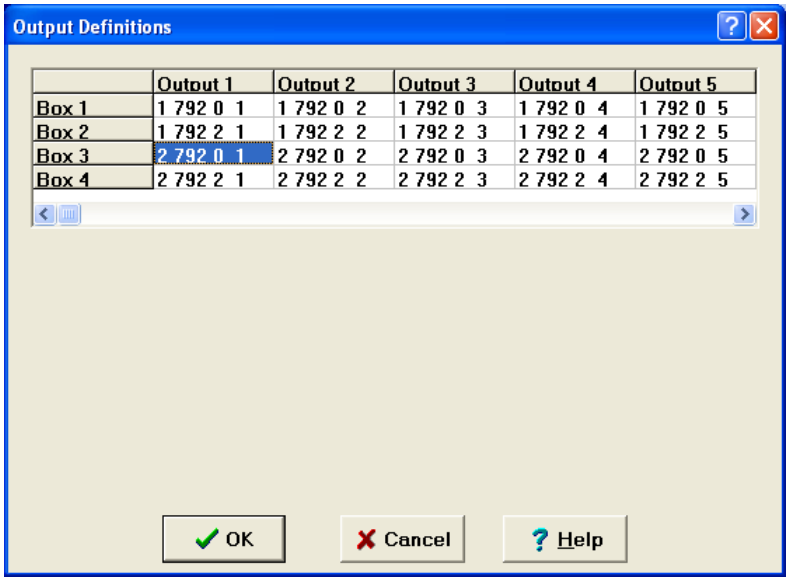
Change the Rack and Offset number to match the Rack and Offset number of the card being set up (in this example Box 3, Output 1 needs to be on Rack 2, Offset 0) and then click the **OK** button.

Figure 3.31 - Editing an Output Cell's Data



Repeat this for the each of the outputs that need to be changed. When finished both Racks will be setup so that they look identical to each other, as shown in Figure 3.32. The only difference between Boxes 1 & 2 and 3 & 4 is the Rack number.

Figure 3.32 - Custom Output Definitions Completed



To save changes go to **File** | **Save** and then **File** | **Exit**. Now when MED-PC is started, it will properly list four boxes and talk to all four SuperPort cards in both Racks, enabling the user to load and run programs in all four boxes without any further modifications.

Appendix D| Binary Numbering

The binary system enables each port to input or output the status of 8 control lines simultaneously. That is, each group of 8 or fewer control lines is represented by a binary "word" with an equal number of bits. Each bit can only be in one of two states, "0" or "1" (OFF or ON). To distinguish one bit from another, each has a weighted value. In the decimal system, each bit (digit) can be in one of ten states (0 to 9), and the weighted values increase by a factor of 10.

For example:

	0	0	0	0	**7**	**3**	**5**
Digit "Number"	6	5	4	3	2	1	0
Weighted Value	1,000,000	100,000	10,000	1,000	100	10	1

The number 735 may be thought of as the sum of each digit times the weighted value or 700 + 30 + 5.

A comparable illustration in the binary numbering system follows.

	0	0	0	1	0	0	1	0
Bit Number	7	6	5	4	3	2	1	0
Weighted Value	128	64	32	16	8	4	2	1

In binary each bit can only be a 0 or 1, therefore the number 10010 has a digital value of 18, that is, (1 x 16) + (0 x 8) + (0 x 4) + (1 x 2) + (0 x 1).

It is not necessary to be proficient in the binary numbering system. Simply keep in mind that each input or output is assigned a bit value of 1, 2, 4, 8, 16, 32, 64 or 128. To turn on output 1, MED-PC outputs the value 1; to turn on output 3, MED-PC outputs the value 4; and to turn on output 5, MED-PC outputs the value of 16.

To turn on multiple outputs, the binary values are added. This concept is useful when using the MED Test dialog boxes to test a number of outputs simultaneously. For example, to turn on outputs 1 and 2, represented by bits 1 and 2, the output value is 3. To turn on outputs 1, 2, and 3, the output value is 7 (the sum of bits 1+2+4); and to turn on the outputs 1, 2, 3, and 4, the value is 15 (the sum of 1+2+4+8). The concept is the same no matter what combination of bits are selected.

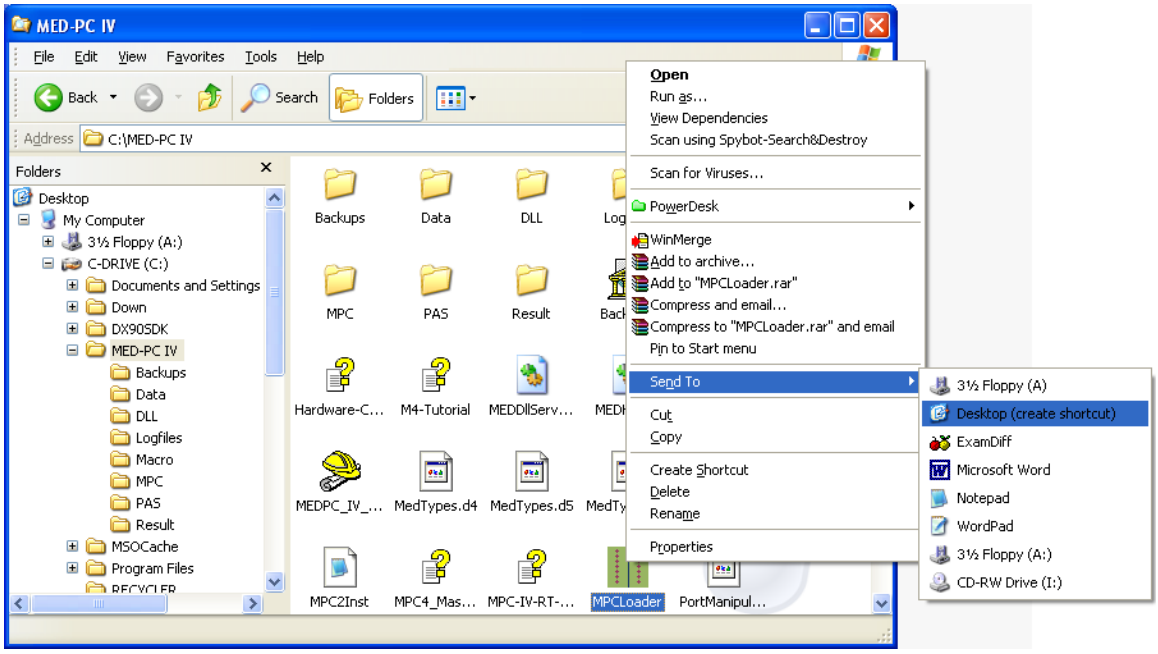
Once hardware is configured and tested, this information may be set aside as MED-PC once again deals with inputs and outputs as ordinal numbers; i.e., ON 5 turns on output five, not a combination of outputs 4 and 1. The underlying ports, offsets and bits are completely handled by the runtime system.

Appendix E | Command Line Operations

Certain aspects of the operations of MED-PC may be controlled from the Windows command line. Command line options are set by editing the properties associated with the MED-PC desktop icon. There may be multiple icons for launching the runtime system, each with its own special properties. The only restriction is that only one copy of MED-PC may be launched at a time.

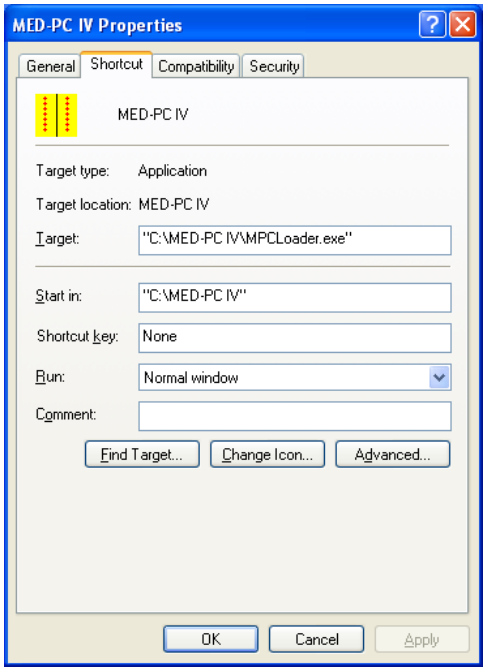
Begin by creating a shortcut to the desktop from the MPCLoader executable. One way to do this is to find the executable using Windows Explorer. Once found, right click to select **Send To** and then click **Desktop (create shortcut)**. The complete series of steps is illustrated in Figure 3.33.

Figure 3.33 - Creating a Shortcut



When the steps above are completed, return to the desktop and right click on the MPCLoader icon. Select **Rename** and give this icon a name distinct from other shortcuts to the MED-PC application. Right Click again and select properties to produce the Shortcut Properties screen in Figure 3.34.

Figure 3.34 - Shortcut Properties



Command line options may be appended to the program name (C:\MED-PC IV\MPCLoader.exe) listed in the target field. Using multiple icons provides a convenient way to gain immediate access to a wide variety of options such as different data directories (requires multiple .dta files created with the Hardware Configuration application), or different load macros. After making changes to the Target dialog box, click **Apply** and then **OK** to close the Shortcut Properties window.

Specifying Macros on the Command Line

As with previous versions of MED-PC, it is possible to specify the names of macros that should be run when MED-PC is launched. These "Command Line Options" must be entered in the target dialog box of the system properties window shown in Figure 3.34.

The default command line is **"C:\MED-PC IV\MPCLoader.exe"**, provided that MED-PC IV has been installed on the C: drive in a directory named \MED-PC IV. The name(s) of one or more macros may be listed following this entry (separated by a single space). Be sure to include the complete name and path for each macro and only one space between entries. The Win API requires quotation marks if there are any spaces in the command line path. To be safe, quotation marks are recommended for all command line strings. For example:

"C:\MED-PC IV\MPCLoader.exe" "C:\MED-PC IV\Macro\Batch 1.mac"

The load wizard may be turned off when using this technique by deselecting the box in the lower left hand corner of the load wizard welcome screen.

Specifying an Alternate Installation File - /INSTALL

By default, hardware configuration information is read from a file named MPC2INST.DTA residing in the same directory as MED-PC. The command line option "/INSTALL=" can be used to specify an alternate file. This is most useful when multiple users or multiple experiments require different data options. It can also be used if different apparatus connected to the same interface require a different hardware configuration. Begin by creating the alternate installation file with the hardware configuration utility as described in **Error! Reference source not found.**. When saving the file, be sure to use a unique file name. Then add the "INSTALL" command to the target dialog shown in Figure 3.34 above. An alternative Installation may be used along or with macros.

Examples:

"C:\MED-PC IV\MPCLoader.exe" "/Install=Other.dta"

"C:\MED-PC IV\MPCLoader.exe" "/Install=Other.dta" "C:\MED-PC IV\Macro\Batch 1.mac"

Appendix F | Data File Formats

A data file format must be selected on the Data File Options screen (Figure 2.10) during Hardware Configuration. Each of the data file options are described in detail in this chapter.

Annotated – FORMAT 1

The annotated data file format requires the least amount of programming sophistication, as all variables and arrays are provided with labels. The annotated format output file contains alphabetic characters and may contain data from multiple sessions, depending upon the file naming conventions used to generate the data. Annotated data files always begin with the name of the data file on line 1. Two lines are then skipped and then the header information begins. The last line in the data file is the comment line beginning with a forward slash "****." In the event no comment is present, this line is omitted in its entirety. This preserves backward compatibility with files generated using older versions of MED-PC without this feature. In the event that more than one data set is in the data file, two lines are skipped following the last data element in each data set and the start date forms the first line for each data set. The file designation line is not repeated. See the sample printout below.

FULL HEADERS

The Annotated example uses the default FULLHEADERS format, with 9 lines of header information. Keep in mind that the start date and time are defined the moment the procedure is loaded to a box, irrespective of the **#START** command. Dates are not padded by leading zeros (May is shown as 5 not 05 and the year is controlled by the Y2K Directive described. For more information on this topic, open Trans IV and select **Help** | **Contents** | **Language Reference** | **Declarations Before The First State Set**. This help file can also be opened from the MED-PC runtime screen by selecting **Help** | **Master Help** and clicking on the reference to the translator.

Also, note that times contain colons and the hour does not necessarily contain a leading zero if the hour is less than 10; however, if the hour is 0, then a 0 will appear in the hour column. The last line of the header contains the name of the MedState Notation procedure file that generated the data. Since variables and array elements are user defined, it is recommended that the .mpc file contain comments to clarify all entries in the data file.

CONDENSED HEADERS

If CONDENSED is specified as part of the DISKOPTIONS command, the following headers would appear. Two blank lines still precede each session's data, irrespective of header format. An example of a CONDENSED header is shown below.

```
File: C:\MED-PC IV\DATA\!FORMAT1.WIN
BOX:  3  SUBJECT: 35F   EXPERIMENT:  5CTRL  GROUP:  2   SOURCE CODE:   FR5WMPC
START: 4/29/98  9:48:06  END: 4/29/98  9:48:39
```

Values of Simple Variables

Following the header information, the values of all simple variables, including non-used zero value variables, are printed. One value is printed per line, unless a specific list is declared in the procedure file with the DISKVARS command. The variables are printed in alphabetical order and each line begins with the variable letter followed by a colon, followed by the data value.

Values of Array Elements

Following the values of simple variables, the values of arrays are printed in alphabetical order. The MSN commands DISKVARS, DISKFORMAT, and DISKCOLUMNS provide control over the appearance of the array data in an annotated file by defining the variables and arrays to save, the characters per number and decimal placement, and the number of columns per row. Additional information on these options may be found in the M**ED-PC Programmers Manual**.

Array printing begins with the letter name of the array followed by a colon, with no other data on that line. On the next line is an array index, starting at 0, followed by the number of columns specified of data values from the array. Note that it is conceivable that the array is listed for printing, but that it contained no data and there will be no lines listing data values. This will happen when the first element in the array contains the end of array tag, -987.987.

Also, from one data set to the next, the number of array elements actually printed for a given array may vary. Each line of data for the array begins with a number indicating the subscript of the data value in the first column of the line. This is followed by the data values. In the sample file for the annotated format, the first five values in array C are C(0) = 5.1, C(1) = 7.1, C(2) = 10.1, C(3) = 5.1, and C(4) = 7.1. The second row begins with the sixth element, C(5) as indicated by the “5:” in the first column of the array.

Important things to note include the fact that the precision of the individual data values, both for simple variables and arrays, as well as the array format, are determined by user defined code in the MedState Notation procedure used to generate the file. Therefore, data parameters may vary from one data set to the next.

Additional Comments and Reminders for the Annotated Data File format:

- The file name is only listed once on line 1 of the file, even if there are multiple sessions in the file.
- Exactly two blank lines always precede each session’s data; the first session’s data is separated from the filename by two lines. If a second session appeared in this file, it would be separated from the preceding session by two blank lines.
- Some arrays and/or variables may be omitted from the file if a DISKVARS command was specified in the MedState Notation (.MPC) procedure file.
- The number of columns of array data may differ from this example if the DISKCOLUMNS command is used in the MedState Notation procedure.

- The number of array elements printed may be less than the number specified by the DIM or LIST command if -987.987 is used to limit the number of elements written to disk.

Sample printout of FORMAT 1 File

```
File: C:\MED-PC IV\DATA\!FORMAT.1
Start Date:  5/6/09
End Date:  5/6/09
Subject: 35F
Experiment: 5CTRL
Group: 2
Box: 3
Start Time: 22:06:43
End Time: 22:07:41
MSN: TEMP
A:       5.000
B:       3.000
D:       1.000
E:       0.000
F:       0.000
G:       0.000
H:       0.000
I:      18.000
J:       0.000
K:       0.000
L:       0.000
M:       0.000
N:       0.000
O:       0.000
P:       0.000
Q:       0.000
R:       0.000
S:       0.000
T:      22.000
U:       0.000
V:       0.000
W:       0.000
X:       5.000
Y:       0.000
Z:       0.000
C:
     0:       5.100       7.100       10.100        5.100        7.100
     5:       0.200      12.100        3.100        5.100        5.100
    10:       6.100       0.200       13.100       10.100       11.100
    15:       8.100       7.100        0.200
\Test Procedure - Simulated Responses
```

Stripped - FORMAT 2

The MED-PC stripped file format is devoid of all labels and begins with the month the box was loaded. Determining the meaning of the column of numbers that follows is dependent upon understanding the file format. Multiple data sets within the same data file are not separated by two blank lines as in the annotated format. All entries are the same except for the start and end times.

Additional Comments and Reminders:

- This format does not retain or provide information about the names of specific arrays and variables; however, simple variables are presented first followed by array elements. There is no way to know the name of the 1st array without having access to the. MedState Notation procedure file that produced the data.
- If more than one session of data appears in the file, each session's data immediately follows the data for the preceding session; there are no blank lines or other landmarks to help locate successive sessions. Of course, successive sessions may be located by virtue of the fact that the headers always occupy a fixed number of lines and the number of arrays (and their sizes) and variables are provided.
- The number of elements listed is the total number of elements actually in the data file NOT always the number of elements declared in the MED-PC procedure. The discrepancy between the dimension declared in the MED-PC procedure and the number listed in the data file may arise due to the use of -987.987 to stop array printing. Also, an array declared as: DIM A=100 will be listed in the data file as having 101 elements because element 0 is included in the total.

Sample printout of FORMAT 2 file

```
5              --Month box was loaded
06             --Day box was loaded
98             --Year box was loaded
5              --Month session ended
06             --Date session ended
98             --Year session ended
35F            --Subject
5CTRL         --Experiment
2              --Group
3              --Box
22             --Hour when box was loaded.  (Military format)
20             --Minutes when box was loaded
59             --Seconds when box was loaded
22             --Hour when session ended
21             --Minutes when session ended
03             --Seconds when session ended
25             --Total number of simple variables
1              --1 array was declared in the MPC procedure
18             --1st Array has 18 elements
5              --1st Variable (A) has a value of 5
3              --2nd Variable (B) has a value of 3
1              --3rd Variable (D) has a value of 1
0              --4th Variable (E) has a value of 0
0              --5th Variable (F) has a value of 0
0              --6th Variable (G) has a value of 0
0              --7th Variable (H) has a value of 0
18             --8th Variable (I) has a value of 18
0              --9th Variable (J) has a value of 0
0              --10th Variable (K) has a value of 0
0              --11th Variable (L) has a value of 0
0              --12th Variable (M) has a value of 0
0              --13th Variable (N) has a value of 0
0              --14th Variable (O) has a value of 0
0              --15th Variable (P) has a value of 0
0              --16th Variable (Q) has a value of 0
0              --17th Variable (R) has a value of 0
0              --18th Variable (S) has a value of 0
22             --19th Variable (T) has a value of 22
0              --10th Variable (U) has a value of 0
0              --21st Variable (V) has a value of 0
0              --22nd Variable (W) has a value of 0
5              --23rd Variable (X) has a value of 5
0              --24th Variable (Y) has a value of 0
0              --25th Variable (Z) has a value of 0
5.1            --Begin 1st Array (C).  Element 0
7.1            --Element 1
10.1           --Element 2
5.1            --Element 3
7.1            --Element 4
0.2            --Element 5
12.1           --Element 6
3.1            --Element 7
5.1            --Element 8
5.1            --Element 9
6.1            --Element 10
0.2            --Element 11
13.1           --Element 12
10.1           --Element 13
11.1           --Element 14
8.1            --Element 15
7.1            --Element 16
0.2            --Element 17
\Test Procedure - Simulated Responses
```

Stripped, C Array Only - FORMAT 3

By definition, this format produces a data set with no simple variables and one array. Again, the data were created in the same manner as the previous files.

Comments:

- If the C Array is empty, the header information will be presented. The last three lines of the data set will be 0, 1, 0 to indicate no simple variables and one array with no data elements.

Sample printout of FORMAT 3 file

```
5               --Month box was loaded
06              --Day box was loaded
98              --Year box was loaded
5               --Month session ended
06              --Date session ended
98              --Year session ended
35F             --Subject
5CTRL           --Experiment
2               --Group
3               --Box
22              --Hour when box was loaded.  (Military format)
25              --Minutes when box was loaded
34              --Seconds when box was loaded
22              --Hour when session ended
25              --Minutes when session ended
38              --Seconds when session ended
0               --Total number of simple variables
1               --There was 1 array declared in the MPC procedure
18              --1st Array has 18 elements
5.1             --Begin 1st Array (C).  Element 0
7.1             --Element 1
10.1            --Element 2
5.1             --Element 3
7.1             --Element 4
0.2             --Element 5
12.1            --Element 6
3.1             --Element 7
5.1             --Element 8
5.1             --Element 9
6.1             --Element 10
0.2             --Element 11
13.1            --Element 12
10.1            --Element 13
11.1            --Element 14
8.1             --Element 15
7.1             --Element 16
0.2             --Element 17
\Test Procedure - Simulated Responses
```

Stripped with Variable Identification - FORMAT 4

This format provides the same information as Format 2 Stripped, with the added features of maintaining alphabetical order of variables and arrays and identifying the number of elements assigned to each variable. Therefore, simple variables are always associated with one element, while arrays may contain from 1 to 10,000 elements. Unlike the simple stripped format, it is not necessary to have access to the .MPC code that produced the data set in order to match variable letters to data elements.

Sample printout of Format 4 file

```
5               --Month box was loaded
06              --Day box was loaded
98              --Year box was loaded
5               --Month session ended
06              --Date session ended
98              --Year session ended
35F             --Subject
5CTRL           --Experiment
2               --Group
3               --Box
22              --Hour when box was loaded.  (Military format)
28              --Minutes when box was loaded
12              --Seconds when box was loaded
22              --Hour when session ended
28              --Minutes when session ended
16              --Seconds when session ended
25              --Total number of simple variables
1               --There is 1 Array declared in MPC Procedure
.3              --.3 is a “Marker Number” only (Data analysis
                  programs may use this value to identify the
                  start of variable identification.)
1               --A has 1 Element (was a simple variable)
1               --B has 1 Element (was a simple variable)
18              --C was an Array of 18
1               --D has 1 Element (was a simple variable)
1               --E has 1 Element (was a simple variable)
1               --F has 1 Element (was a simple variable)
1               --G has 1 Element (was a simple variable)
1               --H has 1 Element (was a simple variable)
1               --I has 1 Element (was a simple variable)
1               --J has 1 Element (was a simple variable)
1               --K has 1 Element (was a simple variable)
1               --L has 1 Element (was a simple variable)
1               --M has 1 Element (was a simple variable)
1               --N has 1 Element (was a simple variable)
1               --O has 1 Element (was a simple variable)
1               --P has 1 Element (was a simple variable)
1               --Q has 1 Element (was a simple variable)
1               --R has 1 Element (was a simple variable)
1               --S has 1 Element (was a simple variable)
1               --T has 1 Element (was a simple variable)
1               --U has 1 Element (was a simple variable)
1               --V has 1 Element (was a simple variable)
1               --W has 1 Element (was a simple variable)
1               --X has 1 Element (was a simple variable)
1               --Y has 1 Element (was a simple variable)
1               --Z has 1 Element (was a simple variable)
5               --Variable (A) has a value of 5
3               --Variable (B) has a value of 3
5.1             --Value of C(0)
7.1             --Value of C(1)
10.1            --Value of C(2)
5.1             --Value of C(3)
7.1             --Value of C(4)
```

```
0.2             --Value of C(5)
12.1            --Value of C(6)
3.1             --Value of C(7)
5.1             --Value of C(8)
5.1             --Value of C(9)
6.1             --Value of C(10)
0.2             --Value of C(11)
13.1            --Value of C(12)
10.1            --Value of C(13)
11.1            --Value of C(14)
8.1             --Value of C(15)
7.1             --Value of C(16)
0.2             --Value of C(17)
1               --Variable (D) has a value of 1
0               --Variable (E) has a value of 0
0               --Variable (F) has a value of 0
0               --Variable (G) has a value of 0
0               --Variable (H) has a value of 0
18              --Variable (I) has a value of 18
0               --Variable (J) has a value of 0
0               --Variable (K) has a value of 0
0               --Variable (L) has a value of 0
0               --Variable (M) has a value of 0
0               --Variable (N) has a value of 0
0               --Variable (O) has a value of 0
0               --Variable (P) has a value of 0
0               --Variable (Q) has a value of 0
0               --Variable (R) has a value of 0
0               --Variable (S) has a value of 0
22              --Variable (T) has a value of 22
0               --Variable (U) has a value of 0
0               --Variable (V) has a value of 0
0               --Variable (W) has a value of 0
5               --Variable (X) has a value of 5
0               --Variable (Y) has a value of 0
0               --Variable (Z) has a value of 0
\Test Procedure - Simulated R
```

Appendix G | Addressing Interface Cards

Interface cards are addressed correctly prior to being shipped from MED Associates, Inc. It should only be necessary to change the addressing of an interface card if additional cards are being added to an existing system.

The appearance of the hardware may differ depending on the revision of the card. Older interface cards utilized jumpers, like the one shown in Figure 3.36. Newer revisions utilized dipswitches resembling the ones shown in Figure 3.37. In the tables below the name of the specific jumper location or dipswitch will be referenced. If a jumper location is referenced, then a jumper should be placed in that location. If a dipswitch is referenced, then that switch should be set to the CLOSED position. For example, Figure D-2 and D-3 both depict cards that are addressed as Card #2.

Figure 3.35 – JP2 with No Jumpers (left) and with Jumper in A1 Location (right)

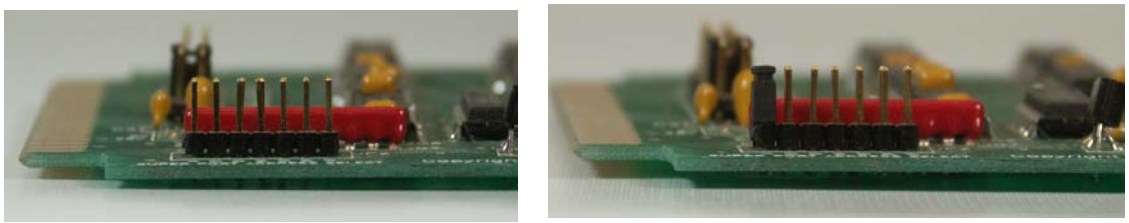


Figure 3.36 - Jumper Diagram

Figure 3.37 - Dipswitch Diagram

SmartCtrl Cards

SmartCtrl cards have an Input Offset Value that is hard coded to –1. SmartCtrl Cards have an Output Port Value that is hard coded to 792.

Table 3-1 - SmartCtrl Offset Settings

Card #	Input Port	Output Offset	Offset Jumpers/Dipswitches
1	780	0	NONE
2	781	2	A1
3	782	4	A2
4	783	6	A1, A2
5	784	8	A3
6	785	10	A1, A3
7	786	12	A2, A3
8	787	14	A1, A2, A3
9	788	16	A4
10	789	18	A1, A4
11	790	20	A2, A4
12	791	22	A1, A2, A4
13	792	24	A3, A4
14	793	26	A1, A3, A4
15	794	28	A2, A3, A4
16	795	30	A1, A2, A3, A4

SuperPort Cards

SuperPort Input Cards always have a jumper on Port 789 and SuperPort Output Cards always have jumpers on Ports 792 and 793.

Table 3-2 - SuperPort Offset Settings

Card #	Offset #	Offset Jumpers/Dipswitches
1	0	NONE
2	2	A1
3	4	A2
4	6	A1, A2
5	8	A3
6	10	A1, A3
7	12	A2, A3
8	14	A1, A2, A3
9	16	A4
10	18	A1, A4
11	20	A2, A4
12	22	A1, A2, A4
13	24	A3, A4
14	26	A1, A3, A4
15	28	A2, A3, A4
16	30	A1, A2, A3, A4

Standard Cards

Standard Input/Output Cards have an Offset Value that is hard coded to –1.

Table 3-3 - Standard Card Offset Settings

Card #	Port #
1	780
2	781
3	782
4	783
5	784
6	785
7	786
8	787
9	788
10	789
11	790
12	791
13	792
14	793
15	794
16	795

Appendix H | Contact Information

MED-PC is already being used in more laboratories around the world than any comparable product; however, it is always being improved and comments on how it might be enhanced further are welcome.

Please contact MED Associates, Inc. for information regarding any of our products.

Visit our website at www.med-associates.com for contact information.

For technical questions, email support@med-associates.com.