SCHEDULE MANAGER™

SOF-706

USER'S MANUAL

DOC-031
Rev. 1.9

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notes

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CHAPTER 1 | INTRODUCTION

General Computer Environment

The minimum required system is as follows:

- Windows® 7 (32 or 64-bit) or higher
- Available PCI slot or USB port

Introduction

Schedule Manager is designed for use with MED Associates modules to collect and analyze data gathered from chambers. Schedule Manager can collect and display real-time data gathered from up to 8 chambers at a resolution of 10 ms or better. Acquired data is displayed in real-time and saved to disk for post-statistical analysis. Schedule Manager will also create data files for use in the SoftCR and SoftCR Pro Cumulative Recorder software (MED Associates, Inc. Catalog Number SOF-721/SOF-722) for graphical printouts.

Overview

Schedule Manager uses four major elements to perform data collection.

Hardware Configuration: A mapping of the test chambers' inputs and outputs to physical electronic channels on the interface cards in the interface cabinet. For example, in order for the software to illuminate the house light in chamber 3, a specific circuit on an output card must be activated. The Hardware Configuration allows the software to interact with the appropriate hardware device.

Component: A Component is the basic building block of Procedures and Experiments. A Component may have a Simple, Concurrent, or Tandem Schedule Type to perform one or multiple schedules per Component. Schedule Manager provides eleven pre-defined Schedules, such as Fixed Ratio and Variable Interval Response.

Procedure: A Procedure is a list of one or more Components, with a user-definable exit condition between each Component.

Experiment: An Experiment is the running of a single procedure on a single subject in a single chamber. The Experiment contains definitions of the Procedure**,** and the test subject is defined by identifier, group, and experiment.

CHAPTER 2 | RUNNING SCHEDULE MANAGER

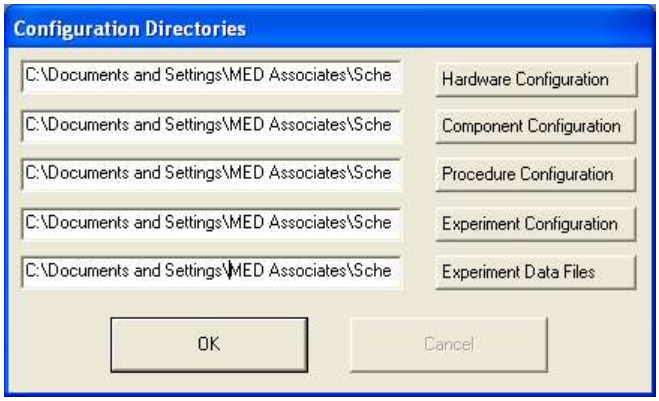
Complete the steps in this chapter to run an experiment using Schedule Manager. Some of these steps are only necessary the first time the application is used.

1. Select Configuration Directories

When the Schedule Manager software application is opened for the first time the Configuration Directories screen will appear, see Figure 2-1 – Configuration Directories Screen. This dialog displays and allows the user to edit the directories where the Schedule Manager elements reside. If the directories for each item listed on the screen are acceptable, click **OK**. If they are not, click the button associated with the directory and browse to the desired location.

This screen may also be accessed by selecting **File** | **Directories**. After the Configuration Directories screen is closed, the Hardware Setup screen appears.

Figure 2-1 – Configuration Directories Screen



2. Hardware Setup

Schedule Manager uses a "hardware configuration file" to specify which input and output cards are in the hardware interface cabinet, and at what specific port addresses. By storing the configuration information in a file on disk, multiple configurations can be saved.

The Hardware Setup screen allows the user to select which hardware configuration to load on subsequent software launches. Select a hardware setup option and click **OK**.

- If **Load Default Configuration** is selected, the Schedule Manager main screen will appear. This should be the most commonly used hardware configuration.
- If **Load Alternate Configuration** is selected, an Open File window will appear. Select the configuration file (*.cfg) to use and select **Open**. The Schedule Manager main screen will appear.
- If **Create New Configuration** is selected the user may create a new hardware configuration. Refer to Chapter 3: | Creating a New Hardware Configuration in this manual for more information.

Figure 2-2 - Hardware Setup Screen

Note: The error message: "Default Configuration file not found" indicates that a file named "Default.cfg" was not found in the hardware configuration file directory specified on the Configuration Directories dialog. To resolve this error, either create a default configuration file, or change the hardware configuration file directory to an existing Default.cfg file's location.

3. Create a New Component

A component contains one or more testing protocol schedules. Follow the directions outlined in Chapter 4: | Creating a New Component.

4. Create a New Procedure

If necessary, create a new procedure using existing components. Follow the instructions outlined in Chapter 5: | Creating a New Procedure.

5. Run an Experiment

Run an experiment by loading a procedure into each active chamber. Follow the instructions outlined in Chapter 6: | Running an Experiment.

CHAPTER 3 | CREATING A NEW HARDWARE CONFIGURATION

The first time Schedule Manager is run, the Hardware Setup screen will appear as shown in Figure 2-2. Select **Create New Configuration** and press **OK** to begin the hardware configuration process.

If the "Automatically load default configuration" checkbox on the Hardware Setup dialog is not selected, the Hardware Setup dialog will appear each time the application starts. Fill this checkbox and each time the software starts it will attempt to load the configuration file named "Default.cfg" in the folder specified as the Hardware Configuration directory. See Figure 2-1 – Configuration Directories Screen

If input/output cards are added to or removed from the interface cabinet, edits to the configuration file must be made. Open the **Hardware** menu and choose **Modify Hardware Configuration** to start the process.

MED Card Setup

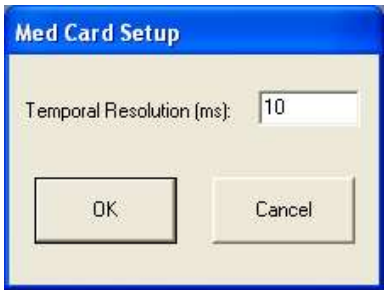
The first step in creating a hardware configuration is the MED Card Setup screen. The MED Card Setup screen allows the user to set the temporal resolution, which determines how often the program will process inputs and outputs.

This value can be between 2ms and 1000ms. 10ms is the most commonly used temporal resolution and is the dialog's default value.

One important note is that the temporal resolution will dictate how often outputs occur. For example, if an output is set to occur every 7ms, and the temporal resolution is set to 10ms, that output will only occur every 10ms.

Enter the desired temporal resolution and click **OK** and the **Interface Configuration** screen will appear.

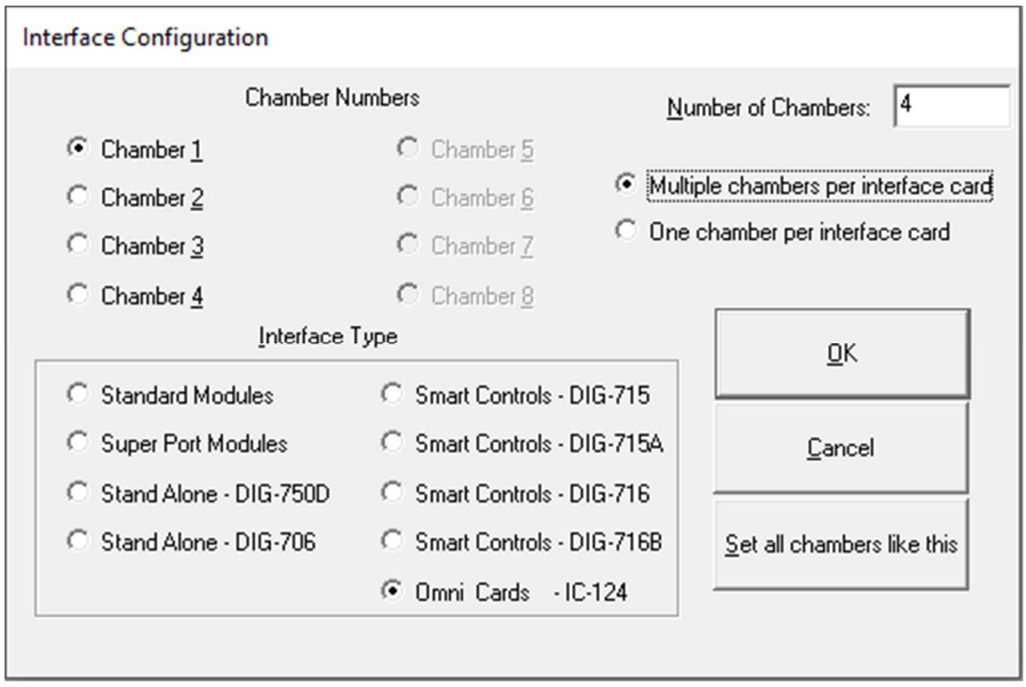
Figure 3-1 - MED Card Setup Screen



Interface Configuration

The interface configuration allows the user to define the type of interface cards and the number of chambers being used. Refer to Figure 3-2.

Figure 3-2 - Interface Configuration Screen



Enter the number of chambers being used. Then click on each Chamber Number and select the Interface Type that is being used with that specific chamber. Or click **Set all chambers like this** to set the Interface Type for all chambers in the system.

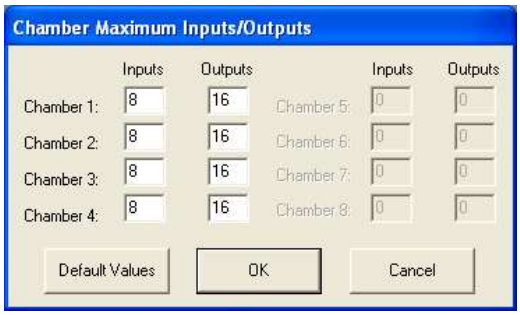
Click **OK** to save changes and proceed to the Chamber Maximum Inputs/Outputs screen.

NOTE: Enabling more chambers than will be used can cause extra work when modifying the chamber configurations.

Chamber Maximum Inputs/Outputs

The Chamber Maximum Inputs/Outputs screen allows the user to assign the number of inputs and outputs for each individual chamber. Refer to Figure 3-3.

Figure 3-3 - Chamber Maximum Inputs/Outputs



Enter the number of Inputs (0-8) and Outputs (0-16) wired to each chamber. Click **Default Values** to set the number of Inputs and Outputs to the defaults values based on the interface type.

Click **OK** to save changes and proceed to the Input/Output Labels screen.

NOTE: Only those chambers defined in the "Configure Interface" window are active. The remaining chambers are "grayed out" and disabled.

Input/Output Labels

The Input/Output Labels screen allows the user to assign specific labels to each input and output. Assigning specific labels does not affect the data gathered by Schedule Manager; however, it is strongly recommended that this feature be used. Components, procedures, and the run time display will all become more meaningful and easier to utilize with specific labels.

Figure 3-4 - Input/Output Labels Screen

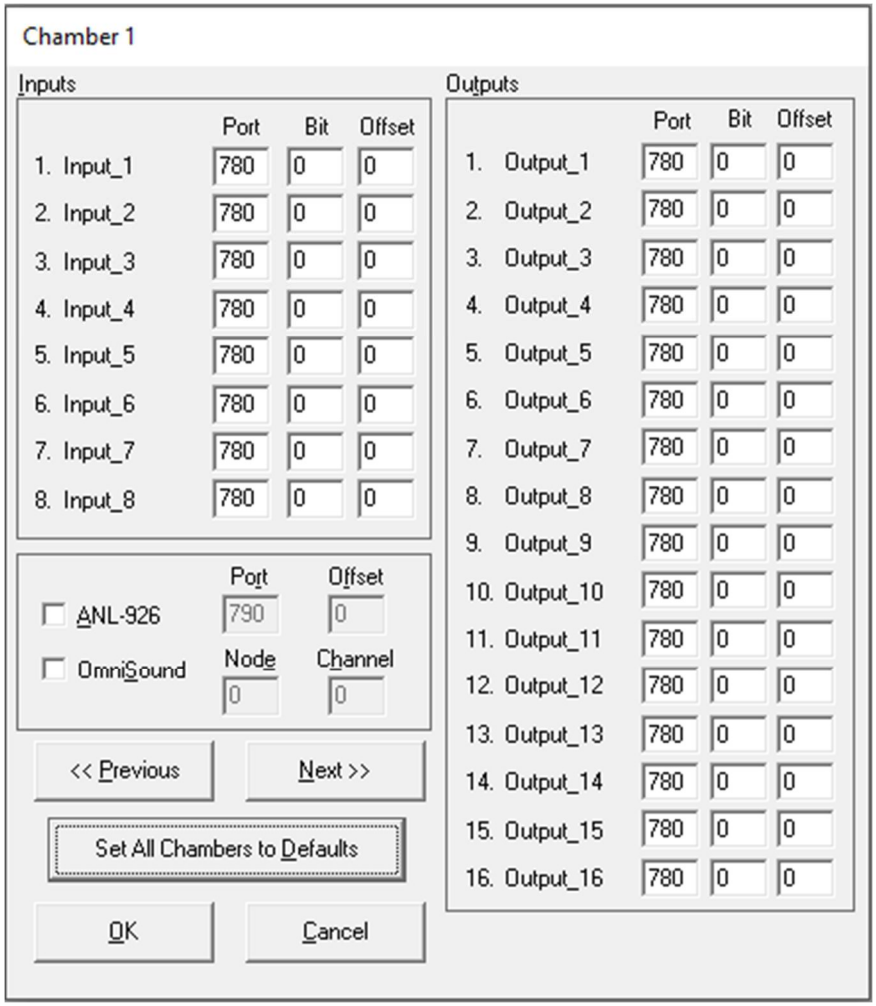
Click **Default Labels** to change all of the labels to their default names. Inputs are labeled "Input_#" and outputs are labeled "Output_#", where "#" is the input or output number.

Enter the desired labels, click **OK** to save and proceed to the Chamber Configuration screen.

Chamber Configuration

The Chamber Configuration screen is the core of the hardware configuration. It contains all of the ports, bits, and offsets needed for Schedule Manager to read and write to the input and output interface cards. A separate window is provided for each "Active" test chamber. Refer to Figure 3-5.

Figure 3-5 - Chamber Configuration Screen



If a previous configuration is being modified and previous settings have just been modified, other than the I/O labels or the MED card screen, consider using the **Set All Chambers to Defaults** button. This will fix any gaps or zeros the previous screens may have created. However, if there are special settings in the configuration, this button will reinitialize all of the chambers indiscriminately. If this is a new configuration, it will be done automatically.

The chamber configuration screen requires the following information:

Table 3-1 - Chamber Configuration Screen Data

Item	Description
Port	The port address of the interface card.
Bit	The bit value on the interface card representing the input or output.
Offset	The offset value on the interface card. For standard cards and SmartCtrl inputs, this value is -1.
ANL-926	Check to use an ANL-926 with this chamber.
ANL-926 Port	The port address of the ANL-926 card.
ANL-926 Node	The node number of the ANL-926 card.
OmniSound	Check to use an OmniSound device with this chamber.
OmniSound Port	The port address of the OmniSound device or the IC-124 that it is connected to.
OmniSound Offset	The offset address of the OmniSound device or the IC-124 that it is connected to.
OmniSound Channel	The channel (1 or 2) that is to be used with this chamber.
Previous (button)	Changes the display to show the previous chamber.
Next (button)	Changes the display to show the next chamber.
Set All Chambers to Defaults (button)	Computes all of the port, bit and offset information for all of the usable chambers. Schedule Manager uses the data given from the previous screens to compute this information.

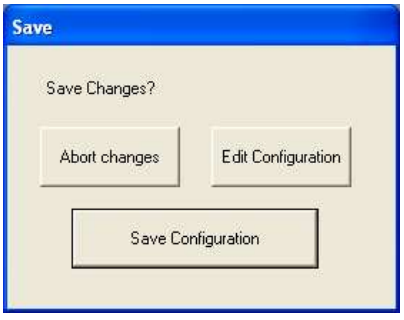
Once the chamber configuration is complete, click the **OK** button. The **Save Changes** screen shown in Figure 3-6 will appear.

Click **Abort Changes** to delete all changes and cancel the creation of a new hardware configuration.

Click **Edit Configuration** to return to the MED Card Setup screen (Figure 3-1).

Click **Save Configuration** to name and save the configuration.

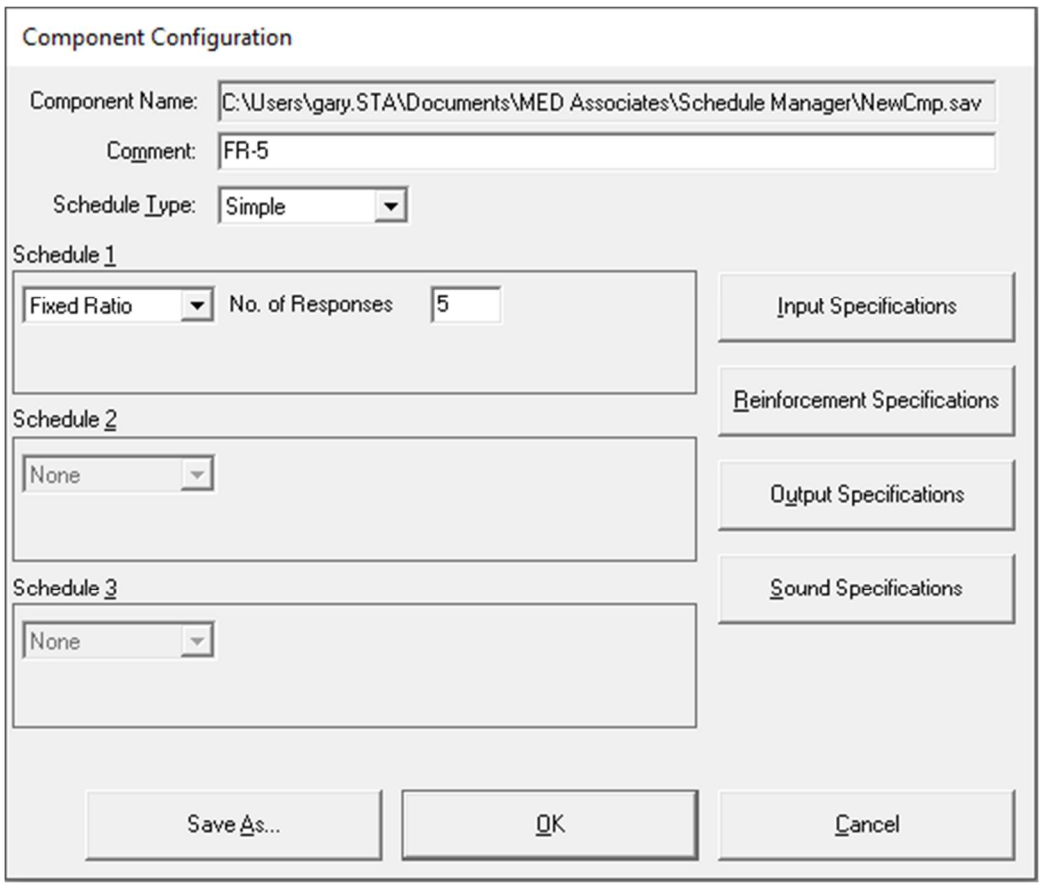
Figure 3-6 – Save Changes Screen



CHAPTER 4 | CREATING A NEW COMPONENT

The component is a building block of a procedure. To create a new component select **Component** | **New Component** and the screen shown in Figure 4-1 will appear.

Figure 4-1 - Component Configuration Screen



Begin by entering a Comment. This Comment will be used to identify this component. Next, select the Schedule Type from the pull-down menu. The schedule types are as follows:

Table 4-1 - Schedule Types

Schedule Type	Description
Simple	A component using a simple schedule type will only have one schedule operating. Only the "Schedule 1" block of the Component Configuration dialog will be active.
Concurrent	A concurrent schedule is two or more simple schedules operating simultaneously. These schedules operate on different inputs and can use the same or different reinforcements.
Tandem	A tandem schedule produces two linked simple schedules beginning with Schedule A. Once completed, Schedule A links to Schedule B without reinforcement. Reinforcement occurs only after both schedules have been completed.

After specifying the Schedule Type, select the File Type for each schedule using the drop-list boxes in each Schedule area. The file types are as follows:

Table 4-2 - Schedule Manager File Types

Abbreviation	Full Name	Description
FR	Fixed Ratio	The subject must produce a user-defined number of correct responses in order to receive a reinforcement.
VR	Variable Ratio	This schedule is similar to a fixed ratio schedule, but instead of the reinforcement being contingent on a specific number of correct responses, it varies around a user-defined mean. After each reinforcement Schedule Manager will compute a new ratio based on a normal distribution with a mean and standard deviation specified by the user.
RR	Random Ratio	The reinforcement is based on the probability entered. The probability is out of 10,000; so for example if 2,500 is entered, there is a one in four chance that the reinforcement will be given after a correct response.
FI	Fixed Interval	The first response after a user specified time interval is reinforced. Following reinforcement, the interval time resets and the process is repeated.
VI	Variable Interval	This schedule is similar to a fixed interval schedule, but instead of the fixed interval time, the interval time varies with a mean and standard deviation specified by the user.
RI	Random Interval	This schedule is similar to a fixed interval schedule, but the user defines the probability of a reinforcement occurring.
FT	Fixed Time	The reinforcement is solely based on a user-defined time. After the specified time, a reinforcement is given. The inputs do not have any impact on reinforcement in this schedule.
VT	Variable Time	This schedule is similar to the fixed time schedule, but the interval time varies with a mean and standard deviation set by the user.
DRH	Differential Reinforcement High Level	Only reinforces correct responses that occur within a user specified time interval since the last response. Each correct response resets the interval time. If the interval time expires without a correct response, no reinforcement is given. The subject must respond again within the interval time in order to be reinforced. This interval time is usually short.
DRL	Differential Reinforcement Low Level	Only reinforces responses made after a user specified interval time. If a response is made before the interval time has elapsed, no reinforcement is given and the interval time is reset. Only waiting until the interval has elapsed, and then responding will cause the subject to be reinforced.
EXT	Extinction	Records responses, control stimuli, and produces SoftCR links without reinforcement.

Input Specifications

Next click the **Input Specifications** button and the screen shown in Figure 4-2 will appear. The Component Input Specification screen allows the user to assign each input as a **Correct**, **Incorrect**, or **Count Only**. The inputs can be recorded in the SoftCR data file, as either an **Event** or a **Step**.

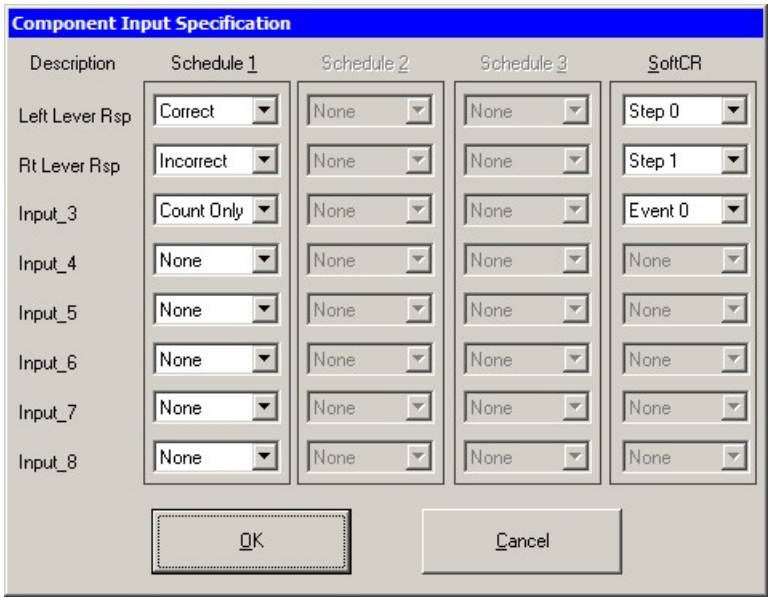
The inputs are listed under the **Description** header, using the labels assigned on the Input/Output Labels screen (Figure 3-4).

For Simple type components, only the **Schedule 1** column will be enabled. The **Schedule 2** column becomes enabled for Tandem type component schedules. The **Schedule 2** and **Schedule 3** columns become enabled for Concurrent type component schedules.

The **SoftCR** column assigns Event pen or Step pen actions to be recorded in the SoftCR data file.

Click **OK** to save changes and return to the Component Configuration screen (Figure 4-1). Click **Cancel** to return without saving changes.

Figure 4-2 - Component Input Specification Screen



Reinforcement Specifications

Next click the **Reinforcement Specifications** button and the screen shown in Figure 4-3 will appear. This screen allows the user to define what the reinforcement type and duration will be, as well as whether or not to save the reinforcement as an Event or Pip in the SoftCR data file.

Select the output that should be used as primary reinforcement from the **Primary Reinforcement** pull-down menu. Notice the labels entered on the Input/Output Labels screen (Figure 3-4) appear here, simplifying the identification of each output.

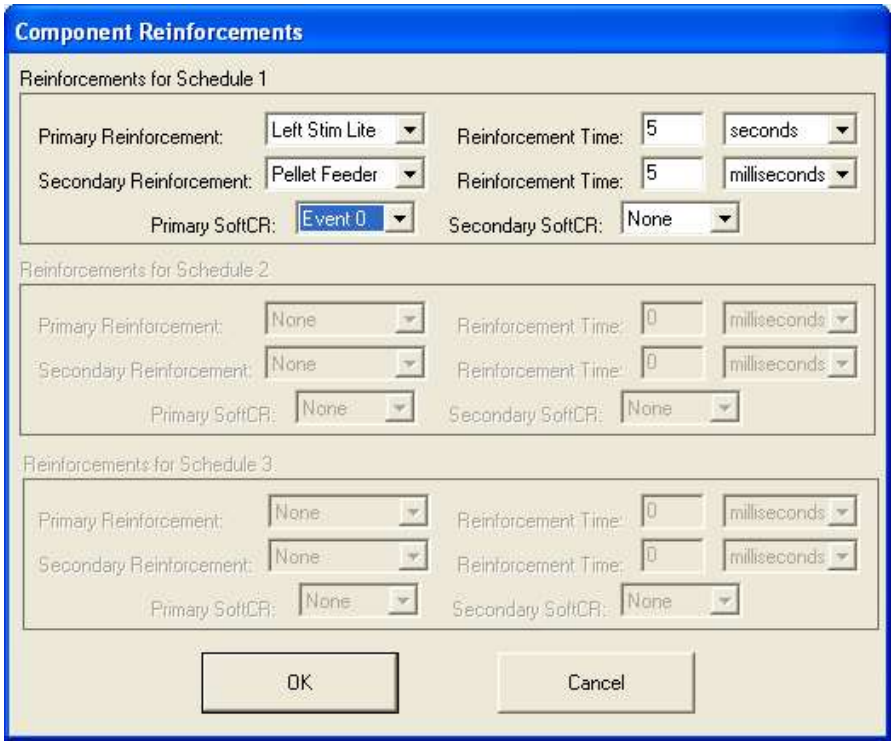
Next enter the duration of the primary reinforcement. A secondary reinforcement may be assigned to activate when the primary reinforcement ends. Select the desired secondary reinforcement from the **Secondary Reinforcement** pull-down menu and enter the desired reinforcement duration.

Both primary and secondary reinforcements may be recorded as **SoftCR** data elements. An **Event** or a **Pip** will be recorded in the output SoftCR format data file.

For Simple type components, only the **Schedule 1** region will be enabled. The **Schedule 2** region becomes enabled for Tandem type components schedules. The **Schedule 2** and **Schedule 3** regions become enabled for Concurrent type component schedules.

Click **OK** to save changes and return to the Component Configuration screen (Figure 4-1). Click **Cancel** to return without saving changes.

Figure 4-3 - Component Reinforcement Screen



Output Specifications

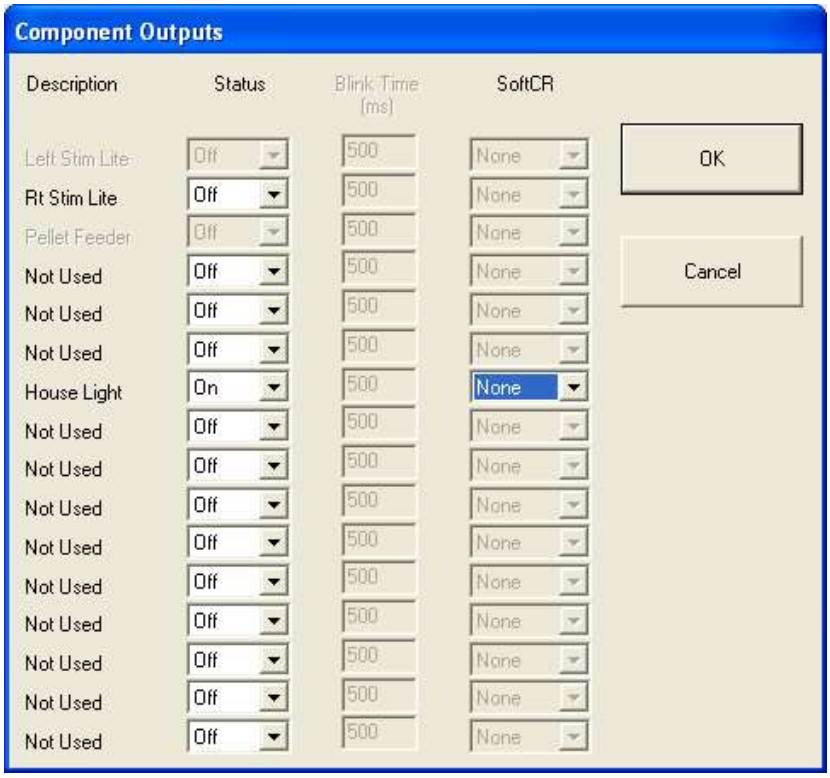
Next click the **Output Specifications** button and the screen shown in Figure 4-4 will appear. The Component Output Screen allows the user to assign which outputs to either turn on, turn off, or blink for the duration of the component, as well as whether or not to save the output as an Event or Pip in the SoftCR data file. In standard cumulative recorder testing, responses create a vertical step on the recorder graph, and a downward diagonal deflection of the pen (pip) indicates a reinforcement was issued. Event pens deflect up or down to indicate the occurrence of other significant environmental events such as stimulus changes.

Select **Off**, **On** or **Blink** from the pull-down menu associated with the desired output. Notice that the labels entered on the Input/Output Labels screen (Figure 3-4) appear here in the **Description** column, simplifying the identification of each output.

Select the optional **SoftCR** recorded element for each output that is used. An **Event** or a **Reset** will be recorded in the output SoftCR format data file.

Click **OK** to save changes and return to the Component Configuration screen (Figure 4-1). Click **Cancel** to return without saving changes.

Figure 4-4 - Component Output Configuration Screen



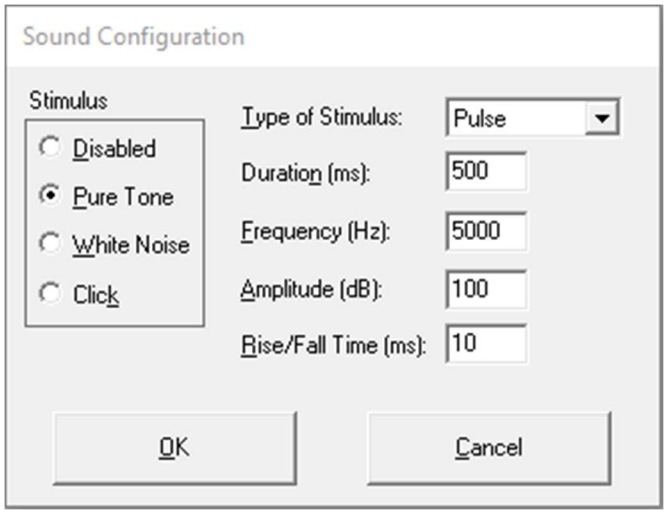
Note: "Left Stim Lite" and "Pellet Feeder" are grayed out because they are already assigned as Reinforcements (see Figure 4-3), and therefore cannot be Outputs.

Sound Specifications

If a Sound Device (ANL-926 or OmniSound) is being used, click the **Sound Specifications** button and the screen shown in Figure 4-5 will appear. The Sound Configuration screen allows the user to setup the Sound Device for this component. If the Sound Device is used, it will turn on at the beginning of the component.

Make the desired selections and click **OK** to save changes and return to the Component Configuration screen (Figure 4-1).

Figure 4-5 - Sound Configuration Screen



Saving Component Changes

Once the component information has been entered, click the **Save As…** button to save the component (see Figure 4-1 on page 9). Enter a component file name. The component file will be saved with a *.cmp extension.

Click the **Cancel** button to ignore all changes and close the Component Configuration screen.

CHAPTER 5 | CREATING A NEW PROCEDURE

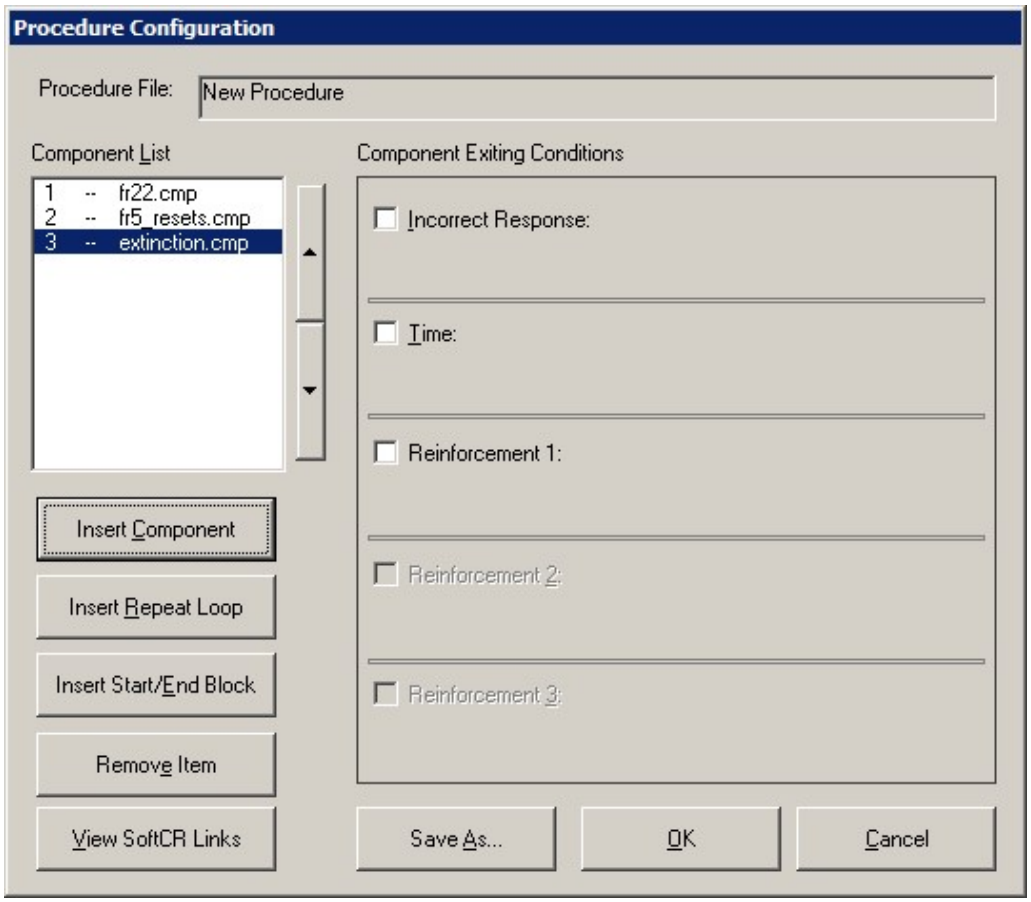
A procedure is a list of components that are linked together by a user-defined path. To create a new procedure, select **Procedure** | **New Procedure** and the screen shown in Figure 5-1 will appear.

The procedure screen's Component List will include the components used in the procedure. The number on the left is the component ID number, and on the right is the file name of the component.

The buttons on the bottom left of the screen allow the user to insert and remove components, insert repeat loops and start/end blocks, and view SoftCR links.

On the right-hand side of the screen are the component exiting conditions. These exiting conditions determine when a component ends, and which component is run next.

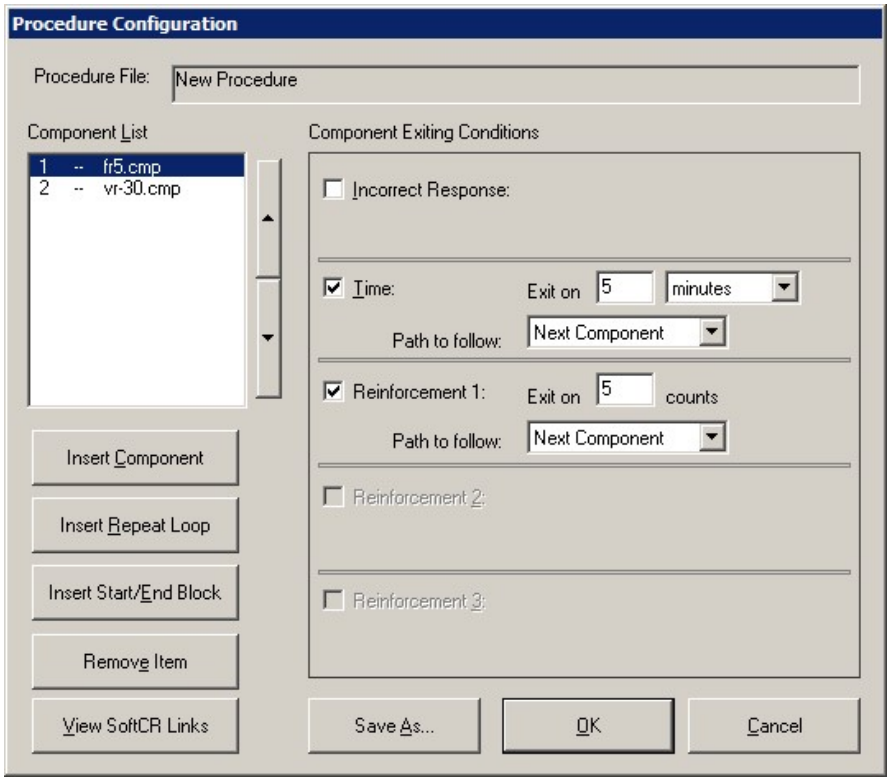
Figure 5-1 - Procedure Configuration Screen



For example, in Figure 5-2 component "fr5.cmp" will end and "vr-30.cmp" will begin when one of the following has happened:

- fr5.cmp has run for 5 minutes
- fr5.cmp has issued 5 reinforcements

Figure 5-2 - Procedure Example



Designing a Procedure

There are many ways to design a procedure. The following steps are recommended.

1. Create a rough sketch of the function of the desired procedure on paper. This will be the best way to keep on the right track.
2. Insert the components in the order that they are called, including Repeat statements when feasible.

NOTE: There is a limit of 32 total components, including repeats. A repeat only counts as one component.

3. Link components beginning at the top and working down. Add and delete components sparingly.

NOTE: If the procedure should remain in the same component until the end of the session time or the end of the experiment, create a link to itself using the component ID number.

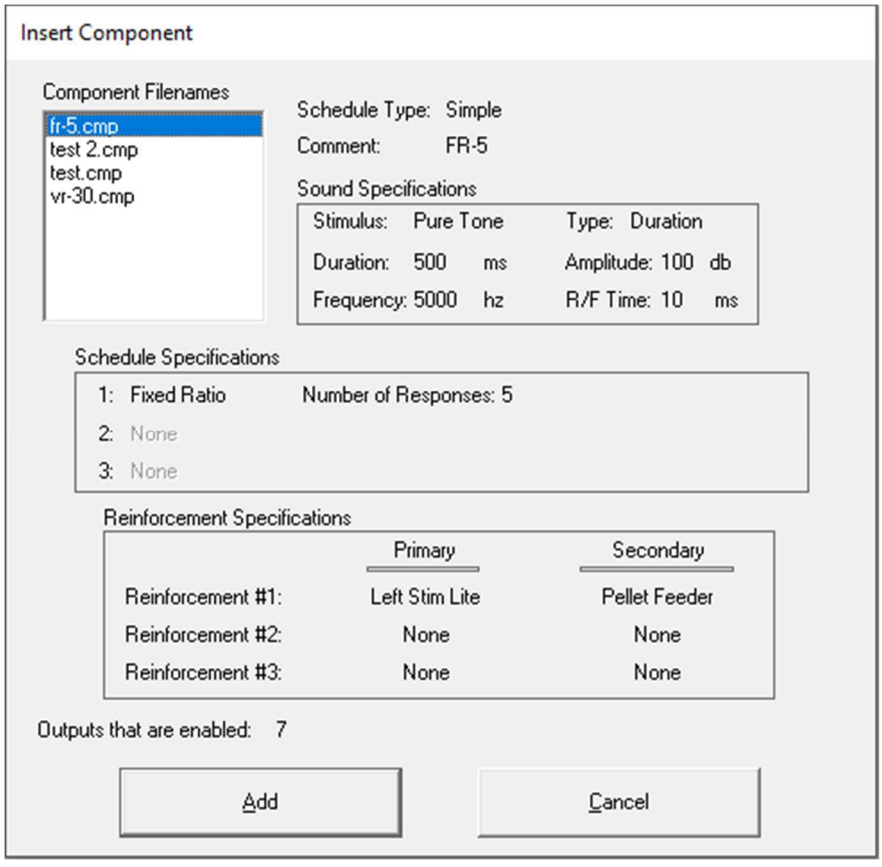
4. Walk through the procedure and verify that all components go to the correct location.
5. Click **Save** and Schedule Manager will verify that every link is legal. If an illegal link is found, it will indicate the ID number and what is wrong with the link.

NOTE: The user is responsible for the SoftCR links being correct. Schedule Manager cannot verify these links due to the variety of different possible applications. Use the **View SoftCR Links** button to help verify the SoftCR links.

Inserting a Component

Click the **Insert Component** button and the screen shown in Figure 5-3 will appear. Select the component and the component information will be displayed on the screen. Click **Add** to add the component to the procedure and return to the Procedure Configuration screen shown in Figure 5-1. Click **Cancel** to close this screen.

Figure 5-3 - Insert Component Screen



Defining Component Exiting Conditions

Exiting conditions must be defined for each component on the Component List. Select the exit condition(s) desired for each component. Each condition must also have a Path to follow selected. The Path to follow options are:

Table 5-1 - Path to Follow Options

Path to follow	Description
Next Component	Proceeds to the next Component on the Component List.
Go to Component ID	Enter the Component ID# to proceed to.
Probability Go to IDs	Click the **Probability** button and enter a probability for each component. The probability is the chance that the component will be randomly chosen to follow the current component.
Go to End	Ends the procedure at the end of this component.

Inserting a Repeat Loop

A single component or group of components may be repeated without having duplicate patterns of components. Repeat loops may be created to break up data into smaller time intervals for post-analysis or for discrete trial applications. To insert a repeat loop click the **Repeat Loop** button and the screen shown in Figure 5-4 will appear.

Figure 5-4 - Insert Repeat Loop Screen

Example:

To create a pattern of components that looks like this:

1, 2, 3, 4, 5, 2, 3, 4, 5, 2, 3, 4, 5, 6, 7, 6, 7, 6, 7

The repeat feature can be used to reduce the list to the following:

1, 2, 3, 4, 5, R(4, 2), 6, 7, R(2, 2)

This notation reduces a 19-component procedure to a 9-component procedure that is much easier to produce and review.

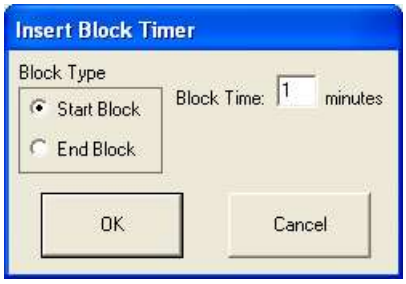
NOTE: Schedule Manager does not accept nested loops. A nested loop is a loop within another loop. If an attempt is made to save a nested repeat loop, Schedule Manager will display an error message.

Inserting a Start or End Block

A block timer allows the user to run a set number of components for a certain amount of time. To insert a block timer click the **Insert Start/End Block** button and the screen shown in Figure 5-5 will appear.

A block requires both Start and End Components. Insert the Start block before the desired set of components that should be confined to a specific number of minutes. Place the End block after the last component in the block.

Figure 5-5 - Insert Block Timer Screen



Viewing SoftCR Links

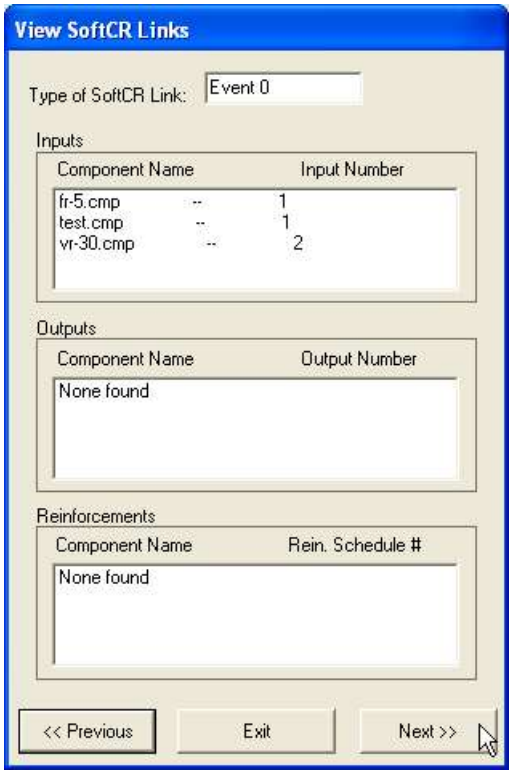
The View SoftCR Links screen is designed to allow the user to verify that the procedure that has been created does not produce inappropriate or inconsistent SoftCR links. The view SoftCR links screen does not allow the user to change SoftCR links.

The View SoftCR Links screen is composed of the following information:

Table 5-2 - View SoftCR Links Data

Item	Description
Type of SoftCR Link	Step, Pip, Reset, or Events. Refer to Chapter 9 for details on the different types of SoftCR links.
Inputs Box	Shows all components using that particular type of link in the input specifications.
Outputs Box	Shows all components using that particular type of link in the output specifications.
Reinforcement Box	Shows all components using that particular type of link in the reinforcement specifications.
Previous (button)	Backup to previous type of SoftCR link.
Next (button)	Advance to next type of SoftCR link.
Exit (button)	Return to the Main Procedure Screen.

Figure 5-6 - View SoftCR Links



Removing Items from Component List

Any item may be removed from the component list by highlighting it on the list and clicking the **Remove Item** button. A verification message will appear.

Saving the Procedure

Save the procedure by clicking the **Save** button. Enter a procedure file name. The procedure file will be saved with a *.prc extension.

Click the **Abort** button to cancel all changes and close this screen.

CHAPTER 6 | RUNNING AN EXPERIMENT

To begin an experiment, select **Experiment** | **Create New Experiment** and the Chamber Assignment screen shown in Figure 6-1 will appear.

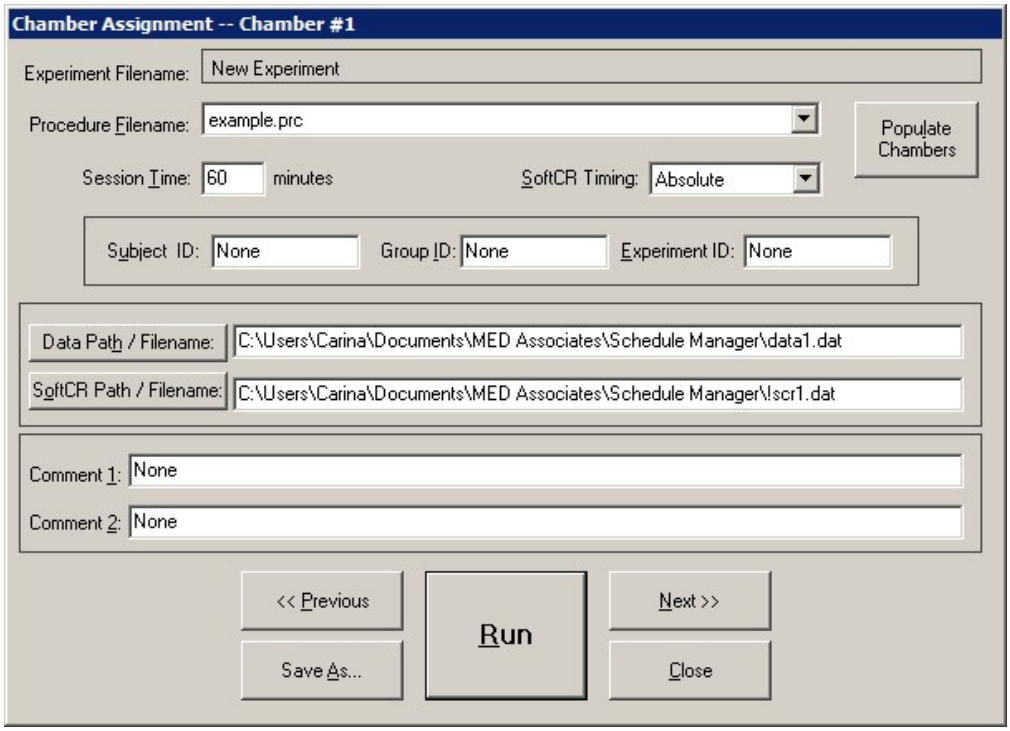
The Chamber Assignment screen is used to load a procedure for each individual chamber. This screen is displayed either when first entering an experiment or when requesting to load a procedure during execution of the experiment.

Select the procedure to load for Chamber 1 from the **Procedure Filename** pull-down menu. Enter the desired **Session Time**, **SoftCR Timing** (refer to Chapter 9 for more information regarding SoftCR Timing), **Subject ID**, **Group ID**, and **Experiment ID**. The default **Data Path/Filename** and **SoftCR Path/Filename** are shown. Click on either button to browse to enter a different path or filename. Enter any desired **Comments**.

Click **Next** to proceed to the Chamber Assignment screen for the next chamber or click the **Populate Chambers** button to copy specific settings from this chamber to all active chambers.

Once assignments have been made for each chamber, click the **Run** button. The runtime screen, shown in Figure 6-2 will appear.

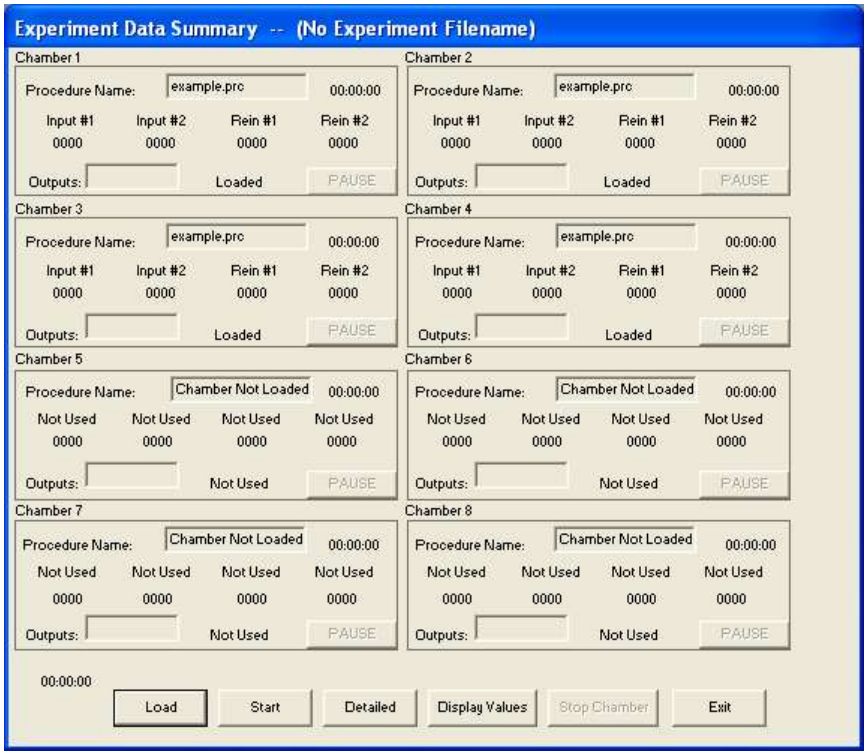
Figure 6-1 - Chamber Assignment Screen



The runtime screen is composed of eight boxes labeled Chamber 1 through Chamber 8. Each of these boxes represents one chamber and will run whatever procedure is loaded into it.

When the runtime screen is first opened, all chambers are stopped and waiting for the start command.

Figure 6-2 - Runtime Screen



Changing the Loaded Procedures

If any changes need to be made to the procedures that have been loaded, click the **Load** button to return to the Chamber Assignment Screen (Figure 6-1).

Starting Chambers

Click the **Start** button and the screen shown in Figure 6-3 will appear. Select the chamber(s) to start and click **OK**. There is a two second initialization period before data collection will begin.

Figure 6-3 – Start Chamber(s) Screen

To enable more chambers, edit the hardware configuration (Hardware menu, Modify Hardware Configuration). See Figure 3-2 - Interface Configuration Screen. The Number of Chambers field is at the upper right of the Interface Configuration dialog.

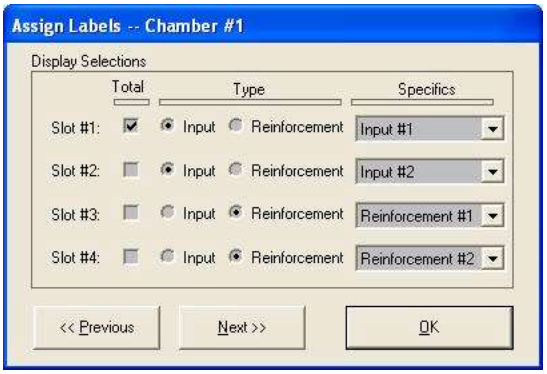
Viewing Detailed Chamber Information

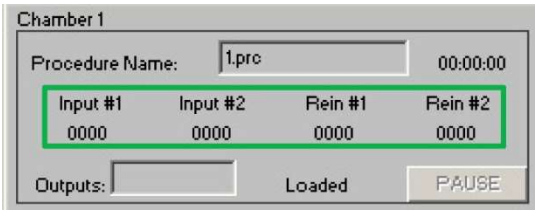
Click the **Detailed** button to display how many inputs and reinforcements have occurred for each chamber.

Configuring the Runtime Screen

Click the **Display Values** button to select what to display for each Chamber on the Runtime Screen (Figure 6-2). If Total is checked, the total number of events during the experiment will be displayed. If Total is unchecked, the number of events for the current component will be displayed. Figure 6-4 illustrates possible selections on the Assign Labels screen for Chamber #1, as well as the resulting display in the Runtime Screen.

Figure 6-4 – Example Assign Labels Screen for Chamber #1





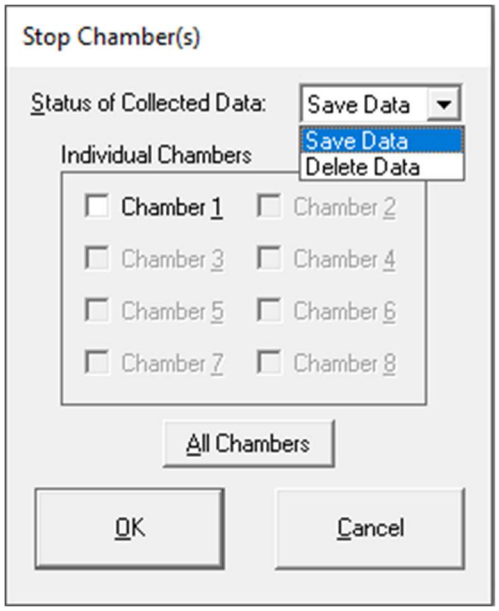
Pausing Chambers

Each chamber on the runtime screen has a Pause button associated with it. Clicking Pause stops the data collection and timing for that chamber. A pause will be shown in the data output file. To resume the chamber, press the button again.

Stopping Chambers

Click the **Stop Chamber** button on the Runtime Screen to select a running chamber to be stopped. Choose to Save or Delete the data using the drop-down control in the upper right. Select the individual chamber(s) via the associated checkboxes, or click **All Chambers**. Press **OK** to stop the chambers marked with a check. Press **Cancel** to close the dialog without stopping any chambers.

Figure 6-5 Stop Chamber Dialog



Save Data: This will stop the selected chambers and save the data in the assigned data file.

Delete Data: This will stop the selected chambers and discard all data collected. Ensure that the session data is not desired prior to using the Stop and Delete button. Once OK is clicked in the selection screen, the data is gone forever!

CHAPTER 7 | DATA

Schedule Manager creates two data files in two formats: SoftCR and Schedule Manager. The files' names and locations are defined on the Chamber Assignment screen (see Figure 6-1 above) during the acquisition setup process. As sessions are acquired, the results will be appended to the Data and SoftCR files specified on each chamber's Chamber Assignment screen.

The default SoftCR data file name format is: **`!scr*.dat`**, and the default Schedule Manager data file name format is: **`data*.dat`**. In both cases **`"*"`** is an integer 1-8 representing the chamber number. The default names may be changed by pressing the **Data Path / Filename** and **SoftCR Path / Filename** buttons on the Chamber Assignment forms.

The Schedule Manager formatted data file has similarities to the SoftCR data file, such as they are both ASCII text files, they both may contain results from multiple sessions in a chamber, and each contains a block of header information for each session. The two data file formats sometimes refer to the same objects differently however, as the SoftCR file calls the arena under test a "Box" where the Schedule Manager file refers to it as a "Chamber", and the SoftCR file's "Source Code" is the Schedule Manager's "Procedure". The Schedule Manager file also contains the two lines of optional comments entered on the Chamber Assignment screen (see Figure 6-1 - Chamber Assignment Screen above).

SoftCR Data Files

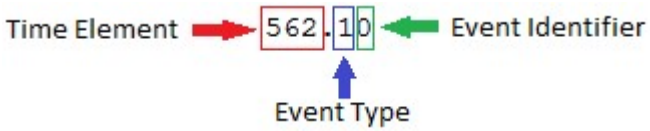
To be precise, there are four SoftCR data file formats. The SoftCR data files created by Schedule Manager are of the "Annotated" (or "Format 1") data file format, with Full Headers.

Each experiment's SoftCR data file (e.g. !scr1.dat for chamber 1's sessions) has the file name as the first line, followed by two blank lines, then nine lines of header information. Following the header information are 25 lines labeled "A:" to "Z:" with "C:" skipped and placed on the 26th line. Additional sessions in the same chamber will be appended to the file following two more blank lines.

For example:

```
C:
        0:  562.10      761.10      1057.11     1388.11     1474.10
        5:  1628.10     2052.10     2053.20     2631.11     2720.11
```

The "C:" label precedes an array of floating point values. There are up to 5 values per line, and each line starts with first element's zero-based index (e.g. "0:" on the first line, "5:" on the second, "10:" on the third, etc). Each value indicates an input recorded by Schedule Manager during the experiment session.



The values are formatted with the time of the input displayed in "Ticks" of time before the decimal point, and the type of the event and event identifier following the decimal point. A tick's time period is dependent on the Temporal Resolution assigned to the MED Card during hardware configuration (see

Figure 3-1 - MED Card Setup Screen above). So if using 10 millisecond resolution, each tick is 0.01 seconds and "562" would be 5.62 seconds.

The event types are:

1Y:	Response or Step,	Y = trace index (0-9).	E.g. .10 = trace 0 step,	.11 = trace 1 step, etc.
2Y:	Reinforcement or Pip,	Y = trace index (0-9).	E.g. .20 = trace 0 pip,	.21 = trace 1 pip, etc.
3Y:	Reset Trace Pen,	Y = trace Index (0-9).	E.g. .30 = trace 0 reset,	.31 = trace 1 reset, etc.
5Y:	Event Pen to Level 0 (down or at baseline),	Y = event index (0-9).	E.g. .50 = Event 0 Low.	
6Y:	Event Pen to Level 1 (up or high),	Y = event index (0-9).	E.g. .60 = Event 0 High.	

The value "562.10" in array "C" of a SoftCR format data file means an event was seen 562 ticks into the session (or 5.62 seconds if using 10 millisecond resolution). The ".10" portion indicates the event was a Response (1) on trace zero (0) or a "Step 0".

Following is the first session of a SoftCR data file:

```
File:  c:\users\smuser\documents\med associates\schedule manager\!scr1.dat


Start Date:  3/30/2014
End Date:  3/30/2014
Subject:  CAEL
Experiment:  For Manual
Group:  Control
Box:  1
Start Time:  13:53:15
End Time  :  13:54:12
Source Code:  fr5 x3
A:      0.00
B:      0.00
D:      0.00
E:      0.00
F:      0.00
G:      0.00
H:      0.00
I:      0.00
J:      0.00
K:      0.00
L:      0.00
M:      0.00
N:      0.00
O:      0.00
P:      0.00
Q:      0.00
R:      0.00
S:      0.00
T:      0.00
U:      0.00
V:      0.00
W:      0.00
X:      0.00
Y:      0.00
Z:      0.00
C:
        0:  0.69        0.68        845.10      942.10      1127.11
        5:  1252.11     1412.60     1412.50     1552.60     1552.50
```

```
10:  1811.10     1957.10     2319.10     2320.20     2320.61
15:  2320.51     2320.67     2569.57     2819.67     3069.57
20:  3319.67     3569.57     3819.67     4069.57     4250.10
25:  4311.10     4319.67     4385.10     4464.10     4569.57
30:  4577.10     4578.20     4578.61     4578.51     4578.30
35:  4578.68     5395.10     5454.10     5514.10     5572.10
40:  5645.10     5646.20     5646.61     5646.51
```

Schedule Manager Data Files

The second type of data file created by Schedule Manager is unique to Schedule Manager and not used by other MED Associates software.

Each session in a Schedule Manager data file is separated by a pair (or two pairs) of double lines (equals signs). Each session begins with a 10 line **Header Block** containing the session's date, chamber, procedure, subject, group, experiment, comment lines from the Chamber Assignment screen (see Figure 6-1 above), and the path to the SoftCR formatted data file.

Following the header block are three more sections: **Input Labels**, **Component Inputs and Reinforcements**, and **Efficiency and Pause** information.

The **Input Labels** section displays the information entered on the Input/Output Labels Screen (see Figure 3-4).

The **Component Inputs and Reinforcements** section displays the Inputs read and Reinforcements issued in a table format. Each row below the header row (header row starts with "Component") represents a component. In the example below, three components were run, the first and third were "fr5-cael" and the second was "fr5 blin".

The **Efficiency and Pause** section indicates any missed hardware interrupts as a percentage of captured hardware interrupts (**Efficiency**) and the count of missed interrupts (**Number of long cycles**). If the experiment was paused, that information will also be included in this last section.

Following is a session's data from a Schedule Manager data file. The data is from the same session as shown above in the SoftCR Data Files section.

```
Start: Sun Mar 30 13:53:15 2014
End:   Sun Mar 30 13:54:12 2014
Chamber: 1
Procedure: fr5 x3.prc
Subject ID: CAEL
Group ID: Control
Experiment ID: For Manual
Comment 1: Three FR5 components
Comment 2: None
SoftCR Filename: C:\Users\smuser\Documents\MED Associates\Schedule Manager\!scr1.dat

Input Labels
   In1  :  Left Lever Rsp    In2  :  Rt Lever Rsp      In3  :  Input_3
   In4  :  Input_4           In5  :  Input_5           In6  :  Input_6
   In7  :  Input_7           In8  :  Input_8

Component   In#1  In#2  In#3  In#4  In#5  In#6  In#7  In#8   Rein1  Rein2  Rein3   Time

fr5-cael    0005  0002  0000  0000  0000  0000  0000  0000   0001   0000   0000   00:23.200
fr5 blin    0005  0000  0000  0000  0000  0000  0000  0000   0001   0000   0000   00:22.580
```

```
fr5-cael    0005  0000  0000  0000  0000  0000  0000  0000   0001   0000   0000   00:10.680

Totals:     0015  0002  0000  0000  0000  0000  0000  0000   0003   0000   0000   00:56.460

Efficiency Statistics
Efficiency: 100.00%
Number of long cycles: 0

Pause Data
----------
There were no pauses on this chamber.

================================================================================================
================================================================================================
```

CHAPTER 8 | SCHEDULE MANAGER MENUS

Selecting Menu Items

There are two ways to select a menu. The first is to use a mouse to click and pull the menu down, and then click on the item desired. The other way is to press and hold the ALT key and then press the underlined character in the menu, then press the underlined character of the item desired. For example, to exit the program, pull down the file menu by typing ALT-F, then type "X".

Menu Items

File

Directories: Opens the Configuration Directories screen shown in Figure 2-1

Exit: Exits Schedule Manager

Hardware

Modify Hardware Configuration

Performs complete overhaul of the hardware configuration loaded at this time. The changes may be aborted at any time by clicking on the cancel button in any of the stated windows.

Load Hardware Configuration

Option loads a pre-existing hardware configuration.

Change Autoload Configuration

Shows the hardware setup screen shown in Figure 2-2. Use this dialog to change the autoload configuration, reload a configuration or create a new configuration.

Partial Hardware Modification

Use this item to modify one of the following items in the hardware configuration:

Modify MED card: Brings up the MED cards setup window

Modify Labels: Brings up the I/O description window.

Modify Chambers: Brings up the chamber configuration window.

Component

New Component

Item launches the Component Configuration screen shown in Figure 4-1. Follow the directions in Chapter 4 | Creating a New Component to create a component.

Modify Component

Select to view or modify an existing component. Choose a component file (*.cmp) from the standard File Open dialog. Click Open, and the component screen will be loaded with the data stored in the component. The modified component may be saved with the same filename or a new filename.

Procedure

New Procedure

Choose to create a new procedure and bring up the Procedure Configuration screen, shown in Figure 5-1. Follow the directions in Chapter 5 | Creating a New Procedure to create a procedure.

Modify Procedure

Select to view or modify an existing procedure. Choose a procedure file (*.prc) from the standard File Open dialog, click Open, and the procedure screen will be loaded with the data stored in the procedure. The modified procedure may be saved with the same filename or a new filename.

Experiment

Create New Experiment

Creates a new experiment and launches the Chamber Assignment screen, shown in Figure 6-1. Follow the directions Chapter 6 | Running an Experiment to create an experiment.

Load/Modify an Experiment

Select to load and run an existing experiment file (*.exp). The Chamber Assignment screen (Figure 6-1) launches after clicking Open on the standard File Open dialog.

Utilities

View Current Config:	Choose to view the current hardware configuration.
View Data File:	Select to view a data file (*.dat) in the registered Windows text viewer application (e.g. Notepad).
Hard Copy:	View any pre-existing hardware, component, procedure, or experiment configurations.
Test Interface Card:	Test the DIG-704, DIG-705, DIG-706, or DIG-750 card. Use this menu item to make sure the MED Associates interface card is working properly.
Clear Interface:	Clears the hardware inputs and outputs.

Data Analysis: Choose how Schedule Manager formats experiment data in the Schedule Manager formatted data file (selecting options will not affect the SoftCR formatted data file).

Chronological: Multiple components of an experiment session are listed in their chronological order of execution. Each component is represented by a row in the Component section of the data file. A single "Totals" row sums the inputs, reinforcements, and component completion times of the multiple components. This is the default option.

Component Detail: Multiple components are ordered by component name (not by execution time). Each component is represented by a row, and each component type group has a subtotal row. The subtotal rows display the sum of each input, reinforcement, and component completion time value columns for its component group. A single "Totals" row sums the subtotals.

Component Summary: Multiple components are grouped by component name as in Component Detail, but only the subtotals and "Totals" rows are presented. Individual component results are not shown.

Help

View Manual: Displays the user's manual in the system's default PDF viewer.

About Schedule Manager: Brings up the About screen, which contains the software version number and copyright information.

CHAPTER 9 |DEFINITIONS

File Types

Schedule Manager uses and creates several different data files. They are as follows:

Table 9-1 Data File Types

File Extension	Description
*.exe, *.dll, *.sav	Master files supplied with Schedule Manager. Do NOT modify these files. Modification of these files will damage the integrity of the program.
*.cfg	Hardware configuration files. Do not modify these files with text editors.
*.cmp	Component configuration files. Do not modify these files with text editors.
*.prc	Procedure configuration files. Do not modify these files with text editors.
*.exp	Experiment configuration files. Do not modify these files with text editors.
*.dat	Data files gathered from the Runtime screen.
*.tx1	Human-readable version of the hardware configuration.
*.tx2	Human-readable version of the component configuration.
*.tx3	Human-readable version of the procedure configuration.
*.tx4	Human-readable version of experiment configuration.

Types of SoftCR Links

Schedule Manager features SoftCR links. These links are used so that data may be viewed as a standard cumulative record with up to ten trace pens and ten event pens. With these links, Schedule Manager produces an annotated ASCII data file (SoftCR Data Format 1). The different types of links that can be created are as follows:

Table 9-2 - Types of SoftCR Links

SoftCR Link	Description
Step	Causes the trace pen to move upward one "step". Usually indicates a subject's response e.g. a lever press.
Reset	Brings the trace pen back down to the baseline.
Pip	Causes a hash mark to appear on the trace. Usually issued when a reinforcement occurs.
Event	Produces a mark on the event table in the case of an input. In the case of an output the event pen will remain high while the output is in use.

Types of SoftCR Timing

In the procedure screen, select the timing type Schedule Manager uses to record for SoftCR.

Table 9-3 - Types of SoftCR Timing

Timing Type	Description
Disable	Disables ALL SoftCR links created in the components. Use this if SoftCR files should not be created.
Absolute	Saves the elapsed time for each response or event in tenths of seconds. This type is not recommended if running very long experiments since the times will get very large.
Relative	Saves the time between the current response or event and the last response or event. Each response or event resets the time to zero.

To clarify this, two samples of SoftCR files are shown below:

Absolute

```
0:      0.50      0.51     23.10     35.10     43.10
5:     45.60     45.50     47.20     47.20     55.30
```

Relative

```
0:      0.50      0.51     23.10     12.10      8.10
5:      2.60      0.50      2.10      0.20      8.30
```

SoftCR data has the format: "NNN.XY", where "NNN" is the time of the event in clock ticks, "**X**" is the event type, and "**Y**" is the trace (or event) index. The number of clock ticks per second is defined by the temporal resolution of the Hardware Configuration. The valid event types (X) are:

1Y: Response or Step. Y = trace index (0-9). E.g. .10 = trace 0 step, .11 = trace 1 step, etc.

2Y: Reinforcement or Pip. Y = trace index (0-9). E.g. .20 = trace 0 pip, .21 = trace 1 pip, etc.

3Y: Reset Trace Pen. Y = trace Index (0-9). E.g. .30 = trace 0 reset, .31 = trace 1 reset, etc.

5Y: Set Event Pen to Level 0 (down/baseline). Y = event index (0-9). E.g. .50 = Event 0 Low.

6Y: Set Event Pen to Level 1 (up/high). Y = event index (0-9) E.g. .60 = Event 0 High.

CHAPTER 10 |EXAMPLES

Hardware Configuration

Hardware configuration is generally performed only during the initial set up of a system. Modifications may be made if additional test chambers are added or when adding additional inputs or outputs to the original test chambers. To complete the hardware configuration, some basic information about the physical hardware must be known, including the port and offset setting for each interface module and the bit value assigned to each input and output for each chamber. MED Associates provides this information with all complete systems.

The following example demonstrates a hypothetical configuration that has six chambers with two inputs and two outputs for each chamber and a resolution of 50ms. Two standard input cards and two standard output cards will be used for this example. The input cards are set for ports 780 and 781. The output cards could also be set at ports 780 and 781; however, for purposes of this illustration they have been placed at ports 782 and 783.

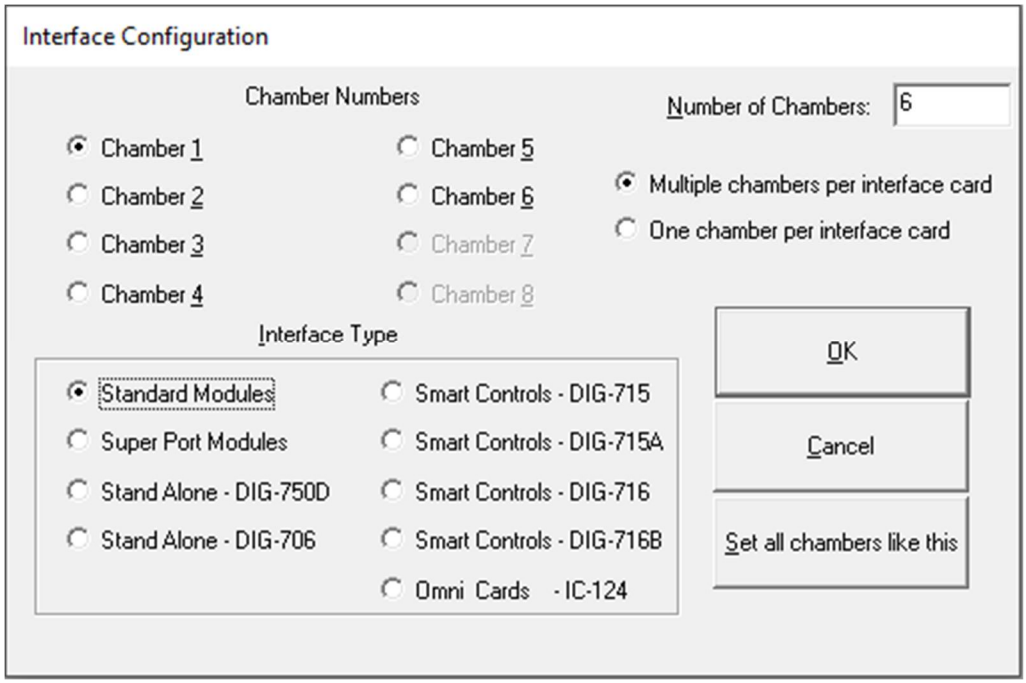
Open the **Hardware** menu and choose **Modify Hardware Configuration** to bring up the MED Card Setup screen. Set the **Resolution** to **50ms** and click on the **OK** button.

Figure 10-1 - MED Card Setup

The Interface Configuration screen appears next. This screen allows Schedule Manager to compute the configuration defaults. This feature will typically save time and for the most part, the user will not have to make any changes.

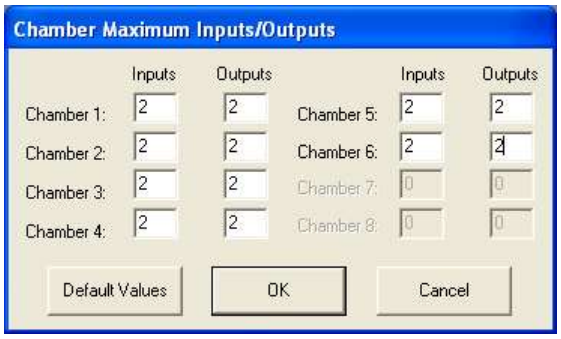
Enter **6** as the **Number of Chambers**, click **Standard Modules**, and then click **Set all chambers like this**. Schedule Manager will now use standard modules on six chambers. Click **OK** to continue.

Figure 10-2 - Interface Configuration Screen



The Chamber Maximum Inputs/Outputs screen appears next. This screen allows the user to define how many inputs and outputs there are going to be for each chamber. For this example there will be two inputs and two outputs for each chamber. Enter **2** in each of the boxes. Notice that chambers seven and eight are disabled. Schedule Manager will not allow the user to modify these chambers because it was indicated earlier that six chambers are being used. Click on the **OK** button once all of the inputs and outputs have been changed.

Figure 10-3 - Chamber Maximum Inputs/Outputs Screen



The Input/Output Labels screen appears next. This screen is used to label the different inputs and outputs. For this example enter **Left Lever** and **Right Lever** for Inputs 1 and 2 and **Stimulus Light** and **Feeder** for Outputs 1 and 2. Once these labels are assigned, they will appear in future windows for designing components and procedures and make working with the forms presented in these windows easier. Click **OK** to proceed.

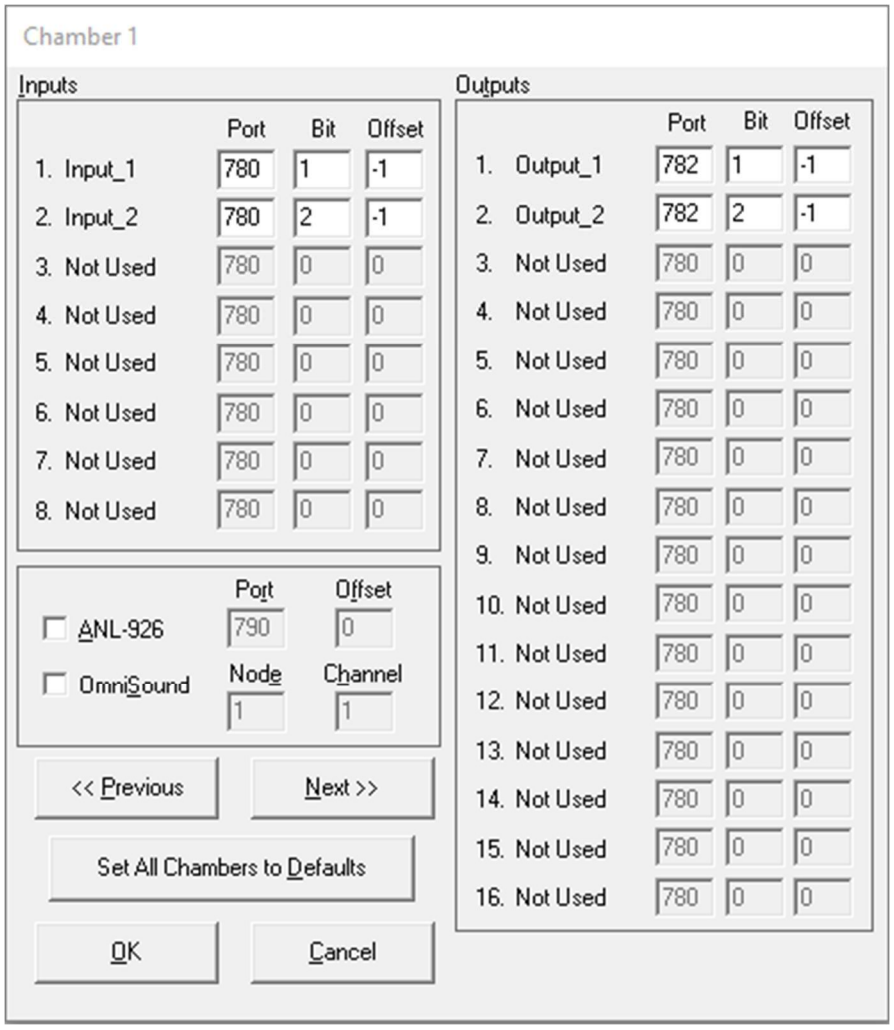
Figure 10-4 - Input/Output Labels Screen

Now the final hardware configuration screen has been reached. Schedule Manager created all of this information from the data given in last four screens. This screen shows the information for Chamber 1, with the default values loaded by Schedule Manager. The output interface cards should be on ports 782 and 783. Change the Output Port from 780 to 782 for Outputs 1 and 2.

Click **Next >>** to advance to the next chamber. Change the Output Port values from 780 to 782 or 781 to 783 for each chamber.

In this example, leave the bits at the default values. Once all of the Output Port numbers have been changed, the configuration is done. Click on the **OK** button. Schedule Manager permits multiple configurations that are useful if connecting different test chambers to the same interface modules. However, if only one configuration is to exist on the system, it is advisable to save it as DEFAULT.CFG. If using multiple files, it is still convenient to save the most frequently used configuration as DEFAULT.CFG.

Figure 10-5 - Final Configuration Screen



NOTE: If an existing hardware configuration is modified, Schedule Manager will not automatically set items to their default values. That is only done when creating a new configuration. If items in the hardware configuration are modified (like the number of inputs), pay close attention to the chamber configuration screen. Use the **Set All to Defaults** button in the chamber configuration screen only when all chambers are changed and ports and bits are still organized sequentially; otherwise, values must be changed manually. An improper chamber configuration may result in input and output errors at run time.

Appendix A | CONTACT INFORMATION

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

Please visit our website at www.med-associates.com.

Sales questions: email sales@med-associates.com.

Technical questions: email support@med-associates.com.