med associates inc

Instrumentation and Software for Research

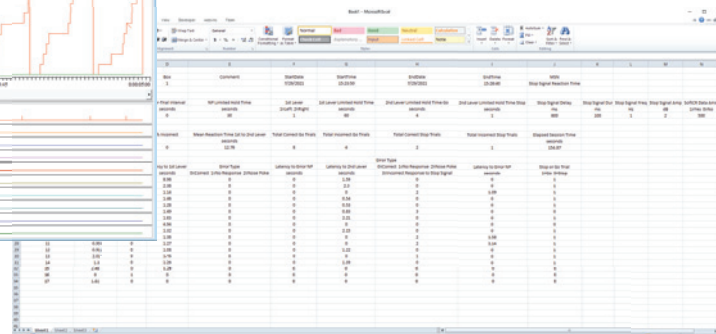## SOFTWARE

Med-PC data shown in SoftCR (SOF-721/-722)
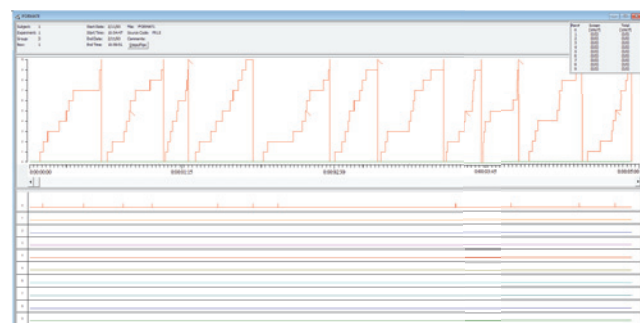
Med-PC data shown exported to Microsoft Excel via MPC2XL (SOF-731)

Med-PC V

COMPUTER REQUIREMENTS

- Windows 7, 8 or 10 *(64-bit)*
- USB port *(for DIG-705)* or PCI/PCIe port *(for DIG-704)**

*NOTE: legacy support for customers with DIG-704 decode cards

TABLE OF CONTENTS EXPANDED

The Med-PC® system provides several options for establishing experimental procedures:

- Use one of our many "canned" procedures, requiring little effort and no programming
- Modify an existing procedure *(or contract us to modify it)*
- Develop a new procedure *(or contract us to develop it)*

In the course of developing custom code for customers over the years, we have turned the popular programs into standard programs, many are found in this brochure.

All of our software is indexed in this document, organized by product name (A-Z) on pages 36-37, and by product number (SKU) on pages 38-39.

If the software you're looking for can't be found there, custom coding services are available. We will work with you to create any protocol, utility, or software you need. Contact our Sales team at 802-527-2343.

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APPROXIMATELY ²/₃ OF RESEARCH ARTICLES IN LEADING BEHAVIORAL RESEARCH JOURNALS FEATURE THE USE OF MED-PC® SOFTWARE FOR EXPERIMENTAL CONTROL.

- Compiled results from the Journal of Experimental Analysis of Behavior (2006 to 2019)

THE BEST IN SHOW.

Although some manufacturers may try, it's difficult to compare any other system to Med-PC®. It has been the leading behavioral experimental control software for over three decades. Med-PC® and MedState Notation™ (MSN) continue to be the preferred choice for more laboratories than any other programming language or system.

Over the last decade, our software has been used for experimental control in more JEAB behavioral research articles than any other software.

Journal of Experimental Analysis of Behavior
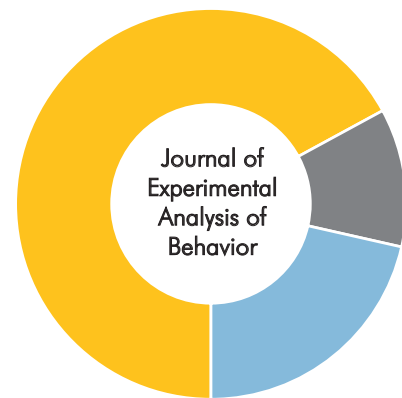
- ■ Med-PC®: 228
- ■ Other commercial software: 37
- ■ Other non-commercial software: 73

\\ THE POWER OF WORDS.

The simple fact is that MedState Notation (MSN) works. Users determine exactly what is desired for experimental flow and data collection, encoded in simple text commands. Reviewing countless tables is no longer necessary to determine which options apply under given circumstances. MSN uses simple commands whose functions are inherently recognizable and easy to learn (e.g. ON, OFF, SHOW, ADD, IF, SET, etc.).

```
S5,
    #R1: ADD R; IF R >= 10 [@NextBlock, @ContBlock]
                @NextBlock: OFF ^LeftLight;
                            ADD B; SHOW 4,Block #,B;
                            SET T = 1 ---> S1
                @ContBlock: ON ^LeftLight;
                            ADD T; SHOW 5,Trial #,T ---> S2
```

Placing these commands into logically ordered text gives you total flexibility in the control of chamber components, stimuli, reinforcement mechanisms, data storage, and display. MSN is a state-based programming language with blocks of states called state sets. If it can be drawn as a state diagram or a flow chart, it can be coded in MSN.

To write your own protocol, use the included Trans™ editor and execute it in multiple chambers with Med-PC. Extensive tutorials and syntax documentation to learn MSN programming and concepts are included.

Many standard pre-written procedures are available for purchase to suit many common applications such as: Fixed Ratio Training, Elevated Maze Data Collection, Delayed Match to Position, Five Choice Serial Reaction Time Task, and many more.

In addition, we offer custom coding solutions. Whether simple or complex, just provide us with your specifications and we will develop the program for you so you can focus on getting your experiment up-and-running quickly.

NEW IN MED-PC® V

IMPROVED USER EXPERIENCE

- Native 64-bit application *(Windows 7 or later)*
- All screens and dialogs have been completely redesigned, with an emphasis on reducing key strokes required for routine tasks
- Tool buttons placed on moveable panels
- New terminal panel for expert users to rapidly enter commands without using the menu system
- Macro parameter panels can be used to create highly customized data entry dialogs in macros
- Each Windows user can have a separate procedure list so that it is easier to find one's own programs when loading boxes
- The new load box screen makes loading multiple boxes with various programs a snap
- Ability to drag & drop or resize the panes and panels in almost any configuration you desire; which can then be saved and easily accessed at any time using the "Saved Desktops" drop-down list

- Graphical Hardware Configuration Utility provides representation of the interface cabinet for easy and intuitive input/output card installation and setup

MED-PC®, SIMPLIFIED

- Data file options are now defined within Med-PC®, and the schemes for naming files have been simplified and otherwise improved
- Data filenames now have a ".TXT" extension so they can be easily opened in text editors
- Saving data has been simplified:
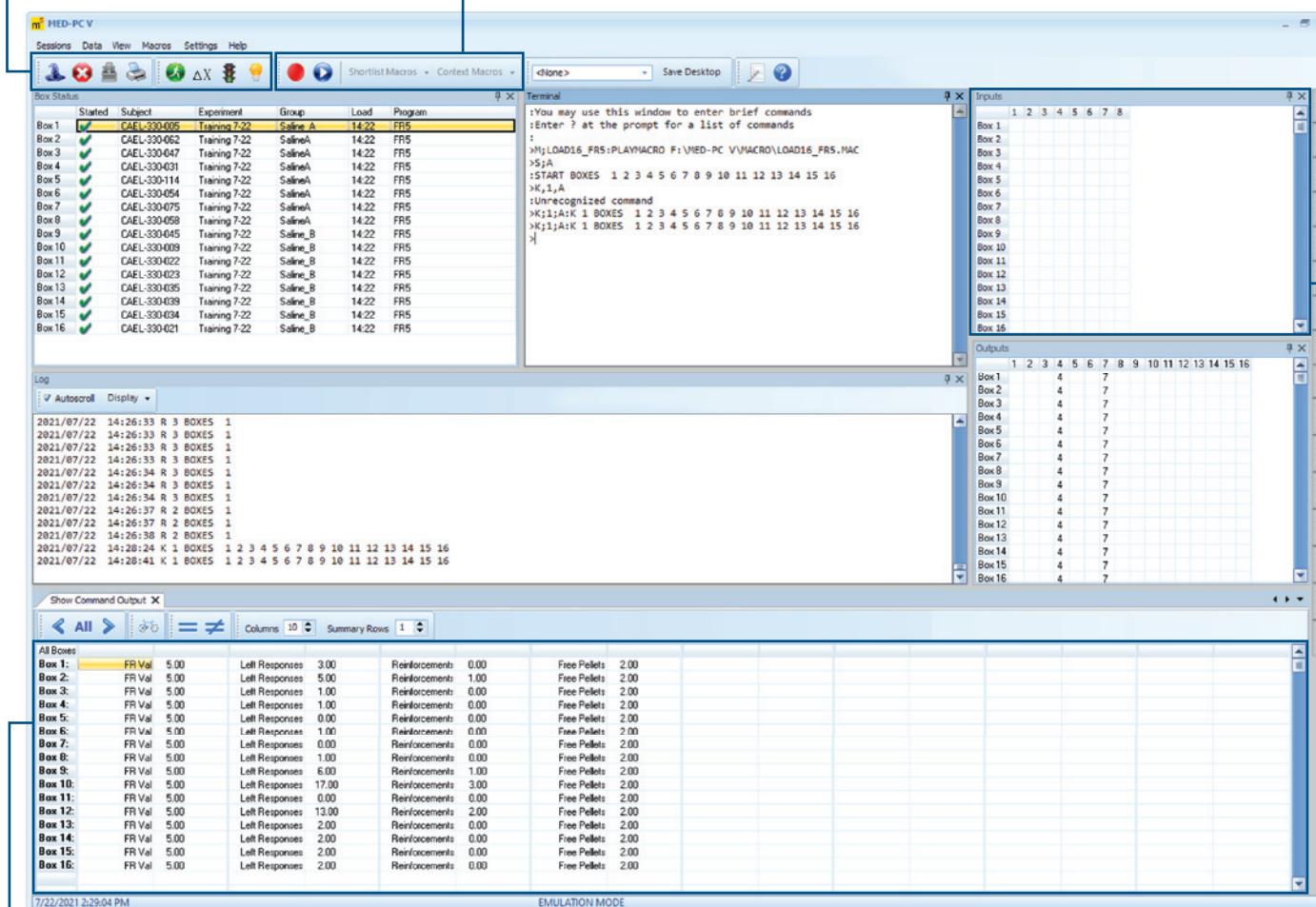 - Use STOPSAVE to end the session and save the data
  - Use STOPDISCARD to end the session and discard the data
- Options for defining print layout and specifying the printer have been simplified

MED-PC V BEHAVIORAL CONTROL SOFTWARE SUITE

SOF-736

The suite is comprised of four applications:

- **Hardware Configuration Utility (HCU)** is used to build a configuration file that informs Med-PC® how many boxes are connected, how many inputs and outputs are available to each box, and how they are identified. Includes on-screen guides that walk the user step-by-step through the setup procedure.
- **Med Test** helps verify hardware functionality independently of Med-PC®. This includes tests for interface cards, Programmable Audio Generators *(e.g. ANL-926)*, Smart-Ctrl interface modules, standard modules, SuperPort modules and more.

- **Trans** is used to compile MedState Notation™ (MSN) procedures into DLL files to be executed by Med-PC®. Trans also serves as a text editor for writing MSN procedures and includes a detailed help file for programming in MedState Notation.
- **Med-PC®** is the runtime or operating system in which MSN procedures are executed. It allows for the use of up to 16 test chambers with up to one million data elements per chamber. A single test chamber may have up to 80 inputs and 80 outputs.

MED-PC

The **macro toolbar** is conveniently positioned for adding commonly used macros to the shortlist for quick and easy access.

Context macros allow the user to assign macros to the shortlist so they are available when specified programs are loaded or running.

The **new & improved toolbar** greatly reduces the clicks and keystrokes needed to start & stop boxes, issue start signals, k-pulses, as well as changing variable & array values.

The new **live inputs panel** makes coding, testing and debugging programs a breeze. Simply double click the desired input square to simulate a single input, or right click for a level mode input.

Improved SHOW fields feature easily adjustable column widths and number of rows. The SHOW toolbar allows the user to view all boxes, manually cycle through them, or automatically cycle through each running box.

TRANS

A **tabbed editor** with features like keyword completion, keyword help, keyword highlighting, and automatic highlighting of syntax elements.

Simplified commands such as the "Time of Day" command. Now, coordinating commands with specific dates and times takes approximately half the amount of code to execute than before.

Flexibly re-arrange your workspace with new **docking panels.**

Easily move a panel using the directional pad shaped icon.

Customizable text coloring to improve both the readability and organization of your code. Choose from a plethora of color and text style options to indicate comments, state numbers, and custom keywords to visually define protocol flow while coding.
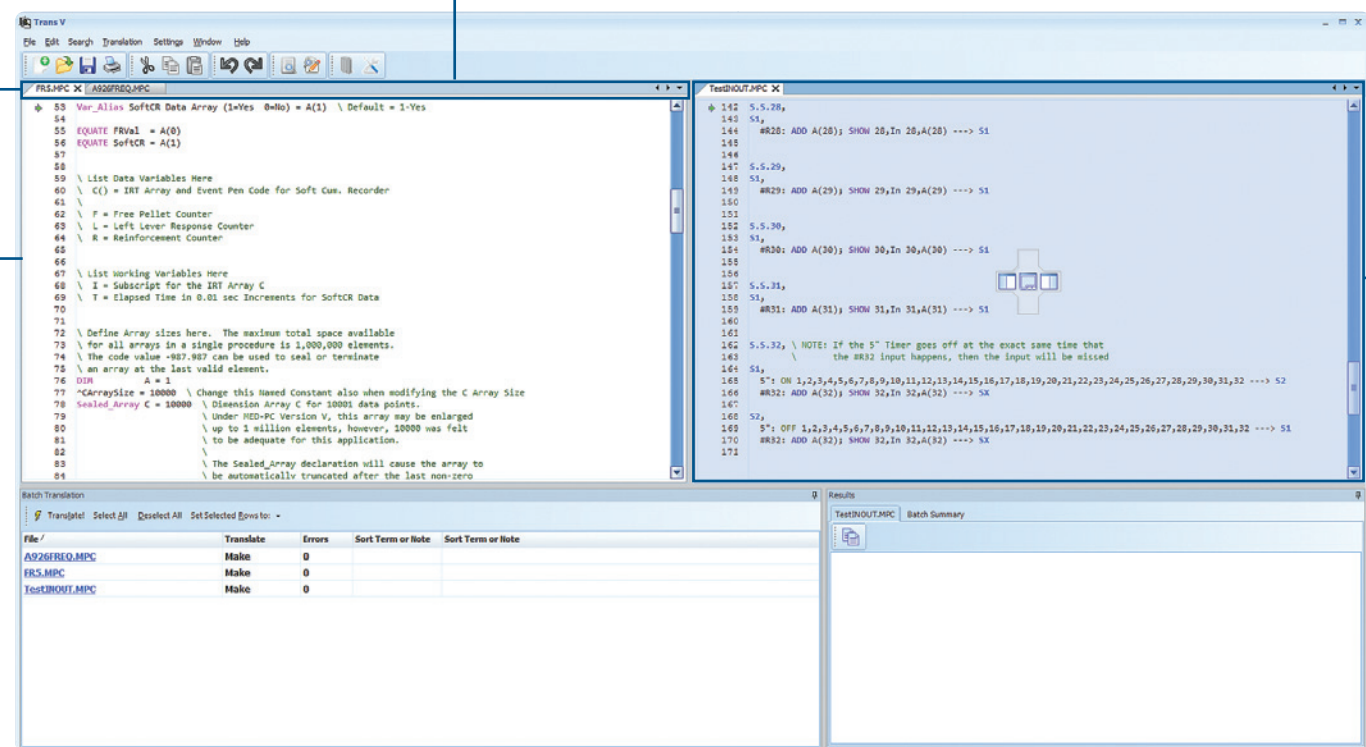
Equated variables make it easier to navigate your code, and also make it immediately understandable to anyone viewing the code by substituting the variable with plain English.

For example:
S.S.1,
S1,
   #R1: ADD L ---> SX

...can now be written as:
EQUATE LeftLeverPresses = L

S.S.1,
S1,
   #R1: ADD LeftLeverPresses ---> SX

NEW IN TRANS V

COMPLETELY REDESIGNED ENVIRONMENT

- Editor bookmarks make it easier to navigate to specified sections of code, the user can now use "Ctrl+#" to create a bookmark, and "Alt+#" to navigate to an existing bookmark
- Support for drag & drop of MSN files into the editor has been added

NEW MSN COMMANDS

- FOR-NEXT loops
- SHOWEX to display data with control over the number of decimal digits
- SEALED_ARRAY will cause the array to be automatically truncated after the last non-zero value so that only those elements used during the running of the procedure are saved to the data file

LANGUAGE CHANGES FROM TRANS IV

- STOPKILL has been renamed STOPDISCARD
  - STOPKILL will continue to function as expected (no need to change existing code)
- STOPABORT and STOPABORTFLUSH are obsolete and will be interpreted as STOPSAVE, which ends the session and writes the data to disk
  - Saving data to memory and writing to disk have been condensed into a single operation (no need to change existing code)
- The FLUSH command has been renamed WRITE
  - FLUSH will be interpreted as WRITE (no need to change existing code)
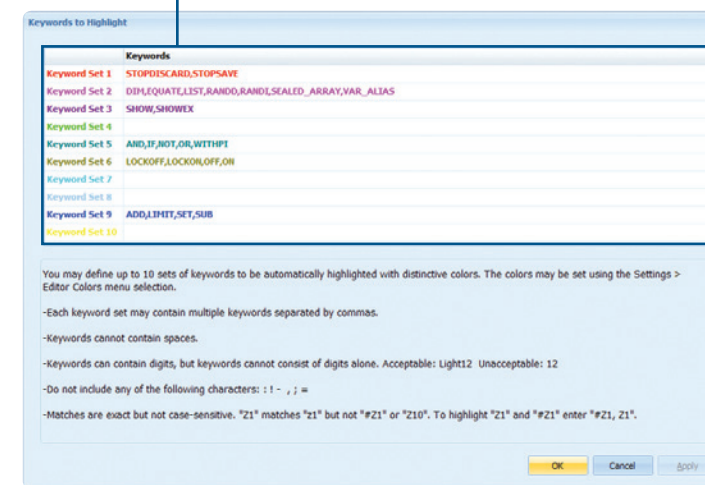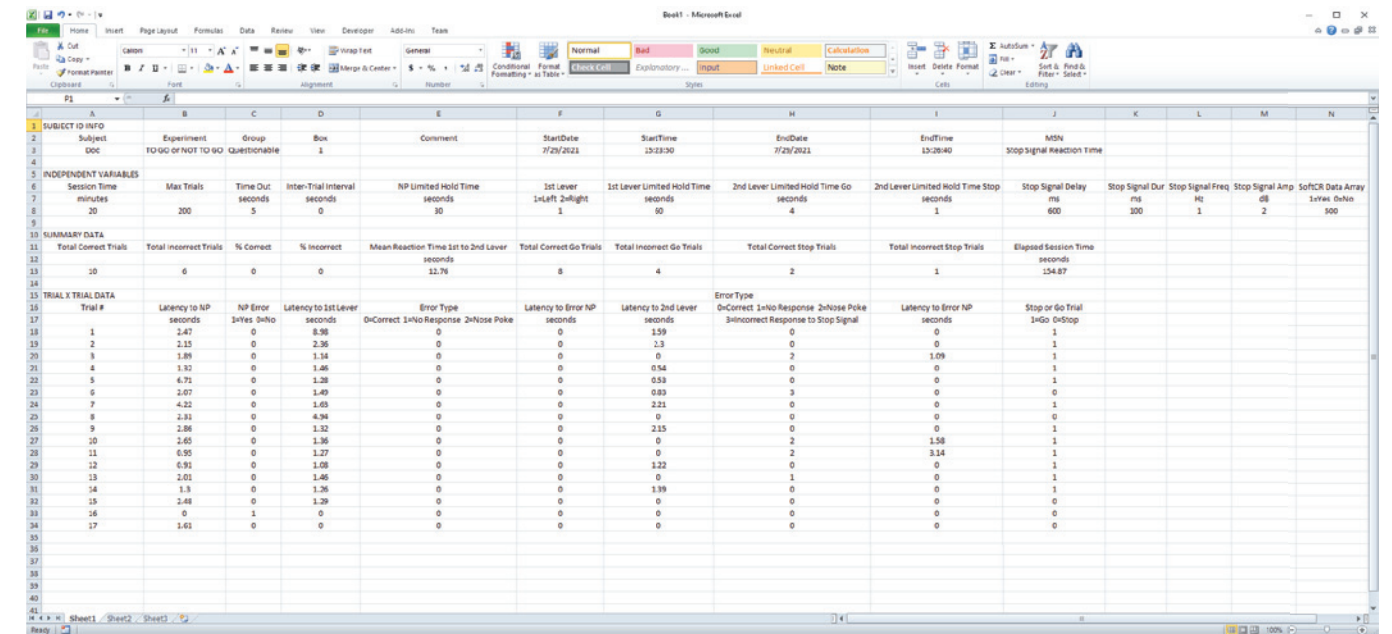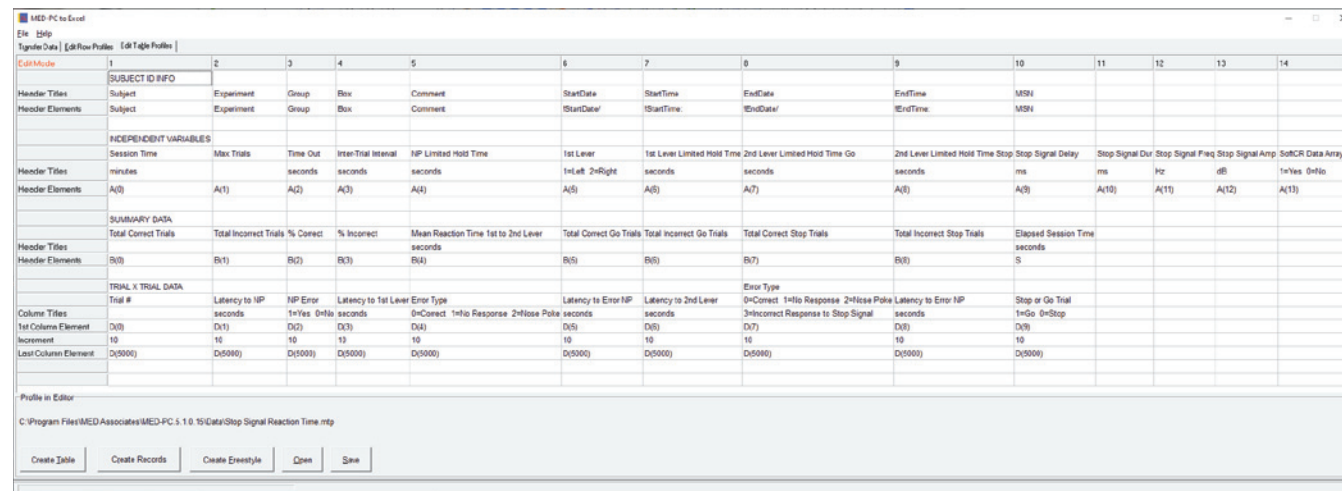
MED-PC TO EXCEL DATA TRANSFER "MPC2XL" UTILITY

SOF-731

SUMMARY

Creates a fast and easy system for transferring the contents of Med-PC® data files to Microsoft Excel spreadsheets, Microsoft Access databases, Quattro Pro, statistical programs, or virtually any other program that can read comma separated data sets (CSV)

- Any Med-PC data file can be transferred, regardless of the file naming scheme or the internal file format
- Create "profiles", a template for the layout of transferred data
  - After a profile is created, it can then be used to automatically transfer data to Excel or other targets
  - The creation of profiles is highly automated, yet very flexible

- There are two basic types of profiles that can be created:

  Row profiles organize the data from a session into a single spreadsheet row or column

  Table profiles create multiple rows and columns, available in freestyle, table, and record styles

  NOTE: Although the program is able to transfer data files containing more than one session, it works by transferring all data that matches the profile, so we recommend a single file for each subject, for each session

REQUIRED HARDWARE & SOFTWARE

> Med Associates operant chamber

> Med-PC V Behavioral Software Suite *(SOF-736)* or Schedule Manager *(SOF-706)*

> Microsoft Excel, Libre Office Calc, or other similar spreadsheet program

ROW PROFILE

A row profile transfers data to Excel on a row-by-row basis. Every session that is transferred to Excel becomes a row in the spreadsheet. Excel spreadsheets are limited to 256 columns, but the number of rows is practically unlimited. The profile generator automatically creates a sample profile that can be easily edited.

This format is useful for organizing data from many sessions so summary statistics can be organized for analysis. Formulas can be placed directly in the profile so the results are present the instant the data are transferred.

TABLE PROFILES

Table profiles transfer data in a tabular format to Excel. They provide a great deal of flexibility, but are not created automatically from sample Med-PC® data files in the same fashion as row profiles are.

There are three basic types of tables that can be created using the table editor:

TABLE PROFILE TYPE 1: FREESTYLE

The simplest table report, it starts with a blank table. Right click to paste special identifiers into profiles.

TABLE PROFILE TYPE 2: TABLE

Designed to present trial-oriented data along with session identifying information. Session identifiers, as well as data, can be placed in the "Header Titles" and "Header Elements" rows.

A key aspect of data tables is the ability to systematically extract data from an array variable without the need to explicitly type in every data element that should appear in the table. Ideal for creating tables displaying the results of trial-oriented sessions.

TABLE PROFILE TYPE 3: RECORD

Designed to transfer trial-oriented data to Excel with adequate descriptive information in each row so that the data in each row stands as an independent record.

For example, including subject and date information in each row with trial data allows one to sort or analyze all of the data for an entire experiment by these elements, perhaps broken down by ranges of dates or by subject subgroups. The key to producing this type of data structure is to place session identifiers, such as "Subject," in the first few columns of the table, leaving the "Increment" and "Last Column Element" fields blank. The remaining columns contain data elements for each trial. This results in the identifier and data information being present in every row.

SCHEDULE MANAGER SOFTWARE

SOF-706

SUMMARY

Designed for non-programmers running standard schedules with structured data collection. Like other closed-ended programming systems, there is a limit to what can be accomplished with Schedule Manager. However, the advantage of selecting a Med Associates system is that should your needs ever demand an open programming language such as Med-PC, the hardware purchased from us will always be 100% compatible.

- Compatible with all Med Associates equipment
- Collect, display, and analyze data gathered from up to 8 chambers at a resolution of 10 ms or better
- Enables the design of protocols such as:
  - Fixed Ratio *(FR)*, Variable Ratio *(VR)*, Random Ratio *(RR)*, Fixed Interval *(FI)*, Variable Interval *(VI)*, Random Interval *(RI)*, Fixed Time *(FT)*, Variable Time *(VT)*, Differential Reinforcement High Level *(DRH)*, Differential Reinforcement Low Level *(DRL)*, Extinction *(EXT)*

Experiment design

- Build procedures with up to 100 individual components each
- The number of components is unlimited by means of repeat loops and timed blocks
- A "populate chambers" button allows common information to be loaded to all chambers at one time to greatly reduce setup time
- Monitor all component details or simulate responses to test procedure logic

Chamber control

- User-defined labels for all inputs and outputs to easily identify test modules and what procedure is being run in them
- Pause or stop a running chamber at any time during the experiment, save or abandon the data, and reload any existing procedure from the directory without affecting other tests in progress

Analyze

- Automatically creates data files for use in the Soft-CR Cumulative Recorder software *(SOF-721/-722)* for graphical printouts, independent of the component data file
- Summary data is automatically saved in an individual, fully annotated, ASCII file, and may be organized: chronologically, by component with full detail, or by component detail only *(optional time stamps in SoftCR format can be saved in a separate file)*

REQUIRED HARDWARE

> Med Associates operant chamber
> Input *(lever, nose poke, etc.)*
> Stimulus *(light, tone generator, etc.)*
> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*
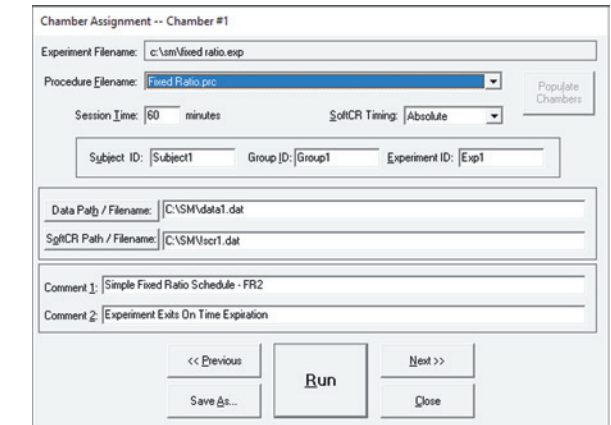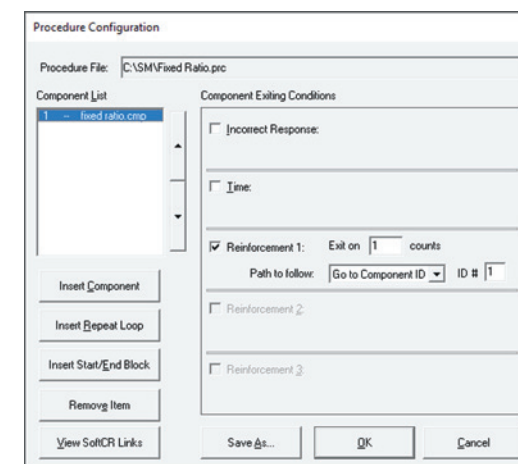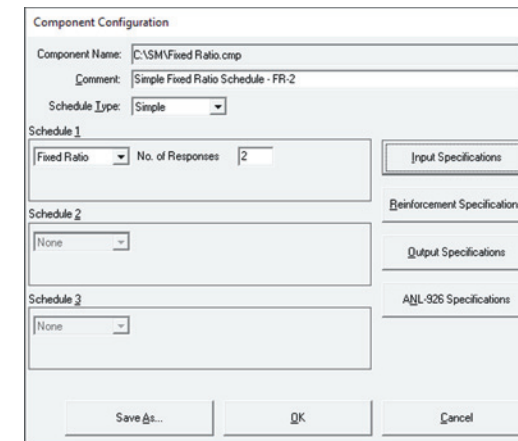
SCHEDULE TYPES

SIMPLE: A component using this type will only have one schedule operating. Only the "Schedule 1" block of the Component Configuration dialog will be active.

CONCURRENT: Two or more simple schedules operating simultaneously. These schedules operate on different inputs and can use the same or different reinforcements.

TANDEM: 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.

DATA COLLECTION ELEMENTS

HARDWARE CONFIGURATION: A mapping of the test chambers' inputs and outputs to physical electronic channels on the interface cards in the interface cabinet. This enables the software to interact with the appropriate hardware.

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.

COMPONENT: 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.

PROCEDURE: A list of one or more components, with a user-definable exit condition between each component.

EXPERIMENT: 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.

SOFTCR

Edit Parameters

File Format : Format 1
Reset Pen : Down
Array Var/Nbr to Plot : C
Y-Axis Responses : 100
X-Axis Width (Min) : 2.00
Resolution (ms): 100
Data Format : Relative
Start Time (Min) : 0.0000
Scroll Width : 1.00
Save Plot... Size: 50%

Trace 0 | Trace 5
Trace 1 | Trace 6
Trace 2 | Trace 7
Trace 3 | Trace 8
Trace 4 | Trace 9
Event Pens | Back Ground
Printer

Screen Pen Size: Small
Printer Pen Size: Small

OK | Cancel
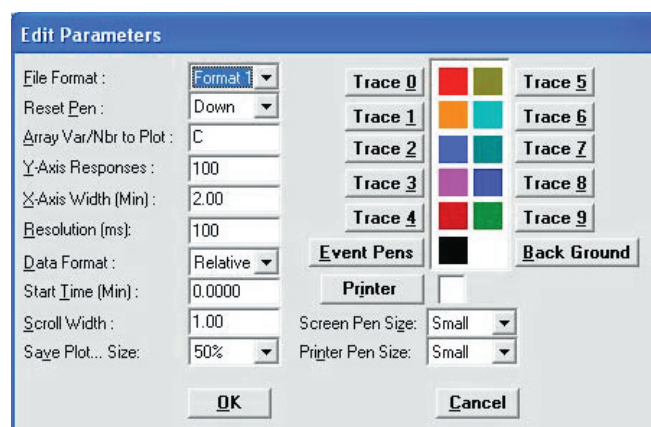
SOFTCR CUMULATIVE RECORD SOFTWARE

SOF-721

SUMMARY

Display and/or print partial or complete cumulative re-cords from IRT data files created by Med-PC® *(SOF-736)* or Schedule Manager™ *(SOF-706)*. However, any properly formatted ASCII file can be used with SoftCR™.

• Permanent data files are created with inter-response times and event marks

• Produces cumulative records to be used as publication-quality figures

• Compatible with four data formats:

1) Annotated *(use with Med-PC or Schedule Manager)*

2) Stripped *(use with Med-PC)*

3) Stripped, C Array Only *(use with Med-PC)*

4) Stripped with Variable ID *(use with Med-PC)*

Printing/Exporting

• At any time while reviewing a record, the user can print the screen or the entire record

• Because the printing of large graphics files can be time consuming, SoftCR™ includes a user-friendly batch print utility, create a tag list file from which multiple files can be printed

• Screen shots can be saved as either a Windows Meta File (WMF) or a Portable Document Format (PDF) file along with the original Bitmap (BMP) option

   ◦ *NOTE: The WMF and PDF options allow the user to zoom in or out of the document without a loss in resolution.*

User Interface

• Dynamic, on-screen scaling of the Y-axis and scrolling along the X-axis to focus on critical time periods

• Easy-to-use menus respond to keyboard entries, function keys, and mouse point-and-click commands

• The X and Y axis can be set to either the standard axis with tick marks or to a scale that defines a specific time interval

• Toggle trace lines and event pens on or off to focus on different areas of the data

   • Display up to 10 event pens to independently track responses and reinforcing events by marking a re-sponse, the beginning and end of code segments, or stimulus durations

   • Up to ten individual trace lines on the same X-Y axis

• Edit parameters to customize the display to best represent the features of the experiment:

   ◦ Start time

   ◦ Scroll width

   ◦ Reset pen status

   ◦ Number of responses on the y-axis

   ◦ Elapsed time on the x-axis

REQUIRED HARDWARE & SOFTWARE

> Med-PC V Behavioral Software Suite *(SOF-736)*

Or Schedule Manager *(SOF-706)*

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1) Header Information 2) Response Axis 3) Pens Plot Window 4) Time Axis 5) Events Plot Window
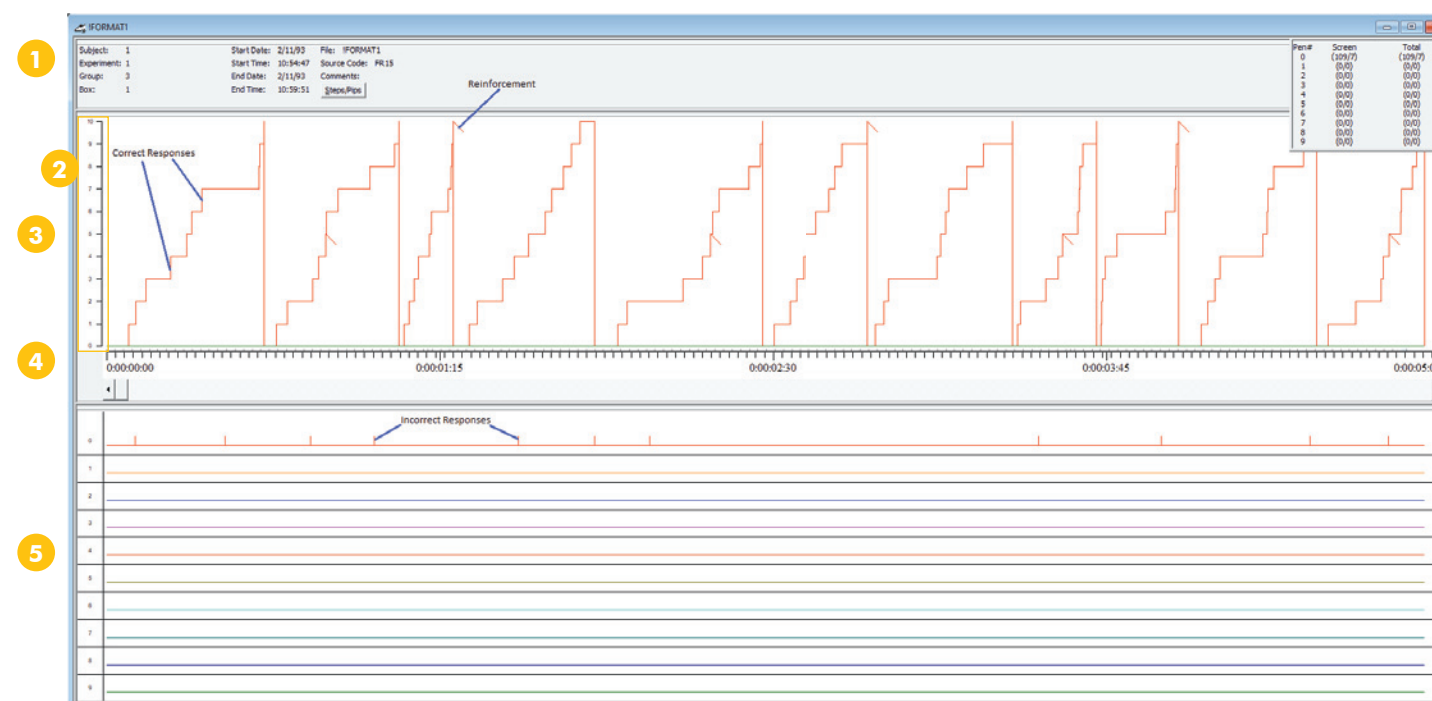
SOFTCR PRO CUMULATIVE RECORD SOFTWARE

SOF-722

SUMMARY

Enables either real-time or offline access of Med-PC cu-mulative record (CR) data, and enables the user to pro-duce screen and printer plots of Med-PC data files.

• Produces cumulative records in real-time on the same computer that is running Med-PC

   ◦ Can be set up to generate records on networked computers to watch an active experiment in the lab, from the computer in your office

• Create an online standalone system providing up to 24 cumulative records with a single computer and up to eight optional remote monitors

   ◦ One, two, or four records can be displayed simulta-neously on the screen in real-time

   ◦ Easily switch between any of the possible 24 records

   ◦ Each "recorder" can be tagged by experiment, sub-ject, and group

   ◦ A hard copy of any cumulative record can be printed at any time, even while other "recorders" are collect-ing data

• Parameters of the plot may be varied to generate multi-ple plots of the same data with different scaling:

   ◦ Vertical resolution in response

   ◦ Horizontal resolution in seconds per division (for hard copy) or seconds per screen (for screen plots)

   ◦ Start time for the plot to begin

   ◦ Duration of the plot

• Includes two programs, SoftCR™ Pro and a Windows service called MedNetService

   ◦ MedNetService facilitates the communication be-tween SoftCR™ Pro and Med-PC

   ◦ Both MedNetService and Med-PC must be installed on the same computer

• Easy on-line help screens

REQUIRED HARDWARE & SOFTWARE

> Med-PC V Behavioral Software Suite *(SOF-736)*

Or Schedule Manager *(SOF-706)*

SOFTCR EVENT ANALYSIS UTILITY

SOF-720E

SUMMARY

Designed for use with SoftCR data files that were generated using Schedule Manager or with Med-PC format 1 data files.

- Creates an output file with the same filename and ".OUT" extension and displayed in notepad
- The file can be printed from the SoftCR Event Analysis program or from Notepad
- Configure the analysis file with the following:
  - Column Headers: Titles for the five columns
  - File Type: Select "Relative" or "Absolute", depending on which method was used to generate the data file
  - Block Time (min): Length of time to segment data for calculating the mean, standard deviation, and standard error of the mean

- Row Time (min): Length of time represented by each row of the data display
- Resolution (ms): Resolution that was used to generate the data file
- Multicode: Display two events simultaneously
- Line 1*: SoftCR event, causes a back slash to be drawn in the data display
- Line 2*: SoftCR event, causes a forward slash to be drawn in the data display
- Vertical Line*: SoftCR event, causes a vertical line to be drawn in the data display
- Graphic Output: Writes directly to the printer, which creates a much higher detail graph.

NOTE: enabled only if mulitcode is deselected

MEDLAB 8 PROTOCOL PACKAGE

SOF-700LA-1

SUMMARY

Set of eight complete, ready to run MedState Notation™ (MSN) programs to be used in Med-PC®:

- Fixed Ratio *(FR)*, Fixed Interval *(FI)*, Variable Ratio *(VR)*, Variable Interval *(VI)*, Random Ratio *(RR)*, Random Interval *(RI)*, Chain *(CHAIN)*, Discrimination *(DISC)*
- Procedures designed by noted psychology professor Dr. Steven Dworkin
- Can be used as a starting point for writing custom MSN programs, as each procedure can be modified by the user to meet specific hardware or research requirements

- The trial data are conveniently stored in an array that prints out in a one row per trial format
  - Stores IRT data in array C that can be used by our SoftCR Cumulative Recorder software *(SOF-721/-722)* to generate a graphical record on screen or to print a cumulative record after the data has been collected

REQUIRED HARDWARE

> Med Associates operant chamber
> Input *(lever, nose poke, etc.)*
> Stimulus *(light, tone generator, etc.)*
> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*

MEDLAB 8 PROTOCOL SUMMARIES

FIXED RATIO (FR):

- A response is reinforced only after a specified number of responses *(default = 1)*
- Produces a high, steady rate of responding with only a brief pause after the delivery of the reinforcer

FIXED INTERVAL (FI):

- The first response is rewarded only after a specified amount of time has elapsed *(default = 1 sec)*
- Causes high amounts of responding near the end of the interval, but much slower responding immediately after the delivery of the reinforcer

VARIABLE RATIO (VR):

- A response is reinforced after an unpredictable number of responses *(mean of 5, ranging from 1 to 20)*
- Gambling and lottery games are good examples of a reward based on a variable ratio schedule
- Creates a high steady rate of responding

VARIABLE INTERVAL (VI):

- A response is rewarded after an unpredictable amount of time has passed *(mean of 10 sec, ranging from 0.25 to 39.96 sec)*
- Produces a slow, steady rate of response

RANDOM RATIO (RR):

- The random ratio value specifies the probability with which a response will be reinforced
- 20% chance of reinforcement on each response

RANDOM INTERVAL (RI):

- Each passing of the interval time has a possibility that the program will move onto the next step. If it doesn't, the program will go back and time the interval time again, thus obtaining a random interval
- A "timer" has a 20% chance of timing out every 2 seconds

CHAIN (CHAIN):

- "Chains" two responses together
- Typically run in test chambers with two standard response levers and stimulus lights
- The stimulus light for the first correct lever turns on, then the animal must press that lever enough times to meet the first user-defined FR value, then the light turns off
- Then, the stimulus light for the second correct lever turns on, the animal must now press that lever enough times to meet the second FR, then a reinforcement is issued
- Two part chain where the first FR = 1 and the left lever is the correct lever
- The second FR = 5 and the right lever is correct

DISCRIMINATION (DISC):

- Stimulus light breaks the session time into alternating periods of extinction (no light) and fixed ratio (light on)
- GO/NO-GO The default procedure switches S+ and S- every 30 seconds for the duration of the procedure

OPERANT CONDITIONING LAB PROTOCOL PACKAGE

SOF-700LA-2

SUMMARY

Consists of five MedState Notation™ (MSN) procedures that are well suited for a research or student lab:

- Fixed Ratio *(FR-X)*, Fixed Interval *(FI-X)*, Differential Reinforcement of Zero Responding *(DRO)*, Inter-Response Time Less *(IRT < X)*, Inter-Response Time Greater *(IRT > X)*
- The procedures all make use of Med-PC® named variables to make running and modifying the schedules straightforward
- The trial data are conveniently stored in an array that prints out in a one row per trial format

- Stores IRT data in array C that may be used by the SoftCR Cumulative Recorder program *(SOF-721/-722)* to generate a graphical record on screen or to print a cumulative record after the data has been collected

REQUIRED HARDWARE

> Med Associates operant chamber

> Input *(lever, nose poke, etc.)*

> Stimulus *(light, tone generator, etc.)*

> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*

OPERANT CONDITIONING LAB PROTOCOL SUMMARIES

FIXED RATIO (FR)

House light and stimulus light above the correct lever turn on. Once the FR has been satisfied, a reward is issued, followed by a Time Out (TO). Both levers are inactive during the TO, but still count as incorrect if pressed during TO.

FIXED INTERVAL (FI)

Reward is delivered only when a single response has occurred after the fixed interval value has expired.

The house light and stimulus light above the correct lever turn on. Once the FI has been satisfied, a reward is issued, followed by a Time Out (TO). Both levers are inactive during the TO, but still count as incorrect if pressed during TO

DIFFERENTIAL REINFORCEMENT OF ZERO RESPONDING (DRO)

Reinforces nonresponse. A time-out interval follows reinforcement and/or the occurrence of a response. The DRO Time is user-defined, with a default of 20 seconds.

INTER-RESPONSE TIME GREATER THAN

Used to modify the rate of responding within an operant chamber. The independent variables define the interval between responses.

The IRT is the minimum interval between responses required before reinforcement will be delivered.

Example: if the IRT = 5 seconds, the first and second responses need to be separated by a minimum of 5 seconds to receive reinforcement.

INTER-RESPONSE TIME LESS THAN

Used to modify the rate of responding within an operant chamber. The independent variables define the interval between responses.

The IRT is the maximum interval separating responses.

Example: if the IRT = 5 seconds, then the inter-response interval must not exceed 5 seconds in order for the reward to be delivered.

CONTEXTUAL CONDITIONING PROTOCOL PACKAGE

SOF-700RA-16

SUMMARY

Contains five protocols:

- Mag Train, Bar Press Shape, VI-90 Training, VI-90 Test, Pavlovian Variable Interval

REQUIRED HARDWARE

> Med Associates operant chamber

> Input *(lever, nose poke, etc.)*

> Stimulus *(light, tone generator, etc.)*

> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*

CONTEXTUAL CONDITIONING PROTOCOL SUMMARIES

MAG TRAIN:

A magazine training program for a Pavlovian Variable Interval schedule.

Program dispenses a pellet every 10 seconds for 18 minutes. Keeps track of the number of pellets dispensed and the number of presses on the lever.

Program ends when either the session time or the maximum number of pellets has been reached.

BAR PRESS SHAPE:

Starts off by running a Continuous Reinforcement (CRF) schedule where every response on the Lever is rewarded.

- To change schedules, issue a:
  - K2 pulse for Variable Interval-30
  - K3 pulse for Variable Interval-60
  - K4 pulse for Variable Interval-90
  - K1 pulse for CRF

VI-90 TRAINING:

VI-90 schedule with fear conditioning to a 60 second Tone. The trial starts with an ITI and it counts responses for 60 seconds in the pre-stimulus period. The program then turns on the tone and it counts responses for 60 seconds in the stimulus period. After the 60 second tone finishes the animal receives a 500 ms shock.

The animal is rewarded on a VI-90 schedule that runs independent of the Tone stimulus.

VI-90 TEST:

VI-90 schedule with fear conditioning to a 60 second Tone. The trial starts with an ITI and counts responses for 60 seconds in the pre-stimulus period. The program then turns on the tone and counts responses for 60 seconds in the stimulus period. Animal receives no shock

The animal is rewarded on a VI-90 schedule that runs independent of the tone stimulus.

PAVLOVIAN VARIABLE INTERVAL:

Program for a Pavlovian Variable Interval Schedule.

The trial starts with an ITI, and counts responses for 10 seconds in the pre-stimulus period. The program then turns on the tone and it counts responses for 10 seconds in the stimulus period. The animal is rewarded in every other trial.

VARIABLE SCHEDULE PROTOCOL PACKAGE

SOF-700RA-18

SUMMARY

Through a series of LIST statements the user may select between the following schedules to run:

- Fixed Ratio *(FR)*, Fixed Interval *(FI)*, Variable Ratio *(VR)*, Variable Interval *(VI)*

- For each trial there is a preCS and a CS (conditioned stimulus) period
  - Both periods are always the same length
  - The correct response(s) on the correct lever during either period gives a reward
  - There is no reward given during the Inter-Trial Interval (ITI) or the pre/post adapt periods
  - Any responses during the preCS period are discarded when the CS period starts
  - Example: If the program is running an FR-10 schedule and the animal has four responses when the program switches to the CS period, the four re-

sponses are discarded and the animal must start over to meet the FR-10 schedule. The same schedule is run during the preCS and CS periods

VARIABLE DEFAULTS

Reward *(1 = pellet / 2 = dipper / 3 = drug)* = 1

Reward Time = 0.05 sec

Number of Trials = 10

Pre Adapt Period = 240 sec

Post Adapt Period = 180 sec

DATA COLLECTED

- Total responses
- Total correct / incorrect responses
- Number of rewards

VARIABLE SCHEDULE PROTOCOL SUMMARIES

FIXED RATIO (FR):

- A response is reinforced only after a specified number of responses
- Produces a high, steady rate of responding with only a brief pause after the delivery of the reinforcer

FIXED INTERVAL (FI):

- The first response is rewarded only after a specified amount of time has elapsed
- Causes high amounts of responding near the end of the interval, but much slower responding immediately after the delivery of the reinforcer

VARIABLE RATIO (VR):

- Gambling and lottery games are good examples of a reward based on a variable ratio schedule
- Creates a high steady rate of responding
- A response is reinforced after an unpredictable number of responses
- Mean of 5 with a range from 1 to 10 responses

VARIABLE INTERVAL (VI):

- A response is rewarded after an unpredictable amount of time has passed
- Produces a slow, steady rate of response
- Mean of 7 seconds and a range from 3 to 10 seconds
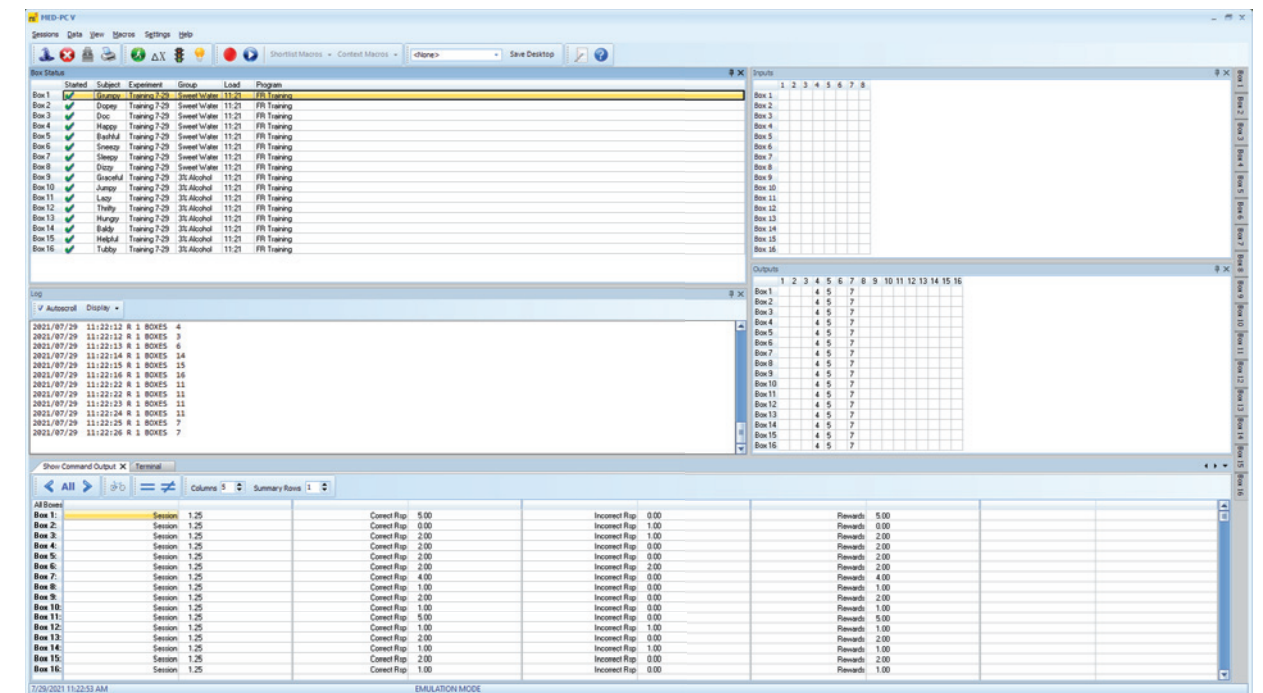
FIXED RATIO TRAINING PROTOCOL
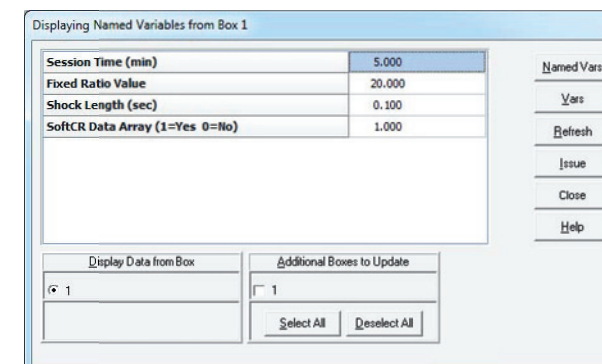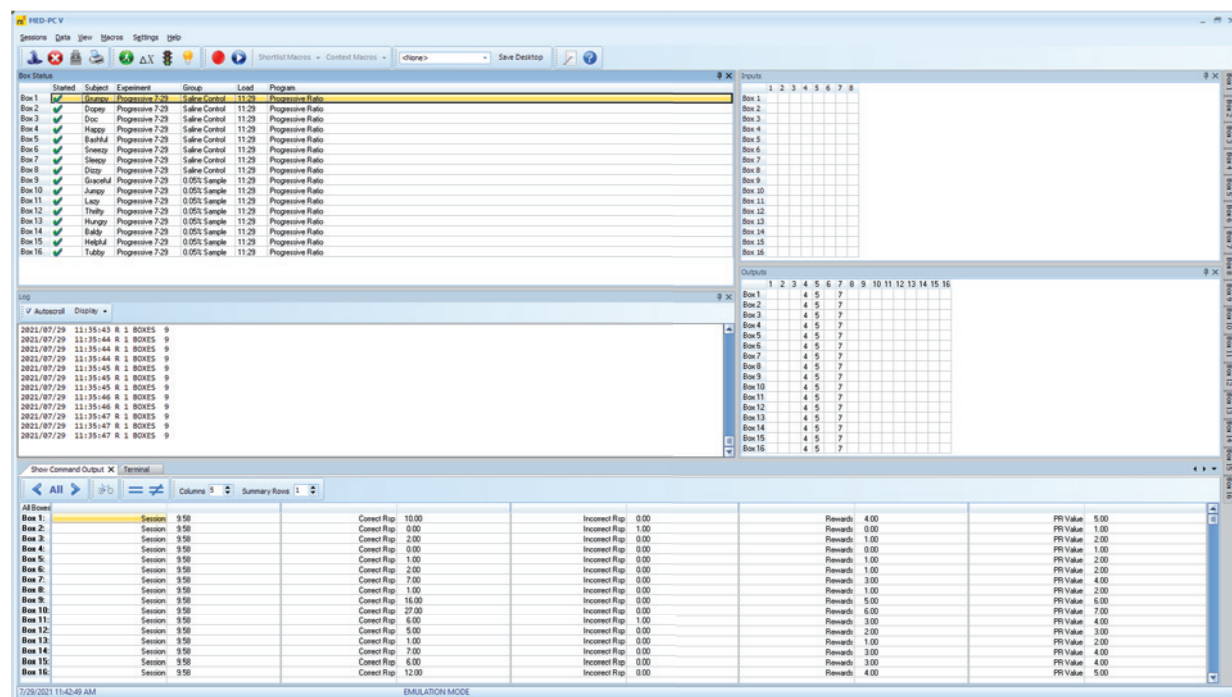
SOF-700RA-1

SUMMARY

The test animal is required to respond on the specified lever on a user-defined fixed ratio and is rewarded when the ratio is met.

- A time out (TO) following the reward can be implemented
- The session ends based on time
- Correct and incorrect lever presses are counted
  - *NOTE: Percent correct/incorrect are calculated at the end of the session*

- Reward is typically a pellet, dipper presentation, or drug infusion

REQUIRED HARDWARE

> Med Associates operant chamber
> Input *(lever, nose poke, etc.)*
> Stimulus *(light, tone generator, etc.)*
> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*

ENV-251M

PROGRESSIVE RATIO PROTOCOL

SOF-700RA-2

SUMMARY

The test animal is required to respond using the specified lever on a progressively increasing ratio schedule, which may be set to increase after each reward or after multiple rewards, and the subject is rewarded when the ratio is met.

• A time out (TO) following the reward can be implemented

• The session ends based on time

• Correct and incorrect lever presses are counted

  ◦ NOTE: Percent correct/incorrect are calculated at the end of the session

• Reward is typically a pellet, dipper presentation, or drug infusion

• The type of progressive ratio (PR) may be specified as:

  Step: The ratio starts with the start PR value and is incremented by the step value each time the PR frequency is met

  List: Pulls the ratio values from the "X" list, which can be in any sequence

REQUIRED HARDWARE

> Med Associates operant chamber

> Input (lever, nose poke, etc.)

> Stimulus (light, tone generator, etc.)

> Reward delivery (pellet dispenser/receptacle, liquid dipper, etc.)

## LICK SUPPRESSION PROTOCOL

SOF-700RA-22

SUMMARY

Allows the animal to freely lick from the sipper tube. After a certain number of licks (defined by the variable fixed ratio value) the animal is given an aversive stimulus.

• Also known as Vogel Conflict

• The duration of the aversive stimulus is defined by the variable shock length

• The variable SoftCR data array determines whether or not an array containing SoftCR data is included in the data file

REQUIRED HARDWARE

> Aversive stimulator

> Sipper w/lick detection (IR beam, contact lickometer, etc.)
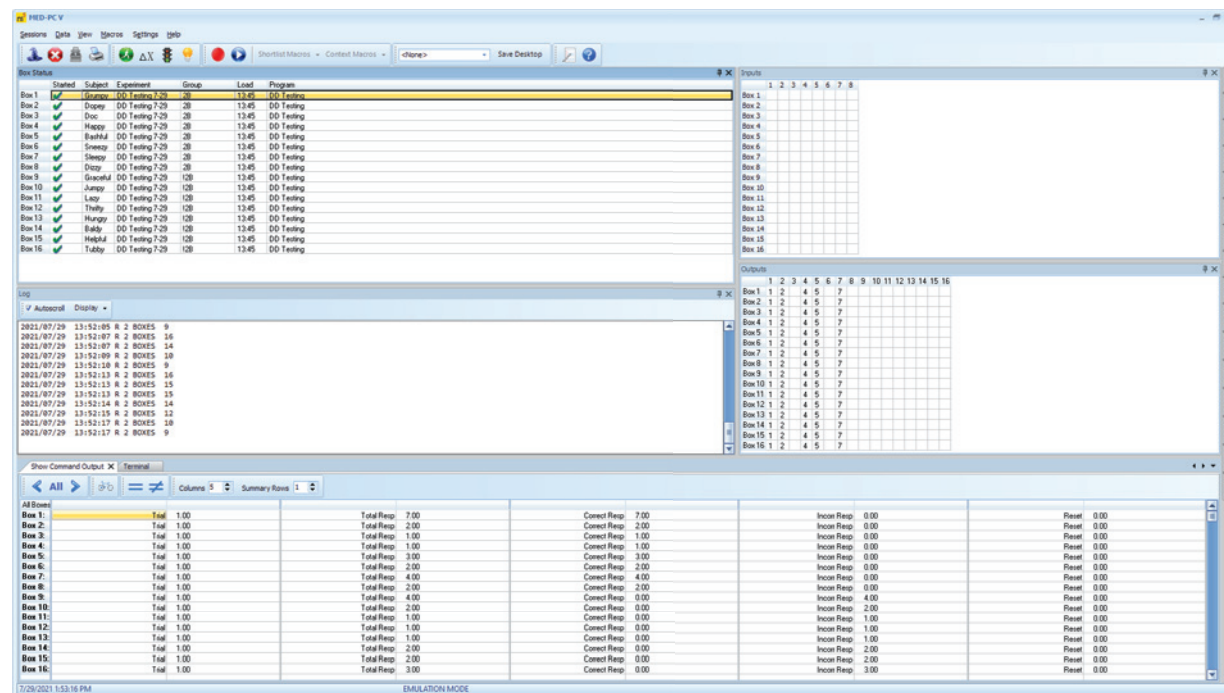
DRUG DISCRIMINATION PROTOCOL

SOF-700RA-24

SUMMARY

Includes three (3) protocols:

- Food Shaping
- Training
- Testing

- Starts by turning on the left & right stimulus lights and house light
- Trial requires the animal to correctly respond with a lever to receive a reward, then time-out
- The program ends when the maximum number of rewards are earned or when the session time ends
- Totals for the whole program, as well as all data during each trial are collected *(NOTE: SoftCR is also recorded)*

Food Shaping

- Mimics a Fixed Ratio schedule
- The program starts by turning on the house light and both the left and right stimulus lights
- A trial consists of correctly responding on a lever to receive a reward, followed by a time-out
- The program ends when the maximum number of rewards are earned or when the session time ends, whichever comes first

Training

- Following an acclimation period, the program turns on the house light and both the left and right stimulus lights
- Responses on the correct lever result in a reward and turn off all lights, followed by an inter-trial interval
- Responses on the incorrect lever will reset the current fixed ratio
- The program ends when maximum number of rewards are earned or when the session time ends

Testing

- Following an acclimation period, the program turns on the house light and both the left and right stimulus lights
- Responses on either lever will result in a reward and turn off all lights, followed by an inter-trial interval
- The program ends when maximum number of rewards are earned or when the session time ends

REQUIRED HARDWARE

> Med Associates operant chamber
> Input *(e.g. lever)*
> Stimulus *(e.g. light, tone generator, etc.)*

DELAYED MATCHED + NON-MATCHED TO POSITION PROTOCOL

SOF-700RA-27

SUMMARY

Designed for use in standard Delayed Match to Position (DMTP) studies.

1. Sample lever presented with the stimulus light, to be pressed by the subject. If they fail to select one or choose incorrectly, then an omission is recorded, the house light is turned off, then the ITI is initiated.

2. Once the subject presses the lever, a head entry into the pellet dispenser must be detected. If it's not, then an omission is recorded, the house light turns off, then the ITI is initiated.

3. After a head entry has been detected, the program waits for a set time that is chosen from the list. After the delay is over, the program presents both levers and both stimulus lights. The subject must then either select the same lever (matched) or the opposite lever (non-matched).

4. **Correct lever chosen:** Reward is presented for a specified amount of time, when the reward time runs out, the program goes to the ITI state, and the next trial begins

   No lever press: An omission is recorded, the house light is turned off, and the program goes to the ITI

   Incorrect lever chosen: Action is recorded, the house light is turned off, and the program goes to the ITI

REQUIRED HARDWARE

> Med Associates operant chamber
> Input *(lever, nose poke, etc.)*
> Stimulus *(light, tone generator, etc.)*
> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*

DELAYED VS. IMMEDIATE REWARD PROTOCOL

SOF-700RA-31

SUMMARY

Initialization

After a timed inter-trial interval (ITI), the program draws the first delay for the large reward, the pellet light turns on to signal the animal to nose poke within the defined response time.

- If a nose poke is not detected, the pellet light is turned off, a Type 1 omission is recorded, and the trial ends.

- If a nose poke is detected, the pellet light is turned off, and the program checks if this is to be a forced trial or a free choice trial.

Trial Types

- Forced Trials: The immediate and delayed levers are presented in an alternating pattern. The animal must respond to the presented lever within the response time. If the animal fails, then the lever is retracted, a type 2 omission is recorded, and the trial ends.

- Free Choice Trials: Both the immediate and delayed levers are presented at the same time. The animal must respond to either lever within the response time. If the animal fails, then the lever is retracted, a type 2 omission is recorded, and the trial ends.

Lever Choices

- If the delayed lever is chosen: Lever(s) are retracted and the cue light is turned on for the delay. At the end of the delay, the cue light is turned off, the pellet light is turned on, and the number of pellets for the large reward is given. If there is no nose poke in the food tray within the response time, then a type 3 omission is recorded.

- If the immediate lever is chosen: Levers are retracted, the pellet light is turned on, and 1 pellet reward is given. There is no delay before the reward is dispensed when the immediate lever is chosen. If there is no nose poke in the food tray within the response time, then a type 4 omission is recorded.

Conclusion

At the end of the trial, the program will wait for the signal for the next trial to begin (new trial interval). At the beginning of each new block, the next delay for the large reward is drawn from the list. When all trial blocks have been completed the program will end.

REQUIRED HARDWARE

> Med Associates operant chamber

> Input *(lever, nose poke, etc.)*

> Stimulus *(light, tone generator, etc.)*

> Reward delivery *(pellet dispenser/receptacle, liquid dipper, etc.)*
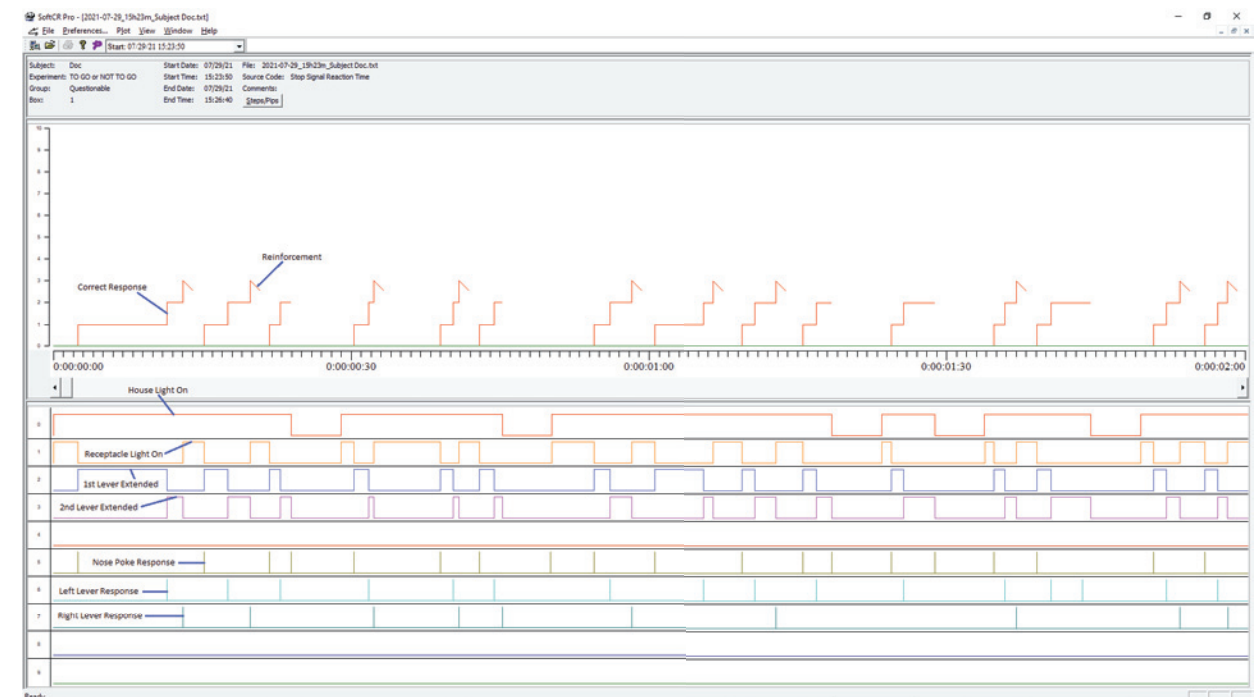
STOP SIGNAL REACTION TIME PROTOCOL

SOF-700RA-34

SUMMARY

Training Procedures

- Nose Poke Training
- Correct Lever Training
- Two Lever Training
- Stop Signal Reaction Time

These are intended to progressively train the subject for the SSRT procedure (Go/No-Go) in which the subject is supposed to either respond or not respond depending on the stimuli.

REQUIRED HARDWARE

- Retractable Levers (x2)
- Nose Poke
- Pellet Dispenser
- Stimulus Lights (x2)
- Receptacle Light
- House Light
- Tone Generator

Box 01 - Day

Total Food Intake

Total Food Intake:	10140 mg
Average Meal Size:	596 mg
Total Meal Duration:	0 Days 01:08:27
Average Meal Duration:	4 Minutes 1 Seconds
Total IMI:	0 Days 22:48:16
Average IMI:	85 Minutes 31 Seconds
Total Number Of Meals:	17
Time Meal Started:	6 Days 23:58:31
Time Last Pellet Dispensed:	6 Days 23:59:57
# Of Pellets Dispensed:	3662
Session Time:	7 Days 00:00:00

Moving or changing the size of the slider bars will cause the graph to focus in on only the data of interest.

12180 mg

Current (µA)

Maximum Current

Step Current

Initial Current

Step Time

Time (sec)

Acclimation Time

SOF-732-3

ANIMAL FOOD INTAKE MONITOR SOFTWARE

SOF-710

SUMMARY

Quantitatively measure the food intake of singly housed mice or rats using a standard pellet dispenser equipped with infrared beam for pellet detection. A pellet is delivered at the start of the experiment. Every time the pellet is retrieved, another is delivered until the end of the experiment.

- Break the data down into multiple phases.
  - For example, if the experiment will last for one week, one could have a phase for each day, every 12 hours, and the entire week
  - The program requires that there be one phase named "Day", which is used to determine when the house light should be turned on or off
  - The number of hours in the day phase is user-defined, to experiment with how either a longer or shorter day cycle might effect an animal's eating patterns

Meal Definition

In order for the beginning of a meal to be recognized, the animal must take enough pellets to meet the "Minimum Meal Size" and the animal must do this in less than the "Meal Period End Criteria".

In order for a meal to end, the "Meal Period End Criteria" must pass with no pellets having been taken.

In the below example, the following settings are used:

- Pellet Size = 20 mg
- Minimum Meal Size = 3 pellets
- Meal Period End Criteria = 10 minutes
- Count All Pellets = Not Selected

Example:

0:00 The program is started

3:00 Animal takes the first pellet

11:00 Animal takes another pellet

13:00 Animal doesn't take any more pellets

In this example only 2 pellets were taken within the ten minute time span, therefore a meal is not started and the pellets are not counted.

REQUIRED HARDWARE

> Med Associates operant chamber or home cage

> House light

> Pellet dispenser

> Pellet receptacle w/IR beam
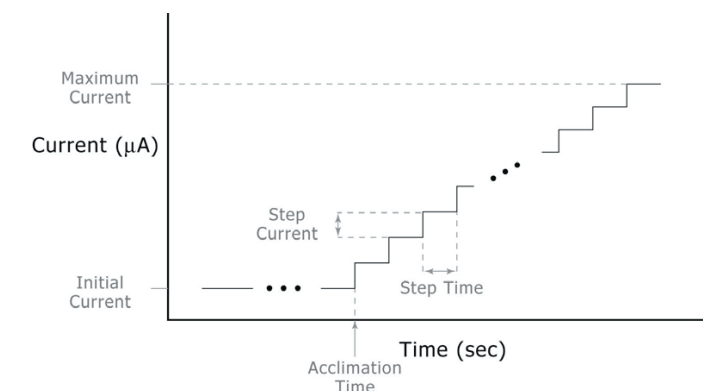
AVERSIVE STIMULATION w/VIDEO MONITORING PROTOCOL

SOF-732-4

SUMMARY

Use Med-PC (SOF-736), Video Monitor (SOF-842), and Aversive Stimulation testing equipment to record aversive reaction in lab animals.

- A MedState Notation protocol to:
  - Control the current going to the grid floor
  - Communicate with Video Monitor software (SOF-842)
- Determine the average minimum current necessary to cause an aversive reaction in mice
  - Maintain consistent current increase using Med-PC to control an Aversive Stimulator (ENV-413C) and Scrambler (ENV-412C)

- Use a video camera in place of a human eye for a more comfortable testing situation
  - Multiple researchers can confer over the subject animal's reactions
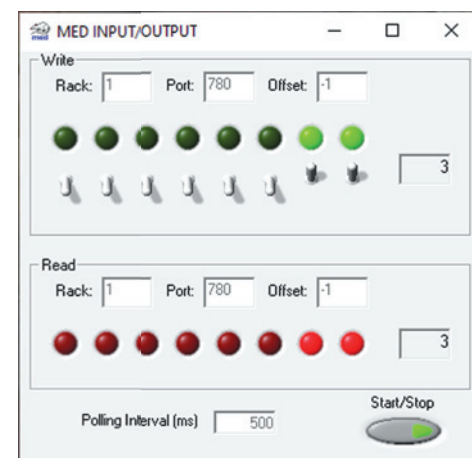 - Ability to rewind and review the animal's reactions

REQUIRED HARDWARE & SOFTWARE

> Med Associates operant chamber

> Med-PC V Behavioral Software Suite (SOF-736)

> Video Monitor (SOF-842)

VISUAL BASIC
DELPHI
C++

SOF-732-3

MED-VFC-OPTO-R

Med-PC V (SOF-736)

Prizmatix Pulser

CONTROL OF MED I/O MODULES FROM OTHER LANGUAGES SOFTWARE

SOF-732-3

SUMMARY

For users who desire the power and flexibility of our interface modules and other hardware, but do not want to use Med-PC® as a programming environment.

- API provides the user with the ability to communicate with the interface using any programming language
  - Turns on outputs, receives inputs
  - Log input data either manually or through other means

- Modules and header files provided for use with:
  - Visual Basic 6.0
  - Delphi
  - C++
- Full documentation is provided, including function declarations and programming syntax
- A sample Visual Basic 6.0 project is also included to demonstrate a simple I/O control user interface

PRIZMATIX FIXED RATIO
PROTOCOL

SOF-732-6

SUMMARY

For pulsing LEDs, lasers and shutters in Optogenetics experiments using Med-PC® protocols and our hardware, while simultaneously collecting experimental data.

- Enables Med-PC® to:
  - Program trains of pulses
  - Create groups of trains
  - Add various triggering conditions

- Includes sample code that may be added to any protocol, as well as a Fixed Ratio protocol
- Requires a TTL output from the Med Associates interface to operate at 1ms resolution

REQUIRED HARDWARE & SOFTWARE

> Med Associates Operant Chamber w/Modified Top
> Prizmatix Pulser or Pulser Plus
> Med-PC V Behavioral Software Suite *(SOF-736)*
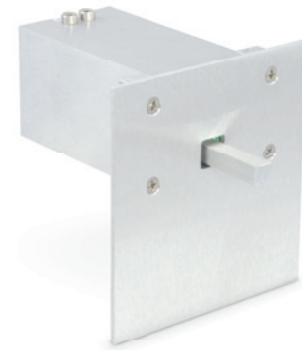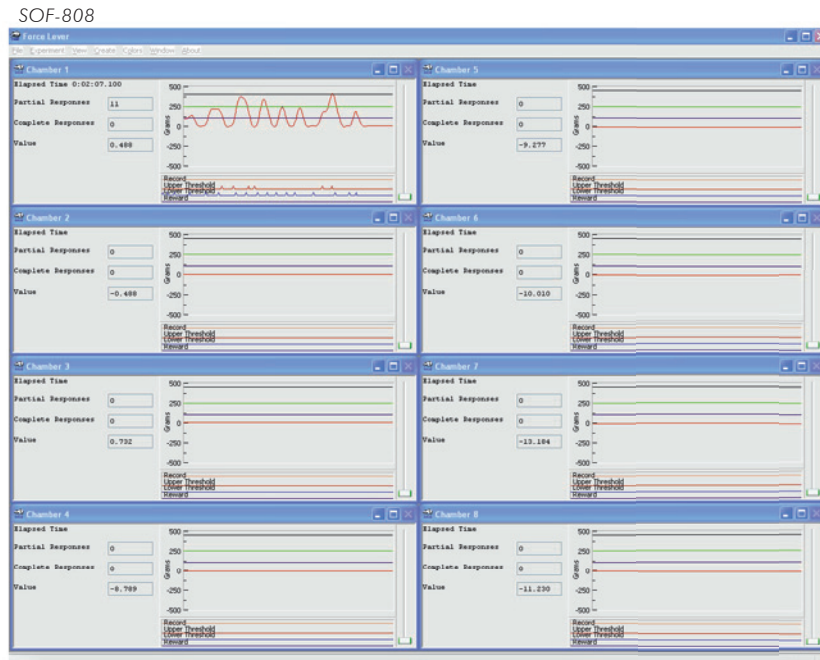
SOF-808

	SOF-700RA-17 UTILITY	SOF-808 SOFTWARE
Create real-time graphs?	No	Yes
Communicate with Med-PC?	N/A	Yes
Run independently of Med-PC?	No	Yes
Use w/third party control software?	No	Yes

FORCE LEVER UTILITY

SOF-700RA-17

FORCE LEVER SOFTWARE

SOF-808

SUMMARY

Use either the force lever utility or software in conjunction with Med-PC to acquire, display, and save data from up to eight (8) Force Levers *(ENV-118M)* simultaneously.

- Quantifies lever responses in a user-specified force range
- Med-PC tells force lever to start and stop recording
- During recording, Med-PC calls force lever functions to determine complete and/or partial responses
- The utility functions identically to the software, except it cannot make real time graphs
  - *NOTE: For more distinction between the utility and software, refer to the table on page 33.*

USER-DEFINED VARIABLES

- Settings:
  - Upper Threshold: -500 – 500g
  - Lower Threshold: -500 – 500g
  - Experiment Time: (user-defined)

- Variables:
  - Session Length *(minutes)*
  - Maximum Time to Complete Response *(ms)*
  - Minimum Duration Above High Threshold *(ms)*
  - Maximum Duration Above High Threshold *(ms)*
  - Low Threshold Value *(volts)*
  - High Threshold Value *(volts)*
  - Limit Threshold Value *(volts)*
  - Reinforce Partial Responses *(yes/no)*
 - SoftCR Data Array *(yes/no)*

REQUIRED HARDWARE

> Med Associates operant chamber
> Force Lever *(ENV-118M)*
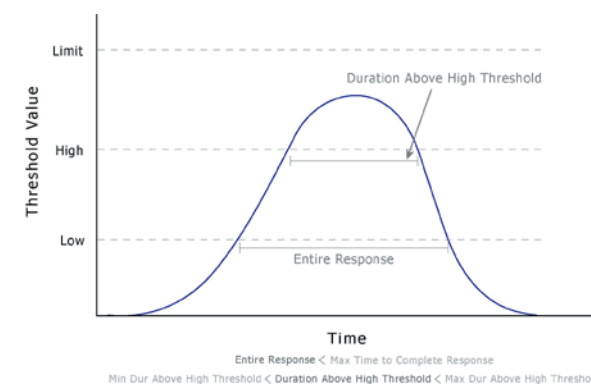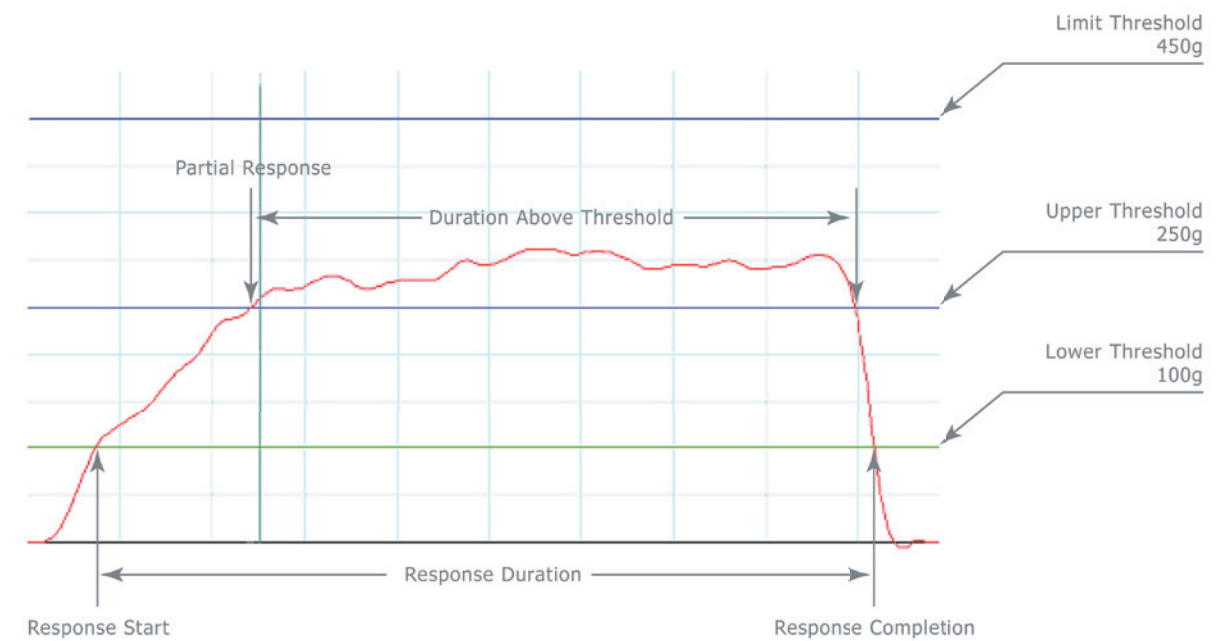
Partial Responses

The lever must be pressed with enough force to exceed the "High Threshold Value," but the entire response must be completed before the "Max Time to Complete Response" runs out. If the response takes longer than this time, then no reinforcement will be given. An entire response is defined as "Low Threshold Crossing" to "Low Threshold Crossing." The "Minimum Duration Above High Threshold" and "Maximum Duration Above High Threshold" is ignored when looking for a Partial Response.
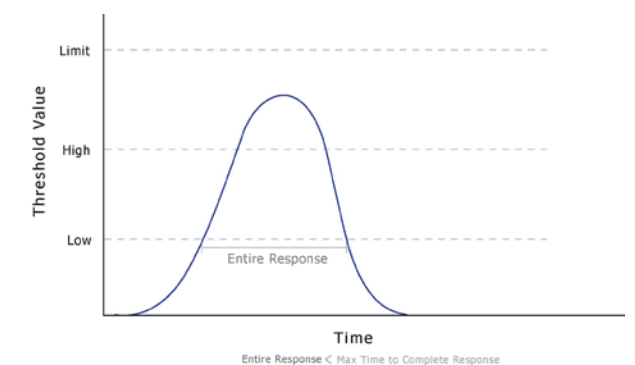
Complete Responses

The force of the lever press must be maintained above the "High Threshold Value" and below the "Limit Threshold Value" for at least the "Min Dur Above High Threshold" and no longer than the "Max Dur Above High Threshold," otherwise no reinforcement will be given.

The entire response, including multiple crossings of the "High Threshold Value," must be completed before the "Max Time to Complete Response" runs out. If the response takes longer than this time, then no reinforcement will be given. An entire response is defined as "Low Threshold Crossing" to "Low Threshold Crossing."

GRAPHICS DISPLAY ROUTINE UTILITY

SOF-732-1

SUMMARY

Enables the user to display images (bitmaps) or solid colors to the subject via a Med-PC program. The program can support multiple monitors, displaying one graphic or color per monitor at a time.

- Create up to 32 windows on 32 different monitors
  - *NOTE: one graphics window per monitor*

- When a bitmap is displayed it is expanded to fill the entire width of the monitor, so the picture resolution (size/shape/location) is important, and is dependent on the resolution of the monitor being used

- Control timing and duration of each graphic display
  - Can be set up to cycle through a set of images and/or colors

- Includes three sample Med-PC programs configured for two monitors:
  - MEDPC Window.mpc presents a graphic on both monitors at the same time
  - MEDPC Window 1.mpc presents a graphic on the first monitor only
  - MEDPC Window 2.mpc presents a graphic on the second monitor only

- Also includes a set of sample bitmap images

REQUIRED HARDWARE

- 1 monitor for each chamber

WAV FILE PLAYER UTILITY

SOF-732-2

SUMMARY

A MedState Notation (MSN) library that enables the user to play ".WAV" format audio files stored on their PC from within a Med-PC procedure.

- Files can be played via any speaker plugged into the PC sound card jack

- Use sound as a stimulus or reinforcer, for example, a protocol can be designed to play a WAV file when the animal enters a specific side of a shuttle box

- Also includes:
  - One negative and five positive reinforcement sounds
  - A complete Fixed Ratio (FR) protocol

- Wave File Player library provides four functions that can be called in an MSN program written by the user:
  - ReadWAVListFile tells the player's library where to find the list file (e.g. WavFiles.txt) and returns the number of WAV files found
  - PlayWave passes the index of the WAV file to be played to the player
  - IsReady checks to see if the player is done playing the last WAV file
  - ClosePlayer commands the MEDPCSound.dll to close

ENV-131M

ENV-131M-DL

SCREEN IMAGE LOADER SOFTWARE

SOF-ENV-131

SUMMARY

Creates and edits bitmap images, organizes image albums, and transfers them to the Image Downloader *(ENV-131M-DL)*, which then loads (transfers) the image album to one or more of our Response Keys w/Stimulus Displays *(ENV-131M)*. Through a process often referred to as "cloning", all of the units that the downloader is temporarily attached to will have the same image album stored in their internal memory.

- Use the Microsoft® Paint program to edit bitmap images of the appropriate dimensions, then these edited images are stored in a collection of images called an album

- Response key can store and display up to 64 custom full color 240x320 px 16-bit bitmap (*.bmp) images
  - Image album files have an "ALB" file extension
  - 48 image and color combinations come pre-loaded on the response key, with storage space for an additional 16 images
  - Display images on an unlimited amount of response keys *(ENV-131M)*

- Connect the downloader to the PC via USB and the Response Key *(ENV-131M)* via CAT-5 *(both included)*

- There are two protocols for controlling the response key, 6-line and 12-line control, each referring to the number of Med-PC output control lines used
  - 12-line mode is a legacy format to keep existing Med-PC procedures viable, and allows for easier mixing of obsolete incandescent bulb models with newer LCD devices
  - The benefit of the 6-line protocol is that more LCD equipped response keys can be controlled with the same amount of output control lines

REQUIRED HARDWARE

- Response Key w/LCD Stimulus Display *(ENV-131M)*
  - Includes Med Image Downloader Software *(SOF-400)*

- Response Key Image Downloader *(ENV-131M-DL)*

DESCRIPTION	SKU	SEE BROCHURE
Activity Monitor 7 Software	SOF-812	Open Field Activity
Activity Wheel Data Collection Utility	SOF-700RA-20	Activity Wheels
Animal Food Intake Monitor Software	SOF-710	Software
Aversive Stimulation w/Video Monitoring CD	SOF-732-4	Software
Avoidance Utility Package for ENV-010MXL	SOF-700RA-30	Shuttle Box
Catalepsy Utility	SOF-700RA-19	Catalepsy
Contextual Conditioning Utility	SOF-700RA-16	Software
Control of Med Input/Output From Other Languages	SOF-732-3	Software
Cystometry Data Analysis Software	SOF-552	Cystometry
Davis Rig Software - Legacy Version	SOF-770	Davis Rig
Delayed Match to Position Utility	SOF-700RA-27	Software
Delayed vs. Immediate Reward Utility	SOF-700RA-31	Software
Drug Discrimination Utility	SOF-700RA-24	Software
Drug Self Infusion Utility	SOF-700RA-10	Self Administration
Elevated Maze Data Collection Utility	SOF-700RA-3	Specialized Mazes
Event Analysis Software	SOF-720E	Software
Five Choice Serial Reaction Task with Olfactory Stimulus	SOF-700RA-33	Five + Nine Choice
Five Choice Serial Reaction Time Task Utility	SOF-700RA-8A	Five + Nine Choice
Force Lever Software	SOF-700RA-17	Software
Force Lever Software	SOF-808	Software
Force Lickometer Software	SOF-809	(Obsolete)
FR Training Utility Package	SOF-700RA-1	Software
Gastrointestinal Motility Monitor (GIMM) Software	SOF-570	GIMM
Graphics Display Routine Utility	SOF-732-1	Software
Intracranial Self Stimulation (ICSS) Utility Package	SOF-700RA-5	ICSS
K-Limbic Software	SOF-740	MedTouch
Med Screen Image Loader Software	SOF-ENV-131	Software
MedLab 8 Utility Package	SOF-700LA-1	Software
Med-PC to Excel Data Transfer Utility	SOF-731	Software
Med-PC V 64-bit Software Lab License	SOF-736	Software
Nine Choice Serial Reaction Time Task Utility	SOF-700RA-8	Five + Nine Choice
Operant Conditioning Lab Utility Package	SOF-700LA-2	Software
PHM-104A High/Low Speed Pump Software	SOF-104A	Syringe pump
Prizmatix Fixed Ratio	SOF-732-6	Software
Progressive Ratio Utility Package	SOF-700RA-2	Software
Radial Arm Maze Data Collection Utility	SOF-700RA-6	Modular Mazes
Razel R-100 API Software	SOF-RAZ-API	Syringe pump
Rota-Rod 2 Software	SOF-571	Rota-Rod
RotoRat™ Rotational Activity Software	SOF-801	Rotometer
Schedule Manager Software	SOF-706	Software
Schedule Manager Software Single License	SOF-706-1	Software
Shuttle Box Active Avoidance FR-2 Utility	SOF-700RA-23	Shuttle Box
Shuttle Box Avoidance Utility Package	SOF-700RA-7	Shuttle Box
Shuttle Box Learned Helplessness Utility	SOF-700RA-28	Shuttle Box
Shuttle Box Step Down Utility	SOF-700RA-11	Shuttle Box
Small Animal Cystometry Software	SOF-551	Cystometry
SoftCR Cumulative Record Graphical Software	SOF-721	Software
SoftCR Pro Cumulative Record Graphical Software	SOF-722	Software
Startle PPI Pro Series Software	SOF-826	Acoustic Startle

DESCRIPTION	SKU	SEE BROCHURE
Startle Pro FPS Software	SOF-827	Acoustic Startle
Startle Reflex Software	SOF-825	Acoustic Startle
Stop Signal Reaction Time Protocol	SOF-700RA-34	Software
Tail Suspension Software	SOF-821	Depression
Three Compartment Place Preference Data Utility Package	SOF-700RA-4	Conditioned Place Preference
T-Maze Training and Testing Utility	SOF-700RA-9	Modular Mazes
Triadic Learned Helplessness Utility	SOF-700RA-12	Depression
Two Compartment Conditioned Place Preference Utility	SOF-700RA-25	Conditioned Place Preference
Ultrasonic Vocalization Software	SOF-937-1	Ultrasonic Vocalization
Ultrasonic Vocalization Test Program	SOF-939	Ultrasonic Vocalization
UroVoid Data Analysis Software	SOF-581	UroVoid
UroVoid Software	SOF-580	UroVoid
USB Syringe Pump Test Program	SOF-111	Syringe pump
Variable Schedule Utility	SOF-700RA-18	Software
Video Freeze Software	SOF-843	Fear Conditioning
Video Monitor Software	SOF-842	Video
Vogel Conflict/Lick Suppression Utility	SOF-700RA-22	Software
Water Maze and Video Tracking Software	SOF-845	Specialized Mazes
Wave File Player Utility	SOF-732-2	Software
Wheel Manager Software	SOF-860	Wireless Running Wheels
Wireless Wheel Analysis Software, Single License	SOF-861	Wireless Running Wheels
Y-Maze Utility	SOF-700RA-32	Modular Mazes

SKU	DESCRIPTION	SEE BROCHURE
SOF-104A	PHM-104A High/Low Speed Pump Software	Syringe pump
SOF-111	USB Syringe Pump Test Program	Syringe pump
SOF-551	Small Animal Cystometry Software	Cystometry
SOF-552	Cystometry Data Analysis Software	Cystometry
SOF-570	Gastrointestinal Motility Monitor (GIMM) Software	GIMM
SOF-571	Rota-Rod 2 Software	Rota-Rod
SOF-580	UroVoid Software	UroVoid
SOF-581	UroVoid Data Analysis Software	UroVoid
SOF-706	Schedule Manager Software	Software
SOF-700LA-1	MedLab 8 Utility Package	Software
SOF-700LA-2	Operant Conditioning Lab Utility Package	Software
SOF-700RA-1	FR Training Utility Package	Software
SOF-700RA-2	Progressive Ratio Utility Package	Software
SOF-700RA-3	Elevated Maze Data Collection Utility	Specialized Mazes
SOF-700RA-4	Three Compartment Place Preference Data Utility Package	Conditioned Place Preference
SOF-700RA-5	Intracranial Self Stimulation (ICSS) Utility Package	ICSS
SOF-700RA-6	Radial Arm Maze Data Collection Utility	Modular Mazes
SOF-700RA-7	Shuttle Box Avoidance Utility Package	Shuttle Box
SOF-700RA-8	Nine Choice Serial Reaction Time Task Utility	Five + Nine Choice
SOF-700RA-8A	Five Choice Serial Reaction Time Task Utility	Five + Nine Choice
SOF-700RA-9	T-Maze Training and Testing Utility	Modular Mazes
SOF-700RA-10	Drug Self Infusion Utility	Self Administration
SOF-700RA-11	Shuttle Box Step Down Utility	Shuttle Box
SOF-700RA-12	Triadic Learned Helplessness Utility	Depression
SOF-700RA-16	Contextual Conditioning Utility	Software
SOF-700RA-17	Force Lever Software	Software
SOF-700RA-18	Variable Schedule Utility	Software
SOF-700RA-19	Catalepsy Utility	Catalepsy
SOF-700RA-20	Activity Wheel Data Collection Utility	Activity Wheels
SOF-700RA-22	Vogel Conflict/Lick Suppression Utility	Software
SOF-700RA-23	Shuttle Box Active Avoidance FR-2 Utility	Shuttle Box
SOF-700RA-24	Drug Discrimination Utility	Software
SOF-700RA-25	Two Compartment Conditioned Place Preference Utility	Conditioned Place Preference
SOF-700RA-27	Delayed Match to Position Utility	Software
SOF-700RA-28	Shuttle Box Learned Helplessness Utility	Shuttle Box
SOF-700RA-30	Avoidance Utility Package for ENV-010MXL	Shuttle Box
SOF-700RA-31	Delayed vs. Immediate Reward Utility	Software
SOF-700RA-32	Y-Maze Utility	Modular Mazes
SOF-700RA-33	Five Choice Serial Reaction Task with Olfactory Stimulus	Five + Nine Choice
SOF-700RA-34	Stop Signal Reaction Time Protocol	Software
SOF-706-1	Schedule Manager Software Single License	Software
SOF-710	Animal Food Intake Monitor Software	Software
SOF-720E	Event Analysis Software	Software
SOF-721	SoftCR Cumulative Record Graphical Software	Software
SOF-722	SoftCR Pro Cumulative Record Graphical Software	Software
SOF-731	Med-PC to Excel Data Transfer Utility	Software
SOF-732-1	Graphics Display Routine Utility	Software
SOF-732-2	Wave File Player Utility	Software
SOF-732-3	Control of Med Input/Output From Other Languages	Software

SKU	DESCRIPTION	SEE BROCHURE
SOF-732-4	Aversive Stimulation w/Video Monitoring CD	Software
SOF-732-6	Prizmatix Fixed Ratio	Software
SOF-736	Med-PC V 64-bit Software Lab License	Software
SOF-740	K-Limbic Software	MedTouch
SOF-770	Davis Rig Software - Legacy Version	Davis Rig
SOF-801	RotoRat™ Rotational Activity Software	Rotometer
SOF-808	Force Lever Software	Software
SOF-809	Force Lickometer Software	(Obsolete)
SOF-812	Activity Monitor 7 Software	Open Field Activity
SOF-821	Tail Suspension Software	Depression
SOF-825	Startle Reflex Software	Acoustic Startle
SOF-826	Startle PPI Pro Series Software	Acoustic Startle
SOF-827	Startle Pro FPS Software	Acoustic Startle
SOF-842	Video Monitor Software	Video
SOF-843	Video Freeze Software	Fear Conditioning
SOF-845	Water Maze and Video Tracking Software	Specialized Mazes
SOF-860	Wheel Manager Software	Wireless Running Wheels
SOF-861	Wireless Wheel Analysis Software, Single License	Wireless Running Wheels
SOF-937-1	Ultrasonic Vocalization Software	Ultrasonic Vocalization
SOF-939	Ultrasonic Vocalization Test Program	Ultrasonic Vocalization
SOF-ENV-131	Med Screen Image Loader Software	Software
SOF-RAZ-API	Razel R-100 API Software	Syringe pump