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instrumentation and software for research

WAVE FILE PLAYER

SOF-732-2 MEDSTATE NOTATION™ PROCEDURE

USER'S MANUAL

DOC-029
Rev. 2.5

Med Associates Inc.
P.O. Box 319
St. Albans, Vermont 05478

Phone: 802.527.2343
Fax: 802.527.5095
www.med-associates.com

notes

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CHAPTER 1 INTRODUCTION

Sound is commonly used as a stimulus or for positive or negative reinforcement in experiments. For example, the user could establish a protocol to play a .wav file when the animal enters a specific side of a shuttle box. Wave File Player allows the researcher to customize the choice of sound files to meet the needs of their experiment.

Wave File Player is a MedState Notation (MSN) utility library that enables the user to play .wav audio files stored on their PC from within a MED-PC IV® procedure. The sound files can be played via the PC's speakers or the chamber speaker can be plugged into the PC's sound card jack.

Wave File Player library provides four functions that can be called in an MSN program written by the user. Those functions, which will be explained, are **ReadWAVListFile**, **IsReady**, **PlayWave** and **ClosePlayer**. The software package includes a sample program called "MedPCSound Sample.mpc " and six sample .wav files to illustrate the usage of the four functions. Please note, any .wav file can be used with the application.

CHAPTER 2 SOFTWARE INSTALLATION

Med-PC IV® and Trans IV must be installed on the PC prior to installing and using Wave File Player. Please refer to the **MED-PC IV® User's Manual, DOC-010,** for a guide to installing the MED-PC IV® software, building a valid hardware configuration with the Hardware Configuration Utility, and opening and compiling MedState Notation (MSN) procedures in the Trans-IV utility. The **Med-PC IV Programmer's Manual, DOC-003**, will also be a great tool for writing MSN procedures that utilize Wave File Player.

To install Wave File Player, place the CD into the CD-ROM drive and click **Install the Wave File Player Software**. If the auto-run feature is not enabled on the CD drive, navigate to the CD drive in explorer and double click the "autorun.exe" file and then click **Install the Wave File Player Software**. The installer will search for the MED-PC IV installation directory ("C:\MED-PC IV" by default), and install the files in Table 2-1.

All files will be installed in the Med-PC IV® installation directory except for MEDPCSoundSample.mpc which will be placed in the MPC sub-directory of Med-PC IV.

Table 2-1- Med-PC Sound Files Installed

File	Description
MEDPCSound.dll	Library file, exports 4 functions: ReadWAVListFile, IsReady, PlayWave, ClosePlayer
MEDPCSound_Iface.hed	Header file, defines interface to 3 exported functions
MEDPCSoundSample.mpc	MPC code, sample described below in this document
WavFiles.txt	Wav List file, used by MEDPCSoundSample.mpc
chimes.wav, chord.wav, ding.wav, ringin.wav, ringout.wav, tada.wav	.WAV files, used by MEDPCSoundSample.mpc

CHAPTER 3 USING WAVE FILE PLAYER

Wave File Player (WFP) is not a standalone application; it is a library of functions that enables playing .wav files from MedState Notation (MSN) procedures. To play .wav files in a procedure, write an MSN procedure that utilizes the functions provided in the WFP package, compile the MSN procedure in Trans IV and create a text file listing the .wav files to be played.

Wave File Player Functions

The samples and explanations below are from the included sample **MEDPCSoundSample.mpc** file.

ReadWAVListFile(MG, BOX, Filename)

The ReadWAVListFile function tells the Wave File Player library where to find the list file (e.g. WavFiles.txt) and returns the number of .wav files found in the list file. An absolute file path to "WaveFiles.txt" is safer, but is not required. An absolute file path example would be: ReadWAVListFile(MG,BOX,"C:\MED-PC IV\WaveFiles.txt"). "WaveFiles.txt" must be in MED-PC IV's .exe folder if the path is not specified.

The sample "WavFiles.txt" file contains 6 files, therefore X will be assigned the value 6 in state 2 shown below. This is used later in the procedure as a loop control value, so the files can be played sequentially in a loop until a K1 pulse is issued.

MG (Med Global pointer) and BOX (currently running box identifier) are reserved keywords used for error logging. The program must pause 0.1 seconds before stopping to allow the error log to be written.

MEDPCSoundSample.MPC uses the ReadWAVListFile function in State 2.

```
S2,
  #START: ~X := ReadWAVListFile(MG, BOX, 'WavFiles.txt');~;
          SHOW 5,Lines Read,X;
          IF X <= 0 [@Exit, @Continue]
             @Exit: ---> S32\ Do Not STOPKILL here, no errors will be logged
             @Cont: ---> S3
```

NOTE: A command from MedState Notation to external code (like the Wave File Player library) must be surrounded by tildes (~).

PlayWave (index)

PlayWave passes the index of the .wav file to be played to the Wave File Player. In MEDPCSountSample.mpc variable "A" indicates which .wav file to play from the WaveFiles.txt file. E.g. to play the first file referenced in WaveFiles.txt use:

~PlayWave(1);~

Using the sample WavFiles.txt file provided with the WFP package, ~PlayWave(1);~ would play chimes.wav and ~PlayWave(6);~ would play tada.wav. Since the sample WavFiles.txt file only contains six files, ~PlayWave(7);~ would cause an error and no sound would be played.

The PlayWave function returns the value 1.0 if it attempts to play a sound file and 0.0 if it does not attempt to play a sound file. PlayWave would not attempt to play the sound file in the following cases:

- WaveFiles.txt not set (ReadWAVListFile not called, or ReadWAVListFile had a problem reading the file)
- It is not ready (IsReady not called, or return value not checked properly)
- Invalid WaveFiles.txt index (index less than 1, or greater than the number of files found by ReadWAVListFile)

In State 3, the variable "R" is assigned the return value from PlayWave.

In State 4, "R" is checked to see if the PlayWave command worked.

```
S3,     \ If MEDPCSound.dll's IsReady returns 0, try again in 0.1".
        \ otherwise, call PlayWave with ONE-based index into .WAV text
        \ file, go to State 4 to display results of call.
  0.1": ~F := IsReady();~;
        IF F <> 0 [@Go, @Wait]
           @Go: ~R := PlayWave(A);~; SET W = 0 ---> S4
           @Wait: SHOW 2,Duration,W/10; ADD W ---> SX

S4,     \ Display results of PlayWave call and increase A for next time
        \ MEDPCSound.dll IsReady to play next .WAV file.
  0.1": IF R <> 0 [@Worked, @Failed]
           @Worked: SHOW 1,Playing,A;
                    CLEAR 2,2; ADD A ---> S5
           @Failed: SHOW 1,ERROR Playing,A;
                    CLEAR 2,2; ADD A ---> S5
```

IsReady ()

The IsReady function checks to see if the Wave File Player is done playing the last .wav file. It returns a 0.0 if it is not done and a 1.0 if it is ready to play another .wav file.

MEDPCSoundSample.MPC uses IsReady in State 3.

```
S3,     \ If MEDPCSound.dll's IsReady returns 0, try again in 0.1".
        \ otherwise, call PlayWave with ONE-based index into .WAV text
        \ file, go to State 4 to display results of call.
  0.1": ~F := IsReady();~;
        IF F <> 0 [@Go, @Wait]
           @Go: ~R := PlayWave(A);~; SET W = 0 ---> S4
           @Wait: SHOW 2,Duration,W/10; ADD W ---> SX
```

State 3 calls IsReady every 0.1 seconds until IsReady indicates that Wave File Player is ready to play a sound. The return value of the IsReady call is assigned to the variable "F". If WFP is ready (F <> 0.0), PlayWave is called to play the next sound file in the list.

ClosePlayer ()

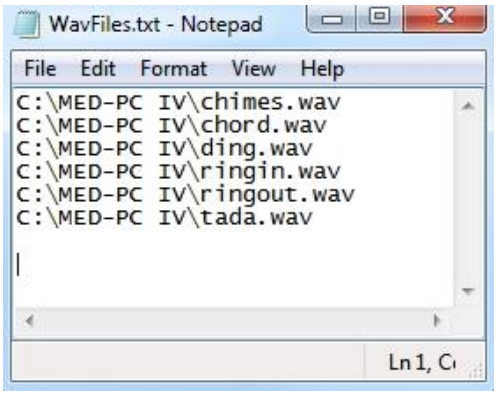
ClosePlayer commands the MEDPCSound.dll to close. This procedure must be called from the FINALIZATIONCODE command and it must be placed before State Set 1, State 1.

```
FINALIZATIONCODE = ~ClosePlayer();~
```

Creating a WavFiles.txt File

The sample list included with WFP, WavFiles.txt, may be used; but custom sound file lists may also be created. Begin by creating a text file that lists the .wav file names and paths of the files you want to use. The text file can be created using Trans IV, Notepad, or any text editor. Place one .wav file name per line, including the drive letter and full file path. In Figure 3-1 WavFiles.txt file shows that the .wav files are stored in the MED-PC IV® installation directory. Using the full path name in the list is not required, but strongly recommended.

Figure 3-1- WavFiles.txt File



Translating a Med-PC IV® (.mpc) File

Programs written in MedState Notation (MSN) must be compiled using Trans IV before they can be executed in MED-PC IV®. Open Trans IV, click the **File** menu option, then **Open** to open your MSN file. Or click the open file icon that looks like a file folder opening, second icon from left. Select your working file, click **Open**. Figure 3-2 illustrates opening the sample "MEDPCSoundSample.mpc" file supplied with the software.

With the MSN file open, click the **Translation** menu and click **Translate and Compile**. Select the program to use for the experiment, click **Make** then **OK** to start the translator which will parse the MSN code for use in MED-PC IV®, see Figure 3-3. Alternately with the MSN file open in Trans IV, click the hammer icon, second from the right, to compile the MSN code. If you encounter any problems refer to the on-screen help menu, the **MED-PC IV® User's Manual, DOC-010**, or contact Med Associates, Inc. for assistance.

Figure 3-2- Trans IV Control Panel for Opening a MedState Notation (.mpc) File

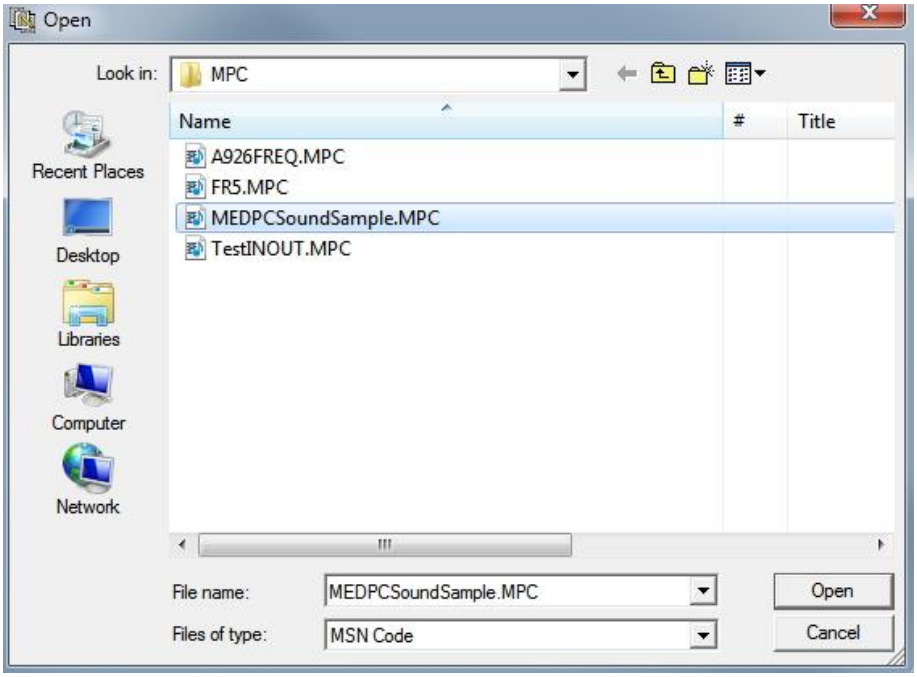
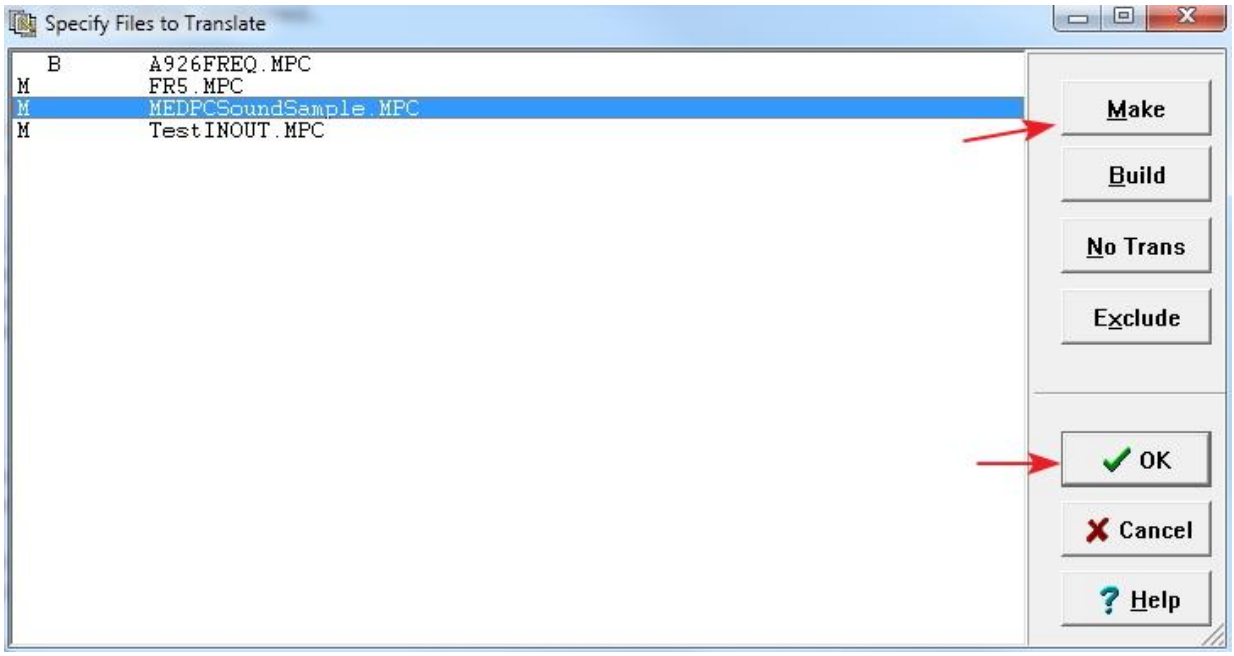


Figure 3-3- Translate & Compile



APPENDIX A CONTACT INFORMATION

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

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

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