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Consumer Products Division

SATURN Sound Simulator Manual

Doc. # ST-168-R3-011895

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REFERENCES

In translating/creating this document, certain technical words and/or phrases were interpreted with the assistance of the technical literature listed below.

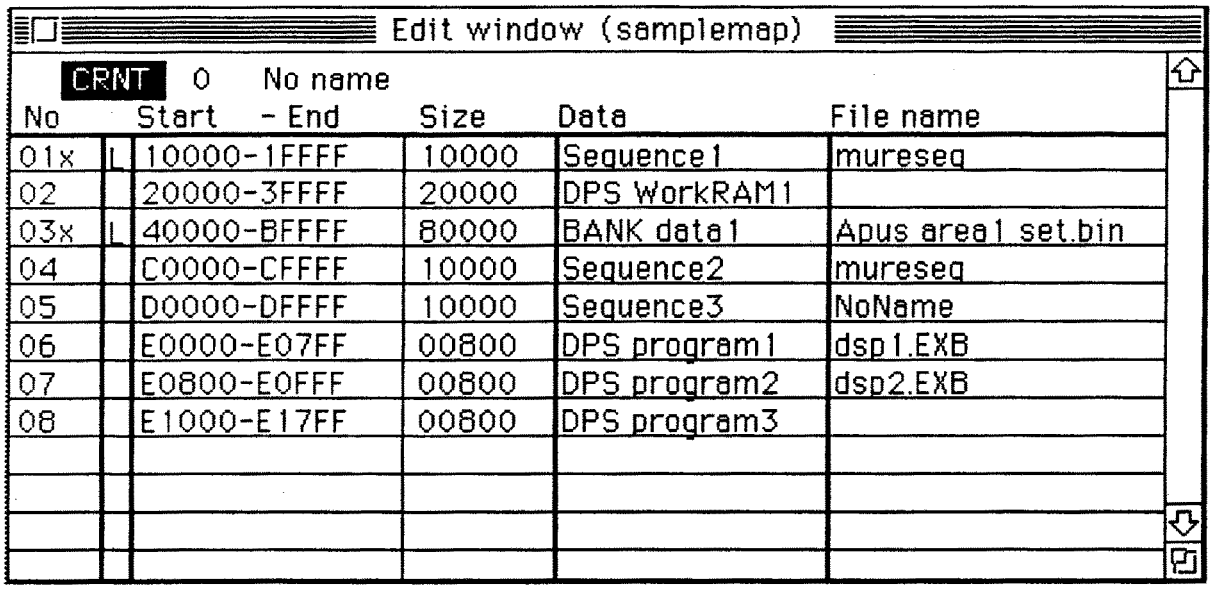
1. *Dictionary of Science and Engineering, 350,000 words, 3rd Edition*
   Inter Press
   Tokyo, Japan
   1990

2. *Computer Dictionary*
   Kyoritsu Publishing Co., LTD.
   Tokyo, Japan
   1978

3. *IBM Dictionary of Computing*
   McGraw-Hill, Inc.
   New York, New York
   1994

The Sound Simulator

Main Window



Sound Simulator

The Sound Simulator is a simulation tool that enables the playback of sound data as it should sound when incorporated into a game. Playback control of sound data is typically not possible until the data is paired with the game application code. The Sound Simulator enables the playback of sound data by simulating the game code on the Macintosh. The Sound Simulator's functions are as follows:

- Sound system startup
- Tone data and song data transfer
- Sound playback control
- DSP (effects) program change
- Creation, compression, and linking of SATURN format data
- Creation of sound area maps

Sound System Start Up

When the power to the sound board is turned on, the sound operating system must be started up. As with the production SATURN, the sound operating system is cleared from memory at power-down. Click on **System Startup** to perform the following processes from the Sound Simulator.

- Hardware initialization
- System table and sound area map transfer
- Sound program transfer
- Sound driver startup

Tone Data and Song Data Transfer

Tone data and song data must be transferred to the sound memory according to a sound area map before any sound can be played back. If the tone data and song data are within the area sizes of the map data, those data can be changed dynamically. Therefore, several tone data and song data areas can be used. Song data can be loaded in while a song is played back.

Sound Playback Control

Start, stop, pause, fade in, fade out, etc. for songs and sound effects can be controlled from the Sound Simulator. In addition to the mouse, function keys can be assigned to the Macintosh keyboard to control real-time playback. Evaluation of sound effects and level matching can be performed while a song is playing.

DSP (Effect) Program Change

When there are several DSP (effect) programs on the sound area map, a DSP program can be changed by clicking on the **Effect Change** button. The DSP program does not run by simply being transferred into memory, so even if there is only one DSP program, **Effect Change** still must be selected.

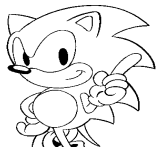
Creation, Compression, and Linking of SATURN Format Data

Song data created with a MIDI sequencer can be converted to compressed SATURN data. Multiple songs can be put into one song data bank (sequence bank) with the **Make Sequence Bank** function. This function links together independent compressed data files. It is assumed that multiple song (and/or sound effect) data is contained in a sequence bank, so even if only one song is in a bank, the **Make Sequence Bank** function must be used.

Creation of Sound Area Maps

Sound is controlled by each individual game area. The tone, song and effect data size of each area are used to create a memory map. The game program refers to this map and transfers tone and song data; the sound driver also controls sounds and playback based on this map. Therefore, the sound area map is an important memory map that is at the heart of sound control.

A unique sound area map is made for each game. The sound area map data is incorporated in the game program by the programmer. This data is transferred to the sound system when the game application is started up.

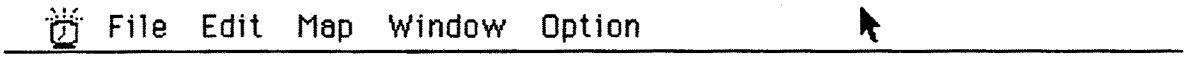


Using the Sound Simulator

This section explains the functions for all Sound Simulator menu items and their uses.

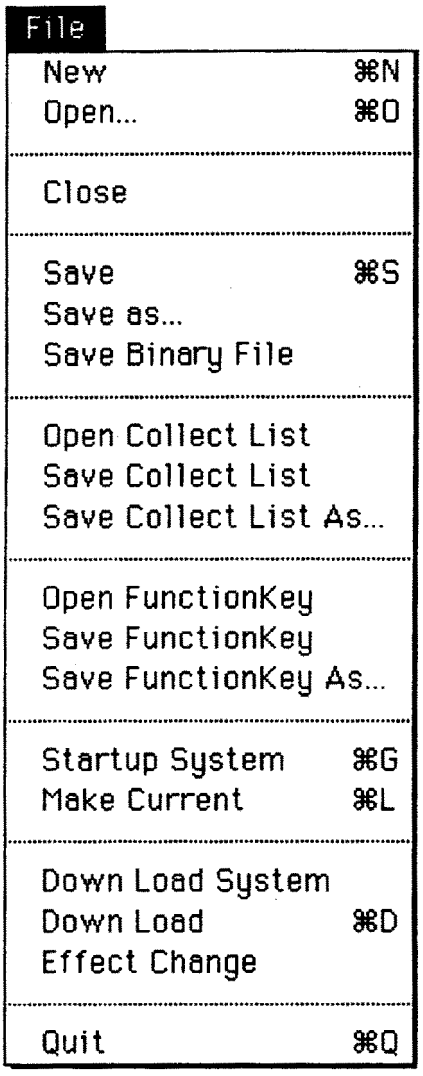
Menu Bar

There are five menus on the Sound Simulator menu bar.



File Menu

Selecting this menu displays the following:



The File menu is the menu that is used to open, save sound area map files, etc.

New
Creates a new map.

Open...
Opens a map that has already been created.

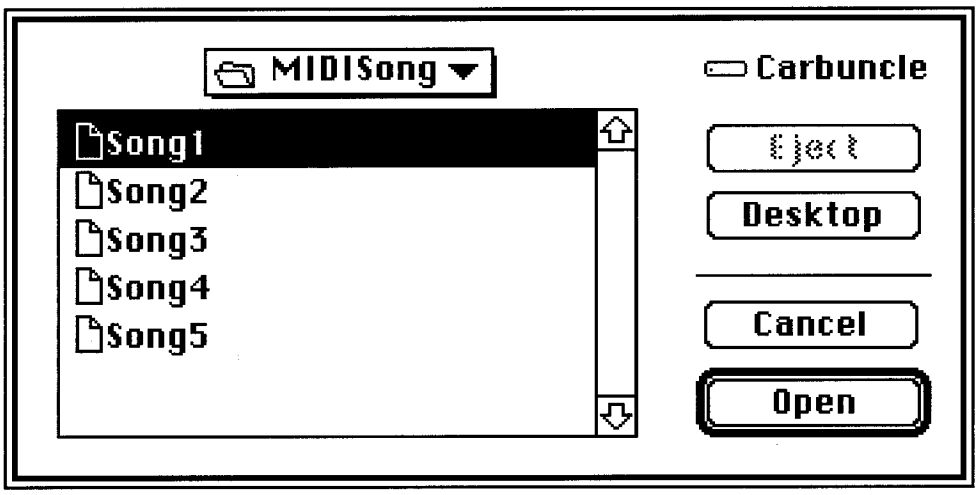
Close
Closes a map that is being edited. The Sound Simulator session will not end.

Save
Saves the map being edited.

Save as...
Saves the map being edited under a different name.

Save Binary File
Saves the currently active file as a binary file.

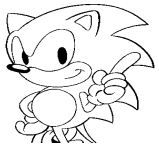
Collect List Open
Opens the collect list file. Selecting this displays the following dialog box:



The existing collect list files are displayed. A collect list is a compilation of multiple file names. It eliminates the need to select individual files at the beginning of each work session. It is used for converting standard MIDI files and creating sequence banks. All files opened here contain both of the above file types.

Collect List Save
Saves the currently active collect list file.

Collect List SaveAs...
Saves the currently active collect list file under a different name.



Function Key Open
Opens the saved function key setups into memory.

Function Key Save
Saves the function key setups to a disk file.

Function Key Save As...
Saves the function key setups under a different name. Function keys are stored in a map file. This menu item is used when function key setups are used in a different map file.

System Startup
Starts the sound system with the sound driver and other sound data transferred to the sound board in advance.

Make Current
Activates the currently selected map, thereby switching the map. The sound driver then uses this map as the current map (currently valid map). If auto load is specified in the map file data, file data is automatically transferred to the sound board.

System Down Load
This feature is used when the target board has crashed and must be reset. It transfers the system startup data to the sound board and eliminates the need to restart the Sound Simulator.

In order to download a customized sound driver, save the driver file under the file name `SDDRV.TSK` in the same folder as the Sound Simulator and execute this command.

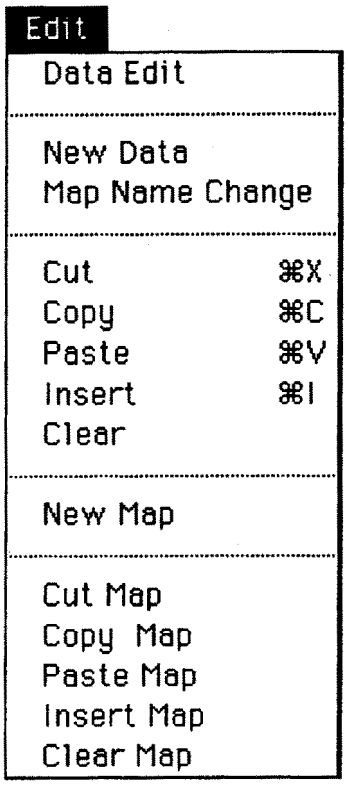
Down Load
Transfers the currently selected file data to the target. Clicking on the download file causes the file to be highlighted in black (reverse type) to show that it has been selected. To select several files at once, hold down the **SHIFT** key while clicking on the desired files. To deselect a file, click on it again to return it to normal display.

Effect Change
Changes DSP programs when there are multiple DSP programs in the current map. Clicking on a DSP program to be switched causes it to be highlighted in black (reverse type) to show that it has been selected. More than one DSP program cannot be selected.

Quit
Ends the Sound Simulator session and closes all open windows.

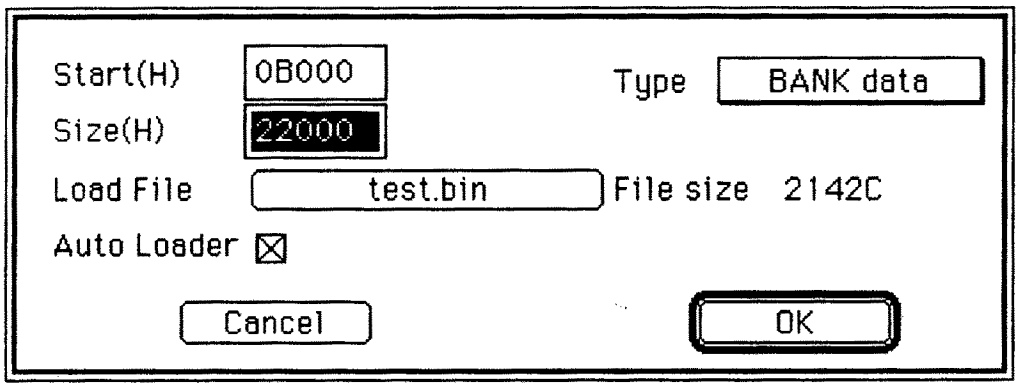
Edit Menu

Selecting this menu displays the following:



Data Edit

Selecting this menu item opens the following dialog box:



A part of the map data can be edited here. The start address, area size, data type, transfer file, and auto load settings can be set. Specifying the transfer file causes the specified file size to be displayed in bytes to serve as a guide for determining and changing the area size.

Using this menu is the same as double-clicking on the Edit window.

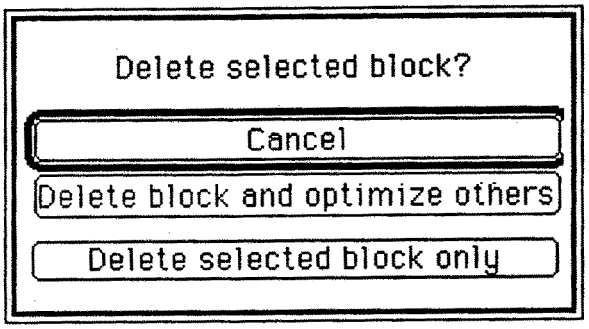
New Data

Selecting this menu item adds new data to the current map. The data type is the default "BANK data" or a data type last selected in the Data Edit dialog box. The default size is set to `00000`.

Map Name Change

Each area map has its own name. This makes it possible to assign easy to understand names when multiple areas exist.

Cut



When selected, a confirmation dialog box appears to prompt the user to either update the address or retain the current address. The cut data is stored in the Clipboard to allow retrieval when **Paste** or **Insert** is selected.

Copy

The selected data is stored in memory and can be retrieved when either **Paste** or **Insert** is selected.

Paste

The most recently stored data in memory is pasted when this is selected.

Insert

The most recently stored data is inserted immediately before the selected data. The insertion position is immediately above the selected data, which is highlighted in reverse type. When data is not selected, the inserted data is added at the very end.

Clear

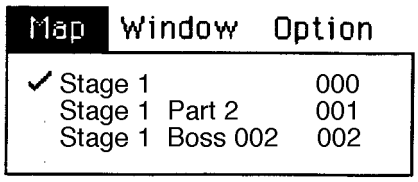
Clears all selected data, with the exception of the data type.

New Map, Cut Map, Copy Map, Paste Map, Insert Map and Clear Map

These functions perform in the same manner as the features above, except maps are edited instead of data.

Map Menu

Clicking on this menu item displays something like the following:

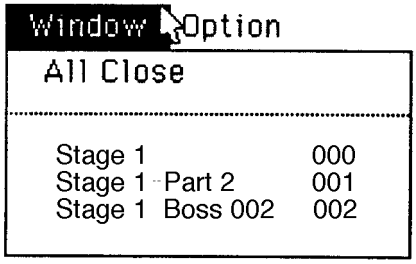


As shown above, the area map to be made current is selected. The area maps switched here are those that are being edited. This operation does not switch the current map. The difference between the Map menu and the Window menu is that the latter only displays other map windows and cannot be used to select other maps.

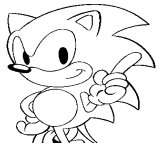
A maximum of 128 individual map data can be stored with the Sound Simulator.

Window Menu

Clicking on this menu item displays the following:

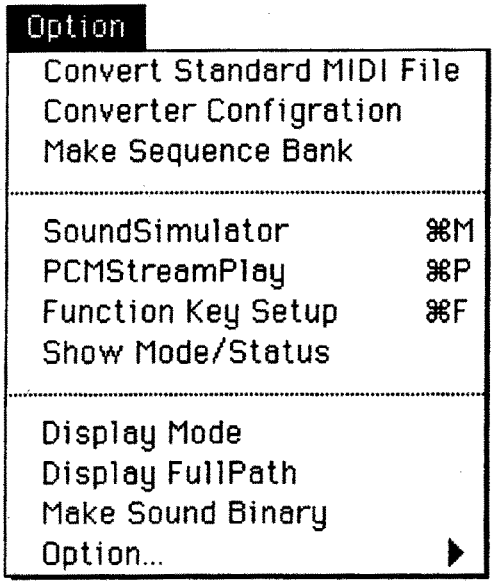


Use this menu to refer to other map data.



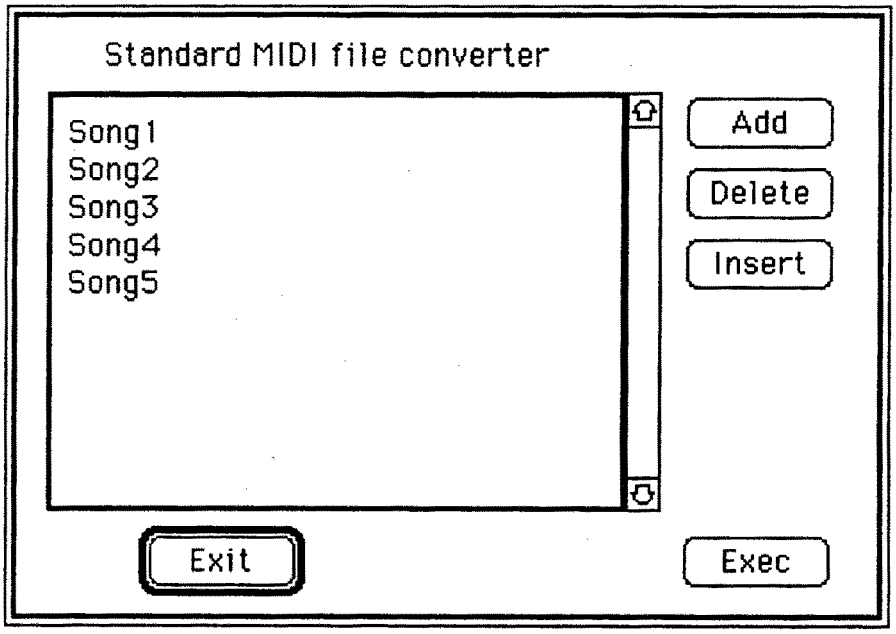
Option Menu

Selecting this menu displays the following:



Standard MIDI File Converter

Selecting this menu item from the Option menu opens the following dialog box:

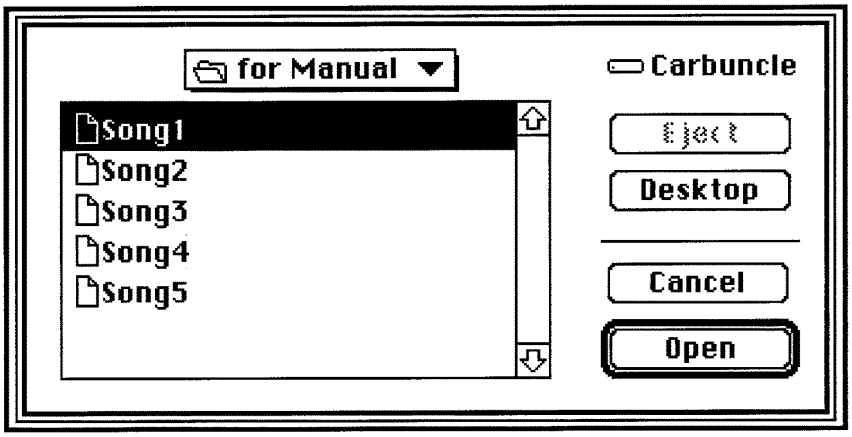


Displayed above are a list of song names selected using the **Add** or **Insert** buttons that are referred to as a "collect list". Nothing is displayed until titles are added or inserted using the buttons. The **Collect List Open** menu item allows the collect list to be read without having to use **Add** or **Insert** to register songs for each Sound Simulator session.

Multiple files can be selected and converted by holding down the **SHIFT** key while clicking on them.

Add

Clicking this button opens the following dialog box:



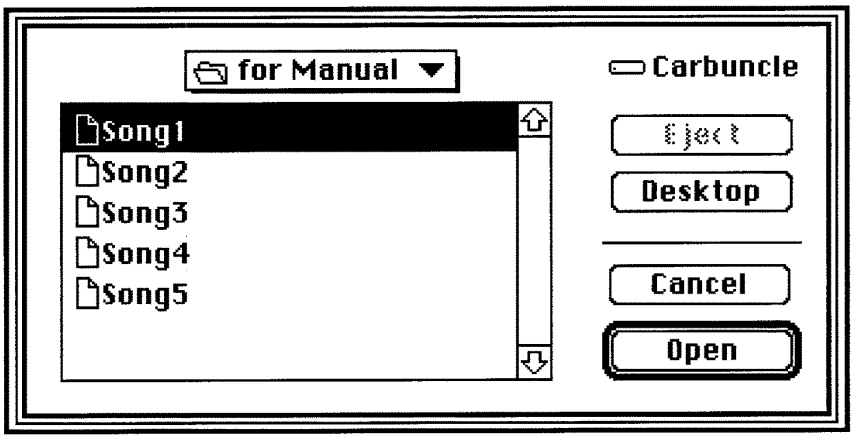
Song names are added to the collect list here. When a song name is selected, it is added to the end of the list.

Delete

Select a song name from the collect list and click the **Delete** button to remove it from the list.

Insert

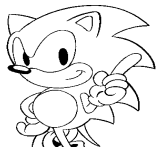
Clicking this button opens the following dialog box:



Song names are inserted into the collect list here. Click on the location in the collect list to insert the song name and then select the song. The song name is then inserted directly above the selected location.

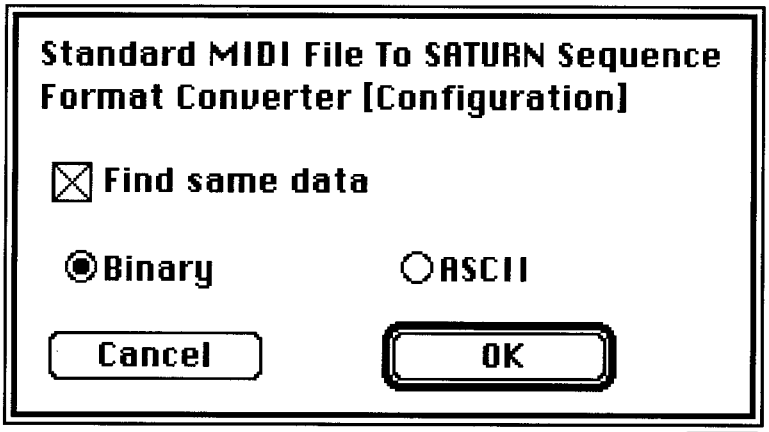
Exec

Start up the converter by specifying the song name (a standard MIDI file) to be converted and then click on **Exec**. A compressed SATURN format file is output. The output file format and compression mode can be specified with the **Converter Configuration** menu item from the Option menu. The final output file is output with the specified file name plus the extension `.CNV`.



Converter Configuration

Select this menu item from the Option menu to display the following dialog box:



An explanation of each check box is given below.

Find Same Data

This analyzes and deletes data that is repeated more than twice in the playback data. This method of compression does not affect playback.

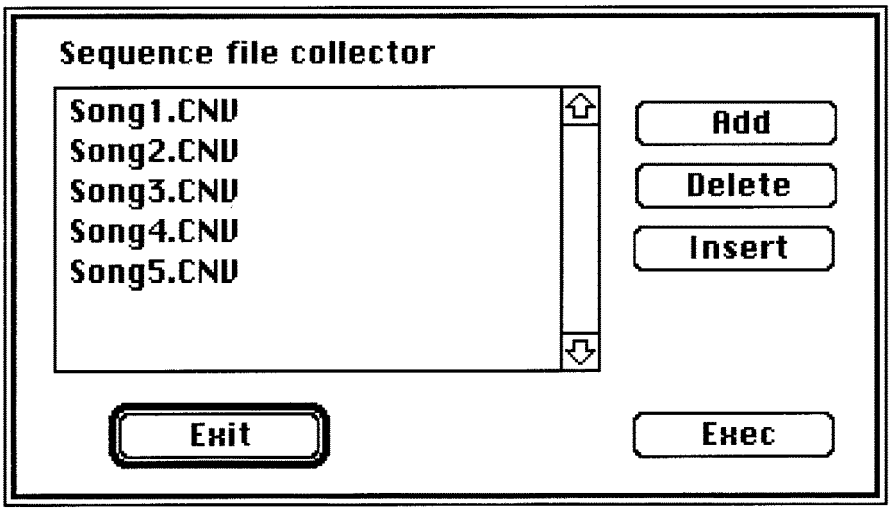
Since this procedure may be time consuming (more song data increases the amount of compression time), this box should only be checked during the final conversion process.

Binary/ASCII

This feature allows the user to select whether the final output file is in ASCII or binary format. If the file is output in ASCII format, the MIDI note data and control changes can be easily checked.

Make Sequence Bank

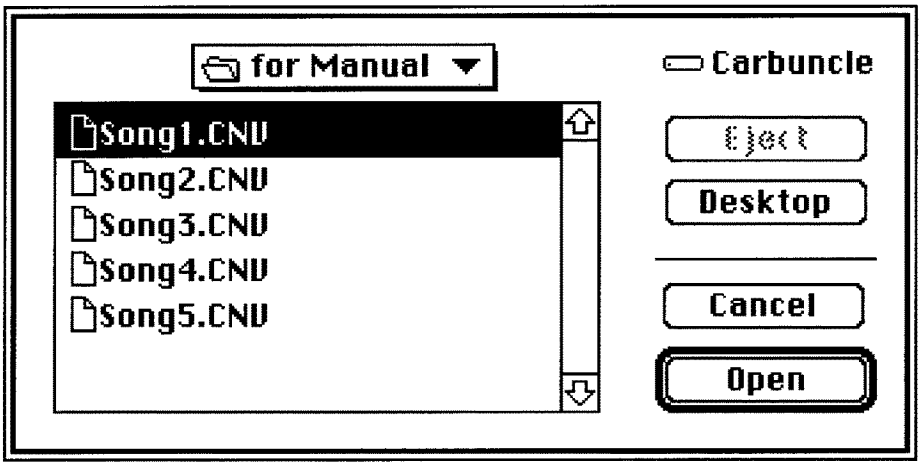
Selecting this menu from the Option menu opens the following dialog box:



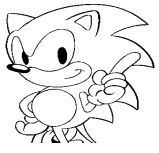
A list of compressed file names (called a collect list) converted by the Sound Simulator's standard MIDI file converter is displayed here. Nothing is displayed at first until file names are added or inserted using the **Add** or **Insert** buttons. The **Collect List Open** menu item allows the collect list to be read without having to add or insert a file name at the beginning of each Sound Simulator session.

Add

Selecting **Add** opens the following dialog box:

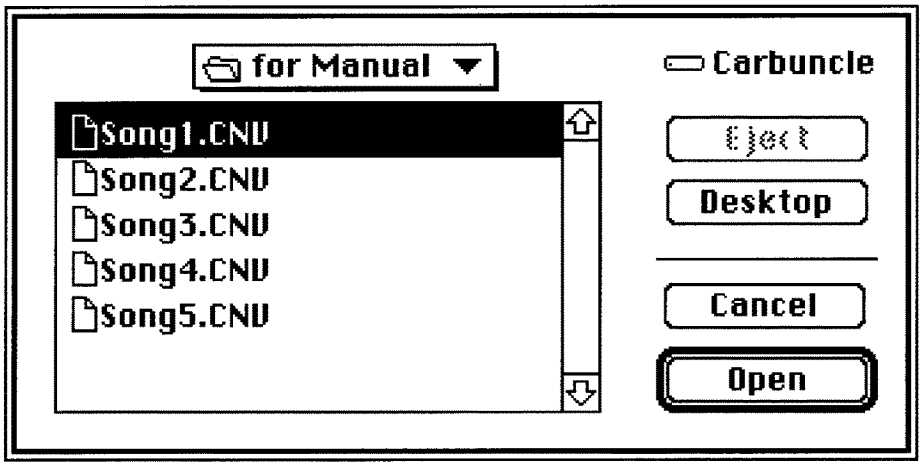


Compressed data file names are added to the collect list here. Selecting the compressed data file name adds that file to the end of the list.



Delete
Select a compressed data file name from the collect list and then click the **Delete** button to delete the file.

Insert
Selecting this displays the following dialog box:

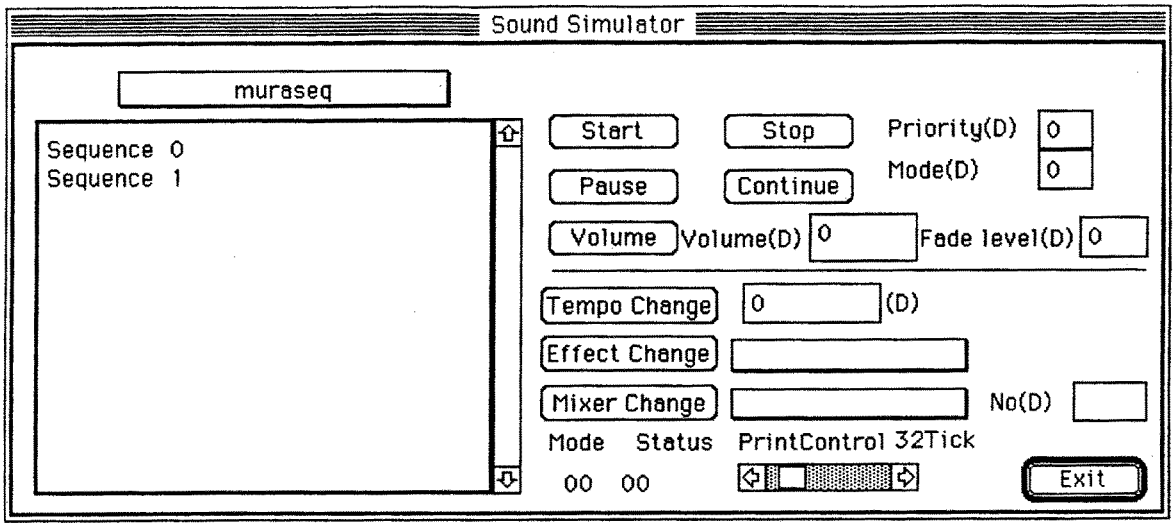


The compressed data file name is inserted in the collect list here. Click on the area in the collect list to insert the file and then select the compressed data file name. The compressed data file name is added to the collect list immediately above the file that was selected.

Exec
Links all the compressed data files specified in the collect list and outputs them as one sequence data bank. The name of the output file can be specified freely.

Sound Simulator

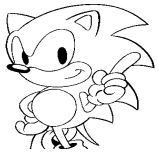
Selecting this menu item displays the following window:



If sequence banks have been transferred from the currently active map, then they can be selected from the pull-down menu above the file list box. Selecting the sequence bank displays a list of the sequence names in the bank similar to the one shown above. Select the sequence desired for playback and use the buttons described below to control playback.

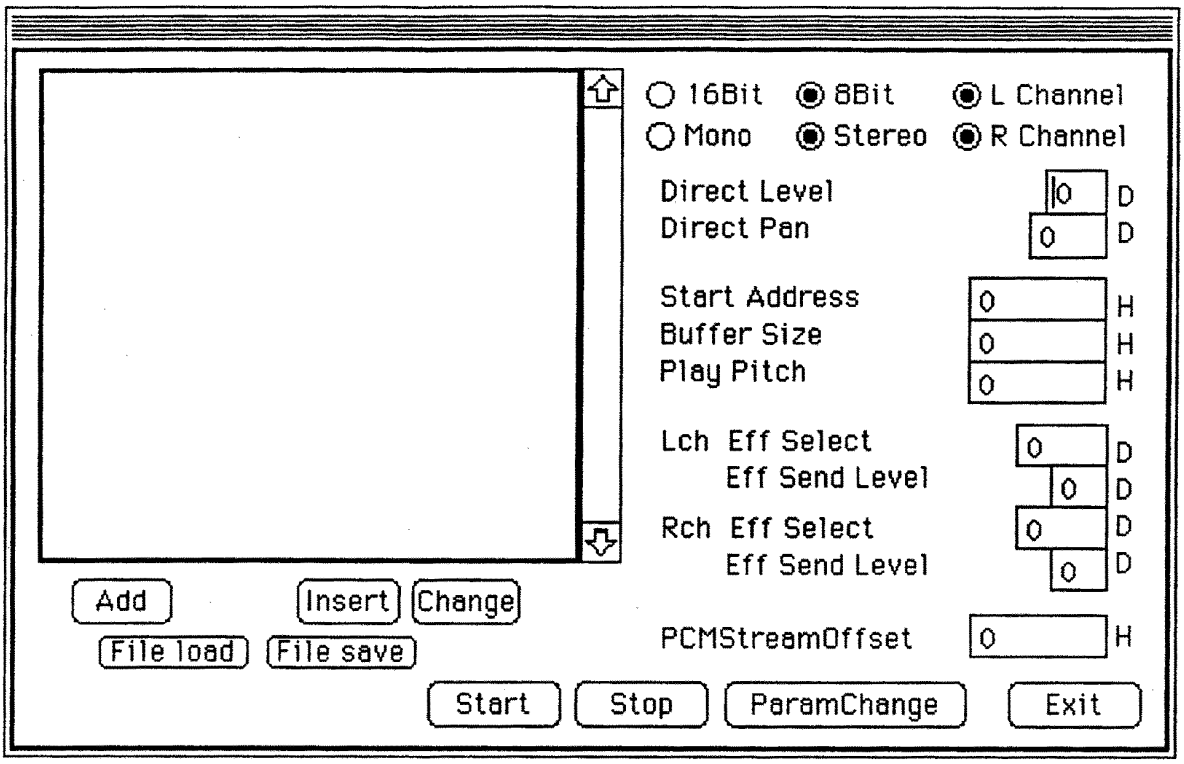
- **Tempo Change:** Changes the tempo of the song.
- **Tempo:** Specifies the value of the tempo to be changed. A plus (+) value means faster, a minus (-) value means slower. The following is an example:
  With a setting range of-32786 to +32767,
  4096 equals 2x (1/2 when negative)
- **Start:** Starts playback.
- **Stop:** Stops playback.
- **Volume:** Sets the sequence volume level and the speed of Fade-in (out).
- **Fade level:** Sets the fade level of Fade-In/Fade-Out. Setting ranges from 0 to 255, where 255 is the slowest.
- **Volume:** Sets the volume from 0—>127, with 127 being the maximum volume. Volume is used in combination with Fade Level.
- **Pause:** Temporarily stops playback.
- **Continue** Restores playback from pause point.
- **Priority:** Specifies sequence playback priority from 0—>127, with 0 having the highest priority.
- **Mode:** Sets the various modes. See the *SATURN Sound Driver Manual* for more information.
- **Effect Change:** Changes the DSP program. Selection is made from a pull-down menu.
- **Mixer Change:** Changes the mixer. Selection is made from a pull-down menu.
- **No:** Sets the mixer number (0 to 127).
- **Mode:** Displays what task the sound driver is currently performing.
- **Status:** Displays the current status of the sound driver.
- **Print Control:** Sets the interrupt interval for Mode and Status and can be set from 8 to 200 ticks, where one tick is 1/60th of a second.
- **Exit:** Ends the simulation and closes the window.

Note: Refer to the section on *System Interface* for a detailed description of each control command.



PCM Stream Play

Selecting this menu item displays the following window:



Add, Insert

Enters a new file for PCM stream data playback. The file can be either an AIFF or BIN file.

Change

The file is changed without changing Direct Level, Direct Pan and other settings in the file.

Delete

The entered PCM files are deleted along with its settings.

File load, File save

The full path of the entered file and the file settings are saved.

Start

Starts PCM Stream Play according to the settings.

Stop

Stops PCM Stream Play.

Param Change

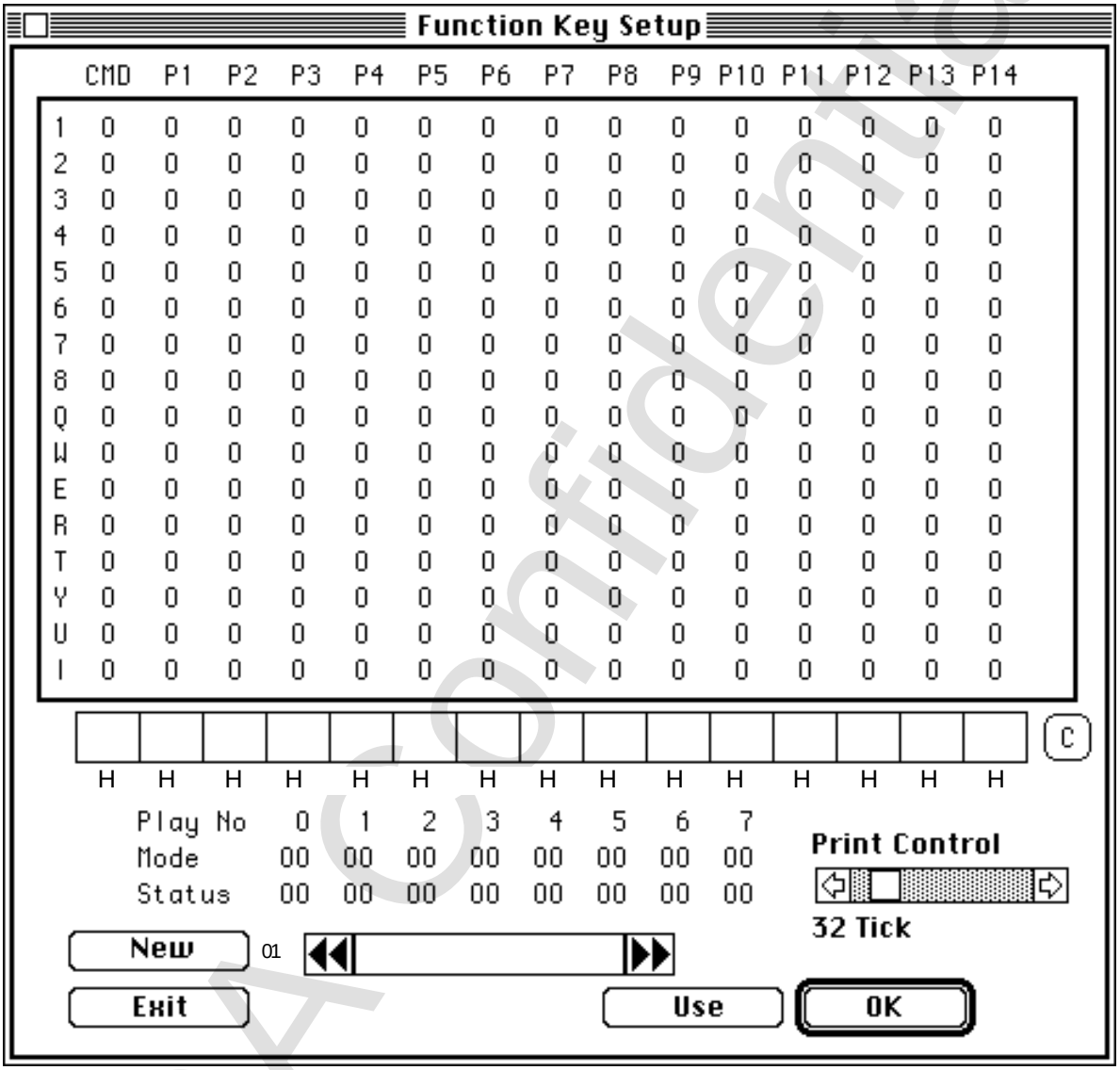
Changes the settings of the PCM data being played back. The parameters for which settings can be changed are Direct Level, Direct Pan, Play Pitch, Eff Select of the left and right channels, and Eff Send level of the left and right channels.

Exit
Ends the PCM Stream Play mode and closes the dialog box.

- **Parameters**
  - **16 bit, 8 bit**
    Selects 16 bits or 8 bits for the PCM playback data.
  - **Mono, Stereo**
    Selects stereo or mono for the PCM playback data. These parameters are not automatically detected even if an AIFF file is loaded.
  - **R Channel, L Channel**
    Enables the specification of the output channel for stereo audio file playback. This setting cannot be made during playback of the file. This parameter is ignored by the **ParamChange** button.
  - **Direct Level**
    Sets the volume during playback from a range of 0 to 8.
  - **Direct Pan**
    Sets the Pan for playback from a range of 0 to 31. This is ignored in stereo playback.
  - **Start Address**
    This is the start address of the PCM playback data. The setting ranges from `0` to `0xffff0`, with the setting at position 1 being ignored.
  - **Buffer Size**
    Sets the buffer for the PCM playback data from a range of `0` to `0xf000` in `0x1000` units. This value represents the number of samples.
  - **Play Pitch**
    Sets the playback pitch from a range of `0` to `0xffff`.
  - **Eff Select**
    Selects the effect for each of the left and right channels from a range of 0 to 15.
  - **Eff Send Level**
    Sets the Effect Send Level from a range of 0 to 7. Effect-related settings for mono audio are set on the right channel.
  - **PCM Stream Offset**
    Sets the playback position in the buffer from a range of `0` to `0xffff`.

Function Key Setup

Selecting this menu item displays the window below. The functions of the sound driver can be assigned to the number keys 1~8 (includes numeric keypad) and the keys Q, W, E, R, T, Y, U and I.

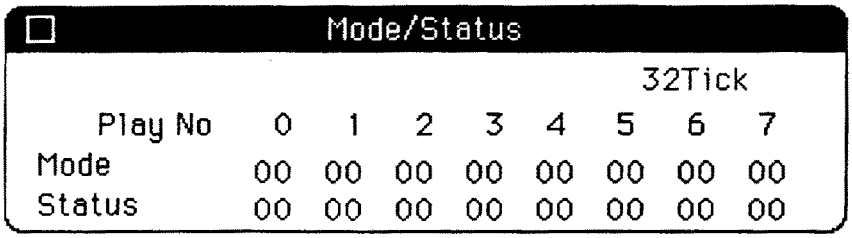


- **Print Control:** Adjusts the interrupt interval for updating Mode and Status. One tick is 1/60th of a second.
- **C:** Clears the contents of the selected function key.
- **New:** Prepares a new map page.
- **<— / —>:** Selects the page for key assignment. Function key tables are identified by their number and name. The name of a table can be set as desired by the text edit box between the arrow keys.
- **Use:** Select the page using <— —> and confirm the active key assignment.
- **OK:** Assigns the input data set in the middle input box to the selected key.
- **Exit:** Closes the window.

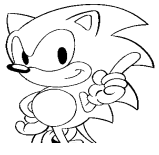
Refer to the *SATURN Sound Driver Manual* for more information on the various command codes and parameters.

Print Mode/Status

Selecting this menu item displays the following dialog box which shows the current mode and status of the target:

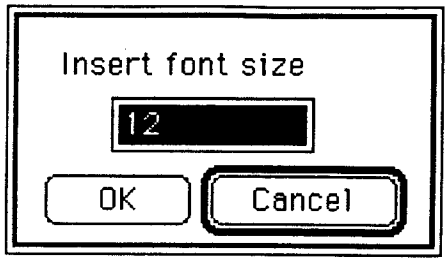


The update rate of the mode and status data is set by the Print Control parameter setting in the **Sound Simulator** and **Function Key** setup windows. Click on the close window box to close this window.



Display Mode

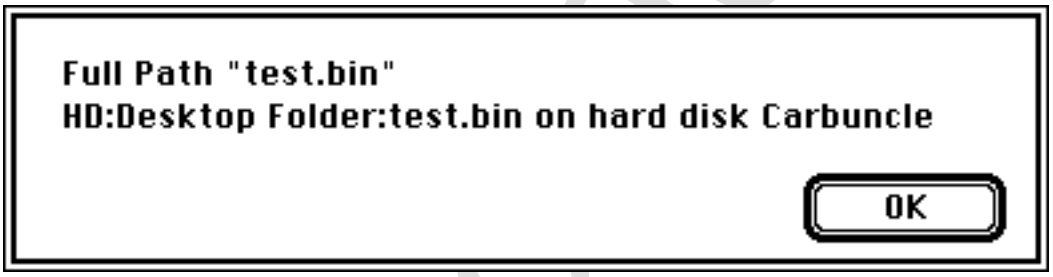
The dialog box below is displayed when this menu item is selected:



Specifies the font size of the displayed characters on-screen. A larger font size can be selected if the characters are difficult to read.

Print FullPath

The dialog box below is displayed when this menu item is selected:



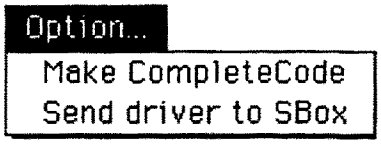
If a data file or folder has been moved, it will not be read in because the file is not at the last-specified location of the hard disk. Select the file name by clicking on it, then click **Print Full Path** to display the full path for the folder in which the file is registered.

Make Sound Binary

This command reads in each file according to the current map and outputs a data file equivalent to the data sent to the target. The download files that are converted have the full file path settings. The file size is 479KB from `0xB000` to `0x80000`. Sections where no full file path data exist are padded with `0x00`.

Option

The following submenu is displayed when the Option menu item is selected:



Make CompleteCode

Beginning with the sound driver running on the target board, all data is made into a single file based on the current map. The difference of this feature from the **MakeSoundBinary** menu item is that that data already transferred to the target board are retrieved. This function notifies the user at compile-time as to whether it is enabled or not. If a map exists but the function does not work, it means that the function cannot be enabled.

Send Driver to SBox

Downloads a sound driver to the sound development target box. Since the download address starts from 0, once it has been executed, this menu is disabled regardless of the driver.

To start a customized driver, place the sound driver file with the name `SDDRVS.TSK` in the same folder as the Sound Simulator and then execute this command.