TWL-System NITRO-Composer

Sound Designer Guide

2009/07/08

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Revision History

Revision Date	Description
2009/07/08	Added a description of the SoundPlayer I2S frequency display and switching operations. Added a description of NAND SoundPlayer.
2009/02/18	Added explanation regarding the SoundPlayer hardware volume display. Added information regarding IS-TWL-MIDI to SoundPlayer real-time MIDI playback. Revised the sample data directory path.
2008/05/30	Made revisions in line with the NITRO-System name change (from NITRO-System to TWL-System).
2008/04/08	Changed the format of the Revision History. Changed page headers.
2007/03/14	Added a description about SoundPlayer's feature for playing back multiple sounds simultaneously.
2005/10/28	Updated headings and title to improve consistency. General editing to help improve clarity. Updated tables, figures, and table of contents. Updated or inserted cross references.
2005/01/31	Added a description associated with the elimination of distinction between uppercase letters and lowercase letters in pitch notation. Added a description related to NITRO-Player. Added a description related to the SoundPlayer channel meter. Revised according to changes to `se.mus` in the sample data. Changed "NITRO" to "Nintendo DS."
2004/10/12	Revised to reflect change that allows the use of labels to specify the player. Revised to reflect the addition of IS-AGB-MIDI support for the SoundPlayer.
2004/09/16	Corrected spelling mistakes in SoundPlayer error messages. Unified the SADL filenames to "sound label files."
2004/09/02	Added the description for the real-time MIDI features of the SoundPlayer.
2004/08/10	Added description of streams.
2004/07/20	Changed the overall organization. Changed `SoundPlayer.bin` to `SoundPlayer.srl`. Added sequence type selection feature in SoundPlayer. Added SoundPlayer error messages. Deleted waveform archive for SE in sample data. Revision involving the increased degree of freedom for making association with banks and waveform archives. Moved the explanation of sound map files to "Sound Archive Manual."

Revision Date	Description
2004/06/01	Fix associated with file system support. Fix associated with changes to SoundPlayer development environment. Added description of sound map file. Added conceptual diagram of sequence archive. Changed name of “registration block” in sound archive to “section.” Made minor changes to diagram showing relationships of the various sound data.
2004/04/12	Added error handling.
2004/04/01	Made corrections in line with changes to use of SoundPlayer. Added explanation regarding sound label lists. Revised part about flats in pitch notation. Supplemented explanation about Sequence Archive. Supplemented explanation about managing the loading of sequence data.
2004/03/18	Made corrections in line with changes to sequence format.
2004/03/01	Initial version.

1 Introduction

This document is for sound data designers. It provides an overview of sound data and specific explanations using example data, explains how to create sound data, and describes how to use the SoundPlayer tool to check sounds on the TWL and Nintendo DS system.

2 Overview of Sound Data

2.1 Structure of Sound Data

NITRO-Composer accepts four types of sound data.

- Waveform data
- Bank data
- Sequence data
- Stream data

The following is a simple explanation of these sound data.

2.1.1 Waveform Data

Mono waveform files in AIFF and WAV format are accepted. See section 6.1.1 Association with Waveform Archives for details on how to use multiple sets of waveform data in a waveform archive with bank data.

2.1.2 Bank Data

Bank data are text files that correspond to sound source data. Waveform files are assigned to each program number to set up the sound source.

2.1.3 Sequence Data

NITRO-Composer accepts Standard MIDI File (SMF) format 0 or format 1. NITRO-Composer also accepts sequence archives, a text file that declares multiple sequences.

2.1.4 Stream Data

Stream data is waveform data used to stream playback. AIFF or mono or stereo WAV format is accepted.

2.2 Sound Archives

NITRO-Composer handles all sound data sets in one sound archive, rather than handling each sound data set separately. Using sound archives simplifies data management and uses memory more efficiently.

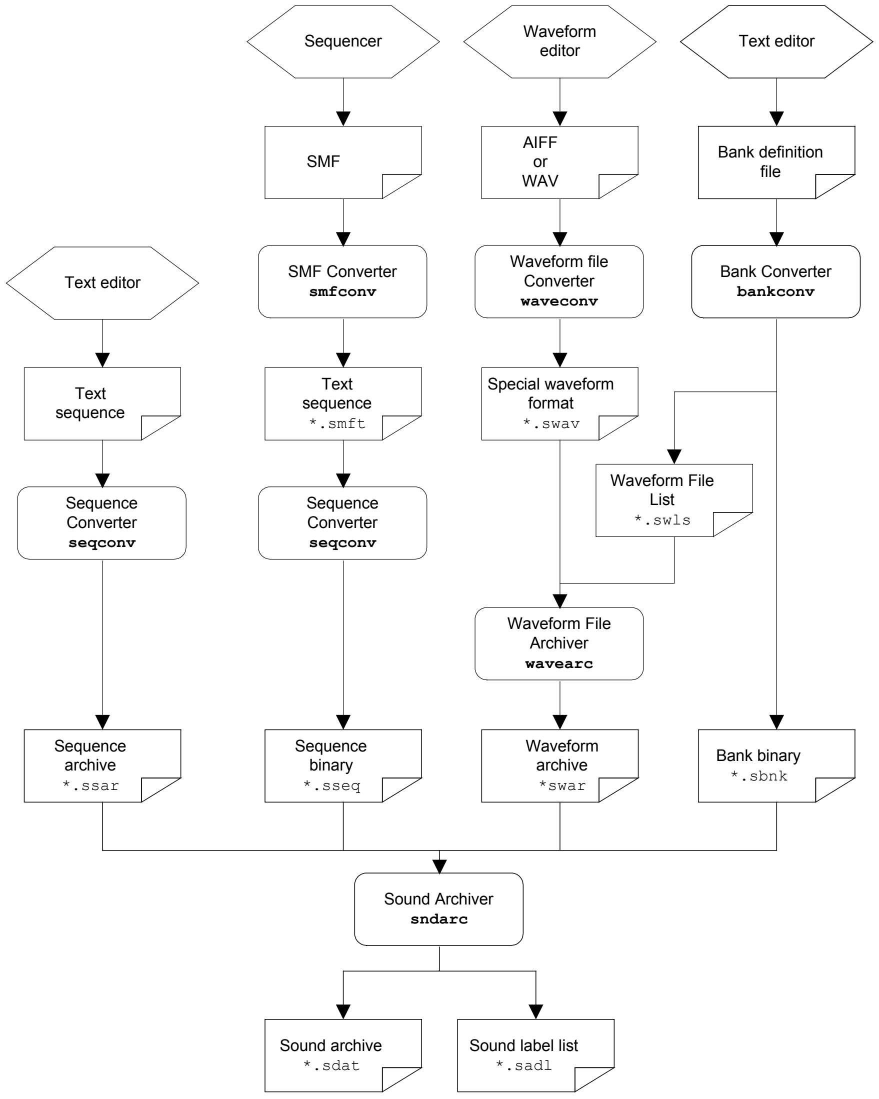
Ultimately, the sound designer is responsible for creating the sound archive file.

2.3 Data Creation

2.3.1 Flow of Data Creation

Figure 2-1 shows the flow of data creation.

Figure 2-1 Flow of Data Creation



2.3.2 Procedure for Creating Data

As shown in Figure 2-1, the creation of sound data takes many steps. Subsequent chapters explain each step using samples; however, understanding each step is not necessary.

To generate the final output sound archive and execute all other conversion processes at the same time, use the tool sound archiver `sndarc`. This tool compares timestamps and converts only necessary files, thereby minimizing the conversion process time.

The sound designer provides the sound programmer with the final output sound archive (SDAT) and sound label file (SADL). The sound archive contains all of the sound data and is stored in ROM to play sounds. The sound label file includes the sequence data numbers defined as labels and can be used by including the file in an include statement in the program.

3 Sound Archive

Now, let's take a close look at the sound archive mentioned in the introduction.

The files in `$TwlSystem/tools/SoundPlayer/sample` are used to explain the sound archive. From this point forward, this directory will be called `$sample`. Copy `$sample` to another location before you start editing the files for your own work.

3.1 Sound Archive Definition File

A sound archive definition file must be created to create a sound archive. Because sound archive definition files are text files, use a text editor to create the file. The sound archive definition file for the sample shown in Code 3-1 is `$sample/sound_data.sarc`. Use a text editor to open this file.

Code 3-1 Sound Archive Definition File

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
;;
;;  NITRO-Composer Sample
;;
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

;;;;;;;;;;;;;;;;;;;;;;
;; Wave Archive

@WAVEARC
 @PATH "swar"

WAVE_SE   : AUTO, "se.swls"
WAVE BGM  : AUTO, "bgm.swls"
;;;;;;;;;;;;;;;;;;;;;;
;; Bank

@BANK
 @PATH "bnk"
BANK_SE=0 : TEXT, "se.bnk", WAVE SE
BANK_BGM  : TEXT, "bgm.bnk", WAVE_BGM

;;;;;;;;;;;;;;;;;;;;;;
;; Player

@PLAYER
 PLAYER_BGM     : 1, 8000
 PLAYER_SE  = 10 : 1
 PLAYER_VOICE    : 1

;;;;;;;;;;;;;;;;;;;;;;





;; Sequence

@SEQ
 @PATH "mid"
SEQ_MARIOKART_TITLE       : SMF, "kart64_title.mid", BANK_BGM, 127, 64, 64,
PLAYER BGM

;;;;;;;;;;;;;;;;;;;;;;
;; Sequence Archive

@SEQARC
 @PATH "mus"
SEQ_SE  : TEXT, "se.mus"

;;;;;;;;;;;;;;;;;;;;;;
;; Stream Player

@STRM PLAYER

 PLAYER_STRM : STEREO, 6, 7

;;;;;;;;;;;;;;;;;;;;;;
;; Stream

@STRM


 @PATH "strm"
 STRM_MARIOKART : PCM8, "kart_title.32.aiff",  127, 64, PLAYER STRM
 STRM_FANFARE       : PCM8, "fanfare.32.aiff",    127, 64, PLAYER STRM

;;;;;;;;;;;;;;;;;;;;;;
;; Group

@GROUP
```

```
GROUP_STATIC = 0:
 SEQ_SE
 BANK_SE
 BANK_BGM
```

Lines that start with semicolons are comments. In the text files handled by NITRO-Composer, any line that starts with a semicolon is treated as a comment. First, note the following section of code.

Code 3-2 Registering Sequence Data

```
;;;;;;;;;;;;;;;;;;;;;;
;; Sequence
@SEQ
 @PATH "mid"
SEQ_MARIOKART_TITLE : SMF, "kart64_title.mid",BANK_BGM, 127, 64, 64, PLAYER BGM
```

The sequence data is registered in the last line of the code. In Code 3-2, a standard MIDI file with the filename `kart64_title.mid` is registered.

Chapter 4 Sequence Data explains how sequence data is registered.

3.2 @PATH

There is a statement that starts with @PATH in the sound archive definition file.

```
@PATH "mid"
SEQ_MARIOKART : SMF, "kart64_title.mid",BANK_BGM, 127, 64, 64, 0
```

This statement specifies the directory that has a file called `kart64_title.mid`. In other words, this statement actually registers the file `mid/kart64_title.mid`.

4 Sequence Data

This chapter explains how to create and register sequence data.

4.1 Sequence Data Registration

First, the method for registering sequence data is explained.

The section that starts with `@SEQ` in the sound archive definitions file is the sequence data section that registers sequence data.

Code 4-1 Sequence Data Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Sequence

@SEQ
@PATH "mid"
SEQ_MARIOKART_    : SMF, "kart64_title.mid", BANK_BGM, 127, 64, 64, 0
```

In Code 4-1 the statement that starts with `SEQ_MARIOKART64_TITLE` registers one set of sequence data. To add another sequence file, add another statement.

Code 4-2 Adding Sequences to the Sequence Data Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Sequence

@SEQ
@PATH "mid"
SEQ_MARIOKART_TITLE      : SMF, "kart64_title.mid", BANK_BGM, 127, 64, 64, PLAYER
BGM
SEQ_NEW_SEQUENCE  : SMF, "new.mid",          BANK_MK64, 127, 64, 64, PLAYER BGM
```

In Code 4-2, the newly added sequence `new.mid` registers the second set of sequence data.

The label `SEQ_NEW_SEQUENCE` specifies this sequence. When this sequence plays back in the program, this label can be used to refer to the sequence.

4.1.1 Specifying Banks

To play back sequences, you need bank data. Therefore, specify the bank data to use to play the sequences.

In the `SEQ_MARIOKART` sequence example in Code 4-1, the bank `BANK_BGM` is specified. This label was defined when the bank data was registered in the sound archive definition file, and this label represents one set of bank data. Bank data registration is explained in subsequent sections.

If there are mistakes in the bank data, distorted sounds may play or no sounds may play at all. When creating sequence data, you need to check which bank data will be used for playback and correctly associate the sequence data and the bank data in the Sequence Data Section.

4.1.2 Specifying the Player

Sequences are played using one of 32 players. Therefore, you must specify which player to use for playback.

By default, only one sequence can be played at a time on one player. Therefore, sequences that play simultaneously need to be played on different players. For more information about players, see the *Sound System Manual*.

The player `PLAYER_BGM` is specified in the last line of Code 4-2. This label is defined in the sound archive definition file and represents a player.

Additionally, instead of using a player label, a number from 0 to 31 can be used to specify a player.

For details about player labels, see the *Sound Archive Manual*.

4.1.3 Other Parameters

The other parameters are settings for volume, priority, and other settings, and are not explained in this manual. See the *Sound Archive Manual* for details.

4.1.4 About Labels

As in the example above, the label may be used in the sound data text file. The label is a placeholder that denotes the set and location of specific data. To denote the set and location of specific data, first define its label and then use that label in another file.

The format of label names must follow these guidelines. The first character must be an uppercase or lowercase Roman letter or underscore (_). The following characters can be uppercase or lowercase Roman letters, underscores (_), and numbers. However, because label names that start with an underscore have a special meaning for sequence data, it is best not to use it. For details, see the *Sequence Data Manual*.

The following is an example of a correct label name.

```
SEQ_TITLE_BGM
loop_start
Track_01
```

Naturally, the same label name cannot be used for other data sets.

4.2 Creating Sequence Data

Sequence data is created as a standard MIDI file. Therefore, sequence data can be created using most commercial sequencers.

For details about the MIDI events that can be used, see the *Sequence Data Manual*.

5 Sequence Archives

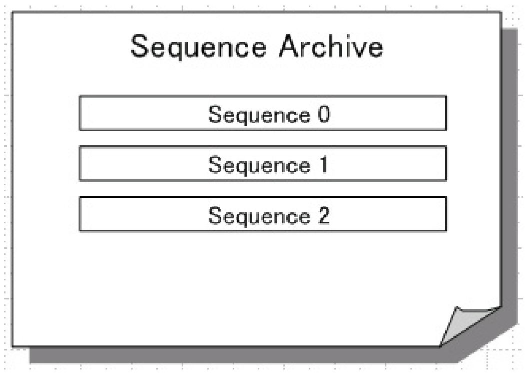
A method to create sequence data as a sequence archive is provided. This chapter describes the sequence archive and how to register and create sequence archives.

5.1 What Is a Sequence Archive?

A sequence archive is a file that groups multiple sets of sequence data together. The sequence data is created and listed in a single file from the start, instead of creating separate files and then combining them, as is the case for a sound archive.

There is no functional difference between sequence data and a sequence archive. The difference is in the way the sequence data is created and how the data is managed.

Figure 5-1 Conceptual Diagram of Sequence Archive



5.1.1 Characteristics of Normal Sequence Files

An individual sequence file is special because it can be created from a standard MIDI file. Creating a sequence from a standard MIDI file allows sound designers to use a sequencer, which enables the sound designer to check the sound of the sequence data in real time.

Usually, this sequence data is loaded into main memory at the start of playback. Thus, the amount of data loaded may increase if the sequence playback is repeated frequently. However, there is an option of loading this kind of sequence data only in advance.

Sequence files are most suitable for creating background music.

5.1.2 Characteristics of Sequence Archives

Sequence archives are created using a text editor. Therefore, before the sound can be checked, the sequence archive must be converted. However, hundreds or thousands of sequence data can be handled in one file, making data management relatively easy. Also, the data size of sequence archives can be created to be smaller than normal sequence files.

The data in a sequence archive is normally loaded into main memory during startup or scene changes, and plays back while loading.

Sequence archives are suitable for creating sound effects.

5.2 Sequence Archive Registration

Sequence archives need to be registered in the sound archive definition file.

The section that begins with `@SEQARC` in the sound archive definition file is the sequence archive section that registers the sequence archive, as shown in Code 5-1.

Code 5-1 Sequence Archive Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Sequence Archive

@SEQARC
 @PATH "mus"
SEQ_SE  : TEXT, "se.mus"
```

A line that begins with `SEQ_SE` registers one sequence archive. This one entry registers multiple sets of sequence data listed in the sequence archive.

Adding additional lines will register multiple sequence archives.

5.3 Creating Sequence Archives

Sequence archives are created with a text editor instead of a sequencer.

`$sample/mus/se.mus` is a sequence archive text file. Refer to Code 5-2.

Code 5-2 Text Sequence Archive

```
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;
; SeqArc for Sample SE
;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;;

#include <sound_data.sbdl>

@SEQ_TABLE

SE_YOSHI:                 yoshi,          BANK_SE, 127, 96, 64, PLAYER_VOICE
SE_WIHAHO:                wihaho,         BANK_SE, 127, 96, 64, PLAYER_VOICE
SE_COIN:                  note_only,      BANK_SE,  65, 96, 64, PLAYER_SE
SE_AMBULANCE:             jump_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_REPEAT:                loop_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_PATTERN:               call_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_PORTAMENT:             porta_seq,      BANK_SE,  65, 96, 64, PLAYER_SE
SE_PORTAMENT2:            porta_time_seq, BANK_SE,  65, 96, 64, PLAYER_SE
```

```
SE_SWEEP:                 sweep_seq,      BANK_SE,  65, 96, 64, PLAYER_SE
SE_VIBRATE:               mod_seq,        BANK_SE,  65, 96, 64, PLAYER_SE
SE_VIBRATE2:              tie_seq,        BANK_SE,  65, 96, 64, PLAYER_SE
SE_SUPER_MARIO:           waitoff_seq,    BANK_SE,  65, 96, 64, PLAYER_SE
SE_SUPER_MARIO2:          opentrack_seq,  BANK_SE,  65, 96, 64, PLAYER_SE

@SEQ_DATA

yoshi:
   prg 0
   cn4 127, 0
   fin

wihaho:
   prg 1
   cn4 127, 0
   fin
```

First, the file starts with `#include <../sound_data.sbdl>`. This statement indicates that the sound archive label file (`sound_data.sbdl`) will be included. The sound archive label file is automatically generated during conversion. By including the sound archive label file, the labels defined in the sound archive definition file becomes available. (Using numbers instead of labels makes the description unnecessary.)

The rest can be divided into two sections, the `@SEQ_TABLE` and `@SEQ_DATA list`. These are explained in the following sections.

5.3.1 Sequence Tables

Sequence tables are lists of sequence data registered in the sequence archive. Sequence table lists begin with `@SEQ_TABLE`, as shown in Code 5-3.

Code 5-3 Sequence Table

```
@SEQ_TABLE

SE_YOSHI:                 yoshi,          BANK_SE, 127, 96, 64, PLAYER VOICE
SE_WIHAHO:                wihaho,         BANK_SE, 127, 96, 64, PLAYER_VOICE
SE_COIN:                  note_only,      BANK_SE,  65, 96, 64, PLAYER_SE
SE_AMBULANCE:             jump_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_REPEAT:                loop_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_PATTERN:               call_seq,       BANK_SE,  55, 96, 64, PLAYER_SE
SE_PORTAMENT:             porta_seq,      BANK_SE,  65, 96, 64, PLAYER_SE
SE_PORTAMENT2:            porta_time_seq, BANK_SE,  65, 96, 64, PLAYER_SE
SE_SWEEP:                 sweep_seq,      BANK_SE,  65, 96, 64, PLAYER_SE
```

```
SE_VIBRATE:               mod_seq,       BANK_SE,  65, 96, 64, PLAYER_SE
SE_VIBRATE2:              tie_seq,       BANK_SE,  65, 96, 64, PLAYER_SE
SE_SUPER_MARIO:           waitoff_seq,   BANK_SE,  65, 96, 64, PLAYER_SE
SE_SUPER_MARIO2:          opentrack_seq, BANK_SE,  65, 96, 64, PLAYER_SE
```

Each line in the sequence table represents a set of sequence data. The list order determines the sequence number for each sequence.

5.3.2 Registering Sequence Data

To register sequence data, add a new line to the sequence table, as shown below.

```
SE_NEW:                   new_seq,       BANK_SE,  65, 96, 64, PLAYER_SE
```

The label `SE_NEW` specifies this sequence. To play this sequence from the program, use this label to specify this sequence.

The next label `new_seq` is attached to sequence data (explained later). Sequence data with the `new_seq` label are in a different location, and the sequence SE_NEW is played back using the `new_seq` sequence data.

The third label `BANK_SE` specifies the bank used for playback. Because the sound archive label file is included, specify the bank label defined in the sound archive definition file. Numbers can be used instead of labels to specify banks.

The remaining values are the same as the values set for each sequence data in the sequence data section of the sound archive definition file. For example, the very last label indicates which player is used. See the *Sequence Data Manual* for details on the other values.

5.3.3 Creating Sequence Data

5.3.3.1 Example of Simple Waveform Playback

Describe the sequence data after `@SEQ_DATA`.

```
Yoshi:
 prg 0
 cn4 127, 0
 fin
```

`yoshi:` is the sequence label definition. This label is used in the sequence table to specify the sequence data.

A series of sequence commands follows. Each sequence command is written in the following format.

```
Command   Argument, Argument, ...
```

The number and meaning of the arguments depend on the command.

`prg 0` is the program change command. This command sets the bank that is specified by the sequence table to program number 0.

The program change command is followed by `cn4 127, 0`, which is a note command. The note command will play a note at the pitch of cn4, or C4 (natural), with a velocity of 127. The final 0 in the note command is the note length. Surprisingly, a length of 0 corresponds to an infinite length, and the waveform data will play until finished. To play back the entire waveform data, use a length of 0, as shown in this example.

In this case the pitch is set to C4, but the pitch of the playback depends on the original key of the waveform data set in the bank definition file explained later. If a waveform is played at the same pitch as its original key, the waveform data will be played without modification. In this example, the original key is set to C4 in the bank definition file, and therefore, the waveform data will play without modification.

The `fin` command indicates the end of the sequence. If this command is omitted, the next set of sequence data will start processing.

5.3.3.2 Example of Simple Sequence Playback

Let's consider another example.

```
note_only:
prg 2
as5 127, 6
ds6 127, 48
fin
```

Unlike the previous example, there are two note commands with note lengths that are not zero. What type of sound will be generated?

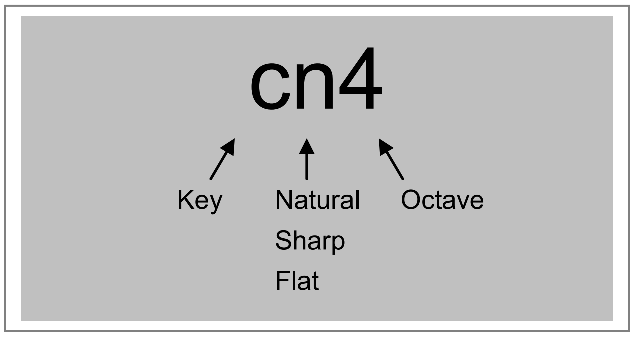
The first note command will play at a pitch of `as5`, or A#5. The note length is 6 and is equivalent to a 30-second note based on the quarter-note resolution of 48. Sequence processing stops while sound is generated, and therefore, the second note command will process only after A#5 is completely generated. Accordingly, A#5 and then D#6 will play. (It is possible to play three notes simultaneously without stopping sequence processing. However, this will not be explained here.)

See the *Sequence Data Manual* for information on other sequence commands.

5.3.4 Pitch Notation

This section explains the pitch notation found in sequence note commands. This notation is used to describe pitch using NITRO-Composer.

Figure 5-2 Pitch Notation



Standard key names represent each note of the musical scale. Write `c`, `d`, `e`, `f`, `g`, `a`, or `b` for each note.

The second character indicates whether the key is natural, sharp, or flat, and is selected from the letters in Table 5-1. However, for natural notes, `n` can be omitted and described as `c4`, the same as `cn4`.

Table 5-1 Characters for Natural, Sharp, and Flat Notes

Character	Description
`n`	Natural
`s`	Sharp (semitone higher)
`f` *or* `b`	Flat (semitone lower)

Numbers indicate octaves. Octave 4 is the middle octave, so `an4` plays at 440 Hz. To define a negative number, use `m` instead of a minus sign, as in `cnm1`.

The pitch can be set in the range of `cnm1` to `gn9`.

The pitch notation is not case-sensitive. For example, the description `Cn4` is the same as `CN4`.

6 Bank Data

Bank data is required to play sequences. This section will explain how to register and create bank data.

6.1 Registering Bank Data

First, the method for registering bank data is explained.

In the sound archive definition file, `@BANK` starts the bank data section that registers the bank data, as shown in Code 6-1.

Code 6-1 Bank Data Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Bank

@BANK
 @PATH "bnk"
BANK_SE   : TEXT, "se.bnk"  ,     WAVE_SE
BANK_BGM  : TEXT, "bgm.bnk",      WAVE_BGM
```

The lines that start with `BANK_SE` and `BANK_BGM` registers one set of bank data. Bank data is associated with the sequence data using the label defined here.

6.1.1 Association with Waveform Archives

`WAVE_SE` that follows `BANK_SE` specifies the waveform data used by this bank. `WAVE_SE` is a label defined in the waveform archive section of the sound archive definition file, and represents a single waveform archive.

Code 6-2 shows the waveform archive section.

Code 6-2 Waveform Archive Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Wave Archive

@WAVEARC
 @PATH "swar"
WAVE_SE   : AUTO, "se.swls"
WAVE BGM  : AUTO, "bgm.swls"
```

The waveform archive groups multiple waveforms into one file. Waveform data is much larger than bank data, so bank data and waveform archive data are handled separately. Because they are handled separately, memory can be used more efficiently. However, bank and waveform archive registration are needed to register one bank.

6.1.2 Example of Registering Bank Data

Code 6-3 is an example of bank data registration.

Code 6-3 Example of Bank Data Registration

```
;;;;;;;;;;;;;;;;;;;;;;
;; Wave Archive

@WAVEARC
 @PATH "swar"
WAVE_SE          : AUTO, "se.swls"
WAVE BGM         : AUTO, “bgm.swls”
WAVE_NEW         : AUTO,  "new.swls"

;;;;;;;;;;;;;;;;;;;;;;
;; Bank

@BANK
 @PATH "bnk"
BANK_SE=0        : TEXT, "se.bnk",       WAVE SE
BANK_BGM         : TEXT, "bgm.bnk",      WAVE_BGM
BANK_NEW         : TEXT,  "new.bnk",     WAVE_NEW
```

The bank file called `bnk/new.bnk` is registered with the `BANK_NEW` label. The waveform archive used is `WAVE_NEW`.

`swar/news.swls` is registered with the `WAVE_NEW label`. However, there is no need to create this file. This file is generated automatically using the `AUTO` parameter.

The bank data registration can also be written as in Code 6-4.

Code 6-4 Example of Bank Data Registration (2)

```
;;;;;;;;;;;;;;;;;;;;;;
;; Wave Archive

@WAVEARC
 @PATH "swar"
WAVE_SE   : AUTO, "se.swls"
WAVE BGM  : AUTO, “bgm.swls”

;;;;;;;;;;;;;;;;;;;;;;
;; Bank

@BANK
 @PATH "bnk"
```

```
BANK_SE=0          : TEXT, "se.bnk",       WAVE SE
BANK_BGM           : TEXT, "bgm.bnk",      WAVE_BGM
BANK_NEW           : TEXT,  "new.bnk",     WAVE_BGM
```

`BANK_NEW`, like `BANK_MK64`, specifies the waveform archive `WAVE_BGM`. Therefore, `BANK_NEW` and `BANK_BGM` both share `WAVE_BGM`.

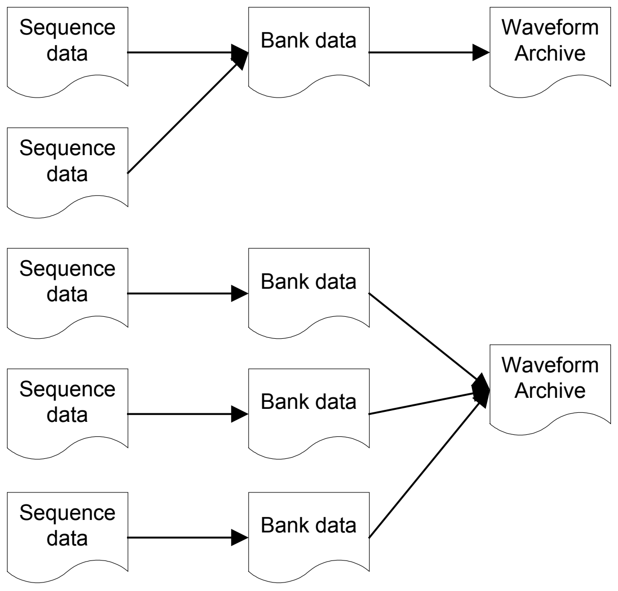
When bank data share a waveform archive, waveform data used by `BANK_NEW` and `BANK_BGM` are both included in `WAVE_BGM`. One waveform archive can be more efficient if the waveform data used by two banks is almost the same.

6.1.3 Sound Data Interrelationships

This section reviews the relationships between sequence data, bank data, and waveform archives.

Figure 6-1 is an example of the relationships among sound data.

Figure 6-1 Relationships Among Various Types of Sound Data



In the above example, one set of bank data is associated with one set of sequence data. However, multiple sets of sequence data can use one set of bank data.

One waveform archive is associated with one set of bank data. However, multiple bank data can use one waveform archive. For example, if banks share waveform archives, the same waveform files do not consume redundant data if it is used in multiple banks.

Actually, it is also possible to specify more complex associations between banks and the waveform archives. Memory efficiency increases by using this method, but the associations become difficult to manage. Therefore, a description of the implementation is omitted. For details, see the *Bank Data Manual* and the *Sound Archive Manual*.

6.2 Creating Bank Data

Bank data is created with a text editor to create a bank definition file.

`$sample/bnk/se.bnk` is the bank definition file. Code 6-5 is an example of a bank definition file.

Code 6-5 Bank Definition File

```
;*****************************************
; Bank for Sample SE
;*****************************************

@PATH "../aif"

@INSTLIST
   0 : ADPCM, "yoshi.aiff",   cn4, 127, 127, 127, 125
   1 : ADPCM, "wihaho.aiff",  cn4, 127, 127, 127, 125
   2 : PSG, DUTY_4_8, cn4,127,70,70,127
   3 : PSG, DUTY_3_8, cn4,127,127,127,127
   4 : NOISE, cn4,127,8,8,127
```

The numbers 0, 1, 2, and so on represent program numbers.

In this example, program numbers 0 and 1 contain the parameters `ADPCM` and a specified waveform file. These parameters indicate that the specified waveform files will be used after they are converted to ADPCM format. AIFF format or WAV format mono waveform files can be specified.

In the bank definition file, describe the original key after the specified waveform file rather than the setting for the waveform data.

The four numbers at the end of each line define the ADSR of the envelope.

For details on the bank definition file, see the *Bank Data Manual*.

6.2.1 Original Key

The original key is the unmodified pitch that the waveform data is played. If you properly set the original key, proper pitch change occurs at note-on from the sequence.

If there is no pitch (as in the voice data), set an arbitrary key and generate the same sequence key for the playback data at the waveform data pitch.

For example, if the original key is set to `cn4`, the note is played at the same pitch when generated from the sequence data at `cn4`, the same as the original key.

The original key setting is unrelated to the sampling rate of the waveform data. Even if the sampling rate changes, there is no need to change the original key setting.

7 Memory Management

On the Nintendo DS and TWL systems, sound data is normally stored in ROM. However, data must first be loaded into main memory to use sound data. This chapter explains what the sound designer should set up to load sound data.

For details on memory management, see the *Sound System Manual*.

7.1 Two Types of Heaps

In this case, heap refers to the memory region for loading sound data. NITRO-Composer offers two types of heaps.

- Sound heap
- Player heap

The following is a simple explanation for each heap.

7.1.1 Sound Heap

The sound heap is used to load sound data needed throughout game play and for upcoming game scenes. The sound heap loads data during game startup and between scenes.

The sound heap is a stack-based heap, and the first data in is the last data to be removed. For example, if data 1, 2, and 3 are loaded into the stack in order, 2 or 1 cannot be removed until 3 is removed.

7.1.2 Player Heap

The player heap loads data as needed. An instance of the player heap must be created for each player, and is automatically deleted at the end of sequence playback.

The player heap loads data while the game executes. Therefore, loading large amounts of data or frequently needed data is unsuitable for the player heap. Also, data for sequence archive playback cannot be used.

7.2 Creating Groups

Creating groups to load data into the sound heap is convenient. By creating groups, multiple sets of data can be loaded at once.

Create the groups in the group information section of the sound archive definition file.

Code 7-1 Group Information Section

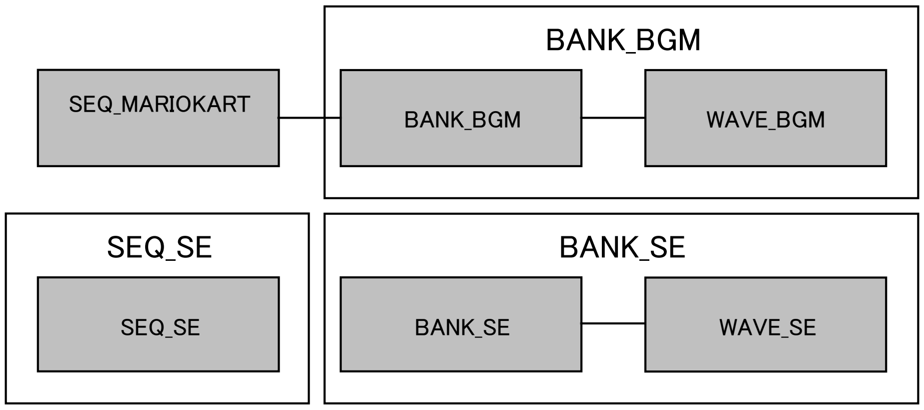
```
;;;;;;;;;;;;;;;;;;;;;;
;; Group

@GROUP

GROUP_STATIC = :
 SEQ_SE
 BANK_SE
 BANK_BGM
```

In Code 7-1, the group `GROUP_STATIC` is defined. The group contains `SEQ_SE`, `BANK_SE`, and `BANK_BGM`. Specifically, data sets like those in Figure 7-1 are included in groups.

Figure 7-1 Relationship Between Group Settings and Sound Data

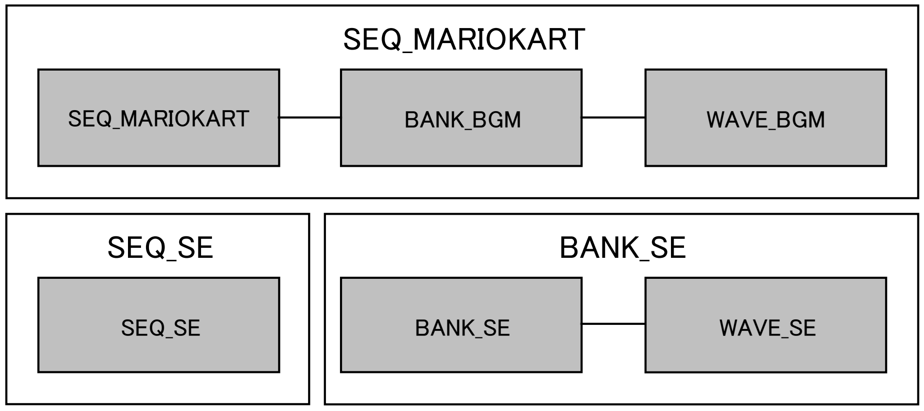


`BANK_SE` and `BANK_BGM` load not only the bank data but also the corresponding waveform archive at the same time. Because the sequence for the sound effects is a sequence archive, is the sequence is not directly associated with the bank. Therefore, even if `SEQ_SE` is specified, the bank and waveform data for the sound effects are not loaded at the same time.

On the other hand, because the sequence data is associated with the bank, `BANK_BGM` and `WAVE_BGM` are loaded at the same time when `SEQ_MARIOKART` is specified.

```
GROUP ALL
SEQ_SE
 BANK_SE
 SEQ_MARIOKART
```

Figure 7-2 Relationship Between Group Settings and Sound Data (2)



7.3 Loading Groups

Once the group is created, that group can be loaded at any time during the game. The sound programmer is responsible for loading the groups. The sound designer must tell the sound programmer which groups to load and at what time.

7.4 Creating Player Heaps

To load to the player heap, create a player heap.

Create player heaps in the player information section of the sound archive definition file.

Code 7-2 Player Information Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Player

@PLAYER
 0 : 1, 8000
```

Code 7-2 specifies how to create an 8000-byte player heap for player 0. The parameter 1 sets the maximum number of simultaneous plays for the sequence. However, the description about that parameter is omitted. For details, see *Sound Archive Manual*.

To decide on a player heap size, determine which sound data set is loaded. How to determine the size of the player heap is explained in a later section.

7.5 Loading to the Player Heap

The data is loaded to the player heap automatically. Normally, data is loaded when a sequence attempts to play back.

Playing sequences requires sequence data, bank data, and the waveform archive. However, if these sets are not loaded in the sound heap, they are loaded in the player heap. For example, if both the bank data and waveform archive are loaded already in the sound heap, sequence data is loaded into the player heap.

7.6 Deciding the Player Heap Size

As stated earlier, the sound data that will be loaded must be known to determine the size of the player heap. Consider the case where only the sequence data is loaded into the player heap.

First remember that a player heap must be created for each player. Only sequence data that plays on this player is loaded onto the corresponding player heap. Match the player heap size with the size of the largest sequence data to play back on this player.

The best way to check sequence data size is by using the NITRO-Player. NITRO-Player displays a list of sequence data sizes so the sequence data size can be easily found. For details about NITRO-Player, see the documents in `$TwlSystem/docs/NitroPlayer`.

There is also a way to view the sound map file, but a description of this is omitted from this section. For details, see the *Sound Archive Manual*.

7.6.1 Note on Size Determination

Even if you load sound data that has the same size as the player heap, failures due to memory shortages are possible. Specify the size with 100-byte boundaries to play it safe.

8 Stream Playback

NITRO-Composer can play back streams as well as sequences. Stream playback is a method that plays back waveform data while the data for the waveform data loads from ROM. The differences between sequence and stream playback are explained in the *Quick Start Guide*.

This chapter explains how to register and create stream data.

8.1 Registering Stream Data

First, registering stream data is explained. In the sound archive definition file, the stream data section to register stream data starts with @STRM as shown below in Code 8-1.

Code 8-1 Stream Data Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Stream

@STRM
 @PATH "strm"
 STRM_MARIOKART : PCM8, "kart_title.32.aiff",  127, 64, 0
 STRM_FANFARE   : PCM8, "fanfare.32.aiff",    127, 64, 0
```

Using Code 8-1 as an example, a line that begins with `STRM_MARIOKART` registers a single sequence data.

`STRM_MARIOKART` is a label that can be used to select the specified stream data. To play this stream from a program, use this label to specify the stream.

8.1.1 Specifying a Player Number

The stream data is played on a stream player. Use the player number to specify which stream player to use for playback. In Code 8-1, the 0 at the end of each statement is the player number. In this case, stream Player 0 will be used for playback.

Stream players must be defined before use. This is described in the stream player information section, below. To register stream data, specify the player numbers of the stream players that were defined in the stream player information section.

A single stream player can play only one stream at a time. Therefore, streams that are played simultaneously with other streams must play back on separate stream players. However, playing more than one stream at once increases processing time dramatically.

8.1.2 Other Parameters

Other parameters include settings such as volume and priority. A detailed description of these parameters is omitted here. For details, see the *Sound Archive Manual*.

8.2 Stream Player Definitions

A stream player is needed to play a stream. In the sound archive definition file, define the stream player in the stream player information section, which starts with `@STRM_PLAYER` as shown in Code 8-2.

Code 8-2 Stream Player Information Section

```
;;;;;;;;;;;;;;;;;;;;;;
;; Stream Player

@STRM_PLAYER
 0 : STEREO, 6, 7
```

In Code 8-2, a stereo stream player is assigned player number of 0. To define a mono player, follow the example below.

```
;;;;;;;;;;;;;;;;;;;;;;
;; Stream Player

@STRM_PLAYER
 0 : MONO, 6
```

A stereo player can play either stereo or mono data, but a mono player can play only mono data. The mono player, however, uses approximately half of the memory of that used by the stereo player.

The number after `STEREO` or `MONO` is the channel number of the channel to be used for stream playback. Because `STEREO` uses two channels, write two channel numbers.

Values from 0 to 15 can be specified for the channel numbers, but there are restrictions on various channels. For details, see the *Sound System Manual*. In most cases, however, using the channels around 6 and 7 is best.

8.3 Creating Stream Data

Stream data is created in AIFF or WAV format. Stream data is basically the same as the waveform data registered in banks. However, in stream playback, mono as well as stereo data can be played back.

9 SoundPlayer

SoundPlayer is used to check sounds on the TWL and Nintendo DS using Sound Archives generated by the sound archiver. This section explains how to use SoundPlayer.

The display on the Nintendo DS when using `NITRO_Player` is almost identical to that of SoundPlayer. So we recommend that you review the use of SoundPlayer.

This description also covers NAND SoundPlayer, which can be imported to the NAND memory of TWL development systems and other hardware.

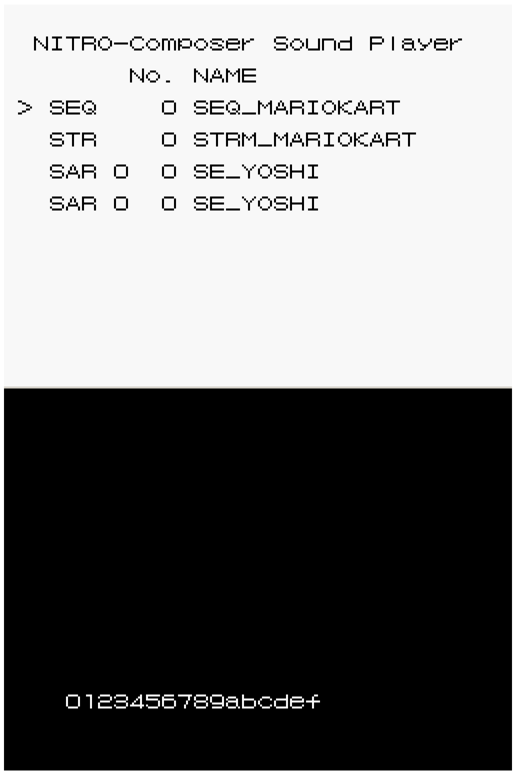
9.1 How to Use SoundPlayer

To use the SoundPlayer, create a SoundPlayer executable file and execute this file in the following order.

1. Create sound data inside the `$sample` directory.
2. Execute `$sample/MakeSound.bat`.
3. `$sample/SoundPlayer.srl` is generated.
4. Load `SoundPlayer.srl` to IS-TWL-DEBUGGER or IS-NITRO-DEBUGGER and execute the file.

If the file executes normally, Figure 9-1 appears on the TWL or Nintendo DS screens.

Figure 9-1 SoundPlayer Screens



```
 NITRO-Composer Sound Player
       No. NAME
> SEQ     0 SEQ_MARIOKART
  STR     0 STRM_MARIOKART
  SAR 0   0 SE_YOSHI
  SAR 0   0 SE_YOSHI

   0123456789abcdef
```

9.1.1 MakeSound.bat

When `MakeSound.bat` is executed, the following also occurs.

1. The sound archiver `sndarc.exe` starts, and the SDAT file is generated.
2. `MakeSoundPlayer.bat` starts, and `SoundPlayer.srl` is generated.

When the preceding operations occur properly, a window displays briefly and then automatically disappears. If an error occurs, the window remains open and displays an error message. See Chapter 10 Error Handling for information on troubleshooting errors.

The batch file `$sample/MakeSound.bat` starts the two processes described above. Modify this file to suit your needs.

Note: If the data file has not been updated, nothing will happen even if `MakeSound.bat` is executed. To reconvert all files and data, execute `ReMakeSound.bat` instead of `MakeSound.bat`.

9.2 Sound Playback

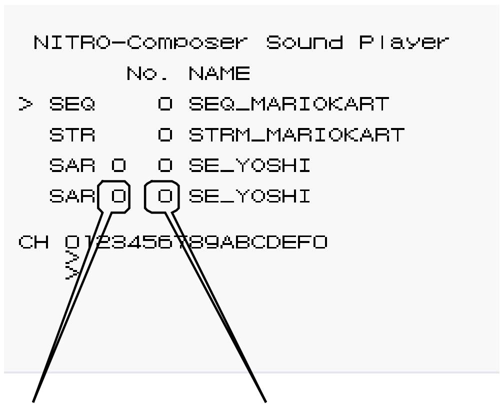
Use the +Control Pad Up/Down keys to select a line that starts with `SEQ (sequence)`, `STR (stream)`, or `SAR (sound archive)`. Point the cursor to the corresponding playback line and press the A Button.

You can play four lines, but each line plays only one sound. Therefore, to play two sounds simultaneously, play the sounds on separate lines. However, even if the sounds are played on separate lines, simultaneous playback may not be possible, because of restrictions on the number of sequences that can play simultaneously on a single player.

Select a sound number using the +Control Pad Left/Right keys. Use the +Control Pad Left/Right keys to select an index number in a Sequence Archive. To select the Sequence Archive itself, hold down the L Button and use the +Control Pad Up/Down keys.

The Sequence Archive number is displayed immediately to the right of `SAR`.

Figure 9-2 SoundPlayer Top Screen (Sequence Archive Number)



```
 NITRO-Composer Sound Player
       No. NAME
> SEQ     0 SEQ_MARIOKART
  STR     0 STRM_MARIOKART
  SAR 0   0 SE_YOSHI
  SAR 0   0 SE_YOSHI

CH 0123456789ABCDEF0
    >
    >
```

To stop a sequence, point the cursor and press the B Button. This stops the sound playing on the corresponding line.

Note: In Figure 9-2, the four lines are arranged in order of `SEQ`, `STR`, `SAR,` and `SAR`. If there is no stream data, the `STR` line may be replaced with `SEQ`.

9.2.1 Simultaneous Playback of Multiple Sounds

It is possible to play back multiple sounds simultaneously with multiple rows, but using the Y Button allows the playback start timing to be coordinated.

First, select the sounds to play and press the Y Button. Once you have done so, an asterisk (*) appears. Perform this procedure on each line for the sounds that you want to play back at the same time. If you then start playback with the A Button, the sounds for which an asterisk is displayed will be played back simultaneously.

Also, when playing back normal streams, a playback delay will occur for data loading. However, preparation for playback will be performed at the timing at which the asterisks were applied with the Y Button, so pressing the A Button will play back the sounds without any delay.

9.3 Selecting the Sound Type

Hold down the L Button and press +Control Pad Up/Down to select the sound type or the sequence archive number. Each time you push the Up key while holding down the L Button, the selection changes as follows.

```
SEQ → SAR 0 → SAR 1 → SAR 2 → ... → STR → SEQ
```

9.4 Screen Displays

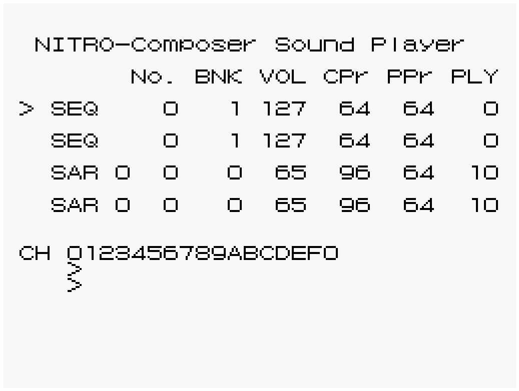
9.4.1 Displaying Label Names

The label name of the selected sound appears in `NAME` as shown in Figure 9-2. If no label is specified, “`no name`” is displayed.

9.4.2 Displaying Parameters

Press the X Button and the parameters will be displayed instead of the label names, as shown in Figure 9-3. Pressing the X Button again displays the label names.

Figure 9-3 SoundPlayer Upper Screen (parameter information)



```
 NITRO-Composer Sound Player
       No. BNK VOL CPr PPr PLY
> SEQ     0   1 127  64  64   0
  SEQ     0   1 127  64  64   0
  SAR 0   0   0  65  96  64  10
  SAR 0   0   0  65  96  64  10

CH 0123456789ABCDEF0
   >
   >
```

Each line in Figure 9-3 contains a series of numbers.

```
No. BNK VOL CPr PPr PLY
```

`No.` is the sound number. Use the +Control Pad Left/Right keys to change the value. The values that follow are parameters set for each sound in the sound archives. These values cannot be changed and are only referenced. Starting from the left, the numbers represent the bank number, the master volume, the channel priority, the player priority, and the player number.

For more information about these parameters, see the *Sound Archive Manual* and the *Sequence Data Manual*.

9.4.3 Sequence Archive Number

The number that is displayed immediately to the right of `SAR` in Figure 9-3 is the Sequence Archive number. Change the number by holding down the L Button and pushing the +Control Pad Up/Down keys.

9.4.4 Hardware Volume

When running the SoundPlayer on TWL or IS-TWL-DEBUGGER, the hardware volume value is displayed on the lower screen.

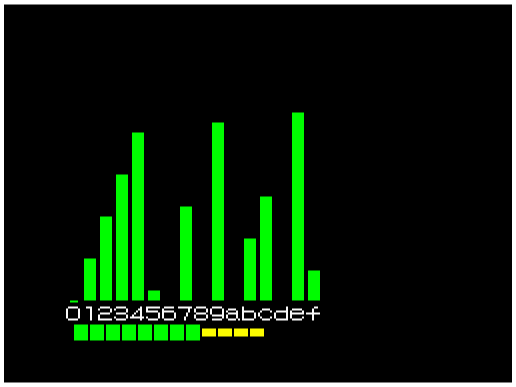
9.4.5 I2S Frequency

When the SoundPlayer runs on TWL or IS-TWL-DEBUGGER, the I2S frequency value is displayed on the lower screen. Use the R Button to toggle the frequency between 32,730 Hz and 47,610 Hz.

9.5 Channel Meter

The channel meter is displayed on the lower screen. This meter shows the condition of sound generation on each channel.

Figure 9-4 SoundPlayer Channel Meter

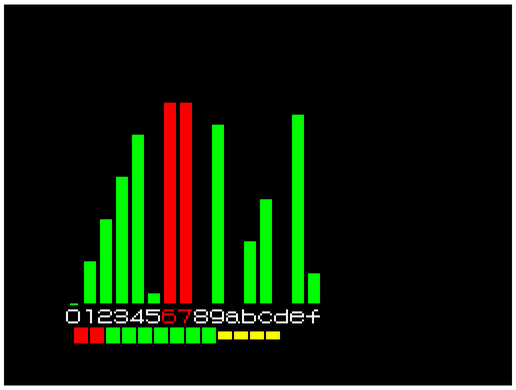


The bars indicate the output volume level for each channel. The numeric values (in hexadecimal) below the bars represent the channel numbers on the TWL and Nintendo DS sound hardware.

The very bottom row represents the number of channels generating sound, and the yellow blocks indicate the number of generated sounds being output.

When a channel is used for stream playback or anything besides sequence playback, the channels are displayed in red, as shown in Figure 9-5.

Figure 9-5 SoundPlayer Channel Meter (Red Display)



9.6 Real-Time MIDI Playback

9.6.1 What Is Real-Time MIDI Playback?

You can use IS-NITRO-UIC with MIDI connectors, IS-AGB-MIDI or IS-TWL-MIDI to use MIDI signals to play sounds from the SoundPlayer. By using this feature, MIDI sequence data can be played without converting sequence data.

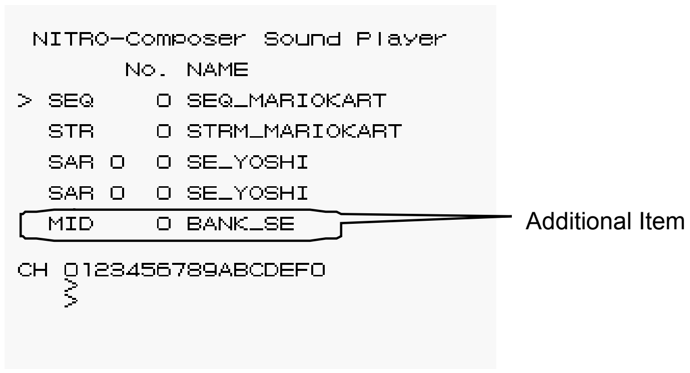
9.6.2 Preparation

Enabling real-time MIDI playback requires using IS-NITRO-UIC with MIDI connectors, IS-AGB-MIDI, or IS-TWL-MIDI. For more information on how to connect the system, see the *IS-NITRO-UIC*, *IS-AGB-MIDI*, or *IS-TWL-MIDI* manual. The following is an example of how to connect the system.

1. Insert the IS-NITRO-UIC (IS-AGB-MIDI) cartridge into the IS-NITRO-EMULATOR cartridge slot.
2. In the IS-NITRO-DEBUGGER project settings, turn the cartridge power ON.
3. Start the SoundPlayer.

If connected properly, `MID` appears in the SoundPlayer display as shown in Figure 9-6.

Figure 9-6 SoundPlayer Display (Real-Time MIDI)



```
 NITRO-Composer Sound Player
       No. NAME
> SEQ     0 SEQ_MARIOKART
  STR     0 STRM_MARIOKART
  SAR 0   0 SE_YOSHI
  SAR 0   0 SE_YOSHI
  MID     0 BANK_SE

CH 0123456789ABCDEF0
   >
   >
```

9.6.3 Bank Selection

Select a bank for real-time MIDI playback.

Use the +Control Pad Up/Down buttons to move to `MID` and the +Control Pad Left/Right buttons to select a bank. After making selection, press the A Button to load the bank to use for playing MIDI.

9.6.4 MIDI Signal Transmission

By transmitting MIDI signals when a MIDI cable is connected to the IS-NITRO-UIC (IS-AGB-MIDI or IS-TWL-MIDI), the sound can be played using selected banks. By default, Program Number 0 is set. Therefore, send the program change message as needed.

9.7 Manual Load Mode

9.7.1 What Is Manual Load Mode?

If you attempt to play the sequence on SoundPlayer, the required data is loaded and played automatically. This feature is very useful for checking sounds. However, automatically loading data while a sequence plays back is rare during actual gameplay. Usually, loads are grouped and uploaded when scenes change. Therefore, the groups must be set properly to have the sequences play.

In manual load mode the data is loaded manually. Manual load mode allows you to verify that the sequence can be played properly during actual game play. In addition, how much memory is consumed by loading a group is displayed.

The mode that automatically loads data for sound verification is called the automatic load mode to distinguish it from the manual load mode.

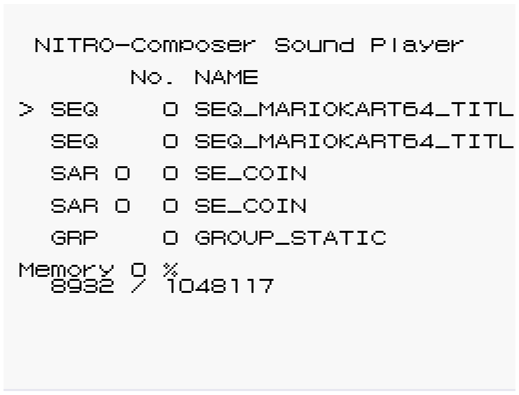
9.7.2 Operation in Manual Load Mode

In manual load mode, the data is not loaded automatically. If the necessary data is not loaded, the sequence playback will fail. However, if the player heap settings are configured and there is sufficient free memory, the data is loaded to the heap and played.

9.7.3 Mode Switching

Change from automatic and manual load mode by pressing SELECT. Every time SELECT is pressed, these two modes toggle.

Figure 9-7 SoundPlayer Screen (Manual Load Mode)



```
 NITRO-Composer Sound Player
       No. NAME
> SEQ     0 SEQ_MARIOKART64_TITL
  SEQ     0 SEQ_MARIOKART64_TITL
  SAR 0   0 SE_COIN
  SAR 0   0 SE_COIN
  GRP     0 GROUP_STATIC
Memory 0 %
  8932 / 1048117
```

Changing modes clears all previously loaded data.

9.7.4 Loading Data

In the manual load mode, the load execution item and memory use status are displayed instead of the Channel Meter.

The data can be loaded in units of group, sequence, sequence archive, bank, or waveform archive. However, with sequence or bank units, the bank and waveform archive that will be used are loaded at the same time.

GRP (group units) is the default load unit. Hold down the L Button and use the +Control Pad Up/Down key to select the load unit.

To load data, select a number with the +Control Pad Left/Right key and press the A Button.

To clear all the loaded data, hold down the L and B Buttons and press the A Button.

9.7.5 Memory Display

The currently used memory is displayed at the very bottom of the screen. Memory is consumed every time data is loaded.

However, even initially, a certain amount of memory is used for the sound archive header information and creation of the player heap.

9.8 Key Operations

Table 9-1 shows the key operations of the SoundPlayer.

Table 9-1 Key Operations in SoundPlayer

Key	Description
+Control Pad Up/Down	Move cursor
+Control Pad Left/Right	Change value
A Button	Start playback or load data
B Button	Stop playback
X Button	Switch label names and parameter view
Y Button	Add simultaneous playback marks
L Button and +Control Pad Left/Right	Add 10 to the value while pressed
L Button and +Control Pad Up/Down	Select sequence archive number, sound type, or load units
SELECT	Switch modes
L Button + B Button + A Button	Clear memory

9.9 Error Messages

Error messages may appear in the very bottom row of the screen. For example, if the sequence playback fails, error messages may explain the cause.

Table 9-2 shows these error messages.

Table 9-2 SoundPlayer Error Messages

Error Message	Description
Low Priority	A higher priority sequence is being played so playback is impossible
Invalid Seq No	An undefined sequence number
Invalid SeqArc No	An undefined sequence archive number

Error Message	Description
Invalid Bank No	An undefined bank number
Invalid WaveArc No	An undefined waveform archive number
Invalid Group No	An undefined group number
Invalid SeqArc Index	An undefined sequence archive index
Invalid Stream No	An undefined stream number
Invalid Stream Player No	An undefined stream player number
Memory Over	Loading is impossible because of insufficient memory
Too Large Priority	Size of the required data is too large so playback is impossible
Not Found Wave Data	Cannot find the required waveform data (manual load mode)
Not Found Bank Data	Cannot find the required bank data (manual load mode)
Not Found Seq Data	Cannot find the required sequence data (manual load mode)
Not Found SeqArc Data	Cannot find the required sequence archive data (manual load mode)
Not Enough Player Heap for Wave	Player heap is too small to load the waveform data
Not Enough Player Heap for Bank	Player heap is too small to load the bank data
Not Enough Player Heap for Seq	Player heap is too small to load the sequence data

9.10 NAND SoundPlayer

9.10.1 What Is NAND SoundPlayer?

NAND SoundPlayer is a version of SoundPlayer that can be used by importing to the NAND memory of a TWL development system or IS-TWL-DEBUGGER hardware. NAND SoundPlayer plays sounds by accessing SDAT files stored on an SD card. An SD card is therefore required for using NAND SoundPlayer.

The major intended application of the software is to import to a TWL development system for use with IS-TWL-MIDI. Under this configuration, supplying SDAT files from an SD card and supplying the MIDI signal from IS-TWL-MIDI allows real-time MIDI playback even in an environment that does not include a PC or IS-TWL-DEBUGGER.

Note: Unfortunately, IS-TWL-MIDI is not easily recognized by NAND applications on the System Menu for TWL System Updater 1.3 and earlier. Please wait for the future version upgrade of TWL System Updater.

9.10.2 Import Procedure

To use NAND SoundPlayer, you must first import the NAND SoundPlayer application to the NAND memory of a TWL development system or IS-TWL-DEBUGGER hardware. Use the following procedure to import NAND SoundPlayer.

1. Copy the file `$TwlSystem/tools/SoundPlayer/NANDSoundPlayer.tad` to an SD card.
2. Insert the above SD card into the TWL development system or IS-TWL-DEBUGGER hardware and import the file `NANDSoundPlayer.tad` from `TwlNmenu`.

9.10.3 Using NAND SoundPlayer

Select NAND SoundPlayer from the Nintendo DSi Menu to start NAND SoundPlayer. NAND SoundPlayer has been started successfully if “NAND Sound Player” appears in the upper screen.

If you place an SDAT file in the root folder of the SD card and insert the SD card into the SD card slot before starting the application, the SDAT file is loaded automatically when the application is started. The path of the loaded SDAT file appears on the lower screen in a form like “`sdmc:/sound_data.sdat`.” From this point forward, the application is controlled in the same manner as the conventional SoundPlayer.

If an SDAT file cannot be found on the SD card or if an SD card is not inserted, the message “cannot find sdat-file” appears on the upper screen. If this happens, insert an SD card containing an SDAT file into the SD card slot and restart NAND SoundPlayer.

If there are multiple SDAT files in the root folder of the SD card, NAND SoundPlayer loads the first SDAT file found.

10 Error Handling

This section explains how to handle errors that occur while converting sound data.

In this example, `MakeSound.bat` is double-clicked to execute the process, but this section can be used as a reference even when `MakeSound.bat` is executed using a different method.

10.1 Error Generation

If the window remains open after double-clicking `MakeSound.bat`, an error has occurred. An error message similar to the one shown below appears at the bottom of the window.

```
smfconv: BgmSeq/kart64_title.mid: Cannot open file
sndarc: smfconv: Failed
Press any key to continue…
```

10.2 Determine the Cause of the Error

It can be difficult to pinpoint the causes of errors because a number of error messages might appear. In general, troubleshoot starting with the last displayed message and work down the list. The last line displays a message to close the window, so start troubleshooting from the second-to-last line.

```
sndarc: smfconv: Failed
```

The line starts with `sndarc:`, which means that all subsequent strings are output by the `sndarc` tool. In other words, it was the `sndarc` tool that output the `smfconv: Failed` message. It seems that `smfconv` has failed, but it does not tell the exact cause. Now, move to the next line up.

```
smfconv: BgmSeq/kart64_title.mid: Cannot open file
```

The `smfconv` tool has output the message `BgmSeq/kart64_title.mid: Cannot open file`. The error message seems to indicate that the file `BgmSeq/Kart64_title.mid` could not be opened. The cause of this error can be determined from this message. `Smfconv` failed because the file `BgmSeq/kart64_title.mid` could not be opened.

10.3 Error Handling

Chances are that `BgmSeq/kart64_title.mid` could not be opened because this file does not exist. Therefore, check if that file exists.

The error may have possibly occurred because the filename was specified incorrectly. If this is the case, correct the description in the sound archive definition file.

10.4 Confirm That an Error Has Been Fixed

After troubleshooting the error, double-click `MakeSound.bat` again and try to convert the data.

If the window closes immediately, the error was fixed. If the window remains open, go through the suggested troubleshooting procedure again.

11 The Next Step

Up to this point, we have learned about the composition of sound data and its broad specifications. To find details about these specifications, see the following manuals.

- Learn more about the sound archiver by reading the *Sound Archive Manual*.

  `NITRO_Composer_SoundArchiveManual.pdf`

- Learn more about sequence data by reading the *Sequence Data Manual*.

  `NITRO_Composer_SequenceDataManual.pdf`

- Learn more about bank data by reading the *Bank Data Manual*.

  `NITRO_Composer_BankDataManual.pdf`

For anyone who wants to use NITRO-Player, the *Nitro-Player User Manual* is provided.
`$TwlSystem/docs/NitroPlayer/NITRO_Player_UserManual.pdf`.