

# Nintendo DS/TWL Programming Guidelines

Version 1.8

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## Revision History

Version	Revision Date	Description
1.8	2009/06/01	<p>Revised the text in section 2.6.2 [DS] [TWL] Specifying Backup Memory <b>[Required]</b>.</p> <p>Revised the table in section 3.3.2[DS] [TWL] Description Text in Each Language <b>[Recommended]</b>.</p> <p>Revised the text in section 5.1.13 [TWL] Handling a Corrupted File System <b>[Required]</b>.</p> <p>Added section 5.2 Application Jumps.</p> <p>Added section 5.3 Writing to SD Cards.</p> <p>Revised the text in section 6.7.4 [TWL] Shutdown Processing Duration <b>[Required]</b>.</p> <p>Revised the text in section 7.6.8 [DS] [TWL] TGID Uses <b>[Required]</b>.</p>
1.7	2009/04/20	<p>Added section 5.1.19 [TWL] Deleting Picture Data in the photo Region <b>[Required]</b>.</p> <p>Revised the text in section 5.2.3 [TWL] [US Version] Display of ESRB Ratings Information <b>[Required]</b>.</p> <p>Added message example to section 7.3.8 [TWL] Support for Wireless-Disabled Mode <b>[Recommended]</b>.</p> <p>Revised the text in section 8.7.3 [TWL] Sending and Receiving Certain User-Generated Content <b>[Required]</b>.</p> <p>Added section 9.2.1 [TWL] [US Version] Display of ESRB Ratings Information <b>[Required]</b>.</p> <p>[English only] Standardized English terms “Single-Card Play” to “Download Play” and “Multi-Card Play” to “Wireless Play.”</p> <p>[English only] Changed the title of section 7.6.8 [DS] [TWL] TGID Used in Single-Card Play <b>[Required]</b> to [DS] [TWL] Uses of TGID <b>[Required]</b>.</p>
1.6	2009/03/09	<p>Revised the tables and explanations in section 3.3.2 [DS] [TWL] Description Text in Each Language <b>[Recommended]</b>.</p> <p>Added section 5.1.2 [TWL] Restrictions on Accessing Regions Not Designated for Your Company's Titles <b>[Required]</b>.</p> <p>Added supplemental information to section 5.1.13 [TWL] Handling a Corrupted File System <b>[Required]</b>.</p> <p>Added section 7.9 Communication Among Different Device Types.</p>
1.5	2009/02/13	<p>Added an exception to section 4.6.1 [TWL] Prohibition of Non-Intended Volume Changes <b>[Required]</b>.</p> <p>Added section 4.6.2 [TWL] Changing Volume Using the SINDEX SetVolume[Async] Function <b>[Required]</b>.</p> <p>Added section 5.1.12 [TWL] Handling Corrupted File System <b>[Required]</b>.</p> <p>Added an explanation of libraries used with e-manuals in section 5.2.1 [TWL] Preparing an Electronic Manual <b>[Required]</b>.</p> <p>Added section 5.2.2 [TWL] Turn DS Wireless Communications OFF When Displaying an E-manual <b>[Required]</b>.</p> <p>Corrected section 7.4.3 [TWL] Displaying the Wireless Feature Icon on the Launcher Screen <b>[Required]</b>.</p>
1.4	2009/01/29	<p>Revised an explanation in section 2.6.6 [DS] [TWL] Distribution of Backup Data <b>[Recommended]</b>.</p> <p>Fixed the width of the DS region from 140 px to 139 px in Table 3-1 of section 3.3.1</p>

Version	Revision Date	Description
		<p>[DS] [TWL] Banner Display Verification on the Launcher Screen <b>[Required]</b>.</p> <p>Removed the description of an implementation from section 3.3.4 [ TWL] When Implementing a Feature for Returning to the Nintendo DSi Menu <b>[Required]</b>.</p> <p>Added section 4.4.3 [TWL] User Confirmation When Capturing Images or Video with the Camera <b>[Recommended]</b>.</p> <p>Revised explanations in section 5.1.9 [TWL] Verifying Free Space <b>[Required]</b>.</p> <p>Revised an explanation in section 5.1.12 [TWL] Handling Corrupted Files <b>[Required]</b>.</p> <p>Added section 5.1.13 [ TWL] User Notification when a File Is Corrupted <b>[Recommended]</b>.</p> <p>Added explanations related to exceptions in section 6.2.1 [DS] [TWL] Active Mode to Sleep Mode Transitions <b>[Required]</b>.</p> <p>Added an explanation related to exceptions in section 6.2.2 [ DS] [TWL] Sleep Mode to Active Mode Transitions <b>[Required]</b>.</p> <p>Revised the content of section 8.5.2 [DS] [TWL] Displaying Captured Images and changed it to <b>[Required]</b>.</p> <p>Revised an explanation in section 8.6.2 [ DS] [TWL] Reset During Backup and Communication <b>[Required]</b>.</p>
1.3	2008/12/26	<p>Revised information given in section 1.6 Terminology.</p> <p>Revised information given in section 2.1.1 [DS] [TWL] Media Access from Each Type of Application [Information].</p> <p>Included “See next page” for applications that do not require card removal detection in section 2.2.1 [DS] [TWL] Processing When Booted from a DS Game Card and Card Removal Is Detected <b>[Required]</b>.</p> <p>Revised information given in section 3.3.1 [DS] [TWL] Banner Display Verification on the Launcher Screen <b>[Required]</b>.</p> <p>Revised information given in section 4.1.2 [DS] [TWL] Simultaneous Pressing of the Directional Buttons <b>[Required]</b>.</p> <p>Revised footnotes for Table 4-2 in section 4.3.2 [DS] [TWL] Ranges in Which Microphone Input Determination Is Prohibited <b>[Required]</b>.</p> <p>Revised information given in section 4.3.6 [DS] [TWL] PM_SetAmpGainLevel User Feedback for the Microphone Input State <b>[Recommended]</b>.</p> <p>Revised information given in section 4.4.1 [TWL] When to Play the Shutter, Recording-Started, and Recording-Ended Sound When Capturing Images or Video <b>[Required]</b>.</p> <p>Supplemented information in section 4.4.1 [TWL] When to Play the Shutter, Recording-Started, and Recording-Ended Sound When Capturing Images or Video <b>[Required]</b>.</p> <p>Changed section 5.1.5 [TWL] Countermeasures Against Hardware Resets / Power Shutdowns During NAND Access <b>[Required]</b>, Countermeasures Against Hardware Resets / Power Shutdowns During NAND Writes <b>[Required]</b>.</p> <p>Revised information given in section 5.1.9 [TWL] Verifying Free Space <b>[Required]</b>.</p> <p>Revised information given in section 5.2.2, [TWL] [US Version] Display of ESRB Ratings Information <b>[Required]</b>.</p> <p>Revised tags for each item in section 7.3 DS Wireless Communications ON/OFF.</p> <p>Revised information given in section 7.3.5 [DS] [TWL] Transitioning from Active Mode to Sleep Mode [Information].</p> <p>Deleted section 8.10.1 [TWL] Prohibition of Checking Signatures of JPEG Files on the ROM Archive <b>[Required]</b> (the section number given is that used in the previous</p>

Version	Revision Date	Description
		version). Added section 8.10.1 [DS][TWL] Standardization of Names <b>[Required]</b> .
1.2	2008/11/19	<p>Revised the table and description in section 2.1.1 [DS] [TWL] Media Access from Each Type of Application [Information].</p> <p>Changed the title of section 2.2.2 [DS] [TWL] Processing When Card Removal Is Detected for a DS Download Play Child [Information] to [DS] [TWL] Applications That Do Not Require Card Removal Detection [Information] and made revisions to the content.</p> <p>Revised the content of section 2.6.11 [DS] [TWL] Display While Writing to the Backup Memory <b>[Required]</b>.</p> <p>Revised the content of section 3.3.1 [DS] [TWL] Banner Display Verification on the Launcher Screen <b>[Required]</b>.</p> <p>Revised the content of section 4.3.4 [DS] [TWL] Preventing Erroneous Microphone Input Due to Speaker Output <b>[Required]</b>.</p> <p>Deleted section 4.6.1 [TWL] Providing the User with Volume Information <b>[Required]</b>.</p> <p>Revised the content of section 5.1.11 [TWL] Handling Fatal Errors <b>[Required]</b>.</p> <p>Added section 5.1.14 [TWL] Use Limitation of the DataPrv Archive <b>[Recommended]</b>.</p> <p>Changed the title of section 5.1.15 [TWL] Prohibition of Software Reset with NAND Applications to [TWL] Prohibition of Using OS_ResetSystem with NAND Applications <b>[Required]</b>.</p> <p>Corrected errors in section 6.7.3 [TWL] Processing When a Shutdown Is Detected [Information].</p> <p>Revised the content of section 6.7.4 [TWL] Shutdown Processing Duration <b>[Required]</b>.</p> <p>Revised the supplemental information in section 7.3 DS Wireless Communications ON/OFF.</p> <p>Changed the content of section 8.4.6 [DS] [TWL] Screen Brightness Calculations [Information] to be applicable to TWL.</p> <p>Added sections 8.10 JPEG Signature and 8.10.1 [TWL] Prohibition of Signature Checks for JPEG Files on the ROM Archive <b>[Required]</b>.</p>
1.1	2008/10/28	<p>Revised the table and description in section 2.1.1 [DS] [TWL] Media Access from Each Type of Application [Information].</p> <p>Revised the description in section 2.6.6 [DS] [TWL] Distribution of Backup Data <b>[Recommended]</b>.</p> <p>Revised part of the table in section 3.3.1 [DS] [TWL] Banner Display Verification on the Launcher Screen <b>[Required]</b>.</p> <p>Revised the description in section 4.4.4 [TWL] Transitioning to Sleep Mode While Taking Pictures or Video <b>[Required]</b>.</p> <p>Added section 4.6.1 [TWL] Prohibition of Non-Intended Volume Changes <b>[Required]</b>.</p> <p>Revised the description in section 5.1.3 [TWL] Handling Fatal Errors <b>[Required]</b> and moved to section 5.1.11.</p> <p>Revised the description in section 5.1.12 [TWL] Handling Corrupted Files <b>[Required]</b>.</p> <p>Added section 5.1.14 [TWL] Prohibition of Software Reset with NAND Applications <b>[Required]</b>.</p>

Version	Revision Date	Description
		<p>Revised the description in section 6.7.4 [TWL] Shutdown Processing Duration [Required].</p> <p>Added section 7.3.4 [TWL] Displaying the Wireless Feature Icon on the Launcher Screen [Required] and Table 7 1 Power Consumption by State.</p> <p>Changed section 8.7.1 [TWL] Handling Restricted Items [Information].</p> <p>Revised the description in section 8.7.2 [TWL] Sending and Receiving Photo Data [Required].</p> <p>Revised the description and table in section 8.7.3 [TWL] Sending and Receiving Some User-Generated Content [Required].</p> <p>Revised the description in section 9.1.1 [DS] Implementation of the Microphone Test Feature [Required] and added Table 9 1 Implementation of Microphone Test Feature by Software Type.</p>
1.0.0	2008/10/02	Initial version.

# 1 Introduction

## 1.1 Contents

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These guidelines provide programming cautions for the Nintendo DS system (DS), TWL, and their peripherals.

The terminology used in these guidelines is based on the Nintendo DS and TWL terminology. Be sure to refer to these documents as well.

## 1.2 NTR-Compatible Features and TWL-Enhanced Features

---

There are three types of software for the DS and TWL systems: DS software, TWL-enhanced software, and TWL-exclusive software.

DS software can be played on a DS system or on a TWL system, but cannot use TWL-enhanced features. When developing DS software, there is no need to refer to items that only concern TWL-enhanced features (items marked with only a [TWL] tag).

TWL-enhanced software can be played on either a DS system or a TWL system, and supports TWL-enhanced features. When developing TWL-enhanced software, refer to all items in these guidelines.

TWL-exclusive software cannot be played on a DS system; it can only be played on a TWL system. When developing TWL-exclusive software, there is no need to refer to DS-specific guidelines (items marked with only a [DS] tag).

The table below summarizes the items that must be referred to for each type of software.

**Table 1-1 Software Items That Must Be Referred To**

	Items with [DS] Tags	Items with [TWL] Tags	Items with [DS] and [TWL] Tags
DS software	Must be referred to	N/A	Must be referred to
TWL-enhanced software	Must be referred to	Must be referred to	Must be referred to
TWL-exclusive software	N/A	Must be referred to	Must be referred to (except where otherwise noted)

The [DS] and [TWL] tags start appearing in Chapter 2.

## 1.3 Levels of Importance

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The following notations indicate the relative importance of the topics contained in this document.

- **[Required]** Items that must be completed.
- **[Recommended]** Items suggested for improving the quality or performance of your game.
- **[Information]** Additional items that provide information for game developers.

## 1.4 Note

---

These guidelines were established to reduce problems in the market. However, adherence to these guidelines does not guarantee that all problems can be avoided.

## 1.5 Prohibition of Using Files Provided for the Nintendo DS/TWL on Other Platforms

---

Files included in each of the development tools or SDKs provided for the DS/TWL are not to be used on other platforms.

## 1.6 Terminology

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To ensure you're using the correct terminology, please refer to the DS Terminology and TWL Terminology files for the names of the system and system parts, names related to operations, names of accessories, and other names.

This content is also included in section 8.10.1 as **[Required]**.

## 1.7 Supplemental Information

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This document contains supplemental information, either at the end of a particular guideline or within the guideline itself. This information is not part of the actual guideline, but rather is included to help clarify the meaning of the given guideline.

## 2 Game Card and Game Pak Slots

### 2.1 General

#### 2.1.1 [DS] [TWL] Media Access from Each Type of Application [Information]

The table below shows the media that can be accessed from each type of application.

**Table 2-1 Media That Can Be Accessed from Each Type of Application**

	DS Game Card		SD Memory Card	System NAND Memory
	ROM Region	Backup Memory		
Card application	Allowed	Allowed	Prohibited	Prohibited
DS Download Play <sup>1</sup>	Prohibited <sup>2</sup>	Read/write allowed if product of the same company. However, a DS Game Card must be inserted when a DS Download Play application starts.	Not possible	Not possible
NAND applications	Prohibited <sup>2</sup>	Prohibited in principle	Prohibited in principle <sup>3</sup>	Possible

<sup>1</sup> Demos that are playable on Nintendo DS systems (distributed by DS Download Stations or other such means) are considered DS Download Play applications.

<sup>2</sup> `CARD_GetRomHeader` can be used to access registration information in ROM.

<sup>3</sup> Consult if you will be using only the write features.

#### Supplemental Information

The reason that access to the DS Game Card backup memory or to an SD Card from a NAND application is prohibited in principle is because the security risk is high that a path can be created to pass arbitrary data to devices operating in TWL Mode.

The risk is thought to be especially high when performing reads. However, if you have plans to perform writing only, contact Nintendo at [support@noa.com](mailto:support@noa.com).

### 2.2 DS Game Card Slot

#### 2.2.1 [DS] [TWL] Processing When Booted from a DS Game Card and Card Removal Is Detected **[Required]**

If the device is booted from a DS Game Card, process according to whether the system is open or closed. For applications that do not require card removal detections, see section 2.2.2 [DS] [TWL] Applications That Do Not Require Card Removal Detection [Information].



1. When a DS Game Card is removed while the system is open:

Stop the DS/TWL CPU core and enter the HALT state when the DS Game Card is removed. Turning off the power is prohibited. If the TWL-SDK library is being used to access the DS Game Card, when a DS Game Card is removed, the system automatically enters the HALT state without the program doing anything.

If DS Wireless Communications is on when the removal of a DS Game Card is detected, TWL-SDK automatically shuts down DS Wireless Communications and halts the CPU cores on the DS or TWL.

2. When a DS Game Card is removed while the system is closed:

When the removal of a DS Game Card is detected while the system is closed, turn off the power. If you are using the TWL-SDK library, this process is performed automatically, so no additional programming is needed.

Special types of DS Game Cards may generate card interrupts at times other than the removal of a DS Game Card while the system is sleeping. For these types of DS Game Cards, a card interrupt must not be included in the conditions for waking the system from Sleep Mode. Instead, the first indication that the DS Game Card has been removed occurs when the system awakens for some other reason. At that time, the system should make the transition to the HALT state.

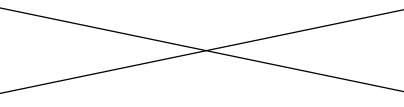
## 2.2.2 [DS] [TWL] Applications That Do Not Require Card Removal Detection [Information]

No processing is required if a DS Game Card is removed from a device running a NAND application or operating as a DS Download Play child. (If the DS Game Card is removed while the Nintendo logo is displayed during or at the time a download has completed on a download play child, the system enters a HALT state. This is by design.)

## 2.2.3 [DS] [TWL] Card Application ROM Type Setting [Required]

When building an application, define `RomSpeedType` in the RSF file properties and explicitly specify the ROM type setting (mask ROM/one-time PROM). Only DS software between 64 and 512 megabits can use the "mask ROM" setting.

**Table 2-2 Card Application ROM Type Setting**

	DS Software	TWL-Enhanced Software/ TWL-Exclusive Software
64 megabit	Both of the following can be used: Mask ROM setting One-Time PROM setting	
128 megabit		
256 megabit		
512 megabit		
1 gigabit	Only the following can be used: One-Time PROM setting	Only the following can be used: One-Time PROM setting
2 gigabit		

**Note:** See the Card's manual for a detailed explanation of the Mask ROM setting and One-Time PROM setting. There is no need to define `RomSpeedType` for NAND applications.

#### 2.2.4 [DS] [TWL] DS Wireless Communications Between Software with Different ROM Type Settings [Information]

---

Communications may not function properly when DS Wireless Communications is used within the software that has different ROM type settings. When updating the remaster version due to a change in the ROM type setting, follow the directions in section 7.6.10 [DS] [TWL] Connection Between Different Remastered Versions [Required] and make sure that communication functions normally.

#### 2.2.5 [DS] [TWL] Strict Adherence to Use of Libraries [Required]

---

To access a DS Game Card (including the backup memory region), always use the library provided by Nintendo of America Inc.

### 2.3 Game Pak Slot

#### 2.3.1 [DS] Detection of Removal with Games That Do Not Use Game Paks [Required]

---

With games that do not use Game Paks, do not perform screen display or stop the game if Game Pak removal is detected.

#### 2.3.2 [DS] Detection of Removal with Games That Use Game Paks [Required]

---

For games using Game Paks, prohibit further pak access when the Game Pak is removed.

When accessing Game Paks using the TWL-SDK library, these processes occur automatically and without programmer awareness.

When a Game Pak is removed during Sleep Mode, detection of the removal normally takes place upon return to Active Mode. However, when a Game Pak is swapped with another with the same title, removal detection does not occur.<sup>1</sup>

**Note:** Due to the hardware specifications, the removal of active products is prohibited in Sleep Mode. To avoid giving the game player a mistaken impression, avoid using this functionality (for example, do not exchange data among Game Paks).

#### 2.3.3 [DS] Swapping of GBA Game Paks with the Same Title During Sleep Mode [Recommended]

---

During Sleep Mode, Game Pak removal is not detected even when swapping a Game Pak with the same title from another device.<sup>2</sup>

To avoid any problems that might arise in such a circumstance, and to detect any swapping that occurs during Sleep Mode, we recommend using the hash values for the Game Pak's backup data before and after Sleep Mode.

#### 2.3.4 [DS] Access to Game Paks [Required]

---

As a general rule, accessing any region on GBA Game Paks produced by other companies is prohibited. Use either the `CTRDG_GetAgbMakerCode` or `CTRDG_GetAgbGameCode` function in TWL-SDK to determine whether a GBA Game Pak is supported or produced by your company.

---

<sup>1</sup> Waking from sleep upon removal of a Game Pak is prohibited. See section 6.2.2 [DS] [TWL] Sleep Mode to Active Mode Transitions [Required] and section 2.3.3 [DS] Swapping of GBA Game Paks with the Same Title During Sleep Mode [Recommended].

<sup>2</sup> Waking from sleep upon removal of a Game Pak is prohibited. See section 6.2.2 [DS] [TWL] Sleep Mode to Active Mode Transitions [Required].

### 2.3.5 [DS] Access to DS Option Paks **[Required]**

---

DS Option Pak access is limited to compatible Game Paks. Access across all regions for other DS Option Paks is prohibited.

In addition, guidelines specific to DS Option Paks are included in sections 2.4 Nintendo DS Rumble Pak and 2.5 Nintendo DS Memory Expansion Paks.

### 2.3.6 [DS] How to Handle DS Programs on Game Paks **[Required]**

---

DS programs (native code for consumption in the ARM core) cannot be placed on Game Paks for immediate or later transfer to memory.

### 2.3.7 [DS] How to Handle DS Scripts on Game Paks **[Required]**

---

You must confirm that DS scripts or code based on scripts that are placed on Game Paks for immediate or later transfer to memory are valid (that is, that they are indeed scripts produced by the game developer).

If you are considering using scripts, contact [support@noa.com](mailto:support@noa.com) in advance.

### 2.3.8 [DS] How to Handle DS Data on Game Paks **[Recommended]**

---

Simple data, exclusive of applications or scripts, can be used directly on Game Paks or transferred to memory in the DS. Nevertheless, we recommend confirming the validity of such data.

## 2.4 Nintendo DS Rumble Pak

### 2.4.1 [DS] Games That Require the Rumble Feature **[Required]**

---

The Nintendo DS Rumble Pak is optional hardware. Because not all users have a Rumble Pak, do not implement specifications that require the use of the Rumble Pak to progress through a game.

### 2.4.2 [DS] Detecting Removal of Games That Use the Nintendo DS Rumble Pak **[Required]**

---

Games should not stop or be otherwise affected when Rumble Pak removal is detected.

### 2.4.3 [DS] Switching Nintendo DS Rumble Feature On/Off **[Recommended]**

---

We recommend that developers implement a Rumble Feature on/off switch for games that support the Nintendo DS Rumble Pak.

### 2.4.4 [DS] Avoid Continuous Operation of the Nintendo DS Rumble Pak **[Recommended]**

---

Games that use the Rumble Feature should be designed to avoid continuous operation of the Rumble Feature. For the health of the game player and the life of the equipment, do not design the game such that a pressed key results in continuous rumbling.

### 2.4.5 [DS] Stopping the Nintendo DS Rumble Pak **[Required]**

---

Do not use the Rumble Feature while the game is paused. Also be sure to turn off the Rumble Feature when placing the DS into Sleep Mode or when performing a software reset.

### 2.4.6 [DS] Using the Nintendo DS Rumble Pak with the Microphone **[Required]**

---

Do not use the Rumble Pak with the microphone because the microphone may pick up the sound caused by the Rumble Feature while the microphone is in use.

## 2.5 Nintendo DS Memory Expansion Paks

### 2.5.1 [DS] Prohibition of Using Memory Expansion Paks **[Required]**

---

The Nintendo DS Memory Expansion Pak and the Nintendo DS Lite Memory Expansion Pak are for use exclusively with the Nintendo DS Browser. These Memory Expansion Paks cannot be used with any game.

However, if the use of a Memory Expansion Pak is an unavoidable element in your game, contact [support@noa.com](mailto:support@noa.com).

## 2.6 Backup Memory

---

Unless otherwise noted, backup memory procedures are the same for both DS Game Cards and Game Paks.

### 2.6.1 [DS] [TWL] Restriction on Library Use **[Required]**

---

Always use the library provided by Nintendo of America Inc. to access backup memory.

The library provided by Nintendo has been tested and adjusted in accordance with the backup memory specifications to achieve proper access. Direct access without the use of these Nintendo-provided libraries is prohibited. Such direct access is not in accordance with specifications and may lead to malfunctions.

Accessing the EEPROM in a GBA Game Pak is prohibited while operating in DS Mode.

### 2.6.2 [DS] [TWL] Specifying Backup Memory **[Required]**

---

Inappropriately accessing backup memory, for example, by using a function specific to FLASH in the SRAM, causes malfunctions. Therefore, do not use functions related to backup memory (including identify functions) until the type and capacity of the backup memory is specified.

The method for specifying the type and capacity of the backup memory is as follows.

- Handling the Backup Memory on the DS Game Card Side

The type and capacity of the DS Game Card-side backup memory is determined when booting from a DS Game Card. However, when using a DS Download Play application to access the backup memory of an inserted DS Game Card, the type and capacity of the backup memory should be identified after confirming that the Game Card is your own product by getting the manufacturer code and the Game Code with the `CARD_GetRomHeader` function.

- Handling the Backup Memory on the GBA Game Pak Side

After using the `CTRDG_GetAgbMakerCode` function to get the manufacturer code to confirm that it is a valid product, look up the Game Code with the `CTRDG_GetAgbGameCode` function and specify the type and capacity of backup memory.

### 2.6.3 [DS] [TWL] Initializing the Factory Default Backup Memory **[Required]**

Specific values are written to backup memory when it is ready for shipping from the factory. However, there is no guarantee that those values will remain unchanged. Always carry out initialization processes for backup memory before the initial save.

### 2.6.4 [DS] [TWL] Disabling the Display of Error Messages for Default Backup Data **[Required]**

Make sure that error messages for default backup data are not displayed. For example, you could display an error message only when a fixed value is stored in a specific location in backup memory, this content is maintained, and backup data is corrupted.

### 2.6.5 [DS] [TWL] Endurance of Backup Memory **[Required]**

EEPROM, FLASH, and DACS all have a limited number of erase-write cycles. Avoid excessive writing and erasing (for example, performing a save every second or each time a character takes a step) with these devices.

**Note:** SRAM does not have this limitation.

#### DS Game Cards

The manufacturers of EEPROM and FLASH packaged in Game Cards guarantee the number of writes and erases, as listed in Table 2-3.

**Table 2-3 Erase-Write Endurance of Backup Memory in Game Cards**

Backup Memory	Guaranteed Endurance of Erase-Write Cycles	Average Daily Guaranteed Number of Erase-Write Cycles (Assuming End of Life in One Year)
4-kilobit and 64-kilobit EEPROM	1,000,000 times (per byte)	Approximately 3,000 times
512-kilobit EEPROM	1,000,000 times (per byte)	Approximately 3,000 times
2-megabit, 4-megabit FLASH	100,000 times (per page)	Approximately 300 times
256-kilobit FRAM	10,000,000,000 <sup>1</sup>	Approximately 30,000,000 times <sup>1</sup>

#### GBA Game Paks

The manufacturers of FLASH and DACS packaged in GBA Game Paks guarantee the number of writes and erases, as listed in Table 2-4.

**Table 2-4 Erase-Write Endurance of Backup Memory in GBA Game Paks**

Backup Memory	Guaranteed Endurance of Erase-Write Cycles Per Sector	Average Daily Guaranteed Number of Erase-Write Cycles (Assuming End of Life in One Year)
512-kilobit and 1-megabit FLASH	10,000 times	30 times
1-megabit and 8-megabit DACS	100,000 times	300 times

<sup>1</sup> Accessing the EEPROM in a GBA Game Pak is prohibited while operating in DS Mode.

### **2.6.6 [DS] [TWL] Distribution of Backup Data [Recommended]**

---

Backup data should be written to all sections in backup memory, rather than to a specific address or page. For example, if the size of the data to be backed up is 10 pages, the first backup should be to pages 0 to 9, the second to pages 10 to 19, and so on, to reduce the number of erase-write cycles to each page.

There is no particular need to observe the requirements of this section when writing to system NAND memory because processing is already automatically handled in this way at the hardware level.

### **2.6.7 [DS] [TWL] Backup Data Reliability [Required]**

---

Code should be written so that the program does not malfunction, even if backup data is corrupted. (Data corruption can be detected by using a method such as a checksum or CRC.)

### **2.6.8 [DS] [TWL] Preventing the Corruption of Backup Data [Recommended]**

---

We recommend that you take precautions, such as making a copy, to be able to recover corrupted data.

### **2.6.9 [DS] [TWL] Display a Message When Backup Data Is Corrupted [Recommended]**

---

We recommend that you display an error message to the game player when unrecoverable backup data is discovered. Do not display an error message when the backup memory has its initial factory setting.

Contents of backup devices that are present at shipping are not guaranteed to be in any specific state.

### **2.6.10 [DS] [TWL] Removing Corrupted Backup Data [Required]**

---

Ensure that corrupted backup data is deleted or overwritten with correct backup data. The following are possible approaches.

- Automatically delete the corrupted backup data when it is detected. Alternatively, allow the game player to delete the data.
- Overwrite the corrupted backup data with normal backup data with the next save.

Ensure that corrupted backup data does not result in unexpected behavior.

### **2.6.11 [DS] [TWL] Display While Writing to the Backup Memory [Required]**

---

When a write to backup memory exceeds 0.5 seconds, provide some visual indication such as "Saving. Do not touch the Game Card or turn the power off." for DS Card applications or "Saving. Do not turn the power off." if the message is intended for both DS Card applications and NAND applications, to prevent the player from turning off the power during the write.

Be particularly careful that the "Writing to backup memory" display does not disappear while the data is still being written.

The display time may be extended to ensure that the game player has adequate time to read the indication.

### **2.6.12 [DS] [TWL] Animation Display While Writing to Backup Memory [Required]**

---

If the backup write operation takes longer than 5 seconds, display onscreen animation so the game player does not mistakenly think the system is hung.

### **2.6.13 [DS] [TWL] Caution Before Writing to Backup Memory [Recommended]**

---

When writing data to backup memory, we recommend reading at least 1 byte in advance each time (you can read and discard the data). If the `Read` function returns an error, the DS Game Card terminals may not be making good contact. When this occurs, do not write data. Instead, follow the instructions in section 2.6.15 [DS] [TWL] Caution About Reading from Backup Memory [Required].

### **2.6.14 [DS] [TWL] Caution After Writing to Backup Memory [Recommended]**

---

Because the TWL-SDK backup functions retry 10 times internally when data write fails, you do not need to implement a retry process when errors occur. However, even if the `Write` function finishes normally without returning an error, there is no guarantee that data was written in the targeted backup memory. Therefore, we recommend either using the `Verify` function in addition to the `Write` function or using the `WriteAndVerify` function instead of the `Write` function.

### **2.6.15 [DS] [TWL] Caution About Reading from Backup Memory [Required]**

---

When using the `read` function to read backup data, be sure to verify the return value. When the `read` function returns an error, the DS Game Card terminals may not be making proper contact. This problem can probably be resolved by reinserting the DS Game Card, so do not assume that the data has been corrupted. In addition, stop the game and display a message such as “The save data could not be accessed. Please turn off the power and reinsert the DS Game Card.”

In addition, display this message *before* stopping the game in cases where the `read` function returns an error as indicated in section 2.6.13 [DS] [TWL] Caution Before Writing to Backup Memory [Recommended].

### **2.6.16 [DS] [TWL] Verification of the DS Game Card Backup Memory [Required]**

---

When the application supports DS Game Card backup memory, read at least 1 byte from any backup memory address (the data can be discarded) soon after the application is launched and before the title screen is displayed. If the `read` function returns an error at this time, the DS Game Card terminals may not be making proper contact, so immediately perform the error handling described in section 2.6.15 [DS] [TWL] Caution About Reading from Backup Memory [Required].

### **2.6.17 [DS] [TWL] Overwriting Backup Memory on DS Game Cards [Recommended]**

---

When a game player manually deletes backup data, display a confirmation message and wait for confirmation before deleting the data.

### **2.6.18 [DS] Overwriting Backup Memory on GBA Game Paks [Required]**

---

Before rewriting backup memory data on GBA Game Paks, display a confirmation screen to inform the game player and to obtain consent.

Use the same procedure when initializing backup memory on GBA Game Paks.



## 3 Launcher

### 3.1 Profiles

#### 3.1.1 [DS] [TWL] Profiles [Information]

---

Whether to reference information registered on an individual system and use it in a game is determined by the game itself; there are no restrictions on the use of the profile data.

#### 3.1.2 [DS] [TWL] Use of User Nicknames and Comments [Required]

---

If characters not included in the application are used in user nicknames or comments, ensure that the display is not corrupted and that gameplay continues without problems.

#### 3.1.3 [DS] [TWL] Display of User Nicknames and Comments [Recommended]

---

When characters not included in the application are used in user nicknames or comments, alternate characters may be used for those characters. Make every effort to maintain a similar meaning as the original user nickname or comment.

When displaying alternate characters, do not use blanks (0x0020 or 0x3000) as alternate characters because it may appear as if nothing is being displayed. We recommend using symbols other than spaces for alternate characters: for example, the asterisk (\*, 0x002a), question mark (? , 0x003f), or hyphen (-, 0x002d).

There are no limits on which characters you can include in the application. For example, instead of including European characters, you can replace them with English characters that are similar for display purposes. Alternatively, you can replace the English uppercase letters with lowercase (or vice versa).

### 3.2 Options

#### 3.2.1 [DS] [TWL] Language Settings [Information]

---

The software can freely access the language setting for individual DS devices and use that language in the game. Games can also have an option to set a language other than that set in System Settings. For example, an option in the game can be used to select English in the game even if the language set in System Settings is Japanese. This data can also be saved to backup memory and loaded the next time the game is started. However, it is not possible to change the Language setting in System Settings from within the game.

#### 3.2.2 [DS] [TWL] Language Settings [Required]

---

The number of languages supported by the DS/TWL systems may increase in the future. Accordingly, be sure that a malfunction does not occur when the `language` member of the `OSOwnerInfo` structure obtained with `OS_GetOwnerInfo` is an undefined value. Process the value as a language that is not supported by the game.

#### 3.2.3 [DS] [TWL] Time and Date Settings [Required]

---

The time and date can be freely changed in System Settings. Therefore, the time when gameplay starts may be earlier than the time stamp of the previous backup. Steps should be taken to ensure that



the program is not affected if time is turned back. This problem may also occur when game players swap DS Game Cards.

### 3.2.4 [DS] [TWL] Time and Date Offset Value Handling [Information]

---

To test whether the game player has changed time settings on a DS, get the time/date offset value and compare it to the previous value on the same device. This comparison works only for values from the same DS. This time determination can be used during a game, but ensure that gameplay is not impeded when continued on a different DS. The MAC address of the DS can be used to determine whether a different DS is being used.

### 3.2.5 [DS] [TWL] Prohibited Use of Time and Date Settings [Information]

---

The functions provided by TWL-SDK to set the time and date in the real-time clock (RTC) can be used only for debugging. When built with the Master ROM as the build target (see the note below), the request to write to the RTC always fails.

**Note:** When using the command line, "TWL\_FINALROM" is the target. When using the IDE, "TWL ROM" is the target.

## 3.3 Game Banners

### 3.3.1 [DS] [TWL] Banner Display Verification on the Launcher Screen [Required]

---

Verify that the banner (that has both the game icon and the game description text) displays normally on the launcher screen, regardless of which language is selected on the system. For NAND applications, check that the banner also displays normally on the software management screen. If using transparency in a banner, note that the launcher screen and software management screen look different, as the background color on the launcher is gray, but the background color on the software management screen is white.

The game description text must include information about both the title and the publisher. When the title (and the subtitle) consists of one line, include the name of the publisher on the second line. When the game title (and the subtitle) consists of two lines, include the name of the publisher on the third line.

For the Nintendo DS game description, you can specify a maximum of three lines with a width of 139 dots. For TWL you can specify a maximum of three lines with a width of 240 dots. However, if several wide characters (see Table 3-1) are used and the text is longer than the display area, text outside the display area is not shown. (About 28 alphanumeric characters can be displayed per line.)

When creating DS-exclusive or TWL-enhanced applications, confirm that the banner is displayed normally on DS and TWL.

#### Supplemental Information

As shown in Table 3-1 below, certain characters are wider or narrower than others, so the number of these characters that can be displayed will differ from normal characters.

**Table 3-1 Banner Font Character Limitations**

	Launcher (DS)	Launcher (TWL)	Software Management Screen (TWL)
Width of region	139 px	240 px	202 px
Maximum number of w's	23	17	16
Maximum number of m's	23	20	19
Maximum number of w's	23	20	19
Maximum number of i's	69	80	64

### 3.3.2 [DS] [TWL] Description Text in Each Language [\[Recommended\]](#)

If the game description text is displayed in a language that is not supported by the game, the player may mistakenly believe that the game supports that language.

For the language that the game supports, enter text in the software description input column in that language. For languages that it does not support, enter text in one of the languages that it does support. In this case, if the game supports English, give English priority.

For those tables below that have more than one “Input Language” row, choose any of the rows and use the corresponding languages in your application. Also, note that TWL systems have regions, so languages shown with gray backgrounds cannot be selected.

**Table 3-2 Games for Japan**

Input Column Type	JP	EN	FR	GE	IT	SP
Input language	Japanese	Japanese	Japanese	Japanese	Japanese	Japanese

**Table 3-3 Games for the USA**

Input Column Type	JP	EN	FR	GE	IT	SP
Input language	English	English	English	English	English	English

**Table 3-4 Games for Europe Using the Same ROM Throughout the European Market**

Input Column Type	JP	EN	FR	GE	IT	SP
Input language	English	English	French	German	Italian	Spanish
	English	English	English	English	English	English

**Table 3-5 Games for a Specific European Country (France, for Example)**

Input Column Type	JP	EN	FR	GE	IT	SP
Input language	French	French	French	French	French	French
	English	English	French	English	English	English

**Table 3-6 Games for China**

Input Column Type	JP	EN	FR	GE	IT	SP	CN
Input language	English	English	English	English	English	English	Chinese

Chinese market games work only with the Chinese DS system iQueDS.

**Table 3-7 Games for Korea**

Input Column Type	JP	EN	FR	GE	IT	SP	CN	HN
Input language	English	English	English	English	English	English	English	Korean

Because the non-Korean language supported DS will also be circulated as an official product, use of Korean outside HN is prohibited.

For more information about Chinese and Korean market games, see the *TWL Programming Manual*.

**Note:** Even if Japanese is specified in the input language row, there is no need to convert alphanumeric characters included in the formal Japanese title into hiragana or katakana.

### 3.3.3 [DS] [TWL] Download Play Banner Display Verification [Required]

As with section 3.3.1 [DS] [TWL] Banner Display Verification on the Launcher Screen [Required], confirm that banners (game icons, game description text) are properly displayed on the DS Download Play game list screen.

The following points differ from banner display in the launcher.

- Because DS Download Play specifications do not allow text to be changed according to the child device's language settings, you may display text in any of the languages supported by the game.
- The game title name display region is one line of 185 dots (approximately 36 alphanumeric characters). The software description text display region is two lines of 199 dots (approximately 40 alphanumeric characters on two lines).
- There is no need to display the publisher name.

### 3.3.4 [TWL] When Implementing a Feature for Returning to the Nintendo DSi Menu [Required]

Implementing a feature for returning from the application to the DSi Menu is optional. However, if you do implement this, use the term "Nintendo DSi Menu."

## 4 Input Devices

### 4.1 Buttons

#### 4.1.1 [DS] [TWL] Chattering Prevention [Recommended]

---

Take measures to prevent chattering (one button press being registered multiple times). Such measures include setting the button read rate to once every sixtieth of a second.

#### 4.1.2 [DS] [TWL] Simultaneous Pressing of the Directional Buttons [Required]

---

Take measures to prevent the game from operating abnormally if Up and Down or Left and Right on the +Control Pad are pressed simultaneously. Some specific measures include invalidating simultaneous input or assigning priority to Up or Down and to Left or Right.

##### **Supplemental Information**

You do not have to consider this item when using the `PAD_Read` function with TWL-SDK, because measures to prevent this operation have been implemented in the SDK.

#### 4.1.3 [DS] [TWL] Unused Buttons [Required]

---

Take measures to ensure that the game does not freeze during gameplay when a user presses a button that the game does not use. In particular, be careful when one of the unused buttons has been allocated for programming use, such as debugging.

#### 4.1.4 [TWL] Detection Feature for the Power/Reset Button [Required]

---

With the TWL system, an interrupt will be generated for a game when it detects that the Power/Reset Button has been pressed. Do not allocate any feature to the Power/Reset Button other than starting shutdown processing.

For more about shutdown processing, see sections 6.7.3 [TWL] Processing When a Shutdown Is Detected [Information] and 6.7.4 [TWL] Shutdown Processing Duration [Required].

### 4.2 Touch Screen

#### 4.2.1 [DS] [TWL] Touch Screen Chattering [Information]

---

Touch Screen chattering may occur when the Touch Screen is pressed with a light force that is below the set input load (80 g when using the stylus). Chattering may occur in the following situations.

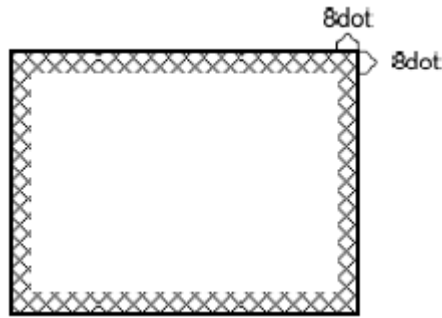
- The Touch Screen is touched with light force.
- The Touch Screen is tapped with the stylus.
- A line is drawn using light force.
- The Touch Screen is tapped repeatedly at high speed.

#### 4.2.2 [DS] [TWL] Touch Screen Durability [Information]

---

The 8-dot area around the outer edge of the Touch Screen is less durable than the area in the center. Avoid controls that would likely lead to players pressing hard on the 8-dot area around this outer edge.

Such controls could result in lifespan reduction or product damage.

**Figure 4-1 Border Area of the Touch Screen**

#### 4.2.3 [DS] [TWL] Calibration Value Use **[Required]**

Always use calibrated values when using the Touch Screen.

If it is not possible to get touch panel calibration (if the `TP_GetUserInfo` function fails), it is okay to not call the `TP_SetCalibrateParam` function. Although values obtained with the `TP_GetCalibratedPoint` function are incorrect when calibration setting is not performed, it is not necessary to do anything about this.

#### 4.2.4 [DS] [TWL] Prohibition of Stylus-Only Interfaces **[Recommended]**

Avoid interfaces that require the game player to use the stylus. Games should allow game players to use their finger if they have lost the stylus. For example, do not require a distinction of a few dots in the area to be pressed for simple operations such as yes/no selection. An exception to this recommendation is a game where a distance of a few dots in the area being pressed is critical to gameplay.

#### 4.2.5 [DS] [TWL] Active Area of the Stylus **[Required]**

Because the stylus has a rounded tip, it cannot reach the outermost edge of the Touch Screen. Therefore, ensure that the outer region of the Touch Screen is not used for gameplay. Specifically, to take into account variations in devices, the area within four dots of the edge should not be used.

#### 4.2.6 [DS] [TWL] Input Accuracy Verification **[Recommended]**

Because chattering and other problems may cause an incorrect coordinate value to be returned, check the `validity` flag to verify the accuracy of the obtained value.

On rare occasions chattering can result in the return of an abnormal value even if the `validity` flag is valid. If necessary, implement other measures, such as comparing the current value with the previous coordinate value and determining that the value is incorrect if there is too much difference between the two values.

#### 4.2.7 [DS] [TWL] Chattering Prevention for the Contact Determination Flag **[Recommended]**

Take measures to prevent complications caused by chattering during contact between the stylus and the Touch Screen. Such measures include setting the contact determination flag inquiry rate to once every sixtieth of a second.

#### 4.2.8 [DS] [TWL] Compliance with Library Use **[Required]**

When using the Touch Screen, be sure to use the library provided by Nintendo.

## 4.3 Microphone

### 4.3.1 [DS] [TWL] Individual Differences in Microphone Sensitivity [Information]

Microphone sensitivity among individual Nintendo DS and Nintendo DSi systems may vary by as much as a factor of two.

### 4.3.2 [DS] [TWL] Ranges in Which Microphone Input Determination Is Prohibited [Required]

Microphone input contains a noise component, so within certain ranges, microphone input will be erroneously detected even when there is no microphone input present. To prevent this kind of false-positive detection, when detecting microphone input, do not consider the values within the ranges shown in the table below, inside which microphone input should be judged as not present.

If the gain is large, button operations and casing friction noise show up pronouncedly as microphone input, so be careful when setting your threshold value.

**Table 4-1 DS / CODEC-DS Mode Sound Circuitry for the TWL**

Amplitude Resolution		Range in Which Microphone Input Determination Is Prohibited	Gain	
			Factor	dB
8-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_8BIT)	$\pm 11$	20	+26
		$\pm 13$	40	+32
		$\pm 15$	80	+38.1
		$\pm 20$	160	+44.1
	Unsigned (MIC_SAMPLING_TYPE_8BIT)	117–139	20	+26
		115–141	40	+32
		113–143	80	+38.1
		108–148	160	+44.1
16-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_12BIT*)	$\pm 2368$	20	+26
		$\pm 2880$	40	+32
		$\pm 3392$	80	+38.1
		$\pm 4672$	160	+44.1
	Unsigned (MIC_SAMPLING_TYPE_12BIT*)	30400–35136	20	+26
		29888–35648	40	+32
		29376–36160	80	+38.1
		28096–37440	160	+44.1

**Note:** When the TWL-SDK's microphone-sampling functions perform sampling with an effective width of 12 bits, what is actually obtained are 16 bits of data, with the lower 4 bits padded with zeros. In this case, refer to the 16-bit values in these tables.

Table 4-2 CODEC-TWL Mode for the TWL

Amplitude Resolution		Range in Which Microphone Input Determination Is Prohibited	Gain	
			Factor	dB
8-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_8BIT)	±3	3-20	10.5-26.0
		±5	21-40	26.5-32.0
		±9	42-80	32.5-38.0
		±16	84-160	38.5-44.0
		±32	168-320	44.5-50.5
		±51	355-640	51.0-56.0
		±110	669-1280	56.5-62.0
		±128	1334-2560	62.5-70.0
	Unsigned (MIC_SAMPLING_TYPE_8BIT)	125-131	3-20	10.5-26.0
		123-133	21-40	26.5-32.0
		119-137	42-80	32.5-38.0
		112-144	84-160	38.5-44.0
		96-160	168-320	44.5-50.5
		77-179	355-640	51.0-56.0
		18-238	669-1280	56.5-62.0
		0-255	1334-2560	62.5-70.0

Amplitude Resolution		Range in Which Microphone Input Determination Is Prohibited	Gain	
			Factor	dB
16-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_12BIT*)	±768	3-20	10.5-26.0
		±1280	21-40	26.5-32.0
		±2304	42-80	32.5-38.0
		±4096	84-160	38.5-44.0
		±8192	168-320	44.5-50.5
		±13056	355-640	51.0-56.0
		±28160	669-1280	56.5-62.0
		±32768	1334-2560	62.5-70.0
	Unsigned (MIC_SAMPLING_TYPE_12BIT*)	32000–33536	3-20	10.5-26.0
		31488–34048	21-40	26.5-32.0
		30464–35072	42-80	32.5-38.0
		28672–36864	84-160	38.5-44.0
		24576–40960	168-320	44.5-50.5
		19712–45824	355-640	51.0-56.0
		4608–60928	669-1280	56.5-62.0
		0–65535	1334-2560	62.5-70.0

**Note:** When the TWL-SDK's microphone-sampling functions perform sampling with an effective width of 12 bits, what is actually obtained are 16 bits of data, with the lower 4 bits padded with zeroes. In this case, refer to the 16-bit values in this table.

The noise component will be particularly noticeable when the gain is set to +44.5 dB (168x) or higher in CODEC-TWL mode (highlighted in light gray in the table), so do not determine whether microphone input is present or absent based on the amplitude level.

When using a gain setting of +62.5 dB (1334x) or higher in CODEC-TWL mode (highlighted in dark gray in the table), the noise component will appear throughout the entire mic input region, so do not use such a setting for games.

Note that for TWL-enhanced software that uses CODEC-DS mode when running on a TWL system, the noise component will be different depending on whether the software is being run on a DS system or a TWL system. The reason for the difference is that applications running on a DS system will use the DS system's sound circuits.

#### 4.3.3 [DS] [TWL] Guaranteed Input Range **[Required]**

Not all of the range of values that express the number of bits of the amplitude resolution can be used for microphone input. Some systems are not able to detect any input outside of the guaranteed range. Avoid using values beyond the guaranteed range to prevent any erroneous determinations.



**Table 4-3 DS / CODEC-DS Mode Sound Circuitry for the TWL**

Amplitude Resolution		Range Below Guaranteed Input	Range Above Guaranteed Input	Guaranteed Microphone Input Range
8-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_8BIT)	-128 to -101	100–127	-100 to +99
	Unsigned (MIC_SAMPLING_TYPE_8BIT)	0–27	228–255	28–227
16-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_12BIT*)	-32768 to -25664	25648–32752	-25663 to +25647
	Unsigned (MIC_SAMPLING_TYPE_12BIT*)	0–7104	58416–65520	7105–58415

**Note:** When the TWL-SDK's microphone-sampling functions perform sampling with an effective width of 12 bits, what is actually obtained are 16 bits of data, with the lower 4 bits padded with zeros. In this case, refer to the 16-bit values in this table.

**Table 4-4 CODEC-TWL Mode for the TWL**

Amplitude Resolution		Range Below Guaranteed Input	Range Above Guaranteed Input	Guaranteed Microphone Input Range
8-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_8BIT)	-128 to -124	123–127	-123 to +122
	Unsigned (MIC_SAMPLING_TYPE_8BIT)	0–4	251–255	5–250
16-bit	Signed (MIC_SAMPLING_TYPE_SIGNED_12BIT*)	-32768 to -31744	31743–32752	-31743 to +31742
	Unsigned (MIC_SAMPLING_TYPE_12BIT*)	0–1024	64512–65520	1025–64511

**Note:** When the TWL-SDK's microphone-sampling functions perform sampling with an effective width of 12 bits, what is actually obtained are 16 bits of data, with the lower 4 bits padded with zeros. In this case, refer to the 16-bit values in this table.

#### 4.3.4 [DS] [TWL] Preventing Erroneous Microphone Input Due to Speaker Output [Required]

The sounds output from the speaker, if treated as microphone input, can trigger undesirable symptoms in some applications. Even if no specific problems arise in a specific system unit, problems may still occur depending on individual variations in microphone sensitivity and speaker volume. To prevent problems from happening, be sure to implement at least one of the following three countermeasures.

- Set sound master volume to 50 or less while the microphone is in use. Use either `SND_SetMasterVolume` or `NNS_SndSetMasterVolume` to set the sound master volume.

- Provide an option that lets the player adjust the microphone's sensitivity. Use `PM_SetAmpGain` or `PM_SetAmpGainLevel` to set the sensitivity.
- Provide an option that lets the player adjust the microphone's input threshold value.

If implementing these measures proves difficult, contact [support@noa.com](mailto:support@noa.com).

#### **Supplemental Information**

In particular, because the Nintendo DSi speaker volume is louder in comparison to the Nintendo DS, “undesirable symptoms” occur more easily. Even if there is no problem on the Nintendo DS system, the problem may become prominent on the Nintendo DSi system.

---

### **4.3.5 [DS] [TWL] Preventing Acoustic Feedback [Required]**

Avoid simultaneous recording of audio from a microphone input and playback of that recorded audio because there is the possibility that acoustic feedback will occur.

For example, caution is needed when implementing a feature such as voice chat.

However, if the specifications of a game require that audio recording and playback of that recorded audio take place at the same time, contact [support@noa.com](mailto:support@noa.com).

---

### **4.3.6 [DS] [TWL] `PM_SetAmpGainLevel` User Feedback for the Microphone Input State [Recommended]**

When using audio data input from a microphone in a game, the operation might not work properly, depending on the game player's audio input method. This could cause the game player to mistakenly interpret the problem as a malfunction, either in the game or in the DS system.

To prevent such a mistaken impression, we recommend that you implement features such as an optional screen on which microphone input can be tested and a feature providing feedback that makes the user input appropriate audio.

If you are implementing features for testing purposes, refer to the example implementation in section 9.1 Microphone Tests, which targets Nintendo titles. Implementing this functionality is **[Required]** for titles published by Nintendo.

When using the Matsushita Voice Recognition Engine, see the accompanying manual for specific examples of these implementation methods.

## **4.4 Camera**

---

### **4.4.1 [TWL] When to Play the Shutter, Recording-Started, and Recording-Ended Sound When Capturing Images or Video [Required]**

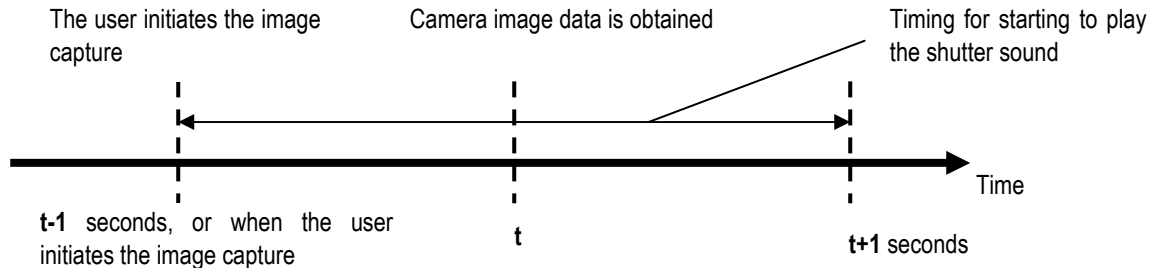
When taking still images, play the shutter sound (see `data/shutter_sound` in TWL-SDK) designated by Nintendo. Be sure there is no time delay between taking a picture (capturing a camera image) and the shutter sound. Begin playing the shutter sound in the 1-second interval before and after the moment the picture is taken.

When taking video, play the recording-started sound (see `data/videorec_sound` in TWL-SDK) in the 1-second interval before and after the time the first frame is taken. Likewise, play the recording-ended sound in the 1-second interval before and after the time the last frame is taken.

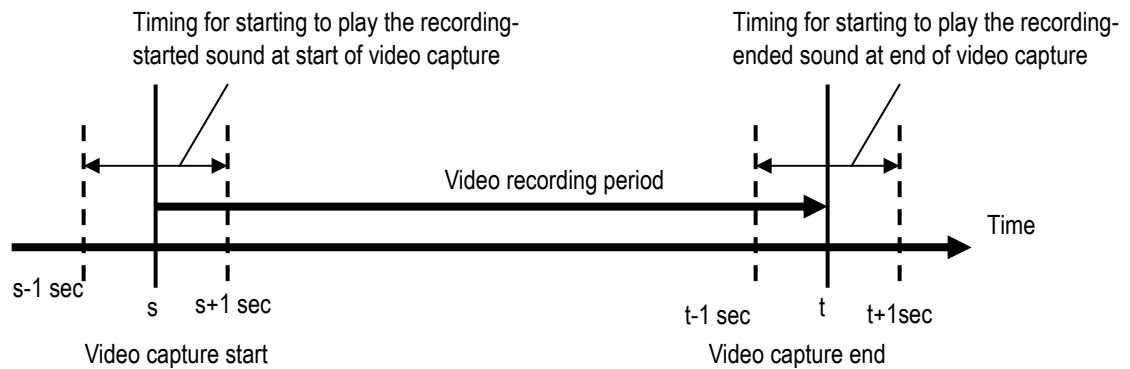
While shooting a movie, if shooting is interrupted by transitioning to sleep mode or another mode transition, recording-started and recording-ended sounds are required even when automatically resuming shooting after recovery from sleep mode.

**Note:** Do not modify the shutter, recording-started, or recording-ended sounds.

### Still Images



### Video



### Supplemental Information

The shutter sound must be played when a picture is taken to prevent sneak photos.

Some titles under development from before this guideline was finalized use a shutter sound different from the one included with the SDK. However, to alter the shutter sound, you must take a sound pressure measurement and verify that it satisfies reference values. In the future, exceptions will not be granted out of concern that not all of them can be supported and the possibility of the use of a sound that is hard to distinguish from the shutter sound.

#### 4.4.2 [TWL] Prohibition of Playing a Shutter, Recording-Started, or Recording-Ended Sound Except When Capturing Images or at the Beginning and End of Video Capture **[Required]**

To prevent users from mistakenly believing that a camera image has been taken, do not play a shutter sound, recording-started, or recording-ended sound except when capturing images or starting or ending video capture.

#### 4.4.3 [TWL] User Confirmation When Capturing Images or Video with the Camera **[Recommended]**

The shutter sound is always played when using the camera to capture images or video. If the application uses the camera's capture feature unbeknownst to the user, the shutter sound may therefore be played in a situation where it is generally not appropriate to capture images or video, such as on a train.

When implementing a feature to capture images or video using the camera in your application, we recommend that you somehow get the user's consent before using the capture feature.

#### **4.4.4 [TWL] How to Play the Shutter Sound [Required]**

---

When playing the shutter sound, use the `DSP_PlayShutterSound` function to give priority to playing the shutter sound from the speaker at a specific volume.

#### **4.4.5 [TWL] Transitioning to Sleep Mode While Taking Pictures or Video [Required]**

---

When the application transitions to Sleep Mode during video recording or while capturing still images, first stop the capture. The transition must be implemented so that Sleep Mode starts after verifying that the recording process is stopped and the shutter or recording-ended sounds have been played.

In particular, `OS_Panic` is called if the transition to Sleep Mode is caused while the DSP is playing the shutter or recording-ended sounds. So it is required to verify that the sounds are finished.

#### **4.4.6 [TWL] Basic Operations of Camera Indicator LED [Information]**

---

The camera indicator LED lights up when the outer camera is active.

#### **4.4.7 [TWL] Temporarily Turning the LED Off When Taking Stills with the Outer Camera [Required]**

---

When capturing still images, be sure to temporarily turn off the camera indicator LED in addition to playing the shutter sound. Doing so prevents light from the LED from entering the lens, and the change in the LED's illumination pattern also helps to deter people from taking clandestine photos. The camera indicator LED can be turned off for a certain period of time by calling `CAMERA_SwitchOffLED`.

Only turn the LED off temporarily when a still picture is being taken.

#### **4.4.8 [TWL] Blinking the LED When Taking Video with the Outer Camera [Required]**

---

When capturing movies, set the camera indicator LED to blink and then go back to having the LED steadily illuminated once the capture has ended.

The camera indicator LED can be set to blink by calling `CAMERA_SetLED(TRUE)`. To return to steady illumination, call `CAMERA_SetLED(FALSE)`.

Only set the camera indicator LED to blink while capturing movies.

#### **4.4.9 [TWL] Screen Display When the Camera Is Active [Required]**

---

When the camera is active, the input image on the LCD screen must be at least 120 pixels high by 160 pixels wide to inform the user and people nearby that the TWL camera is in use.

#### **4.4.10 [TWL] Screen Display When Recording Video [Required]**

---

When recording video, display the REC icon that is specified by Nintendo. You can find the REC icon in `$TwlSDK/data/rec_icon/`.

Display the REC icon on the same LCD screen that shows camera input while recording. The particular methods of display (for example, icon blinking or display location) are not specified.

## 4.5 Opening and Closing the System

### 4.5.1 [DS] [TWL] Open/Close Detection Function **[Required]**

---

As a general rule, the open/close detection function of the system should be used only to switch to Sleep Mode or to turn the LCD off. Because frequent opening and closing of the system can damage or shorten the life of the product, using the opening or closing of the system as a key input is prohibited.

Examples of when opening/closing the system is considered key input and when it is not are provided in the following sections.

#### 4.5.1.1 Examples of When Opening/Closing the System Is Considered Key Input (Not Allowed)

- Opening/closing the system is counted as a button press, and continuous opening and closing is required
- Compressing or stretching out characters with the action of the system
- Calling an event after the system has been opened and closed a set number of times

#### 4.5.1.2 Examples of When Opening/Closing the System Is Not Considered Key Input (Allowed)

- Implementing sound effects when the system is opened or closed
- Implementing fade-in, mosaics, and other visual effects when opening the system
- Auto-saving games when closing the system where a manual save method is provided

Exceptions may be made when opening and closing the system is essential to gameplay and the system does not have to be opened and closed frequently. If planning such a use, contact [support@noa.com](mailto:support@noa.com) before proceeding.

#### Supplemental Information

Although the TWL hinge is slightly stronger than the DS hinge, it is not significantly stronger. If many applications use opening and closing as a switch, the concern is that this may damage the hinge.

Although, as an exception, the launcher will use the open/close detection function to advertise TWL features, currently the effect of this use in the market are unknown. For use other than in the launcher, use the same operating principles as for the Nintendo DS system.

## 4.6 Volume/Brightness Control

### 4.6.1 [TWL] Prohibition of Non-Intended Volume Changes **[Required]**

---

It is prohibited to change the speaker volume other than when the user presses the volume switch or manipulates an onscreen volume control.

Do not allow applications to change the volume at times not expected by the user.

However, if specifications do not confuse the user, then that is acceptable. For example, it is acceptable if the user is allowed to make separate settings such as for a clock alarm, to temporarily output a different volume than the setting. To make temporary settings to volume, use the `SNDEX_SetIgnoreHWVolume` and `SNDEX_ResetIgnoreHWVolume` functions that are provided as extended sound features.

#### Supplemental Information

This prohibition is in place because if applications are allowed to freely change the speaker volume it can result in operations where the user intentionally lowers the volume, but that intention is ignored and sound is output at high volume.

**Note:** This does not apply to the shutter sound or video start/stop sounds, which must be kept at a fixed volume. For more information, see section 4.4.1 [TWL] When to Play the Shutter, Recording-Started, and Recording-Ended Sound When Capturing Images or Video **[Required]**.

#### **4.6.2 [TWL] Changing Volume Using the SNDEX\_SetVolume[Async] Function [Required]**

---

Settings for changing the volume using the `SNDEX_SetVolume[Async]` function must be made only by user operations, such as by using the onscreen volume control.

#### **4.6.3 [TWL] Prohibition of Using the Volume/Brightness Control for Functions Other than Adjusting the Volume or Brightness [Required]**

---

Do not use the volume/brightness control for anything other than adjusting the volume or brightness.

### **4.7 Miscellaneous**

#### **4.7.1 [DS] [TWL] Device Input When the System Is Closed [Required]**

---

When the system is closed, there is no guarantee that input will not be generated from buttons other than the L and R Buttons, or from devices such as the Touch Screen, microphone, or camera. For this reason, ensure that no malfunctions will occur if device input is generated when the system is closed.

A specific example is to prohibit device input while the system is closed.

#### **4.7.2 [DS] [TWL] Continuous or Rapid Operations Over a Long Period [Recommended]**

---

Do not program games to require continuous, rapid, or excessive pressure on the system (for example, the Touch Screen or other input device) over a long period of time. These types of operations can shorten the life of the product, damage the product, or cause injury to the game player.

#### **4.7.3 [DS] [TWL] Animation Display When Device Input Is Offline [Recommended]**

---

When there is no response for more than five seconds after button input, from the Touch Screen, microphone, or other input sources, display animation on the screen so the game player knows the system has not frozen.

#### **4.7.4 [DS] [TWL] Ignore Launcher Button and Touch Screen Input When Starting Games from the Launcher [Recommended]**

---

When the launcher is used to start or select a game, the game might register its input as game input if the button or Touch Screen is pressed for an extended interval.

To avoid this, discard the first value read from the buttons or Touch Screen after the game starts up.

## 5 NAND Applications

### 5.1 [TWL] System NAND Memory

#### 5.1.1 [TWL] NAND Memory Read/Write Units [Information]

---

In a DS Game Card's internal backup memory, data is managed by specifying addresses directly. TWL system NAND memory uses a file system, so data is managed on a file-by-file basis.

For more information about the file system, see `AboutFileSystem.pdf` in the SDK.

#### 5.1.2 [TWL] Restrictions on Accessing Regions Not Designated for Your Company's Titles [Required]

---

As a rule, accessing regions in the system NAND memory other than those designated for your company's titles is prohibited. If you want to access other regions, you must use a special library provided by Nintendo and ensure that your implementation follows the rules described in the associated function reference manual.

For example, if you want to access the "photo" region of system NAND memory, you must use the TCL library.

#### 5.1.3 [TWL] Restrictions on Frequent Writes to NAND Memory [Required]

---

TWL system NAND memory has a limited number of erase-write cycles, so avoid excessive writing or erasing, such as saving every second or every time the character takes a step. Even for data that must ultimately be stored in NAND memory, you should manipulate your data in the main memory most of the time and perform writes to NAND in chunks as much as possible so that the number of writes to NAND is kept to a minimum.

If you are using an auto-save feature, limit the size of the save data to at most 128 KB per 3 minutes or so.

#### 5.1.4 [TWL] Display During Writes [Required]

---

If the write time to system NAND memory exceeds 0.5 seconds, display a message or an icon indicating that the data write to system NAND memory is underway.

Be particularly careful to ensure that the display indicating that a write operation is in progress does not disappear before the write operation has actually completed.

It is okay to display the message for a longer time than it actually takes to perform write operations to make the message easier for the user to recognize.

#### 5.1.5 [TWL] Displaying Animation While Writing [Required]

---

If the write time to NAND memory exceeds 5 seconds, display an animation somewhere on the screen to avoid having the user mistakenly think that the system has frozen.



### 5.1.6 [TWL] Countermeasures Against Hardware Resets / Power Shutdowns While Writing **[Required]**

---

When a hardware reset or power shutdown occurs, use shutdown processing (see section 6.7.3 [TWL] Processing When a Shutdown Is Detected [Information]) or take other measures so that your application will continue to operate without bugs when started up, regardless of when files are closed.

### 5.1.7 [TWL] Data Compatibility Within the Same Application **[Required]**

---

Maintain save data compatibility even if revisions to the NAND application occur.

### 5.1.8 [TWL] Prohibition of Programs that Depend on Access Speed **[Required]**

---

Do not create programs that are dependent on the access speed of NAND memory. This is required because the access speed is variable due to performance variance between individual devices and performance degradation over the years.

If TWL-SDK is used to create an application using the `Debug` or `Release` settings, access speed will be randomized artificially. This is to simulate variable access speed.

### 5.1.9 [TWL] Data Units for Users **[Required]**

---

When notifying users of information such as available memory or file sizes, use units of 128 KB and use the term "block(s)." If the number of blocks does not come out to a whole-number value and you are displaying the available memory, round down to the nearest whole number and display the number of available blocks as that whole number. For file size, discard the decimal portion and round up to the nearest integer value.

When saving photo data or sound data, the application can display available space in units as it determines, such as expressing the amount of photos as "shots."

#### **Supplemental Information**

"Photo data" does not refer to data created using the Nintendo DSi Camera application, but rather to data that an application creates.

### 5.1.10 [TWL] Verifying Free Space **[Required]**

---

When dealing with variable-length data sizes or variable quantities of data, check the free space before each write, and notify the user in the event that there is not enough free space. When dealing with fixed-size data, the cluster size does not change, so there is no need to verify the free space except when creating the file. In addition, it is acceptable to not verify the free space when creating a file if plenty of space can clearly be allocated, such as during initial startup.

Checking for free space in NAND memory can be done at any time before data is written.

#### **Supplemental Information**

You can use `FS_HasEnoughSpaceToCreateFile`, `FS_GetArchiveResource`, and other functions to check the free space. For more details, see each function's page in the *TWL-SDK Function Reference Manual*.

### 5.1.11 [TWL] Fixed File Sizes **[Recommended]**

---

For NAND applications, a fixed-size region is allocated for saving files during the installation, so NAND applications can create, delete, or change the size of their files freely with no problem. However, this



type of control over files can lead to fragmentation of the save area, so it is recommended that NAND applications create files only once and do not change the size of the files.

If files become fragmented, it will become impossible to read contiguous blocks in a single operation, and the write speed for files will be reduced. The table below shows actual example access speeds for when a given file is unfragmented and for when that file has been split into two fragments.

**Table 5-1 Examples of File Access Speeds**

		Not Fragmented	Two Fragments
8 KB	Read	3.0 MB/s (2679 $\mu$ s)	2.2 MB/s (3634 $\mu$ s)
	Write	1.5 MB/s (5411 $\mu$ s)	1.1 MB/s (6788 $\mu$ s)
32 KB	Read	4.0 MB/s (8016 $\mu$ s)	3.6 MB/s (8939 $\mu$ s)
	Write	2.7 MB/s (11807 $\mu$ s)	2.1 MB/s (15214 $\mu$ s)

### 5.1.12 [TWL] Handling Fatal Errors **[Required]**

If the error message `FS_RESULT_MEDIA_FATAL` is returned, indicating a fatal error when system NAND memory is accessed, there may be a risk in rebooting the system. Do not turn off power or cause a hardware reset. Instead, display a message such as "System Save Memory is damaged. For details please read the Nintendo DSi Operations Manual." Do not perform subsequent processing.

#### Supplemental Information

This section assumes access to the save data region. If the access is to the ROM archive, it is assumed that the NAND application itself will not start, and implementing the above is not required.

### 5.1.13 [TWL] Handling a Corrupted File System **[Required]**

In the event `FS_RESULT_BAD_FORMAT` is returned to indicate that the file system is corrupted when accessing the system NAND memory, continuing to process on the system NAND memory will be difficult, so reformat using the `NA_FormatTitleArchive` function.

Because the `NA_FormatTitleArchive` function writes to NAND memory, you need to comply with section 5.1.4 [TWL] Display During Writes **[Required]**. However, you do not need to display an animation as directed in section 5.1.5 [TWL] Displaying Animation While Writing **[Required]** as long as during the initialization of the Save Data region, a special message is displayed to notify the player of the fact that the file system is corrupted (for example, "A problem has been detected, so the Save Data region is being initialized").

#### Supplemental Information

You can use the "Break" feature of the `NandFiler` application included in TWL-SDK to reproduce the `FS_RESULT_BAD_FORMAT` state.

### 5.1.14 [TWL] Handling Corrupted Files **[Required]**

Before using backup data, make sure the data is not corrupted. If the data has been corrupted, either erase the file or overwrite with valid data, as appropriate.

Take measures to ensure that your program does not behave abnormally, even if the backup data is corrupted.

### 5.1.15 [TWL] User Notification when a File Is Corrupted [Recommended]

---

When backup data is corrupted, we recommend displaying an error message to notify the user.

### 5.1.16 [TWL] Prohibition of Restricting the Use of Save Data Based on TWL System-Specific Information [Required]

---

We prohibit using TWL system specific information (for example, MAC address) when creating save data and using that specific information to allow only the TWL system that has the same unique information to access the save data.

This is to prevent save data from becoming unusable if a module or the TWL system is replaced during repair.

### 5.1.17 [TWL] Limitations on Use of the DataPrv Archive [Recommended]

---

Except when required by the game specifications, do not have NAND applications use `DataPrv`.

#### Supplemental Information

Because the data saved in `DataPrv` is not copied to SD Cards, when data is copied from an SD Card into system NAND memory, `DataPrv` is rewritten back to an empty state.

### 5.1.18 [TWL] Prohibition of Using `OS_ResetSystem` with NAND Applications [Required]

---

Do not use the `OS_ResetSystem` function, which performs a software reset, in NAND applications. If this function is used, the game stops due to an `OS_Panic`.

In the case of NAND applications, you can use `OS_RebootSystem`, which uses a hardware reset instead, to restart the application.

### 5.1.19 [TWL] Deleting Picture Data in the photo Region [Required]

---

You can use the TCL library function `TCL_DeletePicture` to delete picture data in the `photo` region of NAND memory, but you must implement restrictions so that you can only delete the data for pictures created by your own game title. Alternatively, it is acceptable to implement narrower restrictions so that you can only delete the data for pictures created by this local copy of the application.

#### Supplemental Information

The `TCL_DeletePicture` function is an API for deleting the picture data in the `photo` region. This API is planned to be provided beginning in TWL-SDK 5.2. If you want to use it with TWL-SDK 5.1 or earlier, contact [support@noa.com](mailto:support@noa.com).

## 5.2 Application Jumps

---

Though not generally publicized, it is possible to jump to a NAND application using special OS library functions. This section presents guidelines related to these application jumps. If you want to implement this feature, contact [support@noa.com](mailto:support@noa.com).

Note that you need to configure the RSF file in advance for the system to accept the jump from another application to the NAND application.

Although the guidelines here in section 5.2 use the same ranking terminology as in other sections (for example, Required, Recommended, and Information), these rankings do not apply to applications that do not use the jump feature.

### 5.2.1 [TWL] Prohibition Against Jumping to an Application with a Stricter Rating [Required]

---

Do not jump from an application to a NAND application that has a more restrictive target age rating. For example, if an application has a ESRB E rating, jumping to a NAND application that has a ESRB T rating is prohibited.

### 5.2.2 [TWL] Restriction on Jumping to Applications That Require Wireless Functionality [Required]

---

When the TWL system is set to wireless-disabled mode (see section 7.1.1 [TWL] Wireless-Enabled Mode and Wireless-Disabled Mode [Information]), do not jump to an application that requires wireless functionality (see section 7.3.4 [TWL] Displaying the Wireless Feature Icon on the Launcher Screen [Required]).

## 5.3 Writing to SD Cards

---

In principle, accessing an SD Card from a NAND application is prohibited (as stated in section 2.1.1 [DS] [TWL] Media Access from Each Type of Application [Information]), but in some cases it is permitted to write data from a NAND application to an SD Card. This section presents guidelines for the restricted writing to SD Cards.

Although the guidelines here in section 5.3 use the same ranking terminology as in other sections (that is, Required, Recommended, and Information), these rankings do not apply to applications that do not access SD Cards.

### 5.3.1 [TWL] Using Dedicated Functions for SD Card Writing [Required]

---

To access an SD Card with a production-version ROM, use the separately provided dedicated functions for SD Card writing. Do not use the FS functions or other functions provided for debugging.

It is acceptable to use the `FS_GetArchiveResource` function and other functions that retrieve SD Card-related information. But do not use the `FS_ReadFile` function or other functions that read file data from the SD Card.

#### Supplemental Information

If you are using dedicated functions for SD Card writing from TWL-SDK 5.2 or earlier, you can use the FS library to read from and write to SD Cards even if they have a production version ROM (which would normally be restricted). If you are therefore using the FS library for debugging purposes, be sure to remember to delete debug code from the production version ROM. In versions after TWL-SDK 5.2, reading from and writing to SD Cards is specified individually. If you specify only the writing to SD Cards, there is no risk of inadvertent reading, but you still must remember to delete debug code.

Leaving debug read functionality in the production-version ROM presents a dangerous security hole that could have a fatal impact on the DSi platform. Exercise appropriate caution.

### 5.3.2 [TWL] Prohibition Against Programs Depending on Access Speed [Required]

---

The access speed of SD Cards differs among cards as well as for the same card as it ages. Do not create programs that depend on the duration of SD Card access.

If you have used TWL-SDK to create an application configured as either a Debug build or a Release build, a wait is added in the library so that access speed is quasi-random.

The first time that the SD Card is accessed, processes are carried out to control the card and check formatting; the initial SD Card access takes a little longer than second and subsequent accesses. This applies not only to when the program starts but also each time the SD Card is reinserted. The time required for initial card access depends mainly on SD Card capacity (not the amount of free space or the number of files).

### 5.3.3 [TWL] Display During Writing **[Required]**

---

To prevent the user from turning the power off or removing the SD Card while data is being written to the card, be sure to display an indication that writing is taking place, regardless of the duration of the writing or the data size.

In addition, when the write time to the SD Card exceeds 5 seconds, display an animation somewhere on the screen to avoid having the user mistakenly think that the system has frozen.

Make sure that this animation remains displayed at least until the writing is completed. Take special care that the indication that writing is occurring does not stop before the actual writing has completed.

Visually, it is acceptable for the indication to remain displayed for longer than the actual writing.

### 5.3.4 [TWL] Data Units for Users **[Recommended]**

---

When notifying the user of the size of a file written to an SD Card, we recommend that you describe it in terms of blocks, where each block is 128 KB in size.

If the blocks do not make an integer value, round up the decimal so the number of blocks can be shown as an integer.

#### **Supplemental Information**

You do not absolutely need to use the term "block" because the most suitable size-unit for handling files on the SD Card will vary, depending on the application. For example, if the application is using an SD Card to link with a PC, it might be better to use KB units.

### 5.3.5 [TWL] Processing When in Sleep Mode **[Information]**

---

Be aware that there may be times when SD Cards are swapped during Sleep mode.

When the TWL system wakes from Sleep mode, access to the SD Card will take longer than it will on subsequent accesses to the card (see section 5.3.2 [TWL] Prohibition Against Programs Depending on Access Speed **[Required]**).

Processes registered to functions such as `PM_AppendPreSleepCallback` are executed automatically when the TWL system transitions to Sleep mode, so design your sleep-time process using processes similar to those for shutdown.

### 5.3.6 [TWL] Implementation of Error Handling **[Required]**

---

For SD Card error handling, follow the instructions in the Function Reference for the dedicated SD Card writing functions provided separately.

### 5.3.7 [TWL] Handling Fatal Errors **[Recommended]**

---

When a fatal error is detected, show a message informing users only that some error has occurred during an SD Card-related process and prompt them to insert a different card or to reinsert the same card. Avoid using any expressions that indicate some specific cause.

### Supplemental Information

When the exact error can be identified, providing details to users is considerate. For fatal errors, however, the cause often cannot be determined (it may be due to a faulty SD card, something other than an SD card being inserted, or simply a poor contact). This section was added to address this concern.

## 5.4 Other

### 5.4.1 [TWL] Preparing an Electronic Manual **[Required]**

---

NAND applications do not have paper manuals. Instead, you must prepare an electronic manual and make it possible to select it from a location close to the title screen. If there is no title screen, make it possible to select the manual as quickly as possible after the application starts.

Note that you must always use the E-Manual Display library provided by Nintendo to display your e-manual.

### 5.4.2 [TWL] Turn DS Wireless Communications Off When Displaying an E-Manual **[Required]**

---

Turn DS wireless communications off before transitioning to the e-manual.

#### Supplemental Information

System specifications call for the system to enter sleep mode when the TWL is closed while the e-manual is being displayed. Therefore, if DS Wireless Communications is ON at that time and the TWL system is closed, `OS_Panic` is triggered by the closure. (See section 6.2.4 [DS] [TWL] Mode Transitions During Communication **[Required]**.)

To reduce the ROM capacity, the E-Manual Display library is not linked to a wireless-related library. Therefore, handle this from the application side.

### 5.4.3 [TWL] [US Version] Display of ESRB Ratings Information **[Required]**

---

The publisher must adhere to any and all ESRB rating display requirements. Pay particular attention to the rules for display of rating information in non-packaged games.

For details, go to [www.esrb.org](http://www.esrb.org) and log in as a publisher or contact the ESRB.

To read about Nintendo titles, see section 9.2.1 [TWL] [US Version] Display of ESRB Ratings Information **[Required]**.

## 6 Power Management

### 6.1 Power Management Modes

#### 6.1.1 [DS] [TWL] Active Mode [Information]

---

This mode is for gameplay. It is the opposite of Sleep Mode.

#### 6.1.2 [DS] [TWL] Sleep Mode [Information]

---

This mode is used to control the amount of power being consumed.

All processor circuits are stopped in this mode. The LCD does not display and sounds are not emitted. However, the CPU and main memory contents are preserved.

#### 6.1.3 [DS] [TWL] Power Controls [Information]

---

While in Active Mode, the power supplied to the CPU, DSP (TWL only), LCD, LCD backlight, graphics, sound, microphone, and camera (TWL only) modules can be individually controlled. Power to the Touch Screen, wireless modules, system NAND memory (TWL only) and the SD Memory Card (TWL only) is automatically stopped when they are not in use, so their power supply cannot be controlled.

In addition, power to the system can also be turned off. (Note that the system cannot automatically be turned on from an `OFF` state.)

When turning the LCD on from an `OFF` state, hardware limitations require an interval of at least 100 ms. For more information, see the `PM_SetLCDPower` function in the *TWL-SDK Function Reference Manual*.

### 6.2 Sleep Mode

#### 6.2.1 [DS] [TWL] Active Mode to Sleep Mode Transitions [Required]

---

Unless you have a particular reason to do otherwise, transition from Active Mode to Sleep Mode only when the system is closed. (The DS and TWL are in Sleep Mode only when closed.)

Use the `PM_GoSleepMode` function to transition to Sleep Mode.

Consult with Nintendo if your application's specifications make it highly desirable to transition to Sleep Mode other than when the system is closed.

#### 6.2.2 [DS] [TWL] Sleep Mode to Active Mode Transitions [Required]

---

Transition from Sleep Mode to Active Mode only when the DS is open.

However, the following exceptions are allowed.

- Temporarily transitioning to Active Mode using the RTC alarm function when the system is closed. In this case, move to Sleep Mode after running the process.
- Temporarily transitioning to Active Mode to turn power off when a DS Game Card is removed while in Sleep Mode. In this case, see section 2.2.1 [DS] [TWL] Processing When Booted from a DS Game Card and Card Removal Is Detected [Required].
- Transitioning from Sleep Mode to Active Mode while the system is open if an exception was granted for your application to transition to Sleep Mode other than when the system is closed.

### 6.2.3 [DS] [TWL] Mode Transitions During Backup **[Required]**

When deleting or writing to backup memory data or system NAND memory, wait for processing to finish before transitioning to Sleep Mode.

### 6.2.4 [DS] [TWL] Mode Transitions During Communication **[Required]**

If performing DS Wireless Communications, turn DS Wireless Communications off before transitioning to Sleep Mode.

When using NITRO-SDK, if DS Wireless Communications is not off when entering sleep mode, it is possible that wireless hardware will become corrupt and continually emit signals. This is very dangerous.

When using TWL-SDK, if DS Wireless Communications is not off when entering sleep mode, TWL-SDK will force the system to halt. Therefore, there is no concern about this danger. However, you will not be able to continue the game.

#### Supplemental Information

It is possible that signals will be emitted if the system enters Sleep Mode while DS Wireless Communications is on. Also, the system state it returns to is not defined and hence is unpredictable, which may result in serious problems. This is why `OS_Panic` (from TWL-SDK) is called.

## 6.3 LCD OFF State

### 6.3.1 [DS] [TWL] Transitions Caused by Closing the System **[Information]**

Use the `PM_SetLCDPower` function to enter the LCD OFF state when the system is closed. When the LCD OFF state is entered, power to the LCD backlight and microphone is turned off. Also no sound is emitted from the speakers.

For headphone output, however, a set of procedures allows sound to be played during the LCD OFF state. For more information, see section 6.3.3 [DS] Clarifying Procedures for Producing Sound from Headphones During an LCD OFF State **[Required]**.

### 6.3.2 [DS] [TWL] Transitions Caused by Opening the System **[Required]**

When the system transitions to the LCD OFF state after the system is closed, be sure to turn ON the LCD when the system is opened. Remember to restore any modules that were on prior to entering the LCD OFF state to the same state they were in before entering the LCD OFF state.

### 6.3.3 [DS] Clarifying Procedures for Producing Sound from Headphones During an LCD OFF State **[Required]**

With DS systems, if a game is designed to produce sound through the headphones<sup>3</sup> during the LCD OFF state, this should be clearly indicated in the game instruction booklet (for example, "Insert the headphone jack *before* closing the DS.>").

<sup>3</sup> Sound can be produced from headphones during an LCD OFF state using the following procedures:

- After inserting the headphone jack into the DS system while the DS system is open (in the LCD ON state), close the DS system to place it in the LCD OFF state.
- Insert the headphone jack while the DS system is closed and in the LCD OFF state. However, there is no guarantee that the DS system will produce any sound through the headphones.



The reason for this is that with the DS, there is no guarantee that sound will be played (depending on when the headphones are inserted, sound might not be played). With TWL systems, sound is guaranteed to play, even in the LCD OFF state, so there is no need to consider this section.

- To reliably produce sound from headphones

To produce sound from headphones even in the LCD OFF state, insert the headphone jack into the DS while the DS is open (in the LCD ON state), and then close the DS to put it in the LCD OFF state.

- To non-reliably produce sound from headphones

Due to the design of the DS, there is no guarantee that sound will be produced from headphones when the headphone jack is inserted while the DS is closed and in the LCD OFF state.

---

#### **6.3.4 [DS] [TWL] Automatic LCD OFF Transition [Required]**

You can implement a feature to automatically turn the LCD OFF when there are no button inputs for a specified period of time. However, if you do, you must also include an option that will allow the game player to disable this feature, and this feature must initially be set to disabled.

---

#### **6.3.5 [DS] [TWL] Automatic Return from LCD OFF Transition [Required]**

When automatic transition has automatically turned the LCD OFF, ensure that any button press will immediately turn the LCD ON.

Optionally, Touch Screen input may also turn the LCD ON.

### **6.4 Microphone**

---

#### **6.4.1 [DS] [TWL] Cautions When Implementing Microphone Power Control [Required]**

Because it takes up to 3 seconds for microphone circuitry operation to stabilize after the power to the microphone is turned on or when moving from Sleep Mode or LCD OFF state to Active Mode, discard the microphone sampling results from this period without using them. (There is no need to stop sampling.)

However, if leaving the microphone off for 3 seconds after recovering from Sleep Mode or LCD OFF causes problems due to game specifications, use the backlight-off state when the system is closed.

---

#### **6.4.2 [DS] [TWL] Avoiding Frequent ON/OFF [Information]**

Turn on the power to the microphone before a scene where the microphone is actually used and leave it on during that scene. By avoiding frequent microphone ON/OFF transitions, it is possible to reduce situations where the user has to wait for the microphone to be enabled.

### **6.5 Backlight**

---

#### **6.5.1 [DS] [TWL] Initial Backlight State [Information]**

When the system's power is turned on, the backlight is on for both screens.

In the launcher, the backlight can be turned on or off when using a DS, and the brightness of the backlight can be specified when using a DS Lite system or a TWL system. However, that setting cannot



be determined from the application. When the game starts, the backlight status remains the same as that set in the launcher.

### 6.5.2 [DS] [TWL] Automatically Switching the Backlight On and Off **[Required]**

Do not automatically switch the backlight on and off except in the one of the following cases.

- When one of the screens is not being used, the backlight for that screen can be turned off.
- When the screen saver is running and the game player is not performing any operations, you can save power by temporarily turning the backlight off and turning it on as soon as any button is pressed.
- When the system is closed, you can turn off the backlight.

### 6.5.3 [DS] [TWL] Do Not Allow Game Player to Turn Backlight Off **[Required]**

Do not give the game player a way of turning off the backlight, except when the system is closed.

## 6.6 Encouraging Power Conservation

### 6.6.1 [DS] [TWL] Power Conservation When the System Is Closed **[Required]**

When the system is closed, transition to one of the following states. In doing so, place the system into the state that maximizes power conservation as much as possible without causing problems.

For example, you can use Sleep Mode most of the time. However, when DS communication is active, you can use LCD OFF.

- Transition to Sleep Mode (extremely large power conservation)
- Transition to LCD OFF state and turn off unnecessary modules individually (moderate power conservation)
- Turn the backlight off (small power conservation)

Table 6-1 shows the comparative battery lives for each state when the battery is fully charged (DS only).

**Table 6-1 Battery Life Depending on the Power Conservation State**

State	Approximate Battery Life	Comment
Sleep Mode	2 weeks	
LCD OFF State	Approximately 18 hours	Changes according to the state of the other modules
Backlight OFF	Approximately 12 hours	

### 6.6.2 [DS] [TWL] Power Conservation When the System Is Opened **[Recommended]**

Power management for each module can be modified. It is recommended that power to unused modules be turned off.

## 6.7 System Power-Down and Hardware Reset

### 6.7.1 [DS] [TWL] Prohibition of Automatic System Power-Downs or Hardware Resets **[Required]**

---

Get permission from the game player before turning the power to the system off or before performing a hardware reset (TWL only). Prepare a confirmation screen for the power-off or hardware reset, and allow the player to cancel and return to the game when the player has mistakenly selected either of them.

However, there is no need to allow for cancellation for the cases noted in section 7.6.13 [DS] [TWL] Process for Terminating Children After Ending Download Play [\[Recommended\]](#).

### 6.7.2 [DS] Powering Down of DS During LCD OFF State Prohibited **[Required]**

---

When an application powers down the system, it must be in the LCD ON state. There is no guarantee that the DS will actually power down in the LCD OFF state. In rare instances, the DS can even restart.

With the TWL system, the system will always be powered down if the program attempts to turn the system off regardless of the LCD ON/OFF state.

### 6.7.3 [TWL] Processing When a Shutdown Is Detected **[Information]**

---

To perform some operation in your application upon detecting shutdown (see note below), use the `PM_AppendPreExitCallback` or similar function to register a shutdown operation using a callback function. After the callback function is processed, the SDK turns the LCDs OFF automatically, so there is no need to do any processing for the screen display.

**Note:** Here, "shutdown" means a hardware reset or power-off caused by the user pressing the Power/Reset Button, a forced power-off (pressing and holding the Power Button for approximately 4 seconds, or a shutdown due to a low battery. This guideline item is not applicable to the resets initiated by the application because the required shutdown processing can be completed in advance for such resets.

#### **Supplemental Information**

Between 3.76 and 4.24 seconds are required for a forced power-off.

### 6.7.4 [TWL] Shutdown Processing Duration **[Required]**

---

With the TWL system, holding the Power/Reset Button down for approximately 4 seconds forces a power-off, so make sure that applications can fully shut down within 3 seconds.

When save data is being written or some other task is processing that you know will take a long time, display a message such as "Writing. Do not turn power off." If the power is then turned off during this time, complete the shutdown after this process has finished.

On the TWL system, the intention is that once hardware reset is detected, it is easy to go to the launcher screen. Therefore, make the shutdown process as fast as possible.

#### **Supplemental Information**

Taking the launcher's startup time into consideration, as a rule no more than 5 seconds should elapse from the Power/Reset button input to the transition to the launcher screen.

The time required by the system for this operation will depend on the features used and the system status. The application's shutdown process must be kept to a maximum of 500 milliseconds. The worst-case scenarios for system-side shutdown operations should be 2 seconds for the wireless features and 1 second for operations related to file access in the system NAND memory and SD cards.

If the shutdown process does not complete by the time of forced power-off from holding down the Power button for 4 seconds, be sure to perform any appropriate recovery processing just as with save data because problems such as corruption of data being written are likely to occur.

## 7 DS Wireless Communications

### 7.1 Wireless-Enabled Mode and Wireless-Disabled Mode

#### 7.1.1 [TWL] Wireless-Enabled Mode and Wireless-Disabled Mode [Information]

---

"Wireless-enabled mode" refers to the state in which the feature to receive or transmit wireless signals can be used from a hardware perspective. Even when a system is in wireless-enabled mode, wireless signals are not actually being received or transmitted if DS Wireless Communications (described below) is turned off.

"Wireless-disabled mode" refers to the state in which the feature to receive or transmit wireless signals cannot be used from a hardware perspective. If a system is in wireless-disabled mode, wireless signals will not be received or transmitted, even if DS Wireless Communications (described below) is turned on.

Wireless mode can only be switched between enabled and disabled from System Settings.

### 7.2 Three States of DS Wireless Communications

#### 7.2.1 [DS] [TWL] DS Wireless Communications ON State [Information]

---

When DS Wireless Communications is on, wireless signals can be or are currently being received and transmitted by the program. Specifically, the DS Wireless Communications ON State is the period from when `WM_Enable` is run while in the DS Wireless Communications READY state to when `WM_Disable` is run.

With the TWL system, if it is in wireless-disabled mode, wireless signals will not be received or transmitted, even if DS Wireless Communications is on.

With the Nintendo DS or Nintendo DS Lite system, if DS Wireless Communications is on, the system's power indicator LED will blink at a variable speed. The power indicator LED of the TWL system is not affected by whether DS Wireless Communications is on or off. Instead, the wireless indicator LED will blink when wireless signals are being sent.

#### 7.2.2 [DS] [TWL] DS Wireless Communications Receive-Only State [Information]

---

The "receive-only" state refers to the state added in NITRO-SDK version 4.2 in which wireless signals can only be received.

Specifically, the DS Wireless Communications Receive-Only state is the period from when `WM_EnableForListening` is run while in the DS Wireless Communications READY state to when `WM_Disable` is run.

The only difference between this state and the DS Wireless Communications ON state is that wireless signals cannot be sent. There is no difference in the power consumption related to receiving data.

With the TWL system, if it is in wireless-disabled mode, wireless signals will not be received, even if DS Wireless Communications is on.

#### 7.2.3 [DS] [TWL] DS Wireless Communications OFF State [Information]

---

When DS Wireless Communications is off, wireless signals cannot be received or transmitted. Specifically, this is the period before `WM_Enable` is run or after `WM_Disable` is run.

With the Nintendo DS or Nintendo DS Lite systems, if DS Wireless Communications is off, the system's power indicator LED will either be steadily lit (when in Active Mode or the LCD is off), or will blink slowly (when in Sleep Mode). The power indicator LED of the TWL system is not affected by whether DS Wireless Communications is on or off. Furthermore, there is no separate LED for distinguishing between the on and off states.

## 7.3 DS Wireless Communications ON/OFF

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### Supplemental Information

The items in section 7.3 DS Wireless Communications ON/OFF are guidelines for preventing wireless signal emissions without the user's knowledge in places such as airplanes and hospitals.

In the TWL system, the user selects to enable or disable the wireless feature, and the system LED status makes this clear. For this reason, compliance with section 7.3 is not required for TWL-exclusive software or when operating TWL-enhanced software on a TWL system.

**Note:** However, sections 7.3.4 and 7.3.8 specifically target TWL, and items related to TWL are included in sections 7.3.5 and 7.3.7 as well.

### 7.3.1 [DS] State Immediately After Game Startup **[Required]**

---

DS Wireless Communications must not be turned on automatically by calling the `WM_Enable` function from the initialization process when a DS game is started. However, DS Wireless Communications can be turned on automatically, but only for when the program for the DS Download Play child device requires DS Wireless Communications immediately after the download completes (for example, games that require additional downloads or games that can only be played when networked). DS Wireless Communications must not be turned on automatically when the program for the DS Download Play child device does not require DS Wireless Communications immediately after the download completes (for example, for games that have modes for single game players).

### 7.3.2 [DS] DS Wireless Communications ON State **[Required]**

---

Turn DS Wireless Communications on only when the game player explicitly selects "Use DS Wireless Communications." For example, display a message such as "Do you want to use DS wireless communications?" in advance and turn on DS Wireless Communications after the player agrees.

DS Wireless Communications may be turned off automatically according to the situation, but you must reconfirm with the game player before turning DS Wireless Communications on again.

For example, when DS Wireless Communications returns to an OFF state from an ON state, if execution returns to the menu screen prior to the one where the DS Wireless Icon (or user confirmation message) is displayed, when wireless communications are turned on you can always go through the menu where the DS Wireless Icon (or user confirmation message) is displayed.

### 7.3.3 [DS] Icon Display When Enabling DS Wireless Communication **[Required]**

---

You can use the designated DS Wireless Icon in conjunction with menu options, instead of text, to allow a game player to select and enable DS Wireless Communications. The DS Wireless Icon is included in TWL-SDK (`$TWLSDK/data/wl_icons/`). See Figure 7-1.

**Figure 7-1 DS Wireless Icon**

If you are using the DS Wireless Icon, be aware of the following.

**Do Not Alter the DS Wireless Icon**

Use of this icon always indicates enabling DS Wireless Communications. When using the icon, maintain the original size, pattern, and coloring of the icon. If the icon appears incorrectly as a menu option, the player might not understand its purpose and may assume that the application began sending a wireless signal on its own.

If the associated menu option is not selected and the game player can adequately see that the icon is present, its role will sufficiently avoid confusion for the game player.

Sample usage of the DS Wireless Icon is shown in Figure 7-2. In this case, if "2 Player Start" or "4 Player Start" is selected, DS Wireless Communications is turned on, and the appropriate game mode starts. The power light also starts blinking at a variable rate on the Nintendo DS system. On TWL, the wireless indicator LED starts blinking when wireless signals are sent.

**Figure 7-2 Sample Use of the DS Wireless Icon**

### **7.3.4 [TWL] Displaying the Wireless Feature Icon on the Launcher Screen [Required]**




If your application requires the use of the wireless feature, and if you do not want users to play the application when the wireless feature is turned off (because playing would be meaningless), configure to display the wireless feature icon on the launcher screen.

When the icon is configured to be displayed, and the TWL system is set to a wireless off mode, the application will not startup.

If configured to display the icon, it is acceptable for the application to consider that the user has agreed to use the wireless feature at the time of startup, and turn on the DS wireless communication feature. However, when configured to display the icon in TWL-enhanced applications, the icon is not displayed in Nintendo DS system launchers. Therefore, do not turn on the wireless communication feature when the application is detected to be running on the Nintendo DS system, but instead get the user's consent by other means and then turn the wireless communications on.

Note that there are two types of icons: one for wireless communications and the other for online communications. Either may be set in the RSF file or with the Master Editor. Because the two types of icons related to the wireless feature cannot be set at the same time, set according to the table below.

**Table 7-1 Use of Wireless Feature Icons on the Launcher Screen**

	Applications Using MP Communications Only	Applications Using Wi-Fi Communications Only	Applications Using Both MP and Wi-Fi Communications
Type of icon to display on the Launcher screen	 DS Wireless Icon	 Nintendo Wi-Fi Connection Icon	 Nintendo Wi-Fi Connection Icon

### 7.3.5 [DS] [TWL] Transitioning from Active Mode to Sleep Mode [Information]

Because the power state in Sleep Mode differs from that of Active Mode, be sure to turn off DS Wireless Communications when switching to Sleep Mode, as discussed in section 6.2.4 [DS] [TWL] Mode Transitions During Communication **[Required]**.

### 7.3.6 [DS] Transitioning from Sleep Mode to Active Mode [Information]

When returning to Active Mode, turn on DS Wireless Communications after getting permission from the game player, as indicated in section 7.3.2 [DS] DS Wireless Communications ON State **[Required]**. (Do not turn on DS Wireless Communications automatically after returning to Active Mode.)

When turning on the DS Wireless Communications Receive-Only state, this restriction does not apply because the applicable guideline is section 7.5.1 [DS] [TWL] Receive-Only Mode ON **[Required]**.

### 7.3.7 [DS] [TWL] Error Processing During the Initialization of DS Wireless Networking **[Recommended]**

Be sure to determine the processing results of the WM initialization functions (`WM_Init`, `WM_Enable`, and `WM_PowerOn`) and perform error processing. When the processing result passed to the WM initialization function callback functions is anything other than `WM_ERRCODE_SUCCESS`, do not perform any wireless networking processing. Also make sure that the game process can continue after displaying "DS Wireless Communications is not available."

### 7.3.8 [TWL] Support for Wireless-Disabled Mode **[Recommended]**

When the TWL system is in the wireless-disabled mode, games that use DS Wireless Communications should display a message somewhere in the game to tell the user to return to the launcher to turn on wireless-enabled mode for wireless communication. (Example message: "Wireless communication is turned off. Please turn it on in System Settings.")

However, such messages do not have to be displayed to the user if it would be inconvenient to display them as DS Wireless Communications is in the receive-only state.

### Supplemental Information

This is recommended because the TWL system displays wireless ON or OFF status with an LED. This only applies to TWL because, due to specifications, Nintendo DS-only games cannot get the TWL wireless ON or OFF mode.

## 7.4 Reception Strength Icon

### 7.4.1 [DS] [TWL] Reception Strength Icon **[Required]**

When the DS Wireless Communications connection is made (referred to as "linked," below), show the signal strength of the reception data using the Reception Strength Icons below. (The display method and location of the icons are not regulated.)

The Reception Strength Icons are included in TWL-SDK (\$TwlSDK/data/wl\_icons/).

**Table 7-2 Reception Strength Icons**

Reception Signal Strength	Icon on Black Background	Icon on White Background
LEVEL 3		
LEVEL 2		
LEVEL 1		
LEVEL 0		

Select either the black background or the white background icons, based on appearance in the given scene. Do not mix their usage in the same scene.



However, if you know in advance that the DS Wireless Communications link status will be extremely brief (as for chance encounters), it is acceptable not to display the Reception Strength Icons.

Hiding the Reception Strength Icons or showing a false icon may be allowed for special reasons, including not wanting the game player to be notified of changes in the signal strength (even when not in chance encounter communications), or in situations when the player would not be upset if the signal strength was not displayed (for example, when a movie is playing, or during an ending scene). In these cases, contact [support@noa.com](mailto:support@noa.com) before proceeding.

---

#### **7.4.2 [DS] [TWL] Prohibition of Changing the Reception Strength Icon [Required]**

Changing the size, dot pattern, or color scheme of the icons is prohibited. However, you are permitted to modify the colors slightly as long as the green, yellow, and red colors are distinguishable.

### **7.5 DS Wireless Communications Receive-Only Mode ON/OFF**

---

#### **7.5.1 [DS] [TWL] Receive-Only Mode ON [Required]**

In receive-only mode, it is guaranteed that wireless signals will not be sent, so unlike the “DS Wireless Communications ON State,” the receive-only state can be enabled without the player’s confirmation.

However, if the receive-only state is enabled without the player’s confirmation, do not perform any of the actions shown below, as they indicate the “DS Wireless Communications ON State.”

- Blinking of the power indicator LED
- Displaying the reception strength icons
- Displaying other screens that indicate that wireless communications are underway

If the receive-only state is enabled after the player’s confirmation, be sure to follow the guidelines below.

- Sections 7.3.2 [DS] DS Wireless Communications ON State [Required] and 7.3.3 [DS] Icon Display When Enabling DS Wireless Communication [Required]
- Section 7.4 Reception Strength Icon

### **7.6 Other**

---

#### **7.6.1 [DS] [TWL] Library Use Compliance [Required]**

When using DS Wireless Communications, use only the libraries supplied by Nintendo.

---

#### **7.6.2 [DS] [TWL] Using MAC Addresses [Required]**

There are no guarantees regarding MAC addresses other than the fact that they are unique to each system. Therefore, although MAC addresses can be used as a means of identifying a communication partner, do not use them for any other purpose. For example, avoid using a MAC address to determine whether a networking partner is a Nintendo DS or TWL system.

---

#### **7.6.3 [DS] [TWL] Message Display for Broken Links [Required]**

When gameplay becomes difficult due to a broken link, display a warning message such as "Communication Error" when the broken link is detected with TWL-SDK’s wireless API.

For example, if several Nintendo DS or TWL systems are linked and some child devices become disconnected, a warning message must be displayed on those child devices that gameplay cannot continue. However, the warning message is not required for those child or parent devices that are still linked and not greatly affected by the disconnection.

Some exceptions are granted. The message does not need to be displayed for special reasons, such as not wanting to notify the game player of the lost link, implying that DS Wireless Communications had occurred. If you are planning such a use, contact [support@noa.com](mailto:support@noa.com) before proceeding.

#### 7.6.4 [DS] [TWL] Data Batch Size for MP Communications [Recommended]

We recommend that the total communication time for MP communication between the parent and all the children be limited to 5600  $\mu$ s or less. Shorter times result in better communication results. Larger data sizes can also cause interference and problems with wireless connectivity, data reception, simultaneous data transmission, and power consumption.

To calculate total communication time, see the Wireless Communications Time Calculation Sheet in Charts and Information located in the Wireless Manager (WM) section of the *TWL-SDK Function Reference Manual*.

The following are sample calculations.

- MP communication every sixtieth of a second with one parent per 15 children  
Parent: 128 bytes or less  
Child: 16 bytes or less
- Data sharing with one parent device/15 child devices  
Data to be shared: 444 bytes  
Parent: 64 bytes  
Child: 8 bytes

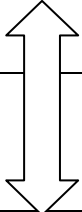
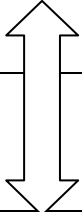
#### 7.6.5 [DS] [TWL] Distributed Processing [Recommended]

We recommend that processing be distributed with data sharing to decrease the communication data size.

#### 7.6.6 [DS] [TWL] Power Consumption Control [Recommended]

To reduce power consumption, put the system in a state that consumes less power (as shown in Table 7-3).

**Table 7-3 Power Consumption by State**

Power Consumed	State (Definitions from Nintendo Libraries)	
	SCAN	(WM_STATE_SCAN)
	CHILD	(WM_STATE_CHILD)
	DCF_CHILD	(WM_STATE_DCF_CHILD)
	PARENT	(WM_STATE_PARENT)
	MP_PARENT	(WM_STATE_MP_PARENT)
	MP_CHILD	(WM_STATE_MP_CHILD)
	IDLE	(WM_STATE_IDLE)
Less	STOP	(WM_STATE_STOP)
	READY	(WM_STATE_READY)

### 7.6.7 [DS] [TWL] GGID Application **[Required]**

Use only the GGID number provided for each game title by Nintendo of America Inc. To get your official GGID, contact [submissions@noa.nintendo.com](mailto:submissions@noa.nintendo.com).

**Note:** Do not use numbers that are not provided by Nintendo.

Private GGIDs can be used when testing or in the early stages of development. However, private GGIDs are allocated for testing, not for individual game titles. Consequently, problems may occur when connecting from another test application that uses a private GGID.

Private GGID: 0x003FFF00 – 0x003FFFFF (256 GGIDs)

### 7.6.8 [DS] [TWL] TGID Uses **[Required]**

To avoid mistakenly establishing a connection with the old connection, ensure that a DS Wireless Communications parent device is assigned a different TGID value each time. Even after the power of the unit is reset, the TGID value must be different than the previous value used before the reset took place.

Specifically, use the `WM_GetNextTgid` function in TWL-SDK to get a different value at each invocation.

For DS Download Play, it is possible to configure a different TGID each time without handling the TGID in the application by specifying `MB_TGID_AUTO` for the `tgid` argument of the `MB_Init` function.

### 7.6.9 [DS] [TWL] Prohibition of Connecting to Other Publishers' Software **[Required]**

Games are prohibited from connecting to games produced by other publishers without the approval of Nintendo.

If you are planning such use, contact [support@noa.com](mailto:support@noa.com) before proceeding.

### 7.6.10 [DS] [TWL] Connection Between Different Remastered Versions **[Required]**

Ensure that the software connects and communicates with different remastered versions of the same software without any trouble.

### 7.6.11 [DS] [TWL] When Too Many Game Players Attempt to Connect **[Required]**

When more child devices attempt to connect than is allowed by the game, ensure there are no communication problems between a parent and the allowable number of children.

Also, notify the game players (on the child devices that are not allowed to connect) that the connection failed.

**Note:** There is no need to inform players in chance encounter communications.

### 7.6.12 [DS] [TWL] Access to Game Cards During Download Play **[Required]**

In principle, access to any area of a DS Game Card produced by another publisher is prohibited.

Allow access only to the backup memory region of a DS Game Card produced by your company. If you plan to access any region other than backup memory, contact [support@noa.com](mailto:support@noa.com) before proceeding.

To determine whether a DS Game Card was produced by your company, refer to the ROM internal registration information stored in main memory. Use the TWL-SDK's `CARD_GetRomHeader` function to get the address of the ROM internal registration information.

**Note:** Because games that are distributed using DS Download Play are DS software titles, they cannot access system NAND memory or SD Memory Cards.

### 7.6.13 [DS] [TWL] Process for Terminating Children After Ending Download Play [Recommended]

---

For DS software and TWL-enhanced software running on a DS system, when a Download Play child device does not perform independent processes after Download Play terminates normally, display a message that indicates to the game player that the power will be turned off. Turn the power off after the game player confirms. For TWL-enhanced software running on the TWL system and TWL-exclusive software, a hardware reset is recommended instead of turning off the power, but the same type of message should be displayed, and the player's consent should be obtained.

### 7.6.14 [DS] [TWL] Usable Wireless Channels [Required]

---

In local game mode, use one of the channels returned by the `WM_GetAllowedChannel` function. For example, if the `WM_GetAllowedChannel` function returns Channels 1, 7, and 13, use Channel 1, 7, or 13. If the `WM_GetAllowedChannel` function returns 0, DS Wireless Communications is not possible because there are no available channels.

### 7.6.15 [DS] [TWL] Prohibition of Using Wireless Channels That Are Always Fixed [Required]

---

#### 7.6.15.1 Parent Devices for DS Wireless Communication

When selecting the actual channel to use from the allowed wireless channels, specifications that always use, or always do not use, specific channels are prohibited.

For more information on how to select the actual channel to use from the allowed wireless channels, see section 7.6.16 [DS] [TWL] Check the Wireless State Before Beginning Parent Device Operation [Recommended].

#### 7.6.15.2 Child Devices for DS Wireless Communication

When scanning for parent devices, scan all allowed wireless channels. Avoid specifications that scan or do not scan only specific channels.

### 7.6.16 [DS] [TWL] Check the Wireless State Before Beginning Parent Device Operation [Recommended]

---

When selecting a channel from the allowed wireless channels, check the wireless states of the channels, using `WM_MeasureChannel`. The game should select the least occupied channel for the wireless link.

### 7.6.17 [DS] [TWL] Update Display for Parent Information [Recommended]

---

When the parent device list is displayed on the child device, continuously check the parent information. Update the parent device list that is displayed whenever a change is made. Do not continue to display a parent device that is no longer accepting child devices.

### 7.6.18 [DS] [TWL] Prohibition of Downloading Programs [Required]

---

Applications (ARM core native code) can be downloaded only with DS Download Play. No other wireless downloading of programs or running of downloaded programs is permitted. However, when the followings are met, the use of wireless overlays is allowed.

#### 7.6.18.1 Use Prescribed Library Functions

Use the library functions listed in Table 7-4. These functions are available in TWL-SDK.

**Table 7-4 Overlay Functions**

Function Name	Conditions for Use
FS_AttachOverlayTable	Always
FS_LoadOverlay	When performing synchronous load processes
FS_LoadOverlayInfo	When performing asynchronous load processes
FS_LoadOverlayImage or FSLoadOverlayImageAsync	
FS_StartOverlay	

Use the `NITRO_DIGEST` build option or specify the `-a` option when using the `compstatic.exe` tool because validity is determined in the SDK.

#### 7.6.18.2 Download Overlay from Same Parent Device

The overlay module must be downloaded from the same parent device as that from which the static module was downloaded.

The parent device can easily be identified by its MAC address.

#### 7.6.19 [DS] [TWL] Parent Data Location During Clone Boot **[Required]**

When performing clone boot, the application data located in `0x5000` to `0x6FFF` of the DS Game Card is treated as parent-specific data. To maintain security, place application data in this region that is used only by the parent and not by the children.

#### 7.6.20 [DS] [TWL] Prohibition of Notification of Data Distribution Support by DS Download Stations, or Through Other Means **[Recommended]**

When data distribution is supported by a DS Download Station, or through other means, do not inform the user about this in any printed material packaged with the software. The user should also not be informed in pre-packaged printed material that there are elements, such as items and events, that can only be obtained through data distributed by a DS Download Station or through other means.

To explain, depending on the time of purchase, it is possible that the distribution may have already ended or that it will cease after the software is purchased.

**Note:** “DS Download Station” refers to equipment that Nintendo has installed in retail outlets and other locations that provide various Nintendo DS services. They are known as “DS Stations” in Japan and Korea, “DS Download Stations” in the USA and Europe, and “Nintendo Wi-Fi Connection Hotspots” in Australia. This includes Nintendo Zone locations as well.

## 7.7 PictoChat Search

#### 7.7.1 [DS] [TWL] Starting PictoChat Search **[Required]**

Perform PictoChat Search only when the game player has explicitly selected “Search for PictoChat.”

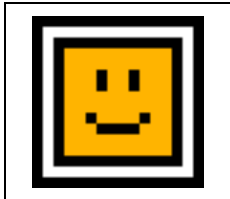
When starting PictoChat search while DS Wireless Communications is off, display the message and icon described in section 7.3.2 [DS] DS Wireless Communications ON State **[Required]**.

### 7.7.2 [DS] [TWL] Chat Icon Display **[Required]**

---

When PictoChat Search finds a PictoChat room, display the chat icon in Figure 7-3 somewhere on the screen. The icon is provided in TWL-SDK, located in the `$TwlSDK/data/cht_data/` directory.

**Figure 7-3 Chat Icon**



### 7.7.3 [DS] [TWL] Chat Icon Modification **[Required]**

---

The chat icon design (that is, dot pattern, color palette, brightness, or size) may not be modified. However, creating minor visual effects that do not modify the design (for example, blinking or shaking the icon) is permissible.

In addition, when a PictoChat room is not found, the icon can be displayed to indicate that fact in ways that will not confuse the game player, such as including a grayed-out display, a display of smaller size, or a darkened display.

### 7.7.4 [DS] [TWL] Chat Sound Playback **[Required]**

---

If playing a sound effect when the icon is displayed, use the customized sound included in TWL-SDK. The file is located in the `$TwlSDK/data/cht_data/PictoChatSearcherSound/` directory.

The icon can also be displayed without any sound.

### 7.7.5 [DS] [TWL] Prohibition of Consecutive Searches **[Recommended]**

---

Do not use PictoChat Search continuously (for example, in every frame) except in special circumstances.

Each time PictoChat Search is used, the parent device must be scanned in advance. Because the wireless circuitry in the SCAN state uses more power than in any other state, continuous scans of the parent device rapidly consumes the remaining power in the Nintendo DS battery. Therefore, we strongly recommend entering the STOP state for a fixed waiting period to reduce power consumption.

For reference, *Yoshi Touch & Go* has a wait period of 7.6 seconds (456 frames) after scanning for 2.4 seconds (144 frames).

### 7.7.6 [DS] [TWL] Information Disclosure **[Information]**

---

You can decide whether each game references and uses the PictoChat information obtained from PictoChat Search in the game. There are no restrictions on using referenced data.

### 7.7.7 [DS] [TWL] Signal Strength Icon Display **[Information]**

---

Signal strength icons do not need to be displayed because PictoChat search can be used only before DS Wireless Communications is linked. However, a signal strength icon can be displayed using the signal strength for the PictoChat room that is found.

### 7.7.8 [DS] [TWL] Touching the Chat Icon **[Information]**

---

The chat icon must be displayed, but it does not need to function as a button.

For example, although touching the chat icon in *Yoshi Touch & Go* causes a special window to appear, this feature is not required for all games.

### **7.7.9 [DS] [TWL] Power-Down Process When Transitioning to PictoChat [Information]**

---

When implementing a power-down process before transitioning to PictoChat, follow the guidelines in section 6.7.1 [DS] [TWL] Prohibition of Automatic System Power-Downs or Hardware Resets **[Required]**.

The following cautions also apply.

- Do not forcibly power-down without confirmation from the game player.
- If the game player chooses to power-down by mistake, let the game player resume the game by providing a cancel option on the Power-Down Confirmation Screen.

## **7.8 Chance Encounter Mode**

### **7.8.1 [DS] [TWL] Auto-Save for Chance Encounter Mode Communication [Recommended]**

---

If your game auto-saves while in the Chance Encounter Mode (data is transmitted while the Nintendo DS system is closed), display a message immediately before entering the mode informing the game player that “Auto-save will be performed.” and “The data won’t be saved if the power is turned off during auto-save or if the Game Card is removed.”

## **7.9 Communication Among Different Device Types**

### **7.9.1 [TWL] Communication Between Nintendo DS Software and TWL-Exclusive or TWL-Enhanced Software**

---

When developing software that allows TWL-exclusive or TWL-enhanced software to communicate with Nintendo DS software, be careful about the region information (game code) of the Nintendo DS software with which the Nintendo DSi software will be communicating.

Because Nintendo DS systems do not use the system region as a means of restricting which software can be run, business decisions may sometimes dictate that applications with different regions than the system may be sold in a given market.

#### **Supplemental Information**

For example, European-region Nintendo DS systems are sold in Australia, and typically the European-region version of a given Nintendo DS title is sold in Australia. However, there may be cases in which the North American version of a Nintendo DS title is sold in Australia.

If you fail to take this into account and implement communication functionality into a TWL-exclusive or TWL-enhanced software title that can only communicate with Nintendo DS software for the same region, communication between them may not be possible in certain regions.

## **7.10[DS] [TWL] Displaying the North American ESRB Online Rating Notice for Nintendo Wi-Fi Connection-Compatible Software**

### **[Required]**

---

If Nintendo Wi-Fi Connection-compatible software released in the U.S. market has unrestricted communication between players during a network connection and/or allows players to send and receive elements (player-generated data, for example) not rated by ESRB, it will be noted as a requirement on the “ESRB Rating Certificate” to display the ESRB Online Rating Notice. If the display of the notice is required by ESRB, see the ESRB Web site (<https://www.esrb.org/>) to confirm the detailed ESRB requirements (see the *ESRB ARC Manual*) and display the notice.



## 8 Other

### 8.1 Main Memory

#### 8.1.1 [DS] [TWL] Main Memory Initialization **[Required]**

The content of main memory when a game starts is uncertain, so do not use uninitialized main memory assuming that it has specific initial values.

#### 8.1.2 [DS] [TWL] Main Memory Protection **[Required]**

Do not write to the following specified regions of main memory when starting a game because data cannot be reloaded to these regions during gameplay. See Table 8-1 for details.

**Table 8-1 Regions That Cannot Be Reloaded During Gameplay**

Region Name	Address	Size
Secure region	0x02000000 – 0x02003FFF	16 KB
DS setup data region	0x027FFC80 – 0x027FFDFF	384 B
ROM registration data region	0x027FFE00 – 0x027FFF7F	384 B

**Table 8-2 Software That Supports TWL**

Region Name	Address	Size
DS secure region	0x00004000 – 0x00007FFF	16 KB
TWL secure region	TWL_ROM_EX + 0x3000 – TWL_ROM_EX + 0x6FFF	16 KB
System settings data region	DS system: 0x027FFC80 – 0x027FFDFF	384 B
	TWL system: 0x02FFFC80 – 0x02FFFDFF	
ROM registration data region	DS system: 0x027FFE00 – 0x027FFF7F	384 B
	TWL system: 0x02FFFE00 – 0x02FFFF7F 0x02FFE000 – 0x02FFEFFF	384 B + 4 KB

**Note:** TWL\_ROM\_EX is the starting ROM offset of the TWL extended region. When you run `Makerom`, its exact size is determined based on the size of the game region.

### 8.2 Display of Legal Rights

#### 8.2.1 [DS] [TWL] Compliance with Legal Rights Display **[Required]**

A separate indication of legal rights is required for some of the library tools provided by Nintendo. Use the specified method for display when using a library tool or other item requiring a legal rights display.

Note that the legal display can be shown in various formats, including display during game startup, in the instruction booklet, and on the packaging. For details, see the instructions for the library tools.

## **8.2.2 [DS] [TWL] Display of License for Licensee Titles Outside Japan [Required]**

---

All licensee titles created for use outside Japan must display "Licensed by Nintendo" on the screen before the game begins. The basic requirement is that the message be displayed before the game begins and for a duration of at least one second. While the message is being displayed, no input device operation should be accepted.

## **8.3 Health and Safety**

### **8.3.1 [DS] [TWL] Prohibition of Health and Safety Warning Screen Display by Application [Required]**

---

The DS and TWL systems display the health and safety warning screen when the user system starts. This onscreen warning directs the consumer to the Nintendo DS Health & Safety Precautions Booklet. Therefore, do not display any other warning message on the application side.

## **8.4 Image Methods for Photosensitivity**

### **8.4.1 [DS] [TWL] About Photosensitivity and These Guidelines [Information]**

---

These guidelines are intended to be used in the development of video games for the Nintendo DS platform. Unlike films and television programs, which produce only one sequence of images each time they are played, one video game can produce an infinite sequence of images. This is because video games are interactive, so that each time a game is played, a different sequence of pictures and images is displayed, depending on the choices and inputs made by the game's player or (in the case of multi-player games) players. In addition, the luminance of images displayed in three-dimensional games is not simply those of the video game artist's original image but the result of the game's programming processes, which render the image in a three-dimensional form in a three-dimensional space, with variations of light, shadow, distance, orientation and player perspective. These variables also are affected by choices made by the individual player.

Because of these infinite variations that are possible within a single game, it may be possible with many games that certain player inputs cause screen imagery that exceed the suggested limits described below. Try to design games that comply with the limits when the games are played with normal gaming strategies and inputs, with the recognition that it may still be possible for player inputs to cause sequences of images that may exceed the suggested limits, particularly if the gameplay is idiosyncratic or counter-intuitive. Compliance with these guidelines or with any other guidelines that have been or will be developed may reduce the incidence of photosensitive seizures, but it will not eliminate them or eliminate seizures that occur during video gameplay from causes other than the visual content of the games.

These guidelines attempt to take what medical science has learned about the images that can trigger photosensitive seizures in susceptible individuals and, in a few paragraphs, apply it to the infinite variety of imagery produced by modern video game technology. Medical research in this area is still developing, and the particular susceptibilities of photosensitive persons vary widely from individual to individual.

As the developers of other guidelines have recognized, it is impossible to craft guidelines that eliminate all risk of seizures, and the measures taken should be proportionate to the risks involved and should not stifle developers' creativity, imagination, or freedom of expression. It may be possible that a game, even though complying with the guidelines, may produce a problematic sequence. Alternatively, a sequence out of compliance with the guidelines may not be problematic in its context. It is therefore

recommended that all games, before final release, be reviewed by one or more persons knowledgeable about photosensitivity, who can check for potentially problematic sequences. It is also recommended that such persons review decisions to deviate from the guidelines when that may be desirable for the artistic or creative imperatives of a game.

These guidelines use the following lighting technology terms.

*Luminance* is a quantifiable measure of the observed brightness of an object—in this case, of a video screen.

*Nits* is a shorthand name for candelas per square meter, the metric system's measurement unit for luminance. (A candela is a measure of the candle power or angular density of light from a source).

A *photometer* is a device that measures the luminance of an object. A photometer with CIEEE characteristics is calibrated to match the response to various color spectra of the average human eye.

The *RGB* value of a color in a video display is a three-number representation of the intensities of, respectively, the red, green and blue elements of the display that combine to form the color. Each value is a number from 0 to 63. Consequently, an RGB value of (0,0,0) is black; and RGB value of (63,63,63) is white; and an RGB value of (63,0,0) is pure red.

[A video with sample footage](#) has been prepared to illustrate and supplement the guidelines. When a portion of the guidelines is illustrated by the video, the guidelines include a reference to the relevant section of the video. The video provides supplemental illustrations and is not an essential part of the guidelines, which can be used without the video.

---

#### 8.4.2 [DS] [TWL] Restrictions on Flashing Images and Lights [Recommended]

---

Do not use a sequence of images that does all of the following.

- Flashes so that the change in luminance of the flash exceeds 20 nits (candelas/square meter)
- Occupies more than 1/4 of either screen or more than 1/8 of the combined areas of both screens
- Has more than three flashes occurring in any one-second period

The sample video contains examples of luminance changes of different magnitudes in [sections 1 \(1\), 1 \(2\), and 1 \(3\)](#).

A flash is a pair of opposing changes in luminance: that is, an increase in luminance followed by a decrease or a decrease followed by an increase. If the luminance measurements of successive flashes over time are plotted using x- and y-coordinates ( $x$  = time;  $y$  = luminance), the shape of the resulting plot appears in profile as alternating peaks (frames of localized maximum brightness) and valleys (frames of localized minimum brightness). Flashes should be evaluated for the change in luminance between adjacent peaks and valleys. No more than three of these peaks (or, alternatively, no more than three valleys) should occur in any 60 consecutive frames.

Screen luminance can be measured or calculated as described in section 8.4.6 [DS] [TWL] Screen Brightness Calculations [Information].

---

#### 8.4.3 [DS] [TWL] Restrictions on Flashing Saturated Red Colors [Recommended]

---

Do not use a sequence of images with all of the following:

- The images produce flashes (regardless of the change in luminance of the flashes).
- One of the images contains saturated red.
- The saturated red occupies more than one-eighth of either screen or more than one-sixteenth of the combined areas of both screens.

- More than three flashes occur in any 1-second period.

The sample video contains examples of red flashing in [sections 2 \(1\), 2 \(2\), and 2 \(3\)](#).

Saturated red is a color whose RGB value for red is greater than 85 percent of the sum of the color's RGB values.

#### 8.4.4 [DS] [TWL] Restrictions on Image Reversals [\[Recommended\]](#)

If the luminance of the elements of an image that occupies more than one-fourth of either screen, or more than one-eighth of the combined areas of both screens, are switched or interchanged (for example, switching between the negative and positive of an image or black and white images in which the black turns white and the white turns black, as in Figure 8-1), the changes in luminance should not exceed 20 nits or occur at a rate faster than that allowed for flashing in section 8.4.2 [DS] [TWL] Restrictions on Flashing Images and Lights [\[Recommended\]](#).

**Figure 8-1 Black and White Reversal**



The sample video contains examples of images with switching luminance in [sections 3 \(1\) and 3 \(2\)](#).

#### 8.4.5 [DS] [TWL] Restrictions on Regular Patterns [\[Recommended\]](#)

Do not use an image that does all of the following.

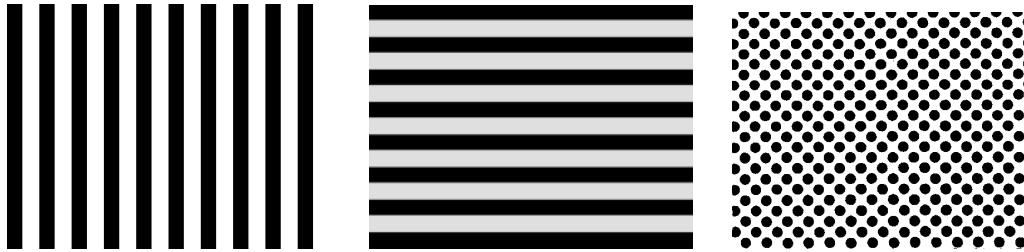
- Consists of striped patterns composed of parallel lines or dots or other regular elements with distinct edges, such as the samples below
- Has high contrast between the bright and dark elements of the pattern, as defined below
- Occupies more than one-fourth of either screen or more than one-eighth of the combined areas of both screens
- Has more than five light–dark pairs of stripes in any orientation

An image has high contrast when it meets either of the following conditions.

- The luminance of the brighter element of the pattern is 30 nits or more, and its contrast is greater than 40 percent. Contrast is  $(L1-L2)/(L1+L2)$ , where  $L1$  is the luminance of the brighter element of the pattern and  $L2$  is the luminance of the darker.
- The luminance of the brighter element of the pattern is less than 30 nits, and the difference in luminance between the brighter and darker elements ( $L1-L2$ ) is 17 nits or more.

The sample video contains examples of patterns in [sections 4 \(1\), 4 \(2\), 4 \(3\), and 4 \(4\)](#).

The stripes may be parallel or radial, curved or straight, black and white or a combination of colors. Avoid especially stripes that oscillate or flash and moving stripes that change direction. Do not switch the luminance of the lighter and darker stripes (so that the dark become light and vice versa). Striped patterns that flow smoothly across, into, or out of the screen in one direction may be used. Checkerboard patterns and plaids are acceptable.

**Figure 8-2 Stripes and Dots**

#### 8.4.6 [DS] [TWL] Screen Brightness Calculations [Information]

Screen luminance can be measured directly from a DS device or from a CRT monitor emulating a DS game with a hand-held spot photometer with a CIE characteristic designed for making measurements from a television screen. The screen brightness on a Nintendo DSi device can also be calculated from RGB values input to the LCD as indicated in the formula below.

DS Game Cards can also be used in the Nintendo DSi device, so calculations and measurements of screen brightness should assume the brightness values for the Nintendo DSi device because its display is brighter than that of the Nintendo DS or DS Lite devices.

The following equation shows how this is calculated:

$$T_{(RGB)} = 65.1 \times \left( \frac{R}{63} \right)^2 + 165.0 \times \left( \frac{G}{63} \right)^2 + 30.9 \times \left( \frac{B}{63} \right)^2 + 0.5$$

( $T$  = screen brightness (in candelas/ $m^2$ ) when the Nintendo DSi device is set to maximum brightness,  $R$  = level of red gradations,  $G$  = level of green gradations,  $B$  = level of blue gradations). Gradations are indicated as an integer ranging from 0 to 63.

### 8.5 Image Methods

#### 8.5.1 [DS] [TWL] Screen Display Independent of the LCD Sub-Pixel Order [Recommended]

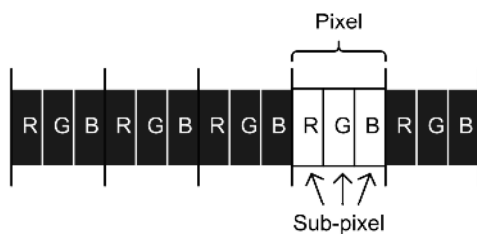
We recommend using a screen display that does not depend on the LCD sub-pixel order.

For the DS, LCD sub-pixels are in R-G-B order (from the left) for the upper screen and in B-G-R order (from the left) for the lower screen. For the DS Lite and the TWL system, both the upper and lower screens use B-G-R. However, these orders may be changed in the future.

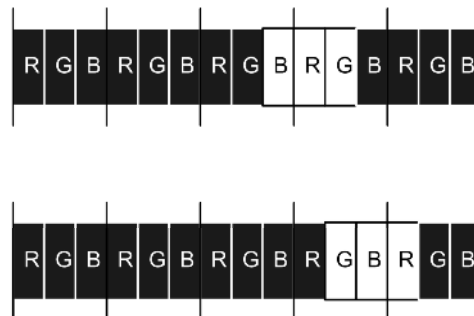
For example, when displaying a one-pixel white point on a black background, if the group of sub-pixels that span the pixel is treated as a single pixel and is displayed as shown on the right of Figure 8-3, that display is dependent on the sub-pixel order.

**Figure 8-3 Example Displays That Depend and Do Not Depend on Sub-Pixel Order**

\* Display that does not depend on the Sub-pixel Order



\* Display that does depend on the Sub-pixel Order



### 8.5.2 [DS] [TWL] Displaying Captured Images **[Required]**

When a 3D image is captured using the display capture feature, the least significant bits of the original RGB=(6,6,6) image data are set to zero so that the resulting image uses RGB=(5,5,5).

Do not alternate between displaying the original image and the captured image because this might cause flickering to occur on certain LCDs.

Consequently, captured images must always be displayed when a 3D image is shown on both the upper and lower screens.

For a sample implementation, see the `Sub_Double3D` demo in TWL-SDK 5.1 and later or NITRO-SDK 4.2 patch plus 6 and later.

## 8.6 Software Reset

### 8.6.1 [DS] [TWL] Software Reset Button Definition **[Required]**

When implementing a software reset function, use only the START + SELECT + L Button + R Button simultaneous combination. Do not use this button combination for any other purpose.

### 8.6.2 [DS] [TWL] Reset During Backup and Communication **[Required]**

When writing to backup memory or system NAND memory, be sure to reset the software only after the backup process has ended. During DS Wireless Communications, reset the software only after halting communications and after performing the procedure that restores the WM library to its pre-initialized state.

(For information on the procedure that restores the WM library to its pre-initialized state, see `WM_End` in the *TWL-SDK Function Reference Manual*.)

### 8.6.3 [DS] [TWL] Prohibit Resets on Child Devices During DS Download Play **[Required]**

The TWL-SDK reset function, `OS_ResetSystem`, cannot be used for child devices during DS Download Play. Use of this function causes the game to halt.

## 8.7 Support for Parental Controls

### 8.7.1 [TWL] Handling Restricted Items [Information]

The TWL system parental control system allows guardians to stop minors from using inappropriate features. Parental Controls settings can be set from the launcher. Games that use features restricted for a TWL system must reflect system settings and carry out feature restrictions. If it is necessary to temporarily unlock Parental Controls during a game or in an application, contact [support@noa.com](mailto:support@noa.com).

#### Supplemental Information

Nintendo's basic policy is that the unlocking of Parental Controls restrictions should be done from the launcher.

It would be user-friendly to unlock items restricted by Parental Controls from within a game. However, this guideline is in place because there are concerns from an operations standpoint (number of PIN retries, range of restrictions to unlock, time period to unlock), and because TWL is likely to be used by an individual. Therefore, we have decided that temporary unlocking has a low level of importance.

### 8.7.2 [TWL] Sending and Receiving Photo Data [Required]

If "Wireless Exchange of Photo Data" is restricted in the Parental Controls settings under System Settings, do not allow any data whose source is image data captured by camera, including photo data, to be sent and received wirelessly. This includes video and images that have been modified with effects. At the same time, provide a display that explains that Parental Controls restrict sending and receiving photographic data, and that users must return to the launcher to disable the restriction.

To check whether exchanging photos wirelessly is restricted, use the `OS_IsRestrictPhotoExchange` function.

### 8.7.3 [TWL] Sending and Receiving Certain User-Generated Content [Required]

If "access to certain user-created content" is restricted in the Parental Controls settings under System Settings, do not allow user-created content to be sent or received when communicating with unspecified parties. At the same time, provide a display that explains that accessing user-created data is restricted by Parental Controls, and that to release controls it is necessary to return to the launcher.

Settings for sending and receiving user-generated content will have the following effects.

**Table 8-3 Settings for Sending and Receiving Some User-Generated Content**

		Communication Type and Target				
		MP Communications	MP Communications with Strangers (Chance Encounter Communication)	Communications Supported by Nintendo Wi-Fi Connection		Communications Not Supported by Nintendo Wi-Fi Connection
				Strangers/Rivals	Friends	
Parental Controls Setting	Restricted	Allowed	Prohibited	Prohibited	Allowed	Prohibited
	Not Restricted	Allowed	Allowed	Prohibited	Allowed	Allowed

If a user can identify the other party by his or her nickname or other such information, and allow (start) communications, this situation is considered as communication with specified parties.



This guideline applies to cases such as Chance Encounter Communication (or “tag mode”) and local communications in which it is impossible to either identify the other party or explicitly allow communications.

To check whether exchanging user-generated content with some users is restricted, use the `OS_IsRestrictUGC` function.

## 8.8 Demo Screens

### 8.8.1 [DS] [TWL] Demo Screen Looping **[Required]**

---

Demo screens can be looped day and night at stores, so ensure that errors in the demo screen (or title screen if there is no demo screen) do not occur over a period of at least 24 hours. If a counter (or something similar) is used in the demo, make sure it does not overflow.

## 8.9 Master ROM

### 8.9.1 [DS] [TWL] TWL-SDK Version Used in the Master ROM **[Required]**

---

When submitting Master ROMs, you must use either the version of TWL-SDK designated by Nintendo or a more recent version. The version designated by Nintendo will depend on when your Master ROM is being submitted and will be announced separately on WarioWorld.

### 8.9.2 [DS] [TWL] Master ROM Compile Target **[Required]**

---

When providing a Master ROM, it must be built with the FINALROM option.

For details about the compile target, see “Description of the Compile Target” in the “Related Information” section of the *TWL-SDK Function Reference Manual*.

## 8.10 Terminology

### 8.10.1 [DS] [TWL] Naming Standardization **[Required]**

---

Names used for system hardware and hardware part names, names related to operations, names of peripheral devices, and other names should conform to the correct terms given in Nintendo DS Terminology and TWL Terminology.



## 9 Nintendo Titles

Guidelines that only target Nintendo titles are recorded in this chapter. Nintendo titles must adhere to the guidelines printed in this chapter.

### 9.1 Microphone Tests

#### 9.1.1 [DS] Implementation of the Microphone Test Feature **[Required]**

In section 4.3.6 [DS] [TWL] PM\_SetAmpGainLevel User Feedback for the Microphone Input State **[Recommended]**, feedback to the user concerning the microphone input state is **[Recommended]**. Nevertheless, games published by Nintendo that use microphone input must implement a feature (hereafter, “microphone test”) to display the microphone input state in stages. Contact [support@noa.com](mailto:support@noa.com) in advance if implementing the aforementioned feature is difficult, such as when microphone input is a hidden game element.

The requested specifications for this feature are shown below. See `MicTestSample`, provided separately, for a sample of program implementation.

**Table 9-1 Implementation of Microphone Test Feature by Software Type**

	Implementation of Microphone Test Feature
<b>DS software</b>	Required
<b>TWL-enhanced software</b>	Required
<b>TWL-specific software</b>	Optional

**Note:** A microphone test feature is not required for TWL-dedicated software because a microphone test feature is provided by the TWL system launcher.

#### 9.1.2 [DS] Transitioning to the Microphone Test **[Required]**

Use a basic user interface (UI) by which the player can access the microphone test within a few levels of menus from the title screen (for example, from the game’s title screen, select **Options** and then **Microphone Test**). If for some reason this type of implementation is not possible, provide a shortcut feature to transition to the microphone test and note this method in the instruction manual. For example, the microphone test could be started by simultaneously pressing the A Button, B Button, X Button, and Y Button when the game is started (the button combination presented is an arbitrary example).

This is to prevent the microphone test from being usable unless specific in-game conditions have been met.

#### 9.1.3 [DS] Microphone Test Screen Message Display **[Required]**

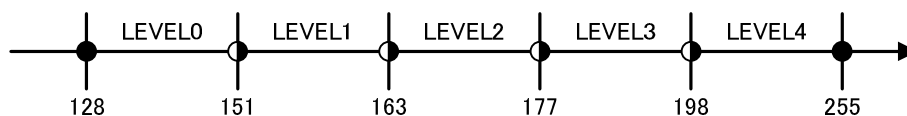
Display a message on the Microphone Test Screen stating “Speak in the direction of the system microphone.” You may change the message to one that better fits the game environment, as appropriate (for example, in a case where speech is not used in-game).

### 9.1.4 [DS] Confirming the Microphone Input Level **[Required]**

When testing the microphone, allow the microphone input level to be measured into five levels. So that users can easily confirm the measured microphone input level, display it continually for some time.

The five input levels are measured as follows.

- Set the gain to `PM_AMP_GAIN_80` (a factor of 80) using `PM_SetAmpGain`.
- Given that the valid range for values in the 8-bit `unsigned char` sampling buffer is between 0 and 255, find the maximum value by subtracting data under 128 from 256 (waveform level inversion). Measure data obtained in this way with divisions similar to the following.



**Table 9-2 Input Levels**

Input Level	Sample Values
LEVEL 4	198–255
LEVEL 3	177–197
LEVEL 2	163–176
LEVEL 1	151–162
LEVEL 0	128–150

## 9.2 Display of Ratings Information

### 9.2.1 [TWL] [US Version] Display of ESRB Ratings Information **[Required]**

For North American versions of NAND applications, display the appropriate rating information, using as your reference the separately released *DSiWare ESRB Rating Icon Template for North America*.

For normal packaged game software, the ESRB rating information is displayed on both the package and the game medium, so the rating of the game can be verified before the game is ever started up. However, this is not possible with NAND applications since there is no physical package or medium, so the rating must be displayed every time the game starts.

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