

NDEV Software Manual

Version 1.08

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1 Overview

NDEV software is a program that uses the files stored on a PC to emulate Revolution discs. By using the PC files as they are, without building a Revolution disc image, NDEV software can make debugging more efficient.

In addition, NDEV software supports emulation with an access speed that is close to the actual Wii optical disc drive speed. (This feature can be enabled or disabled. Disabling this feature enables high-speed debugging that ignores read rates.)

2 Operating Environment

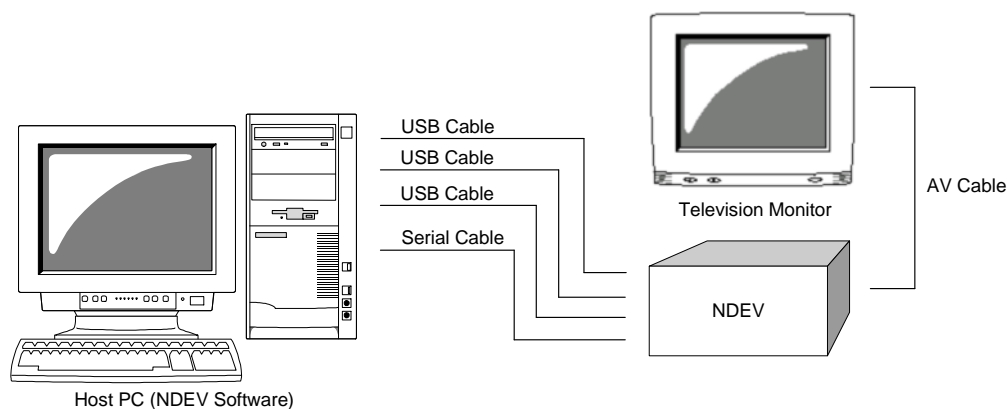
2.1 Operating Environment

NDEV software requires the following operating environment to use NDEV software.

- A PC running Windows XP Home/Professional (SP2 or later)
- At least three free USB 2.0 interfaces
- At least one free serial port
- Approximately 9 GB of hard disk space
- At least 256 MB of RAM memory

2.2 System Configuration

Figure 2-1 System Configuration



2.3 Directory Structure

Shown below is the NDEV software directory structure after the installation.

```
<Installation Directory>/
|
|--bin/                NDEV software
|   |
|   |--NdevRun-Tmp/    Working directory for NdevRun.exe
|
|--lib/                Libraries for Revolution
```

2.3.1 bin : NDEV Software

Optical Disc Drive Emulator

ODEM.exe Optical disc drive emulator

Layout Management Tools

NdevMakeDlf.exe	Application used for creating disc layout information
SetNdEnv.exe	Application used for setting the NDEV software environment
GetNdEnv.exe	Application used for getting the NDEV software environment
NdevRun.exe	Application used for simplifying the optical disc drive emulator startup
NdevRun.ddf	Default definition file used by NdevRun.exe to create disc layout information
ndrun.bat	Batch file used for starting the optical disc drive emulator
ndstop.bat	Batch file used for terminating the optical disc drive emulator
ndrun	Shell script used for starting the optical disc drive emulator (for Cygnus tools)
ndstop	Shell script used for terminating the optical disc drive emulator (for Cygnus tools)
ddfEditor.exe	Application used for creating the .ddf file

2.3.2 bin/NdevRun-Tmp : NdevRun.exe Working Directory

This is the working directory for NdevRun.exe.

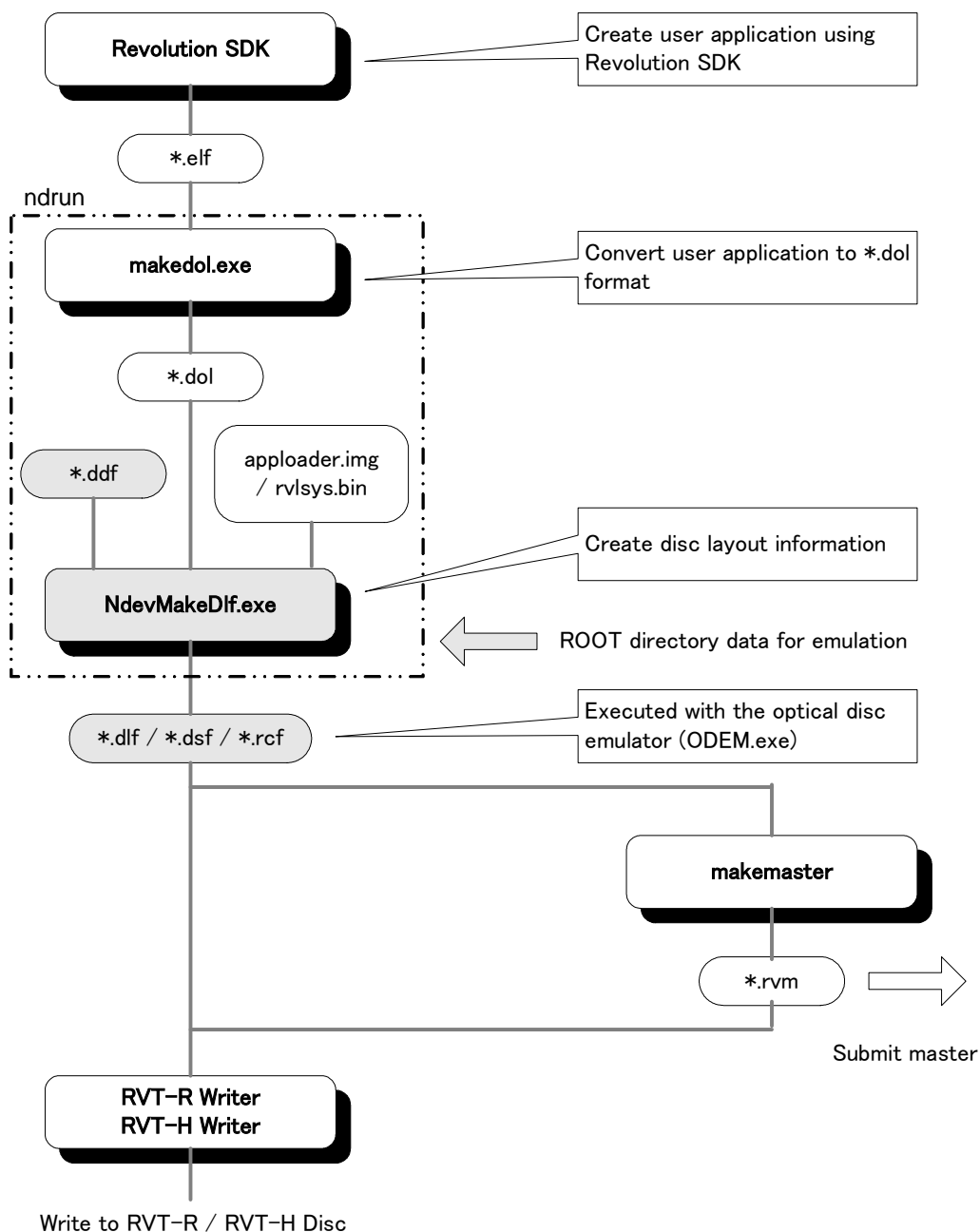
2.3.3 lib : Revolution Libraries

Use the Revolution NdevExi2.a and NdevExi2D.a libraries for running CodeWarrior™ in NDEV.

3 Files Created and Used by NDEV Software

3.1 Application Input and Output Files

Figure 3-1 Application Input and Output Files



3.1.1 Definition File for Disc Layout Information (.ddf)

NdevMakeDlf.exe references this definition file when it creates the .dlf, .dsf, and .rcf files. For more information, see Appendix A Format of the Definition File Used for Creating Disc Layout Information.

3.1.2 Disc Layout File (.dlf)

This is the disc layout file for ODEM.exe, which performs emulation using the .dlf, .dsf, and .rcf files, as well as the files specified within the .dlf files.

3.1.3 Disc System File (.dsf)

This is the disc system file for ODEM.exe. This binary file comprises the DiskID, DiskInfo, BB1, BB2, BI2, FST, and the boot *.dol files. ODEM.exe performs emulation using the .dlf, .dsf, and .rcf files, as well as the files specified within the .dlf files.

3.1.4 Revolution Config File (.rcf)

This is the configuration file for ODEM.exe, which performs emulation using the .dlf, .dsf and .rcf files, as well as the files specified within the .dlf file.

3.1.5 Master Binary File (.rvm)

This is the format in which the mastering data is provided.

3.1.6 Multiple Disc Management File (.mdf)

The management file is used when a multiple disc game is started with ODEM.exe. For more information, see Appendix B, Multiple Disc Management File (.mdf) Format, and Appendix C, Using Multiple Discs.

Note: At this time, multiple-disc games are not supported.

4 Using NDEV Software

4.1 NDEV Software

This chapter describes the NDEV software files installed in the bin/ directory.

ODEM.exe	Optical disc drive emulator
NdevMakeDlf.exe	Application used for creating the disc layout information
SetNdEnv.exe	Application used for setting the NDEV software environment
GetNdEnv.exe	Application used for getting the NDEV software environment
NdevRun.exe	Application used for simplifying the optical disc drive emulator startup
NdevRun.ddf	Default definition file used by NdevRun.exe for creating the disc layout information
ndrun.bat	Batch file used for starting the optical disc drive emulator
ndstop.bat	Batch file used for terminating the optical disc drive emulator
ndrun	Shell script used for starting the optical disc drive emulator (for Cygnus tools)
ndstop	Shell script used for terminating the optical disc drive emulator (for Cygnus tools)
ddfEditor.exe	Application used for creating the .ddf files

4.1.1 ODEM.exe

Synopsis

Optical disc drive emulator for NDEV

Syntax

```
ODEM <options> <input disc layout file>
```

Options

-r	Resets the NDEV CPU at startup
-f	Fast mode (does not emulate seek time or transfer rate)
-i	Does not display operation panel at startup
-end	Terminates the executing instances of ODEM.exe
-l	Loads disc
-s <serial number>	Specifies the serial number (8 digits) of the NDEV being used

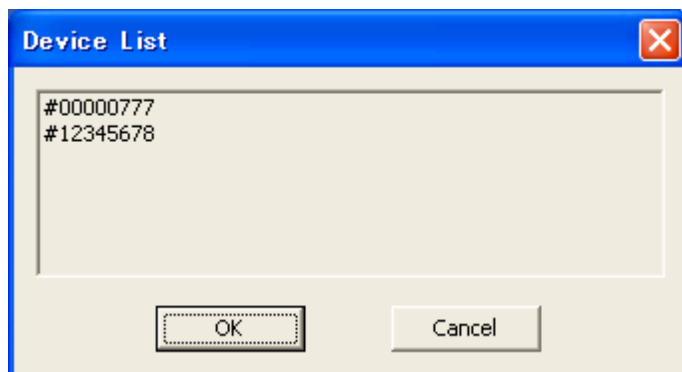
Description

ODEM.exe emulates an optical disc drive by using the disc layout information created by NdevMakeDlf.exe. To start the optical disc emulator, use the command line or click the application icon. After startup, the icon appears in the status area (system tray), and **Control Panel** appears as shown in Figure 4-1. Use **Control Panel** to issue basic optical disc drive emulator commands.

Figure 4-1 Control Panel

If you use the command line, and if the path name includes spaces for the specified disc layout file, the entire path name must be enclosed in double quotation marks (for example, "/path name").

If two NDEV devices are connected to the PC, a dialog box used for selecting the NDEV serial number will appear at startup. (If you specify option `-s` from the command line, the **Device List** dialog box will not be displayed.)

Figure 4-2 Dialog Box Used for Selecting an NDEV Serial Number

Select the NDEV serial number and click **OK**.

4.1.1.1 Operating Procedures

Up to the game program execution, the operating procedures for the optical disc drive emulator and the Wii console are the same.

Table 4-1 Operating Procedures for the Optical Disc Drive Emulator and the Wii Console

Actual Game Console	Optical Disc Emulator
Load disc	Select and load disc layout file
Eject disc	Eject disc
Reset	Reset

When you execute the game program software, be sure to follow the operating procedures.

Executing from the Control Panel

Select disc
layout file
↓
Load disc
↓
Reset

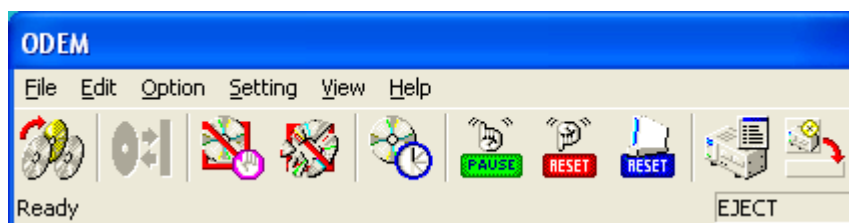
Executing from the Command Line

```
>ODEM -l -r disc_layout_file [ENTER]
```

4.1.1.2 Control Panel

The menu and the toolbar of **Control Panel** allow you to use every feature of the optical disc emulator. The current status is always displayed on **Control Panel** as a toolbar button.

Figure 4-3 Control Panel



Opening a Disc Layout File

This feature selects the disc layout file. The name of the currently selected disc layout file appears in the title bar.

Method of Operation

On the **File** menu, click **Open Disk Layout File**. Alternatively, on the toolbar, click .

Opening Recent Disc Layout Files

This feature allows you to select the disc layout file from the most recently used files.

Method of Operation

On the **File** menu, click **Recent Disk Layout Files**.

Restarting the Emulator

This feature restarts the optical disc drive emulator.

Method of Operation

On the **File** menu, click **Restart Emulator**.

Cancelling the Emulator

This feature cancels the optical disc drive emulator.

Method of Operation

On the **File** menu, click **Cancel Emulator**.

Exiting the Emulator

This feature exits the optical disc drive emulator.

Method of Operation

On the **File** menu, click **Exit**.

Emulation Error Settings

You can enable or disable the emulation of the FATAL and RETRY errors. When the emulation is enabled, a check mark appears in the menu and the disc read command errors are returned. These errors are used for debugging when the disc data cannot be read properly due to scratches on the disc, for example.

Method of Operation

On the **Setting** menu, click **Retry Error Emulation**. Alternatively, on the toolbar, click



On the **Setting** menu, click **Fatal Error Emulation**. Alternatively, on the toolbar, click



Icon Status



RETRY error emulation is enabled



FATAL error emulation is enabled



Emulation for both errors is disabled

Seek Time Emulation Setting

Seek time emulation can be enabled or disabled. When enabled, a check mark appears in the menu. The emulated access speeds are close to those of the actual Wii optical disc drive.

Method of Operation

On the **Settings** menu, click **Seek Time Emulation**. Alternatively, on the toolbar, click



Icon Status



Seek time emulation is enabled



Seek time emulation is disabled

Note: Even though this is called “Seek Time Emulation,” only the READ times are emulated, not the SEEK times.

Eject/Load Disc

This feature ejects and loads the disc. The **Open Disc Layout File** icon is enabled while the disc is being ejected and disabled while the disc is being loaded.

Method of Operation

On the **Operation** menu, click **Eject/Load**. Alternatively, on the toolbar, click



Open Disc Layout File Icon Status



: Ejecting disc



: Loading disc

Pause

If you click and hold this button, disc access will not return a response. This feature is used to check the game behavior when the disc access is slow.

Method of Operation

On the toolbar, hold down

Reset

This feature resets the NDEV CPU.

Method of Operation

On the **Operation** menu, click **Reset**. Alternatively, on the toolbar, click

Console Reset

This feature functions the same way as the **CONSOLE RESET** switch on the NDEV console.

Note: Console Reset functions the same way as the reset switch on the Wii console.

Note: Console Reset is a software reset. When the **Reset** switch is used, the application performs the processing.

Method of Operation

On the **Operation** menu, click **Console Reset**. Alternatively, on the toolbar, click

Display Log

This feature turns on or off the log viewer display. When the log viewer is being displayed, a check mark appears next to the corresponding command.

Method of Operation

On the **Display** menu, click **Display Log**. Alternatively, on the toolbar, click

Minimizing the Control Panel in the Status Area

This feature minimizes **Control Panel** in the status area.

Method of Operation

On the toolbar, click

About OpticalDiskEmulator

This command displays a dialog box that provides the version and other information about the optical disc drive emulator.

Method of Operation

On the **Help** menu, click **About OpticalDiskEmulator**.

4.1.1.3 Status Area Icon

The status area icon indicates that the optical disc drive emulator is minimized.

Figure 4-4 Status Area Icon When the Optical Disc Drive Emulator is Minimized



To open a shortcut menu, right-click on the status area icon. From this shortcut menu, you can select the optical disc drive emulator commands. To maximize or minimize **Control Panel**, double-left-click on the status area icon.

Control Panel Display

This feature turns on and off the display of the **Control Panel**. When **Control Panel** is displayed, a check mark appears next to the corresponding command.

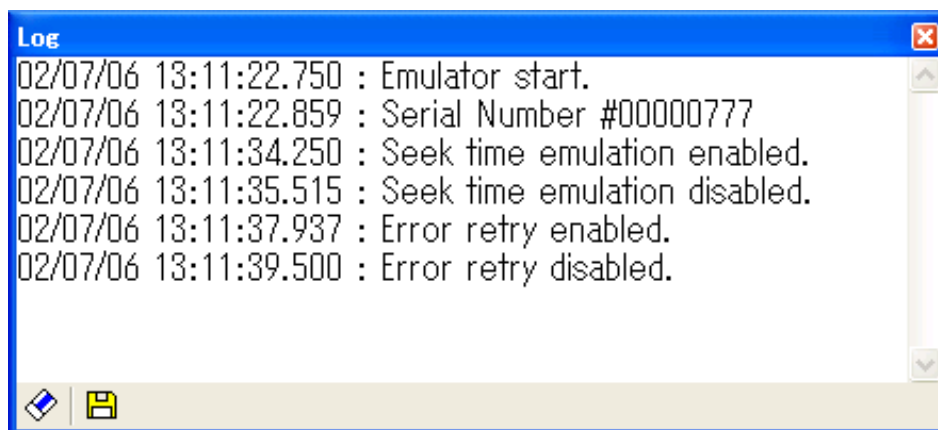
Method of Operation

On the shortcut menu, select **Control Panel**.

Note: Other commands on the shortcut menu are the same as the corresponding commands on the **Control Panel** menu.

4.1.1.4 Log Viewer

The log viewer displays an operation log from the time the optical disc drive emulator is executed until it is terminated. However, if the number of entries exceeds a certain limit, older log entries are not displayed.

Figure 4-5 Log Viewer**Clear Display Log**

This feature clears the currently displayed log.

Method of Operation

On the **Edit** menu, click **Clear Log**. Alternatively, on the toolbar, click .

Save Log to a File

This feature writes to a file all the log information recorded by the optical disc drive emulator.

(This includes the entries that are no longer displayed in the log viewer.)

Method of Operation

On the **Edit** menu, click **Save Log**. Alternatively, on the toolbar, click .

4.1.2 NdevMakeDlf.exe**Synopsis**

This application allows you to create the disc layout information.

Syntax

```
NdevMakeDlf [ options ] [ <input file1> [<input file2>] [<input file3>] ]
```

Options

- v Displays version information
- ? Displays help messages

Description

This application creates the disc layout information from the specified `.ddf` (disc definition file) input files. Up to three `.ddf` files can be specified from the command line at once. If the same sections or variables are defined for the `.ddf` file that has been specified more than once, the content of the file that was specified last will be given the priority. (`<input file3>` has the highest processing priority.)

For more information about the `.ddf` file content, see Appendix A Format of the Definition File Used for Creating Disc Layout Information.

`NdevMakeDlf.exe` creates the following files.

- `.dlf` (disc layout file)
- `.dsf` (disc system file)
- `.rcf` (Revolution configuration file)

To operate, the optical disc drive emulator references a `.dlf` (disc layout file) output by `NdevMakeDlf.exe`.

4.1.3 SetNdEnv.exe

Synopsis

This application is used for setting the NDEV software environment.

Syntax

```
SetNdEnv [-options ] [ <Name> <Data> ]
```

Options

- `-v` Display version information
- `-?` Display help messages

Description

This application stores the NDEV software environment settings in the registry.

When a `.dlf` (disc layout file) is created from a `.ddf` (disc define file), `NdevMakeDlf.exe` references the values set by this application.

When `NdevMakeDlf.exe` is executed, the string `${<Name>}`, written in the `.ddf` file, is converted to `<Data>`.

In the `NdevRun.ddf` file, which is used by `NdevRun.exe`, the `[Input]` section defines `DvdRoot`.

```
[ Input ]  
DvdRoot=${DvdRoot}
```

When a `.dlf` is created and `ODEM.exe` is executed with `NdevRun.exe`, you must set `DvdRoot` with `SetNdEnv.exe`.

When `<Name>` is specified without `<Data>`, the `<Name>` settings are deleted from the registry.

4.1.4 GetNdEnv.exe

Synopsis

This application gets the NDEV software environment and displays the environment on the screen.

Syntax

```
GetNdEnv [-options ]
```

Option

-v Display version information
-? Display help messages

Description

This application gets the NDEV software environment from the registry and displays the environment.

4.1.5 NdevRun.exe

Synopsis

This executable simplifies the optical disc drive emulator startup by creating a disc layout file and running ODEM.exe/makervm.exe.

Syntax

```
NdevRun {<options>} [<Revolution .elf file>] {<options>} <-a argument list...>
```

Options

-t -t=<num>	Set arguments for debugging
-d=<.ddf file>	Specify a .ddf file
-n	Do not wait for termination of ODEM.exe (must specify with -e)
-f	Run ODEM.exe in the high speed mode (must specify with -e)
-o	Put output file in the NdevRun.exe working directory
-e	Execute ODEM.exe
-m=<output master image file>	Execute makervm.exe
-a	Specify the argument list (All arguments listed after this option will be passed to the application.)
-w	Move to the directory location where .elf files are specified as arguments
-v	Display version information
-s=<s/n>	Specify the NDEV serial number (8 digits) to be used

Description

The following points describe NdevRun.exe functions.

1. Uses makedol.exe to convert the .elf file indicated as an argument to a .dol file.
NdevRun-Tmp/NdevRun.dol is created in the directory where NdevRun.exe is located.

2. Uses NdevMakeDlf.exe to create a .dlf file for ODEM.exe.

The default definition file (.ddf) references NdevRun.ddf in the directory where NdevRun.exe is located.

After NdevRun.ddf is read, if the directory that contains the .elf file specified as an argument also contains a file with the same name but a .ddf extension, that file is read next. If this .ddf file and NdevRun.ddf both contain the same definitions, the .ddf file definitions take priority.

3. If -d=<ddf file> is specified, the specified .ddf file is read.

If the directory that contains the .elf file specified as an argument also contains a file with the same name but a .ddf extension, the warning message (shown in the example below) is displayed and the .ddf file is ignored.

Example:

Warning: Instead of bins/sample0.ddf, the bins/test.ddf specified by -d=<ddf file> will be used.

sample0.ddf The .ddf file that has the same name as the .elf file

test.ddf The .ddf file specified using the -d option

Note: NdevRun.exe displays the .ddf being used when the .dlf file is created.

4. If -m=<output master image file> is specified, marvm.exe is started and the master data format files are created.
5. If -e is specified, ODEM.exe is started.

4.1.6 NdevRun.ddf

Synopsis

This is the default definition file for creating the disc layout information used by NdevRun.exe.

Description

This file defines the default values for creating the disc layout information used by NdevRun.exe.

This file is used if the -t option is not specified in NdevRun.exe.

4.1.7 ndrun.bat

Synopsis

This batch file is used for starting the optical disc drive emulator.

Description

This batch file is used for starting the optical disc emulator. `NdevRun.exe` starts this file internally.

4.1.8 ndstop.bat

Synopsis

This batch file is used for terminating the optical disc drive emulator.

Description

This batch file runs `NdevRun.exe` and is used for terminating the optical disc drive emulator.

4.1.9 ndrun

Synopsis

This shell script for Cygnus tools is used for starting the optical disc drive emulator.

Description

This shell script for Cygnus tools is used for starting the optical disc drive emulator. `NdevRun.exe` starts this file internally.

4.1.10 ndstop

Synopsis

This shell script for Cygnus tools is used for terminating the optical disc drive emulator.

Description

This shell script for Cygnus tools is used for terminating the optical disc drive emulator. `NdevRun.exe` starts this file internally.

4.1.11 ddfEditor.exe

Synopsis

This application provides a GUI for creating and editing `.ddf` files, which are the definition files for creating the disc layout information used by the optical disc drive emulator. This application can be used to add or modify the following data in the `.ddf` files.

- DvdRoot in the **[Input]** section
- **[DiskID]** section
- **[LBAlign]** section
- **[Layout]** section
- **[BI2]** section (**CountryCode** only)

4.1.11.1 Main Dialog Box

From this dialog box, you can run such commands as exiting the application, creating files, and selecting files for editing or saving. You can drop files onto the dialog box.

Figure 4-6 Main Dialog Box



About the Window Title

The window title displays the full pathname of the `.ddf` file that is currently open. If no files are open, "No File" is displayed.

Creating New Files

To create a `.ddf` file that has the same name and location as the selected `.elf` file, click **New File** on the **File** menu. If a `.ddf` file with the same name already exists in the directory, a dialog box will appear to confirm that you want to overwrite that file. Even if you choose to overwrite the file here, the original file will not be overwritten unless you click **Overwrite** on the **File** menu.

Editing Files

On the **File** menu, click **Open** and select the `.ddf` file to edit. Once you select a `.ddf` file, the file edit dialog box appears.

Figure 4-7 File Edit Dialog Box

The screenshot shows a dialog box titled "ddf_DATA". It has a tabbed interface with tabs for "DiskID", "Input", "BI2", "LBAAAlign", and "Layout". The "Input" tab is currently active. Within this tab, there are several labeled input fields: "GameName" (containing "FABA", with a "(4Byte)" label), "Company" (containing "ZZ", with a "(2Byte)" label), "DiskNumber" (containing "0", with a "(number 0-99)" label), "GameVersion" (containing "0", with a "(number 0-99)" label), "DiskInfo" (containing "Sample Game Name", with a "(under64Byte)" label), and "TotalDisk" (containing "1", with a "(number 1-99)" label). At the bottom right of the dialog, there are "OK" and "Cancel" buttons.

Saving Files

When creating or editing files, the operation **File** → **Save as** becomes available only when proper values are entered for all the fields required for a .ddf file. To overwrite a file, click **Overwrite** on the **File** menu. The file will not be created or overwritten until you select this command.

Closing Files

This item can be selected if a .ddf file has been opened from the **File** menu, using **New File** or **Open**. Selecting one of these commands will close an open .ddf file. If an open .ddf file contains unsaved changes, a message box for confirming file closure will appear.

Resetting Initial Values

This command can be selected even if a single data setting has been changed with the file edit dialog box. When you select this command, the data in the edited .ddf file will be reset to the initial values and saved to the hard disk.

Help

This command opens the application help file.

Properties

This command reopens the edit dialog box (Figure 4-7) that was opened automatically along with the file.

Exiting the Application

To quit the application, click **Exit** on the **File** menu or click **Exit**. If an open .ddf file contains unsaved changes, a message box for confirming file closure will appear.

4.1.11.2 Edit Dialog Box

Use the edit dialog box to input and to change the data in .ddf files.

Figure 4-8 Edit Dialog Box (DiskID Tab)

The screenshot shows a dialog box titled "ddf_DATA" with a blue title bar and a close button (X) in the top right corner. The dialog has five tabs: "DiskID", "Input", "BI2", "LBAAlign", and "Layout". The "DiskID" tab is selected. The main area of the dialog contains several input fields with labels and constraints:

- GameName**: A text box containing "RABA" with "(4Byte)" to its right.
- Company**: A text box containing "ZZ" with "(2Byte)" to its right.
- DiskNumber**: A numeric spin box containing "0" with "(number 0-98)" to its right.
- GameVersion**: A numeric spin box containing "0" with "(number 0-99)" to its right.
- DiskInfo**: A text box containing "Sample Game Name" with "(under64Byte)" to its right.
- TotalDisk**: A numeric spin box containing "1" with "(number 1-99)" to its right.

At the bottom right of the dialog, there are two buttons: "OK" and "Cancel".

OK Button

Click this button to check the format and to reflect the changes in the data. The dialog box will close. Changes are applied to the data that passes the format check. An error message is displayed for the

data that fails the format check, and the focus shifts to the fields that have errors.

Note: Data can only be written to the file if you select **Overwrite** on the **File** menu. In addition, you can select **Overwrite** only if no format errors exist.

Cancel Button

Click this button to cancel all changes. The dialog box will close. This will restore the data to the state that existed before you opened the dialog box.

DiskID Section Tab

All items in the **DiskID** section can be changed (see Figure 4-8). If you enter improper values for any item, you will not be able to edit the remaining items or to save the `.ddf` file.

Input Format

Proper values must be entered for all items in the **DiskID** section.

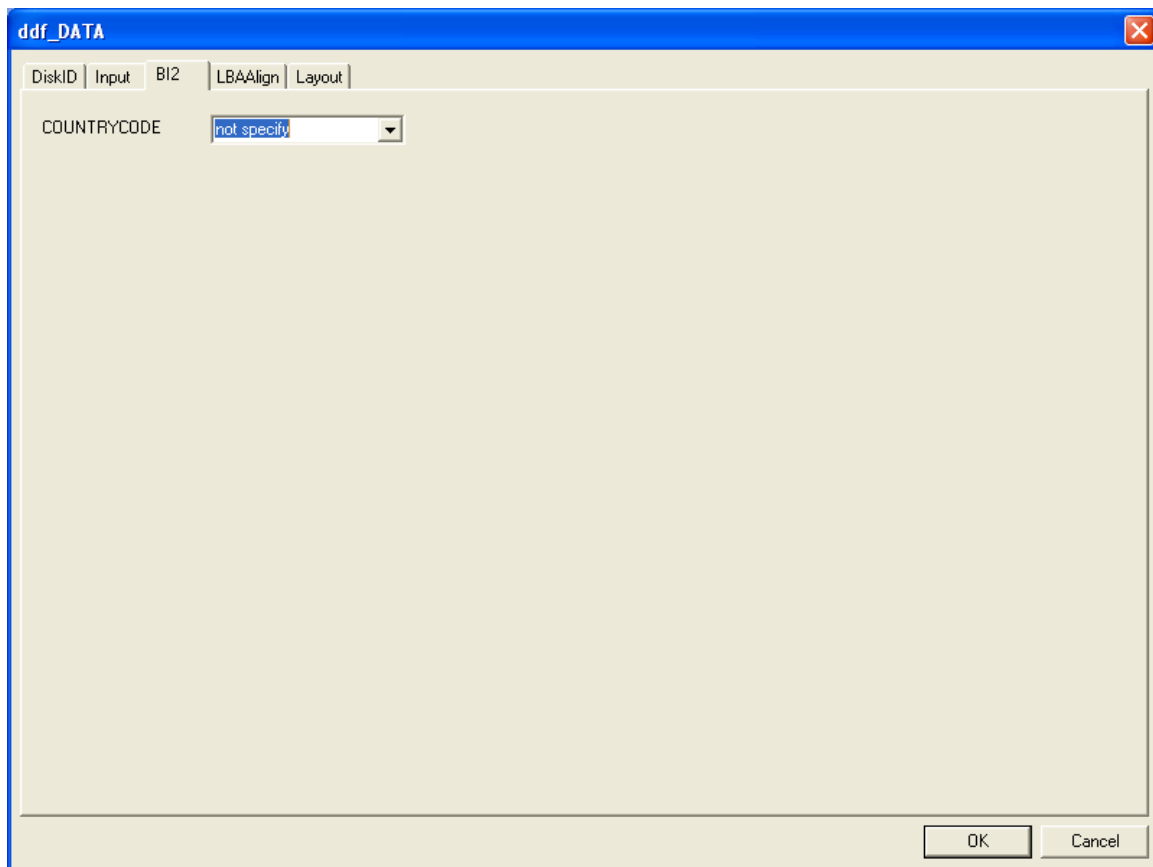
GameName	Must be 4 bytes. Only the ASCII codes A-Z, a-z, and 0-9 can be used.
Company	Must be 2 bytes. Only the ASCII codes A-Z, a-z, and 0-9 can be used.
DiskNumber	Value from 0 to 98, in decimal notation. Must be less than <code>TotalDisk</code> .
GameVersion	Value from 0 to 99, in decimal notation.
DiskInfo	64 or fewer bytes of the ASCII code alphanumeric characters.
TotalDisk	Value from 1 to 99, in decimal notation.

Input Section Tab

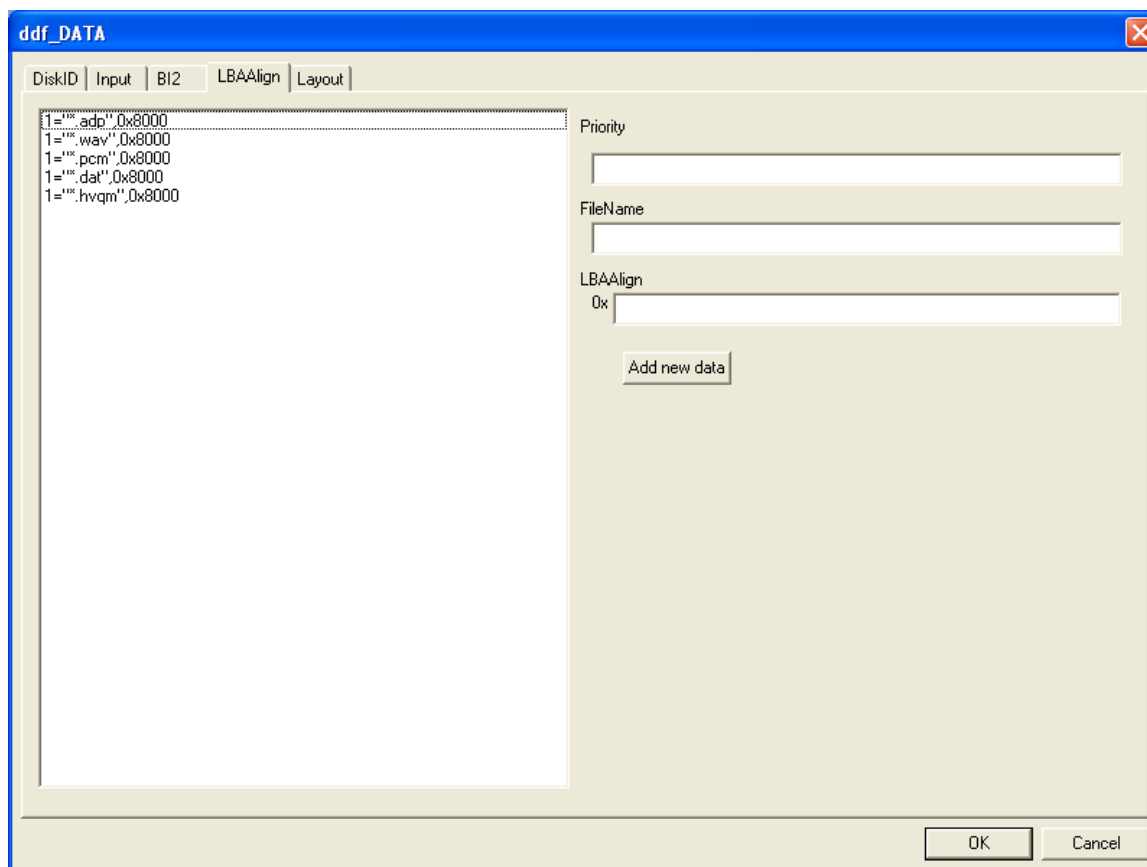
Use this tab to change the value of `DvdRoot`. You cannot input the directory path directly. To find the `DvdRoot`, browse for it in the directory access dialog box. To clear `DvdRoot`, click **Cancel**.

BI2 Section Tab

Even though there is a field to specify a **CountryCode**, the application's country code cannot be configured here. You must use `setcountrycode` in the Revolution SDK to set the country code.

Figure 4-9 Edit Dialog Box (BI2 Tab)**LBAAAlign Section Tab**

Under the **LBAAAlign** tab, you can insert, delete, re-order, or change the values for **Priority**, **FileName**, and **LBAAAlign**.

Figure 4-10 Edit Dialog Box*Insert Data*

From the list box, choose where you want to insert the data. Right-click to bring up the shortcut menu, and select **Insert New**. New data will be created, with the initial values set for **Priority**, **FileName**, and **LBAAAlign**. Specify a proper value for each field, and click **Update** to insert the data. Alternatively, while nothing is selected in the list box enter the values into the empty edit boxes, then insert the data by clicking **Add New Data**.

Delete Data

From the list box, select the data for deletion, right-click, and from the shortcut menu select **Delete**.

Sort Data

To rearrange the data order, drag it within the list box. Inside the same box, you can also select the data that you want to move. Right-click, and select **Cut** from the shortcut menu that appears. Select where to move the data, then right-click and select **Paste** from the shortcut menu.

Change Values

Select the data whose values you want to change. The values will display in the edit dialog box. To

change the values, edit them and click **Update**. Even if you do not click **Update**, the changed values will update automatically when you select other data from the list box.

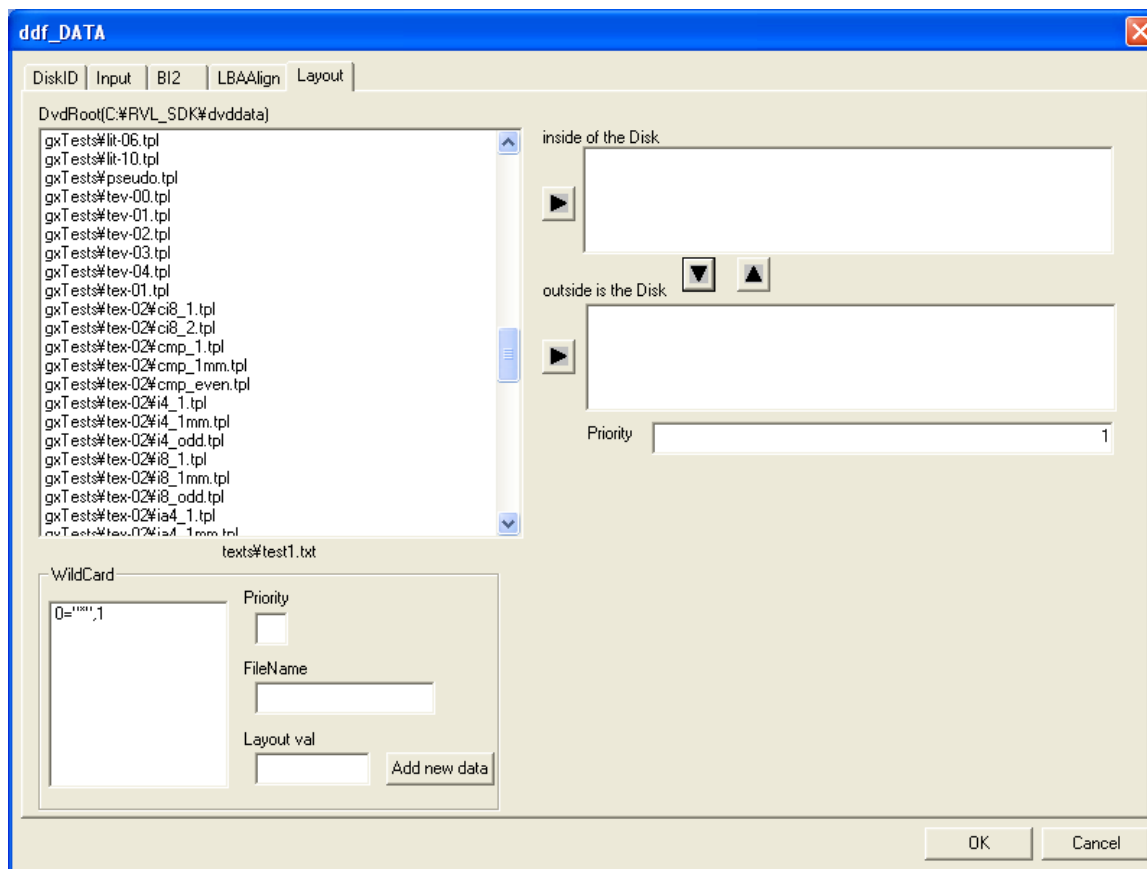
Input Format

- Priority** Value from 0 to 2147483647, in decimal notation
- FileName** Characters that can be used in a file name (cannot use a 2-byte code)
- LBAAlign** Value that can consist of numeric digits 0-9 and A-F, in Hexadecimal notation


Layout Section Tab

The **Layout** section can be edited only if **DvdRoot** has been set in the **Input** section. You can insert, delete, or sort the data from the file list under the **DvdRoot** directory. You can also input the data directly and make specifications using wildcards.

Figure 4-11 Edit Dialog Box (Layout)



Inserting Data from the DvdRoot File List



From the **DvdRoot** file list, select the file to insert and click  for the inner or outer track list box. The same command is executed by right clicking on the selected file, and by clicking **Move to inner list** or **Move to outer list** on the shortcut menu.

Delete Data

From the inner list, outer list, or the wildcard list box, select the data for deletion, right-click, and on the shortcut menu that appears click **Delete**. Data deleted from the inner or outer list box will return to the **DvdRoot** file list box.

Sort Data

If sorting is performed in the list box of the inner or outer lists, it is possible to sort by dragging the data within the list box.

To sort data, drag it inside the inner or outer list box. Select the data for moving and click  or  to move it between the inner and outer list boxes.

Create Data Using Wildcards

If you want to use wildcards (* or ?) in the **FileName** field, you must use a keyboard to enter all values for **Priority**, **FileName**, and **Layout**. To create new data, in the list box select the insertion location for the new data, right-click, and on the shortcut menu that appears click **Insert**. Enter the proper values for all fields and click **Change** to insert the new data.

Input Format Data Using Wildcards

Priority	Value in Decimal notation from 0 to 2147483647
FileName	Character string including wildcards that can be used as a file name
Layout	Numeric value

4.1.11.3 Changing the Window Size

The window size for `ddfEditor.exe` can be changed by setting values in `ddfEditor.ini`.

```
[ddfEditor]
Width=800
Height=600
```

The window's width and height are set by `Width` and `Height`, respectively. Dimensions smaller than 800x600 cannot be used and will automatically be corrected to 800x600 if they are specified. An 800x600 window will be displayed if no `ddfEditor.ini` file exists.

4.2 Running and Debugging Demos

4.2.1 Running Revolution SDK Demo Programs Under NDEV

1. Run `GetNdEnv.exe` and check that `DvdRoot` is set to the `dvddata` directory in which the Revolution SDK is installed. If `DvdRoot` is not set to this directory, execute `SetNdEnv.exe` and make this setting.

Example: Running `SetNdEnv.exe` with the Revolution SDK installed in `F:\RVL_SDK`:

```
SetNdEnv DvdRoot F:\RVL_SDK\dvddata
```

2. Specify the Revolution .elf file to be executed and run NdevRun.exe; for example:

```
NdevRun -e XXXX.elf
```

4.2.2 Debugging Revolution SDK Demo Programs Under NDEV

1. Run GetNdEnv.exe and check that DvdRoot is set to the dvddata directory in which the Revolution SDK is installed. If DvdRoot is not set to this directory, execute SetNdEnv.exe and make the setting.

Example: Running SetNdEnv.exe when the Revolution SDK is installed in F:\RVL_SDK:

```
SetNdEnv DvdRoot F:\RVL_SDK\dvddata
```

2. Move to the Revolution SDK build\demos directory and rebuild.

Examples: Running make when rebuilding:

```
make                (when making a debug build)
make NDEBUG=1       (when making a release build)
```

3. Start the CodeWarrior IDE. On the **Edit** menu, click **Preferences**. In the dialog box, click **Source Trees** and set RevolutionRoot as the name of the directory where the Revolution SDK is installed.
4. Read the .elf file to debug from the IDE.
5. On the **Project** menu, click **Debug** from the IDE to start debugging.

Note: When an error occurs in the CodeWarrior IDE during debugging:

Depending on the PC environment, the following error may be displayed:

"Load script process returned error. (-1)"

You will not be able to debug in this case. If this problem occurs, change the CodeWarrior settings as shown below. In the CodeWarrior's **[Debugger] – [Debugger Settings]**, under **Load Script** add `-=5` to ndrun as follows:

```
ndrun.bat -=5 $F $P
```

In the unlikely event that the problem persists even after the settings have been changed this way, try to specify a number larger than 5.

Appendix A Format of the Definition File Used for Creating Disc Layout Information

Definition files used for creating disc layout information are referenced by `NdevMakeDlf.exe`, the tool that creates the disc layout information.

A.1 Basic Notation

Definition files for creating disc layout information are written according to the following rules.

```
[<section name 1>]
<name11>=<value 11>
<name12>=<value 12>
<name13>=<value 13>
.
.
[<section name 2>]
<name21>=<value 21>
<name22>=<value 22>
<name23>=<value 23>
.
.
[<section name N>]
```

Values can be replaced using environment variables. Be sure to write this in the following form.

```
$(variable-name)
```

Example:

```
[ Input ]
DvdRoot="$(MY_DVDDATA) "
```

Values can be modified by values set using `SetNdEnv.exe`. This is written in the following form.

```
${variable-name}.
```

Example:

```
[ Input ]
DvdRoot="${DvdRoot} "
```

A.2 Section Notation

Note that in the **[LbaAlign]**, **[SizeAlign]**, and **[Layout]** sections, wildcards can be used in `<FileName>`. “*” matches any number of characters, and “?” matches any single character in a filename.

A.2.1 [Input] Section

```
DvdRoot="<Root Directory>"
```

- Name of the directory that stores the files to emulate
- A table to create the FST file is generated by searching files inside the directory specified here

```
LDRFileName="<LDR File Name>"
```

- Filename of Application Loader

```
BI2FileName="<BI2 File Name>"
```

- Name of the BI2 file

```
BootFileName="<Boot File Name>"
```

- Name of the program file to execute
- Specify the .dol file created by makedol.exe in the Revolution SDK

```
RVLSysFileName="<Revolution System File Name>"
```

- Revolution system file name

Example:

```
[ Input ]
```

```
DvdRoot="$ {DvdRoot}"
```

```
LDRFileName="$ (REVOLUTION_SDK_ROOT)\RVL\boot\apploader.img"
```

```
BI2FileName="$ (REVOLUTION_SDK_ROOT)\x86\bin\bi2.bin"
```

```
BootFileName="Sample.dol"
```

```
RVLSysFileName="$ (REVOLUTION_SDK_ROOT)\x86\bin\rvl.bin"
```

A.2.2 [Output] Section

```
LayoutFileName="<output Dlf-File>"
```

- Disc layout file name

```
SystemFileName="<output Dsf-File>"
```

- Disc system file name

```
ConfigFileName="<output Rcf-File>"
```

- Configuration file name

```
Mode=<Output Mode>
```

- Specify the output mode using one of the following strings

RVL Revolution mode

GC Nintendo GameCube compatibility mode

NdevMakeDlf.exe changes the output format of the .dlf (disc layout) file and the .dsf (disc system) file according to the output mode defined here. If the Nintendo GameCube compatibility mode has been specified as the output mode, a .rcf (configuration) file will not be output. If the output mode is undefined, files are processed in the Revolution mode.

Example:

```
[Output]
LayoutFileName="Sample.dlf"
SystemFileName="Sample.dsf"
ConfigFileName="Sample.rcf"
Mode=RVL
```

A.2.3 [DiskID] Section

GameName=<Game Name>

- Four-byte ASCII code game name supplied by Nintendo

Company=<Company Name>

- Two-byte ASCII code company name supplied by Nintendo

DiskNumber=<Disc Number>

- Disc number information for multiple disc games
- Numbers are set beginning from zero. Use zero for games that do not use multiple discs.

GameVersion=<Game Version>

- Game version number

DiskInfo="<Long Game Name>"

- Game name character string for confirming data. This is an alphanumeric ASCII string with a maximum length of 64 characters.

TotalDisk=<Total Disk Number>

- Total number of discs

Example:

```
[DiskID]
GameName="RELS"
Company="AB"
DiskNumber=0
GameVersion=0
DiskInfo="Sample Game Name"
TotalDisk=1
```

A.2.4 [BB2] Section

FSTMaxLength=<size>

- Memory size allocated for FST

FSTAddress=<address>

- Address of the FST location
- Used when making specifications with the start address

FSTEndAddress=<address>

- Address of the FST location
- Used when making specifications with the end address

FSTuserTop=<lba>

- Start of the user area
- When omitted, set to the start of the available free area

FSTuserEnd=<lba>

- End of user area

Example:

[BB2]

FSTMaxLength=0x080000

FSTEndAddress=0x80400000

FSTuserEnd=0x57058000

A.2.5 [BI2] Section

DEBUGFLAG=<flag>

- Specify 0 when not using a debugger under NDEV, or specify 3 when using the CodeWarrior debugger

Example:

[BI2]

DEBUGFLAG=0

A.2.6 [LbaAlign] Section

<Priority>="<File Name>",<LBA Align>

- Aligns the optical disc drive position of the file whose name is set as <File Name> with the boundary set as <LBA Align>
- This section is used for the files, such as ADPCM data, that have a set start address boundary. (ADPCM data must be 32KB-aligned.) The <Priority> value determines the evaluation

priority order; the greater the numeric value, the higher the priority.

Example:

Places "*" at the 32-byte boundary; places "*.adp" at the 32KB boundary.

```
[LbaAlign]
0="*",32
1="*.adp",0x8000
```

A.2.7 [Layout] Section

```
<Priority>="<File Name>",<layout val>
```

The file whose name is indicated with <File Name> is laid out on the optical disc drive based on the value of <layout val>. If the value is negative, the file layout starts from the inside of the disc; if positive, the file layout starts from the outside of the disc. The purpose of this is to lay out files on the outer edge of the disc, thus reducing the access time.

<Priority> determines the evaluation priority order: the greater the numeric value, the higher the priority.

Example:

The file layout starts from the inside of the disc, with the .prg files followed by the .bin files. After this, the file layout starts from the outside of the disc in the following order: .adp files, .mov files, and the files located in the data directory.

Note: Specifications for the .prg, .bin, .adp, and .mov files located in the directory have a higher priority than the specifications for the files located in the data directory:

```
[Layout]
1="*.prg",-2
1="*.bin",-1
0="data/*",1
1="*.mov",2
1="*.adp",3
```

If multiple files have the same <layout val>, the files are laid out in the listed order.

Example:

File layout moves toward the outer edge of the disc in the following order: foo.dat, baa.dat, and aaa.dat, where aaa.dat is the closest to the disc's outer edge.

```
[Layout]
1="foo.dat",1
1="baa.dat",1
1="aaa.dat",1
```

A.2.8 [PathList] Section

```
<Name>="<FST Directory>","<Windows Directory >"
```

Register <Windows Directory> for the <FST Directory>. This method is used when the data is put in a location other than the directory denoted by DvdRoot in the **[Input]** section, or when multiple discs are used and a shared directory is specified. Note that when multiple discs are used, it is more convenient to include a specification in mdf. You can assign any value to <Name>. (<Name> is used internally by NdevMakeDlf.exe for management purposes only.) If the same management name is assigned, the latter specification will be enabled.

Example:

```
[PathList]
ROOT2="ROOT2", "C:\ROOT2\dvddata"
```

A.2.9 [LbaOrigin] Section

```
<LBA>="<Base File Name>",<layout type>
```

The file specified by <Base File Name> is laid out in <LBA> on the optical disc. For <layout type>, use '+' or '-'. When '+' is used, files are laid out in the positive direction, beginning at <LBA> and continuing toward the outside of the disc. When '-' is specified, files are laid out in the negative direction, beginning at <LBA> and continuing toward the inside of the disc. Wildcards cannot be specified for <Base File Name>.

```
<LBA>::"<File Name>"
```

The file designated by <File Name> is laid out on the optical disc after the file designated by <Base File Name>, which was defined in <LBA>="<Base File Name>",<layout type>. Wildcards cannot be specified for <File Name>. <LBA> must be already defined.

Example:

```
[LbaOrigin]
0x30000000="file00", +
0x30000000::"file01"
0x30000000::"file02"
```

In this example, the layout of the specified file is as shown in the figure below.

Figure Error! No text of specified style in document.-1 Layout Based on the [LbaOrigin]
Specification

0x30000000	:
	"file00"
	alignment
	"file01"
	alignment
	"file02"
	alignment
	:

Example:

```
[LbaOrigin]
0x50000000="file10", -
0x50000000::"file11"
0x50000000::"file12"
```

In this example, the layout of the specified file is as follows.

Figure Error! No text of specified style in document.-2 Layout Based on the [LbaOrigin]
Specification

0x50000000	:
	"file12"
	alignment
	"file11"
	alignment
	"file10"
	alignment
	:

A.2.10 [LayoutOff] Section

<File Name>

- File name
- The file specified by <File Name> is not laid out. (A disc layout file, .dlf, and the file specified in FST are not output.)
- Wildcards can be specified in <File Name>

Example:

```
[LayoutOff]
"abc.ecd"
"axdemo\axart\axartdemo.spd"
"axdemo\stream\*.adpcm"
"pictures\*.BMP"
"texts\* "
```

Appendix B Multiple Disc Management File (.mdf)

Format

NdevRun.exe references multiple disc management files. The basic notation is the same as that of the definition files used for creating the disc layout information, and each section can list the same information. When a game that uses multiple discs is created, the write information is shared with both the definition file for the disc layout information and the disc list in this file.

Section Description

Note: Sections described in Appendix A have been omitted.

[MultipleDisk] Section

```
<Disk Number>="<elf File Name>"
```

- Specifies the .elf file list that corresponds to each disc number

Example:

```
[MultipleDisk]  
0="sample0.elf"  
1="sample1.elf"  
2="sample2.elf"  
3="sample3.elf"
```

Appendix C Using Multiple Discs

NDEV Software Features Used for Supporting the Creation of Multiple Discs

1. Update all disc layout information when execution starts.

Disc layout information must be updated whenever file sizes change, even if the number of files remains the same. With multiple disc games, to avoid any possible problems, all disc layout information should be updated when execution starts.

2. Adjust the "FST Max Length" value for each disc.

If the FST of the converted disc is larger than the FST of the unconverted disc, it is necessary to re-allocate the FST area in another memory region. The best way to ensure the efficient use of the main memory is to specify the same FST Max Length value for each disc.

3. Make shared data directories individually manageable on a PC.

Registering shared directories with the **[PathList]** section allows you to avoid multiple instances of shared directories on the PC.

Conditions that Must Be Met to Use these Features

1. For each disc, the following files must be in the same directory: multiple disc management files (.mdf), Revolution startup program files (.elf), and the definition files for creating disc layout information files (.ddf).
2. For each disc, the Revolution startup program files (.elf) must be registered in the **[MultipleDisk]** section of the multiple disc management file (.mdf).

Items That Are Included in Each Definition File (.mdf and .ddf)

1. In the **[MultipleDisk]** section of the .mdf files, register the list of .elf files.
2. In the **[DiskID]** section of the .mdf files, specify a value for TotalDisk.
3. In the **[DiskID]** section of the .mdf file, enter information if necessary.
4. Using the **[PathList]** section, register shared directories in the .mdf file.
5. In the .ddf file that corresponds to the .elf file, specify the local DvdRoot for each disc.

The following is an illustration list of the .mdf and .ddf files.

Example:

Game name: AAA
 Company name: HU
 Version: 1
 DISK count: 4
 DISK0 startup program: sample0.elf
 DISK1 startup program: sample1.elf
 DISK2 startup program: sample2.elf
 DISK3 startup program: sample3.elf
 DISK0 data directory: C:\Sample\Disk0
 DISK1 data directory: C:\Sample\Disk1
 DISK2 data directory: C:\Sample\Disk2
 DISK3 data directory: C:\Sample\Disk3
 Shared data directory: C:\Sample\Share

Shared directories are mapped to SYSTEM on the FST.

Listing

```

;-- contents of sample.mdf - top --
[DiskID]
GameName=AAAA
Company=HU
GameVersion=1
TotalDisk=4

```

```

[MultipleDisk]
0="sample0.elf"
1="sample1.elf"
2="sample2.elf"
3="sample3.elf"

```

```

[PathList]
SharePath="SYSTEM", "C:\Sample\Share"
;-- contents of sample.mdf - end --

;-- contents of sample0.ddf - top --
[Input]
DvdRoot="C:\Sample\Disk0"
;-- contents of sample0.ddf - end --

```

```
!-- contents of sample1.ddf - top --
[Input]
DvdRoot="C:\Sample\Disk1"
!-- contents sample1.ddf - end --

!-- contents of sample2.ddf - top --
[Input]
DvdRoot="C:\Sample\Disk2"
!-- contents of sample2.ddf - end --

!-- contents of sample3.ddf - top --
[Input]
DvdRoot="C:\Sample\Disk3"
!-- contents of sample3.ddf - end --
```

Note: DiskNumber in the [DiskID] section does not need to be written to the .ddf for each disc. The number specified by MultipleDisk in the .mdf file will be used as DiskNumber.

Note: You can specify any name for the .mdf file name. A search is made for all the .mdf files located in the same directory as the .elf files that NdevRun.exe will execute. A search is also made for the .mdf files registered in the [MultipleDisk] section by the .elf files that will be executed.

Appendix D Using Multiple NDEVs

The NDEV software includes a feature for connecting multiple NDEVs to one PC.

D.1 If Multiple Devices Are Run with `ndrun`

If multiple NDEVs are run with `ndrun` and `ndstop`, the following information should be entered.

- a. When a program is run with `ndrun`

<The first NDEV to run>

```
>ndrun -s=11111111 filename.elf [ENTER]
```

<The second and subsequent NDEVs to run>

```
>ndrun -z -s=22222222 filename.elf [ENTER]
```

- b. When ending a program with `ndstop`

When using `ndstop`, the order is irrelevant:

```
>ndstop -s=11111111 [ENTER]
```

```
>ndstop -s=22222222 [ENTER]
```

or

```
>ndstop -s=22222222 [ENTER]
```

```
>ndstop -s=11111111 [ENTER]
```

D.2 If Using One of Multiple NDEVs with the CodeWarrior IDE and the Others with `ndrun`

At this time, CodeWarrior does not support the connection of multiple NDEVs. However, with the following procedure, it is possible to use one of the multiple connected NDEVs with the CodeWarrior IDE.

1. In **Load Script**, under the CodeWarrior project settings, designate the connected NDEVs in the order of their serial numbers. Next, confirm the NDEVs that will be run, that is, the NDEVs that will be recognized.

```
Load Script: ndrun.bat $F $P -s=XXXXXXXX -$
Stop Script: ndstop.bat -s=XXXXXXXX
```

Normally, the NDEV whose power is turned on first is the NDEV that will be run. Due to the way in which Windows recognizes NDEV, sometimes an NDEV that was powered on after the first is run instead. Future revisions will allow you to select the NDEV to use.

2. The NDEV recognized in the preceding step will be used by CodeWarrior.
3. The NDEVs that are run with `ndrun` are those that were not recognized in CodeWarrior.

Note: If an NDEV ceases to run, try again starting from step 1.

D.3 About Serial Numbers

The serial number of a production NDEV is the same as that found on the seal on the rear face of the NDEV. Non-production NDEVs have different serial numbers.

To confirm the serial number, use the serial number selection dialog, which is displayed when `ODEM.exe` is run while multiple NDEVs are connected.

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