Quickstart Guide for the Revolution Development Environment

(for Revolution SDK 2.2)

Version 2.2.2

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Revision History

Revision No.	Date Revised	Items (Chapter)	Description
2.2.2	11/14/2006	All	Deleted NDEV version.
		3	Updated terminology. Deleted the item "NDEV version."
		3.1	Changed heading to "NDEV Points of Difference." Updated contents.
		4.1	Added description of openssl as reference information.
		5	Updated the diagram of NDEV. Updated contents.
2.2.1	10/23/2006	1	Changed written description to refer to Revolution SDK and patch Readme for the NDEV firmware version.
		3.2	Same as above.
		6.4	Same as above.
		3.1	Added 2.2 to supported Revolution SDKs.
		4.1	Changed description so that GNU make 3.80 is obtained from WarioWorld.
		6.3	Revised documents to be referenced to indicate appropriate documents as regards the method of using separate IDE settings.
2.2	9/28/2006	6.5	Added note about double quotation marks (”).
2.2	9/19/2006	4.1	Noted that Cygwin version 3.81-1 cannot be used.
2.1	8/22/2006	1, 3.2	Added an update to the NDEV firmware.
		3.1	Added information on NDEV version 2.1. Made corresponding changes in table. Added note regarding Sensor Bar and NDEV combinations.
		4.1	Added the names of the files downloaded for setup. Added a red oval around the button to cycle display of the different views. Added a description of how to change the make version.
		5	Added a description of how to configure for TeraTerm. Added NDEV 2.1 information on switching the Bluetooth module. Added the USB Controller content when the power is turned on.
		6.4	Added notes specific to Revolution SDK 2.1.
1.3	6/19/2006	3.1	Added the section "NDEV Version."
		5	Updated information for NDEV version 2.x.
		7	Updated the name of the directory used.

Revision No.	Date Revised	Items (Chapter)	Description
1.20	4/7/2006	5	Revised the notes about the dip switches.
1.10	3/28/2006	3	Revised some of the hardware description.
		5	Indicated the need to use a cross serial cable.
		6.6	Added a description of `RVL_NDEV.bat`. Indicated that only the bash shell is supported.
		7	Changed the demo so that its output is displayed on screen. Added notes specific to the CodeWarrior IDE.
1.00	3/14/2006	-	First release by Nintendo of America Inc.

1 Overview

Welcome to the Revolution Development Environment!

This document describes how to connect an NDEV, install the drivers and Revolution SDK, update the NDEV firmware, and how to build and run code.

The installation process differs from that of Nintendo GameCube™ in that it does not rely upon an install application. Instead, developers simply copy the relevant directories to their workstation and configure a few environment variables. Device drivers are installed separately.

The goal is to provide developers with as much control over their environment as possible, with a minimum of intrusive system settings. Furthermore, the Revolution SDK is designed to co-exist with other Nintendo development platforms, such as Nintendo GameCube and the Nintendo DS™ system.

Note: You must update to NDEV Firmware to the appropriate version before executing an application. The appropriate NDEV firmware version is given in the Revolution SDK to be used and the Readme file included with the patch. Note that NDEVs as shipped from the factory may not already be updated to the latest firmware.

2 System Requirements

The Nintendo Revolution Development Environment runs on x86-compatible computers with Microsoft Windows XP. Typical minimum system specifications are:

- 1.0GHz Pentium or Athlon class CPU.
- 512MB of RAM.
- 10GB of free hard drive space.
- Three (3) available USB 2.0 connectors.
- An RS-232 COM port.

3 Hardware Contents

The hardware for the Revolution Development Environment includes:

- NDEV Development Hardware
- A USB-based Disk Interface. This enables disk emulation on the developer's PC.
- A USB-based Debugger Interface. This channel provides debugger control.
- A USB-based Firmware Interface. This channel updates the firmware on the NDEV interface hardware.
- An RS-232 serial-based Terminal Interface. This channel provides terminal output from Revolution applications.

Note: For maximum performance, we strongly recommend that you plug the USB interfaces directly into the host controller of your PC (rather than a hub).

3.1 NDEV Firmware

Before executing an application, NDEV firmware must be updated to the appropriate version. For the appropriate NDEV firmware version and update method, see the Revolution SDK to be used and the Readme file included with the patch.

4 Software Contents

The Revolution Development Environment requires several software components.

Table 1 - Components of Revolution Development Environment

Item	Description
`RVL_SDK-XXXX.zip`	The Revolution SDK package
`NDEV-XXXXXX.zip`	NDEV disc emulation and device drivers
`CW_GCN_3_0_XXXXXX.zip`	Metrowerks CodeWarior

4.1 Obtaining Cygwin

The SDK build system requires the GNU Cygnus Tools for Windows (Cygwin), which are not included in this software package.

To obtain Cygwin, go to:

`http://cygwin.com`

Download the latest setup program from one of the listed mirror sites. Note that you will only be obtaining the setup *program* (a file named `setup.exe`); within the program, you will be presented with a choice of packages to install.

The packages provided may vary between sites.

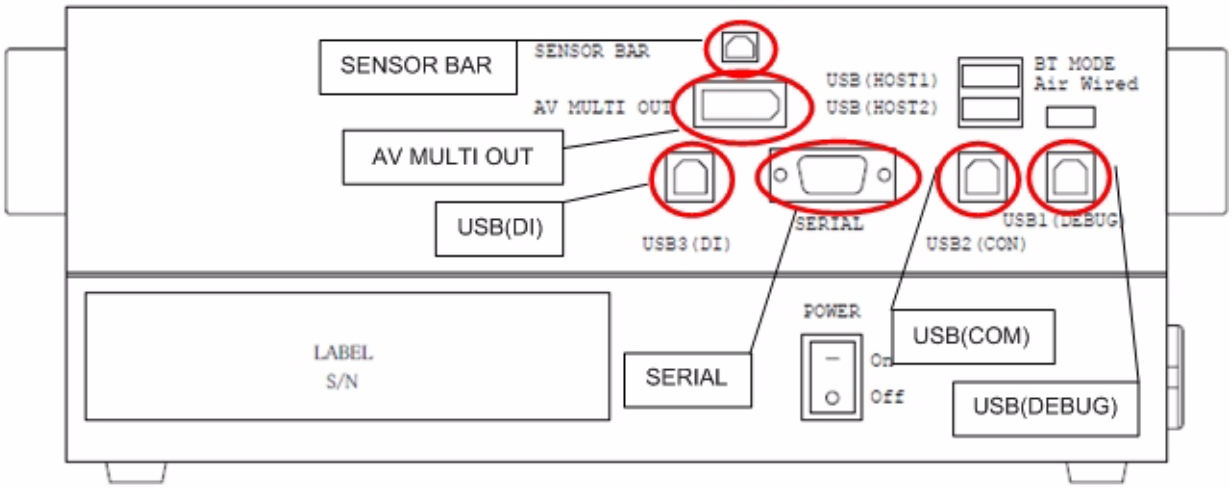
The make utility is required by the SDK build system. Because the latest version of GNU make 3.81, available from the Cygwin site, does not support DOS-style path expressions, it cannot be used for builds under the Wii development environment. Instead, use GNU make 3.80, which runs under the latest Cygwin environment currently distributed on WarioWorld and can be obtained there.

Note: When installing the Cygwin package, we recommend that you install it along with the openssl utility (version 0.9.8b-1). The openssl utility is used by the mastering tool and other utilities. For details, see the "Mastering Tool Quickstart Guide."

5 Connecting the Hardware

Figure 1 shows the rear panel of the NDEV system.

Figure 1 - NDEV System: Rear



Ensure that the power is off.

Connect USB cables from your PC to the ports marked USB(DI), USB(COM), and USB(DEBUG) (circled in red in Figure 1 on page 2).

Connect a serial cross cable (straight cables cannot be used) from your PC to the serial port on the rear of the NDEV system. You can monitor debug output on this port using a terminal program on the PC, such as TeraTerm (not included). Default settings for this communications channel are:

```
115,200 baud.
8-bit data.
No Parity.
One stop bit.
Receive/Transmit CR+LF
```

With TeraTerm, the first four of the above settings can be changed when Serial Port is selected in the toolbar's settings; when Terminal is selected, the last of the above can be changed. Settings for both sending and receiving Japanese characters should be SJIS. This can be changed when Terminal is selected in TeraTerm's toolbar settings.

When turned on, the Device Manager's USB Controller displays one "DI to USB" and two "EXI to USB" strings.

Connect the Sensor Bar to the port marked “SENSOR BAR.”

The port marked “AV MULTI OUT” provides audio and video output to your television monitor.

The switch marked "BT MODE" switches between wired and wireless versions of the Bluetooth module (set to wireless when shipped). As shown in the figures below, set the switch to the right when using the wired module, and to the left when using the wireless module. Be sure to toggle switches only while NDEV power is off.

A serial number is attached in the lower right corner.

Figure 2 - BT MODE Setting for Using the Wired Module Located on the NDEV Rear Panel (Enlarged View)

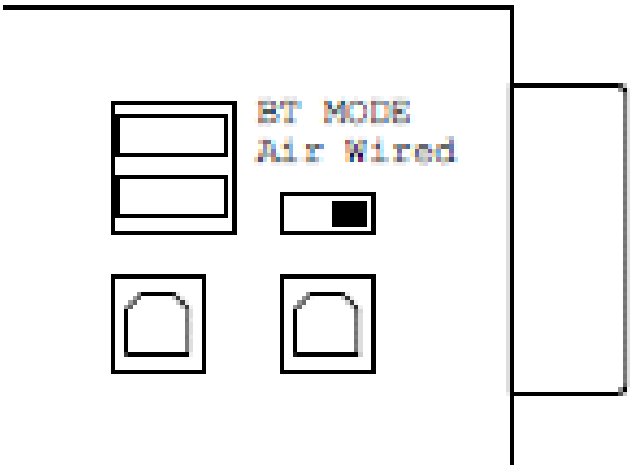


Figure 3 - BT MODE Setting for Using the Wireless Module Located on the NDEV Rear Panel (Enlarged View)

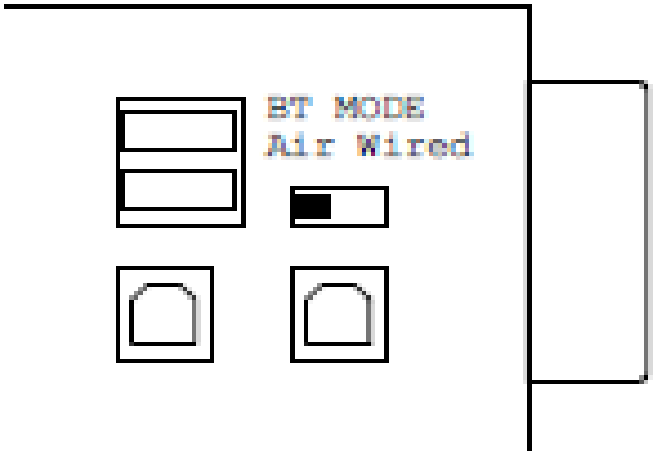
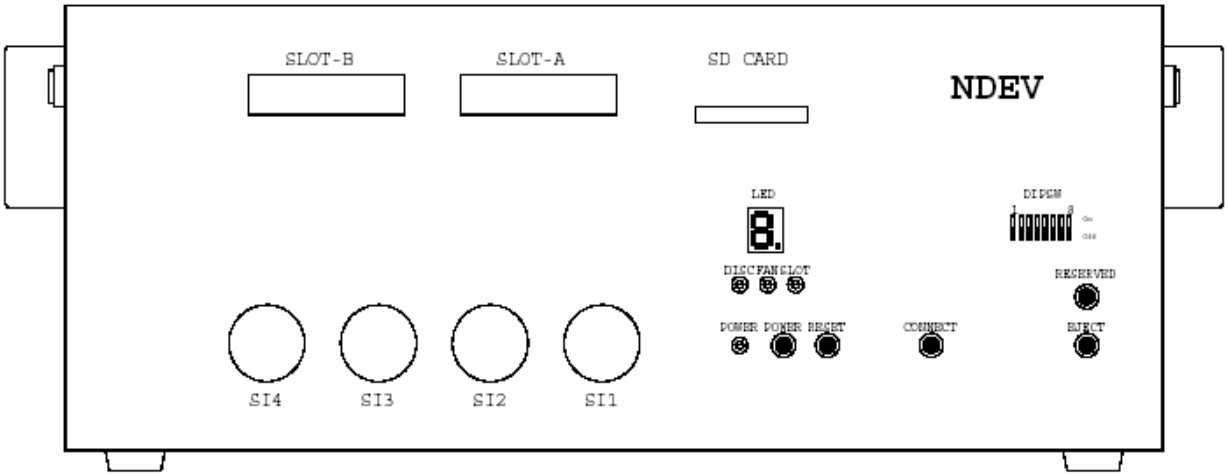


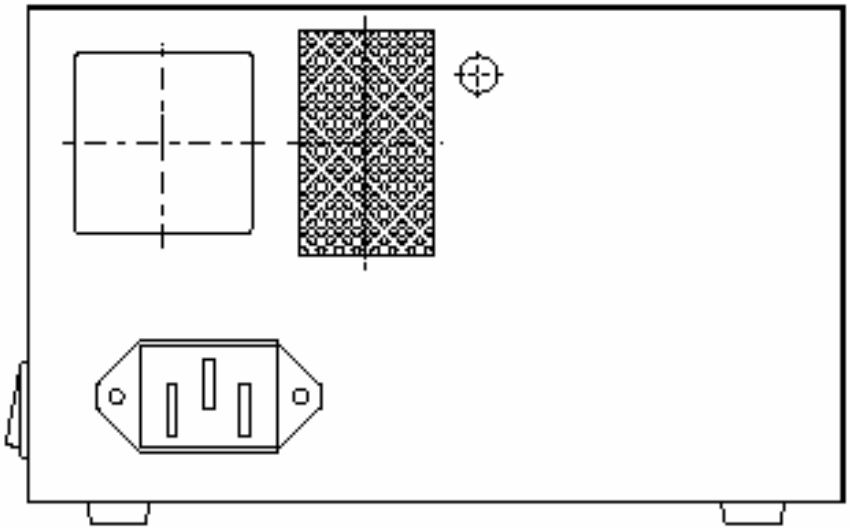
Figure 4 - NDEV Front Panel



Note: The controller ports on the front of the NDEV are ordered from right to left. Leave the DIP switches on the front panel in the ON position

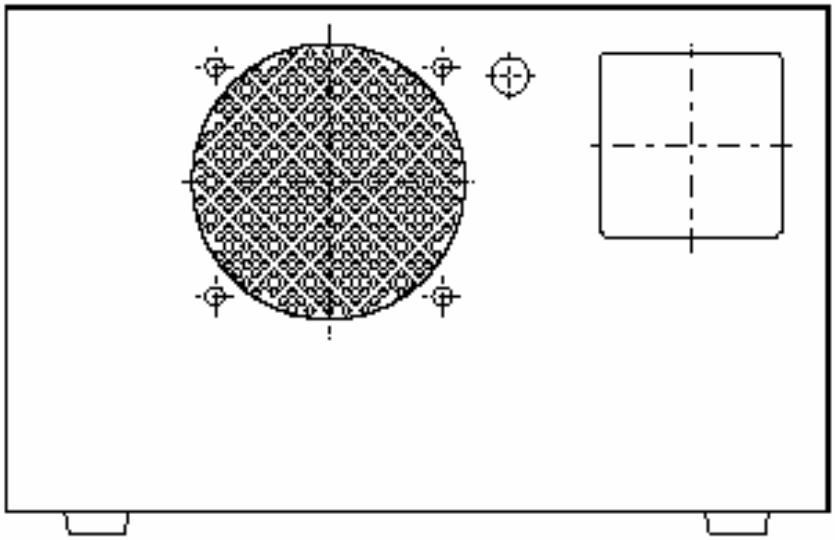
The NDEV includes an SMA connector for the wired Bluetooth module on the left panel.

Figure 5 - Left Panel of NDEV



Up to four wired Wii Remotes can be connected by connecting a wired controller hub to the SMA connectors marked "BT WIRED." Note that the player number does not depend on the connector being connected to. (This is set during registration.) Note that the wired Wii Remote and wired controller hub should be connected after turning NDEV power off.

Figure 6 - Right Panel of NDEV



6 Installing the Software

6.1 Cygwin

The Revolution SDK build system requires the Cygwin bash shell and developer tools. Ensure that you have retrieved the appropriate installation package as discussed in Chapter 4, "Software Contents".

Install the Cygwin package. Make a note of where you installed Cygwin; you'll need this information later.

Ensure that you have installed version 3.80 of `make`. Open a shell and type the following command:

```
% make --version
GNU Make 3.80
Copyright (C) 2002  Free Software Foundation, Inc.
This is free software; see the source for copying conditions.
There is NO warranty; not even for MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.
```

6.2 NDEV Disk Emulator and Interface

1. Unzip the contents of `NDEV-XXXXXX.zip` into a convenient directory of your choice.
2. Ensure that the hardware is connected, but turned off, as specified in “Connecting the Hardware” on page 2.
3. Go to the `ND-Installer-XXXXXX` directory and run the installation program. Follow the prompts.
4. Turn the system power on.

   Windows will recognize the presence of a new device and request a driver.
5. Navigate to `ND-Drivers-XXXXXX\WindowsXP` and select the given driver.

Note that there are three USB interfaces between the PC and the NDEV system. Windows will request a driver a second and third time. Navigate to the same directory, `ND-Drivers-XXXXXX\WindowsXP` in each case, and select the given driver.

Note: The NDEV Development Environment only supports Windows XP SP2 officially. It has not been tested with older versions of Windows.

6.3 Metrowerks CodeWarrior

Unzip the contents of the `CW_GCN_3_0_XXXXXX.zip` archive into a convenient directory of your choice. For example, `C:\CW_RVL`.

Make a note of the destination directory. You will need it to configure environment variables later.

Ensure that you execute `regservers.bat`, found in the `bin\` directory of your CodeWarrior installation. This will register the COM components of the Codewarrior IDE.

If CodeWarrior for Nintendo DS or for some other platform is already installed, its IDE configuration may be in use. If you want separate IDE configurations for each installation, refer to the section “Using Separate IDE Configurations” in the CodeWarrior Developer Notes `Revolution Tools.txt`.

6.4 Revolution SDK

Unzip the contents of the `RVL_SDK-XXXX.zip` archive into a convenient directory of your choice.

Move the `RVL_SDK\` directory to a location that is convenient to navigate from a shell. For example, `C:\RVL_SDK`.

Again, make a note of the destination directory. You will need it to configure environment variables later.

In addition, before executing a program, you must update NDEV firmware to the appropriate version. The appropriate version of NDEV firmware is given in the Revolution SDK and the Readme file included with the patch.

6.5 Environment Variables

We must now initialize environment variables for the Revolution Development Environment.

Find the file `RVL_NDEV.bat` which you extracted from the `RVL_SDK-XXXX.zip` archive. Open the file in a text editor and find the section marked “Please specify your installation paths here:”.

```
@echo off

REM ************************************************************
REM * Revolution SDK - Environment
REM ************************************************************
REM *
REM * Please specify your installation paths here:
REM *
REM ************************************************************

SET REVOLUTION_SDK_ROOT=C:\RVL_SDK
SET CWFOLDER_RVL=C:\CW_RVL
SET CYGWIN_PATH=C:\cygwin
```

You must change the items in red to match the installation directories for the each component.

The `REVOLUTION_SDK_ROOT` variable must correspond to the location of your SDK installation.

The `CWFOLDER_RVL` variable must correspond to the location of Metrowerks Codewarrior.

The `CYGWIN_PATH` variable must correspond to the location of your Cygwin installation.

Note that all paths must be in MS-DOS format.

Also note that ndrun may fail to execute when a double quotation mark (`"`) is included in the `PATH` environment variable. In this case, the double quotation mark must be deleted from the `PATH` environment variable.

6.6 Invoking a Revolution Shell

The batch file `RVL_NDEV.bat` will initialize these environment variables and invoke a Cygwin bash shell. Run this batch file when building or debugging your work.

Note that the environment settings are local to this shell session (and its children). These settings are not permanent, and they will not affect the rest of your system. Thus, you can support multiple platforms (such as Nitro or Nintendo GameCube) on the same PC.

However, there are some caveats:

- You must invoke only the RVL SDK build system from within this shell. Build systems for other platforms are not guaranteed to work.
- The CW IDE/Debugger is specific to Revolution and must be invoked from the command line of this shell session. To invoke the IDE/Debugger:

  ```
  % rvl_ide.sh
  ```

  You may then drag and drop Revolution projects or ELF files into the debugger.
- Only the bash shell is supported.

7 Running a Demo

Ensure that all USB cables are connected, and that the NDEV is powered on.

Open a terminal program and confirm that the COM port is properly configured (for communication channel settings see "Connecting the Hardware").

Open a bash shell by double-clicking on `RVL_NDEV.bat`

Now, we must specify a directory for disk emulation. At the prompt, enter:

```
% setndenv DvdRoot "C:\RVL_SDK\dvddata"
```

In this example, we are pointing the disk emulator at the `dvddata/` directory of the Revolution SDK. If you have installed your SDK elsewhere, modify the example accordingly. Note that the emulation system is case sensitive; ensure that you specify `DvdRoot`, and not `dvdroot`.

Note that if you inadvertently specify `dvdroot` instead of `DvdRoot`, please unset the variable first by issuing the following command:

```
% setndenv dvdroot
```

without a value. Then, re-specify with the desired name:

```
% setndenv DvdRoot "C:\RVL_SDK\dvddata"
```

Note that these NDEV settings will persist across sessions, until you decide to change the location of `DvdRoot`.

Note also that the disk emulator requires MS-DOS style paths. When invoking this command, you may need to enclose the path in quotes.

You can retrieve the current settings by issuing:

```
% getndenv
"DvdRoot" "C:\RVL_SDK\dvddata"
```

Now, go to:

```
% cd /cygdrive/c/RVL_SDK/RVL/bin/demos/gxdemo
```

Execute the sample demo program:

```
% ndrun smp-onetri.elf
```

The sample demo should then appear on your screen.

Note: When launching a demo in the CodeWarrior IDE, a Preference Modification Warning dialog box will appear the first time you open a single `elf` file. This is to be expected. When opening a single `elf` file for the first time, the CodeWarrior IDE turns off file caching and pre-build options in the IDE settings.
In addition, you also uncheck the *Run with CWComUtil* option. CWComUtil does not offer complete support for Revolution. To uncheck the option, from the Edit menu select Environment Settings -> Debugger -> GCN Remote Connection -> Run Settings. By default, CWComUtil is called first when running programs or debugging. However, its use is not necessary; programs can still be run and debugging can still occur without it.

8 Building Code

To build a single demo:

```
% cd /cygdrive/c/RVL_SDK/build/demos/<demo_name>
% make
```

To build a release (non-debug) version:

```
% make NDEBUG=TRUE
```

To build the entire SDK:

```
% cd /cygdrive/c/RVL_SDK/build
% make all
```

To remove all executable files and binary files:

```
% cd /cygdrive/c/RVL_SDK/build
% make clobber
```

For more details on the Revolution SDK, please refer to the Build System document under the Programmer's Guide.