DT-970GUISDK

First Step Guide

(Version 1.04)

CASIO Computer Co., Ltd.

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Editorial Record

Version no.	Date edited	Page	Content
1.00	October 2013		Original version
1.01	December 2013	3	A sample project is stored in CD folder
		8	Explanation correction about *4, *5
1.02	March 2014	13	Explanation correction about PATCH970.LOD
1.03	July 2014	13	Update the version of patch files.
1.04	September 2014	13	Update the version of patch files.

1. Overview

1.1. Provided Products

The DT-970 GUI SDK product CD includes the following content:

	Included items	Description
1	DT-970 Base SDK	An installer containing the following. A license key is required. • RENESAS RX C compiler • Development tools (Fontcnvw) • DT-930 application transition tool (AppConverter)
2	DT-970 Export SDK	An installer containing the following. (No license key required) • SDK Library/ Header • Development tools (KJ_CNVRT, APCNVY)
3	DT-970 Device Emulator	An installer containing the following. (No license key required) • Emulator • Simulator
4	DT-970 Application Builder	An installer containing the following. (No license key required) • Application Builder (IAppBuilder)
5	DT-970 USB Driver	A driver for connecting DT-970 to the PC. • Setup\USB\usbser.inf
6	Manual	The following manuals are included in the package. • Hardware Manual • Software Manual • First Step Guide • Application Development Guide • Device Control Library Manual • Support Libraries Manual • DT-900/930/940 Application Transition Guide • RENESAS RX Compiler Release Notes • RENESAS User's Manual: RX Coding • RENESAS User's Manual: RX Build • RENESAS User's Manual: Message
7	Sample applications	The same following project as DT-930 GUI SDK. • Sample\APSMP : Display / bar code function. • Sample\PRSMP : Printer operation

The following software, which is not included in the development environment product CD, should be obtained separately.

- LMWIN
- Microsoft Visual Studio 2008 Professional (Microsoft Device Emulator 3.0 bundled as standard)
- Microsoft ActiveSync or Microsoft Windows Mobile Device Center

1.2. **Overview**

DT-970 applications are developed on the following Windows PCs, using the C Language.

- Microsoft Windows XP Professional SP3 (x86)
- Microsoft Windows Server 2003 SP2 (x86)
- Microsoft Windows Vista Business SP2 (x86)
- Microsoft Windows Server 2008 SP2 (x86)
- Microsoft Windows Server 2008 R2 SP1 (x64)
- Microsoft Windows 7 Professional SP1 (x86/x64)

The only usable functions are those that are included in the manuals "Device Control Library Manual" and "Support Libraries Manual", which are on the CD included in the package.
*µITRON native system calls etc. not included in the above are not supported.

DT-970 application generation uses a "RENESAS RX C compiler" that is specific to the CPU used in the DT-970.
The created application is transferred, using LMWIN, to the DT-970.

Other than the above, it is also possible to use a Windows CE Emulator and run the Emulator for a DT-970 virtual device on a Windows PC. The Windows CE development environment is necessary for running Emulator.

The DT-970 application development environment can coexist with the DT-930 application development environment.
If Windows XP is used, both application development environments can be installed.

Do not install the following software in an environment in which the RENESAS RX C compiler, which is used as the DT-970 application development environment, is installed (Coexistence on one Windows PC is not supported).

- RENESAS CubeSuite+
- RENESAS High-performance Embedded Workshop

1.3. **Selecting the Development Environment**

There are the following three patterns of DT-970 application development, according to the usage method. Providing Application Builder enables application development through visual and intuitive operations that do not require expert knowledge of compilers etc.

[1] Create applications without using Application Builder, by directly using a compiler such as makefile.

[2] Create only the application for the actual device, by using Application Builder, but not using Emulator.

[3] Use Application Builder to create the application for the actual device, and test run it using Emulator.

The software required for each pattern is as stated below.

Necessary Software	[1] Do not use Application Builder or Emulator	[2] Use Application Builder Do not use the emulator	[3] Use Application Builder and Emulator
DT-970 Base SDK	Yes	Yes	Yes
DT-970 Export SDK	Yes	Yes	Yes
DT-970 Device Emulator	-	-	Yes
DT-970 Application Builder	-	Yes	Yes
Casio LMWIN	Yes	Yes	Yes
DT-970 USB driver	Yes	Yes	Yes
Windows CE development environment (*1)	-	-	Yes

*1 The following software is required.

- Microsoft Visual Studio 2008 Professional (Microsoft Device Emulator 3.0 bundled as standard)
- Microsoft ActiveSync or Microsoft Windows Mobile Device Center
  http://www.microsoft.com/en-us/download/details.aspx?id=8847
  http://www.microsoft.com/en-us/download/details.aspx?id=14
  http://www.microsoft.com/en-us/download/details.aspx?id=3182

2. Constructing the Development Environment

2.1. Windows Support of the Software Used

1) RENESAS RX C compiler

Supported Windows OS	RX C compiler
Windows XP Professional (x86)	Yes
Windows Server 2003 (x86)	Yes
Windows Vista Business (x86)	Yes
Windows Server 2008 (x86)	Yes
Windows Server 2008 R2 (x64)	Yes
Windows 7 Professional (x86)	Yes
Windows 7 Professional (x64)	Yes

*Also usable on Windows 8.

2) Software provided by Casio

Supported Windows OS	LMWIN	DT-970 USB driver
Windows XP Professional (x86)	Yes	Yes
Windows Server 2003 (x86)	Yes	Yes
Windows Vista Business (x86)	Yes	Yes
Windows Server 2008 (x86)	Yes	Yes
Windows Server 2008 R2 (x64)	Yes	Yes
Windows 7 Professional (x86)	Yes	Yes
Windows 7 Professional (x64)	Yes	Yes

*Supported by Windows (x86) with LMWIN Ver7. Supported by Windows 7/2008 R2(x64) with Ver7.08.

3) Microsoft Visual Studio

Supported Windows OS	Visual Studio 2008
Windows XP Professional (x86)	Yes (*1)
Windows Server 2003 (x86)	Yes (*2)
Windows Vista Business (x86)	Yes
Windows Server 2008 (x86)	Yes
Windows Server 2008 R2 (x64)	Yes (*3)
Windows 7 Professional (x86)	Yes (*3)
Windows 7 Professional (x64)	Yes (*3)

*Visual Studio 2008 is not supported under Windows 8.

Notes:

*1...Windows XP SP2 or above

*2...Windows Server 2003 SP1 or above

*3...Visual Studio 2008 Service Pack 1 must be applied

4) Microsoft Device Emulator 3.0

Supported Windows OS	Device Emulator 3.0
Windows XP Professional (x86)	Yes
Windows Server 2003 (x86)	Yes
Windows Vista Business (x86)	Yes
Windows Server 2008 (x86)	Yes
Windows Server 2008 R2 (x64)	Yes
Windows 7 Professional (x86)	Yes
Windows 7 Professional (x64)	Yes

5) Microsoft ActiveSync/Microsoft Windows Mobile Device Center

Supported Windows OS	ActiveSync	Windows Mobile Device Center
Windows XP Professional (x86)	Yes	No
Windows Server 2003 (x86)	Yes	No
Windows Vista Business (x86)	No	Yes
Windows Server 2008 (x86)	No	Yes
Windows Server 2008 R2 (x64)	No	Yes
Windows 7 Professional (x86)	No	Yes
Windows 7 Professional (x64)	No	Yes

2.2. Installation Procedure

Use the following procedure to install the various software on PCs used as the application development environment.

```
┌─────────────────────────────────────────────────────────────────┐
│ Microsoft .NET Framework 3.5 or 3.5.1                            │
│ Installation (*3)                                                │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ Visual Studio 2008 Professional                                 │
│ Installation                                                    │   ⎫
└─────────────────────────────────────────────────────────────────┘   ⎬ (*1)
                              ↓                                        ⎪
┌─────────────────────────────────────────────────────────────────┐   ⎪
│ Microsoft ActiveSync or Microsoft Windows Mobile Device Center   │
│ Installation                                                    │   ⎭
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ DT-970 Base SDK (The DT-970 development environment CD is included in the │
│ package)                                                        │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ DT-970 Export SDK (The DT-970 development environment CD is included in the │
│ package)                                                        │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ DT-970 Device Emulator (The DT-970 development environment CD is included in the │   ⎫ (*1)
│ package)                                                        │   ⎭
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ DT-970 Application Builder (The DT-970 development environment CD is included in │   ⎫ (*2)
│ the package)                                                    │   ⎭
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ LMWIN(*4)                                                       │
│ Installation                                                    │
└─────────────────────────────────────────────────────────────────┘
                              ↓
┌─────────────────────────────────────────────────────────────────┐
│ DT-970 USB driver (*5)                                          │
│ Installation                                                    │
└─────────────────────────────────────────────────────────────────┘
```

Notes:
*1 This is only required if Emulator is used.
*2 This is only required if Application Builder is used.
*3 This is not required if it is already installed on the Windows PC used.
   With Windows 7 and Windows Server 2008 R2, enable Microsoft .NET Framework 3.5.1 under activation and deactivation of Windows functions.
*4 Use Ver.7.11 or later of LMWIN.
*5 In order to install the USB driver, set DT-970 in USB communicating status, then connect DT-970 to Windows PC via USB, and specify "usbser.inf" in a Setup\USB folder on PC.
    Refer to the manual of "LMWIN" for its detail.

On Windows 7
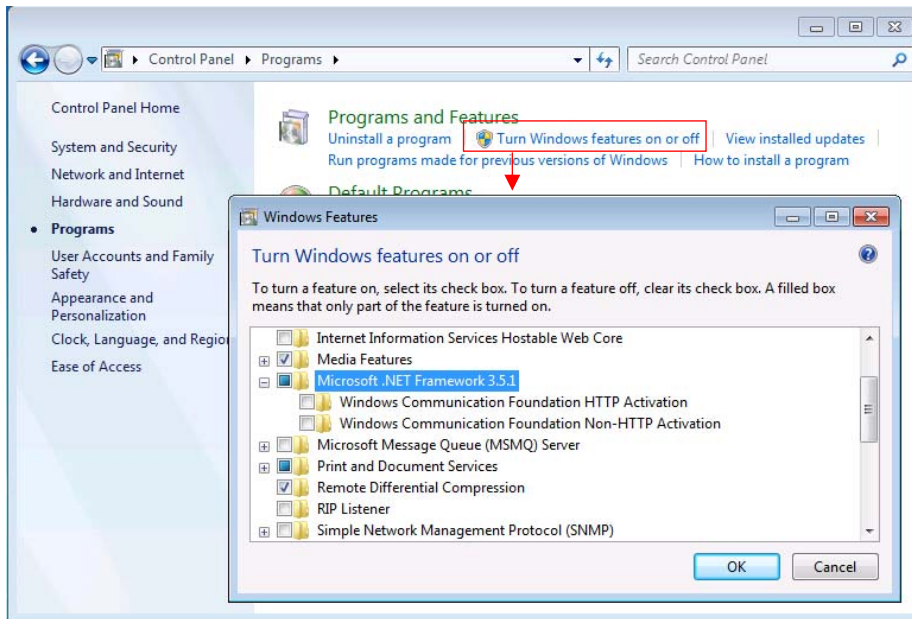
The following two that are displayed under the tree tiers are not required:
- Windows Communication Foundation HTTP Activation
- Windows Communication Foundation Non-HTTP Activation

Therefore, the check box for Microsoft .NET Framework 3.5.1 is grayed out.

2.3. Precautions on Installation

1) Installation execution user

Installation should be performed by a user with administrator privileges.

2) Installing under Windows Vista/Windows 7/Windows Server 2008

If you are installing under Windows Vista/Windows 7/Windows Server 2008, use one of the methods below to install in a state where UAC privilege demotion does not occur.

Method 1	The Windows Login User should be logged in as "**Administrator**" to perform the installation. * This does not mean a user with Administrator privileges, but "**Administrator**" as the actual user name.
Method 2	Disable UAC. * Control Panel -> User Accounts -> Change User Account Control. * A reboot is required when it changes.

3) Installing without Visual Studio

The warning dialog box is displayed if the DT-970 Export SDK is installed without Visual Studio.
Please choose "**Close**" button and continue processing.
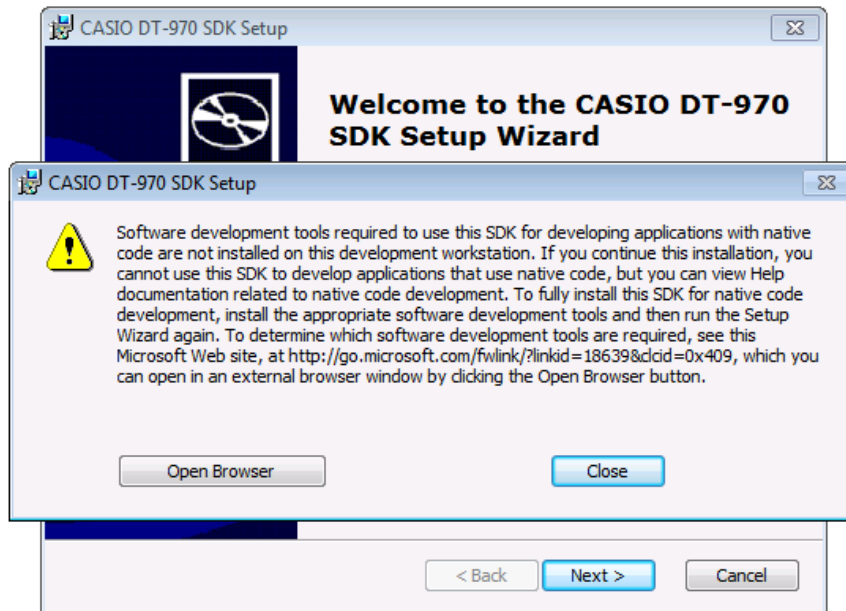
4) Installing the Device Emulator

The following dialog box is displayed if the device emulator is installed as the SDK for another model, so uninstall the previously installed device emulator and install again.

Windows Installer

Another version of this product is already installed. Installation of this version cannot continue. To configure or remove the existing version of this product, use Add/Remove Programs on the Control Panel.

OK
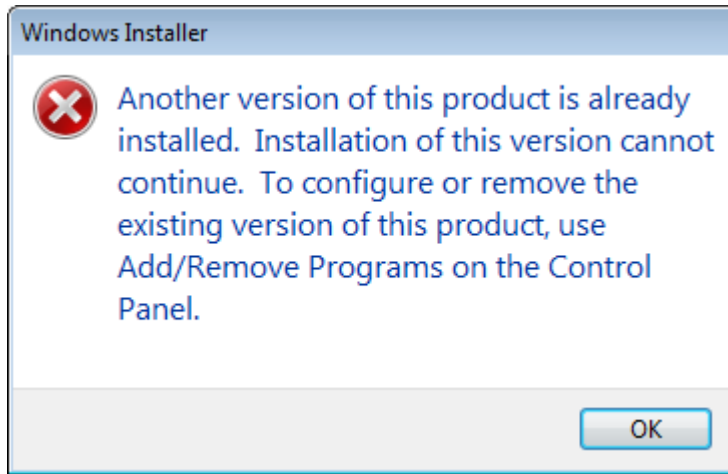
2.4. **Connection the DT-970 and a PC**

In the DT-970 Application Development Environment, use LMWIN to transfer each type of file to the DT-970.
Connect the PC and the DT-970 in one of the following forms:
The recommended forms of connection are 1), 2), and 3).

1) Connect directly with a USB cable [HA-N81USBC]

HA-N81USBC

MicroB-type USB connector
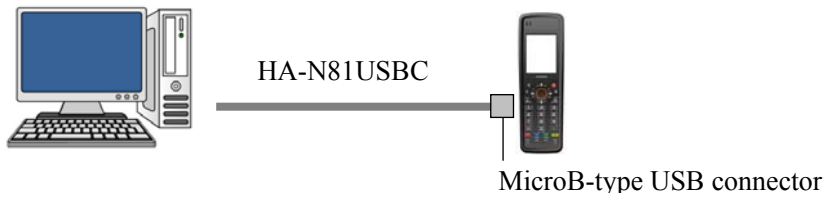
2) Connect with a USB cradle [HA-N60IO]

DT-380USB-A

USB contact terminal

USB cradle
[HA-N60IO]

Type B USB connector
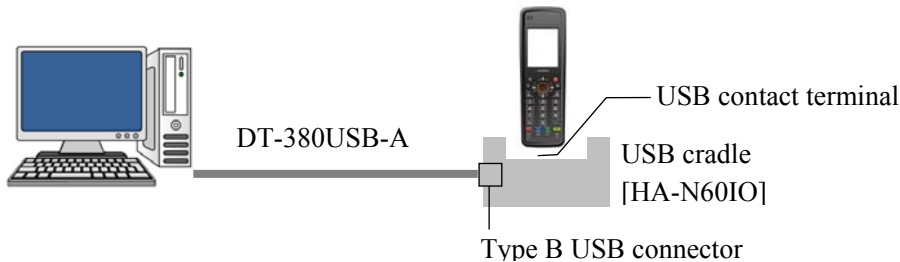
3) Connect with a LAN cradle [HA-N62IO] via USB

The development environment does not support application transfer with LAN connection using the LAN cradle.

DT-380USB-A

USB contact terminal

LAN cradle
[HA-N62IO]

Type B USB connector
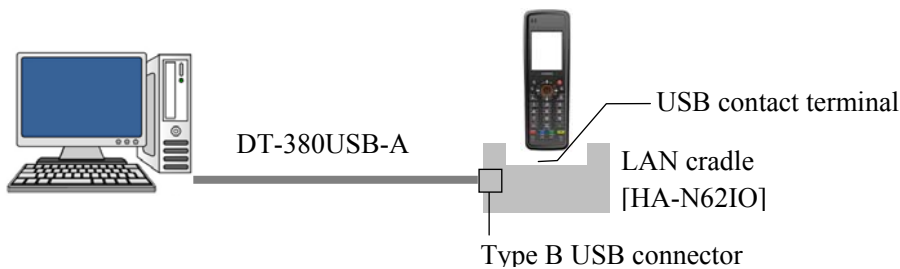
4) Connect with an IrDA-USB cradle [HA-E60IO], and cradle attachment [HA-N64AT]

Cradle attachment
[HA-N64AT]

IrDA

DT-380USB

IrDA-USB cradle
[HA-E60IO]

Type B USB connector
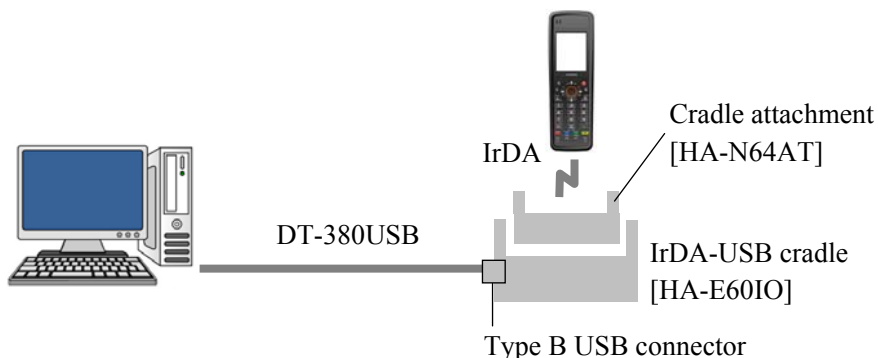
3. Application Development and Testing

3.1. Application Development

DT-970 applications are written in C Language.
The start routine for the DT-970 application is void ap_start( ), not main( ).
Application processes are written in a form that is called from ap_start( ).

```
void ap_start( )
{
    // TODO


}
```

The only usable functions are those that are included in the manuals "Device Control Library Manual" and
"Support Libraries Manual", which are on the CD included in the package.
If these functions are used, use the header and library stated in each manual.

3.2. Application Testing

Transfer the created application via LMWIN to the DT-970, and run an operation test.

1) Patch File (PATCH001.LOD/PATCH970.LOD)
These are system files which applies functional enhancement and bug fixes.
Please transmit patch files (PATCH001.LOD/PATCH970.LOD) to DT-970.
These patch files (Ver1.20) are enclosed in this SDK.
In case the latest version is released, please get and install it.

2) Startup Application Specification File (ASTART.HTS)
If the application is put into the format (*.LOD) for transfer using LMWIN, it is necessary to specify
the program to start, but the specification is provided by this file.
The file specified here is the program that starts when "**EXECUTE AP**" is selected in the System
menu.
The format is that stored in the application path name.
E.g. To specify SAMPLE.LOD in the root of drive A:

```
A: \SAMPLE.LOD
```

3) ID File (CONFIG.ID)

When the ID file (CONFIG.ID) is created and transferred to the DT-970, it is not necessary to register the ID manually. The file content is 6 alphanumeric characters +CR/LF.

Create the ID file as necessary and transfer it to the DT-970.

(The content of the ID file, as it stands, becomes the ID of the DT-970, so if the same file is transferred to multiple DT-970 units, they all take the same ID).

4) System Environment File (CONFIG.HTS)

The contents of the system environment file can be reflected in "**EXECUTE AP**" starting or a reset start-up by putting a system environment file on an application storing directory.

Refer to "Software Manual" for details.

Other than the above, it is also possible to use a Windows CE Emulator and run the Emulator for a DT-970 virtual device on a Windows PC.

Emulator running also allows virtual barcode input using the Simulator.

However, it is running on a virtual device, so some functions will not work.

Refer to "Application Development Guide" for details.

3.3. Transitioning DT-900/930/940 Applications

The DT-900/930/940 Application Transition Guide (*1) and transition tool (*2) are provided to assist in transitioning DT-900/930/940 applications to the DT-970.

Notes:
*1 Stored in the Manuals folder of the product CD provided.
*2 Stored in the Basic Development Environment installer on the product CD provided.

The DT-900/930/940 Application Transition Guide contains the following content:

- Compatibility of functions used on the DT-900/930/940 with the DT-970
- Transitioning communications processes (Transition from Multi-drop to LMWIN. Transitioning from IrDA to Bluetooth/LAN/USB)

Using the transition tool, it is possible to check the existence in the source of statements concerning the above.
It is also possible to replace some content using the transition tool.

The steps of the application development procedure are basically the same as they were for the DT-900/930/940, but the compiler and linkage editor used are different, so there are differences in aspects such as option specifications.

On the DT-900/930/940, AP_START.OBJ and AP_INIT.OBJ were provided as startup objects for application creation, but on the DT-970, those two objects are merged and only AP_START.OBJ is provided. (There is no need to link to AP_INIT.OBJ)

The Memory Write Protection function that was supported on the DT-900/930/940 is not provided as a function on the DT-970.
Therefore, the re-linkage process for reallocation of the sections below, which was run as part of the application development procedure for the DT-900/930/940, does not need to be run on the DT-970. (In a GUI development environment, this content is hidden, so there is no need to be concerned with it).

1. B, R section reallocation (SUBMK.EXE) after link execution with the linkage editor
2. Re-linkage execution after updating the SUBCOMMAND file