User's Manual
TK-850/JH3E+NET

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CAUTION

・Do not give any physical damage to this equipment such as dropping
・Do not superimpose voltage to this equipment.
・Do not use this equipment with the temperature below 0℃ or over 40℃.
・Make sure the USB cables are properly connected.
・Do not bend or stretch the USB cables.
・Keep this equipment away from water.
・Take extra care to electric shock.
・This equipment should be handled like a CMOS semiconductor device. The user must take all precautions to avoid build-up of static electricity while working with this equipment.
・All test and measurement tool including the workbench must be grounded.
・The user/operator must be grounded using the wrist strap.
・The connectors and/or device pins should not be touched with bare hands.

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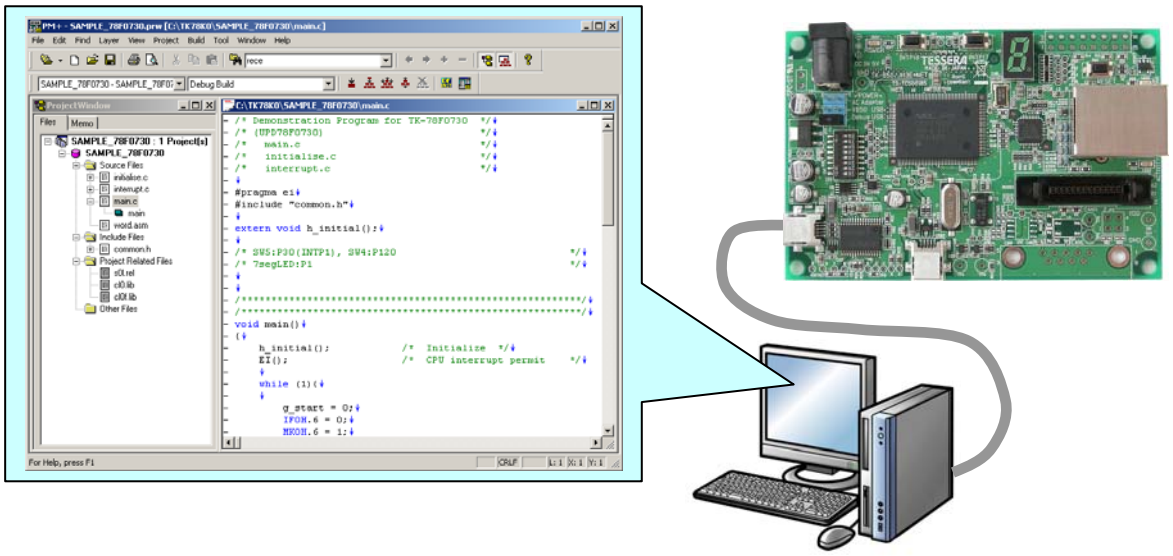
Introduction

TK-850/JH3E+NET is the evaluation kit for development using "V850ES/JH3-E", NEC Electronics 32bit all flash microcontroller.
The user only needs to install the development tools and USB driver, and connect the host machine with the target board to start the code development, build, monitoring the output, and debugging code.
(This demonstration kit uses the on-chip debug feature from the microcontroller itself, without emulator connection)

Configuration for Debugging



Overview This manual consists of the following contents.
Read chapter 1 and 2 first for installing the development tools and using the sample programs.
Read chapter 3-5 for customizing the sample programs and the hardware.

Chapter 1: Preparations
Install the development tools

Chapter 2: Experiences
Experience the basic operations of integrated development environment (PM+) and integrated debugger (ID850QB) with using sample programs.

Chapter 3: Hardware Specifications
Explain the hardware of TK-850/JH3E+NET

Chapter 4: Troubleshooting
Describe how to solve troubles you may face, such as errors when starting the integrated debugger (ID850QB)

Chapter 5: Other Information
Introduce other information, such as how to create a new workspace (project) on integrated development environment (PM+), how to register additional source file, and some useful tips of the integrated debugger.
The circuit diagrams of demonstration kit are included in this chapter.

Reader This manual is intended for development engineers who wish to become familiar with the development tools for the V850.
It is assumed that the readers have been familiar with basics of microcontrollers, C and Assembler languages, and the Windows™ operating system.

Purpose This manual is intended to give users an understanding of the features, hardware configurations, development tools for the V850.

CHAPTER 1　Preparation

This chapter describes following topics:

- Overview and installation of development tools
- Installation of development tools
- Overview and preparation of sample programs

Users can experience the development flow such as coding, build, debugging, and test, by using the development tools bundled with TK-850/JH3E+NET.

1.1 Development Tools / Software

- Integrated Development Environment (IDE) PM+ V6.31

  The IDE works on Windows operation system.
  Users can develop a system efficiently by using the editor with idea processor function, compiler, and debugger.

- C Compiler CA850　W3.30 (code size limited version)

  C compiler for the V850 microcontrollers. The object code size is limited to 128 Kbyte.
  This compiles C code for V850 and ANSI-C code program into assembler code.
  This produces object code and linker.

- V850 Integrated Debugger ID850QB V3.60

  This is the tool for debugging the object program generated by C compiler and assembler. The debugger enables to do C source level debugging. With the debugger, you can debug the code easily and efficiently by refering and changing variables, using step-in debuging function, and so on.

- Device file DF703786 V1.00

  A device file contains device specific information. So, users need a device file to use the development tools.

- Built-in Flash Memory Writing Program WriteEZ5

  This is the Windows software to write programs on built-in flash memory.
  By connecting TK-850/JH3E+NET and PC with bundled USB cable, you can write/delete programs on the built-in flash memory.

- Sample program

  This is the sample program to run the Web server and to send/receive email.

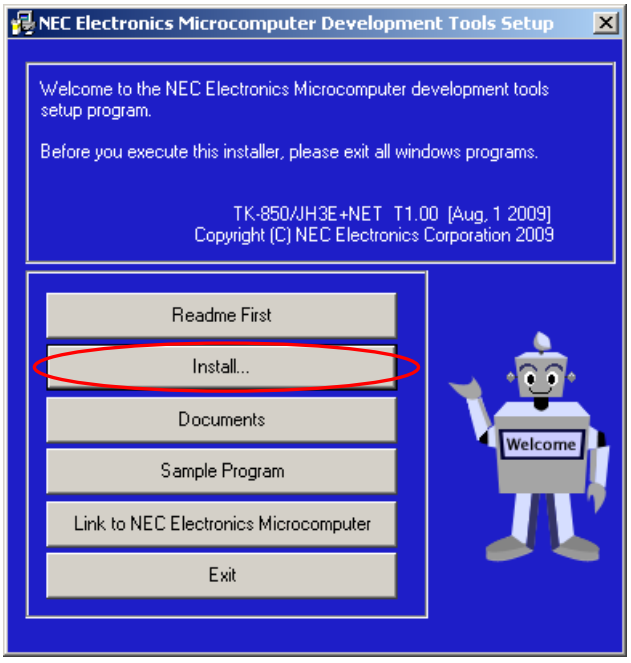
1.2 Installation of Development Tools

1.2.1 Installation Package

The attached CD-ROM includes the development tools and documentations. Users can use the installer to install those development tools and documentations.

1.2.2 Installation of Development Tools

① Please insert the CD-ROM in the drive. The installer will show up automatically. If it does not start automatically, please initiate it by double clicking the SETUP.EXE.



<1> Readme First

The contents of the CD-ROM, and some notes are available.

Please read it at first.

<2> Install…

Click "Install" to start installation of development tools.

For details, please refer to the next section.

<3> Documents

Manuals of development tools and the evaluation kit are available in PDF files.

When this button is clicked, the WWW browser will start. Adobe® Acrobat® Reader is available in the CD-ROM.

<4> Sample Program

Click this button to start the WWW browser for the sample program and the tutorial.

<5> Link to NEC Electronics Microcontrollers

Click this button to start the WWW browser display the link to the NEC Electronics Microcontroller web site (http://www.necel.com/micro/index_e.html)

The NEC Electronics Microcontroller web page provides with the latest product/tool information and FAQs.

<6> Exit

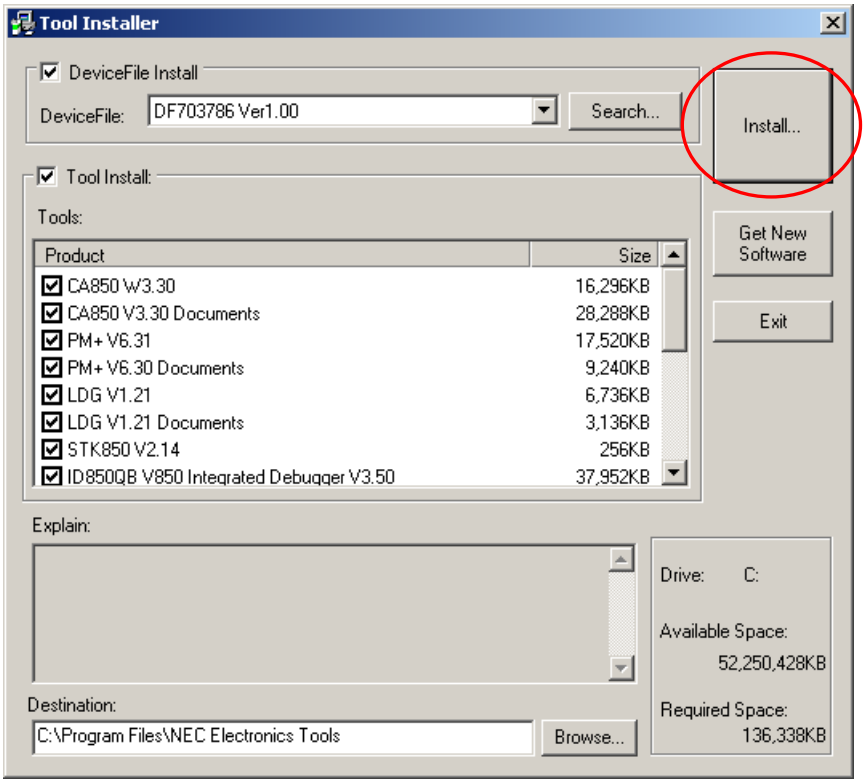
Terminate the setup.

② Click the "Install"

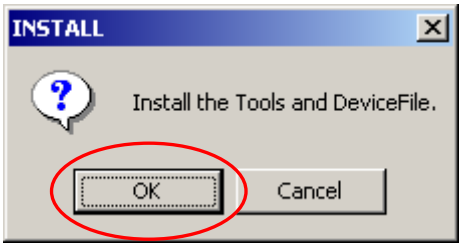
③ "Tool Installer" dialog box is opened.
Select products that you need to install.
(as default, all the products that you need to use the TK-850/JH3E+NET are selected.)
"Explain" area displays an explanation of the selected product.
To change the installation destination, click Browse··· .

When all the settings are completed, click Install··· .

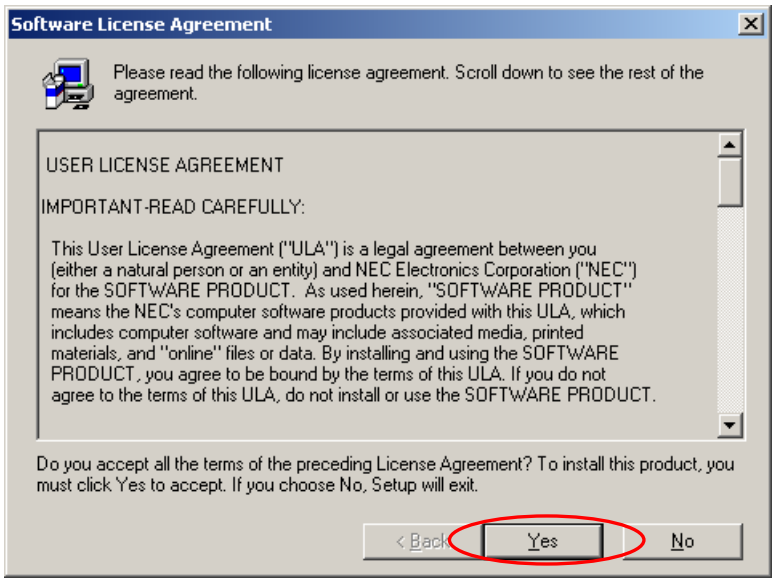
* In this document, it is assumed that users install the programs under "NEC Electronics Tools" directory (default installation directory). Users can find the tools by selecting "Start Menu" -> "Programs" -> "NEC Electronics Tools".



④ Click OK when "Install" comfirmation dialog box is opened.

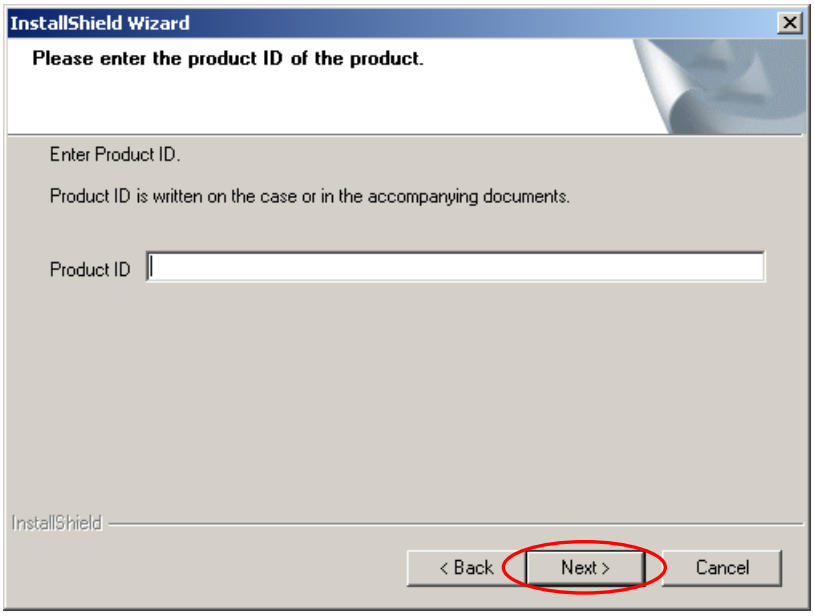


⑤ Read "software license agreement" and click [Yes] for continuing the installation.
To stop the installation, click [No] .



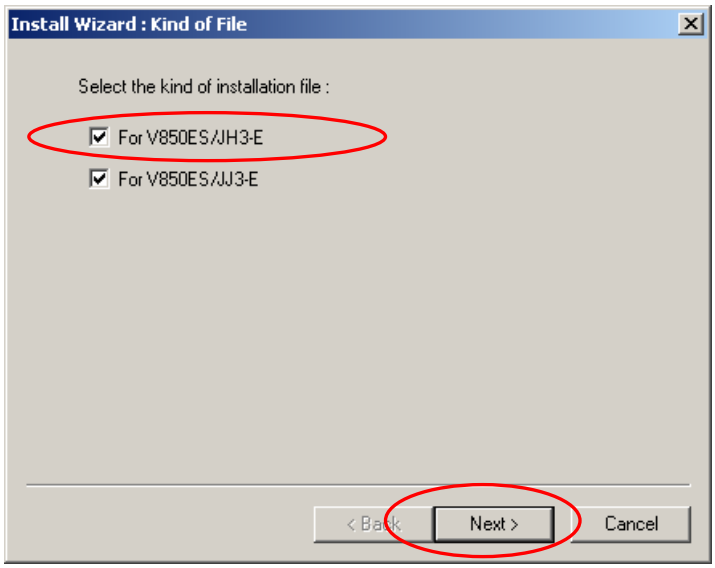
⑥ Enter the product ID, and click [Next] .

＊The product ID is available on the other sheet.

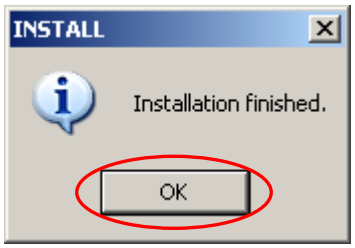


⑦ It starts copying the files.

⑧ Check the item specified below is selected when "Kind of File" dialog displays.
Click "Next".



⑨ When the installation is completed, the following dialog opens.
Click OK .



Notes on the installation authority

To install this tool in Windows 2000 or XP, the authority of an administrator is necessary. Therefore, please login as an administrator.

Notes on the install-directory

Please do not use 2-byte characters, such as umlaut in the directory name, where the product is to be installed.

Note on the version of Windows

If the language of the Windows is not English, a file transfer error during installation might be observed. In this case, please abort the installation in the language, and re-install it in an English version of Windows.

The identical problem may be observed, if a language other than English is specified as the system language in the "Regional Settings Properties" tab.

Limitation

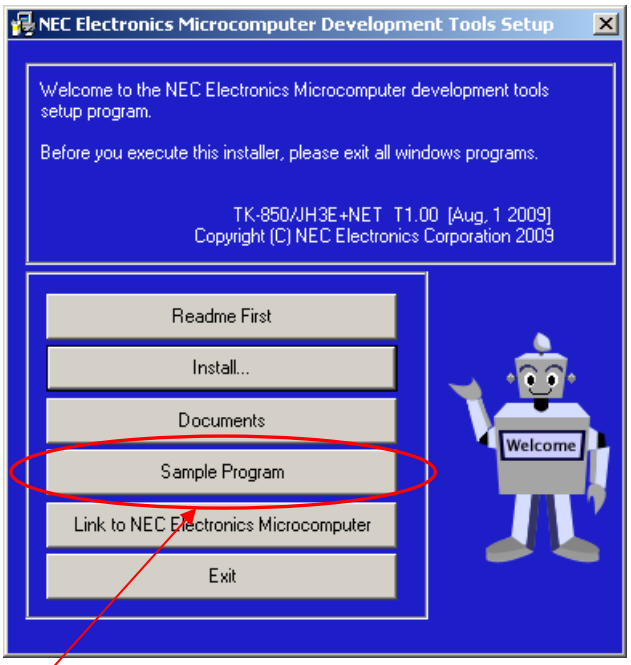
Assembler RA850 and C compiler CA850 limit the object size to 128Kbyte.

1.3 Sample Programs

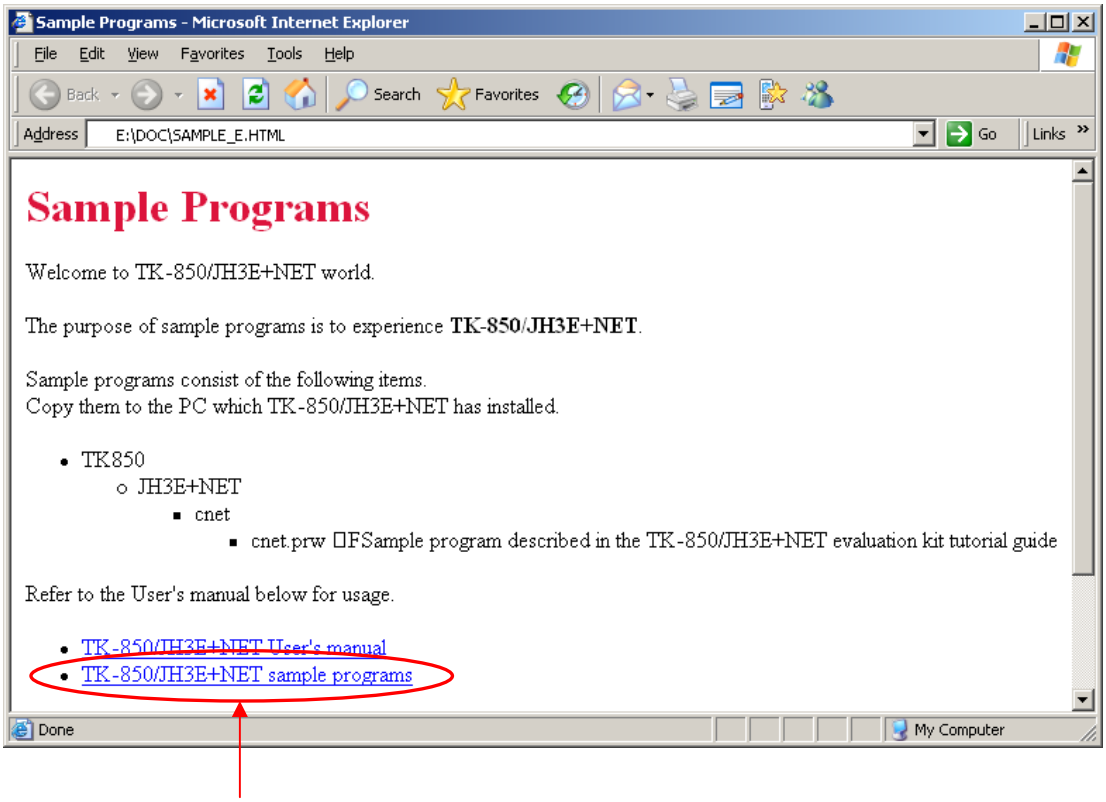
This section explains the overview and preparation of sample programs.

1.3.1 Preparation of Sample Programs

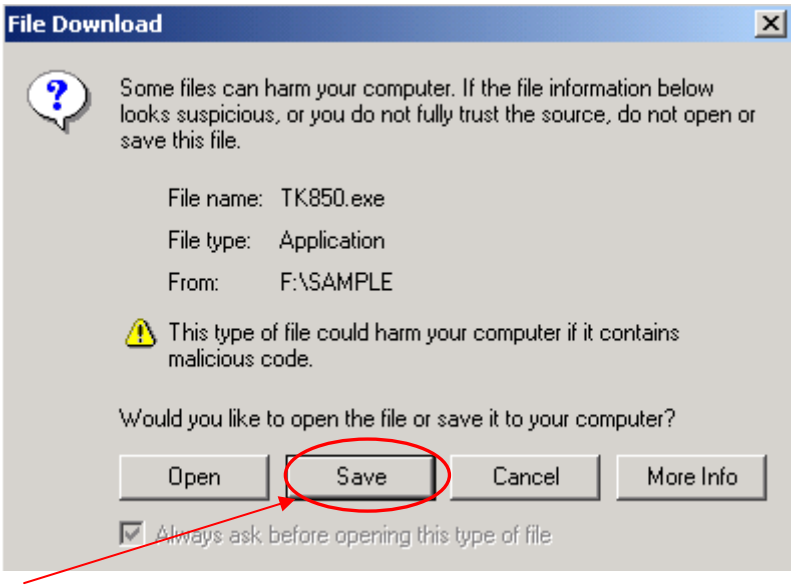
① Insert the CD-ROM disk in the CD-ROM drive of your PC. The [NEC Electronics Microprocessor Development Tools Setup] screen automatically appears.(if this screen does not appear automatically, start setup.exe from Explorer. etc.)



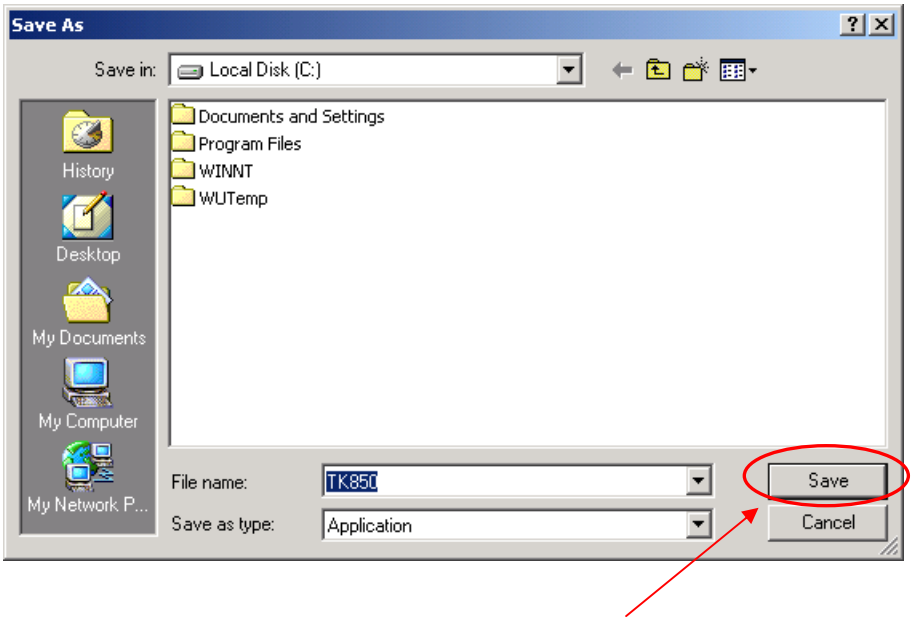
② Press the Sample Program button to start the WWW browser.



③ Click the "TK-850/JH3E+NET Sample Programs" link , the following download confimation window appears.



④ Click the Save butten.

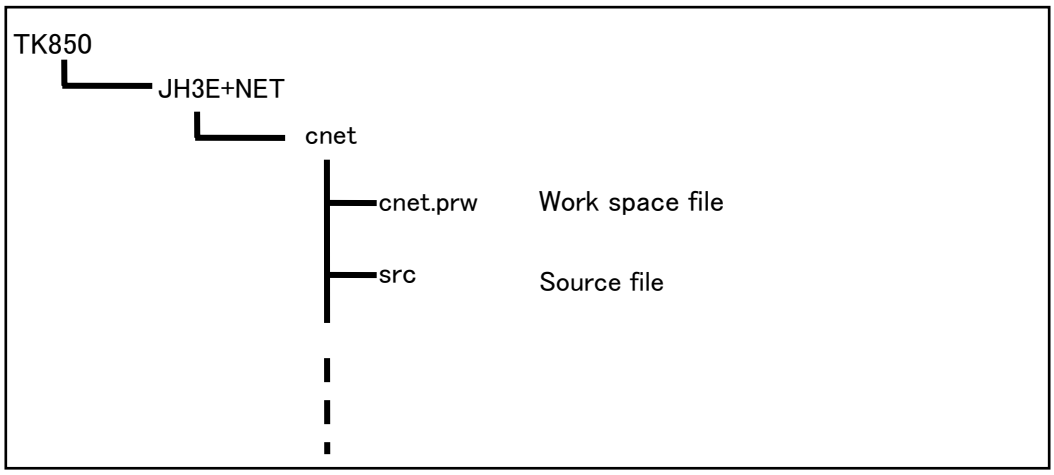


⑤ After specifying the download destination folder, click the Save button.

⑥ The self-extraction sample program (TK850.exe) is copied to the specified folder.
The folder that the "TK850" folder is made when this file is executed, and the sample program is stored under the"TK850" folder.

1.3.2 Overview of Sample Programs

The sample programs consist of following folders.



1.4 Installation of USB Driver

"NEC Electronics Starter Kit Virtual UART" USB driver must be installed on PC before you start using the TK-850/JH3E+NET.
Please, follow the instruction below to install the driver.
"Starter Kit USB Driver" must be installed on the PC. If not, please refer to "1.2 Installation of Development Tools" to install the driver first.

CAUTION:

Do not use a USB hub for connecting TK-850

First, connect the TK-850 to PC with USB.

Depending on the version of Windows OS, the installation will be differed. Please check your Windows version, and follow the instructions

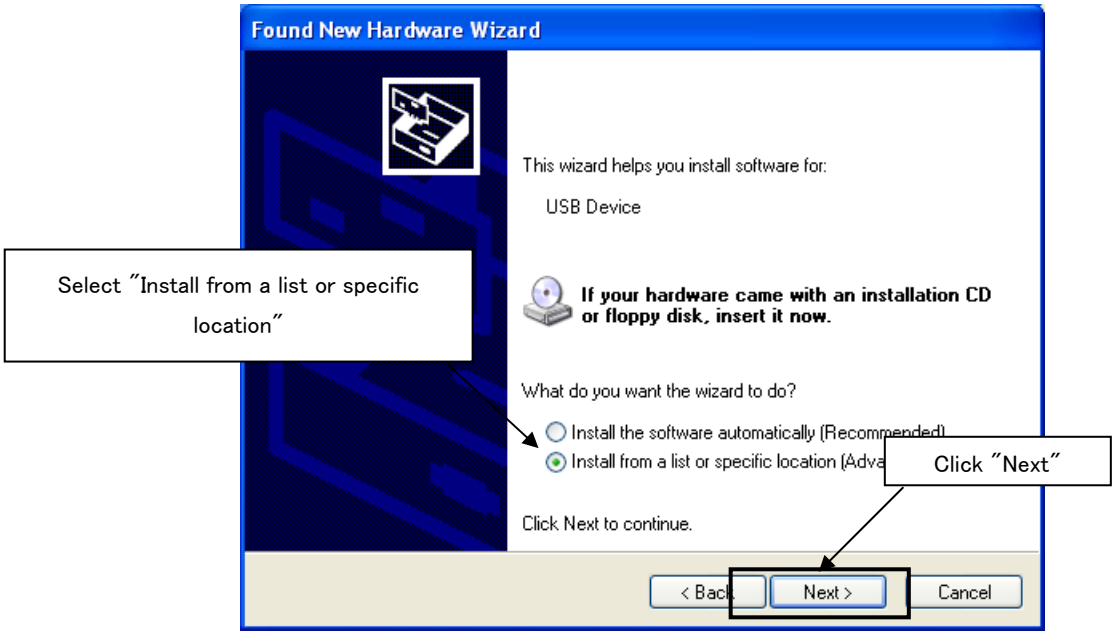
- Windows XP -> "1.4.1 Installation on Windows XP"
- Windows 2000 -> "1.4.2 Installation on Windows 2000"

After the installation, go to "1.4.3 Completion of USB Driver Installation"

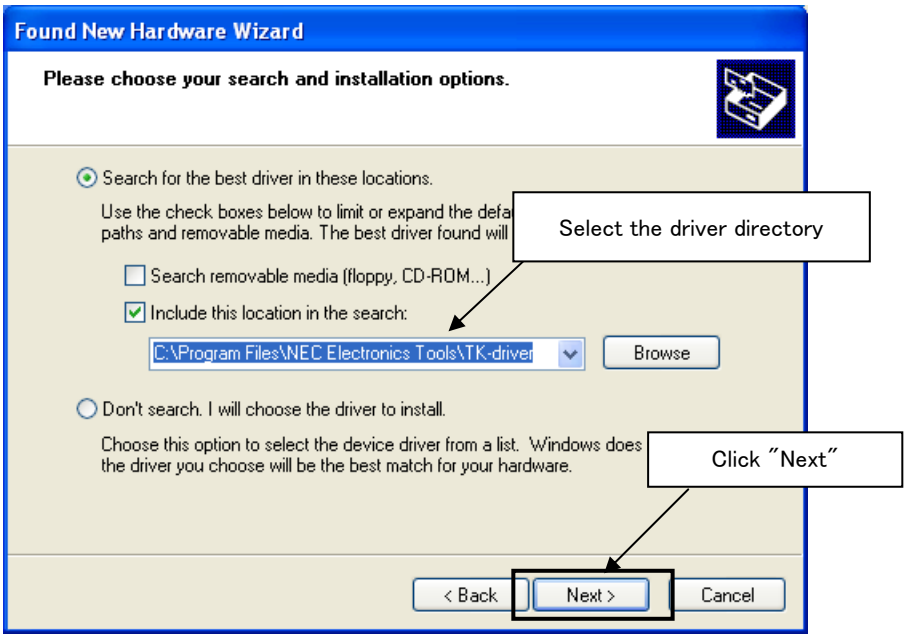
1.4.1 Installation on Windows XP

1. Once the TK-850/JH3E+NET is connected with USB, the "Found New Hardware Wizard" will be started.
   Select "No, not this time" and click Next > .

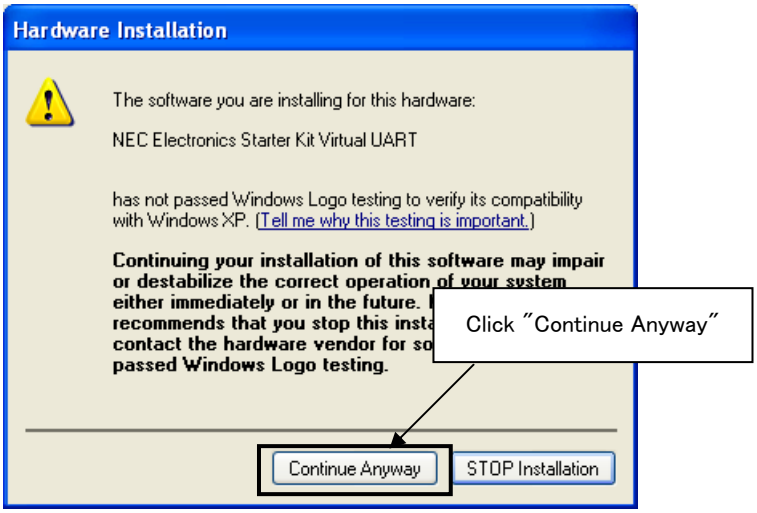
2. Select "Install from a list or specific location" and click Next > .



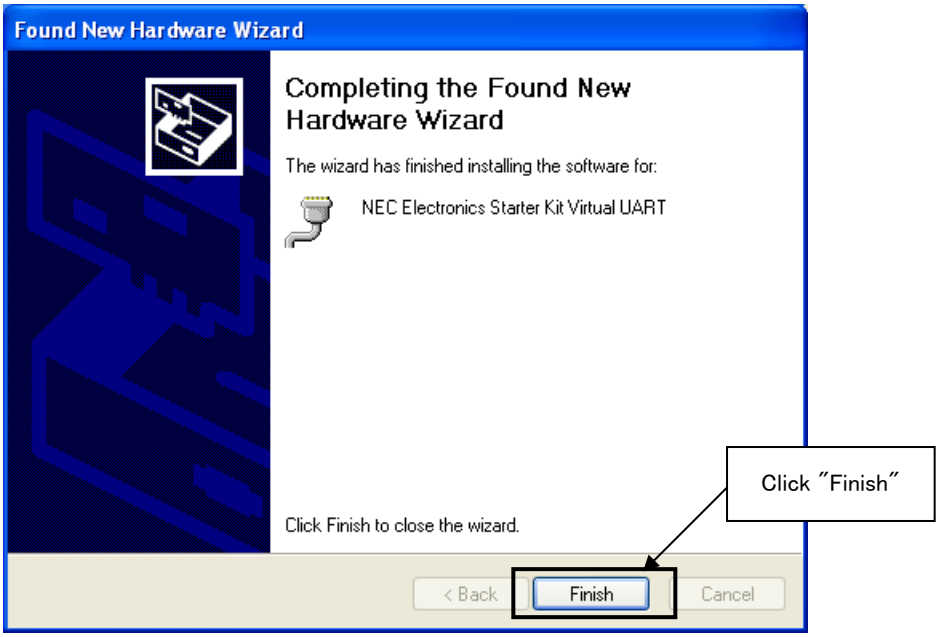
3. Select "Search for the best driver in these locations.", check "Include this location in the search:", and then click "Browse..." to select the driver directory path. The path should be "C:¥Program Files¥NEC Electronics Tools¥TK-driver" as default installation. If the installation directory is not default, then select "TK-driver" under the installation directory.
   Click [Next >] .



4. If the following dialog is opened, click [Continue Anyway] .



5. The installation of "NEC Electronics Starter Kit Virtual UART" driver is completed. Click Finish .

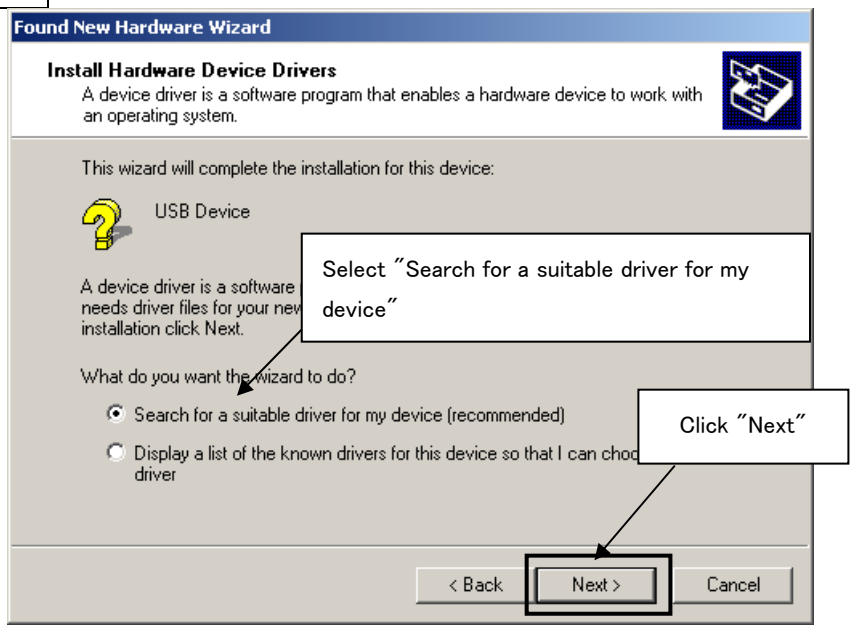


6. Go to "1.4.3 Completion of USB Driver Installation".

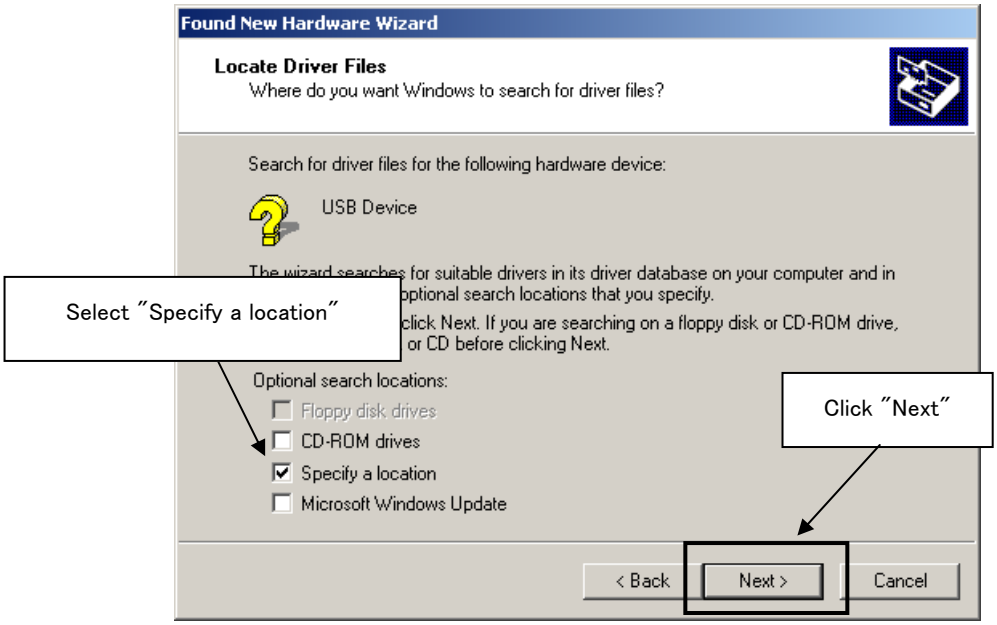
1.4.2 Installation on Windows 2000

1. Once the TK-850/JH3E+NET is connected with USB, the "Found New Hardware Wizard" will be started.
   Select "No, not this time" and click [Next >] .

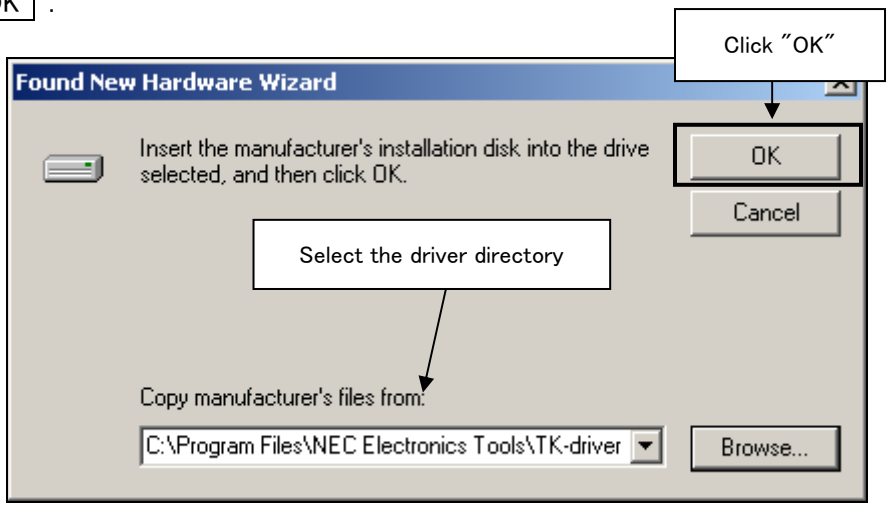
2. Select "Search for a suitable driver for my device".
   Click [Next >] .



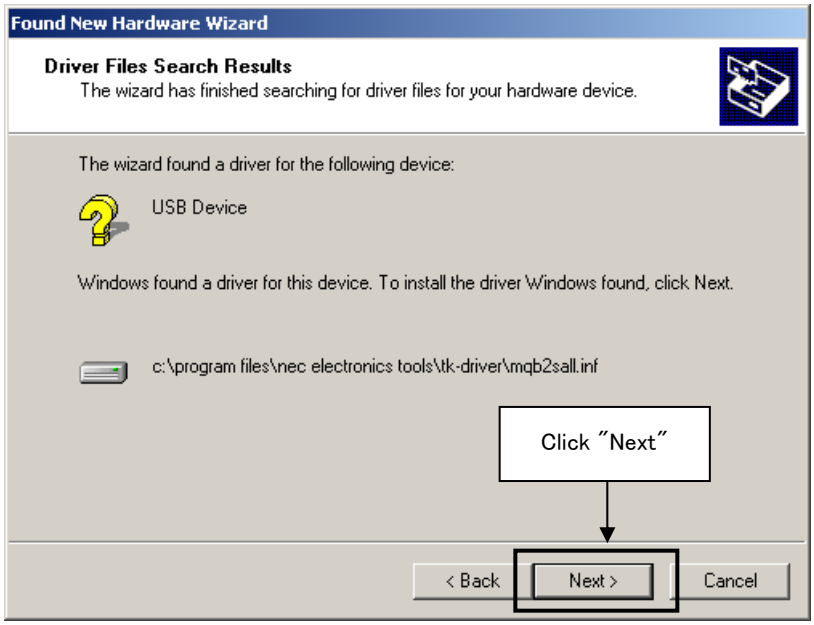
3. Select "Specify a location".
   Click [Next >] .



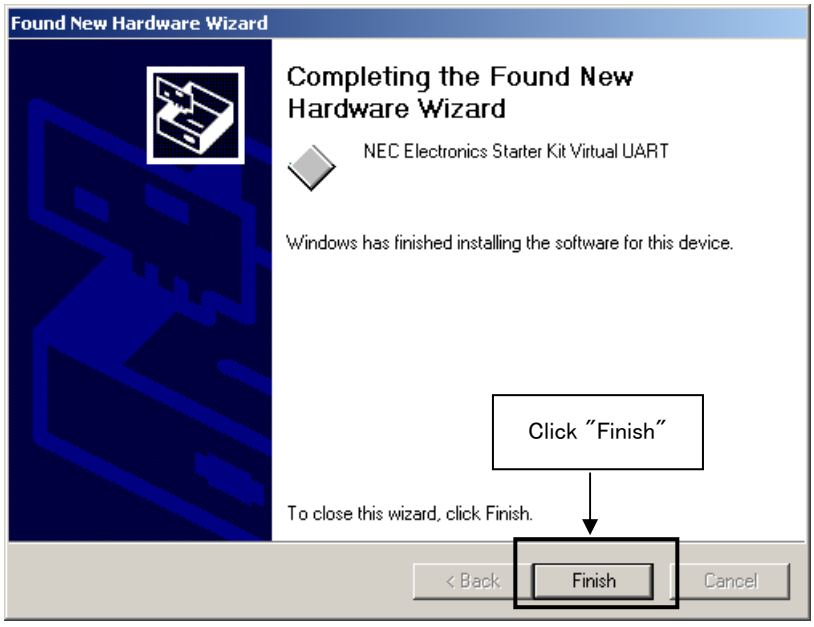
4. Select the driver directory path. The path should be "C:¥Program Files¥NEC Electronics Tools¥TK-driver" as default installation.
   If the installation directory is not default, then select "TK-driver" under the installation directory.
   Click [OK] .



5. Click [Next >] .



6. The installation of "NEC Electronics Starter Kit Virtual UART" driver is completed. Click [Finish] .



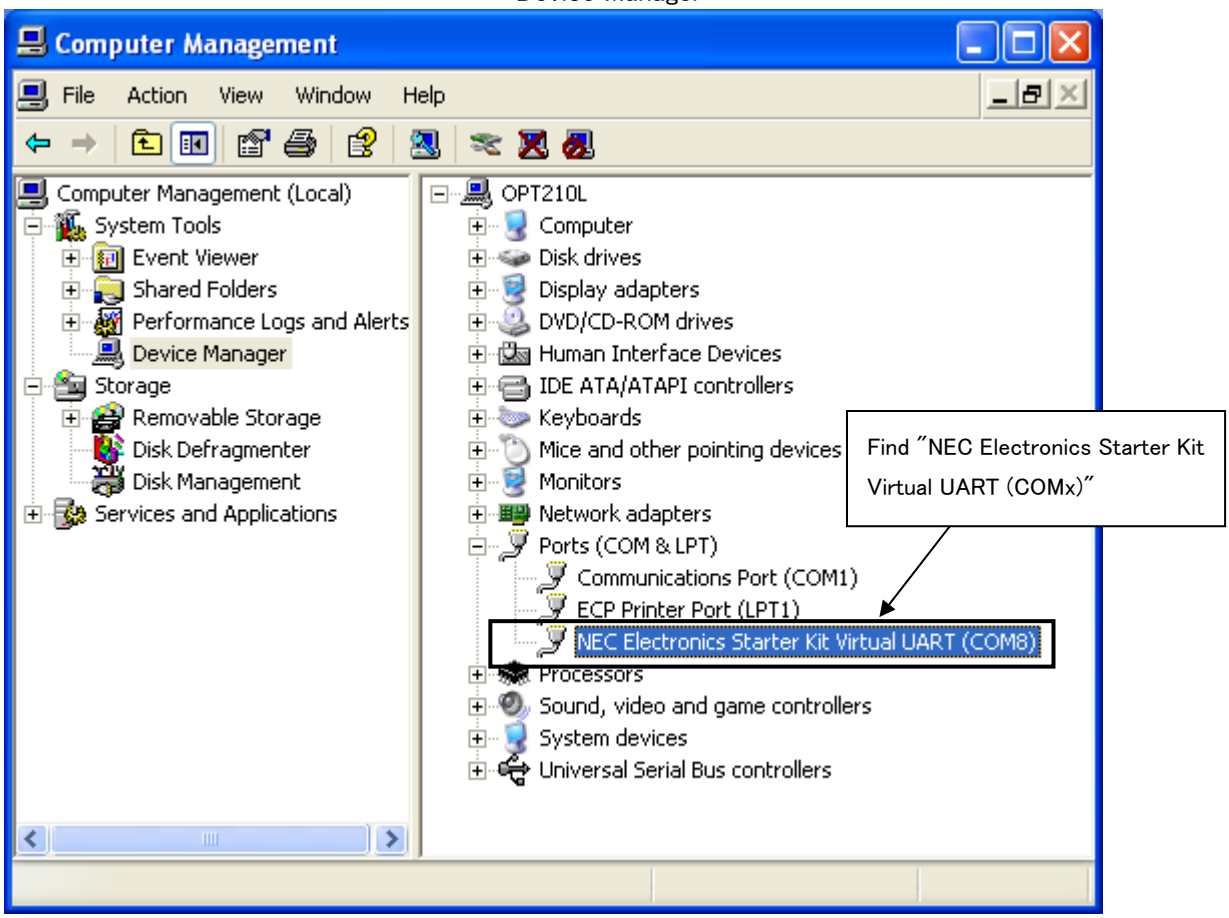
7. Go to "1.4.3 Completion of USB Driver Installation".

1.4.3 Completion of USB Driver Installation

Confirm the USB driver is installed on PC.

Start "Device Manager", and find "NEC Electronics Starter Kit Virtual UART" (without "?" mark) under the "Ports (COM & LPT)".

Device Manager



The screen above shows that the COM port number is "COM8". If ID850QB is not in use, you can use this port number for connecting TK-850/JH3E+NET.
When you change the USB port connection, the COM port number will be changed as well.

Select this COM port number when you use WriteEZ5.

CAUTION

・Do not do "Hardware Modification Scan" when you communicate with the target device.

CHAPTER 2 Experiences

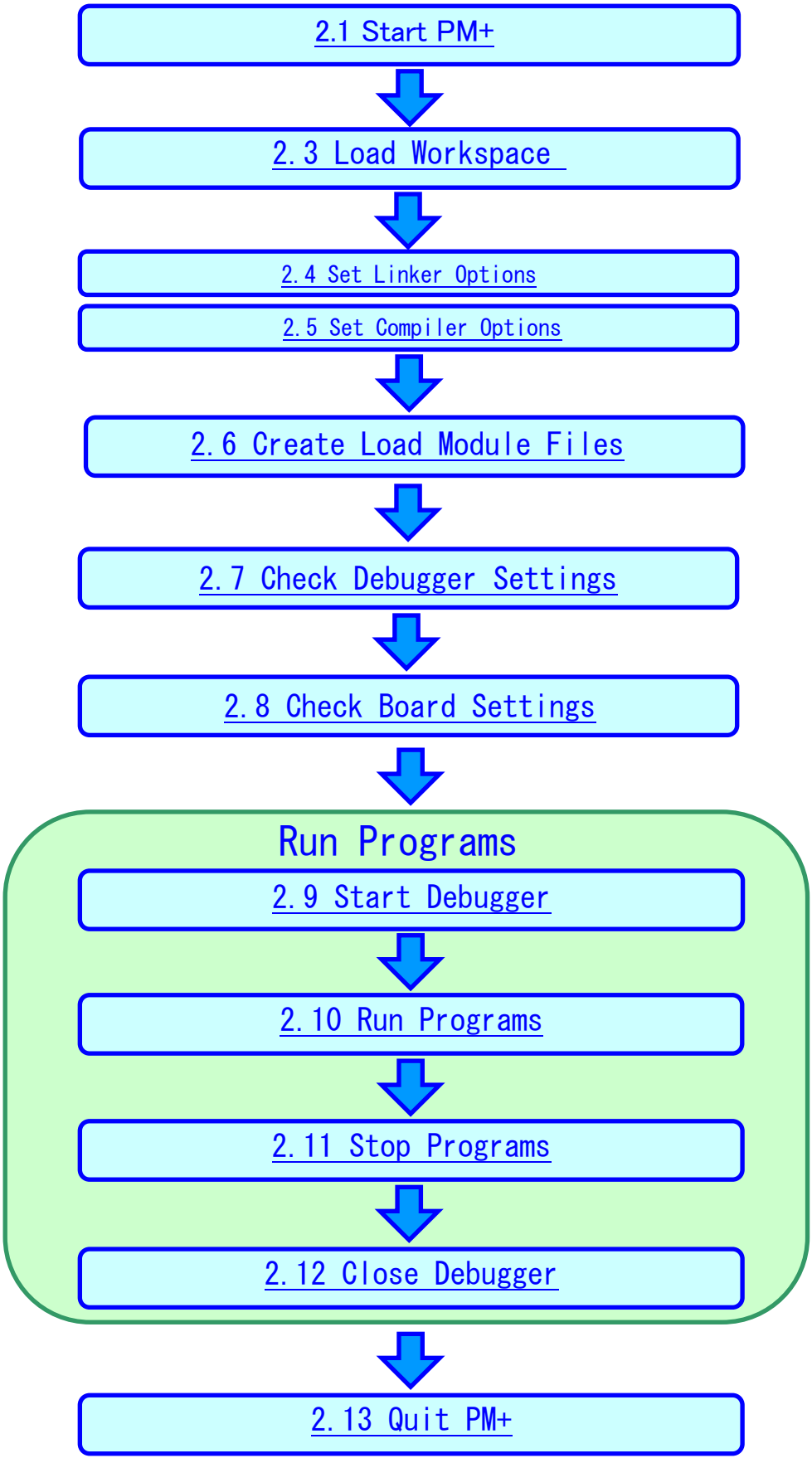
In this chapter, you will experience how to use the development tools with using the sample programs.
The development tools are :

- Integrated Development Environment (IDE), PM+
- Integrated Debugger, ID850QB

You will use the programs that you prepared in "1.3 Sample Programs", as the sample programs for TK-850/JH3E+NET

You will be able to understand how to use the development tools and the concept of project files which you need for producing application programs.

The overall steps are as follows:

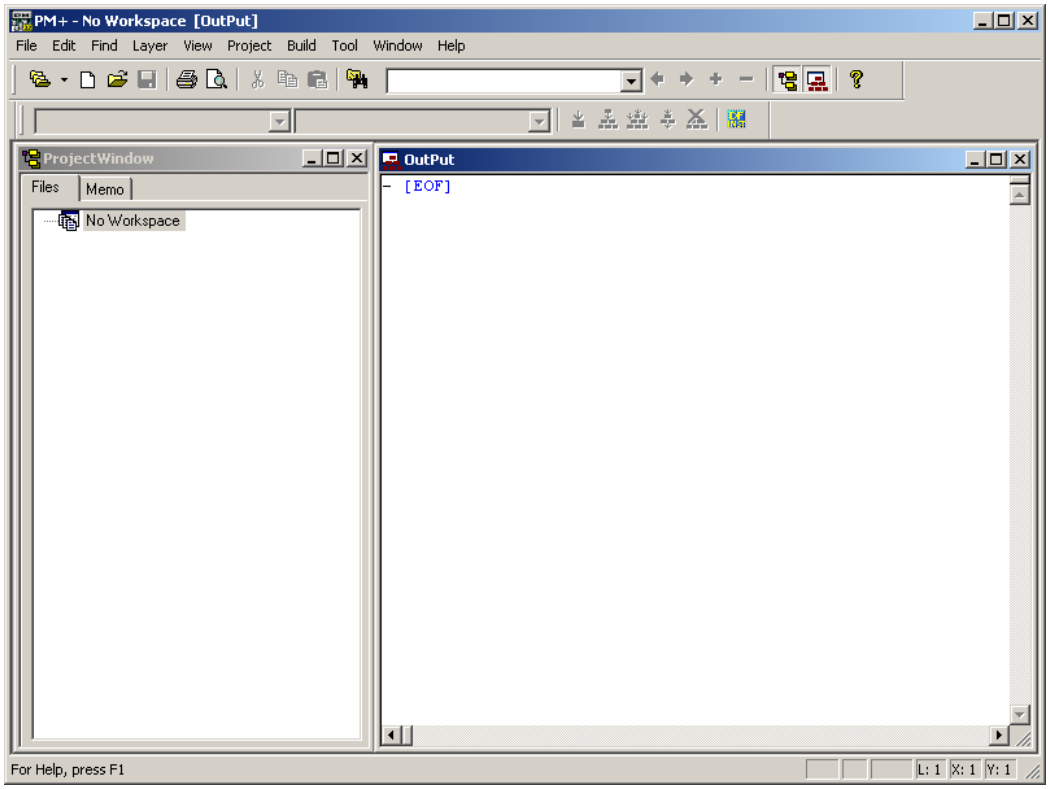


2.1 Start PM+

Let's start using the development tools.

First, start the PM+
Select "Windows Start Menu" -> "Program" -> "NEC Electronics Tools" -> "PM+ V6.31".

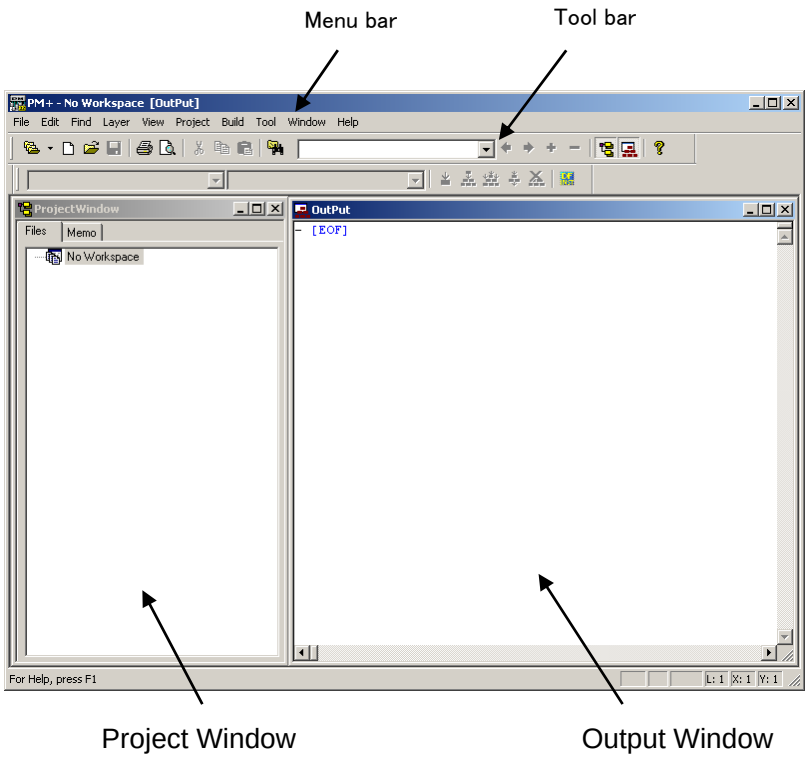
PM+ starts up



2.2 What is PM+

In PM+, application programs and environment setting are handled as a single project, and series of actions such as program creation using the editor, source management, build, and debugging are managed.

Also, one of more project files is managed together as a workspace.



Project window	A window in which project names, source files, and include file are displayed using a tree structure.
Output window	A window in which the build execution status is displayed.

For details regarding menu bars and tool bars, refer to "Help" menu in PM+.
"Help" on menu bar , then "PM+ Help"

What is a project?

A project is the unit that is managed by PM+. A project refers to an application system and environment development based on PM+.

PM+ saves project information in a "project file".

What is a project file?

A project file contains project information that includes the source files, device name, tool options for compiling, editor, and debugger information.

The file name format is "xxxxx.prj".

Project files are created in the directory you specifies when you create a new workspace.

What is a project group?

A project group is a group comprised of a number of projects in an application system.

The target device of each project must be the same within a project group.

What is a workspace?

A workspace is the unit used to manage all the projects and project group required for one application system.

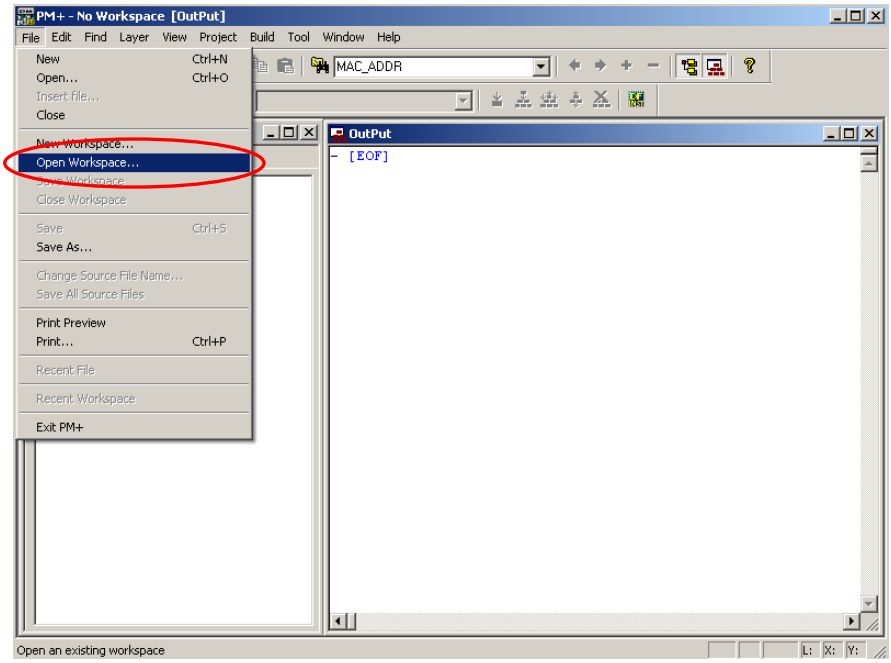
A workspace file contains one or more project files.

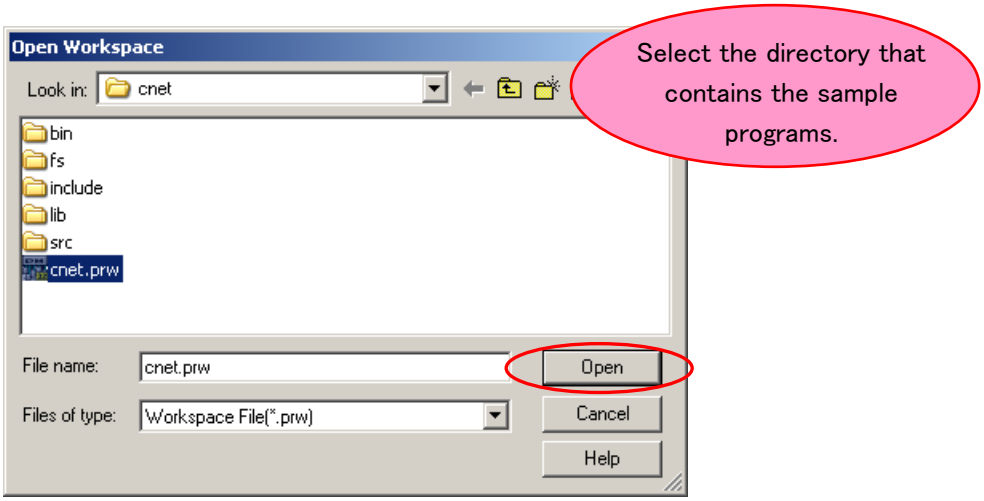
The file name format is "xxxxx.prw".

2.3 Load Workspace (project)

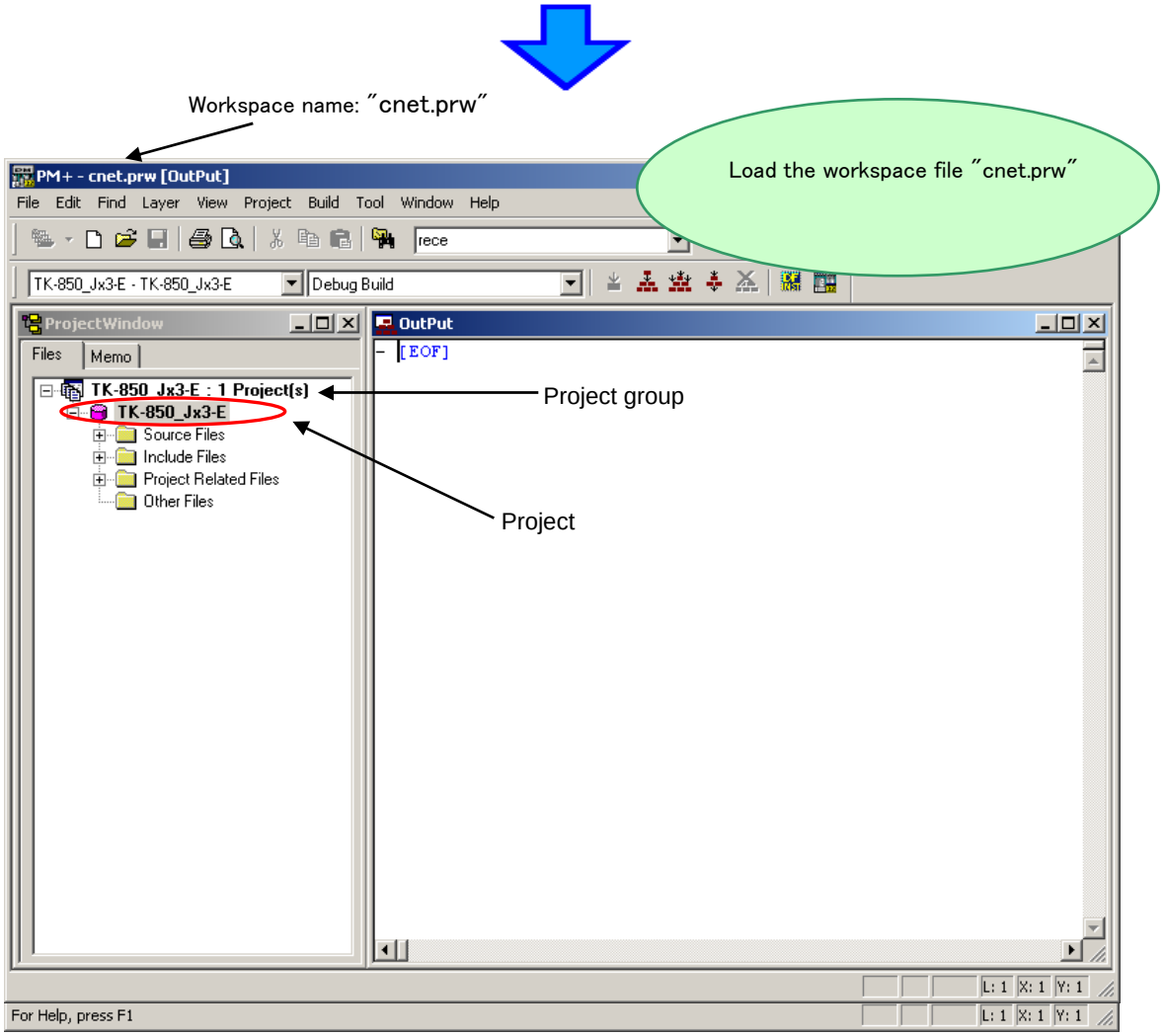
In this section, you will use the workspace that you created in "1.3 Sample Programs"
For creating a new workspace, refer to "Chapter 5 Other Information".
The workspace has information about the build environment for the sample programs.

Select "File" on menu bar and "Open Workspace…".
Then, select "cnet.prw" under the directory "C:¥TK850 ¥JH3E+NET¥cnet".





Select "cnet.prw", then click Open .



The workspace file "cnet.prw" contains one project called "cnet.prw". You will use this project "TK-850_Jx3-E".

CAUTION:

Please ignore when you get a prompt saying "files could not be found". This may occurred when the installation directory is not a default.

2.4 Set Options

The compiler options have been set by project file. However, because some compiler options are useful, following two settings are covered specifically in this section.

- MAC address setting
- Enable C++ comments
- On-chip debug (Disable/Enable, security ID)

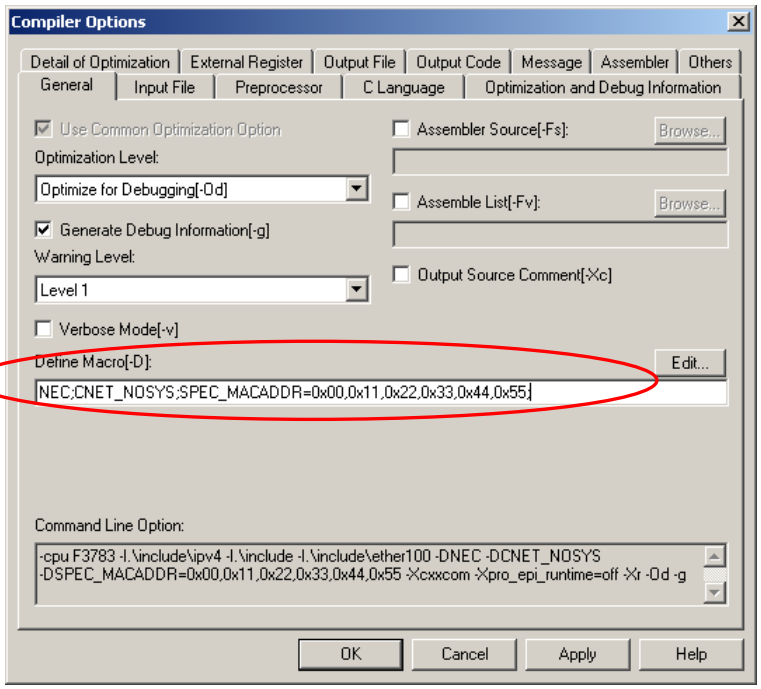
Select "Tools" on menu bar, then "Compiler Common options".

2.4.1 "General" Tab

Select "Tool" on menu bar in PM+, then "Compiler Options...".
Select "General" tab, and specify the MAC address in "Define macro" field as described below.
You can find the MAC address on the back side of substrate.

To Specify MAC Address (physical address):

Add ";SPEC_MACADDR=0x00,0x11,0x22,0x33,0x44,0x55;" in "Define macro" field if the MAC address is "MAC:00-11-22-33-44-55" on the back of substrate.

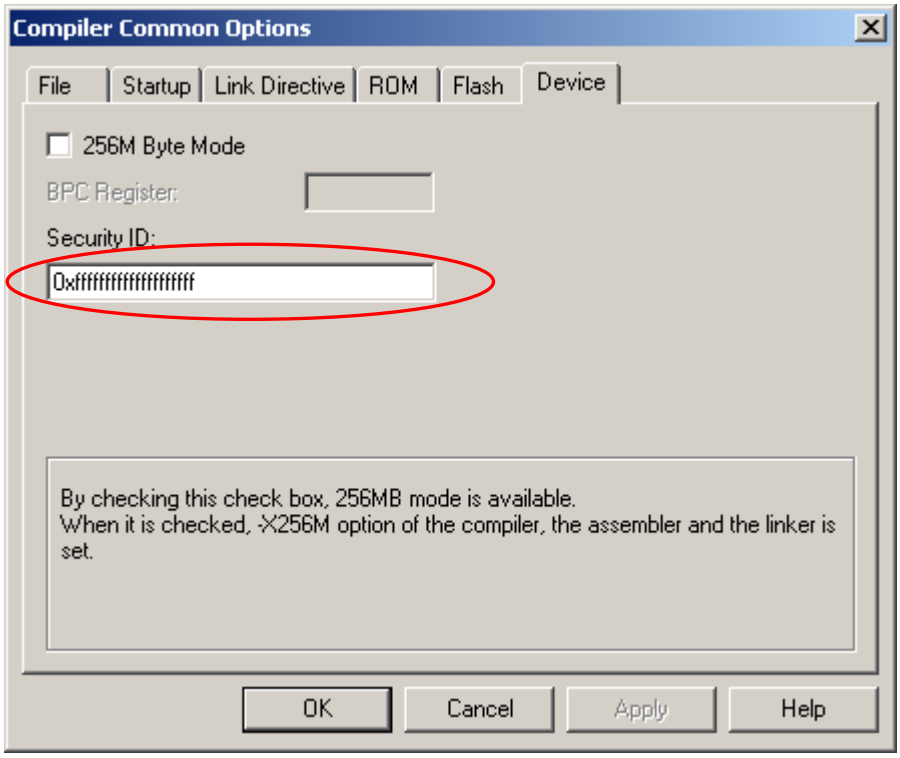


Caution

MAC address is not specified in the sample program as default. This causes a compiling error when you compile it. Therefore, set the MAC address before building it.

2.4.2 "Extend" Tab

Select "Device" tab on "Compiler Common Options" window, and check following settings.



Set the security ID. The security ID is a specific ID code (10 bytes) used for the authentication when the debugger is starting. The security ID is stored at the address 70H-79H in the microcontroller built-in flash memory. The security ID in the flash memory and the ID entered in the configuration dialog are compared when the debugger is starting. When the ID does not match, the debugger cannot be started. Therefore, it is useful to protect the program data in the memory from others.

If you do not need to care about the security, it is recommended to enter "FFFFFFFFFFFFFFFFFFFF". (When you erase the data in the flash memory, the ID is set to this value.)

If you forgot the security ID code stored in the address 70H-79H, the debugger (ID850QB) will not be able to start.

In this case, you need to use "WriteEZ5" to erase the built-in flash memory. By erasing the flash memory, the security ID is set to "FFFFFFFFFFFFFFFFFFFF".

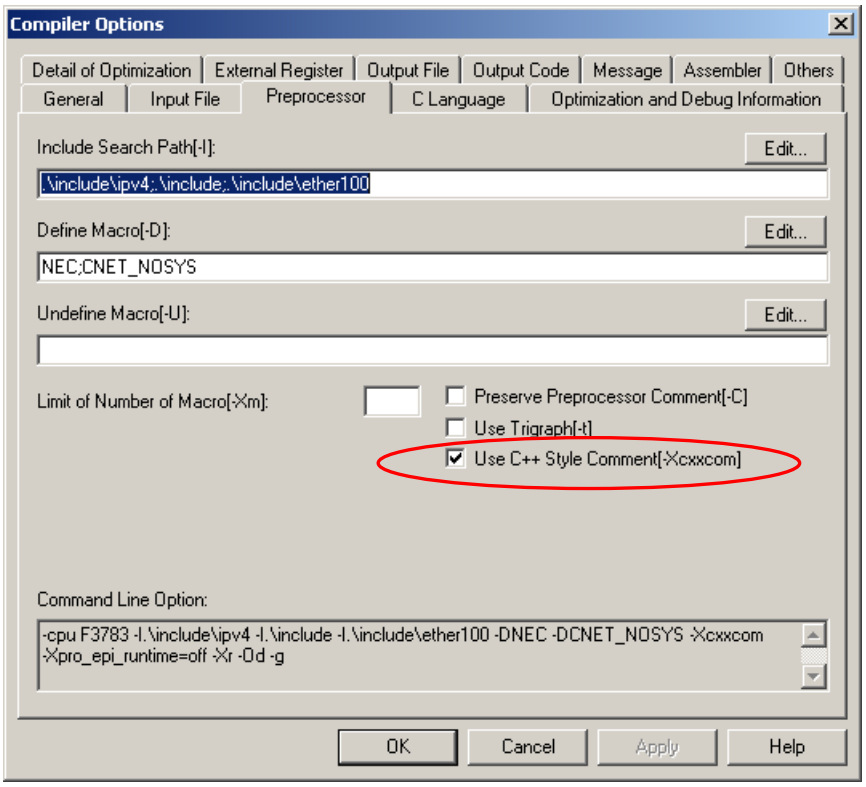
For details, refer to "5.4 WriteEZ5".

2.4.3 "Preprocessor" Tab

Select "Tool" on menu bar in PM+, then "Compiler Options...".

Select "Preprocessor" tab, and check "Use C++ Style Comment".

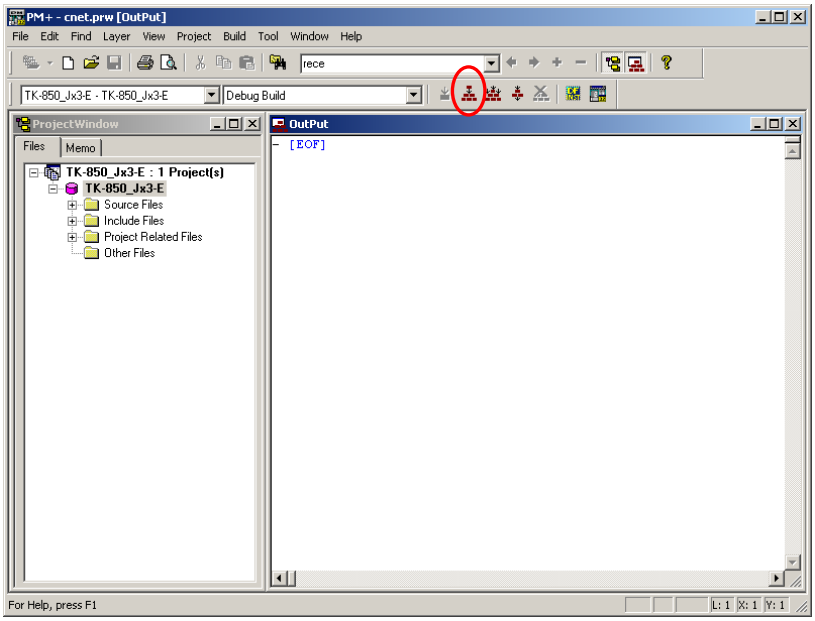
This setting allow you to use the C++ comment using "//".
It is useful feature when editing programs.

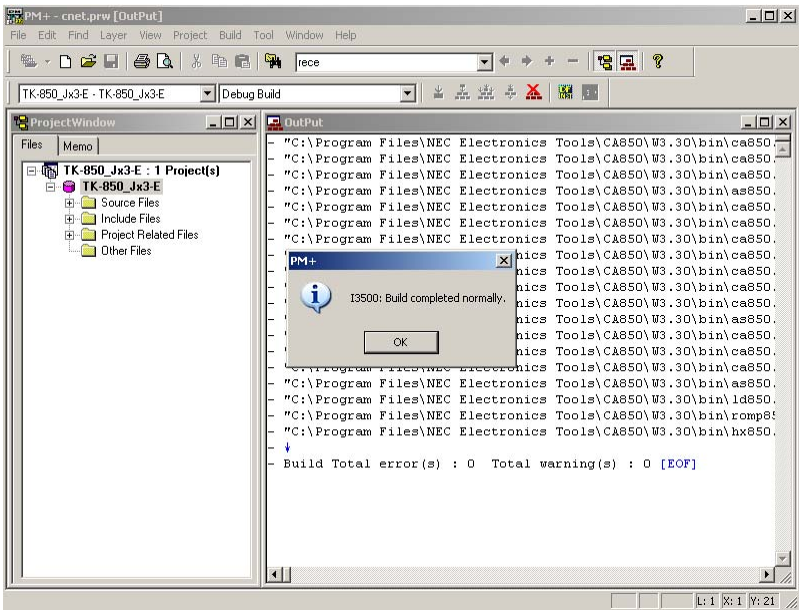


2.5 Create Load Module Files

After developing the source code, you have to create load module files by compiling, assembling, and linking. This process is called build.

Click the build button  , or select "Build" on menu bar, then "Build".





Build has been completed successfully.

What is build?

Build is a function that creates an executable file from source files in a project.
PM+ automatically performs compiling, assembling, linking, and other processing actions.
To reduce the time for the build, PM+ detects and compiles/assembles only the files that have been updated from the previous build process.

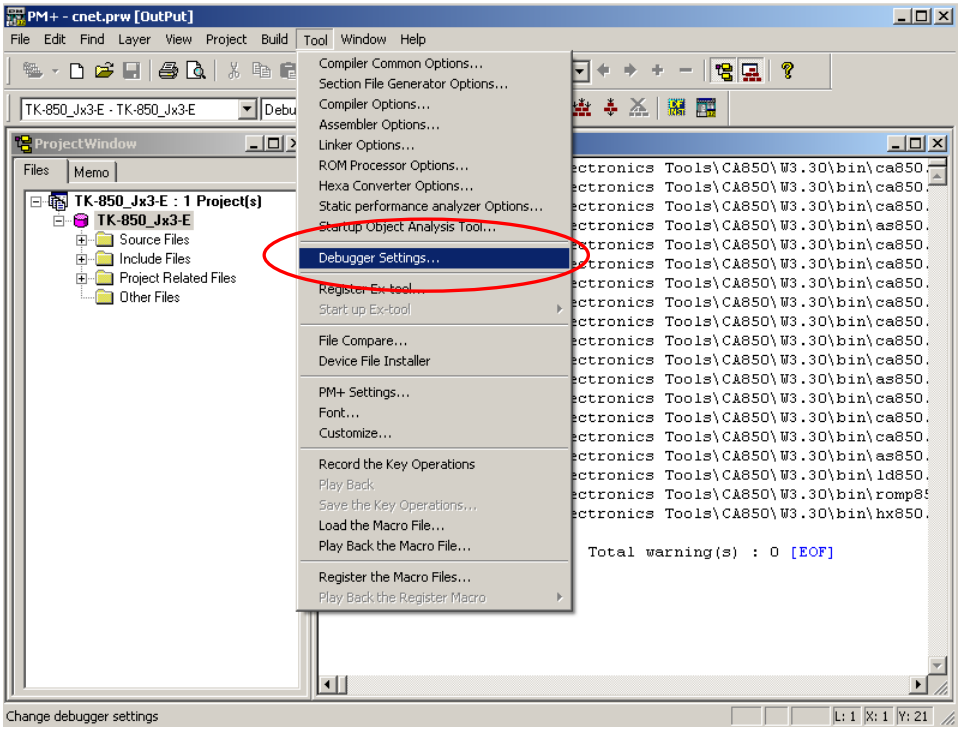
What is rebuild?

Build compiles and assembles only the source files that have been updated from the previous time, whereas rebuild compiles and assembles all the source files.
When setting, such as compiler options, have been changed, you must rebuild instead of build.

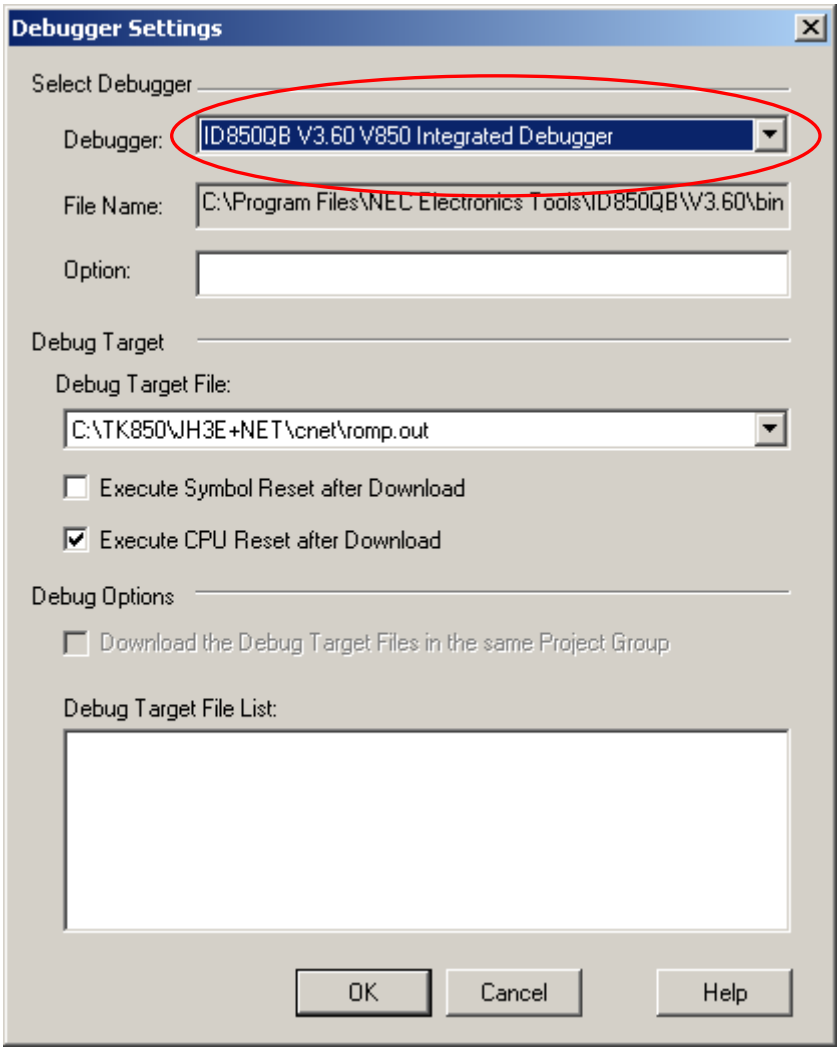
2.6 Check Debugger Settings

After the build, you should configure the debugger settings.
The debugger settings have been set by the project file as well. However, because those settings are important for debugging, some settings are covered in this section.

Select "Tools" on menu bar, then "Debugger Setting...".



Check if "ID850QB V3.60 V850 Integrated Debugger" is selected on "Debugger".



If you cannot select "ID850QB V3.60 V850 Integrated Debugger", select "Project" on menu bar, "Project settings" -> "Tool version settings" -> "Detailsetting" -> then select "ID850QB V3.60".

2.7 Check Board Settings

Before connecting the PC and the TK-850/JH3E+NET with USB, you should check the setting of SW1 on the board.

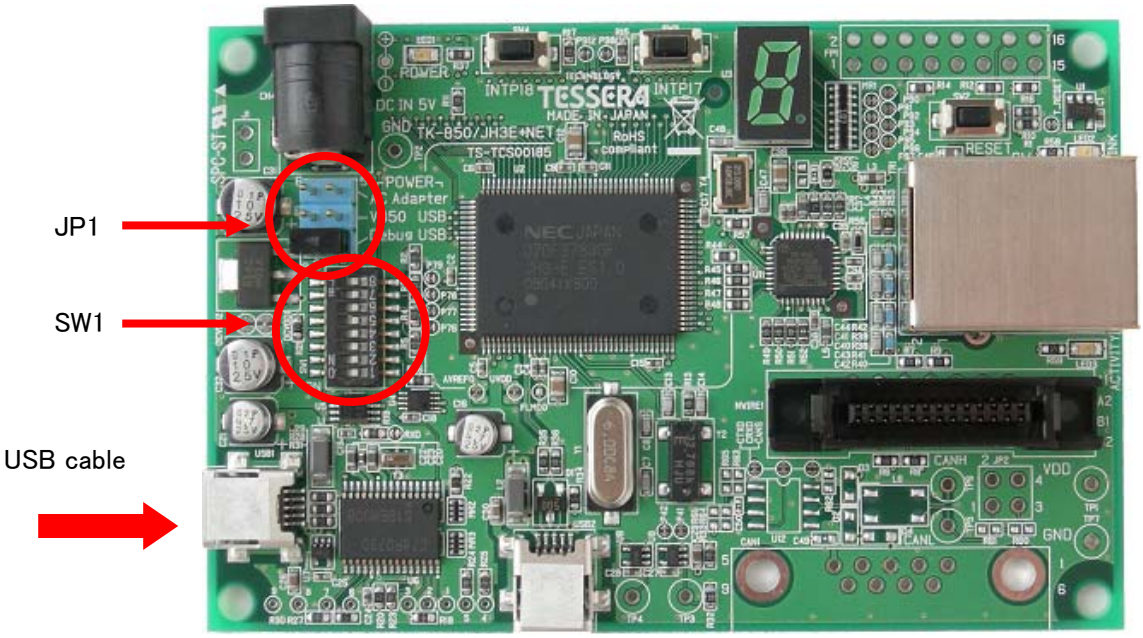
① Set the SW1 of the TK-850/JH3E+NET as follows.

SW1

Bit1	OFF
Bit2	ON
Bit3	ON
Bit4	ON

② Set JP1 to 1-2 short.

③ After the switch settings are completed, connect the PC to USB1 on TK-850/JH3E+NET with USB cable.

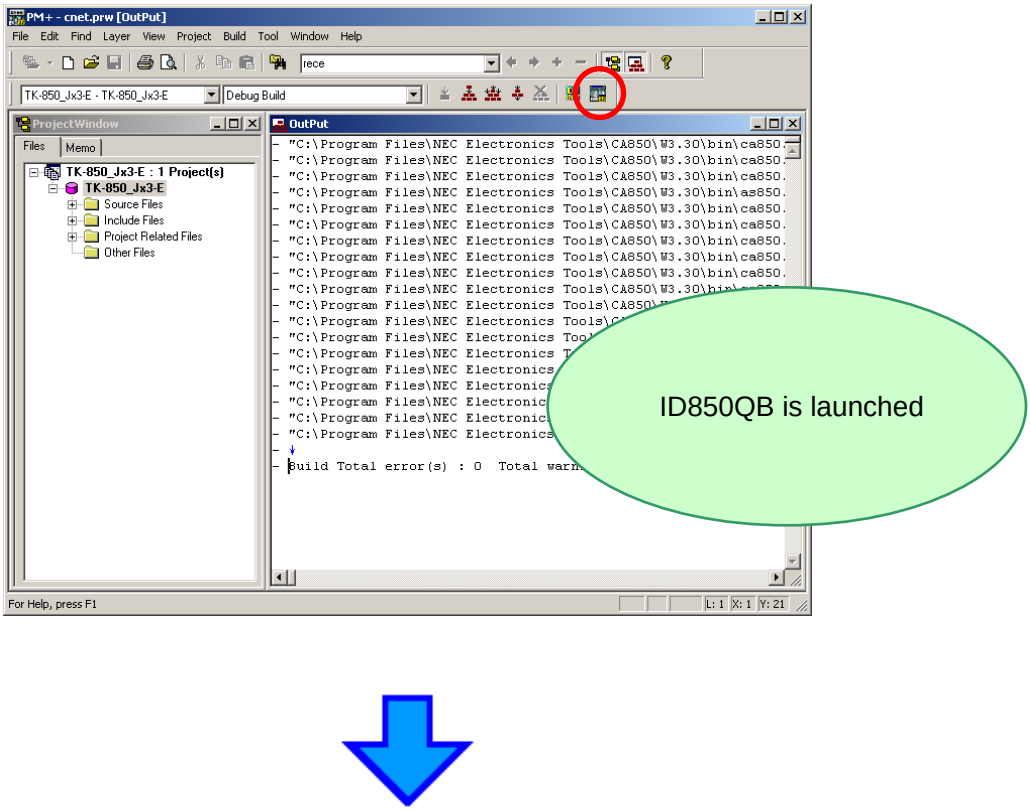


2.8 Start Debugger (ID850QB)

Click the debug button  , or select "Build" on menu bar, then "Debug".

If you do not see the debug button, go to "2.7 Check Debugger Settings" for changing the settings.

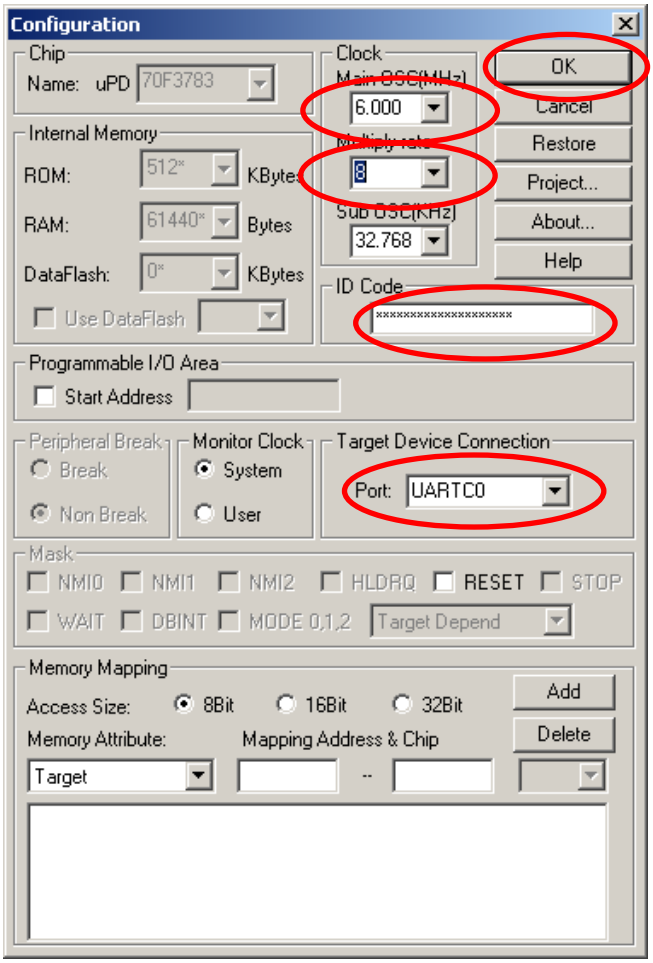
The steps to start the debugger will be explained below.



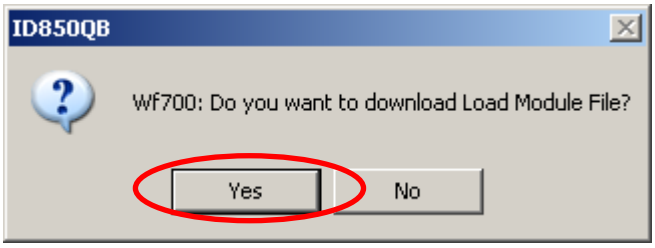
"Configuration" dialog is opened. Follow the settings below and click "OK".

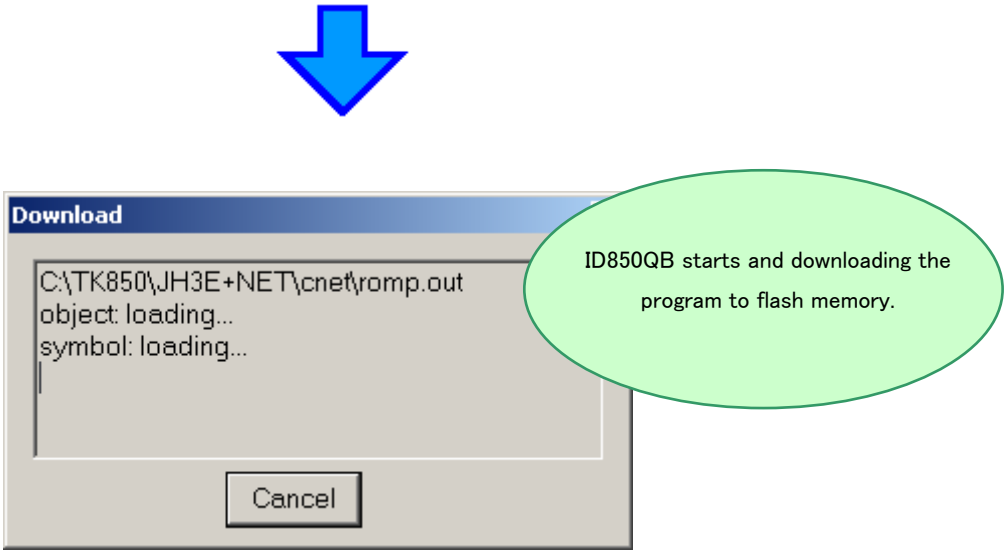
- Enter "6" in "Main OSC"
- Enter "8" in "Multiply rate"
- Enter "FFFFFFFFFFFFFFFFFFFF" (F x 20) in "ID Code".
- Select "UARTC0" in "Port" at "Target Device Connection" area

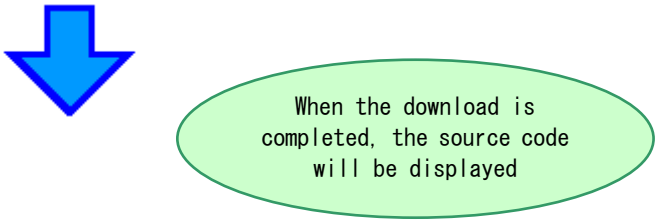
then click OK .

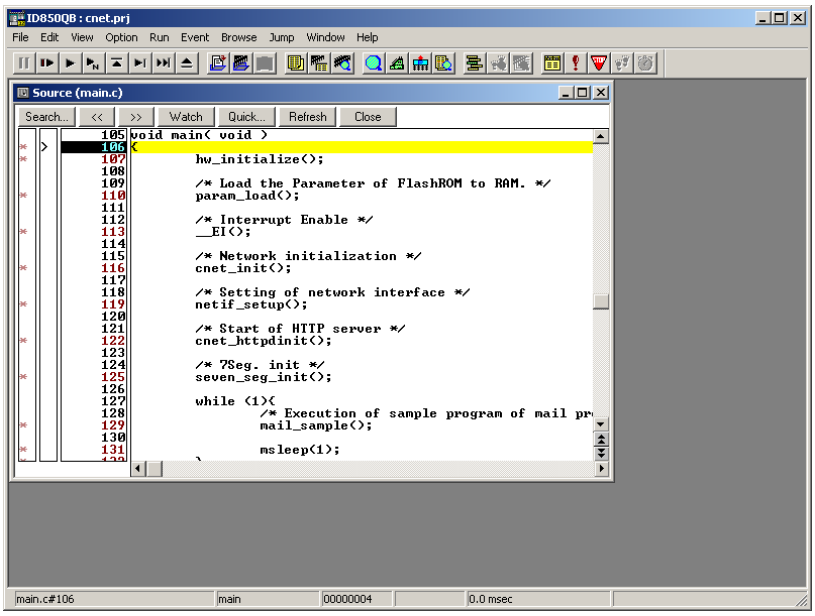


Click Yes when the confirmation dialog for downloading load module file is opened.









NOTE:

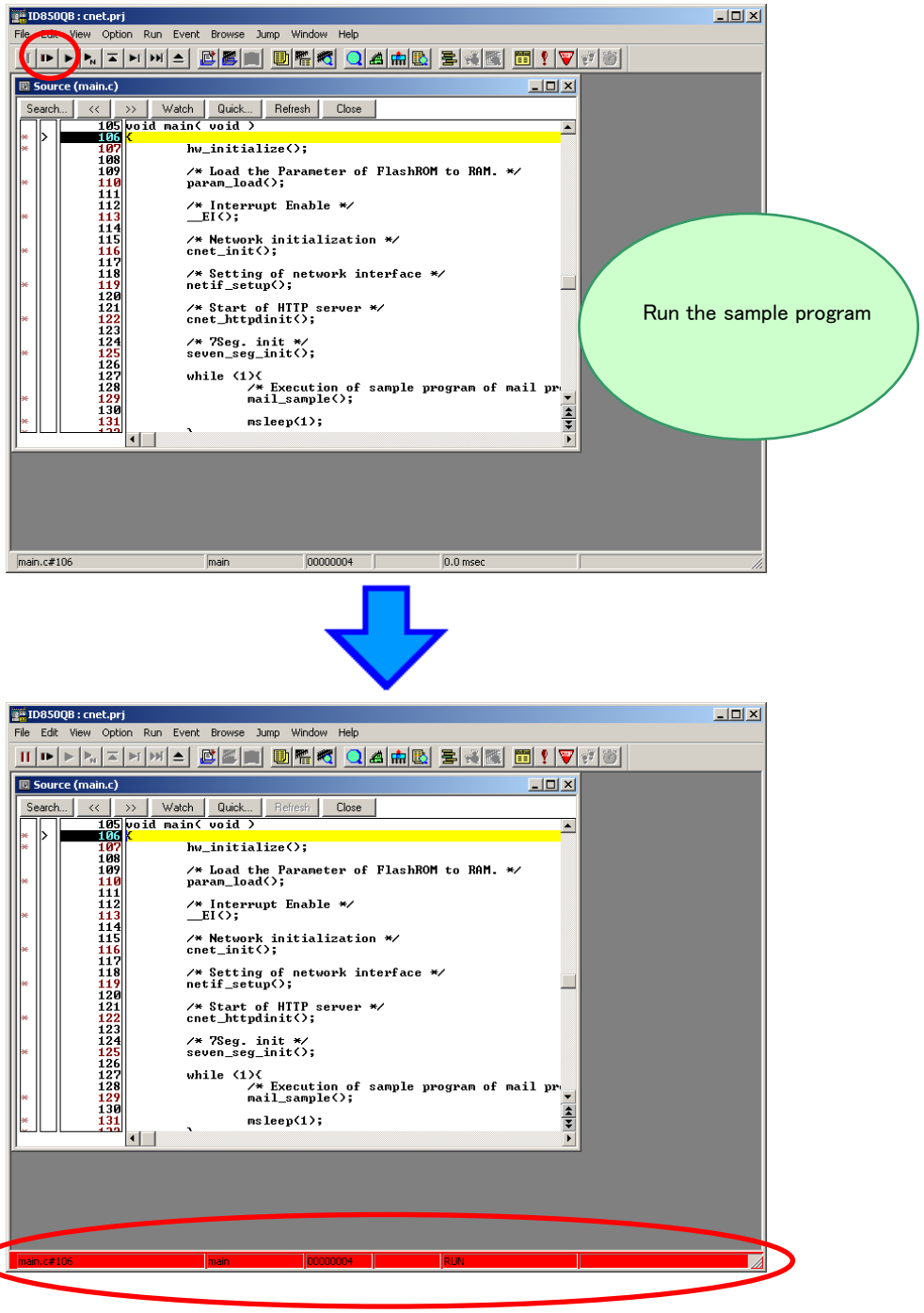
Completion of the download does not mean running the programs. Therefore, even though you press switch on the board, it does not make anything happened. To run the sample program demonstration, see "2.9 Run Programs".

2.9 Run Programs

Now, you are ready to run the program.

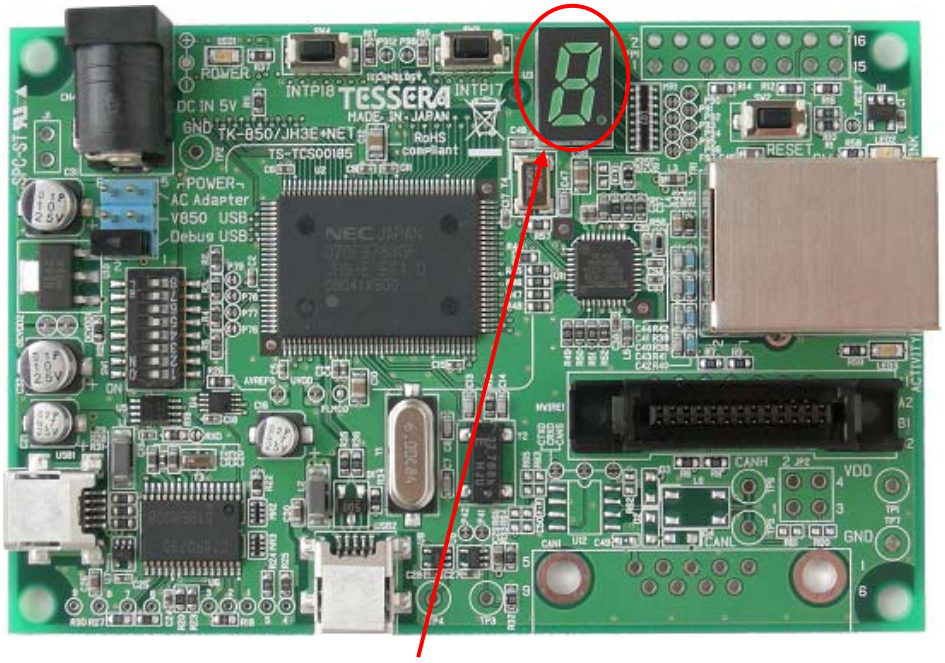
Click the restart button  , or select "Run" on menu bar, then "Restart".

The sample program runs.



When programs are running, the status bar will be red.

Confirm if 7SegLED (U3) on TK-850/JH3E+NET is lighted.



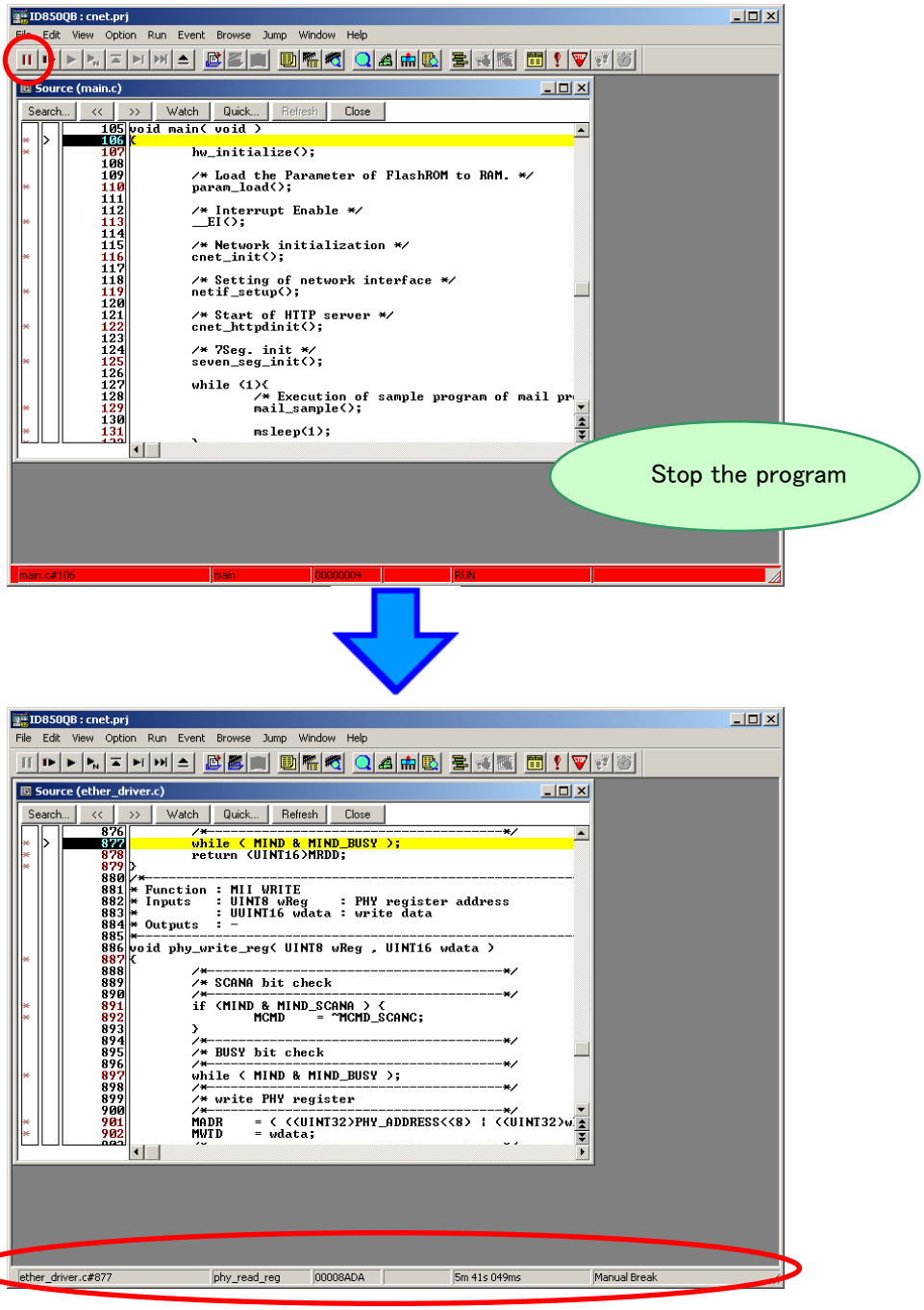
You could confirm the sample program is working.

- The programs downloaded by ID850QB cannot use without ID850QB connection.
  For stand-alone operation, write the HEX file by WriteEZ5.
  For more information about the WriteEZ5, refer to "5.4 WriteEZ5" document.

2.10 Stop Programs

Now, you are going to stop the program.

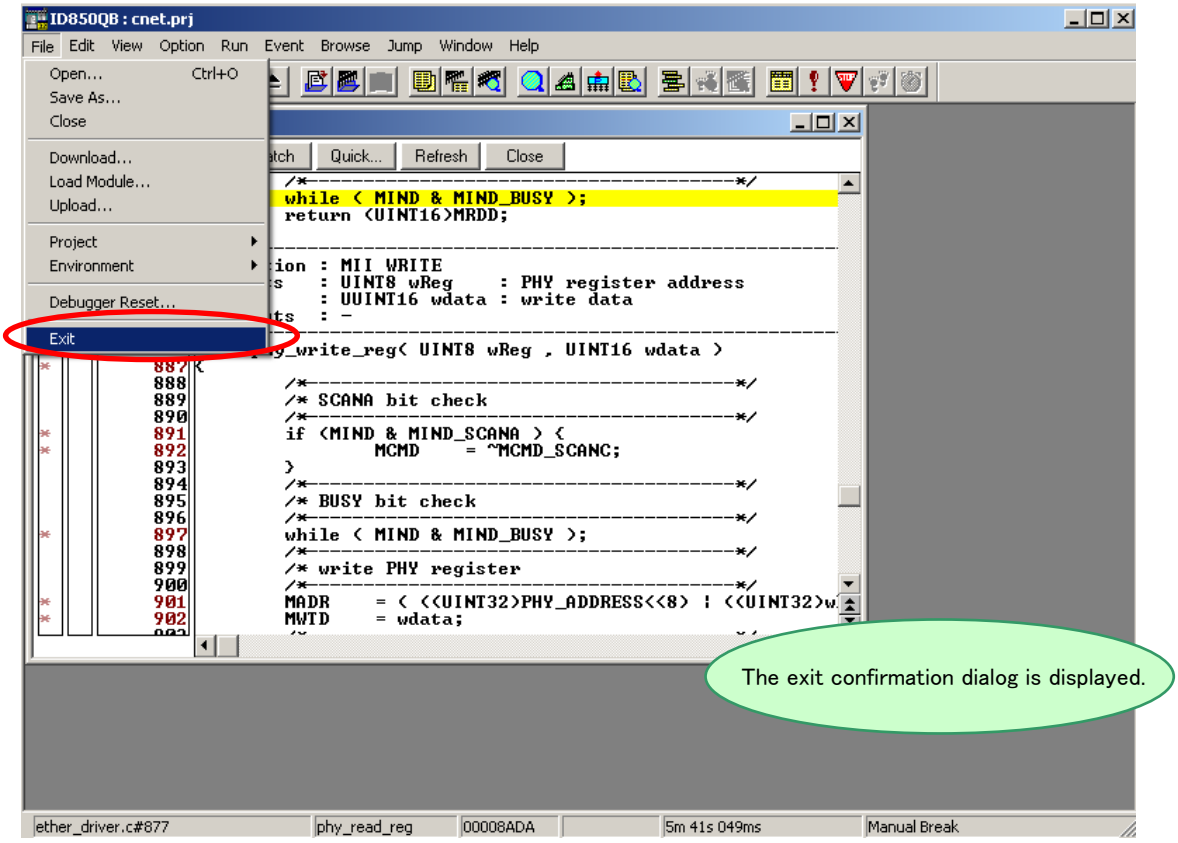
Click the stop button , or select "Run" on menu bar, then "Stop".

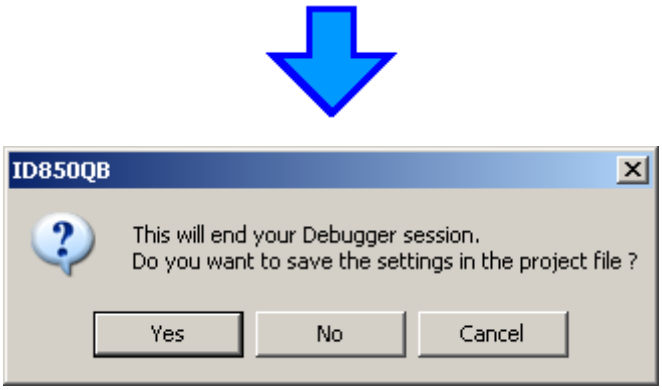


When the program stops, the status bar changes back to the original color.

2.11 Close Debugger (ID850QB)

Select "File" on menu bar, then "Exit".

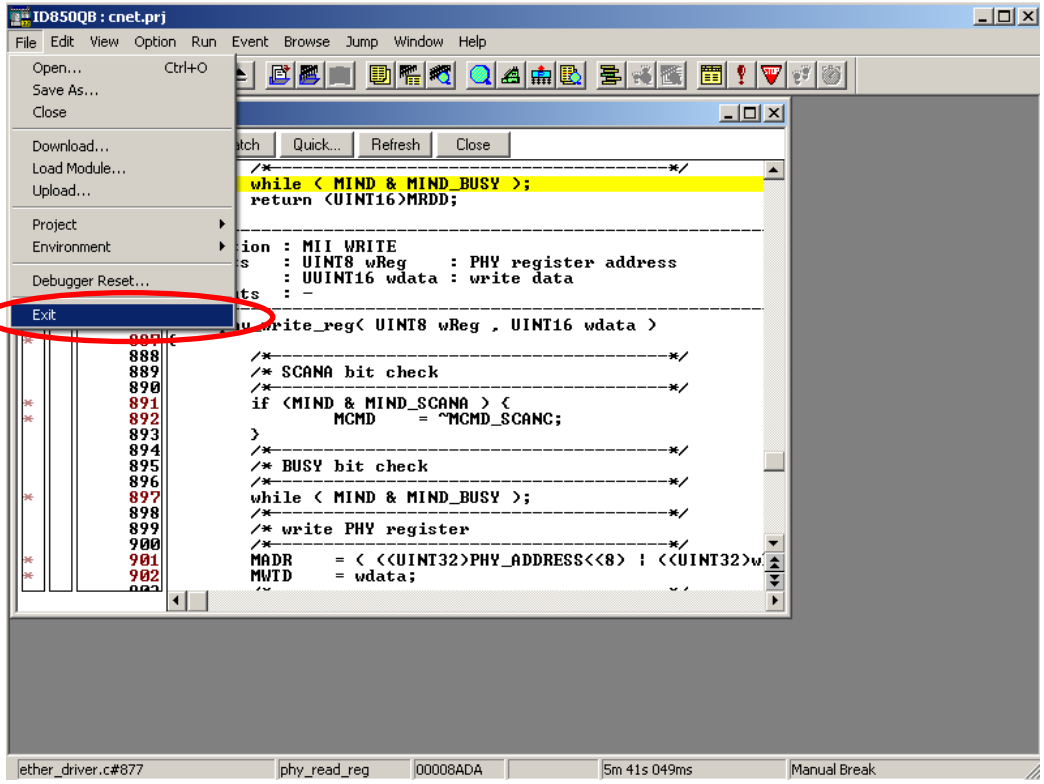




If you click Yes , it saves the settings in the project file, and then closes the ID850QB. It is recommended to save the settings as it saves the window you used, window size, layout, etc.
If you click No , it does not save the settings and closes the ID850QB.

2.12 Quit PM+

Select "File" on menu bar, then "Exit PM+".



PM+ is closed.

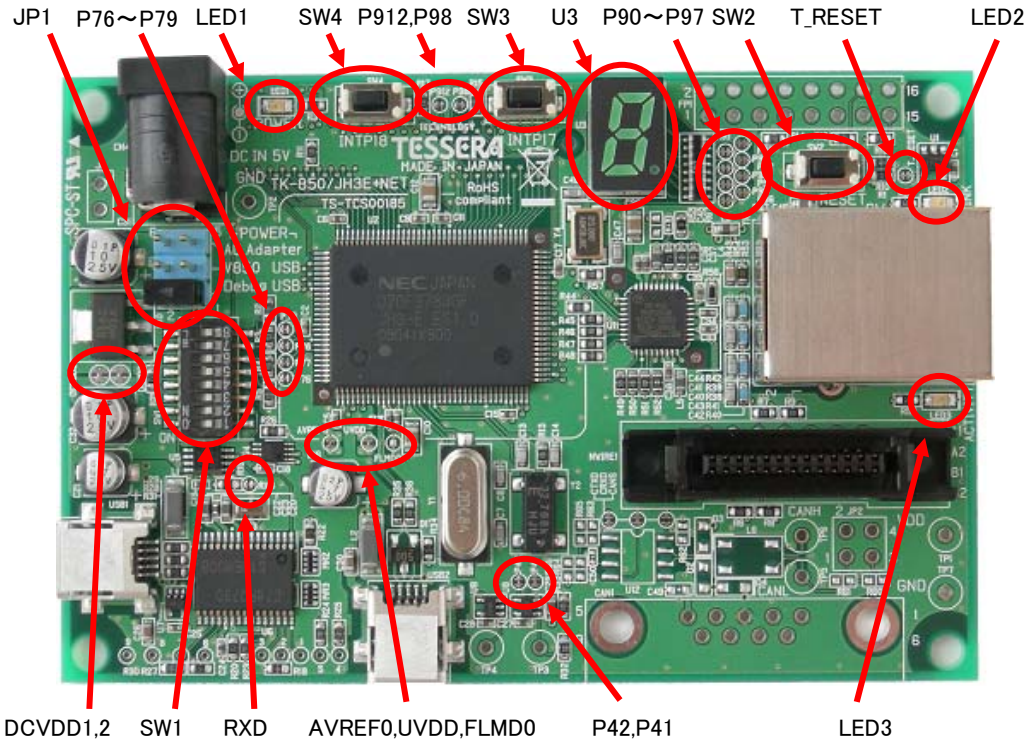
The experiences section ends now.
You can find more information how to use the development tool and information about other useful features in "Chapter 5 Other Information".

CHAPTER 3　Hardware Specifications

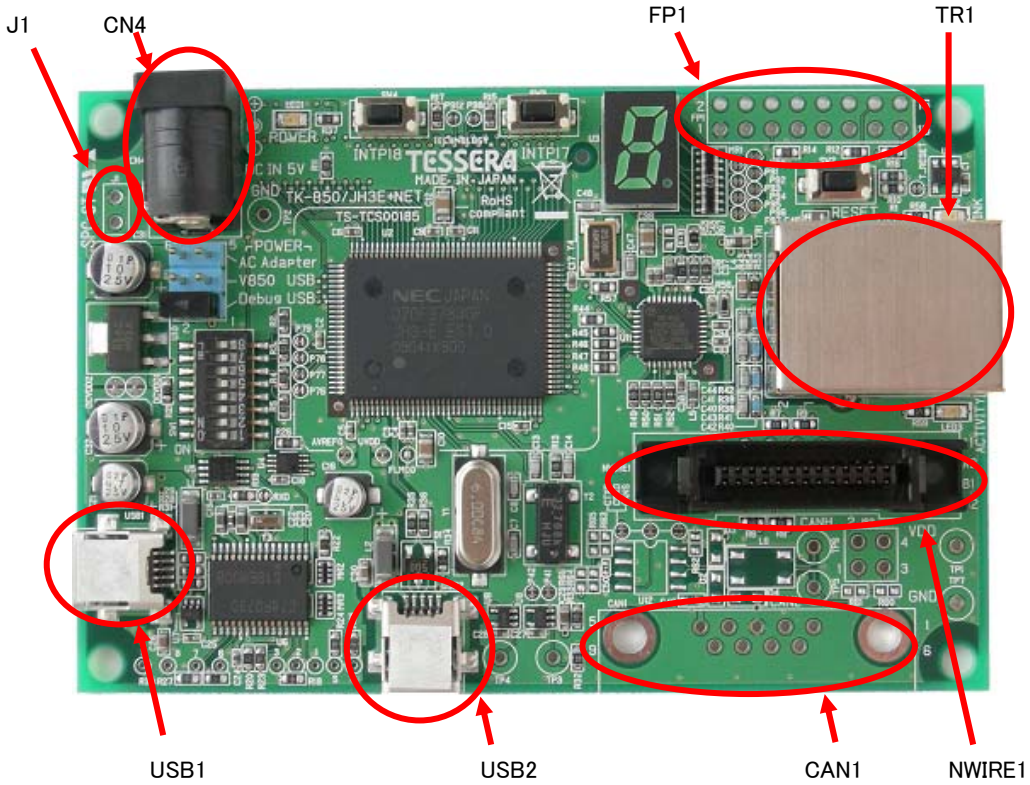
In this chapter, the hardware of TK-850/JH3E+NET will be explained.

Microcontroller	μPD70F3783　※V850ES/JH3-E
Clock	External main system clock: 48MHz (6MHz x8) Sub-clock: 32.768KHz
Interface	USB x2 (MINI B connecter) Connecter for N-Wire (KEL connecter) Connecter for MINICUBE2 (only pad) Connecter for Ethernet (RJ-45, TDK TLA-6T718) Connecter for CAN (Connector and other peripheral parts are not mounted.) Expansion connector　(only pad)
Dimension	90mm x 60mm
Power supply voltage	5V

3.1 Layout of hardware functions



3.2 Layout of solder-short pad



3.3 Hardware Functions

3.3.1 SW1

The bit 1-4 on SW1 are for mode settings, Bit5-8 of SW1 are connected to "P76/ANI6"～" P79/ANI9" for general-purpose input port.

● Set as shown in the following table if you wish to debug using bundled ID850QB through USB1

SW1

Bit1	OFF
Bit2	ON
Bit3	ON
Bit4	ON

＊ When you debug through USB1, it communicates with the host machine through P30 and P31 pins. Therefore, you cannot use these pins.

● Please change to the following settings when writing it in the flash memory with built-in CPU by using WriteEZ5. (The hardware of WriteEZ5 is built into TK-850/JH3E+NET.)

SW1

Bit1	OFF
Bit2	ON
Bit3	ON
Bit4	ON

● To run the programs stored in built-in flash memory by WriteEZ5, use following settings and re-supply power.

SW1

Bit1	OFF
Bit2	OFF
Bit3	OFF
Bit4	ON

● Please change to the following settings when you connect N-Wire emulator.

SW1

Bit1	OFF
Bit2	OFF
Bit3	OFF
Bit4	ON

● Bit5-8 of SW1 is connected with the following terminals CPU.
There are connecting to pull-up resister. When the switch is pushed down, it sends the signal of "Low".

SW1

Bit5	P76
Bit6	P77
Bit7	P78
Bit8	P79

3.3.2 SW2

This is the reset switch. You can reset the microcontroller by pressing this switch.

3.3.3 SW3 (INTP17)

SW3 is the push switch connected to " P98/TENC01/INTP17/A8" pin in CPU. There are connecting to pull-up resister. When the switch is pushed down, it sends the signal of "Low".

3.3.4 SW4 (INTP18)

SW4 is the push switch connected to " P912/TOAB1OFF/INTP18/A12" pin in CPU. There are connecting to pull-up resister. When the switch is pushed down, it sends the signal of "Low".

3.3.5 LED1 (POWER)

This is the POWER LED. It is lighted when it gets power supply.

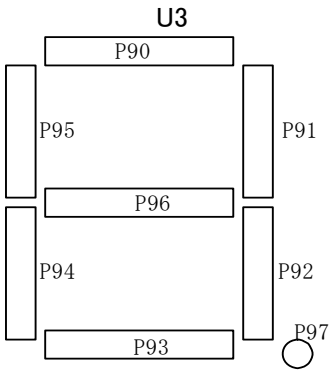
3.3.6 LED2, LED3

The table shows the status of Ethernet transceiver.

	Display	Function
LED2	LINK	Link ON Indication
LED3	ACTIVITY	Activity Indication

3.3.7 U3(7seg LED)

7seg LED of U3 can be lit with P90-P97.
Please set the port mode to the output and output "Low" signal from the port.



The figure of 0-9 can be displayed by writing the following values in P9 register.

Example of displayed figure and set data.

0	0xC0	5	0x92
1	0xF9	6	0x83
2	0xA4	7	0xf8
3	0xB0	8	0x80
4	0x99	9	0x98

3.3.8 JP1

JP1 are the jumper switch pin to select power supply.

JP1	
1-2 short	It is supplied power from USB1 connector(for debug).
3-4 short	It is supplied power from USB2 connector(for V850ES/JH3-E internal USB).
5-6 short	It is supplied power from AC adapter (+5V) connected to CN4.

3.3.9 CN4

CN4 is the power supply connecter of the AC adaptor.
You can supply the power by setting the JP1 to 5-6 short and connect 5V AC adapter.

3.3.10 J1

This is the connector for external power supply.

3.3.11 NWIRE1 Connector

These are connector for N-Wire emulator.
It can connect N-Wire emulator of IE-V850E1-CD-NW etc.
The connector from KEL Corp. "8830E-026-170S" is mounted on NWIRE1.

3.3.12 FP1

This is the interface for connecting MINICUBE2.
As a connector is not mounted, you need to solder 16pin connector ("FFC-16BMEP1" from Honda Tsushin Kogyo Co., Ltd.) on FP1.

3.3.13 USB1

This is the USB interface for debugging.
You can use this when you need to debug or make serial communication using P30 and P31.

3.3.14 USB2

This is V850ES/JH3-E built-in USB interface.

3.3.15 CAN1

This is the interface for CAN communication.
Connector and other peripheral parts are not mounted.

3.3.16 TR1

This is the interface for Ethernet communication.
TLA-6T718 from TDK Corp. is used for RJ-45 connector.
LAN8700C from SMSC is used for Ethernet transceiver.

3.4 solder-short pad label

When using a circumference board connector (CN1) without using a circuit on board, in order to separate a circuit on board, the terminal of CPU can be customized by making the pad for solder short opening.
Pad for solder-short has shape like the figure below.

When you make an open circuit, cut the narrow part of the Pad with a knife.
To make short circuit, join the separated Pad with a soldering iron etc.

Solder-short pad
(opened shape)

Solder-short pad
Shorted shape

Solder-short pad name	State when shipping it	Connection
P90～P97	Short	7SegLED
		Open when using it for other usages
FLMD0	Short	FLMD0 to P37 on CPU
		Short When built-in flash memory is rewritten by self
AVREF0	Short	VDD<->AVREF0
		Open when AVREF0 is driven by other voltages.
DCVDD1,2	Short	VDD<-> Regulator output
		Open, when you supply the power from CN1.
UVDD	Short	VDD<->UVDD
		Open when UVDD is driven by other voltages.
RXD	Short	P30/TCDD0
		Open when P30 isn't used for USB1 communication interface.
P76～P79	Short	SW1, 5-8bit
		Open when P76～P79 isn't used for general-purpose input SW
P98	Short	P98 <-->SW3
		Open when using it for other usages
P912	Short	P912 <-->SW4
		Open when using it for other usages

P42	Short	P42<--> USB D+ pull-up signal pin.
		Open when you don't use USB D+ pull-up signal.
P41	Short	P41<--> USB D+ pull-up enable signal pin.
		Open when you don't use USB D+ pull-up enable signal.
T_RESET	Short	4Pin U2 <--> T_RESET signal.
		Open when the Reset IC isn't used for.

CHAPTER 4 Troubleshooting

This chapter describes how to solve troubles you may face.

4.1 If you cannot find USB driver when you connect PC to the kit

Check Point 1

If you use USB hub, do not use it. (USB hub is not supported)

Check Point 2

Check if you installed "NEC Electronics Starter Kit Virtual UART Driver" in "1.4 Installation of USB Driver". If not, install the driver.

Check Point 3

If above 2 check points are confirmed, disconnect the USB cable from PC and re-connect again.

4.2 Error when you start the debugger

There could be several reasons to make errors happen.
The solving processes differ depending on errors. Please check the error message first.
The solving processes for each error are as follows.

4.2.1 "Can not communicate with Emulator..." (F0100 or A0109)

Check Point 1

If you use USB hub, do not use it. (USB hub is not supported)

Check Point 2

Check if the settings of switches on the kit are correct with referring "2.7 Check Board Settings".

Check Point 3

Confirm the USB driver installation with referring to "1.4 Installation of USB Driver".

Check Point 4

If above 3 check points are confirmed, close the debugger and disconnect the USB cable from PC.
Re-connect USB cable properly to both the PC and the kit, and then re-start the debugger.

4.2.2 "Incorrect ID Code." (Ff603)

This error occurs when the security ID stored on microcontroller built-in flash memory is different from the ID code you entered at the start of debugger.

Security ID entry area at the start of debugger

Check Point 1

Enter correct security ID and click OK on the configuration window.

Check Point 2

If you forgot the security ID, you have to erase the microcontroller built-in flash memory. Before erasing, check if you actually set the security ID with referring to "2.5 Set Options". Also remember the code you set for the security ID.
After this, erase the flash memory with referring to "5.4 WriteEZ5".

4.3 Monitor memory cannot be accessed. (F0c72)

Check Point 1

Check if the settings of switches on the kit are correct with referring "2.7 Check Board Settings".

Check Point 2

Erase the flash memory with referring to "5.4 WriteEZ5".

Check Point 3

If above 2 check points are confirmed, disconnect the USB cable from PC and re-connect again. And, retry starting the debugger.

CHAPTER 5 Other Information

This chapter explains some useful operation techniques of development tools and circuit diagram of the kit for developing of user programs.

5.1 Create a new workspace (project)

5.2 Register additional source file

5.3 Debugger tips

5.4 WriteEZ5

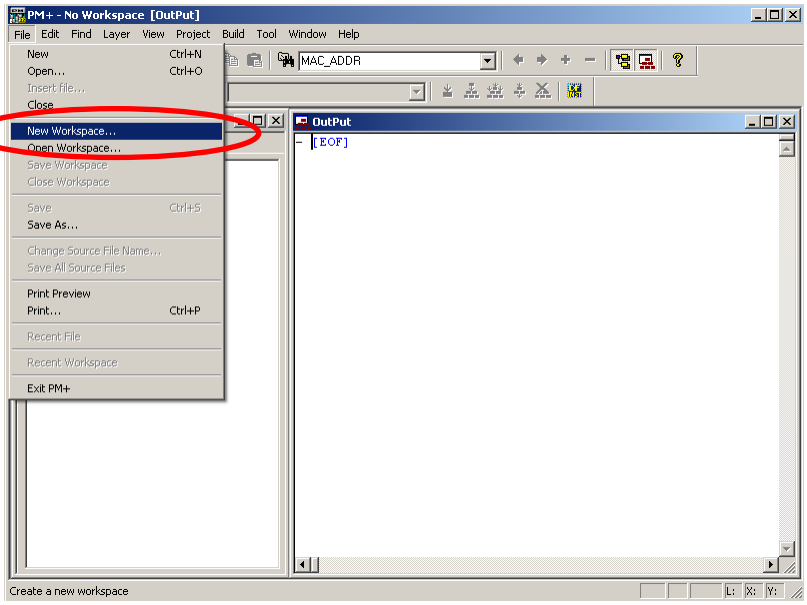
5.5 Parts list, Circuit diagram

5.1 Create a new workspace

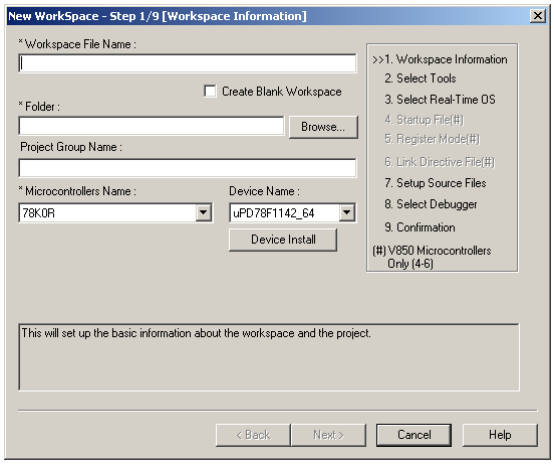
Now, create a new workspace and project.

PM+ allows you to create a new workspace with following "New WorkSpace" dialog.

Select "File" on PM+ menu bar, then "New Workspace...".



"New WorkSpace" dialog opens



<Description of items>

Workspace File Name:
-> Specify the name of the workspace file that manages the project files.
.prw is automatically suffixed as the file type.
A project file (.prj) of the same name is simultaneously created.

Folder:
-> Specify the folder for saving the workspace file by writing its absolute path.
This item can be selected from a reference dialog box by pressing the Browse... button.

Project Group Name:
-> Specify this item if wishing to manage multiple projects together in function units.
If nothing is specified, this item is the same as the workspace file name.

Microcontroller Name:
-> Specify the name of the microcontroller to be used.

Device Name:
-> Specify the name of the device to be used.

The concrete information set here is described on the following pages

Input the workspace information setting as follows.

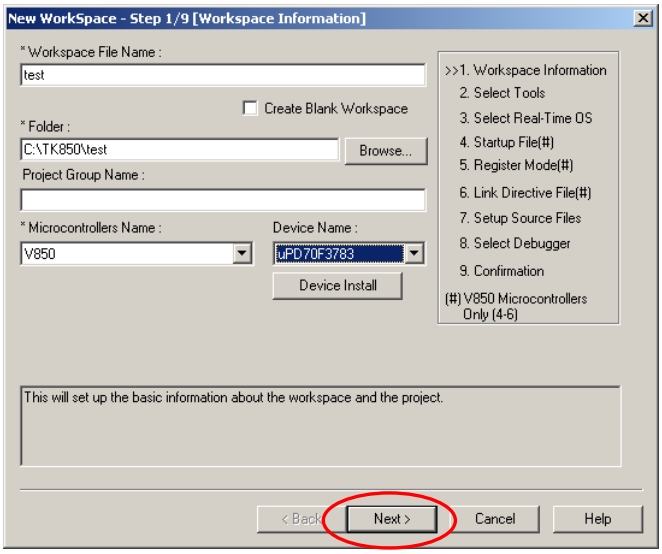
Workspace file name
→ test

Folder
→ C:¥TK850¥test

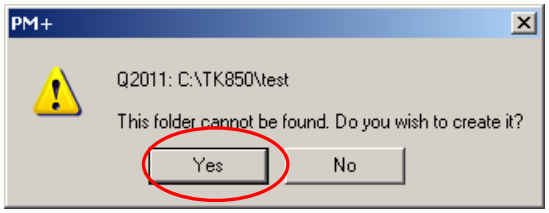
Project Group Name
→ (no input)

Microcontroller Name
→ V850 Series

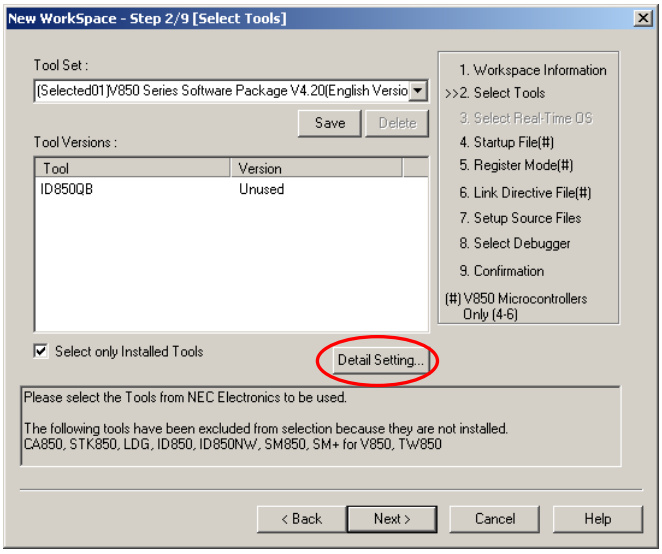
Device Name
→ uPD70F3783



Click Next > button

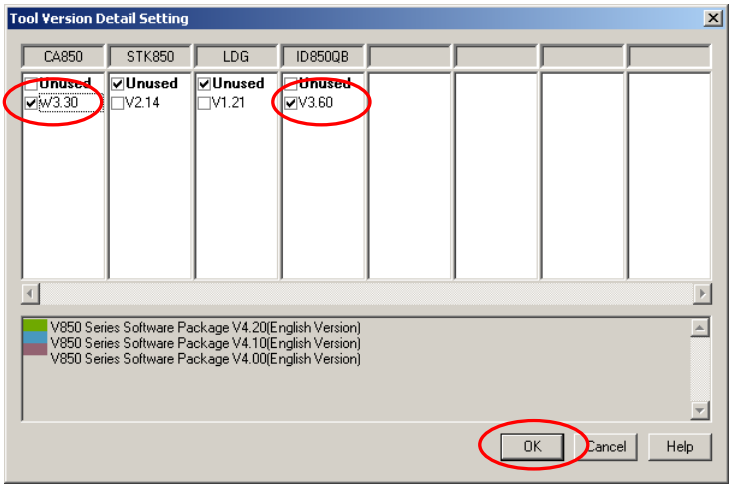


Click Yes button

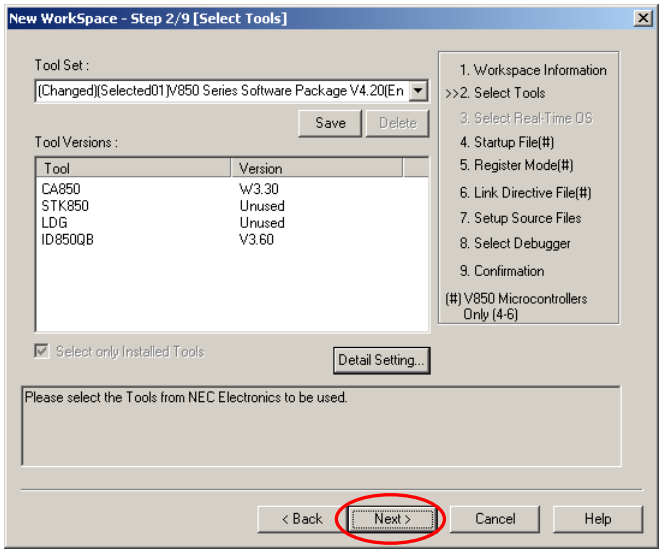


Click Detail Setting button

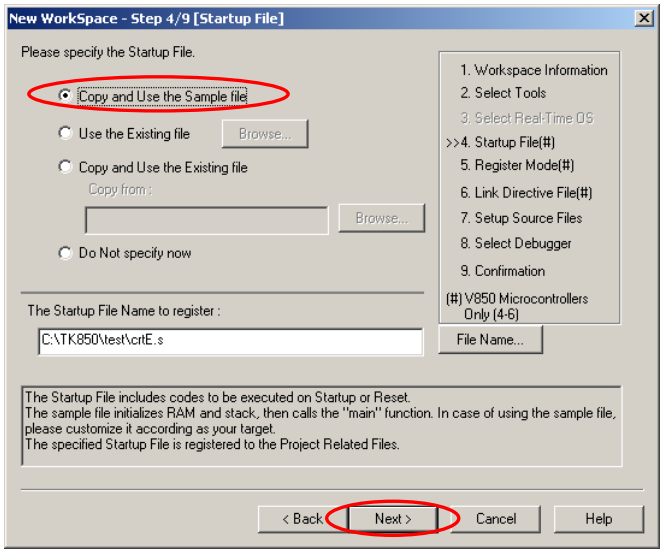
Set the version of tools as follows.
CA850 : W3.30
ID850QB : V3.60



Select tools as above screenshot, then click OK .

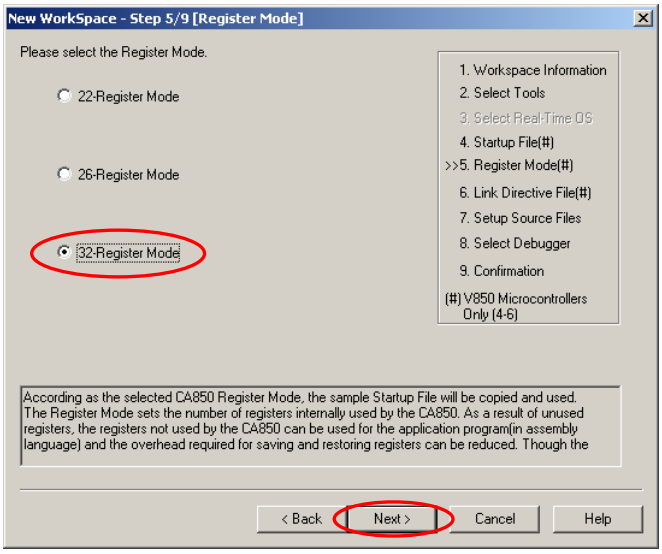


Click Next >



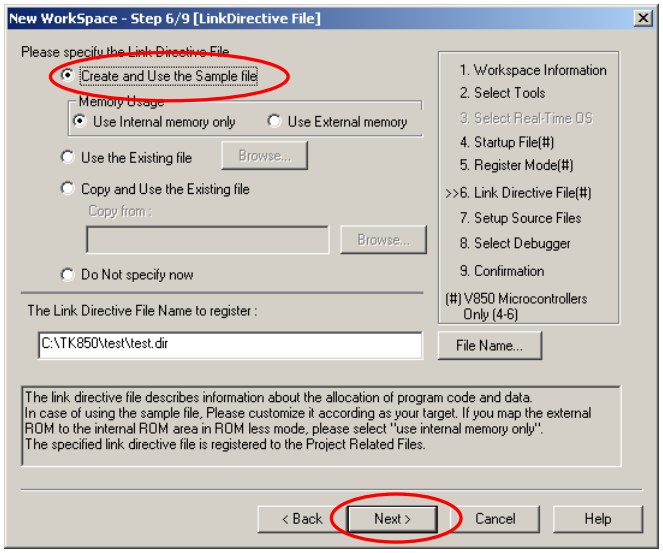
Select the "Copy and Use the Sample file".

Press the Next > button.



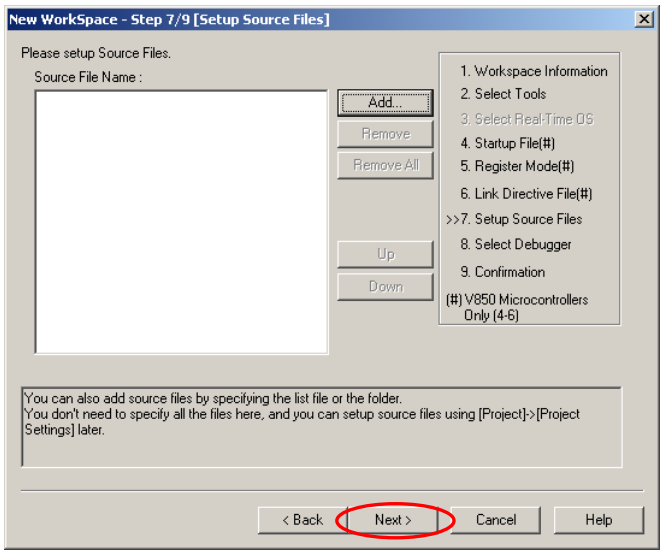
Select the " 32-Register Mode".

Press the Next > button.



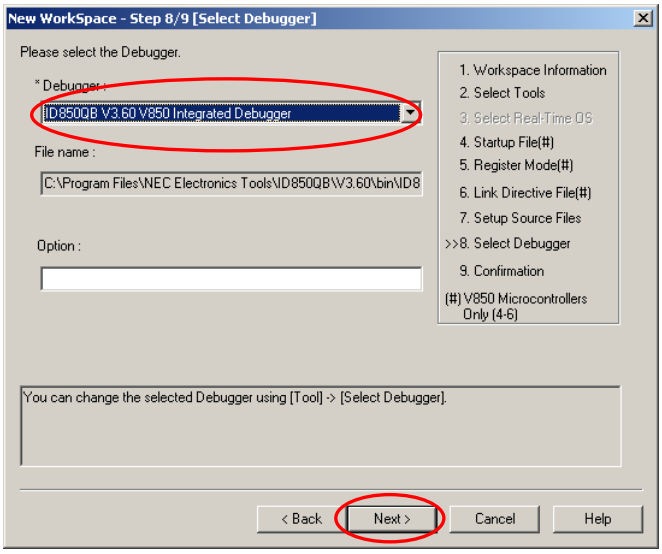
Select the "Create and Use the sample file"

Press the Next > button.

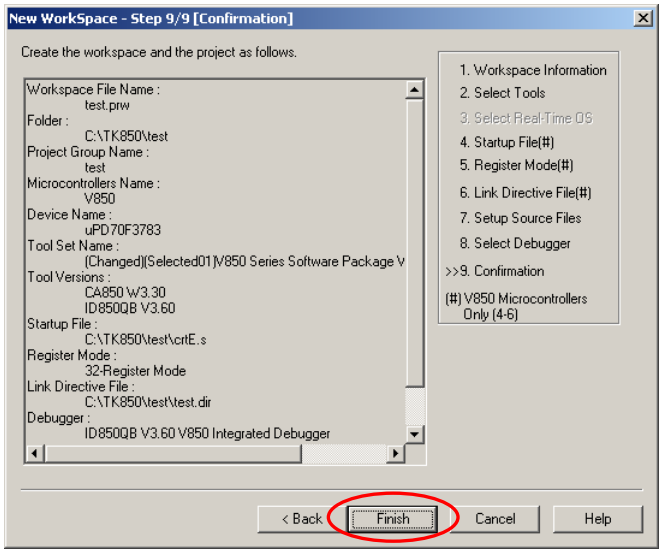


Press the Next > button.

Select the "ID850QB V3.60"

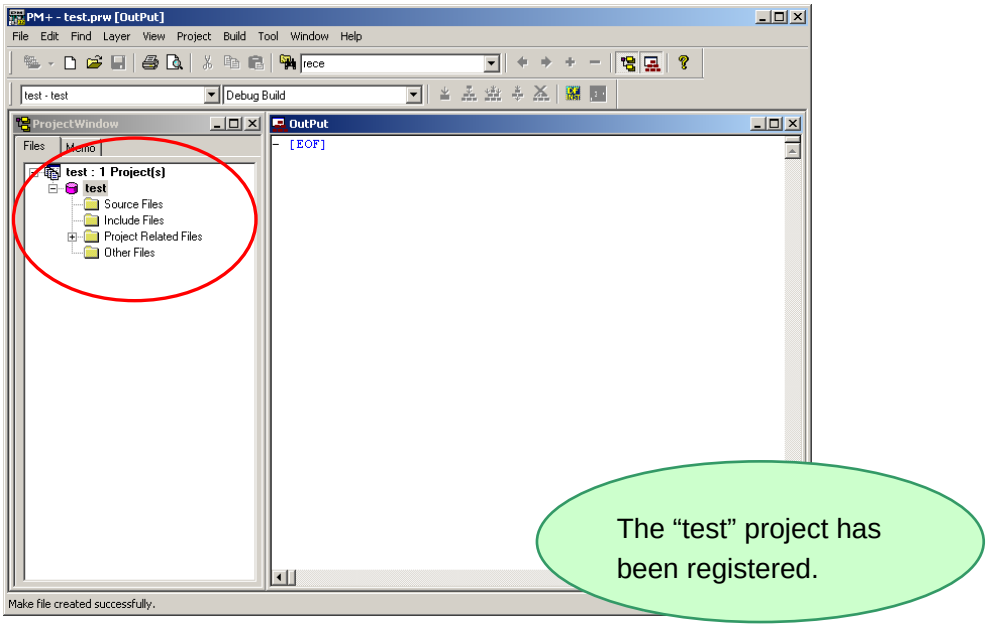


Press the Next > button.



Press the Finish button.

Check the project information setting contents.



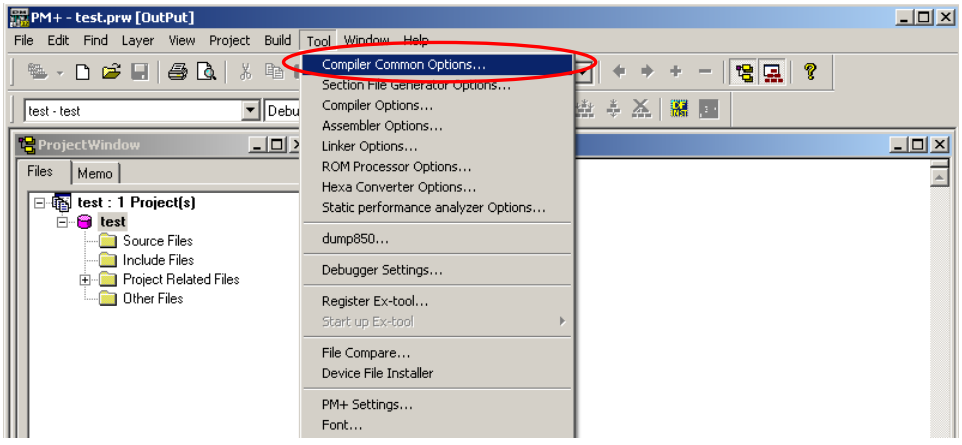
This completes workspace and project creation.

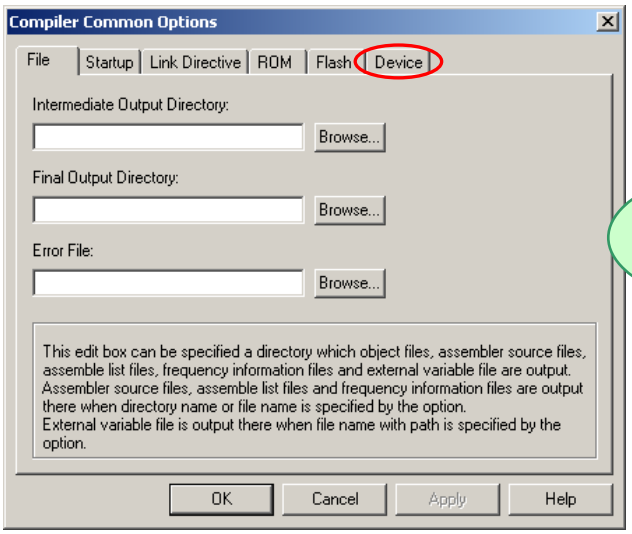
Additional source files can be registered at any time thereafter.

For details, refer to "Registering additional source files".

Next, setup the security ID

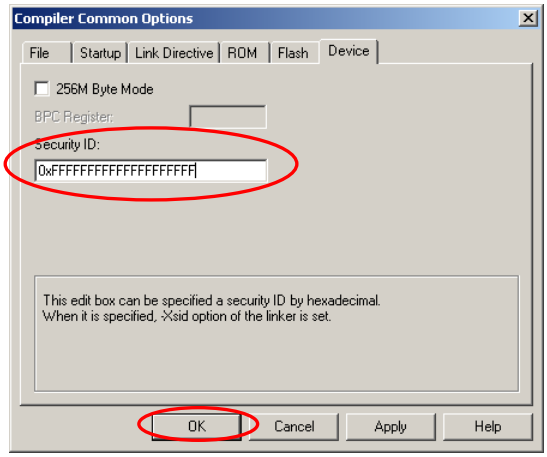
In the PM +, [Tool] → [Compiler common Options...] is selected.





Compiler Common Options setting is open.

Click the "Device" tab.



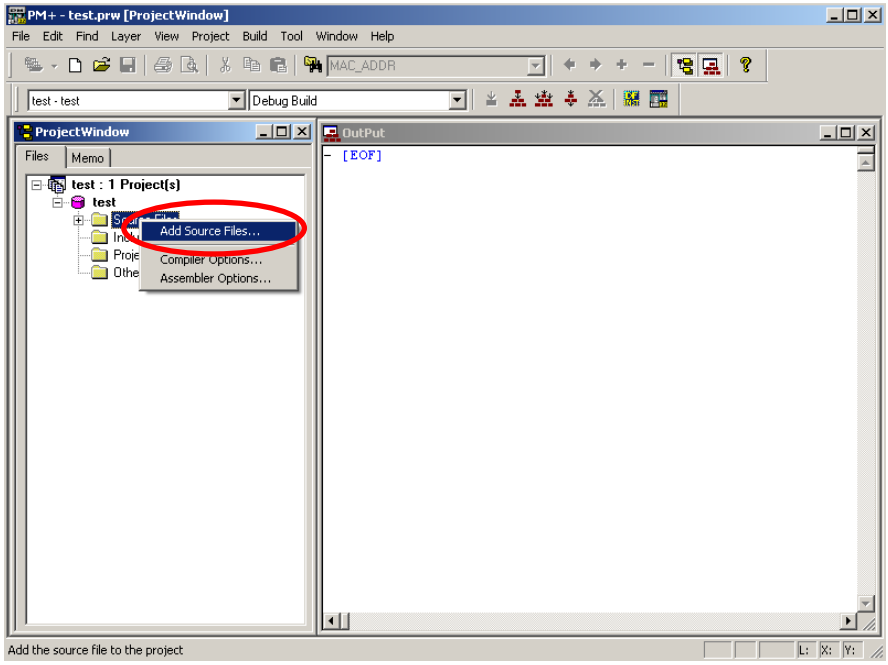
The actualities of "FFFFFFFFFFFFFFFFFFFF"(20 of F) are taken if there is no problem in the value of ID in security.

Press the OK button.

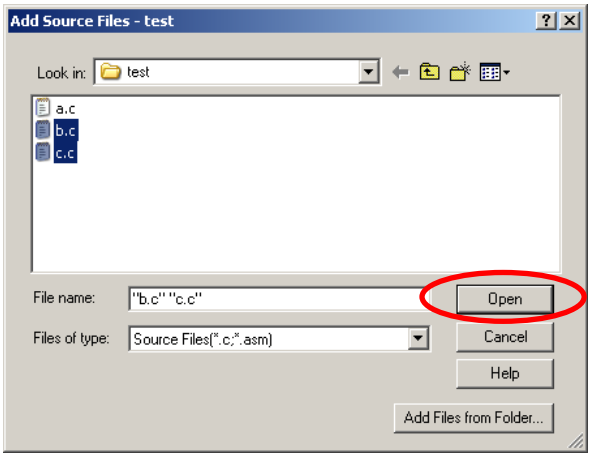
Security ID settings are complete

5.2 Register additional source file

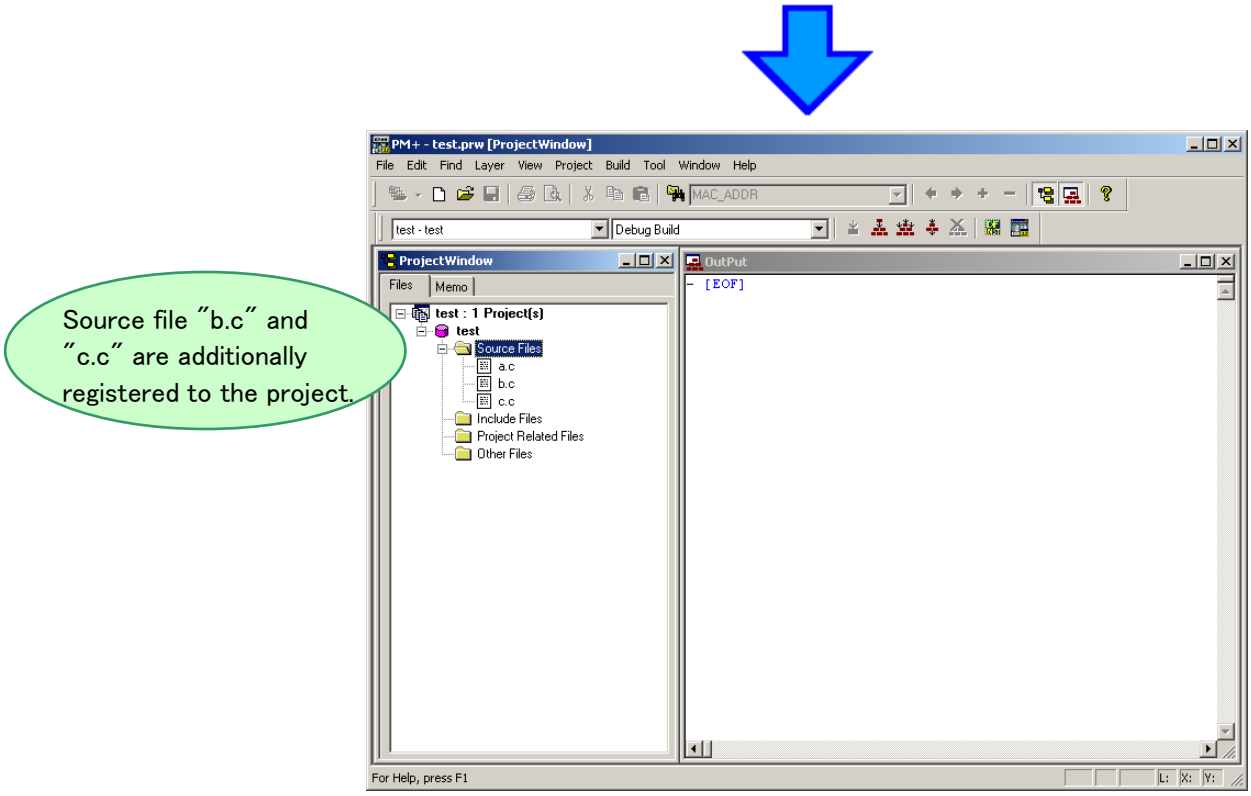
Now, register additional source files.
The following example shows the additional registration of source files "b.c" and "c.c" with source file "a.c" already registered.
Place the cursor on the source file in the Project window of PM+, and select [Add Source Files…] displayed in the right-click menu.



Select source files "b.c" and "c.c", then click Open



Multiple source files can be selected by clicking them with pressing Ctrl key.


Source file "b.c" and "c.c" are additionally registered to the project.
PM+ - test.prw [ProjectWindow]
File Edit Find Layer View Project Build Tool Window Help
MAC_ADDR
test - test
Debug Build
ProjectWindow
Files
Memo
test : 1 Project(s)
test
Source Files
a.c
b.c
c.c
Include Files
Project Related Files
Other Files
OutPut
[EOF]
For Help, press F1

5.3 Debugger tips

This section describes some useful techniques for the debugger (ID850QB).

5.3.1 Change display of buttons

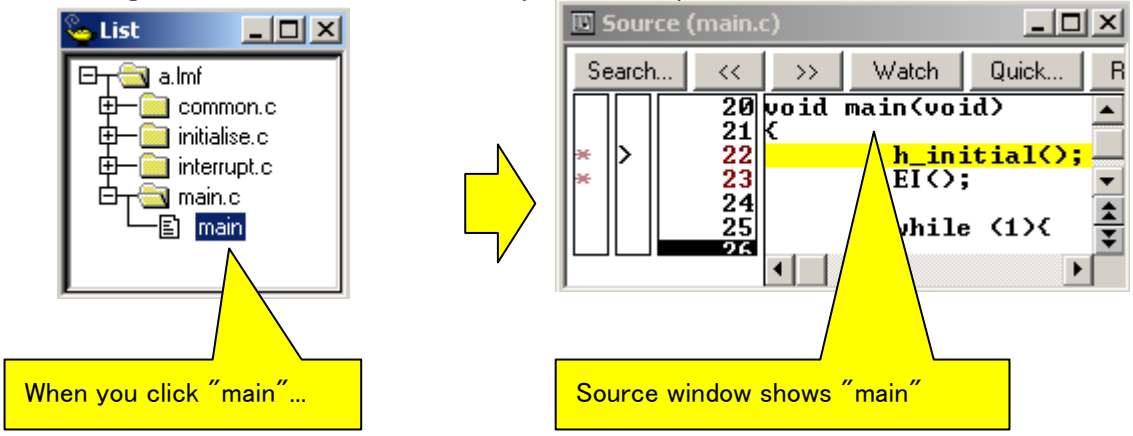
Execution controls (run, stop, step-in debugging, reset, etc) and opening functional window can be made by below buttons. However, it could be difficult to know which button does what.

In this case, select "Options" on menu bar, then "Debugger Options". Check "Pictures and Text" on setting area.

With this setting, the buttons display the text as well, so that it is easier to know what they are.

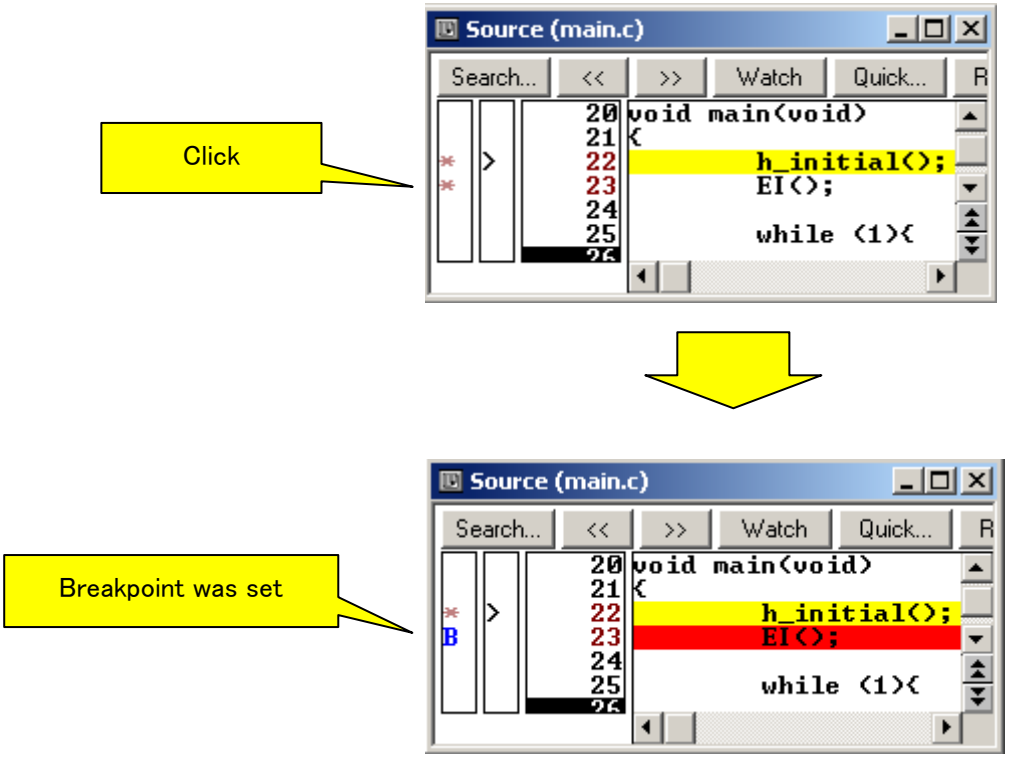
5.3.2 Display source list and function list

When you wish to see source file list or function list, select "Browse" on menu bar, then "Other" -> "List" to open the list window. The information in the windows is synchronized. Therefore, it is not just for referring to the list, but it is useful when you wish to update files or functions.



5.3.3 Set/delete breakpoints

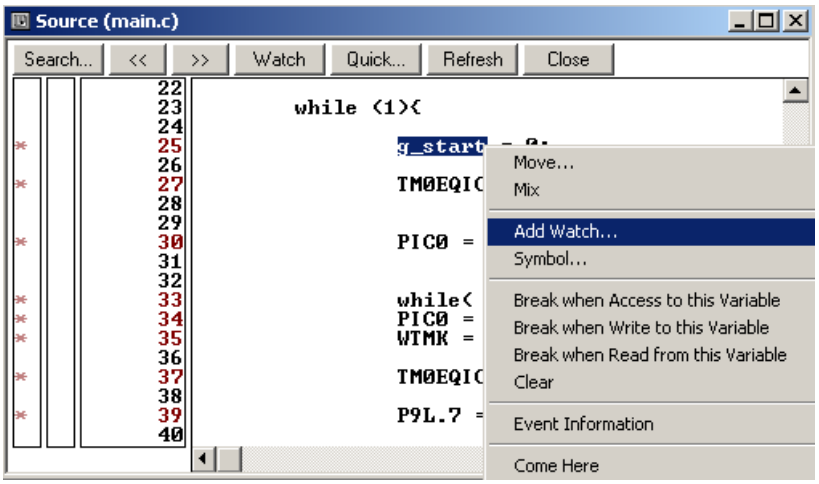
Breakpoints are executed by clicking lines in which " * " is displayed
"B" is displayed in the line where a breakpoint is set.
Breakpoints are deleted by clicking "B".



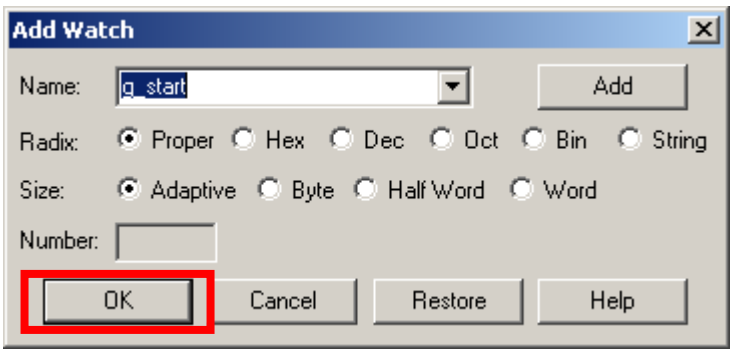
5.3.4 Display global variables

With using Watch Window, you can display global variables. There are several ways to register global variables to watch window. In this section, how to register from source window is described.

①Right-click the variable on source window, then select "Add Watch..."



②Add Watch dialog opens. Click OK .

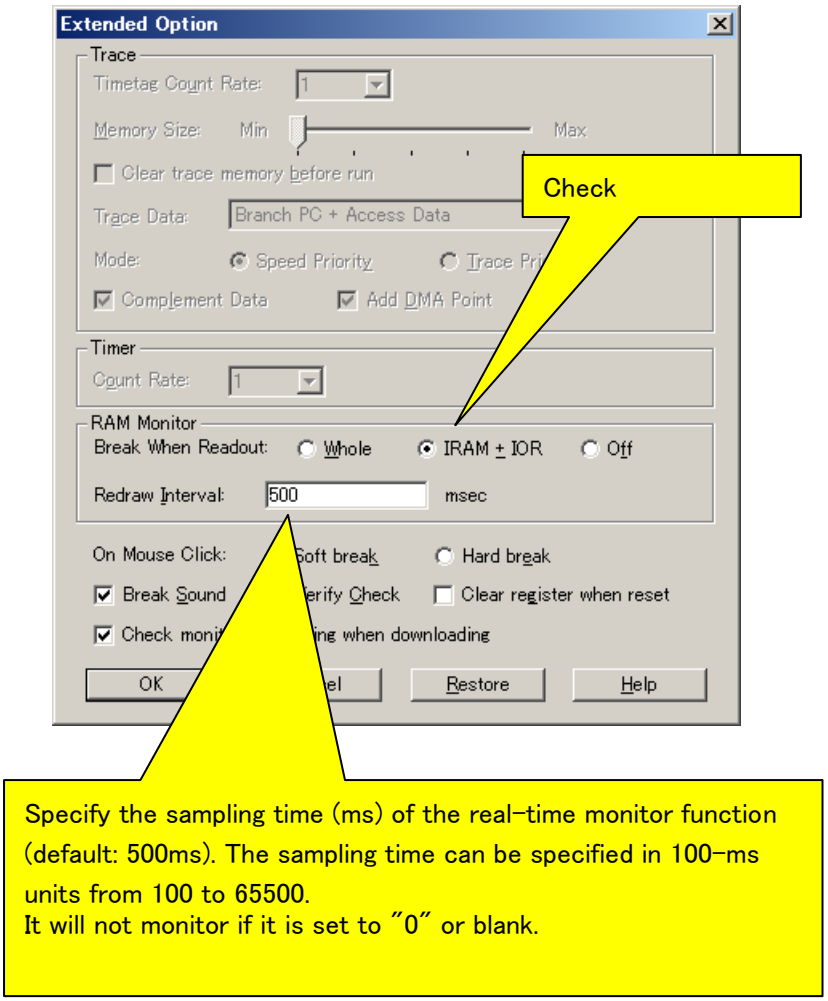


③Adding a variable to watch window is completed.

5.3.5 Display global variables (internal RAM) while programs are running

RAM, general-purpose register, and SFR can be referred by the pseudo real-time monitor function even when the programs are running.

Select "Option" menu -> "Extended Option...". Follow below settings.

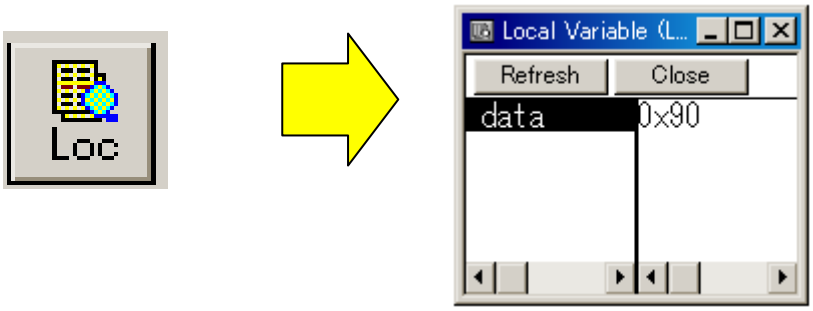


Note:

- The user program momentarily breaks upon a read.
- Do not use the pseudo real-time monitor function while using the memory window. It uses the system resources significantly as it monitors the displaying memory as well.
- It is recommended to close the memory window when you use the pseudo real-time monitor function.

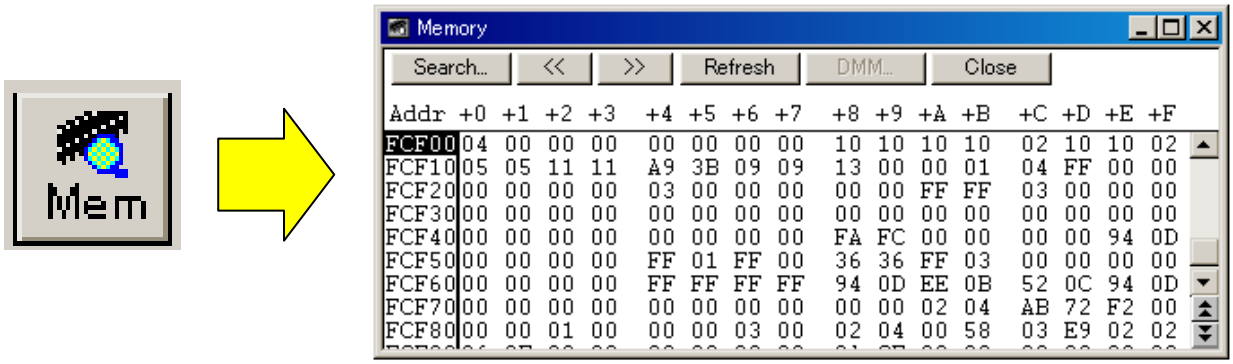
5.3.6 Display local variables

Local variable window is used to display local variables.
By clicking the button below, you can open the local variable window.
Unlike global variables, local variables cannot be displayed when programs are running.

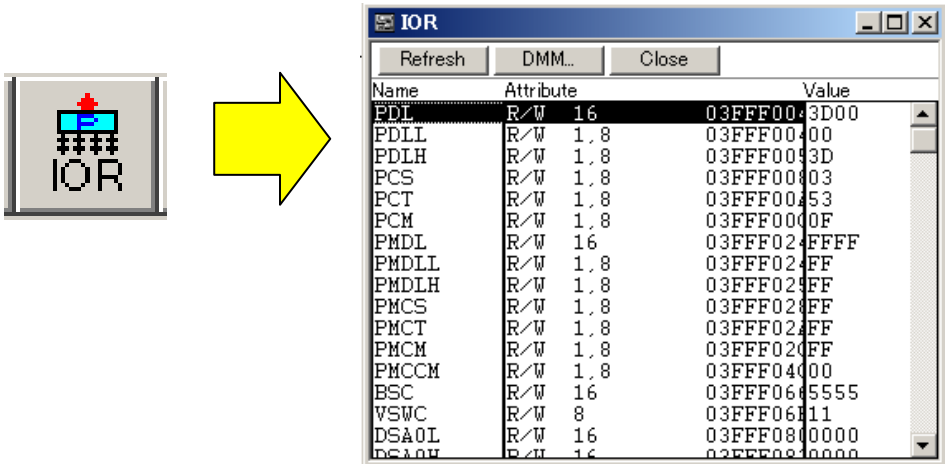


5.3.7 Display memory and SFR contents

By clicking the button below, you can open the memory window.



By clicking the button below, you can open the IOR window.



5.4 WriteEZ5

Since the program downloaded by ID850QB includes monitoring files for debugging, it cannot run stand-alone. However, if you use WriteEZ5 to write programs, it does not write monitoring files. Therefore, it can run stand-alone.
Also, if you forgot the security ID or if you set On-Chip Debug Option Byte to disable the on-chip debug function, you cannot start debugger. In this case, you need to delete the setting values of security ID and On-Chip Debug Option Byte. Use WriteEZ5 to erase the flash memory.

WriteEZ5 is installed at "1.2.2 Installation of Development Tools".
Start WriteEZ5 by selecting "Windows Start" menu, "Programs", "NEC Electronics Tools", "WriteEZ5", "V1.00", and "WriteEZ5".

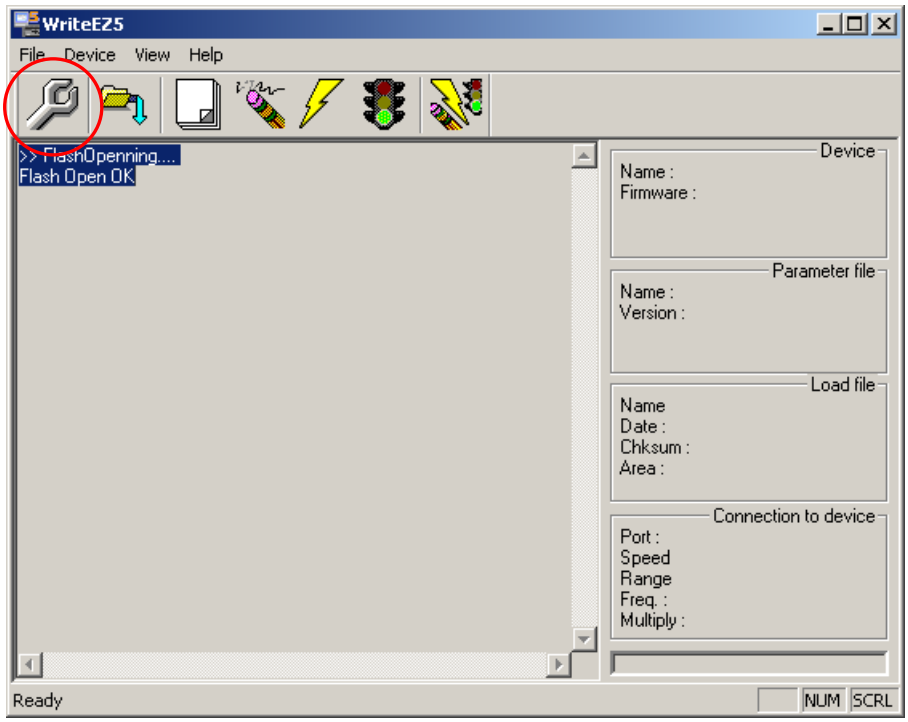
The hardware for WriteEZ5 is incorporated in TK-850/JH3E+NET.

① The switch of TK-850/JH3E+NET is set as follows, and connects TK-850/JH3E+NET to PC.

SW1

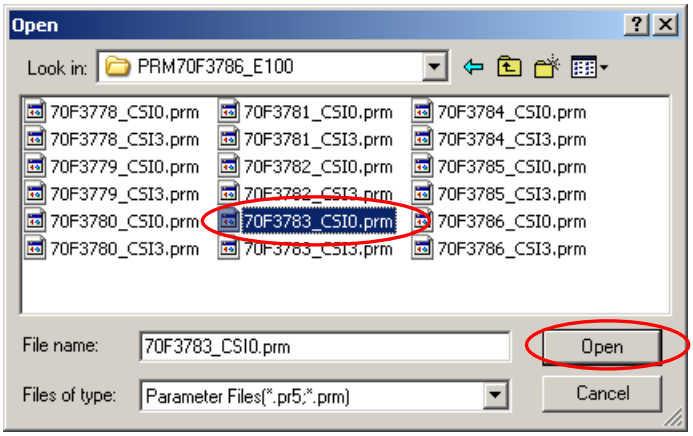
Bit1	OFF
Bit2	ON
Bit3	ON
Bit4	ON

② Please execute WriteEZ5.

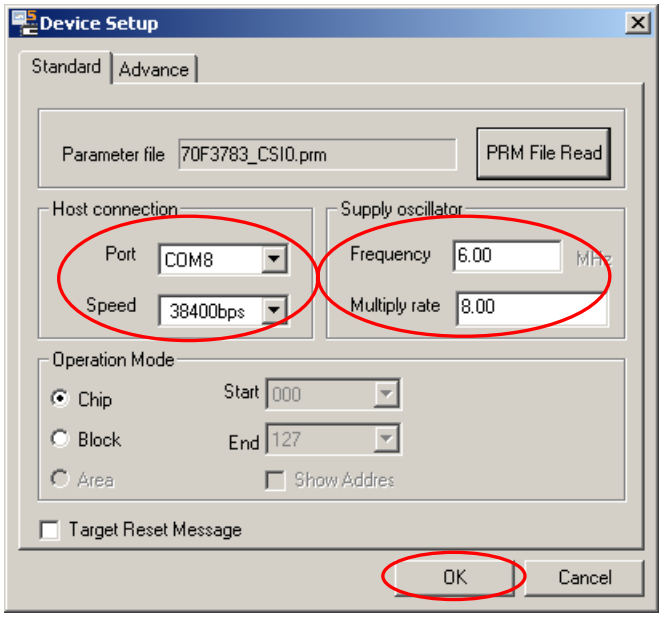


③ Push the「Setup」button.

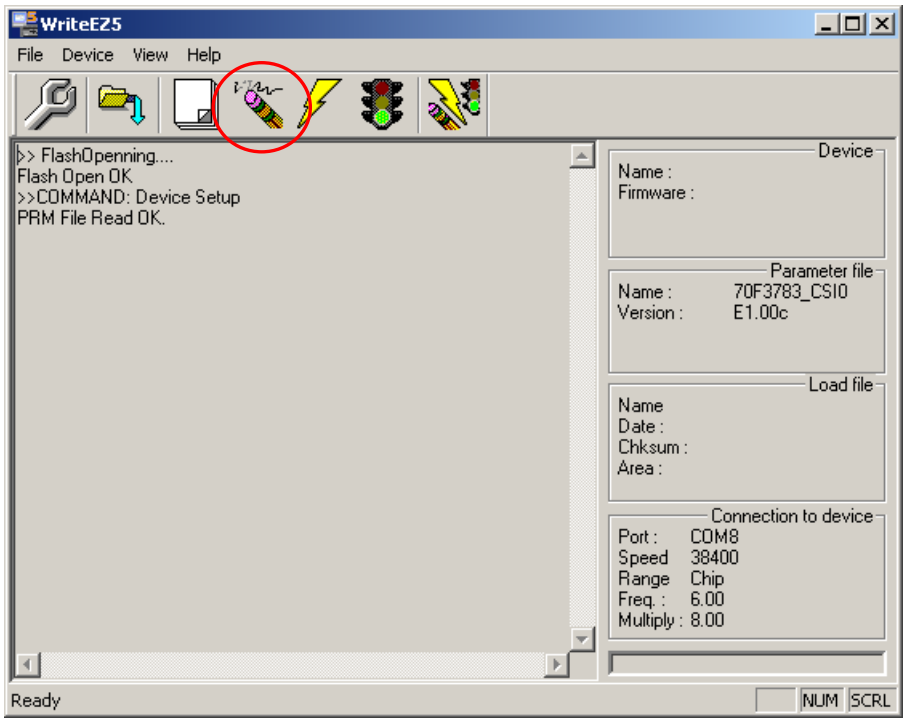
④ Push the「PRM File Read」button.



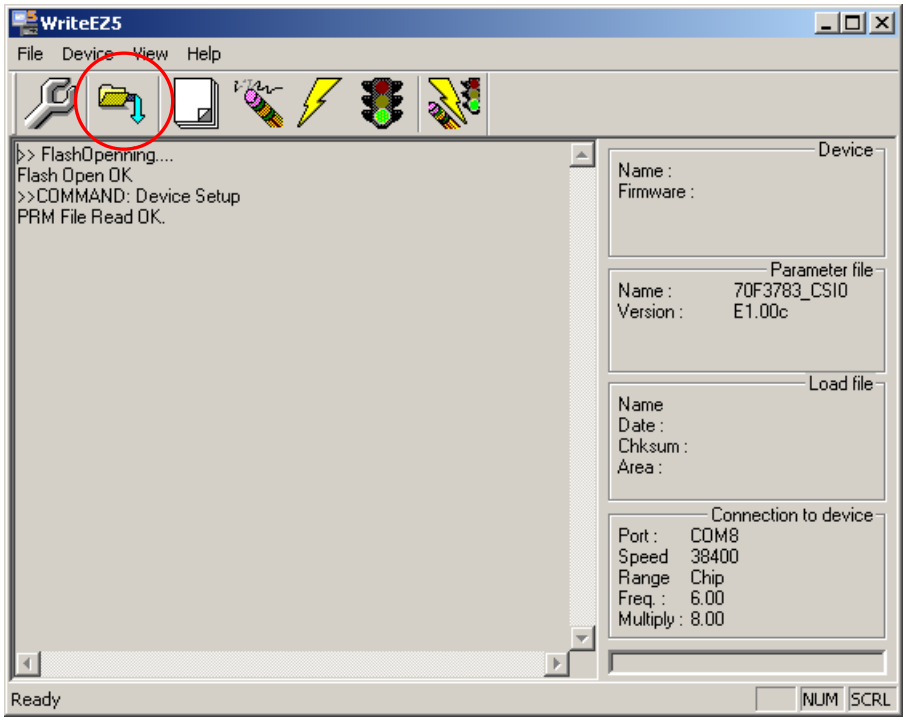
⑤ Please select "70F3783_CSI0.prm" in the directory of "¥PRM¥PRM70F3786_E100" in the CD-ROM.



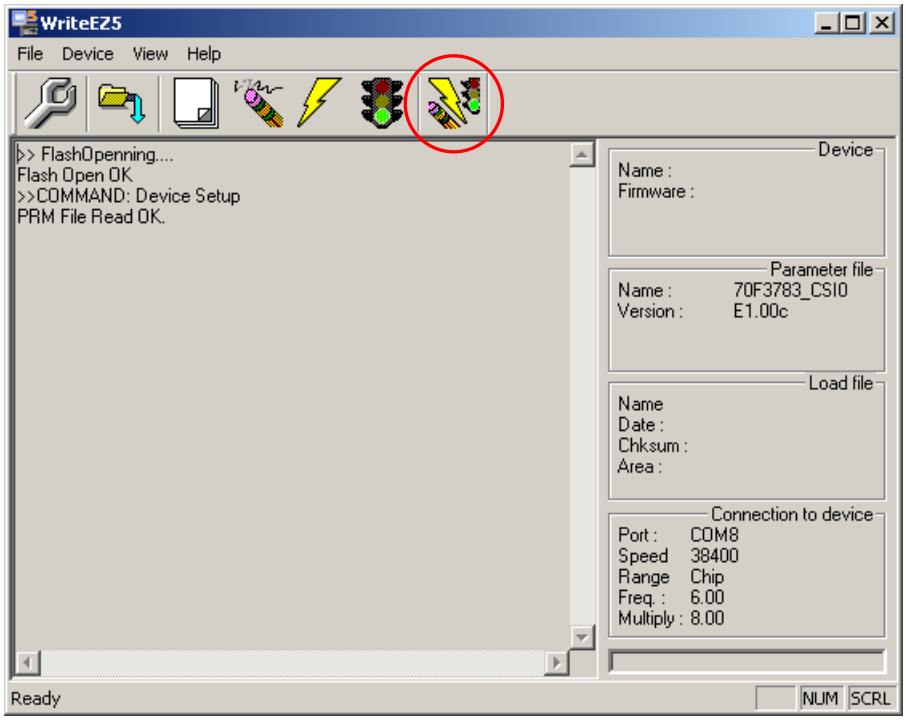
⑥ "Port" selects the COM port number where TK-850/JH3E+NET is allocated.
※Only the COM port number that the personal computer has is displayed in this pull-down menu.
Input "6.00" to "Frequency"
Input "8.00" to "Multiply rate"
Input "38400" to "Speed", and chick "OK"



⑦ "Erase" The deletion of the flash memory begins when the button is pushed.



⑧ When you write the program, click “load” then select writing HEX file.



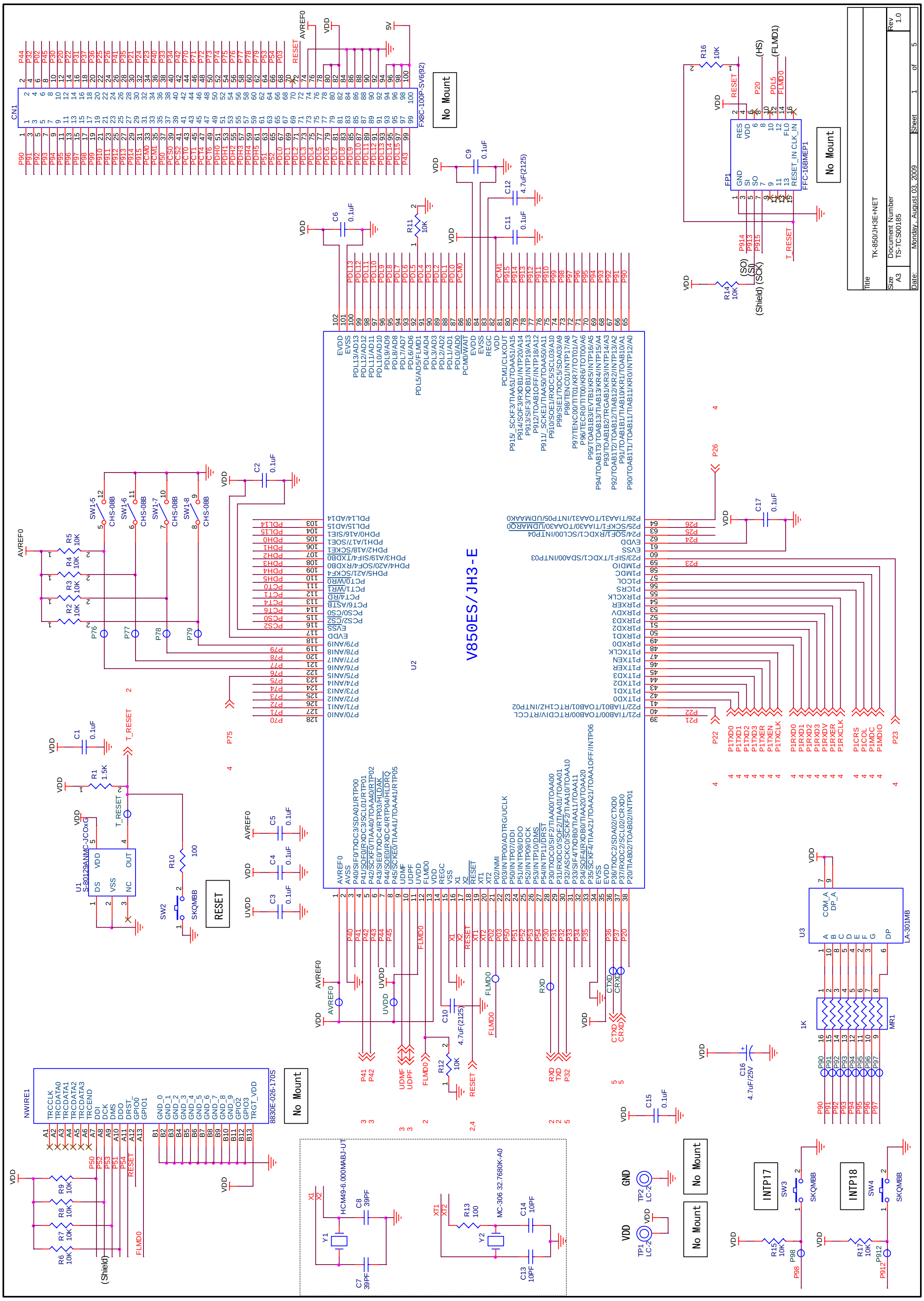
⑨ Hex file writing will be start by clicking "AutoProcedure" .

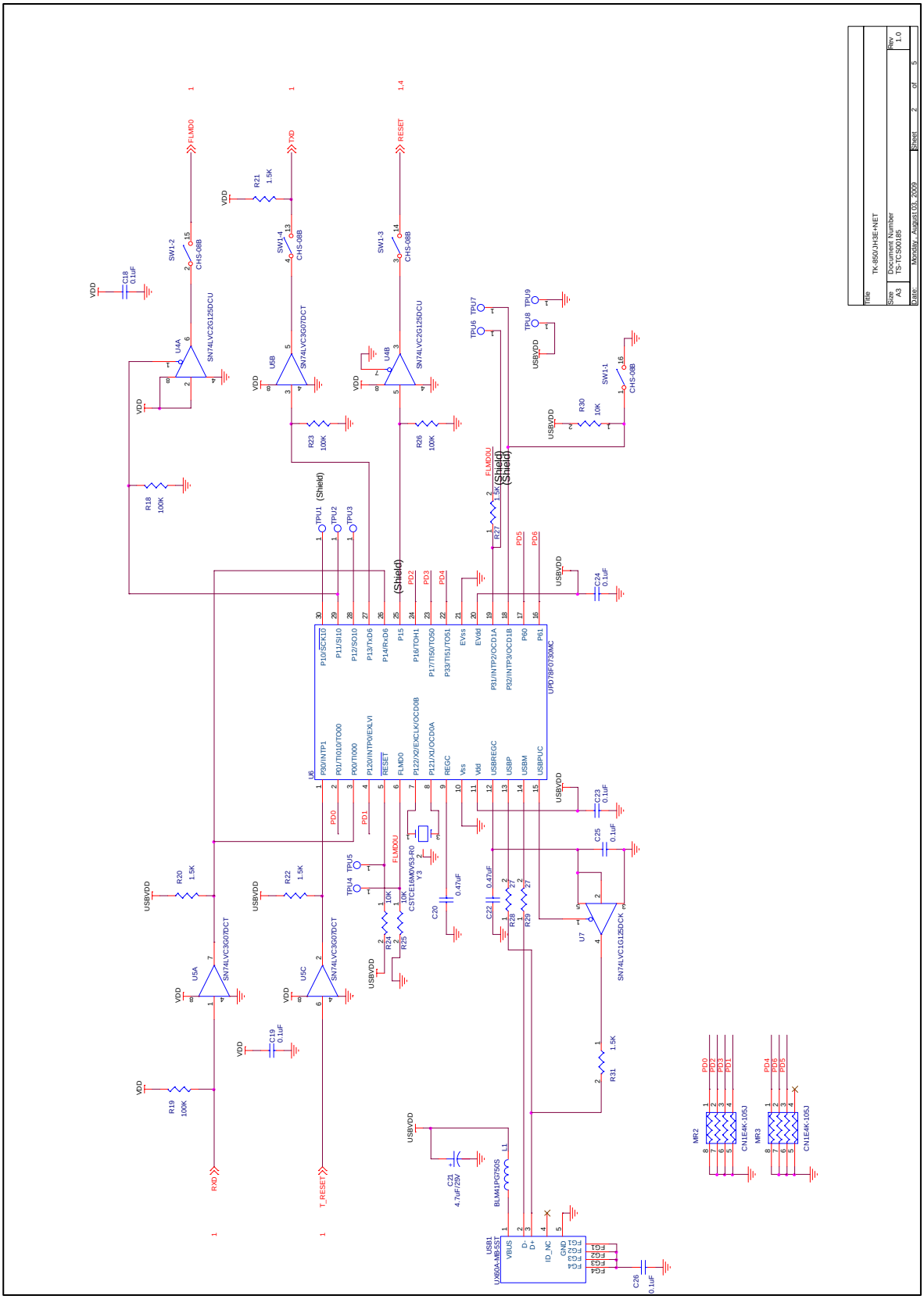
5.5 Parts list, Circuit diagram

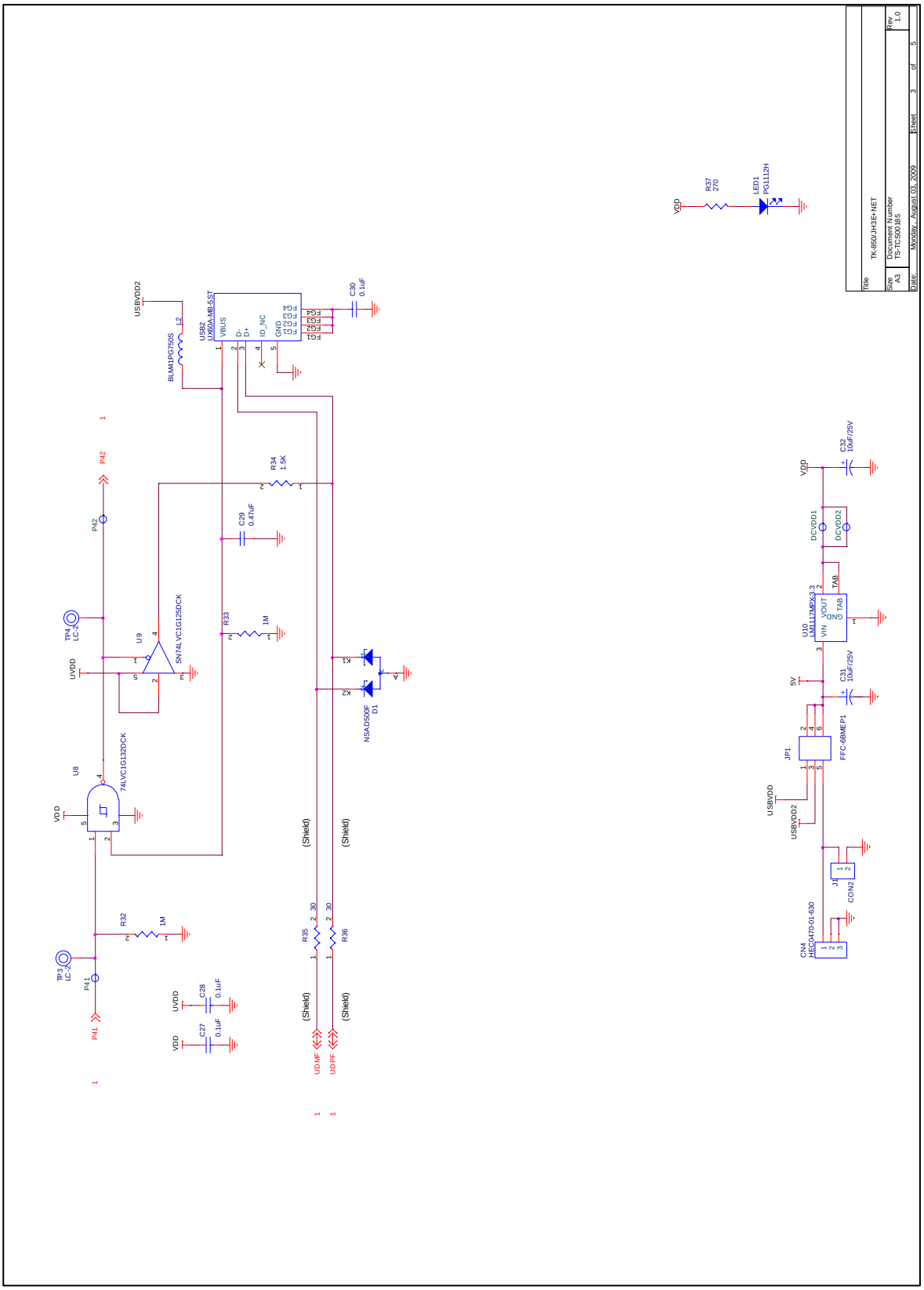
From following page, it shows the parts list and the circuit diagram of the kit.

No.	Mount Quantity	Mount Parts Reference	Un-mount Parts Reference	Type	Parts No	Maker	Note
1	1	FLMD0	DCVDD1,DCVDD2,P41,P42, P76,P77,P78,P79,P90,P91, P92,P93,P94,P95,P96,P97, P98,P912,UVDD,T_RESET, RXD,CTXD,CRXD,AVREF0	Solder short pad	SS		FLMD0 -> short
2	0		FLMD0,CANS	Solder short pad	SO		
3	0		CAN1	D-SUB Connecter	JHEY-9S-1A3B	JST	Not mounted
4	0		CN1	Connecter	FX8C-100P-SV	HIROSE	Not mounted
5	1	CN4		Connecter	HEC0470-01-630		
6	0		CN5	Connecter	DF17(3.0)-030DS-0.5V(57)	HIROSE	Not mounted
7	23	C1,C2,C3,C4,C5,C6,C9,C11, C15,C17,C18,C19,C23,C24, C25,C27,C28,C33, C34,C35,C36,C37,C38,	 C45 C50	Chip ceramic cap	0.1uF		
7	3	C26,C30,C46	C49	Chip ceramic cap	0.1uF		
8	2	C7,C8		Chip ceramic cap	40PF		
9	3	C12,C10,C39		Chip ceramic cap	4.7uF(2125)		
10	6	C13,C14,C40,C41,C42,C43		Chip ceramic cap	10pF		
11	2	C21,C16		Aluminum Electrolytic Cap	4.7uF/25V		
12	3	C20,C22,C29		Chip ceramic cap	0.47uF		
13	2	C32,C31		Aluminum Electrolytic Cap	10uF/25V		
14	1	C44		Chip ceramic cap	0.022uF/50V		
15	2	C48,C47		Chip ceramic cap	30PF		
16	1	D1		Diode	NSAD500F	NECEL	
17	0		D2,D3,D4	Diode	RD27S	NECEL	Not mounted
18	0		FP1	Connecter	FFC-16BMEP1	HONDA	Not mounted
19	1	JP1		Connecter	FFC-6BMEP1	HONDA	
20	0		JP2	Connecter	FFC-4BMEP1	HONDA	Not mounted
21	0		J1	Connecter	FFC-2AMEP1	HONDA	Not mounted
22	3	LED1,LED2,LED3		LED	PG1112H	ROHM	
23	2	L2,L1		ferrite beads	BLM41PG750S	Murata	
24	3	L3,L4,L5		ferrite beads	BLM18PG600SN1	Murata	
25	0		L6	Common mode filter	ACT45B-510-2P	TDK	Not mounted
26	1	MR1		resister module	CN1J8T 102J	KOA	
27	2	MR3,MR2		resister module	CN1E4K-105J	KOA	
28	1	NWIRE1		Connecter	8830E-026-170S	KEL	
29	8	R1,R20,R21,R22,R27,R31, R34,R43		Chip resister	1.5K		
30	18	R2,R3,R4,R5,R6,R7,R8,R9, R11,R12,R14,R15,R16,R17, R24,R25,R30,R44	 R55,R62	Chip resister	10K		
31	12	R10,R13,R45,R46,R47,R48, R49,R50,R51,R52,R53,R54		Chip resister	100		
32	4	R18,R19,R23,R26		Chip resister	100K		
33	2	R28,R29		Chip resister	27		
33	2	R35,R36		Chip resister	30		
34	3	R32,R33,R57		Chip resister	1M		
35	3	R37,R58,R59		Chip resister	270		
36	4	R38,R39,R40,R41		Chip resister	49.9(1%)		
37	1	R42		Chip resister	10(1%, 0.1W)		
38	1	R56		Chip resister	12.4K(1%, 0.1W)		
39	0		R60,R61	Chip resister	120		Not mounted
40	0		R63,R64,R66	Chip resister	xxx		Not mounted
41	1	R67	R65	Chip resister	0		Not mounted
42	1	SW1		Switch	CHS-08B	COPAL	

43	3	SW2,SW3,SW4			SKQMBB	ALPS	
44	0		TPU1,TPU2,TPU3,TPU4,TPU5, TPU6,TPU7,TPU8,TPU9	Check terminal	TPU		Not mounted
45	0		TP1,TP2,TP3,TP4,TP5,TP6, TP7	Check pin	LC-2	MAC8	Not mounted
46	1	TR1		Connecter	TLA-6T718	TDK	
47	2	USB2,USB1		Connecter	UX60A-MB-5ST	HIROSE	
48	1	U1		IC	S-80129ANMC-JCOxG	SII	
49	1	U2		IC	V850ES/JH3-E	NECEL	
50	1	U3		7segLED	LA-301MB	ROHM	
51	1	U4		IC	SN74LVC2G125DCU	TI	
52	1	U5		IC	SN74LVC3G07DCT	TI	
53	1	U6		IC	UPD78F0730MC	NECEL	
54	2	U9,U7		IC	SN74LVC1G125DCK	TI	
55	1	U8		IC	SN74LVC1G132DCK	TI	
56	1	U10		IC	LM1117MPX-3.3	NS	
57	1	U11		IC	LAN8700C	SMSC	
58	0		U12	IC	TJA1050T	NXP	Not mounted
59	1	Y1		Resonator	HCM49-6.000MABJ-UT	Citizen	
60	1	Y2		Resonator	MC-306 32.7680K-A0	EPSON	
61	1	Y3		Resonator	CSTCE16M0V53-R0	Murata	
62	1	Y4		Resonator	ABM3B-25.000MHZ-10-1-U-T	ABRACON	_
63	1	JP1	JP2	Short pin	HIF3GA-2.54SP	HIROSE	


V850ES/JH3-E
TK-850/JH3E+NET
TS-TC00185
Monday, August 03, 2009
RESET
No Mount




VDD
R37
270
LED1
PG1112H
Title
TK-850/JH3E+NET
Size
A3
Document Number
TS-TC350185
Rev
1.0
Date:
Monday, August 03, 2009
Sheet
3
of
5
USBVDD2
L2
BLM41PG750S
USB2
USB_MB-SST
VBUS
D-
D+
ID_NC
GND
FG1
FG2
FG3
FG4
C30
0.1uF
P42
R34
1.5K
C29
0.47nF
R33
1M
TP4
LC-2
UVDD
U9
SN74LVC1G125DCK
U8
74LVC1G132DCK
VDD
NSAD500F
D1
TP3
LC-2
P41
R32
1M
C28
0.1uF
C27
0.1uF
(Shield)
R35
30
R36
30
UD MF
UD PF
DCVDD1
DCVDD2
C32
10uF/25V
U10
LM1117MPX-3.3
VIN
VOUT
TAB
5V
C31
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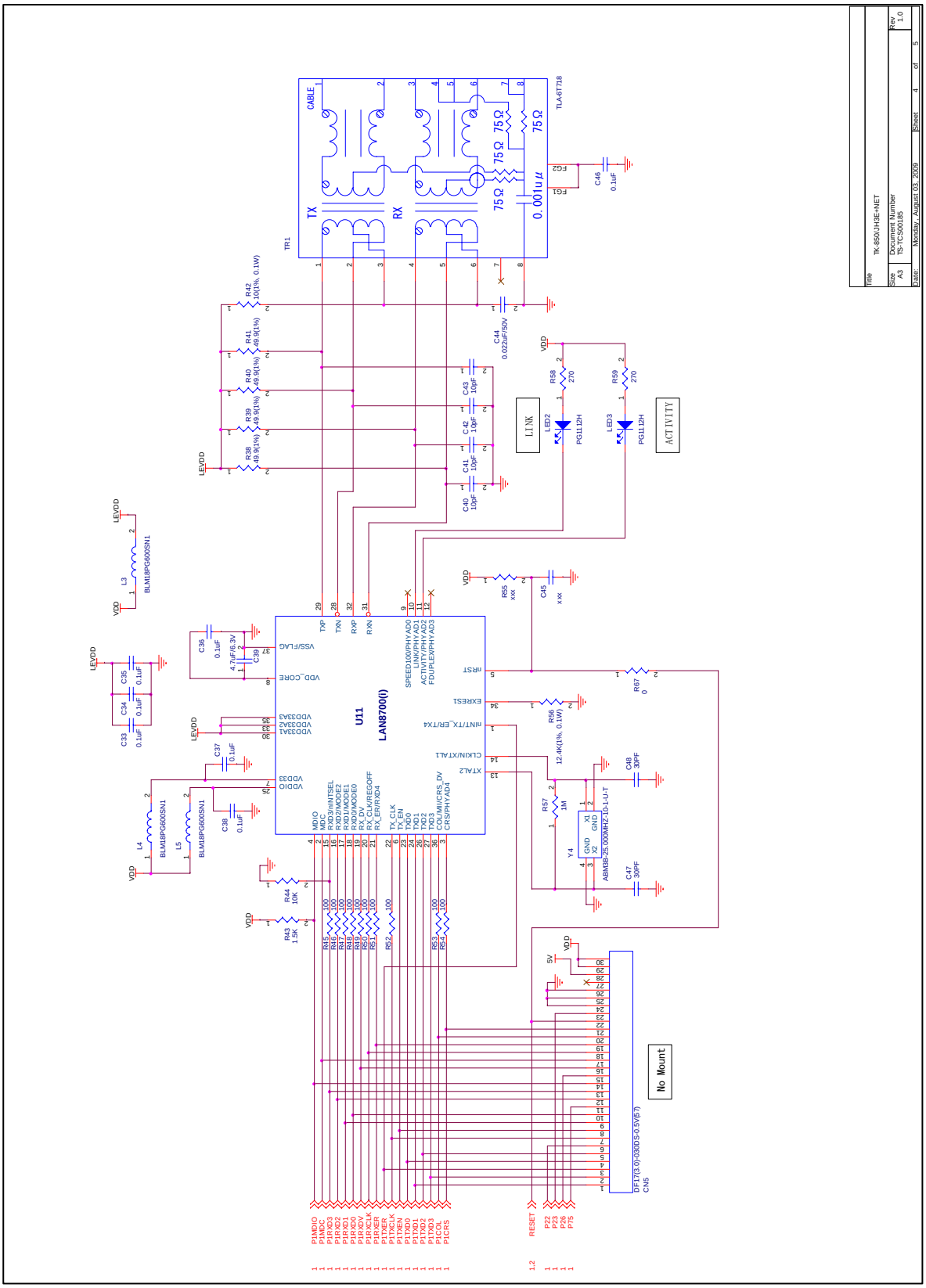
JP1
FFC-68MEP1
USBVDD
USBVDD2
J1
CON2
CN4
HEC047D-01-630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Monday, August 03, 2009
LAN8700(i)
U11
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TR1
CABLE
TX
RX
LINK
ACTIVITY
No Mount
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CN5
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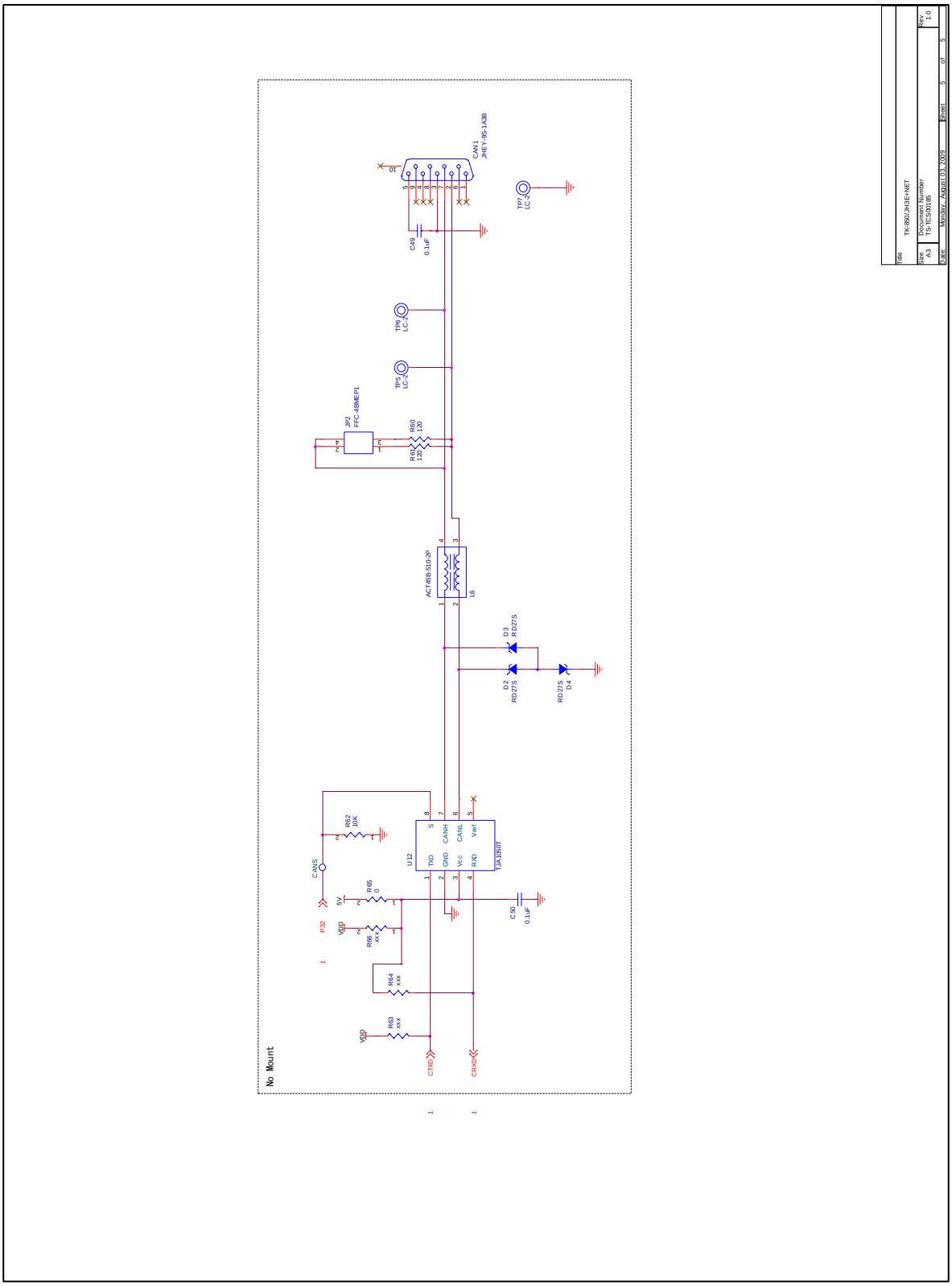
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C49
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TP7
LC-2
TP6
LC-2
TP5
LC-2
JP2
FFC-4BMEP1
R60
120
R61
120
ACT45B-510-2P
L6
D3
RD27S
D2
RD27S
RD27S
D4
R62
10K
C-NAS
U12
TJA1050T
TXD
GND
Vcc
RXD
S
CANH
CANL
Vref
R65
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P32
VDD
R66
xx
R64
xxx
R63
xxx
C50
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Date:
Monday, August 03, 2009
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