Performance Analysis Tuning Tool

TW V1.10

Operating Precautions

For PC98-NX Series (Windows™ based)
and IBM PC/AT compatible (Windows™ based)

Be sure to read this document before using the product.

Thank you for purchasing the performance analysis tuning tool TW V1.10.

This document describes the restrictions and cautions on using this tool. Be sure to read this document before using the tool.

For details of how to use and the functions of this tool, refer to the online help supplied with the product or the User's Manual "TW Performance Analysis Tuning Tool (Windows^{TM}-Based)" (document number: U16104EJ).

1. TW V1.10 OPERATING ENVIRONMENT

(1) Host machine

PC-98NX Series and IBM PC/AT compatible machines

CPU:	Pentium II 450 MHz or above
Main memory:	128 MB or more (256 MB or more recommended)
OS:	Windows 98 SE, Windows NT 4.0, Windows 2000 Professional, Windows Me, Windows XP
	* It is recommended to install the latest service pack for each OS.

(2) Supported tools

(a) NEC Electronics tool-chain version

Supported language:	C compiler package CA850 V2.50 or later
Supported integrated debugger:	ID850 V2.51 or later
Supported integrated debugger:	ID850NW V2.52 or later
Supported integrated debugger:	ID850NWC V2.52 or later
Supported system simulator:	SM850 V2.51 or later
Real-time OS:	RX850 V3.14
	RX850 Pro V3.15

(b) When using Midas Lab IE in combination with ID850NW

IE server:	850Eserve PR0806
	RTESServ PR0809
	RTE for Win32 V5.10 or later

2. FILES NECESSARY FOR EXECUTING TW V1.10

The following files are necessary for using TW V1.10.

(1) TW system file (this product)

   Included in the folder "TW" on the CD-ROM.

(2) JAVA executing environment

   Sun Java2 Runtime Environment (hereafter referred to as JRE) V1.4.1_02 must be installed.

   Install j2re-1_4_1_02-win-i.exe included in the folder "Util" on the CD-ROM.

(3) Device file (separately available)

   The device file corresponding to the target used must be installed before using TW. Install the

   device file included in the SP850 or the one downloaded through ODS (online delivery service).

(4) System library for TW

   TW V1.10 supplies a dedicated system library to enable acquisition of the execution information of

   the system library (standard/arithmetic system library) and tuning, including the system library which is

   equivalent to the one included with the CA850.

   The contents of the system library for TW may differ depending on the version of TW, so be sure to

   use the library that can be used in the relevant TW version.

   The system library for TW that can be used in TW V1.10 and the time stamp of the information file are

   described below. Check the following information to confirm the usability of the system library in TW

   V1.10.

   (The installation destination is assumed to be C:\NECTools32)

   C:\NECTools32\lib850\r*\libtw*.a

   C:\NECTools32\lib850\r*\twlib*.dat

   Time stamp: 2002/5/21 12:00

3. INSTALLATION

It is necessary to install the following before installing TW V1.10.

- CA850
- ID850, ID850NW, ID850NWC, or SM850
- TW
- Sun Java2 Runtime Environment V1.4.1_02
- Device file

3.1 CA850

See CA850 V2.50 C Compiler Package Operation User's Manual.

3.2 ID850, ID850NW, ID850NWC, or SM850

See the following user's manuals.
- ID850 Ver.2.50 Integrated Debugger Operation User's Manual
- ID850NW Ver.2.51 Integrated Debugger Operation User's Manual
- ID850NWC Ver.2.51 Integrated Debugger Operation User's Manual
- SM850 Ver.2.50 System Simulator Operation User's Manual

3.3 JRE

Activate "j2re-1_4_1_02-win-i.exe" in the folder "Util" on the CD-ROM to perform installation.

3.4 TW

ToolLinkManager is also installed when TW is installed.
After ToolLinkManager is installed, the ToolLinkManager icon is displayed on the taskbar when any of the tools is activated (even if TW is not used).

3.4.1 Installation procedure

This section explains the installation procedure, assuming that TW V1.10 is installed under the directory "C:\nectools32".

<1>   Because it may be necessary to restart the computer after installation, terminate all other applications.
See the document "V850 Series Software Package SP850 V3.00 Operating Precautions" for details of cautions on installation.

<2>   Activate the SP850 installer and follow the directions in the screen.

<3>   The following file will be created after TW V1.10 has been installed. This file is necessary for uninstalling TW V1.10 and must not be deleted (the installation destination is assumed to be C:\NECTools32).

           C: \NECTools32\ Setup *.*

3.5 Device File

To install the device file, use the dedicated installer "DFINST.EXE" supplied with TW V1.10 or other 32-bit version products. This installer allows the device file to be installed in the Win32 environment.
The installer "SETUP.EXE" on the disk of the device file is compatible with the Win16 environment and registers the device file information in "NECDEV.INI". In the Win32 environment of TW V1.10, be sure to use "DFINST" because it is necessary to register the device file information in the registry.

The procedure for installing the device file is explained below. For details of the dedicated installer DFINST, refer to the online help provided in DFINST.

<1>   Start "DFINST.EXE". To install a new device file, click $\boxed{\text{install...}}$ on the screen that is displayed after the installer has been started, and select the installation information file "NECSETUP.INI" from the device file product disk.

<2>   To move a device file already registered in "NECDEV.INI" to the Win32 environment, select "Select Source" in DFINST and specify "NECDEV.INI". Select a model from those displayed in the "Source" field, and click $\boxed{\text{Move}}$.

<3>   To uninstall the device file, select a model from those displayed in the "Registry" field in DFINST, check "Delete File", and then click $\boxed{\text{UnRegister}}$.

4. UNINSTALLATION

4.1 TW

 This section describes how to uninstall TW V1.10.

<1> Turn on power to the host machine and start Windows.

<2> Start "Add/Remove Programs" ("Add or Remove Programs" in Windows XP) on the Control Panel
   and select the item to be removed.

<3> The folder may not be deleted completely depending on the order of uninstallation processing.

<4> To uninstall ToolLinkManager, separately start "Add/Remove Programs" ("Add or Remove
   Programs" in Windows XP) on the Control Panel and select the item to be removed.

5. PREPARATION FOR USING TW

A project file to create the execution module and a file containing the debugger settings must be prepared before using TW. The items necessary to use TW are described below.

Confirm the following files.

(1) PM plus project file (*.prj)

  This is a project file used to create the execution module in PM plus.

  Confirm that the PM plus project file exists and the execution module can be created correctly.

(2) Link directive file (*.dir)

  This is a file used to control the program allocation.

  Confirm that this file is registered in the PM plus project file. If not, be sure to create and register it.

(3) ID850, ID850NW, ID850NWC, or SM850 project file (*.pri)

  This is a project file used to set the debugger.

  Confirm that the execution module created in (1) can be executed in the debugger, by executing the module.

  Save the project file of the debugger in which the execution module created in (1) in an executable state (setting in the peripheral I/O register, etc, has been made) under the same name as that in PM plus. Also confirm that the debugger can be activated from PM plus.

6. MAJOR REVISIONS FROM TW V1.00 TO V1.10

(1) Updated to JRE1.4.1_02

  The following bugs have been corrected in line with this upgrade.

  - JRE V1.3.1 has a unique problem that the buttons of internal window maximization, minimization, and restore may not be displayed normally
  - When using MS-IME98/2000 in Microsoft Windows 98 Second Edition or Windows Me, the error message "E0006: A fatal error has occurred." may be output when TW is terminated
  - When TW is activated for the first time in Microsoft Windows 98 Second Edition or Windows Me, the OS may freeze (this bug rarely occurs)

(2) Support of ID850NW V2.52 and ID850NWC V2.52

(3) Support of CA850 V2.60

(4) Support of trace full-break in Midas Lab ICE

(5) Addition of function to specify the source file to be analyzed/tuned (Addition of wizard panel)

(6) Addition of function to specify start/end of trace analysis using events (ID850NW only)

(7) Addition of function to indicate detailed progress of TW processing

(8) Addition of error messages and their workarounds

7. RESTRICTIONS AND CAUTIONS

This section describes the restrictions and cautions on using TW V1.10.

7.1 Restrictions

No.1 When using a V850E Series product such as the V850E/ME2, the instruction cache tuning function
of TW cannot be used even if the target on which the instruction cache is mounted is specified.
[Workaround]
   There is no workaround.
[Action]
   This function is usable by implementing the device file containing cache information.

7.2 Cautions

No.1 Performance analysis and tuning may not be possible using TW depending on the program
characteristics.

a) Performance analysis and tuning may not be possible in a program that has no function whose
performance is to be analyzed. Register one or more source files that can be recognized as the
target function by TW to the project.
b) Performance analysis and tuning may not be possible in a program whose operation is greatly
changed if stopped during program execution, or that may perform an illegal operation.

 • When using the trace data analysis method
   With the trace data analysis method, a break occurs at the analysis start position (or analysis function
   start position), analysis end position (or analysis function end position), or each time trace data
   becomes full in the analysis range. That is, a break may occur many times at any position in the
   analysis range, as well as at the analysis start/end position.

 • When using the probe code insertion method
   With the probe code insertion method, a break occurs only at the analysis start position (or analysis
   function start position) or analysis end position (or analysis function end position).
   With this method, no break occurs in the analysis range.

   As shown above, if the program operation may be greatly changed by a break or the program may
   perform an illegal operation, specify an analysis range in which a break can occur.

c) Performance analysis and tuning may not be possible in a program that must be manipulated
between when the debugger is activated and when it is executed.
   Processing from debugger activation to download and execution of the execution module is
   automatically performed in TW. Therefore, a program that must be manipulated by the user cannot

be executed automatically.

d) Standard tuning cannot be performed in a program that must be manipulated during program execution.

Standard tuning is performed using several patterns of tuning options that are recommended in TW, and the result that was accelerated most (that took the shortest execution time in total in the analysis range) is selected. In a program that must be manipulated by the user in the analysis range, TW cannot judge which pattern generated the most accelerated result.

In this case, select Set By User.

e) Performance analysis and tuning may not be possible in a program in which a function targeted for performance analysis exists in the second image area or later in the internal ROM.

Allocate the target function to the first image area in the internal ROM.

No.2 TW may not operate correctly if the debugger is manipulated while the TW wizard is being executed.

Do not manipulate the debugger while the TW wizard is being executed.

When the TW is used, if the debugger is already active when the wizard is activated, a dialog box to terminate the debugger opens. Terminate the debugger in this dialog box.

No.3 When applying a project that is specified for ROMization to TW, make sure that the areas specified for the profile routine, profile table, function relocation address, and high-speed access memory do not overlap the area targeted for ROMization.

In particular, if ROMization is applied using the compiler or default link directive without specifying the ROMization area, the area is more likely to be overlapped. Therefore, it is recommended that the user specify the ROMization address.

No.4 When applying a project which uses the RX850 Pro to TW, describe the memory spaces of the RX850 Pro shown below in the link directive file.

At this time, do not allocate the profile routine/data and the function after tuning to these areas or in the vicinity of these areas, or to a location that depends on these areas (i.e., that may overlap these areas).

If such a description is not included or the specified allocation depends on the area, program and data in the execution module after performance analysis and tuning using TW is performed may overlap the area, causing malfunction.

SPOL0: System memory pool 0

SPOL1: System memory pool 1

UPOL0: User memory pool 0

UPOL1: User memory pool 1

Description example)

[CA850]

```
SYSPOL0: !LOAD ?RW V0x00110000 {
  .spol0 = $NOBITS ?AW .spol0;
};
SYSPOL1: !LOAD ?RW V0x00120000 {
  .spol1 = $NOBITS ?AW .spol1;
};
USRPOL0 : !LOAD ?RW V0x00130000 {
  .upol0 = $NOBITS ?AW .upol0;
};
USRPOL1 : !LOAD ?RW V0x00140000 {
  .upol1 = $NOBITS ?AW .upol1;
};
```

No.5 The execution module after tuning may not operate correctly in a program that controls the branch address by changing the register tp value during program execution.
When using the RX850 Pro, in particular, the operation may be incorrect when a function is relocated as a result of tuning by TW if an address is specified for a task-unique TP register value.

[Workaround]

Implement any of the following workarounds.

- Declare a section unique to the function that may not operate correctly due to the address change and allocate the function to the section. This method removes the function as a target of tuning.
- Set no_use to the task-unique TP register value in the RX850 Pro.
- Specify a memory area in which the operation is performed correctly after allocation for the function relocation address after tuning.

No.6 JRE has a unique problem that a file cannot be read or written correctly if the total number of characters used in its folder and file names is 255 or more. This problem occurs when there is a project or file with a long name, or the project is in a folder located in a deep directory tree. This problem may also cause another problem that a file cannot be read or written correctly in TW even if the file actually exists and the file is readable.

[Workaround]

Move the location of the project or file to the higher folder, and shorten the file name.

No.7 JRE has a unique problem that inputting a machine name only to the file name input field with UNC notation is not possible in the File Select dialog box. UNC notation is a method to indicate the resources on the network, and uses the format "\\machine-name\folder-name\file-name".
Inputting a machine name only, like "\\machine-name", is not possible in TW.

[Workaround]

Specify the existing folder or file after machine-name when using UNC notation.

No.8 When the print function is activated, the Print dialog box is displayed. The properties of each printer cannot be opened here, so open the printer setting function on the Windows start menu to change properties of the printer.

No.9 When an NEC Electronics tool is activated after TW is installed, the ToolLinkManager icon may be displayed in the task tray. This application is used for communication between tools, so do not terminate it.

No.10 If a .text section allocation is specified for multiple locations in a CA850 link directive, performance analysis and tuning are not performed correctly.
[Workaround]
  Specify the .text section allocation (output section) for one location (.text section) only in a link directive.

No.11 If a bcond (jcond) instruction that cannot extend over two sections is used for a branch that extends over two functions in a hand-written assembly source, the function size is changed by expanding the instruction after tuning, and the next tuning may not be able to be performed.
[Workaround]
  Do not use the bcond instruction for a branch that extends over two functions: use a branch instruction that can extend over two sections.

No.12 When -Xolddir is specified as the linker option (linking using the old link directive protocol), performance analysis and tuning using the probe code insertion method may not be performed correctly.
[Workaround]
  Remove the -Xolddir option. In addition, describe the link directive so that the link result will be the expected one, even if the linker option –Xolddir is not specified.

No.13 Do not apply a project in which -E is specified as the linker option (ignoring error in relocation and linking) to TW. Application itself is possible, but even if the execution module created using TW cannot resolve relocation of a program or data (this is regarded as an illegal execution module), it cannot be detected, causing an illegal program operation. Therefore, it is recommended not to specify -E in such a program.

No.14 When build is performed on the system information table and system call table file of the RX850/RX850 Pro in PM plus, if the system information table that is registered so that it is created automatically from the configuration file is registered in a source file of a project, build of the execution module cannot be performed correctly after performance analysis and tuning.
[Workaround]
  If the system information table and system call table file are registered in a source file of a project, delete them from the source file of the project (they are displayed in the tree even after being deleted, and are assembled and linked when built).

No.15 **[IE-V850E-MC, IE-V850E-MC-A or IE-V850ES-G1]**

When using the ID850, the correct result of performance analysis may not be acquired using the trace data analysis method, depending of the connected IE.

When executing performance analysis using the trace data analysis method on a module whose length exceeds the maximum number of trace frames, the complete trace data cannot be acquired due to the IE restriction. As a result, several frames of data immediately after a trace full break may be missing. This is because unnecessary analysis is performed for several frames at a trace full break in some IE.

[Workaround]

Use the probe code insertion method, or specify the performance analysis range so that it does not exceed the maximum number of trace frames.

There is no workaround if performance analysis information that can be acquired only by the trace data analysis method is required, and if performance analysis must be executed with the length exceeding the maximum number of trace frames (some analysis information may not be obtained correctly).

No.16 If the V851, V852, V853, or V854 is specified as the target device when using the SM850, the correct number of executions of the analyzed function may not be acquired by performance analysis using the trace data analysis method. This is because a break before execution cannot be set in peripheral mode if the V851, V852, V853, or V854 is specified as the target in the SM850.

[Workaround]

There is no workaround.

No.17 If an attempt is made to execute performance analysis on a project in which a code that is outputting nucleus trace information of the RX850/RX850 Pro (source release version) is modified, analysis may not operate correctly, or the operation may not be normal.

There is no problem if the code that is outputting nucleus trace information is not modified, regardless of whether the RX850/RX850 Pro object release version or RX850/RX850 Pro source release version is used.

No.18 TW may not operate normally when big endian is specified in a V850 Series when a target in which the endianness can be switched is used.

[Workaround]

Specify little endian when switching the endianness.

No.19 When a trace on/off event is specified in TW using a V850 Series with a target that can acquire N-Wire trace data, the specifiable address range is as follows according to the DCU specifications.

64 MB mode: 0x0 to 0x3FFFFFF

256 MB mode: 0x0 to 0xFFFFFFF

Performance analysis may not operate correctly, or the operation may not be normal if an address outside this range is specified.

No.20   When using performance analysis and the tuning function of TW with a target with a memory such as flash memory, whose number of writes is limited, make it allowances for how many times performance analysis and tuning are performed.

TW downloads programs each time performance analysis and tuning are performed. If TW is used with a target with a memory such as flash memory, whose number of writes is limited, the remaining number of writes decreases each time performance analysis and tuning are performed. In such a case, it is recommended to minimize how many times performance analysis and tuning are used in TW.

No.21   When the [Restore From History...] function is used while the created history information is selected, the selected status of the analysis target source is not restored. This is because there is no way to confirm whether the source configuration of a project when the history was created and that of the current project are the same. To restore the selected status of the analysis target source, open the setting information of the history to be restored after the [Restore From History...] function is used, and manually restore the history by referring to the "Source File" item.

No.22   Performance analysis and tuning of TW are not performed correctly when a folder or file name is specified while [Assembler source [-Fs]] on the [General] and [Output File] tabs in the [Compiler Options…] dialog box (selected by [Tool] on the PM plus menu) or on the [General] and [Output File] tabs in the [Special Compiler Options…] of the source file is checked.

[Workaround]

  Do not check the [Assembler source [-Fs]] item on the [General] and [Output File] tabs.

No.23   When the ID850NW or ID850NWC is used with a target on which an instruction cache is mounted, the [Disable I-Cache To Original Execution Module Analyze] function cannot be selected even if the check box in the instruction cache selection panel of the tuning wizard is checked. Ignore this check box.

No.24   When using the trace data analysis method with the ID850NW or ID850NWC, trace data cannot be acquired normally if a value higher than the maximum trace clock available in the IE is set as the trace output clock of the target.

[Workaround]

  Set the trace output clock of the target to the maximum trace clock available in the IE or lower. In the case of the ID850NW, this problem can be avoided by describing a hook procedure in the script file. A detailed workaround example is shown below.

[Workaround example]

  When using the Midas Lab RTE-2000-TP in combination with the NEC Electronics target environment SG-703111-1 (V850E/ME2), the maximum trace clock available in the RTE-2000-TP is 133 MHz; whereas the default trace output clock of the SG-703111-1 is 150 MHz, so trace data cannot be acquired normally with the default setting. Therefore, the trace output clock of the SG-703111-1 must

be set to a clock of 133 MHz or lower.

If "module.out" is taken as the execution module of the project to which TW is applied, create a script file "module.tcl" in the folder in which the execution module of the created project is located as shown below.

```
  proc AfterCpuReset { } {
        # Halves the trace output clock
        ie tron clock2
  }
```

If module.tcl already exists, add the above script to it.

Since a CPU reset is applied after the execution module of the project to which TW is applied is downloaded, add the above script to halve the trace output clock by a hook procedure after a CPU reset. In addition, the script file can be modified so that it is executed only when TW is executed by changing the script file name to "tw.tcl". At this time, however, execution-module-name.tcl is ignored.

No.25 The line number of the assembly source cannot be specified at the analysis start/end position.

[Workaround]

Specify the symbol of the assembly source targeted for performance analysis and tuning as the target range for analysis, or change the analysis range.

Describe the global symbol that is not regarded as a function (see the user's manual) by TW at the analysis start/end position for the assembly source; that global symbol can then be specified at the analysis start/end position.

No.26   Performance analysis and tuning may not be performed correctly if a symbol placed before a dollar symbol '$' is specified as the argument for calling a macro in a hand-written assembly source.

[Workaround]

Do not use a symbol placed before a dollar symbol '$' as the argument for calling a macro.