



十速科技股份有限公司  
tenx technology inc.

**Advance  
Information**

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# **TM89 series Tx89Ice Quick User Guide**

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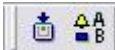


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**tenx technology, inc.**

**Preliminary**

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# TM89 Series ICE Tx89Ice

Quick User Guide

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### 1. Specifications

#### 1-1. System requirements :

- (1) Windows 98/ME/2000/XP operating system
- (2) 10MB HD or more recommended.
- (3) Printer Port : The setting of Parallel Port for BIOS is EPP MODE; if set to EPP or ECP+EPP MODE, the Parallel Port Number will be set to 0x378.

#### Installation procedures :

- STEP1 : Visit our website <http://www.tenx.com.tw> and select the links → [Products](#) ⇒MCU ⇒4 bit MCU ⇒TM89 series ⇒Tools page.
- STEP2 : Double click the setup\_Tx89IceX.X.XbuildXXXVersion.exe, the installation wizard will guide you through the installation process easily with on-screen dialog boxes.

#### 1-2. Applicable Scope :

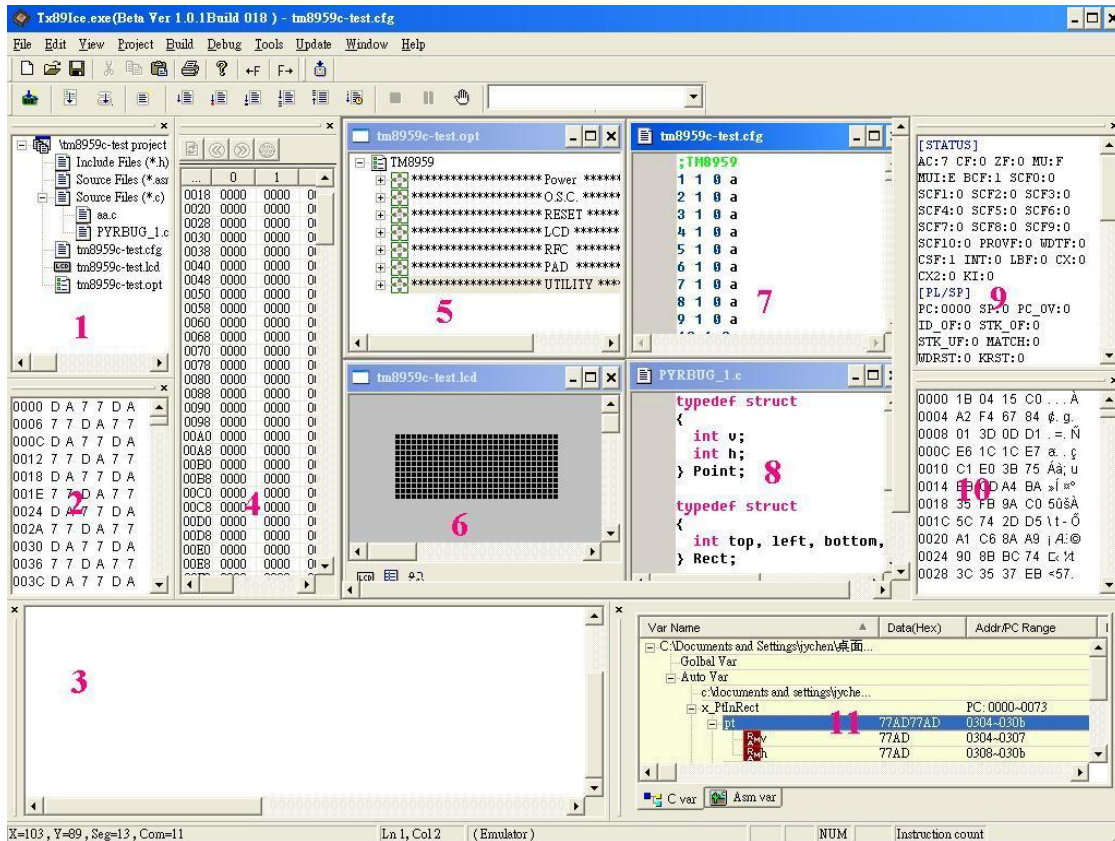
Supported body currently :

TM87 body	Support	TM89 body	Support
TM8727	Yes	TM8959	Yes
	Yes	TM89P59	Yes
	Yes	TM8957	Yes
	Yes	TM8955	Yes
	Yes	TM89P55	Yes
	Yes	TM8952	Yes
	Yes	TM89P52	Yes
	Yes	TM8951	Yes
	Yes	TM89P51	Yes


Table 1-2-1

## 2. Operation Guide

### 2-1. Interface function illustration:



#### 2-1-1. Main Window Introduction :

##### (1). Project Window:

Display files in the current project; you can select files to edit by double click on the left mouse button to open.

1. Add file : Right click on the “Source Files (\*.c)” or “Source Files (\*.asm)” or “Include Files (\*.h)”, you can add files to the directory tree structure; if the file does not exist, a new empty file will be generated automatically.
2. Delete file : Right click on the mouse on the newly added filename will delete the file from the structure.
3. Right click on the mouse on a \*.asm file will delete file from tree/ Set First ASM File for Compiler ◦

## (2). RAM Value Window:

Display RAM value during the execution of ICE (Intermediate Code Engine). The change of the value can be observed or the value can be modified in the step, auto step, and Pause states.

1. Save as: Right click on the mouse on the window can store the RAM data currently in display into a specified file.
2. Go to address : Press Ctrl+G at the same time on the window and enter the starting address of RAM to be displayed; The window will scroll to the address to be displayed automatically.

## (3). Message Window:

Responding to the working status and error messages from COMPILER (TM89), BUILD and files checking etc.

TM89 will compile and Link with the error messages and display them all on this window; double click on the error message from the compiler directly will bring one to the corresponding source code.

(4). TRACE Window: 

Display all the PC counter which are executed under Step · Break · Pause states.

- (1.) Press the blue button to refresh data.
- (2.) Press yellow button can direct ASM to the source code corresponding to the previous memory location that PC is pointing to.
- (3.) Press green button can direct ASM to the source code corresponding to the next memory location that PC is pointing to.
- (4.) Press pink button to clear data in the Trace Window and the RAM.
- (5.) Double click on the Source File will highlight the PC value of the line currently tracing and the line number will be displayed in red.

## (5). OPT Editing Window:

Set up the options of IC; the display screens for TM87 and TM89 are different.

(6). LCD Editing Window: 

Please refer to [Dot Matrix](#) and [LCD Tool Bar](#) for PAT operations.

- (1.) Press the blue button to load the PAT BOX and the graphic library under the screen of red button. You can edit the patterns of LCD by yourself.
- (2.) Press the yellow button to assign the values of SEG and COM of LCD.
- (3.) Press the red button to display LCD screen. When moving the cursor to any graphic, the related data values of X, Y axis, Seg

and Com will be displayed on the status bar on the main window.

(7). CFG Editing Window:

Usually generated by the computer's LCD files automatically; editing by users is not recommended.

(8). ASM Editing Window:

Fonts and highlighting colors for keywords can be configured during the editing of ASM files.

- 1.Auto complete : will prompt for the possible keywords automatically for reference and selection (Press "ESC" to cancel the current prompt window.
- 2.keyword file code.dat : installed in XXX\tenx\Tx89Ice ver X.X.X Build XXXVersion\bin\chiplib, frequently used words can be added using a text editor.

(9). ICE Status Window:

Display Timer, Flag and Stack values during the execution of ICE. The change of these values can be observed under the execution of step or auto step function.

- 1.HL/ZR display : If using HL+1 instruction and the observation on the incremented HL value is desired, it is necessary to wait until the next instruction cycle when the value of the ICE simulated HL is updated. Therefore, the display of HL+1 will be one instruction cycle later than the original instruction cycle.

(10). ROM Value Window:

Display ROM value the execution of ICE. The change of the value can be observed or the value can be modified in the step, auto step and Pause states.

- 1.Go to address : Press Ctrl+G at the same time on the window and enter the starting address of ROM to be displayed; the window will scroll to the address to be displayed automatically.

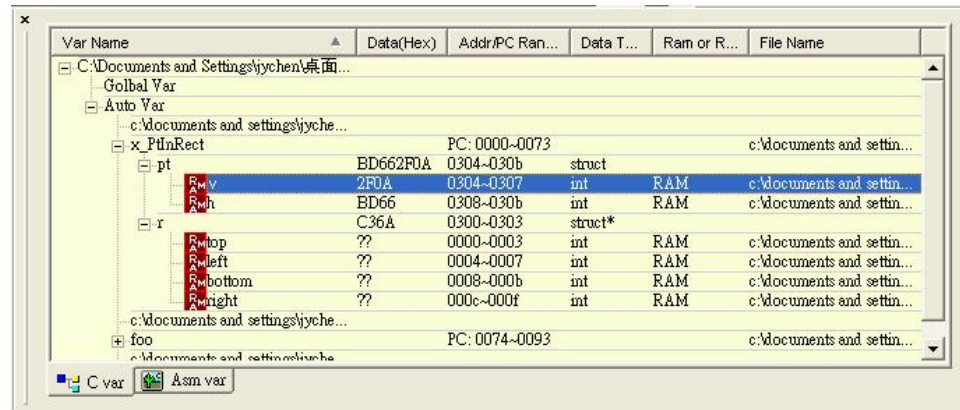
(11). Watch Window:

Open the Debug Watch window and display in real time the value of C or ASM variables during the debug session.

- (1) For C var, all the variables will be loaded automatically when starting a debug session.

TX89ICE opens the Debug Watch window and display in real time the variable values during the debug session.

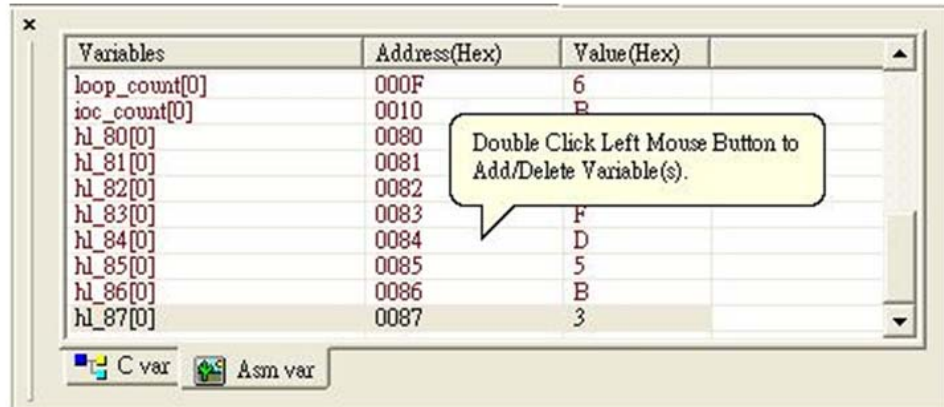
In C var sheet, all the variables for \*.C files will be loaded automatically when Debug starts.



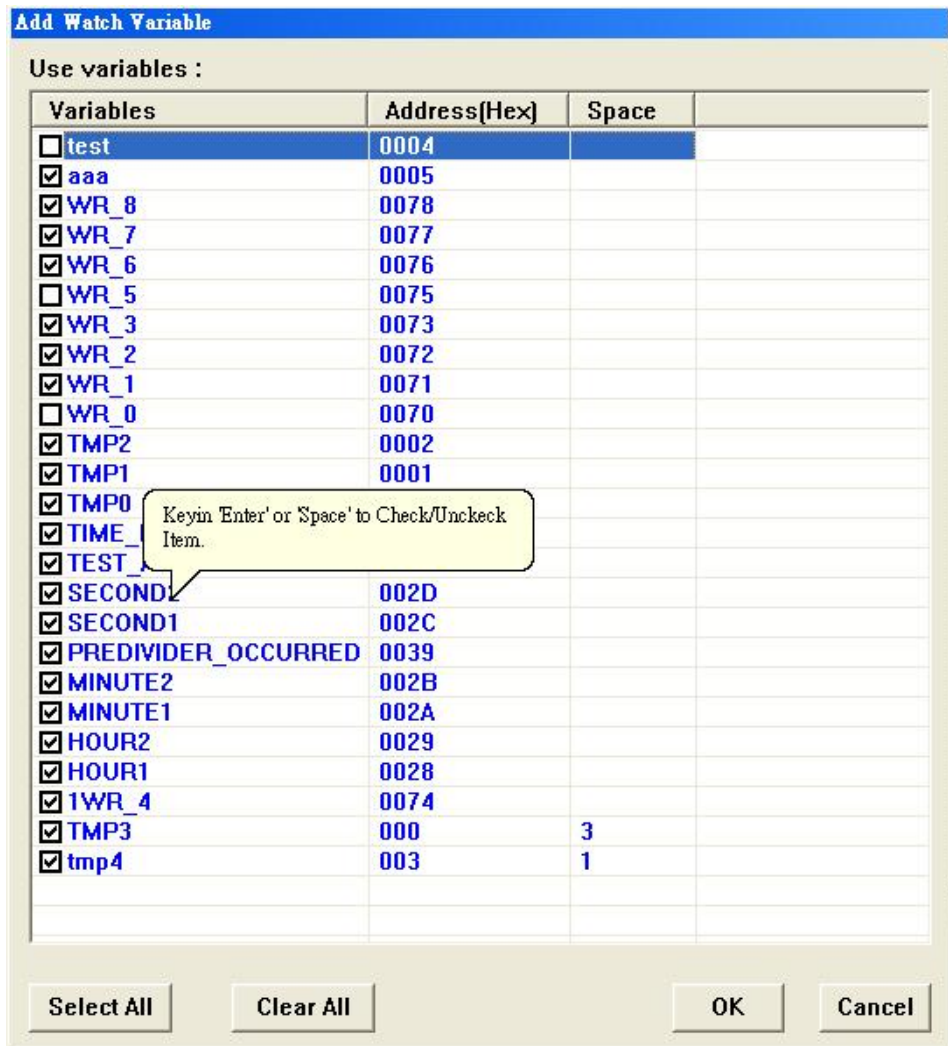
(2) For Asm var, users need to add the variables by themselves.

TX89ICE opens the Debug Watch window and display in real time the variable values during Debug. In Asm var sheet, we can right click on MENU\ “Add/delete watch variable ...” to Add or Delete variables or double click on the left mouse button to Add or Delete variables.

1. When adding a new project, there are no variables in Debug Watch; users need to add the variables to be watched by themselves.



2. Select the variables to be watched and click on “OK” to add to the Debug Watch window.



Note:

(In TM87 Assembler Version 4.0.5)

An example and illustration of variable sorting instructions is as follows :

(Not applicable to TM89XX series Body.)

(The following instructions are not supported in TM89XX series.)

- .EQU (EQU defined)
- .RAM (DN defined)
- .LBL (Label name)

When exporting the defined names of the above 3 files, sorting can be selected, such as :

.SORTEQUFILE A ; Sort ".EQU File" names according to the ascending ASCII sort order.

- .SORTEQUFILE D ; Sort “.EQU File” names according to the descending ASCII sort order.
- .SORTLABELFILE A ; Sort “. LBL File” names according to the ascending ASCII sort order.
- .SORTLABELFILE D ; Sort “.LBL File” names according to the descending ASCII sort order.
- .SORTRAMFILE A ; Sort “. RAM File” names according to the ascending ASCII sort order.
- .SORTRAMFILE D ; . Sort “.RAM File” names according to the descending ASCII sort order.

\*\*The above instructions & parameters can be in either case \*\*

EX: (D:\XXX\XX.ASM)






.chip TM8727

- .SORTEQUFILE A ;→ Table A when exporting .EQU File, sort the variables in ascending order.
- .SORTRAMFILE D ;→ Table D when exporting .RAM file, sort the variables in descending order.
- .SORTLABELFILE A ;→ Table A when exporting .LAB file, sort the variables in ascending order.

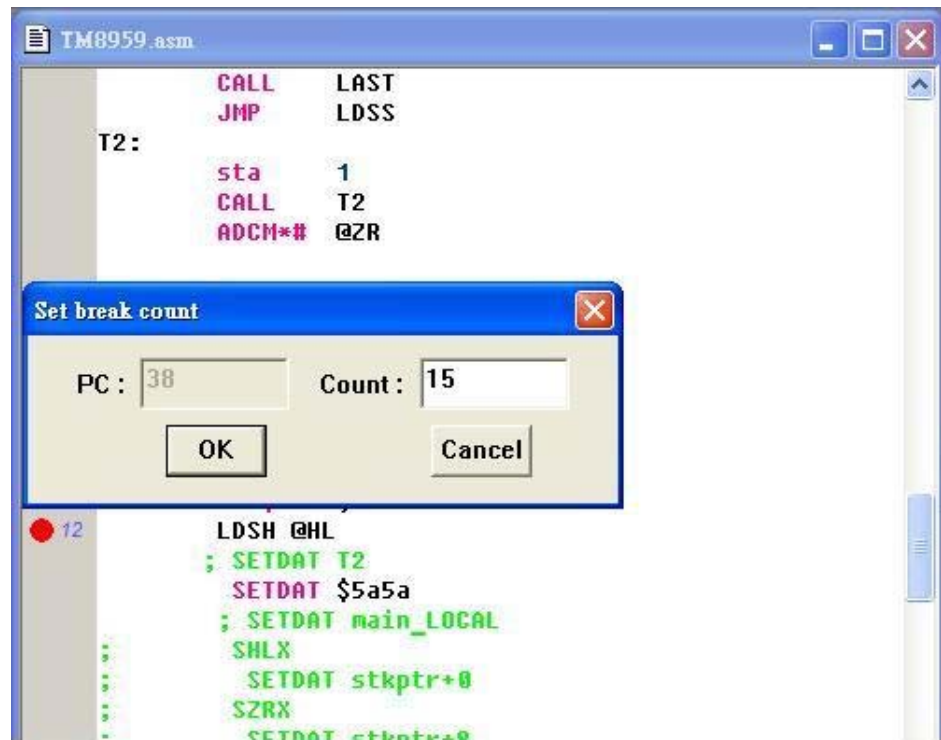
If none of the instructions mentioned above are given, it means that there are no sorting for the 3 files mentioned above.

2-1-2. Toolbar illustration :



-  New : Add new files or new projects.
-  Open : Open existing files or projects.
-  Save : Save file.
-  Cut : Cut objects in the selected areas. (currently only text editing is supported)
-  Copy : Paste Copy objects in the selected areas. (currently only text editing is supported)





If "Set break time and reload in [Options](#) are checked, this dialog box will show up when inserting breakpoints.

 Compiling :

TM87assembles .ASM file and produces .OBJ and .TAB files.

TM89 assembles .ASM file and Links and produces .OBJ and .TAB files. (Only modified files are assembled).

 Build :

TM87 assembles .ASM file and produces .ICE file.

TM89 assembles .ASM file and links and produces .NCE file.

 Check :

TM87 will check whether the content of between .OPT and .CFG is correct or not.

TM89 will check whether the content between .OPT and .LCD is correct or not.

 Free Run :

After executing Compiling -> check -> Build .ICE(or .NCE) ->Download, start the execution and display LCD screen but will not accept [Break Point](#).

The speed for programs in this mode will come closer to the speed of the actual circuit. However, if accurate performance results are needed, please use the Demo board, the frequency of

ICE board is prone to the interference of other factors and can not provide accurate frequency.

Free Run in ICE Mode or in REAL Mode can be set up in [Options](#) .

 Go... :

After executing Compiling -> check -> Build .ICE(or .NCE) ->Download, start the execution, and display LCD screen but not accept [Break Point](#) .

 Single Step :

When first clicking on this, after the Compiling -> check -> Build .ICE (or .NCE) ->Download process, the cursor will stop at the 0th address of the program; the program does not execute. Afterward, every time the Single Step button is clicked, the program code in the current address will be executed and the cursor will be moved to the next address. Every time it executes, the information for RAM, ROM, and Flag Timer etc. in ICE will be displayed on the Tx89Ice screen.

 Step Over :

When debugging program, the cursor (pointer) will not jump into Macros or subroutine; the cursor will jump to the next instruction after the Macro or subroutine.

 Step Out :

When debugging program, jump out of the current Macro or subroutine; the cursor will jump to the next instruction after the Macro or subroutine.

 Auto Run :

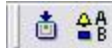
After executing Compiling -> check -> Build .ICE(or .NCE) ->Download process, start “Single Step” execution according to the trigger time interval. Each trigger will execute one step and Tx89Ice will display all the information in ICE.

 Stop :

Stop the execution of ICE completely. The next execution will Download and Reset once again.

 Pause :

Pause and continue the execution of ICE. Program in execution will pause and program in pause will resume from the paused address and continue execution. In the pausing state, all the information about RAM, ROM and LCD and the state of each register will be displayed.

**(3). Auxiliary Toolbar illustration :**

 Generating code file :

Generating (\*.tcod) file needed for MASK ROM and tape-out.

1. For TM87series, \*.tcod includes \*.obj、\*.tab、\*.opt and \*.cfg.
2. For TM89P59 series, \*.tcod includes \*.obj、\*.tab、\*.opt and \*.epm.

3. After opening the project, the program flow during the execution of "Build Pack File" function is as follows:

TM87 Step1: rebuild \*.ice.

TM87 Step2: generate \*.tcod.

TM89 Step1: check the correctness of \*.opt & \*.lcd.

TM89 Step2: if QTP type, generate \*.epm; none QTP type, skip this step.

TM89 Step3: rebuild \*.nce.

TM89 Step4: generate \*.tcod.

 Open Pat Attribute :

In editing LCD Edit, the value of each point in LCD can be set and modified.

## Dot Matrix :

SEG<sub>min</sub> : refers to start SEG number.

SEG<sub>max</sub> : refers to end SEG number.

COM<sub>min</sub> : refers to start COM number.

COM<sub>max</sub> : refers to end COM number.

GAP : sets the gap between two points.

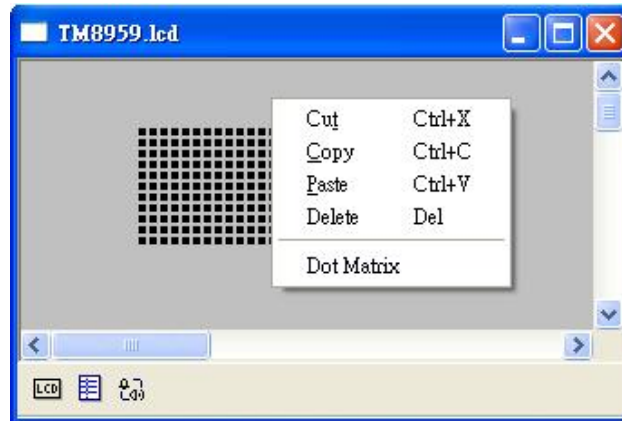
Left to right increase : ascending from left to right.

Left to right decrease : descending from left to right.

Top to bottom increase : ascending from top to bottom.

Top to bottom decrease : descending top to bottom.

Step1. Right click on the mouse will display the LCD operation MENU.



Step2.

Select "Dot Matrix" and the setup dialog box will be show up.



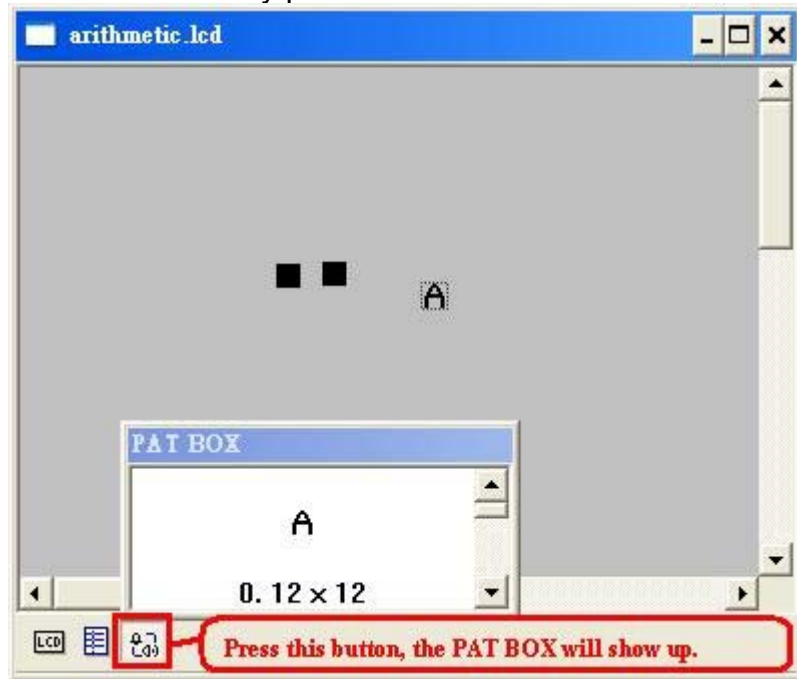
Step3. Click on "OK" and use the left mouse button to drag a rectangle in an area with no PAT display; release the left mouse button to get the LCD graph of a rectangle.

Step4. After using the left mouse button to select the PAT for the operation in the LCD window, the up, down, left and right keys on the keyboard can be used to fine-tune the location.

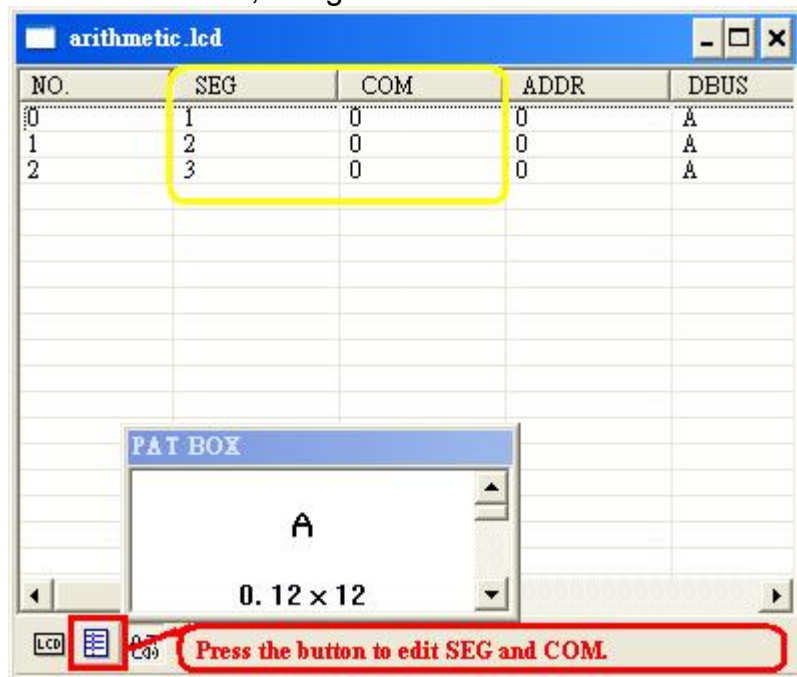
Step5. After using the left mouse button to drag a rectangle in a PAT displaying area, release the left mouse button and use the up, down, left and right keys on the keyboard to fine-tune the location or perform operations such as cut, copy, or delete etc.

LCD Tool Bar :

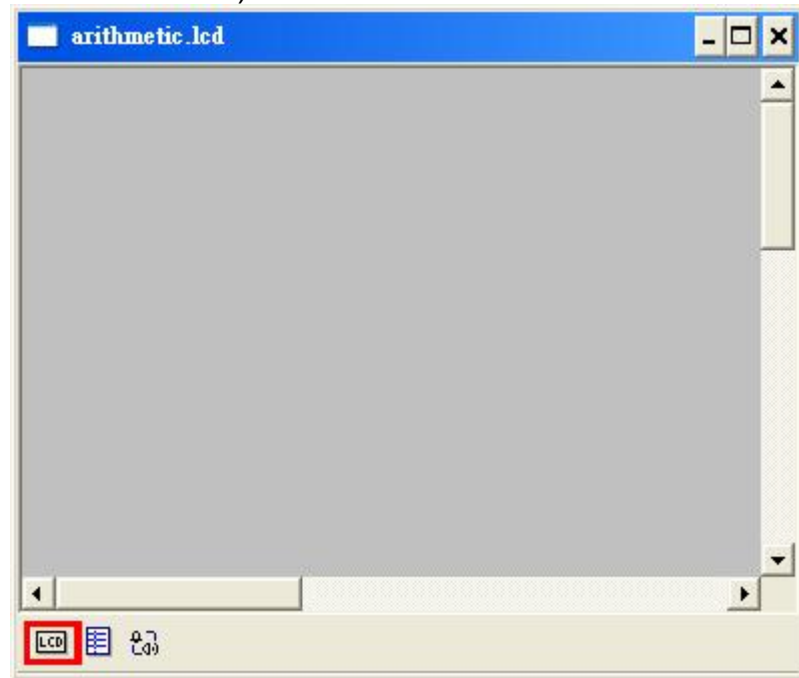
Step1. Click on the red button on the Tool Bar to load the PAT BOX and the graphic library; move the mouse to "Pattern," press the left mouse button and hold; then drag "Pattern" to the desired location in another window, release the left mouse button, and the Pattern will be successfully pasted.



Step2 : Press the red button on the Tool Bar to switch windows; assign the values of SEG and COM of LCD.



Step3 : Press the red button on the Tool Bar to display LCD screen (this screen is the default VIEW for the LCD window)



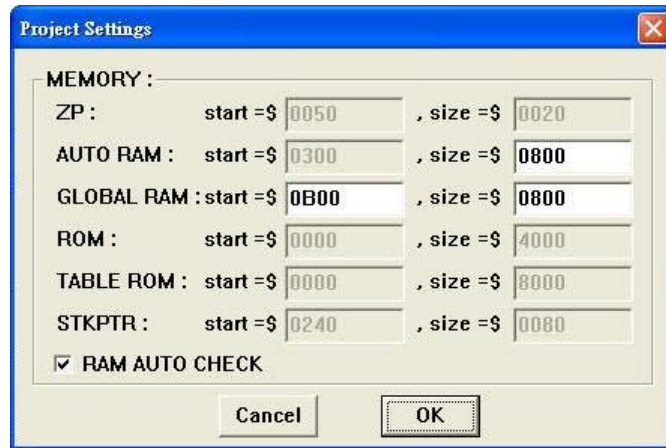
### 2-1-3. Function Menu illustration :

#### (1). Project menu illustration :

Project menu can be configured by the user only under TM89's CPU; there are memory space setting and project setting available currently.

#### Set ROM /TABLE ROM

If there are \*.C files in the Source File of TM89 project, the reserved area for variables can be specified here. The start and size of Table Rom will be adjusted automatically with \*.OPT.



ZP : Storage area for for Compiler temporary variables; do not use this area if C FILE exists.

STKPTR : Storage area for C Compiler temporary variables; do not use this area if C file exists.

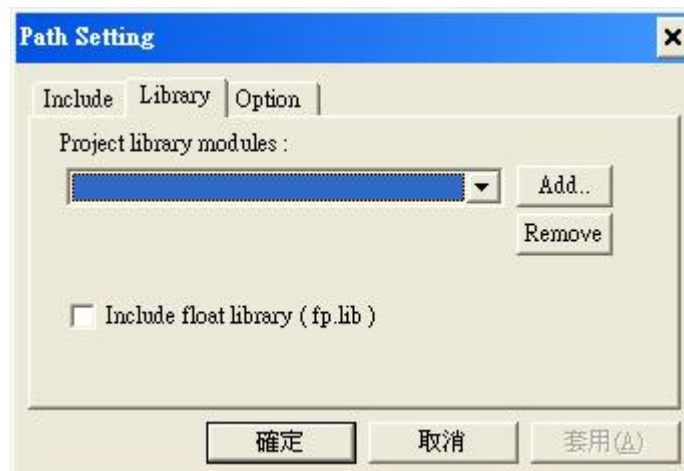
AUTO RAM : Local variable (automatic variable).

GLOBAL RAM : Global variable (external variable).

Project settings :

The Project include header path can be set in TM89 project, and so does the Project include library name(\*.lib or \*.obj).

1. The default library can be runtime\_89.lib and common\_89.lib, but will not show up in the dialog box; the user can use "Add" to add or "Remove" to delete files (\*.obj or \*.lib).



The library adding procedure is illustrated as follows:

- (1.) open an existing file or generating a new project.
  - (2.) Use the mouse to select "MENU" \ "Project" \ "Project settings", and select the library tab.
  - (3.) Click on the "Add" button and a dialog box for opening file will show up; the default filename extension is "\*.lib", "\*.obj" files can also be selected from the file type.
  - (4.) Checkmark the "Include float library (fp.lib )" to add the fp.lib path automatically; uncheck "Include float library (fp.lib )" to delete the fp.lib path automatically.
  - (5.) Click on "Confirm" to complete the set up.
2. There are two default Include paths, but will not be displayed in this dialog box. The defaults are as follows:
- (1.) Current project path.
  - (2.) IDE program path. (ex: C:\Program Files\tenx\Tx89Ice Beta ver 1.0.1 Build 018 Version)



## (2). Build menu illustration :

Rebuild All (nce) :

Rebuild all the source files in TM89 prj.

Compile Active File (.asm or .c) :

Source files which are being edited in TM89 prj

Compile Case Sensitive :

Check this function and the program will check on the cases of the English text / in either case (case sensitive) during TM87

Compilation; if this function is not checked, the program will not check on the cases of the English text (not case sensitive) during TM87 compilation.

### (3). Debug menu illustration :

Debug with LST File :

Check on this function and **TM87** will use LST files to debug program; but this function is not supported by TM89 series CPU.

Debug with ASM File :

Check on this function and **TM87** will use ASM files to debug program.

Debug with C File :

Check on this function and **TM87** will use C files to debug program; this function is not supported by TM87 series CPU.

Auto Step Into :

If this function is checked, the program will jump into subroutines or macros during Autorun.

### (4). Tools menu illustration :

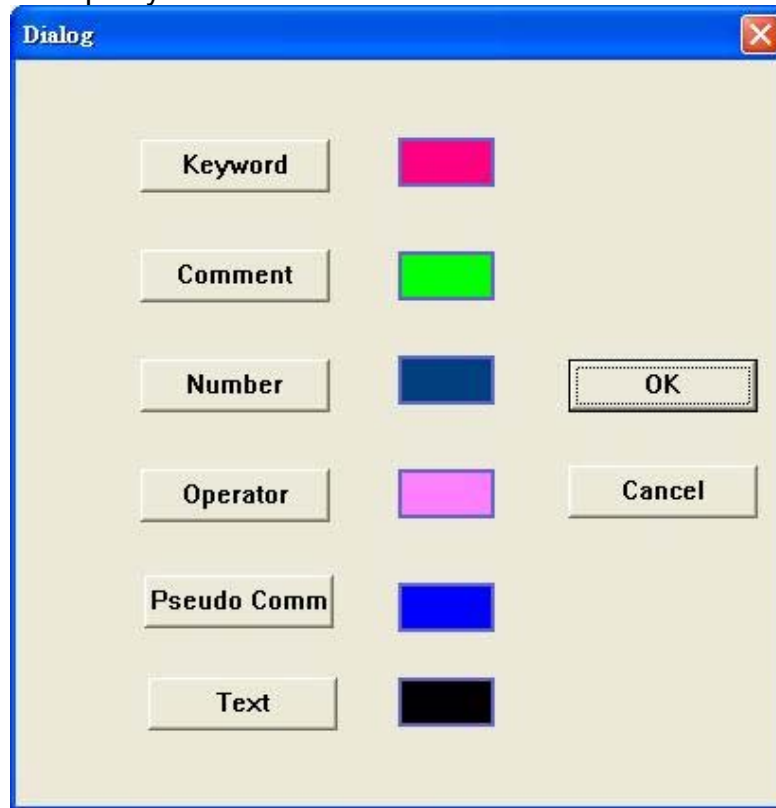
Font :

Set up fonts.



Keyword Color Settings :

Set up keyword color.



Options :

Auto single step : Set up the execution speed of Auto Step (F5).

External Frequency : Provide the external frequency for Debug except Free Run.

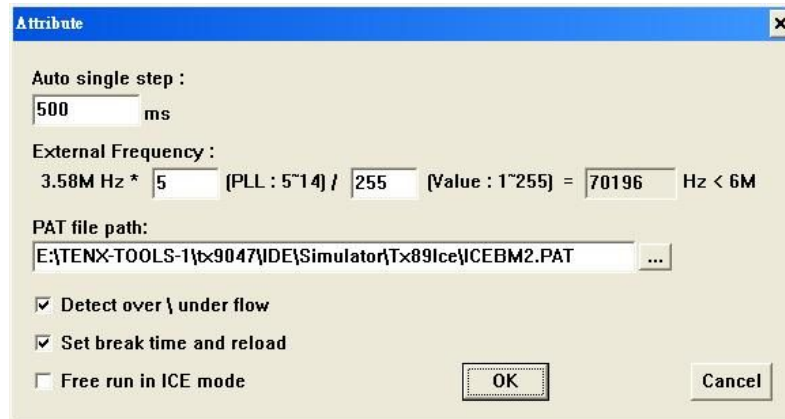
(formula :  $f=3.58M*PLL/VALUE$   
; recommended  $f<6M$  Hz)

PAT file path : Set up the LCD PATTEN.

Detect over \ under flow : If checked, a warning dialog box will show up at the first Over Under flow.

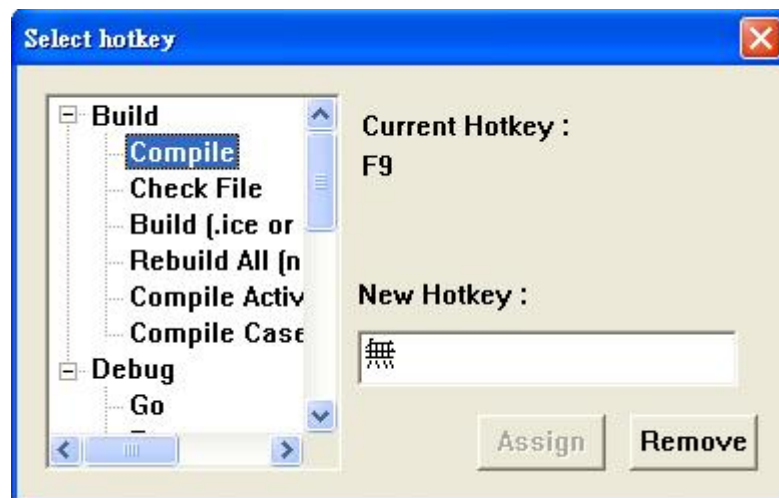
Set break time and reload : If checked, the 1-255 times has to be entered during break point setup.

Free run in Ice mode : If checked, Free Run EV chip is in the Ice mode.



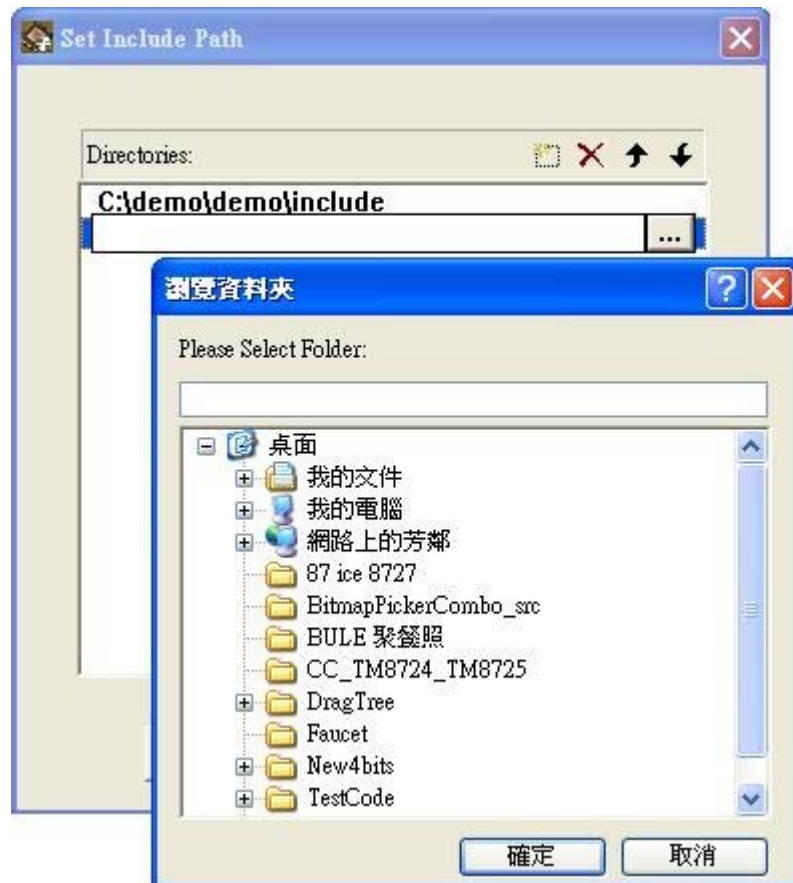
Set Hot Key :

- Step1: Select "Compile".
- Step2: Press the Hotkey, Ctrl+ Shift +C.
- Step3: then click on "Assign" to complete the setup.



Set Include Path :

Set up the path for .include file in TM87.  
 For example: .include "a.asm". If the path for a.asm is not in the same catalog as the project, use this function to include the path of a.asm.



Compare(obj, opt, tab, cfg) :

TM87 use this function to check whether the four files (obj, opt, tab, cfg) returned by tenx ICE are the same as the original four files in project.

TM8TM89 QTP TYPE use this function to check whether the four files (obj, opt, tab, epm) returned by tenx ICE are the same as the original four files in project.

TM89 MASK TYPE use this function to check whether the three files (obj, opt, tab) returned by tenx ICE are the same as the original three files in project.

TM89 Make Library (\*.Lib) :

We can make our own library (\*.lib) using this function, the procedure is illustrated as follows:

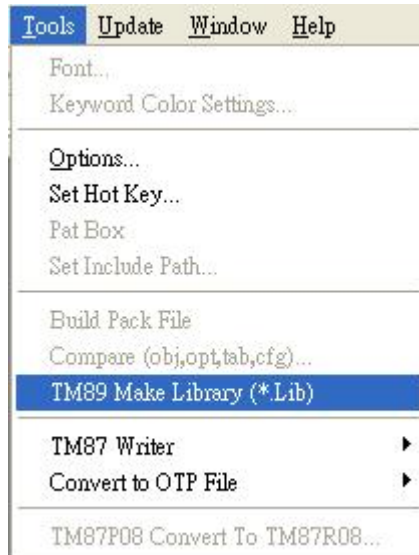
Step1: Mouse click on "Load" and the file dialog box will show up.

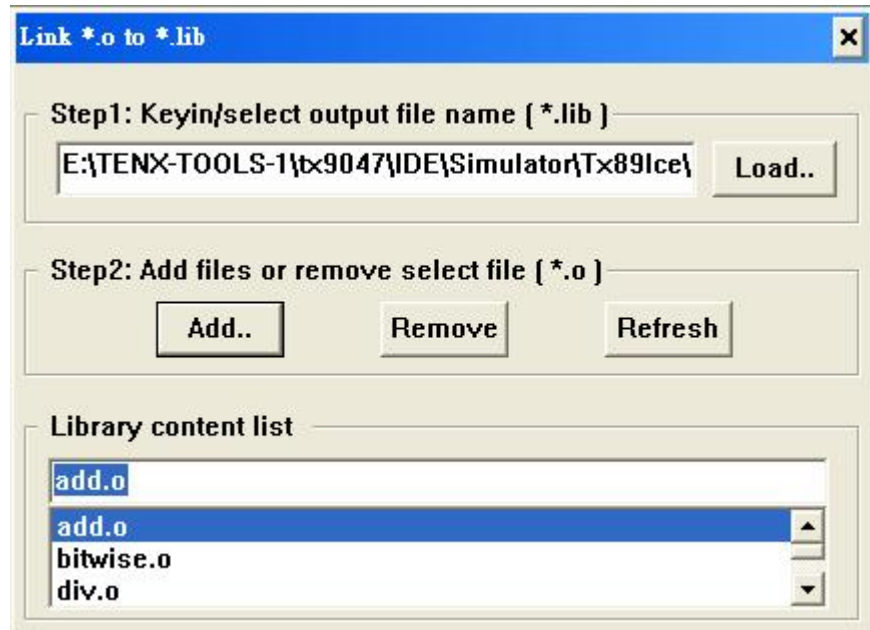
- (1) Select existing Library for the operation; a list of (\*.o) in the Library will be displayed in the "Library content list" at the bottom.
- (2) If new \*.Lib is to be generated, enter the filename directly into the file name input area, then click on "Confirm." Because these are new libraries, the "Library content list" at the bottom will be empty.

Step2: Click on "Add" to select the assembled \*.o files to be added into Library and display messages in the the "Library content list" at the bottom.

Step3: Click on "Refresh" to update the list in library; (\*.o) will show up in the "Library content list" at the bottom.

Step4: Use mouse to select an exiting \*.o, and click on "Remove" to delete the selected file from Library.





#### (5). Update menu illustration :

Check new version when start :

If this function is checked, it means that the program will connect to tenx website to check whether there are new versions available when started; if there is new version, it will inquire the user automatically whether to download and update.

Check new version :

Click on this function, the program will connect to tenx website immediately to check whether there are other updated files available program; if there is new version, it will inquire the user automatically whether to download and update.

Check all update list :

Click on this function, the program will connect to tenx website immediately to check whether there are other updated files available other than the main program; if there is new version, it will inquire the user automatically whether to download and update.

Bug feedback of Tx89Ice :

Click on this function, it will start the Bug feedback web page;

register directly to report problems or propose recommendations.

**(6). Help menu illustration :**

Link to the help documents; those with \_EN in their names are English version and those without are Chinese version.

Tx89ICE Modification history :

Click on this function to open help documents about IDE modification history.

C Compiler :

Click on this function to open help documents with information related to the use of C Compiler. C programmers should read these documents first.

TM89 Assembler :

Click on this function to open help documents about syntax and pseudo-instructions of TM89 Assembler language.

IDE user's guide :

Click on this function will open the file you are currently reading.

Hardware user's guide :

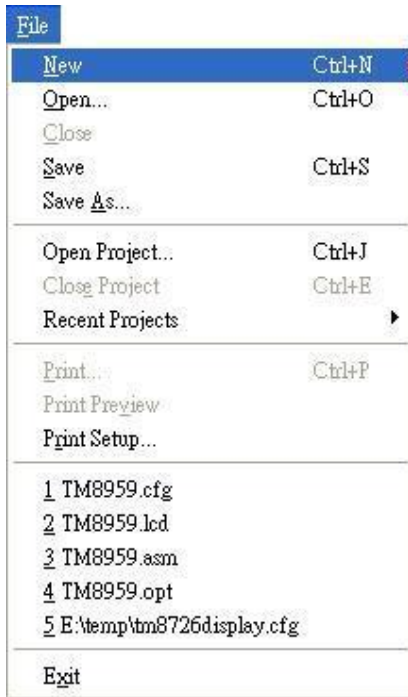
Click on this function to open help documents about ICE hardware connections and the DIP SWITCH settings.

Pat editor :

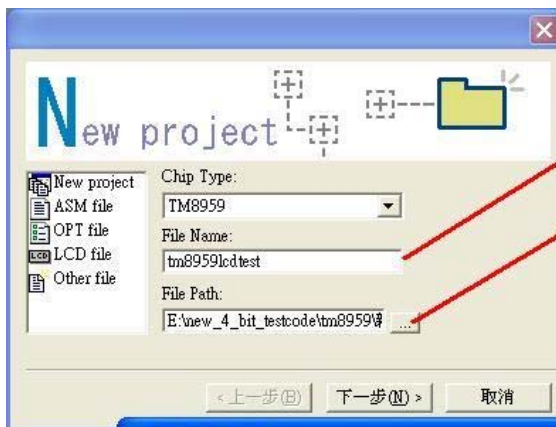
Click on this function to open help documents about using Pat editor and execute Pat editor.

**2-2. Add new project / file :****2-2-1. Add new project :**

When create a new project, just follow the following simple steps to complete the project creation operation.

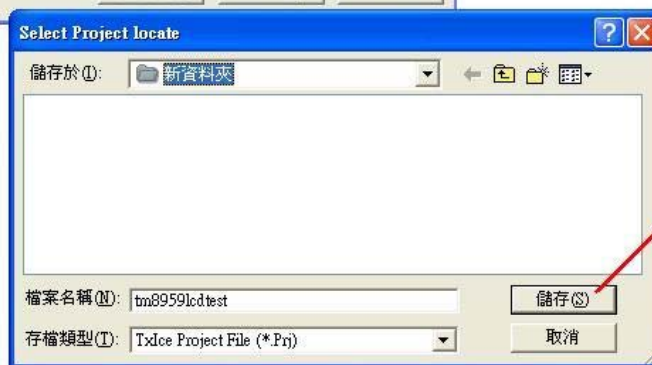


Step 1:  
Select New

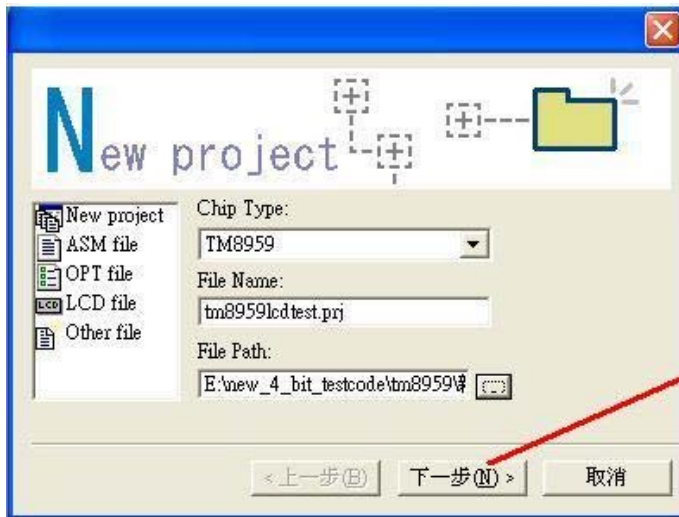


Step 2 Type a new project name.

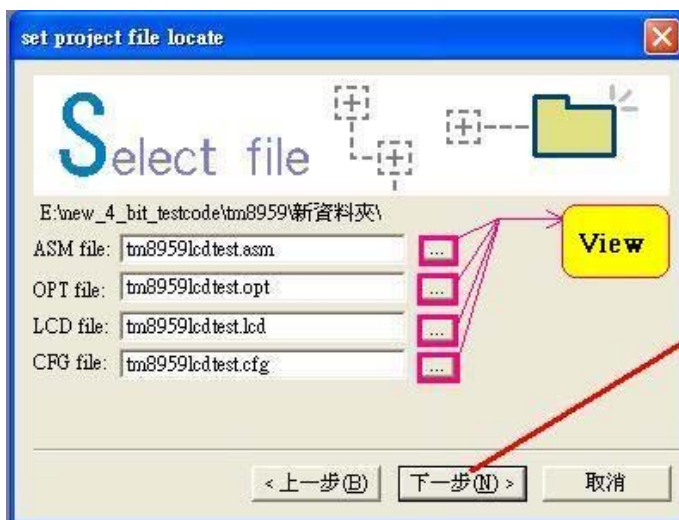
Step 3 Click View to locate the directory of folder.



Step 4 Click Save after select the folder.



Step 5  
Click Next



Step 6 Click Next  
to create a new  
project or click  
View to select  
existing files.

I would like to select exiting files

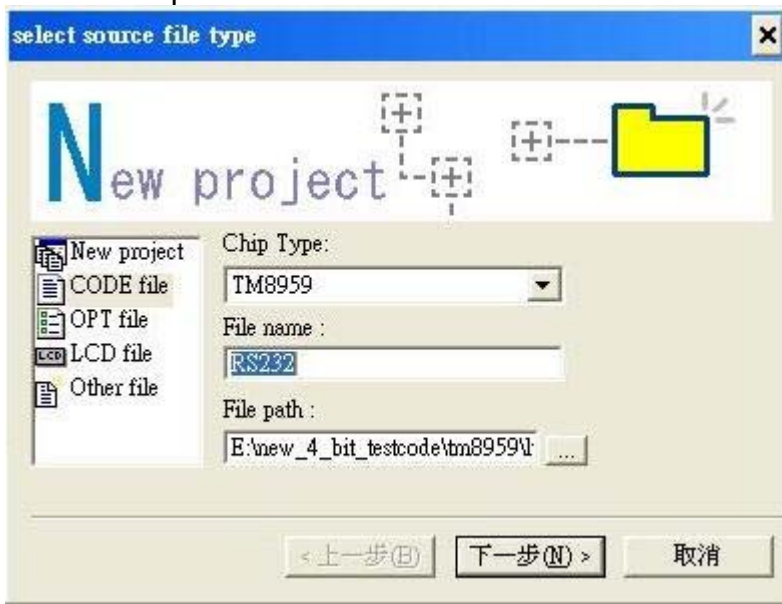


Step 7  
Congratulations!  
Click Finish to  
create a new  
project.

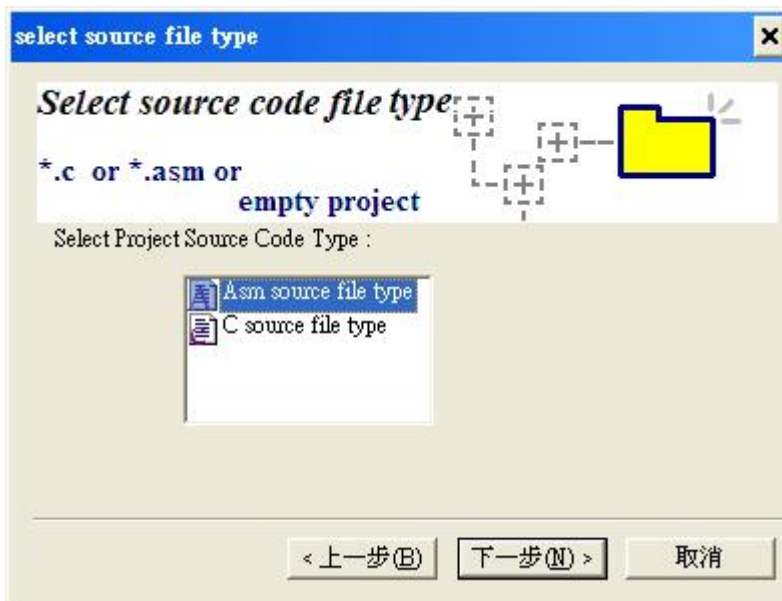
2-2-2. Creating a new file (\*.\*) :

When creating a new file, please select the file type you want at the step 2 of adding new project to generate the file you want.

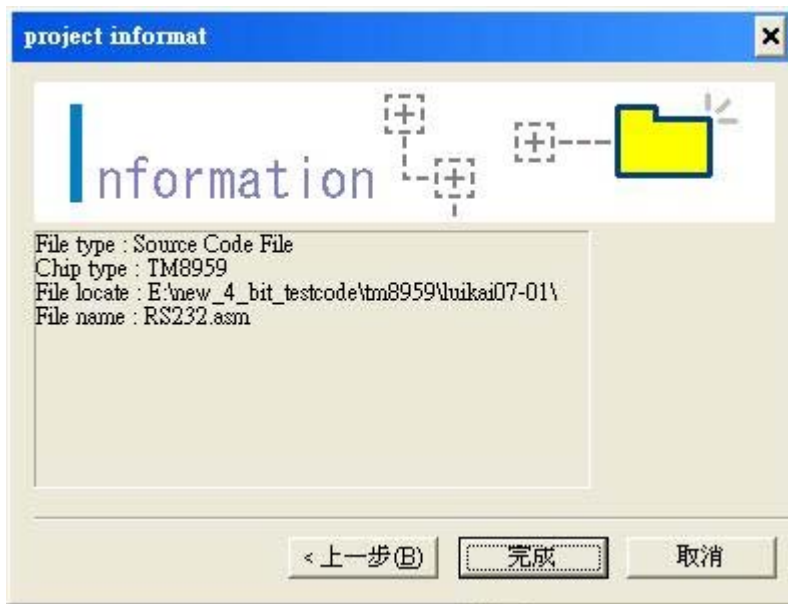
The graph below illustrates the selection of CODE files. If keying in directly, the file type does not need to be entered in the file name part; the program will add ".asm/.c" automatically after the Asm source file/C source file are selected in the next step.



The following graph illustrates the selection of Source file type (\*.asm or \*.c).



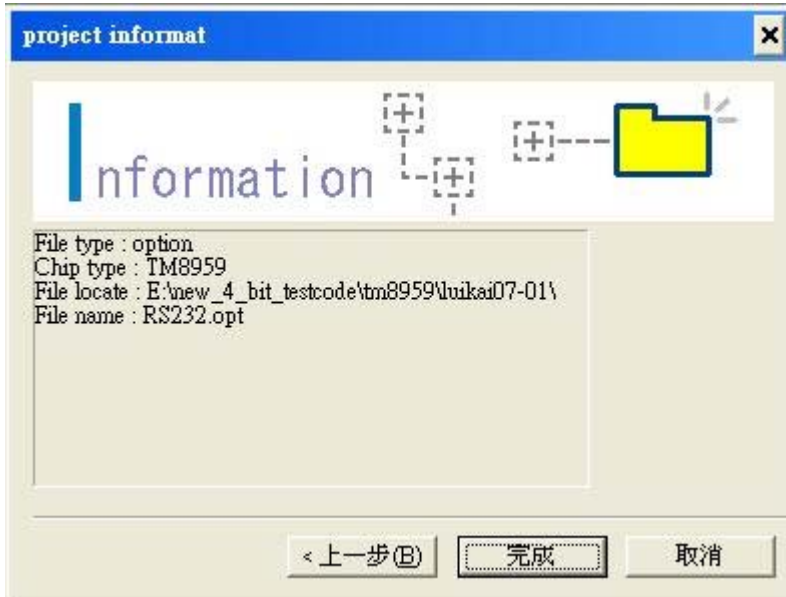
The following graph displays the details of the file information for us to confirm; if there are no mistakes, click on “Done;” otherwise click on “the previous” to make the modification.



The following graph illustrates the selection of OPT files; if keying in directly, the file type need to be entered in the file name part; the program will add “.opt” automatically after click on the next step.



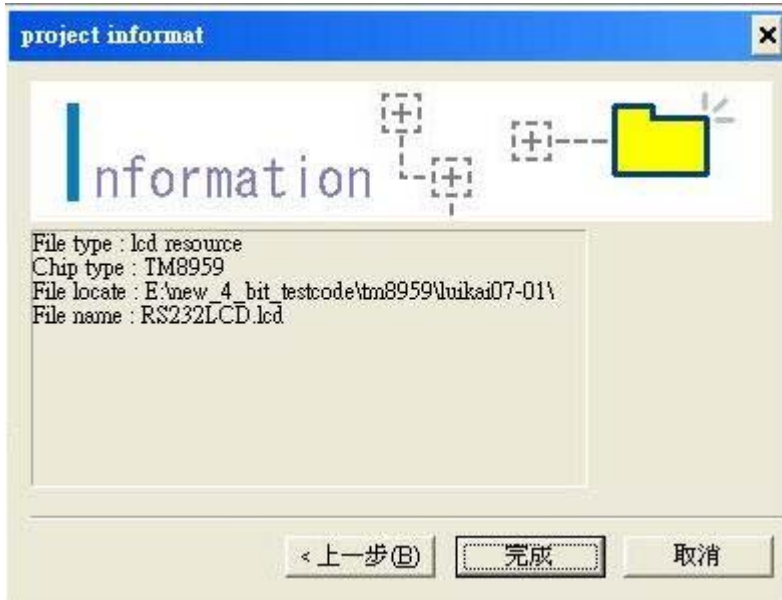
The following graph displays the details of the file information for us to confirm; if there are no mistakes, click on “Done;” otherwise click on “The previous step” to make the modification.



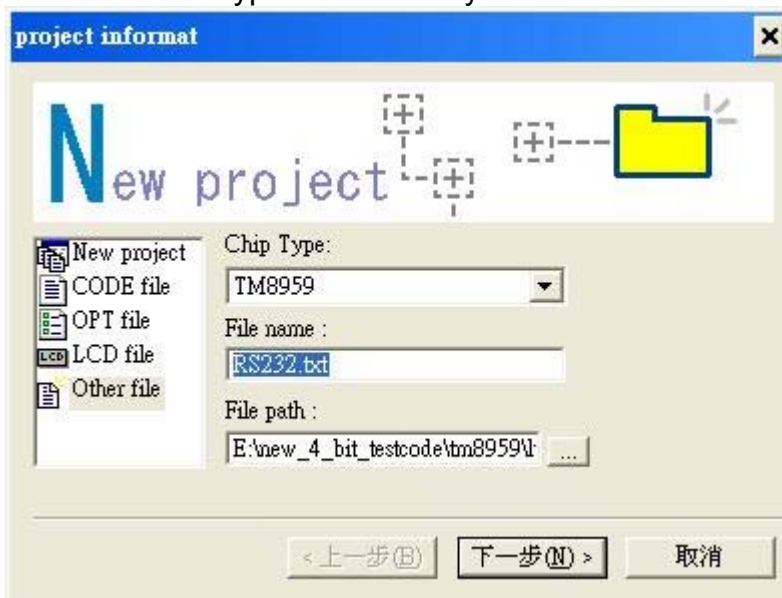
The following graph illustrates the selection of LCD files; if keying in directly, the file type does not need to be entered in the file name part; the program will add “.lcd” automatically after click on the next step.



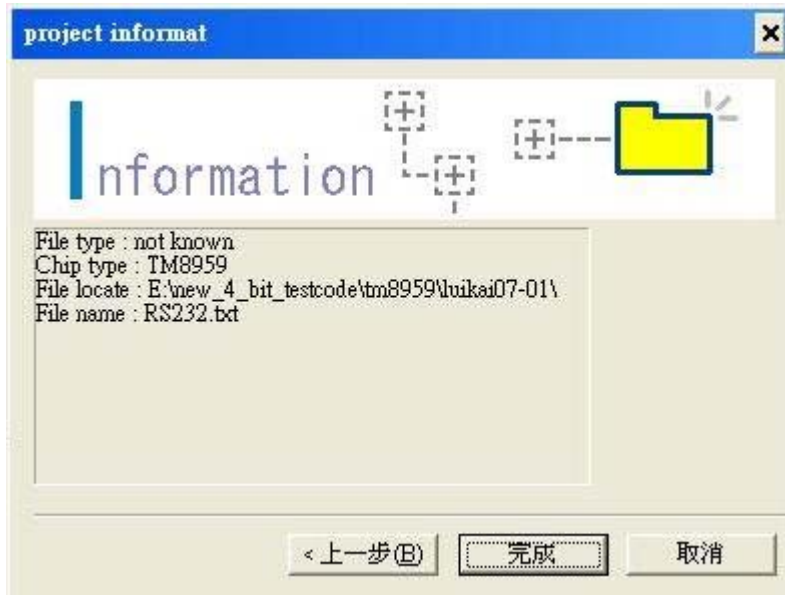
The following graph displays the details of the file information for us to confirm; if there are no mistakes, click on “Done;” otherwise click on “The previous step” to make the modification.



The following graph illustrates the selection for other files; if keying in directly, the file type needs to be entered in the file name part due to that the program would not add the file type automatically after click on the next step.

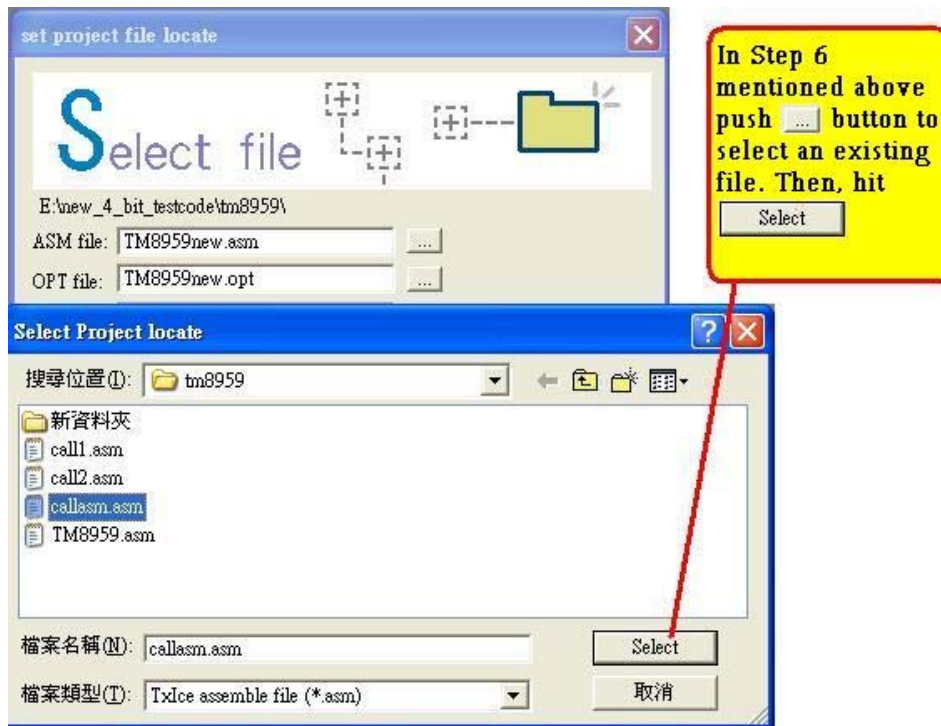


The following graph displays the details of the file information for us to confirm; if there are no mistakes, click on “Done;” or click on “The previous step” to make the modification.



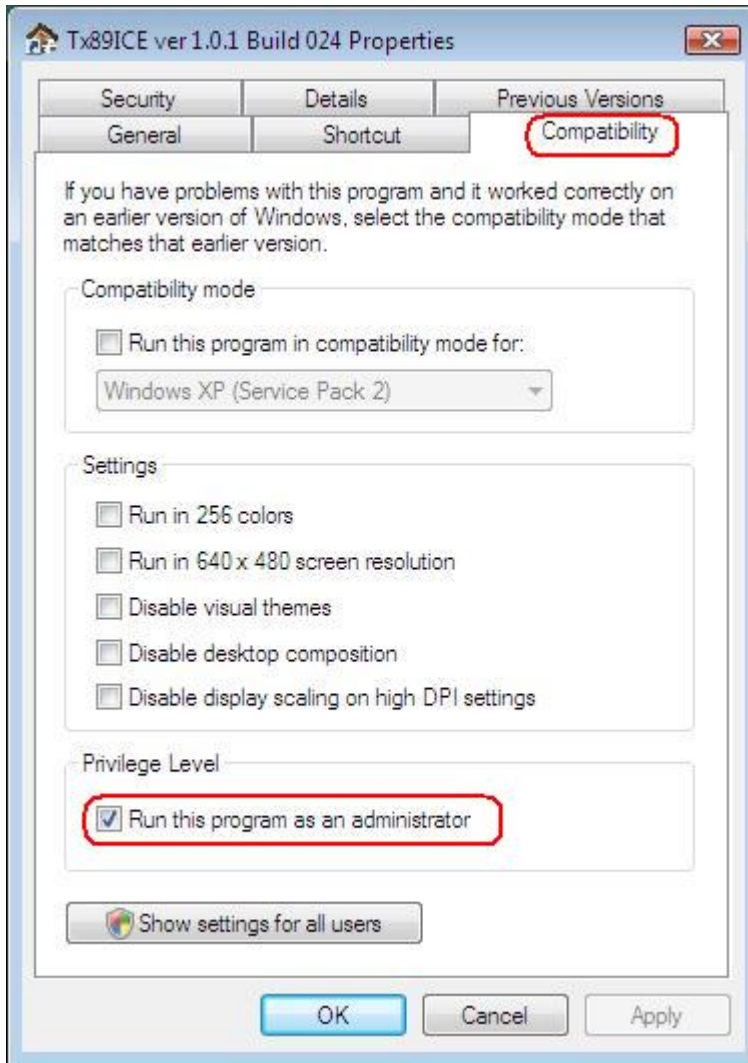
### 2-3. Import exiting files:

When importing existing .ASM, .OPT, .LCD, .CFG files or other exiting files and the project they belong is not established, please go to the step 6 mentioned above and click on the browse button to select files, then click on the Select button to complete the file selection; other steps are the same mentioned above.



### 3. Notes:

1. The setting of Parallel Port Mode for BIOS must be EPP and the Port Number must be set to 0x378.
2. When installing or executing this program under Windows 2000/XP, please login in as someone with the administrative authorization to ensure that the program can be executed normally.
3. **Notes and procedure to edit “.cfg” :**
  - (1) Whether .LCD will be edited?
    - a). Yes : After editing .LCD, save it and turn off the .LCD editing screen.
    - b). No : Please make sure that the .LCD is off.
  - (2) After finishing step (1), you can start editing .cfg; make sure you save the modification.
4. **Installation notes on Windows Vista :**  
 After installation, click on the right mouse button on the Desktop shortcut icon and select “Property” and the following screen will show up; select the Compatibility tab; Checkmark “Run this program as an administrator” and click on “OK” to execute the program.



5. Because TM87XXseries and TM89XX series use different compilers, the syntax for TM89XX Assembler language is different from that for TM87XX.