# HY10P Programmer User's Manual

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# 1. Programmer Structure

## 1.1. Programming Structure

HY10P Series Writer can program and doing other related function through connecting with PC as Figure 1-1. For detailed description, please refer to Programming Tools-Hardware User Manual (http://www.hycontek.com/page2-HY10P.html)

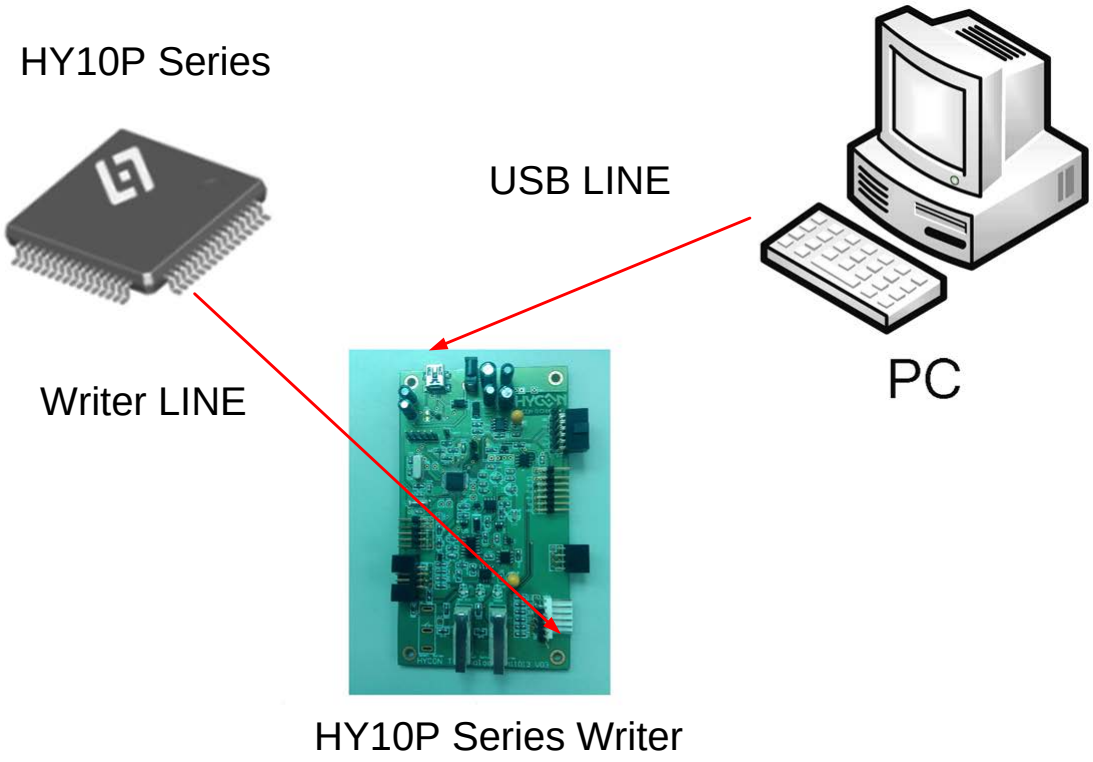


Figure 1- 1

## 1.2. Diagram

HY10P Series Writer is the tool connects with PC for programming HY10P Series. It can program HY10P Series products by using programmer HY10P Writer, as shown in Figure 1- 2.

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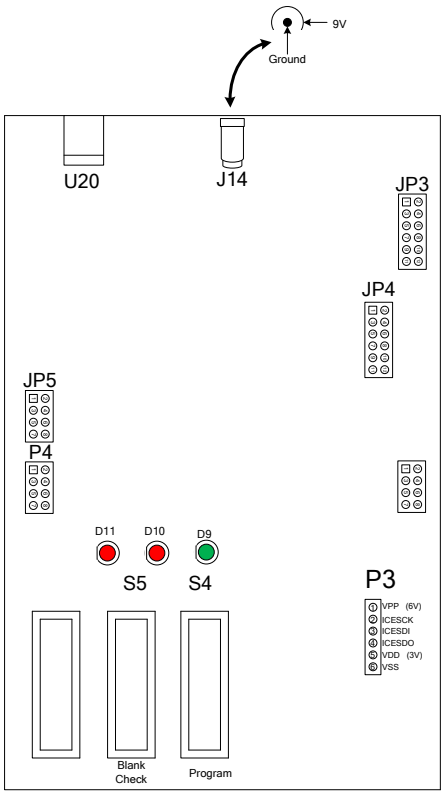


Figure 1- 2

## 1.3. Operation Description

The table in below gives description of every component in Figure 1- 2

| Name | Function |
|---|---|
| J14 | Adapter 9V input ⊕—●—⊖, used when programming OTP |
| U20 | USB connector to PC end：<br>Downloading programming code for HY10P series.<br>Downloading program for emulation and debug. |
| JP3 | Connect the control end of HY10P-IDE ICE Board(A12008) |
| P3 | Programming control end of HY10P series and is connected to OTP.<br>Pins from the left to right are：VSS, VDD, SDO, SDI, SCK, VPP. |
| P4 | Programming extension port；Please refer to Figure 1-3(left) for pin definition and Figure 1-3(right) for connected circuit. Program (S4), Blank (S5), Green (D9), Red (D10), Busy (D11). |
| D9 | Power-on signal.<br>Programming success signal. |
| D10 | Blank Check Fail signal.<br>Programming failure signal.<br>HAO frequency calibration failure signal. |
| D11 | Busy message signal. |
| S4 | Program；IC programming button. |
| S5 | Blank Check；IC blank check button. |

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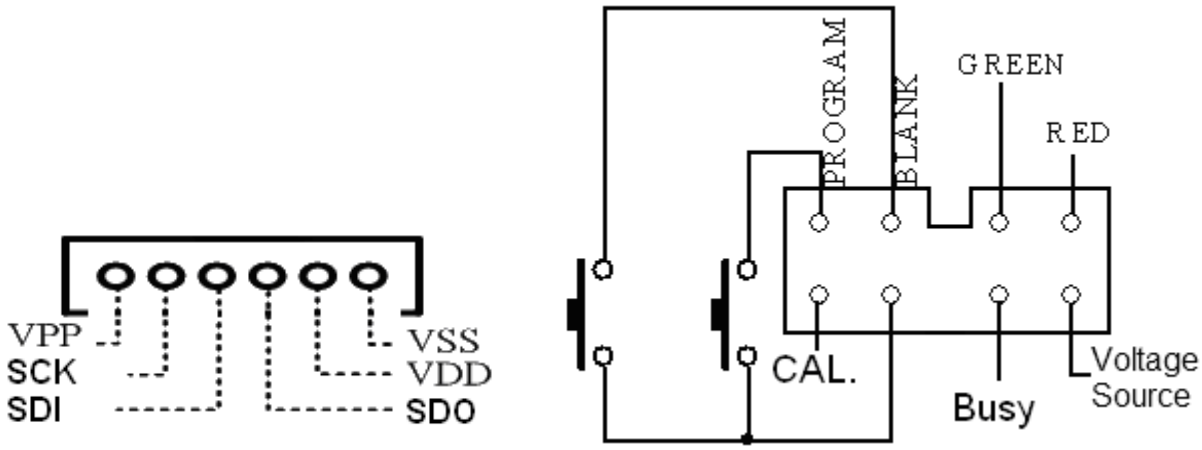


Figure 1- 3

Note: A voltage will be outputted from Voltage Source when implementing Blank & Program.

# 2. Software Operation Description

## 2.1. Software Function

In order to ease customers to use HYCON MCU products, we developed HY10P IDE developing environment so customers can emulate its end products on our development platform and write the program to the OTP of HY10P series. For detailed description, please refer to development tool-software User's Guide . (http://www.hycontek.com/page2-HY10P.html)。

## 2.2. Software Window Setup

Figure 2-1 is the program window of HY10P IDE, which can be used for emulation and debug function,and so on.

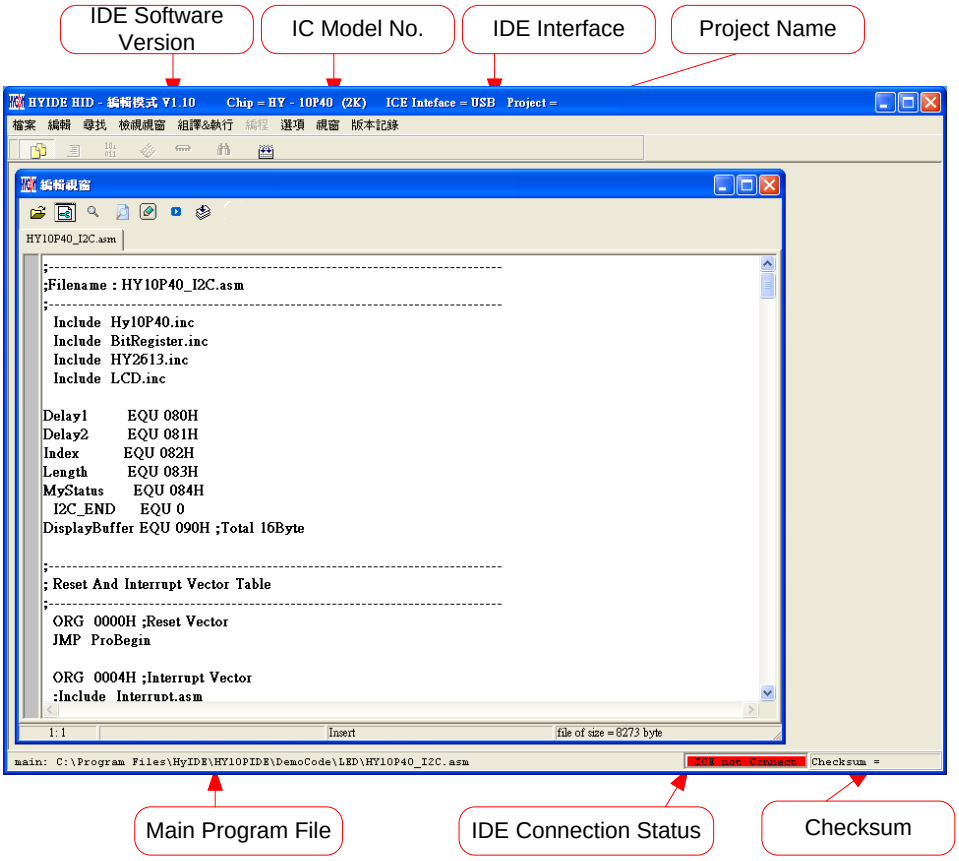


Figure 2- 1

### 2.2.1. Interface Setup

To enter into burn mode,you need to click "Options" from the toolbar, the "Interface Setup" window will appear,then click it, as shown in Figure 2-2.

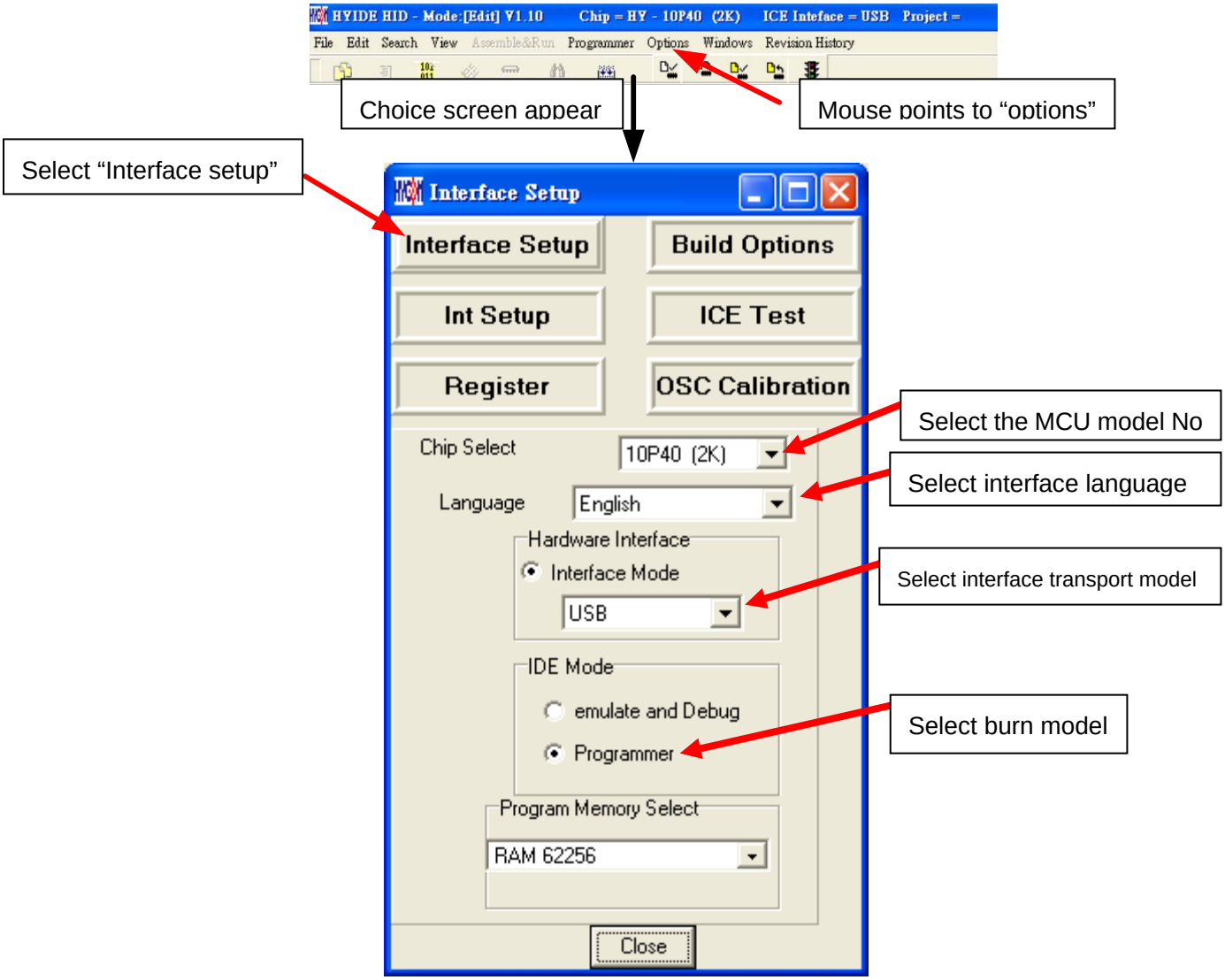


Figure 2- 2

| Name | Function |
|---|---|
| Chip Select | Choose the programming IC part no. If the part No. of programmed IC differs from the selected IC, Blank Check, Program and Verify will fail. |
| Language | Choose operation interface language, like Chinese or English. |
| Hardware settings | Select interface transport model(USB/Parallel Port). |
| IDE Mode | Programmming:burn model, use when programming HY10P Series products.<br>Emulate and Debug: when users use it with simulator for developing. |

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### 2.2.2. Build Options

Click" Build Options",it mainly serve as setting when building and produced attachment after building.

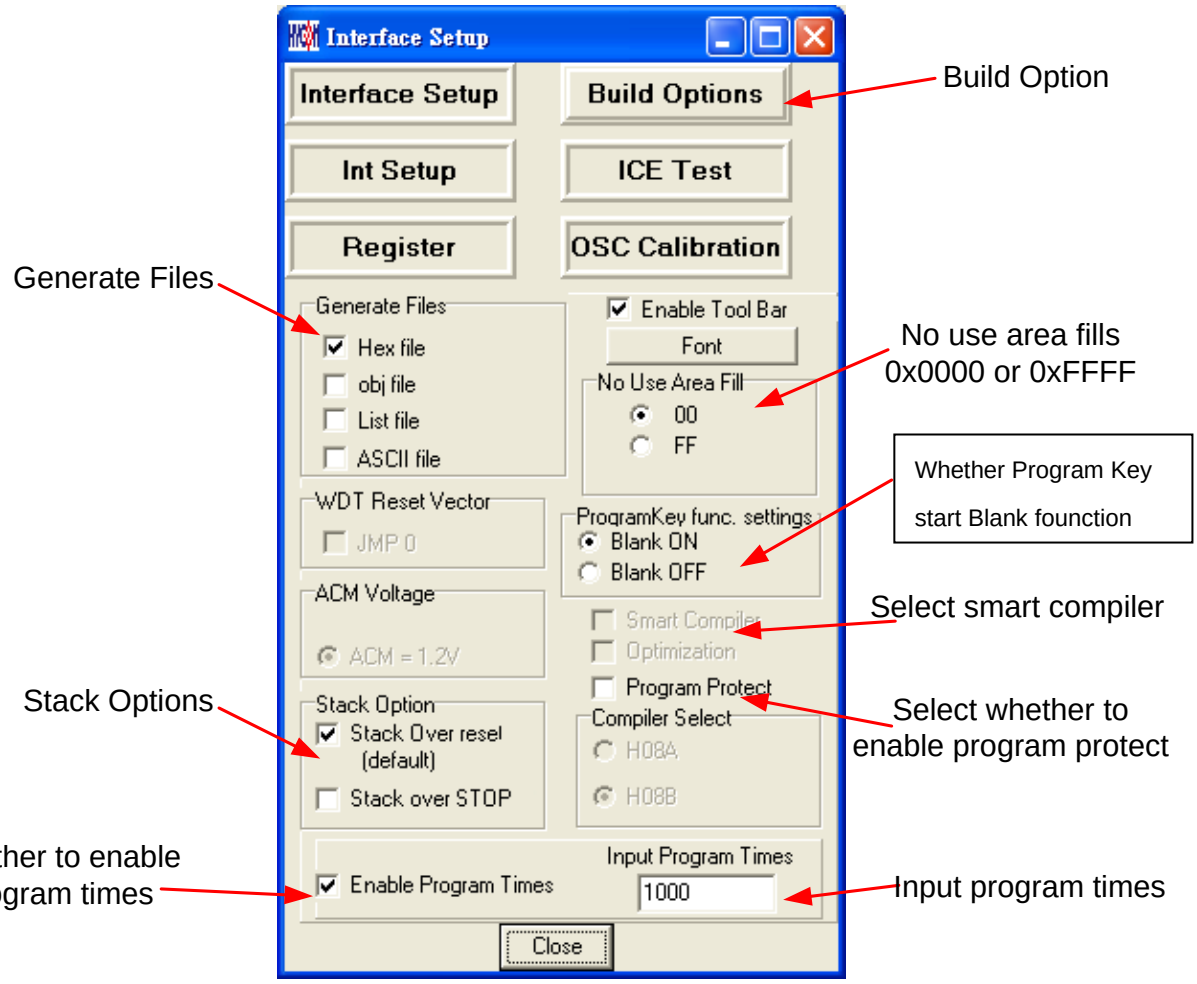


Figure 2- 3

| Name | Function |
|---|---|
| Generate Files | Generated file after choosing assembly |
| Stack Operation | Choose whether to reset when stack overflow or stack full when OTP program operation. |
| No Use Area Fill | Fill up 00 or FF in unused program space after assembly. |
| Smart Compiler | Choose whether to simplify assembly. |
| Enable Program Time | Choose whether to enable Download program times |
| Input Program Time | Input Download program times (Max: 2147483646.Min: 1). |

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### 2.2.3. ICE Test

This function serves as testing whether ICE operating voltage is normal; before testing ,Connect Adapter 9V,then connect USB Line to ICE. Make sure the ICE is connected, and then click "Option" at working bar, and "ICE test",later,click button "CK ALL". Then we can test the VPP and VCC voltage ,as shown in Figure 2-4.

VPP voltage while programming: 5.6<VPP<6.6.

VDD voltage while programming: 2.7<VPP<3.6

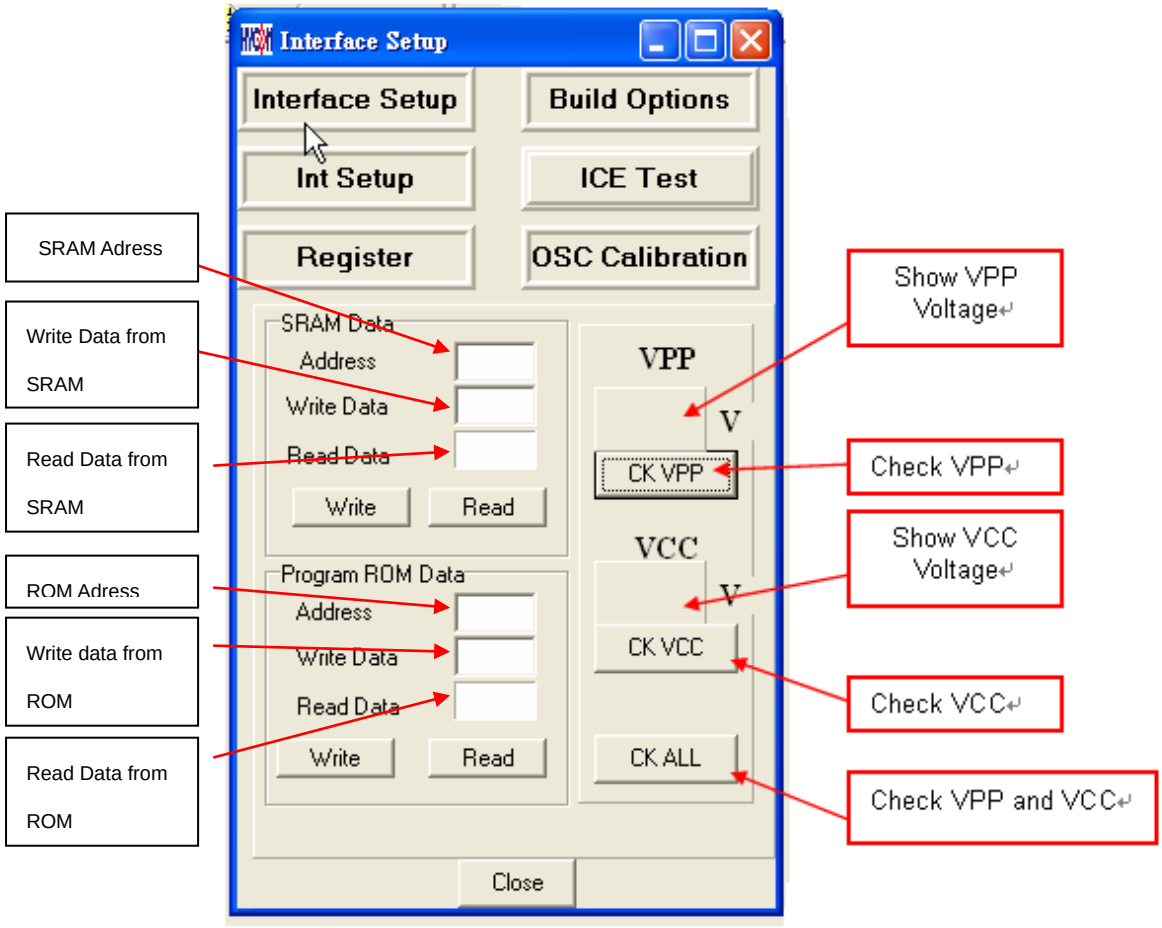


Figure 2- 4

### 2.2.4. OSC Calibration

Software/Hardware frequency calibration is shown in Figure 2-5. If software HAO/LPO calibration programming is initiated, would RAM 0FEH/0FFH address be meaningful after powering on the IC.

The programming time will increase of 500msec. (LPO Software Calibration Started). But software HAO/LPO Calibration is not actual frequency calibration; only provide the difference of frequency for calculation.

Online programming only supports hardware,HAO calibration, not the software calibration function.

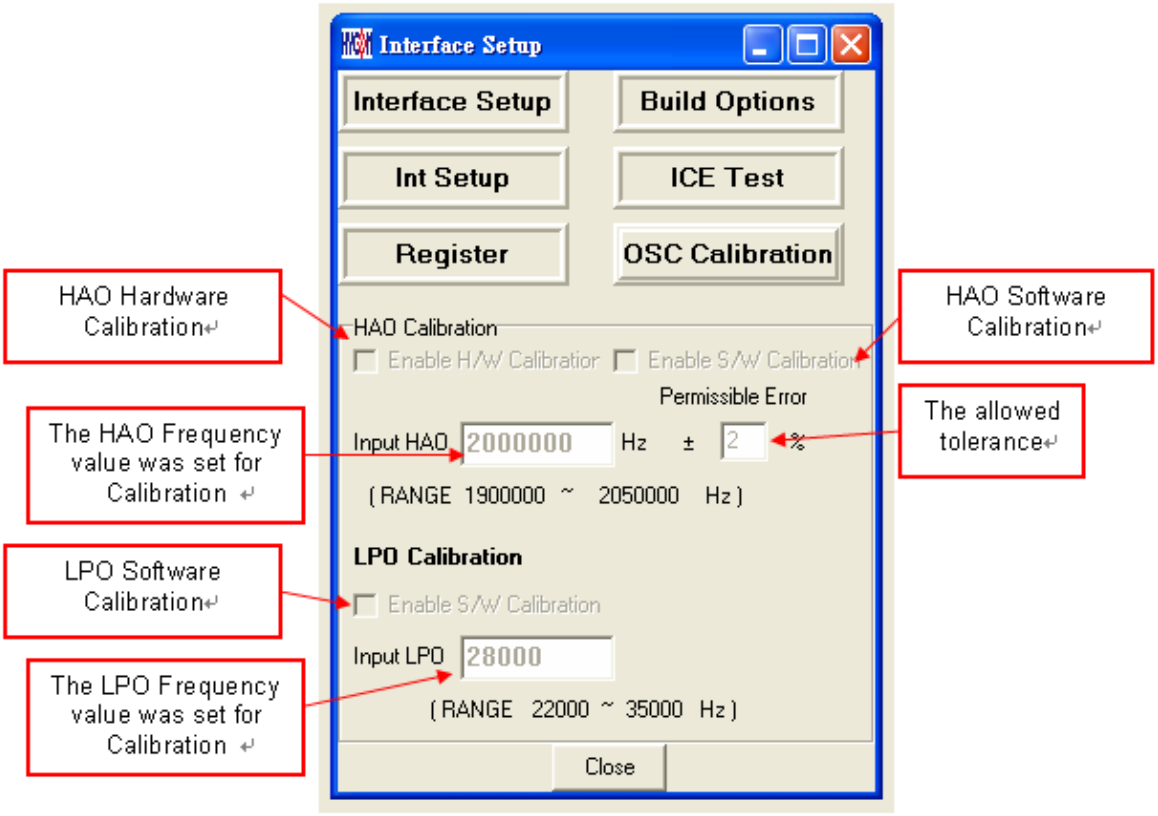


Figure 2- 5

HAO Calibration:

| Name | Function |
|---|---|
| Enable H/W Calibration | Enable HAO Hardware Calibration and in fact,implement the system frequence calibration. This function has to be confirmed whether it can implement hardware calibration after the IC model No. has been selected. |
| Enable S/W Calibration | Enable HAO Software difference Calibration. The difference value is saved in address **0FEH** of RAM. |
| Input HAO | Input the HAO frequency value for calibration. |
| Permissible Error | The allowed tolerance between the calibrated frequency value and the value of being calibrated. |

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| | |
|---|---|
| | 1. "Permissible Error" input tolerance has to be ≧±2%。<br>2. After writer kit conducted hardware calibrating to HAO, the specific programming IC's HAO frequency is measured according to the VDD voltage that writer kit provided and the temperature of programming IC , then filter " Permissible Error " input tolerance。<br>(Caution: HAO frequency will vary in accordance with VDD voltage and temperature.)<br>The VDD and VPP that specific writer kit designed with is as following table: |

| Writer Kit Part No. | VDD(V) | VPP(V) |
|---|---|---|
| HY10S00-CM01 | 3.3 | 6.5 |

LPO Calibration:

| Name | Function |
|---|---|
| Enable S/W Calibration | Enable LPO Software Calibration function. The difference value is saved in addess **0FFH** of RAM. |
| Input LPO | Input the frequency value of LPO to be calibrated. |

Note: The function of OSC Calibration related parameters are recorded into Hex Code. Thus, using Hex Loader software to download the code to programmer can activate the programming correctly and display OSC Calibration function options.

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**Software Calibration:**

**HAO Software Calibration:**

The difference frequence value is saved in address **0FEH** of RAM after calculating;Writting in the difference value to RAM when the IC power-on,it is not doing actual frequence source calibration.

HAO Hardware Calibration, HAO Software Calibration can exist at the same time. Moreover, the Hardware Calibration enforce first and then proceed the Software Calibration to calculate the difference value.

The difference value of base frequency defined as **4000HZ/LSB**。

The address **0FEH** data format:

Bit7：0= +, 1= -；Bit6~Bit0 means frequency difference value.

01H mean the frequency difference value is +4000HZ；FFH mean the frequency difference value is -4000HZ.

Example:

The set value for HAO frequency calibration is 2000000HZ，and the actual value from IC is HAO=1920000HZ. The calculation is (1920000-2000000)/4000 = -80000/4000= -20, therefore the address 0FEH of RAM will be **1110 1100b**

Example 1:

The set value for HAO frequency calibration is 2000000HZ，and the actual value from IC is HAO=2008000HZ. The calculation is (2008000-2000000)/4000 = 8000/4000=2, therefore the address 0FEH of RAM will be **0000 0010b**

**LPO Software Calibration:**

The frequence difference value is saved in address **0FFH** of RAM after calculation. This function is not doing actual frequency calibration; only writing in the difference value to RAM when the IC power-on.

The difference value of base frequency defined as **64HZ/LSB**.

The address **0FFH** data format:

Bit7：0= +, 1= -；Bit6~Bit0 means frequency difference value.

01H means the frequency difference value is +64HZ；FFH means the frequency difference value is -64HZ.

Example:

The set value for LPO frequency calibration is 28000HZ，and the actual value from IC is LPO=28128HZ. The calculation is (28128-28000)/64 = 128/64 = 2, therefore the address 0FFH of RAM will be **0000 0010b**

Example1:

The set value for LPO frequency calibration is 28000HZ，and the actual value from IC is LPO=27872HZ. The calculation is (27872-28000)/64 = -128/64 = -2, therefore the address 0FFH of RAM will be **1111 1110b**

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### 2.2.5 Attention

When Interface Setup finished, please click "close" and all the set parameters will be saved. Next time, when you open the setting, it will load the record parameters automatically and the IC model No. will be displayed on the headline of window as Figure 2-6.

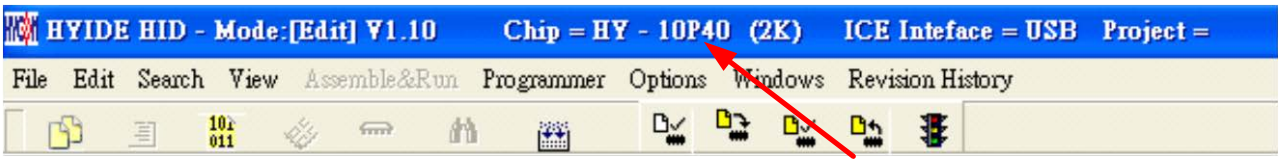


Figure 2- 6

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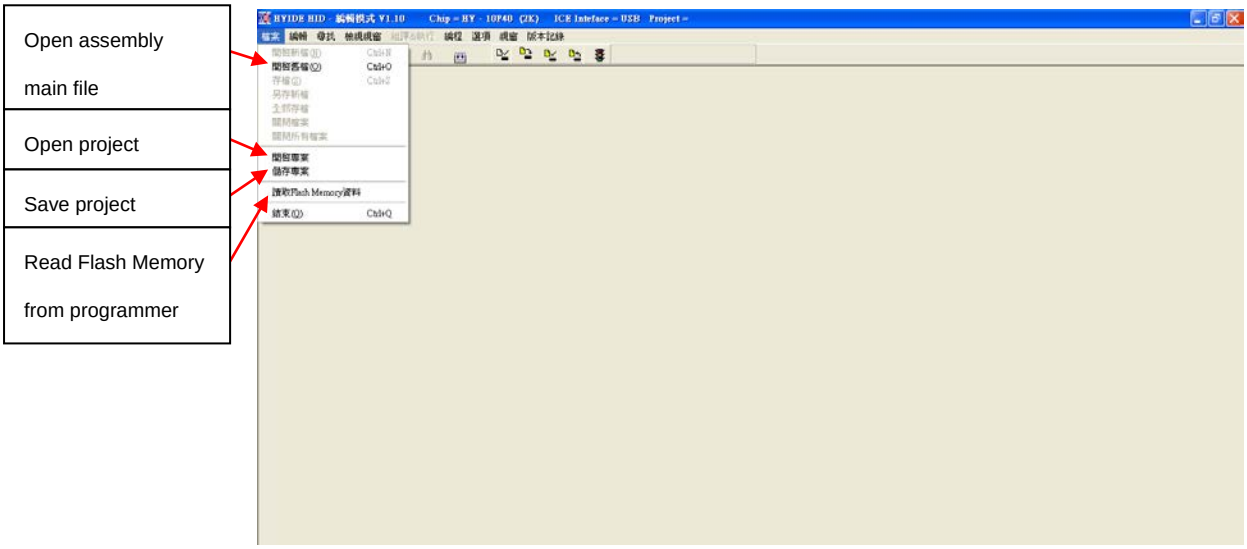
## 2.3. Program Download Method




| Name | Function |
|---|---|
| Open | Open the programmed source code main file. |
| Open Project | Open the saved project |
| Save Project | Save the finished project |
| Read the code from Flash Memory | Read the code of programmer Flash Memory. (Attention: if the programming was protective, the data will not be revealed. |

Note: The "Download file to Flash Memory" function has been cancelled. HYIDE has no function which supports Hex Code downloading.

### 2.3.1. Open/Save Project

"Save Project" will save all setting includes program, the setting of toolbar selection,etc to *.prj. "Open Project" can read back the file with all the settings.

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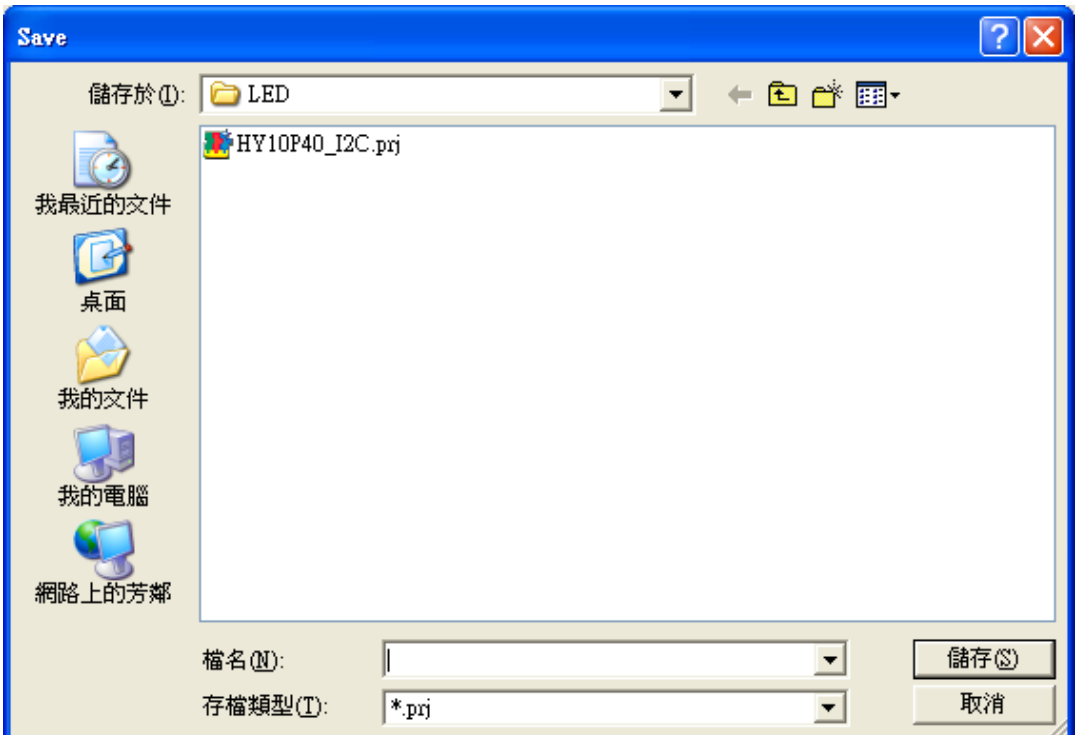

Save
儲存於(I):
LED
HY10P40_I2C.prj
我最近的文件
桌面
我的文件
我的電腦
網路上的芳鄰
檔名(N):
存檔類型(T):
*.prj
儲存(S)
取消

### 2.3.2. Open File and Assembly

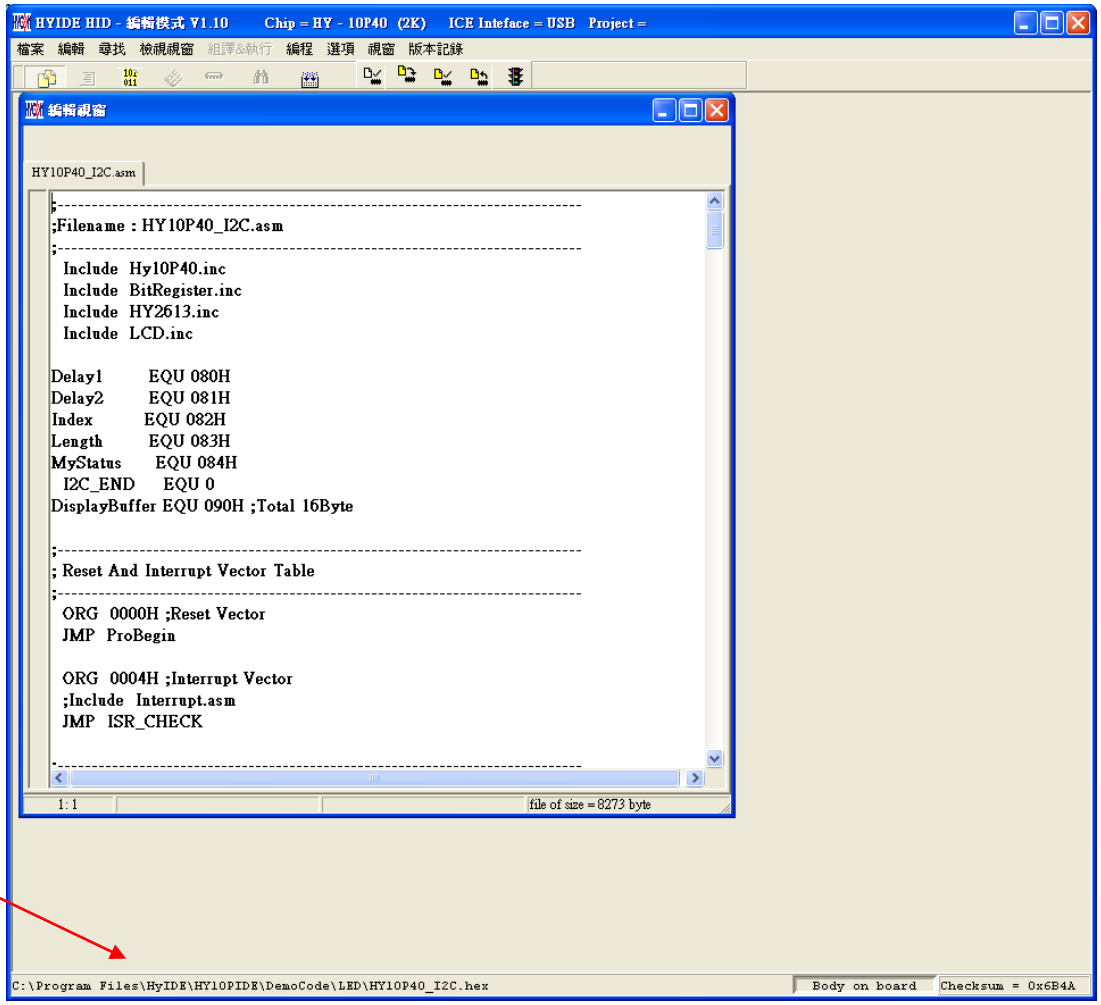



Figure 2- 7

"Open Project" opens source code main file name and it will be displayed under the assembly main file name. If the displayed name differs from main file, as shown in figure 2-7,points the mouse to the specific file and presses right mouse button. Set this file as the assembly main file as shown in Figure 2-8.

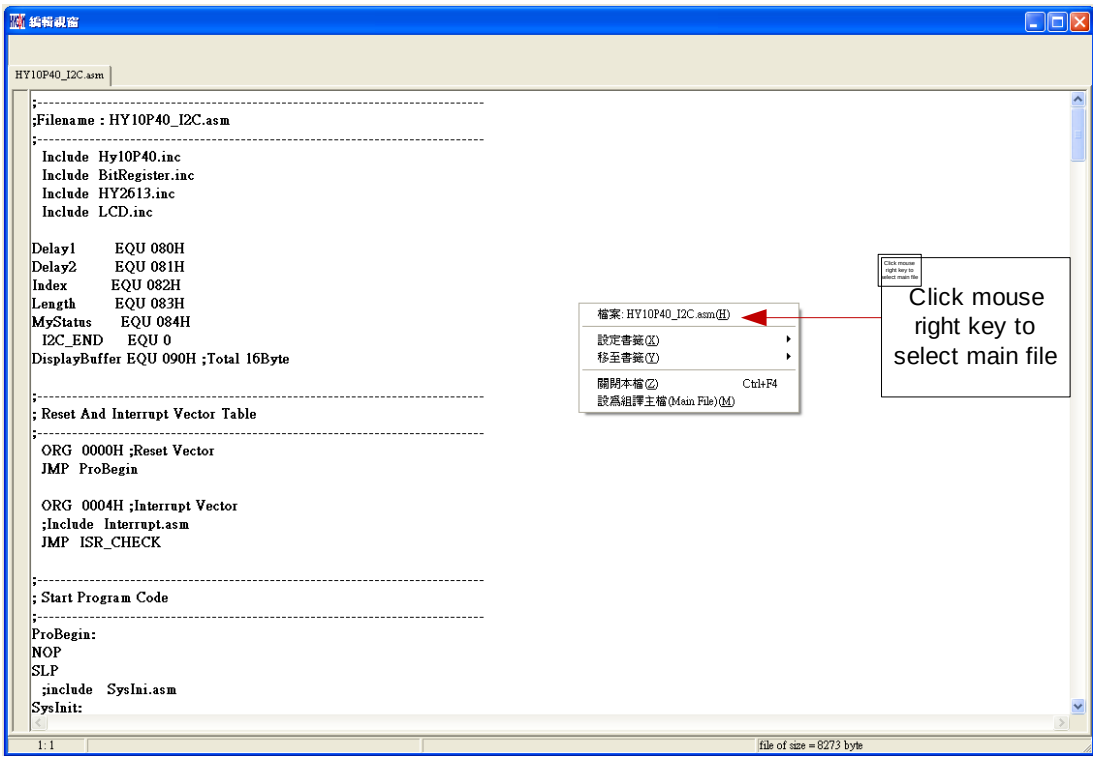



Figure 2- 8

Assembles Source Code and download the file to programmer or IDE Flash Memory, as Figure 2-9 illustrated.

Figure 2- 9

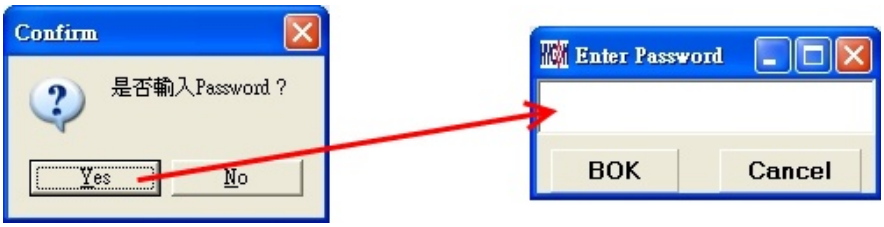



Figure 2- 10

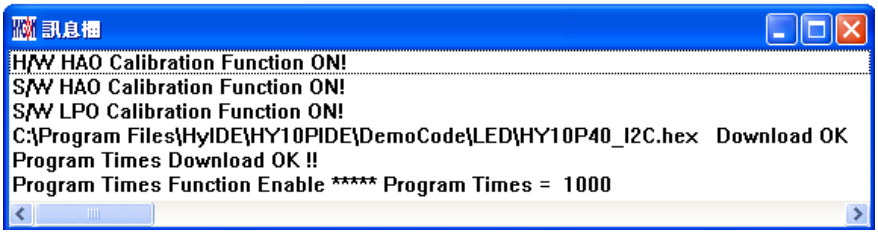



Figure 2- 11

1. When using USB interface, program code will be loaded into the Flash Memory of programmer after the assembly main code was finished for mass production programming.
2. Before downloading code to programmer Flash Memory, system may require

whether to enter into password. This function enables users to monitor the code downloaded into programmer Flash Memory through PC. Please note that password can only include 6 digits (ASCII Code). In order to protect the code that users developed, the password must be entered before downloading the code into programmer. If the password entering step is cancelled during operation, it means that the code will not be allowable to be read from Flash Memory. (As Figure 2-10).

Note: once you set the password, it will be the operating password of the Flash Memory. This password has to be entered before you read the code later on. Please memorize your password to ensure the code can be read in the future.

In addition, every time a new code is downloaded; the programmer will ask you to enter the password afresh.

3. If there is enabled program times in the assembly option, information column will display the programming times as shown in Figure 2-11.
4. After assembling completed, Hex filename and Checksum will be displayed in underneath section, as Figure 2-12 illustrated.

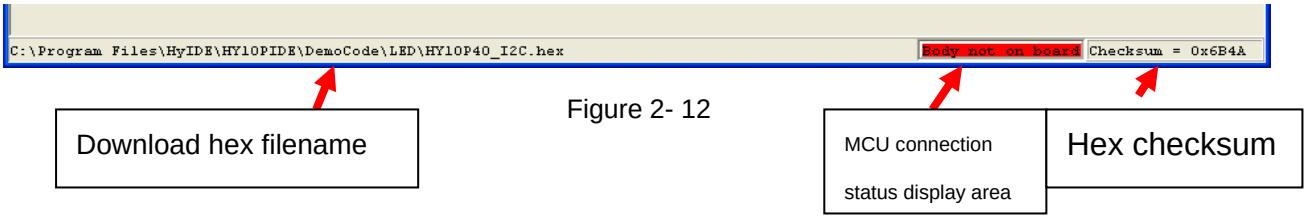



Figure 2- 12

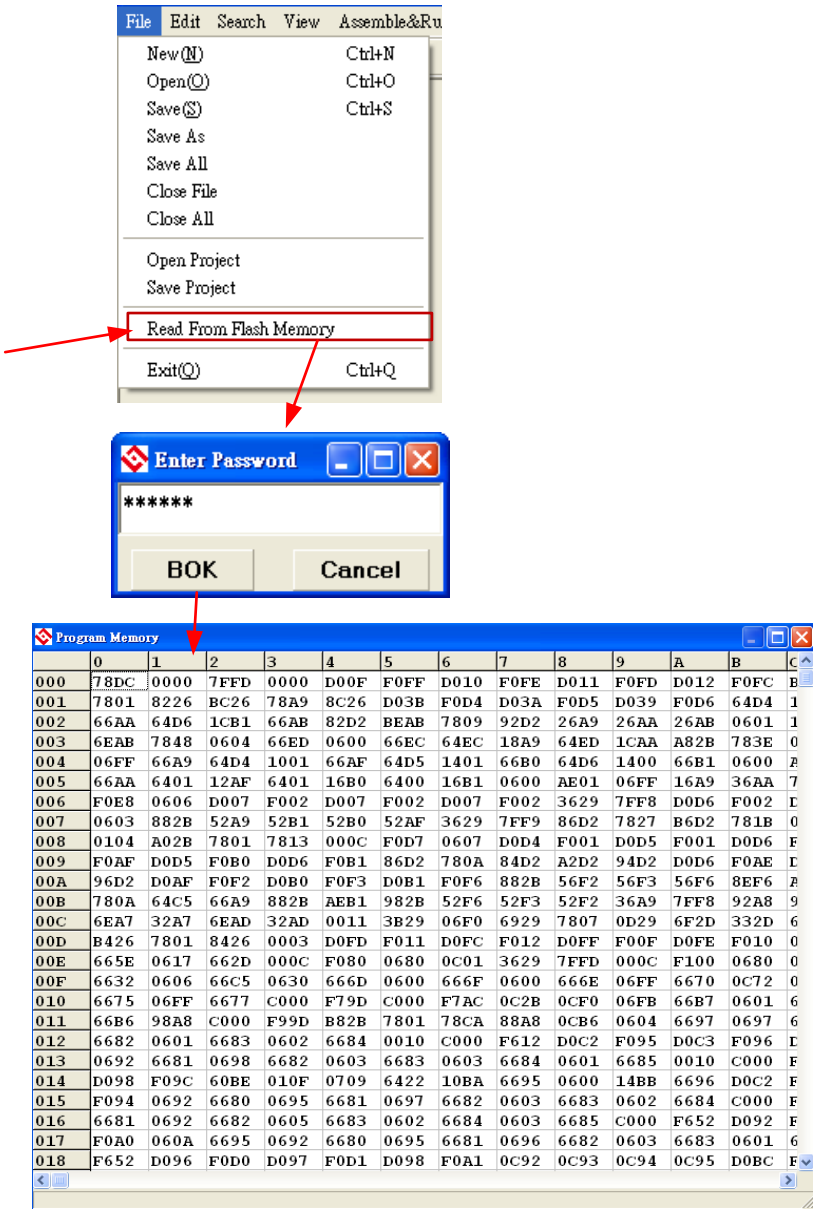
### 2.3.3. Download Hex File to Programmer or IDE Flash Memory

HY 10P Series,If users would like to download Hex File, please download by software, HY10P-Hex Loader and operate accord Users' Guide

### 2.3.4. Read the Code from programmer Flash Memory

This function helps users to ascertain whether the code of programmer Flash Memory is the same with Download Code. The Password entered must in accordance with the Download Password, so the data will be revealed, as Figure 2-13 shown.

If the Flash Memory has assigned a certain Programmer, only the assigned Programmer can use the mentioned way to read the code from Flash Memory.




| | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 000 | 78DC | 0000 | 7FFD | 0000 | D00F | F0FF | D010 | F0FE | D011 | F0FD | D012 | F0FC | B |
| 001 | 7801 | 8226 | BC26 | 78A9 | 8C26 | D03B | F0D4 | D03A | F0D5 | D039 | F0D6 | 64D4 | 1 |
| 002 | 66AA | 64D6 | 1CB1 | 66AB | 82D2 | BEAB | 7809 | 92D2 | 26A9 | 26AA | 26AB | 0601 | 1 |
| 003 | 6EAB | 7848 | 0604 | 66ED | 0600 | 66EC | 64EC | 18A9 | 64ED | 1CAA | A82B | 783E | 0 |
| 004 | 06FF | 66A9 | 64D4 | 1001 | 66AF | 64D5 | 1401 | 66B0 | 64D6 | 1400 | 66B1 | 0600 | A |
| 005 | 66AA | 6401 | 12AF | 6401 | 16B0 | 6400 | 16B1 | 0600 | AE01 | 06FF | 16A9 | 36AA | 7 |
| 006 | F0E8 | 0606 | D007 | F002 | D007 | F002 | D007 | F002 | 3629 | 7FF8 | D0D6 | F002 | D |
| 007 | 0603 | 882B | 52A9 | 52B1 | 52B0 | 52AF | 3629 | 7FF9 | 86D2 | 7827 | B6D2 | 781B | 0 |
| 008 | 0104 | A02B | 7801 | 7813 | 000C | F0D7 | 0607 | D0D4 | F001 | D0D5 | F001 | D0D6 | F |
| 009 | F0AF | D0D5 | F0B0 | D0D6 | F0B1 | 86D2 | 780A | 84D2 | A2D2 | 94D2 | D0D6 | F0AE | D |
| 00A | 96D2 | D0AF | F0F2 | D0B0 | F0F3 | D0B1 | F0F6 | 882B | 56F2 | 56F3 | 56F6 | 8EF6 | A |
| 00B | 780A | 64C5 | 66A9 | 882B | AEB1 | 982B | 52F6 | 52F3 | 52F2 | 36A9 | 7FF8 | 92A8 | 9 |
| 00C | 6EA7 | 32A7 | 6EAD | 32AD | 0011 | 3B29 | 06F0 | 6929 | 7807 | 0D29 | 6F2D | 332D | 6 |
| 00D | B426 | 7801 | 8426 | 0003 | D0FD | F011 | D0FC | F012 | D0FF | F00F | D0FE | F010 | 0 |
| 00E | 665E | 0617 | 662D | 000C | F080 | 0680 | 0C01 | 3629 | 7FFD | 000C | F100 | 0680 | 0 |
| 00F | 6632 | 0606 | 66C5 | 0630 | 666D | 0600 | 666F | 0600 | 666E | 06FF | 6670 | 0C72 | 0 |
| 010 | 6675 | 06FF | 6677 | C000 | F79D | C000 | F7AC | 0C2B | 0CF0 | 06FB | 66B7 | 0601 | 6 |
| 011 | 66B6 | 98A8 | C000 | F99D | B82B | 7801 | 78CA | 88A8 | 0CB6 | 0604 | 6697 | 0697 | 6 |
| 012 | 6682 | 0601 | 6683 | 0602 | 6684 | 0010 | C000 | F612 | D0C2 | F095 | D0C3 | F096 | D |
| 013 | 0692 | 6681 | 0698 | 6682 | 0603 | 6683 | 0603 | 6684 | 0601 | 6685 | 0010 | C000 | F |
| 014 | D098 | F09C | 60BE | 010F | 0709 | 6422 | 10BA | 6695 | 0600 | 14BB | 6696 | D0C2 | F |
| 015 | F094 | 0692 | 6680 | 0695 | 6681 | 0697 | 6682 | 0603 | 6683 | 0602 | 6684 | C000 | F |
| 016 | 6681 | 0692 | 6682 | 0605 | 6683 | 0602 | 6684 | 0603 | 6685 | C000 | F652 | D092 | F |
| 017 | F0A0 | 060A | 6695 | 0692 | 6680 | 0695 | 6681 | 0696 | 6682 | 0603 | 6683 | 0601 | 6 |
| 018 | F652 | D096 | F0D0 | D097 | F0D1 | D098 | F0A1 | 0C92 | 0C93 | 0C94 | 0C95 | D0BC | F |

Figure 2- 13

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# 3. PC Online Programming

## 3.1. Online OTP Programming

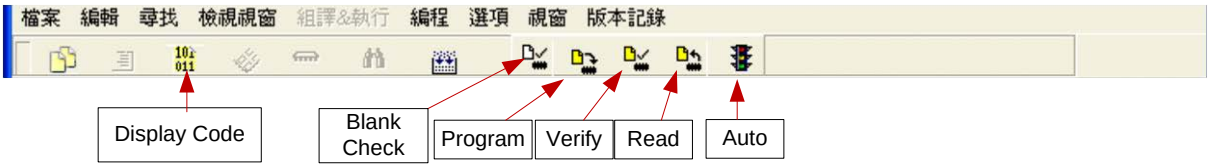


Figure 3- 1

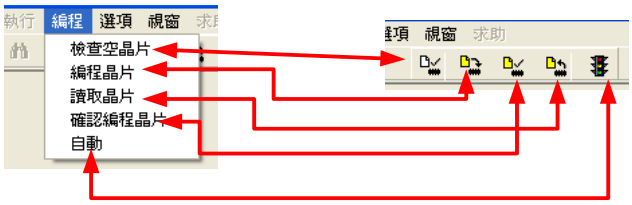


Figure 3- 2

Blank Check, Programming, Verify and Read ,etc can be implemented when the programmed file being successfully loaded into programmer or IDE Flash Memory. On the contrary those commands will not be activated if the download failed.

Figure 3- 3

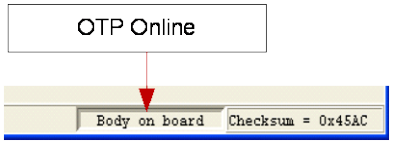


Figure 3- 4

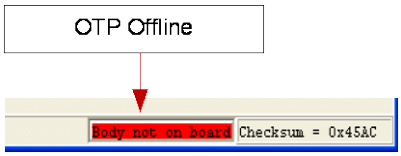


Figure 3- 5

Make sure the selected programming IC part number is the same with the OTP part number in the topic window as Figure 2-6 described. When programmer executes Blank Check, Programming and Verify commands, Program will check whether the IC part number and OTP programming part number are identical. If the part number is different, the data will not be written into OTP and an error message will be displayed in information column as Figure 3-3 described.

If users intend to find out whether the part number is correct before programming, point the cursor to "IC Connection Status Display" and click the left mouse key. If the selected IC is correct, a message will show up as Figure 3-4. If it is incorrect, the message will be

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displayed as Figure 3-5. If "Enable Program Times" has been marked up, the spare program times will be displayed in the message column as Figure 3-6.

Figure 3- 6

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### 3.2. Blank Check

The icon of Blank check is . The internal code of Blank ICs that have yet not been programmed is 0xFFFF. The purpose of checking the IC is to make sure the OTP address content is 0xFFFF. If the IC selection is correct and the content is empty, a message will appear as Figure 3-7.

Figure 3- 7

If the IC selection is incorrect or the content is not empty, a message will show up as Figure 3-8.

Figure 3- 8

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### 3.3. Program

The icon of Program is . The purpose of programming is to write Compiler accomplished program into IC OTP. When programming is completed and the IC is assembled as finished goods, programmer can operate the program as users commanded.

Program the downloaded or assembly finished Hex file (displayed at the bottom of the column) in the selected IC and verify the correctness of the programming content (please refer to Chapter 1.2.1 or 1.2.2 for programming procedures).

If the selected IC is correct and the programming succeeds, message will appear at the information column as Figure 3-9 illustrated. If "Enable Program Times" is ticked up, the enable program times will minus 1 and the program times left will be revealed in the message column.

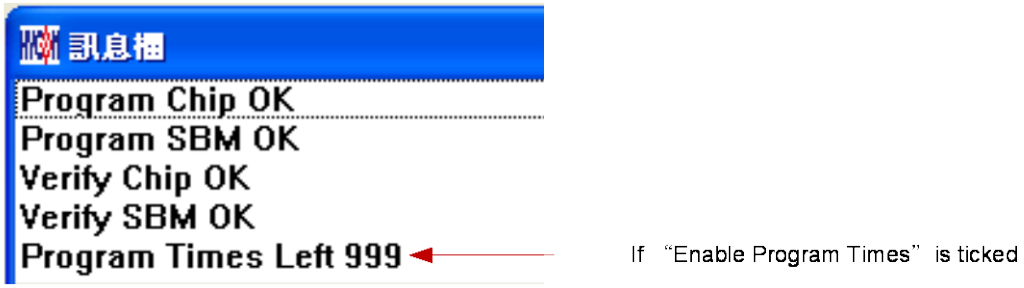


Figure 3- 9

If the IC selection is incorrect or the programming fails, a message will show up as Figure 3-10.

Figure 3- 10

### 3.4. Verify

The icon of Verify is . The purpose to verify programming IC is to compare if the program written into IC OTP equals to the program downloaded to programmer.

Verify programming IC content consistency with the downloaded or assembled Hex file (displayed at the bottom of the column). If the IC is protected by program, this verification is ineffective or the comparison failed.

If IC selection and program verification is success, a message will appear as Figure 3-11.

Figure 3- 11

If IC selection is incorrect or the program verification miscarries, a message will pop up as Figure 3-12.

Figure 3- 12

## 3.5. Read

The icon of Read is . The purpose to read the IC is to verify the consistency of OTP Checksum and programmed Hex file. Read IC content and display it in the "Display Code" window as Figure 3-13 shown. If the IC is protected by program, this function is ineffective or the comparison failed.

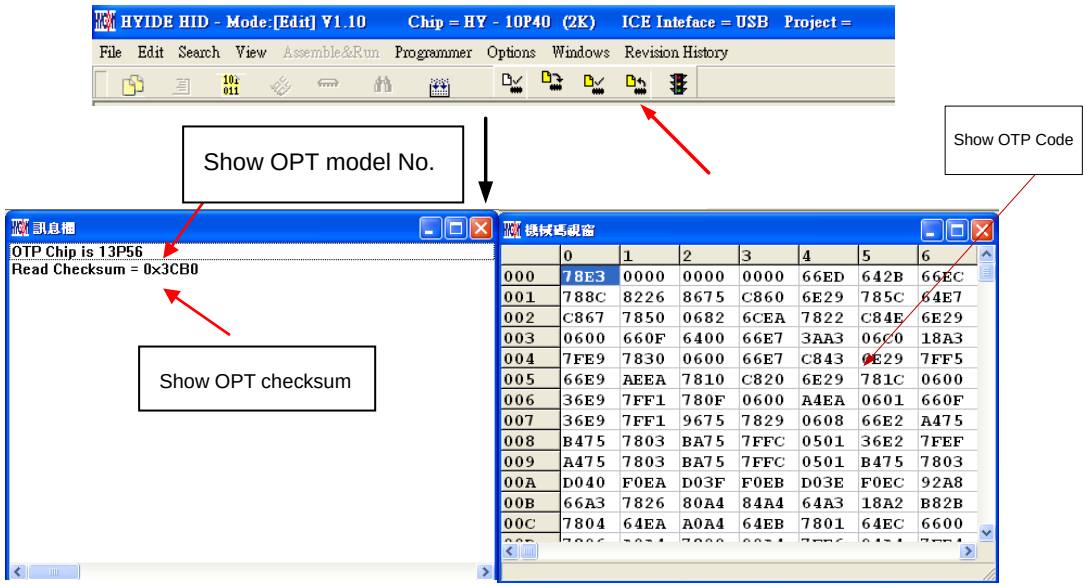


Figure 3- 13

### 3.6. AUTO

The icon of Auto is . Auto integrates Blank Check, Program and Verify function. If user selects Auto, it will first check whether the IC is blank, then program and verify program IC.

After the execution succeeded, a message will be displayed as Figure 3-14 displayed. If the option, "Enable Program Times" is ticked up, the program permitted times will reduce 1 and the program times left will be shown in the message column.

Figure 3- 14

If any function fails, the whole process will stop and display an error message in the message column

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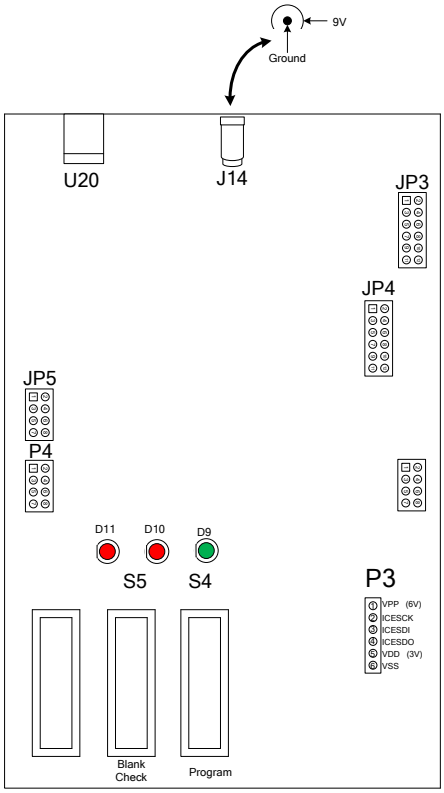
# 4. PC Offline Programming

## 4.1. Program Description

As the development process evolves to mass-production, the programmer can be used alone when programming on the production line. It is not necessary to connect the programmer to the PC.

***Attention:** When use programmer, please make sure the 9V Adapter has been connected before USB line was plugged in PC. Please don't put in or pull out 9V Adapter when programmer connected with PC or the PC may crash




(For the description of the device, please refer to chapter 1.2)

| Name | Function |
|---|---|
| D9 | Power on signal<br>Programming successful signal. |
| D10 | Blank Check Fail signal<br>Programming fail signal.<br>HAO frequency calibration fail signal |
| D11 | Busy signal |
| S4 | Program → Verify, IC programming button |
| S5 | Blank Check, IC blank check button |

- To implement offline operation, Hex file must be firstly downloaded to programmer Flash Memory. Please refer to HY10P-Hex Loader Software User Manual
- To implement offline operation, press S5 button can check if the IC is blank and the D9 Green LED should be lighted up.

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- S4 Button is programming button. Its procedures are: Program → Verify and the D11 (Busy) signal should be lighted up. If "Program Protection" of "Assemble Option" is ticked up before downloading data to Flash Memory, program protection will be executed after Verify completed. If "Program Protection" is not ticked up, it will stop after Verify accomplished. D11 (Busy) signal will go out and D9 Green LED will be lighted up.
- When Programming finished, please press S5 to check if the IC is blank. At this moment, D10 Red LED should be lighted up, representing programming is successful (because the data has been programmed into IC, so Blank Check is failed.).
- **It is suggested to press S5** and check whether the IC is blank, then press S4 to continue programming to ensure programming correctness.
- If any failure or error happened during execution procedures, D10 red LED lights up. If succeed, D9 green LED lights up.

### 4.2. Program Times Restriction

The menu of "Assemble Option" in interface setup has an option of "Enable Program Times" as described in Figure 2-4. This option restricts the permitted program times of download program.

This is a safety mechanism that restrains the permitted program times, preventing it from over-programming on the production line.

After ticking up "Enable Program Times", key in the program times in the column below "Input Program Times" (maximum is 99999999, minimum is 1). This parameter will be written into EEPROM of the programmer after compiler program or download file to Flash Memory. Afterwards, the enabled program times will reduce 1 each time when programming completed. If the value reduced to 0, the programming action may not be executed. At this time, an error signal (Red LED) will be lighted up but Blank Check still operates normally.

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## 5. Revision History

| Version | Page | Revision Summary |
|---|---|---|
| V01 | ALL | First edition |
| V02 | Page.8 | Add the description and specification of Permissible Error of HAO Hardware calibration。 |