

# **QL-PROG**

## **Microchip MCU Programmer**

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# **User's Manual**



**Shenzhen Qianlongsheng Electronic Technology Co., Ltd.**  
**[www.pic16.com](http://www.pic16.com)**

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## **Introduction**

QL-2006/QL-PIC280 programmer is the high-speed programmer designed specially for development and production programming of PIC single chip microcomputer (SCM) by Shenzhen Qianlongsheng Electronic Technology Co., Ltd. The product is featured with small volume, low power consumption, high reliability as well as easy and convenient operation.

QL-2006 is applicable for almost all PIC10/12/16/18 series SCMs except 16C5X. It also supports memories in 24XX series and 93XX series.

QL-PIC280 fully supports entire PIC series of more than one hundred types including 10/12/16/18. It also supports serial EEPROMs including 24/93 series from 1K to 512K-bit. With fully-open design of electronic switch using high-current field effect transistor (FET) and collocation of all chips aligned to the top, this programmer has more stable programming performance, more prompt application and more convenient operation.

## **Features**

Features of QL-2006/QL-PIC280 Programmer:

- 1 High performance-price ratio, designed with the updated PIC programming algorithm, higher speed than other

similar products, stable performance, support more devices.

- | Support online upgrade of programmer hardware, easy and convenient upgrade.
- | Two communication modes of USB and serial port, convenient for application on lap-top computer which doesn't have serial port (convenient connection of one USB cable with computer).
- | Automatic programming function and automatic programming process enable mass production for customer's great convenience (programming available on chip installation without pressing any other key).
- | Overall message indication, audio plus word will enable customer well informed about operating status.
- | All operator interfaces of software in Chinese make application more accessible (setup of configuration bits also in Chinese for beginner's convenience).
- | Through built-in ICSP interface (completely compatible with ICD interface of MICROCHIP), support ICSP (in-circuit serial programming) directly without any additional device. User may program after circuit board is welded. For FLASH SCM, online upgrade is available.
- | Equipped with 40pin DIP socket, available for direct programming of 8pin-40pin DIP chip. Programming of other surface mount device (SMD) is available based on universal adaptor.
- | Compatible with operating systems (OS) including Windows98, Windows2000/NT and Windows XP.

- l Function of programming counting, can preset and count the programming number.
- l Function of serial number auto-increment, available to set auto-increment area as program area or EEPROM data area, set auto-increment system, set auto-increment start address/end address and auto-increment step, set to ignore high byte in auto-increment to avoid effect to RETLW instruction in auto-increment part of program
- l Program supports load of \*.HEX or \*.BIN files, available to converse \*.BIN files to \*.HEX format.
- l With programming data monitoring. Through check summing, available to find immediately if programming data is changed or not. Verification and formula are subject to definition of Microchip.
- l Programmer hardware auto-search when start of software, no need for software setup before use, easier and more convenient operation.
- l High programming success rate, enough programming depth. Programmable voltage, electrical parameter of programming and programming algorithm satisfy the technical specifications of manufacturers.

## **Operation Instruction**

### **I. Hardware Installation**

There is no special requirement for installation of this programmer. Connect programmer to PC through serial port cable or USB cable and power up, then the programmer works.

(This programmer supports direct USB power supply. If USB cable is connected, you may not connect external power. However, if current through USB interface is very low – less than 200MA and insufficient to drive programmer, connection to external power is required to enable the programmer to work regularly.)

## **II. Software Installation**

### **1. Installation of Programming Software**

Find file QL-PROGvXXen.EXE under root directory of CD, double click this file to access installation interface of application software, and operate according to prompts to finish the installation.

Its shortcut will appear on desktop automatically after installation.

Note: The programming software provided by CD may be not the updated one. Please download the updated software from <http://www.pic16.com/jszl/jszl.htm>.

### **2. Installation of USB Driver**

When you first use the USB of this programmer for communication, please connect PC and programmer hardware through USB cable. Then, PC system will indicate to find new hardware and request installation of driver for this hardware.

You can operate in regular way and designate path to install driver, which is under directory “usbdriver” of attached CD.

After installation, a serial port will be added to your computer. Now the programmer is connected to the serial port converted from USB.

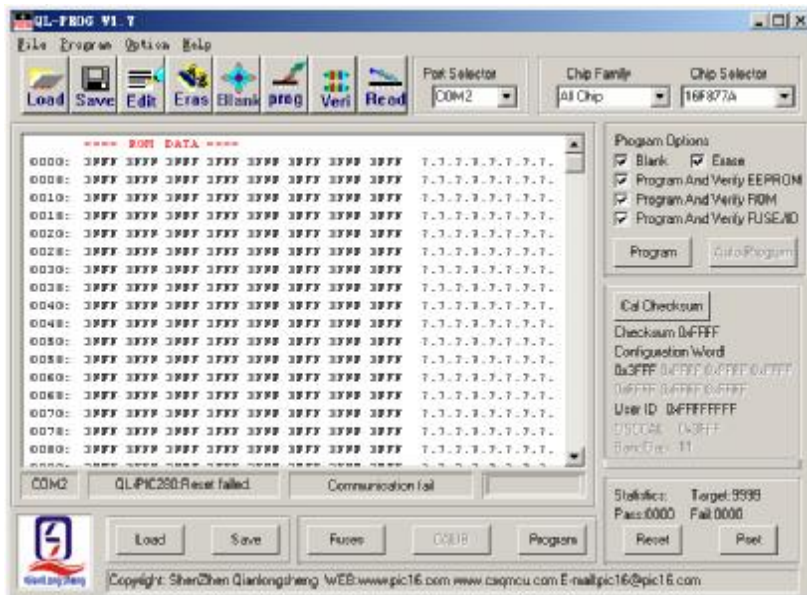
When there is no system message to find new hardware after programmer hardware is connected, please check:

- l Any bad or broken connection for USB cable?
- l Does USB of computer works smoothly?
- l Maybe there is similar USB driver already installed in your computer. You may connect programmer hardware, right click “My Computer”, select “Property” in pop-up list, switch to “Hardware” from “System Property” window, and then click “Device Manager” to check “Port (COM and LPT)”. If you can find “USB Serial Port (COMX)”, the driver of this programmer has been installed in your computer (this operation requests proper connection of hardware and PC).

### **III. Running of Software**

After proper installation, shortcut of this software will appear on desktop. We can double click it to run the software. (Note: Run the software after proper connection of hardware so as to identify the hardware easily.)

Interface after start of software is shown below:



## IV. Use of Software

### 1. Select Communication Port/Select Programmer Hardware

Connect hardware and power up, run the software which will automatically search programmer hardware. If search fails and indicates “Hardware isn’t connected. Please reset hardware”, you can set programmer hardware manually. We offer two methods for user to select communication port and programmer type.



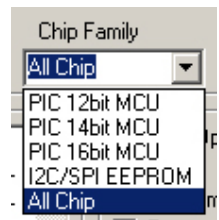
- Method 1: Directly run **【Auto Find Borad】** under **【Option】**. Software will scan the port connecting hardware automatically and check the type of programmer. After scanning, software will switch to correct connecting port and programmer type and indicate to find the programmer. If software fails to find programmer, please check if the connection to programmer hardware and power supply.
- Method 2: Directly select the port from the list of “Port Selector” at top right of the software. Directly select proper programmer from **【 Select Programmer】** under **【 Option】**. (Note: Only existing ports of computer are shown in the list. If only COM1 is installed at your computer, there is only COM1 for your choice. If you have connected USB but can't find it in the list, the reason may be that the software is started too fast. You can shut down the software and restart it.)

## 2. Select Chip Type and Chip

### A. Select Chip Type

The control for selection of chip type is at top right of the software as shown in right diagram:

You may select the type to shorten the chip list for fast selection of proper chip.

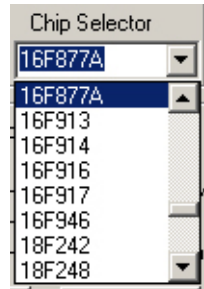


If you don't know exactly the device, please select "All Chip" in the list of "Chip Family"

## B. Select Chip

The control for selection of exact chip is at top right of the software as shown in right diagram:

If the desired chip type is not listed, please change the chip type or select "All Chip" and try again.



If you can't find the desired chip to program in the list, please send E-mail to us. We will upgrade programmer software to support the chip you desire to program based on conditions satisfying programmer hardware.

## 3. Load File to Program

Run【File】-【Load】, or press "Load" button on programming software panel to load machine code file of the chip you desire to program.

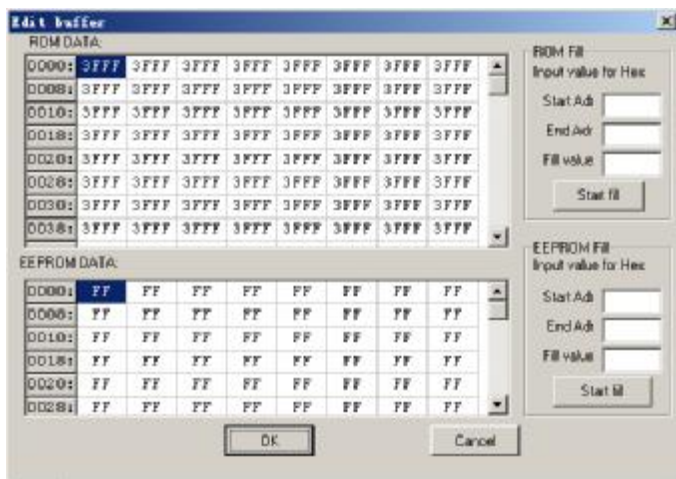
This programmer software supports load of BIN files (generally from code recover) and HEX files (generally from normal program compiling).

This programmer software supports load of configuration bit in the file and EEPROM data. Accordingly, you may write configuration bit information in your source program and EEPROM data inside the chip you desire to pre-program. In this case, HEX file compiled will contain configuration bit parameter of chip and EEPROM data. This file doesn't need to reset configuration bit when programming.

- (1) Click "Load" icon on tool bar or select **【File】-【Load】**, the dialog of selection of file will appear.
- (2) Select the type of file to open in the list under "File Type (T)". For example, to open file of hexadecimal system, please select "Hex File (\*.Hex)".
- (3) Select the file to open under the directory.
- (4) Click "Open" button in dialog, the file will be transferred into current buffer.

#### **4. Edit Buffer**

You may edit current buffer by running **【Option】 - 【Edit Buffer】** or pressing "Edit" button on software panel. After running the command software, pop-up window to edit buffer will appear as shown in below diagram:



Change the content of buffer: first put mouse cursor on the address to edit, double left click to select address content, delete original content with “Delete” key on keyboard, and then input the new content.

After edit, click bottom “OK” button on edit window to exit. The software will automatically save the change in current buffer. If you don’t desire to change the content, you may single click “Cancel” to exit the edit window.

## 5. Set Configuration Bit

You may set or change the configuration bit of chip by running **【Option】 - 【View/Edit Fuses And ID】** or pressing “Fuses” button on software panel. After running the command software, pop-up window to set configuration bit will appear as shown in below diagram. Set the options according to your requirement and click “OK” button.



User's ID can also be input in set window of configuration bit.

If configuration bit information has been written in your program, direct programming will be available without reset of configuration bit.

Note: Setup of configuration is very important, which directly affects the availability of your program. Consequently, before programming, we must confirm the setup of configuration bit is entirely correct. Different chips require different configuration bit options. The detailed setup

information can be obtained by checking the DATASHEET of chip (DATASHEET of chip can be downloaded from official website of MICROCHIP at [www.microchip.com](http://www.microchip.com)).

**The following are listed for your reference:**

Setup of external crystal oscillator: select LP for below 200K; select XT for 200K-4m; select HS for 2M-20M. For 4M crystal oscillator at critical state of XT and HS, if chip doesn't work when you select XT, please try HS.

For the beginner who doesn't know how to set configuration bit, to shut down or disable the functions which are not required if possible (e.g. Watchdog, Power-up Delay, Power-down Monitor, DEBUG Mode, Low Voltage Programming.....all these functions can be shut down or disabled).

If the chip is programmed for production, please carry out the setup correctly according to the requirements of your hardware and software.

**6. Setup and Protect of Parameter Calibration of Internal Clock**

For most of the chips with internal clocks, there is calibration value of internal clock stored in the last address of ROM when leaving the factory. This value can be used to calibrate the accuracy of internal clock frequency in the program when internal oscillation is applied for the chip.

There are two options in our software under **【Option】-【CAL Program Option】** , that is **【Preserve OSCCAL Calibration Value】** and **【Use File】** .

If we select **【Preserve OSCCAL Calibration Value】** , our software will always protect this value in chip unchanged regardless of value in the last address of current buffer and regardless whether you run “CALIB” on software panel to change this value or not. In this case, “CALIB” button is invalid now.

If we select **【Use File】** , the value in current buffer will be used to change the original calibration value of clock when programming. Now, we may press “CALIB” button on software panel to input the calibration value of clock we desire.

For new chip or the chip whose clock calibration value is never changed, we recommend **【Preserve OSCCAL Calibration Value】** to protect this value of chip unchanged.

For the chip whose clock calibration value has been changed, we may select **【Use File】** and input the value we desire by pressing “CALIB” button on software panel (this value may be read from other chips with the same lot number). Then, we can start the programming. When all chips have their own clock calibration values, we had better reset **【SCAL Program Option】** to **【Preserve OSCCAL Calibration Value】**

## **7. Save File**

You may run **【File】-【Save】** or press “Save” button on software panel to save the current file as hexadecimal system file. At the same time, configuration information of chip is saved. For the next time this file is loaded, configuration information of chip will be automatically set as the configuration word saved.

- (1) Click icon on tool bar or select **【File】 - 【Save】** , dialog to save the file will pop up.
- (2) Select the file to save in list of “Save Type (T)”. For example, to save file of hexadecimal system, please select “Hex File (\*.Hex)”.
- (3) Input file name to save in “File Name” box.
- (4) Click “Save” button in dialog.

## **8. Preset Programming Quantity**

You may set the chip quantity to program in one order or within one day by pressing “Pset” button on software panel. After setup, it will count the programming chips. When the quantity come up to the preset number, software will indicate that the programming quantity XXXX has been completed. This function helps to save your time in counting the number of chips.

You may also press “Reset” button to initialize success number and failure number at 0.

## **9. Installation Position of Chip**

QL-PIC280 Programmer:

Pin 1 of all chips will be aligned with pin 1 at handle of 40-pin socket.



QL-2006 Programmer:

There are many chips not aligned with pin 1 of socket, which have their own special installation positions. When the chip is selected, software will automatically indicate the position for chip installation on socket.

You may also forbid the pop-up graphics of device installation by running **【Option】 - 【Not show chip position in chip selector】** .

We can also select **【Option】 - 【View Device Position】** to check the position of current chip on the socket.

## **10. Fully Automatic Production Programming**

To set the availability of production programming of chip, you may select **【Option】 - 【Auto Program】** . Tick off **【Auto Program】** to enable it valid, now “Auto Program” button on software panel is operational.

When **【Auto Program】** is enabled, we may program chip automatically through “Auto Programming” button on software panel. When programming, what we need to do is only to inset or take out the chip according to instruction of software status bar without pressing any button. In this way, production speed is improved. At wait state indicating “Take out Chip” or “Inset Chip”, we may single click “Stop” (“Auto Program” button turns into “Stop” button during programming course) to stop automatic programming.

## **11. About Checksum**

Checksum of this software is completely subject to standard calculation of checksum.

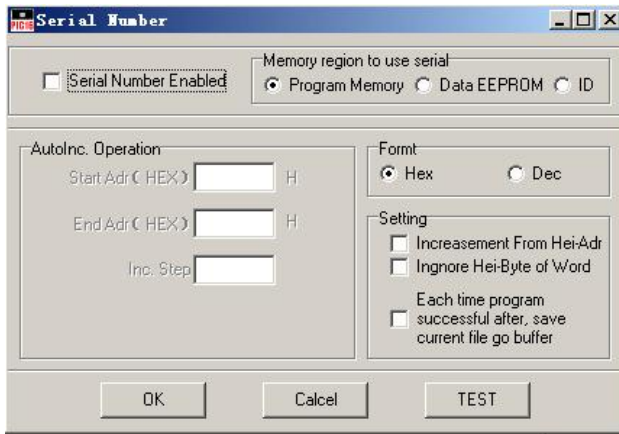
Checksum comprises program area data and configuration bit data of chip excluding user ID and calibration value of internal clock if any.

After editing buffer and configuration bit, checksum is automatically updated. After serial number auto-increment, checksum is automatically updated.

## **12. About Serial Number Auto-increment Programming**

User may program the serial number (SN) of device into some certain units of chip to identify and manage the device developed. The initial value and start address of this serial number will be set by user.

Select **【Option】** - **【Serial Number Options】** , the following dialog will pup up:



SN auto-increment is valid only when “Serial Number Enabled” is ticked off.

“Memory region to use serial”

- l Program Memory – Select auto-increment address of chip in ROM area.
- l Data EEPROM – Select auto-increment address of chip in EEPROM area.

“AutoInc.Operation”

- l End Adr(Hex) – end address in chip to store SN.
- l Start Adr(Hex) – start address in chip to store SN.
- l Inc Step– length increment of chip SN after each programming.

“Formt”

- l Hex – set SN auto-increment step at hexadecimal system.
- l Dec - set SN auto-increment step at decimal system.

### “Setting”

- | Increasement From Hei-Adr – chip SN is auto-incremental from high address to low address.
- | Ignore Hei-Byte of Word – ignore high byte of each word, reserve low byte only.
- | Each time Program Successful after, Save current file go buffer– after successful programming of chip, there is one auto-increment of SN. The value of current buffer will be saved to current file.

### “Test”

Test auto-increment scheme of chip SN.

Properly set all options and click “OK” to apply current setup in the program or click “Cancel” to exit.

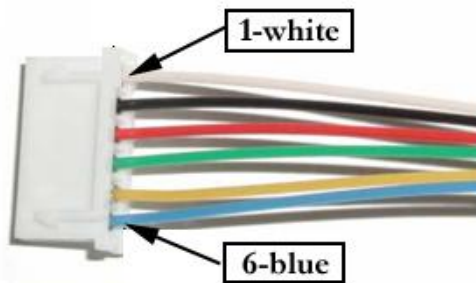
## 13. About ICSP Programming

Please enable **【ICSP Mode】** under **【Option】** manual.

On side of programmer, there is one 6-PIN telephone socket, that is, interface of in-circuit programming. We may directly use the download cable attached with the programmer for in-circuit (on-board) programming.

Sequence of ICSP download cable is exactly same with MCD2/ICD2 as shown below:

- 1—MCLR/VPP
- 2—VDD
- 3—GND
- 4—PGD generally RB7
- 5—PGC generally RB6
- 6—LVP-ENABLE  
(seldom use)



When using it, we only need to connect the output cable of ICSP with corresponding pin of chip you desire to download. For 12XXX series chip, connection shall be subject to PGC-GP1 and PGD-GP0.

For PIC16F57, connection shall be subject to 17PIN-PGD, 16PIN-PGC, 2PIN-VCC, 4PIN-GND, 28PIN-VPP/MCLR.

In case of in-circuit download, relative external circuits connecting to ICSP output cable on user board shall be shut down. Otherwise, the effects of other external circuits may cause failure of programming. Furthermore, if current consumption of 5V voltage on user board is more than 200MA, the user board must be self-supplied with power of 5V voltage. In addition, VPP pin in download circuit shall be connected with 10K resistor pulling up to VCC.

In technical manual of MICROCHIP, there are typical circuits about in-circuit programming for references.

## 14. Entire Process of Chip Programming

- Step 1: Connect programmer hardware with PC, connect power supply of programmer.
- Step 2: Run programmer software.
- Step 3: If message indicates failure, select programmer type manually. Select hardware connecting port to enable communication between software and hardware. (or run **【Option】**-**【Auto Find Borad】** for automatic setup of programmer type and connection port.)
- Step 4: Select chip type and chip.
- Step 5: According to the installation graphics as software indicates, install the chip onto programmer socket (if use QL-PIC280, then pin 1 of chip is aligned with pin 1 at handle of socket).
- Step 6: Load the file to program.
- Step 7: Confirm and properly set the configuration bit of chip.
- Step 8: If chip has internal clock whose calibration value is used in the program, please calibrate the clock or properly set **【Cal Program Options】** under **【Optin】** .
- Step 9: Preset programming quantity as required, properly set SN auto-increment parameter (this step may be omitted).
- Step 10: Properly set programming options.
- Step 11: Press “Program” button to program.
- Step 12: Take out the chip programmed and insert the chip to program.
- Step 13: Repeat Step 11 and Step 12 until all chips are programmed.
- Step 14: Exit, disconnect hardware and PC, or cut off hardware power.

Step 15: Finished.

## **15. Hardware Online Upgrade**

Run **【Download Operating System】** under **【Option】**, current programmer hardware will be upgraded to the version attached in the software to enable the new added function, new added device or improved function. Each software version is related to one hardware version. If you desire to upgrade hardware to the higher version, please download the updated software from our website. Then install the software and start it, run **【Option】** - **【Download Operating System】** to upgrade your hardware version.

More often, when software is upgraded to a higher version, the hardware isn't changed. Now you can use the updated software stably without upgrading your hardware. The note under installation folder of software will indicate if hardware upgrade is required or not when the new software is applied.

You may refer to **【help】** - **【Protocol】** for current hardware version. **Technical Support**

## **Customer Support**

When our R&D department is working hard for high quality product, our sales department is also making every effort to provide perfect pre-sales and after-sales services. From our website, you may find the prices of our products and purchase method. You may also view the product appearance online. Of course, should you have any difficulty for help, you may turn

directly to local sales agent, distributor or our engineers for technical support. Our customer support staff will track the problems and help to solve them completely.

**For better service, please make the following preparations before you contact us:**

- l If you can't understand the program, please study the user manual first carefully.
- l If there is fault during running of software, please repeat it.
- l In case of fault message, please record it.
- l Please sit in front of computer when you call us for convenient contrast and prompt solution of the problem.

**We are not liable for the following cases:**

- l Product repaired or changed by organization or individual who are not authorized by us formally.
- l Damaged product due to fault operation and product changed by user.
- l Program fault due to physical damage of CD.
- l Any joint liability extension due to hardware fault or software defect.

**Licensing Agreement**

Qianlongsheng Electronic Technology reserves all rights that are not expressly granted.



## Statements

The right of change in this manual is reserved without any prior notice.

Any inconsistency of this manual caused by upgraded of software version will be subject to software.

## Warranty Service

Qianlongsheng Electronic Technology operates under strict product quality assurance system. Within one year after the date of purchase, maintenance is available free of charge for both software and hardware problems.

The warranty is subject to correct installation of software and operation under designated working condition.

In addition, if you have any other questions or suggestions to our application software, please contact us and we will always be dedicated in serving you!

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