

Cortex-M In-Circuit Programmer

user

manual

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declaration Ming Dynasty (1368-1644)

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1 summary

1.1 skim through

CM ISP (Cortex-M In-System Programmer) is an in-circuit programmer software for XHSC Cortex-M series MCUs, which supports all Cortex-M series MCU products of XHSC. This article describes how to use the in-circuit programmer software (xhsc.exe) and notes on programming.

This article applies to In-Circuit Programmer software version number V2.02 and above.

1.2 Connection Overview

When the CM ISP Programmer software (xhsc.exe) is used, the serial module is connected to the target MCU as shown in Figure 1-1.

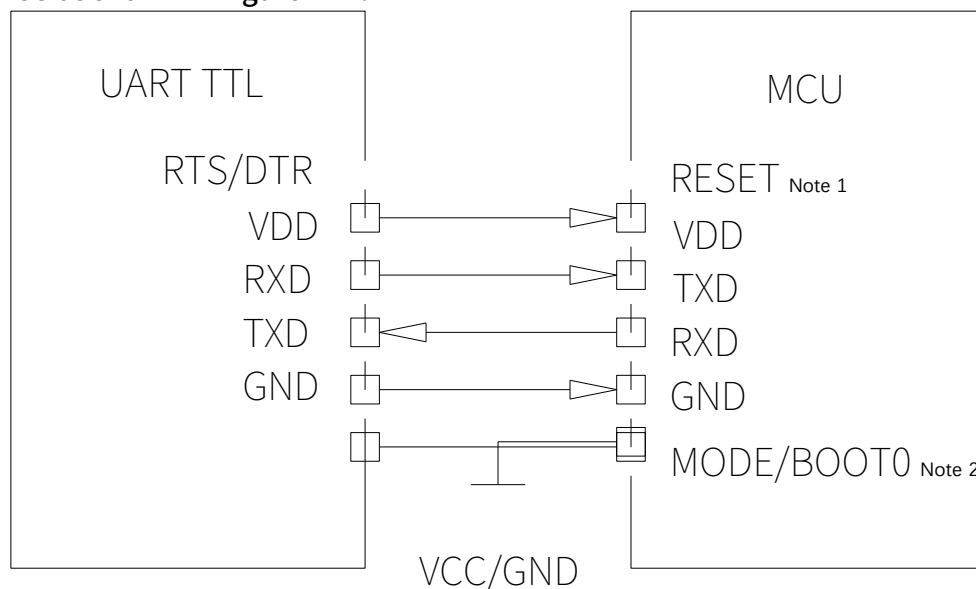


Figure 1-1 Serial Module and Target MCU Connection

Connect the target chip to the serial module and then connect the serial module to the PC.

Notes:

- Some series don't have MODE/BOOT0 pin, you need to connect the RTS or DTR of the serial module to the RESET pin of the target MCU for serial programming.
- The MODE/BOOT0 pins of different chip models may not be connected in the same way, please refer to the programmer software interface for details.

1.3 Overview of software operation

The online programmer software operating environment is shown in Table 1-1.

Table 1-1 Programmer Software Operation Environment

operating system	Windows 7, Windows 8, Windows 10
Framework version	Framework 4.0 or above

To run the software, you need to have Microsoft.NET Framework v4.0 or above installed on your computer. Please make sure that Framework 4.0 exists in the system path "C:\Windows\Microsoft.NET\Framework(64)", as shown in Figure 1-2.

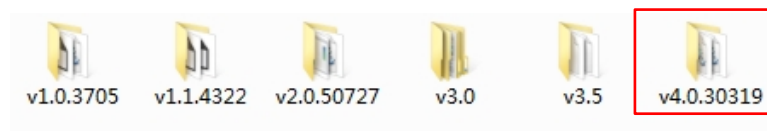


Figure 1-2 Framework 4.0

If the operating system is not installed, please download the corresponding version from the Microsoft website. The file directory of the folder where the online programmer software is located is shown in Figure 1-3.

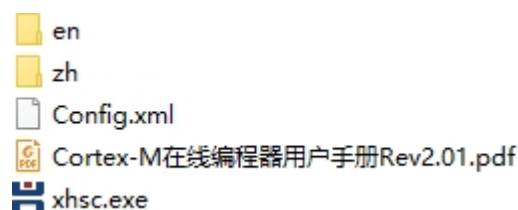


Figure 1-3 Online Programmer File Directory

The "en" and "zh" folders contain the program language configuration files, which can be used to switch between English and Chinese in the program interface, but are not required.

"Config.xml" is the user configuration file. It is generated automatically after the program is closed, and is used to save user-related settings. There is no such file for the first time.

The "Cortex-M In-Circuit Programmer User's Manual Rev2.01.pdf" is a user's manual file, which can be opened by clicking "Help" in the program interface menu.

"xhsc.exe" is the program execution file. The single file can also be run, but can not realize the Chinese and English switch, only supports the English display.

Double-click "xhsc.exe" to open the software, the software interface as Figure 1-4.

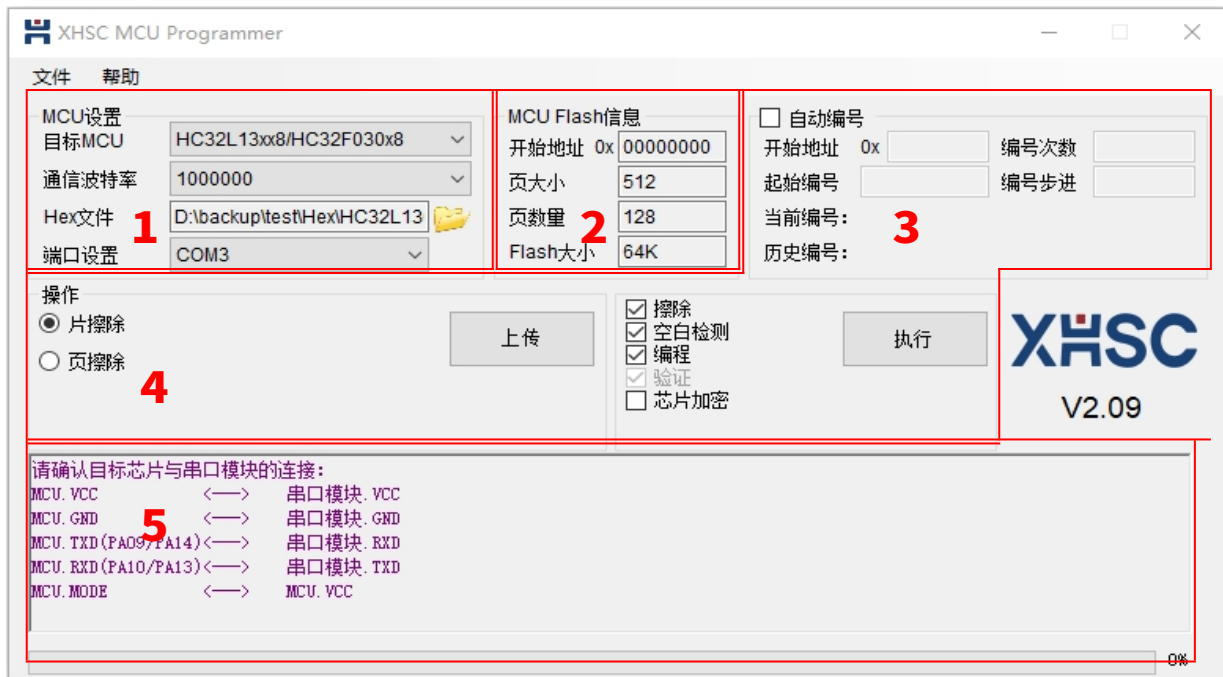


Figure 1-4 Software Interface 1

- **MCU Setting:** Used to set the target MCU model, the crystal frequency used by the target MCU (HC32F146xA/ HC32M140xA and HC32F146x8/ HC32M140x8) or the communication baud rate of the selected serial port (the rest of the series) the Hex file to be burned, and the COM port number of the PC.
- **MCU Flash Information:** Displays selected MCU Flash information: Start Address, Page Size, Number of Pages, and Flash Size.
- **Auto Numbering:** Used for user to number MCUs.
- **Operation:** Operation is divided into two parts: Upload and Execute. Upload reads the target MCU Flash data and saves it as a .hex file; Execute allows you to select the operation items you want to operate, including Erase, Blank Check, Programming (Verification) Chip Encryption, click Execute button after selecting the operation items.
- **Information Display:** Used to display programming information.

If the target MCU is HC32F460xExx/ HC32F45xxExx, the software interface is shown in Figure 1-5.



Figure 1-5 Software Interface 2

HC32F460xExx/ HC32F45xxExx has Read Protect 1, Read Protect 2, and Encrypt function, if you want to operate these functions, you need to check the corresponding option box. To operate these functions, you need to check the corresponding option boxes. For Read Protect 1, you need to input the password, and for Encryption, you need to set the encryption range of flash.

2 quick operation

The following will describe how to program quickly.

1. Connect the serial port end of the USB to serial cable to the serial programming pin of the target MCU, take HC32L136 series for example, the connection method is shown in Figure 2-1. Pull up the MODE pin of the target MCU, and then power on the target MCU to enter the serial programming mode.

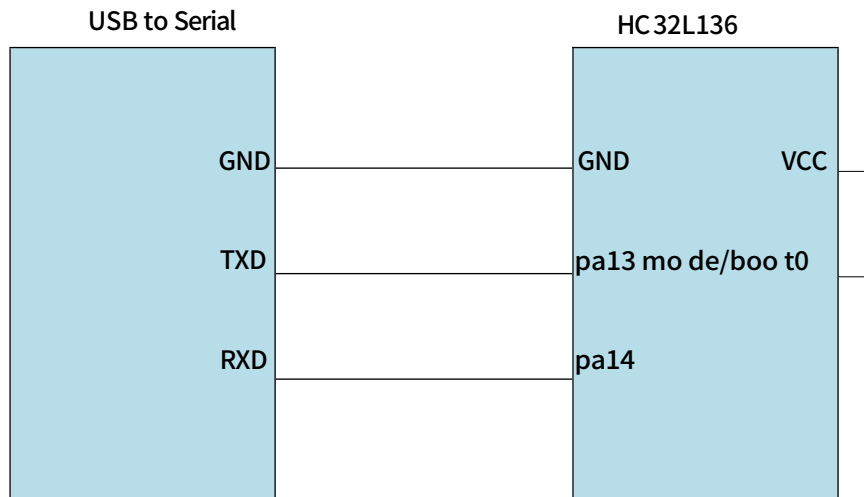


Figure 2-1 Hardware Connection

2. Connect the PC to the MCU target board with a USB to serial cable. Open the software, select the corresponding target MCU model, set the communication baud rate, select the programmed Hex file, and set the port to the COM port number used.



Figure 2-2 MCU Setting

3. Select the desired action. For example, select the "Erase", "Blank Detection", "Program(Verify)" check boxes. This is shown in Figure 2-3.



Figure 2-3 Selection Operation

4. Click the "Execute" button to start programming and wait for the programming to finish.

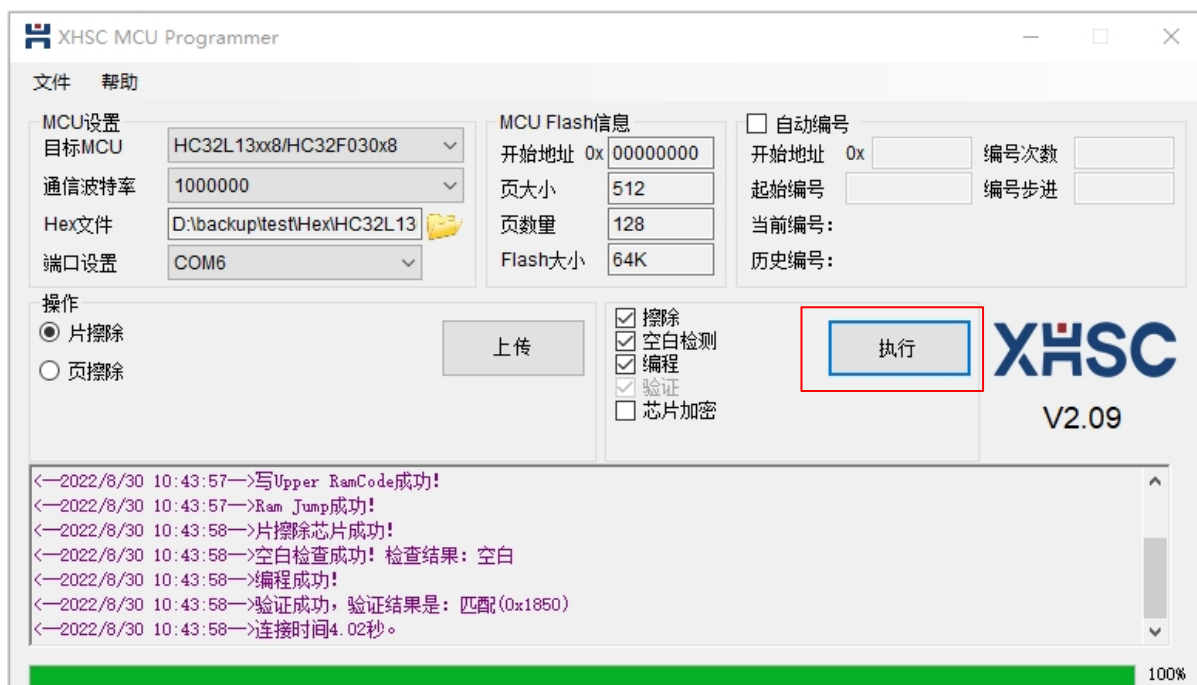


Figure 2-4 Execute Operation

3 Operation Description

3.1 MCU Settings

Setting of MCU related information, selecting the MCU model, setting the crystal frequency or communication baud rate, selecting the Hex file to be programmed, and the corresponding port.

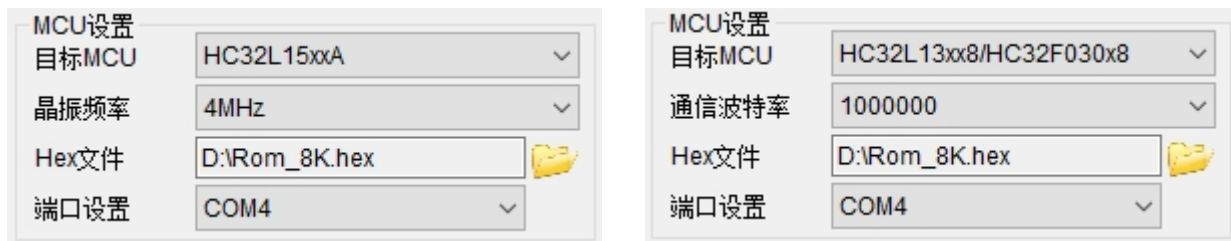


Figure 3-1 MCU Setting

- **Target MCU:** This drop-down box contains all the current MCU types of ARM cortex-M cores of SIAOCHUA, select a model corresponding to the programmed target MCU.
- **Crystal Frequency or Communication Baud Rate:** For HC32F146xA/ HC32M140xA and HC32F146x8/ HC32M140x8 series MCUs, this option is to set the frequency of the crystal used by the target MCU; for the rest of the MCUs, this option is to set the communication baud rate of the selected port.
- **Hex file:** Used to select the Hex file to be programmed.
- **Port Settings:** Sets the port number used for ISP connections.

3.2 MCU Flash Information

MCU Flash information for the selected model displayed: start address, page size, number of pages, and Flash size. As shown in Figure 3-2.

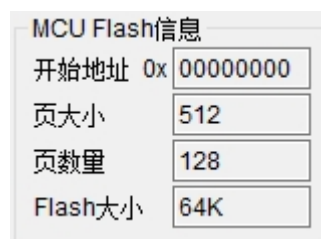


Figure 3-2 MCU Flash Information

3.3 auto-numbering

The software comes with a function to number the target MCUs when programming, just select the radio box "Auto Numbering" in the "Auto Numbering" group to set up the auto numbering.



<input checked="" type="checkbox"/> 自动编号		
开始地址 0x	2000	编号次数 12
起始编号	1	编号步进 1
当前编号:		
历史编号:		

Figure 3-3 Enabling Automatic Numbering

After selecting "Automatic numbering", the function of automatic numbering is enabled, fill in the corresponding parameters, the relevant parameters are described as follows:

- Start Address: Write the number to the MCU Flash address, the start number needs to occupy 4 bytes, the address must be within the MCU Flash range (according to the corresponding model of MCU) the address is in hexadecimal, from 0-F characters.
- Numbering times: how many numbers need to be written, the numbering times must be greater than 0, the value range is 1 to 999999.
- Starting Number: The starting number is the beginning number of the number, from 0 to 4,294,967,295 (0xFFFFFFFF)
- Numbered Steps: Steps between each number, values range from 0 to 999.
- Current Number: Displays the number written for this programming.
- History Number: The history number is the number that shows the last successful write.

3.4 manipulate

This section includes the main functions of this software, upload, erase, blank detection, programming (verification) and chip encryption.



Figure 3-4 Operation

If the target MCU is selected as HC32F460xExx/ HC32F45xxExx, the following functions are displayed in addition to the above: Read Protect 1, Read Protect 2, and Encryption function.



Figure 3-5 HC32F460xExx/ HC32F45xxExx Available Operations

<General

Operation

s>

- **Upload:** If the user has selected a file to burn, only the uploaded burned portion will be read; If the user has not selected the burned file or the address of the burned file is not correct, the entire Flash content of the upload target MCU will be read.
- **Erase:** Erase consists of two types of erase: Slice Erase and Page Erase. Slice Erase erases the entire chip, while Page Erase erases the Flash page according to the position occupied by the programmed Hex file.
- **Blank Detection:** Checks if the entire chip is in a blank state (all 0xFF)
- **Programming:** Programming is the operation of programming a Hex file into the MCU.
- **Verify:** Verify that the code programmed in is correct.

<General Protection Function> (Protection function for chips other than HC32F460xExx/ HC32F45xxExx)

- **Chip encryption:** Protect the flash data of the chip, the flash data can not be read after

-Note Note: The encryption operation of HC32x07xxAxx/ HC32x17xxAxx/ HC32x19xxCxx series chips is only allowed to be performed 64 times, after 64 times, the chip locks up and decryption operation cannot be performed.

<HC32F460xExx/ HC32F45xxExx Chip Protection Function>.

- **Read protection 1:** Read protection is applied to the FLASH area to prevent untrusted users from reading the FLASH data, and the data in the flash can be read by the key after protection.
- **Read protection 2:** Read protection is applied to the FLASH area to prevent untrusted users from reading the FLASH data, and no operation can read the data in the flash after the protection.
- **Encryption:** Encrypt FLASH data to prevent FLASH from physical parsing attack. If the Programming option box is checked, check the Encryption option box and set the encrypted sectors, the data in these sectors will be encrypted after the set sectors are successfully programmed.

3.5 Information Display

Used to display operation information, and the progress of the operation.



Figure 3-6 Information Display

3.6 command-line operation

The program supports command line operations in CMD.exe or third-party programs. Take CMD.exe as an example: Open CMD.exe and



enter the directory where xhsc.exe is located, as shown in Figure 3-

7.

Figure 3-7 Entering the directory where the program is located

Type "xhsc" to open the xhsc.exe program, perform the "MCU Setup", and then close the xhsc.exe program. As shown in Figure 3-8.

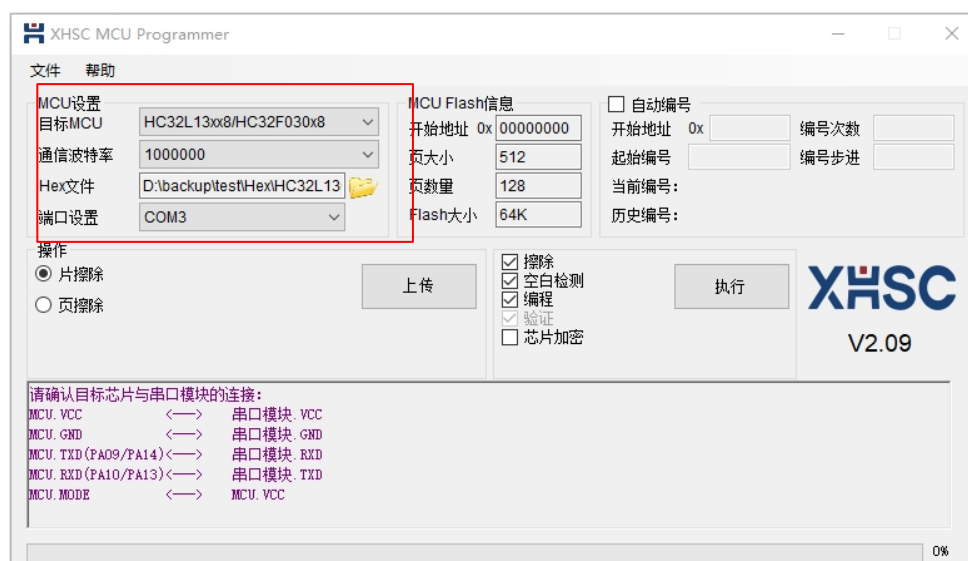


Figure 3-8 Making MCU Settings

Return to CMD.exe and type xhsc ? to display the supported commands. This displays the supported commands, as shown in Figure 3-9.

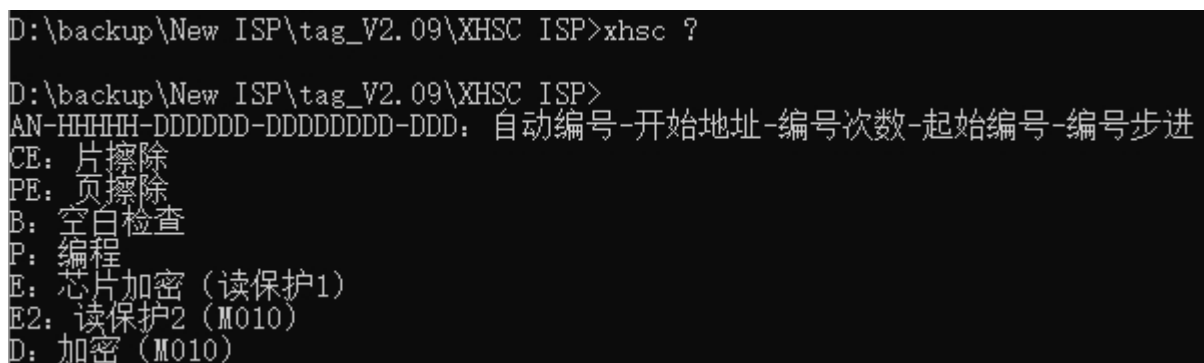
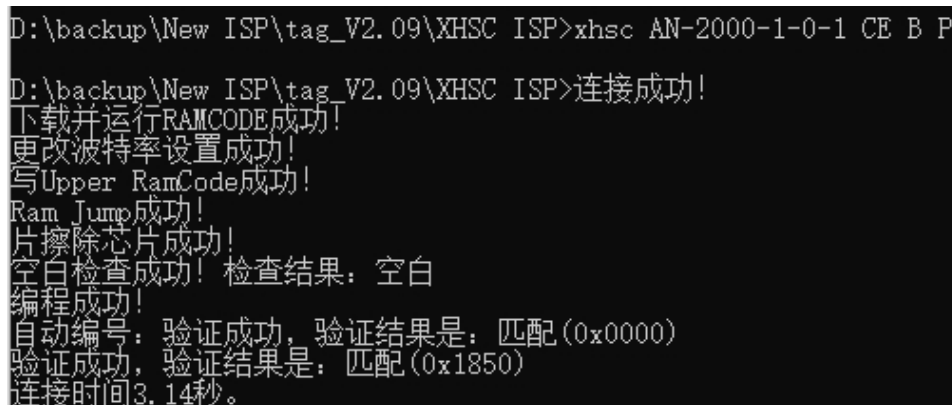


Figure 3-9 Supported Commands

For example, to enable automatic numbering, start address is set to 0x2000, numbering times is set to 1, start number is set to 0, numbering step is set to 1, and at the same time, select slice erase, blank checking and programming, and type "xhsc AN-2000-1-0-1 CE B P" to return to the car, and the result of the operation is shown in Figure 3-10.



```
D:\backup\New ISP\tag_V2.09\XHSC ISP>xhsc AN-2000-1-0-1 CE B P
D:\backup\New ISP\tag_V2.09\XHSC ISP>连接成功!
下载并运行RAMCODE成功!
更改波特率设置成功!
写Upper RamCode成功!
Ram Jump成功!
片擦除芯片成功!
空白检查成功! 检查结果: 空白
编程成功!
自动编号: 验证成功, 验证结果是: 匹配(0x0000)
验证成功, 验证结果是: 匹配(0x1850)
连接时间3.14秒。
```

Figure 3-10 Example Operation Information

Attention:

- Separate the parameters of different operation commands with a space.

4 error handling

4.1 draw attention to sth.

Table 4-1 Tips

Alerts	descriptive	deal with
Connection successful	Connection successful	
The MCU is encrypted and needs to be manually rebooted. Click "Yes" after starting MCU.	Prompt to manually reboot the MCU	Manually restart the MCU and click the Yes button to continue.
Auto-numbering completed	Auto-numbering complete	
Auto-numbering address overlaps with user code, continue operation?	Ask whether to continue automatic numbering	Click "Yes" to continue numbering, otherwise stop writing numbering

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Table 4-2 Errors

error message	descriptive	deal with
Please select the Hex file to be burned	Hex file not selected	Select Hex File
Incorrect file path or invalid file	The path to the selected Hex file does not exist or the file Invalid or occupied.	Reselect the Hex file and make sure the Hex file has the effective and unoccupied
Hex file format error	Hex file format error	Verify that the Hex file is correct
Hex file error! Length exceeds selected chip Flash size.	Hex file size exceeds the selected chip Flash size. few	Reselect the correct Hex file or reselect the The Right Target MCU
Please install a serial port for this computer	This computer does not have a serial port	Installing a serial port
Serial port operation timeout	communications failure	Check hardware connections, check for firmware matches, try to Re-energize.
Read unsuccessful	Failed to read	Check hardware connections, check for firmware matches, try to Re-energize.
MCU Flash is encrypted	Flash is encrypted and data cannot be read	Encrypted chip, Flash data cannot be read out.
Unsuccessful chip erase	Chip Erase Failure	Check hardware connections, check for firmware matches, try to Re-energize.
Page Erase Chip Unsuccessful	Page Erase Failure	Check hardware connections, check for firmware matches, try to Re-energize.
Page Erase Chip Unsuccessful: Chip Encrypted	Encrypted chips cannot be page erased	Selector chip erase
Blank check unsuccessful	Blank check failed	Check hardware connections, check for firmware matches, try to Re-energize.
Unsuccessful test and zeroing	Failure to test and zero	Check hardware connections, check for firmware matches, try to Re-energize.
Programming doesn't work.	Programming Failure	Check hardware connections, check for firmware matches, try to Re-energize.

Verification was unsuccessful	validation failure	Check hardware connections, check for www.xhsc.com.cn firmware matches, try to Re-energize.
The parameter cannot be empty, please fill in	Parameter not filled	Fill in the parameters
The parameter format is wrong, please refill it	Parameter formatting error	Refill parameters
address exceeds the selected chip Flash size, please refill	Invalid starting address	Re-enter the address

Version Revision Record

version number	revision date	revision
Rev1.0	2017/11/10	The first version of the Cortex-M In-Circuit Programmer User's Manual is released.
Rev1.1	2019/04/09	Added description of software version V1.4.
Rev1.2	2019/04/15	Add support for chip models.
Rev2.0	2019/09/03	Support for software version V2.0.
Rev2.01	2021/12/31	Model increase.
Rev2.1	2022/08/30	Model number added and company logo updated.
Rev2.11	2023/04/13	Model Updates.
Rev2.12	2023/07/05	Remove chip specific support model descriptions.