

EC1838B electronic clock manual v1.00

Because this clock has many functions, please read this manual carefully, thank you for your cooperation!

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I. A brief introduction to the principle of this clock

This clock uses a single-chip computer to read the time data in the clock chip, and the hours and minutes are output to the data code tube display, and the seconds are output to the peripheral 60 light-emitting diodes. The time in the clock chip can be adjusted by pressing the buttons, and the alarm clock and time signal. When the sound is output, the MCU reads the data in the storage chip and outputs the sound to the speaker after data conversion. The MCU can sense the brightness of the environment by collecting the changes of the parameters of the photoresistor and thermistor. And temperature, and then do the corresponding control and display.

II. Function introduction

1. Digital tube display

There are red, green, blue and white digital tubes to choose from, and users can also change to other color digital tubes.

The default time of power-on is time, temperature, year, month, day, and week wheel display. You can set to display only time or only time and temperature by pressing the button (set in "Time Display Setting").

2. led display

There are three combinations of red green led, red blue led, blue and white led to choose from. Users can also change to other color led combinations.

13 kinds of display, you can switch the display by pressing the button. You can also set the button to switch to the automatic display (set in the "LED automatic switching display setting"), when the LED switching display parameter x is less than 60, the time to switch the display is $x * 1$ Minutes, when it is greater than 60, the display switching time is $(x-60) * 60$ minutes, when $x = 0$, the display is not automatically switched. For example: when set to 30, switch to the next display every 30 minutes. When set to 62 (greater than 60), switch to the next display every $(62-60) * 60$ minutes (that is, 2 hours).

3. Clock accuracy

There are two clock modules, ds1302 and ds3231, to choose from.

When using the ds1302 module as the clock, the cost is relatively low, but the accuracy of the travel time cannot be guaranteed. Some modules may have an error of a few seconds a day, which is normal. It is normal to require high accuracy for travel time. It is not recommended to buy the ds1302 version. clock.

When using the DS3231 module as a clock, the cost will be a little higher, but the travel time is accurate. The official declared accuracy is ± 2 ppm (that is, the error is about 1 minute per year), please refer to the technical data of the DS3231 for detailed parameters. It is recommended for high travel accuracy. Purchase the DS3231 version of the clock.

4. time setting

The time can be set by pressing the button. When the battery is correctly installed on the clock module, even if the clock is powered off, it will run normally without resetting the time every time the power is turned on.

5. Clock calibration

Since this clock is a kit, the clock will inevitably have errors after welding. To maximize the accuracy of the clock, this function is done. You can correct the clock error by setting the error time and the amount of error. For example: the clock is fast every 24 hours 2 seconds, then the error time is set to 24, and the error amount is set to -2. If it is 8 seconds slower every 24 hours, then the error time can be set to 3, and the error amount is set to 1.

6. Sound output

Use the speaker to output sound. Since the speaker needs a sound cavity to output loud and nice sound, it is recommended to buy a clock with a case.

Multiple pieces of music are built into the memory chip, which can be set as alarm clock, hourly time signal and ringtone for power-on.

The volume can be set.

7. Download ringtones

This kit can download ringtones to the clock yourself. For how to download, please refer to the ringtone download tutorial.

8. Time signal

Press the plus button to broadcast the current time. You can set the time in Chinese or English.

9. report punctually

It can be turned on or off. When it is turned on, when the current time meets both the hour and the time zone, you can report the time. You can set the time zone (for example, you can set the hour to 8 o'clock in the morning to 22 o'clock in the evening, and the time is not at other times) Can set the time signal ringtone and time signal language (Chinese or English).

10. Alarm clock

There are 4 alarm clocks, which can be turned off or on separately, and the alarm duration, alarm ringtone and alarm mode can be set separately.

When the alarm is turned on and the current time meets the hour, minute, and mode of the alarm at the same time, the alarm can sound.

When the alarm time exceeds the set alarm time or press the mode button during the alarm to stop the alarm.

Snooze function: Press the plus button when the alarm sounds, pause the alarm, and then re-alert after five minutes.

6 alarm clock modes to meet various needs.

Alarm mode 0: Normal alarm, it will sound every day.

Alarm mode 1: Alarm 1 on weekdays, Monday to Friday, no alarm on Saturday and Sunday.

Alarm mode 2: Weekend alarm 1, alarm on Saturday and Sunday, no alarm on Monday to Friday.

Alarm mode 3: Alarm 2 on weekdays, Monday to Saturday, no alarm on Sunday.

Alarm mode 4: Weekend alarm 2, alarm on Sunday, no alarm from Monday to Saturday.

Alarm Mode 5: Single alarm, it will automatically turn off after one alarm.

11. Boot music

When the clock is powered on, it will automatically play a piece of music. You can choose any piece of music in the memory chip as the boot music. Of course, if you don't like it, you can also set it to not play music when powered on.

12. temperature display

Use the thermistor to measure the ambient temperature. It can be set to display in degrees Celsius or Fahrenheit. When the clock is displaying the temperature, press the mode key to switch to the display in Fahrenheit or Celsius. When the temperature is not accurate, you can do temperature calibration Calibration settings "(for example: when the displayed temperature is 3 degrees higher than the actual temperature, set the temperature calibration value to -3). Please note that the displayed temperature is the temperature measured by the current environment, not the weather forecast Temperature.

13. Temperature broadcast function

Report the current temperature after the time is over. You can also set to not report the temperature.

14. Brightness adjustment function

Use the photoresistor to measure the ambient brightness. When the automatic brightness function is turned on, the brightness of the clock can be automatically changed according to the brightness of the ambient light. When the automatic brightness function is turned off, the clock brightness can be manually adjusted (a total of 100 levels of brightness can be adjusted).

15. 12/24 hour system

The default is the 24-hour system, which can be set to the 12-hour system by pressing the button (set in the "12 / 24-hour setting mode").

16. Sunday display

It is not correct to display Sunday as Sunday. The correct display should be Sunday, but it is increased to take care of the habits of some people and foreigners may not recognize Sunday. When the clock is displaying Sunday, press the mode key to set the Sunday display Sunday or Sunday 7.

17. Restore factory default settings

Power off the clock and remove the memory battery, wait for about two minutes, and then power on the clock.

18. Some error messages that may appear

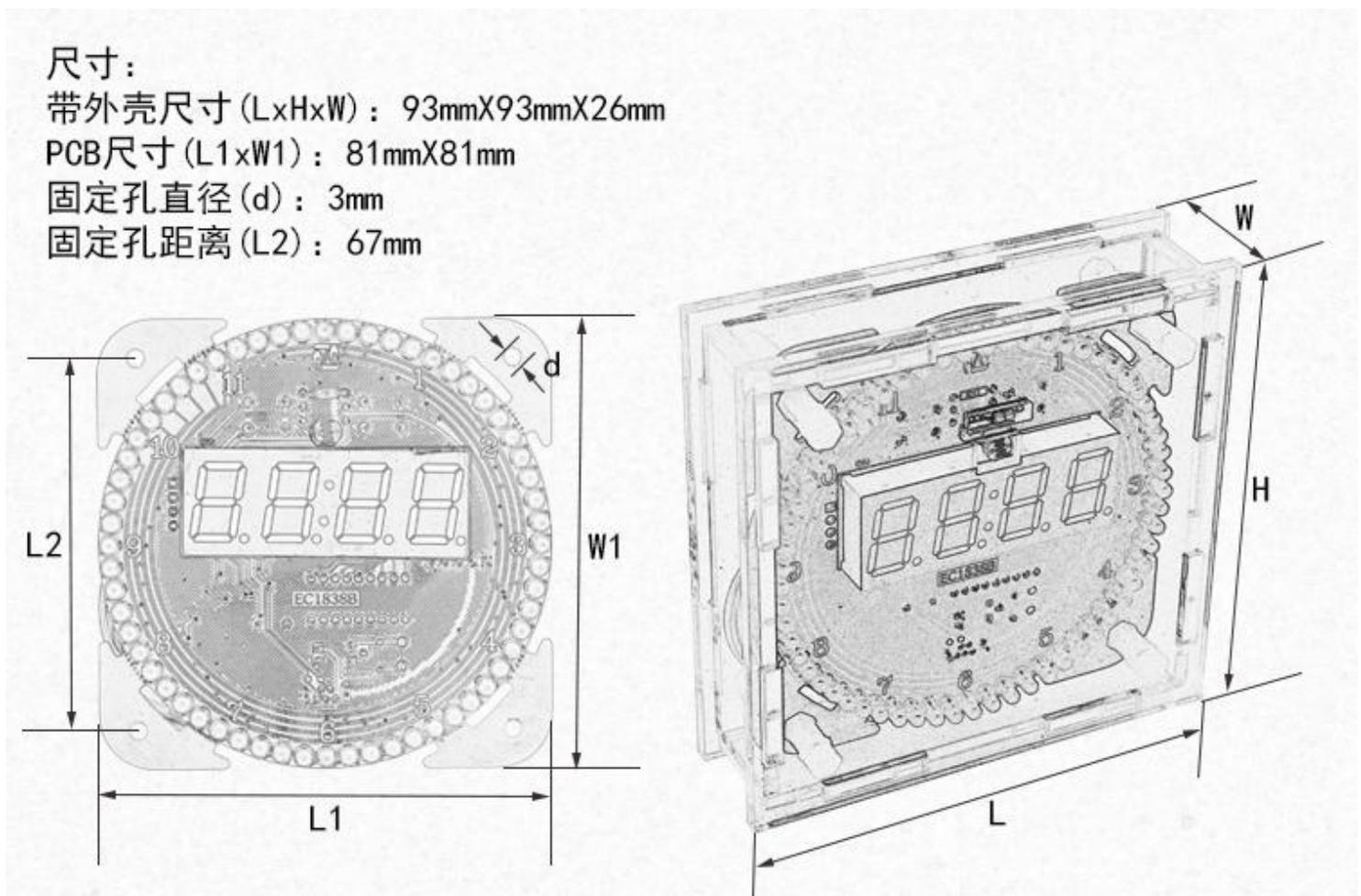
- 1、"Err1" is displayed. The clock module is not soldered or soldered incorrectly.
- 2、"Err2" is displayed. The thermistor (temperature measuring circuit) is not soldered or soldered incorrectly.
- 3、"Err3" is displayed. The photoresistor (photometric circuit) is not soldered or soldered incorrectly.
- 4、"Err4" is displayed. The memory chip is incorrect or unrecognizable.
- 5、"Err5" is displayed. Memory chip sound file error.
- 6、"Err6" is displayed. The microcontroller detected an error.

19. Firmware upgrade

After reaching the player, the clock function can be improved and upgraded, the source code is provided, and the player can also modify the clock function by himself.

III. Hardware Introduction

Product Size:



weight:

Finished product without shell: 82g

Finished product including shell: 168g

IV. Electrical performance

Power supply: DC5v

Working current: <30ma

Alarm current: <300mA

Working temperature: 0 ~ 40 °C

V. Electronic clock display and key functions

1. Time display

	Show description	Mode key function in current mode	Plus key function in current mode
Time display mode (default mode at power-on)	There are 3 display modes: 1, time, temperature, year, month, day, week wheel display. 2. time, temperature wheel display. 3. only time.	1、 Press and hold for 1 second to enter the time setting mode. 2、 Press and hold for 3 seconds to enter hourly timekeeping and alarm setting. 3、 Press and hold for 5 seconds to enter the function setting. 4、 When displaying Sunday, change the display method of Sunday. 5. When displaying the temperature, switch to Celsius or Fahrenheit.	1、 Rotate once to display time, temperature, year, month, day, and week. 2、 Press and hold the mode key first and then press the plus key to switch the LED display style (a total of 12 display styles), and the LED display can be turned off. 3、 Time signal. 4、 When the alarm sounds, enter snooze mode (alarm is paused, and it will sound again after 5 minutes).

2. Time setting

This setting can modify the time of the clock. Under each setting, if there is no key press for 10 seconds, it will automatically return to the time display and restore the previous time.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold for 1 second to enter the year setting
Year setting	Four digital tubes flash at the same time to display the year	Set year, long press to set quickly	Enter month setting
Month setting	The first two nixie tubes flash to display the month, and the last two nixies show the day	Set month, long press to quickly set	Enter the day setting
Day setting	The first two nixie tubes display the month, and the last two nixies flash the day	Set the day, long press to quickly set	Enter hour setting
Hour setting	When the first two nixie tubes flash, the last two nixie tubes are always on. When it is 24 hours, it displays "H"; when it is 12 hours, it displays "A" in the morning and "P" in the afternoon.	When setting, long press to set quickly	Enter minute setting
Minute setting	When the first two nixie tubes are on, the last two nixies flash	Set points, long press to quickly set	Enter second setting
Seconds setting	The first two nixie tubes display "-", the second two nixies flash for seconds	Set seconds, long press to quickly set	If there is an adjustment time, save the settings, otherwise do not save the settings and return to the time display mode.

3. Hourly time signal and alarm clock settings

In each setting mode, long press the mode button for 3 seconds or 10 seconds without any button press, it will automatically return to the time display mode and save the settings.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold the mode key for 3 seconds to enter the hourly time enable setting
Hourly time enable setting	The first two nixie tubes display "01", and the last two nixie tubes flash "On" or "OF", which means turning on or off the hourly time signal function respectively.	Turn on or off the hourly time signal	When the hourly time signal is turned on, enter the hourly time start time setting. When the hourly time is closed, enter the Chinese and English time switch.
Hourly time start time setting	The first two digital tubes display "02", the last two digital tubes flash to show the start time	Set the start time (for example: the start time is set to 8 and the end time is set to 22, then every hour from 8 o'clock to 22 o'clock every day will be hourly)	Enter the hourly time end time setting
Hourly time end time setting	The first two nixie tubes display "03", and the last two nixies flash to show the end time	Set the end time (for example: the start time is set to 8 and the end time is set to 22, then every hour from 8 o'clock to 22 o'clock every day will be hourly)	Enter hourly time ringtone settings
Hourly time ringtone setting	The first two nixie tubes display "04", and the last two nixie tubes flash the name of the ringtone.	Set hourly time signal ringtone	Enter Chinese and English time switch
Time switch between Chinese and English	The first two nixie tubes display "05", and the last two nixies flash "En" or "Cn", which means timekeeping in English or Chinese respectively.	Set time report in Chinese or English	Enter the alarm 1 enable setting
Alarm 1 enable setting	The first two nixie tubes display "10", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 1.	Turn on or off the alarm 1	When the alarm 1 is turned on, enter the hour setting of alarm 1. When the alarm 1 is turned off, enter the alarm 2 enable setting.
Hour setting for alarm 1	The first two nixie tubes display "11", and the second two nixie tubes flash to show the time of alarm 1.	Set the hour of alarm 1, long press to set quickly.	Enter the minute setting of alarm 1
Minute setting for alarm1	The first two nixie tubes display "12", and the last two nixies flash the alarm clock 1	Set the minute of alarm 1, long press to set quickly.	Enter the alarm time setting of alarm 1

Alarm 1 alarm time setting	The first two nixie tubes will display "13", and the last two nixies will flash to show the duration of alarm 1.	Set the alarm duration of alarm 1, the setting range is 1 ~ 20 minutes.	Enter the ringtone setting of alarm 1
Alarm 1 ringtone setting	The first two nixie tubes display "14", and the last two nixies flash the name of the ringtone of alarm 1.	Set the ringtone for alarm 1.	Enter alarm 1 mode setting
Alarm 1 mode setting	The first two nixie tubes display "15", and the last two nixie tubes flash the alarm 1 mode.	Set the alarm mode of alarm 1.	Enter the alarm 2 enable settings
Alarm 2 enable setting	The first two nixie tubes display "20", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 2.	Turn on or off the alarm 2	When the alarm 2 is turned on, enter the Hour setting of alarm 2. When the alarm 2 is turned off, enter the alarm 3 enable setting.
Hour setting for alarm 2	The first two nixie tubes display "21", and the second two nixie tubes flash to show the time of alarm 2.	Set the hour of alarm 2, long press to quickly set.	Enter the minute setting of Alarm 2
Minute setting for alarm 2	The first two nixie tubes display "22", and the last two nixies flash the alarm clock 2	Set the minute of alarm 2, long press to set quickly.	Enter the alarm time setting of alarm 2
Alarm 2 alarm time setting	The first two nixie tubes display "23", and the last two nixie tubes flash to show the duration of the alarm 2	Set the alarm duration of alarm 2, the setting range is 1 ~ 20 minutes.	Enter the ringtone setting of Alarm 2
Alarm 2 ringtone setting	The first two nixie tubes display "24", and the second two nixie tubes flash the name of the ringtone of alarm 2.	Set the ringtone for Alarm 2.	Enter alarm 2 mode setting
Alarm 2 mode setting	The first two nixie tubes display "25", and the last two nixies flash the alarm clock 2 mode.	Set the alarm mode of Alarm 2.	Enter the alarm 3 enable settings
Alarm 3 enable setting	The first two nixie tubes display "30", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 3.	Turn on or off the alarm 3	When alarm 3 is turned on, enter the hour setting of alarm 3. When the alarm 3 is turned off, enter the alarm 4 switch setting.
Hour setting for alarm 3	The first two nixie tubes display "31", and the last two nixies flash the alarm clock 3.	Set the hour of the alarm 3, long press to quickly set.	Enter the minute setting of alarm clock 3
Minute setting for alarm 3	The first two nixie tubes display "32", and the last two nixies flash the alarm 3	Set the minute of the alarm 3, long press to quickly set.	Enter the alarm time setting of alarm 3

Alarm 3 alarm time setting	The first two nixie tubes display "33", and the last two nixie tubes flash to show the length of alarm 3	Set the alarm duration of alarm 3, the setting range is 1 ~ 20 minutes.	Enter alarm 3 ringtone settings
Alarm 3 ringtone setting	The first two nixie tubes display "34", and the last two nixies flash the name of the ringtone of alarm 3.	Set the ringtone for alarm 3.	Enter alarm 3 mode setting
Alarm 3 mode setting	The first two nixie tubes display "35", and the last two nixies flash the alarm 3 mode.	Set the mode of Alarm 3.	Enter the alarm 4 enable settings
Alarm 4 enable setting	The first two nixie tubes display "40", and the last two nixies flash "On" or "OF", which means turn on or off the alarm 4.	Turn on or off the alarm 4	When the alarm 4 is turned on, enter the hour setting of the alarm 4. When the alarm 4 is turned off, it returns to the time display mode.
Time setting for alarm 4	The first two nixie tubes display "41", and the last two nixies flash the alarm clock 4.	Set the hour of the alarm 4, long press to quickly set.	Enter the minute setting of alarm clock 4
Minute setting for alarm 4	The first two nixie tubes display "42", and the last two nixies flash the alarm clock 4	Set the minute of the alarm 4, long press to quickly set.	Enter the alarm time setting of alarm 4
Alarm 4 alarm time setting	The first two nixie tubes display "43", and the last two nixie tubes flash to show the duration of alarm 4.	Set the alarm duration of alarm 4, the setting range is 1 ~ 20 minutes.	Enter alarm 4 ringtone settings
Alarm 4 ringtone setting	The first two nixie tubes display "44", and the last two nixie tubes flash the name of the ringtone of alarm 4.	Set the ringtone for alarm 4.	Enter alarm 4 mode setting
Alarm 4 mode setting	The first two nixie tubes display "45", and the last two nixies flash the alarm 4 mode.	Set the mode of Alarm 4.	Return to time display mode and save settings

4. Function settings

In each setting mode, long press the mode button for 3 seconds or 10 seconds without any button press, it will automatically return to the time display mode and save the settings.

mode	Show description	Plus key function in current mode	Mode key function in current mode
Time display mode			Press and hold for more than 5 seconds to enter the automatic brightness enable setting

Automatic brightness enable setting	The first two nixie tubes display "1-", and the last two nixies flash "On" or "OF", which means that the auto brightness function is turned on or off respectively.	Turn auto brightness on or off	When the auto brightness function is turned off, enter the brightness setting. When the automatic brightness function is turned on, enter the temperature calibration setting.
Brightness setting	The first two nixie tubes display "2-" permanently, and the second two nixie tubes flash to show the light control level parameters.	Set the brightness (the range is 01 ~ 100, when 100 is displayed as 00). This function is effective when the auto brightness function is turned off	Enter temperature calibration settings
Temperature calibration settings	The first two nixie tubes display "3-" permanently, and the last two nixies flash the temperature calibration value	Set the temperature calibration value, the range is -9 ~ 10. For example, when the display temperature is 3 degrees higher than the actual temperature, set the calibration value to -3.	Enter the report temperature setting
Report temperature switch setting	The first two nixie tubes display "4-" permanently, and the second two nixie tubes flash "On" or "OF", indicating that the temperature reporting function is turned on and off respectively.	Turn the temperature reporting function on or off	Enter 12/24 hour display settings
12/24 hours switch settings	The first two nixie tubes display "5-", and the last two nixie tubes flash "12" or "24", indicating 12-hour display or 24-hour display, respectively	Set 12/24 hour display	Enter time display mode setting
Time display mode setting	The first two nixie tubes display "6-", and the last two nixie tubes flash to show the wheel display mode	Set the display mode (a total of 3) 0: only display time. 1: time, temperature, year, month, day, week wheel display. 2: time, temperature wheel display	Enter led automatic switch display setting
LED automatic switching display settings	The first two nixie tubes display "7-", and the last two nixie tubes flash to show the LED change time parameter	Set the time parameter of led change (0 is fixed display). For example: when set to 30, switch to the next display every 30 minutes. When set to 62 (greater than 60), switch to the next display every (62-60) * 60 minutes (that is, 2 hours) (range: 0 ~ 84).	Enter volume setting
Volume setting	The first two nixie tubes display "8-", and the last two nixie tubes flash to show the volume	Set the volume (a total of 5 levels)	Enter the power on music switch settings

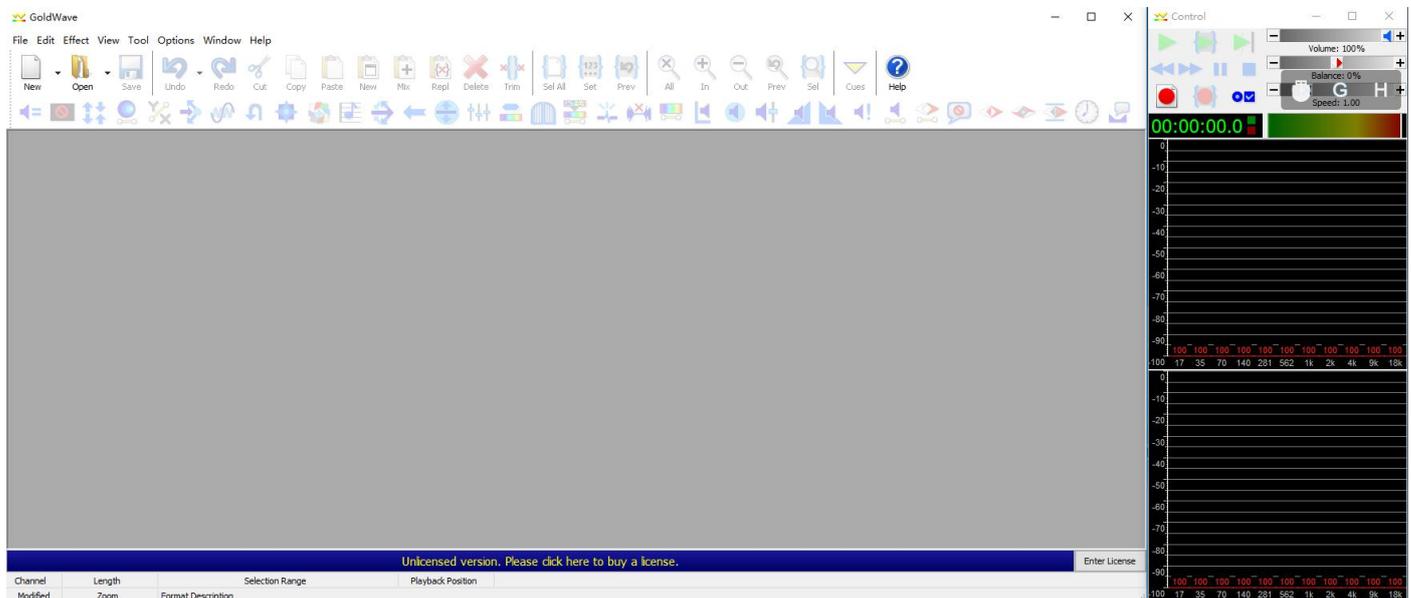
Power on music switch setting	The first two nixie tubes display "9-", and the last two nixie tubes flash "On" or "OF", indicating that music is played or not played when the phone is turned on.	Set to play or not to play music at power on	When setting to play music at boot, enter the boot music settings. When it is set to not play music at startup, return to the time display mode and save the settings.
Boot music settings	The first two nixie tubes display "A-", and the last two nixie tubes flash to show the name of the boot music	Set boot music	Enter error time setting
Error time setting	The first two nixie tubes display "b-", and the last two nixie tubes flash the clock error time	Set the error time (range 0 ~ 96). For example: the clock is 2 seconds faster than every 24 hours, then the error time is set to 24, and the error amount is set to -2.	Enter error amount setting
Error amount setting	The first two nixie tubes display "C-", and the second two nixie tubes flash the error of the clock	Set the error amount (range -6 ~ 6). For example: the clock is 2 seconds faster than every 24 hours, then the error time is set to 24, and the error amount is set to -2.	Return to the time display mode and save the settings.

VI, ringtone download tutorial

This clock can update the internal ringtone by using our downloader. The specific operations are as follows, please be sure to come in order, otherwise the download may not be successful.

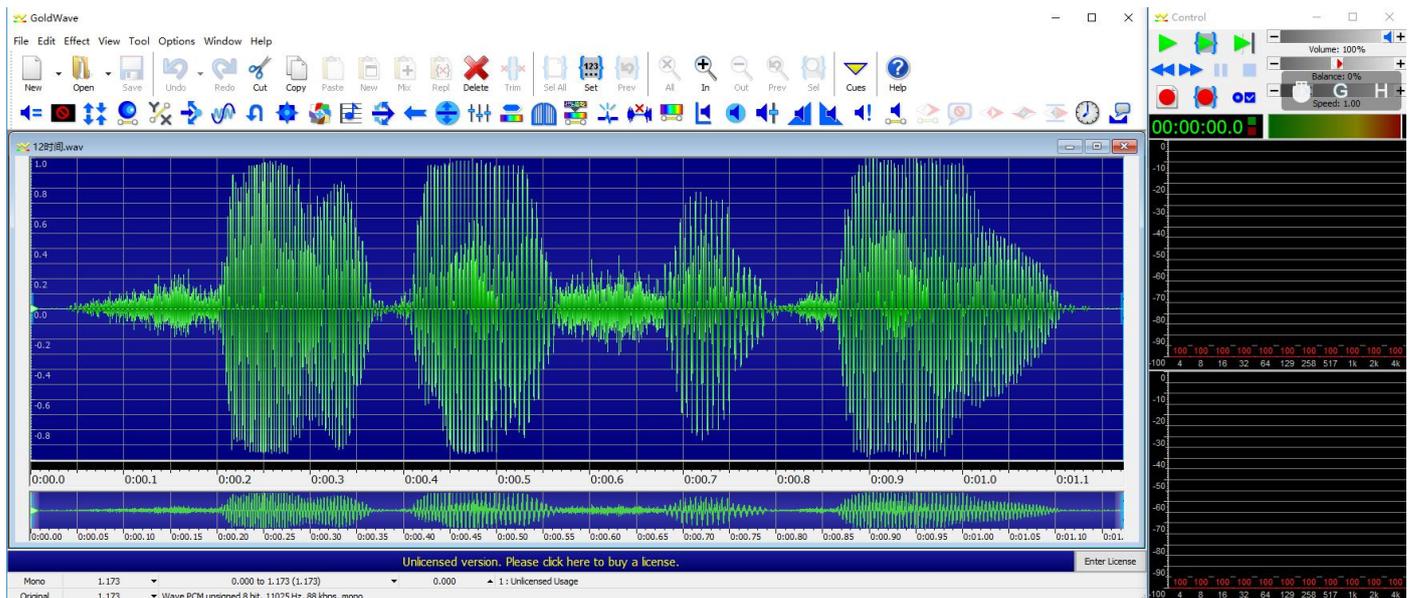
1. Audio processing software

Due to the limited processing power of the microcontroller, cannot process all audio files, currently only WAV files can be processed, and the audio sampling rate cannot exceed 16K, the number of sampling bits is 8 bits, and mono. Such parameter files are difficult to find on the Internet, so it is best to use the software converts itself. Here we recommend using the GoldWave software. The official download address is <http://www.goldwave.com>. This software is not free. If you want to use it for a long time, it is still recommended to buy it. After downloading, please click install. It's very simple, just press the next step, and finally complete it. After the installation is complete, the interface is as follows:

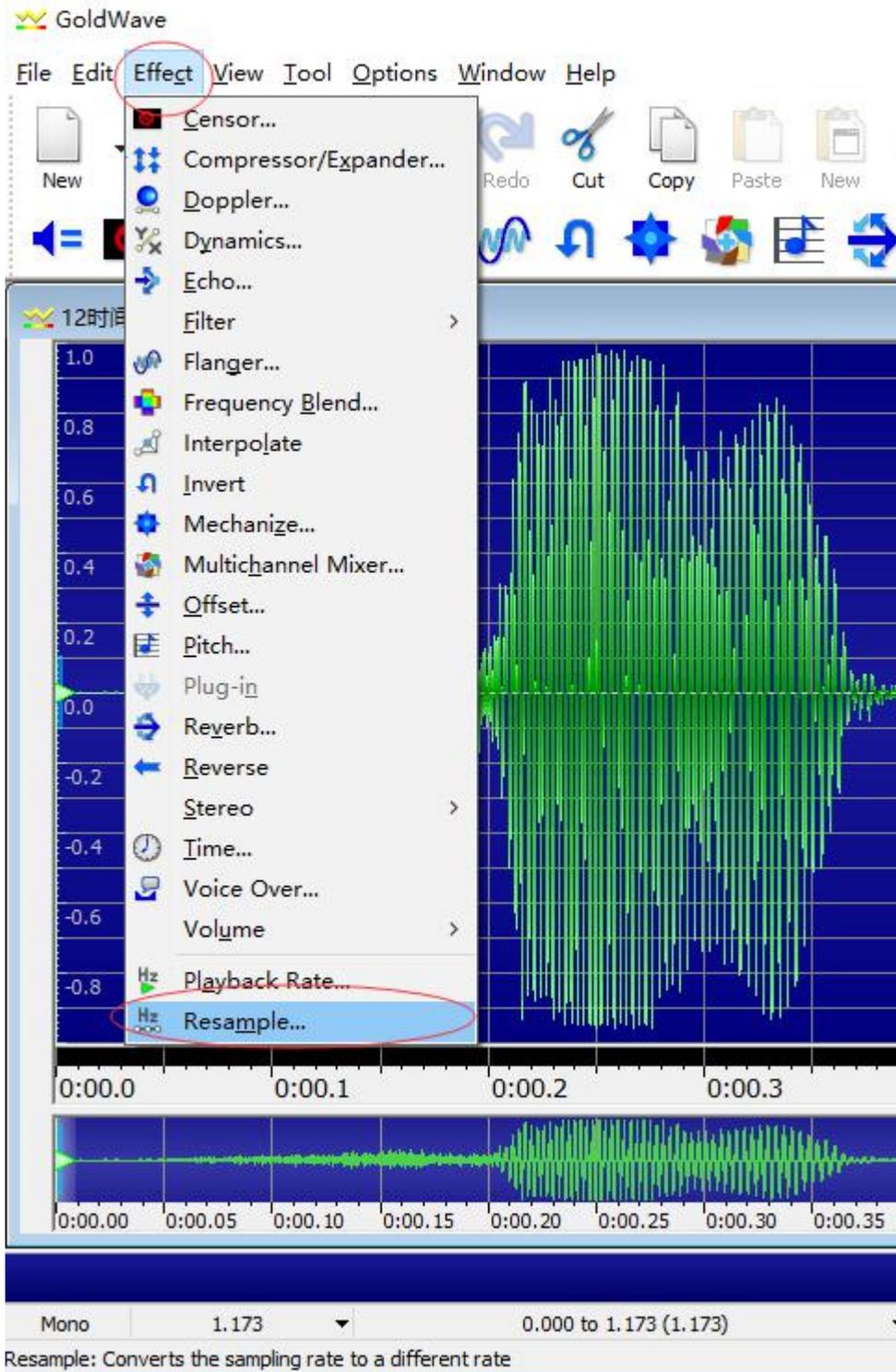


After installation, you can modify the parameters of an audio file.

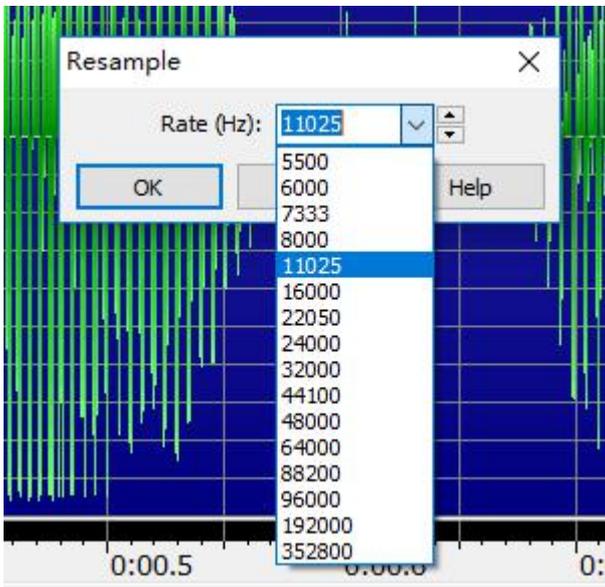
First open an audio file.



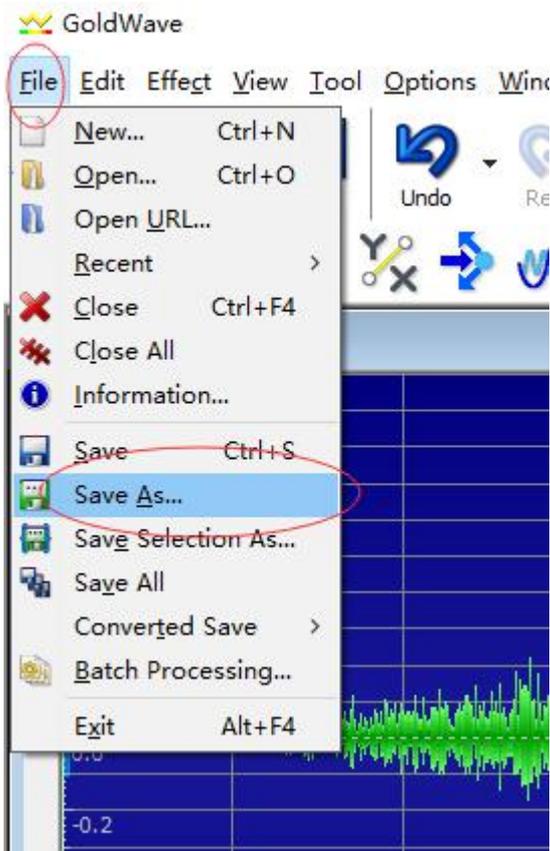
First modify the sampling rate, click Effect-> Resample. As shown below:



Then select the sampling rate in the pop-up dialog box, the maximum sampling rate supported by the microcontroller is 16000. After selecting, click ok.



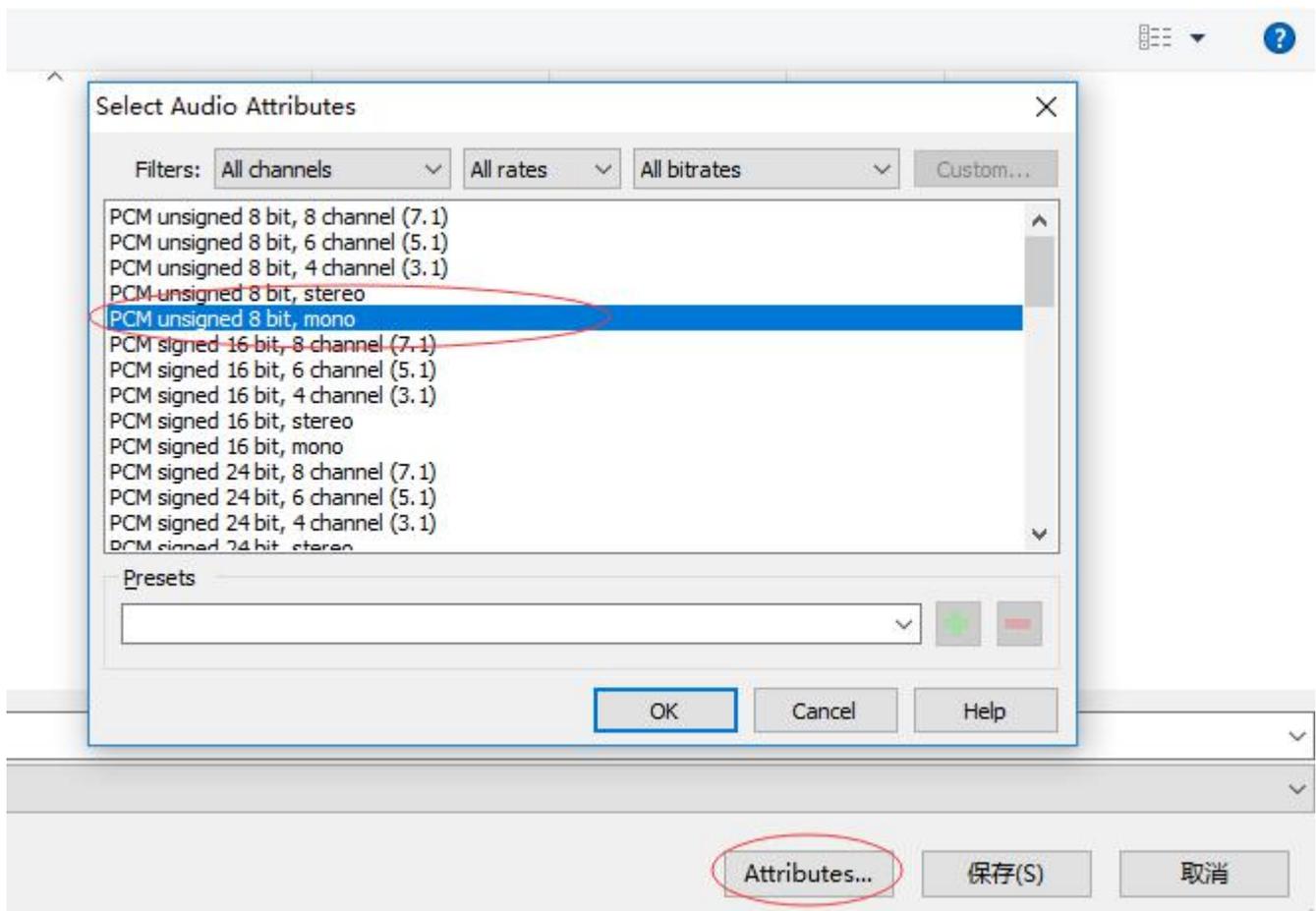
Then select File-> Save as



In the pop-up dialog box, select the saved file type as wav.



Click Attributes and select PCM unsigned 8bit, mono. Finally click OK and save.



2. Download ringtones

(1), connect to the computer

Press and hold the mode key of the clock and connect the clock to the computer with a USB cable. The clock will display a001, and the computer will recognize the clock as a USB flash drive. The following figure shows:





After clicking, there are 3 folders:



Among them, folder 01 is a file of Chinese voice, folder 02 is a file of English voice, and folder 03 is a ringtone file.

Some computers will prompt you to format the U disk. At this time, you should format it according to the steps of putting the ringtone back in the clock, and then download the sound from the network disk into the clock.

(2), increase or decrease ringtone

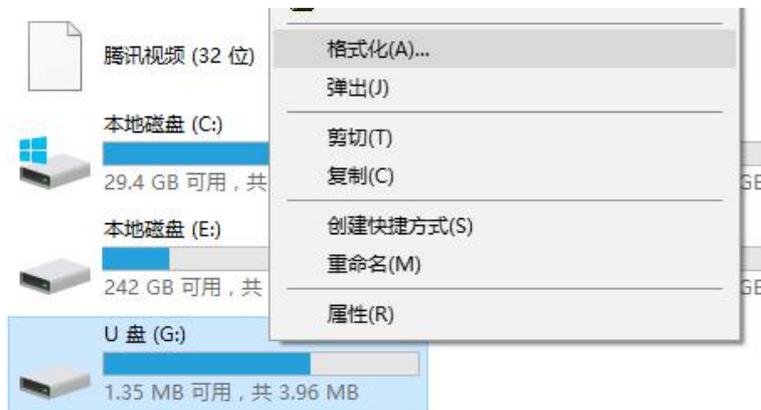
Then copy all the folders to the computer and complete the increase and decrease of the ringtone file on the computer. The contents of the 01 and 02 folders cannot be changed. If the changes may cause a time error, they can only be increased or decreased in the 03 folder Ringtone. There must be at least two ringtones in the 03 folder or the clock will report an error. The first two names of the ringtone file must be numbers, and they must be named sequentially from 00, and the file name length should preferably not exceed 8 characters (a Chinese character is Two characters). The total size of all files after the increase or decrease cannot exceed the capacity of the U disk, otherwise it cannot be put in. As shown in the following figure:



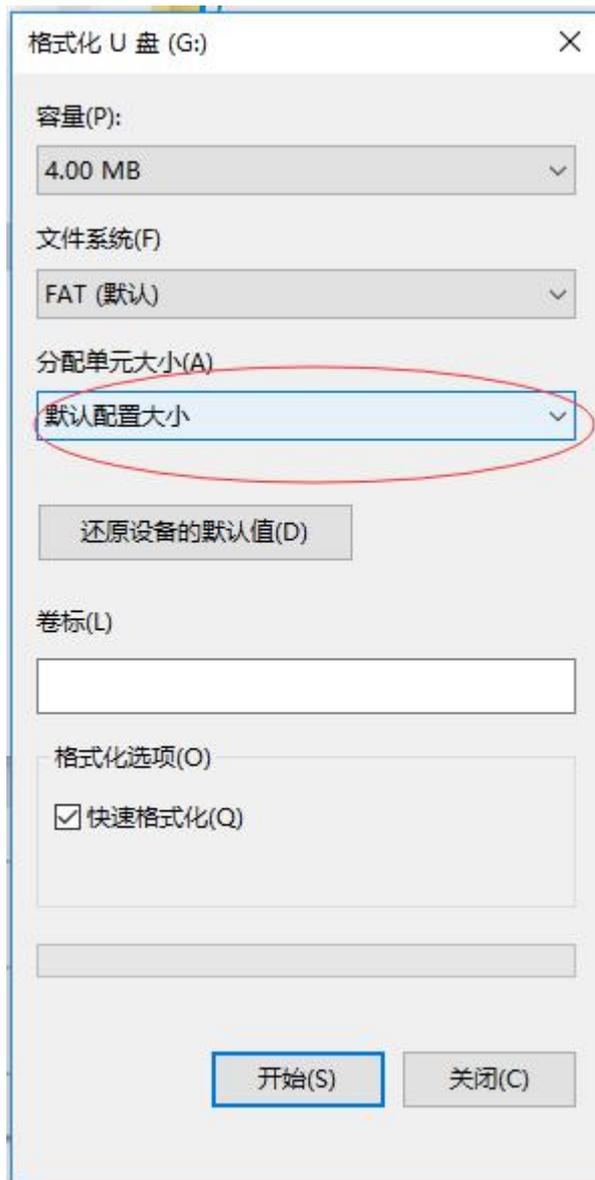
(3), ring back to the clock

After the ringtone is modified, you can put the sound back in the clock.

First format the USB drive, right-click the USB drive, and select Format.



In the dialog box that pops up, select the default configuration size, and finally start, and wait for the formatting to complete.



After formatting is completed, it will become an empty U disk. Then just put all the sound files just copied out together with the folder back into the U disk.

(4), Restart the clock

Finally, power on the clock again.

VII, firmware upgrade

This kit provides a firmware upgrade function, which can still improve and upgrade the clock function after it is in the hands of players. It provides source code, and players can also modify the clock function by themselves.

1、 Compiler

Note: It is not recommended for people without MCU development experience to do this, because if the program is messy, it will cause the system to run abnormally, and it may be necessary to return to the factory to re-program the program. We also do not provide programming guidance, because programming is a complicated System engineering, we have limited manpower and do not have the time and energy to do this work. Please modify the program yourself strictly according to the program framework, and then modify the program after reading the program flow.

First of all, the Keil version used for compiling the software is KeilC51V9.00. Just open the program and compile it directly (the gift program is already compiled, if you do not modify the program, you don't need to compile again). Those who understand programming can modify the program themselves and add The functions you want really become a unique DIY kit.



If the compilation is successful, the prompt shown below will appear:

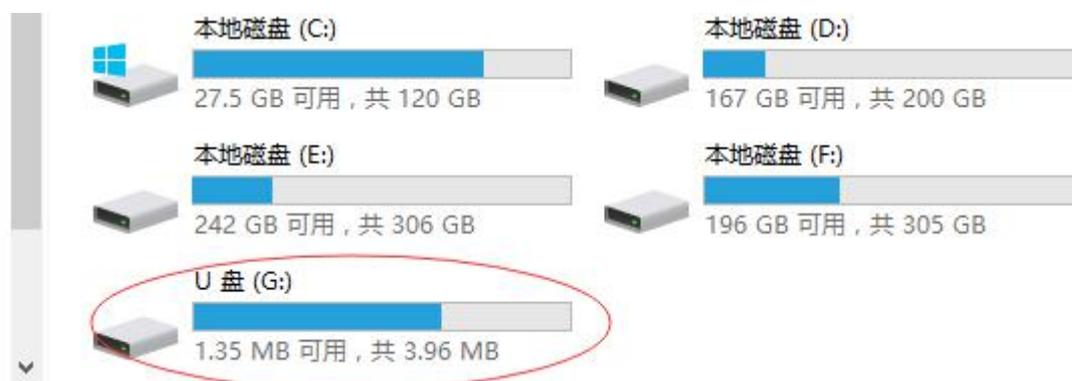
```
Build Output
Program Size: data=189.0 xdata=555 code=23755
creating hex file from ".\Objects\EC1838B"...
".\Objects\EC1838B" - 0 Error(s), 0 Warning(s)
Build Time Elapsed: 00:00:08
```

You will find the required firmware EC1838B.hex in the Objects folder.

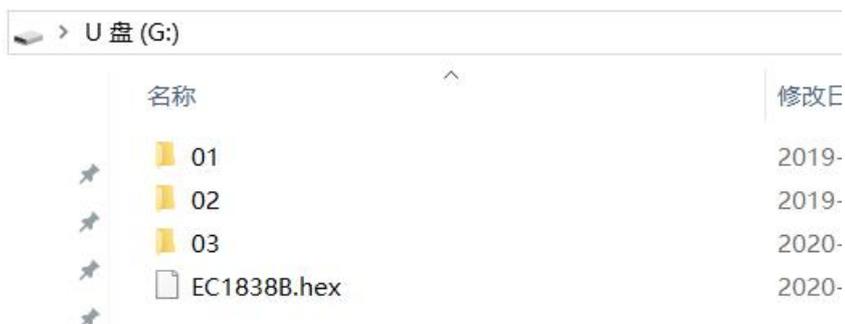
And pay attention to the size of the program, the value of code should be less than 25600, and the upgrade will fail!

2、 Firmware upgrade

Press and hold the mode key of the clock and connect the clock to the computer with a USB cable. The clock will display a001, and the computer will recognize the clock as a USB flash drive. The following figure shows:



After clicking it, there are 3 folders, and then put the clock firmware into the root directory of the U disk, but not in the folder. The file name of the firmware is EC1838B.hex. As shown in the following figure:



Then power on the clock again, the clock flashes and displays the following figure, indicating that the upgrade is in progress, and the program will automatically run after the upgrade is completed.

