

Partial Lock Writer User's Guide

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Partial Lock Writer User's Guide

Introduction

The Holtek HT-PLWriter was specifically developed to program the range of Holtek OTP microcontroller devices allowing users to easily and efficiently burn their program code into OTP devices which support partial lock function.

The HT-PLWriter offers the advantages of a small and easy to manage size, in addition to easy to use special features. Other additional advantages include the ability to operate connected to a PC in an on-line programming mode as well as being able to operate in a stand-alone programming mode. After downloading the program code from PC to the HT-PLWriter, the stand-alone mode allows the user to program the OTP devices without connection to a PC.

In the on-line programming mode, the HT-PLWriter is connected to the PC via the supplied RS232 cable. In the stand-alone programming mode, no connection is required to the PC. As the Holtek range of OTP devices are supplied in many different package types, a range of adapters is supplied by Holtek to match the appropriate package type and pin count being used. The correct OTP adapter must therefore also be selected and plugged into the HT-PLWriter.

The partial lock function allows the program memory of an OTP device to be locked by one page or multiple pages, and in different programming steps. For example, the user can lock page 0, 1, 2 at the first programming step, then lock pages 4 and 5 at the second programming step. The HT-PLWriter supports a partial lock function to lock part or all of the OTP device program memory. The locked unit is a page with a size of 256 words. Some OTP devices may lock more than one page at one time.

The requirements for using the HT-PLWriter are:

- 16V power adapter with minimum current rating of 500mA. It is recommended that only the supplied power adapter is used.
- The correct OTP adapter to match the OTP device package type and pin count
- IBM 386 compatible or higher specification PC
- Win95/98/NT/2000/XP Windows operating system
- HT-MWriter software utility

Installation

For connection to the PC, use the supplied cable to connect the HT-PLWriter 9-pin D-type connector to the RS232 port of the PC as shown in Figure 1.

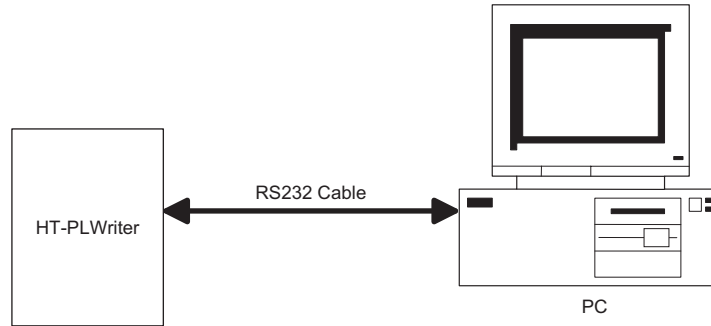


Figure 1

To install the writer software utility, run the "HT-MwriterSetup.exe" file as supplied with the HT-PLWriter, after which the following instructions should be followed. Note, if the HT-Mwriter software utility has been installed already, then ignore this software installation.

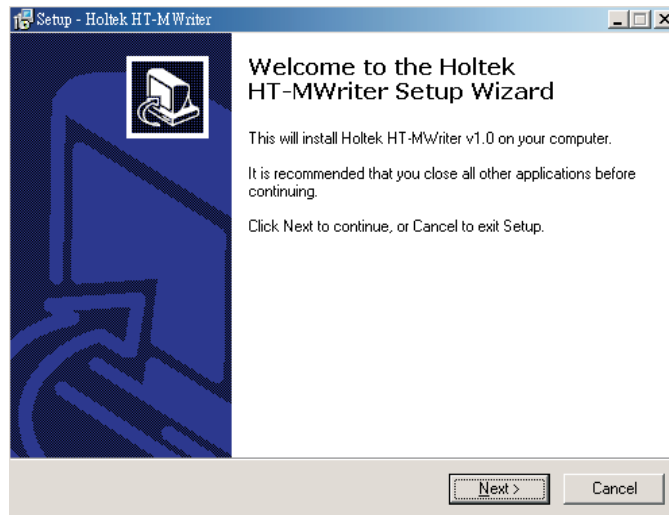


Figure 2

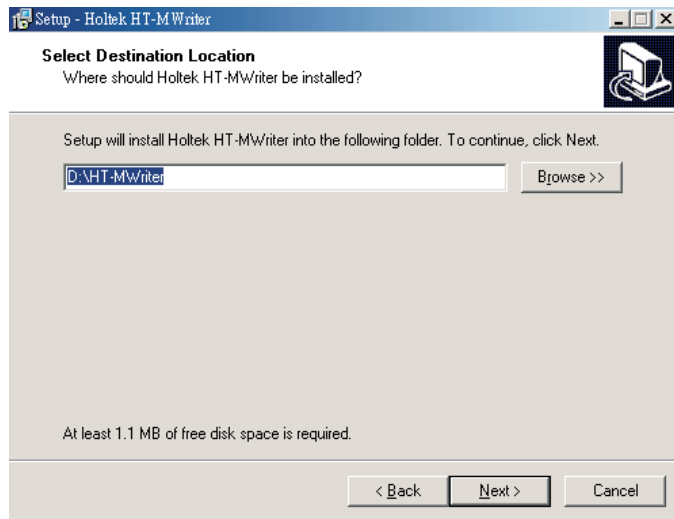


Figure 3

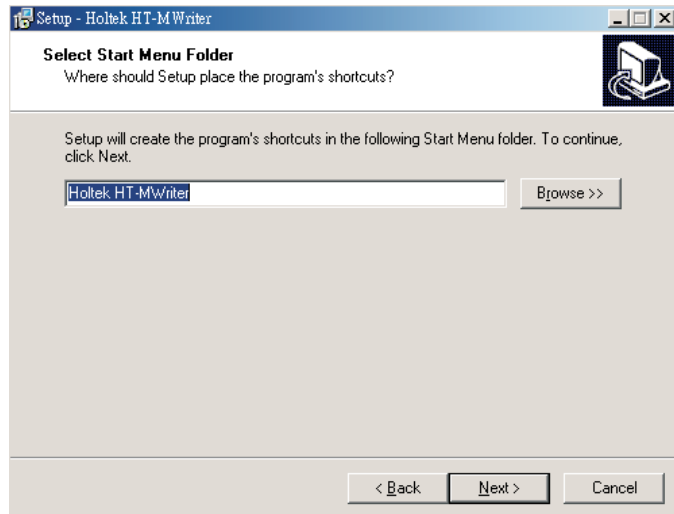


Figure 4

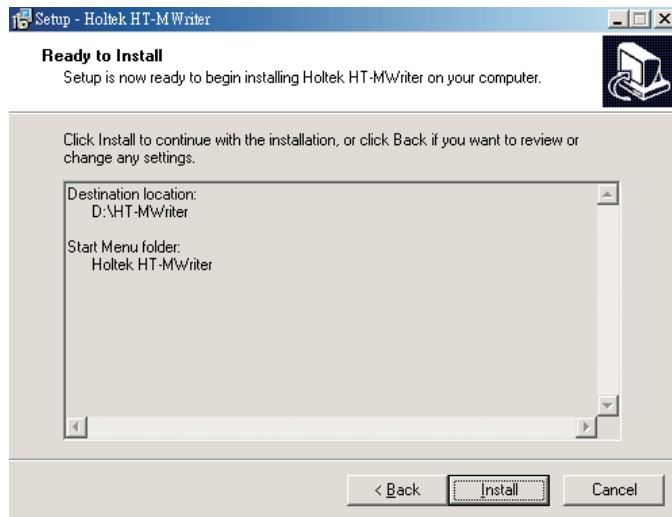


Figure 5



Figure 6

Accompanying Hardware

The outline of the HT-PLWriter is shown in Figure 7:

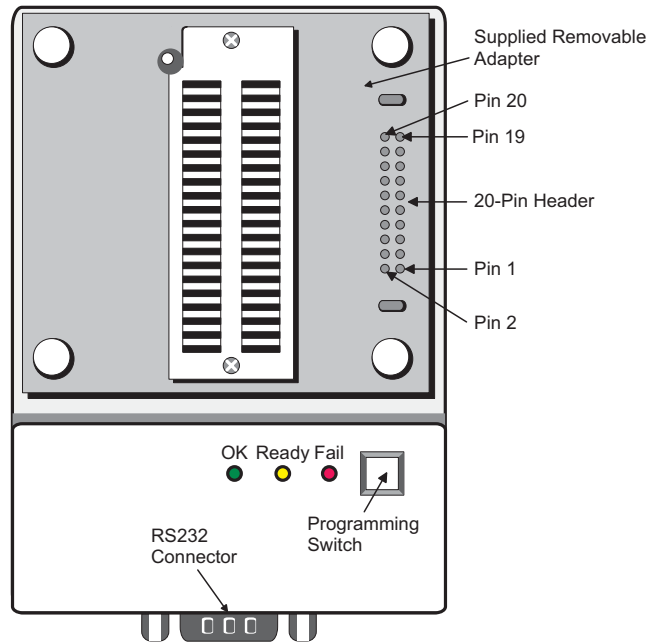


Figure 7

Component	Description
DC16V	DC JACK, DC 16V socket
20-Pin Header	Programming signal connector
OK	Green LED to indicate normal conditions
Ready	Yellow LED to indicate ready conditions
Fail	Red LED to indicate error conditions
Programming Switch	Programming key for stand-alone mode
RS232 Connector	9-pin D-type connector for PC RS-232 port connector
4P DIP Switch	DIP switch on rear side of HT-PLWriter

OTP Device Pin Name	Programming Signal	20-pin Header Position
PA0	AD0	8
PA1	AD1	6
PA2	AD2	4
PA3	AD3	2
PA4	CLK	10
PA5	\overline{CS}	12
PA6	\overline{RW}	14
OSC1	Ground (direct connection)	—
OSC3	Ground (direct connection)	—
VDD	VDD	18
\overline{RES}	VPP	20
VSS	Ground (direct connection)	11, 13, 15, 16, 17, 19

Programming Signal/OTP Device Pin-Out Cross-Reference Table

Programming an OTP Device with the HT-MWriter

Prepare the OTP File Before Programming the Partial-lock OTP Device

Before the OTP device can be programmed, an OTP data file, with the file extension .OTP, must first be generated using the Build command in the Project menu within the HT-IDE3000 development environment. After finishing the build procedure, the HT-PLWriter hardware and the HT-MWriter software can then be used to program the OTP device.

Running the HT-MWriter Software Utility

After running the HT-MWriter software utility, the window as shown in Figure 8 will be displayed.

MCU Type and Driver Type for Programming

The MCU box indicates the present MCU type that is to be programmed. Either of the following commands determines the MCU type:

- Open an OTP file by selecting the Open button, the OTP file contains information about the MCU type of OTP device that is to be programmed
- Set the MCU type by selecting the MCU command in the Settings menu

Note If an OTP device blank check is required, then it is not necessary to open an OTP file. After the HT-PLWriter is connected to the PC, the HT-MWriter software utility will read the driver type from the HT-PLWriter and displays it in the Driver box as shown in Figure 8. Therefore, the MCU type and the Driver type should be the same unless the connection between the PC and the HT-PLWriter is broken or the HT-PLWriter is powered off. The functions that can be executed by the HT-PLWriter depend upon the driver type in its flash memory. An incorrect driver type will induce programming errors. The user has to ensure that the MCU type and Driver type are the same.

On-Line Programming Mode

Basic Functions

There are 9 function keys or control buttons as shown at the right hand side of the window shown in Figure 8, with each button representing an instruction, the functions of which are explained below:

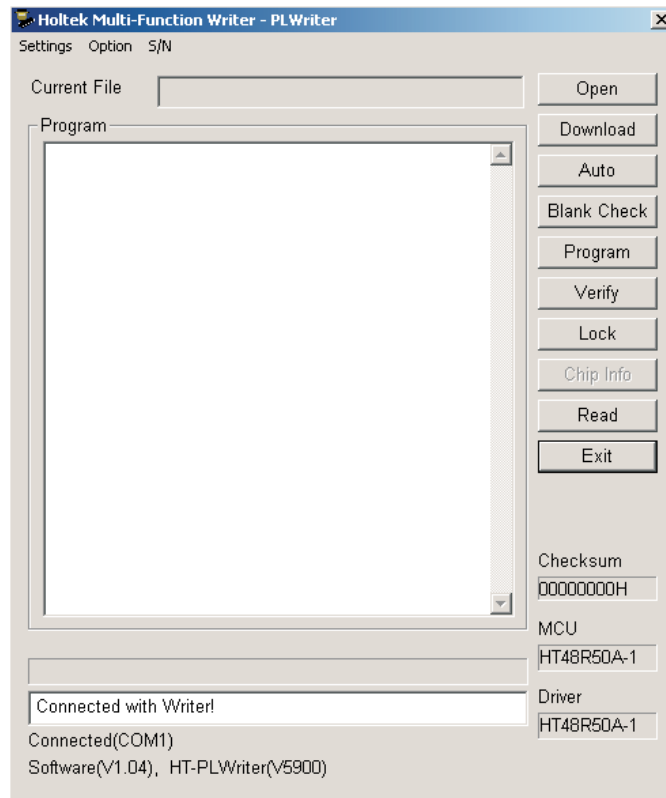


Figure 8

→ **Open**

This instruction opens a file which has an .OTP suffix and reads the contents of this file. It is these contents which will be accessed when programming the relevant OTP device. After selecting "Open" the file dialogue box, as shown in Figure 9, will be displayed from which the correct folder and file name can be chosen. The file contents will be displayed in the message window after being opened, as shown in Figure 10, and the checksum of the opened file will be shown in Checksum box.

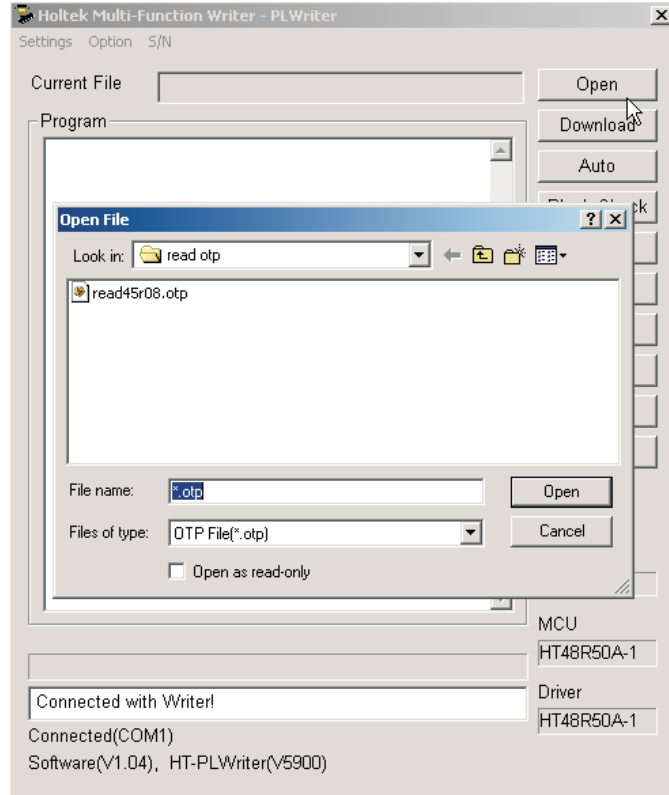


Figure 9

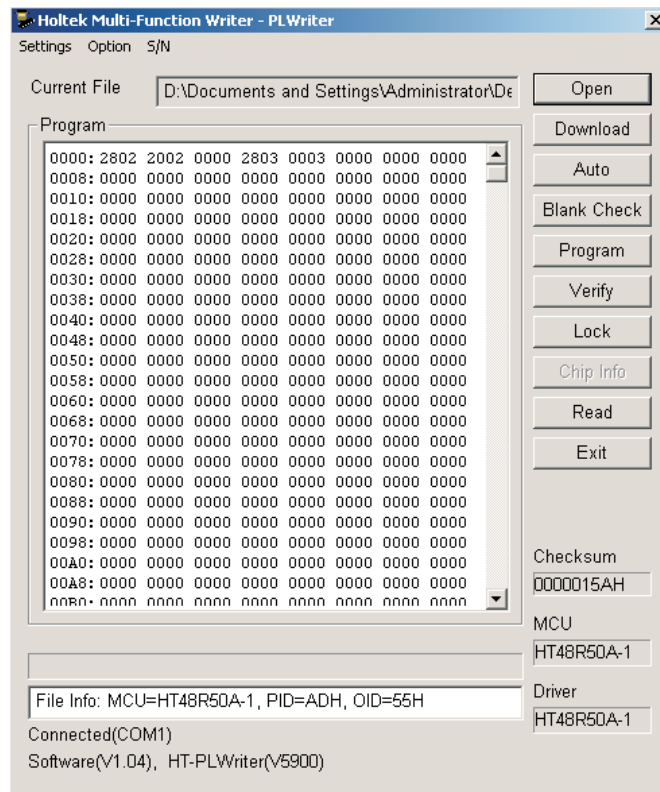


Figure 10

→ **Download**

This instruction downloads the contents of the presently opened OTP file, driver information and locked page information to the writer's flash memory. An OTP file must have been already opened before using this instruction.

At first, this instruction will display a dialog box "Setting for partial lock" as shown in Figure 11. The following selections have to be set before download.

- "Previous", if this is not the first programming step of the OTP device, the user must select those pages having been locked already for this column. Otherwise, don't select any page.
- "Current", to select any page or pages being locked in this step. If no page is being locked, then don't select.
- "Program Options", if this is the last programming step of the OTP device, then it must be selected it. It must not be selected for other programming steps.

The information is downloaded to the HT-PLWriter for programming the OTP device. If the OTP device has no locked pages, no pages should be selected, press the <OK> key. Figure 12 shows the result of selecting Previous and Current locked pages.

If it is required to change the locked page information after download, then use this instruction again, select new lock pages and press <OK>.

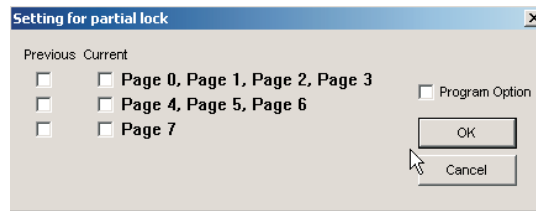


Figure 11

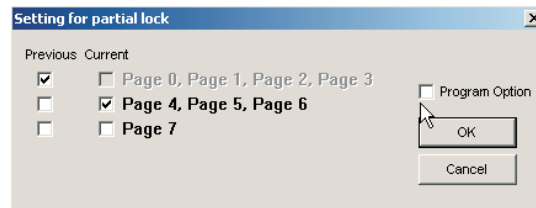


Figure 12

Note that the lock information and the pages to be locked will be saved, and download to the writer's flash memory when [OK] is selected. However the OTP device is still unchanged. The user should select "Program" key to Program the OTP device and select the "Lock" key to lock the specified pages on the OTP device.

→ **Blank Check**

This instruction checks that the presently loaded OTP device has not previously been written to. The results of this check will be displayed in the message window.

→ **Program**

This instruction encompasses two functions. The first is to program the data already in the writer's flash memory into the OTP device, the second is a verification check to ensure that the actual data burned into the OTP device is the same as the data in the writer's flash memory. Before this instruction is used, the relevant OTP file must have been previously downloaded then ascertain which programming step the OTP device is. If it is the last programming step, "Program Option" should be selected. Otherwise, "Program Option" should not be selected.

→ **Verify**

The contents of the presently loaded OTP device will be read and checked to ensure that it is the same as the data loaded into the writer's flash memory, the results of which will be displayed in the HT-MWriter window. Before this instruction is used the relevant OTP file must have been previously downloaded.

→ **Lock**

This instruction will implement a protect function in the OTP device preventing the contents of this OTP device from being read. After programming an OTP device, this instruction can be used to protect its contents. According to the locked pages which are selected during the Download procedure, there is also following process.

- If there is at least one page selected in the "Current" column as shown in Figure 11, then the writer will lock these selected page(s) when the Lock key is pressed.
- If no page is selected in the "Current" column as shown in Figure 11, the writer will lock all pages when this key is pressed, i.e, it will lock the whole program memory.
- If it is not required to lock any other page except those pages already locked, then this key should not be pressed after pressing the Program key.

→ **Chip Info**

This instruction will read the power-on ID, the software ID, the ROM size, option size and lock information from the OTP device and display the results in the message window as shown in Figure 13. If an OTP device does not contain this data or the HT-MWriter software utility does not recognize the ID, then the message "Failed to get chip info or the chip info is null" will be displayed in the message window as shown in Figure 14.

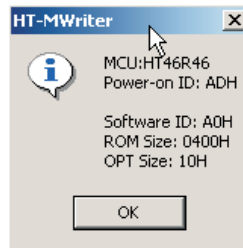


Figure 13

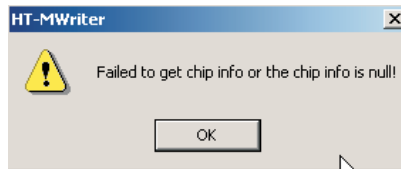


Figure 14

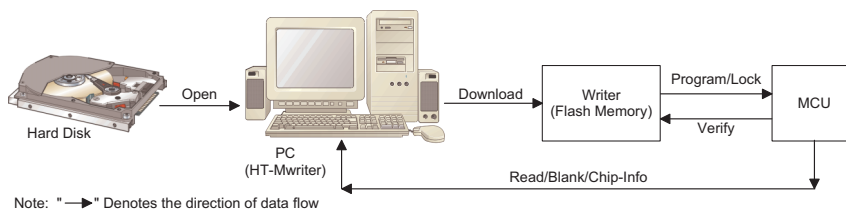
→ **Auto**

This instruction will execute up to four instructions consecutively: Blank Check, Program, Verify and Lock. If any of the instructions do not execute correctly, the process will be halted with any following remaining instructions not being executed. The instructions to be executed by the "Auto" command can be selected from the Auto option under the Settings menu.

→ **Read**

This instruction will read from the OTP device and display the results on the window as shown in Figure 10. The user can then store it to a new OTP file. The contents of the writer's flash memory will not be changed. If it is required to program a new OTP device from this read data, then the writer's flash memory should be updated by pressing the Download key first, then press the Program key. This instruction will fail if the OTP device is already locked.

The relationship between function commands and programming resource.



Additional Functions

→ **Setting**

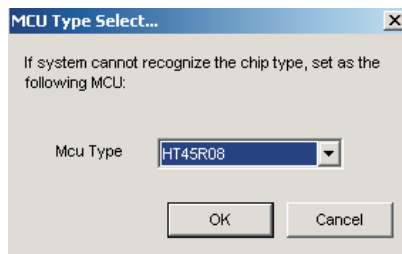
This menu contains four setup commands for the basic configuration of the HT-PLWriter, which determines the way in which the HT-PLWriter is configured and operated. A detailed explanation of each command is shown below:

- Detect Connect

This command will look for a connection between the HT-PLWriter hardware and the PC and display the result in the message window.

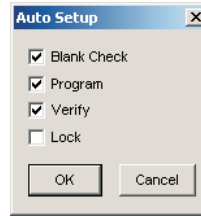
- MCU

This command specifies a specific MCU type for the following operations. The driver data for the specified MCU will be downloaded to the HT-PLWriter hardware if the writer has been connected to the PC and is powered on.



- Auto

This command will setup which programming instructions are to be automatically and sequentially executed by the Auto button.



- Check ID

Before executing any of the Blank Check, Program, Verify, Lock or Auto instructions, the HT-PLWriter can be setup to first check the OTP device type. This compares the OTP device type with the driver type in the writer's flash memory. If these two types are different, then the requested instructions will be aborted. The user can enable or disable this function.

→ **Option**

Two commands exist in this menu. The first of these is the option command, which will display the configuration options for the presently opened OTP file as shown in the window in Figure 15. The other is the Print command, which will printout the configuration options for the presently opened OTP file.

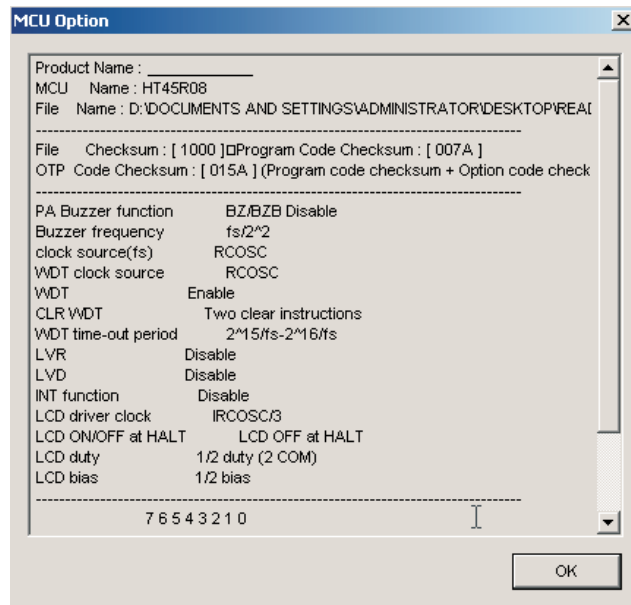


Figure 15

→ **S/N – Serial Number Writing**

The serial number function allows a user specified serial number to be written into each OTP device. This serial number, the address of which is specified by the user, is written into the Lower Byte address of Program ROM for each OTP device. After a serial number is written into an OTP device, an auto-incrementing function ensures that subsequently programmed devices will contain serial number incremented by one each time. It is first required to setup the initial data and fixed address of the first serial number. Selecting "Setup" from the "S/N" menu will display the window as shown in Figure 16, which can be used to input the initial serial number's data and its corresponding address.

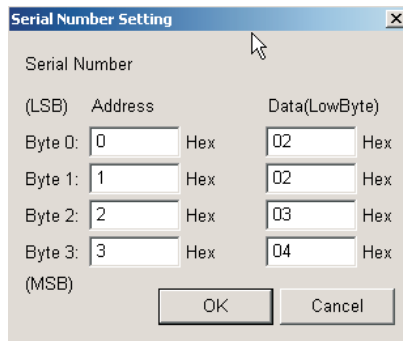


Figure 16

After the initial data and address information has been setup, selecting "Enable" from the "S/N" menu will activate the serial number function. When the serial number function is activated, the present serial number's corresponding address and data will be displayed at the lower right hand side of the main window as shown in Figure 17. During the programming stage the first device to be programmed will contain the previously setup serial number data in its Program ROM at the indicated address. Subsequent devices will contain serial numbers incremented by one for each additional device. To reset the order of serial numbers, again select "Setup" from the "S/N" menu.

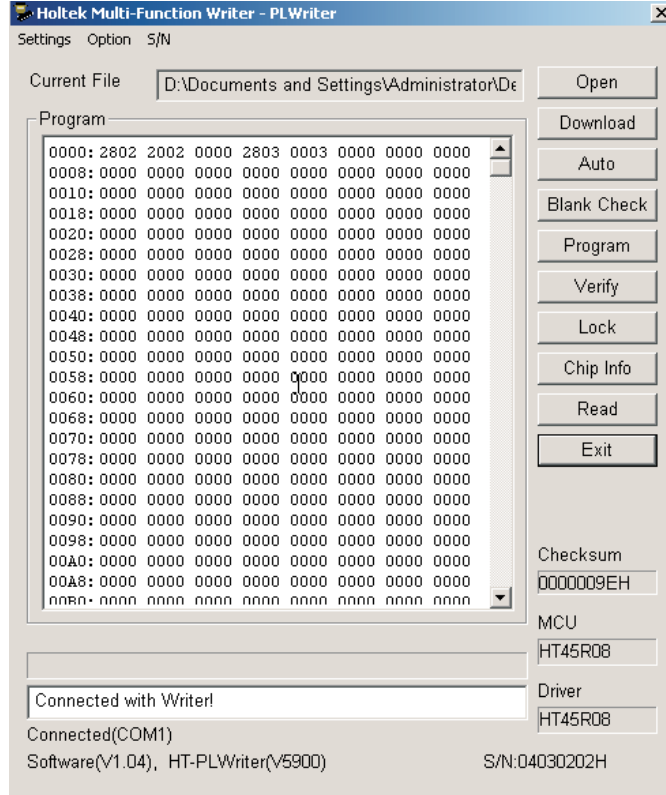


Figure 17

Notes for Programming the Partial-lock OTP Device

Programming Partial-lock OTP device at the first step (No page is locked):

- Do not select "Program Options" in Figure 11
- Do not select any page in the "Previous" column of Figure 11
- Select pages being locked in the "Current" column of Figure 11

Programming a Partial-lock OTP device at another step, apart from the last:

- Do not select "Program Options" in Figure 11
- Select pages which have been already locked in the "Previous" column in Figure 11
- Select pages being locked in the "Current" column of Figure 11

Programming a Partial-lock OTP device at the last step:

- "Program Options" must be selected in Figure 11
- Select pages which have been already locked in the "Previous" column of Figure 11
- Select pages being locked in the "Current" column of Figure 11

The suggested programming procedure is:

- Open an OTP file
- Set/Unset "Program Options"
- Download after selecting locked and being locked pages
- Program and/or Lock

Stand-Alone Programming Mode

Before the stand-alone programming mode is used it is essential that the following steps have been first implemented:

- The program code must have been already been downloaded into the HT-PLWriter. When this happens the yellow LED will illuminate to indicate that the system is ready, if there is an error then the red LED will illuminate.
- Select the programming commands by using the DIP Switch. The following table lists the DIP switch functions. Note that the DIP switches are only used for stand-alone operation.

DIP Position	Function	Description
DIP1	Check ID	If DIP switch #1 is on, the writer will check if the ID type of the OTP device to be programmed has the same ID type as the program code which was downloaded to the HT-PLWriter.
DIP2	Blank Check	If DIP switch #2 is on, the writer will run a blank check on the OTP to check if its contents are empty before programming. If DIP switch #2 is off, the writer will start programming without a blank check.
DIP3	Lock	If DIP switch #3 is on, after programming the data into the OTP, the data will be locked and prevented from being read out in the future.
DIP4	Buzzer	If DIP switch #4 is on, then after programming, whether successful or not, an audible reminder signal will be generated.

Programming Steps

- **Step 1**
Connect the supplied 16V power adapter, the HT-PLWriter will check whether the programming data in Flash memory is correct or not. The system will remain in a standby state if the programming data is valid. Otherwise, the HT-PLWriter must be connected to the PC using the supplied RS232 cable to download the program code to the HT-PLWriter.
- **Step 2**
Place an OTP device that is compatible with the data into the Textool socket on the HT-PLWriter
- **Step 3**
Press the programming switch to begin the programming cycle.
- **Step 4**
Check the indicator LEDs to verify that the programming operation was successful.
- **Step 5**
If successful, remove the programmed OTP device to allow the HT-PLWriter to return to its standby state. If the programming operation has failed, press the programming key again to allow the HT-PLWriter to go back to its standby state.
- **Step 6**
Repeat step 2~step 5.

LED Indicator Description

The HT-PLWriter contains 3 LED indicators to display the status of the programming operation. The following table lists the function of each of the LED indicators:

LED Type	Status	Description
Red LED – Failure Status	Flash once then stop	OTP device is locked
	Flash twice then stop	Data in the HT-PLWriter is incompatible with the present OTP device
	Flash 3-times then stop	OTP device already contains data, device not blank
	Flash 4-times then stop	Programming failed
	Flash 5-times then stop	Programming complete but error detected during the verification process
	Flash 6-times then stop	Failed to lock the present OTP device
	Rapid flashing*	Data in the HT-PLWriter is invalid
Green LED – OK Status	LED illuminated	Programming successful
Yellow LED – Ready Status	Slow flashing	System is ready and awaiting programming instruction
	Rapid flashing	Programming operation in progress

*** If the Red LED flashed rapidly, which indicates the content of the writer's flash memory is invalid. To repair this, just to connect the HT-PLwriter to the PC and execute the HT-Mwriter software utility, then open an OTP file and download to the writer.

Using the Adapter Card

The HT-PLWriter is supplied with an adapter card which contains a 40-pin Textool socket. If it is necessary to program OTP devices whose package types are unable to use the supplied Textool socket there are two alternative possibilities:

- Remove the supplied adapter card and replace it with another type of HT-PLWriter adapter card that can accommodate the different OTP. These other adapter cards for the HT-PLWriter will have a C prefix next to their adapter card product name.
- Use the existing supplied adapter card in conjunction with one of the OTP writer alternative adapter cards. These alternative OTP writer adapter cards can be plugged directly into the 40-pin Textool socket of the supplied HT-PLWriter adapter card. These other adapter cards for the OTP writer will have a T prefix next to their adapter card product name.

System Messages

- **Failed to Erase Flash ROM!**
The HT-PLWriter has failed to clear the flash memory before downloading the driver data or an OTP file.
- **Disconnected from the HT-PLWriter**
The PC has failed to connect to the HT-PLWriter, to rectify check the power supply and the RS232 cable.
- **Failed to Open File!**
The present OTP file cannot be opened, either this file has errors or the file format is invalid.
- **Invalid File Format!**
The file format of the present OTP file is invalid.
- **Not Support the Type of MCU!**
The HT-MWriter software utility does not support the MCU type in the present OTP file or the driver in the HT-PLWriter.
- **Duplicated Program Record!**
The file format of the OTP file is incorrect.
- **Duplicated Option Record!**
The file format of the OTP file is incorrect.
- **Failed to Read OTP File Record!**
The file format of the present OTP file has errors or the file format is invalid.
- **Failed to Allocate Memory!**
Failed to allocate memory for the present OTP file.
- **Invalid Checksum for the OTP File!**
The checksum of the OTP file is incorrect.

- **Writer is Busy.**
The HT-PLWriter cannot execute the requested command as it is still executing other operations.
- **Failed to Write to Flash ROM!**
The HT-PLWriter is unable to download the contents of the OTP file or Driver data into the writer.
- **Device is Locked!**
The OTP device has been locked.
- **ID Error!**
The Driver is not consistent with the ID in the OTP device
- **Not Blank!**
The OTP device is not empty.
- **Programming Failed!**
Failed to program the OTP device.
- **Verify Failed!**
The contents of the present OTP device is not consistent with the data in the HT-PLWriter's flash memory.
- **Lock Failed!**
Cannot lock the present OTP device.
- **ROM Format Error!**
The record format in HT-PLWriter's flash memory is incorrect. This error may be caused by incomplete downloading or because the contents of the flash memory is not valid for the present Driver in the HT-PLWriter.
- **Writer Time-out!**
The HT-PLWriter does not respond after a command has been issued.
- **Error in Checksum of Received Data!**
The checksum returned from the HT-PLWriter is incorrect. Restart the HT-PLWriter and the software utility.
- **Unknown Error!**
The software utility cannot recognize the message returned from the HT-PLWriter. Restart the HT-PLWriter and software utility.
- **No Options Exist!**
When selecting the Option menu commands (Option & Print), an OTP file has to be first opened or the options have to be read first from the OTP device.
- **Fail to load Option DLL!**
This is an internal error caused by incomplete installation.
- **Fail to GetProcAddress!**
This is an internal error caused by incomplete installation.

- There is no Data in the PC Buffer
An OTP file must be opened before executing the Program or Verify instructions.
- The Current File has not been Downloaded, Download It?
The OTP data shown in the main window has not been downloaded into the flash memory of the HT-PLWriter, select <Yes> to download the OTP data and process the present instruction. Otherwise, select <No> to terminate the instruction.
- Program ROM not Blank!
The result message for the Blank Check instruction indicating that the OTP device is not empty.
- Program ROM Blank!
The result message for the Blank Check instruction indicating that the OTP device is empty.
- Failed to Write to Program ROM!
The HT-PLWriter has failed to write to the program ROM.
- Write OK!
The HT-PLWriter has successfully programmed the program ROM.
- Failed to Verify Program ROM!
The HT-PLWriter has failed to verify the contents of the program ROM.
- Verify OK!
The HT-PLWriter has successfully verified the program ROM.
- S/N Address Exceeds the Program ROM Size, Set to Default Address: 1, 2, 3, 7
The address specified for the serial number exceeds the program memory's range. The system will set the addresses to the default addresses 1,2, 3,7.
- S/N Addresses are not Blank in the OTP File!
In the present OTP file, there is data already written to the address specified for the serial number.
- MCU: Cannot Identify
The software utility does not recognize the ID that is read from the OTP device when executing the [Chip Info] instruction.

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