

***PROM8908D/E/F, PROM9801/00***  
***PROGRAMMER Operation Manual***<sub>(07Sep2002)</sub>



**CAPRILION ENTERPRISE CO.**

11F, No. 50 Cheng Hsing Road  
KAOHSIUNG 807, TAIWAN, ROC  
Tel: 886-7-3865061  
Fax: 886-7-3864521  
<http://www.caprilon.com.tw>  
Email: sales@caprilon.com.tw

## Contents

1. Power-on Initial --(2)
2. The layout of key switches and LCD display --(3)
3. The key-switch command operations --(3)
  - Checksum --(3)
  - Verify --(4)
  - Copy/Force --(4)
  - Algorithm/PSB setting --(5)
    - The PSB setting for Memory block Protection Transfer and Group Selection --(6)
    - +Name, -Name --(7)
4. Steps for upload, download and calibration --(7)
  - 4.1 Download --(7)
  - 4.2 Upload --(8)
  - 4.3 Voltage calibration and Verify-type setting --(8)
5. Firmware Update --(9)
6. Appendix of IC operation note --(10)
  - 16bit devices
  - M29/Am29F002T/NT/B/NB --(11)
  - Am29F040
  - Atmel 49F001T/002T --(12)
  - Atmel 49F010/020/040 --(13)
  - Atmel AT80C1051/2051
  - Atmel AT90S1200 --(14)
  - Winbond W29C020/040 --(15)
7. Operation examples --(15)
8. Warranty --(17)

## ***1. Power-on initial***

When the power is turn on, the PROM8908 will take a few seconds to configure its hardware and turn off all the slave's LED lamps. It then starts to check all textool pins by accessing their address bus(A0..A15) and data bus(D0..D7). If there was any error, it will shows " D. BUS ERROR !!!" on the LCD display and it shouldn't be used for any IC related operation. If the test was passed, it brings up the device name which is the last operated one before the previous power-off, and be ready to use.

If the PSB(Protection-Setting-Byte) byte was not set to zero, a warning message "PSB is Locked, Press any key" will appear at the final check to alert the user and wait for an acknowledgment of this situation.

The machine's stack is always been checked at every command operation to make sure that this machine is in a good condition. If a " Stack error!" message appears at anytime, this machine should be doubt on its reliability.

There shouldn't has any IC left on the textools when the power is turn on or off. This might cause an unreliable self-checking results or will damage this IC.

## ***2. The layout of key switches and LCD display***

### ***2-1. The LCD panel***

DEVICE	NAME	CHECKSUM
i27256		0000
P	VPP=12.5V	
\$	MESSAGE	

(1) **DEVICE NAME**: Shows the current device being processed.

(2) **\$**: For EPROMs, this field indicates the current

programming algorithm of speed. For some flashes, it indicates the current Protect-Setting-Byte(PSB) setting value.

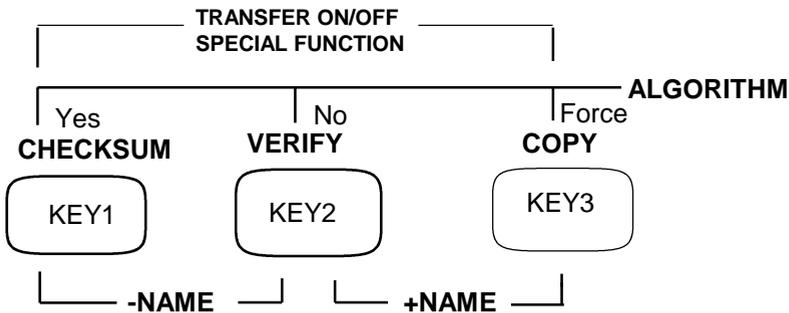
(3) **CHECKSUM**: Displays the master checksum value calculated during the last read-related actions such as "VERIFY", "COPY", etc. The machine will beep every time this value has changed. This value is calculated by one's complement method for the convenience of recognizing a blank \$FF device. For the compatibility with other machines, there is a normal checksum value displayed just below this field each time when the "CHECKSUM" command is executed.

(4) **MESSAGE**: display the general operation message.

**[PROM9801]**

For devices which has the "T48" message shown 4on this field when its name was selected should be handled on the upper 48pin textools.

## 2-2. key switches



## 3. The key-switch command operations

**Checksum**[key1]:

It calculated two types of checksum value of the master IC's memory contents. The first one is calculated by adding up the one's complement

of each byte and shows the sum's last four digits on the LCD's upper row. The second one is calculated by adding up each byte and shows on the LCD's lower row. The first value has the advantage of knowing if the master IC is a blank one or not. For a byte in a erased status(0xFF), adding up its one's complement will always get a '0000' checksum no matter what the size the IC is.

Each time when the calculated value is different from the previous one, a '\*' mark will show on the LCD, leading its value, and a longer beep is accompany with to alert the user.

### ***Verify***[key2]:

Verify the contents of the slave ICs with the master in a byte by byte basis. At the end of this command, some IC's protect status(see section 5) will also be verified with the PSB settings. When you see a red lamp lights just at the final moment, it can almost be sure that it is caused by the un-match of the protection status.

Each time after the power is on, the verify action is conducted only once at the normal VCC voltage. A special mode can be set to verify it twice at different voltage levels, one at a higher voltage(+5% or +10%) and the other one at a lower voltage(-5% or -10%). This includes the verify action embedded in the COPY command.

### ***Copy***[key3]:

This command doing a blank check and/or erase action first, then copy the memory contents of the master IC to all the slave ICs. At last, a VERIFY command was executed to make sure the contents is correct.

A "***Force***" command can be issued by depressing the "COPY" key and hold it down until the programmer acknowledged it with a beep sound. This command will bypass the blank check and/or erase action, start the copy of memory immediately.

For some ICs(see section 5) which has the block lock/protect feature, the programmer will enable/disable this feature on those blocks according to the settings in the PSB byte.

***Algorithm/PSB setting***[key1 + key2 + key3]:

For most EPROMs, this command changes the programming algorithm and the time. Although this is an user accessible feature, we don't encourage to change it unless the user knows exactly what he is doing. Instead, we suggest using the default algorithm to program the device.

For some Flash/Micro ICs, this command become the entrance of the setting mode for the PSB byte.

For other ICs, this command has no action.

**The PSB setting for Memory Protection:**

For ICs which has the ability to lock/unlock some of its memory blocks, preventing data from accidentally lost, the PROM8908 can deal this feature through the PSB(Protection-Setting-Byte) settings. The user should pay attention on its value(shown by 2 digits on the lower left corner of the LCD display in HEX number) because it will influence the result of how those ICs be Copied and Verified.

When those IC's name was chose, depressing all three keys together will bring out the PSB value in bit form on the LCD display. The leftmost bit corresponding to the highest address block of memory and a "1" means this block is "locked". Use [key1] or [key2] to move the cursor to the proper bit position and use [key3] to toggle it. After all bits are setted(all no-use bits should be set to '0'), move the cursor out of those region and depress [key3] to exit. The new value will be shown on the display immediately.

### ***Transfer and Group Selection***[key1 + key3]:

The PROM8908/980x can upload data from the master IC to the PC, or download data from the PC to the slave ICs. Also the PROM8908F using this command to select the Device Group and Size of the target chip.

#### **[PROM8908D/E, PROM980x]**

Using this command to enter the transfer mode will bring up the LCD message " Down Load ?" and waiting for an action key.(This command will be aborted when an invalid key was entered)

If you want to do the download, insert the ICs into the slave textools first and then press the Yes[key1]. All slave ICs will be checked or erased to its blank status. If everything goes fine, it will bring up the LCD message "Download Rdy " and wait for data ***download*** from the host PC. (See section **4.1** for following steps)

If you want to do the upload, depress the No[key2] to bring up the LCD message " Up Load Ready." and wait the host PC to ***upload***. (See section **4.2** for following steps)

If you press the [key2] and [key3] together, it will enter the ***Voltage calibration and Verify-type setting*** procedure.(See section **4.3** for following steps)

#### **[PROM8908F]**

Using this command to select one of the two different sets of function. One is for device group selection(Flash, Eprom or Micro) which was conducted by [key2] and, the other is for data transfer selection(upload, download and calibration) which was conducted by [key1]. When a function was bring up onto the LCD display, depress the [key3] to select it.

After a device group was selected, a further detailed selection based on the size of the chip has to be chose, to help the user more quickly locate his target.

If you want to do the download, insert the ICs into the slave texttools before you depress the [key3] to have them be checked or erased to their blank status.

+**Name**[key2 + key3], -**Name**[key1 + key2]:

[**PROM8908D/E, PROM980x**]

Select the next device name for operation. The arrangement of the name's sequence is from smaller to larger size with the EPROM group comes first, followed by some special devices and then the FLASH group.

The -Name circulate the name list in opposite direction as the +Name does.

[**PROM8908F**]

Select the next device name in this device group for operation. Only the devices of this size category will be shown and can be chose. You can't find device name not belong this size or type.

#### ***4. Steps for upload, download and calibration***

**4.1** When the LCD shows " Download Rdy " message, following the steps below to complete the ***Download:***

(This procedure can be abort at this time by depressing the key1+key3)

1. If you see a " Clear buffer?" message before " Download Rdy ", that means there is already a byte received and, what you want to do on it? Yes[key1] will drop it and waiting for the next data come in, which is the most usual choice. No[key2] will write this data as the first byte into the IC.

2. Run the PROMUTIL.EXE utility on the PC and follows its instruction. (use /I switch to set the LPT port number as required.)

3. There is no final VERIFY action taken at the end of download such as in the COPY commands. Instead, a checksum of all the received data bytes will be shown on the LCD display, letting the user to verify its correctness manually by reading these IC's checksum in the master textool.

**4.2** When the LCD shows " Up Load Ready." message, following the steps below to **Upload:**  
(This procedure can be abort at this time by depressing the key1+key3)

1. Plug the IC into the master textool.
2. running the PROMUTIL.EXE utility on the PC and follows its instructions. (use /I switch to set the LPT port number as required.)
3. At the end, there is checksum shows both on the LCD and the PC monitor, to let user to verify its correctness.
4. The user can abort the transfer at any time by disrupt the PC, usually using the CTRL-C.

### **4.3 Voltage calibration and Verify-type setting:**

The PROM8908 has a build-in calibration feature on the programming voltage VCC and VPP. An offset value will be memorized and be used to adjust all related voltage. The calibration need only be done once within a period of months or when those voltage are in doubt.

Use a multimeter to measure the value on any one of the slave textools.

You can't leave any IC in the textools when doing the calibration, or it will be damaged.

After the voltage calibration, you can choose the verify type the VERIFY command does. There are three types can be chose: verify once at normal VCC voltage(the power-on default), verify twice at VCC +- 5%, or verify twice at +- 10%. The choice will be effected immediatly until the power is off.

## ***5. Firmware Update***

### **[PROM8908D/E, PROM980x]**

The PROM8908D/E has a firmware PROM located at the back side of the main board. It can be easily accessed by simply remove the four plastic stands at the bottom of the machine. The user has to download the updated firmware image file from the web and copy it into a 27C512 equalivent PROM(with access time 70ns) and replace it.

### **[PROM8908F]**

The PROM8908F use an embedded flash ROM with the ISP feature. The user can run the utility program AVR.EXE(with the avr.ini file) on the PC and using the ISP cable to update the firmware through a PC printer port.

After the AVR window was bring up, the printer port was set to "AUTO" and the CPU type was set to "ATMega128" as the default. No "FUSE" or "LOCK" bits update was required(leave those four small tick boxes blank). The user only have to select the correct file(p8908f.bin) and "PROG" it. All setting parameters will be saved in avr.ini after program EXIT for the next time re-use.

## ***6. Appendix of IC operation note:***

The following ICs' lock status has the PSB copied in the COPY command and verified in the VERIFY command:

AM29F010, AM29F040-old, AM29F040, AM29F002T/NT, M29F002T/NT, MX29F8100, MX29F1610, W29C020, W29C040, AT49F010, AT49F020, AT49F040.  
(For AT49F001T and AT49F002T, the PSB will be copied, but not verified)

The following ICs have the capability of Temporary Sector Unprotect feature, allows code changes in previously locked sectors. This feature can be enabled by setting the PSB byte to value \$FF.

AM29F080, AM29F016, AM29F100, AM29F200, AM29F400, AM29LV400, AM29F800, AM29LV800, AM29LV160.

## ***16bit devices:***

### ***16bit EPROM operation on the PROM8908D/E/F***

The PROM8908 was originally designed to handle the 8bit chips. For EPROM with 16bit structure only, you need using an adapter and programming it in a special way: You have to do every operation twice, one on the low byte(D0..D7) and the other on the high byte(D8..D15).

A complete process will be:

- 1.** Set both DIP switches(totally 16) on the adapter to the same direction. This will connect half of the 16bit bus onto the terminal pin and open the other half to make them pulled up. Then you treat this chip just like 8bit device and operate the programmer in the usual way.
- 2.** After the first half part of the chip has been done, you switch all DIP switches to the other side to process another half in the same way.
- 3.** Only both steps work successfully, the process is completed.

For large quantity of ICs, we recommend you process the half part on all ICs together first, then switch to do the other half again.

### ***16bit FLASH operation on the PROM8908D/E/F***

For 16bit flash devices with ability of BYTE configurable, the PROM8908 always handle it in the BYTE mode. For devices only have the WORD configuration, it's impossible to handle on this machine.

### ***16bit EPROM/FLASH operation on the PROM9801***

The upper 48pin texttools are used to handle all 16bit EPROMs and 16bit word-configurable-only devices. When these names were selected, a "T48" or "Use Adapter In T48" message will shown on the LCD to indicate it.

### ***M29/Am29F002T/NT/B/NB Operation***

These chips only has seven sectors available. The value of bit 7(msb) in the Protect-Setting-Byte(PSB) is irrelevant, only the lower seven bits are used for setting/verifying the IC's sector protection status.

The master IC's protection status will not be used for any purpose. Instead, the PSB was used in the COPY and VERIFY command.

After the regular verify on the memory array was completed, all the slave IC's protecting status will be compared with the PSB settings. A slave IC will be acknowledged as good only both comparing of the array and the PSB were passed. If the error LED lights at the last moment during verify, it mostly can say that the protection status is only the difference.

### ***Am29F040 Operation***

There are two names can be chose for this device, AM29F040-old and AM29F040. When "COPY" command is executed, the "-old" name will conduct an extra step of doing the Sector-Protect-Unprotect on the chip.

Because some newer date-coded chip(dated after 3) have a different Unprotect algorithm, the old algorithm will cause all eight sectors been kept on "Protected" state, and causing the following erase action fails. We strongly recommend that using the "AM29F040" name to handle the newer date-coded chips. For those newer dated chips which already been sector protected, it have to be unprotected on some other programmer.

Both names will handle the post Sector-Protect action correctly, after the copy was completed, according to the value in the PSB byte where bit7 represent the highest sector and a "1" means "Protect".

The master IC's protection status will not be used. Instead, the PSB was used in the COPY and VERIFY command.

**1. VERIFY:** After the regular comparison on the memory array completed, all the slave IC's protecting status will be compared with the PSB setting. A slave IC will be acknowledged as a good one only both comparing was passed. If the error LED lights at the last moment, it mostly can say that the protection status is the only difference.

**2. COPY:** The slave chips was erased first, then the master's contents was copied to all slaves, then the sector protect was done according to the PSB setting. At the last, the VERIFY action will taken. If the "-old" name was chose, a Sector-Unprotect action will be conducted at the very beginning, before the erase step.

The "AM29F040" name should be used for most chips, unless you are sure the chip you have is of the older one.

## ***Atmel 49F001T/002T Operation***

These chips have a boot block with lockout feature. This feature works in a OTP (one-time-program) way, which means once it had been activated, it can't be unlocked anymore. To prevent it from accidentally enabled, the user must set the Protect-Setting-Byte (PSB) to the value of 5A(HEX) to let the programmer activate this lockout feature automatically in the COPY command. (Since version 1.16)

## ***Atmel 49F010/020/040 Operation***

These chips have a boot block with lockout feature. This feature works in a OTP (one-time-program) way, which means once it had been activated, it can't be unlocked anymore. To prevent from accidentally enabled, the user must set the Protect-Setting-Byte (PSB) to the value of 5A(HEX) to let the programmer activate this lockout feature automatically in the COPY command.(Since version 1.16)

The VERIFY command will compare the content of all salves with the master device first, then compare their lockout status with the PSB setting. Only those which have both comparisons passed will be recognized as a good one.(Since version 1.16)

## ***Atmel AT80C1051/2051 Operation***

The setting of the Lock bits are stored in the Protect-Setting-Byte (PSB) of the programmer. This value also control some command's (COPY, VERIFY and DOWNLOAD) operation.

The followings explain each bit's meaning and location. Please be noted that the programmer doesn't use any of these information stored in the master IC.

BIT	7	6	5	4	3	2	1	0
	x	x	x	x	x	LB2	LB1	x

1. **VERIFY:** If the Lock bit is set to the "read suppress", all slave ICs will be verified with fixed value of \$FF to confirm this setting. If it's not, all slave ICs will be compared with the master contents.
  
2. **COPY:** Erase all slaves first, copy the contents of the master, then set the Lock bits in all slaves according to the bits stored in the PSB. At the last, a VERIFY command was executed.
  
3. **DOWNLOAD:** Erase the slaves first, transfer data to the slave's memory array, then set the Lock bits in all slaves according to the bits stored in the PSB.

### ***Atmel AT90S1200 operation***

The setting of the Lock and Fuse bits are stored in the Protect-Setting-Byte (PSB) of the programmer. It also control some command's (COPY, VERIFY and DOWNLOAD) operation.

The followings explain each bit's meaning and location. Please be noted that the programmer doesn't use any of these information stored in the master IC.

BIT	7	6	5	4	3	2	1	0
	x	x	SPI	x	x	LB2	LB1	RCE

1. **CHECKSUM:** Show the checksum of the Flash memory portion in the master IC. Its Fuse and Lock bits information also be shown in [xx] format.
  
2. **VERIFY:** First, compares the Fuse and Lock bits of all the slaves with the settings in PSB. Second, if the Lock bits is set to the "read suppress", all slave ICs will be verified with value \$FF to confirm this setting. If it's not, all slaves will be compared with the master's contents (the flash portion).

**3. COPY:** Erase all the slaves, copy the flash portion of the master IC, and then set the Fuse and Lock bits according to the value stored in PSB. At last, execute a VERIFY command.

**4. DOWNLOAD:** Erase all the slaves, transfer data to the slaves' flash portion, then set the Fuse and Lock bits according to the value stored in PSB.

### ***Winbond W29C020/040 Operation***

This chip has two boot blocks with lockout feature. This feature can be enabled by setting the bit0(the first boot block) or the bit7(the last boot block) in the programmer's Protect-Setting-Byte(PSB). The other bits(bit1..6) are don't-care.

Before writing, all the slaves will be unlocked and erased. After the contents of master IC has been copied into the slaves, the boot block will be locked according to its bit status in the PSB byte.('1' for lock, '0' for no-lock)

The VERIFY command will compare the content of all slaves with the master device first, and then compare their lock status with the PSB setting. Only those which has both comparison passed will be recognized as a good one.

### ***7. Operation examples***

#### **7-1 Copying 27256 EPROMs:**

**step1:**

**[PROM8908D/E]:**

Select the correct device name by depressing +NAME[key2 + key3] or -NAME[key1 + key2].

**[PROM8908F]:**

First, select the EPROM device group by entering Transfer mode [key1+key3], then pressing [key2] to bring up the "Eprom Group" message onto the LCD display, then pressing [key3] to confirm.

Second, select the required chip size by pressing [key1] or [key2] to bring up the "Size 512K" message(actually it is already there) and pressing [key3] to confirm.

The last, using +Name or -Name to find the required chip name.

**step2:** Insert the master IC into the master socket. Although it's not a necessity, depressing the CHECKSUM[key1] to calculate and identify the checksum value each time when a new IC was in the master socket might be a good habit on operating this programmer.

**step3:** Insert some erased 27256 EPROM into the slave sockets. (Let's suppose that you have insert 6 pieces into the sockets, from slave0 to slave5, and the one in slave5 is not blank)

**step4:** Depressing COPY[key3] to start the copy action.

The programmer shows error with the message "Not blank! " and a series of short beep. Also the LED lamp of the socket 5 was light to indicate that this one is not blank.

**step5:** Remove that EPROM from socket and insert a new one, or just leave this socket empty.

**step6:** Depressing the COPY key again.

This time the programmer will pass the blank check stage and start to copy the master's contents into all slaves. During the copying, the amount of kilobytes been copied was shown on the LCD to show its progress, and the LED will light if its corresponding IC failed on the copying.

At the end of the copy, the programmer automatically do one VERIFY command to make sure the correctness of data be copied. The

master's checksum was recalculated and displayed again. A noticeable beep will alert the user if there is any change at the checksum value which, in normal situation, shouldn't be happen.

All the failed ICs, including the empty sockets, are indicated by lighting their corresponding LED.

## **8. WARRANTY**

These products are warranted to be free from defects in materials and workmanship, but excluding the ZIF texttools which are of expendable materials, for 18 months from the date of shipment or 12 months after delivery to the first purchaser for use, whichever occurs first, providing that the units have not been misused. Caprilion's obligations hereunder are limited to repairing or replacing any unit which upon examination prove to have been defective within the warranty period specified and are returned to seller's site at the buyer's expense. Authorization must be obtained from Caprilion prior to the return of any product under this warranty. Units or parts which have been subject to the damage of transportation, accident, alteration, abuse, misuse or unauthorized repair are not covered by this warranty.

THE WARRANTY SET FORTH HEREIN IS THE ONLY WARRANTY, ORAL OR WRITTEN, MADE BY CAPRILION ENTERPRISE CO. AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING ANY LOST OR DAMAGE CAUSED BY ITS USE.