FLASH PROGRAMMER

FP-8903

VER 2.00

USER'S MANUAL

TABLE OF CONTENTS

1. INTRODUCTION

1.1 MANUAL CONTENTS

This manual describes the method for installing and operating the FP8903 PROGRAMMER with an IBM PC running on window environment . This manual also contains information about the PROGRAMMER usage in stand-alone mode.

1.2 PROGRAMMER AND ACCESSORIES

Before using this product, please carefully check that the package includes :

* FP8903 PROGRAMMER.

* 9 pin D type connector communication cable

* Power cord

* User's manual.

* CD-ROM .

2.0 FEATURES

Supports following devices:

a) 89C1051, 89C2051, 89C4051, 89C51, 89C51RC, 89C52, 89C55, 89C55WD, 89S8252, 89S51,89S52, 89S53 ,89LS51,89LS52.

b) 90S1200, 90S1200A, 90S2313, 90S4414, 90S8515, 90S4434, 90S8535.

Performs following functions on each device

a) Signature check
b) Blank check
c) Verify
d) Erase
e) Program
f) Read
g) Program lock bits
h) Checksum
i) Auto
j) Edit

PC interface for all above functions and following additional functions:

a) File load from PC to PROGRAMMER (DOWNLOAD)

b) File read from PROGRAMMER to PC (UPLOAD)

Menu driven PC software to select various functions run under windows environment.

Built in battery back up RAM (32768 bytes) to store the program data.

Local keyboard (20 keys membrane) & local LCD (16 x 1 LCD) for PC independent operation, thus useful for programming devices for mass production.

PC interface through any one of the serial ports COM1 to COM10.

PROGRAMMER operates with 230 V 50 Hz AC and requires very low power. No special power supply is necessary.

40-pin ZIF socket for 40 pin devices and 20-pin ZIF socket for 20 pin devices.

3.0 INSTALLATION

System Requirements:

PC PENTIUM I or above.

Minimum 32 MB RAM

Minimum 5 MB Hard Disk Space

CD-ROM Drive

Color Monitor (EGA / CGA)

One RS-232 Compatible Serial Port

Operating system win95 and above

3.1 INSTALLING SOFTWARE

To install FP8903 PROGRAMMER and software supplied, follow the steps below to copy all the files on supplied diskette to a sub directory on the hard disk.

STEPS DESCRIPTION

Open the CD-ROM form windows explorer.

Run the 'setup' application from package folder

Follow guideline provided by the installation wizard.

#After the successful installation process restart the system.

Contents of CD-ROM:

MANUALThis file itself.

Package folder containing setup application file..

3.2 HARDWARE INSTALLATION:

The PROGRAMMER can be connected to standard serial port of IBM compatible PC or LAPTOP.

Connect the PROGRAMMER through communication cable (supplied with PROGRAMMER) to any one of the serial ports of the PC (COM1 to COM10).

Male connector must be connected to the PROGRAMMER.

Turn ON the power switch of PROGRAMMER . LCD will display the following messages in steps

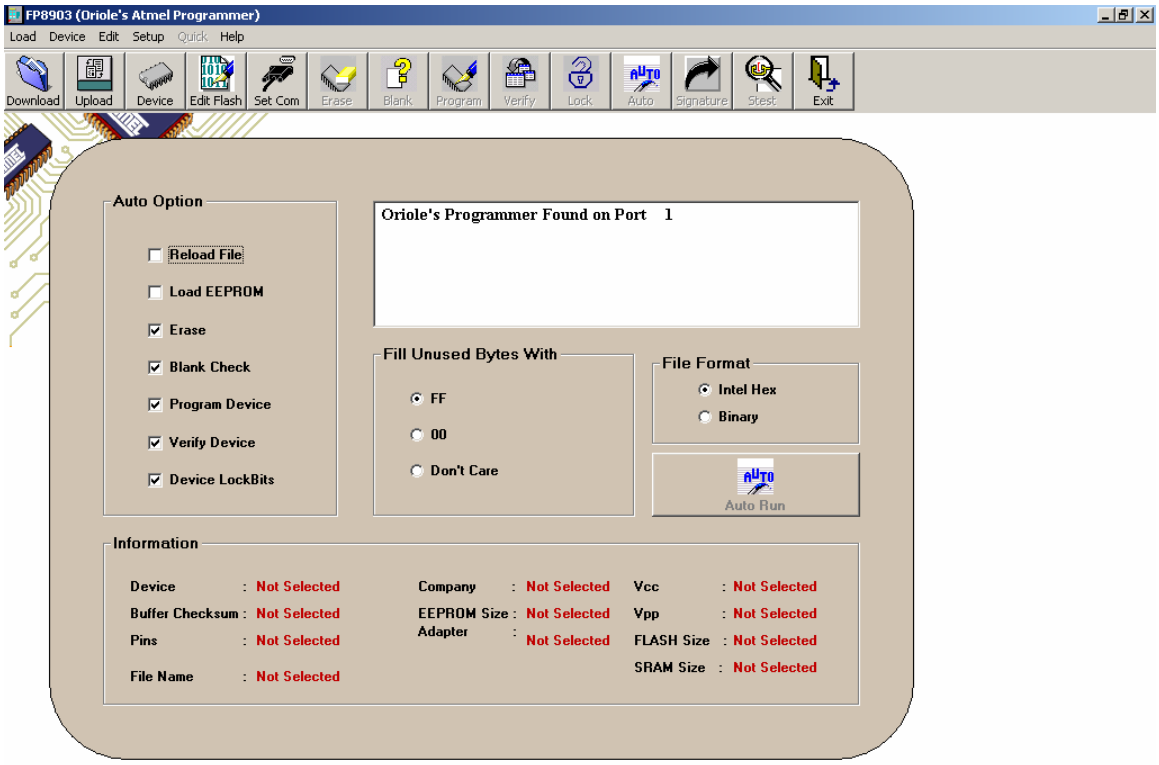
- ✓ ORIOLE presents,
- ✓ ATMEL PROGRAMMER
- ✓ VER 2.00
- ✓ SELECT DEVICE

3.3 RUNNING SOFTWARE

To RUN the software follow the steps given below.

1. Run the software start \programs\FP8903\FP8903 Or create shortcut on desktop of FP8903 and run application from it.

2.The following Display will display on screen



4.0 OPERATING MODE

PROGRAMMER is used to program ATMEL Micro controllers having Flash program memory. The main advantage of this programmer over the others is that it can work in two modes as:

i. PC Interface Mode

ii. Stand Alone Mode

To use the Flash programmer FP8903 in various mode follow the instruction given in the respective section .To use FLASH PROGRAMMER FP8903 in PC interface mode refer the section 4.1 And for using the STAND ALONE mode refer the section 4.2 of this user manual

4.1 PC Interface Mode

Power On:
When the software runs it shows the Splash form which contains picture of programmer and company name i.e. Oriole electronics Pvt. Ltd.. Software automatically detecting for the programmer if it not found it shows the message "Oriole's programmer not found Do you want to start in demo mode? ". If user press 'yes' key the software runes in **Demo mode** otherwise the software runes in **Normal mode**.

Demo Mode:
PC Software not found the Programmer. Some users wants to see the software and want to use the hex editor then it will be useful. The status window shows the message "Programmer Not Found Software Force to Demo Mode "

In this mode following menu will enable

1. download (and its shortcut)
2. setup (and its shortcut)
3. edit (and its shortcut)
4. help(and its shortcut)
5. exit (and its shortcut)

if user try to download file in to the programmer then it will show the message "Downloading Flash File in Buffer ..... Please Wait" and file will download in the PC's buffer not in the programmers buffer and user can see its file in to editor.

Normal mode:
PC Soft found the Programmer the its runs in the normal mode. The status window shows the message "Oriole's Programmer Found on Port 2 "

In this mode following menu will enable

1. Download (and its shortcut)
2. Upload (and its shortcut)
3. Device (and its shortcut)
4. Setup (and its shortcut)
5. Edit (and its shortcut)
6. Help (and its shortcut)
7. Exit (and its shortcut)

If device not selected :
If device has not selected and user presses the download button then also it will ask for the open file to download. After selection of hex or bin file, it shows the message "**Downloading file**" and then "**File Can't Transfer to Programmer's Buffer Please Select the Device**". User can see he file in editor only cant go in to quick menu or its shortcut.

In the PC Interface mode, the serial ports COM1 to COM10 can be used. The user can select the COM ports from the Setup menu. The user can download the file to the programmer or upload the file from the programmer to the PC. Menu driven software is provided to select various functions run under Windows environment.

The Front Window of the FP8903 software consists of the following sub-parts/windows/frames with a brief description of them as listed below: -

TOOL BAR: It depicts the program parameters with their respective identical icons. Execution of the program parameter is enabled by a single click only.

STATUS WINDOW: The outcome (successful/unsuccessful) after the Execution of the selected program parameter is reflected in the Status Window.

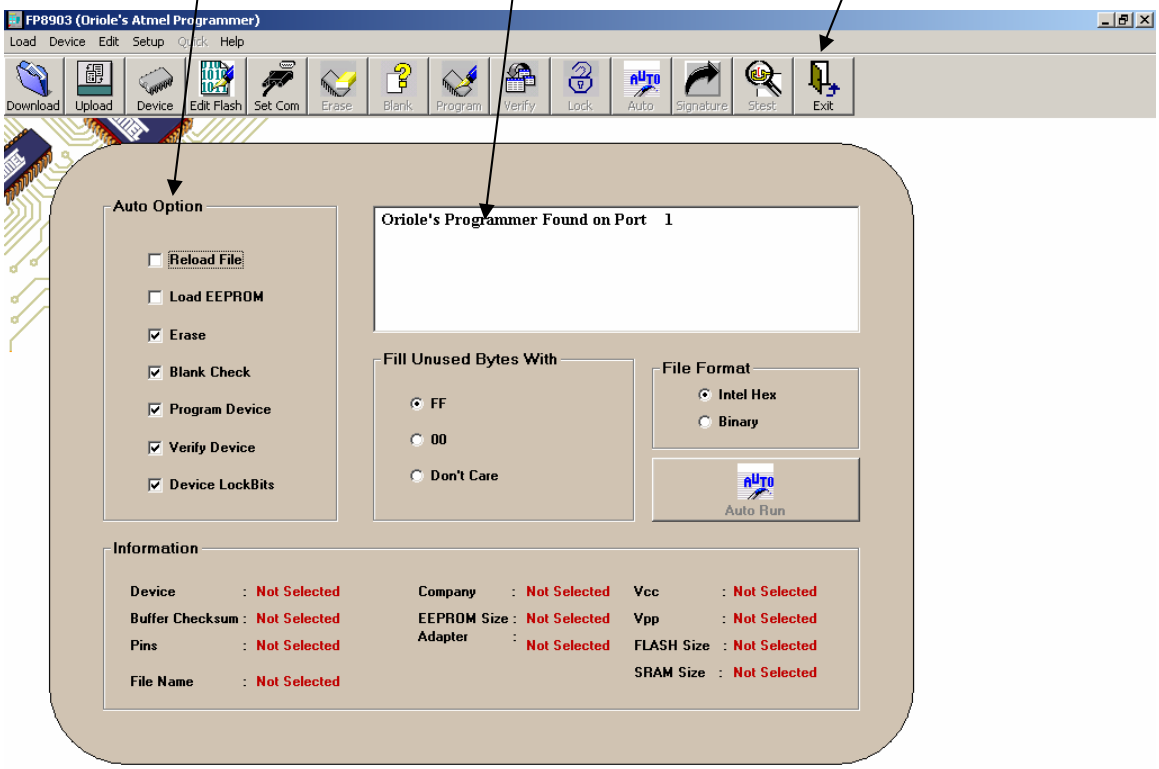
AUTO OPTION FRAME: The enlisted program parameters are selected as per the user requirement and are thereby executed sequentially.

DEVICE INFO FRAME: It gives a detailed description of the device selected along with essential specifications regarding the selected device.

Auto Programming frame

Status Window

Toolbar



Device Info Frame

DESCRIPTION OF MENU COMMAND

LOAD

UPLOAD :Transfers the selected Hex/Binary file from FP-8903 to PC

DOWNLOAD :Transfers the selected Hex/Binary file from PC to FP-8903

DEVICE :To choose the required ATMEL 89/90 series micro Controller

EDIT

FLASH :Edits the selected FLASH program file

EEPROM :Edits the selected EEPROM program file

SETUP :Builds communication setup for COM port for FP-8903 with the PC

QUICK

ERASE :Erase the Flash / EEPROM is blank.

BLANK :Checks whether the Flash / EEPROM is blank.

PROGRAM :Copies the selected program file contents in the Flash/EEPROM To the Chip from the FP8903's buffer.

VERIFY :Verifies the contents of the chip with FP8903's buffer.

SIGNATURE :Checks signature bytes of the chip.

STEST :Read the checksum of the program within the chip.

LOCKBITS :Programs all the lock bits of the chip.

AUTORUN :Selected program parameters in the Auto Option Frame

are executed sequentially.

PROCESS TO USE FP8903 IN PC INTERFACING MODE

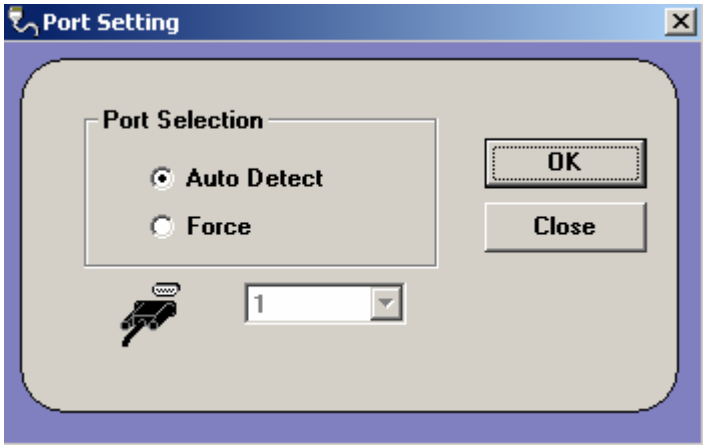
Use following menu command during operating the FP8903 in PC interfacing mode .

SETUP

This command is used to establish communication system and FP8903 unit. There are 2 port selection options available as:

1) **AUTODETECT**

2) **FORCE**

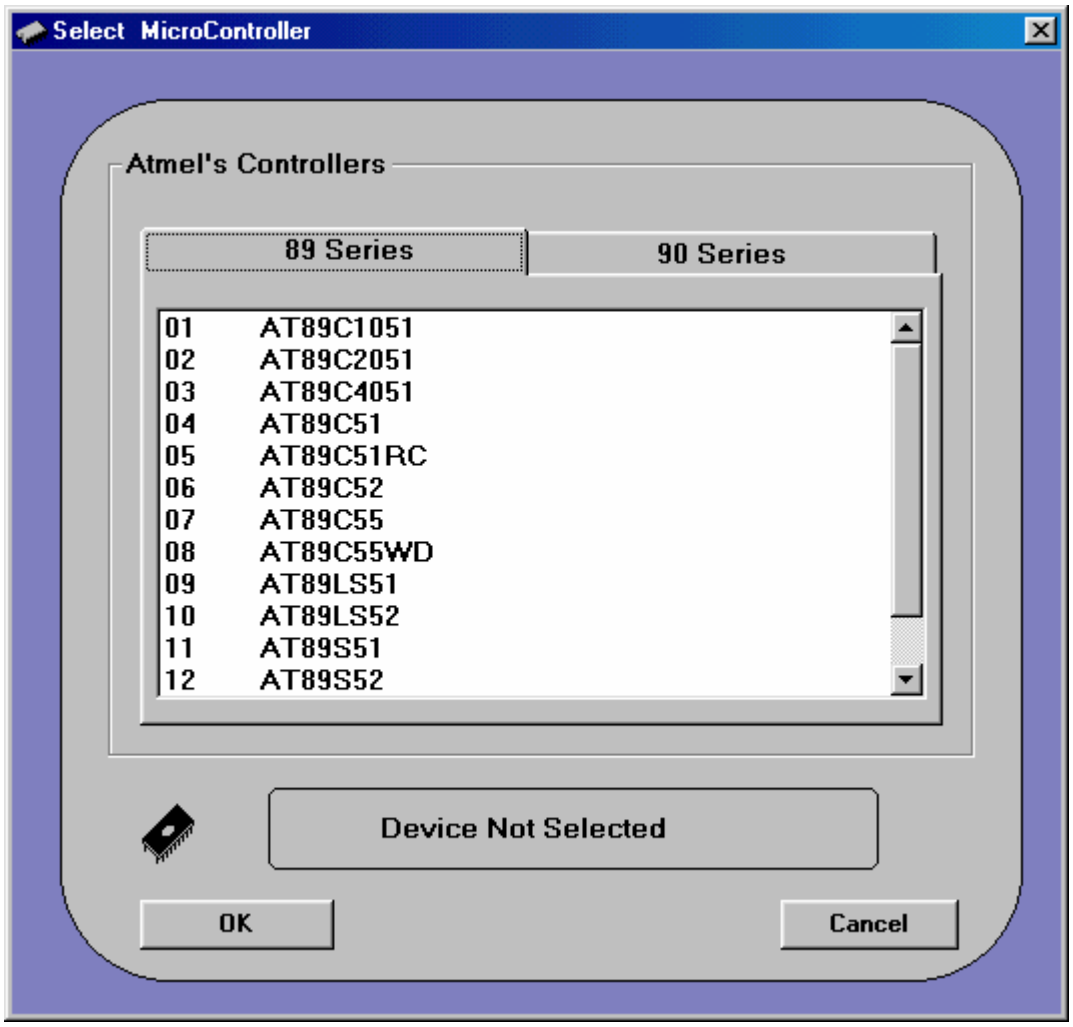


AUTODETECT :-If this option is selected then the software automatically selects the serial communication port on which FP8903 is connected.

FORCE:-If this option is selected then the serial communication port mentioned in the Combo Box is detected for FP8903 connection.

DEVICE SELECTION

FP8903 can program various Atmel devices of 89 Series and 90 Series. The required device can be selected from one of the various available devices as listed in Window as shown



Following Micro controllers can program in FP8903

Device List

Following micro controllers can be program in FP8903

89 Series Micro controllers

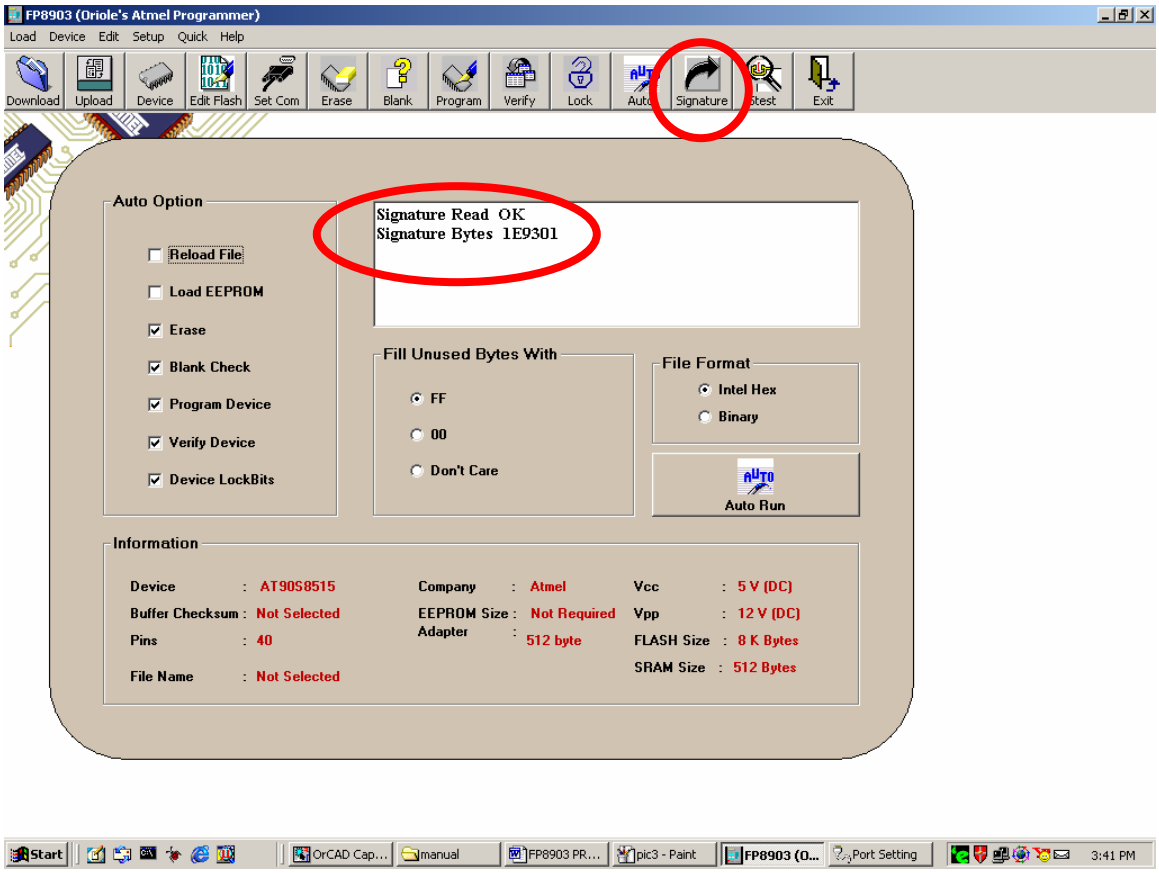
AT 89C1051
AT 89C2051
AT 89C4051
AT 89C51
AT 89C51RC
AT 89C52
AT 89C55
AT 89C55WD
AT 89LS51
AT 89LS52
AT 89S51
AT89S52
AT89S53
AT89S8252

90 AVR Series

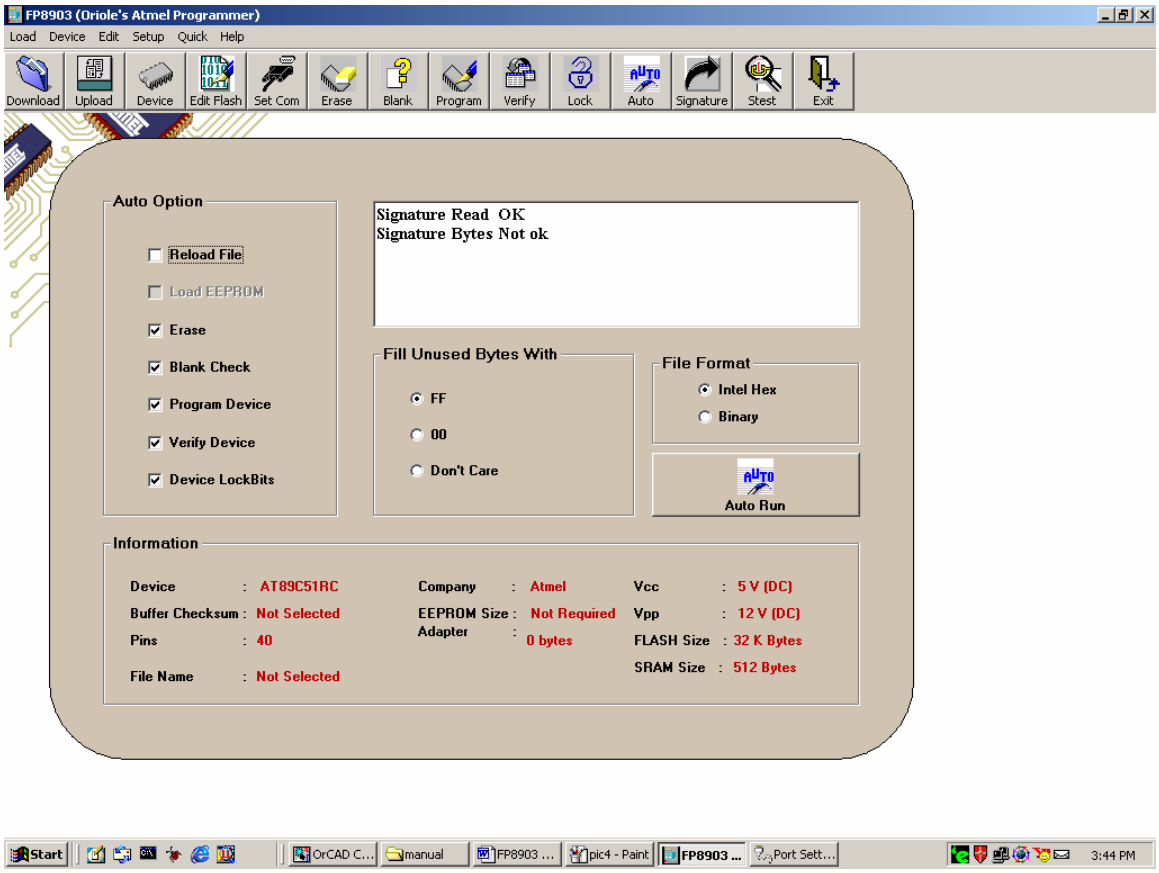
AT 90 S1200
AT 90 S1200A
AT90 S2313
AT 90S 4414
AT 90 S8515
AT 90 S4434
AT 90 S8535

SIGNATURE CHECK

This command reads the signature bytes of the selected device and displays it on the status window



If the chip is faulty then the Status Window displays the following error message.

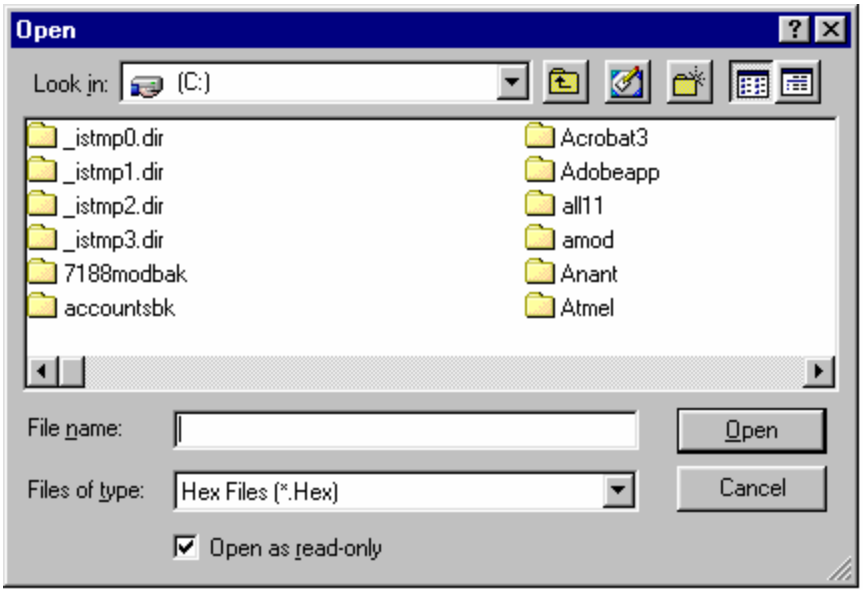


DOWNLOAD MENU

Download Menu Allows the user to transfer the required program file from PC to FP8903.
Required program file can be in program formats as :

1.Intel Hex

2.Bin

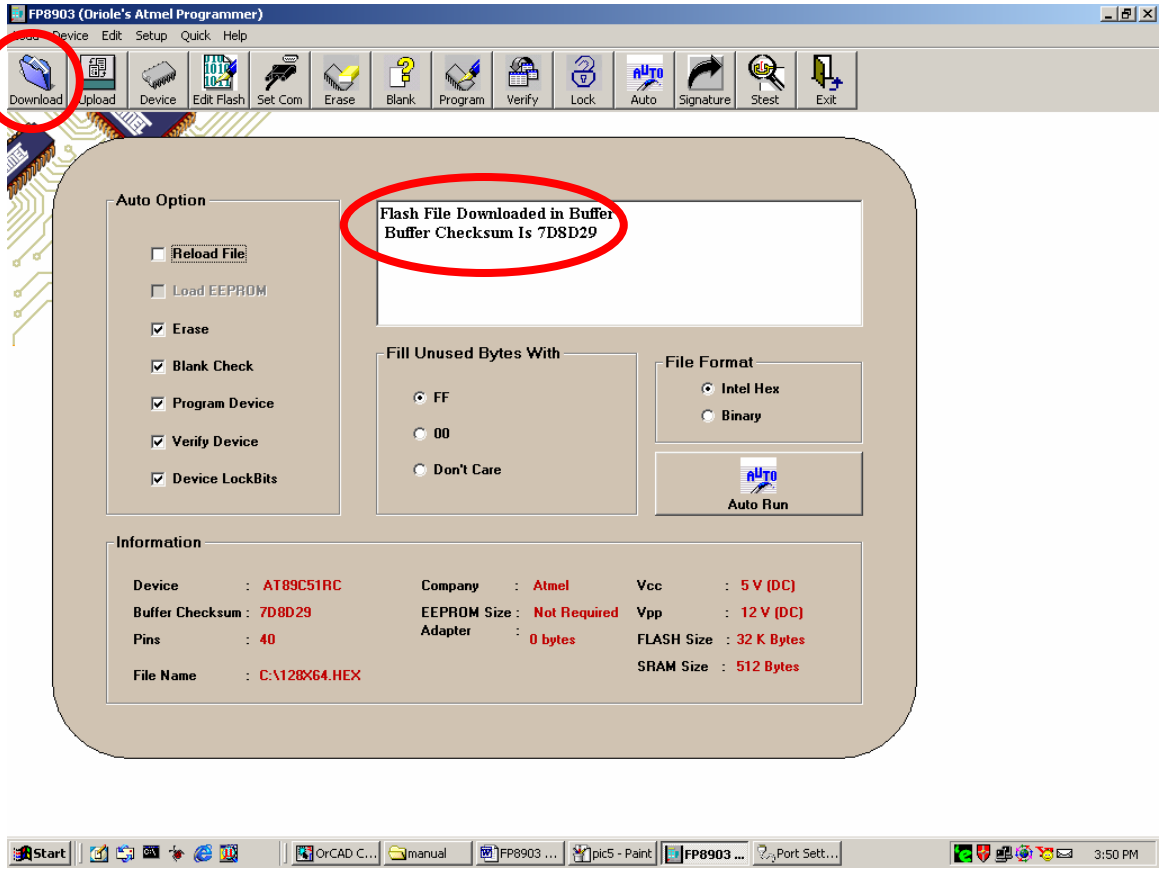


If the file format is selected on **Intel Hex** option, the software check for the intel hex standard format. If it is not there then it will give the error message in status window.

If the file format is selected on **Binary** option, the software downloads any file by converting in to binary.
And the empty space is filled with FF or 00 or don't care, whatever it selected in Fill unused byte with frame.

Once the required file selected, it gets downloaded t in the programmers buffer with internal baud rate of 19200. A confirmation message is displayed in the Status Window as

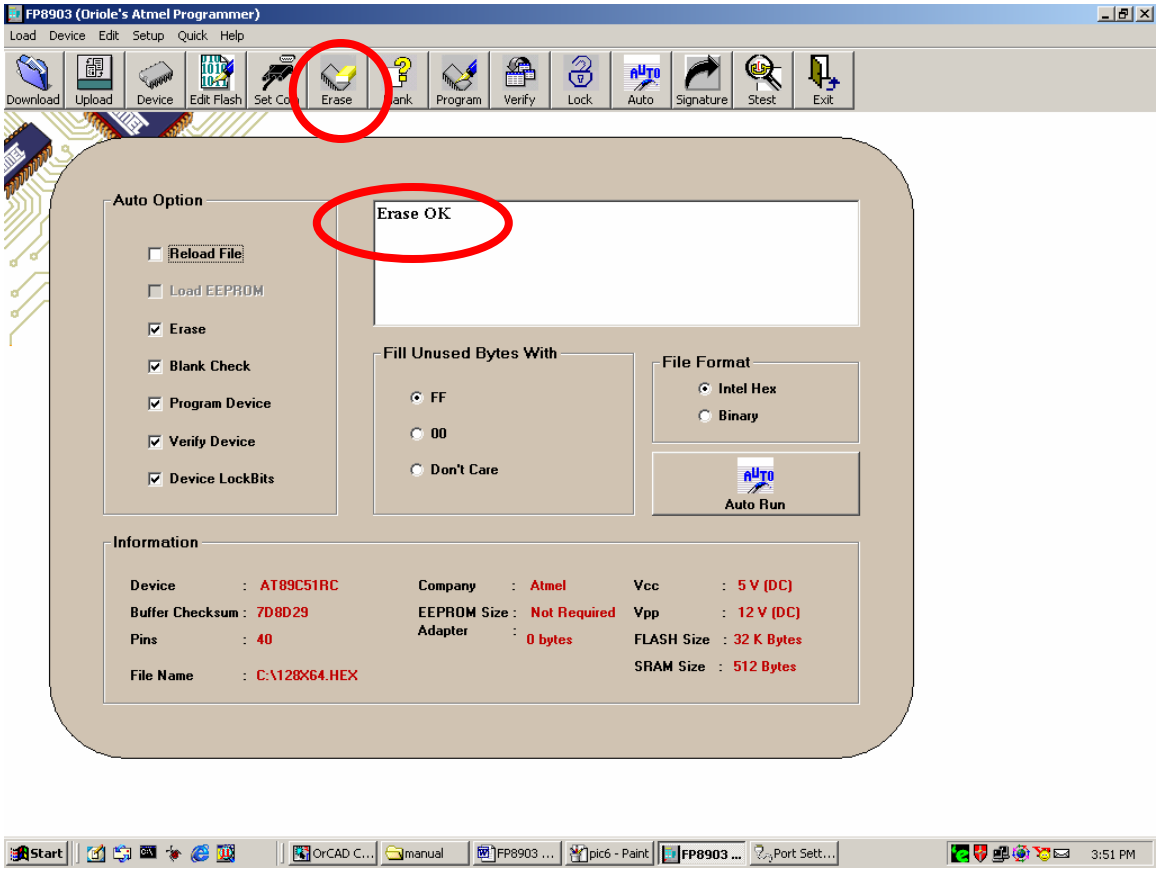
Once the required file selected, it gets downloaded. A confirmation message is displayed in the Status Window as



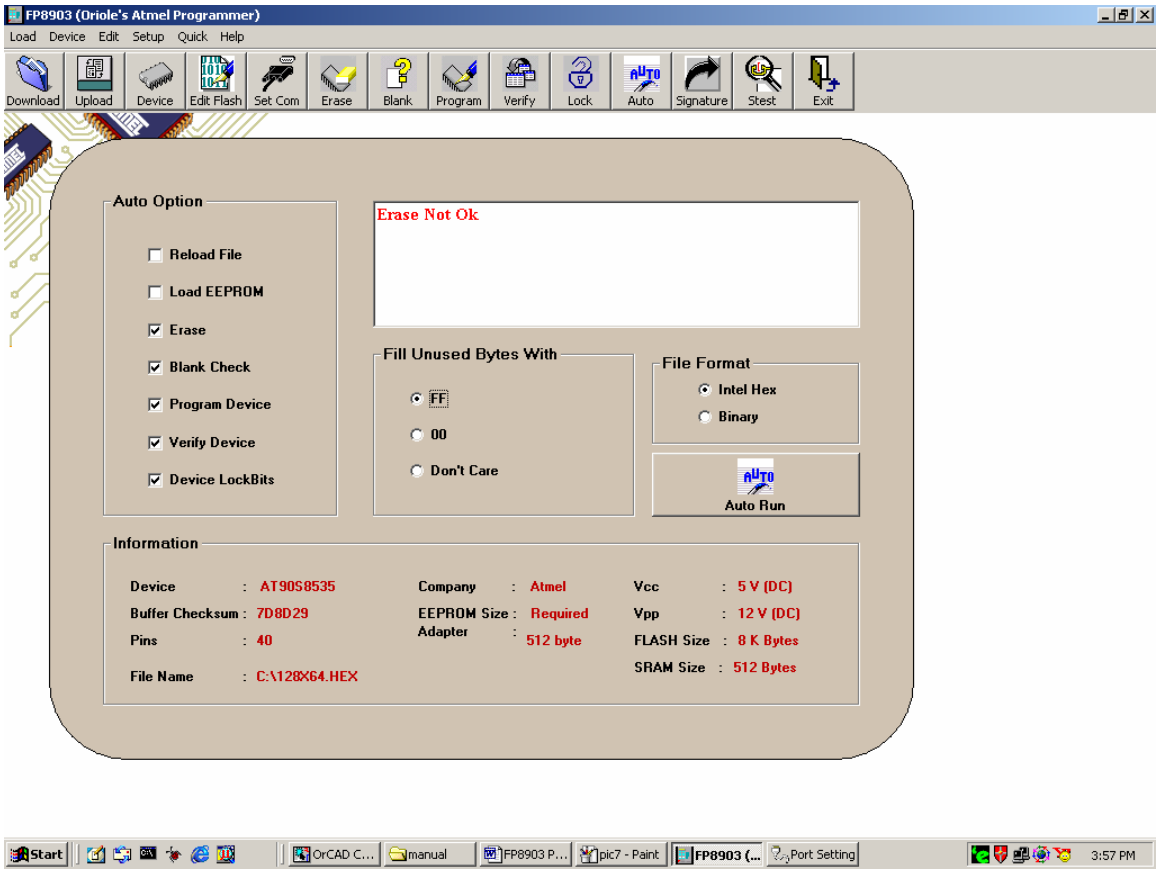
If the device is having the EEPROM along with FLASH,command will ask you for EEPROM file and FLASH file separately ,Follow the same procedure to select the file from its location.

ERASE DEVICE

The entire flash array is erased electrically by using proper combination of control signal. The code array is written with all "1"s. The chip erase operation must be executed before the code memory can be re-programmed.
It erases the contents of FLASH/EEPROM. After the Erase operation is executed successfully then the Status Window displays the following confirmation message as;

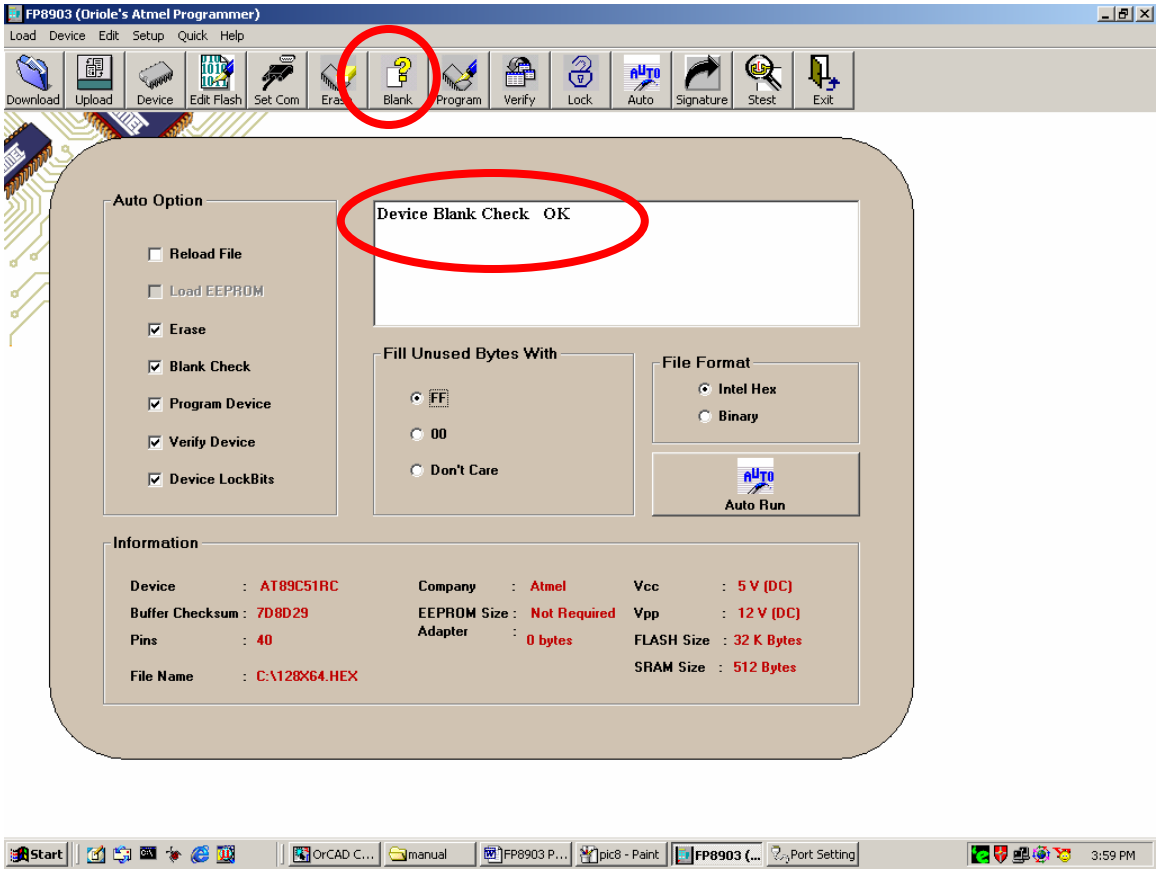


If the Erase operation is not performed successfully then the Status Window displays the following error message,

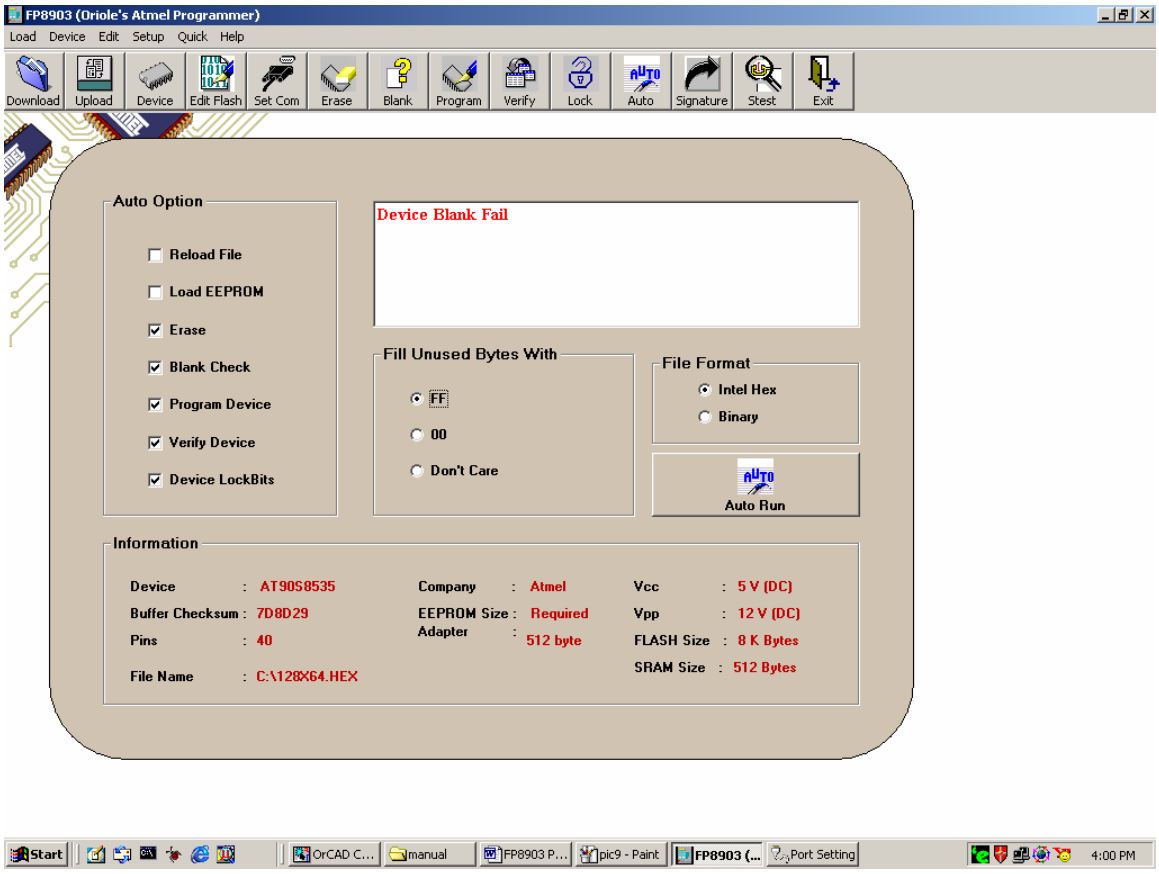


BLANK CHECK DEVICE

It checks whether the contents of FLASH/EEPROM are blank (FF in Hex). After the blank check operation is executed successfully the Status Window display the following confirmation message

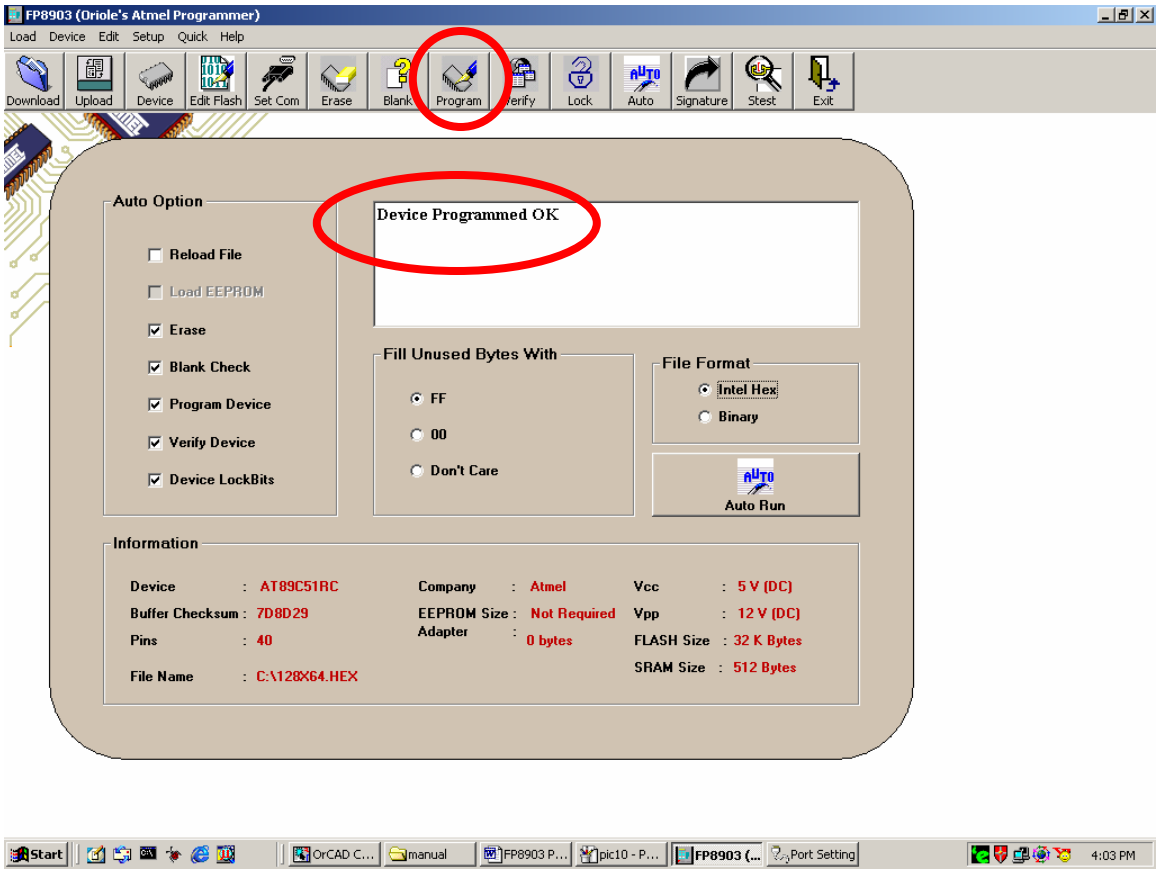


If the blank check operation is not successfully executed then Status Window will display following error message.

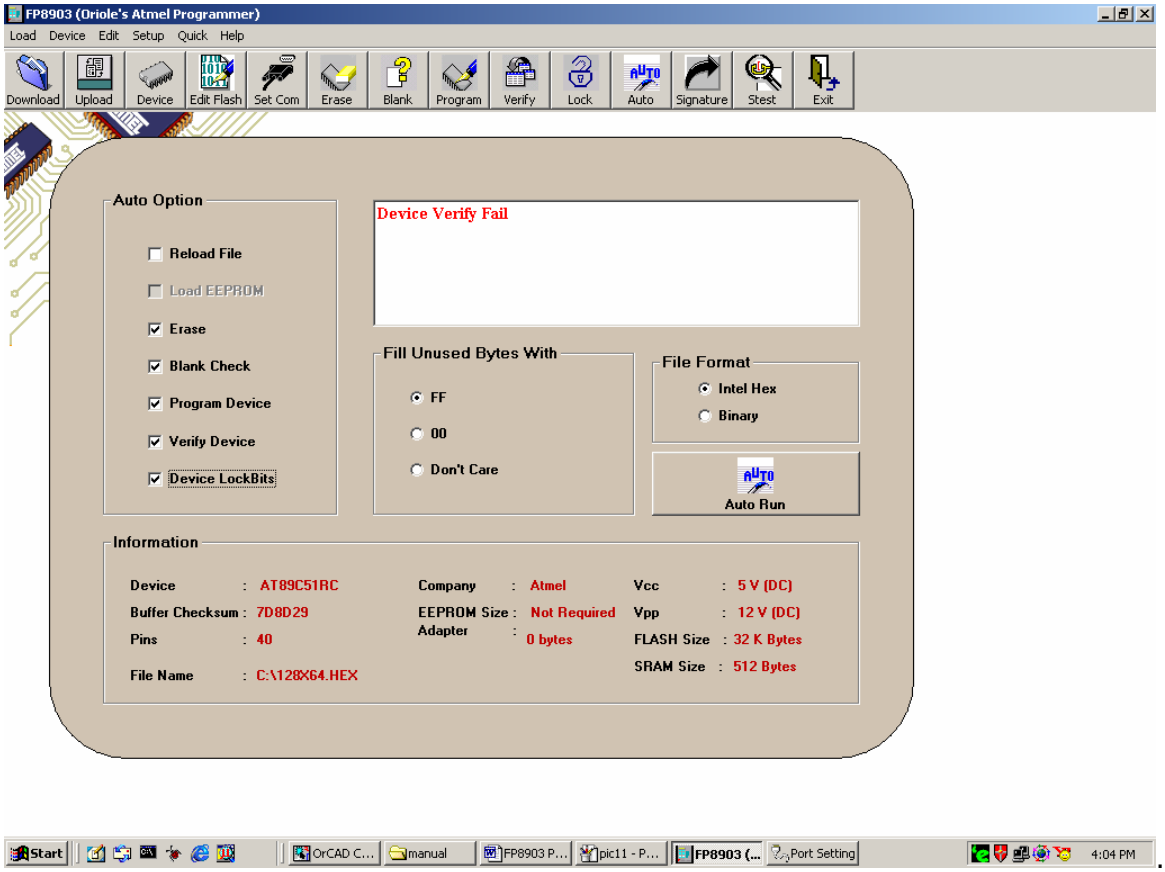


PROGRAM DEVICE

It loads the selected program file into the chip from the programmer's buffer. Also verification of single data byte is performed by this command. After the successful execution of this command the Status Window displays the following confirmation message.



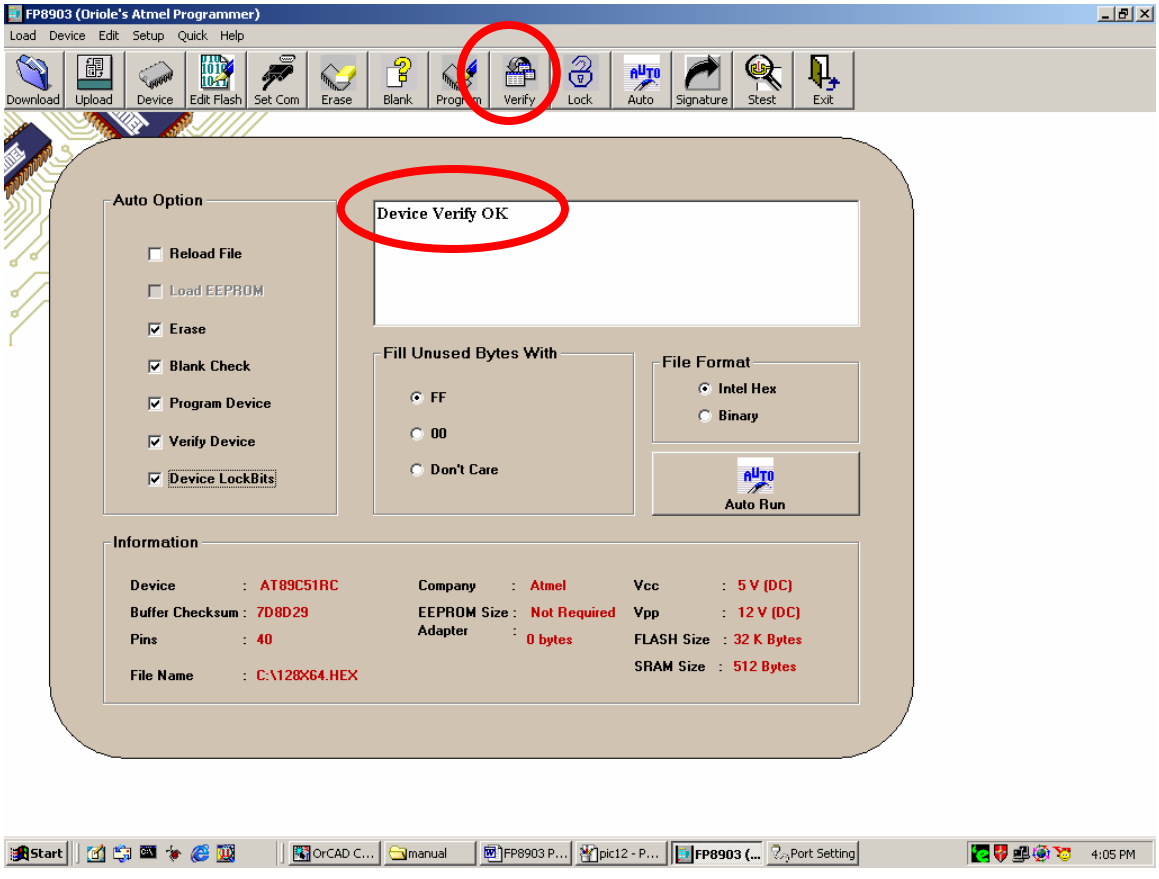
If the command is not executed successfully then the Status Window displays following error message



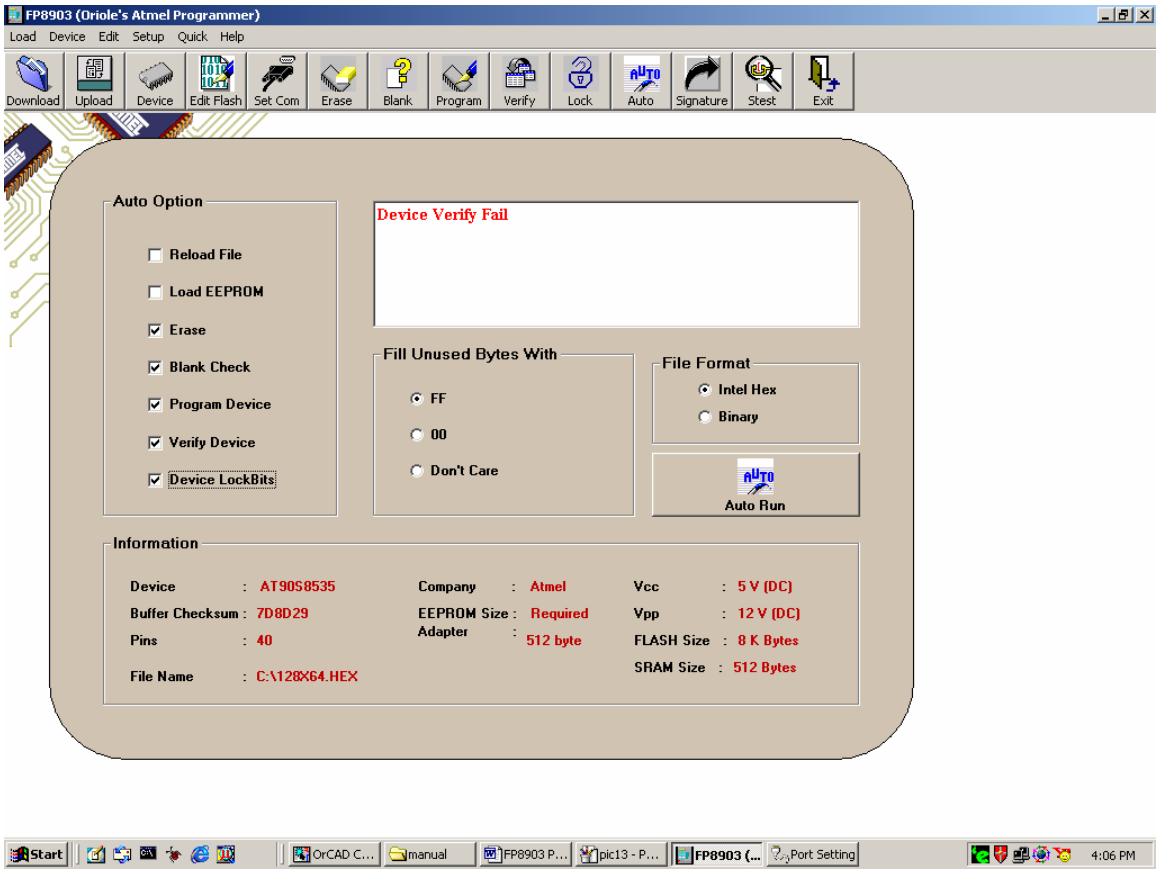
VERIFY DEVICE

The command reads the contents, which is loaded in the chip and compares it with the contents in buffer of the programmer. Thus it performs an overall verification check of the program file loaded in the chip.

After the successful execution of the command, the Status Window displays the following confirmation message.



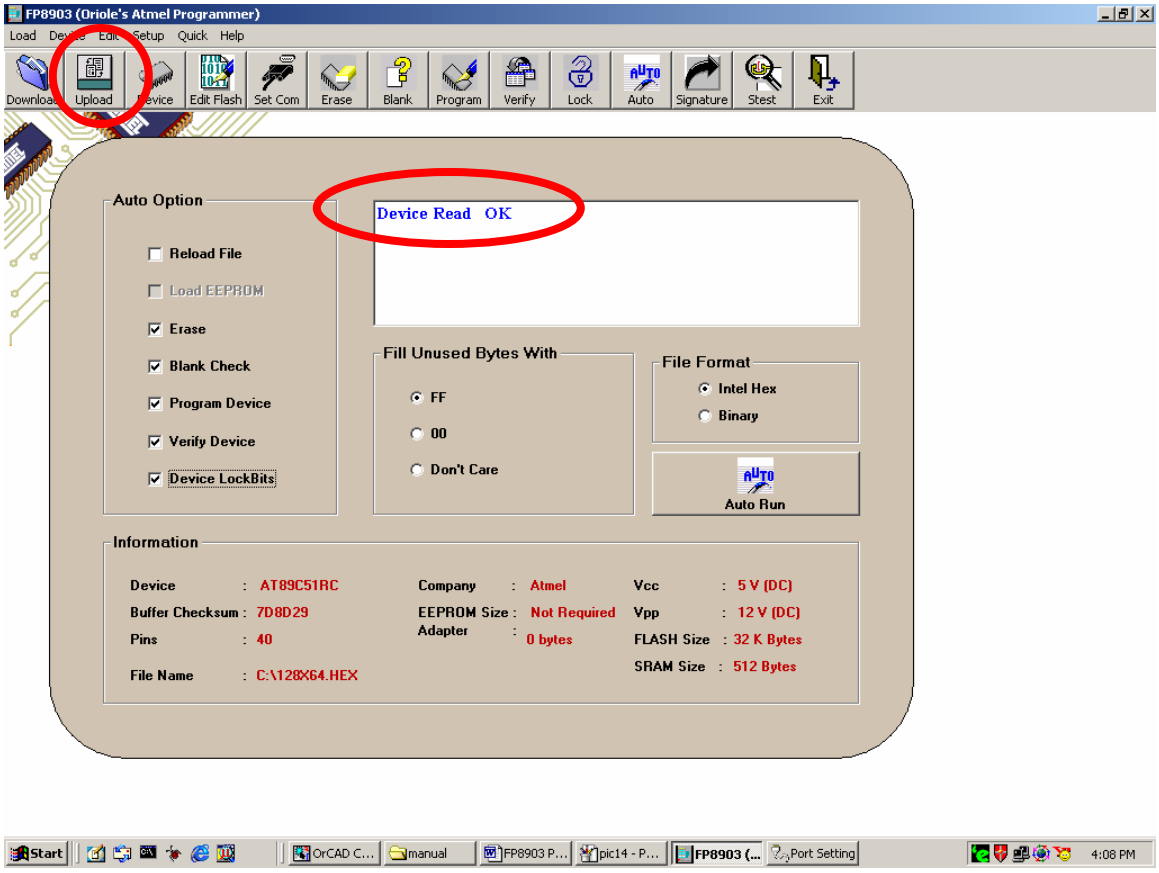
If the command is not executed successfully then the Status Window displays the following error message as



UPLOAD MENU

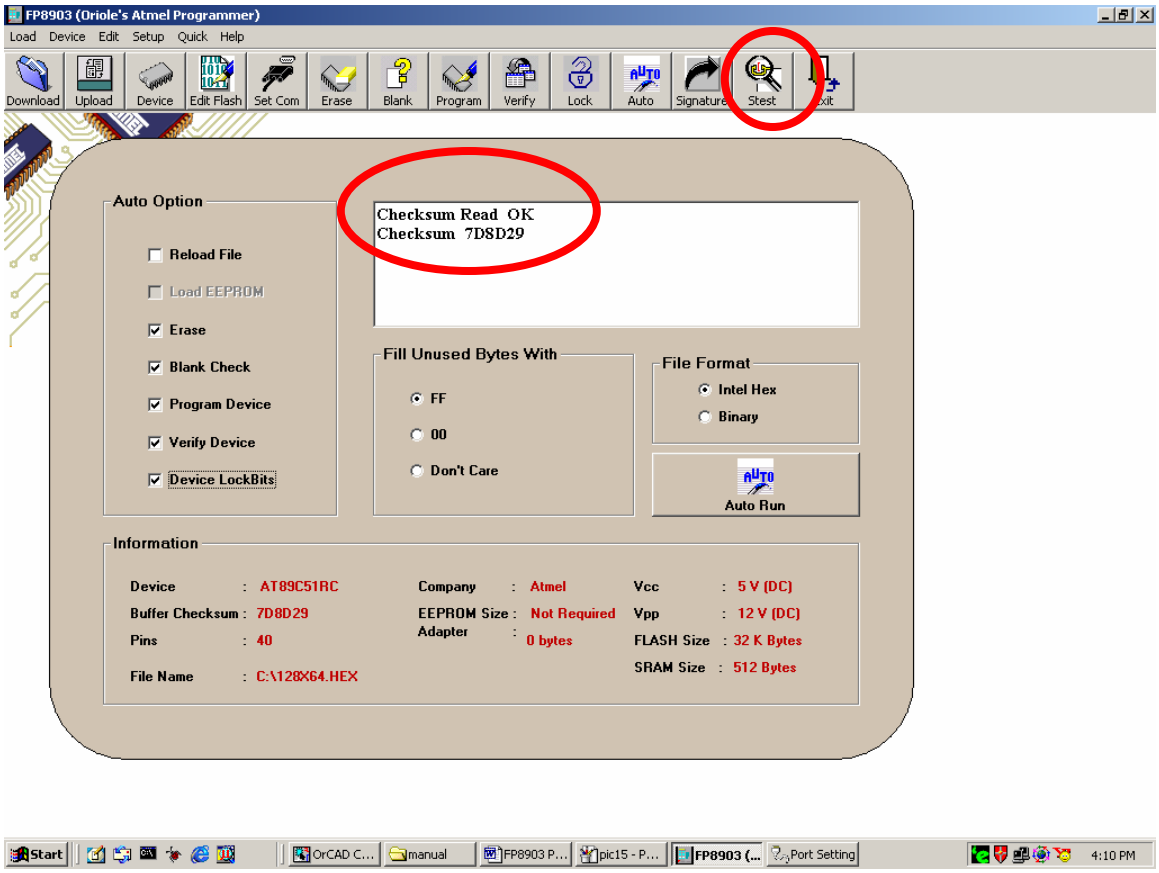
Allows the user to transfer the required program file from FP8903 to PC. Required program file can be in program formats as:

1. Intel Hex
2. Bin



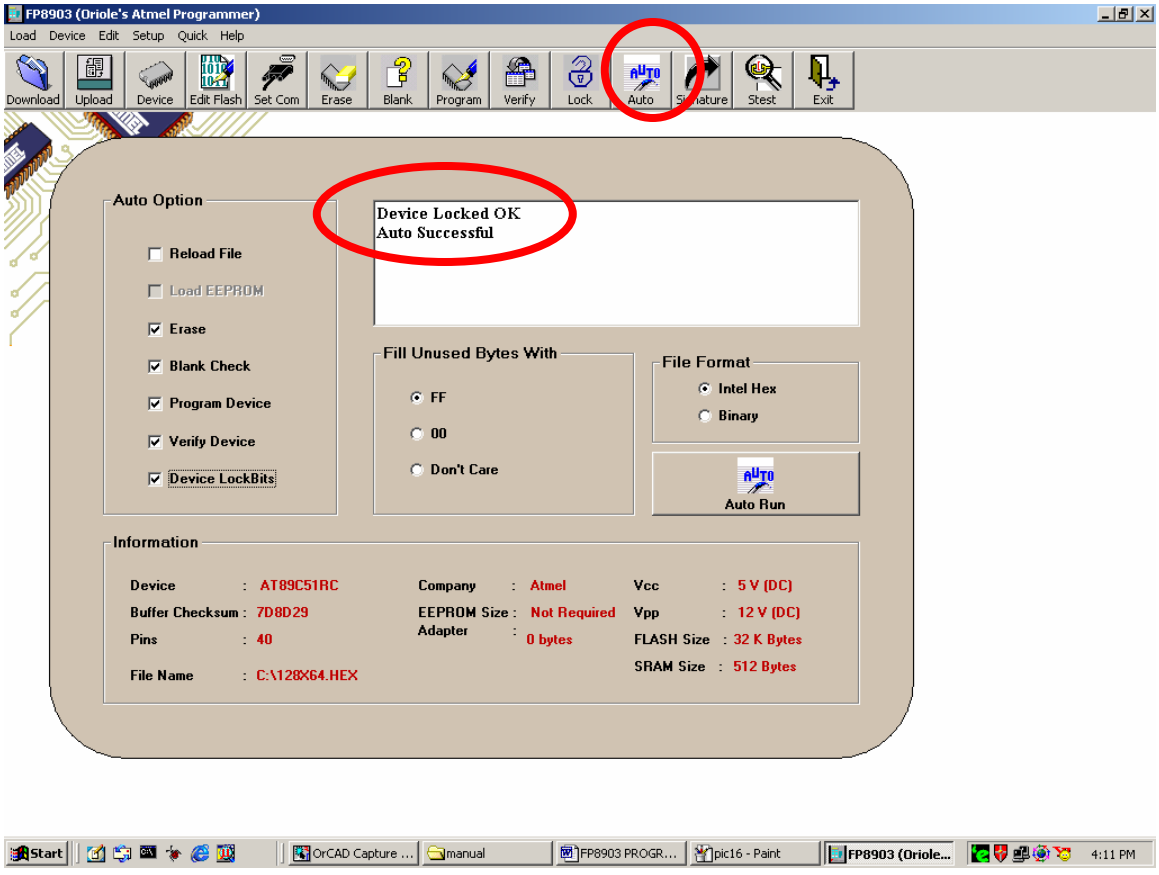
STEST DEVICE

The command reads the chip's checksum and displays it on the Status Windows and information frame.

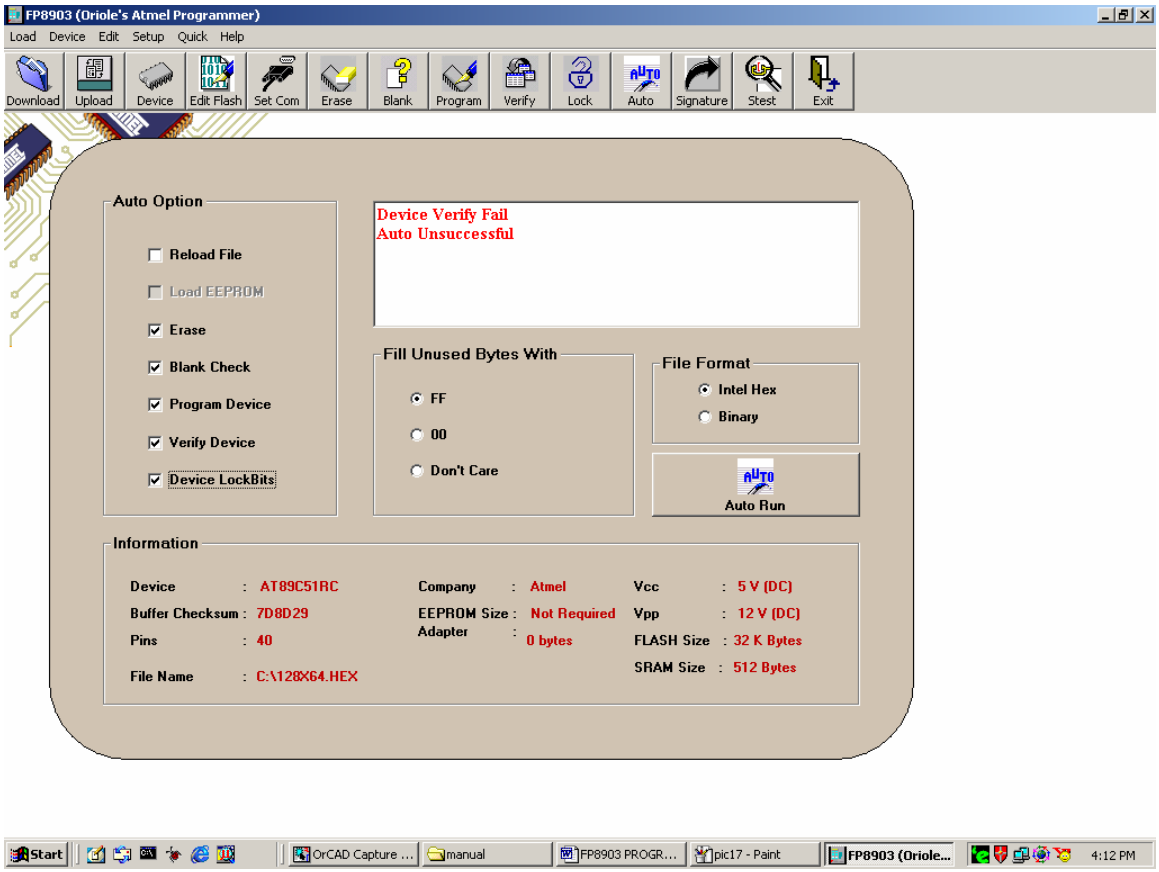


AUTO RUN OPERATION

This command enables sequential execution of the programming parameters as selected by the user in the AUTO OPTION window. After successful execution of the individual selected program parameters the Status Window displays the respective confirmation message as;



If any one of the selected program parameter is not executed successfully then the Status Window displays the respective error message as;

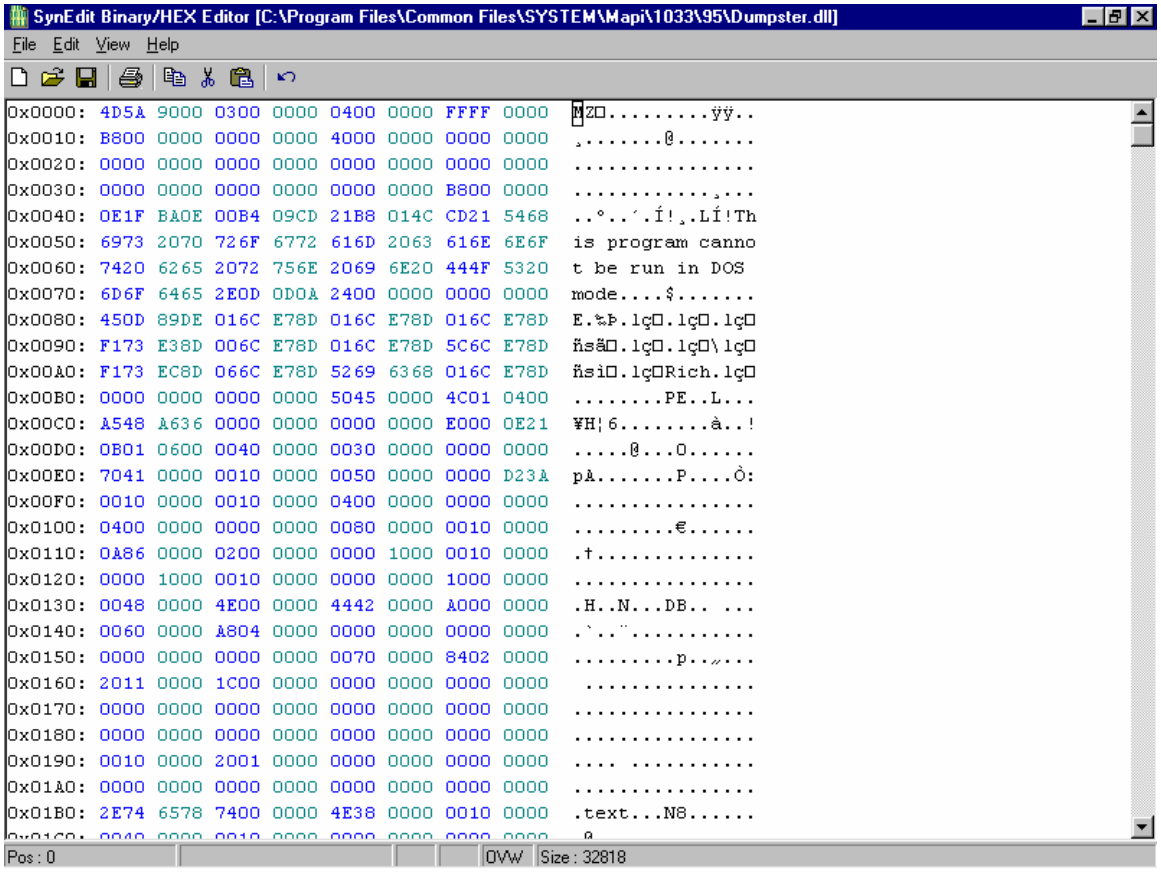


EEPROM OPERATION

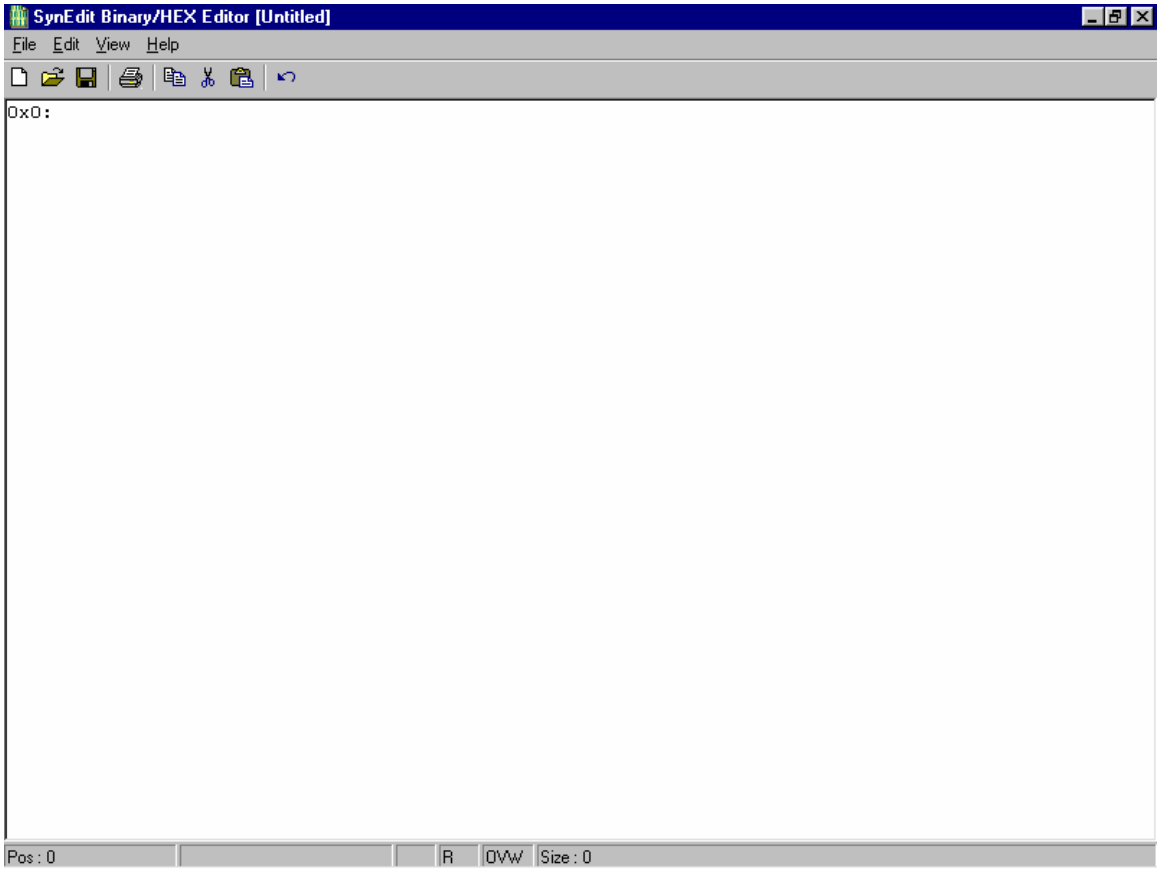
The selected EEPROM file to be uploaded/downloaded can be:

- Modified
- Saved
- Printed
- Viewed as per requirement
- Translated

If the "Load EEPROM " command in the AUTO OPTION window is checked, then the selected EEPROM file is loaded in the HEX EDITOR.



If the "Load EEPROM " command in the AUTO OPTION window is not checked, then the selected EEPROM file is not loaded in the HEX EDITOR.



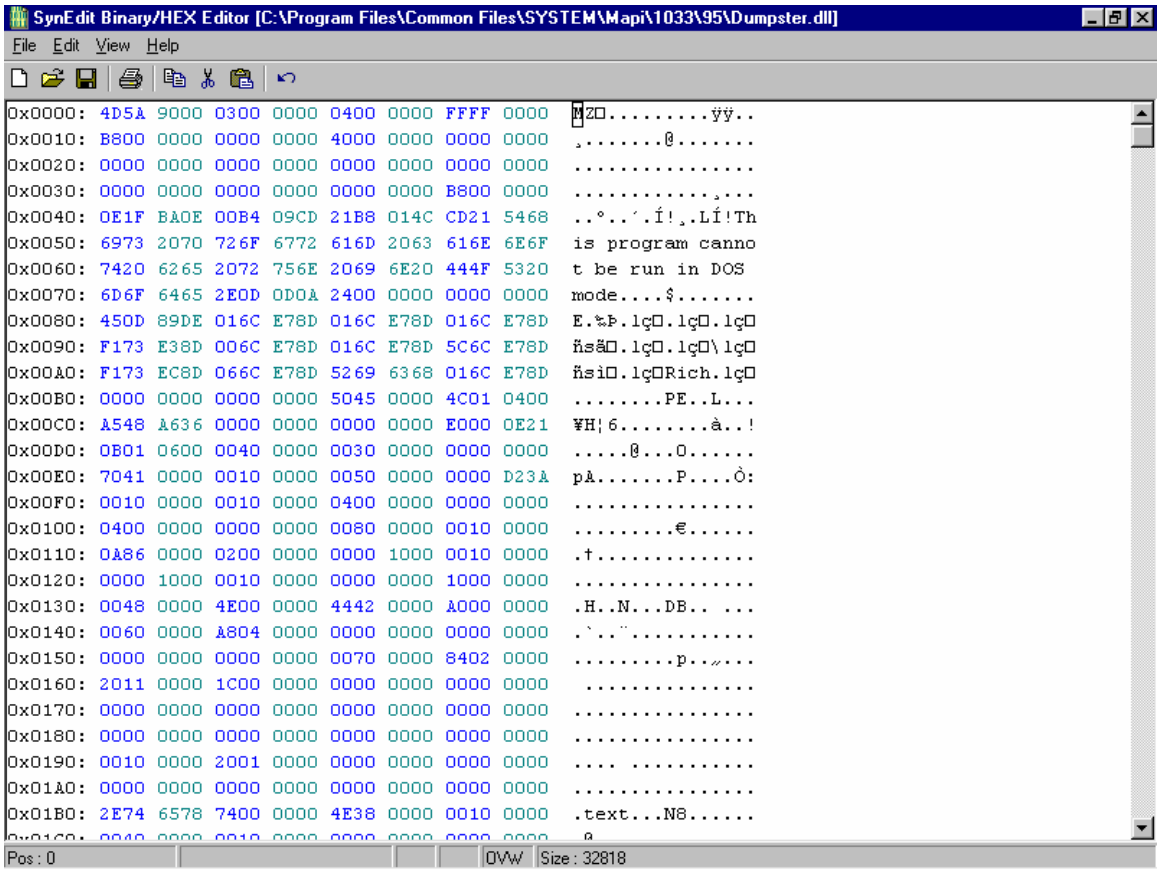
FLASH OPERATION

The selected FLASH file to be uploaded/downloaded can be:

- Modified
- Saved
- Printed
- Viewed as per requirement
- Translated

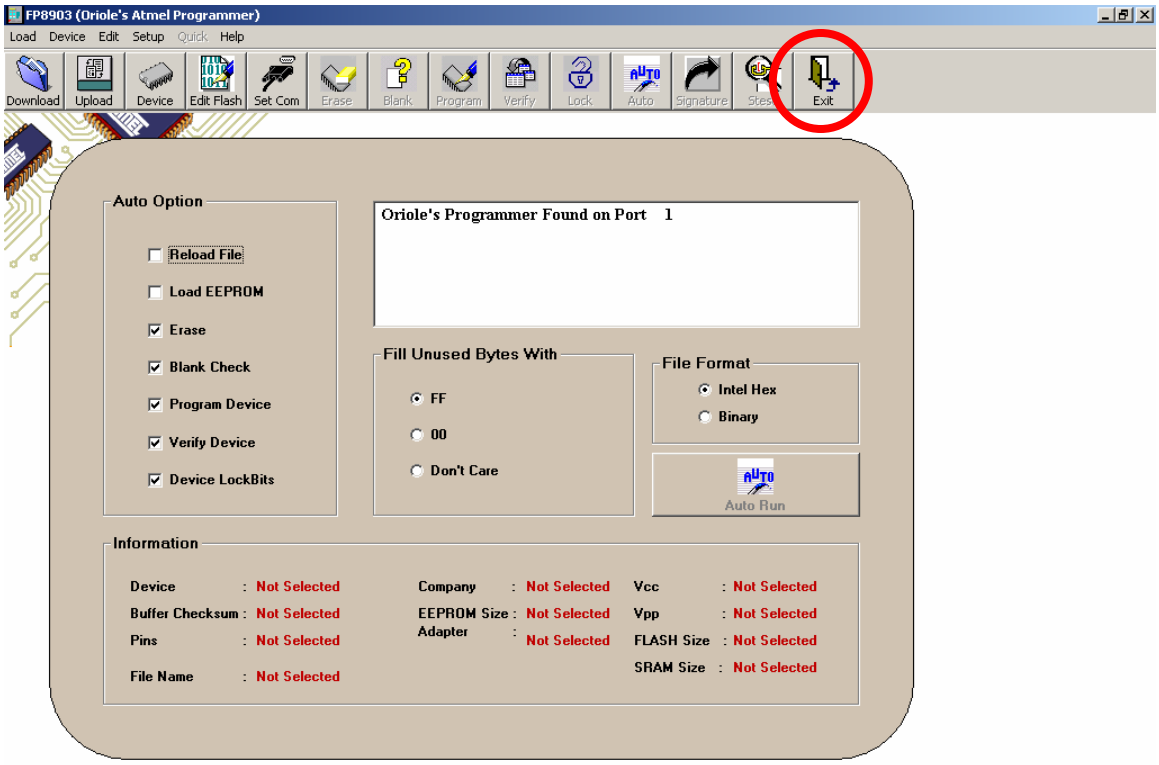
If the "Load EEPROM " command in the AUTO OPTION window is checked, then the selected EEPROM file is loaded in the HEX EDITOR.

If the "Load EEPROM " command in the AUTO OPTION window is not checked, then the selected EEPROM file is not loaded in the HEX EDITOR.



EXIT OPERATION

This command terminates FP8903 Software.



4.2 STAND ALONE MODE

This PROGRAMMER can work in stand-alone mode. User can down load the file from PC to Programmer's buffer (RAM) and can use the unit without PC. The different functions in this mode are as given below.

KEY FUNCTION

0. DEVICES: SELECTING THE DEVICE

1. READ: READING THE DEVICE CONTENTS

2. LBIT: PROGRAMMING LOCKBITS OF THE DEVICE

3.SIG: READING THE SIGNATURE BYTE OF THE DEVICE

4.ERASE: ERASING THE DEVICE

5.BLANK: BLANK CHECKING OF THE DEVICE

6.PRGM: PROGRAMMING THE DEVICE

7.VRFY: VERIFYING THE DEVICE

8. STEST: CALCULATING CHKSUM OF FLASH MEMORY OF THE DEVICE.

9. EDIT: EDITING THE PROGRAMMER BUFFER.

10.AUTO: TO EXECUTEAUTOCYCLE (ERASE/BLANK/PROGRAM/VERIFY/ LOCKBIT)

2.1 FUNCTIONAL DESCRIPTION OF KEYS:

[0] 'DEVICE' KEY:
Pressing 'DEVICE' key shows range of devices that can be programmed. Keep on pressing 'DEVICE' Key till unit displays desired device. After selecting the device put the device in the ZIF SOCKET.

NOTE: All the numeric keys are dual function keys and can be used for the numeric operations
In the edit mode only. In all other functions these keys are used as per their normal operations.

CAUTION: ENSURE THAT ONLY THE SELECTED DEVICE IS PUT IN THE ZIF SOCKET.

Example:
Switch ON the unit .It will give message:

'ORIOLE presents, ATMEL PROGRAMMER','VER 2.00'& then 'SELECT DEVICE'
Press 'DEVICE ' key four times to select micro-controller '89C52'.

[1] 'READ' KEY:

On pressing 'READ KEY', the unit reads the contents of the flash memory of the selected device into its buffer.
Example:

To execute this option follow the following key sequence after selecting the device.

KEY	RESULT	MESSAGE
READ		Read 89C52
ENTER	Reading flash	Reading----
	Read completion	CHKSUM (6 digit checksum)

If the device selected is from the AVR family or it is AT89S8252 then the READ operation reads the EEPROM of the device after reading the flash. CHKSUM is calculated for flash only. If 'ENTER' KEY is pressed again, the same operation will be repeated.

[2] 'LBIT' KEY:

Pressing 'LBIT' key programs all the lock bits of the selected device.
Example: To execute this option follow the following key sequence after selecting the device.

KEY	RESULT	MESSAGE
LBIT		PGMLB 89C52
ENTER	Locking flash	PGM LOCK BIT—
	Lock completion	LOCKBIT OK!!

If 'ENTER' KEY is pressed again, the same operation will be repeated.

[3] 'SIG' KEY:

On pressing 'SIG'key, the unit will check selected device's signature bytes.
Example: To execute this option follow the following key sequence
After selecting the device.

KEY	RESULT	MESSAGE
SIG		SIG 89C52
ENTER	Checking Signature	SIGNATURE CHECK—
	SIG matches	SIG OK
	SIG not matching	SIG FAIL

If 'ENTER' KEY is pressed again, the same operation will be repeated.

ENSURE THAT THE CORRECT DEVICE IS PUT IN THE ZIF SOCKET BEFORE DOING THE 'SIG' OPERATION.

[4] 'ERASE' KEY:
Pressing 'ERASE' key erases the contents of the Flash memory of the selected device.
Example: To execute this option follow the following key sequence after selecting the device

KEY	RESULT	MESSAGE
ERASE		ERASE 89C52
ENTER	Erasing Flash	ERASING!!
	Erase completion	ERASE OK!!

If 'ENTER' KEY is pressed again, the same operation will be repeated.

[5] 'BLANK' KEY:
On pressing 'BLANK' key the PROGRAMMER will check whether selected device is blank or not.

Example:
To execute this option follow the following key sequence after selecting the device

KEY	RESULT	MESSAGE
BLANK		BLANK 89C52
ENTER	Checking Flash	BLANK CHECK—
	Blank successful	BLANK OK!!
	Blank unsuccessful	BLANK FAIL!!

If 'ENTER' KEY is pressed again, the same operation will be repeated.

[6] 'PRGM' KEY:
On pressing 'PRGM' key, PROGRAMMER programs contents of the buffer into the flash memory of the selected device.
Example: To execute this option follow the following key sequence

KEY	RESULT	MESSAGE
PRGM		PGM 89C52
ENTER	Programming Flash	PROGRAMMING—
	Program completion	PROGRAMED OK!!
	Verifying device	VERIFYING—
	Verify successful	VRF OK!
	Verify unsuccessful	VRF FAIL!!

If device contents do not match with buffer contents then 'VRF FAIL' message will appear. If 'ENTER' KEY is pressed again, the same operation will be repeated. At this stage the programming cycle stops if the device selected is from AT89 family excluding AT89S8252. If the device belongs to the AVR family or it is AT89S8252 and the EEPROM buffer is not empty then it will program the EEPROM. While programming EEPROM following message is displayed.

'**PGM EEPROM**- -'

And after a few moments following display will appear

'**PGM EEPROM OK'**

After programming the EEPROM, the PROGRAMMER will execute the EEPROM verify cycle. During this cycle it will display following message
'**VERIFYING EEPROM** -'

If the EEPROM is successfully verified then the PROGRAMMER will give the following message

'**EEPROM VRF OK**!'
Else it will show

'EEPROM VRF FAIL'

[7] 'VRFY' KEY:

On pressing 'VRFY' key, the unit will check contents of the flash memory of the selected device with units buffer.
Example: To execute this option follow the following key sequence after selecting the device.

KEY	RESULT	MESSAGE
VRF		VRF 89C52
ENTER	Checking Buffer	VERIFYING—
	Verify successful	VRF OK!!
	Verify unsuccessful	VRF FAIL!!

If device contents are different from buffer contents, then 'VRF FAIL" message will be displayed If 'ENTER' KEY is pressed again, the same operation will be repeated.

[8] 'STEST' KEY:

On pressing 'STEST' key, the unit will calculate checksum of the contents of the device
Example:
To execute this option follow the following key sequence

KEY	RESULT	MESSAGE
STEST		CHKSUM 89C52
ENTER	Calculate Checksum	CHKSUM—
	Checksum calculated	CHKSUM (6 digit checksum)

[9] 'AUTO' Key:

This key is provided to execute all the necessary operations required to program the device. This will accelerate the programming procedure. This feature is useful for mass programming. This option performs the following operations sequentially.

'ERASE',
'BLANK CHECK',
'PROGRAM',
'VERIFY',
'LOCK BIT'

Example: To execute this option follow the following key sequence

KEY	RESULT	MESSAGE
AUTO		AUTO 89C52
ENTER	Erasing Flash	ERASING --
	Erase completion	ERASE OK!!
	Checking Flash	BLANK CHECK--!
	Blank completion	BLANK OK!!
	Programming Flash	PROGRAMMING--
	Program completion	PROGRAMED OK!!
	Verifying device	VERIFYING--
	Verify completion	VRF OK!
	Locking flash	PGM LOCK BIT--
	Lock completion	LOCKBIT OK!!

NOTE: Once the AUTO MODE is being executed, the PROGRAMMER cannot be interrupted till the AUTO MODE is over. While in the AUTO MODE if any operation is unsuccessful, the PROGRAMMER stops the execution and remains in that state until the user presses any other key. The failure of any operation will be indicated by operation name followed by the 'FAIL' message (e.g. if verify operation is unsuccessful display shows 'VRF FAIL')

[10] 'EDIT' KEY:

This function provides the facility to edit the contents of the PROGRAMMER BUFFER in which a BIN file is downloaded for programming the device. As the PROGRAMMER is capable of programming both FLASH and EEPROM of the device, facility is provided to edit the data of both the buffers.

This function can be invoked by pressing the 'EDIT' key. When the 'EDIT' key is pressed following message is displayed.

EDIT (E / F)?

Before starting the edit procedure PROGRAMMER asks the user to select the buffer to be edited. If 'E' is pressed following message is displayed.

'EDITING EEPROM!!'

If 'F' is pressed it will show the following message.

'EDITING FLASH!!'

Press 'ENTER' key to start the edit mode. 'EDIT' key is a dual function key. When the user enters into the edit mode 'EDIT' key is used for entering digit '9'.
When the 'ENTER' key is pressed, first address of RAM BUFFER and the data contents of that address are displayed as shown below:
Address Data
0000 (contents of 0000th location)
Address field size is 4 characters
Data field size is 2 characters
For both the buffers (FLASH and EEPROM) starting address displayed is the same As shown above, LCD display is divided in two fields, first field displays the address of the RAM BUFFER, and the second field displays contents of the address displayed in address field. A blinking cursor is displayed on the left most character of the address field i.e. on the first 0 of the
Address field.

NOTE: Blinking cursor anywhere in the address field or in the data field prompts the user to enter a new character at that position.

'AUTO' Key: Moving The Blinking Cursor To The Right With the help of 'AUTO' key user can move the cursor to any location in the right direction.

E.g. Following are the address and data displayed on the LCD and cursor is blinking on the left most character in the data field.

0023 02

At this position if address 0123 and its corresponding data is to be displayed then press 'AUTO' key to move the blinking cursor in the right direction until it rolls back on the address field. As the cursor is shifted without changing the data; the data is retained at the address displayed. The cursor is now positioned on the left most character of the address field.

Pressing 'AUTO' again, retains left most 0 in the address displayed; thus the user need not overwrite that '0'. Cursor now shifts to the right by one position. Here, user can change the character to '1'. By pressing 'AUTO' key again, remaining address locations can be skipped.
When the cursor jumps on the data field, data of the address 0123 is displayed and cursor blinks at the starting point of data field. User can also change all the locations of the address field or the data field without skipping any of the characters.

The user is endowed with the provision of scrolling the address field and the corresponding data

Field with the help of 'UP' and 'DOWN' arrow keys. When the 'DOWN' arrow key is pressed the subsequent address appears on the display with the corresponding data contents. The blinking cursor on the first character of the data field anticipates data change. When 'UP' arrow key is pressed, the address prior to the one currently displayed appears on the display. The blinking cursor at the start of the data field anticipates a data change.

If the user doesn't want to edit the data contents, then he can use the arrow keys for moving ahead or back from the current address location. Data on the current address will be retained as it is.

NOTE: The maximum address displayed depends on the size of the program memory available for the particular device being worked on. If the user violates this condition by entering the address, beyond the maximum address of the program memory then, maximum address and the corresponding data are displayed.

While changing contents of the data or address field, change is expected at the blinking cursor position only. When the character at the blinking cursor position is altered the cursor shifts to the next position. Any change made by the user is directly stored in the RAM BUFFER. The user is not expected to press 'ENTER' key for storing the changes made in the current field. While editing the EEPROM memory buffer, the user is not allowed to enter any digit or character at the left most location because EEPROM buffer size is 2Kb only.

The address of EEPROM buffer ranges from 0000H to 07FFH. The procedure for editing the EEPROM data is in the same manner as that explained for the flash. After the completion of editing procedure, press 'ENTER' key to quit the edit mode. With the entry of the 'ENTER' key the following message is displayed:

EDIT MODE OVER! !

After quitting the edit mode user can perform any of the operations on the device selected.

5. SUPPORT

FOR DETAILS / FURTHER INFORMATION CONTACT OUR NEAREST OFFICE

HEAD OFFICE

ORIOLE ELECTRONICS PVT. LTD.
P.B. No.9275. 4, Kurla Industrial Estate, Narayan Nagar,
Ghatkopar (West), MUMBAI - 400 086.
Tel.No. 022-2509 4241-4246.
Fax No. – 022-2511 5810/25163149.
Email – oriole@vsnl.com

BANGALORE

ORIOLE ELECTRONICS PVT. LTD.
No.5 & 6 ,2nd floor ,Renuka Complex
34,New Tippasandra main road,
BANGLORE – 560 075
Telefax: (080)520 2816 /529 1433
Email - oel@blr.vsnl.net.in

NEW DELHI

ORIOLE ELECTRONICS PVT. LTD.
116, Vardhaman Towers, Preeth Vihar,
Community Centre, Vikas Marg,
NEW DELHI-110 092
Tel. No. – (011)-2245 4525 /2245 8352
Email - ravioel@nda.vsnl.net.in

Visit us at **www. orioleindia.com**