

Contents

Table of Contents

Introduction	2
Set Up Terminal Program on Your PC	3
Setting Up TeraTerm	4
Using Your Standalone Programmer	5
Uploading Files to the Standalone Programmer	8
Configuration	10
Programming	12
Troubleshooting	14

Introduction

The [AT89LP Standalone Programmer](#) will program the ATMEL AT89LP devices, in circuit without the use of a computer.***

This programmer supports the following devices:

AT89LP213
AT89LP214
AT89LP216
AT89LP428
AT89LP828
AT89LP51
AT89LP52
AT89LP3240
AT89LP6440
AT89LP51RB2
AT89LP51RC2
AT89LP51IC2
AT89LP51RD2
AT89LP51ED2
AT89LP51ID2

*****(A computer is needed for programmer configuration only)*****

Step 1: Set Up Terminal Program on Your PC

Hex files must be loaded into the programmer's memory for storage before programming. This can be done using any terminal program. For this example, we are using Tera Term downloaded from here:

<https://osdn.net/projects/ttssh2/releases/>

Tera Term works well in Windows. Once installed, the program must be configured correctly.

Terminal Settings

Set the com port number,
Baud Rate = 9600,
Data Bits = 8,
Parity = none,
Stop Bits = 1,
Flow Control = none,
Transmit Delay:
0 msec/char

*****100 msec/line (this is very important)*****

You can use any terminal as long as there is a setting for line delay (see below)

If using Hyperterminal, Set up communication for 9600 baud, no handshaking, 8, N, 1. Line delay 100mS.

*****It is very important to slow down the incoming data using a line delay of 100mS minimum.**

This can be done with most terminal programs. If you do not slow down the terminal, data will be missed.***

(See Fig.1 below)

Setting Up Tera Term

In Tera Term Click on setup, serial port. You will see a screen like this:

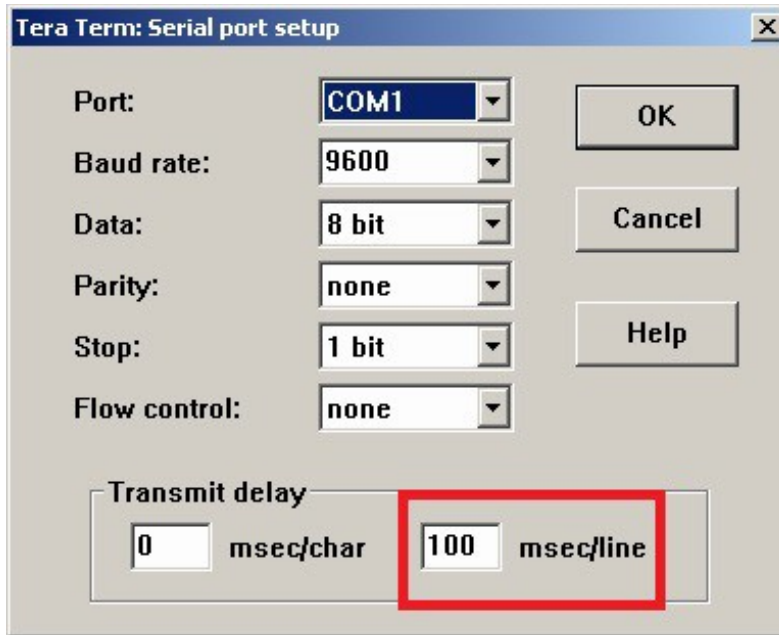


Figure 1.

Be sure that all of the settings match the above.

Next, click on setup, then terminal. You will see a screen like this:

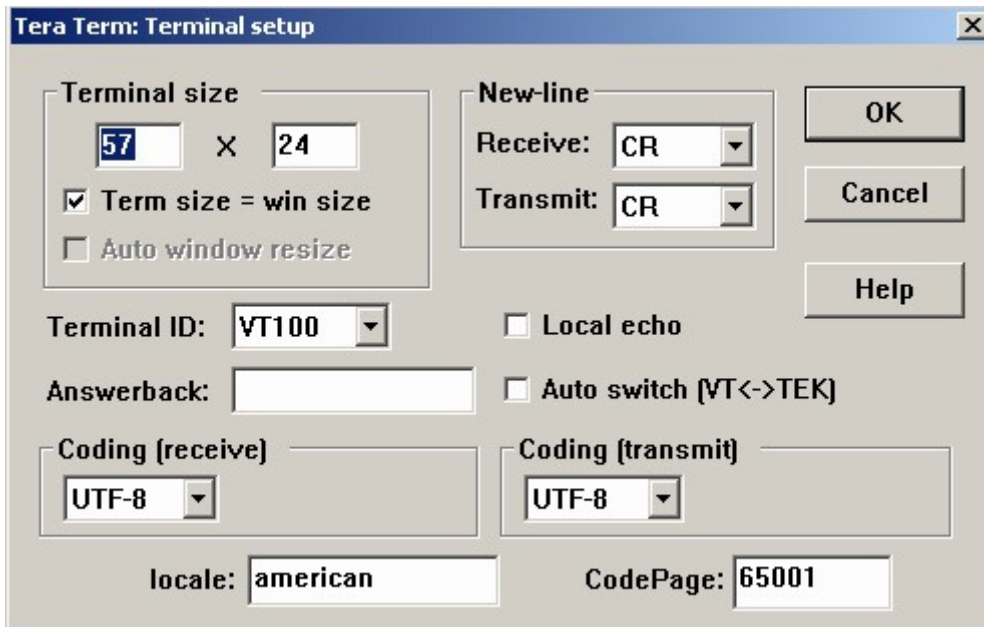


Figure 2.

Again please check the settings as above. You can change any other settings (I.E. color, background, etc)

When you are done, click setup, save setup.

Step 2: Using Your Standalone Programmer

The programmer can take power from the target or from the [USBtoTTL](#) interface. This can be configured with the jumper J4.



Figure 3.

Jumper J4 installed to the right hand side, programmer will take power from [USBtoTTL](#) interface.



Figure 4.

Jumper J4 installed to left hand side. Programmer will take power from the target. (Maximum 5VDC)

*****Please remember that there is no protection if you are using power from the target! Please be sure that the target voltage does not exceed 5VDC.*****

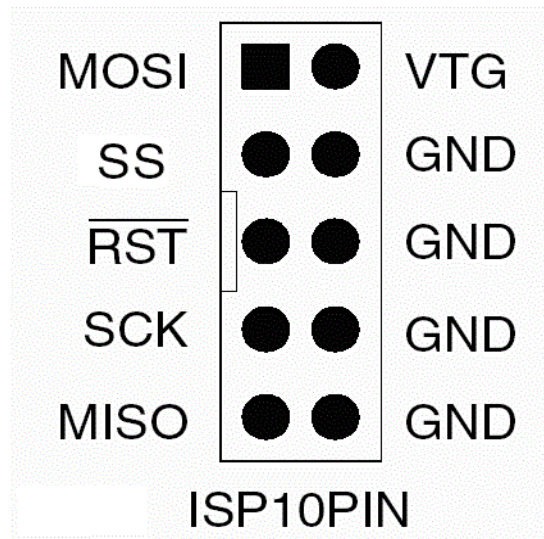


Figure 5.

The AT89LP standalone programmer uses the ATMEL standard 10 pin ISP connector. This is not the same as some older 8051 development boards. Please check the pin out of the connector on your board before plugging in the programmer.

***** The target must use its own clock signal. *****

Before powering up the programmer, please ensure that jumper J1 has been removed, or the programmer will automatically boot into Stand Alone programming mode. When the programmer is powered up, you will see a menu appear on the screen. You then have six options. **The first thing you MUST DO is select the device you will be programming.**

The MAIN MENU will look like this:

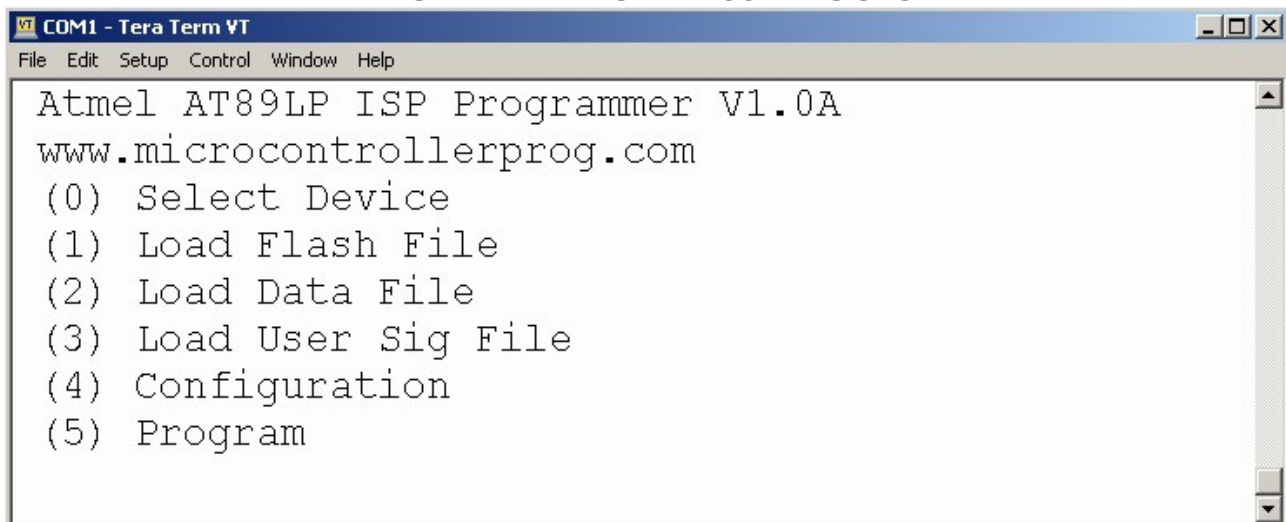


Figure 6.

**From the main menu Select 0, Select Device
When 0 is selected, you will see another menu like this:**

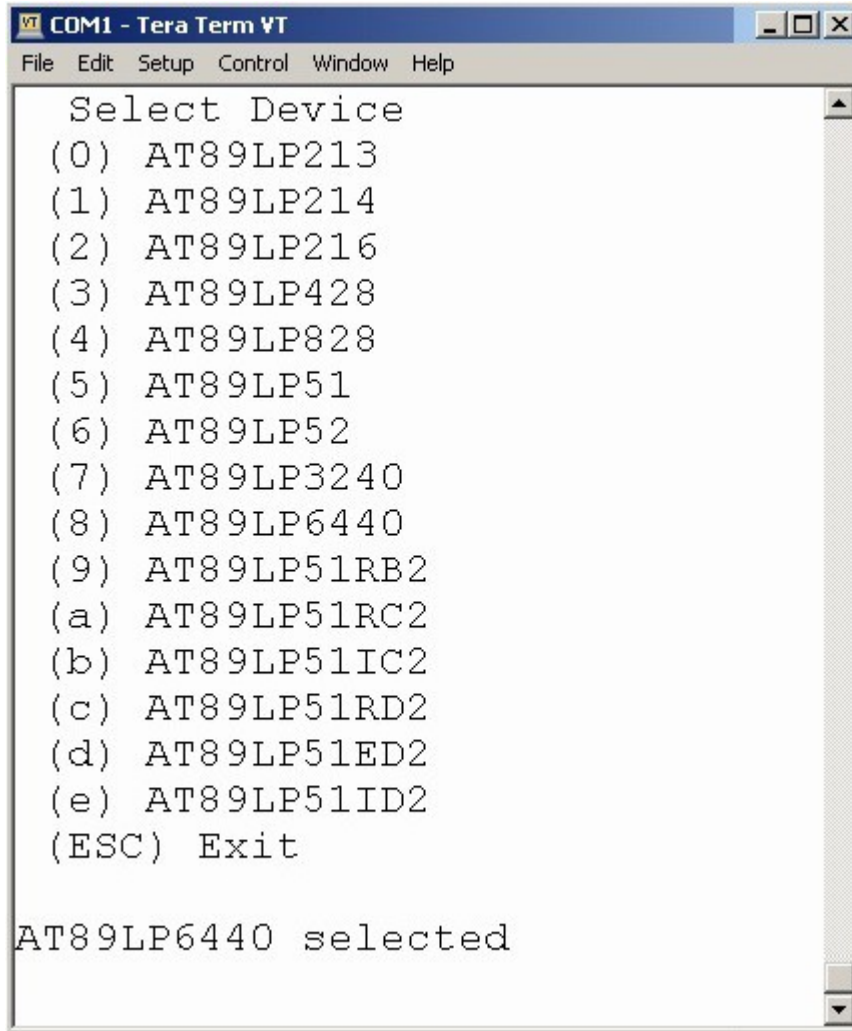


Figure 7.

The standalone programmer will display the last device that was selected. Enter selection 0 through e. When you are done, press ESC on your keyboard, to return to the main menu. The programmer will retain this setting even when powered off or until it is changed.

Step 3: Uploading Files to the Programmer

From the main menu Select 1, Load Flash File (Load a hex file into the programmers flash buffer.) The programmer will begin to clear the buffer for the file to be stored. The yellow led will illuminate indicating that the programmer is busy. You must wait for the prompt ("Send File Now") before sending the file. In TeraTerm, select File, Send File. Ensure that binary checkbox is unchecked. On devices with large capacity, this may take a long time. There is a setting in the configuration menu "Erase Buffer Bypass" where you can disable this.(Not recommended).

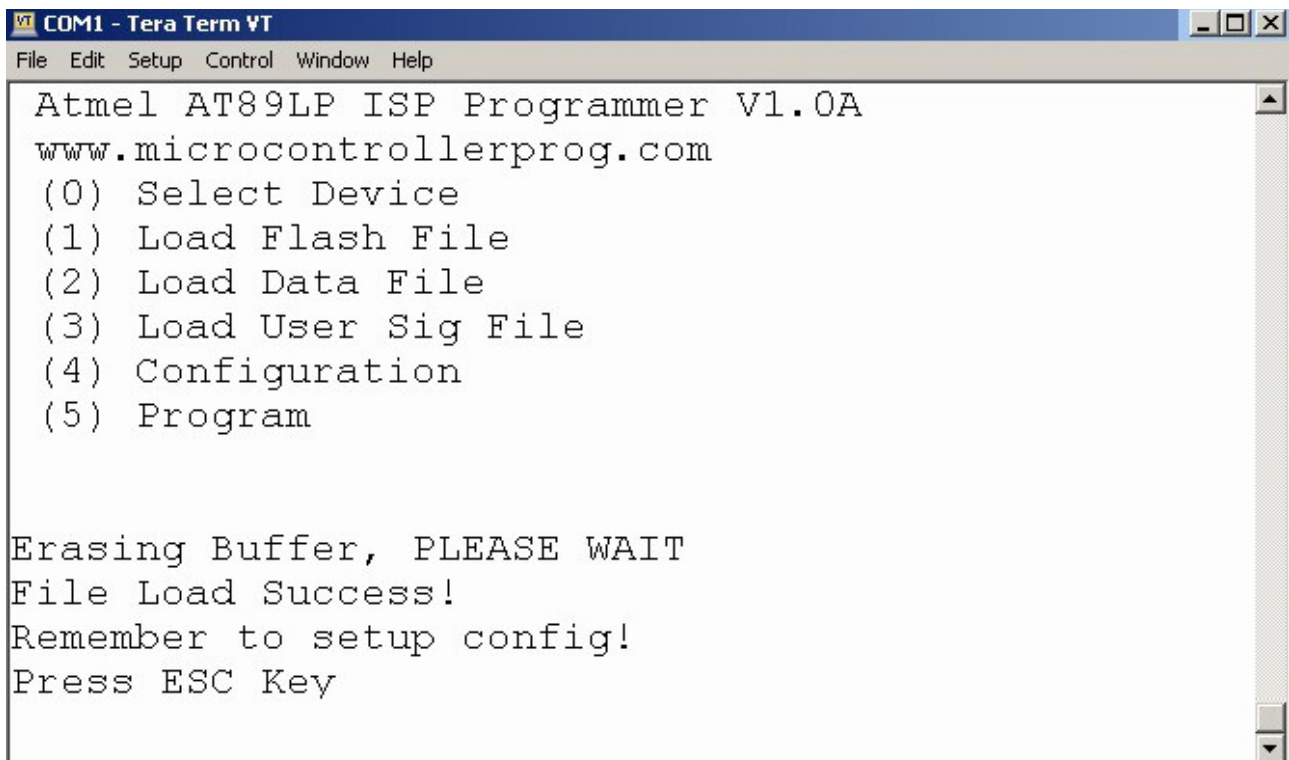
*****See warning below in the configuration section.*****

The hex file for programming the flash memory will be stored in the programmers memory. The data will remain in the memory until it is overwritten. The file must be in hex format with a valid checksum at the end of every line and a valid end record at the end of the file. A valid end record looks like this:

:00000001FF (see figure 9 below)

The file will be saved in the programmers memory and programmed to your device according to the addresses in the hex file. If the address is out of bounds, or there is a bad checksum you will receive an error message.

Successful loading will appear like this:



```

COM1 - Tera Term VT
File Edit Setup Control Window Help
Atmel AT89LP ISP Programmer V1.0A
www.microcontrollerprog.com
(0) Select Device
(1) Load Flash File
(2) Load Data File
(3) Load User Sig File
(4) Configuration
(5) Program

Erasing Buffer, PLEASE WAIT
File Load Success!
Remember to setup config!
Press ESC Key
  
```

Figure 8.

Loading Eeprom or Data Files

From the main menu Select 2, Load Data File (Load a hex file into the programmer's buffer.) This is the same as loading the flash file except that the file will be used to program the data or eeprom in devices where data or eeprom are present. If your device does not have data or eeprom, this can be ignored. Eeprom or data hex files MUST begin at address 0x0000 and the length is specific to the current device selected in the programmer.

Loading User Signature Row Files

From the main menu Select 3, Load User Sig File. Same thing again. (Load a hex file into the programmer's User Signature Row Buffer). The starting address in the hex file must be 0x0000. If your device has 32 bytes of user signature and you load in 64 byte file, only the first 32 bytes will be programmed. If the file is larger than 64 bytes, only the first 64 bytes will be loaded and the programmer will wait for the last line (the EOF). The last line tells the programmer when to stop the loading process. If that line is omitted, the programmer will continue to load the file forever, even if the data after the first 64 bytes is ignored!

***** IMPORTANT NOTE:*****

On devices that contain a User Signature Row, the USER signature fuse must be programmed if you wish to change the data in the User Signature Row. The programmer will program the fuses (if enabled) before programming the User Row. If programming User Signature Row results in an error message, please check the fuse configuration settings.

For all three memories, (Flash, Data, User Signature) the file must be in hex format with a valid end record. The length of each line must be 0x10 (16 bytes). If it is not, an error message will be displayed. Here is a sample of a hex File that the programmer will accept:

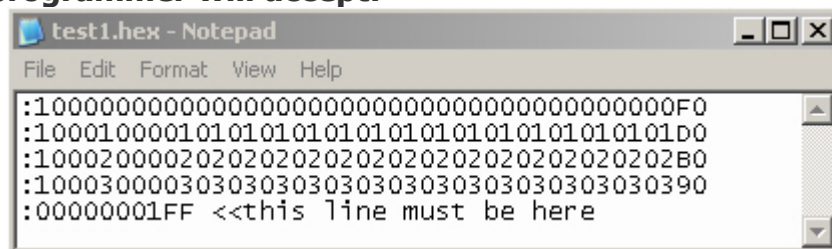


Figure 9.

The maximum file size is dependent on the device that is configured in the programmer. Any deviation from this will result in an error message.

Step 4: Configuration

From the main menu **Select 4, Configuration**. You **MUST** set up configuration in order for the programmer to work! When "4" is pressed, you will see the configuration menu which will look like this:

```

COM1 - Tera Term VT
File Edit Setup Control Window Help

Set Up Configuration
Choose an Option Below Then
Press 1 to Enable Option, 0 to Disable

(1) Erase
(2) Program Flash
(3) Program Data
(4) Program Fuses
(5) Lock After Programming
(6) Program User Signature Page
(7) Set Up Fuses
(8) Erase Buffer Bypass
(9) Reset Polarity
(ESC) Exit Configuration

Erase      : 1 Enabled
Prog Flash : 1 Enabled
Prog Data  : 1 Enabled
Prg Fuses  : 1 Enabled
Lock       : 1 Enabled
Pg Sig Row : 1 Enabled
Buf EraseBP: 0 Disabled
Rst Pol:   1 Active Low

```

Figure 10.

Select any option 1 - 9, then press either 1 or 0 to enable/disable that option. The configuration settings will remain in memory. They can only be overwritten next time you enter the configuration menu. The only way to exit this menu is to press ESC. The settings above are self explanatory, however the following selections require further explanation.

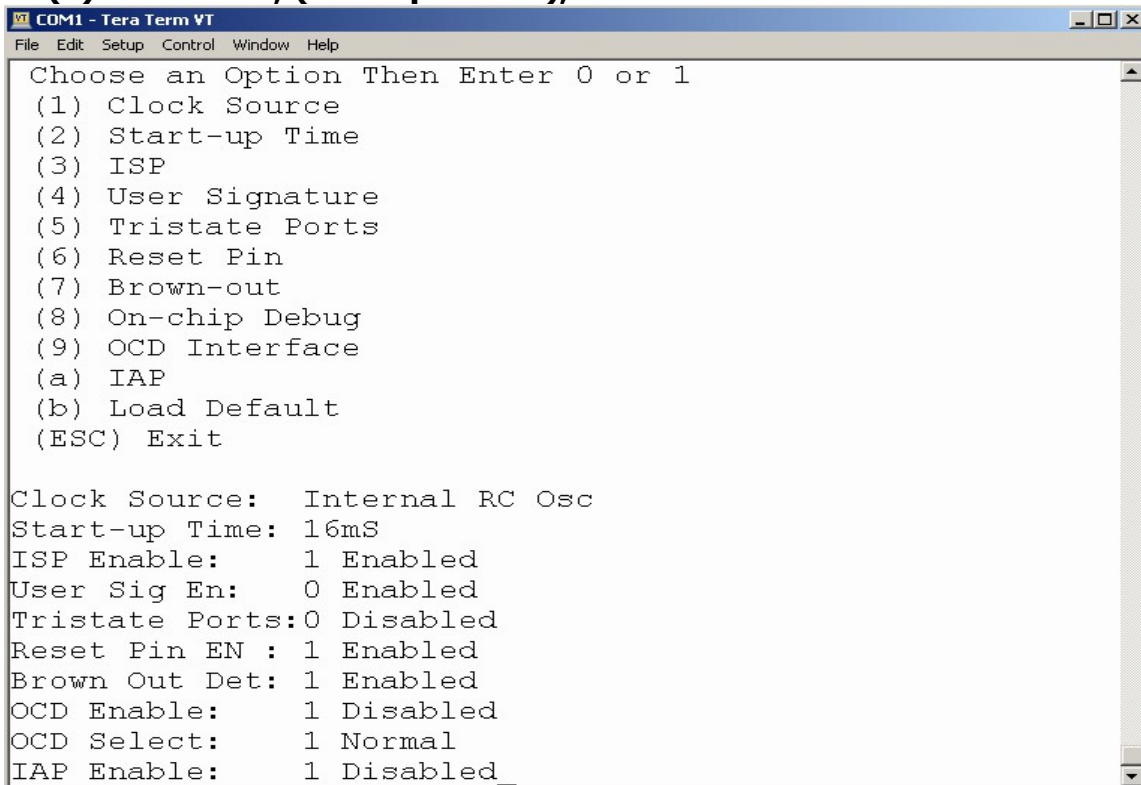
(8) Erase Buffer Bypass

It is absolutely necessary to clear the buffer before a hex file is loaded in the programmers memory. With large hex files (as large as 64K), this can take a very long time. This feature was added to skip the buffer erase in order to save time. If you enable this option, **KNOW WHAT YOU ARE DOING!** When enabled, the hex files loaded must contain consecutive addresses because the standalone programmer is going to program the entire buffer to your device. If your hex files addresses are not sequential (as with some compilers), there will be previous data remaining in the buffer.

(9) Reset Polarity

Some AT89LP devices have select-able reset polarity. This means that the reset can be changed to active LOW or active HIGH. By pressing (9) above, then pressing 1 will change the polarity to active low. The POL pin on your circuit (if available) will determine which setting to use. If the POL pin is joined to VCC, then the reset polarity will be (0) Active High. If the POL pin joined to GND, then the reset polarity will be (1) Active Low. **It is absolutely necessary to power cycle the programmer after this setting is changed, or you will see an error message when programming your device.**

If (7) is selected, ("Set Up Fuses"), a menu will be shown like this one:



```

COM1 - Tera Term VT
File Edit Setup Control Window Help
Choose an Option Then Enter 0 or 1
(1) Clock Source
(2) Start-up Time
(3) ISP
(4) User Signature
(5) Tristate Ports
(6) Reset Pin
(7) Brown-out
(8) On-chip Debug
(9) OCD Interface
(a) IAP
(b) Load Default
(ESC) Exit

Clock Source: Internal RC Osc
Start-up Time: 16mS
ISP Enable: 1 Enabled
User Sig En: 0 Enabled
Tristate Ports:0 Disabled
Reset Pin EN : 1 Enabled
Brown Out Det: 1 Enabled
OCD Enable: 1 Disabled
OCD Select: 1 Normal
IAP Enable: 1 Disabled

```

Figure 11.

The fuse menu will vary from device to device. Before changing fuses, be certain the device you are going to program has been set up in the programmer. (see above) With most options this is self explanatory.

Select an option, then press either 1 or 0 to enable/disable that option. Do the same for all options. If programming the User Signature Row, be sure to enable fuse programming (option 6, Figure 9 above).

(b) Load Default

This selection will load all of the default factory fuses into the programmers memory. The fuse settings will remain in memory. They can only be overwritten next time you enter the fuse configuration menu. The only way to exit this menu is to press ESC. You will then be returned back to the configuration menu where you can press ESC again to get back to the main menu.

Step 5: Programming

Finally you are ready to program your device! From the main menu Select 5, Program. The maximum file size that will be programmed is determined by the device selected. (IE. if a 12K file has been loaded from a larger capacity device, and the current device selected is a 2K device, ONLY 2K will be programmed)

IT IS EXTREMELY IMPORTANT TO SELECT THE CORRECT DEVICE TO PREVENT ERRORS!

The target can be programmed while the programmer is connected to the PC if you would like to see the results in the terminal, or you can just view the LED's when in stand alone mode. If the standalone programmer is connected to the PC during programming, you should see a screen like this:

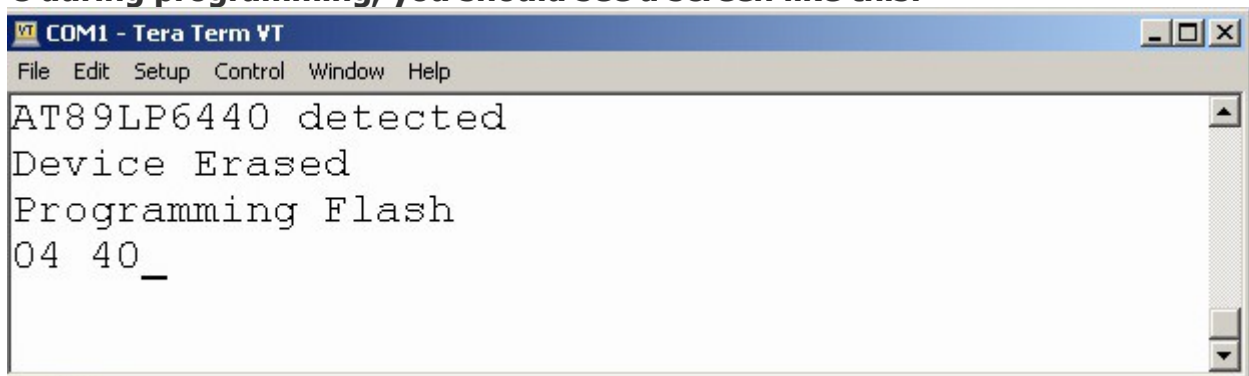
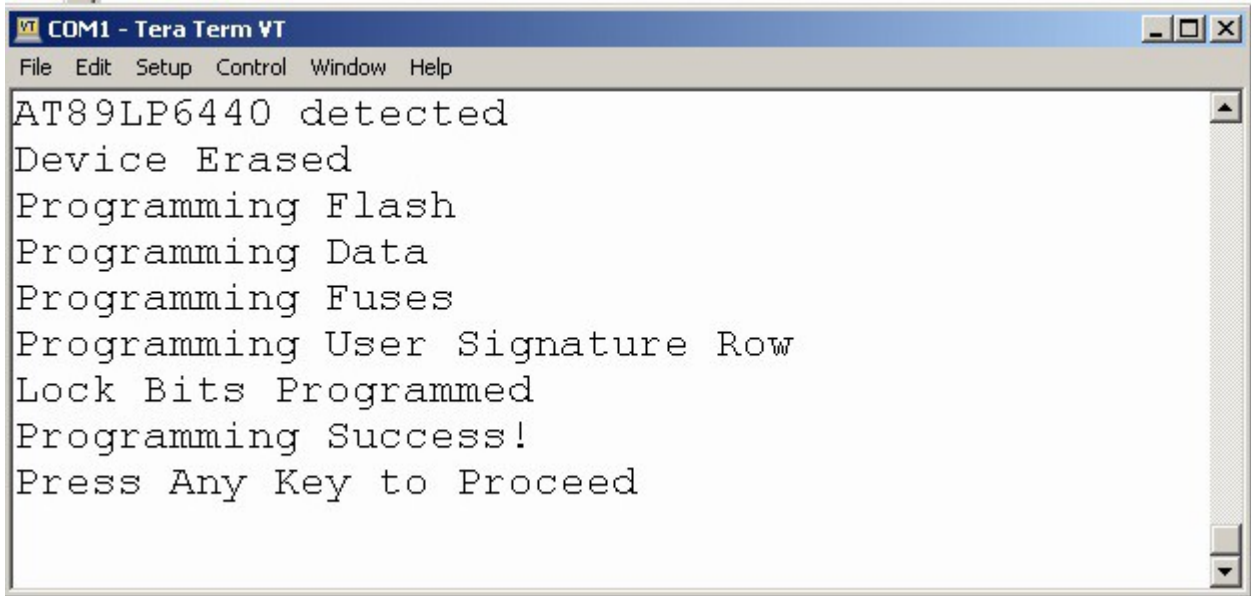


Figure 12.

The programmer will detect the target device and begin to program based on the configuration settings. If the selected device does not match the detected device, you will receive an error message. The programming address will be displayed while programming.

*****If the terminal program you are using does not support CR (carriage return) or LF (line feed) chars, then the display will not appear correctly. This is why we use the teraterm program from the above link.*****

Once programming has completed, the green led will be illuminated if there are no errors. You will then see a screen like this:



```

COM1 - Tera Term VT
File Edit Setup Control Window Help
AT89LP6440 detected
Device Erased
Programming Flash
Programming Data
Programming Fuses
Programming User Signature Row
Lock Bits Programmed
Programming Success!
Press Any Key to Proceed
  
```

Figure 13.

The results will also show on the led's.

The LED's represent: Red (L3) - ERROR, or programming failed.

Yellow (L2) - Busy Programming or receiving DATA.

Green (L1) - Success Programming or receiving DATA

Press any key to return to the main menu. After loading the hex file(s) and the configuration is complete, the unit can run as a stand alone programmer.

When programmer is powered down, install jumper J1 and connect programmer to target device. With Jumper J1 installed, the programmer will operate as a standalone unit. When power is applied to programmer, it will begin to program the target based on the settings you have set in the configuration menu.

Jumper J1 must NOT be installed for loading and configuration.

The programmer automatically verifies every byte it programs. You can choose the option to lock the target for extra security.

*****All lock bits will be programmed (there are no other choices) *****

If you experience any errors while programming simply power cycle the programmer and retry the operation.

Troubleshooting

Problem: Error message "ERROR Reading Device Signature" or "Target Failed"

There are three possible solutions to this error, however the problem is most likely that the target device is not being reset.

1. The most common problem is the correct device is not selected in the device menu. If you are programming an AT89LP213, be sure that the device selected is the right one.

2. The device is not in reset . A perfect example of this is the AT89LP51 or the AT89LP52. These devices are built for compatibility with the older AT89S51, AT89S52 where the EA pin is connected to VCC. The POL pin on the AT89LP51 or the AT89LP52 is in the same location (Pin 31) as the EA pin on the AT89S devices. If the LP device is inserted in a circuit designed for the AT89S where the EA pin is tied to VCC, then automatically the reset circuit is active high. The POL pin must be tied to VCC or GND. It cannot be left unconnected. Please check your target circuit and adjust the reset polarity setting accordingly.

The AT89LP213, AT89LP214, AT89LP216, AT89LP428 and the AT89LP828 all use active low reset. Other devices contain a POL pin (Please see the data sheet for the device you are programming for the correct pin location).

When changing the reset polarity in the standalone programmer, a power cycle is required before you begin to program any devices.

3. Another cause may be the reset circuit on your board. For the sake of troubleshooting, try to disable everything connected to the reset pin of your device except the line connected to the programmer. Power cycle the programmer and try again. If this doesn't work, and as a LAST resort, disconnect the reset line from the standalone programmer. Ensure NOTHING is connected to the reset pin. Connect the reset pin on your device directly to either VCC or GND. Power cycle both programmer and target circuit and try programming the device. If this does not work, the problem is in your target circuit somewhere.

Some things to check:

Check the clock signal to the target. Ensure that the target power supply is adequate. If you are powering the standalone programmer using a [USBtoTTL](#) converter, please ensure that the power is the same as your target circuit. Some targets run at 3V, others at 5V.

Check the ISP pins (SCK, MISO, MOSI, SS). If these pins are connected directly to another device, there may be a conflict during programming. Figure 14 below illustrates proper connection to the SPI bus if the pins are used in your circuit.

Connecting the ISP Interface **

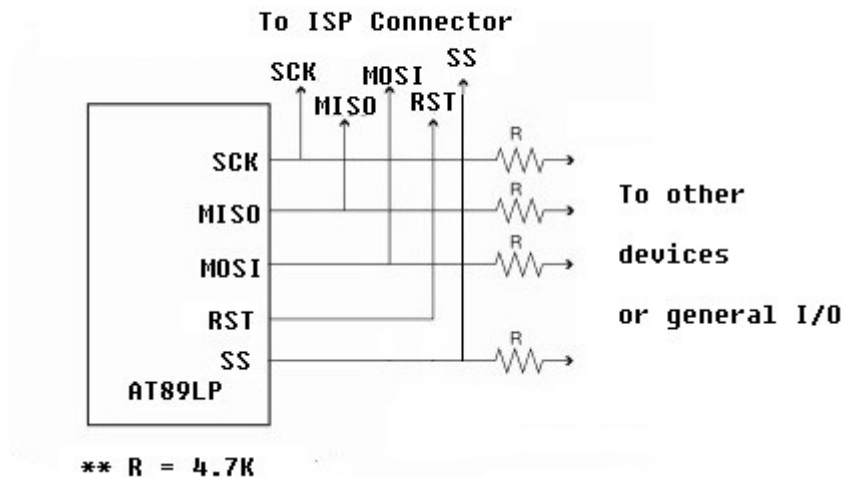


Figure 14.

Problem: Error message "Error in Hex File"

This error is caused by a bad Checksum in the hex file you are loading. It can also be caused by attempting to load a hex file that is larger than the capacity of the selected device. (I.E. if the selected device is AT89LP213 (2K capacity) you are trying to load a 64K hex file (from an AT89LP6440)

Solution: Select correct device before loading any files or configuring fuses. All other configuration settings are dependent on the selected device.

Problem: I programmed my device with the standalone programmer but the device doesn't work.

Solution: If you are 100% certain your code is working, check that the line delay is set correctly. It is possible that some data was missed during loading. Also if the Erase Buffer Bypass option was enabled, try disabling it and re-load your files.

For support or any questions, please email:
microcontrollerprog@yahoo.com