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Bootstrap Loader for Internet Protocol and Serial (BLIPS), V3.0

For the VB6 source code, inquire of the author.

DESCRIPTION:

BLIPS is a graphical user interface and command line MS Windows program that loads programs and data into an Atmel AVR microprocessor's flash and EEPROM memories. BLIPS transfers this data from a PC via either a serial port or a LAN/WAN connection (IP) to an Ethernet/WiFi to serial bridge – such as the Lantronix Xport or WiPort, or equivalent device. The AVR-side bootloader can be the sample provided in source code form with BLIPS or any that meets the Atmel AVR-109 protocol.

Version 3 of BLIPS adds an optional command line interface to the graphical user interface in prior versions. This permits BLIPS to be called from scripts and batch files, with file and action parameters, and return a success status. The batch mode support for commercial for-profit end-users is controlled by a usage key. A sample command line batch file is:

```
blips progf -d atmega8 -p com1 -b 57600 "Flash file1.hex"  
echo blips exit status = %errorlevel%
```

The BLIPS package consists of:

- (1) The BLIPS program for Microsoft Windows (see DEPENDENCIES section, below).
- (2) A sample Atmel-AVR-microprocessor-resident bootstrap loader that fits in 512 bytes.
- (3) Optional: Configuration data for command-line mode operation of BLIPS' PC program.

The graphical user interface mode of BLIPS (non-command-line mode) is shown in the graphic, below, followed by the command line mode options.

Sample AVR-resident code is provided in source code (AVR Studio) and has been adapted from public domain code originally conforming to Atmel's Application Note 109. This code must be configured for the target AVR chip type, assembled and loaded into the AVR chip using an in-system-programmer (ISP). Thereafter, BLIPS may be used for all flash and EEPROM loading, even across the Internet to an AVR at a distant location.

BLIPS communicates with the AVR chip resident bootloader via:

- (1) A windows COM port, be it a real serial port or a virtual serial port created by a LAN-to-serial device's windows driver (e.g., LANTRONIX Xport/WiPort or Moxa NPort).
- (2) A LAN/WAN IP connection directly to an Ethernet-to-serial device such as those mentioned above. This method does not require a virtual COM port driver. The IP connection is either TCP or UDP (user's choice)

A fast block mode transfer is supported, despite the small 512 byte size of the AVR code. The AVR side code supports the large memory AVR chips such as the mega128 (paged).

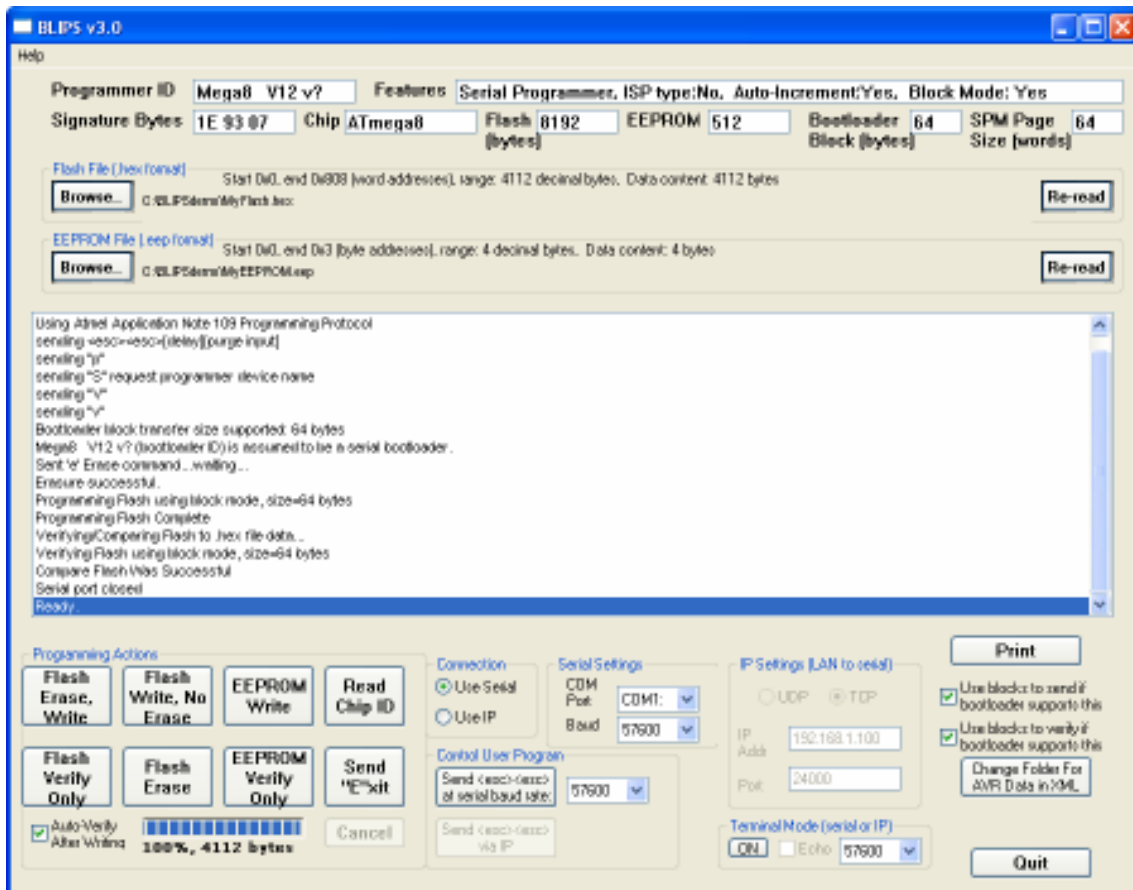
Starting with Version 3, BLIPS supports a command line mode. Here, one may invoke BLIPS from a batch file, a windows desktop icon, or a script file or HTML script. BLIPS returns a success/failure code. Option switches on the command line select the serial port or IP

address/port, AVR chip type and printing of the resultant status log. The INSTALLATION section, below, describes how to configure BLIPS to add support for command-line use.

Printing of the status results log is supported from both the command-line mode and the graphical user interface mode.

A built-in dumb terminal permits seamless keyboard chatting with a user's application running in the AVR, via the chosen communications method (serial port or IP).

The user's application can detect an attempt by BLIPS to start a download. This is indicated by two or more successive ASCII Escape characters on the application's incoming serial data. Other methods for unattended boot-loading triggers may be coded in the supplied sample AVR code. Some wholly independent AVR-resident code may be compatible with BLIPS via the Atmel App. Note #109 conventions.



(below) COMMAND LINE MODE OPTIONS

```

BLIPS Command Line Syntax: <command> -d <device> [options] <hex file name>

<command> may be: progF (program flash) or progE (program EEPROM)
<hex file name> file containing hex flash or eeprom data produced by compiler/assembler.
  Is full pathname or a file in same directory as BLIPS. Use quotes if spaces in path name.

-d <devicename> name of AVR device. MUST be given. Ex: -d atmega8
Options
-p <serial port> name or number such as COM2 or 2. See also -i. Ex: -p COM2
-c same as -p
-b <baud rate> baud rate for serial port. Ex: -b 115200
-m <mode> mode 1: use block mode transfers; 0 = do not use block mode. Ex: -m 1
-x <path name> Folder containing the AVR part's description XML file. Ex: -x "c:\Some Folder\xml\dir"
  If -x is omitted, the XML file must be in either (a) the same folder as the hex data file or
  (b) in the standard XML folder within Atmel's AVR Studio.
-i <IP address> specify IP address for -t and -u options. Ex: 192.168.1.100
-t <port> Use TCP rather than UDP, for the address given in -i.
-u <port> Use UDP rather than TCP, for the address given in -i.
-v Print log file after processing.
-q Do not quit (exit program) after command line processing is completed.

Note: The option letters are case-insensitive.
-h or -H or -? or ?? or help, display this help

Ex1: progF -d atmega8 -p COM2 -b 19200 "c:\documents and settings\user\myFlash.hex"
Ex2: progE -d atmega64 -p 2 -b 115200 "c:\documents and settings\user\myEEPROM version 5.hex"
Ex3: progF -d atmega256 -i 192.168.1.100 -t 4001 "c:\documents and settings\user\myEEPROM version 5.hex"

A command line may be in a desktop icon's properties, a .bat file, a VB Script, etc.
Exit status: a script or .bat file may detect success using the returned status. Ex: echo %errorlevel% (in .bat)

```

Close Print

BLIPS 3.x Summary:

- All BLIPS 2.x features
- Command line mode – invoke BLIPS from a batch file, a windows desktop icon, or a script file. BLIPS returns a success/failure code. Option switches on the command line select the serial port or IP address/port, printing of the resultant status log, and others.
- Print status log in user non-command line (graphical user interface) mode.
- Print the command line mode options
- Added more AVR chip-type configuration blocks to the AVR side assembly language boot loader code. These are easily modified/added for other chips. This code remains 512 Bytes, including support for fast block mode.

BLIPS 2.x Summary:

- Communicates via serial port or Internet Protocol (UDP or TCP) with an on-chip boot loader program. This on-chip boot loader program is installed once in the AVR chip using an “ISP” device and Atmel or other software. An easily configured boot loader program for the mega128 and smaller chips is included with BLIPS; it is assembled using AVRStudio. Then the AVR chip/product can be moved to wherever desired. User programs are then loaded into the AVR chip using BLIPS, perhaps via a LAN or the Internet.
- BLIPS communicates using the PC’s serial port (COMn) or the wired/wireless LAN/Internet connected to the PC. For the LAN cases, the AVR chip’s serial port is connected to the network via a serial-to-ethernet or serial-to-WiFi adapter such as Lantronix XPort or WiPort, Moxa NPort, or the many equivalents.
- Writes a .HEX file from a compiler or assembler to the flash memory
- Writes a .EEP file, as above, to the EEPROM
- Verifies after writing by read-back
- Uses the Atmel Application Note 109 communications protocol
- BLIPS supports high-speed block mode flash write/verify using the included on-chip bootloader code (mega128 or smaller) or any equivalent.
- BLIPS avoids exchanging blocks of “0xFF” bytes. This occurs for .HEX files that contain non-contiguous sections of code or constants in flash. This speeds writing and verifying,

- especially for large chip memories and/or slow communications lines.
- BLIPS includes a built-in simple dumb terminal program. For a developer/user, this is quickly activated after downloading a new application program. This is convenient applications that communicate with a display and keyboard. The communications for this may be the same connection as for downloading or the BLIPS user may change to a different port for the dumb terminal mode.

TO INSTALL BLIPS ON THE PC

A setup.exe installer for BLIPS is provided. It installs the dependency files listed below. If these files already exist on the target PC, then only blips.exe and blips.exe.manifest need be placed in the same folder.

In more detail: the operating system library (DLL/OCX) dependencies are listed in the next section. If any of these are missing, they may be obtained as discussed in the next section.

- (1) Create a folder "BLIPS"
- (2) From the ZIP file, extract and store BLIPS.exe and the blips.exe.manifest file in this folder. These must be in the same directory. The BLIPS setup.exe need not be used – only the EXE and manifest files are needed. The setup.exe can be used as an alternative for resolving the dependencies on DLLs and OCXs (see next section).
- (3) Click on the BLIPS.exe to run in the graphical user interface mode. Create a desktop or start menu shortcut if desired.
- (4) If the command line mode of operation is needed, refer to the COMMAND LINE MODE CONFIGURATION section below.

MICROSOFT LIBRARY DEPENDENCIES

If any of the files listed below are not on the target PC, they may be obtained by:

1. Download from Microsoft's web site or other archive
2. Copy from/to properly licensed PCs or original CD-ROMs or DVDs
3. Run the BLIPS setup.exe installer

If DLLs or OCXs are manually copied to Windows' system32 directory, do not forget to run regsvr32 for each added file.

```

Uses1=msvbvm60.dll
Uses2=oleaut32.dll
Uses3=olepro32.dll
Uses4=asycfilt.dll
Uses5=stdole2.tlb
Uses6=COMCAT.DLL
Uses7=sccrun.dll
Uses8=mscomm32.ocx
Uses9=mswinsck.ocx << An older file, valid for XP, widely available
Uses10=comdlg32.ocx
Uses11=mscomctl.ocx
Uses12=PICTCLP32.OCX

```

Description of the PC side

BLIPS communicates with a bootloader program, installed in the AVR mega chip, that adheres to the Atmel applications note 109 conventions for communications with a host PC.

BLIPS is intended for use with Windows XP. It has been tested with foreign language versions of XP. Win2K support is likely but unsure.

The non-command-line mode of BLIPS requires the folder within Atmel's freeware AVR Studio in which the part description XML files. You may specify where this folder is on the disk.

The command-line mode of BLIPS may also use the AVR Studio location for XML part descriptions, or a particular part's XML file may be given via a command line option.

Description of the AVR Chip-resident Bootloader sample code (assembly language source).

Any App note 109 boot loader "should" work with BLIPS. Those that support high speed block mode are preferable, but byte-at-a-time boot loaders should work.

I could not find, in the public domain, a bootloader with fast block mode that fits in just 512 bytes. All I saw were for the next larger boot area size of 1024 bytes. On mega8's the size is important. Therefore...

Along with BLIPS, a modified boot loader, originally in the public domain, written in assembly language, and tested with BLIPS, is provided. The constants at the beginning of the bootloader program are setup to allow quick configuring for any mega chip (I hope).

BLIPS was designed to work optimally with the BLIPS-related AVR-side boot loader code.

Use AVR Studio to edit and create your version of the bootloader as a .hex file. Install this in the mega chip using an In-System-Programmer device (ISP) used with AVR Studio, or equivalent.

Use your ISP to set the boot size fuses according to the value you set for MYORG in the boot loader ASM code. For the mega128, a 512 byte size is not supported by the chip.

The ASM bootloader code as is fits in 512 bytes.

Be sure to enable the fuses for RESET GOES TO BOOTLOADER.

COMMAND LINE MODE CONFIGURATION

1. Ensure that the graphical user interface mode of BLIPS is installed and working, as above.
2. Next, obtain the file named BLIPSConfig1.zip. See Appendix A to this document for how to obtain this file. Extract the zip file's contents into the BLIPS folder (where BLIPS.exe is located).
3. As Administrator, double-click on `config1.reg` and follow the prompts. Next, test the command line as follows.

TEST THE COMMAND LINE MODE

1. Open a Command Window (DOS prompt).
2. Change directory (a CD command) to the BLIPS folder.
3. Enter the command: `blips -h`
4. Confirm that the command line mode help window is displayed.

USAGE OF THE COMMAND LINE MODE

A batch file, windows icon, or script file to use BLIPS in command line mode is setup based on the command line options (see help file shown earlier).

A sample (minimal) batch (.bat) file is:

```
blips progf -d atmega8 -p com1 -b 57600 "Flash file1.hex"  
echo blips exit status = %errorlevel%
```

Here, the file is assumed to be in the same directory as BLIPS or the script, since the full pathname was not given.

The `%errorlevel%` batch variable contains the error exit status of BLIPS which is 0 if success.

BLIPS command line may be invoked from Windows desktop icons, .bat files, VBS (Visual Basic Script) and other scripting languages, and via client-side VBS in HTML web pages such as .asp.

COMMAND LINE BATCH FILE MODE, DEFAULT SETTINGS

The user-selected settings for a BLIPS command line (icon or .bat file) or a VBS or other script are usually listed on the command line as shown earlier in the command line options. Alternatively, a windows registry import file (.reg) can be created, as follows.

The following is a sample .reg exported by regedit. A custom .reg file may be created and invoked for import by a script file before launching BLIPS. When starting, BLIPS reads these items from the registry.

Windows Registry Editor Version 5.00

```
[HKEY_CURRENT_USER\Software\VB and VBA Program Settings\BLIPS]

[HKEY_CURRENT_USER\Software\VB and VBA Program Settings\BLIPS\Startup]
"verifyAfterProgramming"="1"
"COMbaud"="1"
"UseSerial"="True"
"ProgramHexNameDir"="C:\\BLIPSDemo"
"ProgramHexNamePath"="C:\\BLIPSDemo\\MyFlash.hex"
"ProgramHexNameBase"="MyFlash.hex"
"XMLpath"="C:\\Program Files\\Atmel\\AVR Tools\\Partdescriptionfiles"
"COMbaudTTY"="1"
"COMbaudesc"="1"
"EEPfileNameDir"="C:\\BLIPSDemo"
"EEPfileNamePath"="C:\\BLIPSDemo\\MyEEPROM.eep"
"EEPfileNameBase"="MyEEPROM.eep"
"IPaddr"="192.168.1.101"
"IPport"="24000"
"UseBlockModeProgramming"="1"
"UseBlockModeReadVerify"="1"
```

COMBaud's value is 1..n as follows

1. "115200"
2. "57600"
3. "38400"
4. "19200"
5. "9600"
6. "4800"
7. "2400"
8. "1200"
9. "600"
10. "300"

COMbaudTTY in the registry is the serial port speed for the **terminal mode** of BLIPS.
COMbaudesc in the registry is the serial port speed for the **Send Escape** button in BLIPS.