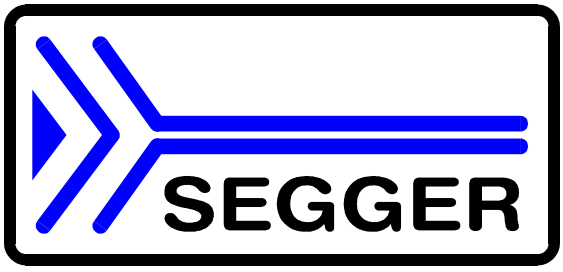
FLASHER ST7

Programming tool for
ST7 series of microcontrollers
with on-chip flash

Software version 2.00
Hardware rev. 2
Manual rev. 2



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Applicable microcontroller

Serial mode:

ST72F26x series	ST72F260G1, ST72F262G1, ST72F262G2, ST72F264G2,
ST72F324 series	ST72F324J6, ST72F324J6T, ST72F324K6, ST72F324K6T, ST72F324J4, ST72F324K4, ST72F324J2, ST72F324K2
ST72F324L series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST72F324L series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST72F324 series	ST72F321R4, ST72F321R5, ST72F321R6, ST72F321R7, ST72F321R9, ST72F321AR4, ST72F321AR5, ST72F321AR6, ST72F321AR7, ST72F321AR9, ST72F321M6, ST72F321M7, ST72F321M9, ST72F321R9, ST72F321J7, ST72F321J9
ST72F325 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST72F32A series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST72F34x series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST72F521 series	ST72F521R6, ST72F521AR6, ST72F521M7, ST72F521R7, ST72F521AR7, ST72F521M9, ST72F521R9, ST72F521AR9
ST72F561 series	ST72F561J4, ST72F561J6, ST72F561J7, ST72F561K4, ST72F561K6, ST72F561R6, ST72F561R7, ST72F561R9
ST7DALI series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7FLCD1 series	ST7FLCD1
ST7FMC1 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7FMC2 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7FOX series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7LITE0 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7LITE1 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7LITE1xB series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7LITE2 series	ST7Lite20, ST7Lite25, ST7Lite29, ST7DALI
ST7LITE3 series	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7SUPERLITE	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html
ST7ULTRALITE	Look at http://www.segger.com/flasher-st7-supported-microcontrollers.html

Features

- Easy to use windows program
- Serial in target programming using ICC protocol
- Programming / Clearing / Verifying / Read back supported; High speed programming
- 512KByte FLASH to store target program
- PC Program for batch mode processing, allowing usage in automated test systems.
- Once set up, Flasher can be controlled without the use of PC program.

Working environment

General

Flasher has been designed for use in a lab or production environment.

Host System

IBM PC/AT or compatible. CPU: 486 (or better) with at least 8Mb of RAM, running Windows 95 / 98 / 2000 or NT. It needs to have an RS232 interface available for communication with FLASHER.

Power supply

Flasher requires 16 - 18V DC, min. 40mA. You may use the power supply which comes with the tool. Flasher is protected against polarity reversion on the supply input. Please avoid excess voltage.

Please note: For ST7 targets requiring programming voltage of 12V, the minimum supply voltage is 16V, ST7 XFlash devices may be handled with Flasher supply voltage of 8V or above.

Installing the FLASHER PC-software

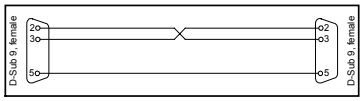
The PC software FLASHER.EXE is distributed on the accommodating 3.5“ floppy disk; the latest version can be downloaded from our website: http://www.segger.com/flasherst7.html. In order to use the software, simply copy it onto your hard drive and start the executable which will guide you through the installation process.

Connecting FLASHER to PC

PC <-> FLASHER interface cable

A standard serial interface cable (null modem) can be used to connect FLASHER to the PC. The pin assignment of the 9 pin SUB-D male RS-232 interface connector is as follows:

Pin no.	Signal	Function	Host-Signal
2	RxD	Serial async. data input	Serial data output (TxD)
3	TxD	Serial async. data output	Serial data input (RxD)
5	GND	Signal ground	Signal ground



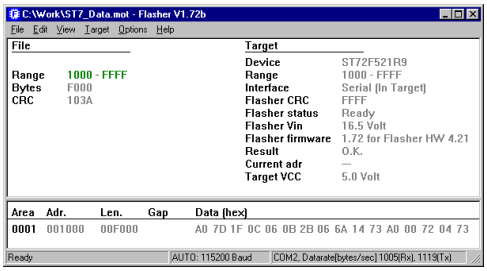
Getting started:

1. Connect FLASHER to a PC running Windows 95/98/2000 or NT using the NULL-modem cable and run the FLASHER software FLASHER.EXE
2. Connect FLASHER to the power supply.
3. Select COM port via Options | Communication menu.
4. Set up the device via Options | Device menu of PC program.
5. For in-circuit programming: Connect FLASHER to target system via customized interface cable.
   Before connecting the target system to Flasher, ensure, there is no ground potential difference between target and Flasher, otherwise the Flasher may be damaged.

Using FLASHER PC program

General

Flasher comes with an easy to use Windows program. It allows reading of program files in motorola or intel hex format. The following is a screenshot of FLASHER.EXE with loaded target program

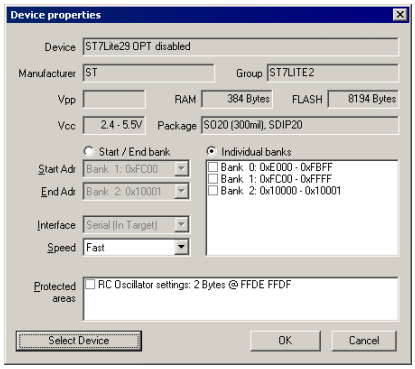


Communication between PC and FLASHER

Make sure the power supply is connected (one of FLASHERs LEDs should be illuminated) and FLASHER is connected to your PC with a NULL-modem cable as supplied. If the PC-program displays anything other than "No communication" under flasher status, the communication between Flasher and your PC is functioning.

First time setup of FLASHER

When using Flasher for the first time, please select the menu point Options | Device. You will see the following dialog box:



First carefully select the correct target device. A false selection may damage your target! Then select the chip area you would like to access, the sectors of the on chip-flash and the interface you would like to use. Choose one of the following options:

Start/Endbank to select adjacent banks.

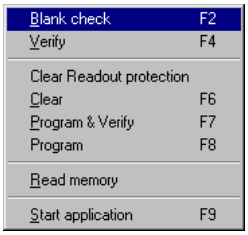
Individual banks to select individual non adjacent banks.

For targets running at low frequencies, it may be necessary to set the speed option to Slow.

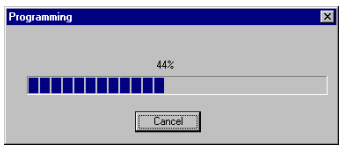
Now you should be able to blank check, clear, program, verify or read the target chip in serial mode (if your target is properly connected to FLASHER). The first time you program or verify, the PC downloads all device settings and your target program to FLASHER, where it is stored in the on board FLASH chip for programming or verification. The PC-Program stores all setup information in the registry; when you start the program the next time, it will start with the same settings.

Programming / clearing / verifying / blank check

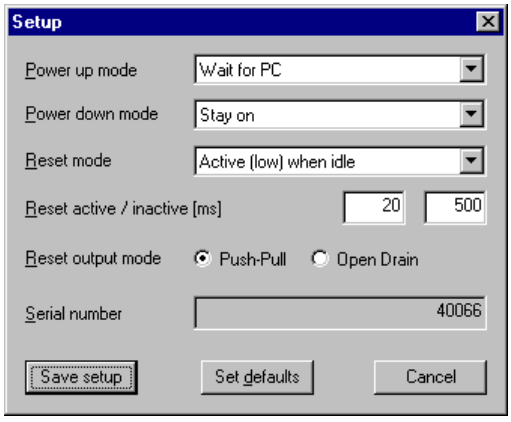
Select one of the commands in the TARGET menu to start the operation. Note that some of the menu points may be grayed if connection to target is not established, or no file is loaded.



A modal dialog box will indicate the state and progress of the operation; the operation can be canceled hitting the CANCEL button.



Setup



The operating mode of FLASHER may be changed using the Setup dialog from the Options menu.

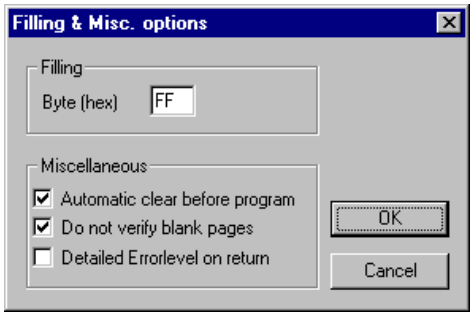
Power up mode, Power down mode and Reset mode should not be changed for normal operation. Setting of Power down mode has no effect on FLASHER ST7.

You may change the reset active and reset inactive time if required by your target hardware.

You may select reset output mode as Push-Pull output or Open Drain.

All setup settings are stored permanently in FLASHER after pressing ‘Save setup’ button.

Additional options



The Filling & Misc. Options from the Options menu may be altered if required.
Normally there is no need to change any of these settings.
The fill byte is automaically programmed to all memory locations not defined in your target hex file. You should not modify the default value of 0xFF.
When programming blank (virgin) CPUs 'Automatic clear before program' is not required, so this feature can be disabled to speed up programming procedure.
Detailed errorlevel on return option may be used to return a detailed errorlevel to the calling program when Flasher is used in batchmode.

Caution: Any setting of fill byte other than 0xFF will be programmed in option bytes if your target file does not contain data at address 0x10000 and 0x10001 and option byte sector is enabled for your target CPU.

Programming Option Bytes

ST7 CPUs require option byte programming to setup various important CPU functions.

FLASHER ST7 defines an additional FLASH memory sector for two Option Bytes.
This sector is located at address 0x10000 to 0x10001.
To access Option Bytes of target CPU, this additional sector has to be enabled.

First you should create a HEX file which contains your Option Bytes.
This can easily be done using Flasher PC software as described below.

To create an Option Byte file and program Option Bytes, proceed as follows:

- Open device dialog by menu "Options | Device"
- Select your target CPU from the device list.
- Choose last memory bank only. (Start Adr = 0x10000; End Adr 0x10001)
- Connect your target CPU and start "Target | Read memory"
- Choose menu "View | Dump mode" which enables editing the two bytes in the data window of Flasher PC program.
- Edit the Option bytes to fit your needs:
  Option Byte 1 is located at address 0x10000
  Option Byte 2 is located at address 0x10001
- Save your Option bytes by menu "File | Save as". The Option byte file may be helpful for later use.
- Choose menu "File | Merge" to add your application program to your Option Bytes.
- Save the resulting file containing your application and Option Bytes for later use.
- Select "Options | Device" and set the target address range to fit your application program plus Option Bytes.
- Finally program your target.

When Option byte settings have to be changed, just merge the Option byte file created under point 7 to your application program and edit the Option Bytes.
To program another application with the same Option Bytes, just open your application program and merge the Option Bytes file.

Caution:
ST7 XFLASH and ST7Lite CPUs offer the choice of write protection by Option Byte settings. This protection can not be removed! So be careful editing your Option Bytes.

Remove Readout Protection of ST7 CPU

ST7 CPUs may be set to read out protection mode by programming Option Bytes.
If target CPU is read out protected, the Flash memory can not be read back by FLASHER ST7.
FLASHER ST7 will respond with error 85: "Target is read protected".
To remove readout protection, the whole target CPUs memory has to be programmed to all zeroes and then it has to be erased inclusive erasure of Option Bytes.

FLASHER ST7 offers the additional function "**Clear readout protection**" under menu "Target" to remove the readout protection.
Older version of PC program offers the function "Clear All" which also clears readout protection for ST7 target CPUs.

Clock options of ST7 CPU

ST7 CPUs require CPU clock to enter ICC mode after reset.

There are two different ways to invoke ICC communication:

- Enter ICC mode and do not take into account option byte settings. (OPT disabled)

This mode always requires external clock supplied to target CPU.
The clock might be supplied by any external oscillator (not crystal or resonator).
Flasher delivers approximately 11 MHz clock at OSC_CLK (pin 9) which has to be connected to the clock input of target CPU, if external oscillator is not available on target board.

- Enter ICC mode and take into account option byte settings. (OPT enabled)

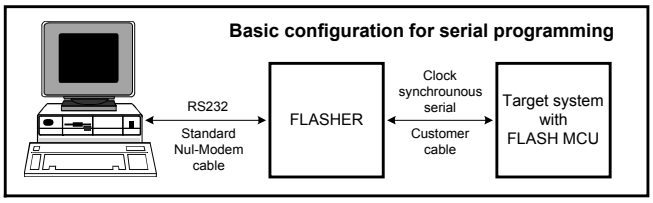
This mode activates CPUs internal oscillator, if option bytes are set up to activate internal oscillator.
Connection of OSC_CLK is not required in this case and Flasher will not deliver any clock signal on pin 9.

To select between the two different modes, you have to select the correct device from menu Device.
The device names in the list are followed by
“OPT disabled” to enter ICC mode without option byte settings (1.)
“OPT enabled” to enter ICC mode and take into account option byte settings (2.)

Special consideration for ST7Lite2 CPUs:
External clock has to be connected to PB4 in case virgin CPUs should be programmed and “OPT disabled” is used as ICC entry mode.

Using the serial link to program in circuit

FLASHER can be used for in circuit programming of ST7 CPUs, which incorporate built in firmware for serial update of user flash. The target system has to be designed to support this mode of operation. Refer to target specific connection diagrams or Users manuals of your target CPU.



Serial programming, technical details

Serial programming of ST7 microcontrollers uses ICC protocol. The commands which are used are described in the ST manual. In general, the sequence is as follows:

- Flasher resets the target CPU and then sets up the target to enter ICC mode
- Flasher downloads an application program (RAMCODE) to target CPU
- Flasher starts the target RAMCODE
- RAMCODE accepts commands from Flasher to read, clear or program the target CPU.

Operating FLASHER in stand-alone mode

After download, the target program and all settings are stored in FLASHERs on board FLASH memory.
Any number of microcontrollers may be now programmed by FLASHER (one at a time) without the need of a host PC, by simply pressing the start button. FLASHER will use the settings which have been made in the PC-program. This includes the selection of target address range as well as any options. Whether the target CPU will be erased before programming depends on setting of option “Automatic clear before program”.
Progress and result of the operation is indicated by the LED:

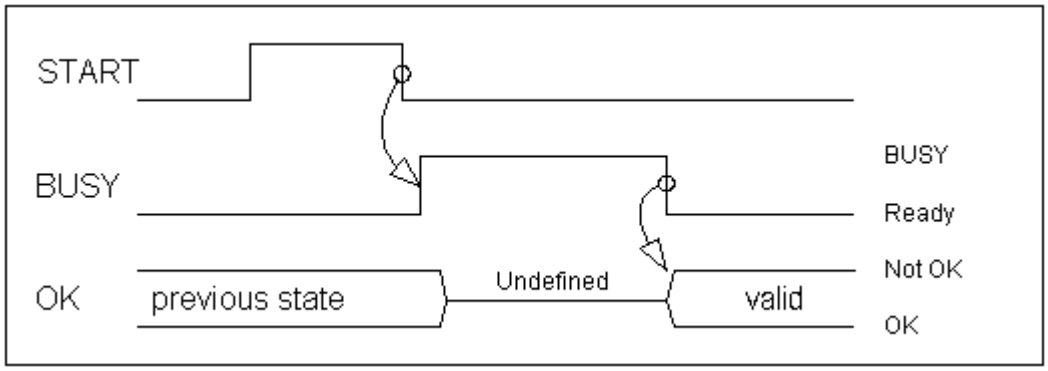
Status of LED	Meaning
GREEN, flashing	Erasing / Programming / Verifying operation in progress
GREEN	Programming operation successful
RED	Programming operation failed

Remote control of FLASHER ST7

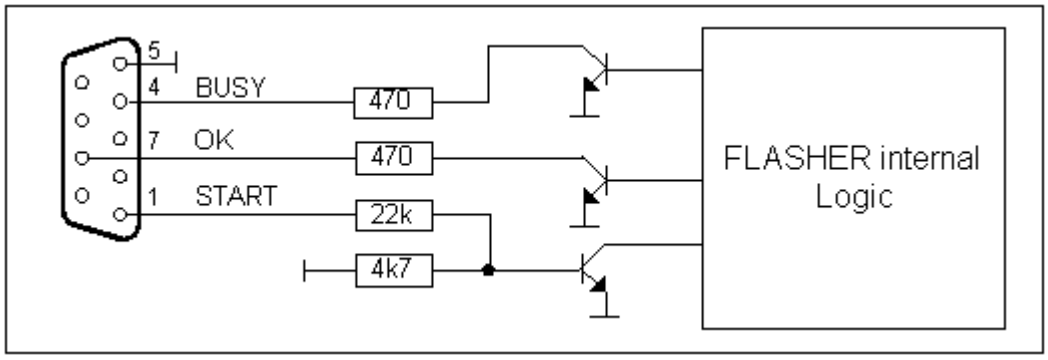
FLASHER ST7 can be remote controlled by automated testers without the need of a connection to PC and Flashers PC program. Therefore FLASHER ST7 is equipped with additional hardware control functions, which are connected to the SUBD9 male connector, normally used as RS232 interface to PC.
The following table shows the pin functions of remote control circuitry of FLASHER:

Pin No.	Function	Description
1	START	A positive pulse of any voltage between 5 and 30V with duration of min. 30 ms starts “Auto” function (Clear / Program / Verify) on falling edge of pulse. Whether Clear is executed depends on Options | Filling & misc. | Automatic clear before program.
4	BUSY	As soon as Auto-Function is started, BUSY becomes active, which means that transistor is switched OFF.
7	OK	This output reflects result of last action. It is valid after BUSY turned back to passive state. The output transistor is switched ON to reflect OK state.
5	GND	Common Signal ground

Shown below is a timing chart of remote control function:



The following diagram shows the internal remote control circuitry of FLASHER ST7:

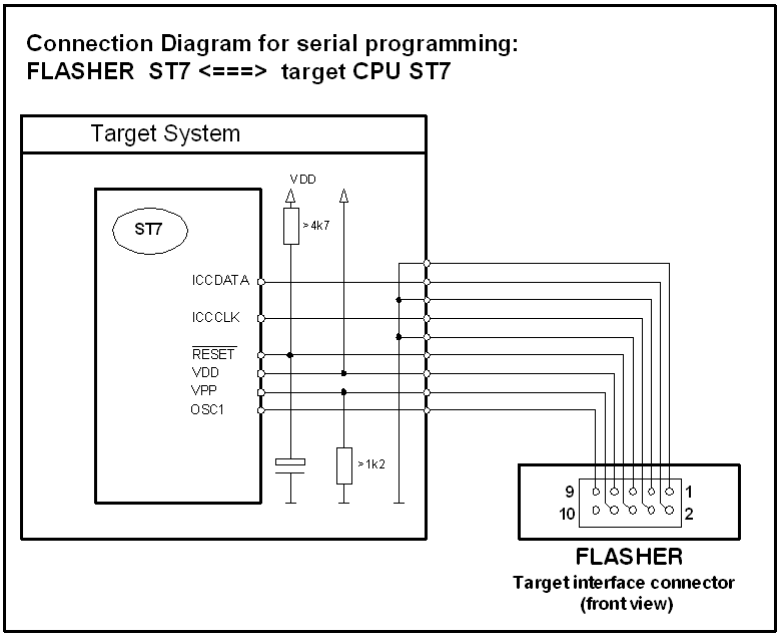


Target system interface for ST7

Target interface pin description

The ICC interface from Flasher to target system is built by a 10 pin dual in line pin connector,(pin1 is marked at the connector) at the front of FLASHER.
Flasher for ST7 uses the standard interface cable connection as described in the ST7 data sheets.

Pin no.	Signal	Function for ST7 target CPU	Specification / remarks
1	GND	Common supply and signal ground	---
2	ICCDATA	Data signal for ICC protocol communication	FLASHER Input / Output, CMOS open drain driver via 220 Ohms with active Pull-Up
3	GND	Common supply and signal ground	---
4	ICCCLK	Clock signal for ICC protocol communication	FLASHER Input / Output, CMOS open drain driver via 220 Ohms with active Pull-Up
5	GND	Common supply and signal ground	---
6	RESET	Target CPU reset	FLASHER output (Note 1)
7	VDD	Target supply voltage	Has to be connected to Flasher as this supplies Flashers target interface.
8	ICCSEL/VPP	Programming voltage	12V programming voltage output, also used to enter ICC mode
9	OSC_CLK	Target CPU OSC clock input	Clock output from Flasher to target, CMOS driver via 220 Ohms.
10	--	--	Not used for ST7, leave open



Note 1:
If RESET of target system is driven by a reset circuitry with active high driver, RESET output of FLASHER must not be connected directly to CPU reset of target.
For ST7 CPUs PUSH/PULL Reset output mode is recommended due to critical timings during initialization.

Note 2:
Clock output of Flasher (Pin 9, Signal OSC_CLK) does not need to be connected under the following circumstances:

- Target CPU is clocked by any external clock oscillator (not crystal, not resonator) on the target board.
- Target CPU uses internal oscillator by option byte settings and Flasher is set up to take into account option bytes of target CPU during ICC communication (refer to chapter “Clock options for ST7 CPU”).

Clock output of Flasher has to be connected, if option bytes of target CPU are programmed to use external clock. As this may happen accidentally, it is a good idea to connect OSC input of target CPU to Flasher interface.
Note that virgin ST7Flite CPUs may require external CPU clock at Port B4 instead of OSC1 input.

Caution:
Before connecting the target with Flasher, ensure that there is NO difference in the ground potential between Flasher and target.
When the Flasher is connected to a PC via RS232C cable, ensure that the PC and the target operate on the same ground potential.
Connect the ground lines from PC and your target before connecting the Flasher to the target.
If a ground potential difference between Flasher and target exists, the Flasher may be damaged.

Error messages

The following error messages can occur during operation of FLASHER ST7 (shown in red on your PC) or returned as errorlevel when operated from batch file and “Detailed errorlevel on return” option is set.

Code	Error message	Meaning / remedy
1	Erase failed	Erase operation has failed
2	Write failed	Write operation has failed
3	Verify failed	Verification failed. Loaded Program and contents of the flash-memory are not identical.
4	Blank check failed	Chip is not blank
5	Flash write/erase timed out	Could not write into flash memory, the max. waiting time has been exceeded
7	Canceled	Last operation has been canceled by user.
43	Timeout of target	Target command Clear, Program or Verify could not be finished within expected time. Please report this error.
55	CRC check in programmer failed.	Integrity of target data held in FLASHERs internal memory is lost. Download new data to FLASHER.
56	Internal Vcc drop during operation	A voltage drop on Flashers internal supply was detected. Internal data may be damaged.
58	DAC for Vpp not calibrated	FLASHER lost calibration data for Vpp generation circuit. Please return FLASHER to factory, as calibration can not be done by user.
60	Unsupported interface, check device setting	FLASHER is requested to access a target CPU that is not supported by Flasher. Normally this fault should not occur. Ensure that Flasher PC software version fits to Flasher firmware version
61	Unsupported command	FLASHER received a command that is not supported. Ensure that Flasher PC software version fits to Flasher firmware version.
62	No target data, please download	FLASHER 5 never received valid data for target, therefore target can not be programmed. Download target data.
63	FLASHER lost Setup	Setup data for Flasher invalid. Please run Option | Setup. and Option | Device.
75	RAMCode does not work	After download to target the RAMCode did not respond to Flasher. Check device configuration.
76	RAMCode does not respond command	RAMCode did not respond to Flashers command. Reset target and retry operation.
80	Could not enter ICC mode	Target did not enter ICC mode. Check configuration and device settings. Check target connection.
81	Timeout during serial data transfer	Target did respond in specified time. Check configuration and device settings. Check target connection.
82	Option byte read failed	Retry operation. Check configuration and device settings. Check target connection.
83	Option byte programming failed	Retry operation. Check target connection. If target was read protected, Option bytes can not be modified. Select "Clear All" function first.
84	Program All function failed	"Clear All" function terminated in error. Retry operation. Check target connection.
85	Target is read protected	Target could not be read, because target is read-protected by option byte settings.
87	Device file for ST7 invalid	Device file for ST7 CPU contains invalid parameter. Do you use a Flasher with firmware version different to PC program version?
88	Target is write protected	ST7 target CPU was set write protected by option byte setting. This protection can not be removed. Target CPU can not be reprogrammed or erased.
202	Blank check failed	Target CPU is not blank.
203	Verify failed	Verification failed. Loaded Program and contents of target CPUs flash-memory are not identical.
204	Clear target failed	Erase operation has failed.
205	Target auto function failed	Any error occurred during “Auto” function (Clear / Program / Verify)
206	Programming target failed	An error occurred during programming of target. If target was not blank before, ensure that target is erased before programming. Retry.
207	Reading target	An error occurred during reading of target. Retry operation. Check

	failed	connection to target.
210	Could not open source file	The source file given as parameter could not be opened. Check file name or path.
211	Invalid Parameter.	Invalid command line parameter found.
212	Invalid parameter count.	Check parameter. Refer to command description.
213	Invalid command syntax.	Check parameter. Refer to command description.
214	Firmware mismatch	PC software version differs from firmware version of Flasher. Download new firmware via Options menu. Otherwise proper function can not be guaranteed.
215	The selected target chip is not supported by the connected programmer.	Check and setup device settings.
216	Session mismatch. Resetting connection	It seemed, that Flasher was disconnected during communication between Flasher and PC. Try an other COM port.
217	Flasher refuses connection..	Did you select a chip which is not supported ? Check device settings.
218	None of the selected com ports is available.	PC program could not open selected COM-Port. Select an other COM port.
219	Error in HEX file	The HEX file for target could not be read. Check file format.
220	Invalid file extension, use .MOT, .HEX or .BIN	You tried to open or save a Hex file with unsupported file extension.
221	Invalid file name	You tried to Open or merge a file that could not be found. Check file name or path.
222	Error in Protocol Manager	PC program internal error. Restart program.
223	VCCS > VCCSmax (Target supply voltage too high...)	Supply voltage of target exceeds max value defined for selected device. Check device settings, connection to Flasher and target supply. If everything is correct, Flashers voltage measurement circuitry seems to be damaged and has to be repaired.
224	VCCS < VCCSmin (Target supply voltage too low ...)	Supply voltage of target is lower than min value defined for selected device. Check device settings, connection to Flasher and target supply. If everything is correct, Flashers voltage measurement circuitry seems to be damaged and has to be repaired.
225	Flasher Input voltage too low	Flashers supply voltage is lower than required to generate programming voltage of connected target CPU. Check supply voltage.
226	Assertion	PC program internal error. Restart and try again.
227	Invalid default program settings found. Please setup device.	Your registry contained invalid data about Flasher PC program. Setup device and other options.
228	Flasher not ready !	Setup data could not be sent to Flasher. Is a Flasher connected to your PC? Check COM port.
229	Invalid commandline option	Your command line parameter contains a command which is not supported.
230	Flasher defect !!! Target interface does not work.	Target interface of FLASHER not found during initialization. Flasher has to be repaired.

Trouble shooting

Proper operation of FLASHER ST7 depends on your target system. If you have any trouble operating FLASHER ST7, please:

a) Check your target hardware,
b) Check the connecting cable,
c) Use an oscilloscope to check the state of all signals on the target connector, especially to check if the target CPU is RESET properly and Programming voltage output, OSC_CLK, ICCDATA and ICCCLK signals work properly,
d) Make sure FLASHER firmware version matches the PC software version, if not choose Menu | Options | Download Firmware.

Support

For support questions, please consult our website at www.segger.com. If this does not answer your questions, please send an email to support_flasher@segger.com.

Using Flasher in batch mode

Introduction

Flasher.exe supports command line options to enable automated programming of targets. This document describes the supported commands and their respective parameters.
Flasher PC software version 1.72b or above replaces FlasherPro, which is not delivered anymore.

How to start Flasher program in batch mode

To use Flasher in batch mode, just call Flasher.exe directly from DOS-Box or start any batch file which calls Flasher.exe, To start any action, parameter may be passed as command line options.

General rules

- The first parameter specified must be the file to load, if download is required.
- The return code is 0 if all operations have been executed successfully, !=0 otherwise.
- All commands are identical to the corresponding commands in the menu bar.
- All commands are processed from left to right.
- If "-exit" is specified as the last command, the program will terminate as soon as any error occurs or after all commands have been executed.
- If one parameter contains a space use quotation marks for this parameter.

List of commands

The following commands are currently supported as parameter when Flasher is called in batch mode:

Command	Description
-download	Downloads the loaded hex file into Flashers memory without starting any additional action.
-checkblank	Checks if target is blank
-verify	Verifies loaded data against contents of target
-clear	Clears target memory area that is currently selected by device settings
-clearall	Removes readout protection of ST7 target CPU and clears entire chip regardless of target memory area currently selected by device settings
-programverify	Programs & verifies target
-program	Programs loaded data into target
-readback	Reads target area into PC
-start	Starts application program
-com<PORT>	Sets COM-port of PC(1..4).
-saveas<FILENAME.EXT>[,FIRST-LAST]	Saves the file currently in PC memory. The extension needs to be "MOT", "HEX" or "BIN" and determines the filetype. The optional range is used for files in BIN-format.
-merge<FILENAME.EXT>	Merge specified file to current data
-delrange<FIRST-LAST>	Deletes the specified range of data
-relocate<OFFSET>	Relocates current data by offset
-selbanks<START,END>	Sets the numbers of start and end bank. The numbers has to be the same as in the selection box shown under Options/Device.
-seldevice<DEVICENAME>	Selects the desired device. The name of the device has to be exactly the same as in the selection box shown under Options/Device. If device name is composed from multiple words, use apostrophes as shown below: "-seldeviceST72F521R9 OPT enabled"
-exit	Finish execution after performing all commands
-help	Displays available commands.
-?	The same as –help

NOTE:
To open a HEX file, just place the file name as first parameter just behind the call of Flasher.exe.

Return values

The following return values are sent as errorlevel unless “Options | Filling & misc. | Detailed errorlevel on return” is selected:

Value	Meaning
2	Target not blank
3	Verify error, Contents of target data not identical to FLASHERs internal data.
4	Erase error. Target CPU could not be erased.
5	Error during Program & Verify function
6	Error during programming of target CPU
7	Error during target readback.
8	Error during “Start application”.
9	Timeout error.
10	HEX file could not be opened.
>10	Corresponds to error number which would normally shown on PC screen when program was used in normal mode.

When “Detailed errorlevel on return” is set as option, the returned value equals to error codes described under chapter “Error messages”.

Examples

Program and verify

In the following example the software

- reads the file TEST.MOT
- tells the Flasher to program and verify,
- exits.

```
Flasher.exe test.mot -programverify  -exit
```

Programming using specified com port

In the following example the software

- reads the file TEST.MOT
- sets the COM-port of the PC to Port 2,
- tells the Flasher to program,
- exits.

```
Flasher.exe test.mot -com2 -program -exit
```

Usage in production environment

This example shows a batch file that executes a download to Flasher once. After the first call of Flasher the batch file runs in a loop that programs the last downloaded file continuously after pressing a key. After every execution of Flasher the return code is evaluated.

NOTE: Evaluating the return code only works under WindowsNT or Windows2000. If you use Windows9x Flasher will be started in a new task and you can’t evaluate the return code from the DOS-box from which you started Flasher, because your DOS-Box will not halt execution until FLASHER finished!

```
@echo off

rem The first call of Flasher loads the the HEX file

Flasher test.mot -program -verify -exit
goto checkerror

rem Loop for repeated programming without download

:loop
pause
Flasher -program -verify -exit

rem Check errorlevel if succeed
```

```
:checkerror
if errorlevel 1 goto ERROR_%errorlevel%

echo Operation successfully finished
goto loop

rem handle errors

:ERROR_1
echo Undefined error
goto end
:ERROR_2
echo ERROR_TARGET_CHECKBLANK
goto end
:ERROR_3
echo ERROR_TARGET_VERIFY
goto end
:ERROR_4
echo ERROR_TARGET_CLEAR
goto end
:ERROR_5
echo ERROR_TARGET_AUTO
goto end
:ERROR_6
echo ERROR_TARGET_PROGRAM
goto end
:ERROR_7
echo ERROR_TARGET_READBACK
goto end
:ERROR_8
echo ERROR_TARGET_STARTAPPLICATION
goto end
:ERROR_9
echo ERROR_TARGET_TIMEOUT
goto end
:ERROR_10
echo ERROR_OPENDOCUMENTFILE
goto end

:end
echo Operation canceled
```

Relocate, delete, merge and save

The following example shows a batch file, where the software

- reads file A.HEX,
- deletes the range 0xC000..0xFFFF,
- moves the remaining bytes 0x4000 bytes up,
- saves the memory contents as B.MOT,
- reads the file A.HEX again,
- deletes the range 0x1000..0xBFFF,
- moves the remaining bytes 0xB000 bytes down,
- saves the memory contents as C.MOT,
- merges the files B.MOT and C.MOT
- and save the new file as RESULT.BIN.

```
Flasher A.HEX -delrangeC000-FFFF -relocate04000 -saveasB.MOT -exit
Flasher A.HEX –delrange1000-BFFF –relocate-B000 -saveasC.MOT -exit
Flasher B.MOT -mergeC.MOT -saveasRESULT.BIN,1000-FFFF -exit
```

Selecting device

The following example shows a batch file, where the software

- selects a device,
- reads the contents of the device.

```
Flasher "-seldeviceST72F521R9 OPT enabled" -readback
```

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