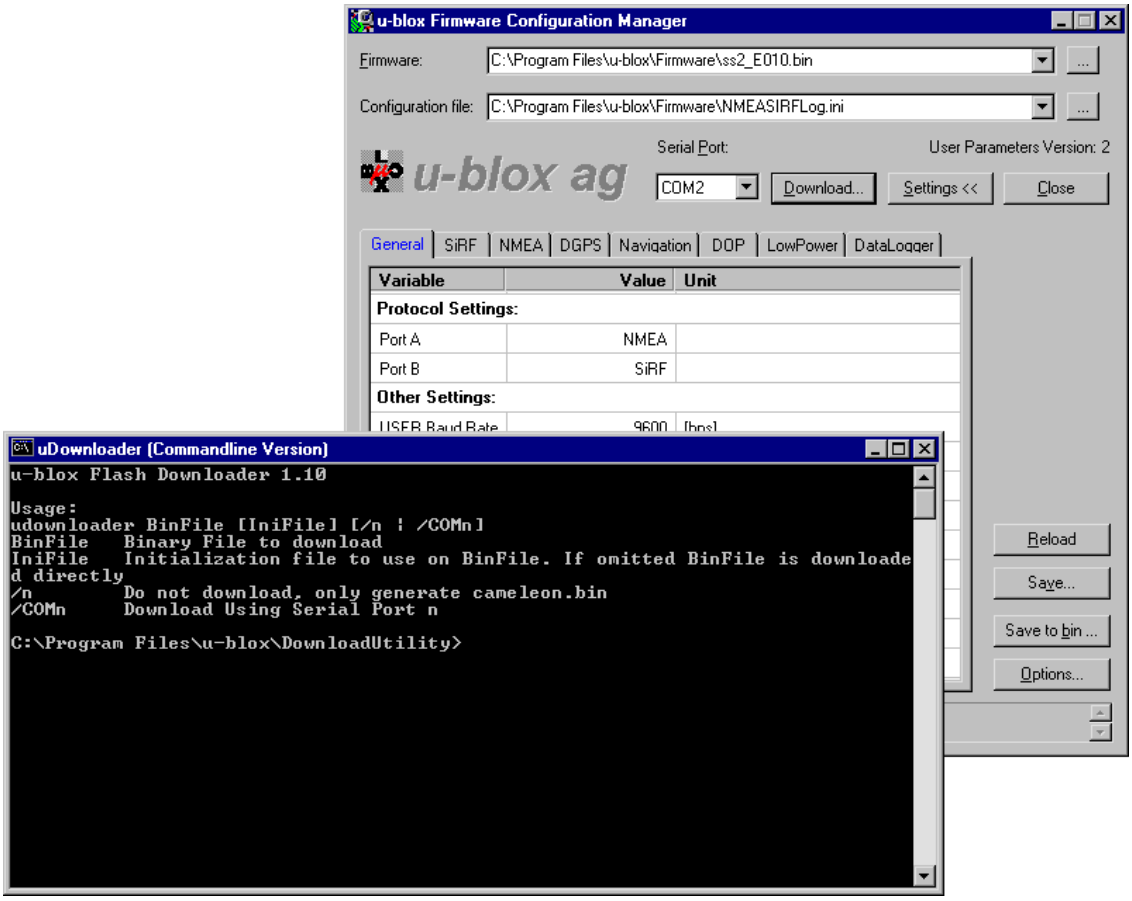
TIM

FIRMWARE UPDATE UTILITY

USER'S MANUAL



Firmware Update Tools for TIM

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For most recent documents, please visit www.u-blox.com	

CONTENTS

1 INTRODUCTION

1.1 Purpose

The Firmware Update Utility consists of a graphical "Configuration Manager" for convenient firmware configuration downloads and a "uDownloader" for command-driven downloads.

1.2 Intended Audience

This manual addresses readers who need to carry out firmware updates for the TIM modules [1] and TIM Evaluation Kit [2] from u-blox.

1.3 Related Documents

[1] TIM - GPS Receiver Macro-Component - Data Sheet, GPS.G2-MS2-01001

[2] TIM EK Evaluation Kit - User's Manual - GPS.G2-EK-01001

[3] TIM Data Logger, User's Guide, GPS.G2-SW-02015

[4] TIM GPS Receiver - Protocol Specification - Application Note, GPS.G2-X-01003-D

[5] The GPS Dictionary, GPS-X-00001

All these documents are available on our homepage (http://www.u-blox.com).

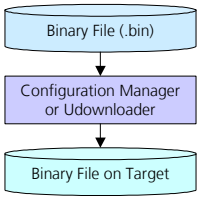
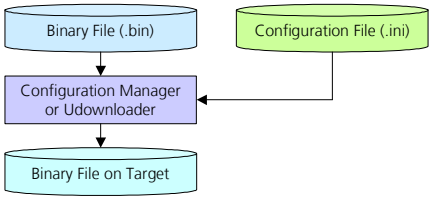
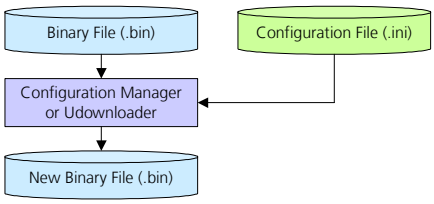
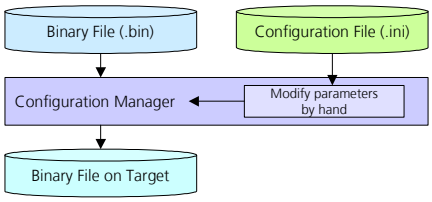
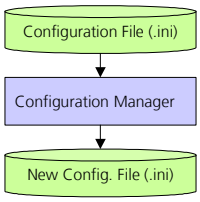
2 OVERVIEW

2.1 Features

As a new feature of the firmware there is no need to set the module into Boot Mode anymore in order to download a new firmware. Precondition: the existing firmware on the module is Cxxx or newer and serial port A is configured to NMEA or SiRF® protocol. Please refer to chapter 7 for details.

The Firmware Download Utility consists of two programs:

1. **uDownloader** is a standalone command-driven program suitable for handling quick downloads with existing binary image files and configuration files. Its main purpose is to use it within superior batch scripts.
2. **Configuration Manager** provides a convenient user interface to select configuration files, make modifications if necessary and carry out downloads.

Features	Diagram	uDownloader (standalone)	Configuration Manager
User interface	-	Command driven ("DOS" shell)	Windows Graphical User Interface
Suitable for use in a batch script	-	Yes	No
Downloading original firmware		Yes	Yes
Downloading firmware with modified parameters provided by a configuration file		Yes	Yes
Create a new binary file with modified parameters		Yes	Yes
Modifying parameters to make a download with customized parameters		No	Yes
Modifying parameters to make a customized configuration file		No	Yes

3 INSTALLATION

3.1 System Requirements

A PC with following minimum system requirements is needed to operate µ-Center:

CPU performance:	Pentium II / 200 MHz or better
Memory:	Provide a PC with sufficient memory to have the operating system run conveniently, e.g. 32 MB for Windows NT, 64 MB for Windows 2000
Hard disk space:	2 MB
Interfaces:	One RS-232 Serial interface. This serial interface is used for downloads
Operating system:	Microsoft Windows 9x / ME / NT 4.0, SP5 / 2000

Important notice:

Downloads are done via serial interface. Serial port A of the GPS receiver must be connected to the host PC. Serial port B is not supported.

3.2 Installation Procedure

The download software is available in two ways:

- Part of the CD in the TIM EK Evaluation Kit
- Via internet from u-blox

The CD provides a guided installation procedure that installs all software needed to work with the TIM Evaluation Kit. For details, please refer to the TIM EK User's Manual [2]. This installation process will automatically install all shortcuts to the start menu required to access the software: **Start -> Programs -> u-blox Products → Download Utility**.

The installation of new versions of Download Utility is very easy:

- Download the compressed and self extracting file (DownloadUtility.exe) from the u-blox homepage (http://www.u-blox.com)
- Run the file and follow it's instructions

The files are automatically installed on the hard drive.

4 uDOWNLOADER

4.1 Overview

uDownloader can only be started from a Windows command console prompt (cmd.exe in Windows NT 4.0 or higher; command.exe in Windows 9x/ME) or batch file. Without specifying any parameters, uDownloader provides information on the required and optional command line parameters.

```
C:\udownloader>udownloader
u-blox Flash Downloader v.1.0
Usage:
udownloader BinFile [IniFile] [/n]
BinFile: Binary File to download
IniFile: Initialization file to use on BinFile to generate a cameleon.bin.
If omitted BinFile is downloaded directly
/n: Do not download, only generate cameleon.bin

C:\udownloader>
```

Description of parameters:

BinFile	Name of binary file to download (.bin).
[Inifile]	Optional configuration file to change configuration
[/n]	Optional: Do not download, generate "cameleon.bin" as new binary file with modified parameters (if Inifile is specified)
[/COMn]	Specifies serial port n for download. Baud rate detection is automatic.

4.2 Firmware Download

A firmware download without modifying the User Parameters in the file can be carried out by specifying the firmware and serial port (/COMn) as shown below.

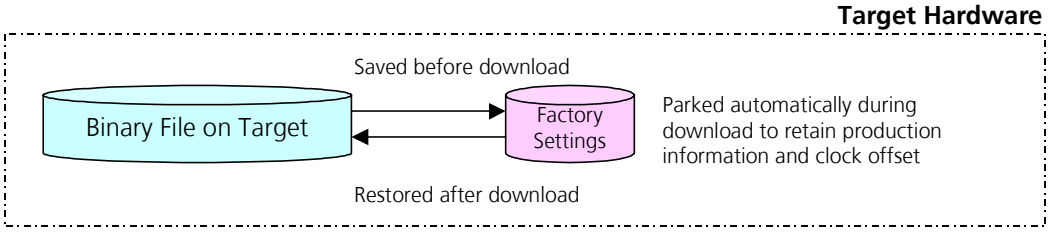
```
C:\udownloader>udownloader firmware.bin /COM1
Port.ProtocolA=1
Port.ProtocolB=0
Sirf.BaudRate=38400

   :
   All current user parameters will be displayed. To keep this text short, these lines are skipped here.
   :

LowPower.MaxAcqTime=120000
LowPower.MaxOffTime=30000
General.ActiveAntenna=0
Opening COM1...
Searching PortA Speed and Protocol(Sirf/Nmea)...
Trying with 38400 baud
Found SiRF protocol at 38400 baud
Downloading FlashLoader...
Starting FlashLoader...
Querying Flash Type...
Flash Manufacturer 0x0001, TYPE 0x225B
Querying Production Block...
Receiving Production Block...
Current Production Block: Version 2, Size 40
New Production Block: Version 2, Size 40
Backing up Production Block on Target...
Erasing Flash...
Erasing Flash 1x16 -> 1x16
Erasing Flash 2x08 -> 2x08
Erasing Flash 1x32 -> 1x32
Erasing Flash 15x64 -> 4x64
Writing Data Block 4096 0x000000/0x044CD8
Writing Data Block 4096 0x001000/0x044CD8

   :
   A line is given out for every data block written. To keep this text short, these lines are skipped here.
   :

Writing Data Block 4096 0x043000/0x044CD8
Writing Data Block 3288 0x044000/0x044CD8
Waiting for FlashWrite Completion...
Firmware Updated Succesfully

C:\udownloader>
```

Important notice:

After successful download, turn GPS receiver off and back on to assure a complete reset has been made.

During any download process, following steps are carried out:

- Displaying all applicable User Parameters. If no configuration file is specified (.ini), then the User Parameters from the binary file (.bin) are used.
- Connection to serial port is established. Automatic baud rate detection
- Detection of current protocol (SiRF® or NMEA)
- Transmission of the appropriate command (SiRF® or NMEA, depending on detected protocol) to put the GPS receiver into download mode.
- Deployment of FlashLoader, a small image capable of carrying out download into Flash EPROM
- Searching the Production Block (contains factory-specific production parameters including clock offset) and making a backup to avoid overwriting during download.



- Erasing Flash EPROM
- Writing Flash EPROM with new firmware
- Restoring the Production Block

Important notice:

If the GPS receiver contains customized software that does neither output SiRF® binary nor NMEA compatible code, it's required to carry out a special boot (see chapter 7) before downloading.

4.3 Firmware Download with Modified Configuration

A firmware download of a binary file with changed User Parameters (100.ini) is shown below:

```
C:\udownloader>udownloader firmware.bin 100.ini /COM1
Port.ProtocolA=1
Port.ProtocolB=0

   :
   All current user parameters will be displayed. To keep this text short, these lines are skipped here.
   :

LowPower.MaxAcqTime=120000
LowPower.MaxOffTime=30000
General.ActiveAntenna=0

C:\udownloader>
```

4.4 Create a new Binary File with Modified Parameters

If the command line parameter /n is specified, no download is executed. Instead a modified binary file (cameleon.bin) containing the modified user parameters will be created and is available for later downloads. It may be renamed according to the needs.

```
C:\udownloader>udownloader firmware.bin 100.ini /n
Port.ProtocolA=1
Port.ProtocolB=0
Sirf.BaudRate=38400

   :
   All current user parameters will be displayed. To keep this text short, these lines are skipped here.
   :

Writing Data Block 3288 0x044000/0x044CD8
Waiting for FlashWrite Completion...
Firmware Updated Succesfully

C:\udownloader>dir cameleon.bin
 Volume in Drive C is HARDDISK
 Volume Serial Number is 0554-031D

 Directory of C:\udownloader

01/25/2002  11:31a             281'816 cameleon.bin
               1 File(s)        281'816 bytes
               0 Dir(s)   9'432'989'696 bytes free

C:\udownloader>
```

5 CONFIGURATION MANAGER

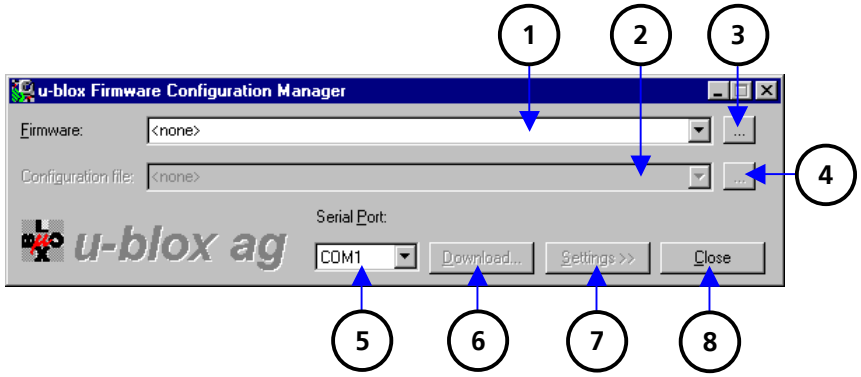
The firmware contains a dedicated block called "User Parameters" that contains operational parameters that the user may change (e.g. communication port settings, message output rates, DOP filters, etc). They become effective at start-up of the TIM module (after power on or reset. The parameters are stored with the firmware in the non-volatile Flash EPROM. Therefore these parameters are independent of a backup battery/voltage and stay in the memory until the next firmware upgrade.

The download utility can be used to configure this user parameters block.

5.1 Overview

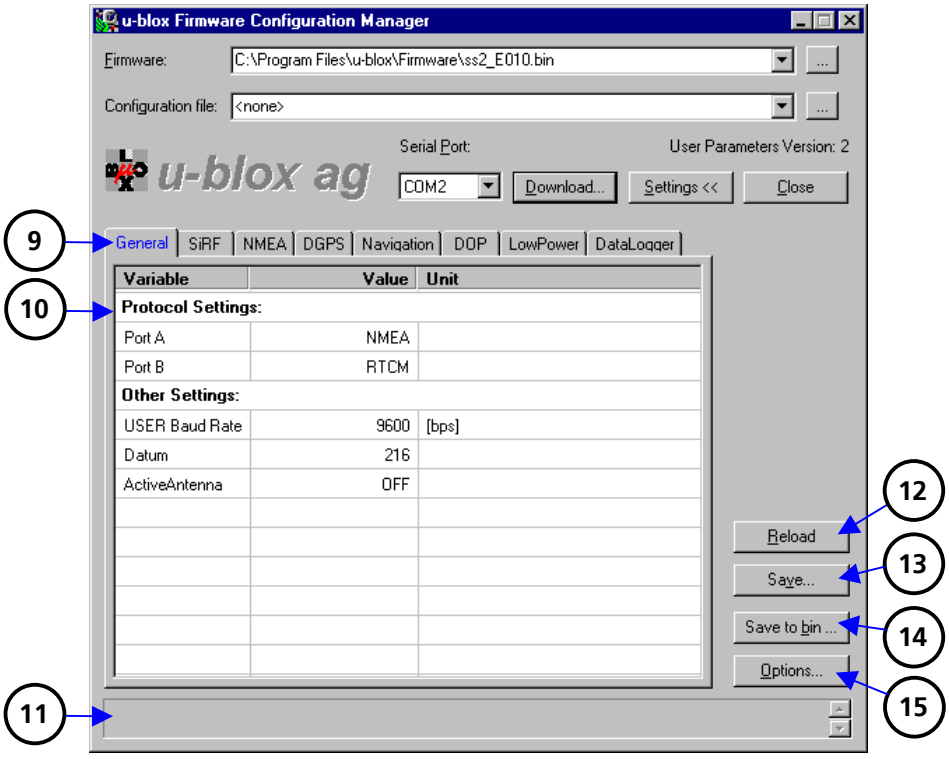
Contracted dialog:

1. Firmware list field
2. Configuration list field
3. Open firmware file
4. Open configuration file
5. Serial port selection
6. Start download
7. Expand / collapse dialog box to change settings
8. Close application



Expanded dialog:

9. Tab selection
10. Table with configurable user parameters
11. Information field providing additional information on selected user parameters
12. Reload firmware and configuration files
13. Save configuration settings
14. Save to new firmware with new configuration settings
15. Options



5.2 General, First startup

5.2.1 Useful hints

Note: **Before downloading a new firmware to the module, be sure all data still needed on the module are backed-up (e.g. logged data of the data logger)! All data (the whole flash EPROM) will be erased when a new firmware is downloaded. There's now way to recover erased data.**

There are some settings that are restored at every new application startup. These settings are ***user specific*** and make the application to show up in the state the user closed it the last time. The settings that may interest the user are the following:

- Whether the dialog is expanded or not (settings tabs visible or not)
- The last ten selected firmware files in the MRU (most recently used) order (inexistent files are removed from the list)
- The last nine selected configuration files (stored parameter changes) plus the *"<none>"* entry in MRU order (inexistent files are removed from the list)
- The selected serial port for download

To download a firmware, there are three different procedures:

- Straightforward: Download a firmware with its original user parameter settings as delivered within the u-blox firmware.
- Download a firmware with changed user parameter settings that will only be used once and are not stored.
- Download a firmware and store the changed user parameter settings, so they can be reloaded and used again later.

5.2.2 Preconditions for firmware download

In order to being able to download a firmware, two things must be fulfilled:

1. The selected firmware file (*:bin) must exist.
2. The selected configuration file must exist or be *"<none>"*.

Be sure that the selected files are valid.

5.2.3 Splash Screen

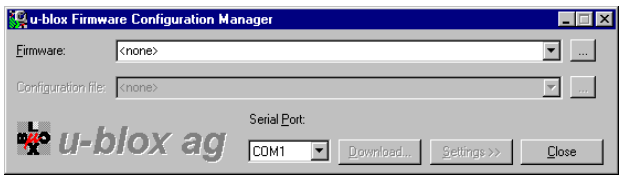
When starting the application, a splash screen appears. It warns about the fact that all data will be erased when updating the firmware on the module.

The splash screen can be disabled by un-checking the checkbox on it. By clicking on the okay button, it closes.

For re-enabling the splash screen, see chapter 5.8.

5.2.4 Application usage

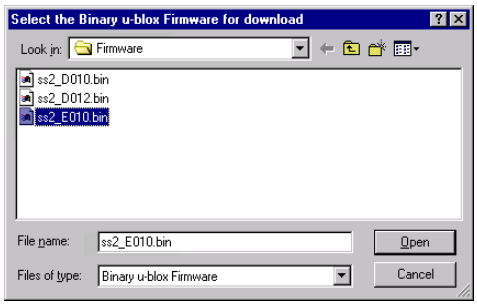
First start the Configuration Manager.

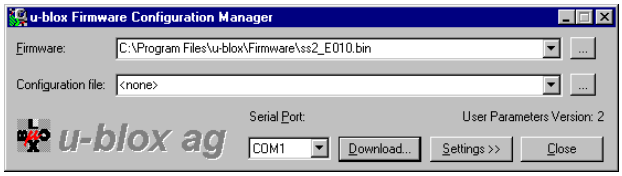


It can be found and started at *"Start→Programs→µ-blox Products→ Download Utility → Configuration Manager"*.

At the very first startup, a valid firmware file (*.bin) must be selected. Therefore type the path and filename into the firmware field or click the *"…"* button on the right side of the firmware selection field. A file open dialog box appears.

Change to the according directory and select the actual firmware file. Open it by clicking the *"Open"* button or double clicking the appropriate file.

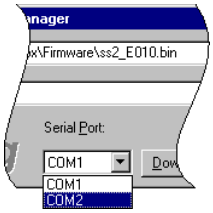




If the chosen file does exist, the buttons and controls required for a firmware download get enabled now.

5.3 Changing the Serial Port

To the left side of the download button there's a dropdown list containing all serial ports found at startup. To change the serial port used for download, open the list with a mouse click or <ENTER> if focused (blue colored) and select the appropriate serial port. Baud rate detection is automatic by default.

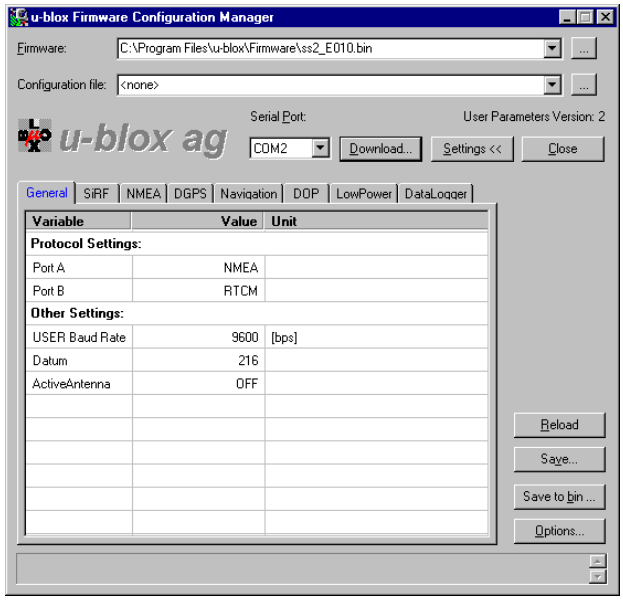


5.4 Firmware Download

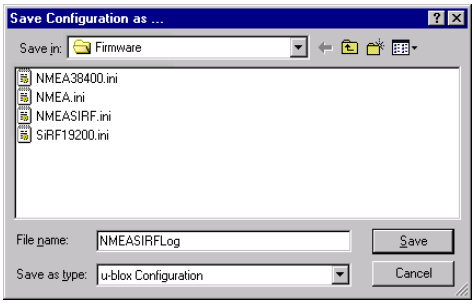
If the selected firmware be downloaded with its default settings, select the appropriate serial port (see chapter 5.3) and click on the *"Download…"* button to start download procedure. A progress dialog as described further down pops up that shows the download status (see chapter 5.6).

5.5 Choose Firmware with Modified Configuration

If it's required to change some settings of the users parameters block, click the *"Settings >>"* button to expand the dialog. The expanded dialog shows a tab control with the various users parameters that can be changed and a serial port selection control.



After changing the default configuration it's possible to save it to disk for later reuse. Therefore press the *"Save…"* button.

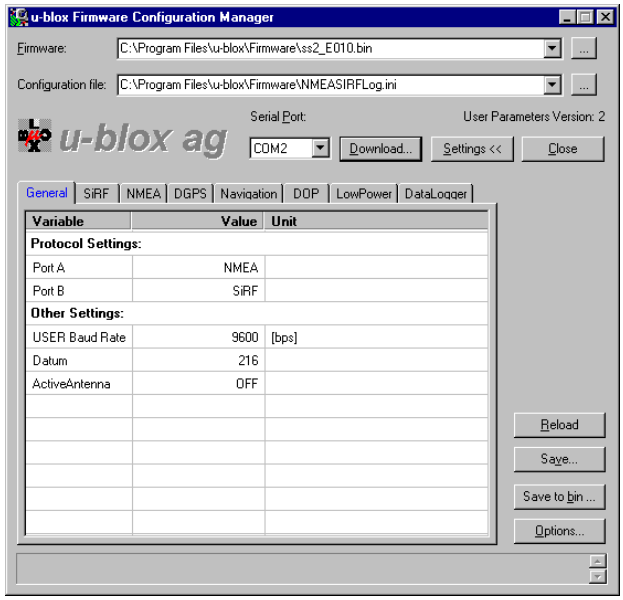


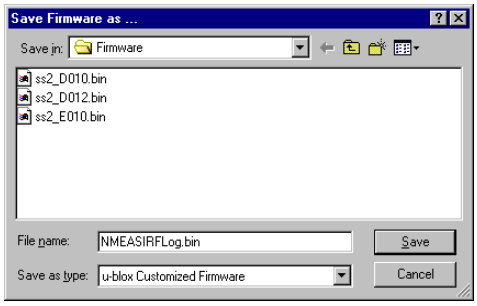
The file save dialog pops up. Put a file name and click *"Save"* to close the dialog.

Note: If a new and therefore not yet valid filename was written into the *"Configuration file"* field this name appears automatically in the *"Save..."* dialog when opened for saving the current configuration.

The chosen file name appears in the *"Configuration file"* field.

After having made more changes, push the *"Save…"* button again to apply the configuration settings to the same file.



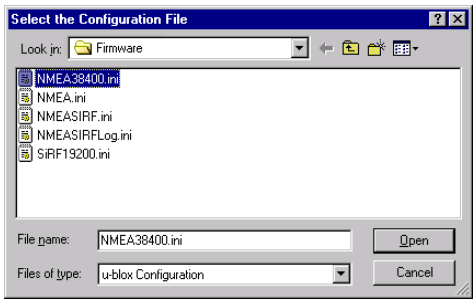


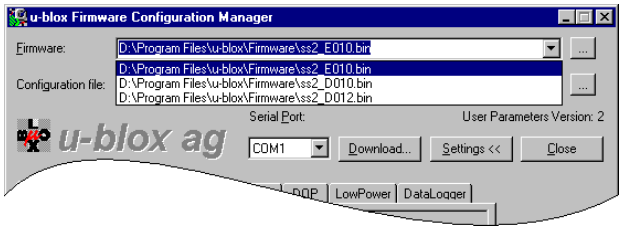
"Save to bin…" allows merging the changes in the user parameters and the original firmware to a new binary file. This customized firmware can be used for an automated download procedure in combination with the command line version, without the need of an additional configuration file.

To save the customized firmware click the *"Save to bin…"* button to open the file dialog. As default, the same filename as the configuration file is preset, except the extension that is now *".bin"*. After having entered the desired filename press the <Save> button.

Note: Do not overwrite the original firmware files. It's strongly recommended to use different file names to create customized firmware files.

If there are already compatible configuration files (*.ini) they can also be selected from a file open dialog. Click on the file open button (*"…"*) on the right side of the configuration file field. Change to the according directory and select the appropriate configuration file. Open it by clicking the *"Open"* button or double clicking the according file. The settings are loaded immediately.

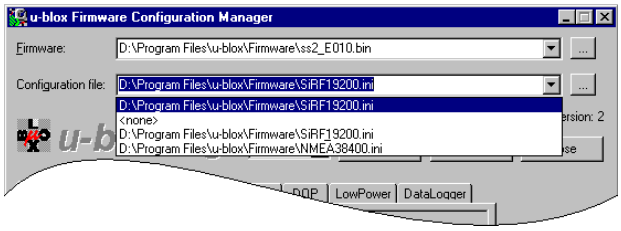




The last ten chosen files are kept and displayed in the appropriate filename field. Just open the dropdown list with the mouse to select another file or use the up/down keys. The new selection is loaded immediately.

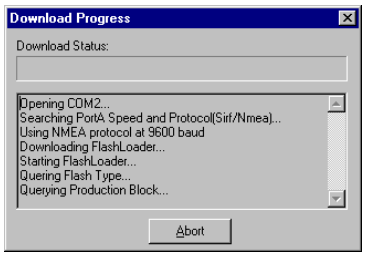
Note: There must be selected a Firmware file in order to use the utility.

The selection of a configuration file works almost the same way. The only difference is the *"<none>"* entry in the list. This one is always present and allows using the selected firmware with its default values (without any changes).



5.6 Download Procedure

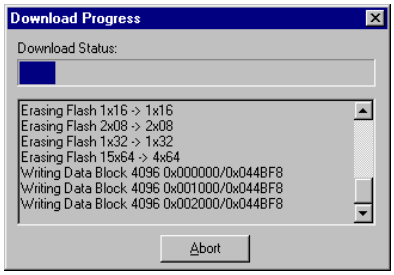
If the configuration is as desired, the right COM port is selected and the TIM EK is attached and ready, start download by simply clicking the *"Download…"* button.



A dialog pops up showing the download progress. There are many detail information displayed that tell what the download process is doing at the moment. This information also can give a hint for solving problems if some should occur.

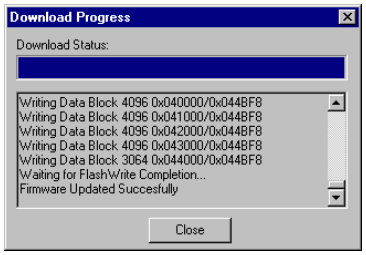
As soon as the utility begins to write data into the flash, a progress bar shows the status of the whole firmware download.

The user can abort the download at any time by simply clicking the *"Abort"* button, although it's not recommended.



Important notice:

Aborting while a download is in progress results in corrupted contents in the Flash EPROM of the GPS receiver. The same applies if the serial link is disconnected, the PC being shut off or a PC system crash or reboot took place. A special boot procedure described in section 7 is necessary to enable another download.



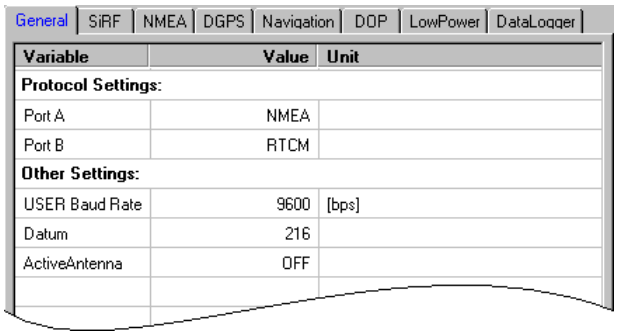
After the whole download process there will be displayed a message whether the download was successful or not.

5.7 User Parameters for Configuration Purposes

The settings are organized on tabs in a tab control. These tabs may vary from version to version. The overview shown here represents the latest version of TIM firmware (E010) when this document was created.

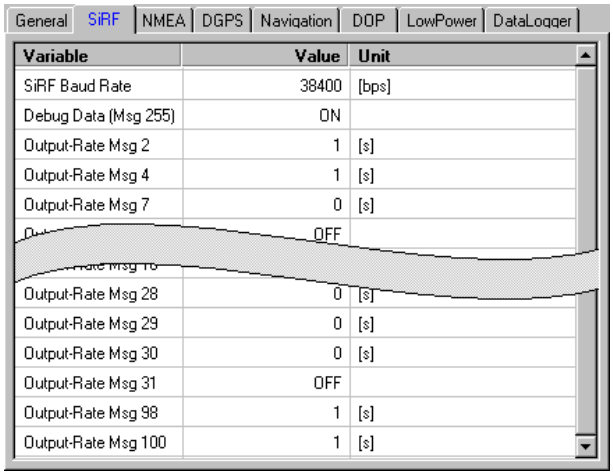
The user parameters are summarized in detail as explanatory text in the status bar if a single mouse click is made on the corresponding field.

5.7.1 General Tab



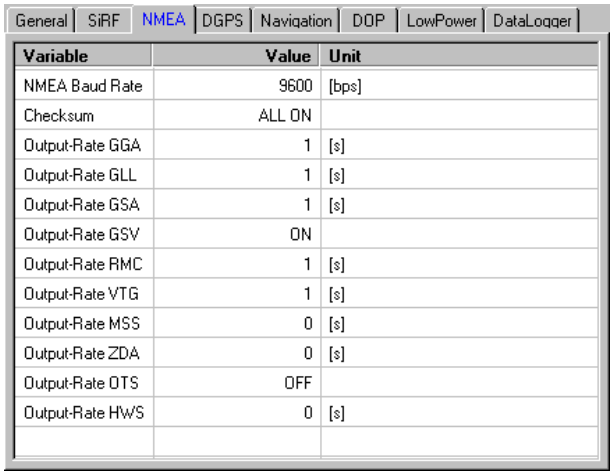
The *General Tab* provides a set of general protocol settings, user protocol baud rate (if user protocol is enabled), datum and active antenna control

5.7.2 SiRF® Tab



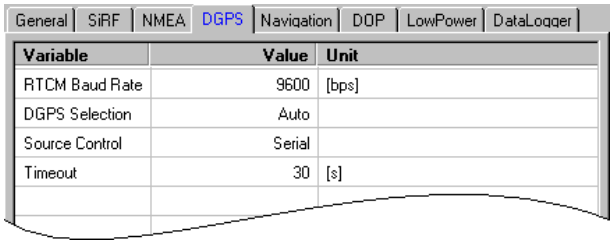
The *SiRF® Tab* provides baud rate control and settings for SiRF® binary protocol output

5.7.3 NMEA Tab



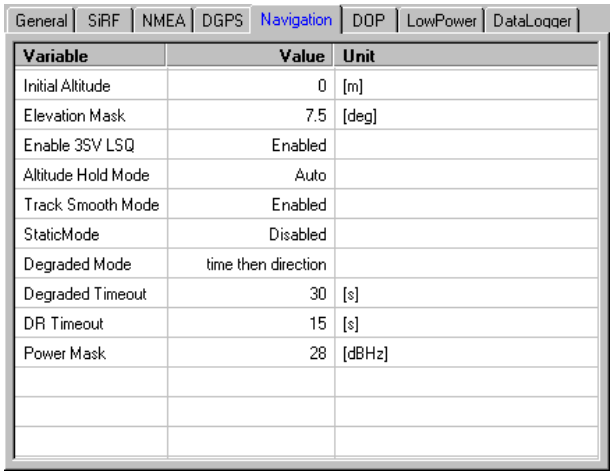
The *NMEA Tab* provides baud rate control and settings for NMEA binary protocol output

5.7.4 DGPS Tab



The *DGPS Tab* provides settings for DGPS input port: Baud rate, DGPS data source and timeout.

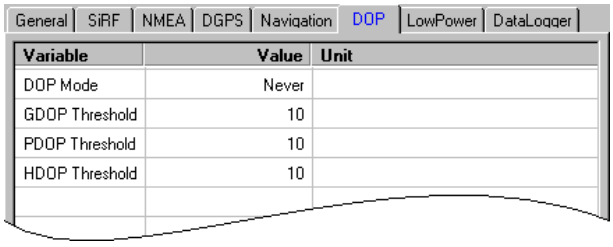
5.7.5 Navigation Tab



Variable	Value	Unit
Initial Altitude	0	[m]
Elevation Mask	7.5	[deg]
Enable 3SV LSQ	Enabled	
Altitude Hold Mode	Auto	
Track Smooth Mode	Enabled	
StaticMode	Disabled	
Degraded Mode	time then direction	
Degraded Timeout	30	[s]
DR Timeout	15	[s]
Power Mask	28	[dBHz]

The *Navigation Tab* shows all Navigation relevant settings.

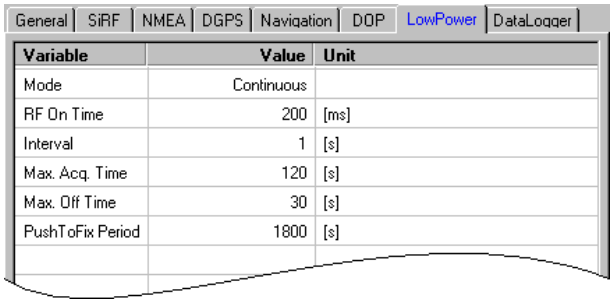
5.7.6 DOP Tab



Variable	Value	Unit
DOP Mode	Never	
GDOP Threshold	10	
PDOP Threshold	10	
HDOP Threshold	10	

The *DOP Tab* contains minimum DOP filter settings to calculate navigation.

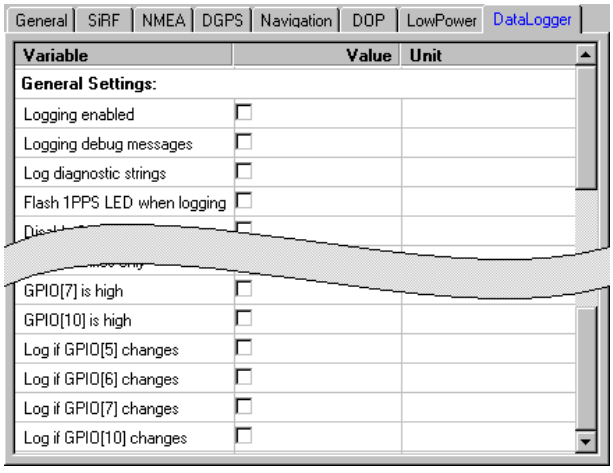
5.7.7 Low Power Tab



Variable	Value	Unit
Mode	Continuous	
RF On Time	200	[ms]
Interval	1	[s]
Max. Acq. Time	120	[s]
Max. Off Time	30	[s]
PushToFix Period	1800	[s]

The *Low Power Tab* provides settings to configure Trickle Power™ and Push-to-Fix™ modes.

5.7.8 Data Logger Tab



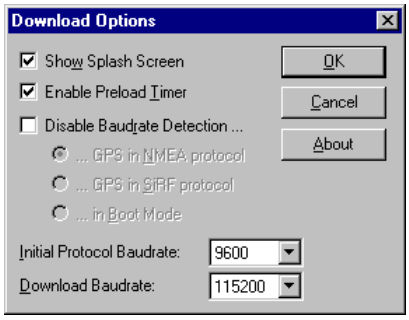
The *Data Logger Tab* will only appear when a firmware with release Exxx (2.11 UBX 1.2) is selected.

The entries are available to configure data logging.

Please refer to [3] for details.

5.8 Options

In the options the following settings can be modified:



1. To enable the splash screen (show at startup), check the "Show Splash Screen" checkbox.
2. In the combo boxes for binary and configuration files it's possible to navigate through the list of most recently used files by using the up and down arrow buttons of the keyboard. If the preload timer is disabled ("Enable Preload Timer" is un-checked) the file is loaded and changed to most recently used position right after having been selected. Checking "Enable Preload Timer" enables the navigation through the whole list using the up and down arrow keys without loading immediately. A progress bar shows the remaining time before loading the selected file. The timer takes about 1 second.

3. It's also possible to disable the baud rate detection that automatically detects the baud rate currently used by the GPS protocol running. This may speed up the download procedure.
   If baud rate detection is disabled, it is important to specify the correct GPS protocol and baud rate ("Initial Protocol Baudrate"). If the module is in boot mode (see chapter 7) the "Initial Protocol Baudrate" is unused and therefore disabled.
4. With baud rate detection enabled ("Disable Baudrate Detection" is un-checked) "Initial Protocol Baudrate" specifies the baud rate initially used by the download procedure to find the module. If it doesn't correspond the current GPS protocol speed, the detection continues to search at other speeds. When the correct baud rate is detected the "Initial Protocol Baudrate" is adjusted to the new speed.
5. To transfer the new firmware, another baud rate is used rather than the original value specified by the GPS protocol. By default, the fastest baud rate is assumed to be used (115'200 [bps]). If there are problems with the download (i.e. it hangs during download), reduce the "Download Baudrate" step by step until the download works correctly.

5.9 How to use the application

5.9.1 Mouse usage

Mouse usage is as commonly known. In the tab control, double click on a row/setting entry for editing the value. Rows with a checkbox only need to be selected. A single click will check/un-check then.

5.9.2 Keyboard usage

Use the tab key to navigate through the controls.

Combo Box: If a combo box is selected, hit <RETURN> to drop the list. Navigate through the list by using up and down arrow keys. Hit <RETURN> again to confirm selection or <ESC> to cancel. List entries can also be selected without dropping the list by just using the up and down keys. The preload timer (see chapter 5.8) has no effect when the list is dropped.
Note: When the preload timer is disabled, binary and configuration files are loaded right after selection. In practice this means that only the second last used can be selected when not dropping the list.

Tab Control: When the focus is on the tab control (the name of the selected tab has a dotted focus frame), either the right/left arrow keys or <TAB>/<SHIFT+TAB> keys can be used to select other tabs. Use down arrow to go into the list on the tab. Navigate with right/down arrow keys to go further down in the list, or left/up arrow keys to go up respectively. When the top row of the list is selected, stepping further up will set the focus back to the tab control again.
<TAB>/<SHIFT+TAB> keys work always for the tab control, whereas right/left arrow keys only work when no row is selected in the list.

Editing list values: To edit list values, select the row and hit <RETURN> or <F2>.
- In combo boxes select another value by using up/left and down/right arrow keys. To drop the list, press <F4>. Hit <RETURN> again to confirm or <ESC> to cancel respectively.
- In spin button controls use the up and down arrow keys to increment/decrement the value or the usual edit keys (numeric keys, left/right, delete/backspace) to edit the value directly by typing.

Note: If a value out of range is entered (e.g. above maximum), the nearest range value is taken as value (i.e. maximum).
Rows with a checkbox only need to be selected and then can directly be changed by pressing the spacebar.

6 TROUBLESHOOTING

6.1 uDownloader (Command line)

Cannot open BinFile: (file name)
Make sure the binary file (.bin) is located in designated directory path or specify directory path correctly.

Cannot open IniFile: (file name)
Make sure the configuration file (.ini) is located in designated directory path or specify directory path correctly.

Timeout Searching Baudrates (nothing sent):
Assuming Bootmode … Device not responding! Try Again
Possible causes:

- Device did not initialize properly. If a download has been executed right before, turn unit off and back on to ensure a correct reset has taken place.
- Serial port is not connected properly. Make sure serial cable is connected into port A and pin assignment is correct.
- If previously a customized firmware has been downloaded which outputs neither SiRF® nor NMEA messages via port A, carry out the special boot procedure (see chapter 7).

Correct problem and retry. If no success, carry out special boot procedure and download again. The special boot procedure is described in chapter 7.

Download doesn't work on some of the serial ports
If using a Multi I/O card with the computer it may be possible that the download will not work due to special drivers used for these ports. In any case, reduce the "Download Baudrate" step by step in the Options dialog and try to download again (at every step) or look for a newer/better version for the Multi I/O card.

6.2 Configuration Manager

Configuration Manager refuses to download ("Download" button is disabled)
The download button will only enabled if a valid name to an existing binary and configuration file is specified. In addition, the download button will activate if either no configuration file ("<none>") or a valid name to an existing configuration file (*.ini) is specified.

Make sure valid file names are specified.

Other messages occurring in the message box during download: See section 6.1.

7 SPECIAL BOOT PROCEDURE

Following circumstances require a special boot procedure in order to being able to download a new firmware:

- Old firmware is inside (coded with Bnnn on product labels). It does not support SiRF® and NMEA commands to activate download.
- The GPS receiver is stuck (e.g. due to an unsuccessful previous firmware download)
- A customized firmware is running in the GPS receiver that does neither output SiRF® nor NMEA messages via port A.

TIM modules:

On TIM module, pull pin 3 (named as "Boot_int" in the TIM Data Sheet [1]) to 3.3V then power TIM module up. This pin is polled once at boot time. If high, the special boot procedure is activated to allow download via serial port A.

TIM Evaluation Kit:

The TIM Evaluation Kit contains a GPS-PS2 board mounted upside down with the soldering side facing upward. To force the download mode, the two pads (squared and round one) marked in the green circle and illustrated in Figure 7-1 must be shorted for 2-3 seconds while power is turned on to start up the GPS receiver. The boot software will poll it during start-up. Holding a metal tweezers onto the two pads is the most convenient approach to establish a short circuit.

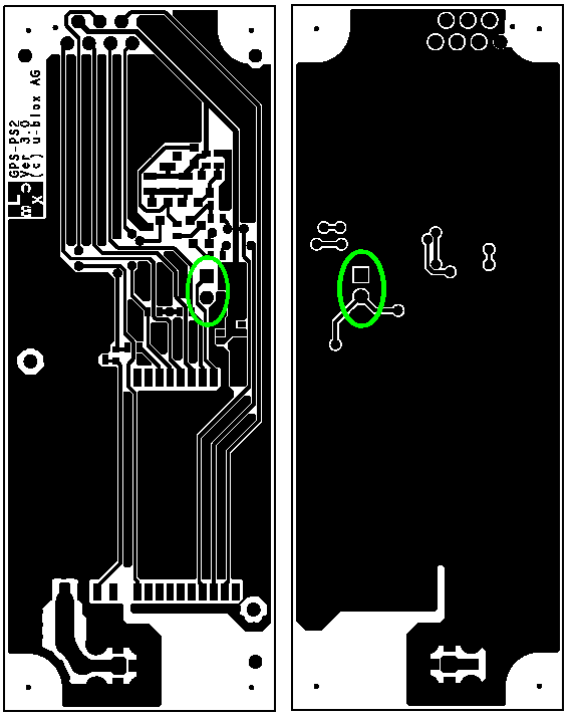


Figure 7-1: GPS-PS2 Board - left: Top view on top side; right: bottom view on bottom side

Once the debug mode has been activated, repeat the download procedure.

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