

DediProg Inc.

4F., No.7, Ln. 143, Xinming Rd., Neihu Dist., Taipei City 114, Taiwan

Application Note: AN0106

On-Board SPI Programming with Dediprog tools: End User Version

(This document is provided to help users who needs to update/repair SPI
rom during development, in production, or in the field)

Table of content:

1. Introduction	3
2. The In System Programming solution (ISP)	4
2.1. How to purchase the programmer.....	4
2.2. Installation.....	5
2.3. Bios update from computer.....	6
2.4. Bios update in Stand alone mode.....	10
2.5. ISP Cable maintenance	13
3. The Backup Boot Flash solution (BBF)	15
3.1. Basic steps for BIOS update	16
3.2. Update the backup Serial Flash.....	18
3.3. BBF Cable maintenance.....	18
4. Contacts:.....	21

1. Introduction

To ensure the best bios update flexibility, DediProg teams are working closely with the main motherboards and notebook makers companies to define and offer the optimized bios updating methods with the Serial Flash soldered on board.

By soldering the SMT memory on board, motherboard makers ensures a perfect quality signal of the High frequency SPI bus and prevent failure rate caused by socket problems (bad contact due to weak pressure, oxidation, wrong insertions, etc)

DediProg is then introducing here advanced and innovative methods to program, update or repair the Bios content easily, quickly and efficiently in any conditions:

- Bios development
- Production line
- Storage area
- Repairing channel
- Final user

Two different methods have been selected to update the Serial Flash soldered on board:

I The In System Programming solution (ISP)

Features: Update your Main Bios memories soldered on motherboard by using the DediProg **SF100** or **SF300** programmer dedicated for the motherboard update. The programmer is used to update directly the serial Flash on board by connecting it on the motherboard ISP connector. The programmer can be connected to a computer via the USB cable (for **SF100** and **SF300**) or work in Stand alone mode (for **SF300** only).

Advantage:

- Very fast update (20sec / 30 sec)
- Flexible update as it only requires only the naked motherboard (no ATX power needed)
Convenient for: production, storage area or repairing channel
- The programmer can be kept connected during motherboard boot.
Convenient for Bios development

Requirement:

This method can only be used on the motherboards designed for ISP update. Please contact your motherboard suppliers to know if this feature is supported by your motherboard models.

Remark: Please contact DediProg for its “On-board SPI Programming with DediProg Tools: Designer Version” document if you are interested in designing in SPI ISP capability into your motherboards.

II Backup Boot Flash solution

Features: The DediProg Backup Boot Flash tool can be connected on the motherboard pin header or directly on the Main serial Flash package soldered on board by using the DediProg SO test clip. When connected, the Backup Boot flash tool disables the Main bios memory automatically and enables the backup Serial Flash inserted on its socket. Then if power up, the motherboard will boot automatically from the Backup Boot Flash previously programmed with the appropriated Bios code. After the motherboard boot completion, operator can update the Main Serial Flash soldered on board by using the Flash Utility tool provided usually by the motherboard maker, Chipset maker or Bios maker.

Advantage:

- Can be used on virtually all motherboards in the market as this solution does not require dedicated hardware modification.
- The Backup Serial Flash inserted in the Backup Boot tool, can be updated with new bios version by connecting the DediProg **SF100** or **SF300** programmer.

Requirement:

- Hold pin of the Serial flash must be connected to Vcc through a resistor (this is typically done already with current motherboard design)
- Need to perform a Boot of the motherboard with DediProg BBF tool therefore it requires the complete computer booting environment (ATX power, processor, monitor, Flash utility tool, etc)
- Longer updating time versus ISP method

2. The In System Programming solution (ISP)

As described previously, the BIOS of the Serial Flash soldered on board can be easily updated with a dedicated programmer from DediProg:

- The **SF100**
- The **SF300** with Stand Alone mode

The motherboard must support the new ISP feature (please contact your supplier)

2.1. How to purchase the programmer

You can purchase the **SF100** or **SF300** programmer by different way according to your convenience:

a) Online purchasing on www.DediProg.com

Access the “In-circuit-programming tools” or “All-in-one Serial Flash Programmer” Web page, currently:

<http://www.dediprogram.com/SPI-flash-in-circuit-programming>

<http://www.dediprogram.com/all-in-one-serial-flash-programmer>

Select the **SF100** or **SF300** according to your updating method selected and “add to cart”. You can follow the instruction for purchasing.

b) Purchasing from DediProg with Purchase Order

Please email to sales@dediprogram.com or fax to +886-2-6618-1338 with order information.

You can follow the instruction on this page:

<http://www.dediprogram.com/framework.php?UID=56>

c) Buy through DediProg distributors

Find on the following link the DediProg distributors links and contacts:

<http://www.dediprogram.com/framework.php?UID=55>

2.2. Installation

After purchasing, you will receive the programmers including the ISP cable and the CD-ROM containing the software and programmer drivers.

a) Download last software release:

For up-to-date reason, it is recommended to download the last DediProg software version directly on our web site:

http://www.dediprogram.com/programmer_tools.php

b) Download the Installation guide:

To install the DediProg software and the programmer driver, we recommend you to download and follow the instruction of the DediProg “Installation guide”:

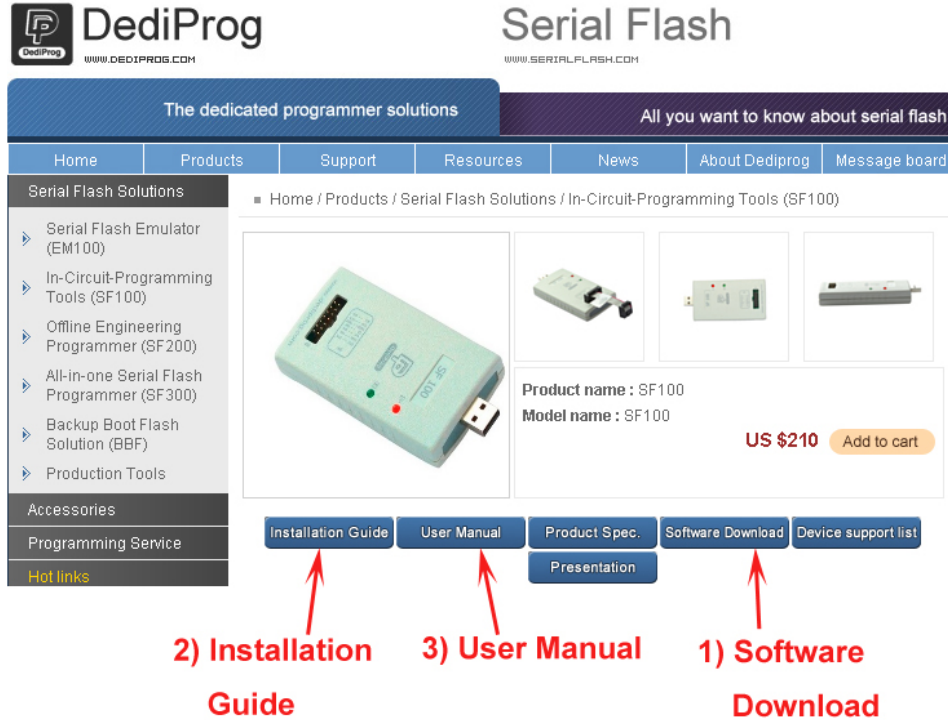
http://www.dediprogram.com/installation_guides.php

Fig 1: Documentation downloads from support page

The screenshot shows the DediProg SUPPORT page. The navigation menu includes Home, Products, Support, Resources, News, About DediProg, and Message board. The 'Support' menu is active. The sidebar menu is expanded to show 'Documentations' with the following items: Installation Guide, Programmer specifications, User manuals, Device support list, Catalog, Application Note, Presentation, Other Documents, and Frequently Asked Questions. The main content area displays two download links for 'SF100' and 'SF200 Engineering' models, each with a 'Download this file' button. Red arrows point from the sidebar menu to the download links, labeled '1) Software Download', '2) Installation Guide', and '3) User Manuals'.

This documentation can also be downloaded from the programmer main page:
<http://www.dediprogram.com/product.php?UID=2>

Fig 2: Documentation downloads from SF100 page



2.3. Bios update from computer

The Bios memory can be updated by using the SF100 or SF300 programmer connected on a computer via the USB cable. The computer will then provide the power to the programmer and manage the Bios update.

This solution has the advantage to offer advanced features like:

- Read and Edit the memory content for checking (corruption analysis)
- Compare the memory content with a reference Bios version, to list the differences and locations (corruption analysis)
- Save the corrupted memory content in the computer for statistics analysis

Table 1: High performances in USB mode:

	4Mb	8Mb	16Mb	32Mb
Blank check	2 sec	4 sec	8 sec	16 sec
Erasing	Flash dependant	Flash dependant	Flash dependant	Flash dependant
Programming	4 sec	8 sec	16 sec	32 sec
Verify	2 sec	4 sec	8 sec	8 sec
Total for update:	about 8 sec	about 16 sec	about 30 sec	about 60 sec

The following are the basic steps for BIOS update with ISP method:

For more advanced feature details, please download the “User Manual” provided by DediProg on the following link:

http://www.dediprogram.com/user_manuals.php

Step 1: connect the programmer to the computer via the USB cable

The green LED of the programmer will be switched ON.

Step 2: connect the ISP flat cable to the programmer ISP connector

The female 14 pins connector of the ISP flat cable or ribbon cable must be connected to the SF100 programmer 14 pin male connector noted ‘ISP’. A mistake proof plastic prevents from bad connection.

Important: the ISP flat cable must be compliant with your motherboard connector. DediProg provides a standard ISP cable with the pin-out displayed in the figure 3.

Step 3: Switch the motherboard in its supported updating mode

Important: Contact the motherboard maker to know the conditions in which your motherboard model can be updated with ISP method.

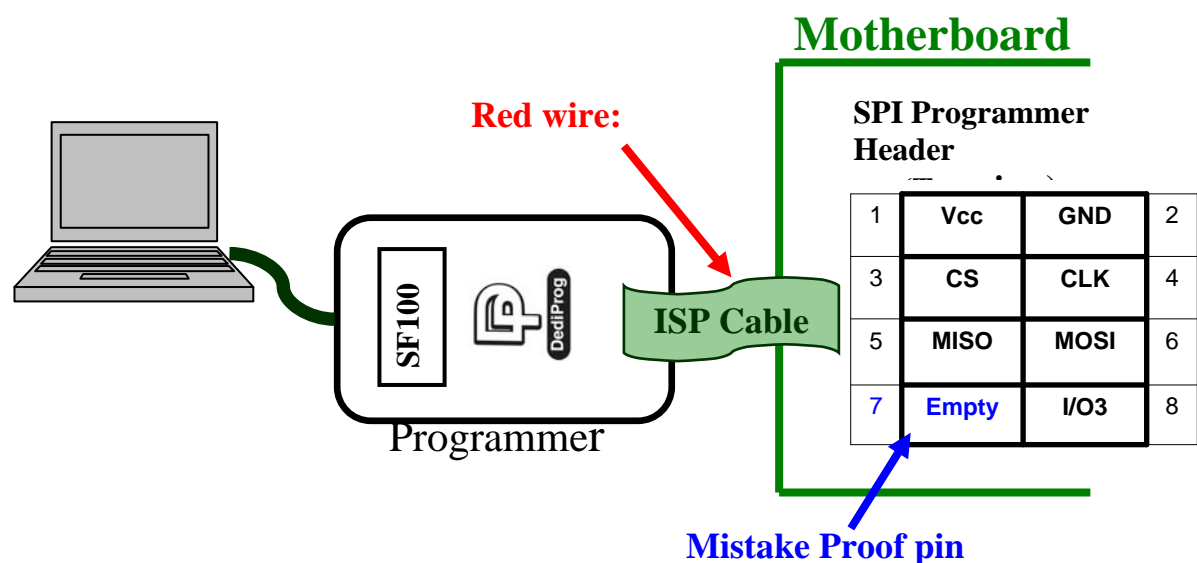
Could be:

- Motherboard OFF (no ATX power supply)
- Stand-By mode (ATX power supply but motherboard not power up)
- Reset mode (can be done manually by keeping the button pressed or automatically managed by the programmer itself)

Step 4: connect the ISP flat cable to the motherboard

The programmer must now been connected to the motherboard ISP connector. User must take care to connect it correctly.

Figure 3: DediProg SF100 Programmer to Motherboard with standard connection



Important: check carefully how you can connect the programmer cable on the motherboard with your motherboard maker.

Fig 4: Motherboard with 2X4 ISP connector

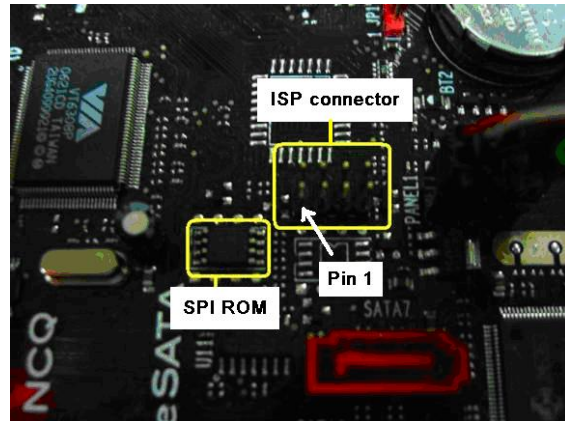


Fig 5: Programmer connection on the motherboard 2X4 ISP connector

Most of the motherboard makers are using a mistake proof pin that prevent from bad connection of the programmer.

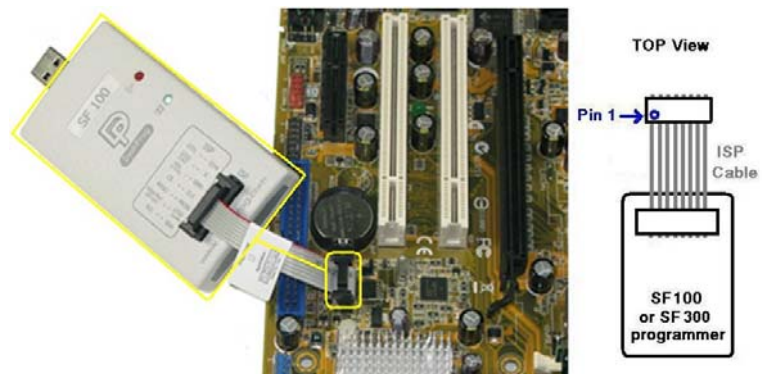


Fig 6: Motherboard 7 pins ISP connector

As displayed on the figure 6, this motherboard has been designed with a 7 pins header connector close to the Serial flash. A Mistake proof pin is also designed to prevent from bad connection.

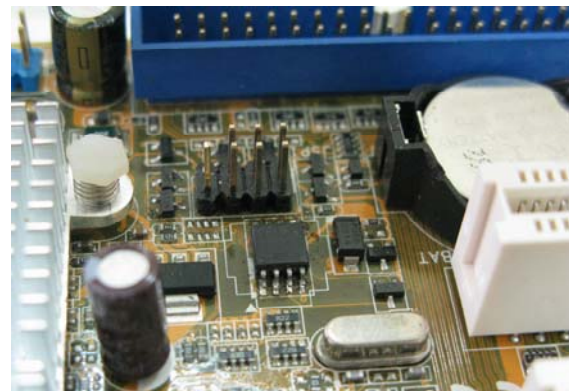


Fig 7: Programmer connection on the motherboard 7 pins ISP connector



Step 5: Open the DediProg software on the computer

Click on the DediProg Icon or in the shortcut in your start menu.

Step 6: Click the “Detect” Icon to detect the memory on board

This function is used to identify the memory soldered on the motherboard.

The information is displayed on the right side of the tool interface.

Step 7: Click the “File” Icon to load the code file

This function is used to load the code file from your Hard Disk Drive to be programmed on the motherboard memory. A pop up window will help you to select the file on the directory.

After the load completed, the successful operation and file information are displayed on the history list.

Step 8: Click the “Batch” Icon to update the memory with the Bios

This function performs an automatic memory erasing if the memory is not blank, program the Bios code previously loaded and verify the bios memory to check if the programming has been well performed.

After the update completed, the successful operation is displayed on the history list.

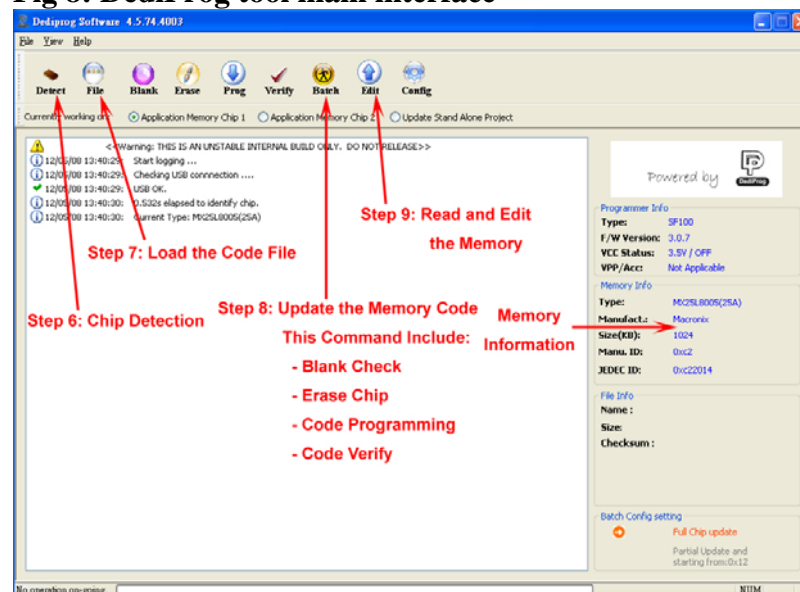
Each of these operations can also be executed individually by using the tool Icons:

- Blank: for Blank Check
- Erase: for Chip erase
- Prog: for Bios programming
- Verify: for memory verify

The Batch button operations setting can also be defined in the option features.

Optional Step 9: Click the “View” Icon to read and Edit the memory content

This function can be used to view the motherboard memory content.

Fig 8: DediProg tool main interface

Step 10: Disconnect the ISP cable from the motherboard and connect it on the next one

Next Steps: Jump on the Step 6 to update the next motherboard

If the Bios version is still the same than previous update, it is not necessary to reload the file (so skip the step 7).

Remark: for repetitive BIOS update on a large volume of motherboard, it is recommended to use DediProg Windows DOS command line software which is provided after DediProg software version 2.0.36. In this case, users only need to click on “enter” with each bios update.

2.4. Bios update in Stand alone mode

The Stand Alone function is only available on the **SF300** programmer.

In this mode, the programmer doesn't need to be connected to a computer and is working independently.

Benefits for Motherboard update:

- No computer needed
- Simple to use (click only one button for update)
- Very Fast performance
- No technical skills required
- Operators can perform few motherboards update in the same time

Table 2: Very High performances in Stand Alone mode:

	4Mb	8Mb	16Mb	32Mb
Blank check	1 sec	2 sec	3 sec	6 sec
Erasing	Flash dependant	Flash dependant	Flash dependant	Flash dependant
Programming	4 sec	8 sec	14 sec	25 sec
Verify	1 sec	1 sec	2 sec	4 sec
Total for update:	about 6 sec	about 11 sec	about 20 sec	about 35 sec

The **SF300** programmer needs to be supplied with 5V DC power such as USB power from PC or power rack provided by DediProg

The **SF300** programmer needs to work with a DediProg Flash Card in which the Bios master code has been previously stored.

The Flash Cards must be firstly prepared by using the **SF300** programmer in USB mode connected to a computer to define and store:

- The Bios image code to be copied on the motherboard
- The flow operations to be performed during the Stand Alone mode (erase, program, verify, etc)
- The density of the target memories

In Stand Alone, the programmer will also store in the Flash Card the history of all the update performed in Stand alone mode so the operator can read back at the end of the day how many motherboards have been updated successfully.

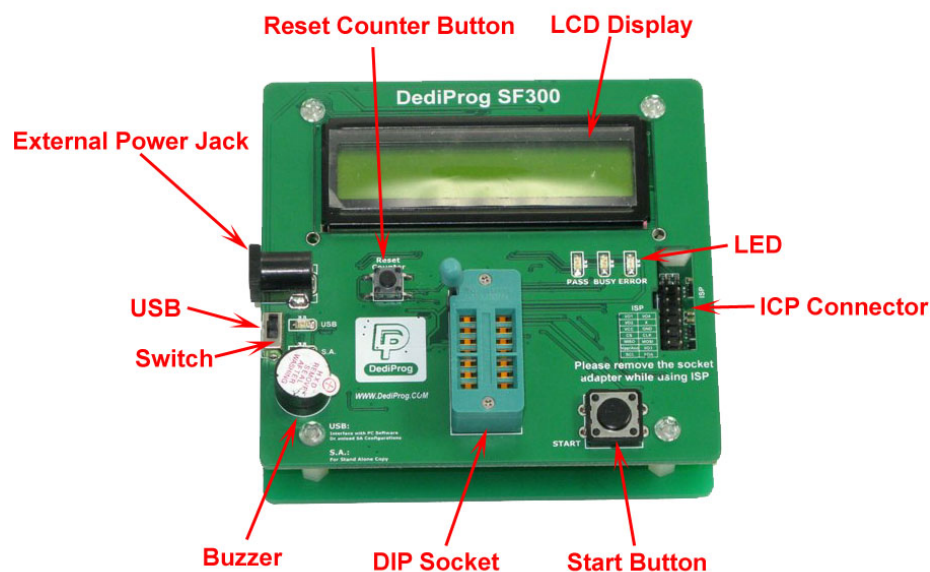
A Flash Card can be prepared for each Bios version to be repaired (a sticker can be used to mark the Bios version stored in the Flash Card). So the operator will only have to select the good Flash Card according to the motherboard to be updated.

To have more information about how to prepare and use the Flash Card, please download the SF300 user manual on DediProg web site.

This is below, the basic steps for BIOS update in Stand alone mode:
In the following steps, the Flash Cards are programmed with the required bios codes in advance.

Step 1: Move the programmer Switch in Stand Alone position

Fig 9: SF300 programmer



Step 2: Connect the programmer to the DediProg Power Supply via the USB cable

The LED of the programmer will be switched ON.

The USB cable is only used to supply the programmer and offer movement flexibility.

Step 3: connect the ISP flat cable to the programmer ISP connector

The female 14 pins connector of the ISP flat cable or ribbon cable must be connected to the SF300 programmer 14 pin male connector noted 'ISP'. A mistake proof plastic prevents from bad connection.

Important: the ISP flat cable must be compliant with your motherboard connector. DediProg provides a standard ISP cable with the pin-out displayed in the figure 3.

Step 4: Switch the motherboard in its supported updating modes

Important: Contact the motherboard maker to know the conditions in which your motherboard model can be updated with ISP method.

Could be:

- Motherboard OFF (no ATX power supply)
- Stand-By mode (ATX power supply but motherboard not power up)
- Reset mode (can be done manually by keeping the button pressed or automatically managed by the programmer itself)

Step 5: connect the ISP flat cable to the motherboard

The programmer must be now connected to the motherboard ISP connector. User must take care to connect it correctly.

Important: check carefully how you can connect the programmer cable on the motherboard with the motherboard maker.

Follow the connection recommendation given on the Step 4 of the “Bios update with computer” chapter.

Step 6: Select the good Flash Card with the appropriate Bios version

A sticker on the flash cards will be helpful for the Bios version selection.

Step 7: Insert the Flash Card in the SF300 Programmer

The Flash Card must be inserted in the “Flash Card connector” (see fig 10).

A mistake proof pin prevents user from wrong connection.

Step 8: Click the ‘Run’ button on the SF300 programmer to start the Bios update

The **SF300** will then automatically execute the operation flow stored in the Flash Card.

The standard operation flow for Bios update would be:

- Erase the motherboard memory
- Copy the Flash Card master Bios code to the motherboard memory
- Verify the motherboard memory (compare its content with the Flash Card)
- Increment the counter of the Flash Card to trace the successful operations or errors if any.

The **SF300** programmer LED will indicate to the operator the operation on going:

- Green LED ON: update successful
- Orange LED Flashing: update on going
- Red LED Flashing: Update failed

In case of failing update, the operator must acknowledge the failing by pushing the ‘Run’ button of the **SF300** during more than 2 sec. If not, the programmer is still locked in Error mode and will not accept to update another motherboard.

This feature has been implemented to avoid operators to mix good motherboard (update successful) with Bad motherboard (failing update) as he has to frankly acknowledge the error.

In case of error, the Error counter of the Flash Card is incremented. So the Flash Card counters (pass and error) can be read at the end of the day to double check if the counter history fit with the operator status of the day.

- Flash Card counter for pass = number of successful motherboard updated
- Flash Card counter for error = number of failing motherboard updated

Step 9: Disconnect the ISP cable from the motherboard and connect it on the next one

Next Steps: Jump on the Step 6 to update the next motherboard

If the Bios version is still the same than previous update, it is not necessary to change the Flash Card (only click 'Run' button': step 8).

2.5. ISP Cable maintenance

If the programmers are often used for motherboard updating, the female connector of the ISP cable on the motherboard side will be step by step wear down (numerous contact with motherboard pin header). So in this case, the ISP cable has to be changed if the connection is no longer in good condition.

Please note that the ISP cable is not taken into account in the DediProg warranty. Therefore before sending back a failing programmer to DediProg, it is recommended first to test the ISP cable quality by replacing it by a new one or a working one (taken from another working programmer).

It is also possible to manufacture your own ISP cable.
You will then have to follow the following instructions:

a) If your motherboard connector is compliant with the Standard DediProg ISP pin-out and need IO3 for reset:

1) Check if your motherboard connector is as follow:

1	Vcc	GND	2
3	CS	CLK	4
5	MISO	MOSI	6
7	X	I/O3	8

Table 4:

2) Prepare the Female connector on the Programmer Side:

You need a 14 pins 2.54mm pitch female connector to be fixed on the flat cable. The programmer ISP header pin-out is displayed on the programmer as follow:

Table 5:

1	I/O1	I/O4	2
3	I/O2	Vdd	4
5	Vcc	GND	6
7	CS	CLK	8
9	MISO	MOSI	10
11	Vpp	I/O3	12
13	SCL	SDA	14

Note 1: the Green Bold signals need to be wired to the female connector

Note 2: the Black signals are not usually used and don't need to be wired to the ISP cable

3) Prepare the Female connector on the motherboard side:

You need an 8 pins 2.54mm pitch female connector to be fixed on the flat cable. The ISP header pin-out is:

Table 6:

1	Vcc	GND	2
3	CS	CLK	4
5	MISO	MOSI	6
7	X	I/O3	8

4) Prepare the Flat cable or Ribbon cable

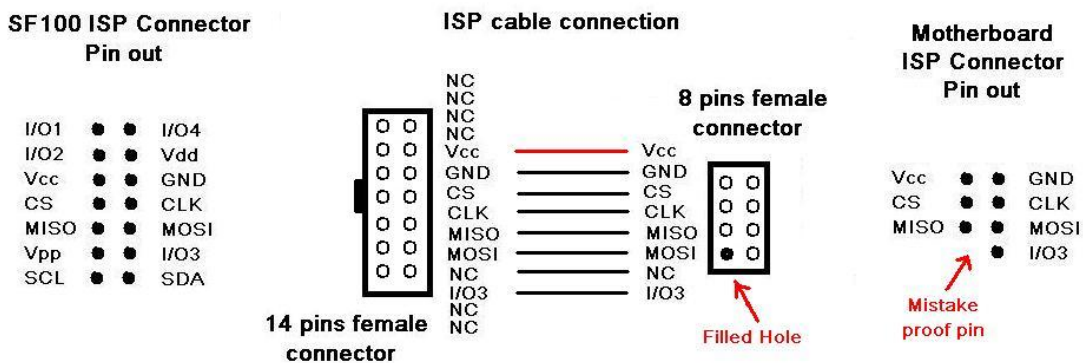
You need a Flat cable of 8 lines with a length of 8 cm maximum.

The length of the ISP cable must be minimized to not increase too much the SPI bus capacitance and disturb the quality of the SPI signals.

The programmer movement flexibility can be optimized by selecting a soft USB cable for the supply.

So the Flat cable must be connected to both female connectors as follow:

Fig 10: Standard ISP cable connection



NC means "Not Connected"

Holes 1, 2, 3, 4, 13, 14 of the programmer female connector don't need to be wired.

b) For the other ISP pin header assignment:

Contact your motherboard maker for more information on the ISP cable connection.

3. The Backup Boot Flash solution (BBF)

The DediProg Backup Boot Flash tool can be differentiated from the In System Programming method on the fact that it will not be used to update directly the Serial Flash on board but ingeniously help the failing computer to boot.

When the Bios of the motherboard is corrupted, the computer is not able to boot anymore. When connected on the motherboard, the DediProg Backup Boot tool will disable automatically the Main Serial Flash soldered on board so that the chipset will boot on the backup Serial Flash inserted in the socket. After the motherboard boot completion, the operator can update the Main Serial Flash soldered on board by using the Bios Flash Utility tool usually provided by the Chipset maker, bios maker or motherboard maker.

Fig 11: Backup Boot Flash tool

The DediProg Backup Boot Flash tool can be connected on the motherboard pin header or directly on the main memory package soldered on the board by using the DediProg BBF SO Test clip:

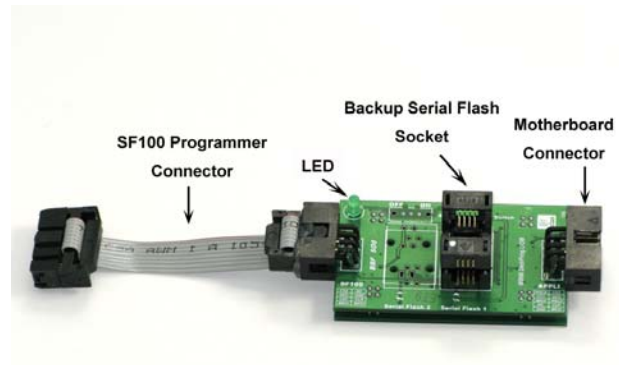
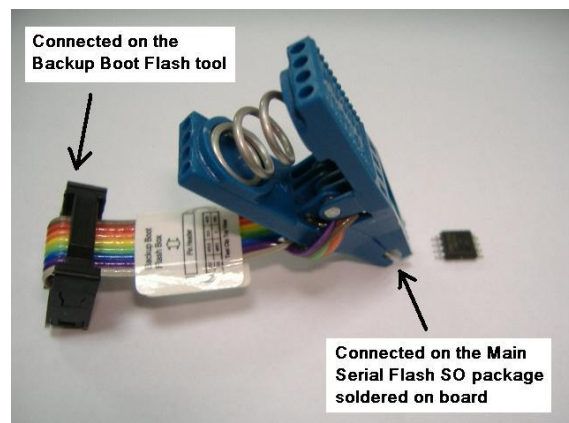


Fig 12: BBF SO Test Clip

This cable has been optimized to minimize the parasitic capacitance added on the SPI bus and ensure a good SPI signal. The SO Test Clip solution presents the advantage to be compatible with most of the motherboards of the market as it doesn't require any hardware modifications or adaptations (only pull-up resistor on Serial Flash Hold pin).



3.1. Basic steps for BIOS update

Step 1: Motherboard must be ready to boot

The motherboard must have all the hardware needed to boot:

- CPU
- RAM
- ATX power supply
- ..

Step 2: Insert the Backup Serial Flash in the BBF socket

The Serial flash must be inserted in the SO socket by taking care of the pin assignment. The pin 1 of the BBF socket is indicated by a dot.

The Backup Serial Flash must have been previously programmed with the correct Bios. For more information on how to program the Serial Flash, refer to the chapter: “3.2 update the Backup Serial Flash”

Step 3: Connect the Backup Boot Flash tool to the motherboard

The BBF tool can be connected directly on the BBF dedicated motherboard connector. On the contrary of the ISP connector, the BBF connector requires the Serial Flash Hold signal.

Important: Check with your motherboard supplier if the connector is compliant with the Backup Boot method. Find in section 3.3, the standard pin assignment for the BBF connector.

Fig 14: Backup Boot Flash connection on the motherboard connector

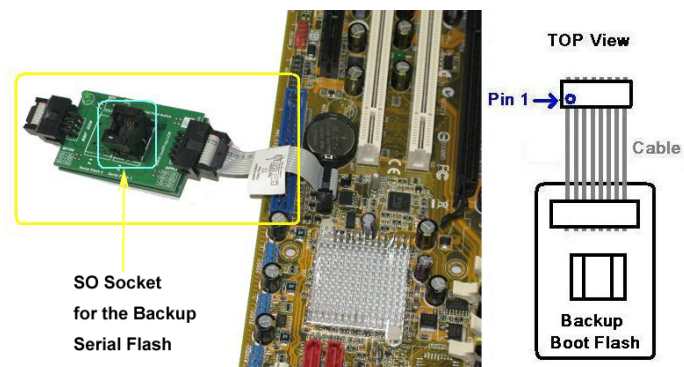


Fig 15: Backup Boot Flash connection on the motherboard connector

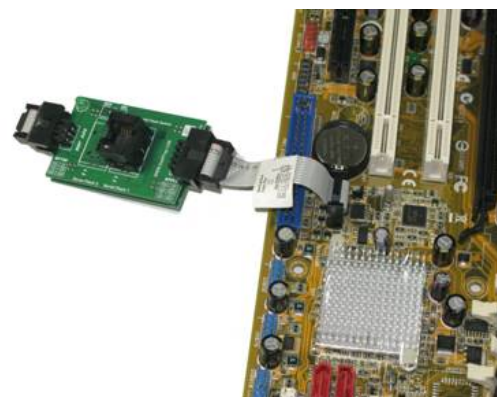
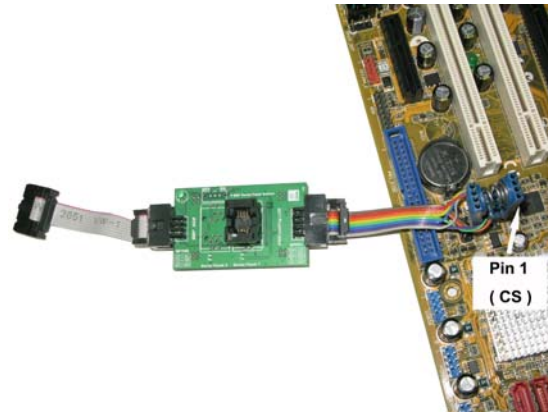


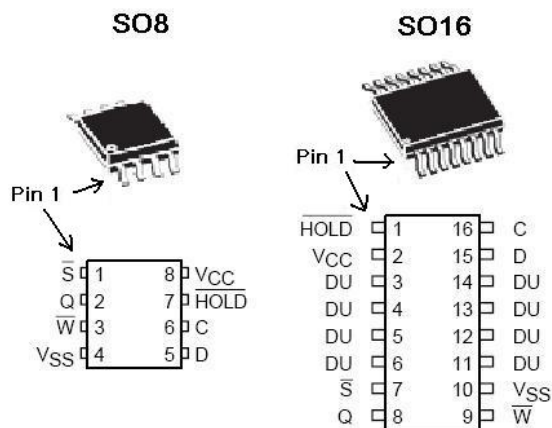
Fig 16: Backup Boot Flash connection on the Serial Flash package

The DediProg backup Boot Flash tool can be connected directly on the Serial flash package (SO8N, SO8W or SO16) by using the appropriate SO Test Clip. In this case, the motherboard will not require any dedicated connector. However it is recommended to have the pin header on the motherboard in order to have a more stable connection mechanically.



Users need to make sure to connect the Test clip correctly according to the Serial Flash pin assignment.

Fig 17: Standard Serial Flash pin out



The pin 1 is usually indicated by a dot on the package or located on the top left corner when the “cut side” is positioned on the left (Top view). The DediProg Test Clip pin 1 is indicated in the figure 17.

Step 5: Move the Switch on the BBF box to be on ON position

The switch on the BBF box is used to disable or enable the Serial Flash.

Switch ON:

- Main Serial Flash on board is disabled
- Backup Serial Flash on BBF socket is enabled (BBF LED ON if supplied)

Switch OFF:

- Main Serial Flash on board is enabled
- Backup Serial Flash on BBF socket is disabled

Step 6: Power up the motherboard

If the switch is on ON position, the BBF LED will be turn ON (Backup Serial Flash enable). The motherboard will boot from the backup serial Flash BIOS.

Step 7: After Boot, Enable the Main Serial Flash on board

The main Serial Flash soldered on board can be enabled by two different ways:

- 1) Remove the Backup Boot Flash tool from the Motherboard then the Main Serial Flash on board is automatically enabled again.
- 2) Move the BBF switch in OFF position.

Step 8: Used the Flash utility tool to update the Main bios memory

The flash utility tool is usually provided by your chipset makers, Bios makers or motherboards makers and can be used in DOS mode or Window mode. This tool can then been used to update the Bios memory soldered on board. As the Main serial Flash has been enabled again, the chipset will update it and repair the corrupted content.

3.2. Update the backup Serial Flash

The DediProg Backup Boot Flash tool can also been connected to their SF100 and SF300 programmer to update the Backup Serial Flash in the socket.

Fig 18: Backup Boot Flash tool connected on programmer



Step 1: connect the Backup boot Flash tool to the programmer

Use the Flat cable with the 14 pins female connector to connect the BBF to the programmer ISP connector.

Step 2: Open the DediProg tool to update the memory in socket

Use the DediProg tool as described on the In-system-Programming section to update the Backup Serial Flash inserted in the SO socket. The Bios of the backup Flash can be updated even if the BBF tool is connected on the motherboard and even if the motherboard is working. This feature is very convenient for Bios development as the motherboard can be reset after the update and boot again on the new Bios without any manipulation.

3.3. BBF Cable maintenance

If the Backup Boot Flash tools are often used for motherboard updating, the female connector of the BBF cable on the motherboard side will be step by step wear down (numerous contact with motherboard pin header). So in this case, the BBF cable must be changed.

Please note that the BBF cable is not taken into account in the DediProg warranty.

Then, before sending back a failing Backup boot Flash to DediProg, it is recommended first to test the BBF cable quality by replacing it by a new one or a working one (taken from another working BBF).

It is also possible to manufacture your own BBF cable.
You will then have to follow the following instructions:

a) If your motherboard connector is compliant with the Standard DediProg BBF pin-out (Serial Flash SO8 pin-out)

1) Check if your motherboard BBF connector is as follow:

Table 7:

1	CS	VCC	2
3	MISO	Hold	4
5	x	CLK	6
7	GND	MOSI	8

The Standard BBF connector is equivalent to the SO8 Serial flash pin out.

2) Prepare the Female connector on the BBF Side:

You need a 10 pins 2.54mm pitch female connector to be fixed on the flat cable.
The BBF header pin-out is as follow:

Table 8: Backup boot flash Header

1	X	CS2	2
3	CS	VCC	4
5	MISO	Hold	6
7	x	CLK	8
9	GND	MOSI	10

Note: The pin 1 and 2 don't need to be wired if the motherboard used only one Serial Flash.

3) Prepare the female connector on the motherboard side:

You need an 8 pins 2.54mm pitch female connector to be fixed on the flat cable.

Table 9: BBF header pin-out to be compliant with the motherboard

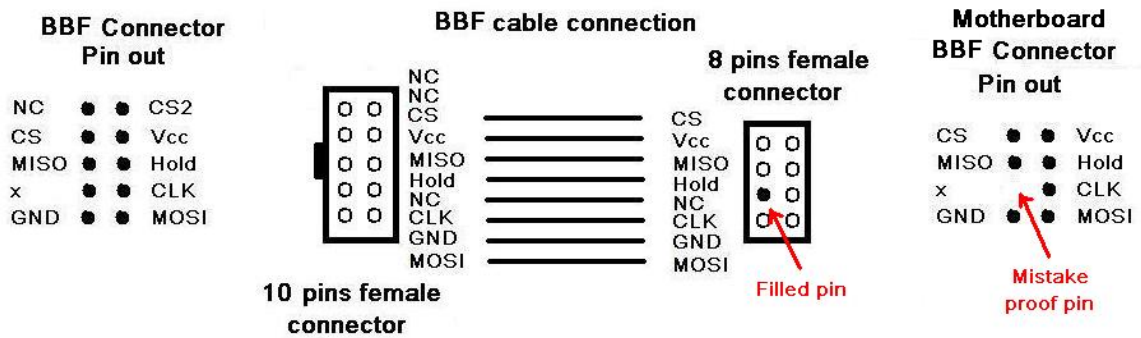
1	CS	VCC	2
3	MISO	Hold	4
5	x	CLK	6
7	GND	MOSI	8

4) Prepare the Flat cable or Ribbon cable

You need a Flat cable of 8 lines with a length of 8 cm maximum.

The length of the BBF cable must be minimized to not increase to much the SPI bus capacitance and disturb the quality of the signals.

Fig 19: BBF Cable connection for the motherboard



NC means Not Connected

The two first signals (X and CS2) of the BBF connector don't need to be wired if the motherboard used only one Serial flash.

b) For the other BBF pin header assignment:

Contact your motherboard maker for more information on the BBF cable connection.

Remark:

In case there is no pin-header designed for the purpose of on-board programming, and the use of testclip is not feasible mechanically, DediProg also provides a BBF cable with 1.27mm header which can be connected to a soldered 1.27mm 2x4 SMT male header (two samples are given for each BBF tool purchased) on the serial flash foot print. This provides BIOS engineers more convenience during BIOS development.

4. Contacts:

DediProg Inc

**4F., No.7, Ln. 143, Xinming Rd., Neihu Dist., Taipei City 114,
Taiwan**

Email for technical support: **support@dediprogram.com**

Email for Sale information: **sales@dediprogram.com**

www.DediProg.com

For more information please contact us or your motherboard suppliers.

We also recommend motherboard makers to enter in contact with our technical team to create a dedicated document that will take into consideration all your motherboard updating constraints and references. This documentation will then be very helpful to simplify the Bios update and avoid any mistake in the field.

Information furnished is believed to be accurate and reliable. However, DediProg assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied.

All rights reserved
Printed in Taiwan.

This manual was last revised on: Dec, 2008.