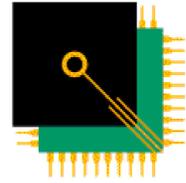# Flash Magic Application Note 3
Using Flash Magic with the 89LPC932
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1. Introduction

This application note describes how to use Flash Magic with the different versions of the 89LPC932. It describes each version's ISP abilities and limitations along with how to configure the Keil MCB900 board for use with Flash Magic. Also included is information on using the command line version of Flash Magic.

2. Identifying Your Device

Your 89LPC932 device will be marked in one of two ways. Either with a sticker displaying "ISP K1.0" or similar, or with numbers and letters printed onto the device casing.

If your device has the "ISP K1.0" or similar sticker then it is a special version of the 89LPC932 with a different ISP entry method to the standard devices. Please read the "ISP K1.0" section below for more information.

If your device has numbers and letters printed onto it, then you have a standard 89LPC932. You will need to determine the revision number of your device to find out its capabilities. The printed numbers and letters will roughly take on the following form:

> **P89LPC932x x**
> **xxxxxxx xx**
> **xxYYWW R**

The R letter at the end of the third line indicates the revision number. It will be a 'B', 'C', 'E', 'F' or some letter after 'F'.
Once you have determined the revision, read the following section in this application note for your revision.

3. "ISP K1.0"

3.1 Overview

This is a special version of the 89LPC932 which was produced in order to make samples of the device available quickly. It is based on the revision C device and will have the same errata sheet, if any.

3.2 ISP Entry Methods

This version does not have the same ISP entry method as the standard 89LPC932, therefore the relevant sections of the 89LPC932 datasheet do not apply.

To enter ISP mode, pin P2.4 is held low during reset. On the Keil MCB900 board this is achieved using the PROG jumper. To execute code, pin P2.4 is held high during reset. On the Keil MCB900 board this is achieved by disconnecting the PROG jumper.

3.3 Flash Magic Versions

Only the special "Flash Magic for MCB900" as supplied on the CD with the Keil MCB900 board will work with this version of the 89LPC932. Using any other version of Flash Magic will render the device unable to be reprogrammed via ISP and the only solution is a parallel programmer to program the status bit.

When using the command line version of Flash Magic for MCB900, any HARDWARE directives passed are ignored, as they are not required for this version.

3.4 Using the Keil MCB900 Board

To execute code set the jumpers to the following then remove and reapply power to the board:

        Run   - on
        Reset   - off
        Prog   - off

To enter ISP mode set the jumpers to the following then remove and reapply power to the board:

        Run   - off
        Reset   - off
        Prog   - on

3.5 Designing Target Hardware

It is not recommended to design target hardware that uses ISP based on this version, as its production run was limited, the ISP entry method is not supported by the other versions of the 89LPC932 and Flash Magic for MCB900 will not be developed further.

4. Revision B

4.1 Overview

This revision is an Engineering Sample and should not be used. Instead obtain revision C, E, F or later.

5. Revision C

5.1 Overview

This version only supports the Break detect method of ISP entry. When using this device, please ensure that the Break detect is enabled in application code.

5.2 ISP Entry Methods

This version supports only the break detect method of ISP entry. It does not support the hardware entry method involving applying pulses to the RST pin.

In order to use the break detect method it must be supported in your code. Therefore if you wish to be able to reprogram the device again, you must include the necessary code for the break detect in the first

code programmed into the device. Failure to do this will result in being unable to reprogram the device via ISP, and a parallel programmer will be needed.

The necessary code can be generated by Code Architect, which is available at:

http://www.codearchitect.org/philips

5.3 Flash Magic Versions

Use only the regular version of Flash Magic version 1.71 or later, either from the CD supplied with the Keil MCB900 board (if you have one) or from the Flash Magic web page at:

http://www.esacademy.com/software/flashmagic

Do not use versions of Flash Magic prior to 1.71 as the 89LPC932 device support was not perfected.

Do not use the special "Flash Magic for Keil MCB900" as supplied on the CD with the Keil MCB900 board. Using it will result in the device unable to execute the programmed code. Switching to the regular version of Flash Magic will solve the problem in this situation.

To send a break condition to the device from Flash Magic in order to enter ISP mode (assuming your previously downloaded code supports it), perform the following steps:

- Choose Start BootROM… from the ISP menu
- Select the "Send Break Condition" option
- Click on Start BootROM

As there is no feedback to Flash Magic as to whether the break condition was understood there will not be an error message displayed if the device failed to enter ISP mode. A quick way to check is to choose Read Security Bits… from the ISP menu.

Because the hardware ISP entry method is not supported with this revision, passing the HARDWARE(KEILMCB900) directive to the command line version of Flash Magic will not work. Instead send a Break Condition using the STARTBOOTROM(BREAK) directive.

5.4 Using the Keil MCB900 Board

When using the Keil MCB900 board, leave the jumpers in the following position to ensure that code on the device is always executed. To enter ISP mode, your code must be set up to switch to ISP mode on a break condition, so no changing of the jumpers is required to execute code and use ISP.

```
Run     - on
Reset   - off
Prog    - off
```

5.5 Designing Target Hardware

Target hardware designed for this version should work with later revisions of the 89LPC932. Note however that if you wish to utilize the hardware ISP entry method available on later revisions the circuit for the MCB900 must be copied, as that is the only circuit supported by Flash Magic. Obviously it will not be possible to test the circuit with this revision.

The MCB900 schematic diagram is available from:

6. Revision E

6.1 Overview

This version behaves exactly the same as revision F, except it uses increased current in power down mode. It was only available on evaluation boards and cannot be purchased through any channel. For information on using ISP with revision E, see the section on revisions F and later.

7. Revisions F and later

7.1 Overview

These versions support both methods of ISP entry mentioned in the 89LPC932 datasheet.

7.2 ISP Entry Method

These versions support both the break detect method and the pulses on RST method for ISP entry.

In order to use the break detect method it must be supported in your code. Failure to do this will result in either having to build the circuit required to support applying pulses on the RST pin, or use a parallel programmer.

The necessary code can be generated by Code Architect, which is available at:

http://www.codearchitect.org/philips

In order to use the hardware method (pulses on RST pin), the ISP circuit for the Keil MCB900 board must be copied. It is the only circuit supported by Flash Magic that allows Flash Magic to generate the reset pulses needed.

The MCB900 schematic diagram is available from:

http://www.keil.com/lpc/me900.chm

7.3 Flash Magic Versions

Use only the regular version of Flash Magic version 1.71 or later, from the Flash Magic web page at:

http://www.esacademy.com/software/flashmagic

Do not use versions of Flash Magic prior to version 1.71 as the 89LPC932 device support was not perfected.

Do not use the special "Flash Magic for Keil MCB900" as supplied on the CD with the Keil MCB900 board. Using it will result in the device unable to execute the programmed code. Switching to the regular version of Flash Magic will solve the problem in this situation.

To send a break condition to the device from Flash Magic in order to enter ISP mode (assuming your previously downloaded code supports it), perform the following steps:

- Choose Start BootROM… from the ISP menu
- Select the "Send Break Condition" option
- Click on Start BootROM

As there is no feedback to Flash Magic as to whether the break condition was understood there will not be an error message displayed if the device failed to enter ISP mode. A quick way to check is to choose Read Security Bits… from the ISP menu.

To configure Flash Magic to automatically generate the reset pulses (as well as control the power to the device), perform the following steps:

- Ensure 89LPC932 is selected in the drop-down list in section 1
- Choose Advanced Options… from the Options menu
- Click on the Hardware Config tab
- Check the option "Use DTR and RTS to enter ISP mode"
- Select Keil MCB 900 from the drop down list
- Click on OK

Whenever any ISP operations are performed, Flash Magic will automatically generate the pulses on the RST pin.

To configure the command line version of Flash Magic to generate the RST pin pulses, use the HARDWARE(KEILMCB900) directive. To generate a break condition when using the command line version of Flash Magic, use the STARTBOOTROM(BREAK) directive.

7.4 Using the Keil MCB900 Board

To execute code with no serial cable connected to both the board and a PC, set the jumpers to the following then remove and reapply power to the board:

        Run   - on
        Reset   - off
        Prog   - off

To execute code when a serial cable is connected to the board and a PC and allow ISP mode to be entered, set the jumpers to the following then remove and reapply power to the board:

        Run   - off
        Reset   - on
        Prog   - off

7.5 Designing Target Hardware

If you wish to utilize the hardware ISP entry method available on later revisions the circuit for the MCB900 must be copied, as that is the only circuit supported by Flash Magic.

The MCB900 schematic diagram is available from:

        http://www.keil.com/lpc/me900.chm

8. Additional Information

Additional information on the 89LPC932, including the latest datasheet, user manual and errata sheets can be obtained from:

http://www.semiconductors.philips.com/pip/P89LPC932BA.html

Additional information on Keil's MCB900 board can be obtained from:

http://www.keil.com/mcb900/

The latest version of Flash Magic can be found at:

http://www.esacademy.com/software/flashmagic

There is also a Flash Magic discussion forum available at:

http://www.esacademy.com/software/flashmagic/forum

A code generation tool for the 89LPC932 may be found at:

http://www.codearchitect.org/philips

Keil has also written the following Knowledge Base entries for their web site, which provide additional information on using the MCB900 board:

http://www.keil.com/support/docs/2553.htm
http://www.keil.com/support/docs/2496.htm

A collection of 89LPC9xx resources and information is available from:

http://www.lpc900.com