

# Using the Kickstart Card with the C-SPY ROM monitor debugger

## **Getting started**

The Kickstart cards are delivered with the ROM monitor installed. If flash sector 0 in the LPC210x chip on your card has been erased you need to reinstall the ROM monitor, see section “How to install the ROM monitor on the Philips LPC210x Kickstart Card”.

## **Example applications**

Two example applications are provided for the Kickstart Card. Running lights and a shooting game!

### Setting up the board

- Place jumpers at JP4, JP5 and at all the positions P0.16-P0.31 in the LED jumper block.
- Make sure that no jumpers are placed at JP6, JP7 and JP8.
- Make sure that the delivered serial cable is connected to serial port P0 on the Kickstart Card and to one of the serial ports on the PC. (If COM1 isn't used the project settings will need to be changed, see below).
- Connect power to the Kickstart Card, battery or battery eliminator.

### Running the examples in the Embedded Workbench

#### *Example 1: Running Lights*

- Run the *IAR Embedded Workbench for ARM* application and open the KickStart\_ROM\_Monitor.eww workspace.
- Choose the first example project, “RunningLights”.
- If you use another serial port than COM1 on your PC, you will have to change this in the project settings. On the project menu, choose “Options”. In the options dialog that opens, choose “C-SPY debugger” and the “OKI-ROM monitor” options page. Choose the serial port you use under “Serial port settings”.
- Press the debug button. The project will now be compiled and linked and the C-SPY debugger starts to download the program to the Kickstart Card.
- When the download has finished, press the run button in the C-SPY debugger and some running lights are displayed on the LED:s.
- If you press the stop button in C-SPY, the program will stop and it is possible to set breakpoints, step in the code, watch register and variable contents etc. For further details see the Embedded Workbench user guide.

#### *Example 2: Shooting game*

The second project, the shooting game “Shoot”, is built and run the same way as “RunningLights”. Remember to adjust the serial port settings for this project also, if you do not use COM1. Instructions on how to play the game are in the comments at the top of the *shoot.c* file.

## **If something doesn't work**

The ROM monitor is a piece of software running alongside the user application. This means that the user application can destroy the setup for the ROM monitor and make it stop working. To prevent this from happening you must write your code so that it doesn't interfere with the ROM monitor. See section “User code limitations when using the ROM monitor”.

If you run into trouble anyway, reset the Kickstart Card using the reset button. Then restart the C-SPY debugger (this is done within the Embedded Workbench application). You can also try to do a power on reset by disconnecting and reconnecting the power to the Kickstart Card, press the reset button and then restarting C-SPY.

## ***Important settings when using the ROM monitor***

### **Kickstart Card settings**

- The jumper JP4 needs to be mounted for the ROM monitor communication to work.

### **Project settings**

- The linker XCL file needs to be adapted for use with the ROM monitor. A suitable XCL file is delivered with the example projects.
- The serial port baudrate for the ROM monitor (set in the “C-SPY debugger->OKI ROM monitor” options page) must be 9600 baud.

## ***ROM monitor hardware resource usage***

The ROM monitor uses the following hardware resources in the LPC210x chip:

- UART0
- VIC vector 0
- 4 Kbytes flash ROM memory at addresses 0x00000000-0x00000fff.
- 1 Kbyte RAM memory at addresses 0x40000000-0x400003ff.

## ***User code limitations when using the ROM Monitor***

The user code must not use any of the HW resources used by the ROM monitor. The following must be observed:

- All UART0 registers must be untouched by user code.
- `pelk` must be kept at the XTAL frequency divided by four. This is the default after reset. If the PLL configuration and `VPBDIV` is altered this relationship must be maintained.
- `PINSEL0`: Bits 0:3 must be set to 0x5.
- `MEMMAP`: Should always be 0x1. (Exception vectors at start of flash, address 0.) Note that the exception vectors for the user code are remapped by the ROM monitor to the start of user RAM.
- Never clear UART0 interrupt enable bit (bit 6 in `VICIntEnable`). That is, never write a 1 to bit 6 in `VICIntEnClr` (writing a 0 to bit 6 in `VICIntEnable` is of course allowed, that doesn't change the interrupt enable status).
- If IRQ:s are disabled for a long time (seconds) it will not be possible to stop execution of the user program by pressing the stop button in C-SPY during that time. If the stop button is pressed anyway during such a long time of disabled IRQ, the ROM monitor debugger communication may fail.
- Do not write to monitor RAM locations 0x40000000-0x400003ff.
- Do not erase/write to monitor flash locations 0x00000000-0x00000fff.

## ***User memory***

### **User Flash**

User flash starts at 0x00001000. It is not possible to set breakpoints in flash memory so user code in flash can not be debugged by the ROM monitor.

### **User RAM**

User RAM starts at 0x40000400.

### **User exception vectors:**

The ROM monitor remaps the start of the user exception vectors to the start of the user RAM, address 0x40000400.

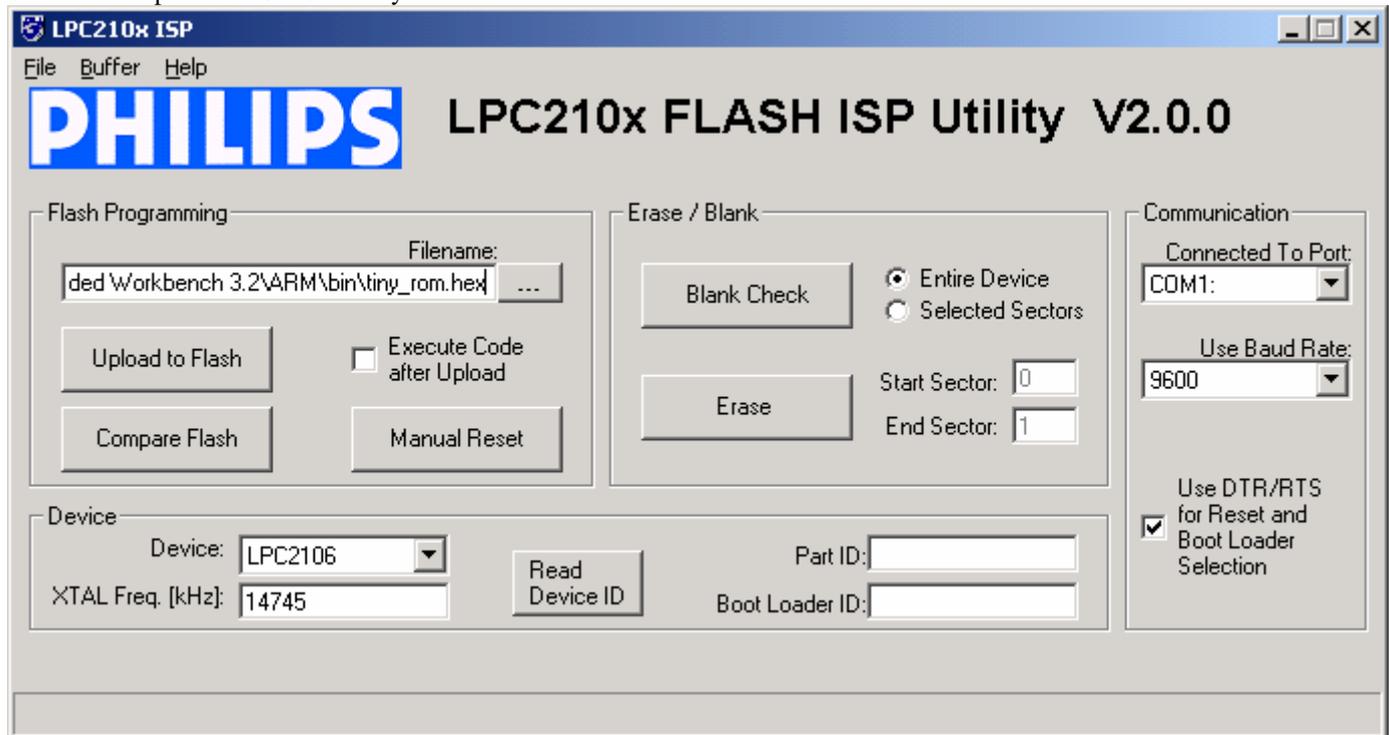
## Known problems

- It is currently not possible to set breakpoints or step in an undefined exception handler. This is because the undefined exception is used to handle breakpoints.
- Currently the ROM monitor only supports the serial baudrate 9600 baud for communication with the C-SPY debugger.

## How to install the ROM monitor on the Kickstart Card

The Kickstart Cards are delivered with the ROM monitor preinstalled. If sector 0 in the flash is erased or an ROM monitor upgrade is available it might be needed for the user to reinstall the ROM monitor on the card. To do this, follow this procedure:

- Make sure that the delivered serial cable is connected to serial port P0 on the Kickstart Card and to one of the serial ports on the PC.
- Make sure that jumpers are mounted at JP2, JP4, JP7 and JP8.
- Connect power to the Kickstart Card, battery or battery eliminator.
- Start the Philips LPC210x ISP utility.



- Choose the serial port you use on the PC.
- Choose baudrate 9600 baud (this value is not critical).
- Make sure that the “Use DTR/RTS for Reset and Boot Loader Selection” tickbox is ticked.
- In the filename box, browse to <Embedded Workbench installation dir>\Arm\bin\tiny\_rom.hex .
- Press the Upload to flash button.
- Close the Philips LPC210x ISP utility.
- Disconnect power to the card.
- Remove jumpers JP7 and JP8.
- Reconnect power.
- Press the reset button. The ROM monitor is now up and running.