

phyCORE®-XScale/PXA270 Development Kit (KPCM-027)

Loading a Linux Image

This Application Note provides instructions on how to install the bootloader (U-Boot) on the PHYTEC Development Board and how to write a kernel / root file system image into the flash memory.

1 System Description

1.1 Hardware Description

The following hardware is necessary for start-up of the phyCORE-PXA270:

- phyCORE-PXA270 (PCM-027)
- Development Board for phyCORE-PXA270
- AC adapter supplying 12 VDC, 3.3A, center positive
- RS-232 null-modem cable
- cross-over Ethernet cable¹

All PHYTEC hardware components are included in the phyCORE-PXA270 Basic Development Kit.

¹: You may also use a straight Ethernet cable connected to a hub to establish network connection between the phyCORE-PXA270 hardware and the host-PC.

1.2 Software Description and Requirements

This Application Note for the phyCORE-PXA270 requires the use of a terminal program on the host-PC, such as Komport or Minicom for Linux, together with TFTP services. The ip address of your host should be configured with the ip address 192.168.3.10.

Information how to setup the network configuration and tftp services can be found in the QuickStart Instructions (Chapter 2 Getting Started). The terminal program Komport will be installed while executing the setup program on your PHYTEC Linux-XScale-Disc. You can find a link on your desktop to start Komport.

The Bootloader used for downloading the Linux kernel is the Universal Bootloader U-Boot. The installation of the bootloader is described in this appnote and will be done with the program jflash. To run jflash, you will have to use a host running windows.

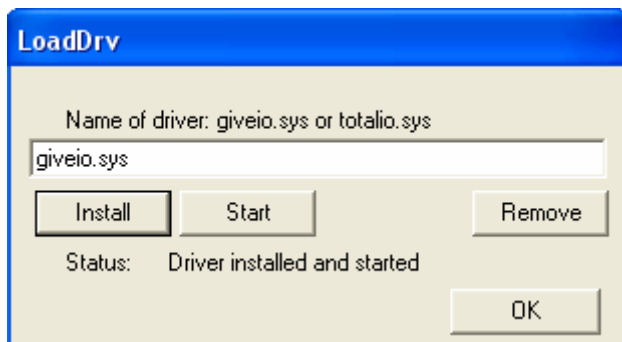
2 Getting Started

2.1 Installing the bootloader

Before you can use jflash you have to install the giveio driver.

- First insert your PHYTEC Linux-XScale-Disc and copy the folder *D:\Tools\jflash* to your hard disk.
- Navigate to the directory *jflash\giveio*.
- If you are using Windows NT run *loaddrv2_NT.exe*. If you are using Windows XP run *loaddrv2_XP.exe*.

A dialog opens:



- Select install.

The driver will be installed and started.

- Click on Button OK.

After you have installed the giveio driver, connect the jtag interface of your board with the jtag adapter and connect the jtag adapter with a parallel cable. Plug the cable into the interface LPT1 on your host.

Now you can use jflash to write the bootloader to flash.

- Connect the AC adapter with the power supply connector X1 (12V) on your board.

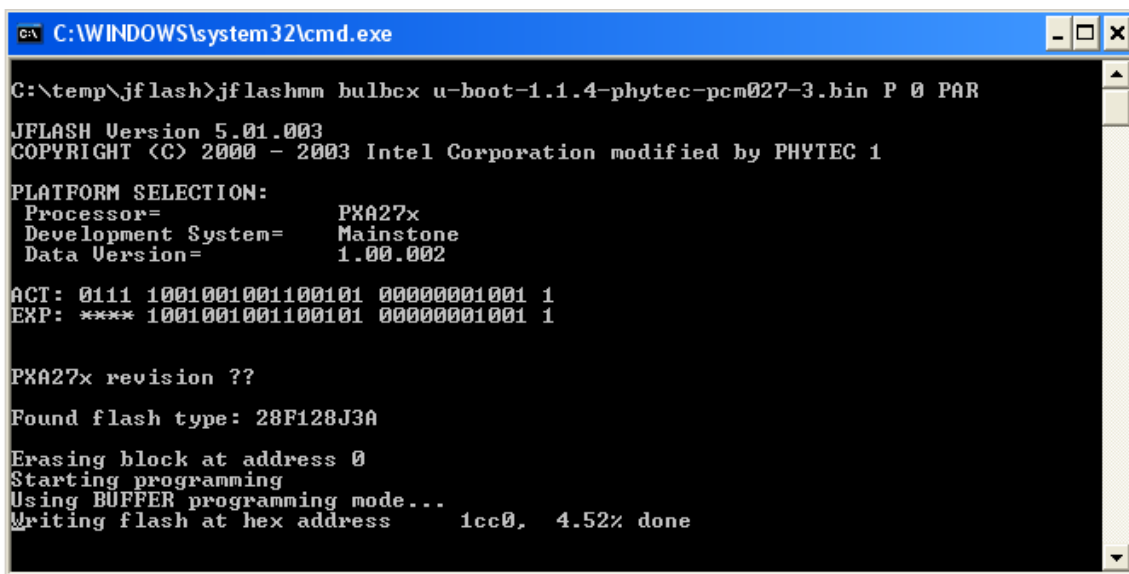
Note: The power connector should have 12 VDC inside and outside should be ground.

- Navigate to the folder jflash.

In this folder you can find the batch file prog.bat.

- Double-click on prog.bat

A new window opens.



```
C:\WINDOWS\system32\cmd.exe
C:\temp\jflash>jflashmm bulbcx u-boot-1.1.4-phytec-pcm027-3.bin P 0 PAR
JFLASH Version 5.01.003
COPYRIGHT (C) 2000 - 2003 Intel Corporation modified by PHYTEC 1
PLATFORM SELECTION:
Processor=          PXA27x
Development System= Mainstone
Data Version=      1.00.002
ACT: 0111 1001001001100101 00000001001 1
EXP: **** 1001001001100101 00000001001 1

PXA27x revision ??
Found flash type: 28F128J3A
Erasing block at address 0
Starting programming
Using BUFFER programming mode...
Writing flash at hex address 1cc0, 4.52% done
```

- Press Enter for two times to start writing the bootloader into flash.

After writing, jflash starts verifying. There will be some verifying errors. These errors can be ignored.

- Disconnect the power supply of the target.

Note: After installing the bootloader you has to disconnect the target of the power supply before you can start the target.

2.2 Configuring Environmental Variables

The following steps will be done on a linux platform. We assume you has configured your host platform and executed the setup program oft the Linux-XScale-Disc. Information on how to configure the host platform can be found in the *Getting Started* part of your QuickStart.

- Connect the serial cable with the connector P1 on the target and the serial interface COM1 on your host
- Connect the cross-over Ethernet cable with the connector X23 on the target and the right network card of your host.



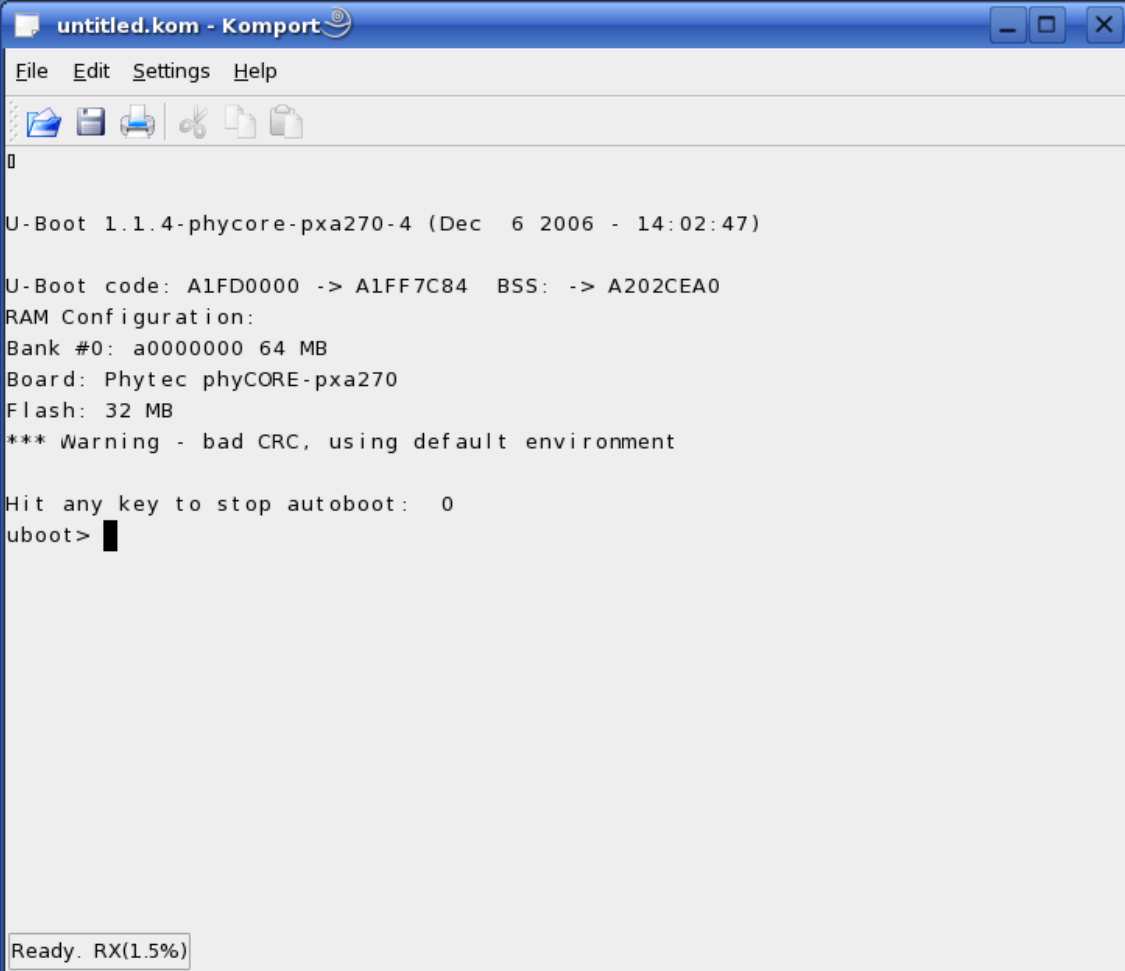
- Click on the *Komport* icon on your desktop

Komport was configured during the setup with the following configuration:

115200 baud, 1 Start bit, 8 data bits, 1 stop bit, no parity and no flow control.

If you want to use another program than Komport for serial communication, you will have to setup this program with these settings.

- Connect the AC adapter with the power supply connector X1 (12V) on your board.



```
untitled.kom - Komport
File Edit Settings Help
[Icons]
[]
U-Boot 1.1.4-phycore-pxa270-4 (Dec 6 2006 - 14:02:47)
U-Boot code: A1FD0000 -> A1FF7C84 BSS: -> A202CEA0
RAM Configuration:
Bank #0: a0000000 64 MB
Board: Phytex phyCORE-pxa270
Flash: 32 MB
*** Warning - bad CRC, using default environment

Hit any key to stop autoboot: 0
uboot> [Cursor]
```

Ready. RX(1.5%)

- Press any key to stop autoboot.

If no default configuration can be found in the EEPROM, the built-in configuration will be used, and you will see the following line :

```
*** Warning - bad CRC, using default environment.
```

Enter the following command to setup the MAC-address of your target. The MAC address can be found on the phyCORE module.

- Type **setenv ethaddr <mac-address>**

for example: `setenv ethaddr 00:50:C2:52:9E:3D`

- Enter **saveenv** to save the environment settings to the EEPROM.

The default ip address of the target is 192.168.3.11 and the default server ip is 192.168.3.10. If you want to setup another network configuration, you can use the following commands:

```
setenv ipaddr <target ip>
setenv serverip <server ip>
setenv gateway <gateway ip>
setenv netmask <netmask>
```

2.3 Restore the U-Boot default configuration

If you want to restore to the default configuration you can use the following command to delete the configuration in the EEPROM:

- **eeprom write 0 0 10.**

After pressing the reset button, the default configuration of the bootloader will be used.

Configure the MAC address with the following command:

- **setenv ethaddr <mac-address>**
- Typ **saveenv** to store the settings in the EEPROM

2.4 Writing the Kernel / Root File System into Flash

Before the kernel / root file system can be written into flash, you will have to download the image from a tftp server. This will be done in the command line of the bootloader. First the image will be copied into RAM. Then you will have to erase the part of the FLASH, where you want to copy the Kernel image.

In the default configuration you will find three partitions on the target. The first partition contains the boot loader, the second the Kernel and the third contains the root file system.

The three partitions have the following address ranges:

0x00000000 - 0x0003FFFF: U-Boot (256k)

0x00040000 - 0x0023FFFF: Kernel (2048k)

0x00240000 - 0x01FFFFFF: Root-Filesystem (30464k)

In the directory Linux/image on your PHYTEC Linux-XScale-Disc you can find a file uImage-pcmXXX-Y. This file is the kernel image. There is another file root-pcmXXX-Y.jffs2. This file contains the root file system.

- Copy the files uImage-pcmXXX-Y and root-pcmXXX-Y.jffs2 into the directory /tftpboot

You can download the kernel / root filesystem from the TFTP – server, erasing the required Flash area and writing the kernel from the RAM into the Flash with one simple command.

Before you can execute this command you have to set the name of your kernel image to the environment variable *uimage* and the name of jffs2-file to the variable *jffs2*.

- Open Komport if is not opened.

- Type the following commands in the u-boot command line to set the environment variables:

```
setenv uimage uImage-pcmXXX-Y
```

```
setenv jffs2 root-pcmXXX-Y.jffs2
```

Then you can start downloading and writing the kernel image into the Flash.

```
Hit any key to stop autoboot: 0
pcm027> setenv uimage uimage
pcm027> run prg_kernel
Using MAC Address 00:50:C2:5A:70:B7
TFTP from server 192.168.3.10; our IP address is 192.168.3.11
Filename 'uimage'.
Load address: 0xa0200000
Loading: T #####
#####
#####
#####
done
Bytes transferred = 1242460 (12f55c hex)
Erase Flash Partition nor0,1, bank 0, 0x00040000 - 0x0023ffff Erasing sector 1 .
.. ok.
Erasing sector 2 ... ok.
Erasing sector 3 ... ok.
Erasing sector 4 ... ok.
Erasing sector 5 ... ok.
Erasing sector 6 ... ok.
Erasing sector 7 ... ok.
Erasing sector 8 ... ok.
Erased 8 sectors
Copy to Flash... done
pcm027>
```

- Type **run prg_kernel**.
- Type **run prg_jffs2** to download and write the root file system into the flash.
- Press the RESET button on the target to start your target

The target will start with kernel and root file system you has written into Flash.