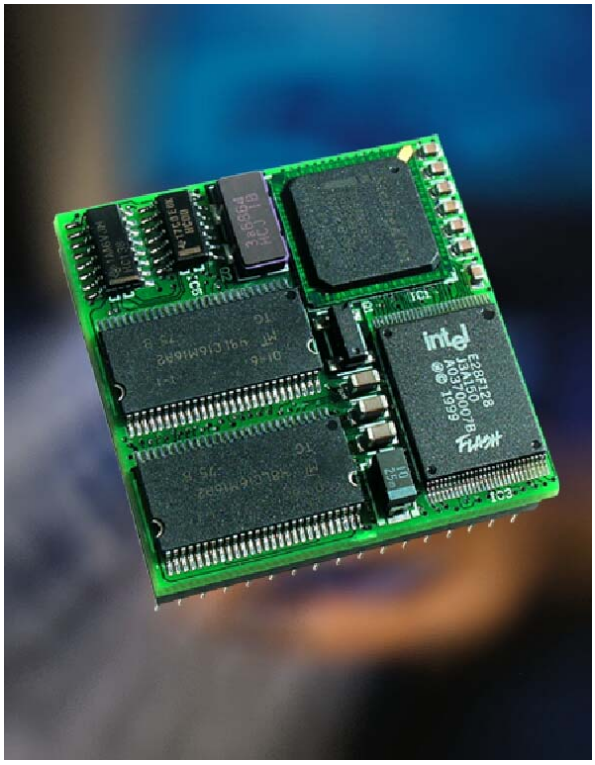


Embedded RISC PC PNP/1110
Starter Kit

User Manual

Contents

1. Introduction

Thank you for choosing an SSV Starter Kit. We are confident that you will be pleased with the performance of your product. Please take a few minutes to read this manual. It describes how to start with the DNP/SK6 Starter Kit and will help you to get out the most of your new system.

For further information about the individual components of this Starter Kit you may follow the links from our website at: *http://www.dilnetpc.com*

Our Website contains a lot of technical information, which will be updated in regular periods.

For specific technical information – like hardware description etc. – please check out the Starter Kit CD-ROM, which is an important part of every Starter Kit.

1.1 Conventions used in this Document

Convention	Usage
italic	Filenames, as well as Internet addresses such as www.ssv-embedded.de
italic	User inputs, command lines and pathnames
bold	New terms
`monospace text`	Program code

Table 1: Convention usage

1.2 Checklist

Compare the contents of your Starter Kit package with the standard checklist below. If any item is missing or appears to be damaged, please contact SSV Embedded Systems.

Standard Items

√ Evaluation Board DNP/EVA4
√ Embedded RISC PC PNP/1110
√ LC-Display
√ LC-Display Data Cable
√ CFL Power Cable
√ Backlight Converter (Inverter)
√ Power Supply
√ Power Cable
√ User Manual
√ Support CD-ROM

1.3 Features

Evaluation Board DNP/EVA4

- 237-pin ZIF-PGA socket (Socket 3) for one Embedded RISC PC PNP/1110
- LCD-Interface
- CFL-Power Output
- Two RS232 Serial Interfaces
- 10/100Mbps Ethernet Interface
- Eight User-Definable LEDs
- Six Manual DIP Switches
- One Reset Switch
- Prototype-Area
- 5 VDC Power Input Connector
- Null-Modemcable
- Size 210 x 148 mm

Embedded RISC PC PNP/1110

- Intel StrongARM SA-1110 CPU with 206 MHz Clock Speed
- 64 MByte SDRAM Memory, 16 MByte FLASH Memory
- LCD-Interface (TFT and passive LCD)
- 10/100Mbps Ethernet Interface
- PCMCIA dedicated Pins
- Real Time Clock
- Two 16C550 UART Serial Ports
- 18-bit General Purpose High-Speed Parallel I/O
- 32-bit I/O Expansion Bus
- 5 Interrupt Inputs, 5 Chip Select Outputs
- In-System Programming Features
- 169-pin JEDEC PGA-Connector
- 3.3 Volt Low Power Design, Single 3.3 VDC Supply
- Supply Current to be defined
- Size 45 x 45 mm

2. Board Layout

The main component of the Starter Kit is the Evaluation Board DNP/EVA4. On this board you will find a 237-pin ZIF-PGA socket (ZIF = Zero Insertation Force) to mount your 169-pin PNP/1110.

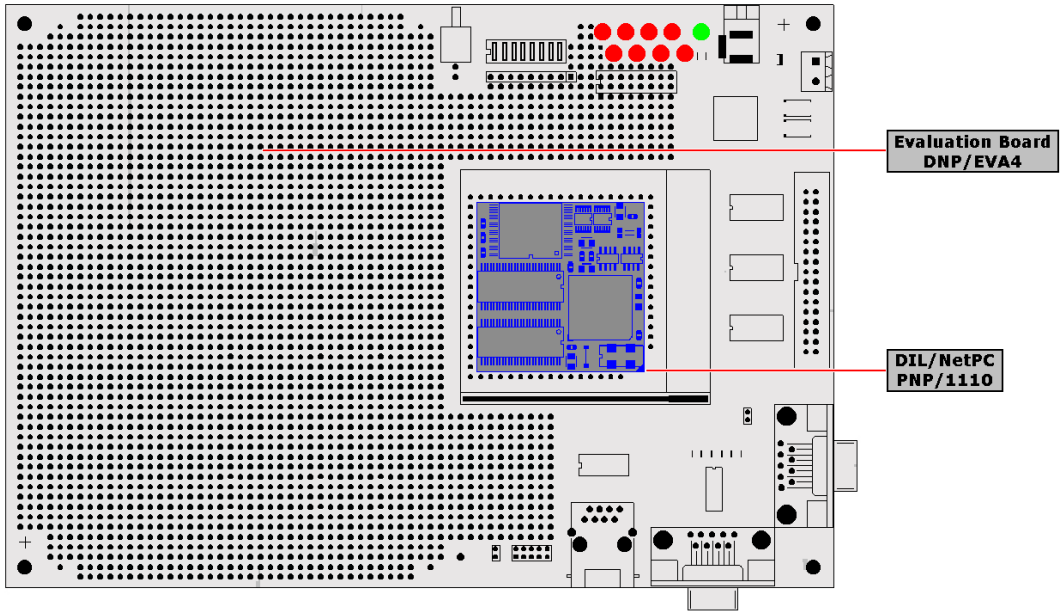


Figure 1: Evaluation Board EVA4 with PNP/1110

The Starter Kit DNP/SK6 provides all required basic hard- and software environment, which allows you the development of individual applications for your PNP/1110. For an instant connection to your hardware the Evaluation Board supports two serial COM interfaces, a 10/100Mbps Ethernet interface as well as a PGA (Socket 3) interface. Further you will find a prototype (wire-wrap) area, eight LEDs, eight DIP-switches (six occupied and two not connected) and one reset switch, which allows you to test your peripheral applications very easy. With the prototype area you have an ideal place to install and test your own aplications on the Evaluation Board. The LC-Display, which is added as supplement to the Starter Kit allows an easy visualizing of your work.

3. Board Components

This chapter describes the most interesting components of the Evaluation Board DNP/EVA4 and gives a short overview about their respective functions.

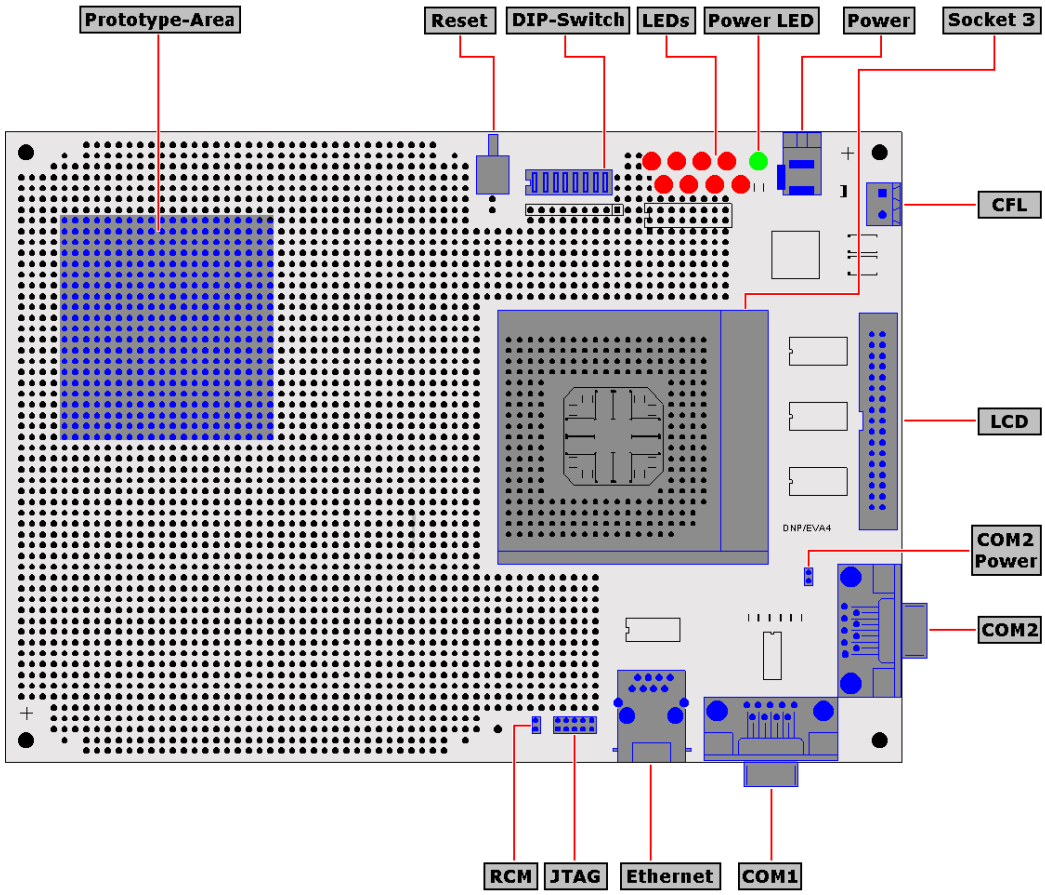


Figure 2: Main components of the Evaluation Board DNP/EVA4

3.1 PGA Socket (Socket 3)

The Evaluation Board offers a single 237-pin ZIF-PGA socket (PGA = Pin-Grid-Array) also known as Socket 3. This socket picks up your 169-pin PNP/1110 and builds the interface to the individual parts on the Evaluation Board.

3.2 Power Connector

The Power connector onto the Evaluation Board has to be connected with the power supply, which is added to your Starter Kit. Alternatively you are able to use a similar power supply that provides +5V DC and about 2A current.

3.3 Power LED

The Evaluation Board DNP/EVA4 is equipped with a single green LED. This LED will light up when the board is provided with the necessary operating voltage.

3.4 Output LEDs

The Evaluation Board provides eight red LEDs for testing purposes. These LEDs are the first little application for the PIO-Ports. The LEDs will flicker or light up to indicate traffic on the output ports PB0–PB7.

3.5 DIP Switches

The Evaluation Board has a set of eight DIP-switches. Six of these switches are allocated with functions; two of them are not connected. The DIP-switches give you the possibility to put 6-bit binary numbers to the input ports PA0–PA5. The DIP-switches are the second little application for the PIO ports.

Switch open = Signal V_{in} Low (GND)
Switch closed = Signal V_{in} High (V_{cc})

The DIP-switches are also used as strap-option for the LC-Display resolution and color. For the available LC-Display settings please see chapter 4.2.4. After the bootstrap is finished these switches can be used free.

3.6 Reset Button

Next to the DIP-Switches you find the Reset button. Press it down if the system hang or you want to restart it. Pressing the Reset button will only restart the PNP/1110. To reset any connected devices–like a LC-Display etc–turn off power from the system.

3.7 Prototype Area

The Prototype Area offers space to develop your own applications and circuits on the Evaluation Board.

3.8 RCM Jumper

Use this jumper to activate the RCM mode of the PNP/1110. To activate the RCM mode place a jumper cap on both pins of the RCM jumper, so that it is short. If you remove the jumper cap, or place the jumper cap on just one pin, the jumper is open and you are not able to use the RCM mode. When closed, you will see some boot messages on the serial port COM1. If the RCM jumper is not set, these messages will be blocked by the system. Please see Appendix 6 for more information.

3.9 JTAG Interface

The Evaluation Board DNP/EVA4 is equiped with a 10-pin JTAG connector. This connector is for factory service only. Please do not touch–the system may be damaged. Please contact SSV Embedded Systems for more information.

3.10 10/100Mbps Ethernet Interface

The PNP/1110 is using a SMSC LAN91C111 chip that allows Ethernet connectivity with a speed up to 100Mbps. The RJ45 Ethernet interface on the Evaluation Board is just a simple connection over a transformer to the PGA interface pins, which are connected to the SMSC LAN controller on the PNP/1110.

3.11 Serial Interface COM1

For an easy connection between the Starter Kit and your development system you can use the serial interface COM1. The COM1 interface is realized as a RS232 standard compliant Sub-D port with 9 pins. The exact layout of the COM1 interface is shown in Appendix 2.

3.12 Serial Interface COM2

The COM2 interface on the Evaluation Board DNP/EVA4 is realized as a RS232 standard compliant Sub-D port with 9 pins. The exact layout of the COM2 interface is shown in Appendix 2.

You have the possibility to switch power to the pins 4 and 7 by closing the COM2 power switch jumper JP2. This feature may be used to supply a connected device like a touch screen or mouse.

3.13 COM2 Power Switch (JP2)

You can use the COM2 port to connect a serial device like a mouse or touch screen. These devices normally need a power supply to work correctly. By closing the jumper JP2 (place a jumper cap on both pins) the pins 4 and 7 of the COM2 Sub-D connector will be connected with main power (5V). If jumper JP2 is left open the pins 4 and 7 of COM2 become not connected.

3.14 LCD Interface

This interface offers all necessary signals to use several types of LC-Displays. Please plug the data cable of the LC-Display to the LCD interface on the Evaluation Board. Please make sure that you have the pin-1 side of the cable matched with the pin-1 side of the connector. The LCD interface on the Evaluation Board is able to run active as well as passive LC-Displays.

Note: If you want to connect a different display than the supplied, please contact SSV Embedded Systems for more information.

3.15 CFL Interface

To provide the affiliated LC-Display with the necessary extra voltage for the backlight there is a CFL interface available on the DNP/EVA4. The extra voltage comes from an external backlight converter (inverter), which is part of the Starter Kit. See Chapter 5.4 for more information about the correct connection between the LC-Display and the DNP/EVA4. To avoid capacity loss the backlight converter should be placed nearby the LC-Display.

3.16 Interrupt Usage

The PNP/1110 supports up to five interrupt lines. One of them is exclusively available in all display modes. The interrupt 2-5 are multiplexed (this means that the pins on the interface are shared with another device) with the LCD data lines 12-15. If you want to use up to five interrupts, only specific LC-Displays can be used. For more information see Appendix 5.

4. Connections

For a quick and easy start with the DNP/SK6 Starter Kit there are several connections necessary. The following chapter describes, how and between which components these connections have to be made.

4.1 Mounting the PNP/1110

To mount the PNP/1110 on the Evaluation Board DNP/EVA4 pull the locking lever away from the socket to unhook it and then raise the locking lever to the downright position. Now identify the pin-1 corner on the socket and the pin-1 corner on the PNP/1110. The socket pin-1 corner is adjacent to the handle of the locking lever. On the PNP/1110 a white sign marks the pin-1 corner. Matching the pin-1 corners, drop the PNP/1110 down into the socket. No force is required and the PNP/1110 should seat easily into the socket. After that, swing the locking lever down and hook it under the latch on the edge of the socket. This locks the PNP/1110 in place.

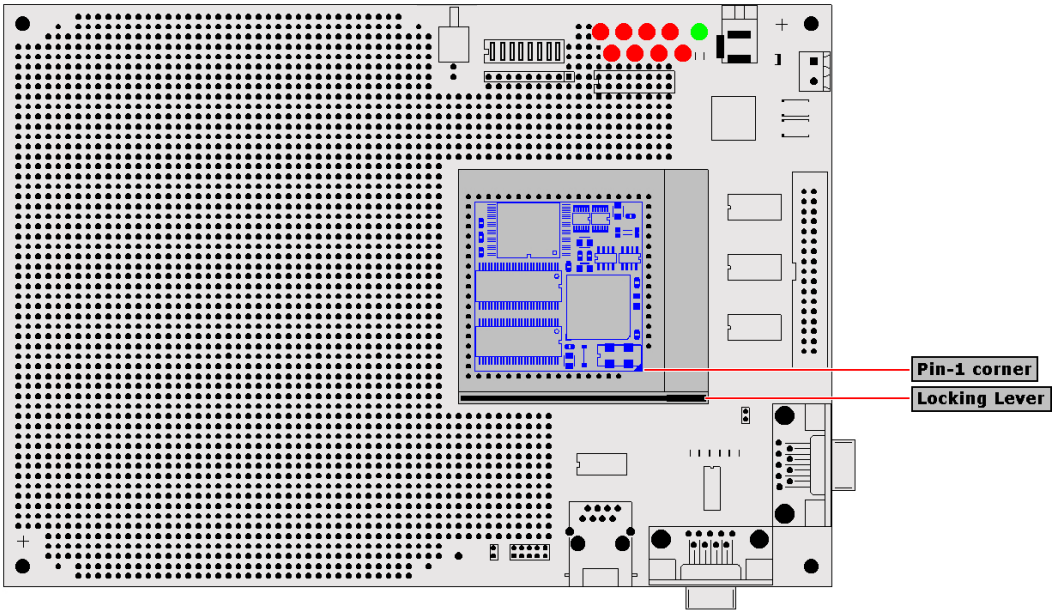


Figure 3: Position of the DIL/NetPC on the Evaluation Board

4.2 Cable Connections

Before you can use your DIL/NetPC Starter Kit you need a further Desktop- or Notebook-PC, which acts as development system. This development system should run under MS-Windows or Linux in an ideal manner. Between the development system and the Starter Kit are two connections required. At first the **RS232 Serial Link** and at second the **Ethernet Link**. The PC will act as development system and as **Remote Console Monitor (RCM)** for the PNP/1110 on the Evaluation Board.

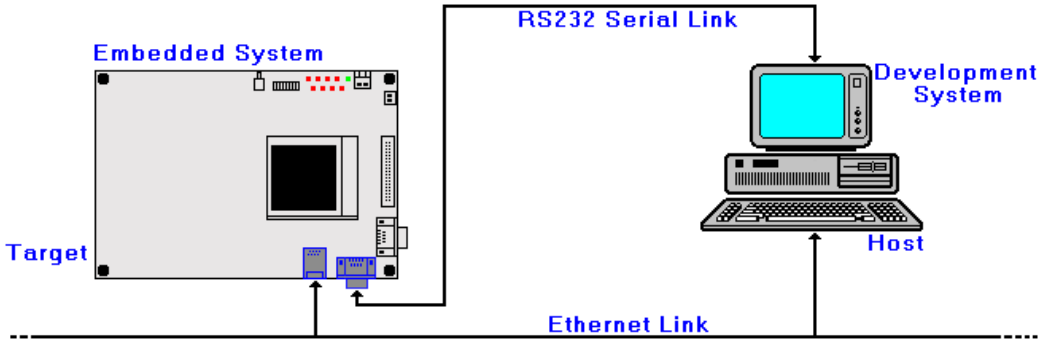


Figure 4: Overview about the required cable Connections

4.2.1 Serial Link

For the Serial Link, you need a Null-Modemcable. This cable comes along with your Starter Kit. Please connect the Evaluation Board with the COM1 port of your development system by using this cable.

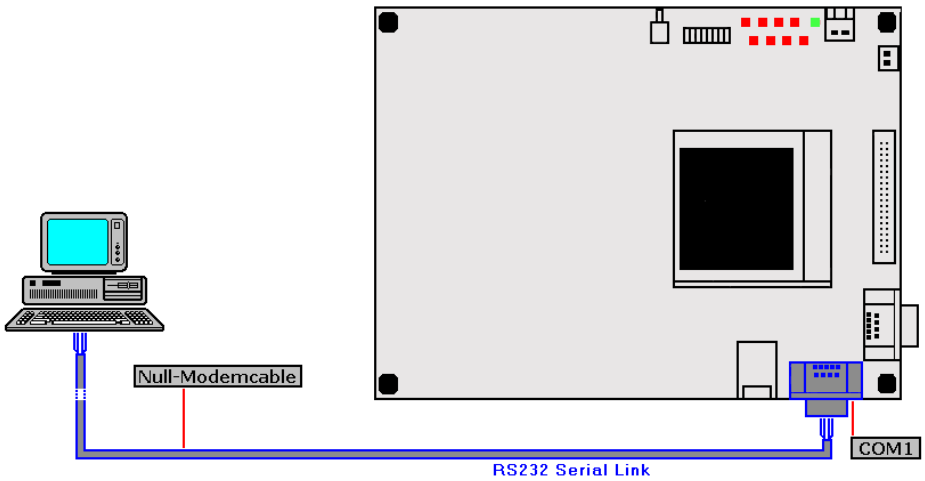


Figure 5: Serial Link Connection

4.2.2 Ethernet Link

The Ethernet Link requires two standard 10Base-T patch cables, one Hub or Switch and an Ethernet-LAN interface for your development system.

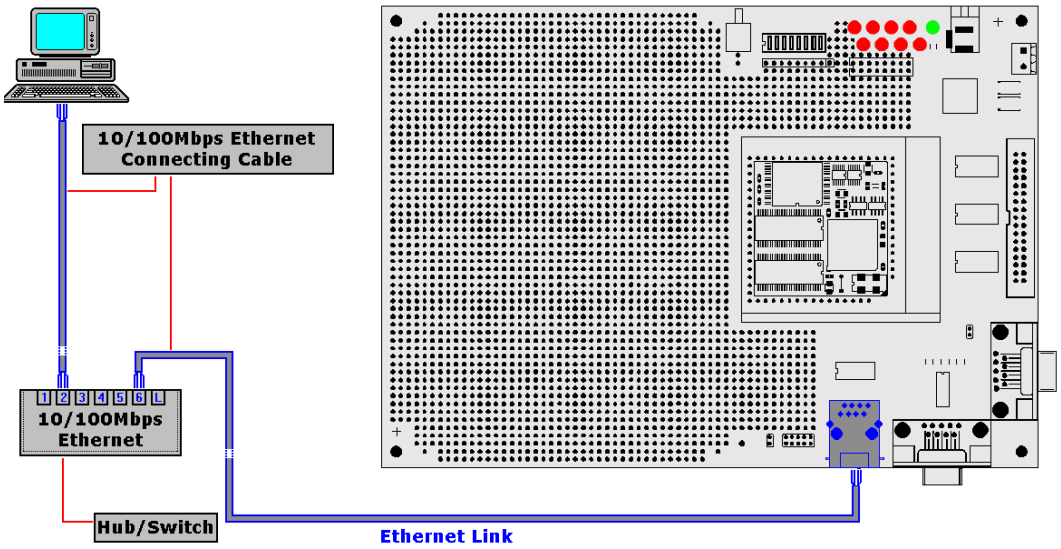


Figure 6: Ethernet Link Connection

4.2.3 Power Supply

The PNP/1110 Starter Kit needs a supply voltage of 5VDC to work. In your Starter Kit package you will find a plug-in power supply unit to provide system and LC-Display with the necessary power. After the connection of all cables the Starter Kit is ready to run.

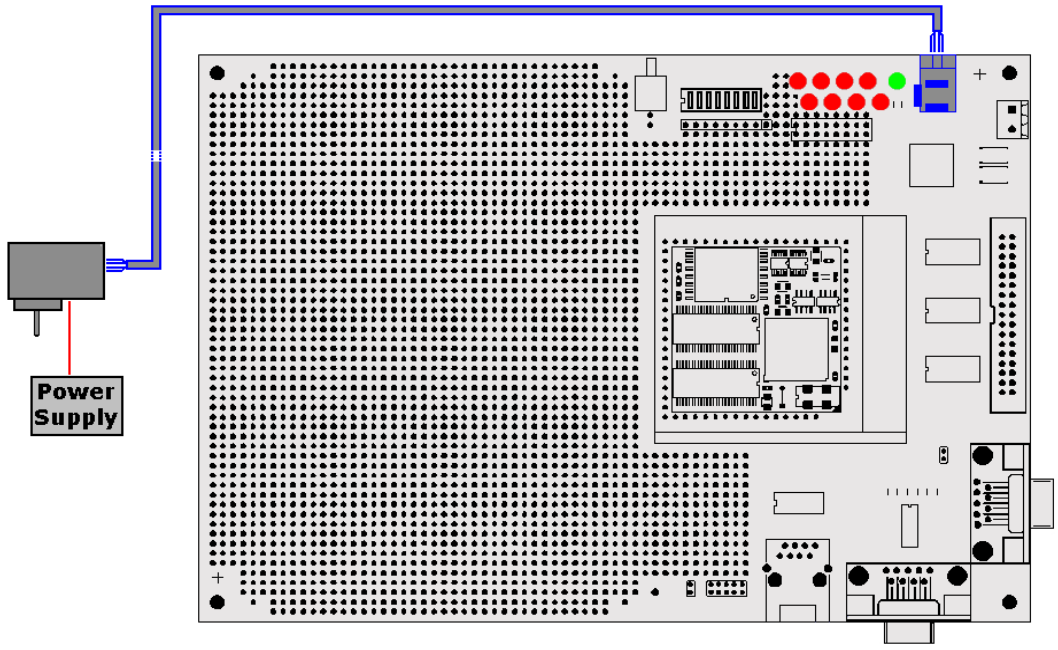


Figure 7: Power supply Connection

4.2.4 LC-Display

The Evaluation Board is ready to be connected with an LC-Display up to 800x600-pixel for the use of embedded GUI applications. To connect such a LC-Display to your system you have to disconnect power from your system.

One side of the CFL power cable should be connected with the supplied backlight converter (Inverter). After this, connect the two CFL backlight lamp cables from the LC-Display with the designated connectors on the backlight converter.

Now plug one side of the LC-Display interface cable into the LCD connector on on the backside of the LC-Display. Connect the other side of the cable with the LCD connector (J6) on the Evaluation Board. Make sure, that you have the pin-1 side of the cable matched with the pin-1 side of the connectors.

Then connect the other end of the CFL power cable with the CFL connector (J7) on the Evaluation Board. Please take notice about the correct polarization. The yellow/orange pair of the wires is +, the brown/red pair is –.

Within the first seconds after power-up the LCD controller output lines are in an undefined state. If you see some lines on the display this is no error. Please wait a few seconds and the picture will turn up.

Note: The CFL connector only provides power for 5V backlight converter. Do not connect any other converter to this connector. Otherwise the system may be damaged. The LCD connector provides 3.3V/600mA to the LC-Display. The default resolution of the Starter Kit LC-Display is set to 640x480x16 bit but the Software image inside the PNP/1110 is also prepared to support some different resolutions and colors. You can change the settings for resolution and color by using the DIP-switches on the Evaluation Board. For the exact settings see Appendix 4: DIP-Switch Settings. To use other displays or resolutions as described, please contact SSV Embedded Systems.

Do not touch the CFL backlight converter (Inverter) when there is power on the system. There is high voltage on the converter unit.

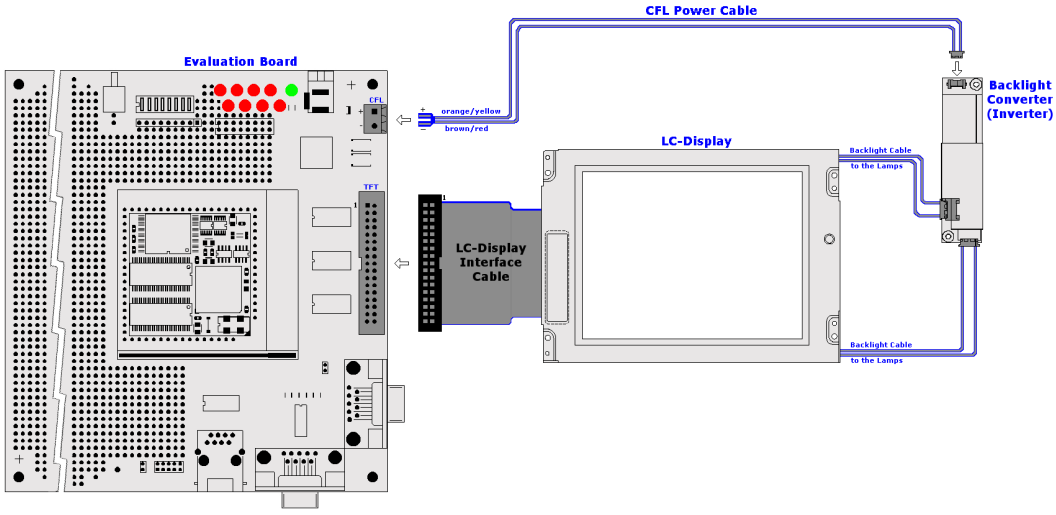


Figure 8: LC-Display Connection

5. First Steps

You can use the PNP/1110 Starter Kit from your development system. This development system may run under different operating systems. The first steps for getting started we describe exemplary by the two most popular operating systems – MS-Windows and Linux.

5.1 Using a Windows–based development System

The following paragraphs will help you to use the PNP/1110 with a development system running under MS-Windows. For these steps some programs are necessary, which normally come along with every MS-Windows installation (e.g. HyperTerminal). Please make sure that these programs are present on your development system. If these programs are not installed at your development system – you have to install these programs manually from your MS-Windows installation CD-ROM.

5.1.1 Setup the Serial Link

Before you provide the Evaluation Board with power for the first time, please run a terminal program – for example Windows HyperTerminal – that offers communication capabilities on your development system. In the following you will see the necessary settings for HyperTerminal under Windows. Select the "direct link cable connection via COM1" interface in the property sheet and choose "Configure".

Figure 9: Interface property Sheet

Now you can change some configuration parameters – such as the maximum baud rate – on a further property sheet. Select the value "115.200" in the "Bits per Second" field and close the property sheet by clicking the "OK" button, as shown in figure 10.

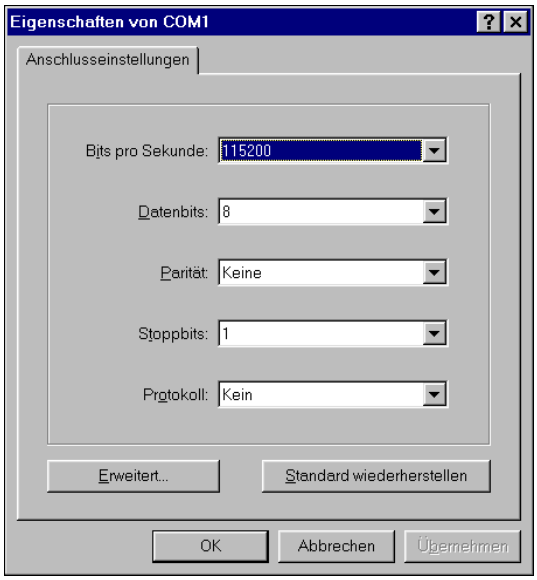


Figure 10: Baud rate Settings

All these settings can also be used for other terminal programs. The following parameters are important to use:

- Connection Speed 115.200 bps (Bits per Second)
- 8 Data bits
- No Parity bit
- 1 Stop bit
- No Protocol (Xon/Xoff, RTS/CTS or similar).

Now turn on the power for the Evaluation Board and you will see all steps of the PNP/1110 boot process in the terminal program window at your PC.

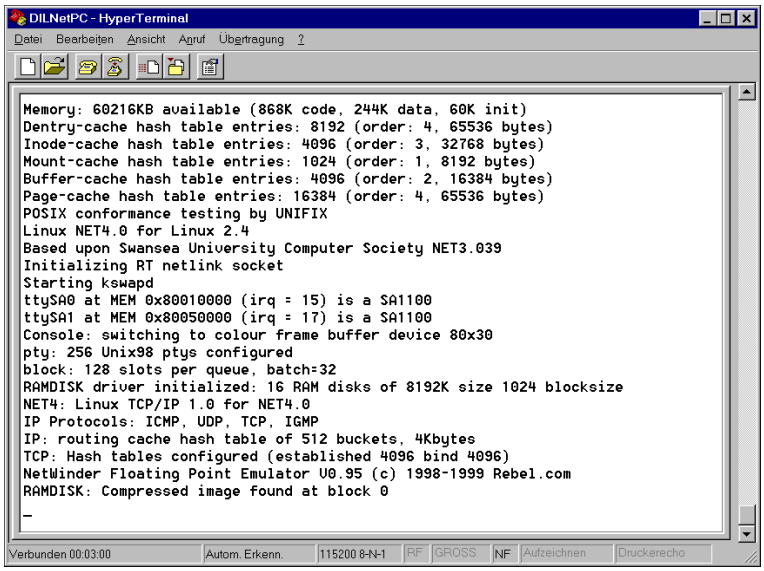


Figure 11: DIL/NetPC boot Process

For a first test of the PNP/1110 you have to change the assigned IP-address of your development system to "192.168.0.1". To change the IP-address under MS-Windows just click "Start→Settings→Control Panel→Network→TCP/IP" and enter the new IP-address. Please make sure, that you don't use another IP-address – this will lead to different network problems.

5.1.2 Checking the Ethernet Link

To test the TCP/IP-communication we use **PING** a very popular TCP/IP-utility program. Please open a DOS window (you can find it in the Windows Start menu) and enter:

ping 192.168.0.126.

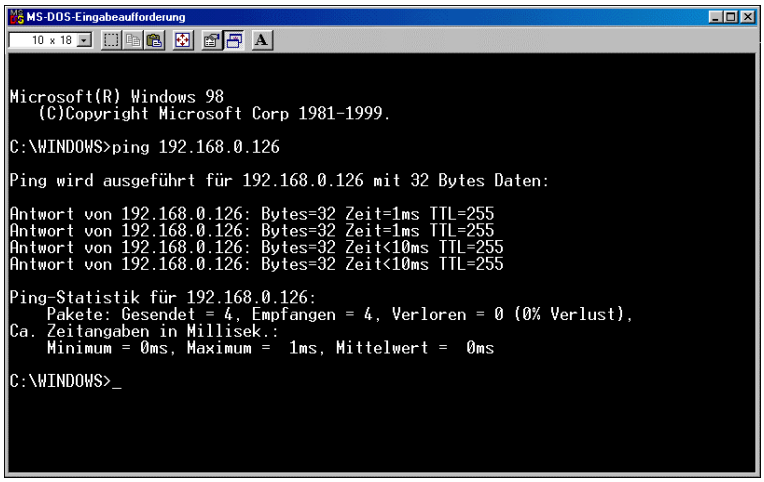


Figure 12: Communication check via PING

The Starter Kit must answer this ping. Otherwise an error will occur. In this case you have to check all parts of your LAN-connection, including the IP-address of the development system. Then you should find out if the IP-address is set correctly to the value "192.168.0.1". For an easy check of the IP-address, you can use the following DOS-command:

Ipconfig

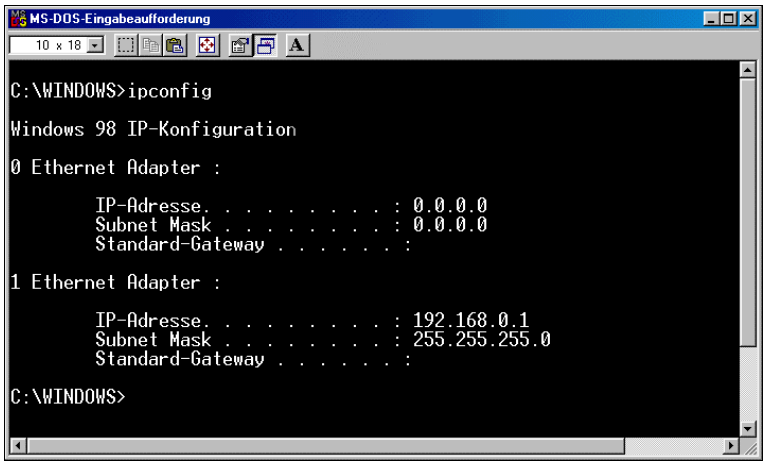


Figure 13: Communication check via ipconfig command

Once the ping was successful, you are ready to start a Web browser on your development PC. This browser can be the Microsoft Internet Explorer or another suitable Web browser like the Netscape Communicator or Opera or similar.

5.1.3 Web Server Access

Open the URL ***http://192.168.0.126/index.htm***. The Embedded Web Server will deliver you a small description about the PNP/1110. That's it. Now you are online with the Starter Kit and your Web browser is connected to the Embedded Web Server of the PNP/1110. It shows you a static web page with some pictures.

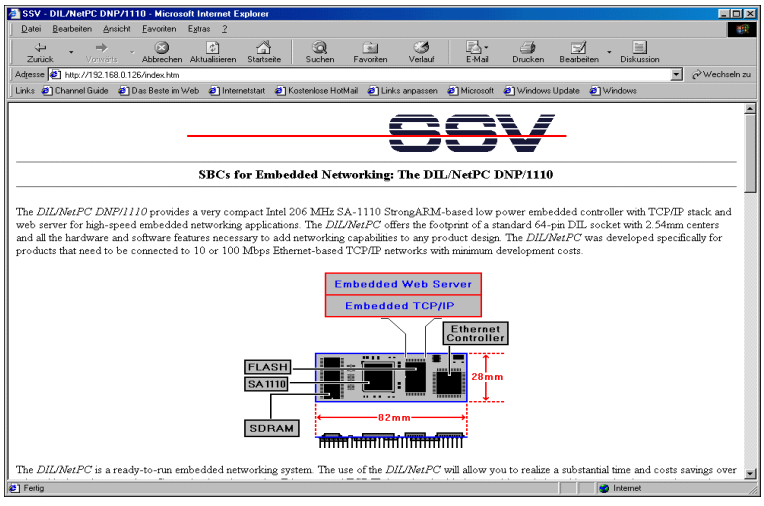


Figure 14: Web page shown by the MS-Internet Explorer

If your Web browser can't establish a connection to the Web Server – but the Ping was successful – you should check your browser settings. Please ensure, that your browser is joined with TCP/IP by using the Ethernet card in your development system. Alternatively you have to install a suitable Web browser.

In some cases the Web browser is only configured for modem based Internet access. In this case, please install a second Web browser from your original operating system CD-ROM.

5.1.4 Login via Serial Console

With a development system running under MS-Windows you can gain access onto the PNP/1110 via HyperTerminal by using the username ***gast***. There is no specific password needed. On the point where the password is expected simply press the ***Enter*** (Return) key. Your system is now ready to execute arbitrary commands.

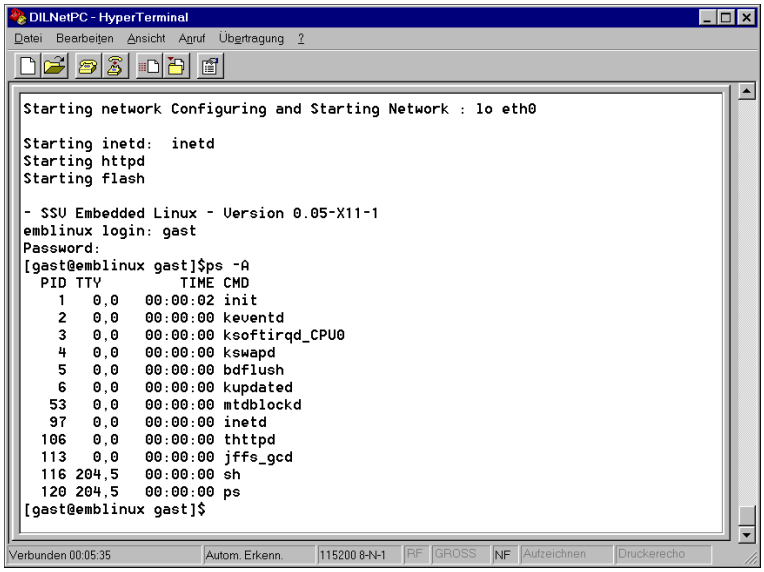


Figure 15: Login procedure via HyperTerminal

5.1.5 Login via Telnet

You are now able to start a Telnet client on the development system. Open a command shell and enter the following command:

telnet 192.168.0.126

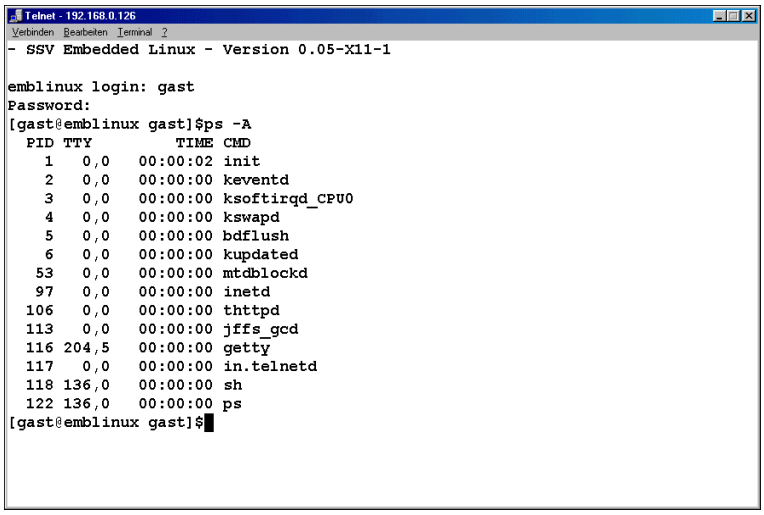


Figure 16: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your PNP/1110 as parameter to the client.

5.1.6 File Transfer via FTP

The **File Transfer Protocol (FTP)** provides a common approach to transfer files between clients and servers. FTP is a client/server protocol like Telnet. The FTP client/server capability is build into most Windows versions. An FTP session begins when the client builds a TCP/IP connection to the server. Once this connection is established, the client will log on to this server. In our actual case your development system acts as client and the PNP/1110 operates as server. After the successful access onto the server you are able to execute various file transfer commands, which typically concern the navigation through the FTP server's directory structure and send or receive files. In the following an example of an FTP session is shown.

To use the File Transfer Protocol on your system, please open a DOS window (via the Windows Start menu) and branch into the desired subdirectory. Now enter ***FTP 192.168.0.126*** and open an FTP connection between client and server. The system will now ask you for a username. To answer this request please enter ***gast*** and confirm the expected password with simply pressing the ***Enter***-key. At this point there is no specific password required. On figure 16 you see the described user inputs in form of highlighted text.

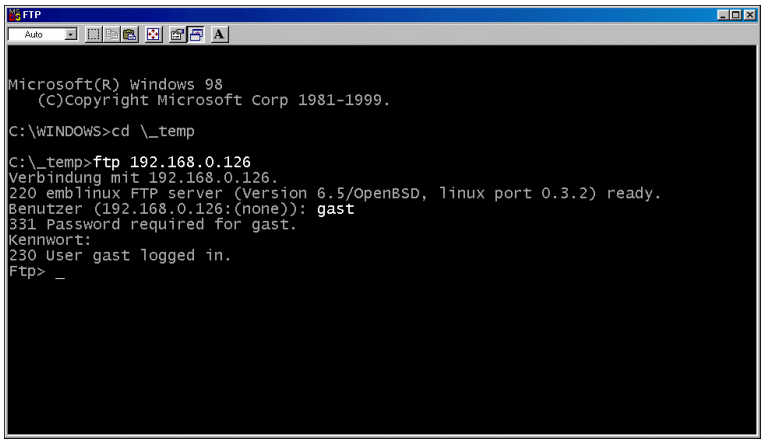


Figure 17: Login procedure via FTP

Now you are ready to transfer a file from your Windows-based development system to the PNP/1110. Before you can transfer a file via FTP you should check, that the FTP link is set correctly to the binary operation mode via the ***binary*** command. In some cases the default setting is ASCII. With the ***pwd*** command you can check out the name of the remote directory. Please note, that the Read/Write access is only allowed for the directory ***/home/gast***. To transfer a file from your development system to the PNP/1110 use the command:

put filename.

For a first view on the content of a directory you should use ***ls –al***. This command shows you the files stored inside a specific directory. To terminate an FTP session use the command ***bye***. This will cancel every operation between client and server. Figure 18 shows you these operations.

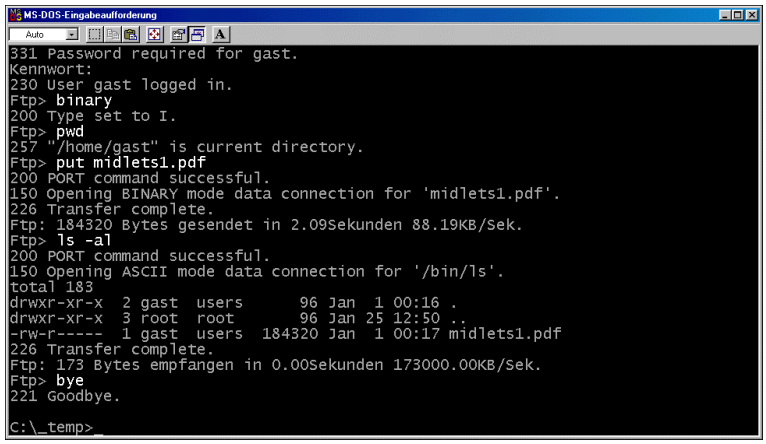


Figure 18: FTP file transfer under DOS

In some Windows versions the Internet Explorer is able to act as FTP client just like an Internet browser. To transfer files by using the Internet Explorer enter ***ftp://gast@192.168.0.126*** as URL into the address bar. Moreover open the Windows Explorer as second file destination. Now you can transfer your desired files very easy by using drag and drop between these two windows. Simply drag the selected file(s) from the Windows Explorer into the Internet Explorer window and drop it down into the chosen directory.

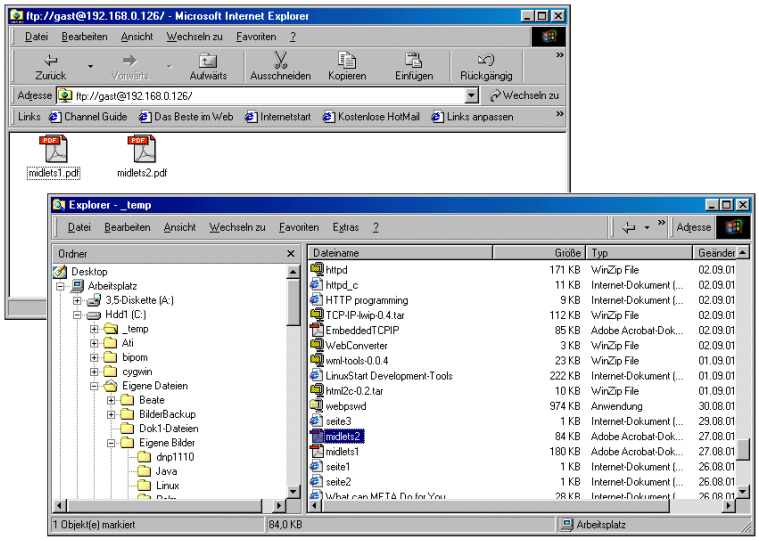


Figure 19: File transfer with the Internet Explorer

5.1.7 Embedded Linux Maintenance

The Embedded Linux of the PNP/1110 consists of two basic parts. At first the file *zimage* as Linux-kernel and second the root filesystem in form of the file *rimage.gz*. Each component exists as a separate file. You can find the file *rimage.gz* on the DIL/NetPC Starterkit CD-ROM under the location ***\Linux\PNP1110-Flash\2.4.18\Rel1\rimage.gz***. The file *zimage* is placed in the directory ***\Linux\PNP1110-Flash\2.4.18\Rel1\zimage.***

For updates or the newest versions of these files please check out our website at: *http://www.dilnetpc.com*

5.1.8 Embedded Linux Maintenance via HyperTerminal/Serial Link

The PNP/1110 offers the capability to upload a Linux binary image, to save it into the Flash memory and to reboot the system after a successful receive. Please open a HyperTerminal window and reboot the PNP/1110. Now you have to start up the Flash Loader. For this you have to press ***CTRL+L*** during the boot procedure. Figure 20 shows the BIOS report sequence.

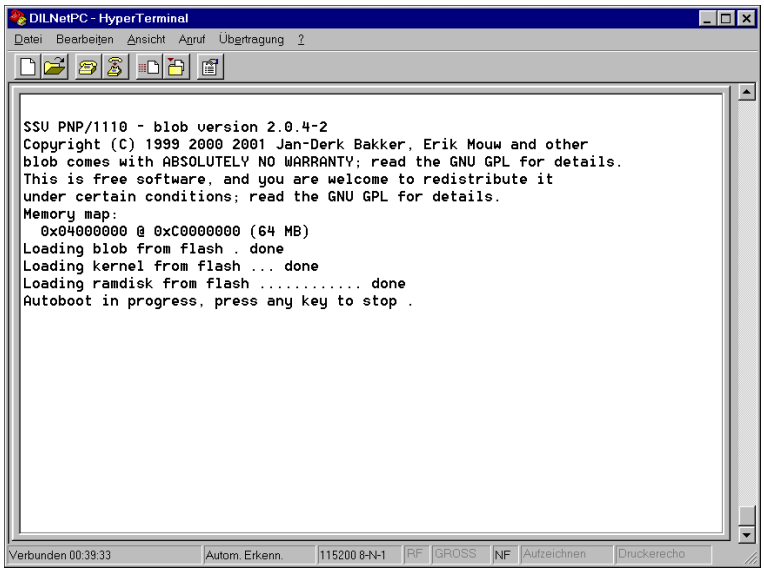


Figure 20: Boot Procedure

Once the BIOS detect the CTRL+L the Flash Loader starts and offers three options (see Figure 21). Please choose option "1" to transfer data via "YMODEM PROTOCOL". Once you have pressed the key "1" the Flash Loader is set in a wait state until a file for transfering is selected in the appearing window. During this status the Flash Loader is continously sending the letter "C" to the console as you can see in Figure 21. With this sign the YMODEM synchronizes the beginning of a file transmission.

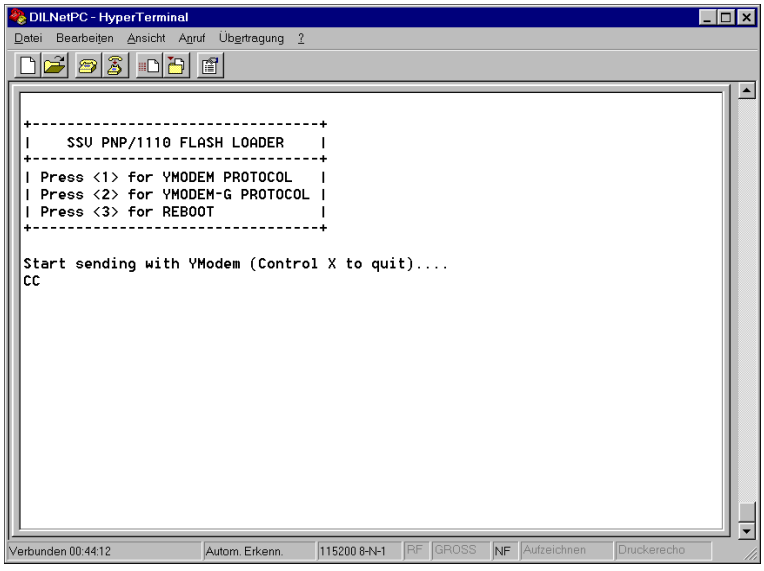


Figure 21: Flash Loader Messages

Now select the desired file (*rimage.gz* or *zimage*) in the appearing window and start the transmition with YMODEM.

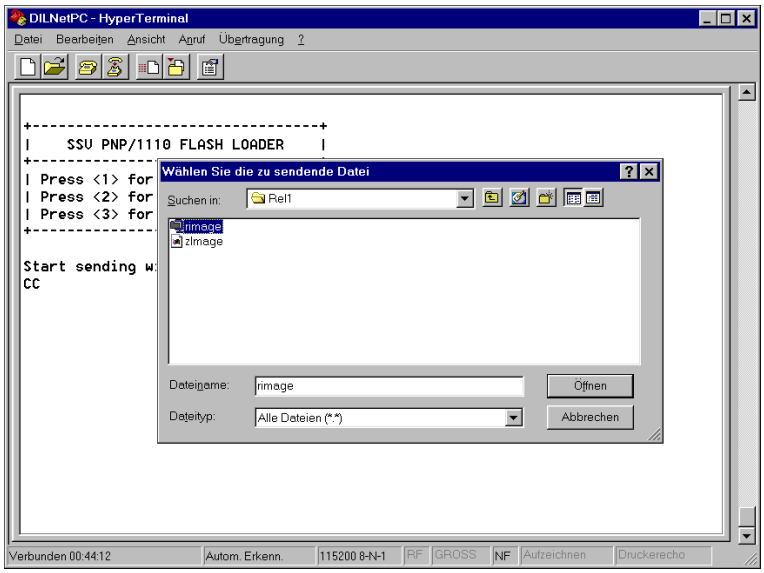


Figure 22: Flash Loader file Select

During the download you will see a progress bar that indicates the state of transmission. Please wait absolutely until the file transmission ends and avoid interruptions. In case of interruption or failure the PNP/1110 would not contain any bootable system and you have to repeat the transmission procedure. After the end of transmission the Flash Loader returns into the menu and continues sending the "C" sign. To reboot the PNP/1110 with the new kernel and/or root filesystem choose option "3" (REBOOT) from the Flash Loader menu.

5.2 Using a Linux–based development System

The following paragraphs will help you to use the PNP/1110 with a development system running under Linux. For this steps are some programs necessary, which normally come along with the Linux installation (i.e. Minicom). Please make sure that these programs are present on your development system. If necessary you have to install these programs from your Linux installation CD.

5.2.1 Setup the Serial Link

Before you provide the Evaluation Board with power for the first time, please run a terminal program like **Minicom**. Minicom is a simple serial communication program originally written by Miquel van Smoorenburg. It offers basic communication capabilities and integrates well with the Linux user interface. Minicom is a lot like the old MS-DOS program PROCOMM. This program can be used to connect a Linux-based PC to embedded devices such as the PNP/1110 for initial configurations. In the following we will show you how to use Minicom and what you have to do to adjust the necessary settings.

Open a terminal window and type in the command ***minicom -s*** to get access to the serial port settings. Now you can change some configuration parameters – such as the maximum baud rate. Set the serial port parameters for the maximum baud rate on "115.200 bps".

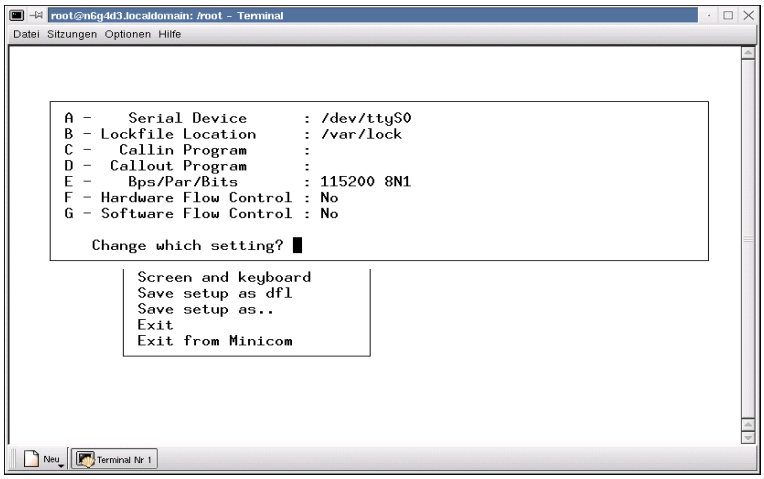


Figure 23: Serial Port Settings under Minicom

After that, please turn on the power for the Evaluation Board. You will now see all steps of the PNP/1110 boot process via Minicom.

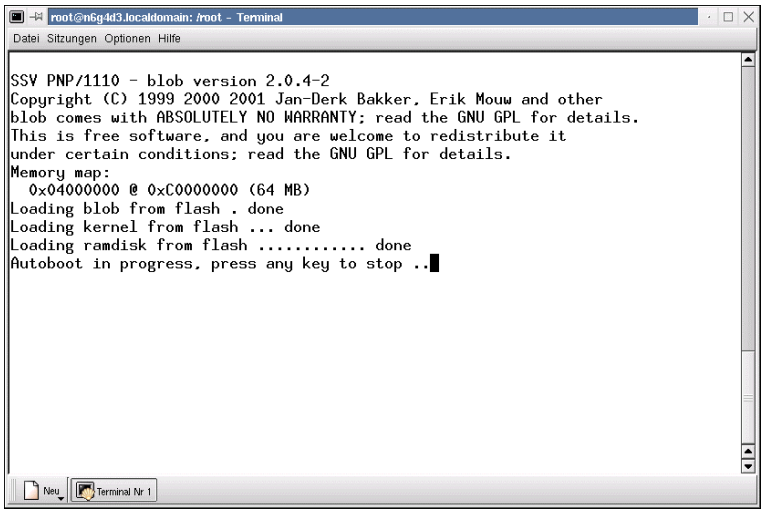


Figure 24: Boot Procedure

To the end of this sequence a login request will appear. The boot process of the PNP/1110 is now complete.

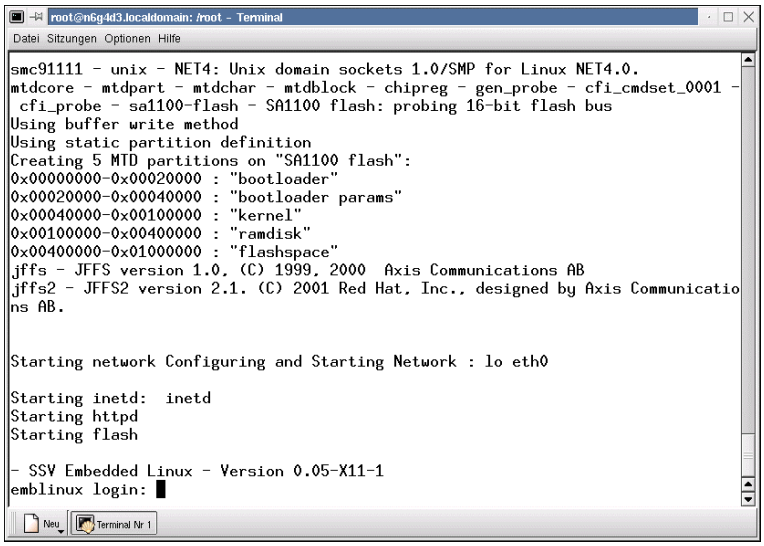


Figure 25: Login Request

5.2.2 Checking the Ethernet Link

Please open a terminal window and type in ***ping 192.168.0.126***. Every ping request has to be answered by your PNP/1110 similar as shown in figure 26.

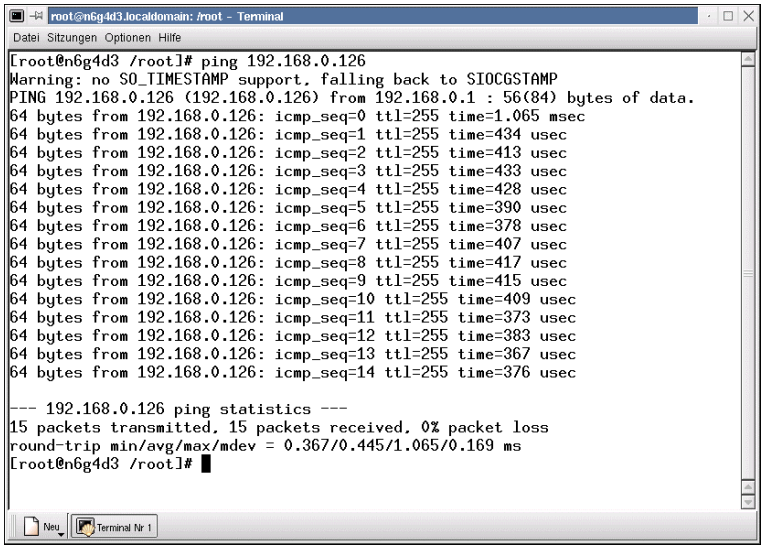


Figure 26: Ping Request

To cancel the ping request just press the keyboard shortcut ***Ctrl+C***. If an error occurs (e.g. the PNP/1110 don't answer the ping of your development system) you have to check your cable connections at first.

Then you should check if the IP-address is set correctly to "192.168.0.1". For an easy check of the IP-address, you can use the Linux-command ***ifconfig***.

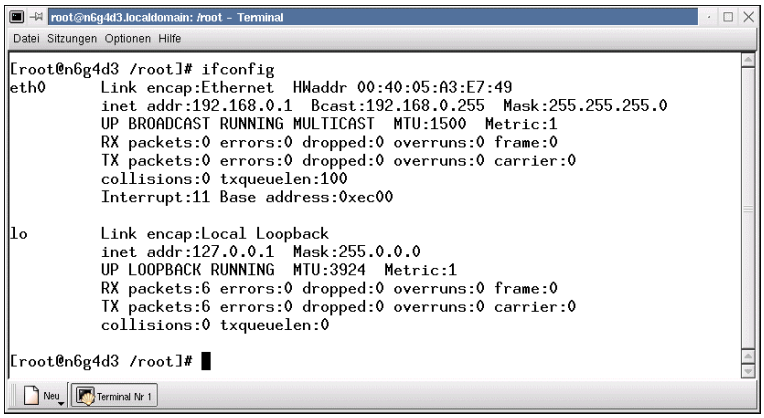


Figure 27: IP-address check via ifconfig

5.2.3 Web Server Access

Once the ping was successful, you are ready to start a Web browser on your development system. This may be the Konqueror File Manager or the Netscape Communicator/Navigator. The Konqueror File Manager is normally part of the Linux installation and acts as File Manager as well as Web browser. Konqueror is able to detect automaticaly when an URL were entered and shows the content.

Just enter the URL ***http://192.168.0.126/index.htm*** and press the ***Enter***-key. The Embedded Web Server will deliver you a small description about the PNP/1110.

That's it. You are now online with the Starter Kit. The Web browser of your development system is connected to the Embedded Web Server of the PNP/1110 and shows you a static web page with some pictures. Figure 28 will show this.

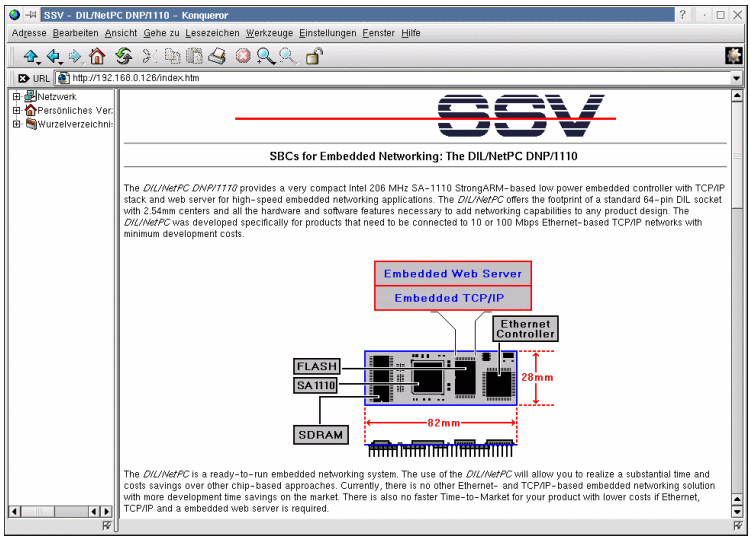


Figure 28: Web page shown by the Konqueror File Manager

5.2.4 Login via Serial Console

Under Linux you can gain access onto the PNP/1110 via Minicom by using the username ***gast***. A specific password is not necessary. At this point simply press the ***Enter*** (Return) key. Your system is now ready to execute arbitrary Linux commands.

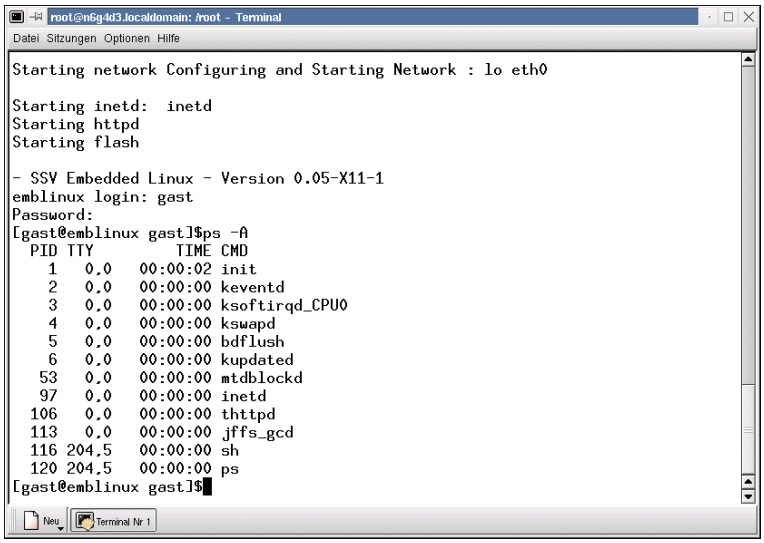


Figure 29: Login procedure via Minicom

5.2.5 Login via Telnet

You are now able to start a telnet client on the development system. Open a Minicom command shell and enter the following command:

telnet 192.168.0.126

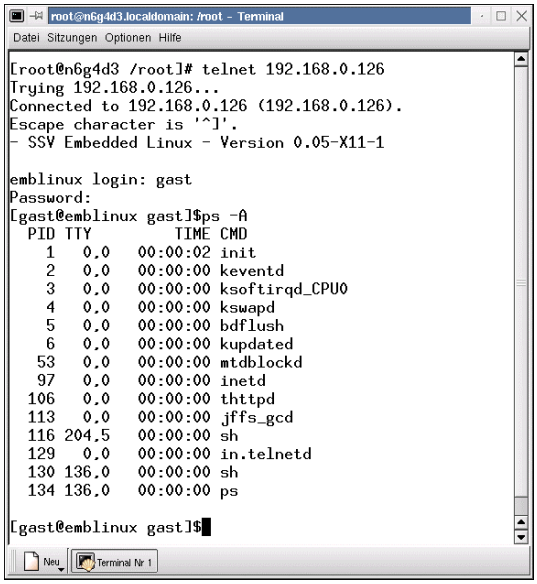


Figure 30: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your PNP/1110 as parameter to the client.

5.2.6 File Transfer via FTP

The **File Transfer Protocol** (FTP) provides a common approach to transfer files between clients and servers. FTP is a client/server protocol like Telnet. An FTP session begins when the client builds a TCP/IP connection to the server. Once this connection is established, the client will log on to this server. In our actual case your development system acts as client and the PNP/1110 operates as server. After the successful access onto the server you are able to execute various file transfer commands, which typically involves navigating the FTP server's directory structure and send or receive files. In the following an example of an FTP Session is shown. The FTP client/server capability is already build into the Konqueror.

To use the File Transfer Protocol on your Linux system please open a command shell, like Minicom and branch into the desired subdirectory. Now enter ***FTP 192.168.0.126*** and open an FTP connection between client and server. The system will now ask you for a username. To answer this request please enter ***gast*** and confirm the expected password with pressing ***Enter***. At this point there is no specific password required. On figure 31 you see the user inputs as highlighted text.

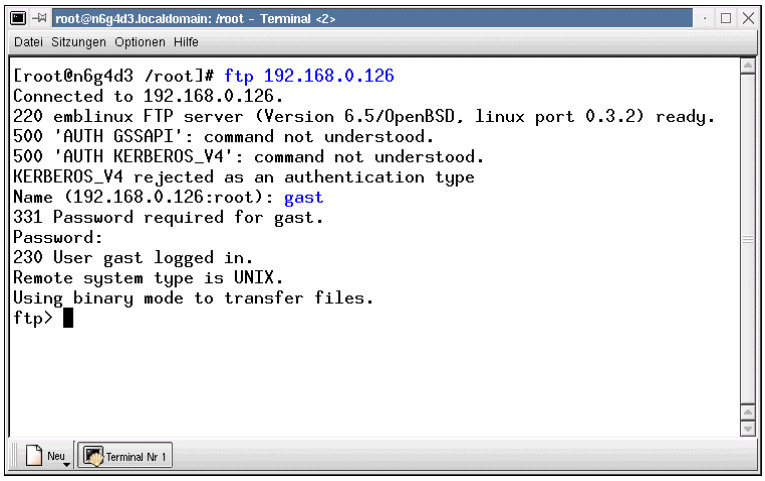


Figure 31: Login procedure via FTP

Now you are ready to transfer a file from a Linux-based development system to the PNP/1110. Before you can transfer a file with FTP you should check, that the FTP link mode is correctly set to the binary operation mode via the ***binary*** command. In some cases the default setting is ASCII. With the command ***pwd*** you can check out the name of the remote directory. The Read/Write access is only allowed for the directory ***/home/gast***. To transfer a file from your development system to the PNP/1110 use ***put filename*** to transfer the desired file.

For a first view on the content of a directory you should use ***ls –al***. This command shows you the files stored inside a specific directory. To terminate an FTP session use the command ***bye***.

This command cancels every operation between server and client. Figure 32 shows you these operations.

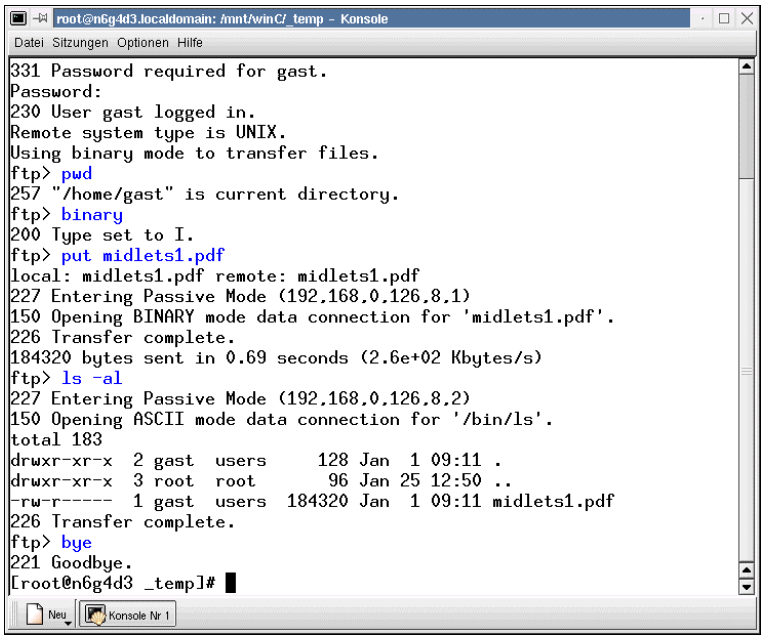


Figure 32: File transfer with Minicom

Next to Minicom it is also possible to use the Konqueror File Manager to transfer files by FTP. For this, please open Konqueror and enter ***ftp://gast@192.168.0.126*** as URL into the address bar. The Konqueror knows the difference between your system directories and folders (\\) and an Internet or intranet address (//). So you can simply type in the desired address. Open a second instance of Konqueror and change into the desired source directory. After that, you are able to transfer arbitrary files very easy by using drag and drop between these two Konqueror windows.

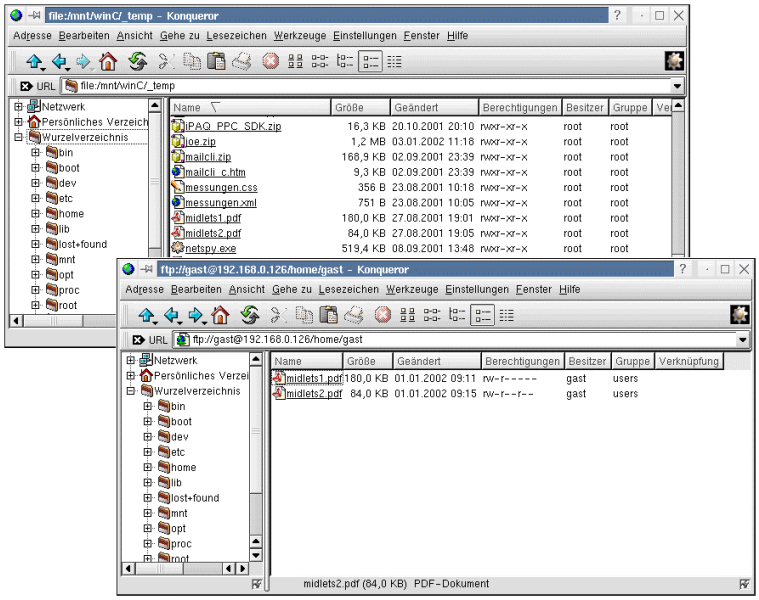


Figure 33: File transfer with the Konqueror

5.2.7 Embedded Linux Maintenance

The Embedded Linux of the PNP/1110 consists of two basic parts. At first the file *zimage* as Linux-kernel and second the root filesystem in form of the file *rimage.gz*. Each of the both components exists as one separate file. You can find the file *rimage.gz* on the DIL/NetPC Starterkit CD-ROM under the location ***\Linux\PNP1110-Flash\2.4.18\Rel1\rimage.gz***. The file *zimage* is placed in the direcory ***\Linux\PNP1110-Flash\2.4.18\Rel1\zimage.***

For updates or the newest versions of these files please check out our website at: *http://www.dilnetpc.com*

5.2.8 Embedded Linux Maintenance via Minicom/Serial Link

The PNP/1110 offers the capability to upload a Linux binary image, to save it into the Flash memory and to reboot the system after a successful receive. Please open a Minicom window and reboot the PNP/1110. Now you have to invoke the Flash Loader. For this press ***CTRL+L*** during the boot procedure. Figure 34 shows the BIOS report sequence.

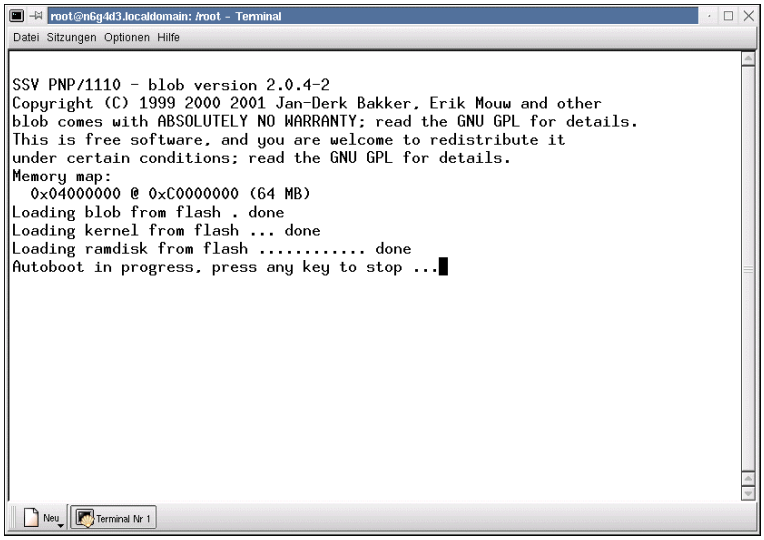


Figure 34: Boot Procedure

Once the BIOS detect the CTRL+L the Flash Loader invokes and offers three options (see figure 35).

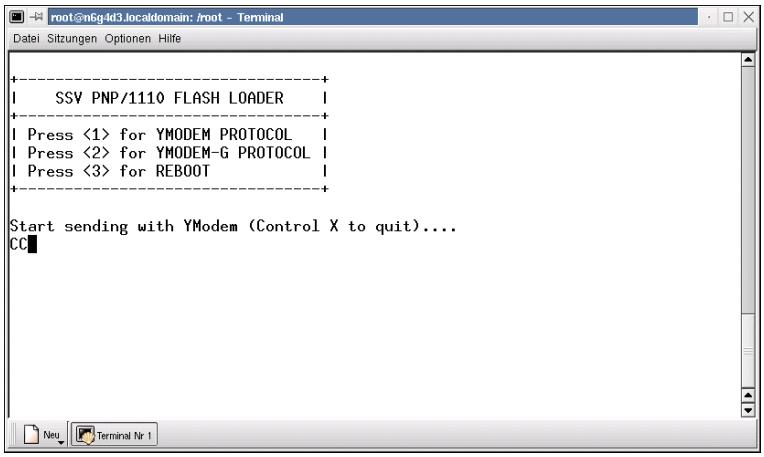


Figure 35: Flash Loader Messages

Please choose option "1" to transfer data via "YMODEM PROTOCOL". Once you have pressed the key "1" the Flash Loader is set in a wait state. During this status the Flash Loader is continously sending the letter "C" to the console as you can see in figure 35. With this sign the YMODEM synchronize the beginning of a file transmission.

Open the Minicom upload menu with the key combination ***ALT+S***. Now you see five options to transmit data. On this point you have absolutely to choose the option "zmodem".

The reason to do this although you normally would choose ymodem is a little bug in Minicom, so here you have to select zmodem absolutely. Choosing "ymodem" may result in different error messages.

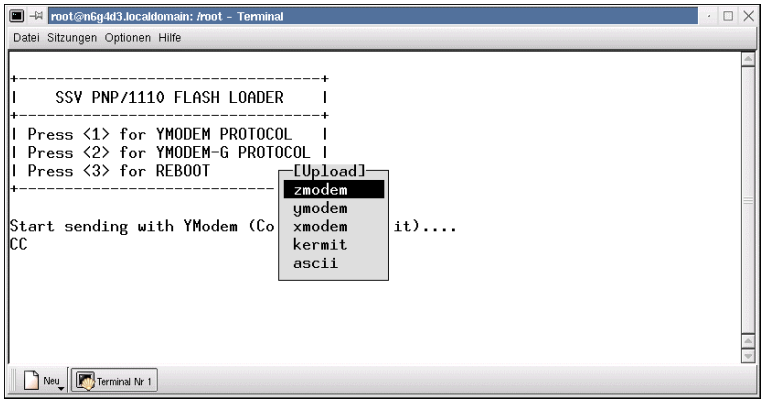


Figure 36: Transfer method Select

After you have chosen the transmission method Minicom opens a new window. Now select the desired file (*rimage.gz* or *zimage*) and start the transmission.

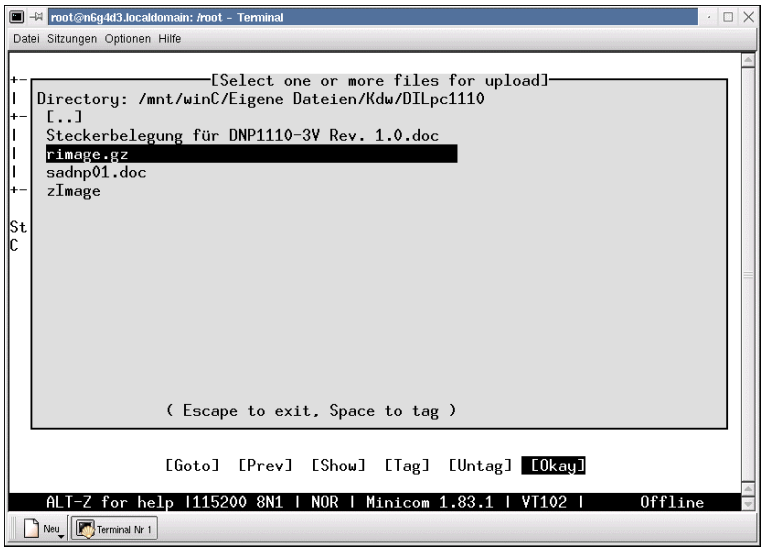


Figure 37: Transmission file Select

During the download you will see a progress bar that indicates the transmission status. Please wait absolutely until the file transmission ends and avoid every interruption. In case of an interruption or failure the PNP/1110 would not contain any bootable system and you have to repeat the transmission procedure.

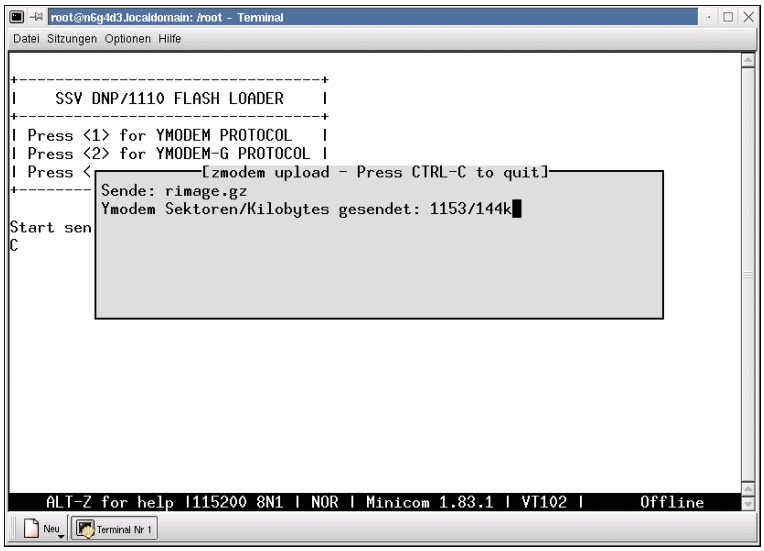


Figure 38: Transmission Status

After a successful transmission the FLASH Loader returns into the menu and continues with sending the letter "C". To reboot the PNP/1110 with the new kernel and/or root filesystem choose option "3" (REBOOT) from the Flash Loader menu. After this, the PNP/1110 restarts with the new kernel and/or root filesystem.

5.2.9 Installation of the GNU Cross Toolchain

Within the scope of supply of the PNP/1110 Starter Kit we deliver a full pre-build GNU cross toolchain as development environment. With this cross development environment you are able to create the necessary code for the PNP/1110 with StrongARM architecture although you work on an x86 Linux-based development system. The complete cross development environment exists in form of a single tar-archive on the Starter Kit CD-ROM. On figure 39 you can see the location of this tar-archive in the directory:

/Linux/PNP1110-ToolChain

This compressed archive has a size of approximately 85 MByte.

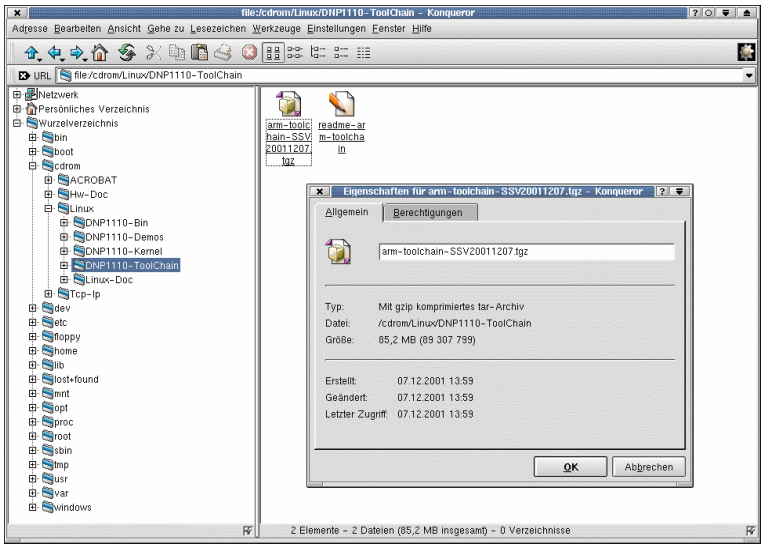


Figure 39: Location of the tar-archive on the Starter Kit CD-ROM

To install the toolchain archive on your Linux-based development system you have to be logged-in as Administrator with the respective rights. After this, you just have to unpack the entire tar-archive outgoing from the directory

/usr/local

To unpack these archive please execute the following Linux command line from a terminal window. You can see this also on figure 40:

tar –xzf /cdrom/Linux/PNP1110-ToolChain/arm-toolchain-SSV20020812.tgz

Instead of ***…/cdrom/…*** please use the correct path to your own CD-ROM drive. The Linux tar program needs some time to unpack all files from the CD-ROM to your hard disk.

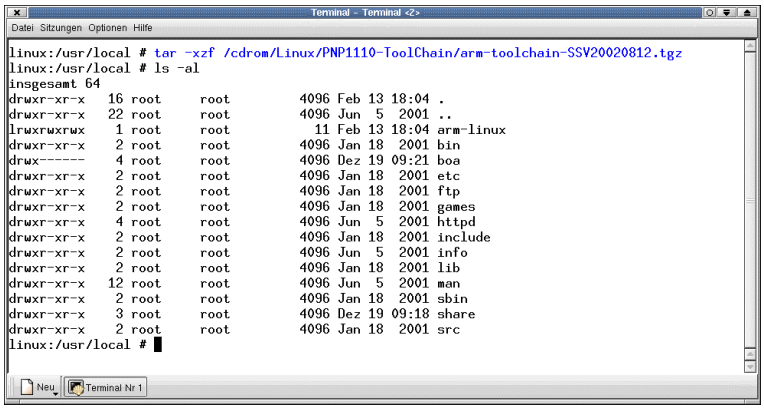


Figure 40: Unpacking the tar-Archive

For a first test of your new cross development environment you should save a simple C source code – like the *Hallo Welt* program shown in figure 41 – into a file within the directory ***/usr/local***. Under Linux you can do this directly via the command:

cat > filename

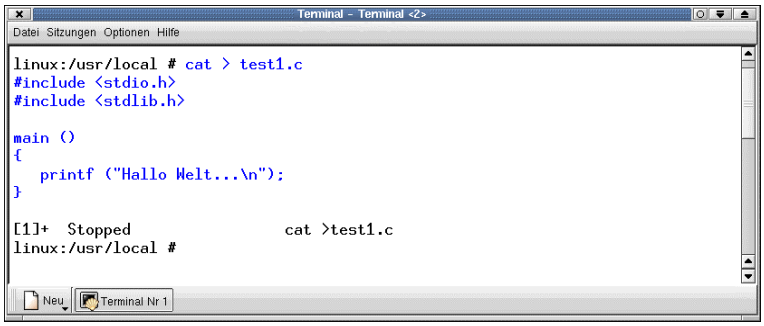


Figure 41: A simple C-Program

To complete the C source code input, please press the key combination ***CTRL+D***. If desired it is possible to check the file content by entering the command line:

cat test1.c

At next the GNU C cross compiler have to translate this C source code for the first time. During this translation process no error messages may occur. To build an executable binary file *test1* from *test1.c* use the following Linux command line from a terminal window:

/usr/local/arm/2.95.2/bin/arm-linux-gcc –o test1 test1.c

Figure 42 shows this command line.

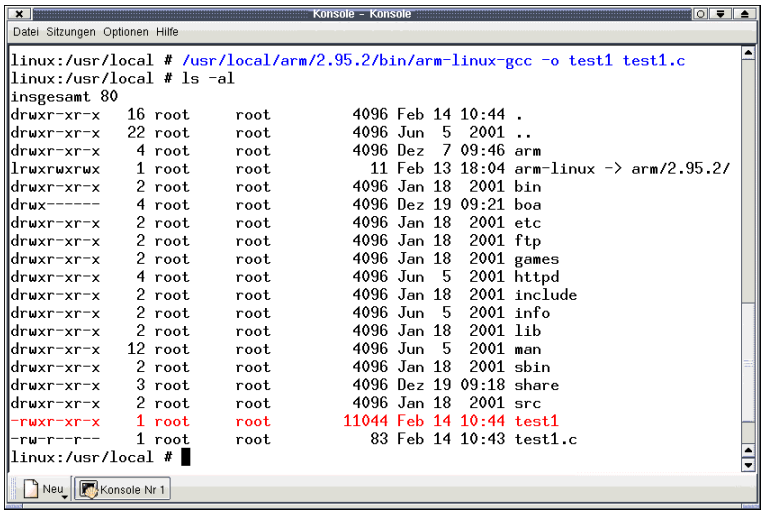


Figure 42: C-source code Compiling

After this, transfer the executable binary file from your development system to the PNP/1110 RAM disk within an FTP session. For this, enter the following command line within a terminal window and open an FTP connection between client and server:

ftp 192.168.0.126

The system asks now for a username. To answer this request please enter ***gast*** and confirm the expected password with pressing ***Enter***. At this point of time there is no specific password required.

To transfer the binary file test1 from your development system to the PNP/1110 use the command:

put test1

After the successful transfer you can terminate the FTP session with the command:

bye

This command will cancel every operation between client and server. On figure 42 you see the required user inputs as highlighted text.

At least run the new binary file on your PNP/1110. Open a Telnet session and start the program.

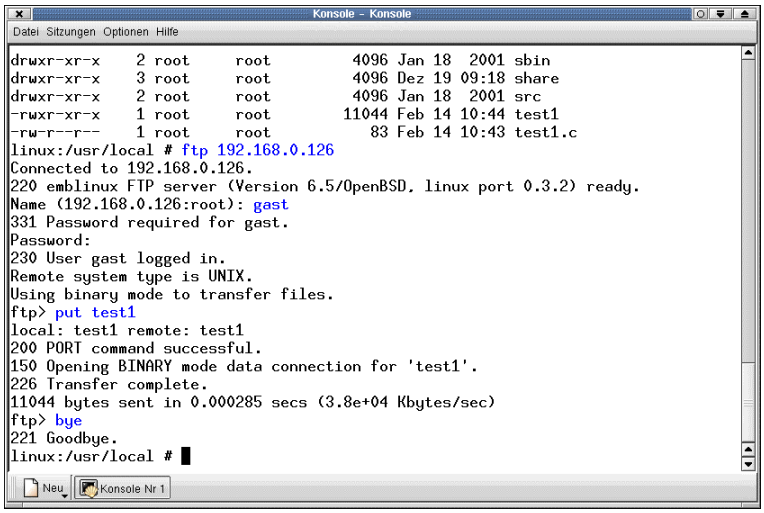


Figure 43: File transfer with FTP

Please note: During the FTP file transfer process the executable attribute of *test1* can get lost. Without this attribute it is not possible to execute this file. Some FTP clients watch the attributes. In this case you can skip the next step.

To restore the executable attribute (lost by the FTP transfer) enter the command line:

chmod +x test1

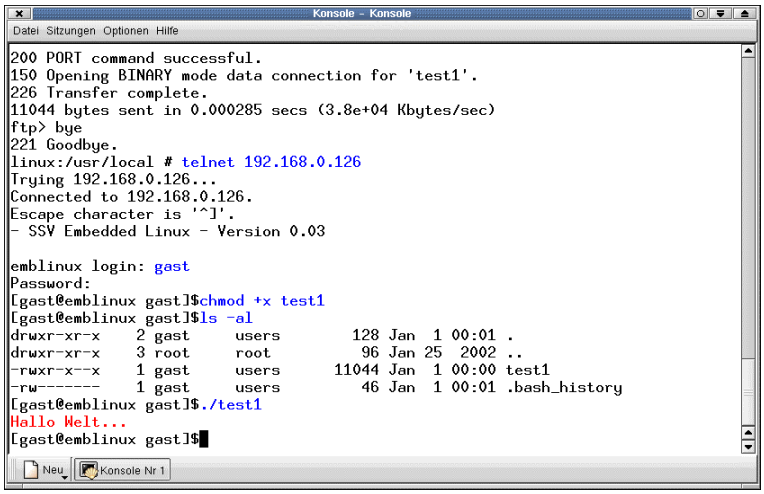


Figure 44: Telnet Session

After the executable attribute was reassigned you should check the correct status with the command ***ls –al***. Now you will see the content of the directory named gast. To execute the transfered and assembled file please type in:

. /test1

The file will now be executed and deliver the output "Hallo Welt…" to you.

For the assembling of a C-program the gcc will normally be activated by using a so-called makefile.

```
CROSS      = /usr/local/arm/2.95.2/bin/arm-linux-
CC         = $(CROSS)gcc
CFLAGS     = -Wall -O2 -march=armv4 -mtune=strongarm
LFLAGS     = -Wl,-s

$(PROJ):   $(PROJ).c Makefile
           $(CC) $(CFLAGS) $(PROJ).c -o $(PROJ) $(LFLAGS)
clean:
           rm -f $(PROJ)
```

All required parameters needed to create the desired binary file are stored in such a makefile.

6. Troubleshooting

This page shows problems that can be corrected by users. If a problem persists after trying these solutions, please contact SSV Embedded Systems.

Phenomenom	Probable Cause	Reference
No power to the system at all. Power light does not illuminate.	Power cable is unplugged	Make sure power cable is securely plugged in.
	Power supply failure.	Contact technical support.
	Defective power cable.	Contact technical support.
	Incorrect polarity.	Make sure polarity of the cable matched with polarity from connector.
Screen is blank.	No power to display.	Check the CFL power cable connect-ion to backlight converter and system. Check the connection between display and backlight converter.
	Display not connected to LCD connector.	Make sure display is connected to LCD connector.
Lines on the display.	No LCD power management.	No error. Picture will appear in a few seconds.
Wrong colors on display.	Wrong DIP-switch settings.	Check DIP-switch settings.
Missing lines on display	Defective LCD cable.	Check LCD cable.
No boot messages.	RCM jumper is not set.	Open RCM jumper will block all boot messages

7. Appendix

The Appendixes 1 to 4 give you more detailed informations about the signals on the individual connectors. Table cells marked with NC indicate signals, which may be not connected.

Appendix 1: Pin Assignment PNP/1110

The 169 pins of the PGA socket are associated to 17 lines and 17 columns. The individual lines are allocated to digits; letters localizes the columns.

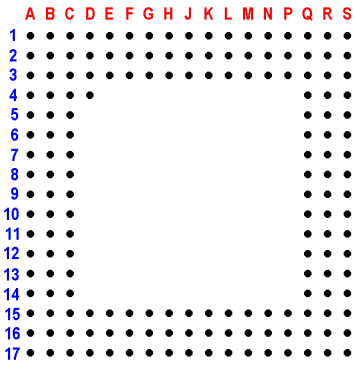


Figure 45: PNP/1110 Pin Side View

The tables 2-18 show the pinout of the PNP/1110 and the corresponding pins on the SA-1110. Please consider, that the notation of letters is not continuous. The letters „I“ and „O“ are not be provided.

Pin	Name	Function	SA-1110 Signal
A1	RX-	Ethernet LAN Interface, RX-	–
A2	TX-	Ethernet LAN Interface, TX-	–
A3	NC	Reserved - Don’t use	–
A4	NC	Reserved - Don’t use	–
A5	TMS	JTAG Interface, TMS Signal	TMS
A6	TDI	JTAG Interface, TDI Signal	TDI
A7	TRST	JTAG Interface, TRST Signal (Low-active)	nTRST
A8	SA24	Expansion Bus, Address Bit 24	A24
A9	SA22	Expansion Bus, Address Bit 22	A22
A10	SA20	Expansion Bus, Address Bit 20	A20
A11	SA18	Expansion Bus, Address Bit 18	A18
A12	SA16	Expansion Bus, Address Bit 16	A16
A13	SA13	Expansion Bus, Address Bit 13	A13
A14	SA10	Expansion Bus, Address Bit 10	A10
A15	SA8	Expansion Bus, Address Bit 8	A8
A16	SA7	Expansion Bus, Address Bit 7	A7
A17	SA6	Expansion Bus, Address Bit 6	A6

Table 2: Pin assignment PNP/1110 pin A1 to A17

Pin	Name	Function	SA-1110 Signal
B1	RX+	Ethernet LAN Interface, RX+	–
B2	TX+	Ethernet LAN Interface, TX+	–
B3	NC	Reserved - Don't use	–
B4	NC	Reserved - Don't use	–
B5	TCK	JTAG Interface, TCK Signal	TCK
B6	TDO	JTAG Interface, TDO Signal	TDO
B7	SA25	Expansion Bus, Address Bit 25	A25
B8	SA23	Expansion Bus, Address Bit 23	A23
B9	SA21	Expansion Bus, Address Bit 21	A21
B10	SA19	Expansion Bus, Address Bit 19	A19
B11	SA17	Expansion Bus, Address Bit 17	A17
B12	SA15	Expansion Bus, Address Bit 15	A15
B13	SA12	Expansion Bus, Address Bit 12	A12
B14	SA9	Expansion Bus, Address Bit 9	A9
B15	SA5	Expansion Bus, Address Bit 5	A5
B16	SA3	Expansion Bus, Address Bit 3	A3
B17	SA4	Expansion Bus, Address Bit 4	A4

Table 3: **Pin assignment PNP/1110 pin B1 to B17**

Pin	Name	Function	SA-1110 Signal
C1	TXD1	COM1 Serial Port, TXD Pin	TXD_1
C2	RXD1	COM1 Serial Port, RXD Pin	RXD_1
C3	VBAT	Real Time Clock Battery Input	–
C4	GND	Ground	–
C5	RCME	Remote Console Mode Enable (Low-active)	RXD_2
C6	VCC	3.3 Volt Power Input	–
C7	GND	Ground	–
C8	GND	Ground	–
C9	GND	Ground	–
C10	GND	Ground	–
C11	GND	Ground	–
C12	VCC	3.3 Volt Power Input	–
C13	SA14	Expansion Bus, Address Bit 14	A14
C14	SA11	Expansion Bus, Address Bit 11	A11
C15	SA2	Expansion Bus, Address Bit 2	A2
C16	SA0	Expansion Bus, Address Bit 0	A0
C17	SA1	Expansion Bus, Address Bit 1	A1

Table 4: Pin assignment PNP/1110 pin C1 tto C17

Pin	Name	Function	SA-1110 Signal
D1	TXD2	COM2 Serial Port, TXD Pin	TXD_3
D2	RXD2	COM2 Serial Port, RXD Pin	RXD_3
D3	GND	Ground	–
D4	GND	Ground	–
D15	CS3	Chip Select Output 3 (Low-active)	nCS3
D16	CS1	Chip Select Output 1 (Low-active)	nCS1
D17	CS2	Chip Select Output 2 (Low-active)	nCS2

Table 5: Pin assignment PNP/1110 pin D1 to D17

Pin	Name	Function	SA-1110 Signal
E1	LCD.D14	LCD Controller, Data Bit 14 (alternative INT4, if LCD in 8-bit mode)	GP8
E2	LCD.D13	LCD Controller, Data Bit 13 (alternative INT3, if LCD in 8-bit mode)	GP7
E3	LCD.D15	LCD Controller, Data Bit 15 (alternative INT5, if LCD in 8-bit mode)	GP9
E15	RDY	External Ready Input	RDY
E16	CS4	Chip Select Output 4 (Low-active)	nCS4
E17	CS5	Chip Select Output 5 (Low-active)	nCS5

Table 6: Pin assignment PNP/1110 pin E1 to E17

Pin	Name	Function	SA-1110 Signal
F1	LCD.D12	LCD Controller, Data Bit 12 (alternative INT2, if LCD in 8-bit mode)	GP6
F2	LCD.D11	LCD Controller, Data Bit 11	GP5
F3	VCC	3.3 Volt Power Input	–
F15	VCC	3.3 Volt Power Input	–
F16	OE	Expansion Bus, Output Enable (Output - Low-active)	nOE
F17	WE	Expansion Bus, Write Enable (Output - Low-active)	nWE

Table 7: Pin assignment PNP/1110 pin F1 to F17

Pin	Name	Function	SA-1110 Signal
G1	LCD.D10	LCD Controller, Data Bit 10	GP4
G2	LCD.D9	LCD Controller, Data Bit 9	GP3
G3	GND	Ground	–
G15	GND	Ground	–
G16	PCC.OE	PC Card Interface, Output Enable (Output -Low-active)	nPOE
G17	PCC.WE	PC Card Interface, Write Enable (Output -Low-active)	nPWE

Table 8: Pin assignment PNP/1110 pin G1 to G17

Pin	Name	Function	SA-1110 Signal
H1	LCD.D8	LCD Controller, Data Bit 8	GP2
H2	LCD.D7	LCD Controller, Data Bit 7	LDD7
H3	GND	Ground	–
H15	GND	Ground	–
H16	PCC.IOR	PC Card Interface, I/O Read (Output - Low-active)	nPIOR
H17	PCC.IOW	PC Card Interface, I/O Write (Output - Low-active)	nPIOW

Table 9: Pin assignment PNP/1110 pin H1 to H17

Pin	Name	Function	SA-1110 Signal
J1	LCD.D6	LCD Controller, Data Bit 6	LDD6
J2	LCD.D5	LCD Controller, Data Bit 5	LDD5
J3	GND	Ground	–
J15	GND	Ground	–
J16	PCC. WAIT	PC Card Interface, WAIT Signal (Input - Low-active)	–
J17	PCC. REG	PC Card Interface, REG Signal (Output - Low-active)	nPREG

Table 10: Pin assignment PNP/1110 pin J1 to J17

Pin	Name	Function	SA-1110 Signal
K1	LCD.D4	LCD Controller, Data Bit 4	LDD4
K2	LCD.D3	LCD Controller, Data Bit 3	LDD3
K3	GND	Ground	–
K15	GND	Ground	–
K16	PCC. IOCS16	PC Card Interface, IOCS16 Signal (Input -Low-active)	NIOIS16
K17	PCC. SKTSEL	PC Card Interface, SKTSEL Signal (Output)	PSKTSEL

Table 11: Pin assignment PNP/1110 pin K1 to K17

Pin	Name	Function	SA-1110 Signal
L1	LCD.D2	LCD Controller, Data Bit 2	LDD2
L2	LCD.D1	LCD Controller, Data Bit 1	LDD1
L3	GND	Ground	–
L15	GND	Ground	–
L16	PCC.CE1	PC Card Interface, Chip Enable 1 (Output - Low-active)	nPCE1
L17	PCC.CE2	PC Card Interface, Chip Enable 2 (Output - Low-active)	nPCE2

Table 12: Pin assignment PNP/1110 pin L1 to L17

Pin	Name	Function	SA-1110 Signal
M1	LCD.D0	LCD Controller, Data Bit 0	LDD0
M2	LCD.BIAS	LCD Controller, BIAS Signal (TFT Data Enable)	L_BIAS
M3	VCC	3.3 Volt Power Input	–
M15	VCC	3.3 Volt Power Input	–
M16	RD/WR	Read/Write Signal (Output - Write is Low-active)	RD_nWR
M17	INT1	Interrupt Input 1	GP1

Table 13: Pin assignment PNP/1110 pin M1 to M17

Pin	Name	Function	SA-1110 Signal
N1	LCD. PCLK	LCD Controller,PCLK Signal (TFT Pixel Clock)	L_PCLK
N2	LCD. LCLK	LCD Controller, LCLK Signal (TFT HSYNC)	L_LCLK
N3	LCD. FCLK	LCD Controller, FCLK Signal (TFT VSYNC)	L_FCLK
N15	CLKOUT	Clock Output (Default 3.6864 MHz)	GP27
N16	RESIN	RESET Input (Low-active)	–
N17	RESOUT	RESET Output (Low-active)	nRESET_OUT

Table 14: Pin assignment PNP/1110 pin N1 to N17

Pin	Name	Function	SA-1110 Signal
P1	PC2	Parallel I/O, Port C, Bit 2	SCLK_C
P2	PC1	Parallel I/O, Port C, Bit 1	RXD_C
P3	PC3	Parallel I/O, Port C, Bit 3	SFRM_C
P15	SD2	Expansion Bus, Data Bit 2	D2
P16	SD0	Expansion Bus, Data Bit 0	D0
P17	SD1	Expansion Bus, Data Bit 1	D1

Table 15: Pin assignment PNP/1110 pin P1 to P17

Pin	Name	Function	SA-1110 Signal
Q1	PC0	Parallel I/O, Port C, Bit 0	TXD_C
Q2	PB2	Parallel I/O, Port B, Bit 2	GP18
Q3	PB5	Parallel I/O, Port B, Bit 5	GP21
Q4	PA5	Parallel I/O, Port A, Bit 5	GP15
Q5	PA2	Parallel I/O, Port A, Bit 2	GP12
Q6	VCC	3.3 Volt Power Input	–
Q7	GND	Ground	–
Q8	GND	Ground	–
Q9	GND	Ground	–
Q10	GND	Ground	–
Q11	GND	Ground	–
Q12	VCC	3.3 Volt Power Input	–
Q13	SD17	Expansion Bus, Data Bit 17	D17
Q14	SD14	Expansion Bus, Data Bit 14	D14
Q15	SD5	Expansion Bus, Data Bit 5	D5
Q16	SD3	Expansion Bus, Data Bit 3	D3
Q17	SD4	Expansion Bus, Data Bit 4	D4

Table 16: Pin assignment PNP/1110 pin Q1 to Q17

Pin	Name	Function	SA-1110 Signal
R1	PB0	Parallel I/O, Port B, Bit 0	GP16
R2	PB4	Parallel I/O, Port B, Bit 4	GP20
R3	PB7	Parallel I/O, Port B, Bit 7	GP23
R4	PA3	Parallel I/O, Port A, Bit 3	GP13
R5	PA0	Parallel I/O, Port A, Bit 0	GP10
R6	SD30	Expansion Bus, Data Bit 30	D30
R7	SD28	Expansion Bus, Data Bit 28	D28
R8	SD26	Expansion Bus, Data Bit 26	D26
R9	SD24	Expansion Bus, Data Bit 24	D24
R10	SD22	Expansion Bus, Data Bit 22	D22
R11	SD20	Expansion Bus, Data Bit 20	D20
R12	SD18	Expansion Bus, Data Bit 18	D18
R13	SD15	Expansion Bus, Data Bit 15	D15
R14	SD12	Expansion Bus, Data Bit 12	D12
R15	SD8	Expansion Bus, Data Bit 8	D8
R16	SD6	Expansion Bus, Data Bit 6	D6
R17	SD7	Expansion Bus, Data Bit 7	D7

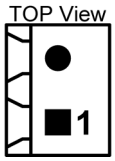
Table 17: Pin assignment PNP/1110 pin R1 to R17

Pin	Name	Function	SA-1110 Signal
S1	PB1	Parallel I/O, Port B, Bit 1	GP17
S2	PB3	Parallel I/O, Port B, Bit 3	GP19
S3	PB6	Parallel I/O, Port B, Bit 6	GP22
S4	PA4	Parallel I/O, Port A, Bit 4	GP14
S5	PA1	Parallel I/O, Port A, Bit 1	GP11
S6	SD31	Expansion Bus, Data Bit 31	D31
S7	SD29	Expansion Bus, Data Bit 29	D29
S8	SD27	Expansion Bus, Data Bit 27	D27
S9	SD25	Expansion Bus, Data Bit 25	D25
S10	SD23	Expansion Bus, Data Bit 23	D23
S11	SD21	Expansion Bus, Data Bit 21	D21
S12	SD19	Expansion Bus, Data Bit 19	D19
S13	SD16	Expansion Bus, Data Bit 16	D16
S14	SD13	Expansion Bus, Data Bit 13	D13
S15	SD11	Expansion Bus, Data Bit 11	D11
S16	SD10	Expansion Bus, Data Bit 10	D10
S17	SD9	Expansion Bus, Data Bit 9	D9

Table 18: Pin assignment PNP/1110 pin S1 to S17

Appendix 2: Pin Assignment DNP/EVA4 Components

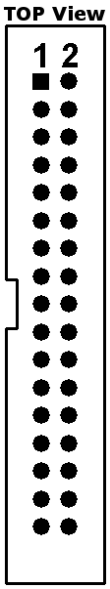
CFL Connector



Pin	Name	Signal
1	VCC	Power Out
2	GND	Power

Table 19: Pinout CFL Connector

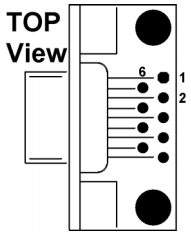
LCD Connector



Pin	Name	Signal
1	GND	Power
2	CLK	Pixel Clock
3	HSYNC	Horizontal. Sync.
4	VSYNC	Vertical Sync.
5	GND	Power
6	R0	---
7	R1	RED 1
8	R2	RED 2
9	R3	RED 3
10	R4	RED 4
11	R5	RED 5
12	GND	Power
13	G0	GREEN 0
14	G1	GREEN 1
15	G2	GREEN 2
16	G3	GREEN 3
17	G4	GREEN 4
18	G5	GREEN 5
19	GND	Power
20	B0	---
21	B1	BLUE 1
22	B2	BLUE 2
23	B3	BLUE 3
24	B4	BLUE 4
25	B5	BLUE 5
26	GND	Power
27	DE	Data Enable
28	VCC	Power
29	VCC	Power
30	nc.	---
31	DPS	---
32	nc	---
33	nc	---
34	nc	---

Table 20: Pinout LCD Connector

COM1 Connector

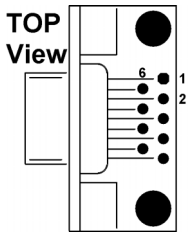


Pin	Signal
1	nc
2	RxD
3	TxD
4	nc
5	GND

Pin	Signal
6	nc
7	nc
8	nc
9	nc

Table 21: Pinout COM1 Connector

COM2 Connector



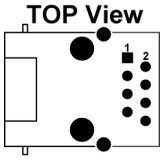
Pin	Signal
1	nc
2	RxD
3	TxD
4	nc/5V*
5	GND

Pin	Signal
6	nc
7	nc/5V*
8	nc
9	nc

* switchable (see Chapter 3.11 and 3.12)

Table 22: Pinout COM2 Connector

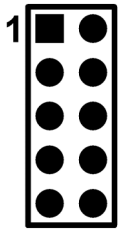
10/100 Mbps Ethernet Connector



Pin	Name	Signal
1	TX+	TXD+
2	TX–	TXD–
3	RX+	RXD+
4	nc	---
5	nc	---
6	RX–	RXD–
7	nc	---
8	nc	---
S1..2	Shield	---

Table 23: Pinout 10/100 Mbps Connector

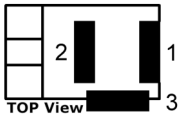
JTAG Connector



Pin	Name	Signal
1	TDI	JTAG Test Data In
2	TDO	JTAG Test Data Out
3	TMS	JTAG Test Mode Select
4	GND	Power
5	TRST#	JTAG Test Reset
6	TCK	JTAG Test Clock
7	VCC	Power (3.3V)
8	nc	---
9	WD Disable	nc
10	GND	Power

Table 24: Pinout JTAG Connector

Power Connector



Pin	Name	Signal
1	VCC	Power In
2	GND	Power
3	GND	Power

Table 25: Pinout Power Connector

RCM Jumper

Jumper	Function
open	Disable RCM mode for PNP/1110
close	Enable RCM mode for PNP/1110

Table 26: RCM Jumper Settings

COM2 Power Switch Jumper JP2

Jumper	Function
open	COM2 RTS and DTR not connected
close	COM2 RTS and DTR tied to +5V

Table 27: Pinout Power Connector

Appendix 3: PNP/1110 Memory Map

Physical Address	Description	Virtual Address	Read	Write	Cached	Buffered
0x00000000-0x07FFFFF	Boot-Flash	0xE8000000-0xEFFFFFFF	Y	Y	N	N
0x28000000-0x2FFFFFF	Ethernet	not mapped	Y	Y	N	N
0x08000000-0x0FFFFFF	external Device at CS1	not mapped	Y	Y	N	N
0x10000000-0x17FFFFF	external Device at CS2	not mapped	Y	Y	N	N
0x18000000-0x1FFFFFF	external Device at CS3	not mapped	Y	Y	N	N
0x40000000-0x47FFFFF	external Device at CS4	not mapped	Y	Y	N	N
0x48000000-0x4FFFFFF	external Device at CS5	not mapped	Y	Y	N	N
0x80000000-0xB7FFFFF	SA-1110 int. Registers	0x80000000-0xB7FFFFF	Y	Y	N	N
0xC0000000-0xC7FFFFF	SDDRAM Bank 0	0x00000000-0x07FFFFF	Y	Y	Y	Y

Table 28: PNP/1110 Memory Map

Appendix 4: DIP-Switch Settings

DIP-Switch			LCD
A0	A1	A2	
OFF	OFF	OFF	640x480x16 bit (default)
ON	OFF	OFF	640x480x 8 bit*
OFF	ON	OFF	640x480x 4 bit*
ON	ON	OFF	800x600x 8 bit*
OFF	OFF	ON	800x600x 4 bit*
ON	OFF	ON	do not use
OFF	ON	ON	do not use
ON	ON	ON	do not use

*to use this setting an adapter is needed, please contact SSV Embedded Systems

Table 29: DIP-Switch Settings

Appendix 5: Interrupt Usage

Figure 46 shows, which interrupts are available on the related LCD mode.

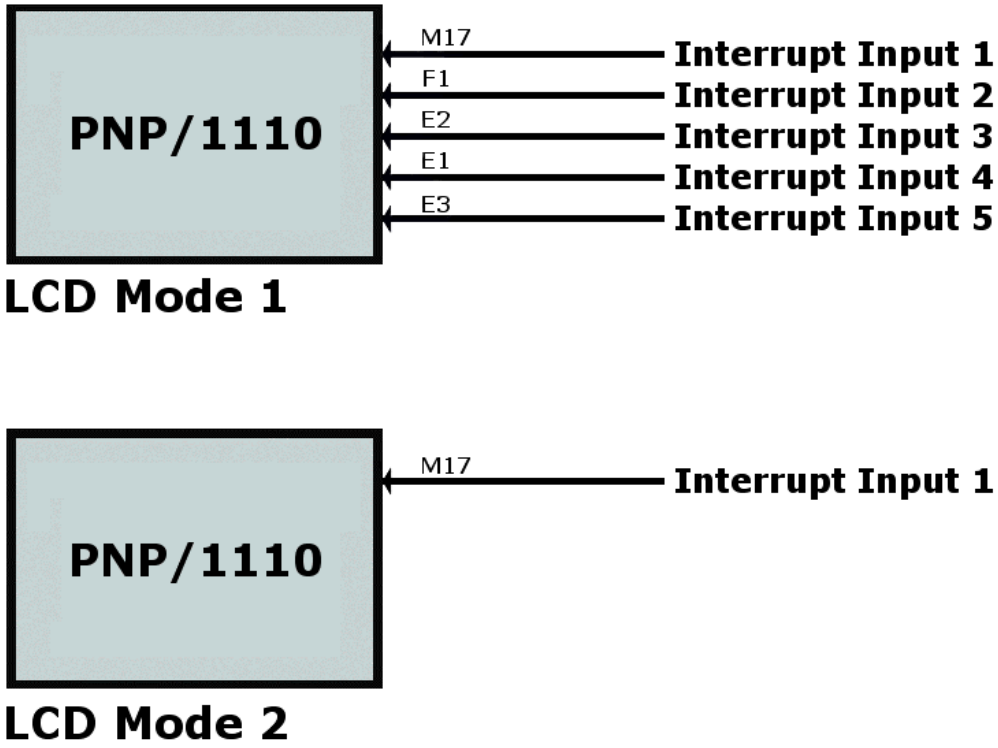


Figure 46: Interupt Usage

Display Mode	Display Type	Available Interrupt
LCD Mode 1	• TFT Color 4/8 Bit • Color Single Scan Passive LCD • Monochrome Passive LCD	INT 1, 2 .. 5
LCD Mode 2	• TFT 16 Bit • Color Dual Scan Passive	INT 1

Table 30: Interrupt Usage

Appendix 6: The RCME (RCM Enable) Jumper

To enable the RCM mode of the PNP/1110, connect a jumper as well as a pulldown resistor on pin C5 and use it like shown in figure 47.

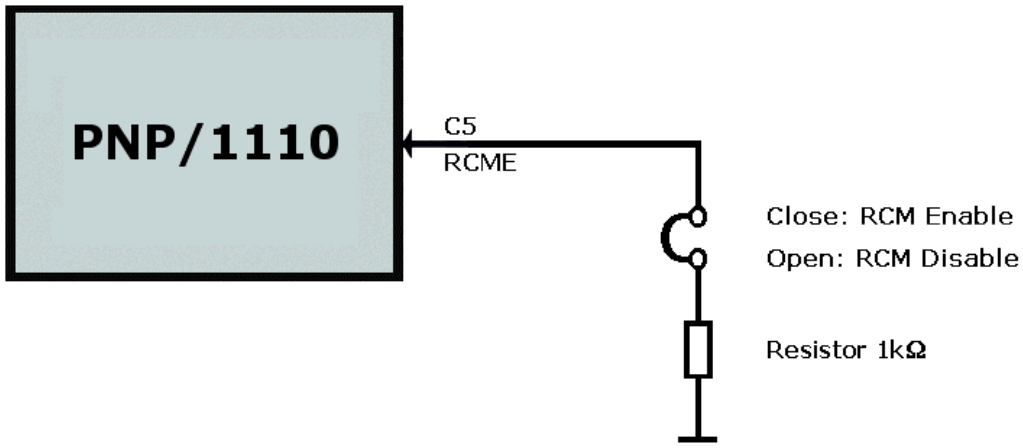


Figure 47: RCME Jumper

Appendix 7: The PNP/1110 Clock Output

The Clock Output (CLKOUT) frequency of 3.6864 MHz is generated by the internal PLL of the SA-1110 microcontroller.

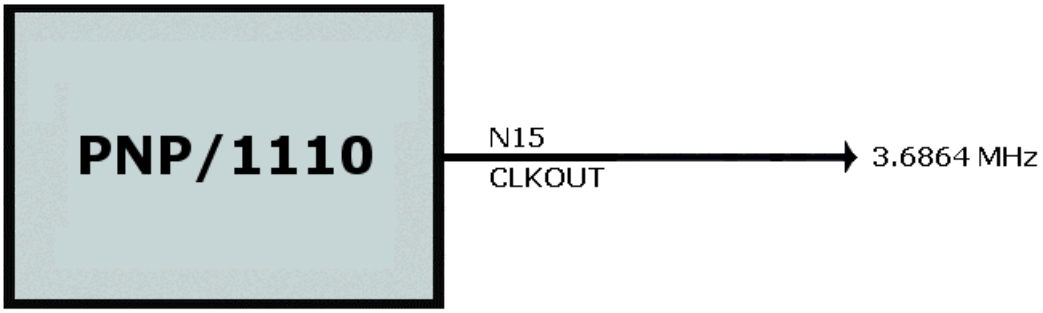


Figure 48: PNP/1110 Clock Output

Appendix 8: Using the SA-1110 Serial Channels

The PNP/1110 features five serial channels (SIO Ch 0 .. SIO Ch 4). Serial Channel 4 alias Port C is free for use. Serial channel 0,1 and 3 are connected like shown in figure 49.

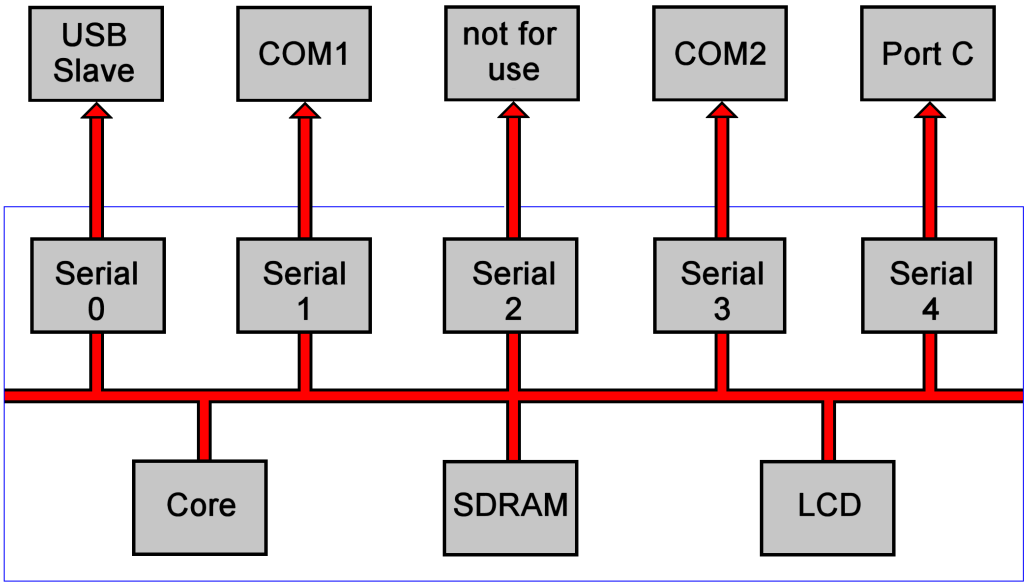


Figure 49: PNP/1110 Serial Channels

Note: Serial channel 0 is not connected outside. Serial channel 2 is completely used internal and not connected outside; please do not use this channel.

Appendix 9: Using the Compact Flash (CF)-Interface

The PNP/1110 offers the possibility to connect a Compact Flash (CF) adapter to realize different system expansions. Figure 50 shows a general diagram how to connect a CF-interface onto the PNP/1110.

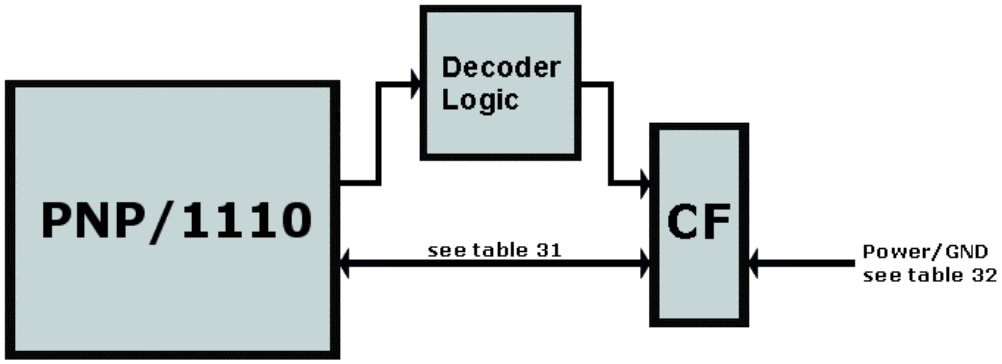


Figure 50: PNP/1110 CF-Interface Connection

This chapter describes only one possible capability to connect an 8-bit CF-interface. This interface is running in memory mode. For the memory mode SSV Embedded System offers a Linux device driver. For more information please contact SSV. Table 31 shows which connections have to be made between the pins of the PNP/1110 and the 8-bit Compact Flash interface. The necessary connections between the CF-interface and Power/Ground are shown in table 32.

From	To	Function
PNP/1110 Pin	CF Pin	
P16	21	Data 0
P17	22	Data 1
P15	23	Data 2
Q16	2	Data 3
Q17	3	Data 4
Q15	4	Data 5
R16	5	Data 6
R17	6	Data 7
C16	20	Addr. 0
C17	19	Addr. 1
C15	18	Addr. 2
B16	17	Addr. 3
H16	9	PCC.IOR#
H17	36	PCC.IOW#

Table 31: CF-Interface Pin Connections

In addition to the connections shown in table 31 there are some Power/GND connections necessary. You can see these connections on table 32.

Source		To CF Pin		Function
GND		1, 50		Power (0V)
GND		8, 10..12, 14..16		A10, A9..7, A6..4
GND		39, 41		CSEL, RESET
VCC		13, 38		Power (3.3V)
VCC		32, 34, 35, 44		CE2#, IOR#, IOW#, REG#
NC		47..49, 27..31		D8..10, D11..15
NC		26, 25		CD1#, CD2#
NC		24, 33, 37, 40, 42, 43, 45, 46		WP, VS1, RDY/BSY, VS2, WAIT#, INPACK#, BVD2, BVS1

Table 32: CF-Interface Power/GND Connections

Some pins of the PNP/1110 have to be connected with a special decoder logic shown in figure 50. The decoder logic connections and its characteristic will be described in detail by figure 51 and table 33. Please note, that a connection from the decoder output to pin 7 of the CF-interface is needed.

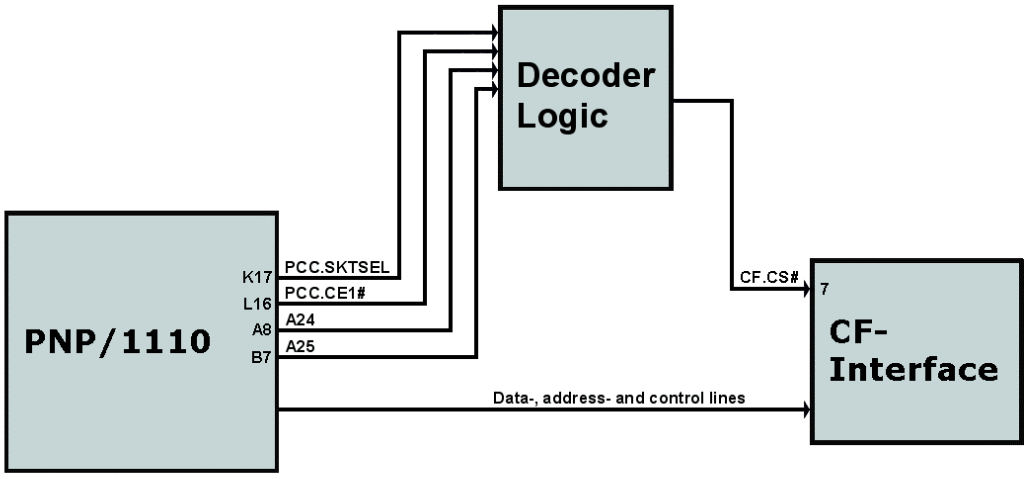


Figure 51: PNP/1110 Decoder Logic Connection

The decoder logic used to connect a Compact Flash interface to the PNP/1110 is realized with a 74HC138 component. Table 32 shows the standard settings.

Inputs						Outputs							
Enable			Select										
VCC	PCC.CE1#		PCC.SKTSEL	A25	A24					CS			
G1	G2A	G2B	C	B	A	Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
X	H	X	X	X	X	H	H	H	H	H	H	H	H
X	X	H	X	X	X	H	H	H	H	H	H	H	H
L	X	X	X	X	X	H	H	H	H	H	H	H	H
H	L	L	L	L	L	L	H	H	H	H	H	H	H
H	L	L	L	L	H	H	L	H	H	H	H	H	H
H	L	L	L	H	L	H	H	L	H	H	H	H	H
H	L	L	L	H	H	H	H	H	L	H	H	H	H
H	L	L	H	L	L	H	H	H	H	L	H	H	H
H	L	L	H	L	H	H	H	H	H	H	L	H	H
H	L	L	H	H	L	H	H	H	H	H	H	L	H
H	L	L	H	H	H	H	H	H	H	H	H	H	L

Table 33: Decoder Characteristics

Note: To use our standard Compact Flash device driver for the PNP/1110 make sure that the used logic corresponds to the settings marked in table 32.

This interface does not support the so-called “hot plug in” mode. To use this mode a special logic is needed. Plugging cards into the card cage with power on will usually not cause a problem but you shouldn`t do this. However, the card may be damaged if the right sequence of pins contacts as the card is pushed into the socket. This may damage chips and they may become hot when power is applied. This is one of the most common failures of expansion cards.

Appendix 10: Mechanical Dimensions

The PNP/1110 uses a 169-pin PGA socket (Socket 3) as mechanical base. The figure 50 shows the dimensions. All length dimensions have a tolerance of 0.5 mm.

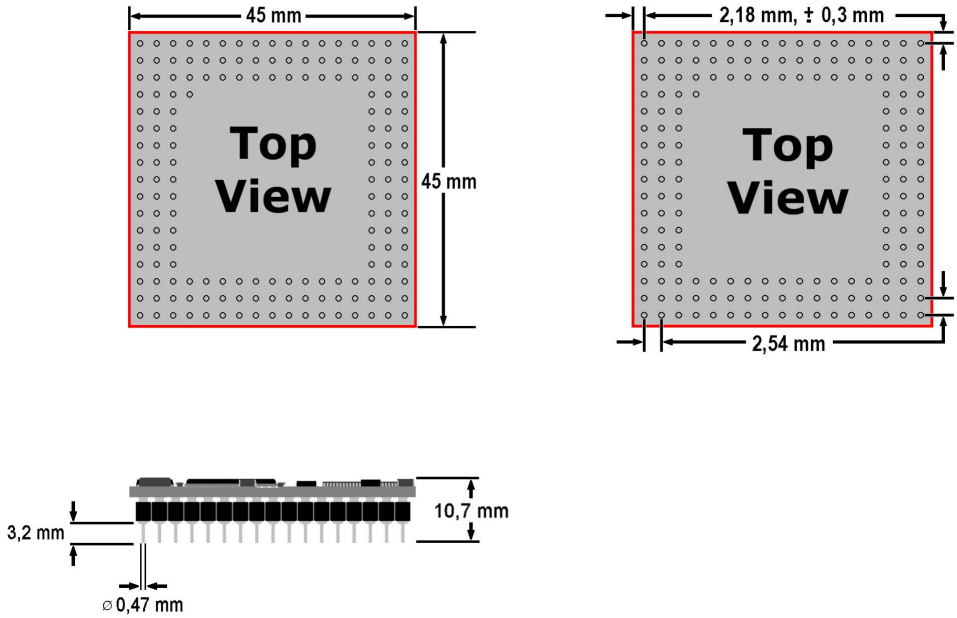


Figure 52: Dimensions of the PNP/1110

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List of Figures

List of Tables

List of Appendixes

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