

DIL/NetPC DNP/1110 Starter Kit

User Manual

Contents

1. INTRODUCTION	4
1.1 Conventions used in this Document.....	4
1.2 Main Features.....	4
2. BOARD LAYOUT.....	6
3. BOARD COMPONENTS.....	7
3.1 Power LED.....	7
3.2 Output LEDs	7
3.3 DIP Switches.....	7
3.4 Serial Interface COM1.....	7
3.5 10Base-T Ethernet Interface	8
3.6 RCM Jumper	8
3.7 DIL-64 Interface.....	8
4. MOUNTING THE DIL/NETPC.....	9
5. CABLE CONNECTIONS.....	10
5.1 Serial Link.....	10
5.2 Ethernet Link.....	12
5.3 Power Supply	12
6. FIRST STEPS.....	13
6.1 Using a Windows–based development System	13
6.1.1 Setup the Serial Link	13
6.1.2 Checking the Ethernet Link	15
6.1.3 Web Server Access	16
6.1.4 Login via Serial Console	17
6.1.5 Login via Telnet.....	18
6.1.6 File Transfer via FTP	19
6.1.7 Embedded Linux Maintenance	21
6.1.8 Embedded Linux Maintenance via HyperTerminal/Serial Link.....	21
6.2 Using a Linux–based development System	23
6.2.1 Setup the Serial Link	23
6.2.2 Checking the Ethernet Link	25
6.2.3 Web Server Access	26
6.2.4 Login via Serial Console	27
6.2.5 Login via Telnet.....	28
6.2.6 File Transfer via FTP	29

6.2.7 Embedded Linux Maintenance 31

6.2.8 Embedded Linux Maintenance via Minicom/Serial Link 31

6.2.9 Installation of the GNU Cross Toolchain 34

Appendix 1: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (1. Part) 39

Appendix 2: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (2. Part) 40

Appendix 3: DNP/1110 Memory Map..... 41

Appendix 4: Using the Compact Flash (CF)-Interface 41

Appendix 5: GNU General Public License 43

Appendix 6: GNU Lesser General Public License 48

List of Figures..... 55

List of Tables 56

List of Appendixes 56

Contact 57

Document History 57

1. Introduction

This document describes how to get started with the DNP/1110 Starter Kit. 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 further technical information – like hardware description etc. – please check out the DIL/NetPC Starter Kit CD-ROM, which is included in every Starter Kit.

1.1 Conventions used in this Document

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

Table 1: Convention usage

1.2 Main Features

Evaluation Board DNP/EVA2 (Special Version)

- DIL-64 Socket for one DIL/NetPC DNP/1110
- RS232 Serial Interface (COM1)
- 10BASE-T/100BASE-TX Ethernet Interface
- 8 User-Definable LEDs
- 8 Manual DIP Switches
- 1 Reset Switch
- Wire-Wrap-Area
- 5VDC Power Input Connector
- Null-Modemcable
- Size 142 x 124 mm

DIL/NetPC DNP/1110

- Intel StrongARM SA-1110 CPU with 206 MHz Clock Speed.
- 32 MByte SDRAM Memory, 16 MByte FLASH Memory
- 10/100 Mbps Ethernet Interface
- Two 16550 Serial Ports (one with all Handshakes)
- 20-bit General Purpose high-speed Parallel I/O
- 8-bit I/O Expansion Bus
- 5 Interrupt Inputs, 4 Chip Select Outputs
- Programmable Watchdog Timer
- JTAG IEEE 1149.1 Test Interface
- In-System Programming Features
- 64-pin JEDEC DIL-64 Connector, 2.54mm Centers
- 3.3 Volt Low Power Design, Supply Voltage 3.3 VDC (+- 5%)
- Supply Current 300 mA typ. at 206 MHz
- Size 82mm x 28mm

2. Board Layout

The base component of the Starter Kit is the Evaluation Board DNP/EVA2. On this board you will find a DIL-64 socket (DIL = Dual In Line) to mount your DNP/1110.

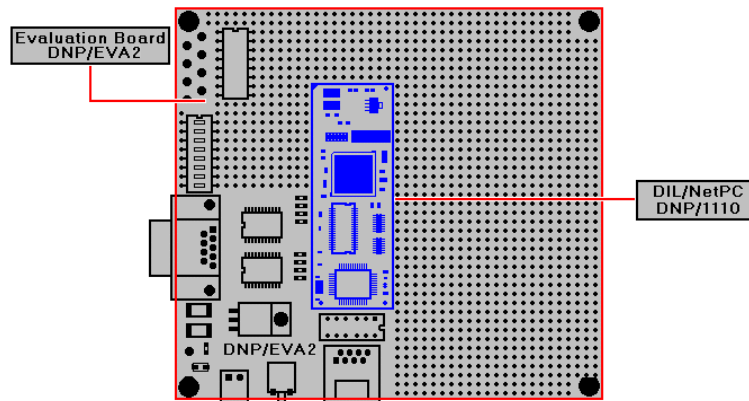


Figure 1: Evaluation Board DNP/EVA2 with DNP/1110

The Starter Kit provides all required basic hard- and software environment, which allow you the development of individual applications for your DNP/1110. For an instant connection to your hardware the Evaluation Board supports a serial COM1 interface, a 10Base-T Ethernet interface as well as a DIL-64 (DIL =Dual In Line) interface. Further you will find a Prototype (wire-wrap) area, 8 LEDs, 8 DIP switches and one reset switch, which allows you to test your peripheral applications very easy. The figure 2 shows the base components of the Evaluation Board.

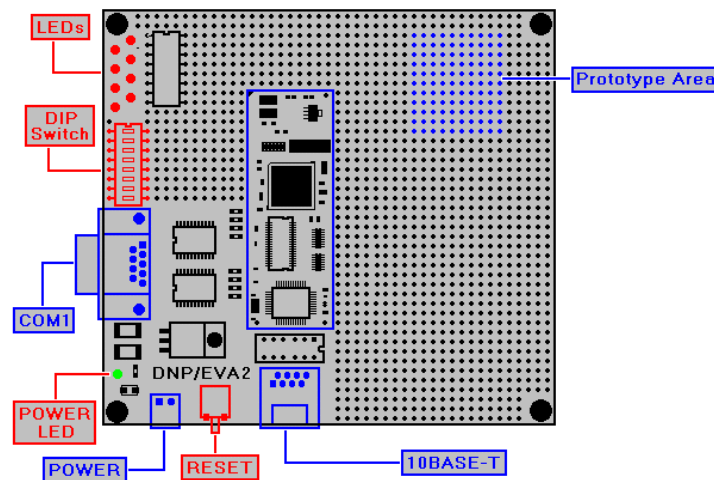


Figure 2: Components of the Evaluation Board DNP/EVA2

3. Board Components

This chapter describes the most interesting components of the Evaluation Board DNP/EVA2 and gives a short overview about their respective functions.

3.1 Power LED

The Evaluation Board DNP/EVA2 is equipped with a single green LED. This LED will light up when the Board is provided with the necessary operating voltage.

3.2 Output LEDs

The Evaluation Board provides eight LEDs for testing purposes. These LEDs will flicker or light up to indicate traffic on the output ports PA0–PA7.

3.3 DIP Switches

The Evaluation Board has a set of eight DIP-switches that give you the possibility to control the input ports PB0–PB7.

Switch open – Signal V_{in} Low (GND)

Switch closed – Signal V_{in} High (V_{cc})

3.4 Serial Interface COM1

For an easy connection between the Starter Kit and your development system you can use the serial interface on the Evaluation Board. A RS232 standard compliant Sub-D port with 9 pins realizes this interface. The exact layout is shown on table 2.

Pin	Signal	Pin	Signal
1	DCD	6	DSR
2	RxD	7	RTS
3	TxD	8	CTS
4	DTR	9	RI
5	GND		

Table 2: Pinout COM1

3.5 10Base-T Ethernet Interface

The DNP/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 DIL-64 interface pins, which are connected to the SMSC LAN controller on the DNP/1110.

3.6 RCM Jumper

Use this jumper to activate the RCM mode of the DNP/1110. The RCM mode (Remote Console Mode) offers the possibility to control the PNP/1110 via terminal program. 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 open, these messages are blocked. Figure 3 shows the exact position of the RCM jumper onto the DNP/1110.

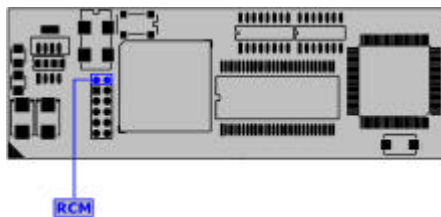


Figure 3: RCM Jumper

3.7 DIL-64 Interface

The Evaluation Board DNP/EVA2 provides a DIL-64 interface for mounting the DNP/1110. The table 3 shows the signals connected to the DIL-64 interface.

Pin	Name	Usage	Pin	Name	Usage
1	PA0	YES, LED	33	RX+	YES
2	PA1	YES, LED	34	RX-	YES
3	PA2	YES, LED	35	RESOUT#	NO
4	PA3	YES, LED	36	VBAT	NO
5	PA4	YES, LED	37	CLKOUT	NO
6	PA5	YES, LED	38	TXD2	NO
7	PA6	YES, LED	39	RXD2	NO
8	PA7	YES, LED	40	INT5	NO
9	PB0	YES, DIP-Switch	41	INT4	NO
10	PB1	YES, DIP-Switch	42	INT3	NO
11	PB2	YES, DIP-Switch	43	INT2	NO
12	PB3	YES, DIP-Switch	44	INT1	NO

13	PB4	YES, DIP-Switch	45	CS4#	NO
14	PB5	YES, DIP-Switch	46	CS3#	NO
15	PB6	YES, DIP-Switch	47	CS2#	NO
16	PB7	YES, DIP-Switch	48	CS1#	NO
17	PC0	NO	49	RDY	NO
18	PC1	NO	50	RD#	NO
19	PC2	NO	51	WR#	NO
20	PC3	NO	52	SA3	NO
21	RXD1	YES	53	SA2	NO
22	TXD1	YES	54	SA1	NO
23	CTS1	YES	55	SA0	NO
24	RTS1	YES	56	SD7	NO
25	DCD1	YES	57	SD6	NO
26	DSR1	YES	58	SD5	NO
27	DTR1	YES	59	SD4	NO
28	RI1	YES	60	SD3	NO
29	RESIN	YES	61	SD2	NO
30	TX+	YES	62	SD1	NO
31	TX-	YES	63	SD0	NO
32	GND	YES	64	VCC	YES

Table 3: Signals connected to the DNP/EVA2 DIL-64 Interface

4. Mounting the DIL/NetPC

To mount the DNP/1110 on the Evaluation Board DNP/EVA2 set it carefully on the DIL-64 interface onto the Evaluation Board. Please note, that the DNP/1110 is positioned in the right way like shown in figure 4. After that, push the DNP/1110 down, so that the DIL-64 socket fixes it.

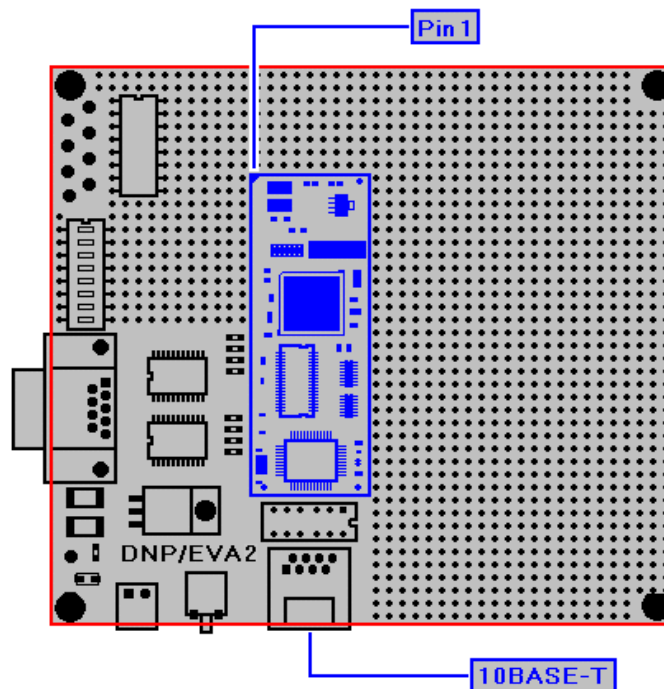
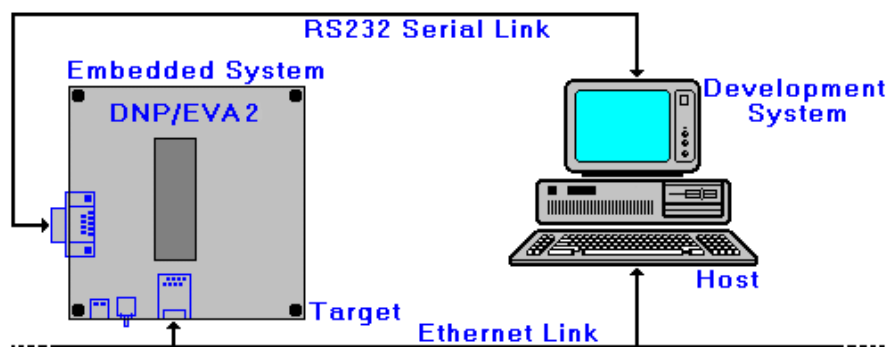


Figure 4: Position of the DIL/NetPC on the Evaluation Board

5. Cable Connections

Before installing the necessary cable connections you should check the correct setting of the RCM jumper onto the PNP/1110 (see chapter 3.6). Normally this jumper is set by default. Before you can use your DIL/NetPC Starter Kit you need a further Desktop- or Notebook-PC that act as development system. This development system should run under MS-Windows or Linux in an ideal manner. This computer will act as your development system. Between the development system and the Starter Kit are two new connections required. At first the **RS232 Serial Link** and second the **Ethernet Link**. The PC will act as development system



and as **Remote Console Monitor (RCM)** for the DNP/1110 on the Evaluation Board. Please make sure, that the RCM jumper on the DNP/1110 is set correctly.

Figure 5: Overview about the required cable Connections

5.1 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 a COM port of your development system (for example COM1 or COM2) by using this cable.

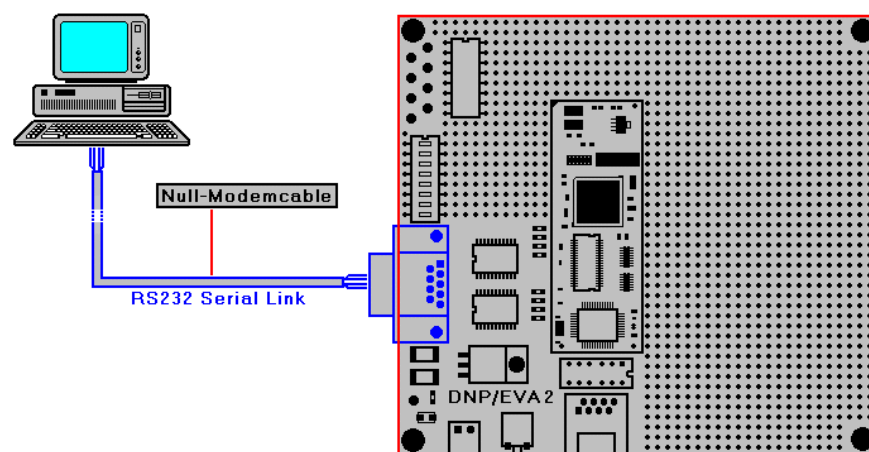


Figure 6: Serial Link Connection

5.2 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.

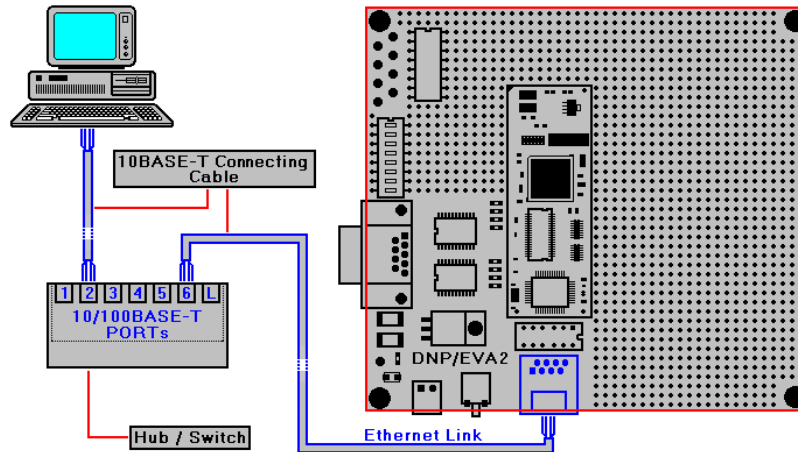


Figure 7: Ethernet Link Connection

5.3 Power Supply

The DNP/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 the system with the necessary power.

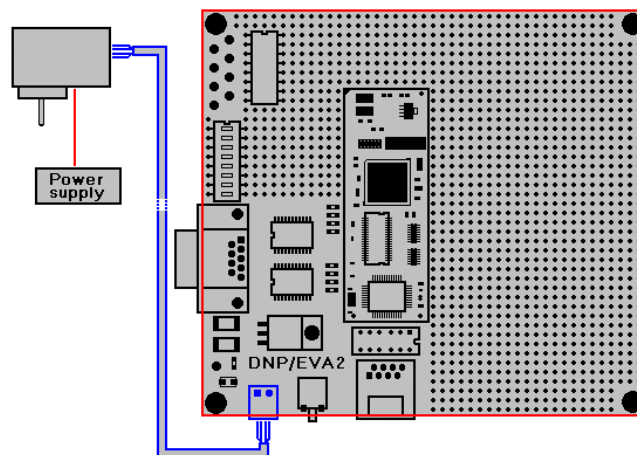


Figure 8: Power supply Connection

After the successful connection of all cables between the Evaluation Board and your development system, the Starter Kit is ready to run.

6. First Steps

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

6.1 Using a Windows-based development System

The following paragraphs will help you to use the DNP/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.

6.1.1 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, like shown in figure 10.

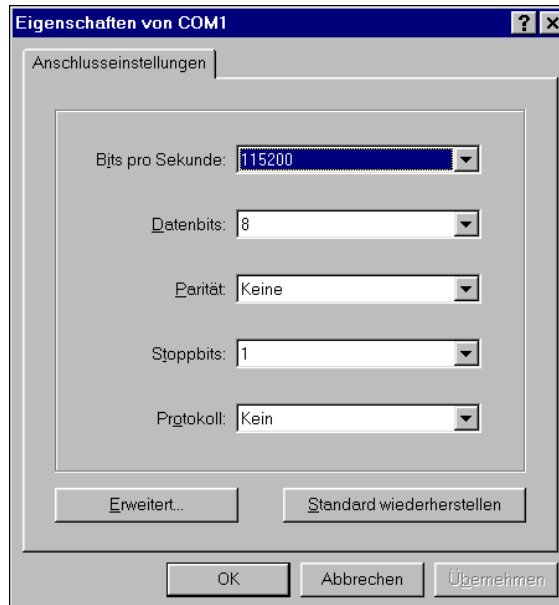


Figure 10: Baud rate Settings

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 DNP/1110 boot process in the terminal program window at your PC.

```

DIL-NetPC - HyperTerminal
Datei Bearbeiten Ansicht Appl Übertragung 2

SSV DNP/1110 - blob version 2.0.4
Copyright (C) 1999 2000 2001 Jan-Derk Bakker, Erik Mouw and other
blob comes with ABSOLUTELY NO WARRANTY; read the GNU GPL for details.
This is free software, and you are welcome to redistribute it
under certain conditions; read the GNU GPL for details.
Memory map:
0x02000000 @ 0xC0000000 (32 MB)
Loading blob from flash . done
Loading kernel from flash ... done
Loading ramdisk from flash ..... done
Autoboot in progress, press any key to stop .....
Starting kernel ...

Uncompressing Linux.....

```

Figure 11: DIL/NetPC boot Process

For a first test of the DNP/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.

6.1.2 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.

```

MS-DOS-Eingabeaufforderung
10 x 18

Microsoft(R) Windows 98
(C)Copyright Microsoft Corp 1981-1999.

C:\WINDOWS>ping 192.168.0.126

Ping wird ausgeführt für 192.168.0.126 mit 32 Bytes Daten:

Antwort von 192.168.0.126: Bytes=32 Zeit=1ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit=1ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit<10ms TTL=255
Antwort von 192.168.0.126: Bytes=32 Zeit<10ms TTL=255

Ping-Statistik für 192.168.0.126:
    Pakete: Gesendet = 4, Empfangen = 4, Verloren = 0 (0% Verlust),
    Ca. Zeitangaben in Millisek.:
        Minimum = 0ms, Maximum = 1ms, Mittelwert = 0ms

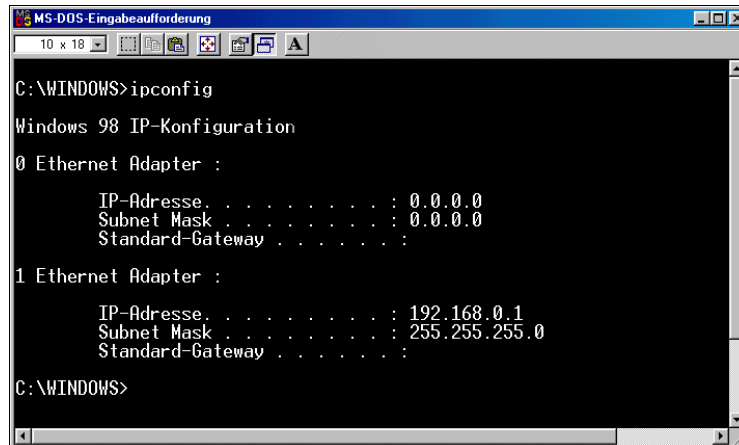
C:\WINDOWS>_

```

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 check the correct IP-address setting to the value "192.168.0.1". For an easy check of the IP-address, you can use the following DOS-command:

ipconfig



```

C:\WINDOWS>ipconfig

Windows 98 IP-Konfiguration

0 Ethernet Adapter :

    IP-Adresse . . . . . : 0.0.0.0
    Subnet Mask . . . . . : 0.0.0.0
    Standard-Gateway . . . . . :

1 Ethernet Adapter :

    IP-Adresse . . . . . : 192.168.0.1
    Subnet Mask . . . . . : 255.255.255.0
    Standard-Gateway . . . . . :

C:\WINDOWS>

```

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.

6.1.3 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 DNP/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 DNP/1110. It shows you a static web page with some pictures. Figure 14 show you this Web page in the browser window.

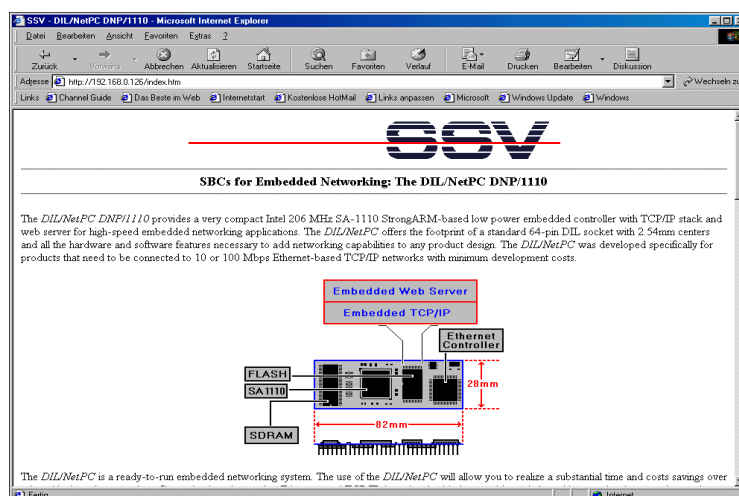


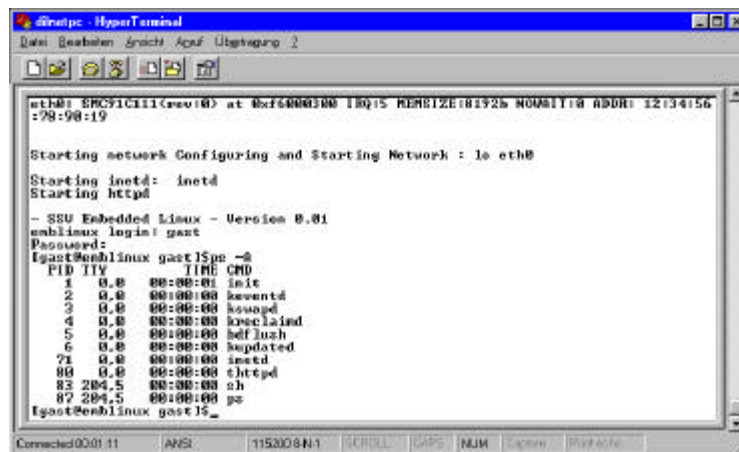
Figure 14: DNP/1110 Web page shown by the MS-Internet Explorer

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.

6.1.4 Login via Serial Console

With a development system running under MS-Windows you can gain access onto the DNP/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.



```
gast@pc - HyperTerminal
Date: 04.08.2008 10:15:19
Size: 80x25
Charset: ANSI
Port: COM1

eth0: 80:00:00:00:00:00 at 0x00000000: IRQ:15  MEMSIZE:8192k  NUMBLK:16  ADDR: 12134156
:98:98:19

Starting network Configuring and Starting Network : lo eth0
Starting inetd:  inetd
Starting httpd

- SSV Embedded Linux - Version 0.01
enblinux login: gast
Password:
Igast@enblinux:~$

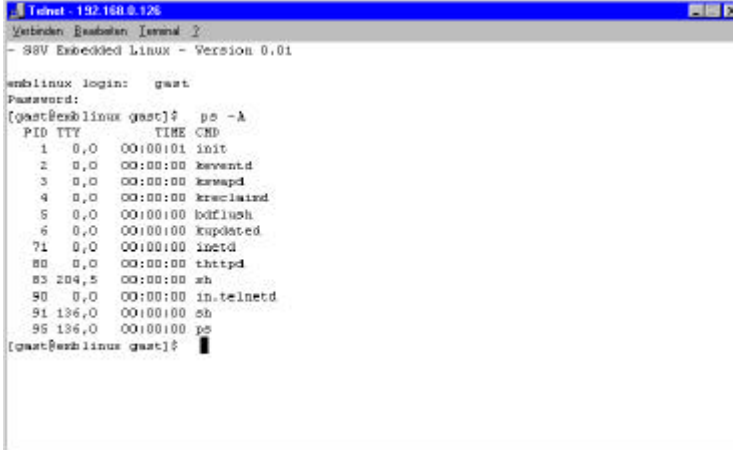
PID  PPID  TIME  CMD
1    0.0    00:00:00  init
2    0.0    00:00:00  ksmtd
3    0.0    00:00:00  ksmtd
4    0.0    00:00:00  ksmtd
5    0.0    00:00:00  hdl_lush
6    0.0    00:00:00  ksmtd
71   0.0    00:00:00  inetd
80   0.0    00:00:00  httpd
83  204.5  00:00:00  sh
87  204.5  00:00:00  ps
Igast@enblinux:~$
```

Figure 15: Login procedure via HyperTerminal

6.1.5 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
```



```
Telnet - 192.168.0.126
Verbinden: Erweitern, Terminal ?
- SSV Embedded Linux - Version 0.01

sshlinux login: guest
Password:
[guest@sshlinux guest]$ ps -A
  PID TTY          TIME CMD
    1  0,0   00:00:01 init
    2  0,0   00:00:00 ksysd
    3  0,0   00:00:00 ksysd
    4  0,0   00:00:00 ksysd
    5  0,0   00:00:00 ksysd
    6  0,0   00:00:00 ksysd
   71  0,0   00:00:00 inetd
   80  0,0   00:00:00 tftpd
   85 204,5 00:00:00 sh
   90  0,0   00:00:00 in.telnetd
   91 136,0 00:00:00 sh
   95 136,0 00:00:00 ps
[guest@sshlinux guest]$
```

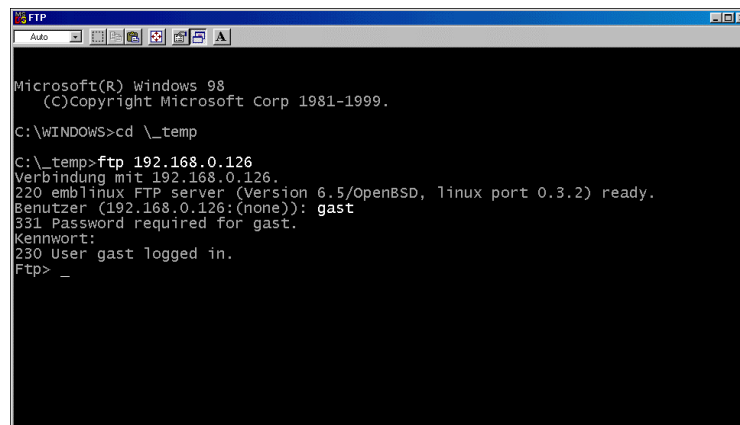
Figure 16: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your DNP/1110 in shape of a parameter to the client.

6.1.6 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 the most Windows versions. An FTP session begins when the client build 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 DNP/1110 operate 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 a 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 a 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 17 you see the described user inputs in form of highlighted text.



```
Microsoft(R) Windows 98
(C)Copyright Microsoft Corp 1981-1999.
C:\WINDOWS>cd \_temp
C:\_temp>ftp 192.168.0.126
Verbindung mit 192.168.0.126.
220 emblinux FTP server (Version 6.5/OpenBSD, linux port 0.3.2) ready.
Benutzer (192.168.0.126:(none)): gast
331 Password required for gast.
Kennwort:
230 User gast logged in.
Ftp> _
```

Figure 17: Login procedure via FTP

Now you are ready to transfer a file from your Windows-based development system to the DNP/1110. Before you can transfer a file with FTP you should check, that the FTP link is correctly set 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 DNP/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 a FTP session use the command *bye*. This will cancel every operation between client and server. The figure 18 shows you these operations.

```

MS-DOS Eingabeaufforderung
331 Password required for gast.
Kennwort:
230 User gast logged in.
Ftp> binary
200 Type set to I.
Ftp> pwd
257 "/home/gast" is current directory.
Ftp> put midlets1.pdf
200 PORT command successful.
150 Opening BINARY mode data connection for 'midlets1.pdf'.
226 Transfer complete.
Ftp: 184320 Bytes gesendet in 2.09Sekunden 88.19KB/Sek.
Ftp> ls -al
200 PORT command successful.
150 Opening ASCII mode data connection for '/bin/ls'.
total 183
drwxr-xr-x  2 gast  users      96 Jan  1  00:16 .
drwxr-xr-x  3 root  root       96 Jan 25 12:50 ..
-rw-r----- 1 gast  users 184320 Jan  1 00:17 midlets1.pdf
226 Transfer complete.
Ftp: 173 Bytes empfangen in 0.00Sekunden 173000.00KB/Sek.
Ftp> bye
221 Goodbye.
C:\_temp>

```

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.

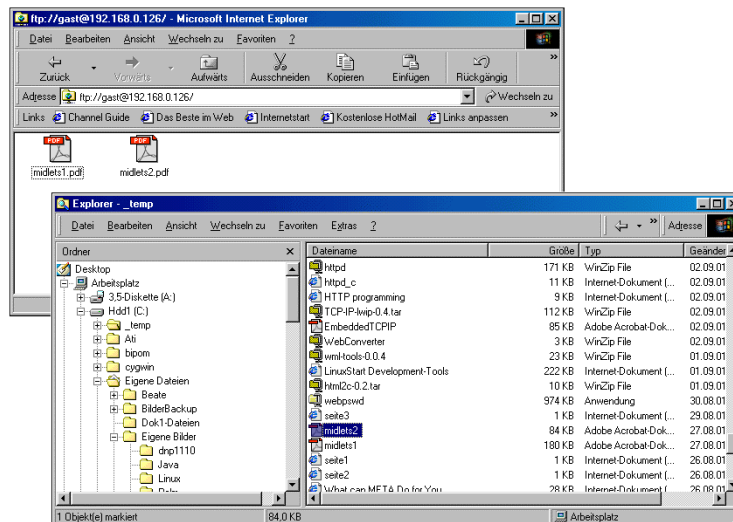


Figure 19: File transfer using the Internet Explorer

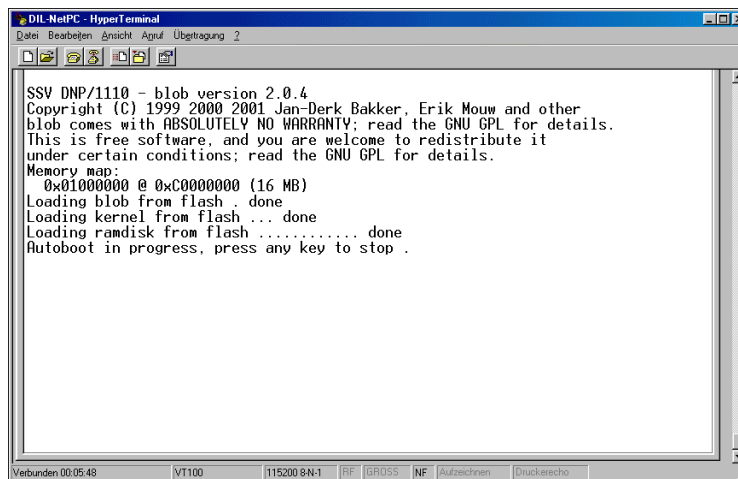
6.1.7 Embedded Linux Maintenance

The Embedded Linux of the DNP/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\DNP1110-Bin\rimage.gz`. The file *zimage* is placed in the directory `\Linux\DNP1110-Bin\zimage\bin\zimage`

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

6.1.8 Embedded Linux Maintenance via HyperTerminal/Serial Link

The DNP/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 DNP/1110. Now you have to invoke the Flash Loader. For this you have to press **CTRL+L** during the boot procedure. Figure 20 shows the BIOS report sequence.



```
SSV DNP/1110 - blob version 2.0.4
Copyright (C) 1999 2000 2001 Jan-Derk Bakker, Erik Mouw and other
blob comes with ABSOLUTELY NO WARRANTY: read the GNU GPL for details.
This is free software, and you are welcome to redistribute it
under certain conditions; read the GNU GPL for details.
Memory map:
 0x01000000 @ 0xC0000000 (16 MB)
Loading blob from flash . done
Loading kernel from flash ... done
Loading ramdisk from flash ..... done
Autoboot in progress, press any key to stop .
```

Figure 20: Boot Procedure

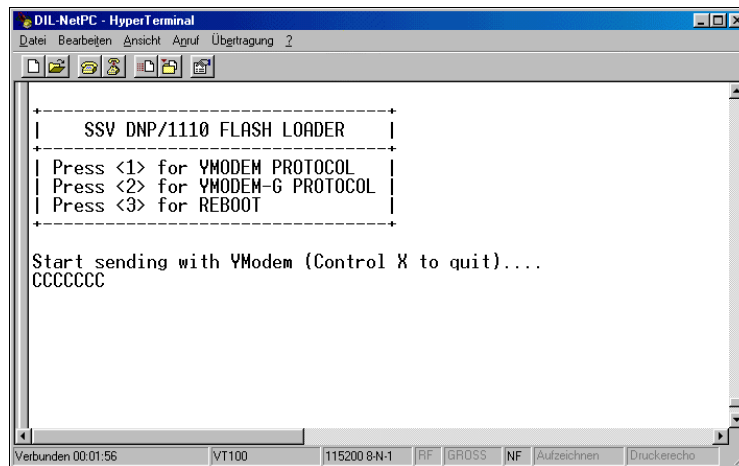


Figure 21: Flash Loader Messages

Once the BIOS detect the CTRL+L the Flash Loader invokes and offers three options (see Fig. 20). 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 to transfer is selected in the appearing window. During this status the Flash Loader is continuously sending the letter "C" to the console as you can see in figure 222. With this sign the YMODEM synchronizes the beginning of a file transmission.

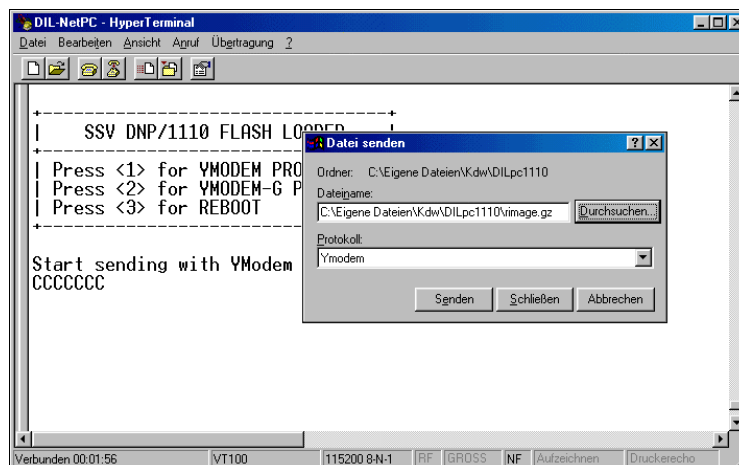


Figure 22: Flash Loader file Select

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

During the download you will see a progress bar that indicates the state of the transmission. Please wait absolutely until the file transmission ends and avoid interruptions. In case of an interruption or failure the DNP/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 DNP/1110 with the new kernel and/or root filesystem choose option "3" (REBOOT) from the Flash Loader menu.

6.2 Using a Linux–based development System

The following paragraphs will help you to use the DNP/1110 with a development system running under Linux. For this steps are some programs necessary that 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.

6.2.1 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 communications program originally written by Miquel van Smoorenburg. It offers base 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 DNP/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 become 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".

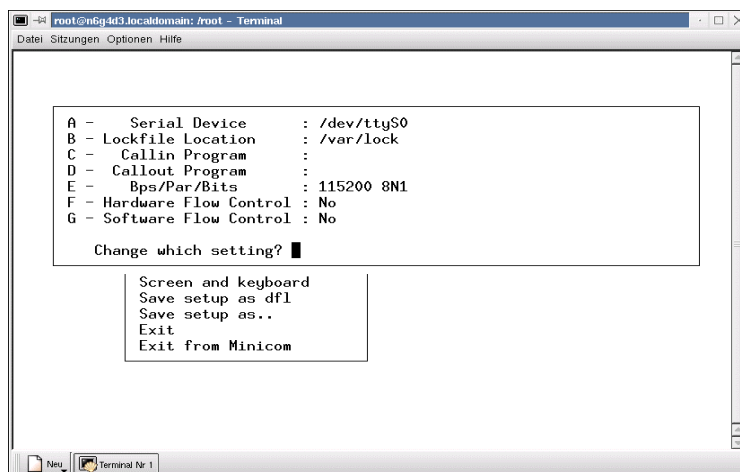
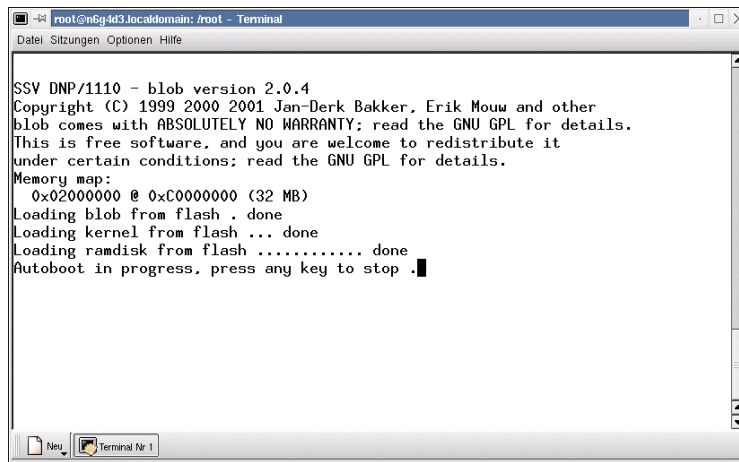


Figure 23: Serial Port Settings under Minicom

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

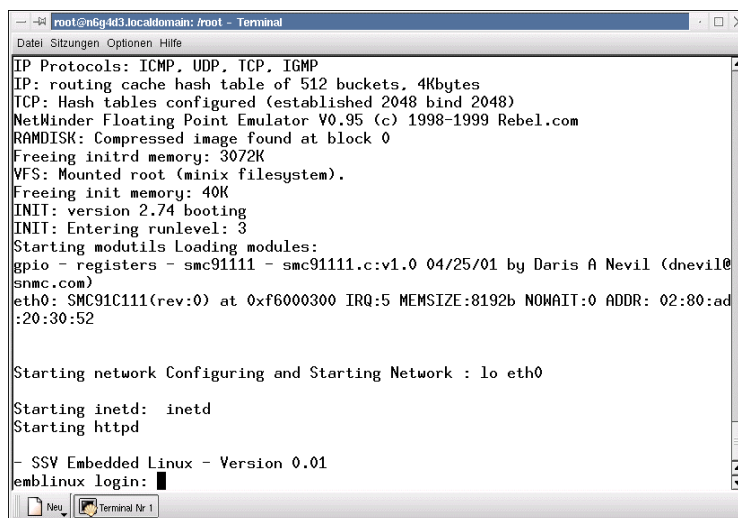


```
root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe

SSV DNP/1110 - blob version 2.0.4
Copyright (C) 1999 2000 2001 Jan-Derk Bakker, Erik Mouw and other
blob comes with ABSOLUTELY NO WARRANTY; read the GNU GPL for details.
This is free software, and you are welcome to redistribute it
under certain conditions; read the GNU GPL for details.
Memory map:
 0x02000000 @ 0xC0000000 (32 MB)
Loading blob from flash . done
Loading kernel from flash ... done
Loading ramdisk from flash ..... done
Autoboot in progress, press any key to stop .█
```

Figure 24: Boot Procedure

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



```
root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe

IP Protocols: ICMP, UDP, TCP, IGMP
IP: routing cache hash table of 512 buckets, 4Kbytes
TCP: Hash tables configured (established 2048 bind 2048)
NetWinder Floating Point Emulator V0.95 (c) 1998-1999 Rebel.com
RAMDISK: Compressed image found at block 0
Freeing initrd memory: 3072K
YFS: Mounted root (minix filesystem).
Freeing init memory: 40K
INIT: version 2.74 booting
INIT: Entering runlevel: 3
Starting modutils Loading modules:
gpio - registers - smc91111 - smc91111.c:v1.0 04/25/01 by Daris A Nevil (dnevil@
smc.com)
eth0: SMC91C111(rev:0) at 0xf6000300 IRQ:5 MEMSIZE:8192b NOWAIT:0 ADDR: 02:80:ad
:20:30:52

Starting network Configuring and Starting Network : lo eth0

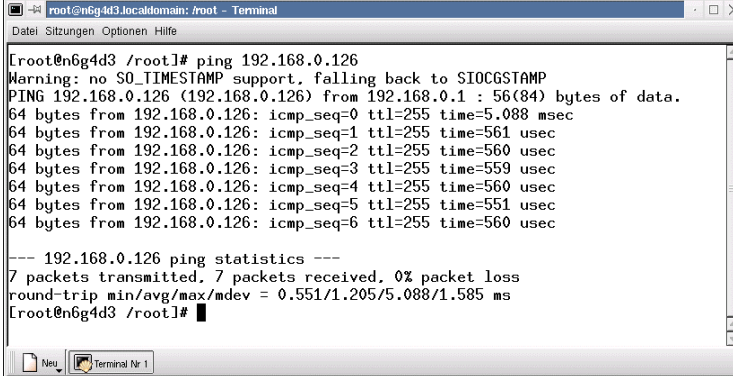
Starting inetd: inetd
Starting httpd

- SSV Embedded Linux - Version 0.01
emblinux login: █
```

Figure 25: Login Request

6.2.2 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 DNP/1110 similar as shown in figure 26.



```
root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe

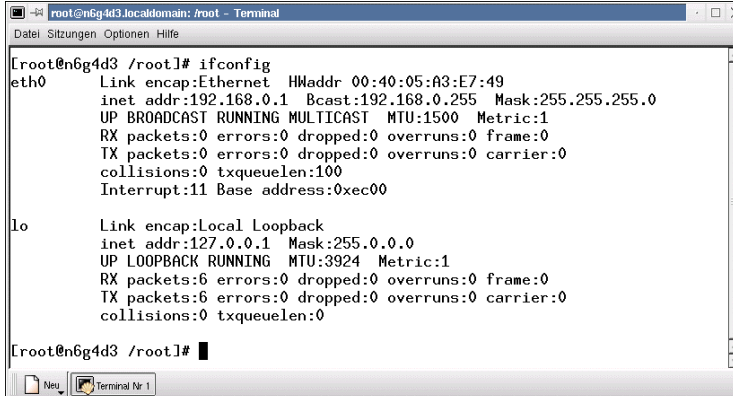
[root@n6g4d3 /root]# ping 192.168.0.126
Warning: no SO_TIMESTAMP support, falling back to SIOCGSTAMP
PING 192.168.0.126 (192.168.0.126) from 192.168.0.1 : 56(84) bytes of data.
64 bytes from 192.168.0.126: icmp_seq=0 ttl=255 time=5.088 msec
64 bytes from 192.168.0.126: icmp_seq=1 ttl=255 time=561 usec
64 bytes from 192.168.0.126: icmp_seq=2 ttl=255 time=560 usec
64 bytes from 192.168.0.126: icmp_seq=3 ttl=255 time=559 usec
64 bytes from 192.168.0.126: icmp_seq=4 ttl=255 time=560 usec
64 bytes from 192.168.0.126: icmp_seq=5 ttl=255 time=551 usec
64 bytes from 192.168.0.126: icmp_seq=6 ttl=255 time=560 usec

--- 192.168.0.126 ping statistics ---
7 packets transmitted, 7 packets received, 0% packet loss
round-trip min/avg/max/mdev = 0.551/1.205/5.088/1.585 ms
[root@n6g4d3 /root]#
```

Figure 26: Ping Request

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

Then you should check that 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*.



```
root@n6g4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe

[root@n6g4d3 /root]# ifconfig
eth0      Link encap:Ethernet  HWaddr 00:40:05:A3:E7:49
          inet addr:192.168.0.1  Bcast:192.168.0.255  Mask:255.255.255.0
          UP BROADCAST RUNNING MULTICAST  MTU:1500  Metric:1
          RX packets:0 errors:0 dropped:0 overruns:0 frame:0
          TX packets:0 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:100
          Interrupt:11 Base address:0xec00

lo        Link encap:Local Loopback
          inet addr:127.0.0.1  Mask:255.0.0.0
          UP LOOPBACK RUNNING  MTU:3924  Metric:1
          RX packets:6 errors:0 dropped:0 overruns:0 frame:0
          TX packets:6 errors:0 dropped:0 overruns:0 carrier:0
          collisions:0 txqueuelen:0

[root@n6g4d3 /root]#
```

Figure 27: IP-address check via ifconfig

6.2.3 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 automatically 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 DNP/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 DNP/1110 and shows you a static web page with some pictures. The figure 28 will show you this.

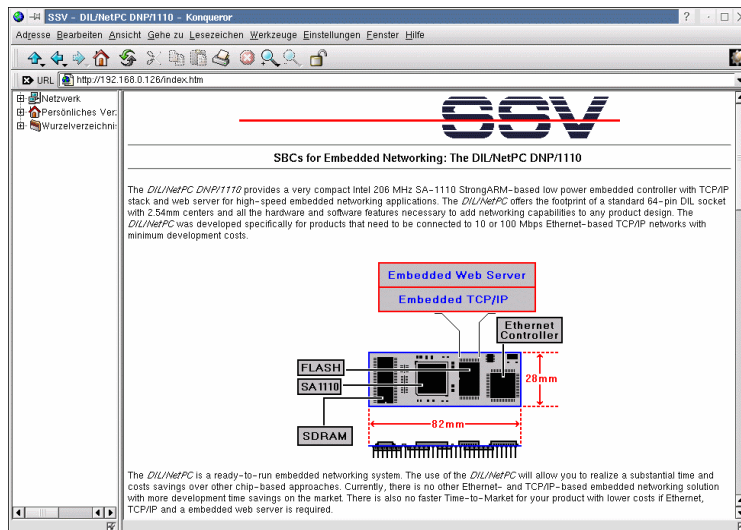
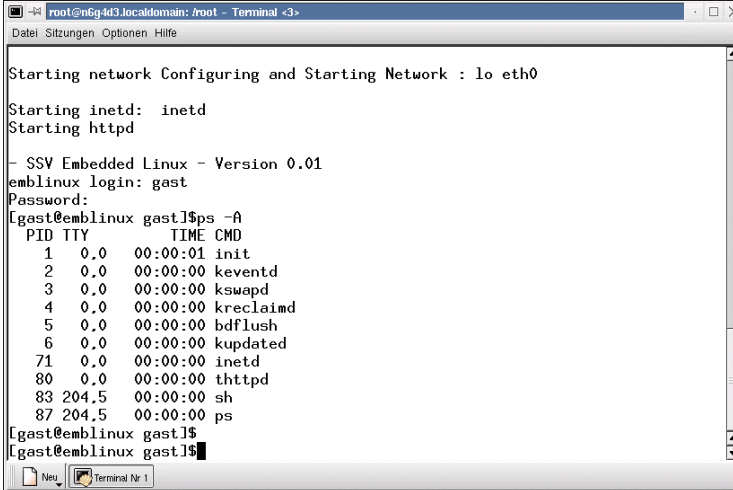


Figure 28: DNP/1110 Web page shown by the Konqueror File Manager

6.2.4 Login via Serial Console

Under Linux you can gain access onto the DNP/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.



```
root@nbg4d3.localdomain: /root - Terminal <3>
Datei Sitzungen Optionen Hilfe

Starting network Configuring and Starting Network : lo eth0

Starting inetd: inetd
Starting httpd

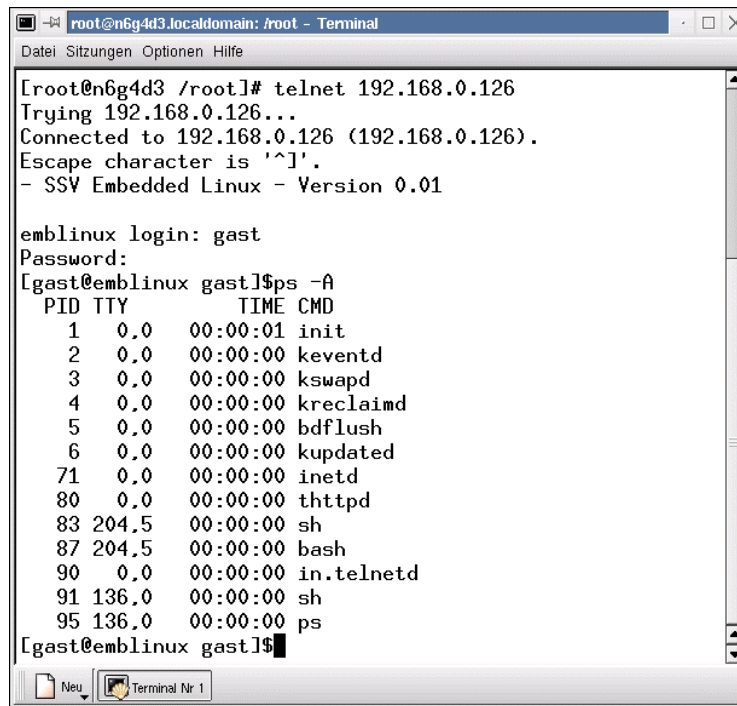
- SSV Embedded Linux - Version 0.01
emlinux login: gast
Password:
[gast@emlinux gast]$ps -A
  PID TTY          TIME CMD
    1  0.0   00:00:01 init
    2  0.0   00:00:00 keventd
    3  0.0   00:00:00 kswapd
    4  0.0   00:00:00 kreclaimd
    5  0.0   00:00:00 bdflush
    6  0.0   00:00:00 kupdated
   71  0.0   00:00:00 inetd
   80  0.0   00:00:00 thttpd
   83 204.5   00:00:00 sh
   87 204.5   00:00:00 ps
[gast@emlinux gast]$
[gast@emlinux gast]$
```

Figure 29: Login procedure via Minicom

6.2.5 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
```



```
[root@n6g4d3 /root]# telnet 192.168.0.126
Trying 192.168.0.126...
Connected to 192.168.0.126 (192.168.0.126).
Escape character is '^]'.
- SSV Embedded Linux - Version 0.01

emblinux login: gast
Password:
[gast@emblinux gast]$ps -A
  PID TTY          TIME CMD
    1  0.0   00:00:01 init
    2  0.0   00:00:00 keventd
    3  0.0   00:00:00 kswapd
    4  0.0   00:00:00 kreclaimd
    5  0.0   00:00:00 bdflush
    6  0.0   00:00:00 kupdated
   71  0.0   00:00:00 inetd
   80  0.0   00:00:00 thttpd
   83 204.5   00:00:00 sh
   87 204.5   00:00:00 bash
   90  0.0   00:00:00 in.telnetd
   91 136.0   00:00:00 sh
   95 136.0   00:00:00 ps
[gast@emblinux gast]$
```

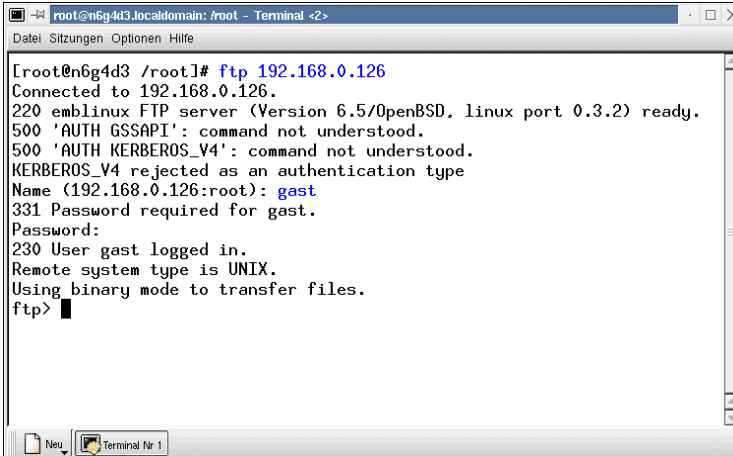
Figure 30: Login procedure via Telnet

Please pay attention, that this command will pass the IP-address of your DNP/1110 in shape of a parameter to the client.

6.2.6 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 build 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 DNP/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 a 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 a 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 the figure 31 you see the user inputs as highlighted text.



```
root@n6g4d3.localdomain: /root - Terminal <2>
Datei Sitzungen Optionen Hilfe
[root@n6g4d3 /root]# ftp 192.168.0.126
Connected to 192.168.0.126.
220 emlinux FTP server (Version 6.5/OpenBSD, linux port 0.3.2) ready.
500 'AUTH GSSAPI': command not understood.
500 'AUTH KERBEROS_V4': command not understood.
KERBEROS_V4 rejected as an authentication type
Name (192.168.0.126:root): gast
331 Password required for gast.
Password:
230 User gast logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp>
```

Figure 31: Login procedure via FTP

Now you are ready to transfer a file from a Linux-based development system to the DNP/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 DNP/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 a FTP session use the command **bye**.

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

```

root@m6g4d3.localdomain: /mnt/winc7/temp - Konsole
Datei Sitzungen Optionen Hilfe
331 Password required for gast.
Password:
230 User gast logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> pwd
257 "/home/gast" is current directory.
ftp> binary
200 Type set to I.
ftp> put midlets1.pdf
local: midlets1.pdf remote: midlets1.pdf
227 Entering Passive Mode (192.168.0.126,8,1)
150 Opening BINARY mode data connection for 'midlets1.pdf'.
226 Transfer complete.
184320 bytes sent in 0.69 seconds (2.6e+02 Kbytes/s)
ftp> ls -al
227 Entering Passive Mode (192.168.0.126,8,2)
150 Opening ASCII mode data connection for '/bin/ls'.
total 183
drwxr-xr-x  2 gast  users   128 Jan  1 09:11 .
drwxr-xr-x  3 root  root    96 Jan 25 12:50 ..
-rw-r----- 1 gast  users 184320 Jan  1 09:11 midlets1.pdf
226 Transfer complete.
ftp> bye
221 Goodbye.
[root@m6g4d3_temp]#

```

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.

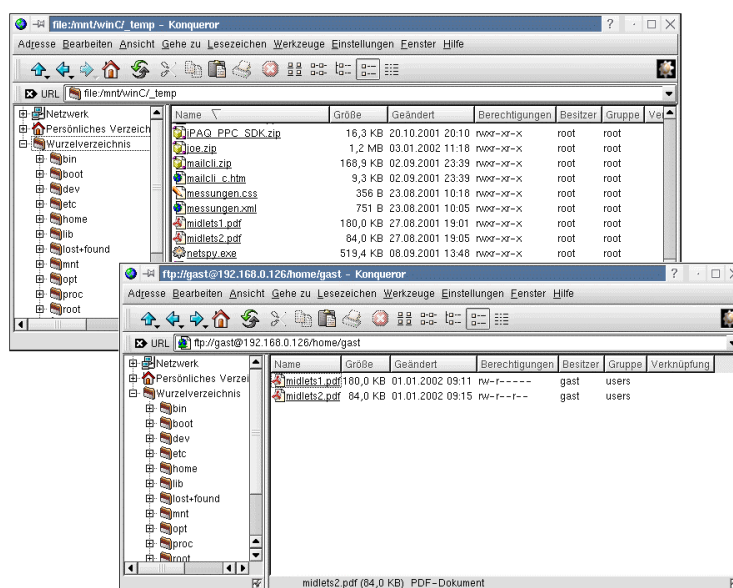


Figure 33: File transfer with the Konqueror

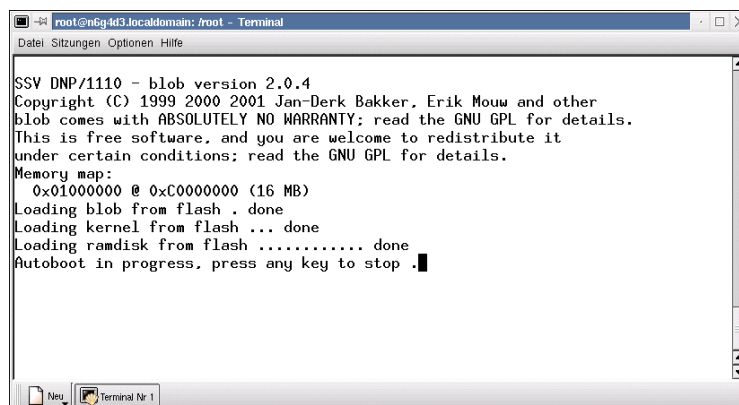
6.2.7 Embedded Linux Maintenance

The Embedded Linux of the DNP/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|DNP1110-Bin|rimage.gz`. The file *zimage* is placed in the directory `|Linux|DNP1110-Bin|zimage|bin|zimage`

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

6.2.8 Embedded Linux Maintenance via Minicom/Serial Link

The DNP/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 DNP/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.



```
root@nbg4d3.localdomain: /root - Terminal
Datei Sitzungen Optionen Hilfe

SSV DNP/1110 - blob version 2.0.4
Copyright (C) 1999 2000 2001 Jan-Derk Bakker, Erik Mouw and other
blob comes with ABSOLUTELY NO WARRANTY; read the GNU GPL for details.
This is free software, and you are welcome to redistribute it
under certain conditions; read the GNU GPL for details.
Memory map:
 0x01000000 @ 0xC0000000 (16 MB)
Loading blob from flash . done
Loading kernel from flash ... done
Loading ramdisk from flash ..... done
Autoboot in progress, press any key to stop .█
```

Figure 34: Boot Procedure

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

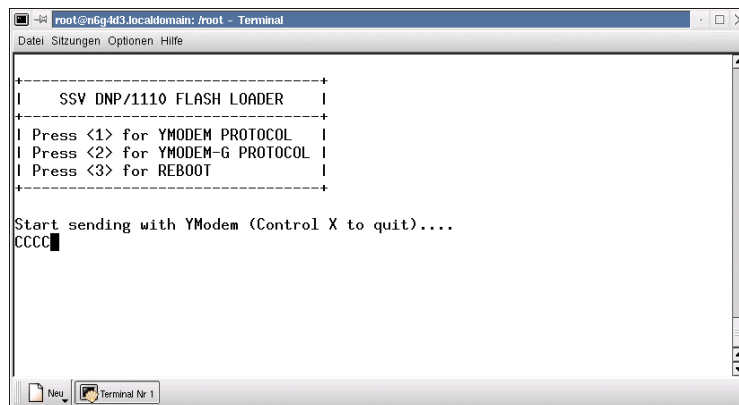


Figure 35: Flash Loader Messages

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 continuously 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.

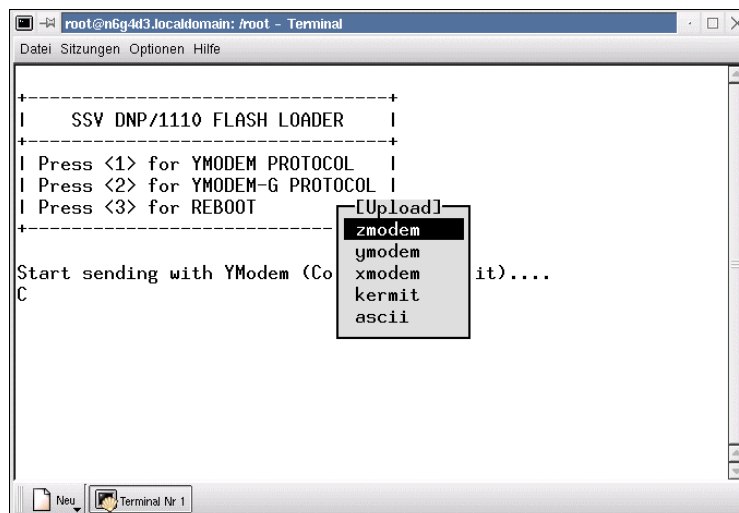


Figure 36: Transfer method Select

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.

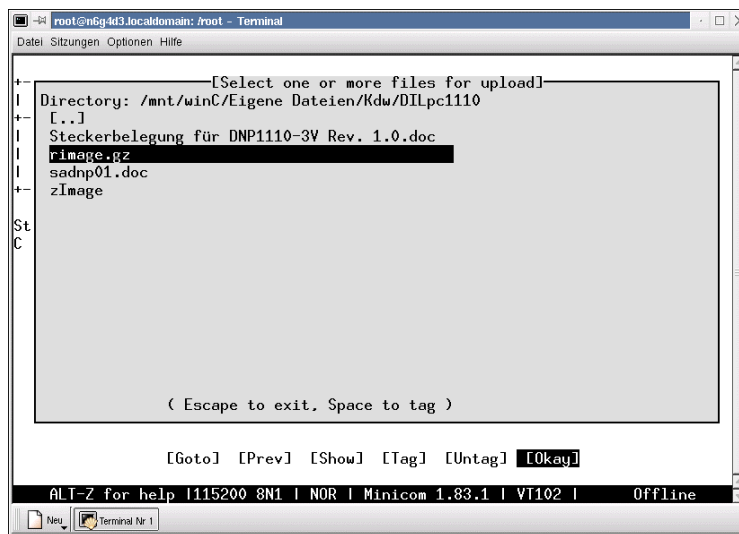


Figure 37: Transmission file Select

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 DNP/1110 would not contain any bootable system and you have to repeat the transmission procedure.

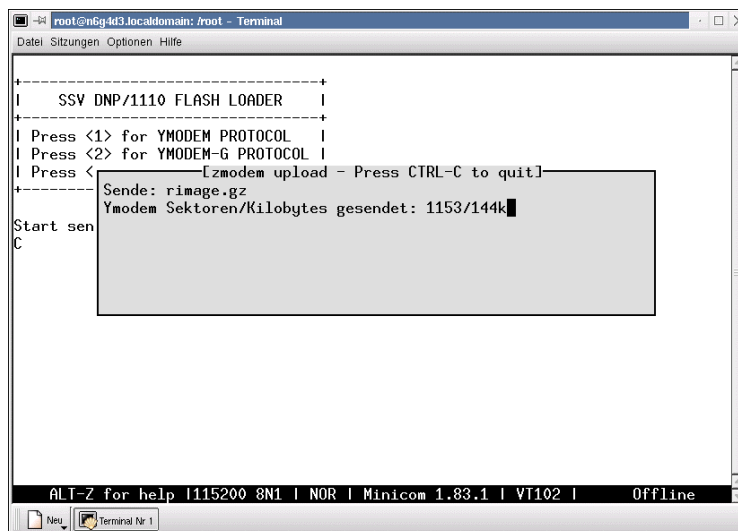


Figure 38: Transmission Status

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

6.2.9 Installation of the GNU Cross Toolchain

Within the scope of supply of the DNP/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 DNP/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 38 you can see the location of this tar-archive in the directory:

/Linux/DNP1110-ToolChain

This compressed archive has a size of approximately 85 MByte.

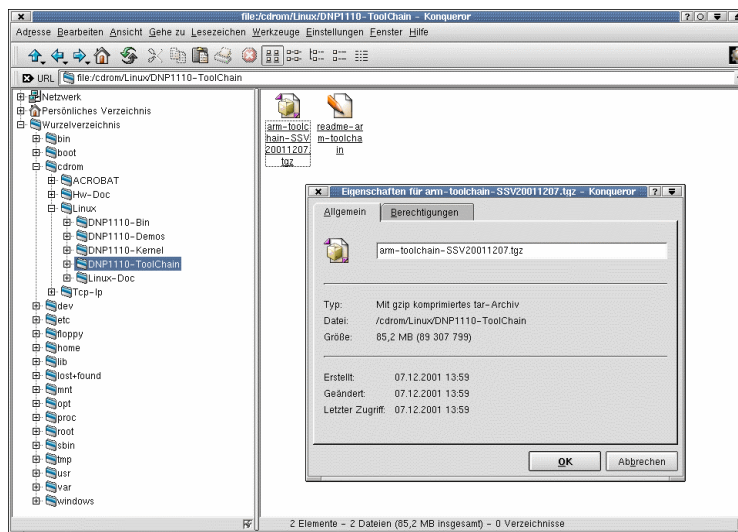


Figure 39: Location of the tar-archive on the Starter Kit CD-ROM

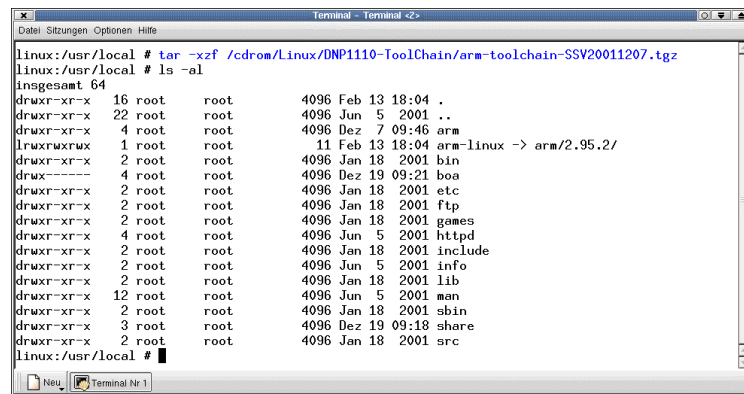
To install the toolchain archive on your Linux-based development system you have to be logged-in as Administrator with the respective rights. After this, you just have to unpack the entire tar-archive outgoing from the directory

/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/DNP1110-ToolChain/arm-toolchain-39SSV20011207.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.

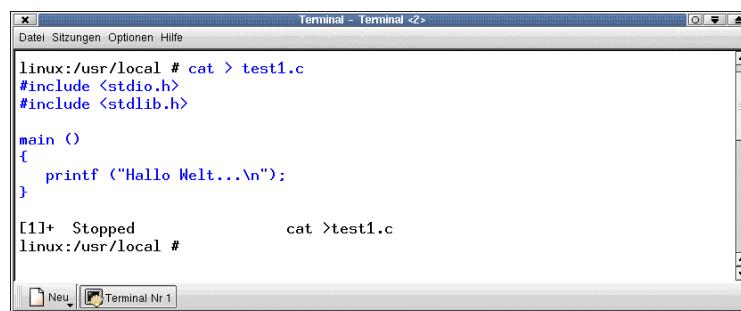


```
linux:/usr/local # tar -xzf /cdrom/Linux/DNP1110-ToolChain/arm-toolchain-SSV20011207.tgz
linux:/usr/local # ls -al
insgesamt 64
drwxr-xr-x 16 root root 4096 Feb 13 18:04 .
drwxr-xr-x 22 root root 4096 Jun 5 2001 ..
drwxr-xr-x 4 root root 4096 Dez 7 09:46 arm
lrwxrwxrwx 1 root root 11 Feb 13 18:04 arm-linux -> arm/2.95.2/
drwxr-xr-x 2 root root 4096 Jan 18 2001 bin
drwxr-xr-x 4 root root 4096 Dez 19 09:21 boa
drwxr-xr-x 2 root root 4096 Jan 18 2001 etc
drwxr-xr-x 2 root root 4096 Jan 18 2001 ftp
drwxr-xr-x 2 root root 4096 Jan 18 2001 games
drwxr-xr-x 4 root root 4096 Jun 5 2001 httpd
drwxr-xr-x 2 root root 4096 Jan 18 2001 include
drwxr-xr-x 2 root root 4096 Jun 5 2001 info
drwxr-xr-x 2 root root 4096 Jan 18 2001 lib
drwxr-xr-x 12 root root 4096 Jun 5 2001 man
drwxr-xr-x 2 root root 4096 Jan 18 2001 sbin
drwxr-xr-x 3 root root 4096 Dez 19 09:18 share
drwxr-xr-x 2 root root 4096 Jan 18 2001 src
linux:/usr/local #
```

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
```



```
linux:/usr/local # cat > test1.c
#include <stdio.h>
#include <stdlib.h>

main ()
{
    printf ("Hallo Welt...\n");
}

[[1]+ Stopped cat >test1.c
linux:/usr/local #
```

Figure 41: A simple C-Program

To complete the C source code input, please press the key combination **CTRL+Z**. 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
```

The figure 42 shows this command line.

The screenshot shows a terminal window titled 'Konsole - Konsole'. The prompt is 'linux:/usr/local #'. The user enters the command `/usr/local/arm/2.95.2/bin/arm-linux-gcc -o test1 test1.c`. The prompt changes to `linux:/usr/local #`. The user then enters `ls -al`. The output shows a directory listing for `/usr/local`. The file `test1` is listed with permissions `-rwxr-xr-x`, owner `root`, group `root`, size `11044`, date `Feb 14 10:44`, and name `test1`. The prompt returns to `linux:/usr/local #`.

Figure 42: C-source code Compiling

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

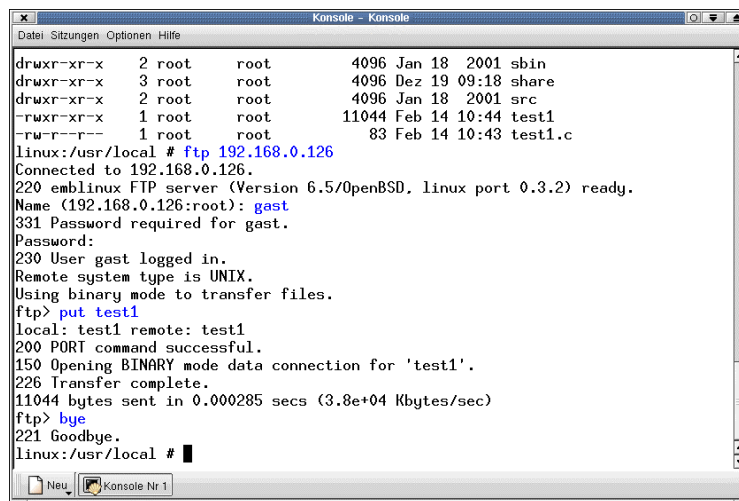
```
put test1
```

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 43 you see the required user inputs as highlighted text.

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



```

drwxr-xr-x  2 root   root    4096 Jan 18  2001 sbin
drwxr-xr-x  3 root   root    4096 Dec 19  09:18 share
drwxr-xr-x  2 root   root    4096 Jan 18  2001 src
-rwxr-xr-x  1 root   root   11044 Feb 14 10:44 test1
-rw-r--r--  1 root   root    83 Feb 14 10:43 test1.c
linux:/usr/local # ftp 192.168.0.126
Connected to 192.168.0.126.
220 emblinux FTP server (Version 6.5/OpenBSD, linux port 0.3.2) ready.
Name (192.168.0.126:root): gast
331 Password required for gast.
Password:
230 User gast logged in.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> put test1
local: test1 remote: test1
200 PORT command successful.
150 Opening BINARY mode data connection for 'test1'.
226 Transfer complete.
11044 bytes sent in 0.000285 secs (3.8e+04 Kbytes/sec)
ftp> bye
221 Goodbye.
linux:/usr/local #

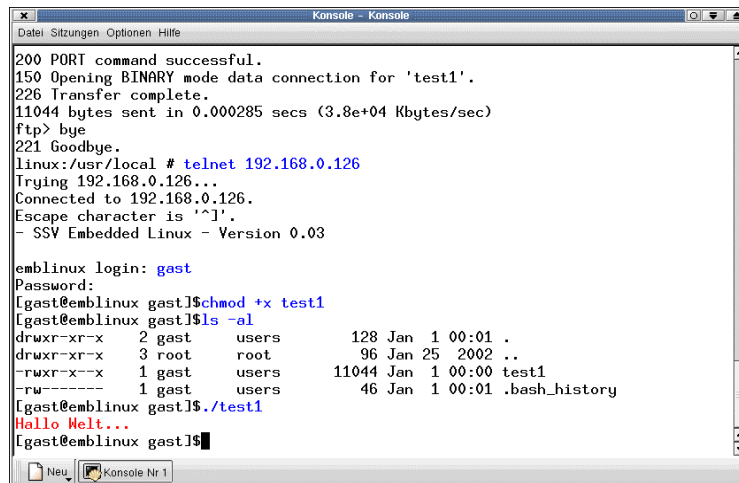
```

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



```

200 PORT command successful.
150 Opening BINARY mode data connection for 'test1'.
226 Transfer complete.
11044 bytes sent in 0.000285 secs (3.8e+04 Kbytes/sec)
ftp> bye
221 Goodbye.
linux:/usr/local # telnet 192.168.0.126
Trying 192.168.0.126...
Connected to 192.168.0.126.
Escape character is '^]'.
- SSV Embedded Linux - Version 0.03

emblinux login: gast
Password:
[gast@emblinux gast]$chmod +x test1
[gast@emblinux gast]$ls -al
drwxr-xr-x  2 gast   users    128 Jan  1 00:01 .
drwxr-xr-x  3 root   root     96 Jan 25 2002 ..
-rwxr-xr-x  1 gast   users   11044 Jan  1 00:00 test1
-rw-----  1 gast   users    46 Jan  1 00:01 .bash_history
[gast@emblinux gast]$./test1
Hallo Welt...
[gast@emblinux gast]$

```

Figure 44: Telnet Session

After the executable attribute were 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 transferred 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.

Appendix 1: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (1. Part)

Pin	Name	Group	Function
1	PA0	PIO	Parallel I/O, Port A, Bit 0
2	PA1	PIO	Parallel I/O, Port A, Bit 1
3	PA2	PIO	Parallel I/O, Port A, Bit 2
4	PA3	PIO	Parallel I/O, Port A, Bit 3
5	PA4	PIO	Parallel I/O, Port A, Bit 4
6	PA5	PIO	Parallel I/O, Port A, Bit 5
7	PA6	PIO	Parallel I/O, Port A, Bit 6
8	PA7	PIO	Parallel I/O, Port A, Bit 7
9	PB0	PIO	Parallel I/O, Port B, Bit 0
10	PB1	PIO	Parallel I/O, Port B, Bit 1
11	PB2	PIO	Parallel I/O, Port B, Bit 2
12	PB3	PIO	Parallel I/O, Port B, Bit 3
13	PB4	PIO	Parallel I/O, Port B, Bit 4
14	PB5	PIO	Parallel I/O, Port B, Bit 5
15	PB6	PIO	Parallel I/O, Port B, Bit 6
16	PB7	PIO	Parallel I/O, Port B, Bit 7
17	PC0	PIO	Parallel I/O, Port C, Bit 0
18	PC1	PIO	Parallel I/O, Port C, Bit 1
19	PC2	PIO	Parallel I/O, Port C, Bit 2
20	PC3	PIO	Parallel I/O, Port C, Bit 3
21	RXD1	SIO	COM1 Serial Port, RXD Pin
22	TXD1	SIO	COM1 Serial Port, TXD Pin
23	CTS1	SIO	COM1 Serial Port, CTS Pin
24	RTS1	SIO	COM1 Serial Port, RTS Pin
25	DCD1	SIO	COM1 Serial Port, DCD Pin
26	DSR1	SIO	COM1 Serial Port, DSR Pin
27	DTR1	SIO	COM1 Serial Port, DTR Pin
28	RI	SIO	COM1 Serial Port, RI Pin
29	RESIN	RESET	RESET Input
30	TX+	LAN	Ethernet Interface, TX+ Pin
31	TX-	LAN	Ethernet Interface, TX- Pin
32	GND	----	Ground

Table 4: DNP/1110 Pinout – Pin 1 to 32

Appendix 2: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (2. Part)

Pin	Name	Group	Function
33	RX+	LAN	Ethernet Interface, RX+ Pin
34	RX-	LAN	Ethernet Interface, RX- Pin
35	RESOUT	RESET	RESET Output
36	VBAT	PSP	Real Time Clock Battery Input
37	CLKOUT	PSP	Clock Output (Default 3.6864 MHz)
38	TXD2	PSP	COM2 Serial Port, TXD Pin
39	RXD2	PSP	COM2 Serial Port, RXD Pin
40	INT5	PSP	Interrupt Input 5
41	INT4	PSP	Interrupt Input 4
42	INT3	PSP	Interrupt Input 3
43	INT2	PSP	Interrupt Input 2
44	INT1	PSP	Interrupt Input 1
45	CS4	PSP	Chip Select Output 4
46	CS3	PSP	Chip Select Output 3
47	CS2	PSP	Chip Select Output 2
48	CS1	PSP	Chip Select Output 1
49	RDY	PSP	External Ready Input
50	RD	PSP	Read Signal, Expansion Bus
51	WR	PSP	Write Signal, Expansion Bus
52	SA3	PSP	Expansion Bus, Address Bit 3
53	SA2	PSP	Expansion Bus, Address Bit 2
54	SA1	PSP	Expansion Bus, Address Bit 1
55	SA0	PSP	Expansion Bus, Address Bit 0
56	SD7	PSP	Expansion Bus, Data Bit 7
57	SD6	PSP	Expansion Bus, Data Bit 6
58	SD5	PSP	Expansion Bus, Data Bit 5
59	SD4	PSP	Expansion Bus, Data Bit 4
60	SD3	PSP	Expansion Bus, Data Bit 3
61	SD2	PSP	Expansion Bus, Data Bit 2
62	SD1	PSP	Expansion Bus, Data Bit 1
63	SD0	PSP	Expansion Bus, Data Bit 0
64	VCC	----	3.3 Volt Power Input

Table 5: DNP/1110 Pinout – Pin 33 to 64

Appendix 3: DNP/1110 Memory Map

Physical Addr.	Virtual Addr.	Description	Cached	Buffered	Access
0x00000000-0x07FFFFFFF	0xE8000000-0xEFFFFFFF	16 Mbyte FLASH	No	No	R/W
0x20000000-0x20FFFFFFF	0xF6000000-0xF6FFFFFFF	Ethernet Controller	No	No	R/W
0x30000000-0x30FFFFFFF	None	Chip Select Signal CS1	No	No	R/W
0x31000000-0x31FFFFFFF	None	Chip Select Signal CS2	No	No	R/W
0x32000000-0x32FFFFFFF	None	Chip Select Signal CS3	No	No	R/W
0x33000000-0x33FFFFFFF	None	Chip Select Signal CS4	No	No	R/W
0x80000000-0xB7FFFFFFF	0x80000000-0xB7FFFFFFF	SA-1110 internal Registers	No	No	R/W
0xC0000000-0xC7FFFFFFF	0x00000000-0x07FFFFFFF	32 Mbyte SDRAM	Yes	Yes	R/W

Table 6: DNP/1110 Memory Map

Appendix 4: Using the Compact Flash (CF)-Interface

The DNP/1110 offers the possibility to connect a Compact Flash (CF) adapter to realize different system expansions. Figure 45 shows a general diagram how to connect a CF-interface onto the DNP/1110.

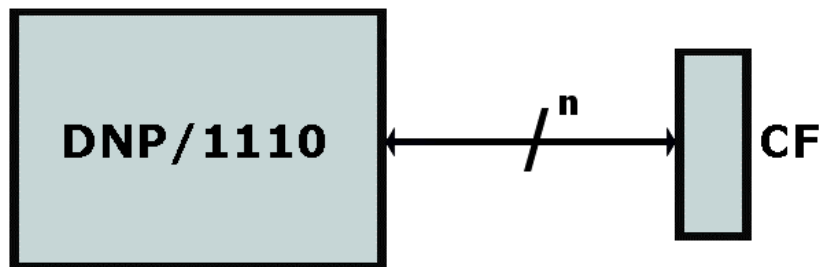


Figure 45: DNP/1110 CF-Interface Connection

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 7 shows which connections have to be made between the pins of the DNP/1110 and the 8-bit Compact Flash interface.

Table 7 shows which connections have to be made between the pins of the DNP/1110 and the 8-bit Compact Flash interface.

From		To	Function
DNP/1110 Pin	Other	CF Pin	
63		21	Data 0
62		22	Data 1
61		23	Data 2
60		2	Data 3
59		3	Data 4
58		4	Data 5
57		5	Data 6
56		6	Data 7
55		20	Addr. 0
54		19	Addr. 1
53		18	Addr. 2
52		17	Addr. 3
51		36	WR#
50		9	RD#
48 (CS1)		7	CF.CS#
	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 7: CF-Interface Pin Usage

Note: To use our standard Compact Flash device driver for the DNP/1110 make sure that CF.CS# (Pin 7 of Compact Flash) is connected to CS1.

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 the 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 5: GNU General Public License

GNU GENERAL PUBLIC LICENSE. Version 2, June 1991. Copyright © 1989, 1991 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed.

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public License is intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users. This General Public License applies to most of the Free Software Foundation’s software and to any other program whose authors commit to using it. (Some other Free Software Foundation software is covered by the GNU Library General Public License instead.) You can apply it to your programs, too.

When we speak of free software, we are referring to freedom, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish), that you receive source code or can get it if you want it, that you can change the software or use pieces of it in new free programs; and that you know you can do these things.

To protect your rights, we need to make restrictions that forbid anyone to deny you these rights or to ask you to surrender the rights. These restrictions translate to certain responsibilities for you if you distribute copies of the software, or if you modify it.

For example, if you distribute copies of such a program, whether gratis or for a fee, you must give the recipients all the rights that you have. You must make sure that they, too, receive or can get the source code. And you must show them these terms so they know their rights.

We protect your rights with two steps: (1) copyright the software, and (2) offer you this license which gives you legal permission to copy, distribute and/or modify the software.

Also, for each author’s protection and ours, we want to make certain that everyone understands that there is no warranty for this free software. If the software is modified by someone else and passed on, we want its recipients to know that what they have is not the original, so that any problems introduced by others will not reflect on the original authors’ reputations.

Finally, any free program is threatened constantly by software patents. We wish to avoid the danger that redistributors of a free program will individually obtain patent licenses, in effect making the program proprietary. To prevent this, we have made it clear that any patent must be licensed for everyone’s free use or not licensed at all.

The precise terms and conditions for copying, distribution and modification follow.

GNU GENERAL PUBLIC LICENSE. TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

1. This License applies to any program or other work which contains a notice placed by the copyright holder saying it may be distributed under the terms of this General Public License. The “Program”, below, refers to any such program or work, and a “work based on the Program” means either the Program or any derivative work under copyright law: that is to say, a work containing the Program or a portion of it, either verbatim or with modifications and/or translated into another language. (Hereinafter, translation is included without limitation in the term “modification”.)

Each license is addressed as “you”.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running the Program is not restricted, and the output from the Program is covered only if its contents constitute a work based on the Program (independent of having been made by running the Program). Whether that is true depends on what the Program does.

1. You may copy and distribute verbatim copies of the Program’s source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and give any other recipients of the Program a copy of this License along with the Program.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Program or any portion of it, thus forming a work based on the Program, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

1. You must cause the modified files to carry prominent notices stating that you changed the files and the date of any change.

- b) You must cause any work that you distribute or publish, that in whole or in part contains or is derived from the Program or any part thereof, to be licensed as a whole at no charge to all third parties under the terms of this License.

- c) If the modified program normally reads commands interactively when run, you must cause it, when started running for such interactive use in the most ordinary way, to print or display an announcement including an appropriate copyright notice and a notice that there is no warranty (or else, saying that you provide a warranty) and that users may redistribute the program under these conditions, and telling the user how to view a copy of this License. (Exception: if the Program itself is interactive but does not normally print such an announcement, your work based on the Program is not required to print an announcement.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Program, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Program, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Program.

In addition, mere aggregation of another work not based on the Program with the Program (or with a work based on the Program) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may copy and distribute the Program (or a work based on it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you also do one of the following:

1. Accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

b) Accompany it with a written offer, valid for at least three years, to give any third party, for a charge no more than your cost of physically performing source distribution, a complete machine-readable copy of the corresponding source code, to be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange; or,

c) Accompany it with the information you received as to the offer to distribute corresponding source code. (This alternative is allowed only for noncommercial distribution and only if you received the program in object code or executable form with such an offer, in accord with Subsection b above.)

The source code for a work means the preferred form of the work for making modifications to it. For an executable work, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the executable. However, as a special exception, the source code distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

If distribution of executable or object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place counts as distribution of the source code, even though third parties are not compelled to copy the source along with the object code.

4. You may not copy, modify, sublicense, or distribute the Program except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense or distribute the Program is void, and will automatically terminate your rights under this License.

However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

5. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Program or its derivative works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Program (or any work based on the Program), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Program or works based on it.

6. Each time you redistribute the Program (or any work based on the Program), the recipient automatically receives a license from the original licensor to copy, distribute or modify the Program subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein.

You are not responsible for enforcing compliance by third parties to this License.

7. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Program at all. For example, if a patent license would not permit royalty-free redistribution of the Program by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Program.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system, which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

8. If the distribution and/or use of the Program is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Program under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

9. The Free Software Foundation may publish revised and/or new versions of the General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Program specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Program does not specify a version number of this License, you may choose any version ever published by the Free Software Foundation.

10. If you wish to incorporate parts of the Program into other free programs whose distribution conditions are different, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

11. BECAUSE THE PROGRAM IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE PROGRAM, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE PROGRAM “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE PROGRAM IS WITH YOU. SHOULD THE PROGRAM PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

12. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE PROGRAM AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PROGRAM (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE PROGRAM TO OPERATE WITH ANY OTHER PROGRAMS), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Programs

If you develop a new program, and you want it to be of the greatest possible use to the public, the best way to achieve this is to make it free software which everyone can redistribute and change under these terms.

To do so, attach the following notices to the program. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

```
<one line to give the program's name and a brief idea of what it does.>  
Copyright © <year> <name of author>
```

This program is free software; you can redistribute it and/or modify it under the terms of the GNU General Public License as published by the Free Software foundation; either version 2 of the License, or (at your option) any later version.

This program is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE. See the GNU General Public License for more details.

You should have received a copy of the GNU General Public License along with this program; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail.

If the program is interactive, make it output a short notice like this when it starts in an interactive mode:

```
Gnomovision version 69, Copyright © year name of author  
Gnomovision comes with ABSOLUTELY NO WARRANTY; for details type `show w'.  
This is free software, and you are welcome to redistribute it under certain conditions;  
type `show c' for details.
```

The hypothetical commands `show w' and `show c' should show the appropriate parts of the General Public License. Of course, the commands you use may be called something other than `show w' and `show c'; they could even be mouse-clicks or menu items—whatever suits your program.

You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the program, if necessary. Here is a sample; alter the names:

```
Yoyodyne, Inc., hereby disclaims all copyright interest in the program `Gnomovision'  
(which makes passes at compilers) written by James Hacker.
```

```
<signature of Ty Coon>, 1 April 1989  
Ty Coon, President of Vice
```

This General Public License does not permit incorporating your program into proprietary programs. If your program is a subroutine library, you may consider it more useful to permit linking proprietary applications with the library. If this is what you want to do, use the GNU Library General Public License instead of this License.

Appendix 6: GNU Lesser General Public License

GNU LESSER GENERAL PUBLIC LICENSE. Version 2.1, February 1999. Copyright © 1991, 1999 Free Software Foundation, Inc. 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA. Everyone is permitted to copy and distribute verbatim copies of this license document, but changing it is not allowed. [This is the first released version of the Lesser GPL. It also counts as the successor of the GNU Library Public License, version 2, hence the version number 2.1.]

Preamble

The licenses for most software are designed to take away your freedom to share and change it. By contrast, the GNU General Public Licenses are intended to guarantee your freedom to share and change free software—to make sure the software is free for all its users.

This license, the Lesser General Public License, applies to some specially designated software packages—typically libraries—of the Free Software Foundation and other authors who decide to use it. You can use it too, but we suggest you first think carefully about whether this license or the ordinary General Public License is the better strategy to use in any particular case, based on the explanations below.

When we speak of free software, we are referring to freedom of use, not price. Our General Public Licenses are designed to make sure that you have the freedom to distribute copies of free software (and charge for this service if you wish); that you receive source code or can get it if you want it; that you can change the software and use pieces of it in new free programs; and that you are informed that you can do these things.

To protect your rights, we need to make restrictions that forbid distributors to deny you these rights or to ask you to surrender these rights. These restrictions translate to certain responsibilities for you if you distribute copies of the library or if you modify it.

For example, if you distribute copies of the library, whether gratis or for a fee, you must give the recipients all the rights that we gave you. You must make sure that they, too, receive or can get the source code. If you link other code with the library, you must provide complete object files to the recipients, so that they can relink them with the library after making changes to the library and recompiling it. And you must show them these terms so they know their rights. We protect your rights with a two-step method: (1) we copyright the library, and (2) we offer you this license, which gives you legal permission to copy, distribute and/or modify the library.

To protect each distributor, we want to make it very clear that there is no warranty for the free library. Also, if the library is modified by someone else and passed on, the recipients should know that what they have is not the original version, so that the original author's reputation will not be affected by problems that might be introduced by others.

Finally, software patents pose a constant threat to the existence of any free program. We wish to make sure that a company cannot effectively restrict the users of a free program by obtaining a restrictive license from a patent holder. Therefore, we insist that any patent license obtained for a version of the library must be consistent with the full freedom of use specified in this license.

Most GNU software, including some libraries, is covered by the ordinary GNU General Public License. This license, the GNU Lesser General Public License, applies to certain designated libraries, and is quite different from the ordinary General Public License. We use this license for certain libraries in order to permit linking those libraries into non-free programs.

When a program is linked with a library, whether statically or using a shared library, the combination of the two is legally speaking a combined work, a derivative of the original library. The ordinary General Public License therefore permits such linking only if the entire combination fits its criteria of freedom.

The Lesser General Public License permits more lax criteria for linking other code with the library.

We call this license the “Lesser” General Public License because it does Less to protect the user’s freedom than the ordinary General Public License. It also provides other free software developers Less of an advantage over competing non-free programs. These disadvantages are the reason we use the ordinary General Public License for many libraries. However, the Lesser license provides advantages in certain special circumstances.

For example, on rare occasions, there may be a special need to encourage the widest possible use of a certain library, so that it becomes a de-facto standard. To achieve this, non-free programs must be allowed to use the library. A more frequent case is that a free library does the same job as widely used non-free libraries. In this case, there is little to gain by limiting the free library to free software only, so we use the Lesser General Public License.

In other cases, permission to use a particular library in non-free programs enables a greater number of people to use a large body of free software. For example, permission to use the GNU C Library in non-free programs enables many more people to use the whole GNU operating system, as well as its variant, the GNU/Linux operating system.

Although the Lesser General Public License is Less protective of the users’ freedom, it does ensure that the user of a program that is linked with the Library has the freedom and the wherewithal to run that program using a modified version of the Library.

The precise terms and conditions for copying, distribution and modification follow. Pay close attention to the difference between a “work based on the library” and a “work that uses the library”. The former contains code derived from the library, whereas the latter must be combined with the library in order to run.

GNU LESSER GENERAL PUBLIC LICENSE. TERMS AND CONDITIONS FOR COPYING, DISTRIBUTION AND MODIFICATION

1. This License Agreement applies to any software library or other program which contains a notice placed by the copyright holder or other authorized party saying it may be distributed under the terms of this Lesser General Public License (also called “this License”). Each licensee is addressed as “you”.

A “library” means a collection of software functions and/or data prepared so as to be conveniently linked with application programs (which use some of those functions and data) to form executables.

The “Library”, below, refers to any such software library or work which has been distributed under these terms. A “work based on the Library” means either the Library or any derivative work under copyright law: that is to say, a work containing the Library or a portion of it, either verbatim or with modifications and/or translated straightforwardly into another language. (Hereinafter, translation is included without limitation in the term “modification”.)

“Source code” for a work means the preferred form of the work for making modifications to it. For a library, complete source code means all the source code for all modules it contains, plus any associated interface definition files, plus the scripts used to control compilation and installation of the library.

Activities other than copying, distribution and modification are not covered by this License; they are outside its scope. The act of running a program using the Library is not restricted, and output from such a program is covered only if its contents constitute a work based on the Library (independent of the use of the Library in a tool for writing it). Whether that is true depends on what the Library does and what the program that uses the Library does.

1. You may copy and distribute verbatim copies of the Library's complete source code as you receive it, in any medium, provided that you conspicuously and appropriately publish on each copy an appropriate copyright notice and disclaimer of warranty; keep intact all the notices that refer to this License and to the absence of any warranty; and distribute a copy of this License along with the Library.

You may charge a fee for the physical act of transferring a copy, and you may at your option offer warranty protection in exchange for a fee.

2. You may modify your copy or copies of the Library or any portion of it, thus forming a work based on the Library, and copy and distribute such modifications or work under the terms of Section 1 above, provided that you also meet all of these conditions:

1. The modified work must itself be a software library.
- b) You must cause the files modified to carry prominent notices stating that you changed the files and the date of any change.
- c) You must cause the whole of the work to be licensed at no charge to all third parties under the terms of this License.
- d) If a facility in the modified Library refers to a function or a table of data to be supplied by an application program that uses the facility, other than as an argument passed when the facility is invoked, then you must make a good faith effort to ensure that, in the event an application does not supply such function or table, the facility still operates, and performs whatever part of its purpose remains meaningful. (For example, a function in a library to compute square roots has a purpose that is entirely well-defined independent of the application. Therefore, Subsection 2d requires that any application-supplied function or table used by this function must be optional: if the application does not supply it, the square root function must still compute square roots.)

These requirements apply to the modified work as a whole. If identifiable sections of that work are not derived from the Library, and can be reasonably considered independent and separate works in themselves, then this License, and its terms, do not apply to those sections when you distribute them as separate works. But when you distribute the same sections as part of a whole which is a work based on the Library, the distribution of the whole must be on the terms of this License, whose permissions for other licensees extend to the entire whole, and thus to each and every part regardless of who wrote it.

Thus, it is not the intent of this section to claim rights or contest your rights to work written entirely by you; rather, the intent is to exercise the right to control the distribution of derivative or collective works based on the Library.

In addition, mere aggregation of another work not based on the Library with the Library (or with a work based on the Library) on a volume of a storage or distribution medium does not bring the other work under the scope of this License.

3. You may opt to apply the terms of the ordinary GNU General Public License instead of this License to a given copy of the Library. To do this, you must alter all the notices that refer to this License, so that they refer to the ordinary GNU General Public License, version 2, instead of to this License. (If a newer version than version 2 of the ordinary GNU General Public License has appeared, then you can specify that version instead if

you wish.) Do not make any other change in these notices.

Once this change is made in a given copy, it is irreversible for that copy, so the ordinary GNU General Public License applies to all subsequent copies and derivative works made from that copy.

This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

4. You may copy and distribute the Library (or a portion or derivative of it, under Section 2) in object code or executable form under the terms of Sections 1 and 2 above provided that you accompany it with the complete corresponding machine-readable source code, which must be distributed under the terms of Sections 1 and 2 above on a medium customarily used for software interchange.

If distribution of object code is made by offering access to copy from a designated place, then offering equivalent access to copy the source code from the same place satisfies the requirement to distribute the source code, even though third parties are not compelled to copy the source along with the object code.

5. A program that contains no derivative of any portion of the Library, but is designed to work with the Library by being compiled or linked with it, is called a “work that uses the Library”. Such a work, in isolation, is not a derivative work of the Library, and therefore falls outside the scope of this License.

However, linking a “work that uses the Library” with the Library creates an executable that is a derivative of the Library (because it contains portions of the Library), rather than a “work that uses the library”. The executable is therefore covered by this License. Section 6 states terms for distribution of such executables.

When a “work that uses the Library” uses material from a header file that is part of the Library, the object code for the work may be a derivative work of the Library even though the source code is not. Whether this is true is especially significant if the work can be linked without the Library, or if the work is itself a library. The threshold for this to be true is not precisely defined by law.

If such an object file uses only numerical parameters, data structure layouts and accessors, and small macros and small inline functions (ten lines or less in length), then the use of the object file is unrestricted, regardless of whether it is legally a derivative work. (Executables containing this object code plus portions of the Library will still fall under Section 6.)

Otherwise, if the work is a derivative of the Library, you may distribute the object code for the work under the terms of Section 6. Any executables containing that work also fall under Section 6, whether or not they are linked directly with the Library itself.

6. As an exception to the Sections above, you may also combine or link a “work that uses the Library” with the Library to produce a work containing portions of the Library, and distribute that work under terms of your choice, provided that the terms permit modification of the work for the customer’s own use and reverse engineering for debugging such modifications.

You must give prominent notice with each copy of the work that the Library is used in it and that the Library and its use are covered by this License. You must supply a copy of this License. If the work during execution displays copyright notices, you must include the copyright notice for the Library among them, as well as a reference directing the user to the copy of this License. Also, you must do one of these things:

1. Accompany the work with the complete corresponding machine-readable source code for the Library including whatever changes were used in the work (which must be

distributed under Sections 1 and 2 above); and, if the work is an executable linked with the Library, with the complete machine-readable “work that uses the Library”, as object code and/or source code, so that the user can modify the Library and then relink to produce a modified executable containing the modified Library. (It is understood that the user who changes the contents of definitions files in the Library will not necessarily be able to recompile the application to use the modified definitions.)

- b) Use a suitable shared library mechanism for linking with the Library. A suitable mechanism is one that (1) uses at run time a copy of the library already present on the user’s computer system, rather than copying library functions into the executable, and (2) will operate properly with a modified version of the library, if the user installs one, as long as the modified version is interface-compatible with the version that the work was made with.
- c) Accompany the work with a written offer, valid for at least three years, to give the same user the materials specified in Subsection 6a, above, for a charge no more than the cost of performing this distribution.
- d) If distribution of the work is made by offering access to copy from a designated place, offer equivalent access to copy the above specified materials from the same place.
- e) Verify that the user has already received a copy of these materials or that you have already sent this user a copy.

For an executable, the required form of the “work that uses the Library” must include any data and utility programs needed for reproducing the executable from it. However, as a special exception, the materials to be distributed need not include anything that is normally distributed (in either source or binary form) with the major components (compiler, kernel, and so on) of the operating system on which the executable runs, unless that component itself accompanies the executable.

It may happen that this requirement contradicts the license restrictions of other proprietary libraries that do not normally accompany the operating system. Such a contradiction means you cannot use both them and the Library together in an executable that you distribute.

7. You may place library facilities that are a work based on the Library side-by-side in a single library together with other library facilities not covered by this License, and distribute such a combined library, provided that the separate distribution of the work based on the Library and of the other library facilities is otherwise permitted, and provided that you do these two things:

- 1. Accompany the combined library with a copy of the same work based on the Library, uncombined with any other library facilities. This must be distributed under the terms of the Sections above.
- b) Give prominent notice with the combined library of the fact that part of it is a work based on the Library, and explaining where to find the accompanying uncombined form of the same work.

8. You may not copy, modify, sublicense, link with, or distribute the Library except as expressly provided under this License. Any attempt otherwise to copy, modify, sublicense, link with, or distribute the Library is void, and will automatically terminate your rights under this License. However, parties who have received copies, or rights, from you under this License will not have their licenses terminated so long as such parties remain in full compliance.

9. You are not required to accept this License, since you have not signed it. However, nothing else grants you permission to modify or distribute the Library or its derivative

works. These actions are prohibited by law if you do not accept this License. Therefore, by modifying or distributing the Library (or any work based on the Library), you indicate your acceptance of this License to do so, and all its terms and conditions for copying, distributing or modifying the Library or works based on it.

10. Each time you redistribute the Library (or any work based on the Library), the recipient automatically receives a license from the original licensor to copy, distribute, link with or modify the Library subject to these terms and conditions. You may not impose any further restrictions on the recipients' exercise of the rights granted herein. You are not responsible for enforcing compliance by third parties with this License.

11. If, as a consequence of a court judgment or allegation of patent infringement or for any other reason (not limited to patent issues), conditions are imposed on you (whether by court order, agreement or otherwise) that contradict the conditions of this License, they do not excuse you from the conditions of this License. If you cannot distribute so as to satisfy simultaneously your obligations under this License and any other pertinent obligations, then as a consequence you may not distribute the Library at all. For example, if a patent license would not permit royalty-free redistribution of the Library by all those who receive copies directly or indirectly through you, then the only way you could satisfy both it and this License would be to refrain entirely from distribution of the Library.

If any portion of this section is held invalid or unenforceable under any particular circumstance, the balance of the section is intended to apply, and the section as a whole is intended to apply in other circumstances.

It is not the purpose of this section to induce you to infringe any patents or other property right claims or to contest validity of any such claims; this section has the sole purpose of protecting the integrity of the free software distribution system which is implemented by public license practices. Many people have made generous contributions to the wide range of software distributed through that system in reliance on consistent application of that system; it is up to the author/donor to decide if he or she is willing to distribute software through any other system and a licensee cannot impose that choice.

This section is intended to make thoroughly clear what is believed to be a consequence of the rest of this License.

12. If the distribution and/or use of the Library is restricted in certain countries either by patents or by copyrighted interfaces, the original copyright holder who places the Library under this License may add an explicit geographical distribution limitation excluding those countries, so that distribution is permitted only in or among countries not thus excluded. In such case, this License incorporates the limitation as if written in the body of this License.

13. The Free Software Foundation may publish revised and/or new versions of the Lesser General Public License from time to time. Such new versions will be similar in spirit to the present version, but may differ in detail to address new problems or concerns.

Each version is given a distinguishing version number. If the Library specifies a version number of this License which applies to it and “any later version”, you have the option of following the terms and conditions either of that version or of any later version published by the Free Software Foundation. If the Library does not specify a license version number, you may choose any version ever published by the Free Software Foundation.

14. If you wish to incorporate parts of the Library into other free programs whose distribution conditions are incompatible with these, write to the author to ask for permission. For software which is copyrighted by the Free Software Foundation, write to the Free Software Foundation; we sometimes make exceptions for this. Our decision will be guided by the two goals of preserving the free status of all derivatives of our free software and of promoting the sharing and reuse of software generally.

NO WARRANTY

15. BECAUSE THE LIBRARY IS LICENSED FREE OF CHARGE, THERE IS NO WARRANTY FOR THE LIBRARY, TO THE EXTENT PERMITTED BY APPLICABLE LAW. EXCEPT WHEN OTHERWISE STATED IN WRITING THE COPYRIGHT HOLDERS AND/OR OTHER PARTIES PROVIDE THE LIBRARY “AS IS” WITHOUT WARRANTY OF ANY KIND, EITHER EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. THE ENTIRE RISK AS TO THE QUALITY AND PERFORMANCE OF THE LIBRARY IS WITH YOU. SHOULD THE LIBRARY PROVE DEFECTIVE, YOU ASSUME THE COST OF ALL NECESSARY SERVICING, REPAIR OR CORRECTION.

16. IN NO EVENT UNLESS REQUIRED BY APPLICABLE LAW OR AGREED TO IN WRITING WILL ANY COPYRIGHT HOLDER, OR ANY OTHER PARTY WHO MAY MODIFY AND/OR REDISTRIBUTE THE LIBRARY AS PERMITTED ABOVE, BE LIABLE TO YOU FOR DAMAGES, INCLUDING ANY GENERAL, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE LIBRARY (INCLUDING BUT NOT LIMITED TO LOSS OF DATA OR DATA BEING RENDERED INACCURATE OR LOSSES SUSTAINED BY YOU OR THIRD PARTIES OR A FAILURE OF THE LIBRARY TO OPERATE WITH ANY OTHER SOFTWARE), EVEN IF SUCH HOLDER OR OTHER PARTY HAS BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.

END OF TERMS AND CONDITIONS

How to Apply These Terms to Your New Libraries

If you develop a new library, and you want it to be of the greatest possible use to the public, we recommend making it free software that everyone can redistribute and change. You can do so by permitting redistribution under these terms (or, alternatively, under the terms of the ordinary General Public License). To apply these terms, attach the following notices to the library. It is safest to attach them to the start of each source file to most effectively convey the exclusion of warranty; and each file should have at least the “copyright” line and a pointer to where the full notice is found.

<one line to give the library’s name and a brief idea of what it does.>
Copyright © <year> <name of author>

This library is free software; you can redistribute it and/or modify it under the terms of the GNU Lesser General Public License as published by the Free Software Foundation; either version 2.1 of the License, or (at your option) any later version. This library is distributed in the hope that it will be useful, but WITHOUT ANY WARRANTY; without even the implied warranty of MERCHANTABILITY or FITNESS FOR A PARTICULAR PURPOSE.

See the GNU Lesser General Public License for more details. You should have received a copy of the GNU Lesser General Public License along with this library; if not, write to the Free Software Foundation, Inc., 59 Temple Place, Suite 330, Boston, MA 02111-1307 USA

Also add information on how to contact you by electronic and paper mail. You should also get your employer (if you work as a programmer) or your school, if any, to sign a “copyright disclaimer” for the library, if necessary. Here is a sample; alter the names:

Yoyodyne, Inc., hereby disclaims all copyright interest in the library `Frob’ (a library for tweaking knobs) written by James Random Hacker.

<signature of Ty Coon>, 1 April 1990
Ty Coon, President of Vice

List of Figures

Figure 1: Evaluation Board DNP/EVA2 with DNP/1110	6
Figure 2: Components of the Evaluation Board DNP/EVA2	6
Figure 3: RCM Jumper.....	8
Figure 4: Position of the DIL/NetPC on the Evaluation Board	9
Figure 5: Overview about the required cable Connections	10
Figure 6: Serial Link Connection.....	11
Figure 7: Ethernet Link Connection.....	12
Figure 8: Power supply Connection.....	12
Figure 9: Interface property Sheet	13
Figure 10: Baud rate Settings	14
Figure 11: DIL/NetPC boot Process	15
Figure 12: Communication check via PING	15
Figure 13: Communication check via ipconfig command.....	16
Figure 14: DNP/1110 Web page shown by the MS-Internet Explorer	16
Figure 15: Login procedure via HyperTerminal.....	17
Figure 16: Login procedure via Telnet.....	18
Figure 17: Login procedure via FTP	19
Figure 18: FTP file transfer under DOS.....	20
Figure 19: File transfer using the Internet Explorer.....	20
Figure 20: Boot Procedure.....	21
Figure 21: Flash Loader Messages.....	22
Figure 22: Flash Loader file Select	22
Figure 23: Serial Port Settings under Minicom	23
Figure 24: Boot Procedure.....	24
Figure 25: Login Request.....	24
Figure 26: Ping Request	25
Figure 27: IP-address check via ifconfig.....	25
Figure 28: DNP/1110 Web page shown by the Konqueror File Manager	26
Figure 29: Login procedure via Minicom	27
Figure 30: Login procedure via Telnet.....	28
Figure 31: Login procedure via FTP	29
Figure 32: File transfer with Minicom	30
Figure 33: File transfer with the Konqueror	30
Figure 34: Boot Procedure.....	31
Figure 35: Flash Loader Messages.....	32
Figure 36: Transfer method Select.....	32
Figure 37: Transmission file Select	33
Figure 38: Transmission Status	33
Figure 39: Location of the tar-archive on the Starter Kit CD-ROM.....	34

Figure 40: Unpacking the tar-Archive	35
Figure 41: A simple C-Program.....	35
Figure 42: C-source code Compiling	36
Figure 43: File transfer with FTP.....	37
Figure 44: Telnet Session.....	37
Figure 45: DNP/1110 CF-Interface Connection.....	41

List of Tables

Table 1: Convention usage	4
Table 2: Pinout COM1	7
Table 3: Signals connected to the DNP/EVA2 DIL-64 Interface	9
Table 4: DNP/1110 Pinout – Pin 1 to 32.....	39
Table 5: DNP/1110 Pinout – Pin 33 to 64.....	40
Table 6: DNP/1110 Memory Map	41
Table 7: CF-Interface Pin Usage	42

List of Appendixes

Appendix 1: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (1. Part).....	39
Appendix 2: DNP/1110 Pinout – JEDEC 64-pin DIL Connector (2. Part).....	40
Appendix 3: DNP/1110 Memory Map.....	41
Appendix 4: Using the Compact Flash (CF)-Interface	41
Appendix 5: GNU General Public License	43
Appendix 6: GNU Lesser General Public License	48
List of Figures.....	55
List of Tables.....	56
List of Appendixes.....	56
Contact	57
Document History.....	57

Contact

SSV Embedded Systems
 Heisterbergallee 72
 D-30453 Hannover
 Tel. +49-(0)511-40000-0
 Fax. +49-(0)511-40000-40
 E-Mail: sales@ist1.de
 Internet: www.ssv-embedded.de

Document History

Revision	Date		Name
1.00	18.12.2001	First Version.	KDW, JNE
1.01	23.01.2002	Technical Data updates.	KDW
1.02	31.01.2002	Some new chapters added.	JNE
1.03	04.03.2002	Further chapter added.	JNE
1.04	06.09.2002	Memory Map corrected, RCM chapter added	JNE
1.05	02.12.2002	Appendix 4 added	JNE
1.06	14.05.2003	Error corrections within Appendix 4	KDW

This document is written only for the internal application. The contents of this document can change any time without announcement. There is taken over no guarantee for the accuracy of the statements. Copyright © **SSV EMBEDDED SYSTEMS 2003**. All rights reserved.

INFORMATION PROVIDED IN THIS DOCUMENT IS PROVIDED 'AS IS' WITHOUT WARRANTY OF ANY KIND. The user assumes the entire risk as to the accuracy and the use of this document. Some names within this document can be trademarks of their respective holders.