ELAN-104NC
Quickstart Manual For
Embedded Linux

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Contents

Revision History

Manual	Comments	
Issue A	000905	Initial revision
Issue B	20-09-2001	Upissued to include additional login information.

Preface

Disclaimer

The information in this manual has been carefully checked and is believed to be accurate. Arcom Control Systems assumes no responsibility for any infringement of patents or other rights of third parties that may result from its use.

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Anti-Static Handling

The boards in this development kit contain CMOS devices that may be damaged in by electrostatic discharge. At all times, please observe anti-static precautions when handling the boards. This includes storing the boards in appropriate anti-static packaging and wearing a wrist strap when handling the boards.

Packaging

Please ensure that should a board need to be returned to Arcom Control Systems, it is adequately packed, preferably in the original packing material.

Acknowledgements

Linux is a trademark of Linus Torvalds.
All other trademarks acknowledged.

Technical Support

Arcom Control Systems has a team of technical support engineers who will be able to provide assistance if you have any problems with this product. Contact support@arcom.co.uk

Getting Started

Arcom Embedded Linux development kits are designed to provide a complete environment allowing software engineers to concentrate on the development of their application. The development kits are available with or without an LCD panel. This Manual describes how to set up the kit so you can commence development straight away.

What's in the Kit?

Arcom's ELAN-104NC Embedded Linux kit comprises of the following items: -

- ELAN-104NC-100-M16-F8 processor board
- Power supply with US, UK and Euro style plugs, and connector for the ELAN_104NC board
- Power supply adapter cable
- PS/2 mouse
- PS/2 to AT keyboard adapter
- VGA adapter cable
- Serial adapter cable
- Floppy drive cable
- Crossover RJ45 Ethernet cable
- Arcom Embedded Linux Development Kit CD ROM
- Printed copy of the Arcom Embedded Linux Quick Start manual (this document).
- Technical Manual (on CD-ROM)

The following items are also included with the LCD panel kit: -

- NEC 6.5" flat panel (Type NL6448AC20-06 or NL6448ABC20-08)
- Backlight inverter board
- FPIF to flat panel interface cable
- Backlight power cable

Note: The PSU supplied with the kit is sufficient to power the items in the development kit. If additional boards or peripherals are to be used a more powerful supply may be required. The +5 V supply must supply a voltage between +5.25V and 4.9 V


What else do I Need?

- A PS/2 or AT Keyboard

- A VGA monitor (for non LCD version)

- An ATAPI/IDE CD-ROM and floppy drive if you wish to reinstall Embedded Linux to the on board flash.

- A host system capable of producing GLIBC 2.1 dynamically linked ix86 executables.

  Arcom suggests **Red Hat Linux 6.2** running on a PC, though other distributions/platforms may be suitable.

- Networking details for the ELAN-104NC:
  Consult your network of system administrator for these
  - IP address and subnet mask (netmask)
  - Default gateway IP address if required
  - Nameserver (DNS) IP address (optional)

- Networking details for the host machine. It will be useful to have the following details
  - IP address

Unpacking & Connecting Up

Arcom's Embedded Linux development kits are shipped 'ready to run'. All you need to do is remove the various components from the packaging and connect them up.

Remember that a number of the components are static sensitive so standard anti-static precautions should be taken while unpacking.

Refer to the diagram below and follow the numbered instructions to ensure that everything is correctly connected.
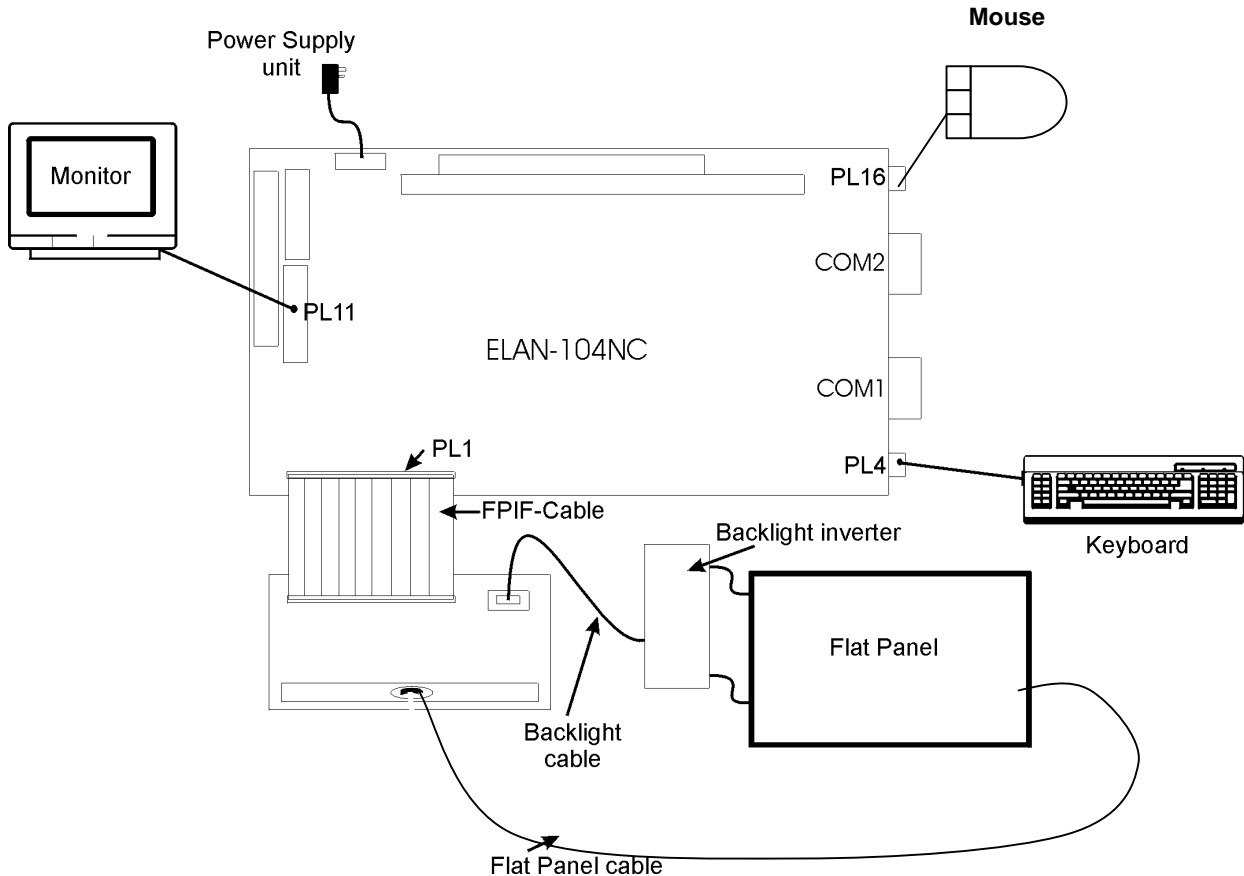
1. Remove the ELAN-104NC CPU board from the packaging and place it on a static free work surface.

2. Plug the mouse into the socket labelled 'PL16 MSE'.

3. Plug a keyboard into the socket labelled 'PL4 KBD' using the PS/2 adapter if required.

4. Plug the Ethernet cable into the socket labelled 'PL5 Network' and plug the other end into your development system. The cable supplied in the kit is a crossover cable, designed to go directly between the ELAN-104NC and another PC. If you want to connect to an existing network you will need a straight through cable instead. For further details consult your IT administration department.

5. If your kit was not supplied with an LCD then plug a video monitor into the supplied adapter cable and plug the adapter cable into the socket labelled 'PL11 CRT'. If you intend to use a LCD panel, DO NOT plug in a monitor.

6. If your kit was supplied with an LCD, plug the interface cable between the ELAN-104NC socket labelled 'LCD Panel PL1', and the flat panel interface board (FPIF) socket 'PL1'.

Plug the backlight power cable between the FPIF board PL3 and the backlight inverter board. Plug the LCD panel cables into the backlight inverter board. Plug the interface cable between the LCD and the FPIF board socket 'PL2'. Make sure that the power is off while connecting the LCD as the backlight inverter generates high voltages.

7. Fit the ELAN_104NC power supply cable to the socket labelled 'PL17 POWER'.

8. Fit the appropriate wall socket adapter to the power supply unit.

9. **Switch on and the ELAN-104NC will boot the installed copy of Arcom Embedded Linux.**

10. Login as root (login name: root, password: arcom) to access the entire system; or as the regular user arcom (login name: arcom, password: arcom) for restricted access.

Note: The default BIOS for the ELAN-104NC sets the output to CRT only mode if a CRT monitor is detected when the board is switched on. Therefore, to use a flat panel, make sure that a CRT monitor is NOT connected. Also the backlight inverter generates high voltages, so make sure the power is off while connecting it.

Flat Panels

The default BIOS can be used to drive a 6.5" NEC TFT flat panel
(Part number NL6448AC20-06 or NL6448BC20-08), as supplied in the Flat Panel variant of the kit, or a 10.4" NEC TFT flat panel (Part Number NL6448AC33-18/-27/-29).

To use the supplied 6.5" flat panel, connect the flat panel as described in the previous instructions.

For further details of other flat panels supported by the ELAN-104NC, contact Arcom Control Systems Technical Support Department.

What's in Arcom Embedded Linux

Arcom Embedded Linux is basically a space optimised standard Linux including many of the standard file, shell and text utilities. In addition there are

- Telnet server and client

- FTP server and client

- HTTP server

For a complete list of software consult the Technical Manual supplied on the CD.

The File system

The onboard flash has been divided into three partitions (boot, root (/) and /var). By default the root partition is mounted read-only for added data security, to mount it read-write type

```
mount –n –o remount,rw /
```

The /var partition is read-write and can be used for storing application data which must persist across reboots. The /var partition also contains users' home directories. In addition a 2 Mbyte ram disk is mounted on /var/tmp for temporary files -- these will be lost after a reboot.

Setting up Networking

1. Login to the ELAN-104NC as root user,

   login name: **root**

   password: **arcom**

2. Mount the root (/) partition as read-write by typing
   ```
   mount -n -o remount,rw /
   ```

These steps only need to be carried out once.

3. Change to the directory /etc/config/network/interfaces by typing

   ```
   cd /etc/config/network/interfaces
   ```

4. Copy the file lo to the file eth0

   ```
   cp lo eth0
   ```

5. Edit the file eth0 using the ae editor.
   ```
   ae eth0
   ```

The file should look like (with appropriate IP address and netmask)-

```
DEVICE=eth0
IPADDR=IP address
NETMASK=netmask
```

6. Save the file by typing CRTL+X then CTRL+W

7. Exit the ae editor by typing CTRL+Q

8. Setup DNS if required, by editing the file /etc/resolv.conf
   ```
   cd /etc
   ae resolv.conf
   ```

The file should look like this-

   nameserver *IP address of nameserver*

9. Setup a default gateway if required, by editing the file /etc/config/network/routes/gateway
   ```
   cd /etc/config/network/routes
   ae gateway
   ```

The file should look like this-

   GATEWAY=*IP address of gateway*

10. Reinitialise networking by typing
    ```
    /etc/init.d/network start
    ```

Installing the Support Software

The Arcom Embedded Linux kit is supplied with a CD, which contains a number of support programs and examples. The CD is bootable and can be used to reinstall the base system plus any of the optional components. Consult the technical manual for details. In addition the CD includes example source code for utilising the Arcom specific device drivers, and utility programs.

Installing an IDE(Source-Navigator)

Also included is the source code for an IDE (Source-Navigator) that you may wish to use to build and test application on your Red Hat 6.2 host system before downloading to the Elan-104NC board.
 To install the IDE (Source-Navigator) on your host system follow these instructions -

1. Copy the source tarball from the CD (/utils/ide/SN451.tar.gz) to a suitable directory (e.g. your home directory) on your host system.

2. If you're using X (KDE, GNOME etc.) start a terminal emulator such as xterm, Konsole (in KDE) or GNOME terminal (in GNOME).

3. Change to the directory containing the source tarball

    cd *directory containing source tarball*

4. Unpack the tarball

    tar xzf SN451.tar.gz

    cd SN451

5. Configure and build the application

    ./configure

    make

6. Change to the root user (Enter the root password when prompted)

    su

7. Install the application

    make install

8. Change back to a regular user

    exit

Building and Running Applications

Included on the CD is an example application (/Linux Examples/test/), which you can build on your host system and then install onto the ELAN-104NC.

Building the Test Application

1. Copy the content of the directory /examples/test/ from the CD to a suitable directory on the host system.

2. Change to the directory containing the source

    ```
    cd directory containing source
    ```

3. Build the application by typing

    ```
    make
    ```

4. Test the application by typing

    ```
    ./hello
    ```

5. You will see the following text printed on the screen-

    Hello world!

Building an Application with Source Navigator

A more detailed tutorial on Source Navigator is available from the Help | Users Manual menu option of Source Navigator

1. You will need to be running X on your host system to run Source Navigator

2. Start a terminal emulator such as xterm, Konsole (in KDE), or GNOME terminal (in GNOME)

3. Create a new project directory

    ```
    mkdir demo_project
    ```

4. Change to the project directory

    ```
    cd demo_project
    ```

5. Start Source Navigator

    ```
    snavigator &
    ```

6. At the first dialog box (Source-Navigator Projects) press New Project…

7. Select OK from the Auto-Create Project dialog box

8. Select Windows | New views | Editor from the menu bar of the Source-Navigator [demo_project] Symbols window.

9. Enter your code into the Editor window and save using File | Save As…

10. Choose Tools | Build settings… from the menu

11. Enter the executable name to be built in the bottom box of the Build Settings dialog box and press Create.

12. Add all the Project files required to build the executable to the Target files. Then click on OK.

13. Choose Tools | Build… from the menu.

14. Change the Build Targets from <External Makefile> to the new target you created.

15. Click Start to begin the build process

16. Click Run to run the executable

17. Exit Source Navigator with File | Exit

Downloading the Application

Applications can either be downloaded using FTP or transferred via NFS. Setting up NFS is beyond the scope of this document so the FTP method is described here.
Use an ftp client on the host system to transfer files to the board

1. Run the ftp client on the host system
    ftp *IP address of ELAN-104NC*

2. Login to the ELAN-104NC as arcom (password: arcom). Note that for security reasons you can't login as root

3. Transfer the files to the ELAN-104NC (the files will end up in /home/arcom)
    put *local file name*

4. On the ELAN-104NC copy the executable from /home/arcom to the appropriate location (e.g. /usr/bin)
    cp /home/arcom/*executable name* **/usr/bin**

5. Change the permissions of any of the executables to make them runnable
    chmod a+x /usr/bin/*executable name*

Running the Application

Run the application

   executable name

Detailed Information

The following detailed information can be found in the ELAN-104NC embedded Linux technical manual, which can be found on the CD.

- Detailed Software list
- File system layout
- Arcom embedded Linux CD contents
- Utilities
- Installing Linux on to a hard drive
- Limitations of the JFFS