

» Kontron User's Guide «

Geode LX800 / LX900

BIOS, Driver & Software Information
Document Revision 101

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1 User Information

1.1 About this Document

This document provides information about products from Kontron AG and/or its subsidiaries. No warranty of suitability, purpose, or fitness is implied. While every attempt has been made to ensure that the information in this document is accurate, the information contained within is supplied "as-is" and is subject to change without notice.

For the circuits, descriptions and tables indicated, Kontron assumes no responsibility as far as patents or other rights of third parties are concerned.

1.2 Copyright Notice

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1.3 Trademarks

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The following lists some of the trademarks of components used in this product.

- » AMD Geode
- » Microsoft is a registered trademark of Microsoft Corp
- » Intel is a registered trademark of Intel Corp

All other products and trademarks mentioned in this manual are trademarks of their respective owners.

1.4 Standards

Kontron AG is certified to ISO 9000 standards.

1.5 Warranty

This Kontron AG product is warranted against defects in material and workmanship for the warranty period from the date of shipment. During the warranty period, Kontron AG will, at its discretion, decide to repair or replace defective products.

Within the warranty period, the repair of products is free of charge as long as warranty conditions are observed.

The warranty does not apply to defects resulting from improper or inadequate maintenance or handling by the buyer, unauthorized modification or misuse, operation outside of the product's environmental specifications or improper installation or maintenance.

Kontron AG will not be responsible for any defects or damages to other products not supplied by Kontron AG that are caused by a faulty Kontron AG product.

1.6 Technical Support

Technicians and engineers from Kontron AG and/or its subsidiaries are available for technical support. We are committed to making our products easy to use and will help you use our products in your systems.

Please consult our website at <http://www.kcc-ag.ch/index.php?id=products-download> for the latest product documentation, BIOS, drivers, tools and software information.

For technical support consult <http://support.kcc-ag.ch/>.

1.7 Environmental Protection Statement

This product has been manufactured to satisfy environmental protection requirements wherever possible. Many of the components used (structural parts, printed circuit boards, connectors, batteries, etc.) are capable of being recycled. Final disposal of this product after its service life must be accomplished in accordance with applicable country, state, or local laws or regulations. All components within this product fulfill the requirements of the RoHS (Restriction of Hazardous Substances Directive). The product is soldered with a lead free process.

1.8 RoHS Commitment

Kontron Compact Computers AG (Switzerland) is committed to develop and produce environmentally friendly products according to the Restriction of Hazardous Substances (RoHS) Directive (2002/95/EC) and the Waste Electrical and Electronic Equipment (WEEE) Directive (2002/96/EC) established by the European Union. The RoHS directive was adopted in February 2003 by the European Union and came into effect on July 1, 2006. It is not a law but a directive, which restricts the use of six hazardous materials in the manufacturing of various types of electronic and electrical equipment. It is closely linked with the Waste Electrical and Electronic Equipment Directive (WEEE) 2002/96/EC, which has set targets for collection, recycling and recovery of electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste.

Each European Union member state is adopting its own enforcement and implementation policies using the directive as a guide. Therefore, there could be as many different versions of the law as there are states in the EU. Additionally, non-EU countries like China, Japan, or states in the U.S. such as California may have their own regulations for green products, which are similar, but not identical, to the RoHS directive.

RoHS is often referred to as the "lead-free" directive but it restricts the use of the following substances:

- » Lead
- » Mercury
- » Cadmium
- » Chromium VI
- » PBB and PBDE

The maximum allowable concentration of any of the above mentioned substances is 0.1% (except for Cadmium, which is limited to 0.01%) by weight of homogeneous material. This means that the limits do not apply to the weight of the finished product, or even to a component but to any single substance that could (theoretically) be separated mechanically.

1.8.1 RoHS Compatible Product Design

All standard products from Kontron Compact Computers (KCC) comply with RoHS legislation.

Since July 1, 2006, there has been a strict adherence to the use of RoHS compliant electronic and mechanical components during the design-in phase of all KCC standard products.

1.8.2 RoHS Compliant Production Process

KCC selects external suppliers that are capable of producing RoHS compliant devices verified by:

- » A confirmation from the supplier indicating that their production processes and resulting devices are RoHS compliant.
- » If there is any doubt of the RoHS compliancy, the concentration of the previously mentioned substances in a produced device will be measured. These measurements are carried out by an accredited laboratory.

1.8.3 WEEE Application

The WEEE directive is closely related to the RoHS directive and applies to the following devices:

- » Large and small household appliances
- » IT equipment
- » Telecommunications equipment (although infrastructure equipment is exempt in some countries)
- » Consumer equipment
- » Lighting equipment – including light bulbs
- » Electronic and electrical tools
- » Toys, leisure and sports equipment
- » Automatic dispensers

It does not apply to fixed industrial plants and tools. The compliance is the responsibility of the company that brings the product to market, as defined in the directive. Components and sub-assemblies are not subject to product compliance. In other words, since Kontron Compact Computers AG does not deliver ready-made products to end users the WEEE directive is not applicable for KCC. Users are nevertheless encouraged to properly recycle all electronic products that have reached the end of their life cycle.

1.9 The Swiss Association for Quality and Management Systems

The Swiss Association for Quality and Management Systems (SQS) provides certification and assessment services for all types of industries and services. SQS certificates are accepted worldwide thanks to accreditation by the Swiss Accreditation Service (SAS), active membership in the International Certification Network, IQNet, and co-operation contracts/agreements with accredited partners.

www.sqs.ch

The SQS Certificate ISO 9001:2000 has been issued to Kontron Compact Computers AG in the field of development, manufacturing and sales of embedded computer boards, embedded computer modules and computer systems. The certification is valid for three years at which time an audit is performed for recertification.

2 Introduction

2.1 Geode LX800 / LX900 Features

The MICROSPACE® LX800 / LX900 BIOS is used on all Kontron Compact Computers embedded computer products based on the Geode LX800/900 architecture:

- » INSYDE XpressROM LX firmware BIOS
- » PXE boot
- » Support RTOS's, LINUX and Windows OS
- » ROM debugger
- » USB legacy support
- » Serial redirect support (headless)
- » Quick boot
- » ACPI support
- » Boot from USB support
- » Boot from USB-CD and from USB-HDD
- » Legacy USB keyboard and mouse support
- » PowerOn splash screen for OEM images
- » Download of the BIOS into a flash chip

2.2 Incompatibilities

Keyboard versus NUM-Lock

Without a connected keyboard, the NUM-Lock ON field in the BIOS setup **must not be** activated. Otherwise the time-out noticeably slows down the reaction speed of the computer as soon as the keyboard is not connected.

The PS2 peripherals (KB and MS) are **not hot-plug compatible**.

Not supported on an ISA bus:

- » VGA peripheral cards

Not supported in the current BIOS Version:

- » Smart battery support

3 Operating Systems Compatibility

3.1 Microsoft Windows

Kontron Compact Computers (KCC) recommends the following Windows operating systems in combination with the chipset listed below:

- » AMD LX800: Windows XP (SP2) or higher

It is not recommended to install an older Windows OS, such as Windows 95/98/ME/NT4/2K, because of incomplete driver support from the chip manufacturer.

3.2 Microsoft Windows XPe

KCC provides a Windows XPe (SP2) Board Support Package for the following chipset:

AMD LX800:

<http://www.kcc-ag.ch/index.php?id=bsp&dir=/XPe-LX800-LX900&mountingpoint=42>

A CompactFlash with a copy of "Evaluation Windows XPe" pre-installed can be ordered for testing purposes:

- » AMD LX800: Article Number 816014

3.3 Microsoft Windows CE

3.3.1 CE4.2 / CE5.0

KCC works in cooperation with Pfaadtsoft and therefore recommends using the WINCE 4.2/5.0 Board Support Package (BSP) developed especially for this product.

There are also DEMO Windows CE 4.2 / 5.0 images available for free at:

<http://dlag.pfaadtsoft.de/>

3.3.2 CE6.0

Kontron Compact Computers provides a Windows CE 6.0 BSP for the following chipset:

AMD LX800:

<http://www.kcc-ag.ch/index.php?id=294&dir=BSP/LX800-LX900&mountpoint=46>

A CompactFlash with a copy of "Evaluation Windows CE6.0" pre-installed can be ordered for testing purposes:

- » AMD LX800: Article Number 816050

3.4 Linux

3.4.1 SLAX

Kontron Compact Computers (KCC) provides a Linux distribution (Kernel 2.6.24) for the following chipsets:
AMD LX800, Intel 855, Intel 945, Intel A200

Follow this link to download the BSP / Demo SLAX Linux:

http://www.kcc-ag.ch/index.php?id=bsp&dir=/SLAX-Linux-BSP_for_all_chipset&mountingpoint=42

A CompactFlash with a pre-installed copy of Linux for testing purposes can be ordered:

» Linux: Article Number 816030

The distribution is based on the SLAX Linux. For more information, updates and plugins, visit: www.slax.org

3.4.2 ELinOS

KCC works in cooperation with SYSGO and therefore recommends using the ELinOS Linux distribution.

<http://www.elinos.com/>

SYSGO has developed a board support package (BSP) for the Pentium M and the Pentium BX/TX chipset-based products for ELinOS. If you are interested or if you have any questions about ELinOS, please contact SYSGO directly.

3.4.3 What is ELinOS?

ELinOS is a development environment based on Linux for the creation of embedded systems for intelligent devices. With ELinOS the memory demand of Linux is reduced to less than 1MB ROM and 2MB RAM. In this manner Linux can, for the first time, conform to the reduced hardware conditions of embedded systems. Even in this basic configuration, Linux offers largely the same functionality which made it so popular in the server and desktop field. By virtue of access to the constantly growing number of Linux components, the basic system can be expanded at any time.

The core of ELinOS is a Linux distribution custom-tailored to the embedded systems currently sold. Besides the well-known Linux version for x86, ELinOS also supports PowerPC-, ARM-, MIPS-, and SH3-platforms which are very popular in the embedded field.

The emphasis of the current version of ELinOS is on the new CoTools, CODEO and COGNITO. CODEO is Eclipse based and provides additional plug-ins for project management and target communication, which substantially improves the ease of development of applications with ELinOS. COGNITO is a further integrated tool for the analysis of system performance. It permits the collection, recording and display of all system information and facilitates the fast optimization of software for intelligent devices.

ELinOS has been updated to the new version of the GNU tool chain and contains the stable Linux Kernel starting with version 2.4.25; it has integration of Java and the real-time extensions RTAI 3.0 for hard real-time requirements. The package is complemented with Carrier Grade Extensions such as IPv6, IPSec, SNMP, etc., for the use of Linux in applications in the telecommunications market.

3.5 Real-time OS

3.5.1 QNX

Download a demo image from the following website: <https://www.qnx.com/account/Login.html?logout=1>

3.5.2 VxWorks

Please contact Wind River for VxWorks support: www.windriver.com

4 Driver Installation

4.1 Windows 2000 & XP


On the Product CD you will find all the tools and drivers you'll need to work with the product. If you are unsure how current your software is, please visit our website to get the latest releases!

<http://www.kcc-ag.ch/index.php?id=products-download>

A correct installation of Windows is required for the following steps.

1. Close all applications before beginning with the driver installation!
2. Put the Kontron Compact Computers Product CD into the CD-drive. The start menu should appear automatically.
3. Select: DRIVERS/XP_W2k.
If there is no menu then manually open up the CD on the desktop.

Board-Support-Package for AMD LX800/LX900 Based Products - V2.00



HOME	MANUALS	BIOS	BSP	DRIVERS	TOOLS	EXIT
------	---------	------	-----	---------	-------	------

This CD contains all manuals, drivers, BSP, tools and bios for the following products:
SM800-900PC/X, SM800-900DK, MSM800BEV, MSM800SEV/SEL,
MCM800BEV/VEI, MCM800BEI/BEV, MCM800VEV, MCM800, MCM800V

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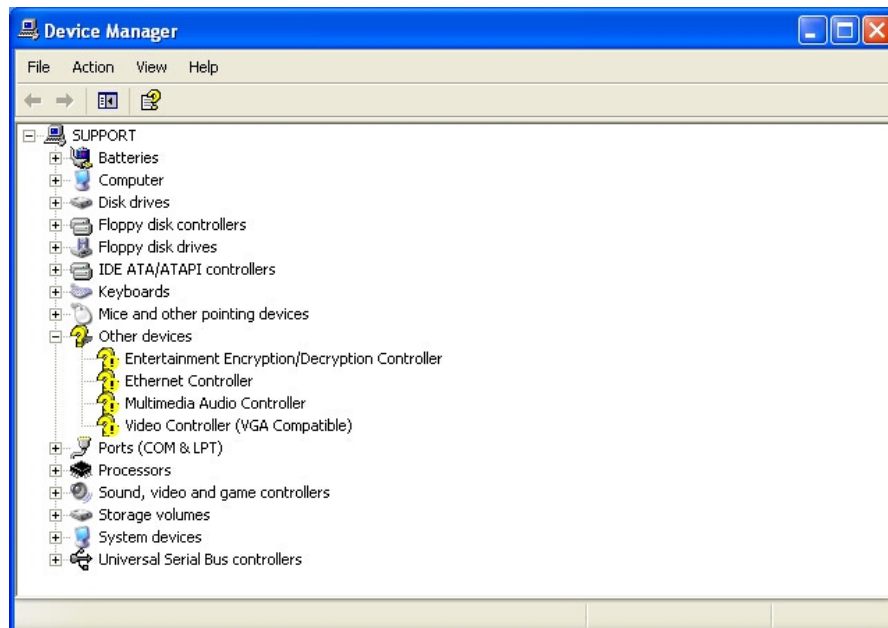
<http://www.kcc-ag.ch>

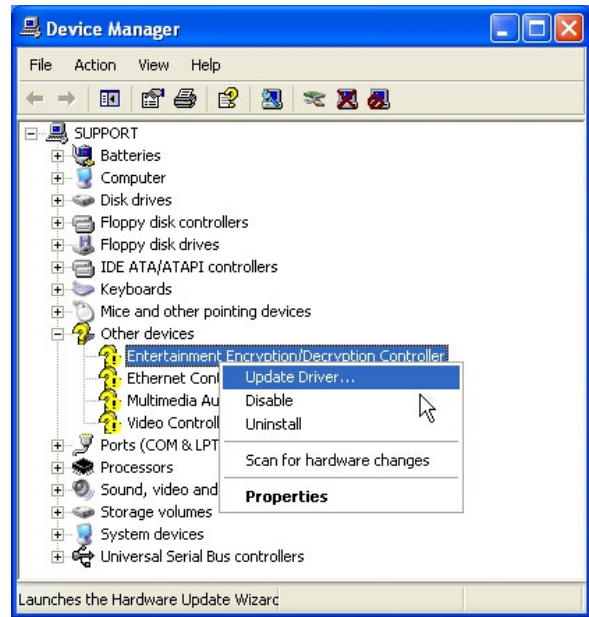
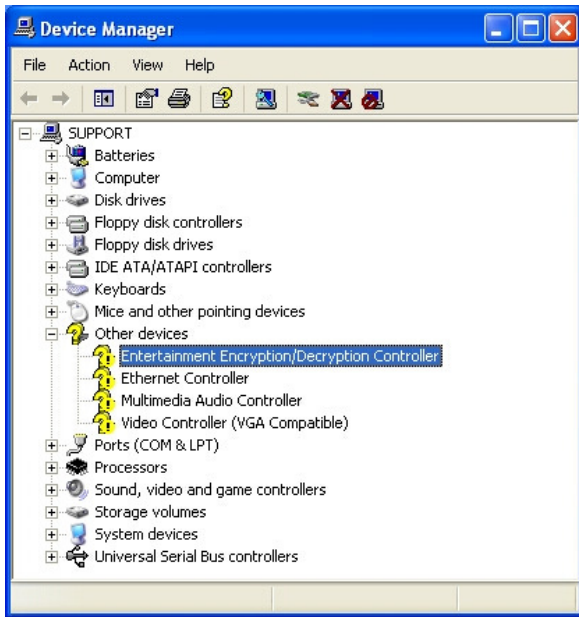
SupportCenter Manual

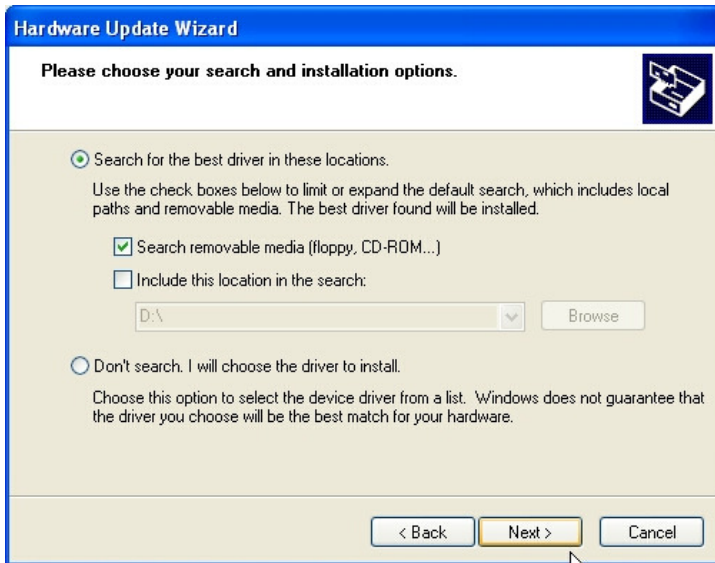


4.1.1 Encryption / Decryption Controller

Enter the device manager and proceed as follows:

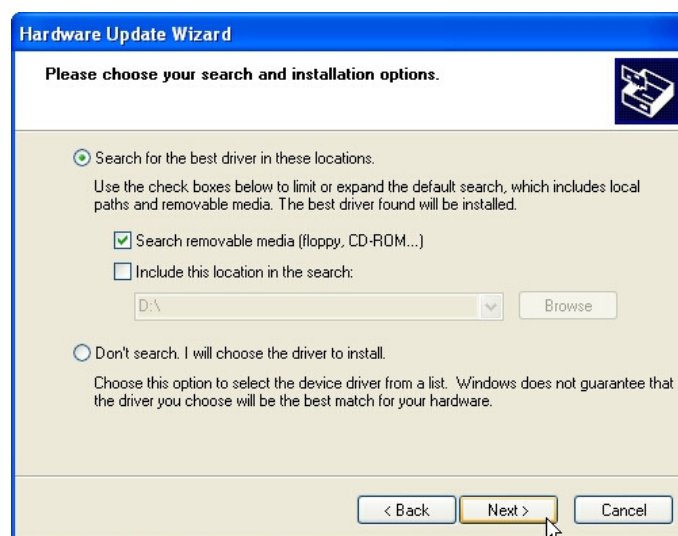
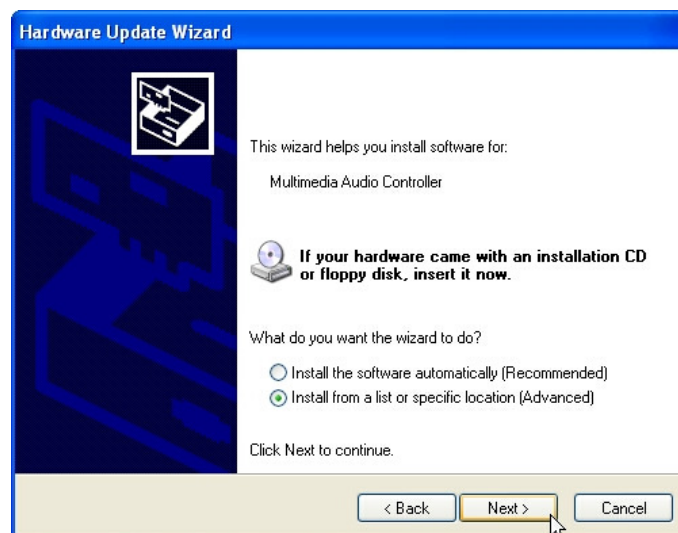
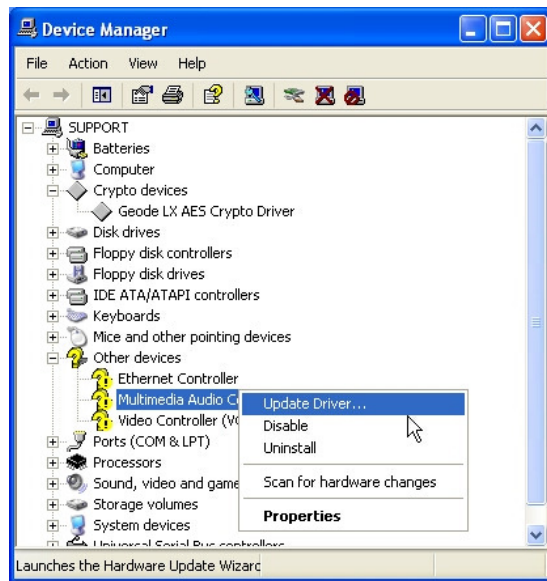


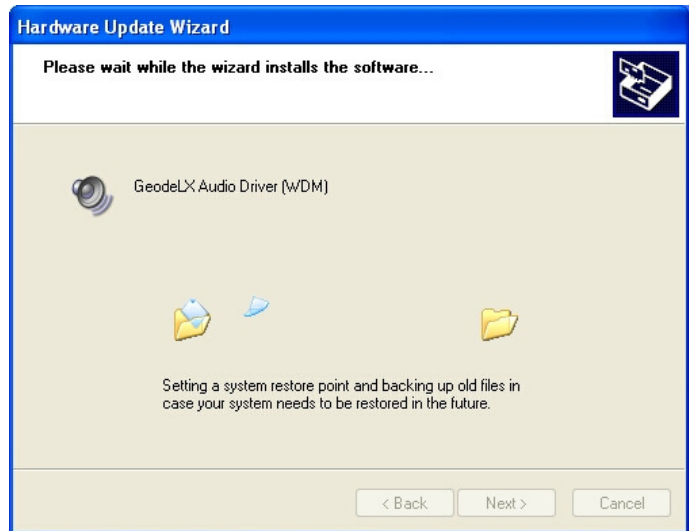




4.1.2 Audio / Multimedia

Enter the Device Manager and carry out the following instructions:

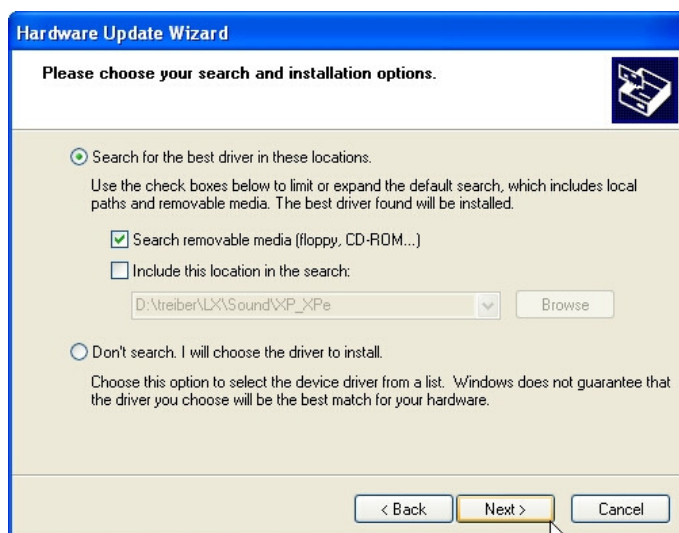
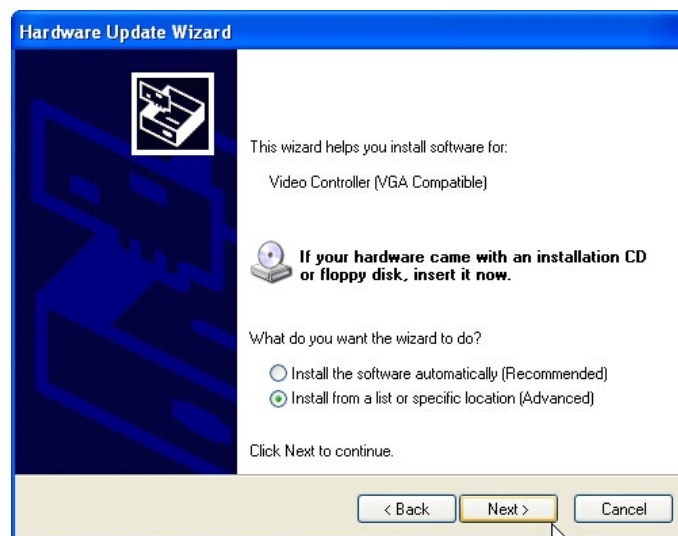


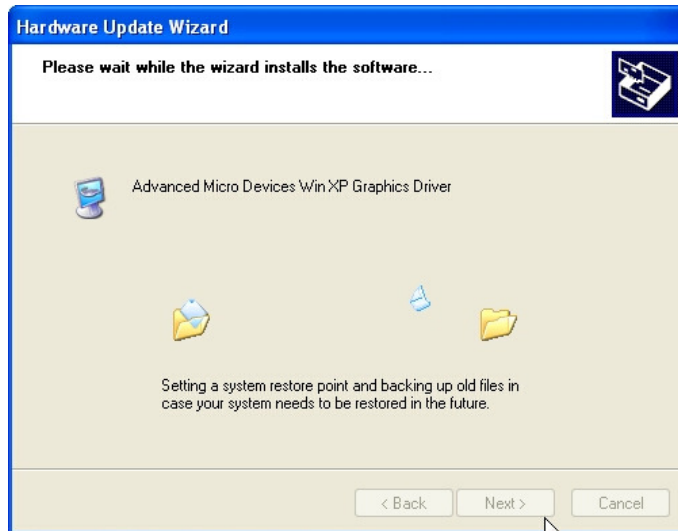


4.1.3 VGA

Note: ISA VGA peripheral cards are not supported.

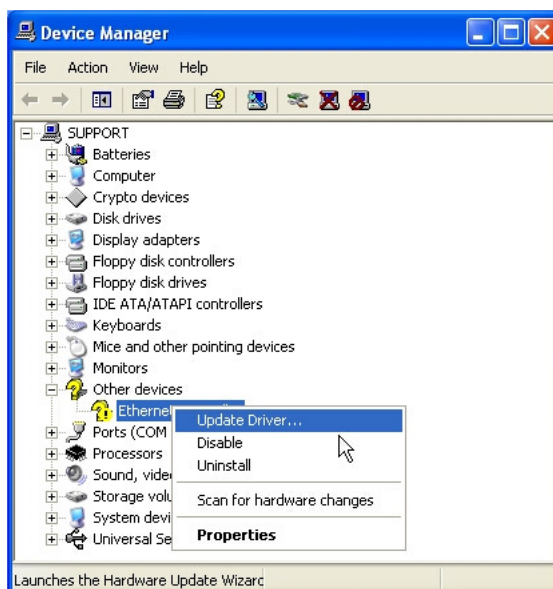
Enter the device manager and continue as follows:

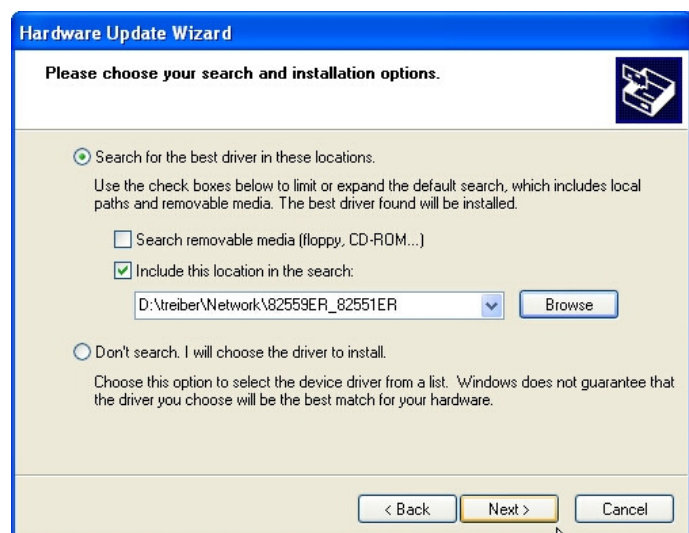
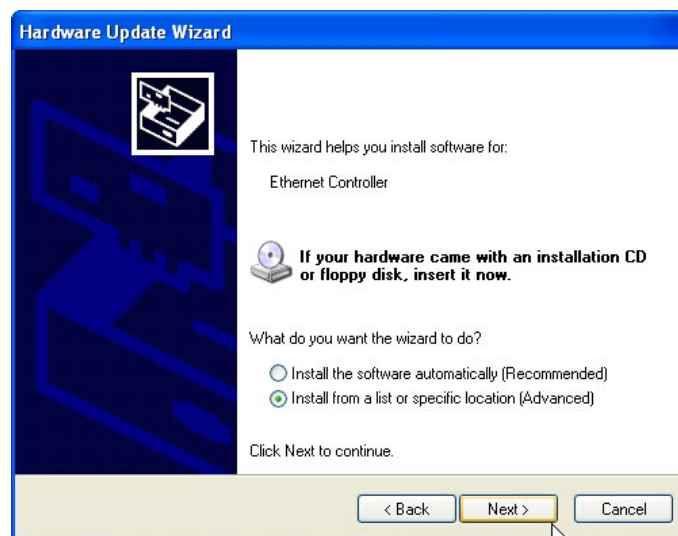


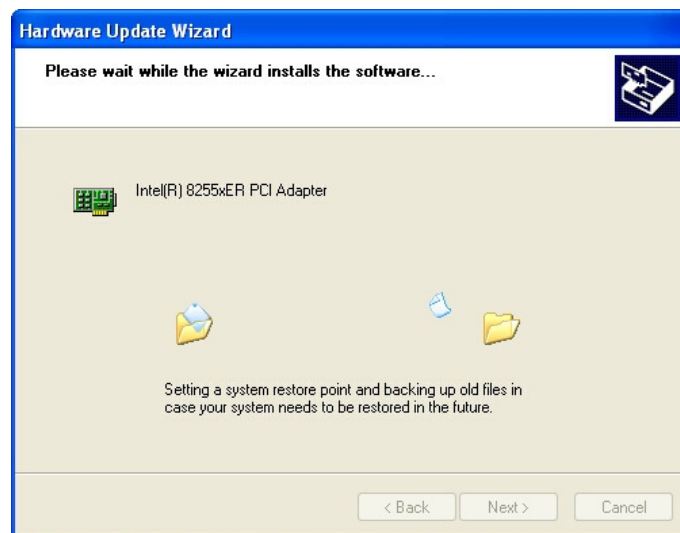
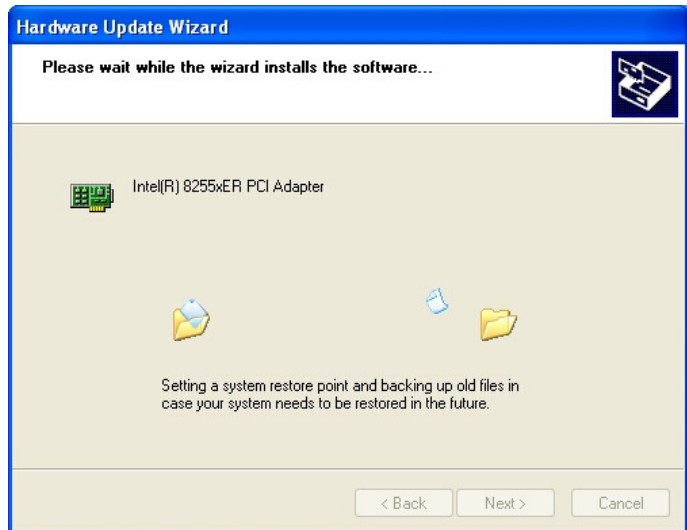


4.1.4 Ethernet / LAN

Enter the device manager and continue as follows:







4.1.5 Int15 Emulator Driver for W2k/XP

Location: \Tools\DL-INT15_Tool\int15dl_install36.exe

How to execute the file int15dl_install19.exe:



After installation of this driver you can use these tools:

WinInt15.exe (Int15 function test tool) and T855.exe (temperature sensor (SMBUS) monitor)

For more information see Section 5.1.

4.1.6 Windows XP 2nd IDE Bug Fix

Most PC-AT chipsets contain a dual IDE controller. The AMD Geode™ CS5536 and CS5535 companion devices contain only a single IDE controller. These companion devices use the same out-of-box Windows® XP IDE driver as other compatible chipsets.

This may present a problem since the driver will assume a dual controller is present. The result is that, system resources may become reserved and unavailable for other devices. Install the following .reg file from the Product CD:

```
DRIVERS\WinXP-Win2K\IDE\General-IDE-Driver\XP Geode disable IDE2.reg
```

This reg file (XP Geode disable IDE2.reg) disables the second IDE controller in the XP OS.

The changes do not affect the performance of the IDE controller but simply allow the resources to be used elsewhere.

4.1.7 VideoIn

The VideoInput function (frame grabber) is available in conjunction with the MSB800, MPC21, MSEP800 and optional on the MPCV800. The low cost version MSB800L and MSEP800L do not include this feature.

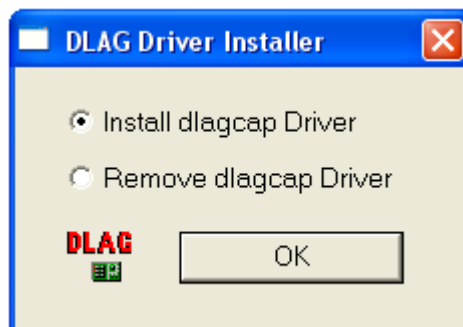
The Geode LX800 / LX900 contains a low cost video input port. It consist of LX800 / LX900's video input port (VIP) and the external frame grabber chip SAA7111A from Philips. This port is capable of digitizing a CVBS video signal with 15 frames per second at a resolution of 352 x 288bits. Note that this frame rate is only achievable when the raw data stream is compressed before being stored on the hard drive. Driver support is currently available for the Windows XP platform.

With higher resolutions, the frame rate will decrease.

Resolution	Frames per second
352 x 288	15

Run the VidInpLX800 / LX900 installer. The video input can be tested with the amcap application.

Note: For video input, preview must be selected.



Hardwareinstallation



Die Software, die für diese Hardware installiert wird:

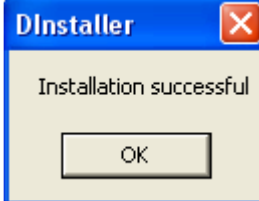
DLAGCap, LX800 WDM Video Capture

hat den Windows-Logo-Test nicht bestanden, der die Kompatibilität mit Windows XP überprüft. [\(Warum ist dieser Test wichtig?\)](#)

Das Fortsetzen der Installation dieser Software kann die korrekte Funktion des Systems direkt oder in Zukunft beeinträchtigen. Microsoft empfiehlt strengstens, die Installation jetzt abzubrechen und sich mit dem Hardwarehersteller für Software, die den Windows-Logo-Test bestanden hat, in Verbindung zu setzen.

Installation fortsetzen

Installation abbrechen



5 Software

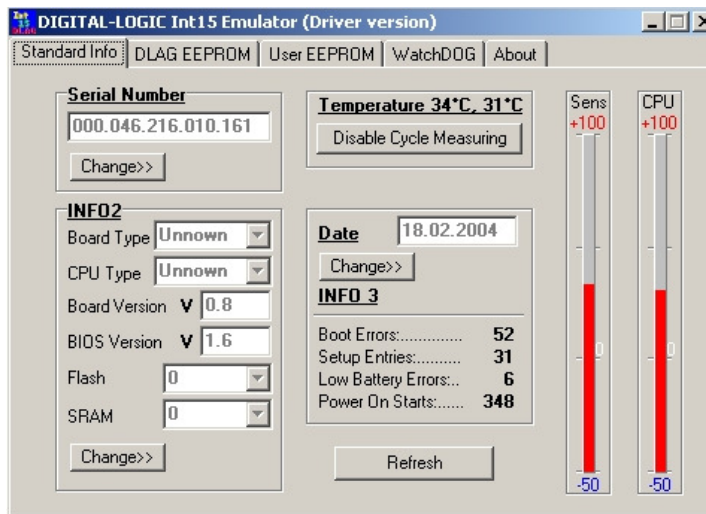
5.1 Windows Int15 Tool

The tool and driver can be found on the Product CD under or in the download area of the support center.

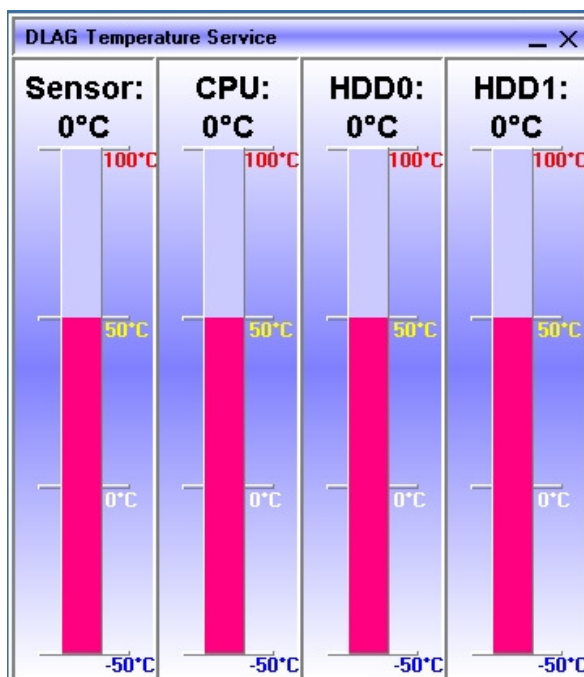
Note: Before you can use these tools, you must install the Windows WDM driver first.
For instructions, see the Section titled "Driver Installation W2k/XP" on page 31.

5.1.1 Int15 Windows Software

WinInt15.exe (Int15 function test tool)



T855.exe (Temperature Sensor [SMBUS] Monitor)



5.2 Remote Control over COM Port

5.2.1 Requirements

- » **Serial null-modem cable** (only RX and TX)
- » **Remote computer:** Serial port address 3F8h
- » **Host computer:** Serial port COM1 or COM2, OS (Windows or MSDOS), floppy image file with MSDOS 6.22 or FREEDOS (eg. freedos2img which is located on the Product CD or in the download area).

5.2.2 Limitations

- » **OS on the remote computer:** MSDOS or FREEDOS
- » **Enabling "remote floppy" support:** All other floppy disks on the remote computer will be disabled

5.2.3 Principles of Functionality

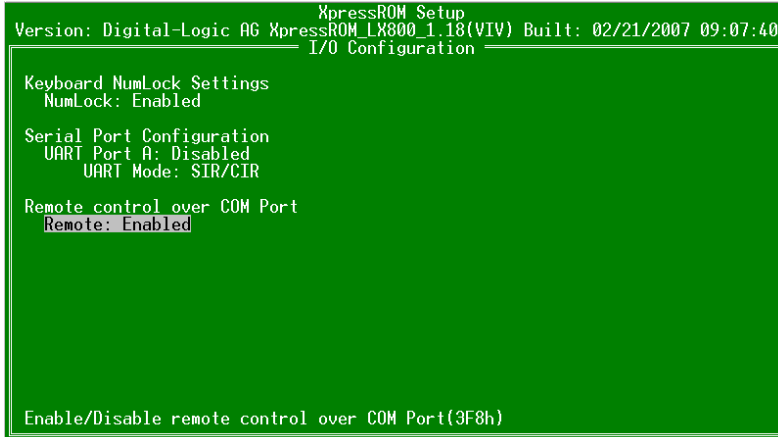
The main principles are based on the hooks of vectors INT10(video), INT13(disk) and INT16(keyboard) in a special (DLINT) ROM extension, which redirects the command interrupt requests over the serial COM port to the remote console running on another (host) computer under Windows or MSDOS.

During startup, DLINT ROM module tries to initiate communication over the COM port. If this initial communication is unsuccessful, the remote access feature will be disabled. If the initial connection is successful, DLINT module asks for supported options and initializes appropriated TSR vectors. Options which are not enabled in remote console will stay native on the remote computer. Remote connection was successfully established if, in the upper left corner, the message "Press F1 for Setup" appears.

5.2.4 BIOS Settings on the Remote Computer

To enable a remote COM port for remote control:

4. During boot up, press **F1** to enter the BIOS setup
5. Enter "C. Motherboard Device Configuration"
6. Enter "I/O Configuration"
7. Select "Remote control over COM port"
8. Set "Remote:" to Enabled



```
XpressROM Setup
Version: Digital-Logic AG XpressROM_LX800_1.18(VIV) Built: 02/21/2007 09:07:40
I/O Configuration

Keyboard NumLock Settings
  NumLock: Enabled

Serial Port Configuration
  UART Port A: Disabled
  UART Mode: SIR/CIR

Remote control over COM Port
  Remote: Enabled

Enable/Disable remote control over COM Port(3F8h)
```

For proper functionality, the serial port address must be set under "LPC Card devices": "Serial Port 1: 0x3f8" to 3F8 hex address. If the remote floppy disk feature will be used, then "Floppy BIOS Support" must be enabled in the BIOS setup.

Note: All remote features are supported only under FREEDOS or MSDOS 6.22.
When the remote floppy option is enabled, it is **impossible** to use another floppy disk; even the USB floppy is not accessible.

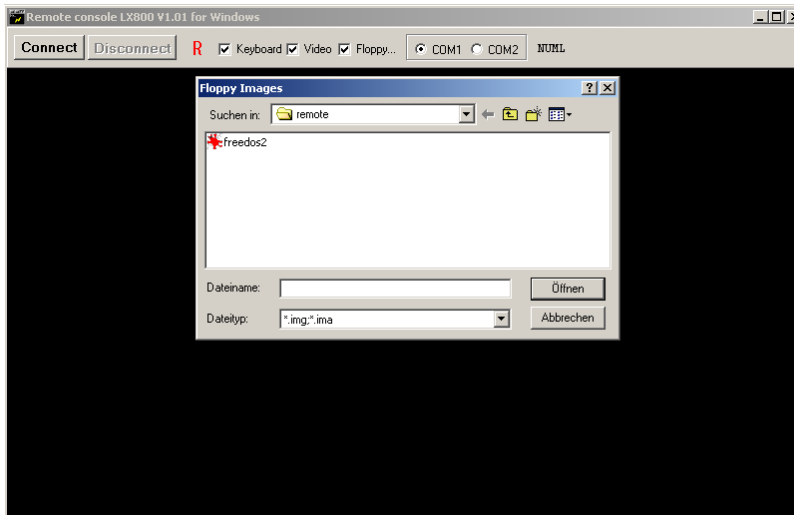
5.2.5 Settings on the Host Computer

Note: The remote console application must be loaded and connected before switching on (BIOS start) the remote computer.

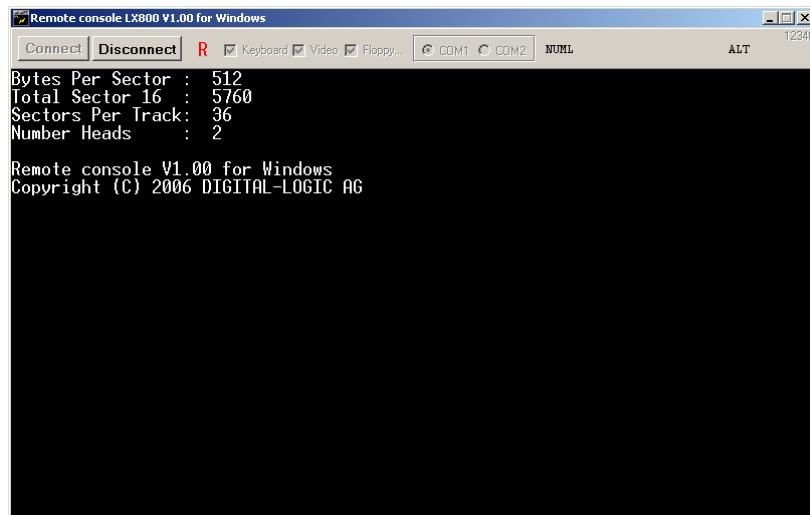
Windows Tool

Supported options such as "Keyboard", "Video" and "Floppy..." must be chosen before connection. The remote application simulates floppy disk access over the "floppy image file".

Connect to the FreeDos Image file by enabling the option "Floppy...":



After that press "Connect".

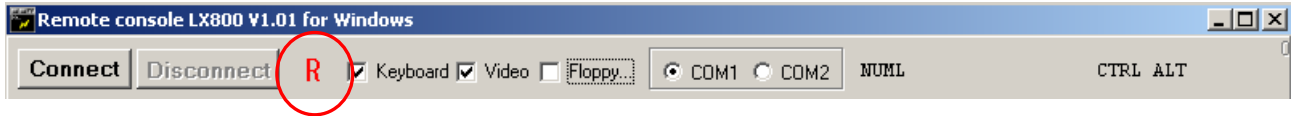


Windows application RemoteLX800.exe

Please start the remote computer now.

Functions:

R – enabling this option is helpful when the remote application is working in direct video mode without using the BIOS Int10 functions. Every 0.5-1 seconds, the windows application will send a request to the remote computer to refresh a screen on the host computer. For example, if you want to use the "Volkov Commander VC", you must enable this feature.

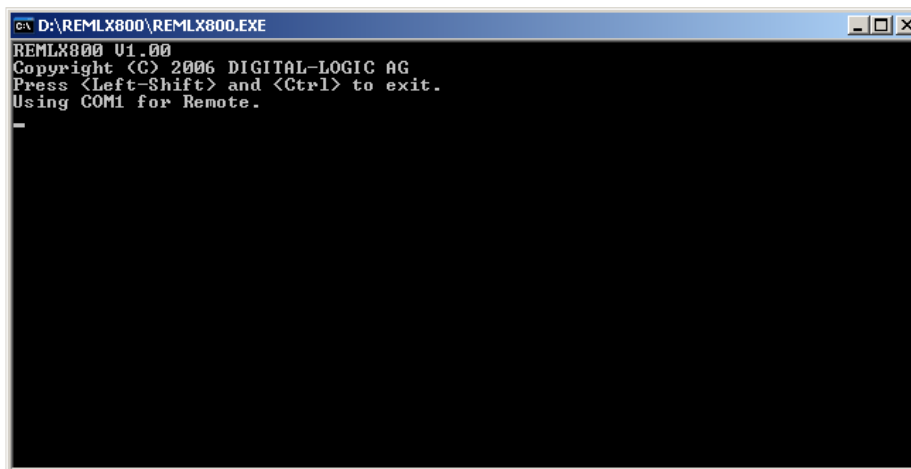


Ctrl-Alt-Del Simulation: The Windows OS hooks the **Ctrl-Alt-Del** keys sequence and sends a signal from the host console to the remote computer. Press **Ctrl-Alt** and the *on-screen Del* button by mouse click.



DOS Tool

Note: All remote features are supported only under FREEDOS or MSDOS 6.22.
When the remote floppy option is enabled, it is **impossible** to use another floppy disk; even the USB floppy is not accessible.



MSDOS application remlx800.exe

Options for MSDOS applications can be changed in the REMLX800.INI file.

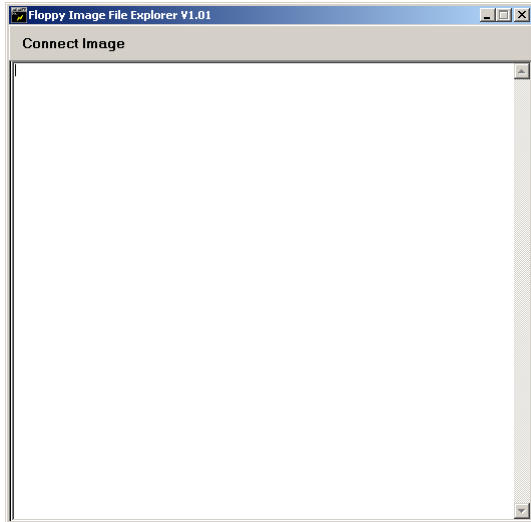
- » PORT=1: use COM1 for remote control on the host computer
- » KEYBOARD: enable remote keyboard
- » VIDEO: enable remote video
- » FLOPPY=FREEDOS2.IMG: enable remote floppy and use FREEDOS2.IMG image file for floppy disk emulation
- » MSDOS application does not support the direct video option

5.2.6 Update the FreeDos Image with flimfex.exe

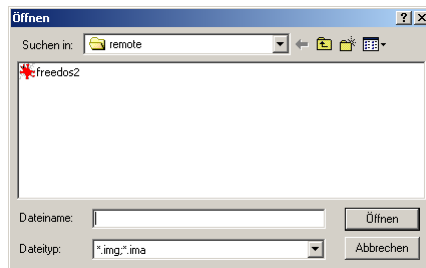
It's possible to use flimfex.exe from Kontron Compact Computers' remote software package.

(Or the image file can be modified with, for example, Winimage software <http://www.winimage.com/winimage.htm>.)

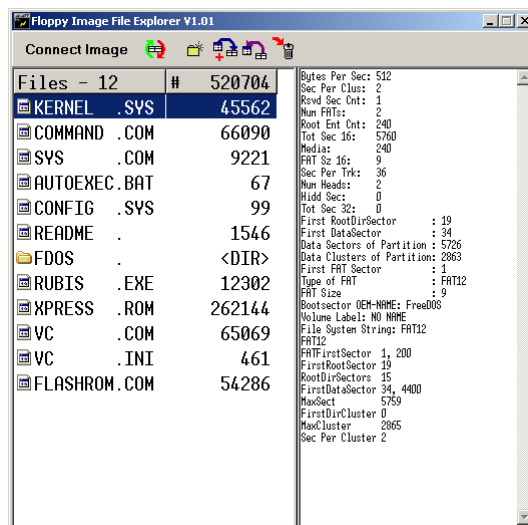
Start the tool flimfex.exe:



Click on "Connect Image" and select the freedos2.img:



Now you can modify the FreeDos image:



5.2.7 Emulated Features

Keyboard: INT 16 command interrupt

- AH = 0: read key from keyboard buffer
- AH = 1: check if keyboard buffer is empty
- AH = 2: report keyboard status bits
- AH = 10h: see AH = 0
- AH = 11h: see AH = 1

Video: INT 10 command interrupt

Remote video console supports only mode 3: text mode 80*25. In this mode it works like a twin of the main display, which is always enabled.

- AH = 0, AL=3: only, all other modes will be ignored on the remote console
- AH = 2: set cursor position (display page = 0)
- AH = 6: scroll up
- AH = 7: scroll down
- AH = 9: write "char" and attribute
- AH = 0Ah: write "char" and attribute
- AH = 0Eh: write "char" teletype
- AH = 13h: write text string (emulated over AH = 2 and AH = 0Eh commands)

Note: Remote "emulator" does not support direct access to the screen memory. Popular software, such as Norton Commander, will not work properly with remote video console, and the picture will be visible only on the remote computer screen.

Floppy Disk: INT 13

When the remote floppy disk is enabled, all floppy disk requests will be redirected to the remote console application; all requests to the hard disk will be executed by the native BIOS.

To make the "remote floppy disk" bootable, it is necessary to make a floppy image from a bootable floppy disk.

6 Special Peripherals, Configurations, Software

6.1 The Special Function Interface for MICROSPACE Computers

All functions are performed by starting the software interrupt 15hex with the following arguments:

6.1.1 INT 15h SFR Functions

Function:	WRITE TO EEPROM		
Number:	E0h		
Description:			Writes the Data Byte into the addressed User-Memory-Cell from the serial EEPROM. The old value is automatically deleted.
Input values:	AH	78h	DLAG Int15 function
	AL	E0h	Function request
	BX		Address in EEPROM (0-1024 Possible)
	CL		Data Byte to store
	SI		1234h User-Password (otherwise EEP is write-protected)
Output values:			None, all registers are restored when reopened

Function:	READ FROM EEPROM		
Number:	E1h		
Description:			Reads the Data Byte from the addressed User-Memory-Cell of the serial EEPROM.
Input values:	AH	78h	DLAG Int15 function
	AL	E1h	Function request
	BX		Address in the EEPROM (0-1234 possible)
	SI		1234h User-Password (DLAG-Password for access to the DLAG-Memory-Cells)
Output value:	AL		Data Byte

Function:	WRITE SERIAL NUMBER		
Number:	E2h		
Description:			Writes the serial number from the serial EEPROM into the addressed DLAG-Memory-Cell. The old value is automatically deleted.
Input values:	AH	78h	DLAG Int15 function
	AL	E2h	Function request
	BX, CX, DX		Serial number
	SI		Password
Output values:			None, all registers are restored when reopened

Function:	READ SERIAL NUMBER		
Number:	E3h		
Description:			Reads the serial number from the board into the serial EEPROM
Input values:	AH	78h	DLAG Int15 function
	AL	E3h	Function request
Outputs values:	BX, CX, DX		Serial number (binary, not ASCII)

Function:	WRITE PRODUCTION DATE		
Number:	E4h		
Description:			Writes the production date into the addressed DLAG-Memory-Cell from the serial EEPROM. The old value is automatically deleted. If the Password is also in DX, the counters will be reset (=0).
Input values:	AH	78h	DLAG Int15 function
	AL	E4h	Function request
	BX, CX		Production date
	CL		Day of month (1-31)
	DI		Password (clear counter)
	SI		Password
Output values:			None, all registers are restored when reopened

Function:	READ PRODUCTION DATE		
Number:	E5h		
Description:			Reads the production date from the board in the serial EEPROM
Input values:	AH	78h	DLAG Int15 function
	AL	E5h	Function request
Output values:	BX, CX		Production date

Function:	WRITE INFO 2 TO THE EEPROM		
Number:	E8h		
Description:			Writes the information Bytes into the serial EEPROM.
Input values:	AH	78h	DLAG Int15 function
	AL	E8h	Function request
	SI		Password
	DI		CPU type bits 1-7 and board type bits 8-15 CPU type: 01h=ELAN300/310, 02h=ELAN400, 05h=P5, 08h=P3, 09h=ELAN520, 10h=P-M Board type: 'M'=PC/104, 'E'=Euro, 'W'=MSWS, 'S'=Slot, 'C'=Custom, 'X'=smartCore or smartModule
	BH, BL		Board Version (Ex: V1.5 => BH=1, BL=5)
	CH, CL		BIOS Version (Ex: V3.0 => CH=3, CL=0)
	DH		Number of 512k flash
	DL		Number of 512k SRAM
Output values:			None, all registers are restored when reopened

Function:	READ INFO 2 FROM EEPROM		
Number:	E9h		
Description:			Reads the information Bytes out of the serial EEPROM.
Input values:	AH	78h	DLAG Int15 function
	AL	E9h	Function request
Output values:	AL		Board type: 'M'=PC/104, 'E'=Euro, 'W'=MSWS, 'S'=Slot, 'C'=Custom, 'X'=smartCore or smartModule
	DI		CPU type bits 1-7 and board type bits 8-15 CPU type: 01h=ELAN300/310, 02h=ELAN400, 05h=P5, 08h=P3, 09h=ELAN520, 10h=P-M Board type: 'M'=PC/104, 'E'=Euro, 'W'=MSWS, 'S'=Slot, 'C'=Custom, 'X'=smartCore or smartModule
	BH, BL		Board Version (Ex: V1.5 => BH=1, BL=5)
	CH, CL		BIOS Version (Ex: V3.0 => CH=3, CL=0)
	DH		Number of 512k flash
	DL		Number of 512k SRAM

Function:	READ INFO 3 FROM EEPROM (ReadCounter –low 2 Byte of 3 byte counter)		
Number:	EAh		
Description:			Reads the information Bytes out of the serial EEprom.
Input values:	AH	78h	DLAG Int15 function
	AL	EAh	Function request
Output values:	AX		Number of boot errors
	BX		Number of setup entries
	CX		Number of low battery errors
	DX		Number of power-on starts

Function:	WATCHDOG			
Number:	EBh			
Description:			Enables strobes and disables the Watchdog. After power-up, the Watchdog is always disabled. Once the Watchdog has been enabled, the user application must perform a strobe at least every 800ms, otherwise the watchdog performs a hardware reset	
Input values:	AH	78h	DLAG Int15 function	
	AL	EBh	Function request	
	BL	00h	Disable	
	BL	01h	Enable	01h-FFh enable watchdog / retrigger
	BL	FFh	Strobe	
	BH		00h = BL → number of sec. / 01h = BL → number of min.	
Output value:	AL	01h	Watchdog timer time-out occurred	

Function:	Read Temperature of THE CPU		
Number:	ECh		
Description:			Reads the temperature from the LM75 or CPU-thermal sensor
Input values:	AH	78h	DLAG Int15 function
	AL	ECh	Function request
Output values:	BL		00h → value OK, otherwise error
	CL		ADM1023 TempBit 7 = 01h neg./ *1C
	DX		CPU Temp (from the ADM1023) Bit 10= 01h neg./ *0125C

6.1.2 Int15 Emulator Driver for Windows

Int15 Hardware

Resources:

1. EEPROM: 2K size
000h-3FFh: reserved
400h-7FFh: available for user data
2. Temperature sensor
3. Watchdog hardware

Access to these resources under DOS can be provided by the INT 15h function, see Section 5.1.

Access under Windows 98, ME, 2000 and XP can be provided by the "Int15dl"-WDM driver; under Windows-NT with the "Int15dl"-NT driver.

At the moment this driver supports all Kontron Compact Computer boards with PIIX4 and ICH4 chipsets (eg. MSM855, M5EBX855, MSMP5SEV, MSMP3SEV, M5EP800, etc.). The driver can be found on the Product CD or in the download area of the support center.

Int15 Windows Software

- » WinInt15.exe (Int15 function test tool)
- » T855.exe (Temperatur sensor (SMBUS) monitor)

Driver Installation W2k/XP

"Int15dl" is not a plug-and-play driver, it must be installed manually:

1. Open the "Control Panel".
2. Double-click on "Add/Remove Hardware".
3. To continue click the "Next>" button.
4. On the page "Choose a Hardware Task", check "Add/Troubleshoot a device" and click "Next>".
5. After "New hardware detection", a windows automatic procedure, choose "Add a new device" and click the "Next>" button.
6. In the "Find New Hardware" page, choose "No, I want to select the hardware from a list" and click "Next>".
7. Choose "Other devices" in the "Hardware Type" list and click the "Next>" button.
8. On the page "Select a Device Driver" press "Have Disk..." button and find the driver location (Int15dl.inf - WDM). After opening the ".inf" file, the installation program will show a Models list and "DIGITAL-LOGIC INT15 functions emulator" string. Press the "Next>" button.
9. Then press "Finish" button; it is not necessary to restart the computer after installation.
10. After installation, please be sure that "DIGITAL-LOGIC INT15 functions emulator" has been installed properly. Open "Control Panel", then double-click on "System" icon. Choose the "Hardware" tab and click on the "Device Manager" button. Expand "System Devices" and double-click on "DIGITAL-LOGIC INT15 functions emulator". Be sure, that device is working properly.

Programming the Int15dl Interface under Windows

Programming of the Int15dl Interface is very similar to DOS programming, based on the DeviceIOControl function, which operates with a pre-defined structure named "Registers".

Files:

- Int15srv.h: contains definitions for the Registers structure.
- Int15dlioctl.h: contains definitions for the IO control code constants.
- Test_Int15dl.cpp: Sample subroutines providing access to hardware functions over the Int15dl driver.

Functions (Test_Int15dl.cpp)

bool Int15 (Registers *Regs): the main function, which sends user requests to the driver.

Returns *true* if the request finished successfully; otherwise it returns *false*.

Regs: address of the Registers structure containing specific request data (defined in Int15srv.h).

For example, the following code will initiate temperature measuring:

```
Registers Regs;
Regs.ah = 0xEC;
if(!Int15(&Regs)) //error in driver request
{
    printf("Error reading temperature\n");
    return;
}

//success - temperature value is in Regs.al
if(Regs.bl == 0)printf("\tTemperature = %d C\n",Regs.al);

//error - not valid value
else printf("\tError reading Temperature\n");
```

Note: Input and output arguments of the Int15 function vary for different chipsets and BIOSes. Read the User Manual on defining registers.

For example: To get a temperature value on a board with a PIIX4 chipset, use "Regs.ah = 0xEC;" but on a board with an ICH4 chipset, use "Regs.ax = 0x78EC;".

bool Open_Int15dl(void): the first function and must be called to create a link between the "DIGITAL-LOGIC INT15 functions emulator" driver and the user software. It returns *true* if the device was successfully opened; otherwise it returns *false*.

void Close_Int15dl(void): the last function, it breaks the link between the driver and the user software.

int GetChipID(void): an additional service function; it returns the type of chipset (for PIIX4 = 4, for ICH4 = 5).

Registers Structure

This is used for exchanging information between the user program and the "Int15dl" driver.

```
typedef struct Registers {
    union {
        struct {
            unsigned short ax;
            unsigned short bx;
            unsigned short cx;
            unsigned short dx;
            unsigned short bp;
            unsigned short si;
            unsigned short di;
            unsigned short ds;
            unsigned short es;
            unsigned short flags;
        };
        struct {
            unsigned char al;
            unsigned char ah;
            unsigned char bl;
            unsigned char bh;
            unsigned char cl;
            unsigned char ch;
            unsigned char dl;
            unsigned char dh;
        };
    };
} TRegisters;
```

Information for Advanced Users

At the first call of the function **Open_Int15dl()**, the Int15dl driver tries to detect the type of chipset. To disable this procedure the user must define the following parameters in the "Int15dl.inf" file before installing the driver:

For PIIX4 chipset:

```
HKR, "Parameters", "chipID", 0x00010001, 0x4
HKR, "Parameters", "pmBase", 0x00010001, 0x1000
HKR, "Parameters", "smbBase", 0x00010001, 0x1040
HKR, "Parameters", "tsaddr", 0x00010001, 0x9E - LM75 sensor address
```

For ICH4 chipset:

```
HKR, "Parameters", "chipID", 0x00010001, 0x5
HKR, "Parameters", "pmBase", 0x00010001, 0x1000
HKR, "Parameters", "smbBase", 0x00010001, 0x1880
HKR, "Parameters", "tsaddr", 0x00010001, 0x9C - ADM1023 sensor address
```

For more information, please contact the Kontron Compact Computers support department.

6.2 LINUX I²C Bus Access

The following information is valid for Knoppix 5.2 (kernel 2.6.19.5).

Note: The I²C system may differ when other kernel versions are used.

Kontron Compact Computers LX800 / LX900 products have the following I²C devices onboard:

Address	Device	Driver
0x4c	Temperature sensor	lm83.ko ★
0x50	RAM EEPROM	eeeprom.ko
0x57	RTC backup EEPROM	eeeprom.ko

★ not available on the MSB800(L), MPC20 and MPC21

The I²C (also called ACCESS.bus on LX800 / LX900 products) adapter is included in the AMD CH5536 companion chip. The driver is called: `scx200_acb.ko`

Once the required drivers are loaded, the device nodes will appear in: `/sys/class/i2c-adapter/i2c-0/`

7 BIOS

7.1 BIOS History

Note: **This BIOS history is for the following products:**

MPCV800, MSEP800, MSM800SEV/SEL, MSM800BEV, SM800

This BIOS history is *not* for the MSB800/L, the MPC20/21 and the MPC20WOL. The MSM800XEV/XEL had a unique BIOS (V1.22) but has been reincorporated with the standard BIOS as of V1.24.

Vers.	Date	Status	Edited by	Modifications
1.05	08.03.2006	Development	BRM	Initial version for DLAG boards
1.06	"	"	BRM	ISA IRQ reservation
1.07	23.05.2006	"	BRM	AC97 codec detection
1.08	24.05.2006	Released	BRM	ISA IRQ table corrected
1.09B	09.2006	"		USB fix BIOS V1.09B is only for the following board versions: MSEP800: V0.1, V0.2, V0.3 and V1.0 MSM800SEV: V1.0, V1.1 and V1.2
1.10B	24.08.2006	Released	BRM	PCI routing table BIOS V1.10B or newer releases are for the following board versions and later: MSEP800: V1.1 MSM800SEV: V2.0 / V2.1 SM800PCX: V1.0
1.12	23.10.2006	Released	BRM	Video default settings fixed / RAM memory settings restored
1.13	17.11.2006	"	BRM	NumLock / IRQ15 assignable for ISA / IRQ6 no longer available for PCI
1.14	04.01.2007	"	BRM	IT8888 PCI to ISA bridge / NumLock fix
1.19	09.03.2007	Released	VIV	PCI bridge fix / CMOS fix / Memory fix / Remote support
1.24	10.01.2008	"	BRM	Memory problem fixed (MSM800XEV/XEL reincorporated)
1.26	24.04.2008	"	BRM	Corrected LPT ASL part / IT8888 new menu for IO Access Recovery Time / Programming of Register 51h of IT8888 (IO Access Recovery Time)
1.30	30.09.2008	Released	DIP	Added Extended Temperature switch to setup / Fixed Qt and AMIDIAG DMA test failures / Added possibility to include spd eeprom content into main BIOS / Remove LAN boot from memory if LAN boot is disabled
1.36	13.04.2010	"	BRM	Increased e100er.lom to 64k / USB boot fixed / Replaced LAN boot extension for 82551QM (only for boards with this installed) / Removed pxe password / Kontron Logo / Added Audio codec detection with setup option / Added setup option to disable USB boot enumeration

Note: MSB800/L, MPC20/2 and MPC20WOL have a unique BIOS version and, therefore, their own BIOS History which can be found in the MSM800/L Detailed Manual, the MSB800 Detailed Manual or in the MPC20/21 Technical Manual. Also included in these manuals are the specific instructions for that BIOS version.

7.2 Core BIOS Download

Before downloading a BIOS, please check the following:

Make a bootable diskette which includes the following files:

- » Flashrom.com
- » core BIOS xxxxxxxx.yyy

IMPORTANT: Do not use boot disks created in a Windows operating system. If you do not have an MSDOS 6.22 disk available, you can download a boot disk from www.bootdisk.com.

- Note:
- » Disable the EMM386 or other memory managers in the CONFIG.SYS of your bootdisk.
 - » Make sure that the FlashROM.com program and the BIOS to be downloaded are in the same path and directory!
 - » Boot DOS without config.sys and autoexec.bat → press F5 while starting the DOS boot.
 - » Is the empty disk space, where the FlashROM.com is located, larger than 64kB (for safe storage)?
 - » Is the floppy disk not write-protected?

Start the DOWNLOADING process:

1. Start the system with the bootable diskette. If you do not have a bootable diskette or floppy drive you can start in DOS mode by pressing the **F5** key to disable autoexec.bat and config.sys.
2. Run FlashROM.com as follows: FLASHROM /sFFFC0000 biosname.xxx
3. Power off the system.
4. After powering the system back up, press **F1** to enter the setup mode and set the default values ("L").
5. "Save and leave" the setup ("X").
6. Switch off the system after the download is completed.

If the download does not work:

- » Check to be sure no EMM386 is loaded.
- » Check if there is a peripheral card in the system, which occupies the same memory range. If present, disconnect this card.
- » If the download has stopped or is not completed, make a warm boot and repeat the steps or download another file. As the video may be shadowed, everything is visible and a cold boot would clear the screen so nothing would be visible afterwards.

Attention! Since FlashROM version 12.05, it is also possible to update the BIOS from a USB device (USB bootstick).
If you have two IDE devices attached to the board (e.g. HDD and CD-ROM), disconnect the CD-ROM before downloading the BIOS.

7.3 BIOS Setup

Setup Menu Screens and Navigation

The XpressROM™ Setup Menu contains a number of features and options. You are advised to evaluate the menu options prior to the shipment of your platform to ensure the removal of options that could have a negative consequence if users change them.

The controls for the setup menu are:

Function	Key
BIOS setup	F1
Change values	ENTER
Jump	ARROWS / SPACE
Save	X
Back/exit	ESC

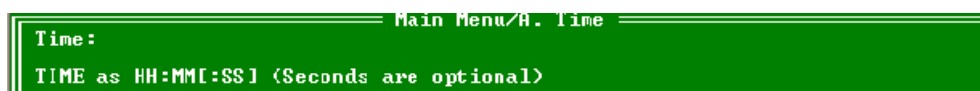
7.3.1 Main Menu

The main menu is the first screen that appears when a user selects **F1** during the boot process. Below is a screen shot of the main menu. Press the letter or use the arrow keys (↑↓) to select an option.



Changing the Time

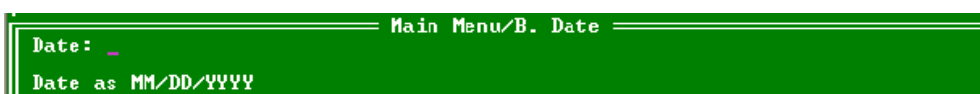
To change the time select **A** from the main menu. You will be prompted with the following submenu:



Enter the time in the format listed. For example: 11:30:01 then hit **<enter>**.

Changing the Date

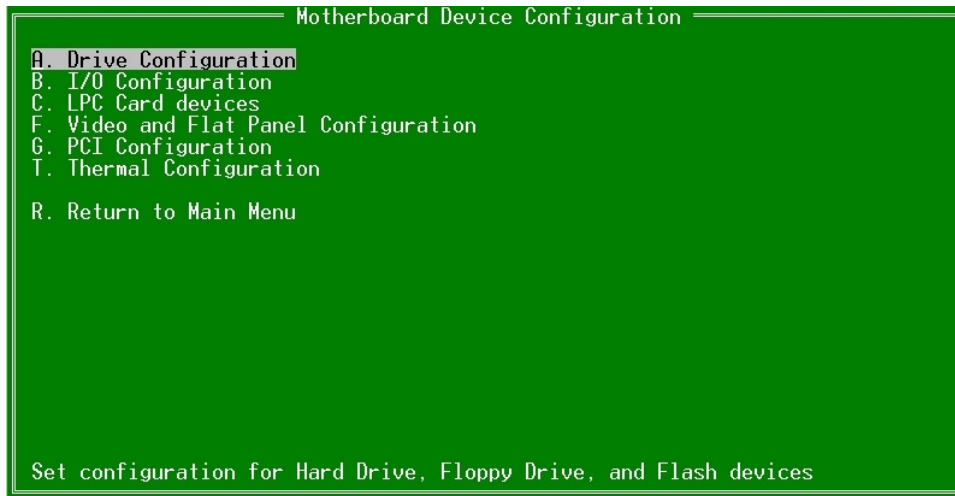
To change the date, select **B** from the main menu. You will be prompted with the following submenu:



Enter the date in the format listed. For example: 12/16/2006 then hit **<enter>**.

7.3.2 Mother Board Device Configuration

The Mother Board Device configuration contains the only sub menu system in the setup screens. The choices are:



Drive Configuration

The drive configuration screen determines the setup for the hard drives, floppy, CD-ROM and flash configurations.

Hard Drive Configuration:

IDE BIOS Support: Allows the configuration of the IDE channel. The options are Enabled or Disabled.

80-Conductor Cable Sense: Selects the GPIO that is connected to the IDE-PDIAG sense. The options are: GPIO 00-17; None (disabled); Force to 40pin conductor cable; or Force to 80pin conductor cable.

DMA/UDMA BIOS Support: This enables DMA/UDMA timings. The options are Enabled and Disabled.

Max mode for Drive 1 or 2: This enables the transfer mode. The options are: Auto; PIO 0-4; MDMA 0 or 1; and UDMA 0-4.

Floppy Configuration: Allows the Floppy to be Enabled or Disabled.

CDROM Configuration: Allows the CD-ROM to be either Enabled or Disabled.

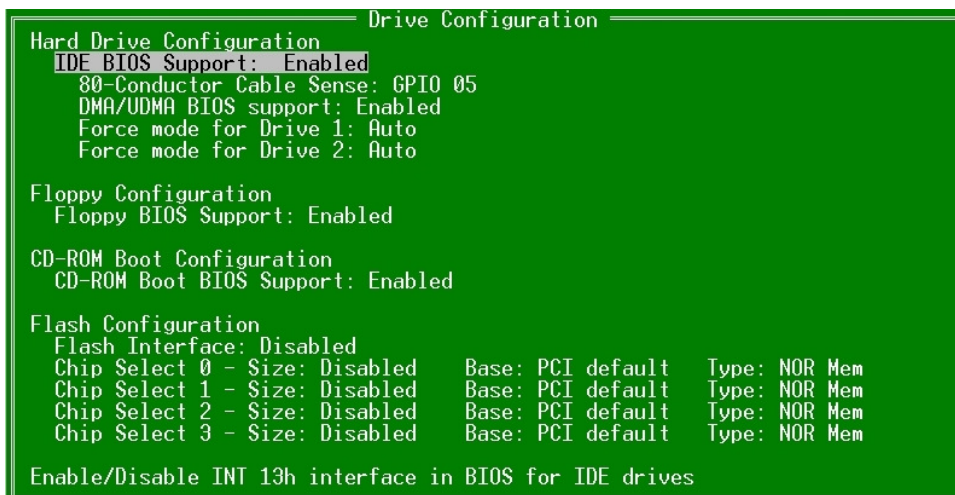
Flash Configuration: Allows the use of a flash device over the IDE; options are Enabled or Disabled.

Chip Select 0-3:

Size: Allows the configuration of the flash chips to be Disabled or set to the sizes 8K/16B, 16K/32B, 128K/64B, 512K/128B, 4M/256B, 8M/256B or 256M/256B (in the form MemorySize / I/O size).

Base: Allows the configuration of the base address. The options are PCI defaults, D2000, D4000 or D6000.

Type: Allows the selection of the flash memory type. The options are NOR Mem, or NAND I/O.



I/O Configuration

The I/O configuration menu allows the configuration of the serial ports on the CS5535/CS5536 parts. To select the option use the arrow keys (↑↓) and press **<enter>**.

UART Port A or B: Allows selection of the address of the UART port; options are Disabled, 0x3F8 IRQ 4, 0x2F8 IRQ 3, 0x3E8 IRQ 4, 0x2E8 IRQ3.

UART Mode: Allows the selection of the mode for operation of the serial port. The options are CIR, Serial-16550 Compatible, or Serial Extended.

```
----- I/O Configuration -----
Keyboard NumLock Settings
  NumLock: Enabled

Serial Port Configuration
  UART Port A: Disabled
  UART Mode: SIR/CIR

Remote control over COM Port
  Remote: Enabled

Selects Power-On state for Keyboard NumLock
```

LPC Card Devices

The LPC Card Configuration enables the configuration of each serial port and the parallel port on the LPC.

Serial Port Configuration: use the arrow keys (↑↓) to select the port and hit **<enter>** to change the state of the choices which are Disabled, 0x3F8 IRQ 4, 0x2F8 IRQ 3, 0x3E8 IRQ 4, 0x2E8 IRQ3.

Parallel Port Configuration: Allows selection of the address; choices are Disabled, 0x378, 0x278, 0x3BC.

Mode: Allows changing the parallel port mode. The options are Compatible, PS/2 Bi-directional, EPP 1.7, EPP 1.0 ECP.

IRQ: Allows configuration of the IRQ for the parallel port. The options are IRQ Disabled, IRQ5, IRQ7, IRQ9, IRQ10, IRQ11.

DMA: Allows configuration of the DMA for the parallel port; options are None, Channel 1, or Channel 3.

Video and Flat Panel Configuration

The following menu allows configuration of the video settings for the system. To change an option, select the field using the arrow keys (↑↓) and then hit <enter> to change the value of the field. The menu system will also display the bond-out option for either a flat panel or a CRT.

Video Memory: Allows selection of the amount of video memory to reserve on the system. The options are <none> or 4MB to 16 MB.

Multi-monitor Configuration: Allows the selection of the mode for the video controller when an external monitor is present; choices include Disabled, Primary and Secondary.

Flat Panel Configuration: Allows the auto or manual configuration of the flat panel.

Type: Enables selection of the type of flat panel; choices are Auto Detect, TFT, LVDS. Auto Detect is typically recommended. (If Auto Detect is selected, the Resolution, Bus Width and Data type will be grayed out.)

Resolution: Allows the setting of the resolution of the panel. The choices are 640x480, 800x600, 1024x768, 1152x864, 1280x1024. (Only active if Auto Detect is not selected.)

Bus Width: Allows the selection of the bus width for the panel. The options are 8, 9, 12, 16, 18, or 24bits. (Only active if Auto Detect is not selected.)

Data Type: Allows selection of the data type for the panel; options are Normal or 2x. (Only active if Auto Detect is not selected.)

Refresh Rate: Allows selection of the monitor's refresh rate. The options are 60, 70, 72, 75, or 85Hz.

HSYNC Polarity: Selects the active polarity of the HSYNC signal to the panel; options are Active Low or Active High.

VSYNC Polarity: Selects the active polarity of the VSYNC signal to the panel. The options are Active Low or Active High.

LP Active Period: Selects the active period of the LDE/MOD (LP) signal; options are Free Running or Active Only.

SHFCLK Active Period: Selects the active period of the SHFCHK signal; options are Free Running or Active Only.

Backlight Configuration: Allows configuration of the backlight.

Backlight Enable: Allows the backlight to be Enabled or Disabled.

Initial Brightness: Selects the initial brightness of the panel. Options are Last Value, 0% (off), 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 100% (full on).

```
Graphics Configuration
Internal Adaptor Mode: Disabled
Graphics Memory:      024
Output display:      Auto
Driver controls init: Disabled
DOTPLL Bypass:      Disabled

Flat Panel Configuration
Type:                TFT
Resolution:          800x600
Data Bus Type:       9-24 bits, 1 ppc
Refresh Rate:        60 Hz
HSYNC Polarity:      Active low
VSYNC Polarity:      Active low
LP Active Period:    Free running
SHFCLK Active Period: Free running

Software Backlight Control
Backlight Enable:    Disabled
Initial Brightness: Last Value

TV Output Configuration
TV Encoder:          AUTO
TV Standard:         NTSC
TV Resolution:       Low

Mode for internal controller when an external video device is present.
```

PCI Configuration

The following menu system allows the configuration of the PCI interrupts. Select the PCI interrupt desired to change and hit **<enter>** to cycle through the IRQs.

USB 2.0 Settings:

OHCI: Enable or Disable OHCI Controller.

EHCI: Enable or Disable EHCI Controller.

UDC: USB Device Controller Enabled or Disabled.

OTG: On-The-GO Enabled or Disabled.

Overcurrent Reporting: Enable or Disable Overcurrent Reporting.

Port 4 Assignment: Determines the functionality of the USB port 4; options are Not Used, Device or Host.

```
----- PCI Configuration -----
PCI Interrupt Steering
PCI INTA#: IRQ 10
PCI INTB#: IRQ 11
PCI INTC#: IRQ 10
PCI INTD#: IRQ 11

USB 2.0 Settings
OHCI: Enabled
EHCI: Enabled
UDC: Disabled
OTG: Disabled
Overcurrent reporting: Disabled
Port 4 assignment: Host

Enable/Disable INTA# to IRQ steering
```

Thermal Configuration

The Thermal Configuration screen allows reading the current state of the Ambient and CPU high temperatures. The values are in Celsius. Press **<enter>** to update both temperatures.

```
----- Thermal Configuration -----
Reading Current Temperature...
Current Ambient Temperature: 044
Current CPU Temperature: 065

Reading back the current temperature (Celsius) from ADM1023.
```

7.3.3 Memory and Cache Optimizations

The Memory and Cache Optimizations screen should be removed from all systems before shipping to the customer. Incorrectly configuring the memory can render the system unable to boot and it may be necessary to short circuit the CMOS to get the system to boot.

Cache Enable: Allows the configuration of the system Cache to either Enabled or Disabled.

Cache Mode: Allows selection of the Cache mode, either Write-Back or Write-Through.

DIMM 0 or 1:

Memory Optimization DIMM 0 or 1: Allows the memory to be configured by Auto or Manual. If Auto is selected then Page Size, Size, Module Banks, and Component Banks will be grayed out.

DIMM 0 or 1 Page Size: Options are Not Installed, 1, 2, 4, 8, 16 kB.

DIMM 0 or 1 Size: Allows configuration of the Memory size to 8MB, 16MB, 32MB, 64MB, 128MB, 256MB, or 512MB. (alternately: 8, 16, 32, 64, 128, 256 or 512MByte).

Module Banks: Allows configuration of the number of module banks; options are 1 or 2.

DIMM Component Banks: Allows configuration of the component banks; options are 2 or 4.

CAS Latency (SDR/DDR): Allows the configuration of CAS (Column Address Select) latency. The options are Auto, 2CLK/1.5CLK, 3CLK/2CLK, 4CLK/ 2.5CLK, 5CLK/3CLK or 6CLK/NA.

DDR/SDR: Allows the selection of the memory type; options include Auto, DDR and SDR.

Refresh rate: Allows the setting of the memory refresh rate. Options include: auto, 3us, 7us, 15us, 31us, 62us and 125us.

Interleave selection: Allows setting of the interleaving to either LOI (Low Order Interleaving) or HOI (High Order Interleaving).

XOR MBO, BAO or BA1: Options are Enable or Disable of the XORing of module bank BA1or BAO with upper GLIU address bit.

Memory Latencies: Allows manual or auto configuration of the memory latencies.

ACT2PRE: ACT to PRE period (tRAS). Minimum number of clocks from the ACT to PRE commands on the same component bank.

PRE2ACT: Pre to ACT period (tRP). Minimum number of SDRAM clocks between PRE and ACT commands.

ACT2CMD: Delay time from ACT to Read/Write (tRCD). Minimum number of SDRAM clocks between ACT and Read/Write Commands.

ACT2ACT: ACT(0) to ACT(1) period (tRRD). Minimum number of SDRAM clocks between ACT and ACT commands to two different component banks within the same module bank.

REF2ACT: Refresh to Activity Delay (tRFC). Minimum number of SDCLKS 90-31 between refresh and next command, usually inactive.

```
Memory and Cache Setup
Cache Enable: Enabled
L2 Cache Enable: Enabled
Cache Mode: Write-Back
Cache Allocate: Disabled

DIMM 0
Memory Optimization DIMM0: Auto
DIMM 0 Page Size: Not Installed
DIMM 0 Size: 8 MB
Number of Devices: 0 devices
DIMM 0 Module Banks: 1 bank
DIMM 0 Component Banks: 2 banks

DIMM 1
Memory Optimization DIMM 1: Auto
DIMM 1 Page Size: Not Installed
DIMM 1 Size: 8 MB
Number of Devices: 0 devices
DIMM 1 Module Banks: 1 bank
DIMM 1 Component Banks: 2 banks

CAS Latency: Auto
Refresh Rate: Auto
Interleave Select: LOI

XOR BA0: Disabled
XOR BA1: Disabled
XOR MB0: Disabled
XOR Bit Select: 18

Memory Latencies: Auto
ACT2PRE: 07
PRE2ACT: 3
ACT2CMD: 3
ACT2ACT: 07
ACT2ACTREF: 08
REF2ACT: 08
```

7.3.4 System Clock/PLL and Clock Gating Configuration

The system clock/PLL allows the setting of the clocks for the AMD Geode™ system.

Clock Mode: Allows the clock speed to be determined by either the hardware strapping or the manual settings. If the H/W strapping option is selected, then the manual divisor settings will be grayed out.

Manual divisor settings:

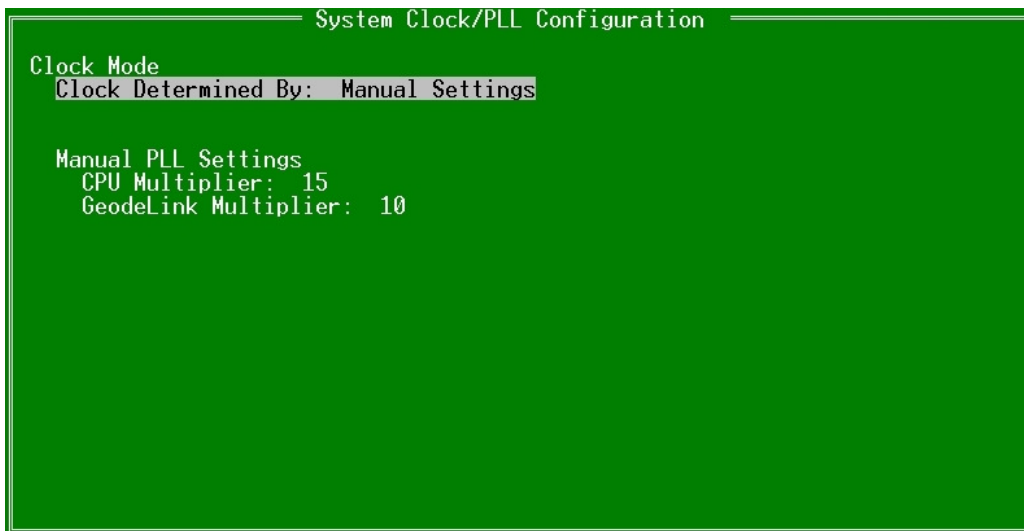
Mdiv: Options from 2 to 17.

Vdiv: Options from 2 to 9.

FbDiv: Options from 6 to 61.

The formula for the MDiv, VDiv, and FbDiv is as follows:

$$(PCI * FbDiv) / VDiv = \text{CPU speed and } (PCI * FbDiv) / MDiv = \text{GeodeLink™ speed.}$$



7.3.5 Power Management

This menu is for configuring the BIOS's power management in relation to the installed OS. The LX800 / LX900 supports ACPI and APM Version 1.2.

The following ACPI Sleep States are supported:

S1 (Standby)

S4 (Hibernation)



7.3.6 Miscellaneous Configurations

The Miscellaneous Configuration screen focuses on a variety of functions. Use the arrow keys (↑↓) to select the function and hit <enter> to change the value.

Splash Screen Configuration:

Splash Screen: Allows the splash screen to be, or not be, displayed; options are Enabled or Disabled.

Clear Splash Screen: Allows the system to leave the splash screen on until the operating system clears the screen. The options are Enabled or Disabled.

Splash Screen Timeout: Sets the length of time the splash screen is displayed. The time is in milliseconds and goes from 0 to 65535. Type in the amount and select <enter>.

Summary Screen Configuration:

Summary Screen: On boot, allows the summary screen to be displayed or not; options are Enabled or Disabled.

Summary Screen Timeout: Sets how long the summary screen is displayed. The time is in milliseconds and goes from 0 to 65535. Type in the amount and select <enter>.

Power Button Configuration: Allows the power button to be configured with ACPI mode or Instant Off.

PC Speaker Configuration: Allows the PC speaker to beep. The options are Enabled or Disabled.

```

Miscellaneous Configuration
-----
Splash Screen Configuration
Splash Screen: Enabled
Clear Splash Screen: Enabled
Splash Screen Timeout: 00000

Summary Screen Configuration
Summary Screen: Enabled
Summary Screen Timeout: 00000

Power Button Configuration
Power Button: ACPI Mode

PC Speaker Configuration
AC Beeper: Enabled

Enable/Disable display of splash screen
```

7.3.7 ISA I/O

ISA Bus I/O Recovery Time

The recovery time of back to back ISA I/O cycles is 1.5 BCLK (ISA System BUS clock). The IT8888 provides different I/O recovery time settings for 8bit I/O cycles and 16bit I/O cycles. The configured 8bit I/O recovery time is inserted after ISA I/F finishes the 8bit I/O cycle, and the configured 16bit I/O recovery time is inserted after ISA I/F finishes the 16bit I/O cycle. No additional recovery time will be inserted due to byte conversion (PCI I/O cycle could be 8/16/24/32 bits, but ISA I/O is only 8/16 bits).

This register is used by the system BIOS to set the ISA I/O recovery time between two different PCI I/O accesses (i.e. no additional recovery wait state will be inserted during byte conversion).

16bit I/O Access Recovery Time

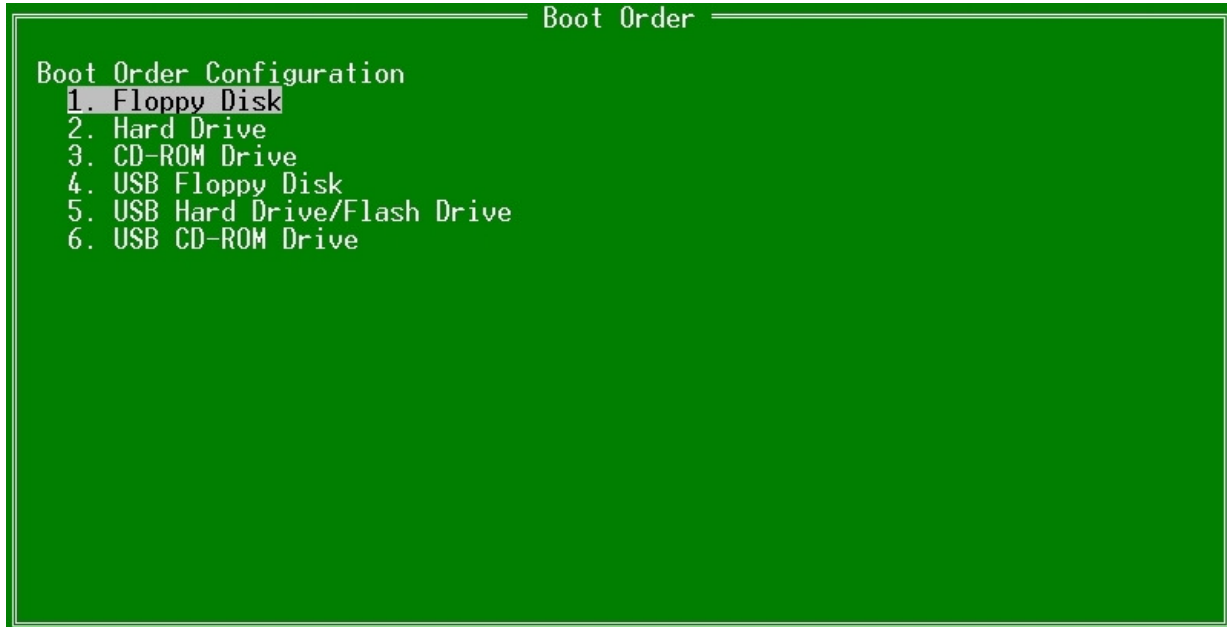
00b:3.5 BCLK, 01b:4.5 BCLK, 10b:5.5 BCLK, 11b: 7.5 BCLK

8bit I/O Access Recovery Time

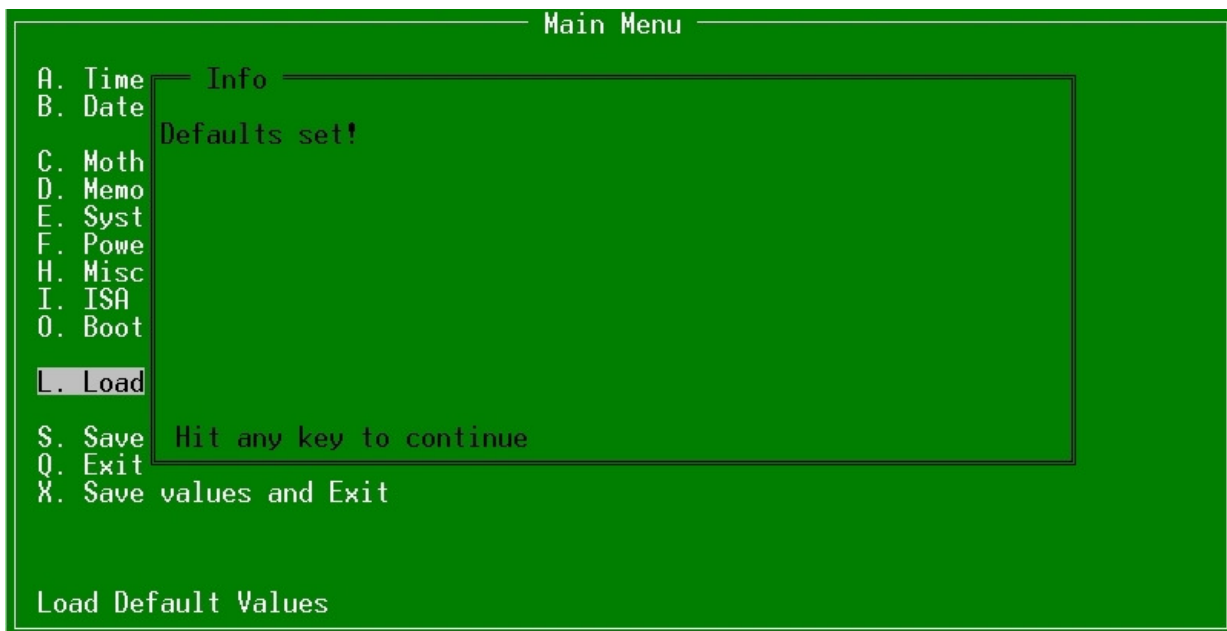
00b:3.5 BCLK, 01b:5.5 BCLK, 10b:7.5 BCLK, 11b:11.5 BCLK

7.3.8 Boot Order

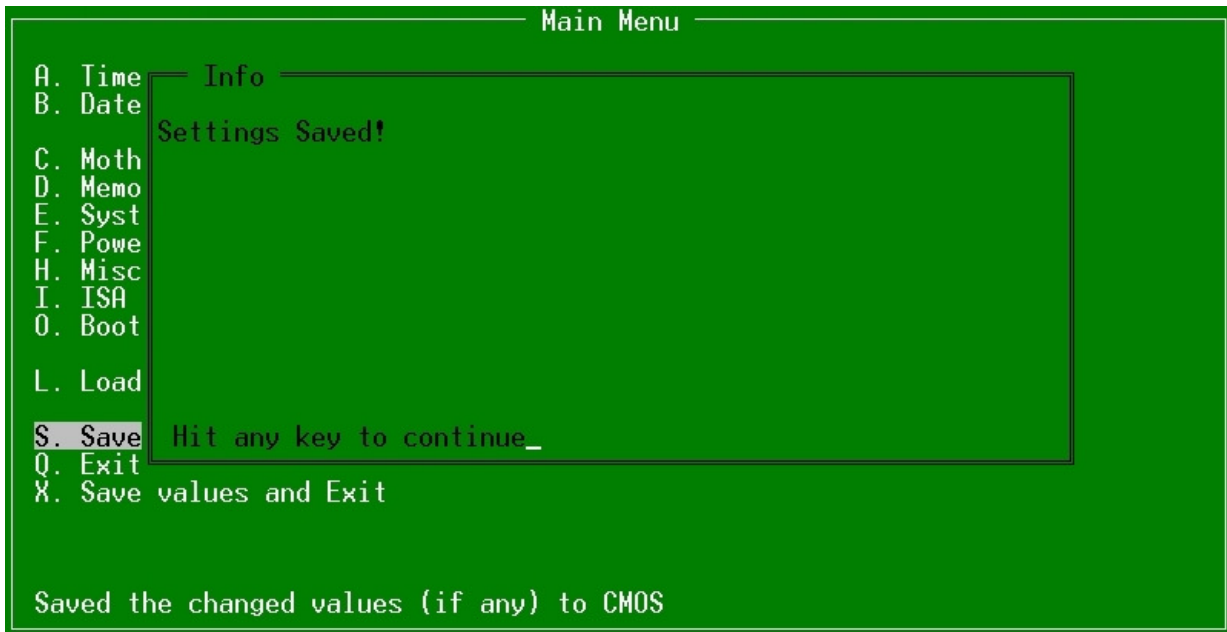
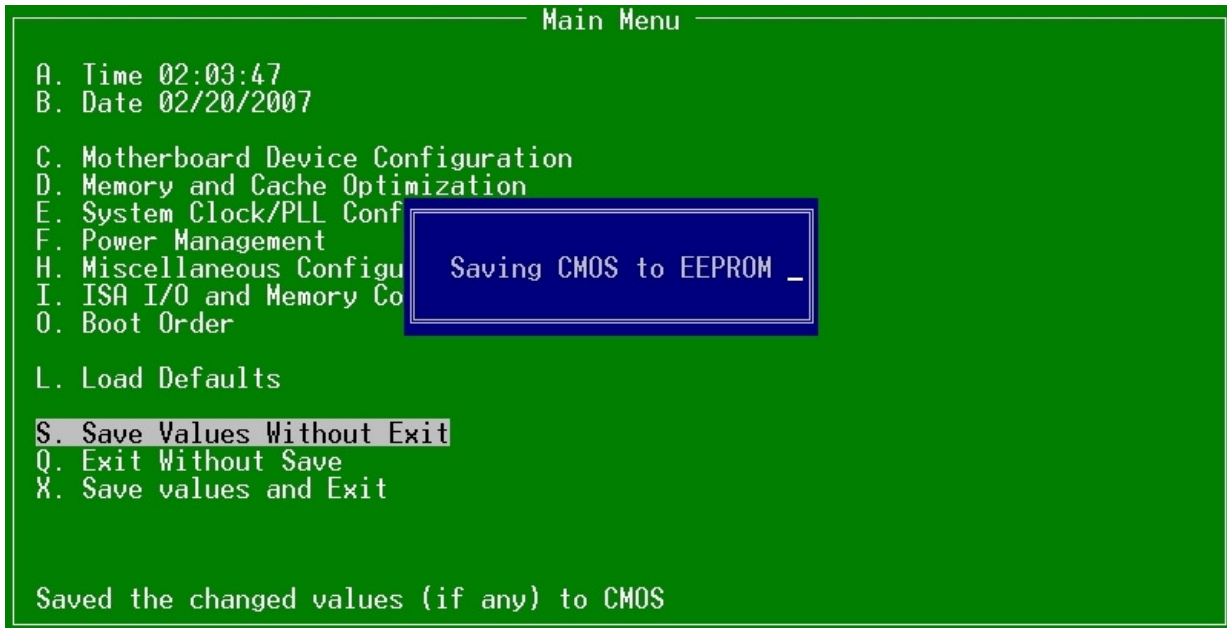
This menu allows the selection of the sequence of devices which are checked for a bootable image. There are six positions. Use the arrow keys (↑↓) to select the number and then press **<enter>** to cycle through the options. The options are None, Floppy Disk, USB Floppy Disk, Hard Drive, CD-ROM Drive, USB CD-ROM Drive and USB Hard Drive/Flash Drive.



7.3.9 Default Values



7.3.10 Save Values without Exit



7.3.11 Exit without Save



7.3.12 Save Values and Exit



7.4 BIOS Diagnostics – Post Codes

This is the GeodeRom port 80 flow for a cold boot on a gx system. There are some additional codes on a scx2xx system. This shows what functions generate which port 80 code. The first column of codes is generated by xpresrom.asm; the second column is the function which is run after the post code and any additional post codes generated by that function.

Kontron Compact Computers LX800 / LX900 Post Codes

Info: Informational code only
 Error: Error code. The system halts
 Info/Error: Informational code but the system can halt.

Checkpoint	Description	Type
00h	Initialize CS5536 specific registers	Info
02h	Initialize some cpu registers	Info
03h	Initialize ES and FS as Big Real Mode segments	Info
05h	Test CUID instruction	Info
06h	Setup DRAM Memory controller Detect installed DRAM modules Detect memory size Detect memory timing => See Post 7xh	Info
07h	Set up a stack for further post tests. => See Post 90h, 9Eh, 9Fh	Info
08h	Perform memory test => See Post 0Bxh	Info
09h	Copy ROM (F000:0 - F000:FFFF) into SDRAM (F000:0 - F000:FFFF) and disable write access to shadow memory.	Info
0Bh	Initialize L1 and L2 cache => See Post 0CEh	Info
0Ch	Core Logic initialization: Host bridge Setup GLPCI registers Enable Clock Gating Setup AES engine Apply CPU bugfixes => See Post 0E8h	Info
0Dh	Platform specific chipset Init	Info
0Eh	Initialize Super I/O	Info
0Fh	PC/AT Compatibility stuff Initialize DMA controller to AT compatible mode Clear the first 640kB of memory (to make DOS happy) Clear 2nd MB of memory (to make DOS happy)	Info
10h	Set up software interrupt vectors Setup interrupt vectors Program interrupt controller for PC usage Initialize Timer	Info
11h	store how much memory is available to the OS	Info
12h	Decompress ROM images and initialize them Soft A20 Power Management Soft VGA Virtual Audio SMM system => See post 0Dxh	Info
13h	Check for PLL reset and set PLLs if not done already => See port 0Axh	Info
14h	Wakeup the keyboard controller	Info
16h	Initialize the BIOS Data Area	Info
17h	Scan PCI bus and assign resources Scan PCI bus for devices Assign BAR and Interrupt	Info

Checkpoint	Description	Type
18h	Scan and Initialize option ROMs Configure IT8888 Bridge Find and call all option ROMs from C800:0 to DFF0:0	Info
19h	Leave Big Real mode	Info
1Ah	Display the summary screen (if enabled)	Info
1Bh	Try to boot Trying to boot via INT19h Trying to boot via INT18h If boot failed, pod 1Fh	Info
1Ch	System pre init Flush the prefetch queue Invalidate the cache	Info
1Eh	GLIU Descriptors setup	Info
1Fh	Failed to boot via INT18h and INT19h Possible causes: No boot device found No boot device attached Boot order in setup wrong	Info/Error

CPU/Chipset Status Codes:

Checkpoint	Description	Type
20h	In CPUID test procedure => Status of post 05h	Info
28h	Check the CPU Stepping information => Status of post 05h	Info
29h	Check CPU DM BIST status	Info/Error
2Bh	Check if there is an CS5536 Chip present	Info
2Ch	CS5536 Chip is present	Info
2Dh	CS5536 Chip not found Possible causes: Stuck line on the PCI bus Southbridge defect	Error
2Eh	CPUID test passed	Info
2Fh	CPUID test failed. => Status of post 05h	Error

Memory Setup Status and Error Codes:

Checkpoint	Description	Type
70h	In memory setup procedure (See Post 06h, 7xh)	Info
72h	Check that the memory is not overclocked	Info
73h	Detect and size DIMM0	Info
74h	Detect and size DIMM1	Info
75h	Preparing to enable memory controller	Info
76h	Enabling memory controller	Info
77h	No DIMMS found. => See Post 7Fh	Info*
78h	Found no common CAS setting for both DIMM. => See Post 7Fh	Info*
7Ah	Unsupported page size for DIMM => See Post 7Fh	Info*
7Bh	DIMM has unsupported density. (e.g. 2GB or 8MB) => See Post 7Fh	Info*
7Ch	Unsupported DIMM. (e.g. registered, buffered or asymmetric density) => See Post 7Fh	Info*
7Dh	Unsupported number of banks on DIMM => See Post 7Fh	Info*
7Eh	Memory setup successful	Info

Checkpoint	Description	Type
7Fh	Memory setup failed. Possible causes: No memory installed Unsupported memory type Bad SPD eeprom content	Error*

* Immediately after the information post code was output, the system will display post code 7Fh.

Note: You can show the last post code by pressing the MSLPCPOD's SW1 switch once).

Checkpoint	Description	Type
80h	Early OEM post init	Info
81h	OEM post init	Info
82h	Fill out BDA area with system information	Info
83h	Checking NVRAM checksum (and load default values if mismatch)	Info
85h	MSR "fingerprint" passed	Info
86h	MSR "fingerprint" failed Possible cause: BIOS bug Hardware failure	Error
87h	Check IM_TAG BIST status	Info/Error
88h	Check IM_DATA BIST status	Info/Error
89h	Check FPU BIST status	Info/Error

Checkpoint	Description	Type
90h	In Stack Setup procedure (See Post 07h, 9Eh, 9Fh)	Info
91h	Check CPU PF BIST status	Info/Error
92h	Check CPU L2 BIST status	Info/Error
93h	Check GLCP BIST status	Info/Error
94h	Check DF BIST status	Info/Error
95h	Check VG BIST status	Info/Error
96h	Check VIP BIST status	Info/Error
9Eh	Stack setup up correctly (Status of Post 90h)	Info
9Fh	Stack setup detected an error (Status of Post 90h) Possible causes: Bad memory Bad memory timing	Error

Checkpoint	Description	Type
0A0h	In PLL init procedure	Info
0A1h	Setting Manual PLL values	Info
0A3h	You should never get here..... The chip should reset!	Reset*
0A5h	Detected memory overclocking and cannot fix it. Possible causes: User has set memory speed in setup above maximum supported value in SPD Maximum memory speed in SPD is bad BIOS bug No Memory installed (should make post 77h but it doesn't work every time)	Error

* Hardware reset necessary to apply register changes Post 08h status and error codes

Checkpoint	Description	Type
0B0h	Starting memory test	Info
0B1h	Reading 64 bytes from memory	Info
0B2h	Writing 64 bytes to memory	Info
0B3h	Read and compare 64 bytes of memory	Info
0B4h	Walk Memory by x^2	Info
0BEh	Memory test passed successfully	Info
0BFh	Memory test failed. Possible causes: Bad memory Bad memory timing	Error

Checkpoint	Description	Type
0C0h	EEPROM content valid; loading settings from EEPROM to CMOS	Info
0C2h	Saving CMOS settings to EEPROM	Info
0CEh	No SYSMEM entry found. Possible causes: BIOS bug Flash chip defective	Error

Checkpoint	Description	Type
0D0h	Turn on SHADOW r/w for C000-EFFF	Info
0D1h	Search all ROM images and decompress them	Info
0D2h	Initialize SMM module	Info
0D3h	VIDEO BIOS Init - loads which ever BIOS is at C0000	Info
0D4h	Initialize a LCD panel	Info
0D5h	Display splash screen if enabled	Info
0D6h	Initialize Harddisk module	Info
0D7h	Write enable System BIOS region and init remaining System Roms	Info
0D8h	Initialize Dowser module	Info
0D9h	Initialize a TV solution	Info
0DEh	Turn off SHADOW r/w for ROM'd areas	Info
0DFh	Loading defaults from DLAG serial eeprom	Info

Checkpoint	Description	Type
0E1h	Early setup of the CS5536	Info
0E2h	Chipset init after VSA init	Info
0E8h	In Core Logic initialization routine	Info

Checkpoint	Description	Type
0F0h	Perform FAR jump to post entry point	Info

8 Appendix A: Architecture Information

The following sources of information can help you better understand PC architecture.

8.1 Buses

8.1.1 ISA, Standard PS/2 – Connectors

- » AT Bus Design: Eight and Sixteen-Bit ISA, E-ISA and EISA Design, Edward Solari, Annabooks, 1990, ISBN 0-929392-08-6
- » AT IBM Technical Reference, Volumes 1&2, 1985
- » ISA & EISA Theory and Operation, Edward Solari, Annabooks, 1992, ISBN 0929392159
- » ISA Bus Specifications and Application Notes, Jan. 30, 1990, Intel
- » ISA System Architecture, Third Edition, Tom Shanley and Don Anderson, Addison-Wesley Publishing Company, 1995, ISBN 0-201-40996-8
- » Personal Computer Bus Standard P996, Draft D2.00, Jan. 18, 1990, IEEE Inc
- » Technical Reference Guide, Extended Industry Standard Architecture Expansion Bus, Compaq 1989

8.1.2 PCI/104

- » Embedded PC 104 Consortium
- » The consortium provides information about PC/104 and PC/104-Plus technology. You can search for information about the consortium on the Web.
- » PCI SIG
- » The PCI-SIG provides a forum for its ~900 member companies, who develop PCI products based on the specifications that are created by the PCI-SIG. You can search for information about the SIG on the Web.
- » PCI & PCI-X Hardware and Software Architecture & Design, Fifth Edition, Edward Solari and George Willse, Annabooks, 2001, ISBN 0-929392-63-9.
- » PCI System Architecture, Tom Shanley and Don Anderson, Addison-Wesley, 2000, ISBN 0-201-30974-2.

8.2 General PC Architecture

- » Embedded PCs, Markt&Technik GmbH, ISBN 3-8272-5314-4 (German)
- » Hardware Bible, Winn L. Rosch, SAMS, 1997, 0-672-30954-8
- » Interfacing to the IBM Personal Computer, Second Edition, Lewis C. Eggebrecht, SAMS, 1990, ISBN 0-672-22722-3
- » The Indispensable PC Hardware Book, Hans-Peter Messmer, Addison-Wesley, 1994, ISBN 0-201-62424-9
- » The PC Handbook: For Engineers, Programmers, and Other Serious PC Users, Sixth Edition, John P. Choisser and John O. Foster, Annabooks, 1997, ISBN 0-929392-36-1

8.3 Ports

8.3.1 RS-232 Serial

- » EIA-232-E standard
- » The EIA-232-E standard specifies the interface between (for example) a modem and a computer so that they can exchange data. The computer can then send data to the modem, which then sends the data over a telephone line. The data that the modem receives from the telephone line can then be sent to the computer. You can search for information about the standard on the Web.
- » RS-232 Made Easy: Connecting Computers, Printers, Terminals, and Modems, Martin D. Seyer, Prentice Hall, 1991, ISBN 0-13-749854-3
- » National Semiconductor: The Interface Data Book includes application notes. Type “232” as search criteria to obtain a list of application notes. You can search for information about the data book on National Semiconductor’s Web site.

8.3.2 Serial ATA

Serial AT Attachment (ATA) Working Group. This X3T10 standard defines an integrated bus interface between disk drives and host processors. It provides a common point of attachment for systems manufacturers and the system. You can search for information about the working group on the Web. We recommend you also search the Web for information on 4.2 I/O cables, if you use hard disks in a DMA3 or PIO4 mode.

8.3.3 USB

USB Specification

USB Implementers Forum, Inc. is a non-profit corporation founded by the group of companies that developed the Universal Serial Bus specification. The USB-IF was formed to provide a support organization and forum for the advancement and adoption of Universal Serial Bus technology. You can search for information about the standard on the Web.

8.4 Programming

- » C Programmer’s Guide to Serial Communications, Second Edition, Joe Campbell, SAMS, 1987, ISBN 0-672-22584-0
- » Programmer’s Guide to the EGA, VGA, and Super VGA Cards, Third Edition, Richard Ferraro, Addison-Wesley, 1990, ISBN 0-201-57025-4
- » The Programmer’s PC Sourcebook, Second Edition, Thom Hogan, Microsoft Press, 1991, ISBN 1-55615-321-X
- » Undocumented PC, A Programmer’s Guide to I/O, CPUs, and Fixed Memory Areas, Frank van Gilluwe, Second Edition, Addison-Wesley, 1997, ISBN 0-201-47950-8

9 Appendix B: Document Revision History

Revision	Date	Edited by	Changes
100	13.Aug.2010	WAS	Changed to new Kontron Corporate Design from DLAG V1.3A. General corrections according to MEG/approved by BRM.
101	03.Feb.2011	WAS	Preface corrected. BSP screen shot & web links changed to KCC AG.

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