

DIGITAL-LOGIC

smart embedded computers

BIOS and DRIVER MANUAL FOR:

MICROSPACE[®]

GEODE LX800

Driver, Software & BIOS Information

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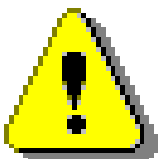
The software described herein, together with this document, are furnished under a license agreement and may be used or copied only in accordance with the terms of that agreement.

About this Manual and How to Use It

This manual is written for the original equipment manufacturer (OEM) who plans to program or setup software based on the single board MICROSPACE-PC. It is for integrators and programmers of systems based on the MICROSPACE-Computer family. This manual provides instructions for installing and configuring the software, and describes the drivers and setup requirements. This document contains information on how to program the system. Please check the Product CD for further information and manuals.

DOCUMENT REVISION HISTORY:

Document Version	Date/Initials:	Modification: Remarks, News, Attention:
V1.0	03.2007 KUF	Bios V1.14
V1.1	04.2007 KUF/WAS	Details fine-tuned/Standard format with English applied
V1.1A	04.2007 KUF/WAS/DAR	VideInput Chapter (7.1.7) added Logical renaming, restructuring, formatting RoHS Commitment Section added to Preface BIOS for MSB800 excluded from BIOS History
V1.1B	05.2007 WAS/DAR	Revision History format change / Filename & Path moved Linux I ² C Bus Access added / MSM800 BIOS History added
V1.1C	07.2007 DAR/WAS	BIOS download (Chapter Core BIOS Download) / List of Post Codes (chapter 7.4) updated



Attention!

1. All information in this manual, and the product, are subject to change without prior notice.
2. Read this manual prior to installation of the product.
3. Read the security information carefully prior to installation of the product.

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1. PREFACE

The information contained in this document has been carefully checked and is believed to be accurate; it is subject to change without notice. Product advances mean that some specifications may have changed. DIGITAL-LOGIC AG assumes no responsibility for any inaccuracies, or the consequences thereof, that may appear in this manual. Furthermore, DIGITAL-LOGIC AG does not accept any liability arising from the use or application of any circuit or product described herein.

1.1. Trademarks

DIGITAL-LOGIC, DIGITAL-LOGIC-Logo, MICROSPACE, and smartModule are registered trademarks owned worldwide by DIGITAL-LOGIC AG, Luterbach (Switzerland). In addition, this document may include names, company logos, and registered trademarks which are, therefore, proprietary to their respective owners.

1.2. Disclaimer

DIGITAL-LOGIC AG makes no representations or warranties with respect to the contents of this manual, and specifically disclaims any implied warranty of merchantability or fitness, for any particular purpose. DIGITAL-LOGIC AG shall, under no circumstances, be liable for incidental or consequential damages or related expenses resulting from the use of this product, even if it has been notified of the possibility of such damage.

1.3. 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.

1.4. Who should use this Product

- Electrical engineers with know-how in PC-technology.
- Because of the complexity and the variability of PC-technology, we cannot guarantee that the product will work in any particular situation or set-up. Our technical support will try to help you find a solution.
- Pay attention to electrostatic discharges; use a CMOS protected workplace.
- Power supply must be OFF when working on the board or connecting any cables or devices.

1.5. Recycling Information

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.

1.6. Technical Support

1. Contact your local DIGITAL-LOGIC Technical Support, in your country.
2. Use the Internet Support Request form at <http://support.digitallogic.ch/> → embedded products → New Support Request

Support requests are only accepted with detailed information about the product (i.e., BIOS-, Board-version)!

1.7. Limited Two Year Warranty

DIGITAL-LOGIC AG guarantees the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for two years following the date of shipment from DIGITAL-LOGIC AG, Switzerland. This warranty is limited to the original purchaser of the product and is not transferable.

During the two year warranty period, DIGITAL-LOGIC AG will repair or replace, at its discretion, any defective product or part at no additional charge, provided that the product is returned, shipping prepaid, to DIGITAL-LOGIC AG. All replaced parts and products become property of DIGITAL-LOGIC AG.

Before returning any product for repair, direct customers of DIGITAL-LOGIC AG, Switzerland are required to register a RMA (Return Material Authorization) number in the Support Center at <http://support.digitallogic.ch/>

All other customers must contact their local distributors for returning defective materials.

This limited warranty does not extend to any product which has been damaged as a result of accident, misuse, abuse (such as use of incorrect input voltages, wrong cabling, wrong polarity, improper or insufficient ventilation, failure to follow the operating instructions that are provided by DIGITAL-LOGIC AG or other contingencies beyond the control of DIGITAL-LOGIC AG), wrong connection, wrong information or as a result of service or modification by anyone other than DIGITAL-LOGIC AG. Nor if the user has insufficient knowledge of these technologies or has not consulted the product manuals or the technical support of DIGITAL-LOGIC AG and therefore the product has been damaged.

Empty batteries (external and onboard), as well as all other battery failures, are not covered by this manufacturer's limited warranty.

Except, as directly set forth above, no other warranties are expressed or implied, including, but not limited to, any implied warranty of merchantability and fitness for a particular purpose, and DIGITAL-LOGIC AG expressly disclaims all warranties not stated herein. Under no circumstances will DIGITAL-LOGIC AG be liable to the purchaser or any user for any damage, including any incidental or consequential damage, expenses, lost profits, lost savings, or other damages arising out of the use or inability to use the product.

1.8. Explanation of Symbols



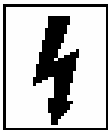
CE Conformity

This symbol indicates that the product described in this manual is in compliance with all applied CE standards.



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 60V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your equipment.



Caution, Electric Shock!

This symbol and title warn of hazards due to electrical shocks (> 32V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your equipment.



Warning, ESD Sensitive Device!

This symbol and title inform that electronic boards and their components are sensitive to Electro Static Discharge (ESD). In order to ensure product integrity at all times, care must always be taken while handling and examining this product.



Attention!

This symbol and title emphasize points which, if not fully understood and taken into consideration by the reader, may endanger your health and/or result in damage to your equipment.



Note...

This symbol and title emphasize aspects the user should read through carefully for his, or her, own advantage.



Warning, Heat Sensitive Device!

This symbol indicates a heat sensitive component.



Safety Instructions

This symbol shows safety instructions for the operator to follow.



This symbol warns of general hazards from mechanical, electrical, and/or chemical failure. This may endanger your life/health and/or result in damage to your equipment.

1.9. Applicable Documents and Standards

The following publications are used in conjunction with this manual. When any of the referenced specifications are superseded by an approved revision, that revision shall apply. All documents may be obtained from their respective organizations.

- Advanced Configuration and Power Interface Specification Revision 2.0c, August 25, 2003 Copyright © 1996-2003 Compaq Computer Corporation, Intel Corporation, Microsoft Corporation, Phoenix Technologies Ltd., Toshiba Corporation. All rights reserved. <http://www.acpi.info/>
- ANSI/TIA/EIA-644-A-2001: Electrical Characteristics of Low Voltage Differential Signaling (LVDS) Interface Circuits, January 1, 2001. <http://www.ansi.org/>
- ANSI INCITS 361-2002: AT Attachment with Packet Interface - 6 (ATA/ATAPI-6), November 1, 2002. <http://www.ansi.org/>
- ANSI INCITS 376-2003: American National Standard for Information Technology – Serial Attached SCSI (SAS), October 30, 2003. <http://www.ansi.org/>
- Audio Codec '97 Revision 2.3 Revision 1.0, April 2002 Copyright © 2002 Intel Corporation. All rights reserved. <http://www.intel.com/labs/media/audio/>
- Display Data Channel Command Interface (DDC/CI) Standard (formerly DDC2Bi) Version 1, August 14, 1998 Copyright © 1998 Video Electronics Standards Association. All rights reserved. <http://www.vesa.org/summary/sumddcci.htm>
- ExpressCard Standard Release 1.0, December 2003 Copyright © 2003 PCMCIA. All rights reserved. <http://www.expresscard.org/>
- IEEE 802.3-2002, IEEE Standard for Information technology, Telecommunications and information exchange between systems–Local and metropolitan area networks–Specific requirements – Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications. <http://www.ieee.org>
- IEEE 802.3ae (Amendment to IEEE 802.3-2002), Part 3: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications, Amendment: Media Access Control (MAC) Parameters, Physical Layers, and Management Parameters for 10 GB/s Operation. <http://www.ieee.org>
- Intel Low Pin Count (LPC) Interface Specification Revision 1.1, August 2002 Copyright © 2002 Intel Corporation. All rights reserved. <http://developer.intel.com/design/chipsets/industry/lpc.htm>
- PCI Express Base Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI Express Card Electromechanical Specification Revision 1.1, March 28, 2005, Copyright © 2002-2005 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI Local Bus Specification Revision 2.3, March 29, 2002 Copyright © 1992, 1993, 1995, 1998, 2002 PCI Special Interest Group. All rights reserved. <http://www.pcisig.com/>
- PCI-104 Specification, Version V1.0, November 2003. All rights reserved. <http://www.pc104.org>
- PICMG® Policies and Procedures for Specification Development, Revision 2.0, September 14, 2004, PCI Industrial Computer Manufacturers Group (PICMG®), 401 Edgewater Place, Suite 500, Wakefield, MA 01880, USA, Tel: 781.224.1100, Fax: 781.224.1239. <http://www.picmg.org/>
- Serial ATA: High Speed Serialized AT Attachment Revision 1.0a January 7, 2003 Copyright © 2000-2003, APT Technologies, Inc, Dell Computer Corporation, Intel Corporation, Maxtor Corporation, Seagate Technology LLC. All rights reserved. <http://www.sata-io.org/>

- Smart Battery Data Specification Revision 1.1, December 11, 1998. www.sbs-forum.org
- System Management Bus (SMBus) Specification Version 2.0, August 3, 2000 Copyright © 1994, 1995, 1998, 2000 Duracell, Inc., Energizer Power Systems, Inc., Fujitsu, Ltd., Intel Corporation, Linear Technology Inc., Maxim Integrated Products, Mitsubishi Electric Semiconductor Company, Power-Smart, Inc., Toshiba Battery Co. Ltd., Unitrode Corporation, USAR Systems, Inc. All rights reserved. <http://www.smbus.org/>
- Universal Serial Bus Specification Revision 2.0, April 27, 2000 Copyright © 2000 Compaq Computer Corporation, Hewlett-Packard Company, Intel Corporation, Lucent Technologies Inc., Microsoft Corporation, NEC Corporation, Koninklijke Philips Electronics N.V. All rights reserved. <http://www.usb.org/>

1.10. For Your Safety

Your new DIGITAL-LOGIC product was developed and tested carefully to provide all features necessary to ensure its compliance with electrical safety requirements. It was also designed for a long, fault-free life. However, this life expectancy can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and for the correct operation of your new DIGITAL-LOGIC product, please comply with the following guidelines.



Attention!

All work on this device must only be carried out by sufficiently skilled personnel.



Caution, Electric Shock!

Before installing your new DIGITAL-LOGIC product, always ensure that your mains power is switched off. This applies also to the installation of piggybacks or peripherals. Serious electrical shock hazards can exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable and any other cables which provide external voltage before performing work.



Warning, ESD Sensitive Device!

Electronic boards and their components are sensitive to static electricity. In order to ensure product integrity at all times, be careful during all handling and examinations of this product.

1.11. RoHS Commitment

DIGITAL-LOGIC AG 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.

1.11.1. RoHS Compatible Product Design

All DIGITAL-LOGIC standard products 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 DIGITAL-LOGIC standard products.

1.11.2. RoHS Compliant Production Process

DIGITAL-LOGIC selects external suppliers that are capable of producing RoHS compliant devices. These capabilities are verified by:

1. A confirmation from the supplier indicating that their production processes and resulting devices are RoHS compliant.
2. 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.

1.11.3. 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 DIGITAL-LOGIC does not deliver ready-made products to end users the WEEE directive is not applicable for DIGITAL-LOGIC. Users are nevertheless encouraged to properly recycle all electronic products that have reached the end of their life cycle.

2. OVERVIEW

2.1. Standard Features

The MICROSPACE LX800 BIOS is used on all embedded computer products based on the Geode LX800 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
- Suspend to RAM support: S3-Hot
- 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

Not supported on an ISA bus:

- VGA peripheral cards

Not supported in the current BIOS Version:

- Smart Battery support

3. OPERATING SYSTEMS COMPATIBILITY

The CPU LX800 is fully compatible to other PC-standard CPUs. The Intel chipsets are also fully PC-compatible. No incompatibilities are known.

3.1. Microsoft Windows

This system is fully compatible with Windows 2000 and Windows XP Professional/Home.

We do not recommend installing older Windows versions, such as Windows 95/98/ME/NT4, because of the incomplete driver support.

3.2. Microsoft Windows CE 4.2 / 5.0

Since we are in cooperation with Pfaadt Software, we recommend using the WINCE 4.2/5.0 Board Support Package (BSP) which is developed especially for this product.

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

There are also demo images available for free:

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

3.3. LINUX

After registration with AMD, there are some drivers and tools located on their website:

<http://wwwd.amd.com/amd/developer.nsf/>

3.4. Real-time OS

This must first be carefully tested. Many power management functions will control the latency time.

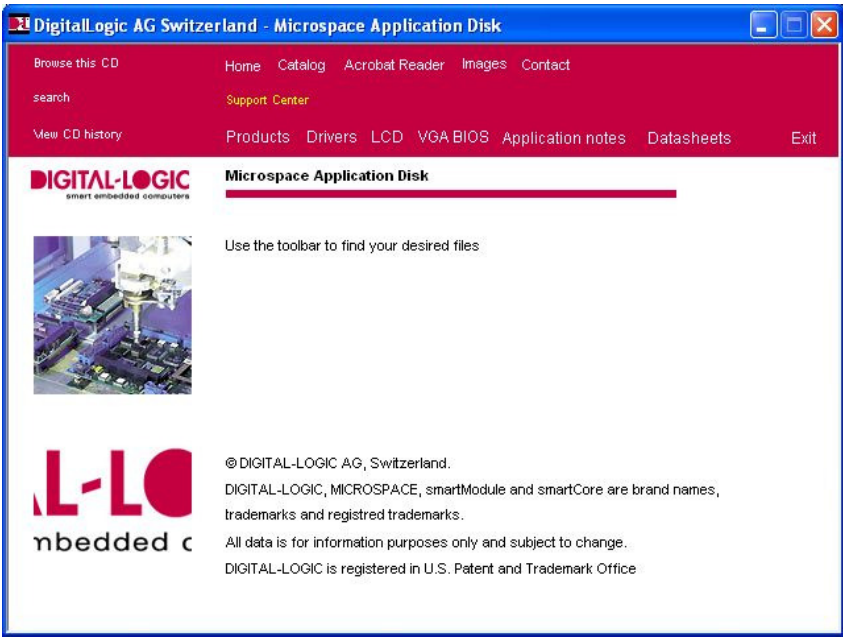
Contact your real-time operating system manufacturer and ask for support for the AMD chipset LX800.

4. DRIVER INSTALLATION

4.1. Windows 2000 & XP

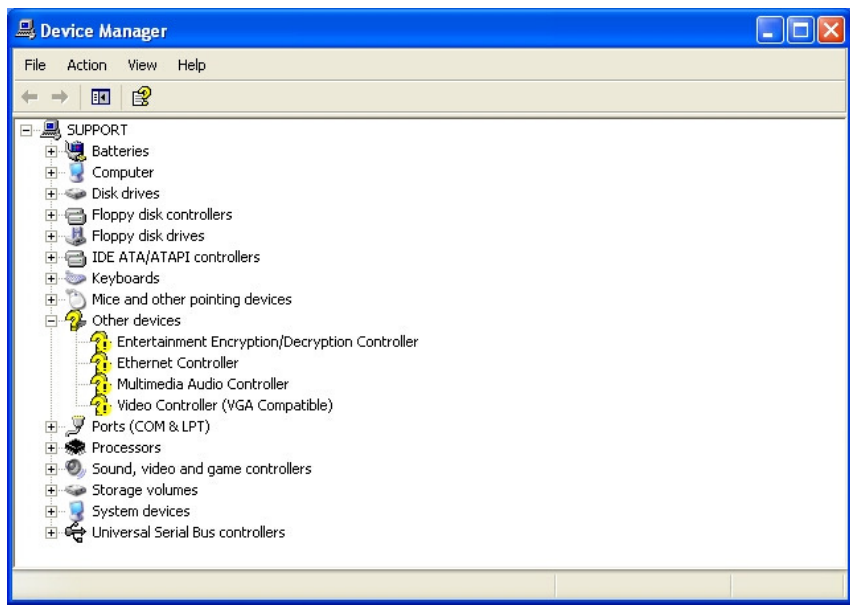
On the MICROSPACE Application CD you will find all the tools and drivers you'll need to work with the product. If you are unsure how current your software is, please visit our homepage to get the latest releases!

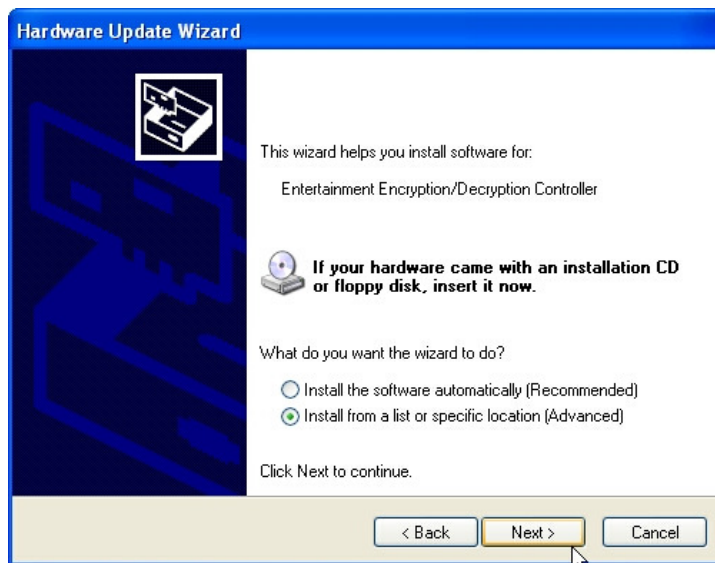
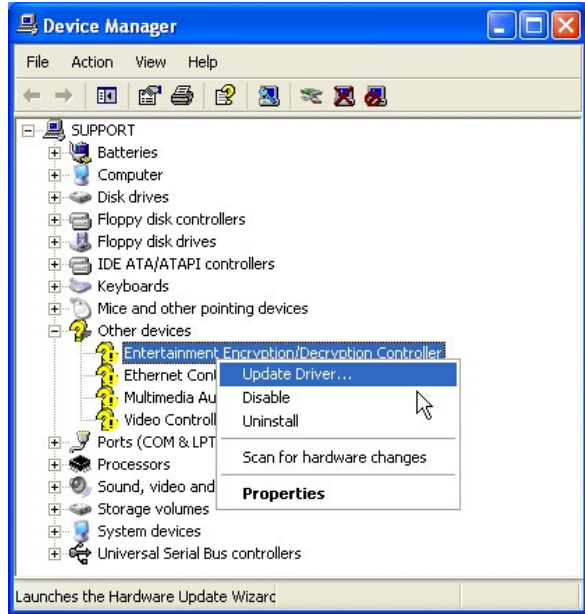
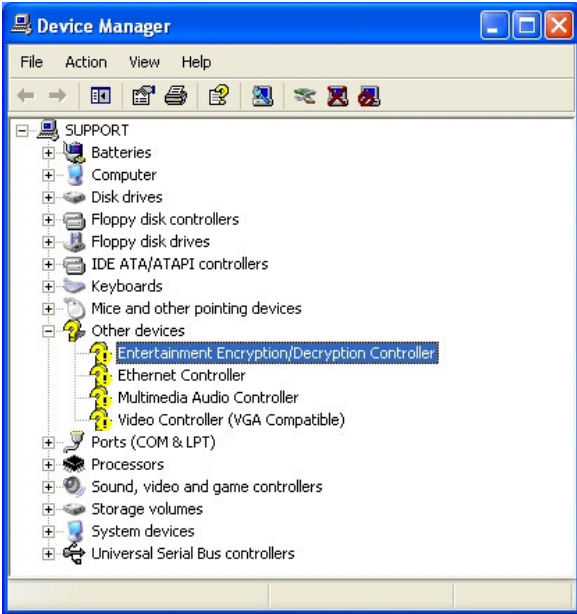
<http://www.digitallogic.com>

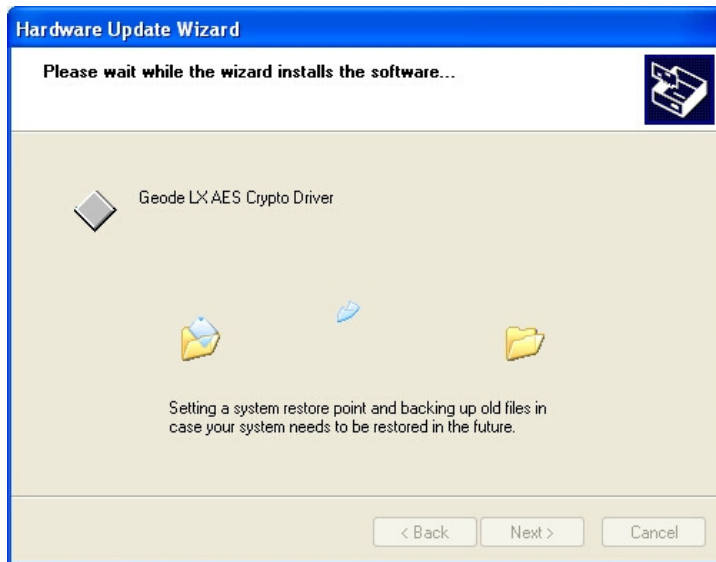
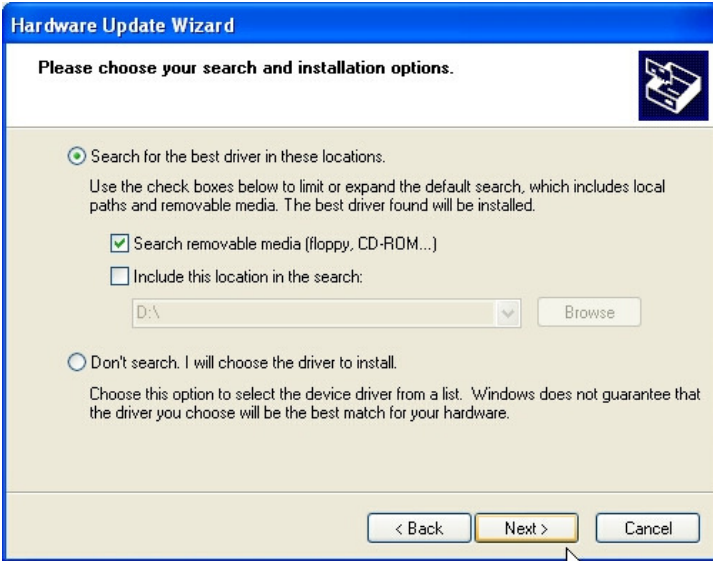


4.1.1. Encryption / Decryption Controller

Enter the device manager and proceed as follows:

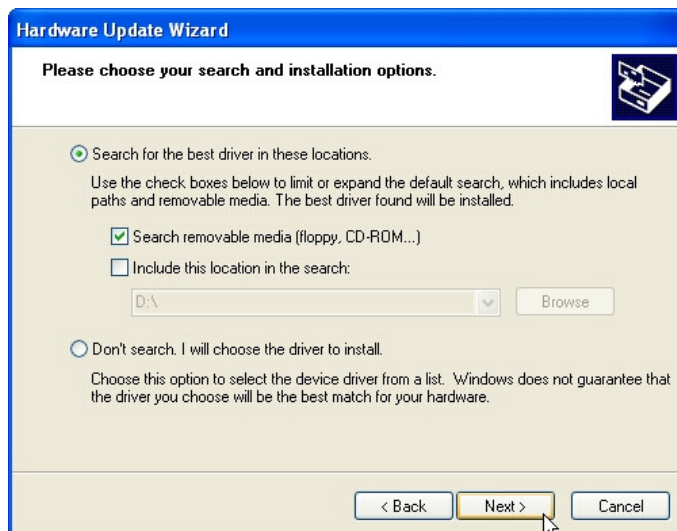
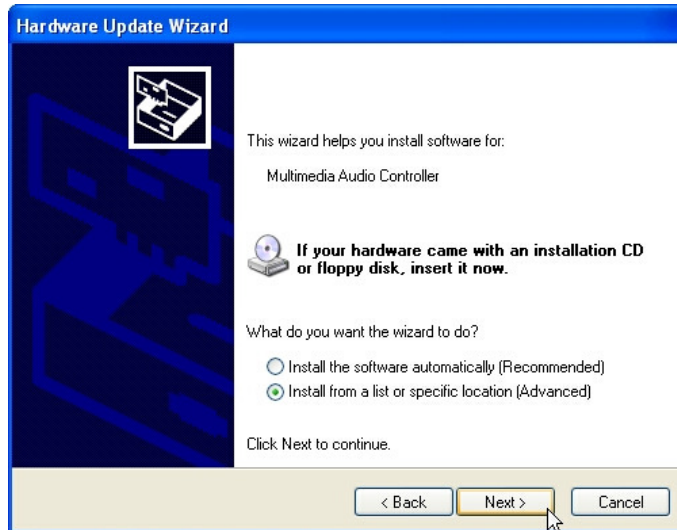
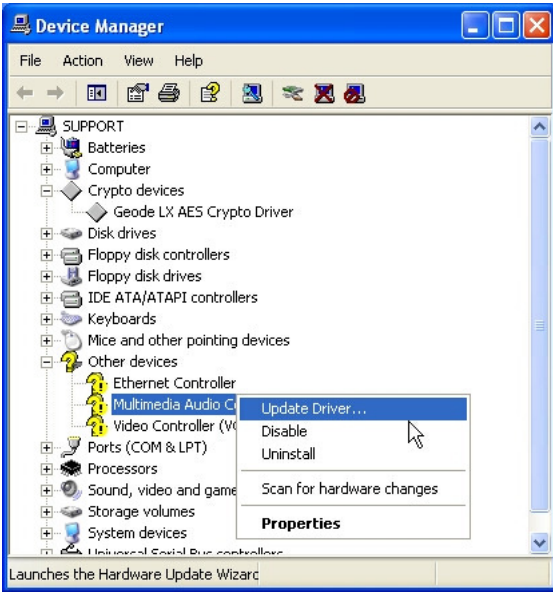


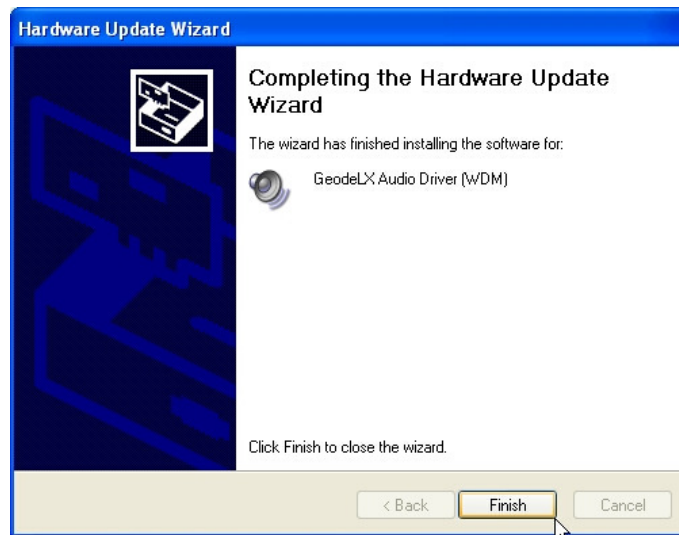
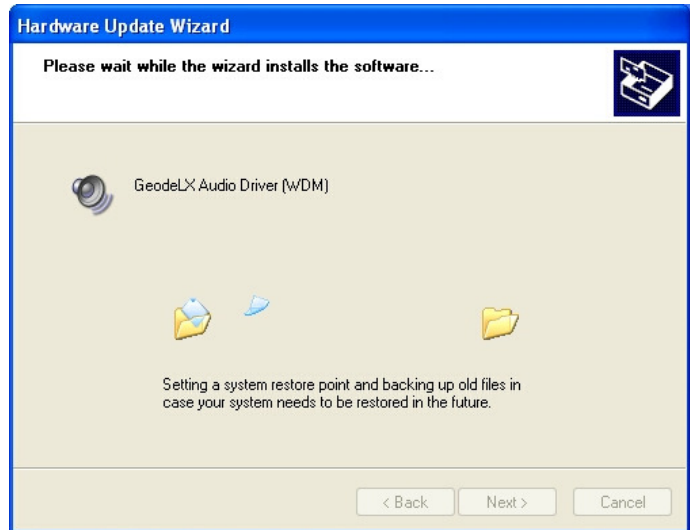




4.1.2. Audio / Multimedia

Enter the device manager and carry out the following instructions:



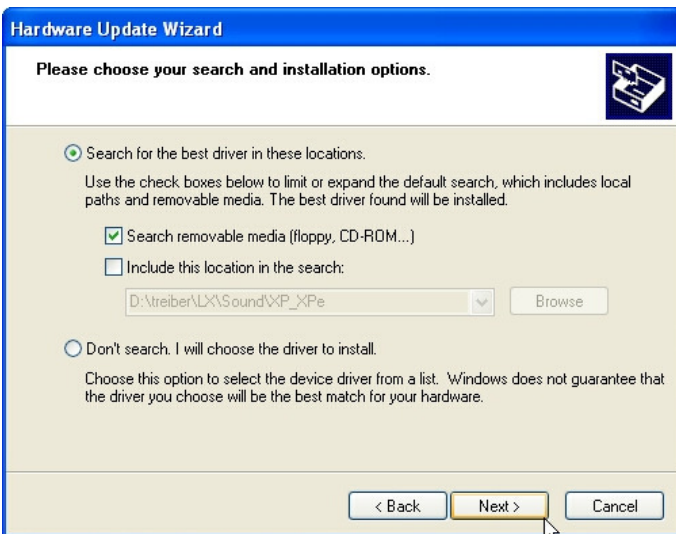
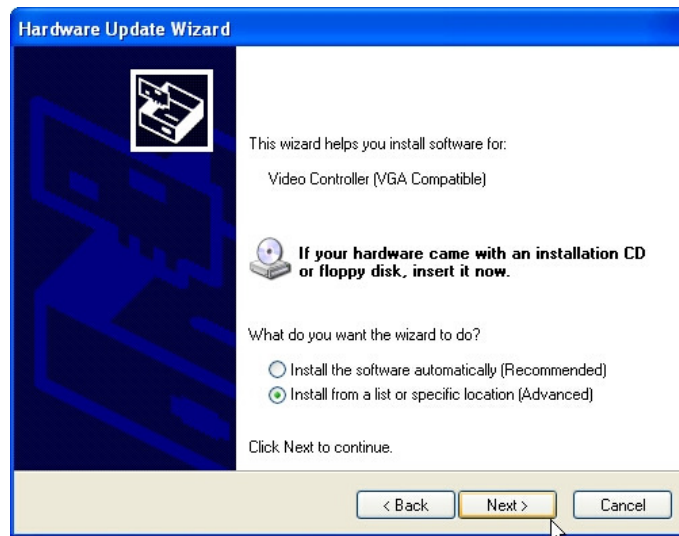


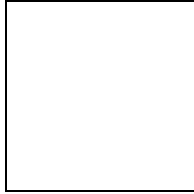
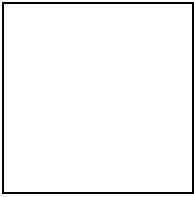
4.1.3. VGA



Note...
ISA VGA peripheral cards are not supported.

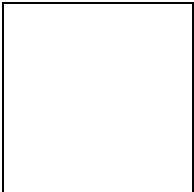
Enter the device manager and continue as follows:

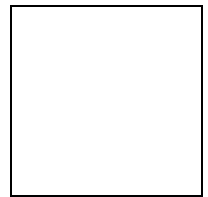
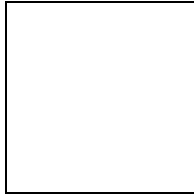
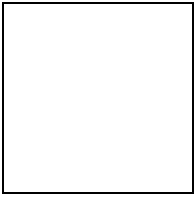


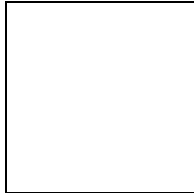
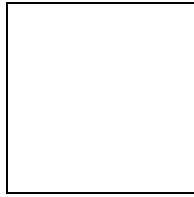
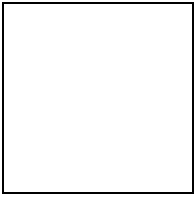


4.1.4. Ethernet / LAN

Enter the device manager and continue as follows:



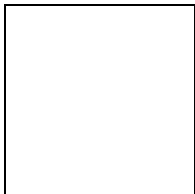




4.1.5. Int15 Emulator Driver for W2k/XP

Location: \Tools\MPC4x_x-MPCF40_MPCV855\int15dl\ int15dl_install19.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:

```
\drivers\LX800\IDE\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. VideIn

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 contains a low cost video input port. It consist of LX800's video input port (VIP) and the external frame grabber chip SAA7111A. This port is capable of digitizing a CVBS video signal with 15 frames per second at a resolution of 352x288bits. 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 framerate will decrease.

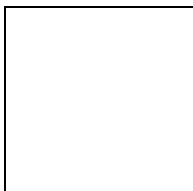
Resolution:	Frames per second	Remarks
352 x 288	15	

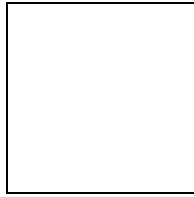
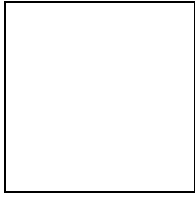
Run the VidInpLX800 installer. The video input can be tested with the amcap application.



Note...

For video input, preview must be selected.





5. SOFTWARE

5.1. Windows Int15 Tool

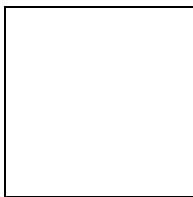
Please find the tool and the driver under: x:\tools\int15dl on the Product CD or in the download area of the support center.

**Note...**

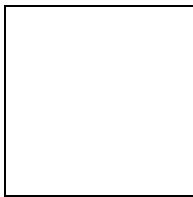
Before you can use these tools, you must install the Windows WDM driver first. For instructions, see [Section 6.1.2.3](#).

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

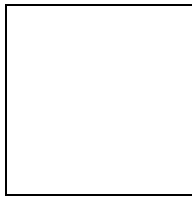
5.2.2. Limitation

OS on the Remote computer: MSDOS or FREEDOS

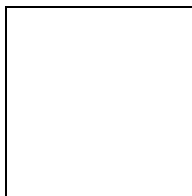
By enabling "remote floppy" support, all other floppy disks on the remote computer will be disabled.

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.



Windows application RemoteLX800.exe



MSDOS application remlx800.exe

The remote console application must be loaded and connected before a BIOS start on the remote computer. Supported options like "Keyboard", "Video" and "Floppy..." must be chosen before connecting. The remote application simulates floppy disk access over the "floppy image file"; this image file can be modified with, for example, WinImage software <http://www.winimage.com/winimage.htm>. It's also possible to use Flimfex.exe from DIGITAL-LOGIC's remote software package. (Flimfex = floppy image file explorer)

R – enabling this option is helpful when the remote application is working in DirectVideo mode without using BIOS Int10 functions. Every 0.5-1 second the windows application will send a request to the remote computer to refresh a screen on the host computer.

Options for an MSDOS application: 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: Doesn't support DirectVideo option.

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



Note... All remote features are supported only under FREEDOS or MSDOS 6.22.

5.2.4. Hardware Settings on the Remote Computer

To enable a remote COM port for remote control:

1. Press **F1** at boot time to enter a BIOS setup
2. Enter "C. Motherboard Device Configuration"
3. Enter "I/O Configuration"
4. Select "Remote control over COM port"
5. Set "Remote:" to Enabled

For proper functionality in the menu "LPC Card devices", set "Serial Port 1: 0x3f8" to 3F8 hex address.

If you plan to use the remote floppy disk feature, the "Floppy BIOS Support" must be enabled in the BIOS Setup.



Note... When the remote floppy option is enabled, it's impossible to use another floppy disk; even the USB floppy is not accessible.

5.2.5. 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 support 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. Such popular software 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 native BIOS.

To make the "remote floppy disk" bootable, it's 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 SFI

All functions are performed by starting the SW-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 values:	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 value:			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
Outputs 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 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
	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 value:	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

6.1.2.1. 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 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 DIGITAL-LOGIC boards with PIIX4 and ICH4 chipsets (eg. MSM855, MSEBX855, MSMP5SEV, MSMP3SEV, MSEP800, etc.).

You'll find the driver under: \products***\TOOLS\int15dl on the Product CD or in the download area of the support center.

6.1.2.2. Int15 Windows Software

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

6.1.2.3. Driver Installation W2k/XP

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

1. Open "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" item 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's not necessary to restart a computer after installation
10. After installation, please, be sure, that "DIGITAL-LOGIC INT15 functions emulator" has been installed properly. Open "Control Panel", then doubleclick on "System" icon. Choose tabsheet "Hardware" and click on "Device Manager" button. Then expand "System Devices" and doubleclick on "DIGITAL-LOGIC INT15 functions emulator". Be sure, that device is working properly.

6.1.2.4. Programming Int15dl Interface under Windows

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

Files:

Int15srv.h: contains definitions for the Registers structure.

Int15dliocctl.h: contains definitions for the IO control code constants.

Test_Int15dl.cpp: Sample subroutines providing access to hardware functions over the Int15dl driver.

6.1.2.4.1. 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 Int15 function for different chipsets and BIOSes are different, please, read the user manual about registers definition. For example: To get temperature value on the board with PIIX4 chipset you have to use "Regs.ah = 0xEC;", but on the board with ICH4 chipset, please use "Regs.ax = 0x78EC;".

bool Open_Int15dl(void): the first function, it must be called to create a link between "DIGITAL-LOGIC INT15 functions emulator" driver and 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 user software.

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

6.1.2.4.2. 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;
```

6.1.2.5. 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 installation of 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 get in contact with the DIGITAL-LOGIC 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.

DIGITAL-LOGIC LX800 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 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

The following BIOS history is for the MSM800 products:

Version	Date	Status	Modifications
1.05	03.2006		
1.06	05.2006		ISA IRQ reservation
1.07	05.2006		AC97 detection
1.08	05.2006	Final	ISA IRQ table corrected
1.09B	09.2006		USB fix
BIOS V1.09B is only for the following board versions:			
<ul style="list-style-type: none"> - MSEP800: V0.1, V0.2, V0.3 and V1.0 - MSM800SEV: V1.0, V1.1 and V1.2 			
1.10B	09.2006		PCI ROUTING TABLE
BIOS V1.10B or newer releases are only for the following board versions:			
<ul style="list-style-type: none"> - MSEP800: V1.1 - MSM800SEV: V2.0 / V2.1 - SM800PCX: V1.0 			
(or newer board versions)			
1.12	11.2006		Video default settings fixed RAM memory settings restored
1.13	12.2006		NumLock IRQ15 assignable for ISA IRQ6 no longer available for PCI
1.14	01.2007		IT8888 PCI to ISA Bridge NumLock Fix

This BIOS history is for the following products:
MPC20/21, MPCV800, MSEP800, MSM800, SM800

This BIOS history is not for the MSB800/L.

Version:	Date:	Status:	Modifications:
1.12	11.2006		Video default settings fixed RAM memory settings restored
1.13	12.2006		NumLock IRQ15 assignable for ISA IRQ6 no longer available for PCI
1.14	01.2007		IT8888 PCI to ISA Bridge NumLock Fix
1.19	05.2007		PCI Bridge fix CMOS fix Memory fix Remote Support



Note...

The MSB800/L has a unique BIOS version and, therefore, its own BIOS History which can be found in the MSB800/L Detailed Manual. Also included in that manual 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 the autoexec.bat and config.sys.
2. Run FlashROM.com as followed: `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 is stopped or 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

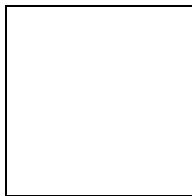
The XpressROM™ Setup Menu contains a number of features and options. You are advised to evaluate the menu options prior to the shipment of your platform to ensure the removal of options that could have a negative consequence if users change them.

The controls for the setup menu are:

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

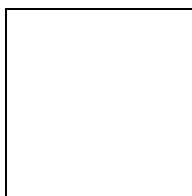
7.3.1. Main Menu

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

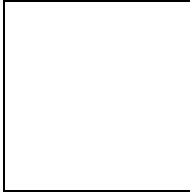
To change the time select **A** from the main menu. You will be prompted with the following submenu:



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

Changing the Date

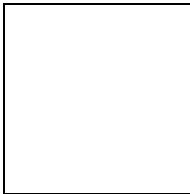
To change the date, select **B** from the main menu. You will be prompted with the following submenu:



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:



7.3.2.1. 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.

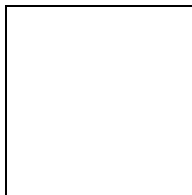
Flash Configuration: Allows the use of a flash device over the IDE; options are Enabled or Disabled.

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.

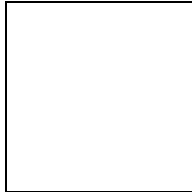


7.3.2.2. I/O Configuration

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.



7.3.2.3. LPC Card Devices

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

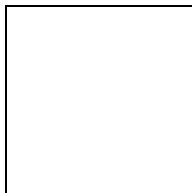
Serial Port Configuration: use the arrow keys (↑↓) to select the port and hit <enter> to change the state of the choices which are Disabled, 0x3F8 IRQ 4, 0x2F8 IRQ 3, 0x3E8 IRQ 4, 0x2E8 IRQ3.

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.



7.3.2.4. 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.

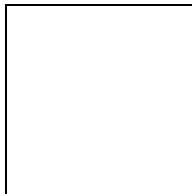
LP Active Period: Selects the active period of the LDE/MOD (LP) signal; options are Free Running or Active Only.

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).



7.3.2.5. 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.

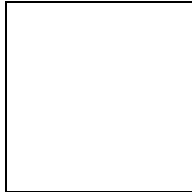
EHCI: Enable or Disable EHCI Controller.

UDC: USB Device Controller Enabled or Disabled.

OTG: On-The-GO Enabled or Disabled.

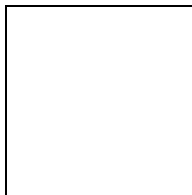
Overcurrent Reporting: Enable or Disable Overcurrent Reporting.

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



7.3.2.6. Thermal Configuration

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



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 MB0, BA0 or BA1: Options are Enable or Disable of the XORing of module bank BA1 or BA0 with upper GLIU address bit.

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

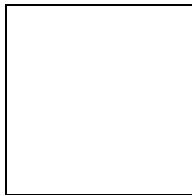
ACT2PRE: ACT to PRE period (tRAS). Minimum number of clocks from the ACT to PRE commands on the same component bank.

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.



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:

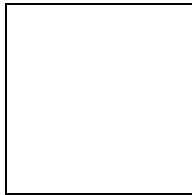
Mdiv: Options from 2 to 17.

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 supports ACPI and APM Version 1.2.

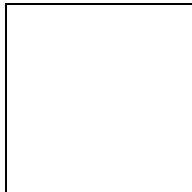
The following ACPI Sleep States are supported:

S1 (Standby)

S3 hot* (Suspend to RAM - wakeup only with the Power Button)

S4 (Hibernation)

* always powered



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>.

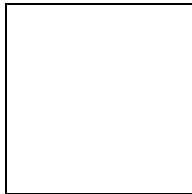
Summary Screen Configuration:

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

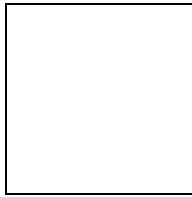
Summary Screen Timeout: Sets how long the summary screen is displayed. The time is in milliseconds and goes from 0 to 65535. Type in the amount and select <enter>.

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.

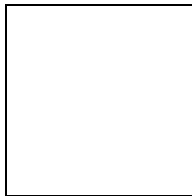


7.3.7. ISA I/O and Memory Configuration

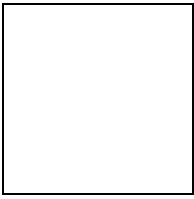


7.3.8. Boot Order

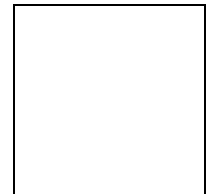
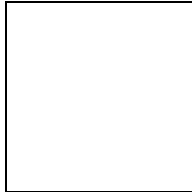
This menu allows the selection of the sequence of devices which are checked for a bootable image. There are six positions. Use the arrow keys (↑↓) to select the number and then press <enter> to cycle through the options. The options are None, Floppy Disk, USB Floppy Disk, Hard Drive, CD-ROM Drive, USB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



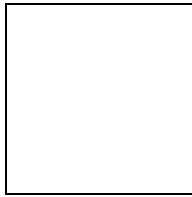
7.3.9. Default Values



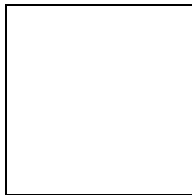
7.3.10. Save Values without Exit



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.

Digital-Logic LX800 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 CPUID instruction	Info
06h	Setup DRAM Memory controller <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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 <ul style="list-style-type: none"> - 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
Checkpoint	Description	Type

16h	Initialize the Bios Data Area	Info
17h	Scan PCI bus and assign resources - Scan PCI bus for devices - Assign BAR and Interrupt	Info
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*
Checkpoint	Description	Type

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
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

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