DIGITAL-LOGIC
smart embedded computers

TECHNICAL USER MANUAL FOR:

MPC20/20L/21/21C
MPC20WOL/21WOL

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CE

For internal use only:
File: MPC20_21_L_C_TechManual_V1.5D.doc
Path: R:\HANDBUCH\MPC\MPC20_21\MPC20_21_L_C_TechManual_V1.5D.doc

About this Manual and How to Use It

This manual is written for the end user / system integrator who plans to install computer systems based on the MICROSPACE-PC. It is for integrators and programmers of systems based on the MICROSPACE-Computer family. This manual describes the system and setup requirements; it provides instructions for installing and configuring the system. This document contains information on hardware requirements, interconnections, and details of how to program the system. Please check the Product CD for further information and manuals.

REVISION HISTORY:

Document Version	Date/Initials:	Modification: Remarks, News, Attention:
V1.0	03.2007 KUF	Initial Version
V1.1	04.2007 KUF/WAS	Details fine-tuned/Standard format w/English applied Preface additions (Battery warranty, RoHS)
V1.1A	04.2007 WAS/PHA	New photos MPC20 V1.0
V1.1B	05.2007 WAS/DAR	Revision History format change / Filename & Path moved New photos MPC21 V1.0 / Rewrite PCI104 install incl. photos Document rename as only one manual for this product
V1.2	07.2007 KUF	PXE Info added / New Power Connector Photos
V1.2A	08.2007 WAH/FUW	PXE License Info updated
V1.2B	10.2007 DAR	Chapters 5 / 7
V1.3	01.2008 SEP/WAS	ACPI S3 (Suspend to RAM) not available / MPC21C added & 1.12/13
V1.3A	01.2008 DAR	Minor corrections
V1.4	03.2008 DAR/WAS	BIOS History added (MPC20/21/21C & MPC20WOL/MPC21WOL)
V1.4A	04.2008 DAR	MPC20/21WOL – PXE & WOL descriptions / ACPI updated
V1.5	06.2008 DAR	MPC20L / EMV & EC Confirmity
V1.5A	06.2008 DAR/was	CF Master/Slave Jumper Video controller specs. screen resolutions updated
V1.5B	09.2008 DAR	Layout corrected
V1.5C	10.2008 DAR/WAS	BIOS V1.24
V1.5D	***10.2008 WAS*** ***03.2008 WAS***	***Operating Temperature clarified w/separate table*** ***bootix license in English***

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.

Table of Contents

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.

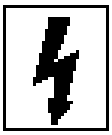
Empty batteries (external and onboard), as well as all other battery failures, are not covered by this manufacturer's limited warranty.

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.



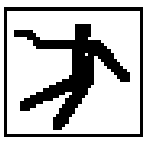
Caution, Electric Shock!
This symbol and title warn of hazards due to electrical shocks (> 32V) when touching products or parts of them. Failure to observe the precautions indicated and/or prescribed by the law may endanger your life/health and/or result in damage to your equipment

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.

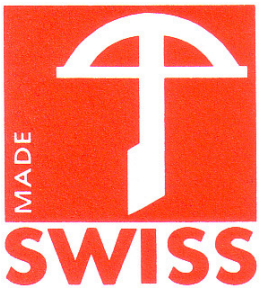
1.11.3. WEEE Application

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.

1.12. Swiss Quality



- 100% Made in Switzerland
- DIGITAL-LOGIC is a member of "Swiss-Label"
- This product was ***not*** manufactured by employees earning piecework wages
- This product was manufactured in humane work conditions
- All employees who worked on this product are paid customary Swiss market wages and are insured
- ISO 9000:2001 (quality management system)

1.13. 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 DIGITAL-LOGIC AG, the entire company, 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.

1.14. EC – Declaration of Conformity MPC20

DIGITAL-LOGIC
smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 017/07
Document No.

Monat, Jahr: 03/2007
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC20
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 07.03.2007
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.15. EC – Declaration of Conformity MPC20L

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smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 023/08
Document No.

Monat, Jahr: 06/2008
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC20L
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 11.06.2008
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.16. EC – Declaration of Conformity MPC20WOL

DIGITAL-LOGIC
smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 024/08
Document No.

Monat, Jahr: 06/2008
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC20WOL
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 11.06.2008
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.17. EC – Declaration of Conformity MPC21

DIGITAL-LOGIC
smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 018/07
Document No.

Monat, Jahr: 03/2007
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC21
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 07.03.2007
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.18. EC – Declaration of Conformity MPC21C

DIGITAL-LOGIC
smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 021/08
Document No.

Monat, Jahr: 06/2008
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC21C
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 11.06.2008
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.19. EC – Declaration of Conformity MPC21WOL

DIGITAL-LOGIC
smart embedded computers

CE – Konformitätserklärung
CE-Declaration of Conformity

Dokument Nr.: 022/08
Document No.

Monat, Jahr: 06/2008
Month, Year:

Hersteller: DIGITAL-LOGIC AG
Manufacturer

Anschrift: Nordstrasse 11/F
Address CH-4542 Luterbach, Switzerland

Produktbezeichnung: MPC21WOL
Name of product, type or model

Dieses Produkt erfüllt die Anforderungen der folgenden Europäischen Richtlinien:
The product complies with the requirements of the following European directives:

73/23/EEC Amended by directive 93/68/ECC

EN 60950-1: 2006

89/336/EEC Amended by directive 91/263/EEC, 92/31/EEC and 93/68/EEC

EN 55022: 1998 + A2: 2003 class B
EN 61000-4-2: 1995 + A2: 2001
EN 61000-4-3: 2006
EN 61000-4-4: 2004
EN 61000-4-5: 1995 + A1: 2001
EN 61000-4-6: 1996 + A1: 2001
EN 61000-4-11: 2004

Aussteller: Leiter Qualitätsmanagement
Issuer *Director Quality Management*

Ort, Datum: CH-Luterbach, 11.06.2008
Place, date

Konformitätsbeauftragter der DIGITAL-LOGIC AG
Representative for conformity

Felix Kunz (CEO & Leiter Qualitätsmanagement)
(CEO & Director Quality Management)

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1.20. EMV Certificate MPC20 / 20WOL / 21 / 21C / 21WOL

Berichts-Nr.: 08.015	Datum: 2. 4. 2008
Version: 01	Seite: 4 von 30

EMV-Testcenter RUAG Aerospace Defence Technology

1 Durchgeführte Prüfungen und Ergebnisse

Basisnorm	Anschlüsse (Schnittsstellen)		Offerierte bzw. vereinbarte Prüfungen u. Grenzwerte					Resultate
	Typ	N	FW	FI	P	Spez.	I	
Störfestigkeit								
61000-4-2, ESD	Gehäuse			X				erfüllt
61000-4-3, HF-Feld	Gehäuse			X				erfüllt
61000-4-4, „Burst"	AC/DC	1		X				erfüllt
	Signal	9		X				erfüllt
61000-4-5, „Surge"	AC/DC	1		X				erfüllt
	Signal							
61000-4-6, HF auf Kabel	AC/DC	1		X				erfüllt
	Signal	7		X				erfüllt
61000-4-11, Sp'gs'einbr.	AC	1		X				erfüllt
Störaussendung								
61000-3-2, Oberschwing.	AC							
61000-3-3, „Flicker"	AC							
55022 / 55011, Strahl'g	Gehäuse	1	X					erfüllt
55022 / 55011, HF Leitg.	AC	1	X					erfüllt

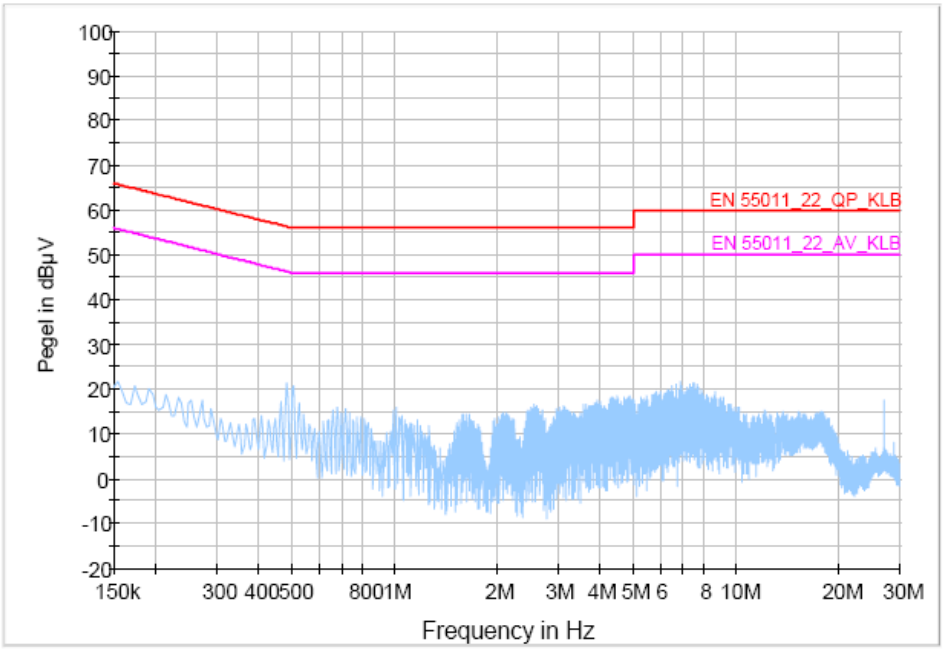
Legende

N Anzahl Schnittstellen, vorgesehen für die praktische Prüfung
FW Fachgrundnorm, Wohnbereich, Geschäfts- und Gewerbebereiche sowie Kleinbetriebe (EN 61000-6-1:2001, EN 61000-6-3:2001)
FI Fachgrundnorm, Industriebereich (EN 61000-6-2:2005, EN 61000-6-4:2001)
P Produkt(familien)norm:
Spez. Spezialgrenzwerte

Anmerkung: Für die Störaussendung bzw. Störfestigkeit wurden jeweils die schärferen der beiden Grenzwerte für den Wohn- bzw. Industriebereich herangezogen.
Mitgeltende Unterlagen: EN 55024

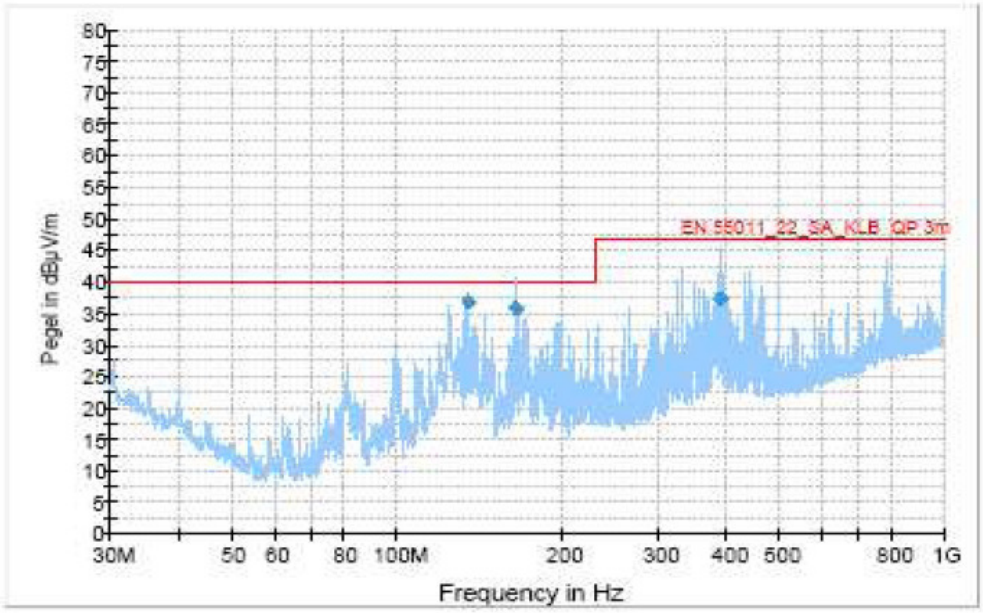
1.20.1. EMV Test Diagram, Class A MPC20 / 20WOL / 21 / 21C / 21WOL

EN 55011_22_LA_KLB LISN PMM_L1+N



1.20.2. EMV Test Diagram, Class B MPC20 / 20WOL / 21 / 21C / 21WOL

EN 55011 22 SA KLB ESS 90° 3m



2. OVERVIEW

2.1. Packing List

After opening the box, check that the following items from the packing list are included:

- MICROSPACE-PC20/21-x
- Technical User Manual
- CD with drivers and documentation

2.2. System Overview

The MICROSPACE-PC20/21 is a miniaturized PC system incorporating the major elements of a PC/AT compatible computer. It includes standard PC/AT compatible elements, such as:

- AMD Geode LX800 with 500MHz clock
- 128k L2 Cache
- DDR-RAM Memory 256-1024MByte (SODIMM200)
  - MPC20L: only 256MB
- Option: hard disk: 40GByte
- CompactFlash Type II socket
- Direct-X compatible video controller XVGA with up to 16MByte video memory
- VGA video
- USB controller with up to 4 channels (3x external – 1x internal [not assembled])
- Audio stereo Mic in and stereo line out
- 10-30V DC supply input
- Fan-less low power system
- MINI-PCI socket
- First and second LAN: Intel82551ER 100/10Base-T
  - MPC20L: only 1 LAN
- Boot from LAN (PXE)
- PS/2 keyboard/mouse support
  - MPC20L: no PS/2
- 256M CompactFlash boot medium with SLAX LINUX and Free DOS
  - MPC20L: not available

Additional functions of the MPC21 models:

- COM1 and LPT
- PCI/104 expansion (1 slot)
- Video input

Additional functions of the MPC21C:

- COM1 and COM2 (no LPT)
- PCI/104 expansion (1 slot)
- Video input

Additional functions of the MPC20WOL and MPC21WOL:

- First LAN chip: Intel82551QM with boot from LAN-PXE and WOL (Wake On LAN)

2.3. Differences between MPC20, MPC21, MPC21C

The product has different functions:

Option	MPC20	MPC20L	MPC21	MPC21C
Video Input			yes	yes
COM1			yes	yes
COM2	internal		internal	yes
LPT1			yes	-
PCI/104 Expansion			1 slot	1 slot

2.4. Assembly Options

The product has different assembly options. Ask the factory for the detailed information about the currently available options and combination of options.

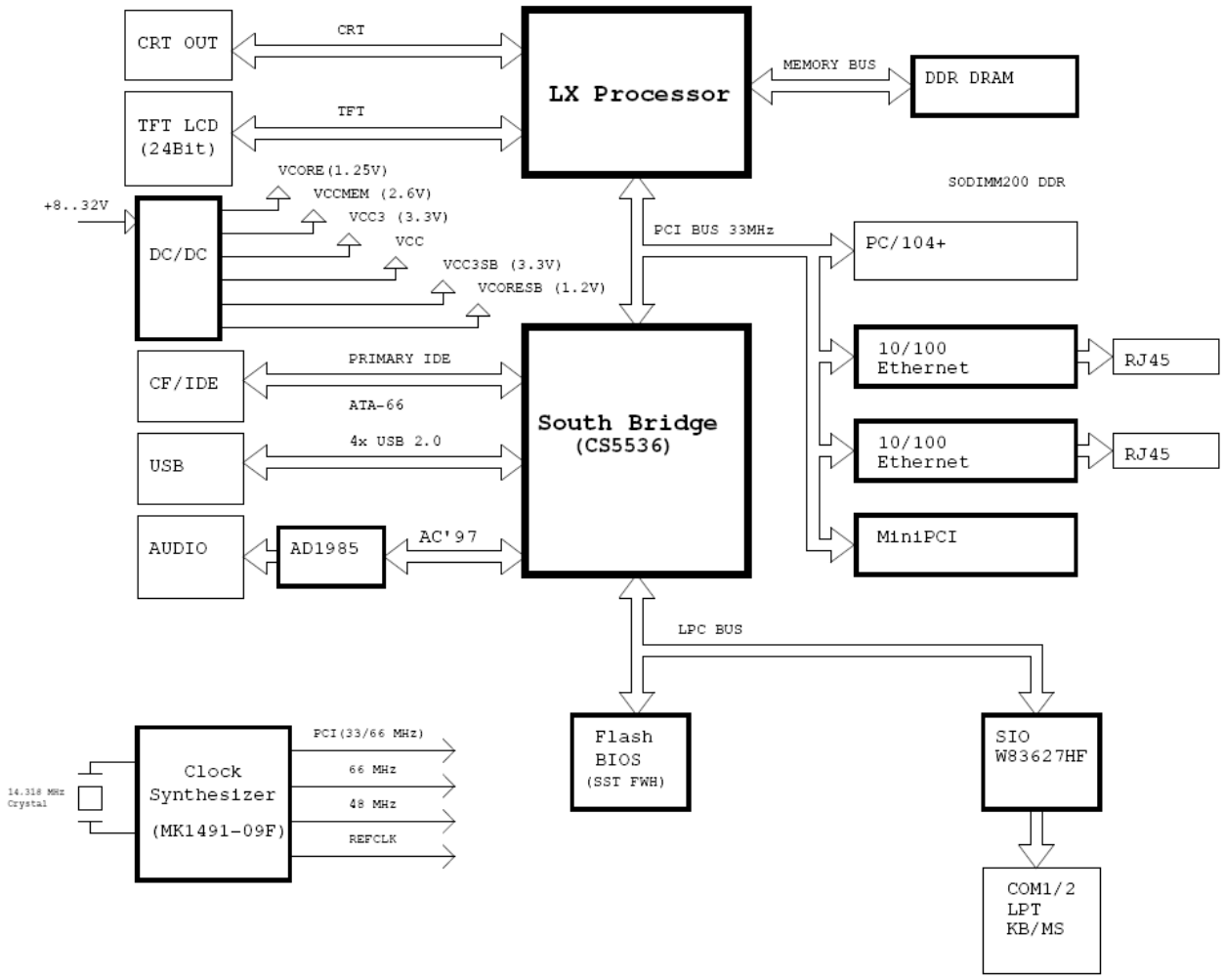
MPC20/21:

Option	Part No.		Comments
Hard disk drive 40GB	807460	O	Option
Hard disk drive 40GB ext.	807462	O	Optional HD with -25°C to +70°C
Power supply adapter	812029	O	Power supply 60Watt
Wireless LAN	812028	O	Mini-PCI WLAN module
WOL (Wake On LAN)		U	Ugrade WOL for MPC20
WOL (Wake On LAN)		U	Upgrade WOL for MPC21

U = Upgrade, D = Downgrade, O = Option

2.5. Functional Block Diagram

The diagram provides additional information concerning board functionality.



2.6. Technical Specifications

CPU	Specifications
MPC20/21	AMD GEODE LX800/900
Compatibility	80x86 CPU
1st Level Cache	16k data and 16k code
2nd Level Cache	128kByte
Socket	Soldered directly
Clock	500MHz
Performance	500MHz
FSB (GEODE)	33MHz
FPU	Integrated

Chipset	Specifications
Northbridge	AMD GEODE LX800/900
Southbridge	AMD CS5536
LAN 100Mbit	Intel 82551QM
LAN 100Mbit	Intel 82551ER
Audio	Integrated AC97
Firewire IEEE1394	-
Video	AMD GEODE
Frame Grabber / Video Input	Digital video input 16bit

Memory	Specifications
Main Memory	DDR-SDRAM, 64bit, up to 1024MByte in DDR-SODIMM200 socket
Flash BIOS	256kByte Flash
Setup EEPROM	2kByte for CMOS backup in battery-less applications
Flash Video BIOS	Serial flash
Video RAM	16MByte

Video Controller	Specifications
Controller	GEODE internal video controller
Video Memory	2-16MByte
Channel 1	CRT VGA 320x240 up to 1920x1440 pixels
Boot-up Resolution	640x480 / 800x600 / 1024x768 selectable
2D Graphics	Integrated accelerator

External Interface	Specifications
Video Interfaces	CRT1
TV Interfaces	None
USB 2.0	2 front, 2 rear, 1 internal (not assembled)
IEEE1394	None
LPT1	Only MPC21
COM1	Only MPC21: RS232
COM2	Internal: RS232 (MPC21C D-Sub9)
Keyboard	PS/2
Mouse	PS/2
Audio	Stereo I/O

Power Management	
Available since V2.0	The LX800/900 supports ACPI and APM Version 1.2. The following ACPI Sleep States are supported: ➢ S1 Sleep with CPU content. ➢ S4 Hibernation (LED* is blinking) with transition to S5. ➢ S5-G2 Power Off (LED* is blinking). The device can be switched on by the Main Button (or with WOL if available). ➢ S5-G3 Power Off (mechanically) * = if available

Power Supply	Specifications
Input	Nom. 12V / 24VDC (range 10V to 32VDC)
Protection	Load dump resistant, wrong polarity resistant, EMI filtered
Specification	MIL-STD-1275 compliant
Running	Typical
Running with HDD	Typical
Running WOL	Typical
Running WOL with HDD	Typical
Power-off Standby	Typical
Power-off Standby WOL	Typical

Power Consumption @ 19V				
Description				
	MPC20		**MPC20WOL**	
	w/ HDD	w/o HDD	w/ HDD	w/o HDD
Power ON (BIOS setup)	368mA	344mA	393mA	372mA
Power OFF (green LED is blinking)	30mA	30mA	57mA	57mA
Power OFF (LAN cable is connected - LINK LED glows)			66mA	66mA
	MPC21		**MPC21WOL**	
	w/ HDD	w/o HDD	w/ HDD	w/o HDD
Power ON (BIOS setup)	456mA	433mA	420mA	397mA
Power OFF (green LED is blinking)	45mA	45mA	57mA	57mA
Power OFF (LAN cable is connected - LINK LED glows)			67mA	67mA

Physical Characteristics	Specifications
Dimensions	Length: 165 mm Depth: 110 mm Height: MPC20 27 mm MPC21/21C 46 mm
Weight	MPC20 .5 kg MPC21/21C .7 kg

Operating Environment	Specifications
Relative Humidity	5 - 90% non-condensing IEC68-2-30 at -+5 to +50°C operating
Vibration Operating	IEC68-2-6 10-50Hz, 0.075mm and 55-500Hz, 1.0G
Vibration Non-operating	IEC68-2-6 10-50Hz, 0.15mm and 55-500Hz, 2.0G
Shock Operating	IEC68-2-27 10G, 11ms ½ sine
Shock Non-operating	IEC68-2-27 50G, 11ms, ½ sine
Altitude	IEC68-2-13 4571meter operating
Temperature Operating	IEC68-2-1,2,14 (see separate table below)
Temperature Storage	IEC68-2-1,2,14: -40°C to +70°C

Operating Temperature	Specifications
Without hard drive	-25°C to +70°C
With standard hard drive	0°C to +50°C
With extended temp. hard drive	-25°C to +70°C

EMI / EMC Tests	Specifications
EMC Emission EN61000-6-2:2001	
Conducted disturbance	EN55022 Class B
Radiated disturbance	EN55022 Class B
EMC Immunity EN61000-6-2	
Electro-Static Discharge (ESD)	EN61000-4-2 Voltage = 4kV contact / 8kV air Criteria A
Radiated RF field	EN61000-4-3 Level = 10V/m Criteria A
Electrical fast transients (burst)	EN61000-4-4 Grade 2: DC-Power lines = 1000V (5/50ns) Grade 2: AC-Power lines = 2000V (5/50ns) Grade 2: Signal lines = 500V (5/50ns) Criteria B
Surge	EN61000-4-5 Grade 2: DC-Power lines = 1kV, (1.2/50us) Grade 2: AC-Power lines = 2kV, (1.2/50us) Criteria B
Conducted disturbances	EN61000-4-6 Voltage = 10V coupled by case Criteria A

Security:	
e1:	Not planned
UL	Not planned
ETL 301	Not planned
SEV	
Safety	AR385-16

2.7. MPC20/20L/21/21C Incompatibilities to a Standard PC/AT

None.

2.8. Related Application Notes

Application Notes are available at ***http://www.digitallogic.com*** ➔ support, or on any DIGITAL-LOGIC Application CD.

#	Description

3. SAFETY REGULATIONS

Safety verifications follow the guidelines adapted from the US Army Communication and Electronics Command Supplement (1992 version) 1 to AR385-16.

3.1. Safety: Power-On Indicator

The green power indicator is located in the front of the computer system. [MIL-STD-1472D]

3.2. Safety: Coded and Marked Connectors

All connectors (plugs and receptacles) are coded and marked to prevent insertion of the wrong plug into a receptacle or other mating unit [MIL-STD-1472D]. Depending on the mounted replicator unit, the connectors are PC-Style, DSUB or MIL versions. The male connectors are de-energized when disconnected. [MIL-STD-454M]

3.3. Protection of the Supply Input Current

Note…
The computer system protects the internal supply from overcurrent by an external fuse of 6.3amp. In case of an overcurrent the fuse opens the main circuit and interrupts the fault current. [MIL-STD-454M]

3.4. Safety: Wrong Polarization on the Power Input

Attention!
The supply input is protected against wrong polarization with a serial diode. This diode withstands current up to 28Volts.

3.5. Safety: Protection of the Output Currents

There is no overcurrent protection on any peripheral port. The following table shows the maximum available current at each peripheral connector:

Connector	Nominal maximum current
USB	0.5 Amp. @ 5V
KB/MS	0.1 Amp. @ 5V
VGA	0.1 Amp. @ 5V

3.6. Safety: Load Dump Protection in 12V/24V systems

There is no integrated protection against load dump!

If the computer system will be installed in a vehicle (car, truck, train), an external, overvoltage protection must be attached. Connecting a zinc oxide based metal oxide varistor (MOV) directly at the supply input connector is recommended. Use a typical 28V clamp voltage for the 12/24V systems.

Example: Varistor: B72220S300K (Infineon) Vbreak=30V

3.7. Ground Potential

All interface connectors are permanently in contact with the ground (earth). The system must be grounded with a ground wire (colors green with yellow stripes). [NFPA 7087]

The ground must have the capacity to safely conduct any current that might be imposed thereon. The ground is wired separately from the electrical ground.

The leakage current is: 5 uA at 28 V.

The ground cable must be connected separately to the chassis or through the power connector.

Pin	Left	Middle	Right
Signal	GND	Shield	Power 10-30V

3.8. Power On/Off Switch

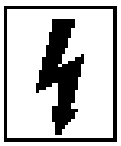
The power switch is clearly identified and located on the front panel. [MIL-STD-545M]

The power on/off switch does not cut all electricity to the system. In the “off” position, a microcontroller is still working, to supervise wakeup events (switch, Wake on LAN). [MIL STD 454M] In this state, the system is consuming approximately 300mW.

To turn on the system, the power switch must be pressed for at least one second. While running, the system can be forced to shut off by pressing the on/off switch for 4 seconds.

Be sure to disconnect the power supply before opening the system.

3.9. Safety: Batteries Inside the Device



Caution, Electric Shock!

The system has an integrated backup lithium battery (RTC). The battery compartment is not vented. The system casing prevents the operator from a possible exploding battery cell.

3.10. Protection against Over-Heating

The computer system integrates temperature-sensitive components such as:

- Hard disk (max. 55°C)
- The CPU with a max. junction temperature of 105°C

Do not cover the device with paper, textiles or other objects. The minimum space between the housing and the next object is 50mm on each side. Make sure to allow enough airflow to the computer system when the device is assembled.

Protect the computer system from solar radiation or other thermal energy exposure.

Never place the functioning computer system in a closed case or box; or the inside air will heat above the maximum temperature and the system will be destroyed.

Keep the surface of the computer system free of dust, oil and other isolating materials, to prevent a reduction of the cooling efficiency.

3.11. Mechanical Safety: Safe Assembly and Mounting

The computer system must be fixed with a minimum of 4 screws using the mounting holes. It is very dangerous to place the device on the seat of a vehicle (car, truck, train, boat), while driving. In case of an accident, the device may hit a passenger or window.

Never drill new mounting holes into the chassis of the computer system because the internal electronics or hard disk may be damaged. Use only the mounting holes for assembly.

3.12. Environmental Safety: At 25°C No "Hot" Surfaces

Note…
When the system runs at +25°C ambient temperature, no surfaces or other operating elements will have temperatures above +60°C. [MIL-STD-454M]

3.13. Environmental Safety: No Release of Toxins

Note…
As long as the computer system is used in the specified operating temperature range, no toxic, corrosive, or explosive fumes or vapors are exposed. [MIL-STD-454M]

3.14. Environmental Safety: Laser Devices

Note…
No assembled CD/DVD-Drive included.

3.15. Environmental Safety: Noise Emission

Note…
This computer system is a low noise system; the level is less than 15 dbA.

3.16. Environmental Safety: Hazardous Environs

The computer system must not be used in a hazardous area because there is nothing to prevent spontaneous combustion. Never use the system in explosive gas or vapor, flammable dusts or ignitable fibers and filings.

3.17. Environmental Safety: Humidity and Water Spray

The computer system is not protected from splashing water.

The protection is IP40.

3.18. Safety: Independent Software

Note…
The system is divided into 2 different software parts, each running on its own microcontroller or CPU. Both parts communicate with a dedicated link.

1. Power management CPU and software are always running, even when the system's power is off.
2. The Geode LX800-CPU main processor is controlled from the power management CPU.

3.19. Safety: Recycling the Computer System

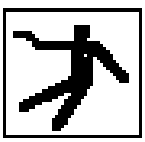
Disposal:
Never dispose of old batteries or the entire computer system as domestic waste. Return it to the manufacturer for proper disposal.

3.20. Safety: Static Electricity

Warning, ESD Sensitive Device!
Excessive static electricity can damage the system. Before you handle the chassis or its components, use the grounding wrist strap provided with the system to discharge static electricity. Instructions for using the wrist strap are printed on the strap's envelope.

Handle the components by the grips or the front panel to help prevent accidental damage caused by static discharge.

3.21. Safety: Operator Security



Safety Instructions
It is important to protect yourself and your equipment before you perform any of the procedures outlined in this, or the extended, manual.
Before handling the equipment or when making changes to the configuration, power-off the system and disconnect all power cords from their source.

Use a grounding wrist strap or other static-dissipating device to prevent accidental damage caused by static discharge.

Only qualified, experienced electronics service personnel should access and handle the equipment.

4. FUNCTIONS

4.1. Connectors

4.1.1. Front of the MPC20 / 20L

Version 0.1:

Connectors:

USB:	2.0 USB
MIC:	Stereo input for microphone
FRONT:	Stereo speaker out
HD-LED (red)	Hard disk/CompactFlash activity indicator
POWER-LED (green)	OFF: No power available, system is not running Flashing: Power is applied, but computer is in the “off” state On: Computer is running
COMPACT FLASH:	Socket for CF Type 1 and Type 2
DC-Input:	10-30VDC power input
On/Off-Switch:	Power switch

Version 1.0:

Connectors:

MIC:	Stereo input for microphone
SPEAKER:	Stereo speaker out
USB:	2.0 USB
HD-LED (red)	Hard disk/CompactFlash activity indicator
POWER-LED (green)	OFF: No power available, system is not running Flashing: Power is applied, but computer is in the “off” state On: Computer is running
COMPACT FLASH:	Socket for CF Type 1 and Type 2
On/Off-Switch:	Power switch

4.1.2. Rear of the MPC20 / 20L

Version 0.1:

Connectors:

Dual-USB:	USB 2.0
KB/MS:	PS/2 keyboard / mouse with a Y-cable (only MPC20)
VGA:	Video output for RGB-CRT/LCD
WLAN:	Option WLAN: Antenna
LAN-Port 1:	100MB / with activity / link – LED (only MPC20)
LAN-Port 0:	100MB / with activity / link – LED

Version 1.0:

Connectors:

⏚	GND / Shield
Dual-USB:	USB 2.0
KB/MS:	PS2 Keyboard; with a Y-cable, a PS/2 Mouse also
DC-Input:	10-30VDC power input
VGA:	Video output for RGB-CRT/LCD
WLAN:	Option WLAN: Antenna
LAN-Port B:	100MB / with activity / link – LED
LAN-Port A:	100MB / with activity / link – LED

4.1.3. Front of the MPC21/21C

Version 0.1

Connectors:

USB:	2.0 USB
MIC:	Stereo input for microphone
FRONT:	Stereo speaker out
HD-LED (red)	Hard disk/CompactFlash activity indicator
POWER-LED (green)	OFF: No power available, system is not running
	Flashing: Power is applied, but computer is in the “off” state
	On: Computer is running
Compact Flash:	Socket for CF Type 1 and Type 2
DC-Input:	Power input
On/Off-Switch:	Power switch

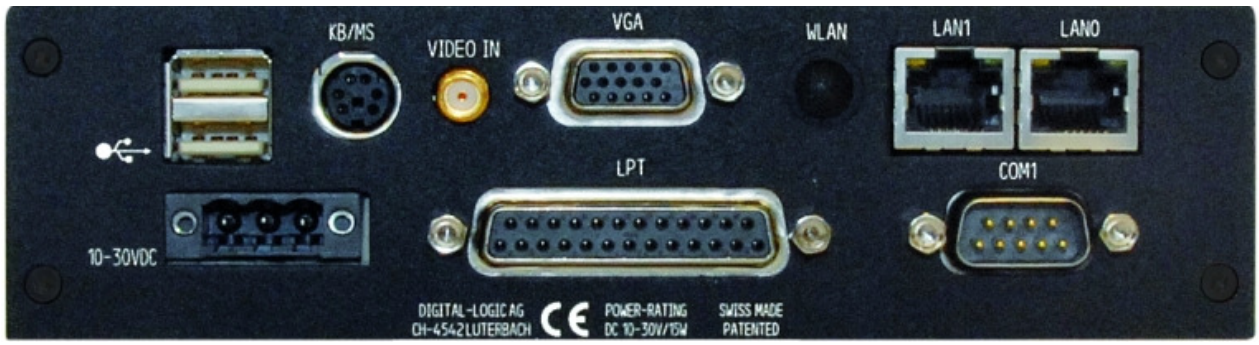
Version 1.0

Connectors:

MIC:	Stereo input for microphone
SPEAKER:	Stereo speaker out
USB:	2.0 USB
HD-LED (red)	Hard disk/CompactFlash activity indicator
POWER-LED (green)	OFF: No power available, system is not running
	Flashing: Power is applied, but computer is in the “off” state
	On: Computer is running
Compact Flash:	Socket for CF Type 1 and Type 2
VIDEO IN:	CVBS video input
On/Off-Switch:	Power switch

4.1.4. Rear of the MPC21

Version 0.1



Connectors:

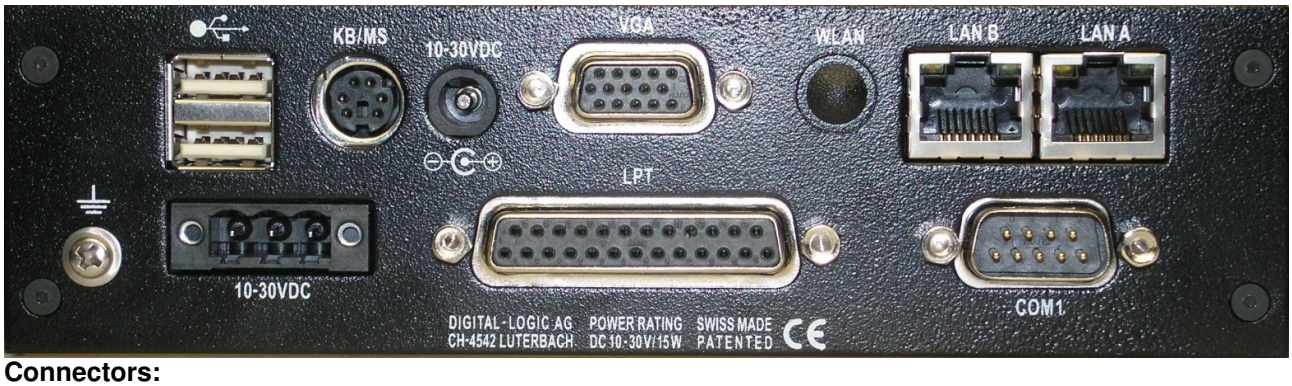
1st Row:

Dual-USB:	USB 2.0
KB/MS:	PS2 Keyboard; with a Y-cable, a PS/2 Mouse also
Video-In:	CVBS video input
VGA:	Video output for RGB-CRT/LCD
WLAN:	Option WLAN: Antenna
LAN-Port 1:	100MB / with activity / link – LED
LAN-Port 0:	100MB / with activity / link – LED

2nd Row:

Power Input:	10-30VDC power input
LPT:	Printer interface
COM1	Serial interface RS232C

Version 1.0



Connectors:

1st Row:

Dual-USB:	USB 2.0
KB/MS:	PS2 Keyboard; with a Y-cable, a PS/2 Mouse also
DC-Input:	Power input
VGA:	Video output for RGB-CRT/LCD
WLAN:	Option WLAN: Antenna
LAN-Port B:	100MB / with activity / link – LED
LAN-Port A:	100MB / with activity / link – LED

2nd Row:

⏚	GND, Shield
Power Input:	10-30VDC power input
LPT:	MPC21: Printer interface
COM1	Serial interface RS232C

4.1.5. Rear of the MPC21C

Version 1.0

Connectors:

1st Row:

Dual-USB:	USB 2.0
KB/MS:	PS2 Keyboard; with a Y-cable, a PS/2 Mouse also
DC-Input:	Power input
VGA:	Video output for RGB-CRT/LCD
WLAN:	Option WLAN: Antenna
LAN-Port B:	100MB / with activity / link – LED
LAN-Port A:	100MB / with activity / link – LED

2nd Row:

⏚	GND, Shield
Power Input:	10-30VDC power input
COM2	Serial interface RS232C
COM1	Serial interface RS232C

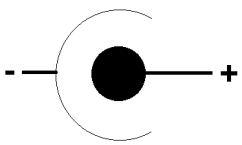
4.1.6. Power Supply Connector

BLZ 5.08/3F SN SW (Part number: 1803050000) available from www.weidmueller.com .

Signal Definition:

+ Power	10-32V power supply
GND	0V or the ground from the power supply
Shield	Grounding of the MPC20/21

Pin	Left	Middle	Right
Signal	GND	Shield	Power 10-30V



4.2. DC-Power Input Specifications

4.2.1. Nominal DC-Power Input Voltage

The nominal DC-power input is within the 10Volt to 32Volt range.

This means the device may be used with 12V or 24V batteries, usually found in boats, cars and trucks.

4.2.2. Minimal DC-Power Input Voltage Specification

The MPC runs with a minimal power of 7.2V, measured at the input of the rear connector. If installed in a vehicle that is starting its motor, the power supply voltage may drop for a moment under 8V.

The following limits are specified:

DC-Input Voltage	Duration	Comments:
32V	Highest static input voltage	
12/24V	Always: Nominal operation	
8V	Lowest static voltage	

4.3. Hard Disk 2.5" - Standard Type

The internal hard disk is mounted onto a caddy

Technical Specifications (without the shock absorbers)	
Capacity	20-80GByte
Manufacturer	IBM Travelstar Model: IC25N020ATCS04 (20GB) IBM Travelstar Model: IC25N040ATCS04 (40GB) IBM Travelstar Model: IC25N060ATCS04 (60GB)
Sector size	512Byte
Data heads	16
Disks	2 or 4
Rotation speed	4200 RPM
Latency	7ms
Operating temperature	+5°C to +55°C
Relative humidity	8% to 90%
Power-on hours	333h / month
Max. read/write duty cycles	20%
Vibration, operating	0.67G (5-500Hz) random
Shock, non-operating	800G / 1ms
Vibration, non-operating	3G (5-500Hz)

4.4. WLAN Option

A MiniPCI wireless LAN module can be installed. Option MPC2x WLAN MiniPCI consists of Intel's PRO/Wireless 2915ABG Network Connection MiniPCI card and a HF connector cable.

Intel PRO/Wireless 2915ABG Network Connection MiniPCI card specifications:

Form Factor Mini PCI Type 3A
Dimensions: Width 2.85 in x Length 1.75 in x Height 0.20 in (59.75 mm x 50.95 mm x 5 mm)
Weight: 0.7 oz. (12.90 g.)
Antenna Interface Connector: Hirose U.FL-R-SMT mates with cable connector U.FL-LP-066
Dual Diversity Antenna: On-board dual diversity switching
Connector Interface: 124-pin SO-DIMM edge connector
Voltage: 3.3 Volt

Operating Temperature: 0 to +70 degrees Celsius
Humidity: 50 to 85% non-condensing

Frequency Modulation: 5 GHz (802.11a) 2.4 GHz (802.11b/g)

Frequency Band: 5.15 - 5.85 GHz, 2.400 - 2.472 GHz (dependent on country)
Modulation: BPSK, QPSK, 16 QAM, 64 QAM CCK, DQPSK, DBPSK
Wireless Medium: 5 GHz UNII: Orthogonal Frequency Division Multiplexing (OFDM)
2.4 GHz ISM: Orthogonal Frequency Division Multiplexing (OFDM)
Channels: 4 to 12 non-overlapping, dependent on country
Channel 1-11 (US only); Channel 1-13 (Japan & Europe)
Data Rates: 54, 48, 36, 24, 18, 12, 9, 6 Mbps / 11, 5.5, 2, 1 Mbps

General

Operating Systems: Microsoft Windows XP, Microsoft Windows 2000
Wi-Fi® Alliance Certification for 802.11b, 802.11g, 802.11a, WPA, WPA2, WMM, EAP-SIM, LEAP, PEAP, TKIP, EAP-FAST, EAP-TLS, EAP-TTLS, MD5
Cisco Compatible Extensions Certification v3.0
WLAN Standard IEEE 802.11g, 802.11b, 802.11a
Product Safety: UL, C-UL, CB (IEC 60590)

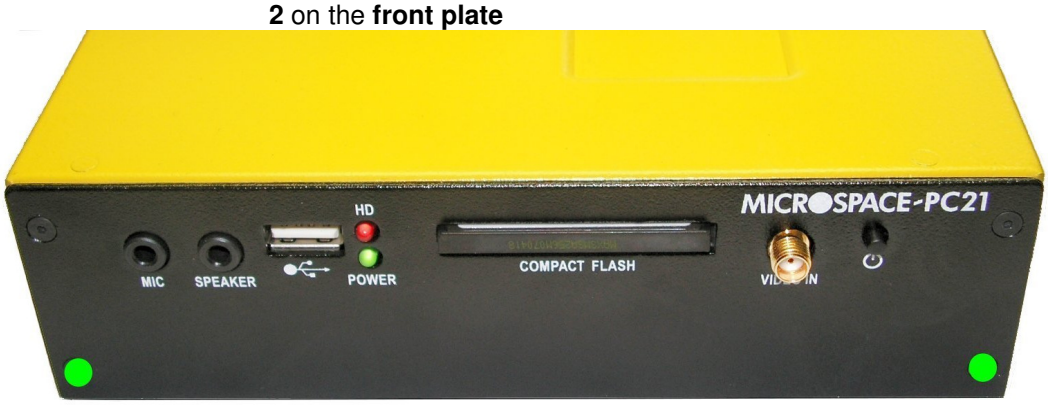
5. HARDWARE INSTALLATION

5.1. Install an additional PCI/104 card (MPC21/21C only)

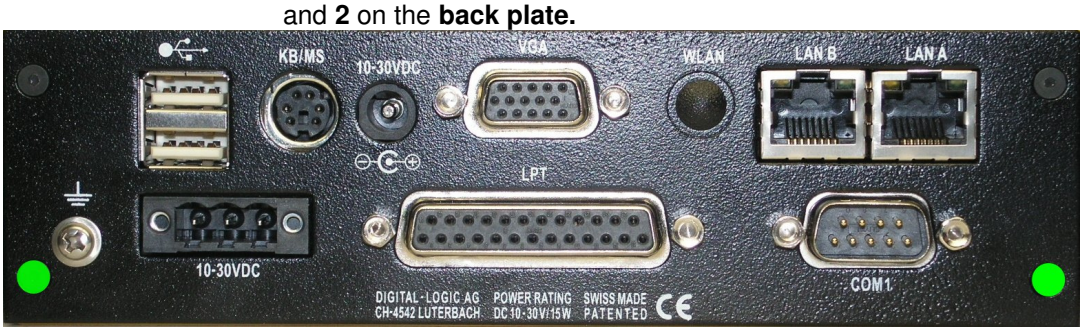
To install a PCI/104 card, open the device as follows (please use a star TX8 screwdriver):

1. Remove the lower screws marked in green:

2 on the **front plate**



and **2** on the **back plate.**



2. Carefully turn over the device and remove the bottom.

3. Gently insert or remove the PCI/104 card.

6. PREPARE THE COMPUTER SYSTEM

Warning, ESD Sensitive Device!
Place the embedded computer board on an isolated, ESD-protected surface. Also be sure that all equipment, tools and personnel are fully protected against ESD.

6.1. Print the Detailed Manuals from the Product CD

Note…

- Place the Product-CD into a personal computer that is connected to a printer.
- Open the CD; open the directory MPC20/21.

Since the internal computer board is the MSB800 embedded computer, the corresponding manuals must be used for detailed information.

Printout the following detailed manuals:

1. The Technical/Hardware manual: MSB800_Detailed.pdf

2. The driver/software/BIOS manual: GEODE_LX800-LX900.pdf

6.2. Jumper Configuration

To open the device, please refer to chapter 5.

Jumper	Structure	open	closed	Remarks
J1	**CompactFlash master / slave**	Slave	**Master**	
J2	**Autostart function**	Enabled	N/A	

6.3. Connect the Peripherals to the System

Prepare the following peripherals:

- VGA Monitor (LCD or CRT) with a resolution up to 1024x768pixel
- PS2 Keyboard
- USB-Mouse
- LAN cable if available
- USB CD-drive or Floppy drive
- Power supply with 12Volt and minimum 30Watt

1. Connect the VGA Monitor to the 15pin HD-Subconnector.
2. Connect the Keyboard to the PS/2 connector.
3. Connect the USB-Mouse to one of the USB-connectors.
4. Connect a USB-CD-drive or a USB-Floppy drive to one of the USB connectors.
5. Connect the 12Volt power supply to the power input of the computer board.

The polarity must be correct or the electronic board may be destroyed.

6. Insert a boot device: USB-Stick, Floppy or bootable CompactFlash or use a PXE/RPL server to boot from LAN A *(in earlier versions LAN 0).*

Photo of MPC20 Version 1.0

Photo of MPC21 Version 1.0

7. POWER-ON THE SYSTEM

Attention!
Check that the voltage is regulated to +12Volts and that the polarity is correct.

The power supply voltage must be in the range of 8V to maximum 32Volt.

Jumper J2 determines the behavior after power-on. The autostart function is enabled by default from the factory (to set J2, please refer to chapter 6.2).

- In autostart mode the board automatically enters the boot sequence and the green power LED will come on.
- In non-autostart mode the board will remain in standby mode until the power button is pressed.

Now switch on the external 12V power supply. The green power-LED should light.

After some seconds the screen should display the BIOS initial message/picture:

7.1. BIOS Setup

Since the BIOS auto-configures during the start-up procedure, the user normally does not need to enter the BIOS setup. The manual setup is only needed to change from the default settings. Please refer to the Driver/Software/BIOS Manual "GEODE_LX800-LX900" for the BIOS-Setup details.

For the MPC20/21: The RTC clock and date **must** be correct, since TOD is adjusted in the production field test.

7.2. Boot up the Operating System and Install the Drivers

Depending on which boot drive is available, boot up the operating system from the CompactFlash or hard disk (if installed as an option).

To install the drivers, see the driver/software/BIOS manful "GEODE_LX800-LX900" on the Product CD.

7.3. FreeDOS, DSLinux und ELinOS Bootflash

7.3.1. Free DOS

FreeDOS 0.9 (http://www.freedos.org/) is available on the boot device and contains a variety of useful programs for configuring a computer system. With these tools partitions can be manipulated and data can be transferred.

The most important of these programs are:
Fdisk, Format, Sys, XCOPY, Edit, Dos Navigator (dn) and UnZip.

7.3.2. SLAX LINUX

The Linux installed on the boot device is based on SLAX Linux (http://www.slax.org/?lang=en) It boots with a graphical interface and includes many useful applications.

The most important of these are:
Web browser, xine, Mplayer (Multimedia Player) and PDF-Viewer.

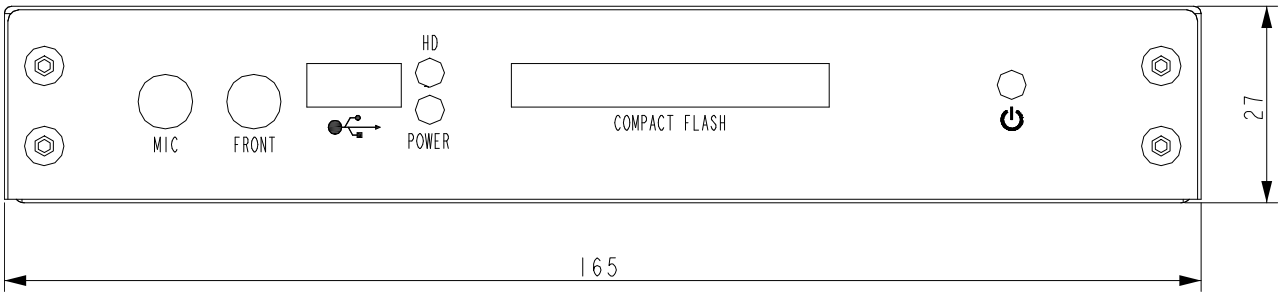
7.3.3. ELinOS Demo

This demo is a Linux Tetris game generated with **ELinOS 4.0** (http://www.sysgo.com/). It shows how fast imbedded Linux can boot up and how little storage space it requires.

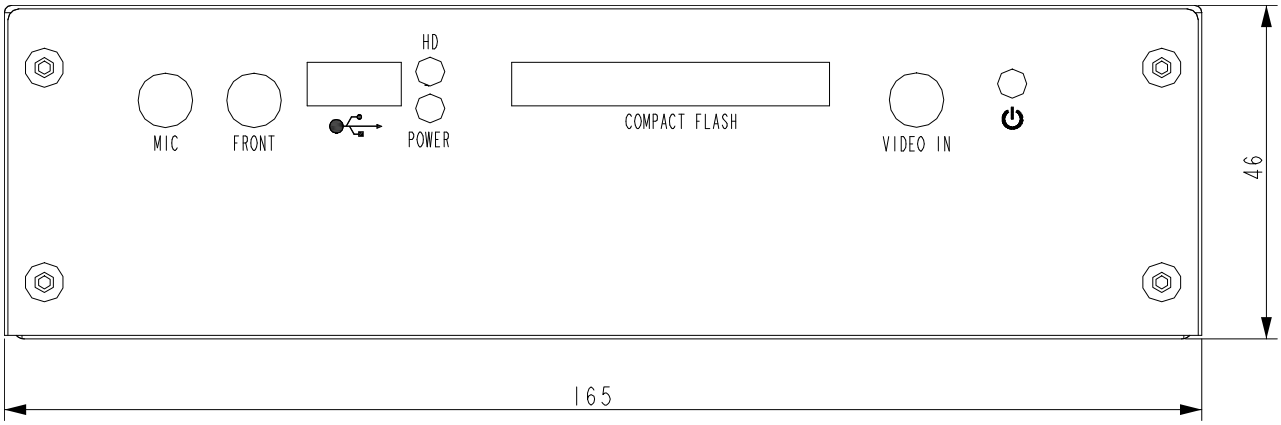
8. DIMENSIONS AND DIAGRAMS

8.1. Front Views

MPC20/20L (Version 1.0)

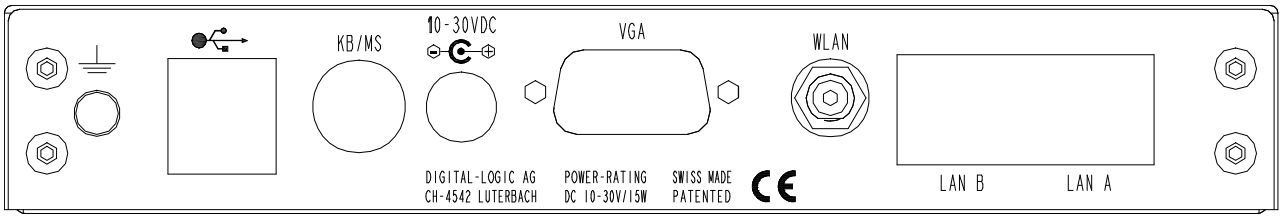


MPC21/21C (Version 1.0)

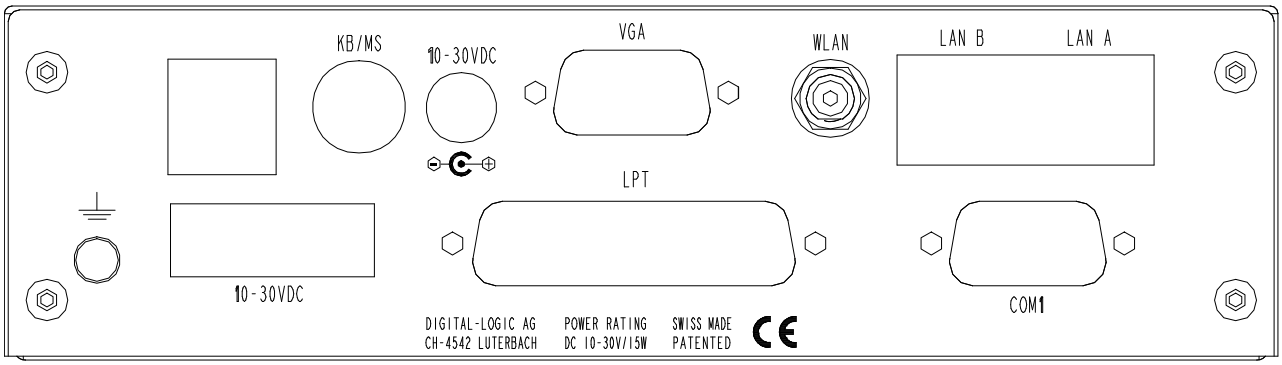


8.2. Rear Views

MPC20/20L (Version 1.0)

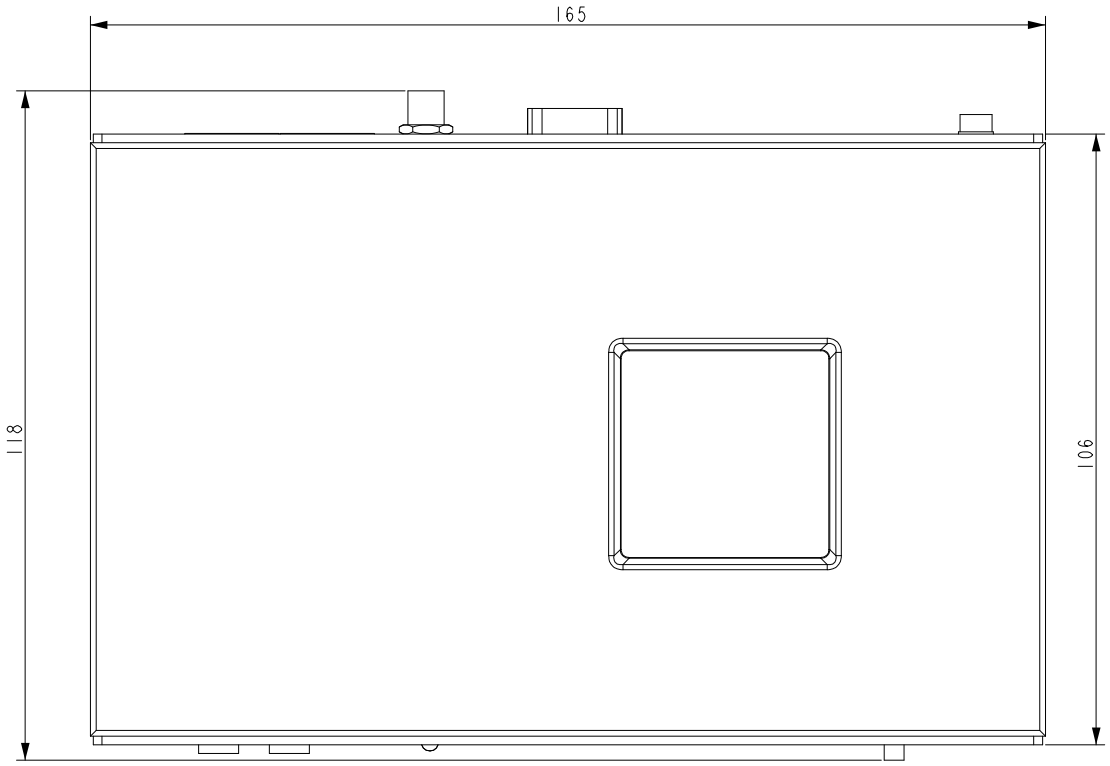


MPC21/21C (Version 1.0)

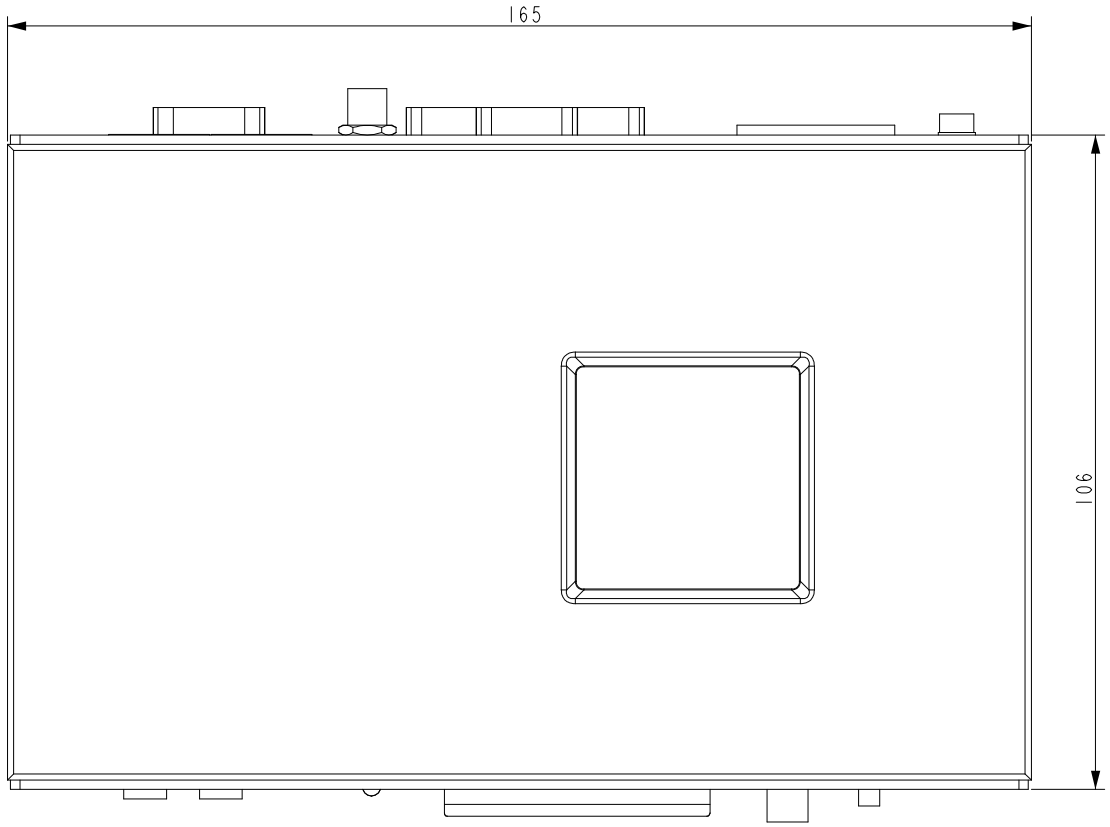


8.3. Top Views

MPC20/20L (Version 1.0)

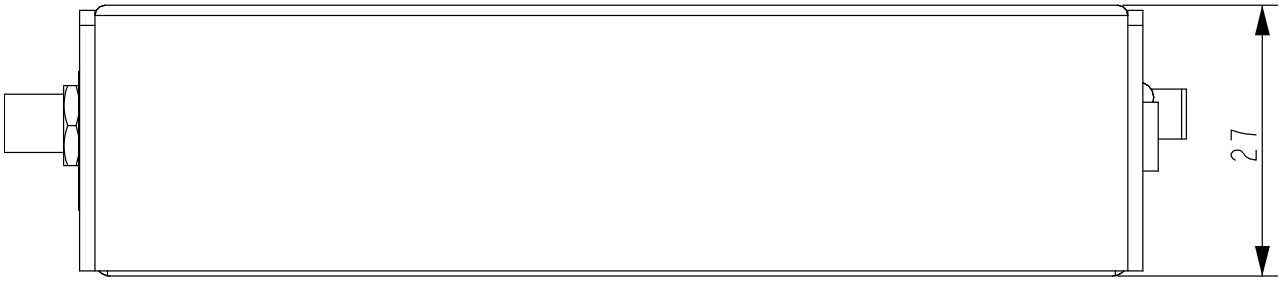


MPC21 (Version 1.0)

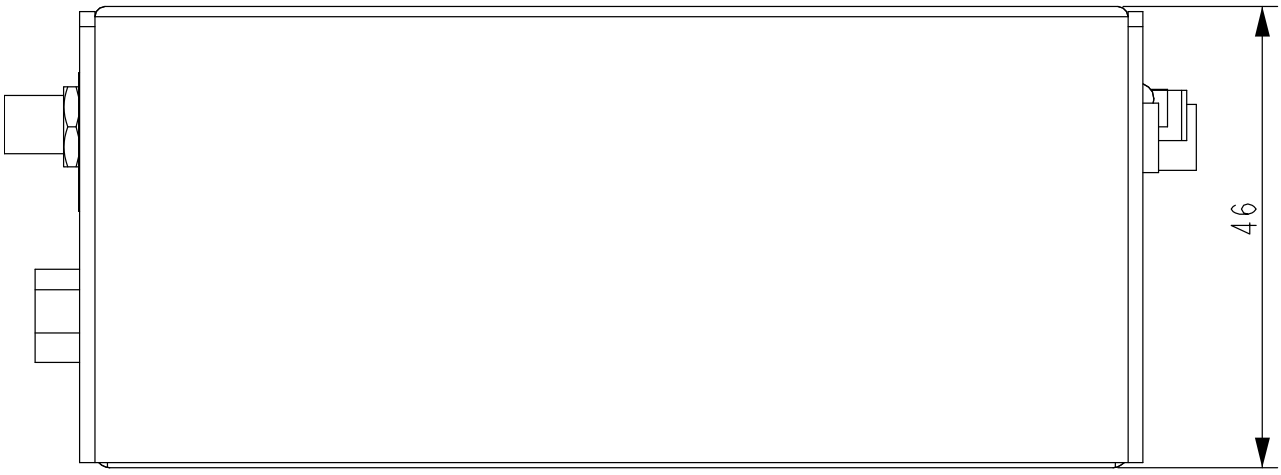


8.4. Side Views

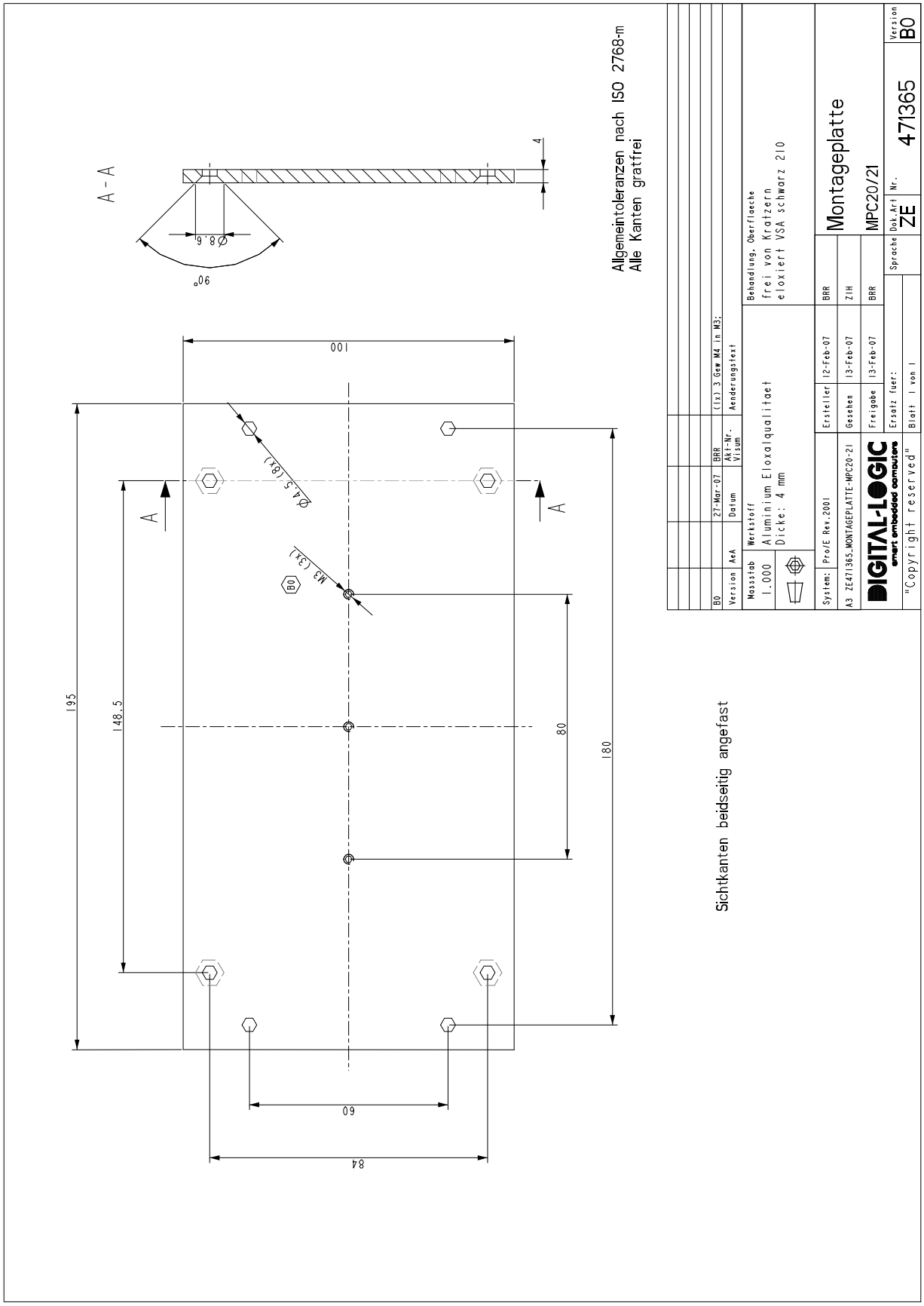
MPC20/20L (Version 1.0)



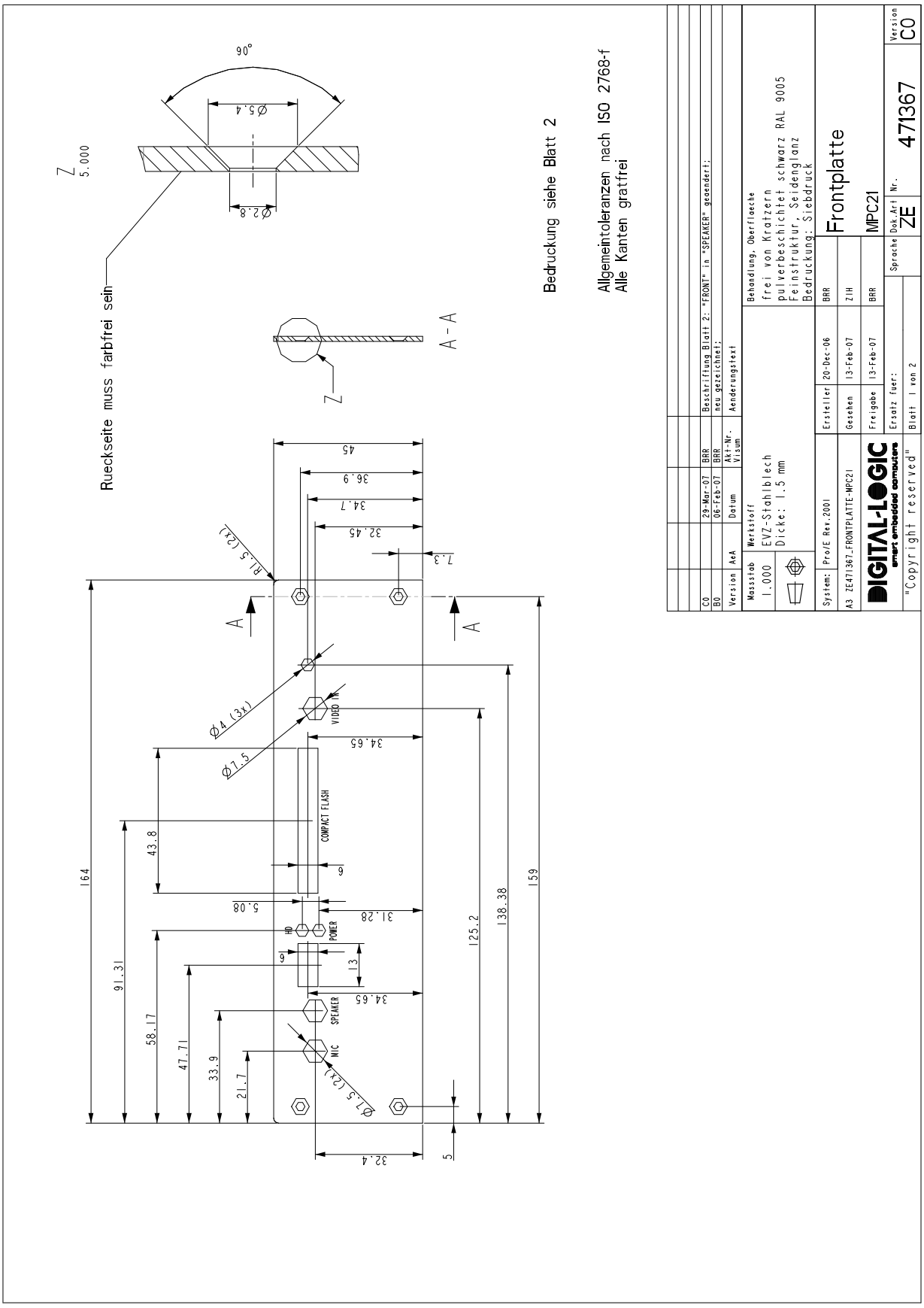
MPC21/21C (Version 1.0)



8.5. Mounting Plate MPC20/20L/21/21C



8.6. Front Plate MPC21/21C



9. CORE BIOS

9.1. BIOS History

For the MPC20 / MPC20L / MPC21 / MPC21C:

Version	Date	Status	Modifications
1.23	02.2008		Memory problem solved
1.24	**10.2008**		**SelfTest BIOS Extension UltraX included** **Enter with < ALT - D > during the boot up** **ATTENTION! Since BIOS version V1.24, the BIOS size is now 512kB instead 256kB.** **To download the BIOS, use the following command:** **BIOS up to V1.23: flashrom /sFFFC0000 filename.cor** **BIOS since V1.24: flashrom /sFFF80000 filename.cor**

(for previous BIOS versions, please see the GEODE LX800-LX900 Manual)

For the MPC20WOL / MPC21WOL:

Version	Date	Status	Modifications
1.25W	**02.2008**		**Memory problem solved**

9.2. 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.

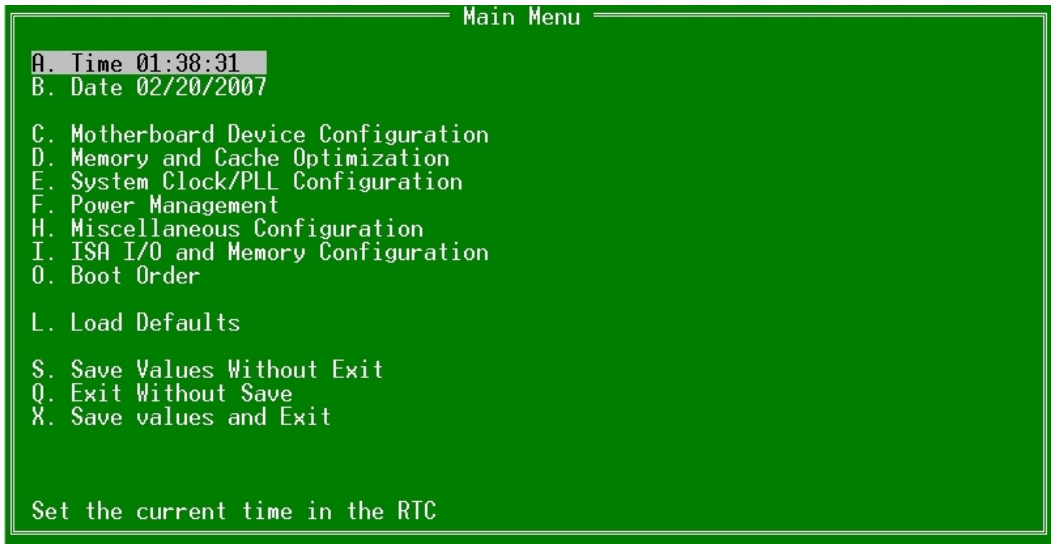
The controls for the setup menu are:

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

9.3. BIOS Setup

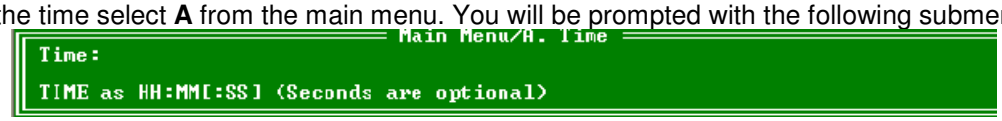
9.3.1. Main Menu

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

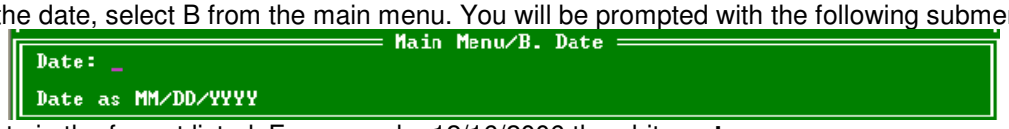
To change the time select **A** from the main menu. You will be prompted with the following submenu:



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>.**

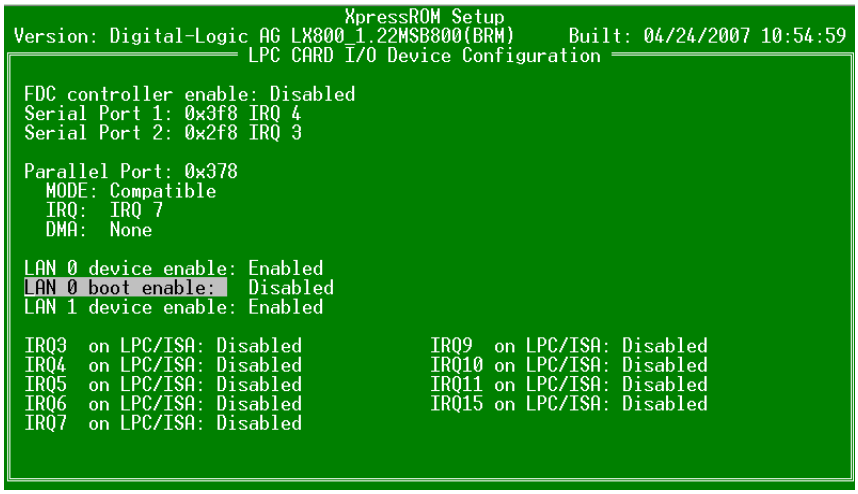
10.BOOT FROM LAN – PXE & WOL (WAKE ON LAN)

10.1. MPC20WOL and MPC21WOL

10.1.1. Boot from LAN (PXE)

10.1.1.1. PXE Setup in the BIOS

BIOS-Setup Screen with the LAN-BOOT (PXE) DISABLE / ENABLE menu:



10.1.1.2. PXE Boot and PXE Protocol

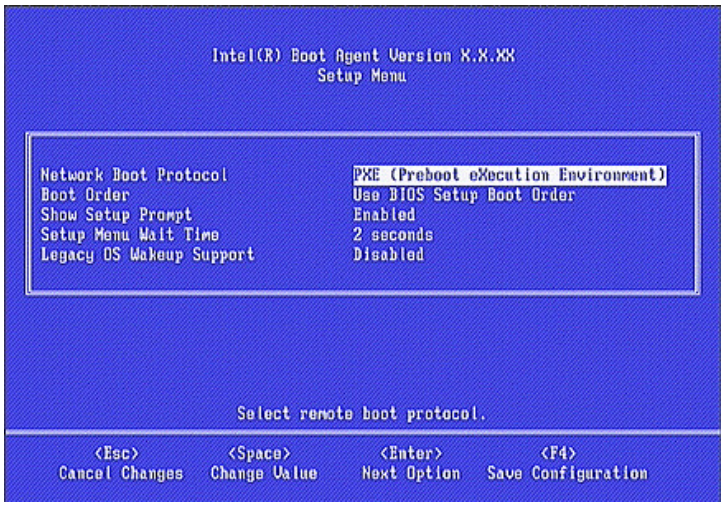
When the boot process begins, the screen clears and the computer begins its Power On Self Test (POST) sequence.

Shortly after completion of the POST, the Boot Agent software stored in the flash ROM executes. The Boot Agent then displays an initialization message, similar to the one below, indicating that it is active:

```
Initializing Intel(R) Boot Agent Version X.X.XX
PXE 2.0 Build 083 (WfM 2.0)
```

NOTE...
This display may be hidden by the manufacturer's splash screen. Consult your manufacturer's documentation for details.

Enter the LAN boot BIOS setup with **CTRL**+**ALT**+**S**.



The configuration setup menu shows a list of configuration settings on the left and their corresponding values on the right. Key descriptions near the bottom of the menu indicate how to change values for the configuration settings. For each selected setting, a brief "mini-Help" description of its function appears just above the key descriptions.

1. Highlight the setting you need to change by using the **arrow** keys.
2. Once you have accessed the setting you want to change, press the **spacebar** until the desired value appears.
3. Once you have completed your changes, press **F4** to update the adapter with the new values. Any changed configuration values are applied as the boot process resumes.

The table below provides a list of configuration settings, their possible values, and their detailed descriptions:

Boot Agent Configuration Settings

Configuration Setting	Possible Values	Description
Network Boot Protocol	PXE (Preboot eXecution Environment) RPL (Remote Program Load)	Controls whether the RPL or PXE boot protocol will be used. Select PXE for use with WfM-compatible network management programs, such as LANDesk* Management Suite, Windows* 2000 RIS, and Linux*. Select RPL for legacy-style remote booting, as well as for Novell* Netware* remote boot solutions. ***NOTE…***Depending on the configuration of the Boot Agent, this parameter may not be changeable.
Boot Order	Use BIOS Setup Boot Order Try network first, then local drives Try local drives first, then network Try network only Try local drives only	Sets the boot order in which devices are selected during boot up if the computer does not have its own control method. If your client computer's BIOS supports the BIOS Boot Specification (BBS), or allows PnP-compliant selection of the boot order in the BIOS setup program, then this setting will always be **Use BIOS Setup Boot Order** and cannot be changed. In this case, refer to the BIOS setup manual specific to your client computer to set up boot options. If your client computer does not have a BBS- or PnP-compliant BIOS, you can select any one of the other possible values listed for this setting *except* for **Use BIOS Setup Boot Order**.
Legacy OS Wakeup Support. (For 82559-based adapters only)	0 = Disabled (Default Value) 1 = Enabled	If set to 1, the boot agent will enable PME in the adapter's PCI configuration space during initialization. This allows remote wake-up under legacy operating systems that don't normally support it. ***NOTE…***Enabling this makes the adapter technically non-compliant with the ACPI specification, which is why the default is disabled.

NOTE…
If, during PXE or RPL boot, more than one adapter is installed in a computer and you want to boot from the boot ROM located on a specific adapter, you can do so by removing the adapter from the BIOS Boot Order or disabling the flash by running `IBAUTIL -FlashDisable` on the desired adapter.

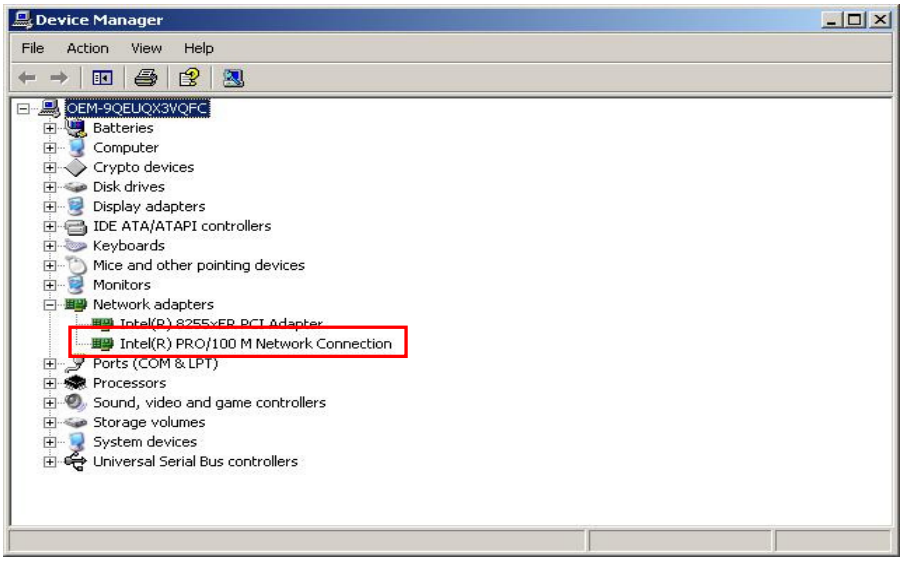
10.1.2. Wake On LAN (WOL)

Please find the WOL tools here: BSP CD LX800-LX900\TOOLS\WAKEONLAN\ .

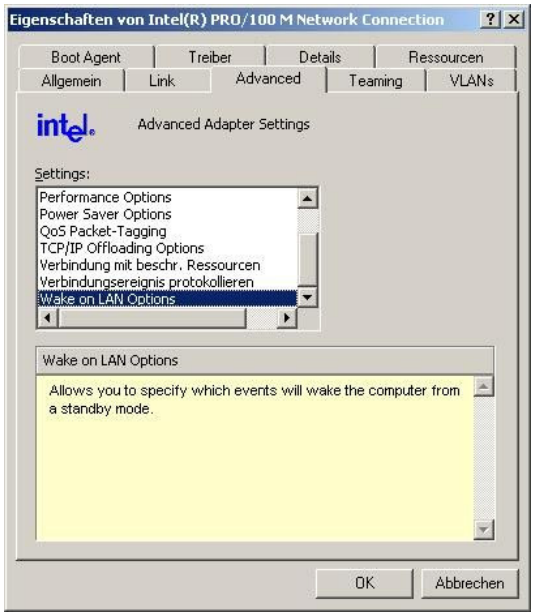
1. **Comments:**
   To awaken a PC in stand-by mode (that means only shut down the Windows OS, then the green LED is blinking) over the network, a so called “Magic Packet” must be sent to the LAN Interface. There are various tools for sending Magic Packets.

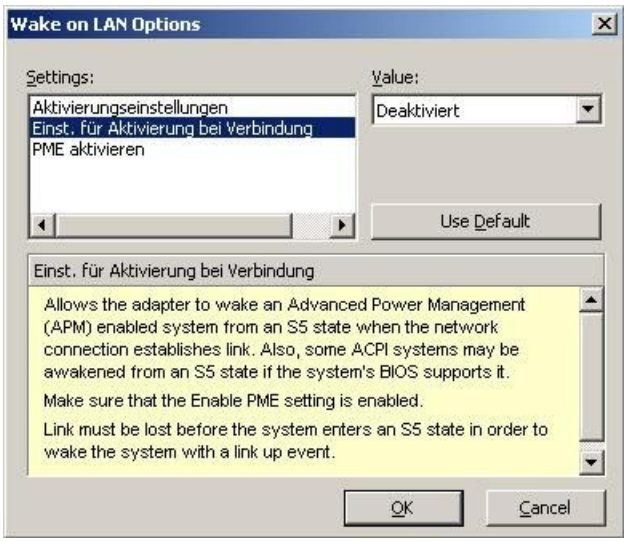
2. **Requirements:**
   - MPC20WOL or MPC21WOL with LAN drivers installed
   - MAC address is known (this can be read out on Windows XP with IPCONFIG / ALL)
   - The host PC has a LAN connection and the WOL.EXE tool (on DIGITAL-LOGIC AG’s Product CD)

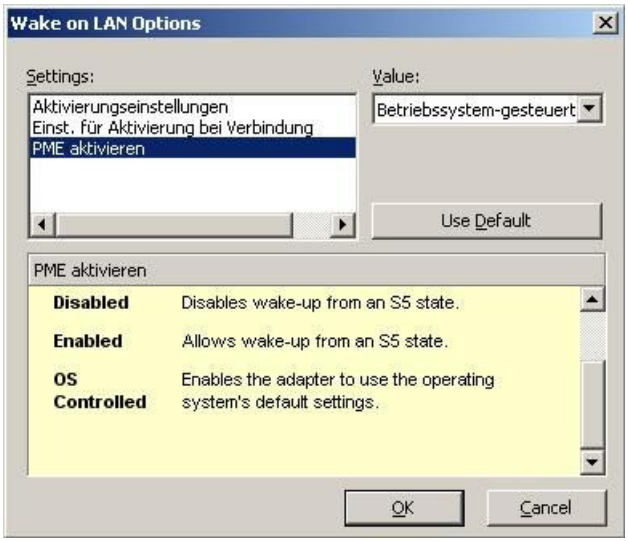
3. **Preparation:**
   In Windows XP, open the Device Manager / Network adapters and then the Properties of the “Intel(R) PRO/100 M Network Connection”.



Under the Power Management tab, select the option “Device can wake up the computer from stand-by” and click “OK”.



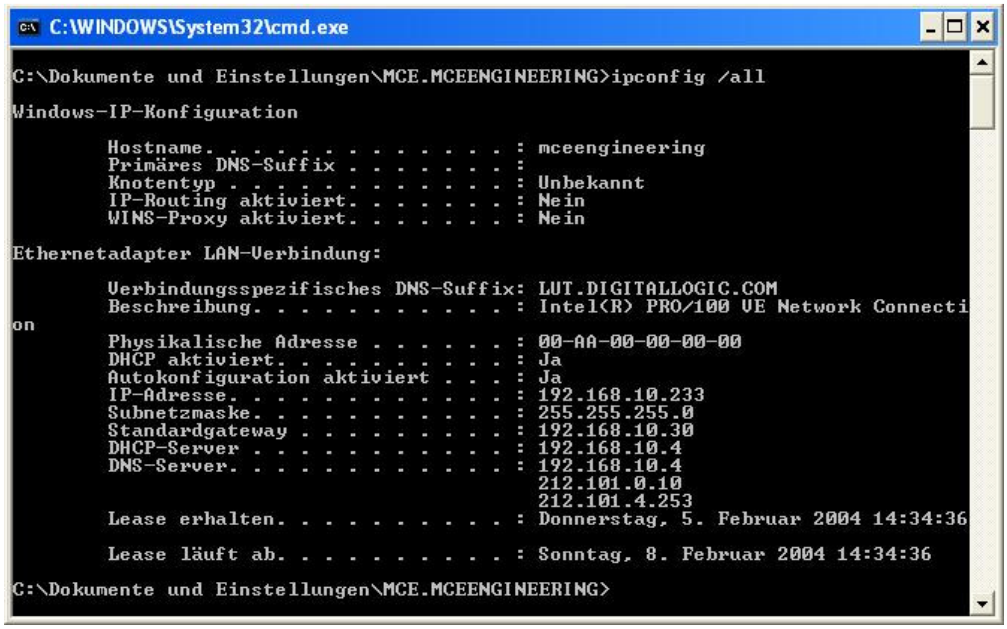




4. **Shutdown:**
   Shutdown the computer with Standby mode

5. **To Wake Up:**
   On the host computer, start the tool “WOL.EXE” and enter the desired MAC address. By clicking on the “Wake On LAN” button, the client computer will be awakened.

Find the MAC address by opening a DOS window (Start ➔ Execute ➔ CMD); enter “ipconfig /all” and note down the MAC address (for example 00 AA 00 00 00 00).

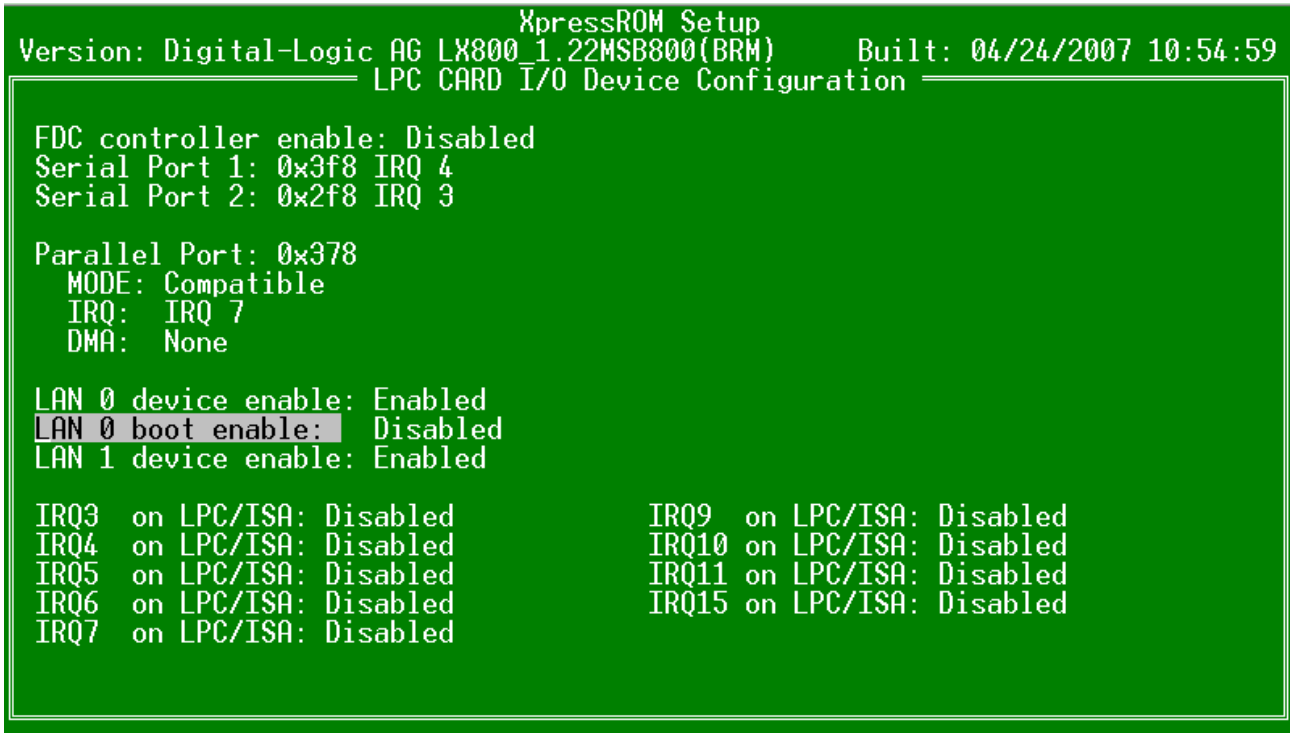


MPC20/20L/21/21C

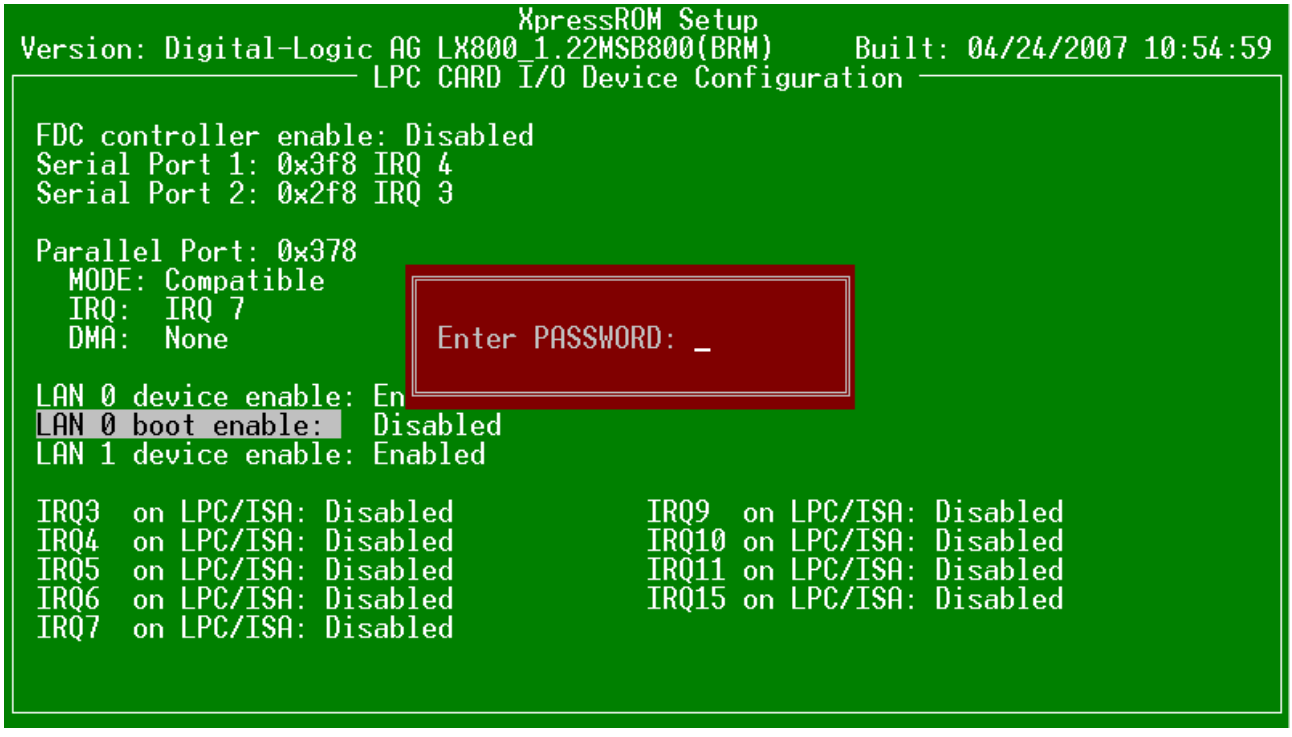
10.1.3. Boot from LAN (PXE)

10.1.3.1. PXE Setup in the BIOS

BIOS Setup Screen with the LAN-BOOT (PXE) DISABLE / ENABLE menu:



After ENABLING the LAN-Boot, the Password must be entered.



The password must be requested with the PXE License Order Form on page 56.

10.1.3.2. PXE Boot and PXE Protocol

PXE is defined on a foundation of industry-standard Internet protocols and services that are widely deployed in the industry, namely TCP/IP, DHCP, and TFTP. These standardize the *form* of the interactions between clients and servers. To ensure that the *meaning* of the client-server interaction is standardized as well, certain vendor option fields in DHCP protocol are used, which are allowed by the DHCP standard. The operations of standard DHCP and/or BOOTP servers (that serve up IP addresses and/or NBPs) will not be disrupted by the use of the extended protocol. Clients and servers that are aware of these extensions will recognize and use this information, and those that do not recognize the extensions will ignore them.

In brief, the PXE protocol operates as follows. The client initiates the protocol by broadcasting a DHCPDISCOVER containing an extension that identifies the request as coming from a client that implements the PXE protocol. Assuming that a DHCP server or a Proxy DHCP server implementing this extended protocol is available, after several intermediate steps, the server sends the client a list of appropriate Boot Servers. The client then discovers a Boot Server of the type selected and receives the name of an executable file on the chosen Boot Server. The client uses TFTP to download the executable from the Boot Server. Finally, the client initiates execution of the downloaded image. At this point, the client's state must meet certain requirements that provide a predictable execution environment for the image. Important aspects of this environment include the availability of certain areas of the client's main memory, and the availability of basic network I/O services.

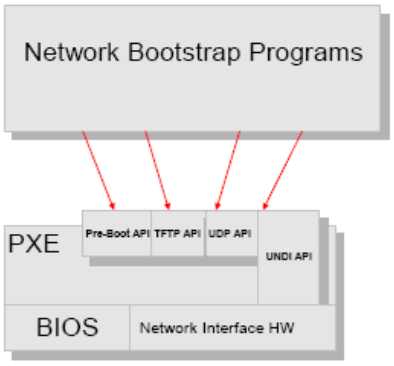
Deployment of servers
On the server end of the client-server interaction there must be available services that are responsible for providing redirection of the client to an appropriate Boot Server. These redirection services may be deployed in two ways:

1. **Combined standard DHCP and redirection services.**
   The DHCP servers that are supplying IP addresses to clients are modified to become, or are replaced by servers that serve up IP addresses for all clients and redirect PXE-enabled clients to Boot Servers as requested.

2. **Separate standard DHCP and redirection services.**
   PXE redirection servers (Proxy DHCP servers) are added to the existing network environment. They respond only to PXE-enabled clients, and provide only redirection to Boot Servers. Each PXE Boot Server must have one or more executables appropriate to the clients that it serves.

Preboot Execution Environment (PXE) Specification 11
Version 2.1 September 20, 1999

This diagram illustrates the relationship between the NBP (the remote boot program) and the PXE APIs.



10.1.4. PXE License Order Form (for MPC20 / MPC20L / MPC21 / MPC21C)

The PXE function ***must be*** licensed before it can be enabled (MPC20 / MPC21 / MPC21C only). To order, fill out and sign this form; return it to the fax number below. This form may be printed out separately from the digital copy of this manual on the Product CD. *The PXE license is not necessary for the MPC20WOL and MPC21WOL.*

NOTE...
Each computer system requires an individual, one-time royalty payment for the PXE-license. After receipt of payment, you will be emailed the password necessary to enable the PXE function (see Section 10.1.3.2).

Customer Information:

Company Name: _____

Your Name: _____

Street Address: _____

ZIP / City: _____

Email: _____

Information for the PXE-License:

Product		Number of Licenses	DLAG Part Nr. 809108
MPC20	☐	_____	
MPC21/C	☐	_____	
Price per license:	17 Euro		Contact your Sales Manager for more information, price in USD/CHF, or if you have any questions.

Date: _____ Signature: _____
dd / mm / yyyy

Fax this form to your DIGITAL-LOGIC Sales Manager:

_____
(please write in his/her name)

Fax: +0041 32 681 58 01

10.1.4.1. PXE Boot from LAN, BootManager License Agreement

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