DIGITAL-LOGIC

smart embedded computers

TECHNICAL USER'S MANUAL FOR:

MICROSPACE®

PC/104 PERIPHERAL BOARD

MSMM104

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REVISION HISTORY:

Prod.-Serialnumber: From: To:	Product Version	Document Version	Date/Vis:	Modification: Remarks, News, Attention:
	V1.1	V1.0	05.97	Initial Version
	V1.1	V1.1	01.00 STP	Jumper description added
	V2.0	**V1.2**	**04.2000 STP**	**New board, new sound chip**
	V2.1a	**V1.3**	**12.2000 STP**	**New board**

Product Registration:

Please register your product at:

http://www.digitallogic.com -> SUPPORT -> Product Registration

After registration, you will receive driver & software updates, errata information, customer information and news from DIGITAL-LOGIC AG products automatically.

Table of Contents

1   PREFACE

This manual is for integrators and programmers of systems based on the MicroSpace card family. It contains information on hardware requirements, interconnections, and details of how to program the system. The specifications given in this manual were correct at the time of printing; advances mean that some may have changed in the meantime. If errors are found, please notify DIGITAL-LOGIC AG at the address shown on the title page of this document, and we will correct them as soon as possible.

1.1   How to use this manual

This manual is written for the original equipment manufacturer (OEM) who plans to build computer systems based on the single board MicroSpace-PC. It provides instructions for installing and con-figuring the MSMM104 board, and describes the system and setup requirements.

1.2   Trademarks

Chips & Technologies	SuperState R
MicroSpace, MicroModule	DIGITAL-LOGIC AG
DOS Vx.y, Windows	Microsoft Inc.
PC-AT, PC-XT	IBM
NetWare	Novell Corporation
Ethernet	Xerox Corporation
DR-DOS, PALMDOS	Digital Research Inc. / Novell Inc.
ROM-DOS	Datalight Inc.

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1.4   Who should use this product

- Electronic engineers with know-how in PC-technology.
- Without electronic know-how we expect you to have questions. This manual assumes, that you have a general knowledge of PC-electronics.
- Because of the complexity and the variability of PC-technology, we can't give any warranty that the product will work in any particular situation or combination. Our technical support will help you to may find a solution.
- Pay attention to the electrostatic discharges. Use a CMOS protected workplace.
- Power supply OFF when you are working on the board or connecting any cables or devices.

This is a high technology product.
You need know-how in electronics and PC-technology to install the system !

1.5   Recycling Information

Hardware:

- Print:	epoxy with glass fiber
	wires are of tin-plated copper
- Components:	ceramics and alloys of gold, silver
	check your local electronic recycling

Software:

- no problems:	re-use the diskette after formatting

1.6   Technical Support

DIGITAL-LOGIC AG
smartModule DesignIn Center
Nordstr. 11/F
CH-4542 Luterbach (SWITZERLAND)
Fax: ++41 32 681 58 01
E-Mail: support@digitallogic.com
Internet   www.digitallogic.com

Support request form (fill in and send via fax to DIGITAL-LOGIC AG support center):

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2   OVERVIEW

2.1   Ordering Information

MSMM104	Base Board

2.2   General Information

BUS:	
Standard:	PC/104
Size:	8 Bit databus, 16Bit only for IRQs

Power Supply:	
Power: V1.0	Working: 5V / 1W
Power: V2.0	5V / max 3W
Power: V2.1	5V / max 3W

Physical Characteristics:	
Dimensions:	Length: 90mm
	Width: 96mm
	Height: 15mm

Operating Environment:			
Relative humidity:	5 - 90% non condensing		
Vibration:	5 to 2000 Hz		
Shock:	10g		
Temperature:	Operating:	Standard version:	-25°C to +70°C
		Industry version:	-25°C to +85°C (ask DIGITAL-LOGIC AG)
	Storage:	-55°C to +85°C	

2.3   Features of the Soundboard, V2.0 and V2.1

Features:

- ESS1869 is compatible with:
  SoundBlaster and SoundBlaster Pro
  Microsoft-Windows Sound System
  Meets PC97/PC98 and WHQL specifications
- 3D Stereo Enhancement
- Digital mixer
- Game Port
- Ext. volume up/down
- Programmable IRQs, DRQs and I/O addresses
- Supports 16 Bit type F DMA playback
- LM4831 stereo 1W amplifier onboard
- Optional crystal 14MHz and EEPROM assembling possibilities

Any information is subject to change without notice.

2.4   Features of the Soundboard, V1.0

Features:

- AD1816 is compatible with: SoundBlasterPro 8 Bit, AD-Lib, MicroSoft-Windows Sound System
- OPL3 Synthesizer built in
- 3D Stereo Enhancement
- Digital mixer
- Game Port
- Ext. volume up/down; bass boost
- Programmable IRQs, DRQs and I/O addresses
- Supports 16 Bit type F DMA playback
- LM388 stereo 1W amplifier onboard

Any information is subject to change without notice.

2.5 Related Application Notes

#	Description
079	Soundcontroller with the ELAN400

➔ *Application Notes are availble at http://www.digitallogic.com ->support, or on any Application CD from DIGITAL-LOGIC.*
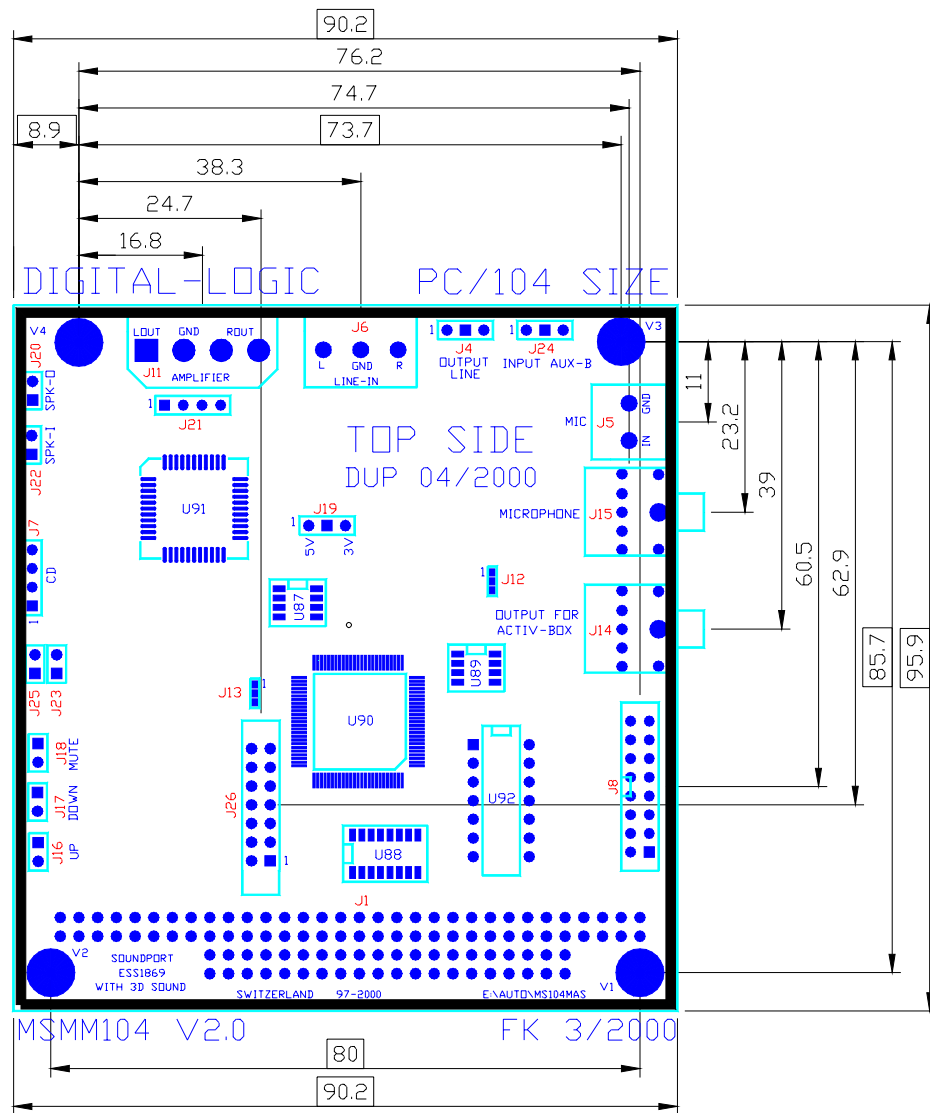
3 MECHANICAL DIMENSIONS

3.1 Boardversion V2.1a
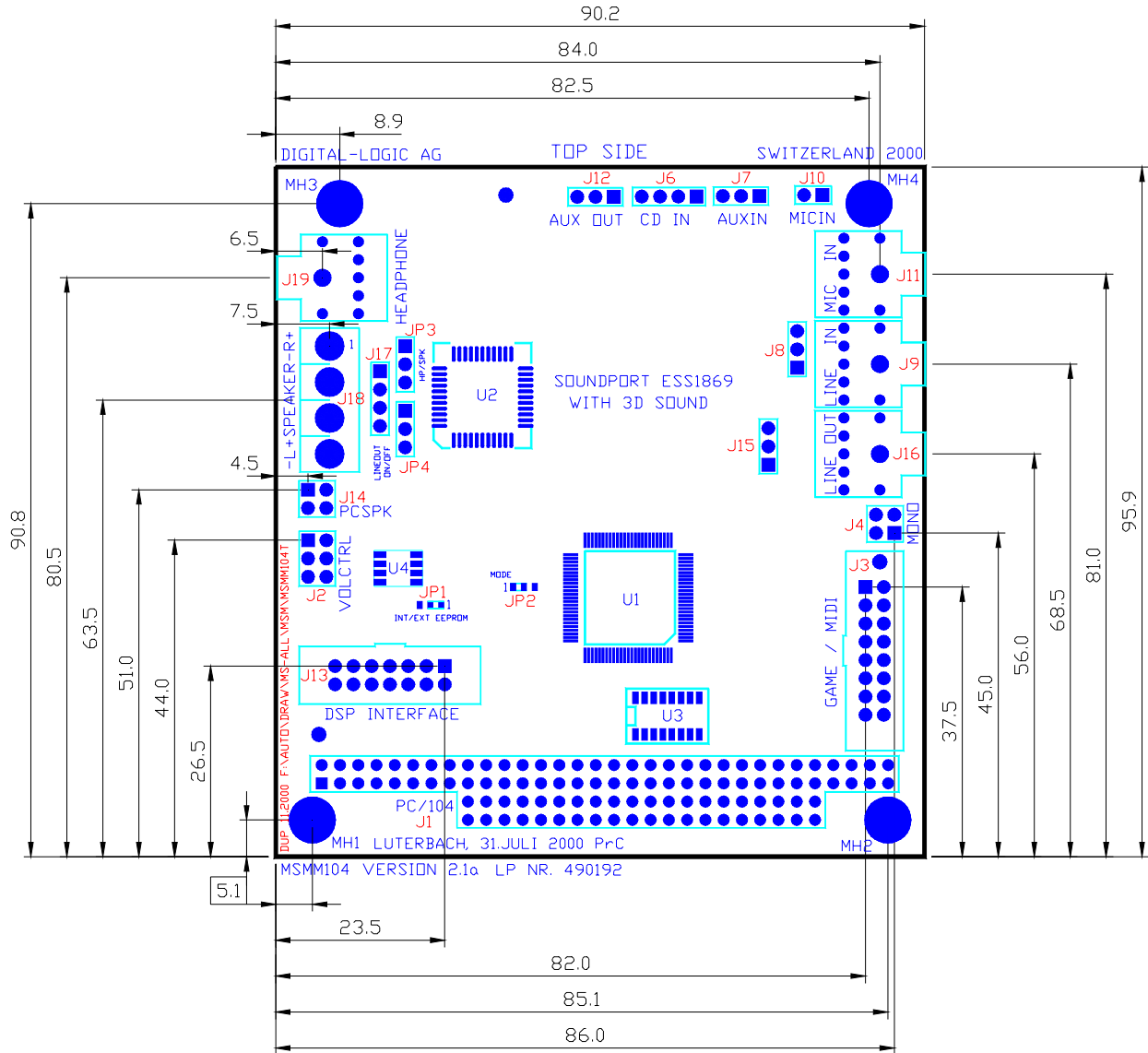
3.2 Boardversion V2.0

4   PC/104 BUS SIGNALS

AEN, output
Address Enable is used to degate the microprocessor and other devices from the I/O channel to allow DMA transfers to take place. **low = CPU Cycle , high = DMA Cycle**

BALE, output
not used.

/DACK[0 , 1 , 3], output
DMA Acknowledge 0 to 3 are used to acknowledge DMA requests (DRQO through DRQ3). They are **active low**. This signal indicates that the DMA operation can begin.

DRQ[0 , 1 , 3], input
DMA Requests 0 through 3 are asynchronous channel requests used by peripheral devices and the I/O channel microprocessors to gain DMA service (or control of the system). A request is generated by bringing a DRQ line to an active level. A DRQ line must be held high until the corresponding DMA Request Acknowledge (DACK/) line goes active. DRQO through DRQ3 will perform 8-Bit DMA transfers;

/IOCHCK, input
not used.

IOCHRDY, input
I/O Channel Ready is pulled low (not ready) by a memory or I/O device to lengthen I/O or memory cycles. Any slow device using this line should drive it low immediately upon detecting its valid address and a Read or Write command. Machine cycles are extended by an integral number of one clock cycle (67 nanoseconds). This signal should be held low for no more than 2.5 microseconds. **low = wait, high = normal operation**

/IOCS16, input
not used.

/IOR, input/output
I/O Read instructs an I/O device to drive its data onto the data bus. It may be driven by the system microprocessor or DMA controller, or by a microprocessor or DMA controller resident on the I/O channel. this signal is **active low**.

/IOW, input/output
I/O Write instructs an I/O device to read the data on the data bus. It may be driven by any microprocessor or DMA controller in the system. This signal is **active low**.

IRQ[4, 5, 7, 9, 11 , 15], input
These signals are used to tell the microprocessor that an I/O device needs attention. An interrupt request is generated when an IRQ line is **raised from low to high**. The line must be held high until the microprocessor acknowledges the interrupt request.

/Master, input
not used.

/MEMCS16, input
not used.

/MEMR input/output
not used.

/MEMW, input/output

not used.

OSC, output
not used.

RESETDRV, output
Reset Drive is used to reset or initiate system logic at power-up time or during a low line-voltage outage. This signal is active high. When the signal is active all adapters should turn off or tri-state all drivers connected to the I/O channel. This signal is driven by the permanent Master.

/REFRESH, input/output
not used.

SAO-SA19, LA17 - LA23 input/output
Address bits 0 through 19 are used to address memory and I/0 devices within the system. These 20 address lines, allow access of up to 1MBytes of memory.

/SBHE, input/output
not used.

SD[0..7], input/output
These signals provide bus bits 0 through 7 for the microprocessor, memory, and I/0 devices.

/SMEMR input/output
not used.

/SMEMW, input/output
not used.

SYSCLK, output
not used.

TC output
not used.

/OWS, input
not used.

12V   +/- 5%
not used.

GROUND = 0V
used for the entire system.

VCC, +5V +/- 0.25V
 for logic

5   INSTALLING THE MSMM104 SOUNDCARD

5.1   Check the hardware and system requirements

Make sure, that the PC you plan to use with a MSMM104 meets the minimum system requirements. The basic requirements to run the peripheral board are:

- Any 386 CPU board but only in DOS- mode.
  ELAN300/400 are not supported in Windows mode with the generic drivers
- 5X86, DX or Pentium compatible for WINxx
- At least 2MB RAM (4MB RAM for WIN 3.1 Apps. or 8MB RAM for WIN95)
- VGA or SVGA graphics adapter or monitor
- 2 MB free harddisk space
- External speakers, microphone or headphones
- Installed MSDOS, WIN3.11, OS2, WIN95/98 or WIN NT4.0

5.2   Installing the board

The next steps to install the board into your computer:

1. Power off the system
2. Stack the MSMM104 board onto the PC/104 CPU BUS
3. Use plastic bolts and screws to mount the board
4. Ensure that the PC/104 bus is 16Bit, that means that all 104pin must be contacted
5. Connect all peripheral components (speakers, headphones, microphone, CD-player)
6. Restart the computer and check, if the system boots up correctly
7. If IRQ corruptions occure, reserve the IRQ in the BIOS setup

6   SOFTWARE DRIVER INSTALLATION

To download the latest chip producer drivers, go to:

http://www.esstech.com or http://www.analog.com or http://www.digitallogic.ch

6.1 BOARDVERSION V2.0 / V2.1

6.1.1 DOS Driver

ESSCFG.EXE allows the user to configure the ESS sound chip with a base address, a DMA chanel, an IRQ channel, and an address for the MPU-401 port, if a wavetable is supported by the sound card.

ESSVOL.EXE allows the user to configure the output volume level of the mixer in the sound chip.

Type
ESSCFG.exe [Enter]
to run the program or
ESSCFG.EXE /? [Enter]
for help.

Type
ESSVOL.EXE [Enter]
to run the program or
ESSVOL.EXE /? [Enter]
for help.

Typical parameters are:
address : 220
DMA   : 1
IRQ   : 5
MPU-401 : 330

Example for a ELAN300/400 based board:

1) Run **esscfg.exe** and use the following settings:

    IRQ   = 7
    DMA   = 1
    2nd DMA   = 0
    Adr.   = 220

2) All other   = disabled

3) Reboot the system

4) Add a VESA driver (**vesa.com**) to the **autoexec.bat**
    (Necessary when using the shareware "SUPERSONIC" and if grafic controller is set to Vesa LocalBus)

5) Add the DMA mapping tool (**PDMA0TO0.exe**) to the **autoexec.bat**
    (FLOPPY does not work anymore until a cold boot and disabled tool).
    Not necessary on CPU's with enough available DMA's, read also application note 079

6) Install des program SUPERSONIC with **install.exe** and configure the devices afterwards with the **setup.exe**
(When using the SBPRO driver, one can also record)

7) Add a mouse driver in the **autoexec.bat** if SUPERSONIC does not detect any

<u>**EXAMPLES:**</u>

AUTOEXEC.BAT

C:\SOUND\ESSCFG.EXE /A:220 /I:7 /D:1 /E:0 /B:D /J:E
@ECHO OFF
PROMPT pg
PATH C:\DOS;c:\ss;c:\sound;
SET TEMP=C:\DOS
MODE CON CODEPAGE PREPARE=((850) C:\DOS\EGA.CPI)
MODE CON CODEPAGE SELECT=850
KEYB SG,,C:\DOS\KEYBOARD.SYS
vesa.com
c:\sound\pdma0to0.exe
lmouse.com

CONFIG.SYS

DEVICE=C:\DOS\SETVER.EXE
DEVICE=C:\DOS\HIMEM.SYS /testmem:off
DOS=HIGH
COUNTRY=041,,C:\DOS\COUNTRY.SYS
DEVICE=C:\DOS\DISPLAY.SYS CON=(EGA,,1)
FILES=30
rem DEVICE=C:\SOUND\ES1868.COM /A:0 /I:0

6.1.2 WIN311, OS2, WIN95, WIN98, WIN NT

For all the other operating systems (OS), please run the setup program to install the appropriate drivers, if not already recognized by the OS.

Note, that depending on the BIOS, one has might to reserve certain IRQ's to avoid corruptions with other devices.

6.1.3 Frequency response
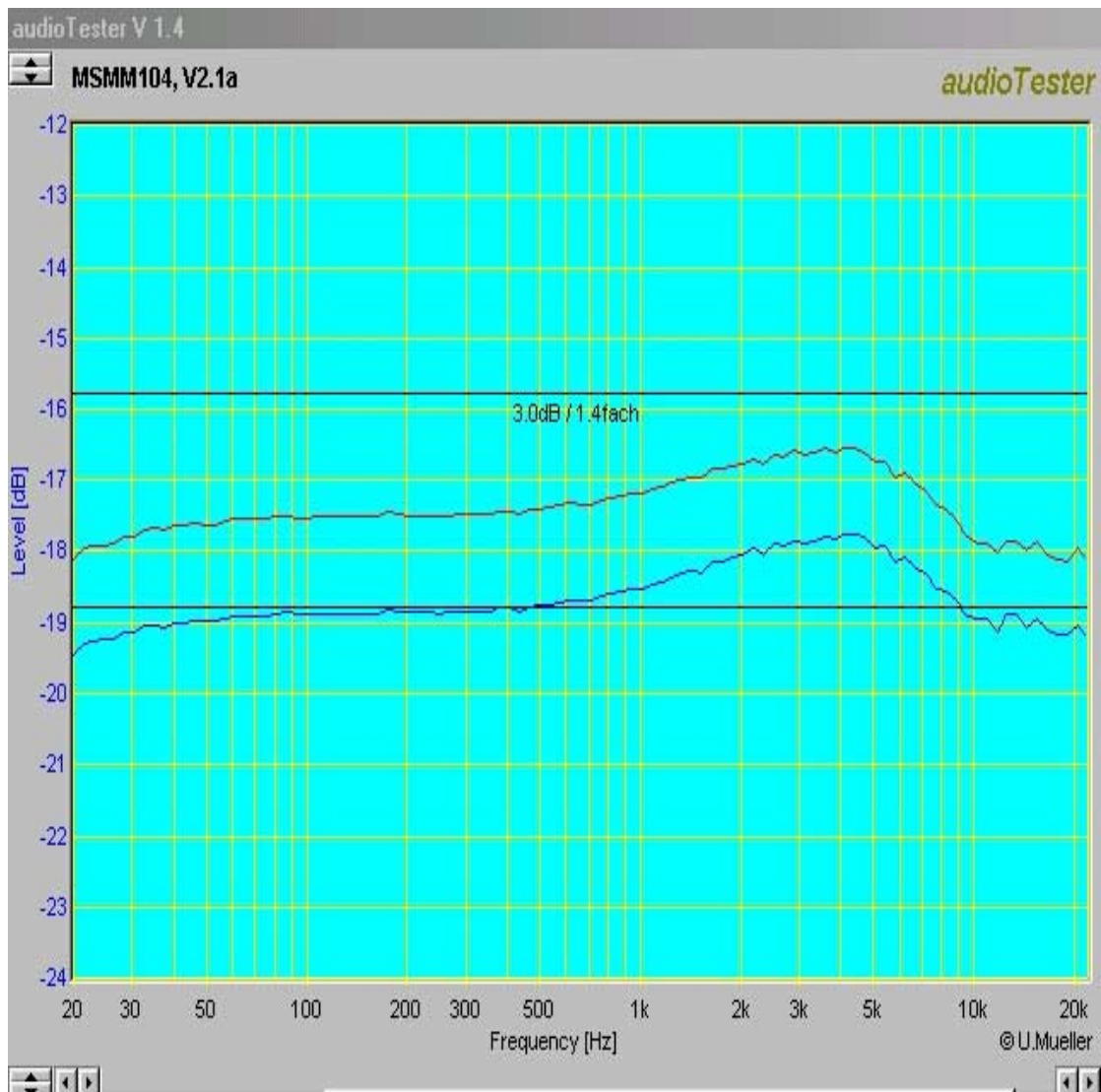
- Picture has been taken with an audio testsoftware.
  Line OUT is connected to the Line IN and oscillator has been created by the software.
- Red is Right Channel
- Blue is Left Channel
- The ±1.5dB window is for the Right Channel

6.2 BOARDVERSION V1.0

6.2.1 Driver for WIN 3.11

Insert the DRIVER DISK FOR WIN3.1, after starting windows V3.1. Run „SETUP.EXE" on the driver floppydisk A:. Choose „INSTALL" for all the files to be loaded and system files to be modified. The setup utility allows a different directory to be choosen other than default „ C:\ADISOUND" for copying. Select „CONTINUE" to begin copying the files from the disk. After the setup has completed type „EXIT", restart Windows. You may configure the device before restarting Windows by choosing „CONFIG". This „AD1816 I/O Configuration" allows the user to configure the device to something other than default.

After exiting setup, other configuration changes must be made using the program item drivers under AD1816 Control Panel !

In the Control Panel for the AD1816 the following setting may be made:

Windows Sound System:
Base Port: Address 530 - 53fh
IRQ   IRQ5
DMA Play   DMA 01
DMA Rec.   DMA 00

MPU401:
Base Port: Address 330-331h
IRQ: IRQ9

Sound Blaster System:
Base Port: 220-22fh

Others:
OPL3 Port: 388h-388h
Game Port: 201h-201h   (not free on MSM-P5!)

After exiting setup and restarting Windows V3.1 the drivers will be loaded. If there is an I/O, DMA or IRQ conflict between the audio drivers and other devices in the system, use the Willow Pond Universal SoundComm Driver setup to change any setting, it is located in „drivers" under Control Panel. The MPU-401 I/O address and IRQ settings are located in the Roland MPU-401 driver.

6.2.2 Driver for WIN 95

After installing the MSMM104 card, Win95 will recognize the new hardware by displaying a dialog box „New Hardware Found AD1816". Insert DRIVER DISK WIN95 into the floppydisk A:. Select the option „Driver from disk provided by hardware manufacturer", and hit ENTER. In the next windows select the default driver and hit OK. Select the default driver also for the GAMEPORT. The DRIVER DISK WIN95 must be in the floppy drive and the correct drivers are loaded. Remove the disk and restart the system when prompted. Your soundcard is now active.

6.2.3 Driver for NT4.0

After installing the MSMM104 card, NT will recognize the new hardware by displaying a dialog box saying „New Hardware Found AD1816". Insert DRIVER DISK NT4.0 into the floppydisk A:. Select the option „Driver from disk provided by hardware manufacturer", and hit ENTER. On the next windows select the default driver and hit OK. Select the default driver also for the GAMEPORT. The DRIVER DISK NT must be in the floppy drive and the correct drivers are loaded. Remove the disk and restart the system when prompted. Your soundcard is now active.

6.2.4 Bundled Applications, MediaRack

Insert the Disk witch contains all the bundled and optional applications.
Run a:\setup.exe (for Win 3.11, Win95, NT4.0).
The installer will create a program group called „bundled applications" and „optional applications".

Included applications:

- MEDIA RACK
- MEDIA LAUNCHER
- WAVE SHAPER
- DOC TALKER TTS and NOTE TALKER TTS
- KARAOKE PRODUCER
- PRESTO ARRANGER

7   CONNECTORS

7.1   The connectors of the MSMM104, V2.1a

Connector	Texture	Pin	Remarks
J03	GAMEPORT/MIDI	2x8	2.54mm
J04	MONO IN/OUT	2X2	2.54mm
J06	CD IN	4	2.54mm
J07	AUX B IN	3	2.54mm
J08	LINE IN	3	2.54mm
J09	LINE IN	3	JACK Ø3.5
J10	MIC	2	2.54mm
J11	MIC	3	JACK Ø3.5
J12	AUX OUT	3	JACK Ø3.5
J13	DSP INTERFACE (not assembled)	2x7	2.54mm
J14	PC- SPEAKER IN/OUT	2X2	2.54mm
J15	LINE OUT	3	2mm
J16	LINE OUT	3	JACK Ø3.5
J17	SPEAKER	4	2.54mm
J18	SPEAKER	4	SOLDER
J19	HEADPHONES	3	JACK Ø3.5

J1   PC/104 BUS Interface

Pin	A:	B:	C:	D:
0			Ground	Ground
1	IOCHCK	Ground		
2	SD7	RESET		
3	SD6	+5V		IRQ10
4	SD5	IRQ9		IRQ11
5	SD4			IRQ12
6	SD3			IRQ15
7	SD2			
8	SD1			DACK0-
9	SD0	+12V		DRQ0
10				DACK5-
11	AEN			NCDRQ5
12				
13		SIOW		
14		SIOR		
15		DACK3-		
16	SA15	DRQ3		
17	SA14	DACK1-		
18	SA13	DRQ1		Ground
19	SA12		Ground	Ground
20	SA11			
21	SA10	IRQ7		
22	SA9			
23	SA8	IRQ5		
24	SA7	IRQ4		
25	SA6	IRQ3		
26	SA5			
27	SA4			
28	SA3			
29	SA2	+5 Volt		
30	SA1	OSC		
31	SA0	Ground		
32	Ground	Ground		

J8 / J9   LINE IN connector

Pin	Signal Name		
1	L		
2	AGND		
3	R		

(Impedance ~125kΩ)

J10   MICROPHONE connector

Pin	Signal Name		
1	AUDIO	13kΩ to 5V included	
2	AGND		

(Impedance > ~125kΩ)

As the connector J11 has the signals pulled to GND when microphone is not used, the connector J11 can only be used, when there is a dummy pluged in into J10 or the J10 is removed from the board.

J11   MICROPHONE connector

Pin	Signal Name		
1	AUDIO	13kΩ to 5V included	
2	AGND		
3	NC		

(Impedance > ~125kΩ)

As the connector J11 has the signals pulled to GND when microphone is not used, the connector J11 can only be used, when there is a dummy pluged in into J10 or the J10 is removed from the board.

J14   PC-SPEAKER IN / OUT connector, software controlled

Pin	Signal Name	Signal Name	Pin
1	SPEAKER IN	GND	2
3	SPEAKER OUT	GND	4

J15 / J16   LINE OUT connector

Pin	Signal Name		
1	L		
2	AGND		
3	R		

(Impedance ~10kΩ)

J6   CD IN connector

Pin	Signal Name		
1	L		
2	AGND		
3	AGND		
4	R		

(Impedance ~125kΩ)

J3   MIDI / GAME connector

Pin	Signal Name		
1	Vcc		
2	GPA1		
3	GPAX		
4	GND		
5	GND		
6	GPAY		
7	GPA2		
8	Vcc		
9	Vcc		
10	GPB1		
11	GPBX		
12	MIDI OUT		
13	GPBY		
14	GPB2		
15	MIDI IN		
16	NC		

J17 / J18   Loudspeaker connector

Pin	Signal Name		
1	L-		
2	L+		
3	R-		
4	R+		

(1.5W at 4Ω, 1.1W at 8Ω)

J2   VOLUME UP / DOWN / MUT connector

Pin	Signal Name	Signal Name	Pin
1	VOLUME DOWN	GND	2
3	VOLUME UP	GND	4
5	MUTE	GND	6

J4   MONO IN / OUT connector, software controlled

Pin	Signal Name		
1	MONO IN	GND	2
3	MONO OUT	GND	4

(Impedance ~5kΩ, R to 2.25Vpp)

J24   AUX B IN connector

Pin	Signal Name		
1	AUDIO L		
2	GND		
3	AUDIO R		

(Impedance ~125kΩ)

J26   external GPO0 connector

Pin	Signal Name		
1	Vcc		
2	GPO0		
3	SENA		
4	DX		
5	DR		
6	FSR		
7	MMIEB		
8	MMCSB		
9	MMIRQ		
10	MSD		
11	MCLK		
12	FSX		
13	DCLK		
14	GND		

7.2 Jumperdescription

Jumper	Texture	1-2 = open	2-3 = closed
JP1	EEPROM configuration	1-2 = ext. EEPROM	**2-3 = internal ROM**
JP2	J14 mode select	1-2 = PC- speaker	**2-3 = modem**
JP3	J17/18/19 mode select J16	1-2 = headphones / LINE OUT mute	**2-3 = speaker / LINE OUT normal**
JP4	J17/18/19 mode select J16	1-2 = headphones / LINE OUT normal	**2-3 = speaker / LINE OUT mute**

Settings written in bold are defaults and shall might not be changed !

Remarks:

JP2 (MODE):

1-2 = HIGH:
- J14(pin1) PCSPKI
  Normally low digital PC speaker input. This signal is converted to an analog signal with volume control and appears on analog output PCSPKO, J14(pin3).

- J14(pin3) PCSPKO
  Modem interrupt enable active-low input. Generated from the modem UART.

2-3 = LOW:
- J14(pin1) MMIRQ
  Modem interrupt request active-high input. IRQ input from the modem device gets mapped to an IRQ output on the ES1869 based on the PnP configuration.

- J14(pin3) MMIEB
  PC speaker analog output.

JP3 (HP-IN):
This pin places the output power amplifier in "headphone" mode.
If **HP-IN is low**, the amplifier is in bridged mode and the 2:1 mux passes the input on the EQ_IN pin.
If **HP-IN is high**, the amplifier is in single-ended mode and the 2:1 mux passes the output of the mixing stage. Single-ended mode places the non-inverting amplifier in the output amplifiers into a high impedance state.
HP-IN also has priority over the DS-IN pin, so if HP-IN and DS-IN are both high, the device is in single-ended mode and the stereo line out amplifier is in a high-impedance state.

JP4 (DS-IN):
This pin is used to put the LM4831 into "docking-station" mode and control the line out drivers and the state of the internal 2:1 analog multiplexer.
If **DS-IN is high**, the stereo line out amplifier is on and the stereo bridged amplifier is in a high impedance state.
Asserting the DS-IN pin also changes the 2:1 analog multiplexer output from the stereo signal on the L_EQIN and R_EQIN pins to the internal path from the stereo input mixer.

- There will might be a IRQ10 and DMA reserved by the soundchip when being in **MODEM MODE**.
  This IRQ will not be free for other applications, like LAN, etc.
- By using the **HEADPHONES MODE**, the generic sound driver will not work properly.
- Microphone level increases when having JP4 (1-2) and JP3 (2-3) or JP3 (1-2) and JP4 (xx)

7.3 Jumperlocation

DIGITAL-LOGIC AG   TOP SIDE   SWITZERLAND 2000

MSMM104 VERSION 2.1a LP NR. 490192
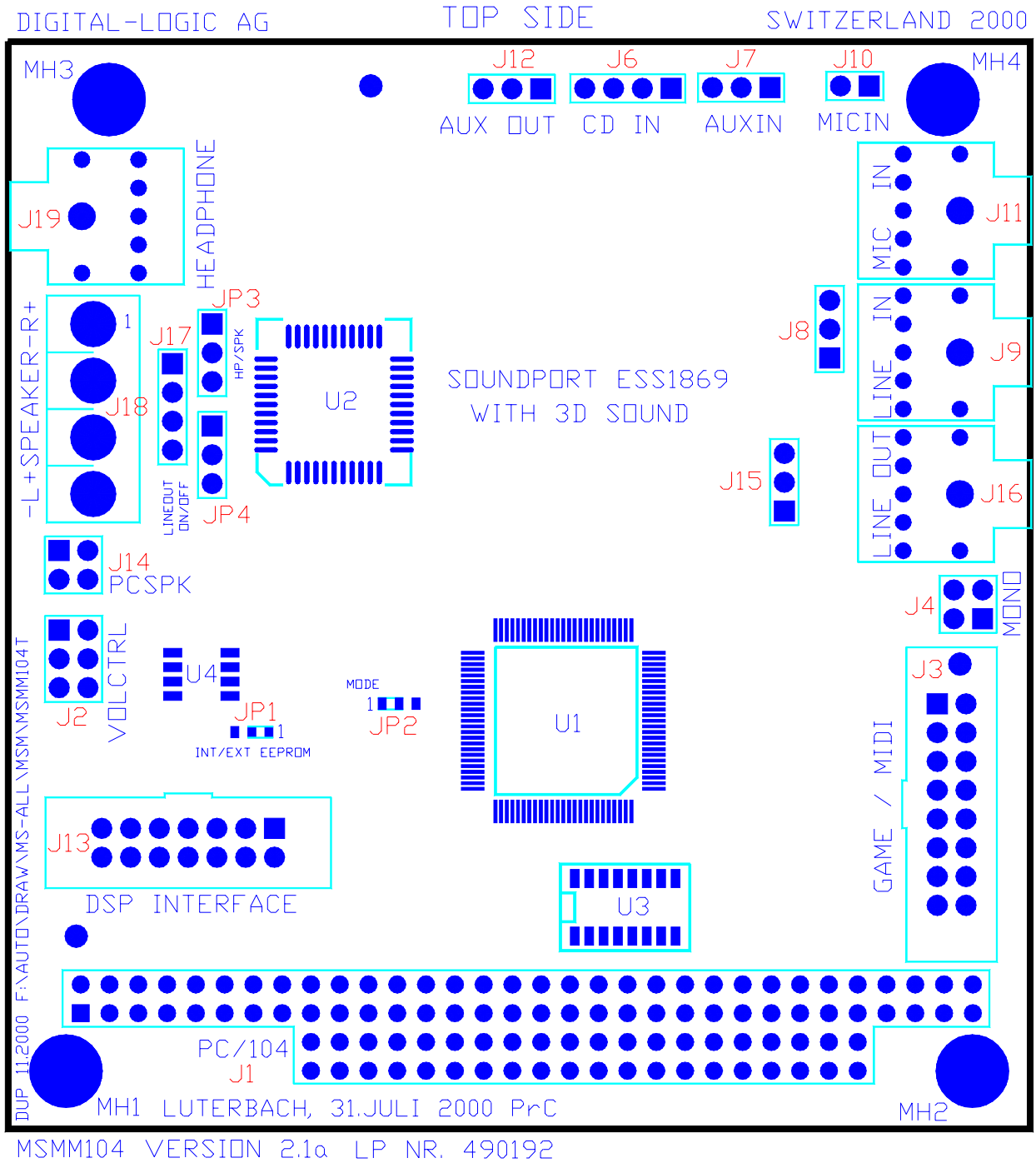
7.4   The connectors of the MSMM104, V2.0

J01	PC104 BUS
J04	LINE IN
J05	MIC
J06	LINE OUT (not used)
J07	CD IN
J08	MIDI/GAME
J11	LS solderpoints
J14	LINE OUT STEREO JACK
J15	MIC STEREO JACK
J16	VOLUME UP
J17	VOLUME DOWN
J18	AUDIO MUTE
J20	PC SPEAKER OUT (modem)
J21	LS
J22	MONO OUT
J23	MONO IN
J24	AUX IN
J25	PC SPEAKER IN (modem)
J26	external GPO0

J1   PC/104 BUS Interface

Pin	A:	B:	C:	D:
0			Ground	Ground
1	IOCHCK	Ground		
2	SD7	RESET		
3	SD6	+5V		IRQ10
4	SD5	IRQ9		IRQ11
5	SD4			IRQ12
6	SD3			IRQ15
7	SD2			
8	SD1			DACK0-
9	SD0	+12V		DRQ0
10				DACK5-
11	AEN			NCDRQ5
12				
13		SIOW		
14		SIOR		
15		DACK3-		
16	SA15	DRQ3		
17	SA14	DACK1-		
18	SA13	DRQ1		Ground
19	SA12		Ground	Ground
20	SA11			
21	SA10	IRQ7		
22	SA9			
23	SA8	IRQ5		
24	SA7	IRQ4		
25	SA6	IRQ3		
26	SA5			
27	SA4			
28	SA3			
29	SA2	+5 Volt		
30	SA1	OSC		
31	SA0	Ground		
32	Ground	Ground		

J4   LINE IN connector, RM2.54mm

Pin	Signal Name		
1	L		
2	AGND		
3	R		

(Impedance ~125kΩ)

J5   MICROPHONE connector, screws

Pin	Signal Name		
1	AUDIO	1kΩ to 3.3V included	
2	AGND		

(Impedance > ~1kΩ)

J6   LINE OUT connector, screws (not enabled)

Pin	Signal Name		
1	L		
2	AGND		
3	AGND		

(Impedance ~10kΩ)

J7   CD IN connector, 2.54mm

Pin	Signal Name		
1	L		
2	AGND		
3	AGND		
4	R		

(Impedance ~125kΩ)

J8   MIDI / GAME connector, 2x8 RM2.54mm

Pin	Signal Name		
1	Vcc		
2	GPA1		
3	GPAX		
4	GND		
5	GND		
6	GPAY		
7	GPA2		
8	Vcc		
9	Vcc		
10	GPB1		
11	GPBX		
12	MIDI OUT		
13	GPBY		
14	GPB2		
15	MIDI IN		
16	NC		

J11   Loudspeaker amplified connector, solderpoints

Pin	Signal Name		
1	R-		
2	R+		
3	L-		
4	L+		

(1.5W at 4Ω, 1.1W at 8Ω)

J14   LINE OUT connector, 3.5mm stereo jack

Pin	Signal Name		
1	L		
2	R		
3	AGND		

(Impedance ~10kΩ, max 1Vpp)

J15   MICROPHONE MONO connector, 3.5mm stereo jack

Pin	Signal Name		
1	AUDIO	1kΩ to 3.3V included	
2			
3	AGND		

(Impedance > ~1kΩ)

J16   VOLUME UP connector, RM2.54mm

Pin	Signal Name		
1	AUDI		
2	GND		

J17   VOLUME DOWN connector, RM2.54mm

Pin	Signal Name		
1	AUDO		
2	GND		

J18   AUDIO MUTE connector, RM2.54mm

Pin	Signal Name		
1	AUSK		
2	GND		

J21   Loudspeaker amplified connector, RM2.54mm

Pin	Signal Name		
1	R-		
2	R+		
3	L-		
4	L+		

(1.5W at 4Ω, 1.1W at 8Ω)

J22   MONO OUT connector, RM2.54mm

Pin	Signal Name		
1	AUDIO		
2	AGND		

(Impedance ~5kΩ)

J23   MONO IN connector, RM2.54mm

Pin	Signal Name		
1	AUDIO		
2	AGND		

J24   AUX connector, RM2.54mm

Pin	Signal Name		
1	AUDIO L		
2	GND		
3	AUDIO R		

(Impedance ~125kΩ)

J25   PC SPEAKER IN connector, RM2.54mm

Pin	Signal Name		
1	AUDIO		
2	GND		

J26   external GPO0 connector, 2x7 RM2.54mm

Pin	Signal Name		
1	Vcc		
2	GPO0		
3	SENA		
4	DX		
5	DR		
6	FSR		
7	MMIEB		
8	MMCSB		
9	MMIRQ		
10	MSD		
11	MCLK		
12	FSX		
13	DCLK		
14	GND		

7.4.1 Jumper location

RM2.54mm Jumpers on the front side

		1-2 = open	**2-3 = closed**
J19	Sound chip supply	**5 V**	3.3V

Jumpers on the front side, solder jumpers

		1-2 = open	**2-3 = closed**
J12	EEPROM configuration	1-2 = ext. EEPROM	**2-3 = internal ROM**
J13	J22 / J23 mode select	1-2 = modem	**2-3 = PC- speaker**

7.4.2 The part schematics of the MSMM104, V2.0
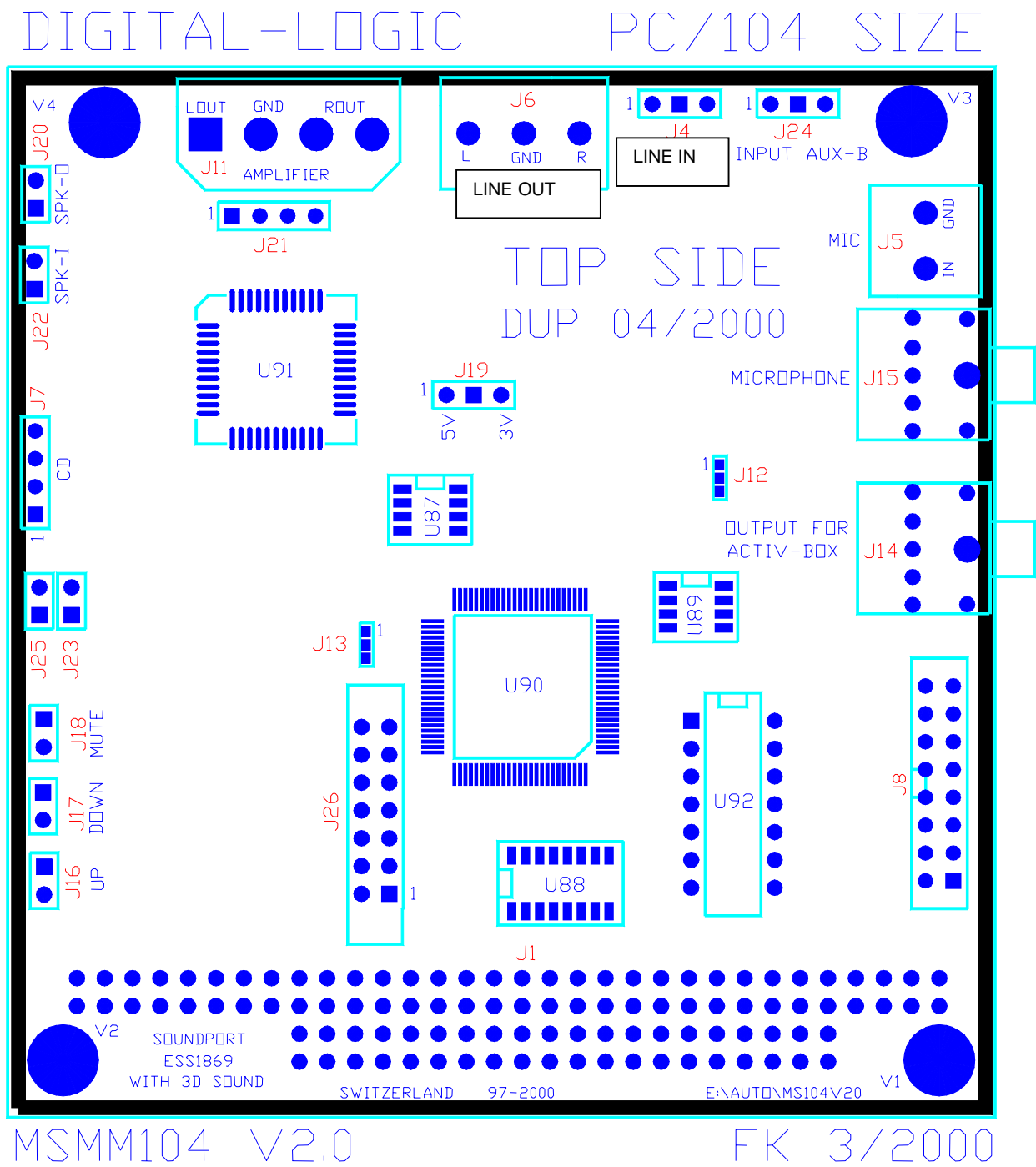
7.5   The connectors of the MSMM104, V1.0

7.5.1 Amplifier Speaker Output

J11	Pin 1	=	R Output	(1 watt >4Ω)
	Pin 2	=	Ground	
	Pin 3	=	L Output	

Use passive speakers with 1-2watts min. 8Ohm.

7.5.2 Line Input

J6	Pin 1	=	L Input	(Impedance ≈12kΩ /1000Hz)
	Pin 2	=	Ground	
	Pin 3	=	R Input	

7.5.3 Line Output

J4	Pin 1	=	R Output	(Impedance ≈40Ω /1000Hz;
	Pin 2	=	Ground	47kΩ for DC)
	Pin 3	=	L Output	

7.5.4 Microphone Input

| J5 | Pin 1 | = | Mic. Input (+9V /10kΩ) | (Impedance ≈4kΩ /1000Hz) |
| | Pin 2 | = | Ground | |

7.5.5 CD Input

J7	Pin 1	=	L Input	(Impedance ≈22kΩ /1000Hz)
	Pin 2	=	Ground	
	Pin 3	=	R Input	

7.5.6 BASS BOOST

| J9 | Left channel |
| J10 | Right channel |

7.5.7 EEPROM

| J12 | SPEEC (clk out) | (not used) |
| J13 | SPEED (data in) | |

7.5.8 MASTERVOLUME

| J14 | Volume down – |
| J15 | Volume up + |

7.5.9 SERIALPORT, IIS

| J2 | not supported |

7.5.10 Gameport and Midi
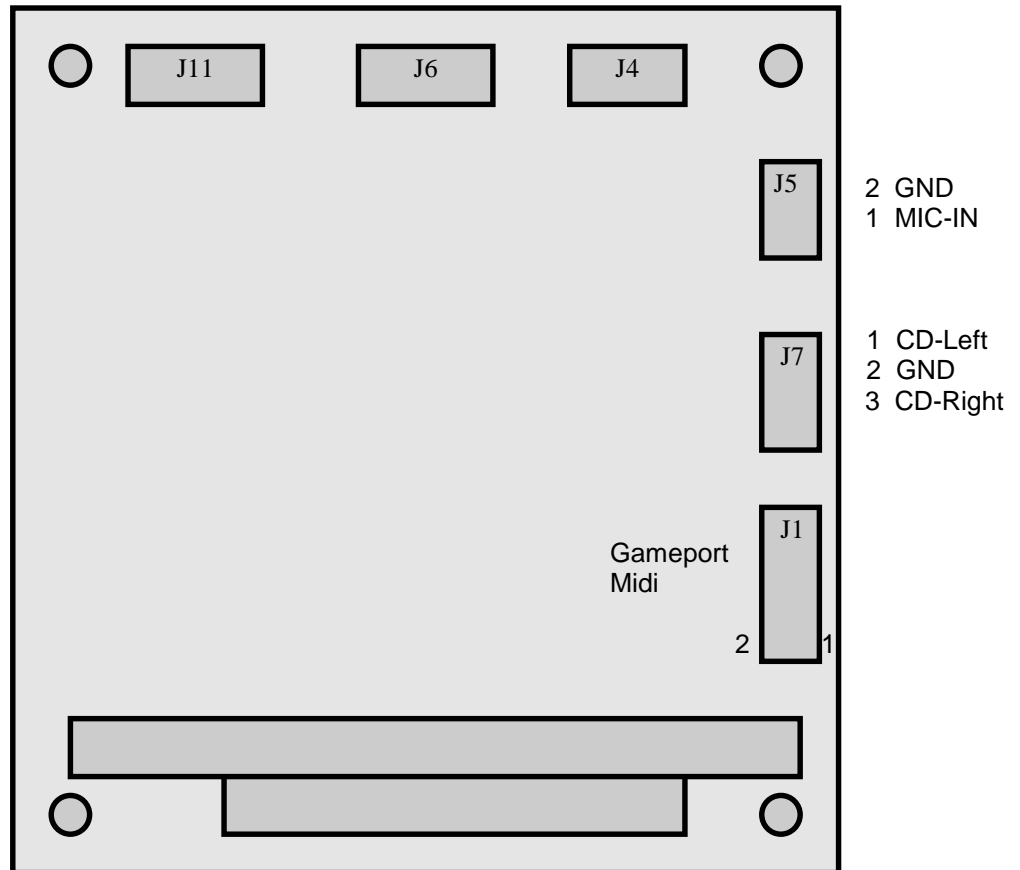
J1   Use an 1=1 connection between the 16pin header and a 15pin DSUB connector. The 15pin
         connector is compatible with the MIDI / GAME port.

Pin definition on the 15pin DSUB connector

Pin 1	VCC
Pin 8	VCC
Pin 9	VCC
Pin 4	GND
Pin 5	GND
Pin 2	GP_A1
Pin 3	GP_AX
Pin 6	GP_AY
Pin 7	GP_A2
Pin 10	GP_B1
Pin 11	GP_BX
Pin 13	GP_BY
Pin 14	GP_B2
Pin 12	MIDI_OUT
Pin 15	MIDI_IN

7.6   The part schematics of the MSMM104, V1.0

8 INDEX