

TECHNICAL USER'S MANUAL FOR:

MICROSPACE®

PC/104

MSMV104L

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DIGITAL-LOGIC AG

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V4.0	V4.00	02.98 JM	New Product Version
V4.0	V4.01	03.99 TS	Related APP-NOTES
V4.0	V4.02	02.02.2000 STP	Minor corrections

Registration Form:

Please register your product under:

<http://www.digitallogic.ch> -> SUPPORT -> Product Registration

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

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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 in this manual are subject to change without notice. In addition, this manual's contents are believed to be accurate. However, if errors are found, please notify DIGITAL-LOGIC AG at the address shown on the title page of this document and we will endeavour to 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 MSE/Mxxx-PC. It provides instructions for installing and configuring the MSE/Mxxx boards, and describes the system and setup requirements. MSE/Mxxx designs all CPU-Boards such as MSE286, 386, 486 and MSM286, 386, 486.

1.2 The Trademarks

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

1.3 Disclaimer

DIGITAL-LOGIC AG makes no representations or warranties with respect to the content 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. DIGITAL-LOGIC AG reserves the right to revise this publication from time to time without obligation to notify any person of such revisions. If errors are found, please contact DIGITAL-LOGIC AG at the address listed on the title page of this document.

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

1. Contact your local Digital-Logic Technical Support in your country.
2. Use Internet Support Request form on <http://www.digitallogic.ch> -> support / support request form
3. Send a FAX or an E-mail to DIGITAL-LOGIC AG with a description of your problem.

DIGITAL-LOGIC AG
Dept. Tech. Support
Nordstr. 4F
CH-4542 Luterbach (SWITZERLAND)

Fax: ++41-32 681 53 31
E-Mail: support@digitallogic.ch

➔ Support requests will only be accepted with detailed information about the product (BIOS, Board Version) !

1.7 Limited Warranty

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

During the one 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, customers are required to contact the company.

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. Neither, if the user has not enough knowledge of these technologies or has not consulted the product manual or the technical support of DIGITAL-LOGIC AG and therefore the product has been damaged.

Except, as expressly 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.

2 MSMV104L SPECIFICATIONS

Controller:	65535 from C&T
Enhanced BIOS:	VGA / LCD BIOS
	MultiBios Feature
Default Panels:	1. CRT and MONO-LCD Type Sharp Mono LM64P8XX 2. CRT and TFT LCD Type Sharp TFT LQD011 and Toshiba TFT LTM9C015 3. CRT and STN-Color LCD Type Torisan STN Color LMCA53/22NAZ 4. CRT and EL-Plasma Type Sharp TFT LQ10DH11
Memory:	DRAM onboard: 0.5 MByte 1 MByte (Option)
CRT-Monitor:	VGA / SVGA
Resolution:	up to 768 x 1024 Pixel 16/256 Colors
Flatpanel-Display:	TFT: 640 x 480 , 800 x 600, 1024 x 768 with 8,9,12,15,16,18 Bits STN: 640 x 480 , 800 x 600, 1024 x 768 Monochrome STN: 640 x 480 with 64 colors 2-2/3 and 5-1/3 bit DD and SS Plasma:640 x 480 to 1280 x 1024 EL: 640 x 350 , 640 x 480, 768 x 1024 Pixels
Connectivity:	CRT only Flatpanel only CRT and Flatpanel (Default) simultaneous
Contrast Control:	10kOhm software controlled resistor with 100 steps
Backlight Control:	10kOhm software controlled resistor with 100 steps
Frame Buffer:	64k advanced frame buffer architecture
Supported Standard Panels with MultiBIOS:	CRT simultaneous with: 1. MONO STN 2. TFT - FP 3. STN-Color FP 4. EL Panel see also Flatpanel Support Manual by DIGITAL-LOGIC AG; list with already adapted flatpanels
Bus:	Standard: PC/104 Size: 16 Bit only
Power Supply:	Power: 1 W at 5Volt Power Sequencing: control by 65535 for VCC, Bias, Backlight Bias Voltage: -35 to +35 Volt, 40mA
Physical Characteristics:	Dimension: Length: 96 mm Width: 90 mm Height: 20 mm
Operating Environment:	Relative humidity: 5 - 90 % non condensing Vibration: 5 to 2000 Hz Shock: 10 g Temperature: Operating: -25°C to +85°C Storage: -55°C to +85°C
Ordering Information:	
MSMV104L	PC/104 VGA Board with VEE Voltage generation
MSMV104LL	PC/104 VGA Board without VEE-Voltage generation (CRT and TFTs)

Any information is subject to change without notice.

3 VGA, LCD

3.1 VGA / LCD Controller 65535

The 65535 High Performance VGA Flatpanel / CRT controller provides a powerful, yet versatile, feature set optimized for portable PC requirements. The 65535, which integrates the VGA controller, industry standard RAMDAC, and monitor sense circuitry, enables a complete VGA sub-system to be implemented with just two chips: CHIPS' 65535 VGA controller and one memory device. The 65535 employs separate address and data buses and direct panel drive outputs so that no external buffers are required. The 65535 provides high performance by use of zero wait-state writes (write buffer), minimum wait-state reads (internal asynchronous FIFO design), 16-bit CPU and I/O interfaces, and 8/16-bit internal video data paths or local bus.

The 65535 provides a variety of programmable features to optimize display quality, such as simultaneous LCD/CRT display capability (with the optional frame buffer), vertical and horizontal compensation, SMARTMAP, text enhancement, three selectable RGB color-to-gray-scale reduction techniques, and a polynomial FRC gray scale algorithm which reduces flicker on fast response "mouse quick" displays without increasing the panel's vertical refresh rate.

The 65535 produces up to 64 gray scales on a wide variety of monochrome LCD, EL and plasma Flatpanels with resolutions up to 1280x1024. The 65535 supports color TFT LCD panels with a 24,389-color palette, supports analog and digital CRT monitors -- interlaced monitors up to 1024 x 768 x 16 colors and non interlaced monitors up to 800 x 600 x 256 colors.

The 65535's advanced power management features reduce power consumption of the display subsystem and extended battery lifetime in portable applications. The 65535 provides CAS-before-RAS refresh cycles for DRAMS.

The 65535 is fully compatible with IBM's VGA standard at the register, gate and BIOS levels. Enhanced backwards compatibility is provided with the EGA, CGA, Hercules, and MDA standards without using NMIS. Also available from CHIPS and third-party vendors are a fully VGA-compatible BIOS, enduser utilities, and drivers for Super-VGA modes, Windows panning, and portrait landscape rotation.

3.2 Display Interface

The 65535 is designed to support a wide variety of flatpanel and CRT displays of different types and resolutions.

3.3 Flatpanel Displays

The 65535 supports all flatpanel display technologies including plasma, electroluminescent (EL) and liquid crystal displays (LCD). LCD panel interfaces are provided for single panel-single drive (SS), dual panel-single drive (DS) and dual panel dual drive (DD) configurations. A single panel sequences data similar to a CRT (i.e., sequentially from one area of video memory). By contrast, a dual panel requires video data to be provided alternating between two separate areas of memory. In addition, a dual drive panel requires the data from the two areas to be provided simultaneously. Due to its integrated line buffer, the 65535 supports all panels directly. Support for LCD-DD panels does not require external hardware (such as a frame buffer). The 65535 handles display data sequencing transparently to application software providing full compatibility on both CRT and flatpanel displays.

The 65535 supports panel resolutions up to 1280x1024, including the popular panel resolutions of 640x200, 640x400, 640x480, 800x600, 1024x768, and 1280x 1024. For non-standard applications additional resolutions are supported.

Currently, there is no standard interface for flatpanel displays. Interface signals and timing requirements vary between panel technologies and manufacturers. The 65535 provides register programmable features to allow interfacing to the widest possible range of flatpanel display units. The 65535 provides a direct interface to panels from vendors such as Sharp, Sanyo, Epson, Seiko Instruments, Oki, Toshiba, Hitachi, Fujitsu, NEC, Matsushita/Panasonic, and Planar.

3.4 CRT Displays

The 65535 supports resolution fixed frequency and variable frequency analog monitors in interlaced and non-interlaced modes of operation. Digital monitor support is also built in.

3.5 CRT Monitor Support

640 x 480	VGA	265 Colors
800 x 600	SVGA	265 Colors
1024 x 768	HiRes VGA	16 Colors

Compatibility: VGA, EGA, CGA, MDA & Hercules

3.6 Simultaneous Flatpanel / CRT Display

The 65535 provides simultaneous display operation with Multi-Sync variable frequency or PS/2 fixed frequency CRT monitors and single panel-single drive LCDs (LCD-SS), dual panel-single drive LCDs (LCD-DS), dual panel-dual drive LCDs (LCD-DD) and plasma and EL panels (which employ single panel-single drive interfaces). Single drive panels sequence data in the same manner as CRTs, so the 65535 provides simultaneous display with CRTs and LCD-SS, LCD-DS, plasma or EL panels by driving the panels with CRT timing. No external hardware is required. By contrast, LCD-DD panels require video data alternating between separate locations in memory. In addition, a dual-drive panel requires data from both locations simultaneously. The 65535 provides also simultaneous display with LCD-DD and CRT monitors without using external VRAMs.

The internal VRAM frame buffers offer significant advantages relative to competitors' DRAM frame buffers. A DRAM frame accelerator requires that the flatpanel be refreshed at double the CRTs vertical refresh rate. Therefore, an expensive 6.3 MHz LCD (with 120 Hz panel vertical refresh rate) is required for simultaneous display with 60 Hz CRT monitors when a DRAM frame buffer is used. Due to its higher bandwidth relative to DRAMS, a VRAM frame buffer can refresh both the flatpanel and CRT at the same vertical refresh rate. Therefore, an inexpensive 3 MHz and 6 MHz LCDs (in addition to 6.3 MHz LCDs) can be used for simultaneous display with 60 Hz and 72 Hz CRT monitors when a VRAM frame buffer is used.

3.6.1 Simultaneous Display

CRT:	Flatpanel Type:	Needed modification:
CRT +	Mono Single Drive STN LCD	none
CRT +	Mono Dual Drive STN LCD	none
CRT +	Mono Single Drive TFT LCD	none
CRT +	Color Single Drive STN LCD	none
CRT +	Color Single Drive TFT LCD	none

3.7 Superior Display Quality

The 65535 produces up to 64 flicker-free gray scales on monochrome or grayscale panels. Because most application softwares are written for color CRT monitors, the 65535 provides several proprietary features to maximize display quality on monochrome flatpanels. Via its Extension Registers, the 65535 provides the flexibility to interface to a wide range of flatpanels and provides full compatibility transparent to the application software. The 65535 enables flatpanel display option simultaneously with the CRT monitor.

3.8 RGB Color To Gray Scale Reduction

The 18 Bits of color palette data from the VGA standard color lookup table (CLUT) are reduced to 6 bits for 64 gray scales via one of the selectable RGB color to gray scales reduction techniques:

- 1) NTSC Weighting: 59% Red, 30% Green, 11 % Blue
- 2) Equal Weighting: 5/16 Red 6/16 Green 5/16 Blue
- 3) Green Only: 6 Bits of Green only

NTSC is the most common weighting, which is used in television broadcasting. Equal weighting increases the weighting for Blue, which is important for applications such as Microsoft Windows V3.0 which often uses Blue for background colors. Green Only is useful for replicating on a flatpanel the display of software optimized for IBM's monochrome monitors, which use the six Green Bits of palette data.

3.9 Gray Scale Algorithm

A proprietary polynomial-based Frame Rate Control (FRC) and dithering algorithm in the 65535's hardware generates 64 gray levels on monochrome panels. The FRC technique simulates 16 gray levels on monochrome panels by turning the pixels on and off over several frames in time. The dithering technique increases the number of gray scales from 16 to 64 by altering the pattern of gray scales in adjacent pixels. By programming the polynomial (8 Bit value in Extension Register XP,6E), the FRC algorithm may be adjusted to reduce flicker without increase the panel's vertical refresh rate. The persistence (response time) of the pixels varies among panel manufacturers and models. By reprogramming the polynomial by trial-and-error while viewing the display, the FRC algorithm can be adjusted to match the persistence of the particular panel. With this technique, the 65535 produces 64 flicker-free gray scales on the latest fast response "mouse quick" film compensated monochrome STN LCDs. The alternate method of reducing flicker - increasing the panel's vertical refresh rate - has several drawbacks. As the vertical refresh rate increases, the panel's power consumption increases, ghosting (cross-talk) increases, and contrast decreases. The maximum vertical refresh rate specified by panel manufacturers is often well below 100 Hz. CHIPS' polynomial FRC gray scale algorithm reduces flicker without increasing the vertical refresh rate.

3.10 Vertical & Horizontal Compensation

Vertical & Horizontal Compensation are programmable features that adjust the display to completely fill the flatpanel display. Vertical Compensation increases the usable display area when running lower resolution software on a higher resolution panel. Unlike CRT monitors, Flatpanels have a fixed number of scan lines (e.g., 200, 400, 480 or 768 lines). Lower resolution software run on a higher resolution panel only partially fills the usable display area. For instance, 350-line EGA software displayed on a 480-line panel would leave 130 blank lines at the bottom of the display and 400 line VGA text or Mode 13 images would leave 80 blank lines at the bottom. The 65535 offers the following Vertical Compensation techniques to increase the usable screen area:

Vertical Centering displays text or graphics images in the center of the flatpanel, with a border of unused area at the top and bottom of the display. Automatic Vertical Centering, adjusts automatically the Display Start address so that the unused area at the top of the display equals the unused area at the bottom. Line replication (referred to as "stretching") duplicates every Nth display line (where N is programmable), thus stretching text characters and graphic images an adjustable amount. The display can be stretched completely to the flatpanel area. Double scanning, a form of line replication where every line is replicated, is useful for running 200 line software on a 400 line panel or 480 line software on a 1024 line panel. Line replication can be used in text and graphics modes.

The line insertion, inserts N blank lines (where N is programmable) between each line of text characters. The text can be evenly spaced to fill the entire panel display area without altering the height and shape of the text characters. Blank line insertion can be used in text mode only.

Small fonts use a non-VGA standard font so that the text fills almost a line on the flatpanel and all lines of the text are the same size. For example, an 8x19 font would fill 475 lines on a 480-line panel, or an 8x30 font would fill 750 lines on a 768-line panel. Tall fonts can be used in text mode only.

Each of these Vertical Compensation techniques can be controlled by programming the Extension Registers. Each Vertical Compensation feature can be individually disabled, enabled and adjusted. A combination of Vertical Compensation features can be used by adjusting the features priority order. For example, text mode vertical compensation consists of four priority order options:

- Double Scanning +Line Insertion, Double Scanning, Line Insertion
- Double Scanning +Line Insertion, Line Insertion, Double Scanning
- Double Scanning +Tall Fonts, Double Scanning, Tall Fonts
- Double Scanning +Tall Fonts, Tall Fonts, Double Scanning

Text and graphic modes offer two Line Replication priority order options:

- Double Scanning+ Line Replication, Double Scanning, Line Replication
- Double Scanning+ Line Replication, Line Replication, Double Scanning

Horizontal Compensation techniques include Horizontal Compression, Horizontal Centering and Horizontal Doubling. Horizontal Compression will compress 9-dot text to 8-dots such that 720-dot text in Hercules modes will fit on a 640-dot panel. Automatic Horizontal Centering automatically centers the display on a larger resolution panel, so that the unused area at the left of the display equals the unused area at the right. Non-Automatic Horizontal Centering enables the left border to be set (via programming the Horizontal Centering Extension Register) so that the image can be positioned anywhere on the display. Automatic Horizontal Doubling will automatically double the display in the horizontal direction when the horizontal display width is equal to or less than half of the horizontal panel size.

3.11 SmartMap

SmartMap is a proprietary feature that can invoke intelligent map colors to gray levels in text mode. SmartMap improves the legibility of flatpanel displays by solving a common problem.

Most application programs are optimized for color CRT monitors using multiple colors. For example, a word processor might use a blue background with white characters for normal text, underlined text could be displayed in green, italicized text in yellow, and so on. This variety of colors, which is quite distinct on a color CRT monitor, can be illegible on a monochrome flatpanel display if the colors are mapped to adjacent grayscale values. In the example, underlined and italicized text would be illegible if yellow is mapped to grayscale 4, green to grayscale 6, and the blue background mapped to grayscale 5.

SmartMap compares and adjusts foreground and background grayscale values to produce adequate display contrast on flatpanel displays. The minimum contrast value and the foreground / background grayscale adjustment values are programmed in the 65535's Extension Registers. This feature can be disabled if desired.

3.12 Text Enhancement

Text Enhancement is another feature of the 65535 that improves image quality on flatpanel displays. Many applications, such as MS-DOS, use a White for normal text characters, which results in non-optimal contrast on flatpanels. When turned "on," the Text Enhancement feature displays DIM White as Bright White, thereby optimizing the contrast level on flatpanels. This feature inverts the functionality of the Intensity Bit for White only. Highlighted White, which is displayed as Bright White when Text Enhancement is "off," is shown as DIM White with Text Enhancement "on," thus maintaining a difference between normal and highlighted text. Text Enhancement can be turned "on" and "off" by changing a Bit in one of the Extension Registers.

3.13 Inverse Video

Inverse Video can be chosen in text modes only on the flatpanel (normal video is displayed on the CRT and in graphic modes on the flatpanel), in graphic modes only on the flatpanel (normal video is displayed on the CRT and in text modes on the flatpanel), or in both text and graphic modes on the flatpanel.

4 SOFTWARE

4.1 Driver Resolutions and Filenames

Driver Disks are available for DOS/Windows/OS2/WinNT.

5 DESCRIPTION OF THE CONNECTORS

5.1 VGA-Connector Analog Interface for Monitors

VGA-Connector		MICROSPACE Product
Signal Name	Sub-D 15 pol	MSMV104L/LL Vers. 2.0, 2.1, 3.1
	Pin No.	Header Pin No.
VGA red	1	2
VGA green	2	4
VGA blue	3	6
Horizontal Sync.	13	8
Vertical Sync.	14	9
Ground	7	1
Bridge	8 + 11	

5.2 VGA Connector for Flatpanel Display

J4:		
34 Pin:	Signal:	Function:
1	M	M-Clock
2	FLM	Frame
3	DE	Display Enable (selected by M or LP)
4	LP	Line Pulse
5	VCC	5V
6	GND	0V
7	VDD	Controlled 5V Supply
8	SHFCLK	Shift Clock
9	EVEE	TTL Signal for Display Enable (H=Disp. on)
10	P3	Digital Signal
11	P2	Digital Signal
12	VSAFE/BKL	Controlled Backlight Supply 5V
13	P1	Digital Signal
14	VEE	Controlled BIAS -35V to +35V
15	P0	Digital Signal
16	P7	Digital Signal
17	CONT1	Contrast Resistor IN
18	P6	Digital Signal
19	CONT2	Contrast Resistor OUT
20	P5	Digital Signal
21	P4	Digital Signal
22	reserved	reserved
23	P8	Digital Signal
24	P9	Digital Signal
25	P10	Digital Signal
26	P11	Digital Signal
27	P12	Digital Signal
28	P13	Digital Signal
29	P14	Digital Signal
30	P15	Digital Signal
31	P16	Digital Signal
32	P17	Digital Signal
33	BACK1	Backlight Resistor IN
34	BACK2	Backlight Resistor OUT

6 JUMPER LOCATION ON THE BOARD

6.1 The Jumpers on this MICROSPACE product

6.1.1 Flatpanel Interface

Flatpanel Interface:		1 - 2	2 - 3
J6	Flatpanel Interface: VEE-Polarity	negative -35V	positive +35V
J8 (solder jumpers)	Flatpanel Interface: DE-Signal	LP	M (Default)

6.1.2 Standby the VGA Controller:

Standby the VGA Controller:		1 - 2	2 - 3
J9 (solder jumpers)	Standby the VGA Controller: StnBY	active (Default)	Standby

6.1.3 Selection of the BIOS Address

	Function:	Jumper Position, Address:	Jumper Position, Address:
J10	Selection of the BIOS Address FLASH Boot process: Flash Operation	1-2 = C000	2-3 = C800
J11	Selection of the BIOS Address EPROM Boot process: Standard Operation from EPROM	1-2 = C000	2-3 = C800

6.1.4 16-Bit CPU Interface:

16-Bit CPU Interface:		Default-16 Bit:
J13 (solder jumper)	SMEMR-MEMR	closed = not used open = 16Bit
J14 (solder jumper)	SMEMW-MEMW	closed = not used open = 16Bit
J21 (solder jumper)	IOCS16	closed = 16Bit open = not used
J22 (solder jumper)	MEMCS16	closed = 16Bit open = not used
J23 (solder jumper)	SBHE	closed = 16Bit open = not used
J24 (solder jumper)	ALE	closed = Default open = not used

6.1.5 Selection of the FP-BIOS with the MultiBios

for MB4xy MultiBIOS 128k (Standard)

J15 J16 J17	VGA BIOS type selection	J15	J16	J17
	FP-BIOS Nr. 1	open	open	open
	FP-BIOS Nr. 2	closed	open	open
	FP-BIOS Nr. 3	open	closed	open
	FP-BIOS Nr. 4	closed	closed	open

for MB8xy MultiBIOS 256k (optional)

J15 J16 J17	VGA BIOS type selection	J15	J16	J17
	FP-BIOS Nr. 5	open	open	close
	FP-BIOS Nr. 6	closed	open	close
	FP-BIOS Nr. 7	open	closed	close
	FP-BIOS Nr. 8	closed	closed	close

6.1.6 Selection of the Flash Sector

(for using C800-CFFF, as alternate Flash-BIOS Memory, use the 64k-GAL. The standard implementation is 32k-GAL!)

J18 J19 (solder Jumper)	Selected Sector:	J18	J19
	Sector 1 (Default)	open	open
	Sector 2	closed	open
	Sector 3	open	closed
	Sector 4	closed	closed

6.1.7 VEE Generator supply

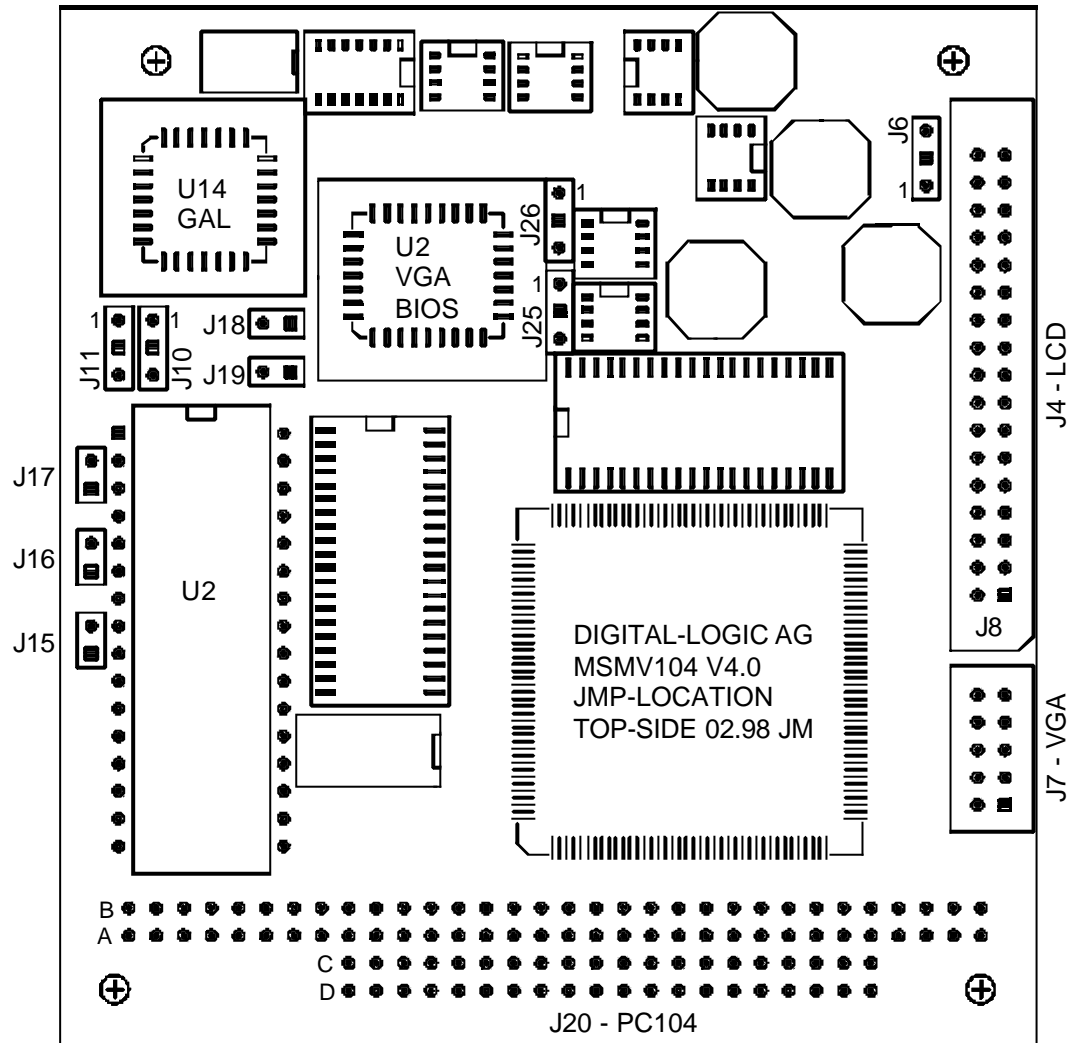
If there is an external 12V power supply at the PC/104 BUS PIN B9, switch the Jumpers J25 and J26 to 2-3. With 12V at the VEE generator the stability of the VEE range is improved. VEE Range -35V to +35V.

Jumper	Function	PIN	PIN
J25	VEE Generator supply	1-2 = 5V *	2-3 = 12V
J26	VEE Generator supply	1-2 = 5V *	2-3 = 12V

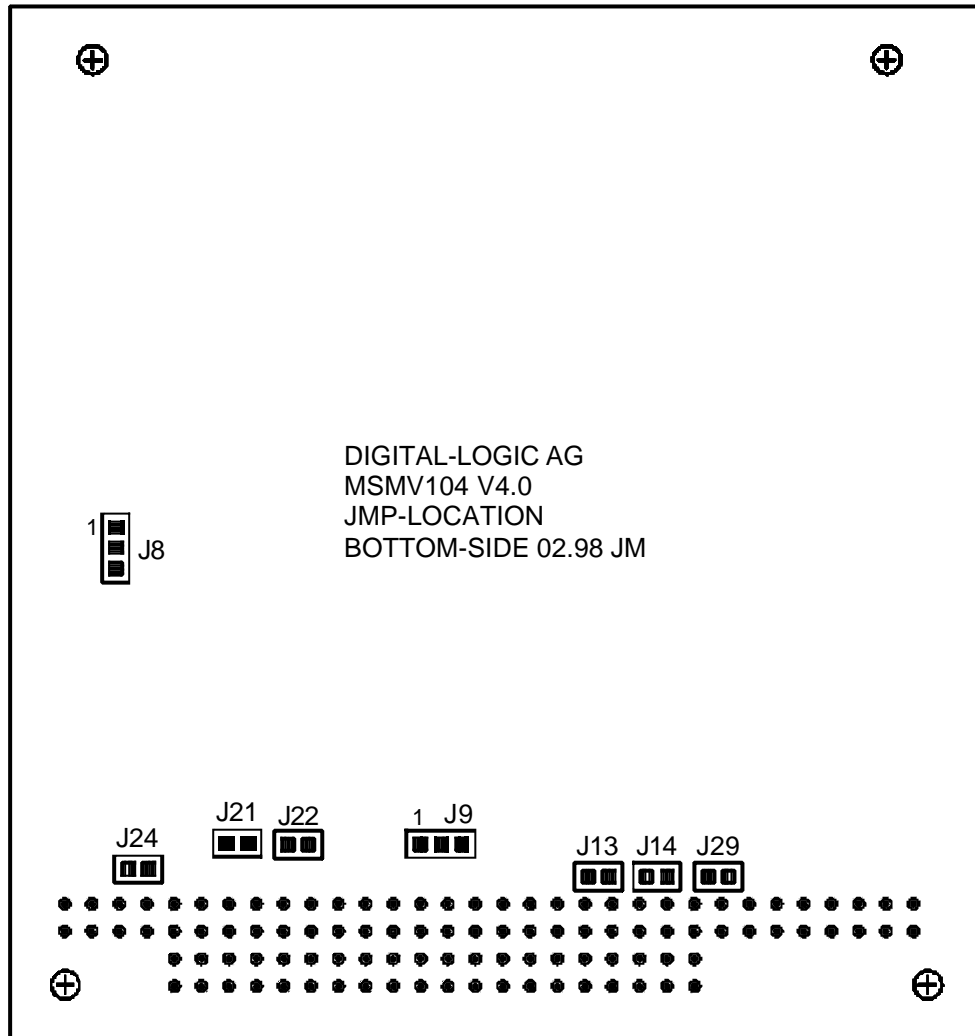
* Default

6.2 Jumper Locations

6.2.1 Front Side Version 4.0



6.2.2 Rear Side Version 4.0



7 SPECIAL PERIPHERALS, CONFIGURATION, FUNCTIONS

7.1 Onboard BIAS Power generation (only on the MSMV104L)

On the MSMV104L (low cost) board is no BIAS generator implemented.

IMPORTANT:

The onboard voltage generation must be adjusted and measured before the LCD panel is connected, otherwise the display may be destroyed.

Follow these steps:

7.1.1 VEE Generation

If there is an external 12V power supply at the PC/104 BUS PIN B9, switch the Jumpers J25 and J26 to 2-3. With 12V at the VEE generator the stability of the VEE range is improved. VEE Range -35V to +35V.

7.1.2 Selection of the polarity VEE

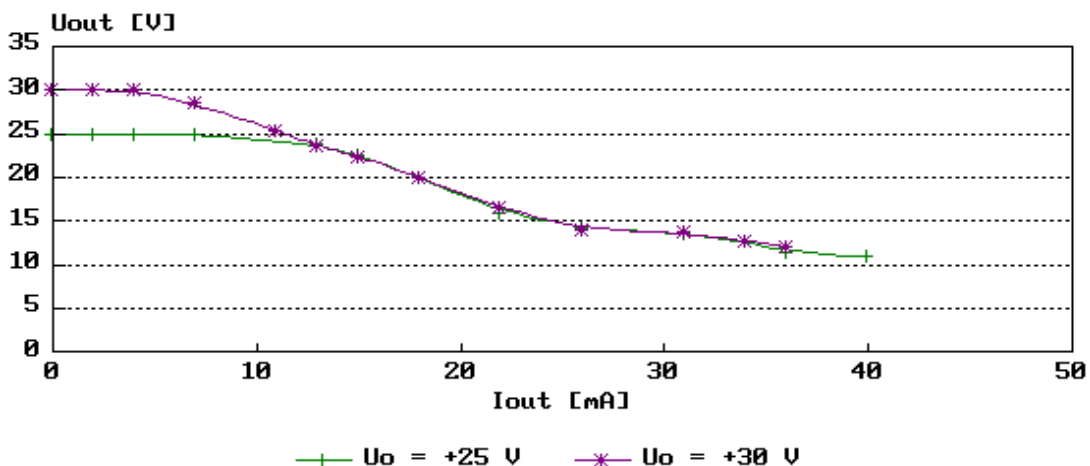
Some displays use positive, other use negative BIAS voltages. Refer to the datasheet of the flatpanel in order to find out the correct polarity. With the polarity jumper J6 (see Jumper) the definition is made.

7.1.3 Adjustment of the voltage

The voltage may be varied between 35V and 15V with the selected polarity.
The current depends on the input voltage and the load. Check the following diagrams:

7.1.3.1 Positive voltage with 5V input

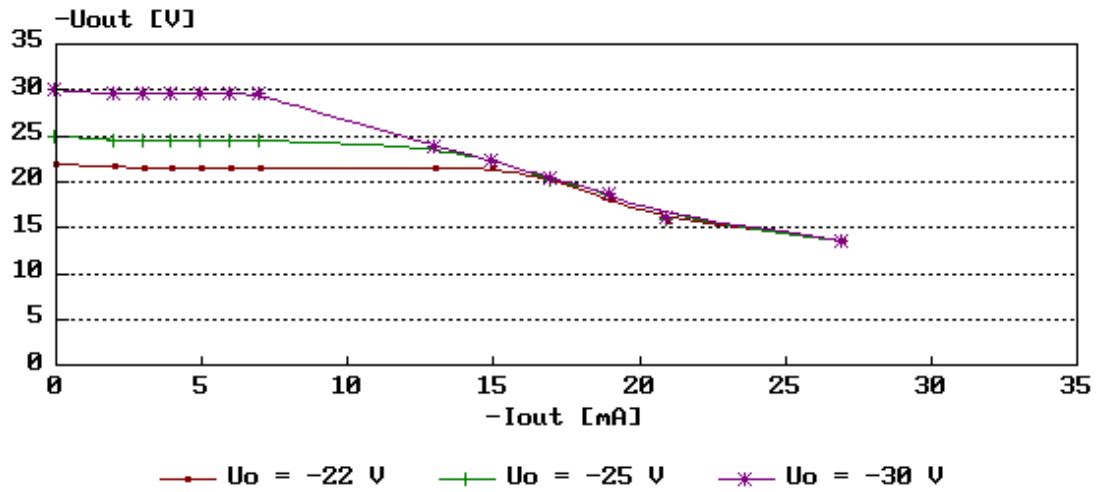
Positive VEE(f) = Iout
Supply Voltage = 5 V



7.1.3.2 Negative voltage with 5V input

Negative $V_{EE}(f) = I_{out}$

Supply Voltage = 5 V



7.2 Programmable Contrast and Backlight for LCDs

7.2.1 ADJPOTI1.COM

The contrast and the backlight are programmable, if these options are available. In order to use these options, the flatpanel must be wired correctly and the analog input must be adjusted. On the tooldisk the programm ADJPOTI is available at the tooldisk.

The ADJPOTI must be started with the following product codes:

ADJPOTI [x]	x =	A:	MSE535V
		B:	MSE286X
		C:	MSE386V
		D:	MSE486V
		E:	MSE486DX
		F:	MSMV104L
		G:	MSM286X
		H:	MSWS1
		I:	MSWS2

7.2.2 ADJPOTI2.COM

With new products, use the ADJPOTI2.COM. This utility tool works over SW Interrupt 60H. You can use it also in your own program (refer also to the PC-Manual; Interrupt 60H on our CPUs). This utility is only working with DIGITAL-LOGIC PCs.

7.2.3 Adjusting the contrast and backlight with hotkeys

After loading the ADJPOTI, the adjustments are performed by using hotkeys:

L-SHIFT + ALT + CTRL + F	Contrast increment
L-SHIFT + ALT + CTRL + C	Contrast decrement
L-SHIFT + ALT + CTRL + G	Speaker increment
L-SHIFT + ALT + CTRL + V	Speaker decrement
L-SHIFT + ALT + CTRL + H	Backlight increment
L-SHIFT + ALT + CTRL + B	Backlight decrement

7.2.4 Uninstall the ADJPOTI

Uninstall the ADJPOTI by re-starting the programm.

7.2.5 Electronic trimmer stores the adjusted value

The electronic trimmer stores the adjusted value automatically into the integrated EEPROM. Therefore, after re-booting the system, the last adjusted values are available as soon as the system is powered-on.

7.2.6 Programmable contrast and backlight

J4 Connector

Pin 17 Collector

Pin 19 Emmitter

The resistor varies between 0 k and 10 k.

Pay attention to the polarity, because the resistors are switched by a FET.
The maximal current through the resistor is **1mA**.

Refer to the Flatpanel Manual by DIGITAL-LOGIC AG.

This feature is available on the following MICROSPACE® products: MSM486V, MSE486V, MSE486DX, MSWS1, MSWS2, MSMV104.

There are software adjustable potentiometers on these products. Contrast, backlight and speaker volume can be adjusted by using the keyboard.

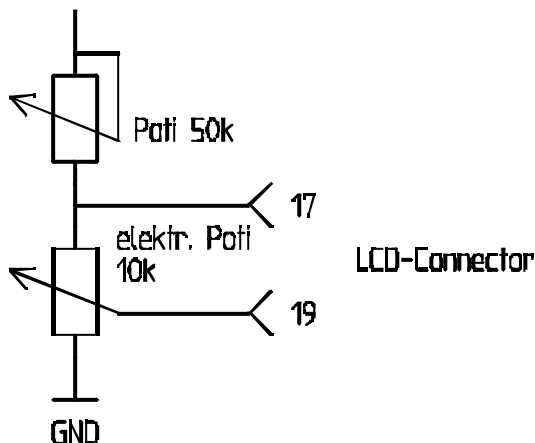
These electronic potentiometers have an integrated EEPROM. The actual value will therefore always be saved in there. The last inputs will still be valid even after restarting the MICROSPACE PC.

The contrast of an LCD is most often adjusted by changing VEE-voltage. This voltage will be generated on most of the MICROSPACE boards. The blue potentiometer and a jumper to select negative or positive VEE is an indication whether the voltage is generated onboard or not.

Off all types of boards that have an LCD-connector, there is also an electronic potentiometer to adjust VEE. The influence on VEE of these electronic potentiometer have though not the same amount of influence to the contrast as ordinary potentiometers.

So the two types of potentiometers are wired in series. Pin 17 of the LCD-connector is wired to one end of the potentiometer, pin 19 is wired to the wiper of the software adjustable potentiometer. These two pins allow the connection of a temperature depending resistor, if needed.

VEE Voltage Regulation



Some LCDs have a separate input for adjusting the contrast. Pin 17 and 19 can be used for this adjustment. In that case, an external VEE-voltage generation is needed.

J4 Connector

Pin 33 Collector

Pin 34 Emmitter

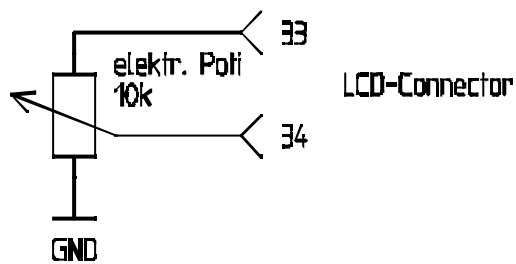
The resistor varies between 0 k and 10 k.

Pay attention to the polarity, because the resistors are switched by a FET.

The maximal current through the resistor is **1mA**.

Refer to the Flatpanel Manual by DIGITAL-LOGIC AG.

Some of the MICROSPACE products do also provide the possibility to adjust the backlight via a second software adjustable potentiometer. An external circuitry is still needed to adjust the backlight via this electronic potentiometer.



Keep in mind that one pin of the electronic potentiometer is connected to GND. This is an important detail!

8 POSSIBLE FAILURES

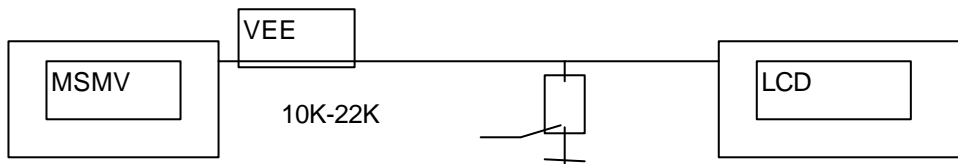
8.1 General LCD Failures

Refer to the Flatpanel Manual by DIGITAL-LOGIC AG.

1. Check the LCD-BIOS. You have a special BIOS for every LCD.
2. Check the cable to the LCD.
3. Check the Jumper.
4. Check the power supply.

8.2 The LCD is not stable

Try to place a resistor at the VEE to the GND.



This occurs to LCDs which do not consume enough current. Try to raise the resistor values as much as possible.

8.3 Start peak at 4A 500 μ S

Follow these steps:

1. Encrease the power supply to 5.3V in order to have 5V on the MSMV104L.
The voltage on the MSMV104L must not fall short of 4.8V when powering-on.
2. Shorten the cable to your equipment as much as possible or make a new line directly to the MSMV104L.
The power at the MSMV104L must be higher, measure it and try to go 0.1V - 0,2V higher, but do not exceed 5.25V directly on the MSMV104L.
3. Place an inductor between the power supply and the equipment.
4. Use a different power supply.

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