VME-PROF-S

Technical Manual

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Preface

The user requires comprehensive information in order to make full use of the technical abilities of this product. This manual is intended for hardware developers, project engineers, and programmers who plan on using this VMEbus device.

The present publication has been designed to provide you with a complete range of structured information. The following pages contain information which should make it easier for you to use this manual. You will be provided with information on how this manual is structured.

Despite all efforts from our side some problems may not be covered by this manual. This is mainly due to the broad range of possible VMEbus applications. Please do not hesitate to contact DMS if you experience any problems that are not covered by the 'Troubleshooting' section.

Contents

- Hardware and Technical Data (Chapter 1)
  This chapter contains a description of the device itself, how it fits into our range of VMEbus products, and its principles of operation.

- How to Setup the Unit (Chapter 2)
  This chapter summarizes all data necessary for setting up the device. Special care has been taken to make clear that hardware and software influence each other.

- Primary Functions and Operating Principles (Chapter 3)
  Chapter 3 contains a full description of built-in functions, i.e. information on wiring the device and how to program it.

- Address Information (Chapter 4)
  This chapter details all address ranges and register addresses.

- Software (Chapter 5)
  This chapter contains a description on hardware-dependent software such as drivers and descriptors.

- Service and Maintenance (Chapter 6)
  The information contained in this chapter includes details on maintenance and service issues as well as a troubleshooting section where common problems are discussed that may occur during operation of the card.

- Appendix (Chapter 7)
  This chapter contains wiring diagrams, dimension drawings, etc.

The last pages of this manual contain a number of forms (e.g. 'Reader Comments' or 'DMS Return Form'). Please fill in those forms if you would like to propose any changes, corrections or supplements. We suggest that you mail the sheet back to us. Your suggestions will help us to improve the quality of future editions of this manual.

Printing Conventions

In order to improve its readability this document is structured like a menu.

- The first pages of this document contain a chart of contents.
- Pages, illustrations, and tables are numbered consecutively.
- Abbreviations have been used for a number of terms. You will find a list of abbreviations in the Appendix Section.
- Footnotes are indicated by text printed in superscript such as numbers (e.g. "[1]"), or stars ("*"). Generally, the comments related to a footnote can be found at the bottom of the page. Bullets (•) and dashes are used in most cases (like for example in this list) to indicate an enumeration.
- Cross references are used as follows: "(see Chapter 3.3.2)" refers to Section 3.2 of chapter 3.
- All dimensions given in drawings, sketches, and tables are in millimeters (mm).
- Value ranges are given in the following form: 17 .. 21 means a range from 17 to 21.
- Hexadecimals are indicated by a leading "$".
- You will find that outlined boxes like the one below often contain very important information:

Warning

Please take the time to read through the section 'Information on Operational Safety' which is located at the end of this introduction. It contains definitions for certain terms like '**Warning', 'Danger', 'Caution', 'Note'**

Information on Operational Safety

This manual contains all information necessary for the designated use of the products described in it. It is written for the use by qualified personnel. The term ‘qualified’ as used in this manual or as printed on the product itself refers to persons

- that are working in the field of research and development
- or that are members of the project staff and are familiar with all safety regulations used in automation technology.

Safety Precautions

The following safety precautions will help to prevent personal injuries as well as the protect the product and other devices connected to it.

Safety precautions and warnings that may threaten the life or health of the operator or maintenance personnel or that may result in damage to property will be indicated by signal terms defined below. The terms used in this manual or on product labels have the following meaning:

Danger

means that death, major injuries, or major damage will occur if the appropriate safety precautions are not obeyed.

Warning

means that death, major injuries or major damage may occur if the appropriate safety precautions are not obeyed.

Caution

means that minor injuries or damages may occur if the appropriate safety precautions are not obeyed.

Note

this section contains useful hints about the product, product handling or the part of the manual which it refers to explicitly.

Normal use of the product

Warning

- The device/system must not be used in cases other than those mentioned in the catalogue or the manual and may only be used in conjunction with third party components that are either recommended or approved by DMS.
- Professional transport, storage, erection/installation as well as careful operation and servicing are a prerequisite for the trouble free and safe operation of the device.

Declaration of Conformity

We, DMS Dorsch Microsystem GmbH, declare under our sole responsibility that the product described in this technical documentation complies with the standards or other normative documents quoted in this notice.

All DMS devices that features a **CE symbol** fulfill the requirements of the EU guideline #89/336/EWG on electromagnetic compatibility as well those of the harmonized European standards stated below.

As required by paragraph 5.1(3) of the 'Electromagnetic Compatibility - Federal Office of Postal Services and Telecommunications Act' the declaration of conformity as well as the appropriate documentation are kept with:

DMS Dorsch Mikrosystem GmbH
Holmlück 15
D-24972 Steinberkirche
Germany

Range of Application

The DPS device has been designed for industrial operation and complies with the following standards and normative documents:

Electromagnetic Compatibility (EMC) - Electromagnetic Emissions : EN 50081-2:1994
Electromagnetic Compatibility (EMC) - Generic Immunity Stand.: prEN 500082-2: 1994

Installation Guidelines

The DMS device does meet all EMV requirements under the following conditions:

1. The device is operated in a DMS rack with CE certification.
   All devices of a VMEbus system need to comply with the EU guidelines on electro-magnetic compatibility (#89/336/EWG) (i.e. must feature a CE symbol).
2. The VMEbus-system frame ground must be connected to the system ground through a low resistance cable.
3. PROFIBUS systems must employ cables and connectors that are recommended by DMS or that are compatible with those recommended by DMS (see Chapter 3.2.1.1).
4. Shielded Cables are to be used for all additional data connections. All connectors (jacks, sockets, and plugs) must be fitted with a metal shielding. The protective case must be connected bidirectionally conducting with the cable shielding. In order to prevent transient currents within the GND shielding, the potential drop needs to be compensated for by means of bonding.
5. Data cables must not be installed near the mains lead or near cables with a high throughput or switching high inductance loads.
6. When installed outdoors all cables that may be subjected to excessive voltages (e.g. lightning) are to be fitted with lightning arresters or to be protected by metal tubes.
7. All slots of a system rack that are not currently in use need to be closed by an electrically conducting front panel.
8. During operation and installation of the device - special care is required with respect to electrostatic discharge (ESD - see also EN 10015-1 Basic Specification: Protection of electrostatic sensitive devices).

Validity of this Manual

This manual is valid for:

VMEbus-Cards: VME-PROF-S Version 5.0 or higher

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1. VME-PROF-S - Overview

- **PROFIBUS-DP-Slave Interface 12 Mbaud**
- **SPC3 PROFIBUS Slave ASIC**
- **VMEbus Slave Interface with 64 KB Dualport RAM**
- **512 KB Boot-Flash-EPROM with DPS Firmware**
- **MC68331 CPU**

1.1. General Information

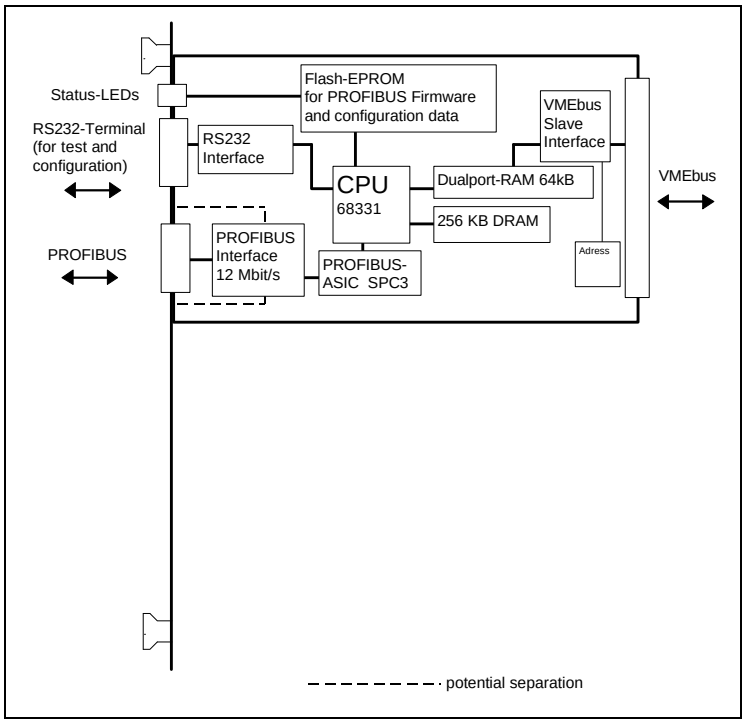


Figure 1: Block Diagram VME-PROF-S

The VME-PROF-S is a compete independent PROFIBUS-DP-Slave interface on an VMEbus board. The interface is based on the SPC3-ASIC which handles the layer 1 / 2 of the PROFIBUS protocol (DIN 19245 / EN 50170) and the MC68331 processor. 64 kB dualport-RAM are used as data interface to the VMEbus.

With the PROFIBUS-DP-Slave firmware (DPS), the VME-PROF-S builds a independent arbitrary configurable DP-Slave interface. The slave is configured through the dual-port-RAM. The configuration can be build with max. 32 configuration bytes and can use up to 244 input bytes and 244 output bytes. The total amount of input / output data can be 400 bytes. Due to the arbitrary configuration the Slave can fit the requirements of the VMEbus system or the VME-PROF-S can be used to simulate other Slaves.

1.2. Technical Specifications

VMEbus:	A24, D16 Slave
Memory:	64KB Dualport-RAM 512 KB Boot-Flash-EPROM
Interface:	1 * RS485 PROFIBUS, galvanic separated, 12 Bit/sec with PROFIBU SPC3 -ASIC 1 * serial RS232
Processor:	MC68331
Protocol:	PROFIBUS DP-Slave (DIN 19245 / EN50170)
Status display	6 LED's for board and PROFIBUS Status
Dimension:	VME-PROF-S 6HE-4TE (3HE boart with 6HE frontplate) VME-PROFS3 3HE-4TE (single euro format, 160x100mm)
Power:	+5V: typ. 800 mA +5V Standby not needed +12V and -12V not needed
Temperature	Operating: 0 ... +50 °C Storage: -25 ... +70 °C

1.3. The VME-PROF-S Package

The VME-PROF-S package includes:

- the VME-PROF-S board (including DPS firmware stored in the Flash-EPROM)
- Disc (PC1.44 format) with ANSI-C demo programs and GSD-file.
- this technical Manual

1.4. Order Codes

VME-PROF-S	VMEbus 68331 CPU, PROFIBUS DP-Slave 12 Mbit/sec, RS232, 6HE
VME-PROFS3	VMEbus 68331 CPU, PROFIBUS DP-Slave 12 Mbit/sec, RS232, 3HE
Other PROFIBUS products:	
IPE	VMEbus with 68040 CPU, 64 MHz, 8 MB RAM, IEC-1491 and PROFIBUS DP-Master interface 3 Mbit/sec, RS232, 20 mA, 2 Memorycards
PCI-40	PC ISA-Slotcard with 68040 CPU, 64 MHz, 8 MB RAM, IEC-1491 and PROFIBUS DP-Master interface 3 Mbit/sec
PCP-DP	PC ISA-Slotcard with PROFIBUS DP-Master interface 3 Mbit/sec
VME-PROFI	VMEbus PROFIBUS Interface 6 HE, 3 Mbit/s incl. PROFIBUS-DP-Master Software
VME-PROFI3	VMEbus PROFIBUS- Interface 3 HE, 500 kbit/s incl. PROFIBUS DP-Master Software
PMC-PROFI	PMC Mezzanine Module with PROFIBUS DP-Master interface, 3 Mbit/s incl. PROFIBUS-DP-Master Software
PCU	PROFIBUS Control Unit with graphic display 320*240 pixel, 68331 CPU, 512 kB RAM, 2 MB Flash, Ethernet-Controller, OS9-Extended, TCP/IP, DP-Master Firmware
PST	PROFIBUS DP Slave Terminal, display with 2 lines a 24 characters
Accessories:	
PROFI-STV	PROFIBUS Bus connector (9 pol. DSUB) with switchable terminating resistors
PROF-KABEL	PROFIBUS cable

1.5. Safety precautions

Caution

- The device may only be used in subracks that meet the requirements of the following VMEbus standards: ANSI/IEEE STD1014-1987, IEC 821 and 297 [2]
- The device may only be switched on if installed properly.
- The device must be disconnected from the VCC power supply prior to connecting or disconnecting hardware interfaces.
- Handle with care! The device must be protected from electrostatic discharge (see EN 100015-1).
- This device uses, produces and may emit high-frequency signals. Operation of the device may be disturbed by strong high-frequency signals. The device has been designed by DMS for a high degree of electromagnetic compatibility, e.g. galvanic separated front interfaces, multi-layer technology, etc. have been incorporated in the design. Please make sure that the device is used in compliance with all applicable regulations regarding electromagnetic compatibility (EMC). See „Declaration of Conformity“ in the Preface chapter.

2. Hardware Installation and Configuration

2.1. Hardware settings

Warning
The system must be switched off when changing hardware within or connected to the system!

2.1.1. VMEbus slave address range (Slot Address)

The VME-PROF-S use 64 kByte within the VMEbus standard range. The base address can be selected in 64 k steps within the 16 MB address space. The address setting is done with the addressbits (A23 - A16) at S21 / S20 . A Jumper Diagram with the default settings can be found in chapter 7.4.

Base address: $xy0000

³ÀÄ— (A19-A16)
³ Set by S20.
³ Default: **$F**
ÀÄ— (A23-A19)
Set by S21
Default: **$8**

Note:
For 6HE VMEbus-boards (like the previous VME-PROF-S Vers. 4.x) DMS use an optionally slot depending addressing. For this address coding some address lines (for example A19 - A16) are connected to the J2 connector. With a binary coded J2 backplane, the slot depending addressing can be realized for this boards.

For the VME-PROFI-S Vers. 5.x this address coding **is not possible**, due to the 3HE layout of the board. The address of the board is always set by S21 / S20. If S21 use the default setting „8“, the setting of S20 correpndents to the „slot-number“.
The „slot-number“ are used by some example and utility programs and within some other DMS manuals.

2.2. Autorun Jumper J20

J20 selects the start-mode of the VME-PROF-S.

Open: After power-on or SYSRESET, the board will remain in the Reset-state. The PROFIBUS controller will not start. Both red Led’s (VMEbus and PROFIBUS) will be on

Close: After power-on or SYSRESET, the board will be reset and then the PROFIBUS controller will start.

2.3. Final Installation

After finishing the installation align and insert the VME-PROF-S card into the designated slot and tighten it by fastening the two screws at the top and bottom of the cards front panel. Safe and trouble free operation can only be ensured if the card is well aligned and tightened.

2.4. Software Setup

The VME-PROF-S DP-Slave firmware (DPS) are stored in the Flash-EPROM. Therefore no software must be loaded into the board. The configuration of the DP-Slave parameters are done through the VMEbus. This configuration are described in chapter 5.1.1.

2.5. How to Remove the Card

Prior to removing the card all connectors at the card's front panel need to be disconnected. Remove the two screws at the bottom and the top of the front panel. Pressing the upper card handle towards the upper end of the card and the lower handle respectively towards the bottom will loosen the card. Now you can remove the card from the subrack.

2.6. Shipping and Packaging

Packing needs to be done with greatest care. The card needs to be protected from electrostatic discharge. If possible use the original packaging.
A 'DMS Return Form' (see Appendix) must be included with all returns to DMS.

3. Function Elements of the VME-PROF-S

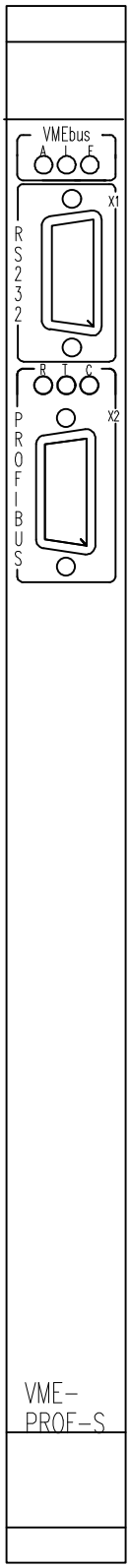


Figure 1: Front View of the VME-PROF-S

3.1. Status LED's

5 LED's will deliver information on the VME-PROF-S's operating state. The meaning of the 1. LED row is independent of the loaded firmware:

1. LED-row (VMEbus state)

green	(**A** active)	VMEbus access to the VME-PROF-S
yellow	(**S**)	reserved
red	(**F** Fail)	the VME-PROF-S is in RESET (disabled), only the Monitor program is running. The VMEbus-SYSFAIL is generated by the VME-PROF-S

2. LED-row (PROFIBUS state) with PROFIBUS-DP-Slave firmware

green	(R RxData)		the VME-PROF-S receives data from the PROFIBUS
yellow	(T TxData)		the VME-PROF-S sending data to the PROFIBUS
red	(**C** Com-Fail)	Off:	The VME-PROF-S is configurated by the DP-Master and transfers data
		On:	the VME-PROF-S is in hold or not/wrong configurated by a DP-Master, no data transfer

3.2. Interfaces

3.2.1. PROFIBUS-Interface X2

The PROFIBUS an be accessed via a 9-pin connector X2 located at the front panel. The interface has separated potentials and a pin-layout as specified in the DIN 19245.

Connector X2	I/O - Signal
Pin 1	n.c.
Pin 2	n.c.
Pin 3	Data B (RxD/TxD-P)
Pin 4	CNTR (Repeater control signal TTL)
Pin 5	GND
Pin 6	Termination-Power
Pin 7	n.c.
Pin 8	Data A (RxD/TxD-N)
Pin 9	n.c.
Connector case	shield

Table 1: Pin-layout PROFIBUS X2

3.2.1.1. PROFIBUS-Cable

The PROFIBUS standard DIN 19245 Part1 and Part3 permits two types of bus cable (Cable A and Cable B).

Parameter	Cable A PROFIBUS-DP DIN 19245 Part 3 Chap. 6.2	Cable B DIN19245 Part 1 / 4.91 Chap. 3.1.2.3
type of cable	Two-conductor shielded twisted pair cable	Two-conductor shielded twisted pair cable
Impedance	135 ... 165 Ω (3 ... 20 MHz)	100 ... 130 Ω (f > 100kHz)
Capacity	< 30 pF/m	< 60 pF/m
Loop resistance	< 110 Ω/km	-
Diameter	> 0,64 mm	> 0,53 mm
	> 0,34 mm²	> 0,22 mm²

Table 2: PROFIUS cable parameter

The maximal bus length depends on the type of cable and the baud rate (see table).

Baud rate kBit/s	9,6 - 93.75	187,5	500	1500	3000 - 12000
Cable A, max. distance in m (without repeater)	1200	1000	400	200	100
Cable B, max. distance in m (without repeater)	1200	600	200	--	--

Table 3: Maximal bus length

The maximal bus length can be extended until approx. 10 km with repeaters. The max. number of repeaters that can be used in a network depends on the type of the repeater and is between 3 and 10.

The PROFIBUS is a linear bus from device to device. Only short stubs are possible, see DIN 19245 Part1 and 3. The bus cable can be ordered from DMS with the order code PROF-KABEL. The bus cable must be terminated at both ends. We recommend connectors with integrated, switchable termination resistors

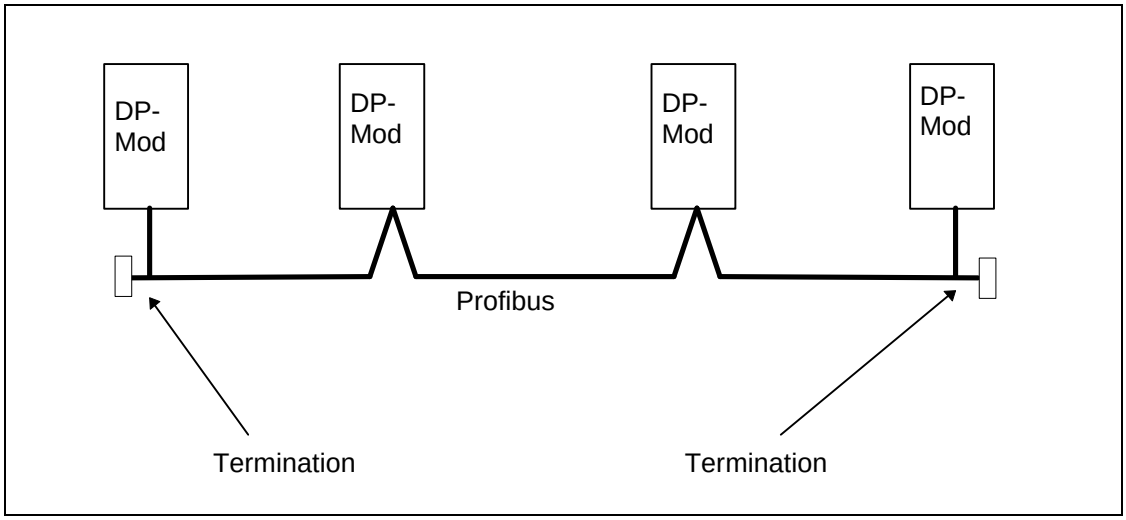


Figure 2: Bus cable with termination

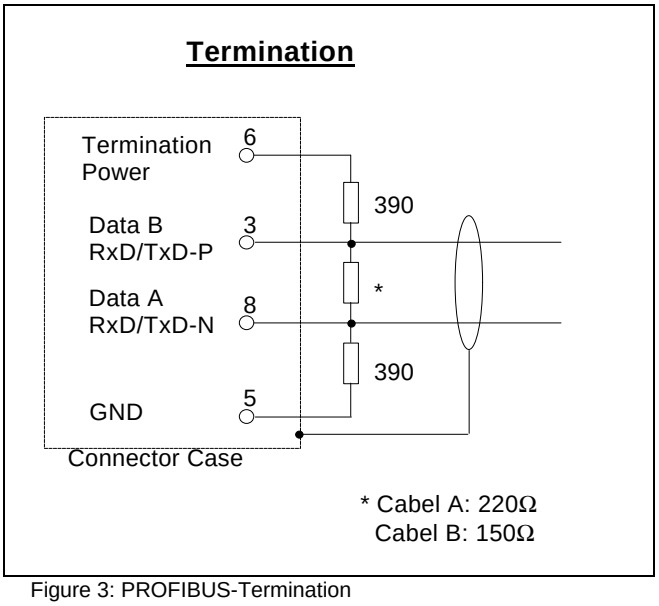


Figure 3: PROFIBUS-Termination

3.2.1.2. Number of Stations

Max. 32 devices are allowed per bus segment (without Repeater). With repeaters the number can be expanded up to 126 devices.

3.2.2. Terminal-Interface X1

The X1 RS232 interface is used only as debug port for the internal firmware.

Pin	RS232
1	-
2	RxD input data
3	TxD output data
4	-
5	GND
6	-
7	RTS output [1]
8	CTS input [1]
9	-

Table 4: Pin layout Terminal-interface X1

[1] do not connect

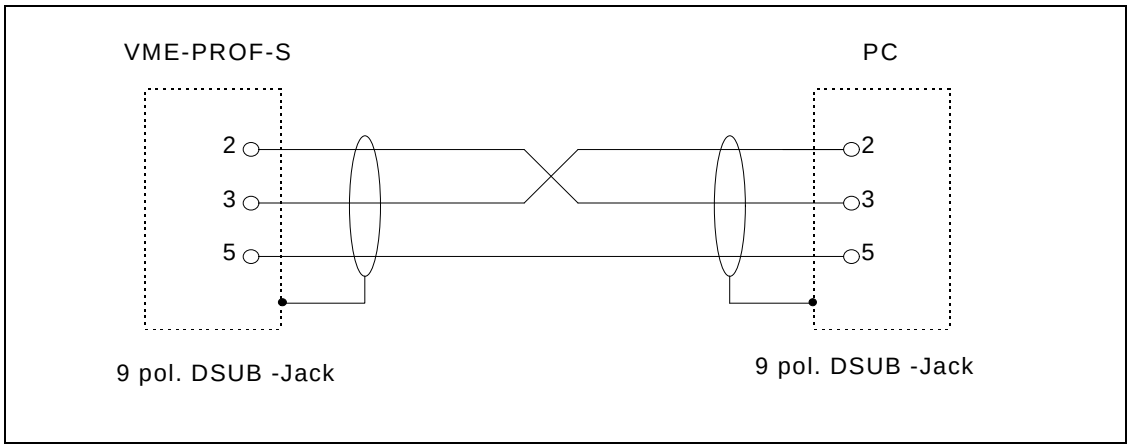


Figure 4: Interface cable VME-PROF-S X1 - PC (VT100 Terminal)

3.3. The VMEbus Interface

The table below summarizes a number of VMEbus functions[1]:

VMEbus Function	Included	Remark
DTB Master Address Bus	-	no VMEbus-Master functions
Master Data Bus	-	" " " "
Slave Address Bus	A24	24 Bit address bus width
Slave Data Bus	D08, D16	8 and 16 Bit data bus width
SSEQ	no	Slave: Sequential Access
Interrupt-Handler	-	no Interrupt-Handler function
Interrupter	IH1, IH2, IH3, IH4, IH5, IH6	Jumper selectable IRQ-Level

Table 5: Summary of VMEbus Functions

[1] Definition of VMEbus functions see [2].

3.3.1. VMEbus Master

The VME-PROF-S has no VMEbus-Master functions.

3.3.2. VMEbus Slave

The VME-PROF-S use 64 kByte within the VMEbus standard range. The base address of that address-range can be set with S21 / S20 (see chapter 2.1.1).

3.3.3. VMEbus Interrupt-Handler

The VME-PROF-S has no Interrupt-Handler functions.

3.3.4. VMEbus Interrupter

The VME-PROF-S card can generate IRQ-Level 1 to 6.

The IRQs are not used by the PROFIBUS DPS software.

3.3.5. VMEbus-Signals

3.3.5.1. SYSFAIL

The VME-PROF-S will activate the SYSFAIL signal-line and lit the LED VMEbus/F, after power-on or RESET, until the VME-PROF-S's firmware (DPS) is enabled (see chapter 4.1).

3.3.5.2. SYSRESET

The VME-PROF-S firmware will be reset (disabled) from an active SYSRESET-signal.

3.4. J2-Bus / Slot depending addressing

The VME-PROFI-S Version 5.0 or higher did not feature a slot depending addressing

4. System information

The VME-PROF-S comes with ready installed PROFIBUS DP-Slave software.

No system programming by the user is necessary.

4.1. Enabling of the VME-PROF-S

After Power-on or SYSRESET the VME-PROF-S will start it's Monitor program. To start the DPS firmware the Main-VMEbus-CPU must write a $08 at the VMEbus-address $8F000F[1] to enable the DPS firmware.

[1] A23 - A16 of the VME-PROF-S´s VMEbus-Standard base address are set with the S21 /S20 (see chapter 2.1.1).
In the following description, the default base address ($8F0000) are always used.

Writing $00 will disable the firmware.

4.2. Address-Map Standard-VME-range

The dualport RAM address map for the VME-PROF-S are listed attached.

4.2.1. VME-PROF-S VMEbus Address-Map with DPS firmware

Address (Hex) VMEbus-Standard base address +	Type	Name	Remark
$0000	Byte	Dummy0	Dummy
$0001	Byte	ID1	"D"
$0002	Byte	IRQSET	reserved
$0003	Byte	ID2	"M"
$0004	Byte	IRQEN	reserved
$0005	Byte	ID3	"S"
$0006	Byte	Dummy3	Dummy
$0007	Byte	BoardID	$0D for VME-PROF-S
$0008	Byte	Dummy4	Dummy
$0009	Byte	BoardED	Board Vers. = <D7..D4>.<D3..D0>
$000A	Byte	Dummy5	Dummy
$000B	Byte	Mail	reserved
$000C	Byte	Dummy6	Dummy
$000D	Byte	Vector	reserved
$000E	Byte	Dummy7	Dummy
$000F	Byte	Control	Card-Control-Register By writing $08 into this register, the DPS firmware will be enabled Writing $00 will disable the firmware
$0010	Lword[252]		reserved
$0400	Byte	Command	reserved
$0401	Byte	Error	reserved
$0402	Word[6]	Prm	reserved
$040E	Word	Live	“live“ will be increased while the VME-PROF-S is running
$0410	Byte[256]	ReadBuf	reserved
$0510	Byte[256]	WriteBuf	reserved
$0610 -$070F	Word[128]	DataBuf	reserved
$0710	char [7]	Software	„DPS“ = DP-Slave software
$0717	char	Version	SW-version = <D7..D4>.<D3..D0>
$0718	unsigned char	Station	PROFIBUS station address 0 .. 125

$0719	unsigned char	Status	„status“ are set by the DP-Slave software as followed: $02 -> The DP-Slave software starts, the configuration data will be read. $10 -> New output data are available in the output buffer. $41 -> Timeout (Watchdog time exceeded) $81 -> Communication error „status“ are set by the VMEbus main CPU as followed: $00 -> Status are cleared $01 -> The configuration data are valid See chapter 5.1.2.1
$071A	unsigned char	Baud	the VME-PROF-S automatically detects the baudrate and sets the value 0 -> 9600 Bit/s 1 -> 19200 Bit/s 2 -> 93,7 kBit/s 3 -> 187,5 kBit/s 4 -> 500 kBit/s 6 -> 1,5 Mbit/s 7 -> 3 Mbit/s 8 -> 6 Mbit/s 9 -> 12 Mbit/s
$071B	unsigned char	res	reserved
$071C	unsigned short	Ident	Ident-number 2 Byte = $5848 for VME-PROF-S = $5849 for CPUC The Ident-number are automatically set by the DPS firmware. To simulate a other type of DP-slave, a different ident-number can be set.
$071E	unsigned char	UparLn	length of user parameter
$071F	unsigned char	ConfLn	length of configuration data
$0720	unsigned char	InputLn	length of input data (automatically set by the DPS firmware)
$0721	unsigned char	OutputLn	length of output data (automatically set by the DPS firmware)
$0722 .. $0741	unsigned char	Uparam[32]	user parameter (not used)

$0742 .. $0761	unsigned char	Config[32]	configuration data Code as definied in DIN 19245 T3 8.3.5 D7 D6 D5 D4 D3 D2 D1 D0 | | | | |__|__|__|_ Number of | | | | data (N - 1) | | | | 00=1 Byte/Word | | | | 15=16 Byte/Word | | | | | | |__|_____Input/Output-code | | 00 = special format | | 01 = input | | 10 = output | | 11 = I/O-channel | | | |__0 = Byte | 1 = Word | |__consistency for 0 = Byte/Word 1 = whole number of data See also Config codes in the GSD-file.
$0762 ... $0861	DPR_Buffer	Inputs	Input-data buffer (VME-PROF-S -> DP-Master) DPR_Buffer consists of:
$0762	unsigned char	Sema	Sema must be increased before and after the VMEbus-CPU data access. With Sema, a consistency data access can be realized. See chapter 5.1.2.2
$0763	unsigned char	Lng	length of input data
$0764 .. $0861	unsigned char	Daten[254]	data
$0862 ... $0961	DPR_Buffer	Outputs	Output-data buffer (DP-Master -> VME-PROF-S) DPR_Buffer consists of:
$0862	unsigned char	Sema	Sema will be increased before and after the VME-PROF-S data access. With Sema, a consistency data access can be realized. See chapter 5.1.2.2
$0863	unsigned char	Lng	length of output data
$0864 .. $0961	unsigned char	Daten[254]	data
$0962 - $FFFF			reserved

Table 6: VME-PROF-S VMEbus Address-Map with DPS firmware

5. Software

The VME-PROF-S`s DPS-firmware are stored in the onboard Flash-EPROM.

5.1. PROFIBUS-DP-Slave Software

5.1.1. Slave configuration

For the configuration of the DP-Slave the following parameters must be available. The following table shows witch parameter must be set by the user or is detected automatically by the firmware. All with „set by user“ marked parameters must be set, before the DP-Slave software is enabled by writing **$01** to „**Status**“:

Parameter	Function	Comment
Station	PROFIBUS station address (0 .. 125)	**set by user**
Baud	Baudrate	automatically detected
Ident	Ident-number	Default Ident no set by the DPS firmware.
UparLn	Length of user parameter	**set by user**
ConfLn	Length of configuration data	**set by user**
InputLn	Length of input data	automatically calculated from the config data
OutputLn	Length of output data	automatically calculated from the config data
Uparam[32]	User parameter	not used
Config[32]	Configuration data	**set by user**

Table 7: DP Slave configuration parameters

Station

Any address in the range of 0 .. 125 can be selected as station address. Normally the lowest addresses are reserved for Master stations.

For Example: $00 DP-Master(Klasse2) (= Programming unit)
$01 DP-Master(Klasse1)
$02 DP-Master(Klasse1)

Baud

When the DPS firmware are enabled it will automatically detects the used baudrate and sets the following value:

0 -> 9600 Bit/s
1 -> 19200 Bit/s
2 -> 93,7 kBit/s
3 -> 187,5 kBit/s
4 -> 500 kBit/s
6 -> 1,5 Mbit/s
7 -> 3 Mbit/s
8 -> 6 Mbit/s
9 -> 12 Mbit/s

Note:
If the baudrate changes, the DPS firmware must be disabled and then enabled again to start the automatically baud rate detection! See chapter 4.1.

Ident

$5848 is the PNO Ident-number for the VME-PROF-S. This Ident-number are automatically set by the firmware. If the VME-PROF-S is used to simulate another DP-Slave type, the ID-Code of this simulated Slave can be set.

Config[xx]

The Configuration can consists from up to 32 configurations-bytes. The resulting input length must be ≤ 244 byte and resulting output length must be ≤ 244 byte. Together up to 400 I/O-bytes could be configured.

InputLn, OutputLn

The InputLn and OutputLn are automatically set by the firmware.

Uparln

The VME-PROF-S didn't need user-bytes. Therefore Uparln should be set to $00.

Uparam[32]

The VME-PROF-S didn't need user-bytes (= Uparam). In case of a simulated DP-Slave, user-bytes can be send from the Master. This bytes are ignored from the VME-PROF-S.

5.1.2. DP-RAM data interface

The input and output data of the VME-PROF-S can be accessed trough the dualport RAM. See chapter 4.2.1 for the address range.

5.1.2.1. Status- Variable

„status" are set by the DP-Slave software as followed:

$02 -> The DP-Slave software starts, the configuration data will be read. If „status" is set to $02 and didn't change, an error had occurred (for example wrong configuration data, wrong length of configuration data).

$10 -> New output data are available in the output buffer.

$41 -> Timeout (Watchdog time exceeded).
The data in the output-buffer are reset to $00 by the VME-PROF-S-software.

$81 -> Communication error.
The data in the output-buffer are reset to $00 by the VME-PROF-S-software.

„status" are set by the VMEbus main CPU as followed:

$00 -> Status are cleared.
After reading the output data, „status" should be cleared (= $00).

$01 -> The configuration data are valid.
After setting $01, the VME-PROF-S-software starts and sets status=$02.

Note:
If the VME-PROF-S configuration includes inputs, but no outputs, the variable „status" will not be set during the regular operating of the VME-PROF-S, because no new output data are available. If the operating mode of the VME-PROF-S should be checked, one dummy output byte must be configured.

5.1.2.2. Sema-Variable within the input- and output buffer

A semaphon control byte „sema“ are included in the input- and output-data-buffer.

Output-Sema:

Sema will be increased before and after the VME-PROF-S data access. Sema must be set to $00 when the output buffer is initialized.

Input-Sema:

The VME-PROF-S-software will only accept new input data, if Sema are even and didn’t change, while the data were read.
Sema must be set to $00 when the input buffer is initialized.

5.1.2.3. Data access without consistency

The input and output data in the DP-RAM can directly be read and written, if no consistency data access necessary.
In this case, input sema must have a constant, even value. Otherwise, the VME-PROF-S-software would not read the input data.

Note

Word data are only copied consistency, if the data starts at an even address. Therefore the configuration should consists of an even number (0, 2, 4,....) of bytes in front of word data.

Example:

Cfg-data(hex):	10 12 40	(1 byte input, 3 byte input, 1 word input)	=> ok
	10 11 40	(1 byte input, 2 byte input, 1 word input)	=> no concistency for the word data

5.1.2.4. Consistency data access

The consistency data transfer can be monitored through the semaphon control byte „Sema“.
A consistency data access is necessary, if more than 2 bytes (= 1 word, see note above) must be processed as a block of data. For example a 3 byte (=24 bit) angle value. Bytes or words always handled consistency, without usage of sema.

Reading consistency output data:

The VMEbus-CPU must read sema two times, once before the output data are read and second after the output data are read.
The output data can be used, if both sema-values are even numbered and equal (i.e. no DP-Slave data transfer occurs in the mean time).

Writing of consistency input-data:

The VMEbus-CPU must increase sema (-> odd value), write the data and had to increase sema again (-> even value).

A ANSI C demo program with consistency data access can be found in chapter 5.1.3.1.

5.1.3. Demo program

5.1.3.1. Ultra C (ANSI C)

Syntax: **vpsdemo s**

s = slot number (1 .. 15 if slot depending addressing takes place) (15 without slot depending addressing)

vpsdemo.c

```
/* VME PROFI / VME-PROF-S DEMO with consistency data access)*/
/*            13.09.96      RC  */
/*            11.07.97      RC  extention for  VME-PROF-S         */

#include <stdio.h>
#include <module.h>
#include <signal.h>
#include <types.h>
#include <process.h>


#define VS_Base 0x800000


typedef unsigned char byte ;
typedef unsigned short wort ;
typedef unsigned int lwort ;

#include "../defs/VPS.h"
#include "../dps/DPR_Sub.c"


/* Global variables */
VS_Typ *DP ;


int main (int argc , char **argv)
{
int err,ret;
u_int32 st ;
u_int16 sink ;
process_id pid ;
byte *p ;
short n, s;
byte b ;

int counter ;
unsigned char outbuf[16] ;

printf ("Demoprogramm for VMEPROF-S / CPUC\n") ;
printf ("------------------------------------ \n\n") ;
s = atoi (argv[1]) ;      /* s = Slot Number    1 .. 15  */
p = (byte*) (VS_Base + (0x10000 * s) ) ;
DP = (VS_Typ*) p ;

if ( (err = _os9_id(&pid,&sink,&sink,&sink)) ) /* Get ID */
      printf("Error _os9_id() %X\n",err);

if ((err = _os_permit ((void*)p,0x10000,0x777,pid)))
           /*VMEbus Standard 64 KB starting at address p */
    printf("Error _os_permit() %X \n",err);


DP->Control = 0x00 ; /* disable DPS firmware */
```

```
sleep (1) ;
printf ("  Manufactor-Ident ...: %c%c%c\n", DP->ID1,DP->ID2,DP->ID3 );
printf ("  Board-Ident ........: %3d\n", DP->BoardID );
printf ("  Board-Version ......: %3X\n", DP->BoardED );
DP->Error = 1 ;
DP->Control = 0x08 ;   /*  Enable DPS firmware */
       /* Now the DPS firmware starts and claers 'Error'             */
       /* Then the following configuration-variables are preset by   */
       /* the DPS-firmware:                                          */
       /*      DP->Ident     = 0x5848  (or 0x5849 for the CPU-C)     */
       /*      UparLn    = 0                                        */
       /*      ConfLn    = 02                                       */
       /*      Config[0] = 0x1F                                     */
       /*      Config[1] = 0x2F                                     */
       /* The DPS-firmware then waits, until Status are set to 1     */

sleep (1) ;
printf (" Wait for Lokal-CPU start ...\n");
for (n=0;n<10;n++) if (DP->Error) sleep(1) ;
if (DP->Error)
  {
       printf (" *** Error : Local CPU did not start !\n") ;
       DP->Control = 0x00 ;
       return (0) ;
  } ;
printf (" --> Start O.K.\n") ;


printf ("  Software ...........: %s\n", DP->Software );
printf ("  SW-Version .. ......: %1X\n", DP->Version );

DP->Station   = 20 ;    /* Profibus Stations Address (0 .. 125) */
/* DP->Ident     = 0x5848; */
                        /* the DPS firmware sets the default Ident no.        */
                        /* PNO Ident Nummer for the VME-PROF-S     = 0x5848   */
                        /* PNO Ident Nummer for the CPUC           = 0x5849   */
                        /* If a other DP-slave shall be simulated, a different*/
                        /* ID-Number can be set.                              */
/* DP->Baud      = 4 ; */
                       /* The DPS firmware automatically detects the used baud*/
                       /* rate, therefore the baud rate setting not necessary */
                       /* The used baud rate can be red from DP->Baud */
                       /* Baudrate ( 0 / 1  / 2  / 3   / 4 /  / 6  / 7 )      */
                       /*         = 9,6/19,2/93,7/187,5/500/  /1500/3000kBit/s*/

DP->UparLn    = 0 ;     /* User Parameter Length (0 .. 32) */
DP->ConfLn    = 02 ;    /* Config Length (1 .. 32)*/
DP->Config[0] = 0x13 ;  /* 4 Byte Input Data to Master */
DP->Config[1] = 0x2f ;  /* 16 Byte Output Data from Master */
DP->InputLn   = 0 ;     /* 0 = preset value for the Input Data Length.       */
                        /* The correct value is later calculated by the DPS- */
                        /* firmware                                          */
DP->OutputLn  = 0 ;     /* 0 = preset value for the Output Data Length. The  */
                        /* correct value is later calculated by the DPS-     */
                        /* firmware*/

DPR_Init (&DP->Inputs ,DP->InputLn) ;  /* pre-initialization of the buffer    */
DPR_Init (&DP->Outputs,DP->OutputLn) ; /*  "         "        "   "   "       */
DP->Status = 1 ;        /* Enable */
                        /* Status = 1  -> the configuration data are valid    */
                        /* the DPS software now starts-up with this           */
                        /* configuration data.                                */
                        /* The firmware will now calculate the InputLn and    */
                        /* OutputLn from the given Config[*] data and then    */
                        /* initializes the Input and Output buffers with the  */
                        /* correct Input- / Output length.                    */

counter = 0 ;

while (1)
```

```
  {
   counter++ ;
   DPR_Write (&DP->Inputs, (unsigned char*) &counter) ;
   while ( DPR_Read  (&DP->Outputs, &outbuf[0]) ) ;
   printf ("\nStatus : %02X",DP->Status) ;
   if (DP->Status & 0x10)      /* Status = 10  -> new Output data avialable */
     {
        printf ("\nOutput :");
        for (n=0;n<16;n++) printf (" %02X",outbuf[n]) ;
        DP->Status = 0 ;
     } ;
     sleep (1) ;
  } ;

return (0) ;
} /* END MAIN */
```

vps.h

```
/* Slave DPR */

typedef struct {
    unsigned char Sema ;
    unsigned char Lng ;
    unsigned char Daten[254] ;
               } DPR_Buffer ;



typedef struct { byte dumy0  ;  byte ID1 ;
                 byte IRQSET ;  byte ID2 ;
                 byte IRQEN  ;  byte ID3 ;
                 byte dumy3 ;  byte BoardID ;
                 byte dumy4 ;  byte BoardED ;
                 byte dumy5 ;  byte Mail ;
                 byte dumy6 ;  byte Vector ;
                 byte dumy7 ;  byte Control ;
                 lwort LokalVec[252] ;
                 byte Comand ;
                 byte Error ;
                 wort Prm[6] ;
                 wort Live ;
                 byte ReadBuf[256] ;
                 byte WriteBuf[256] ;
                 wort DataBuf[128] ;
             char Software[7] ;
             char Version ;
    unsigned char Station ;
    unsigned char Status ;
    unsigned char Baud ;
    unsigned char Blink ;
    unsigned short Ident ;
    unsigned char UparLn ;
    unsigned char ConfLn ;
    unsigned char InputLn ;
    unsigned char OutputLn ;
    unsigned char Uparam[32] ;
    unsigned char Config[32] ;
    DPR_Buffer Inputs ;
    DPR_Buffer Outputs ;

               } VS_Typ ;
```

dpr_sub.c

```
/* DPR with consistency data access */


void DPR_Init ( DPR_Buffer *DB , unsigned char Length )
{
unsigned char n ;
    DB->Sema = 0 ;
    DB->Lng  = Length ;
    for (n=0; n < DB->Lng; n++)
         DB->Daten[n] = 0 ;
}

void DPR_Write ( DPR_Buffer *DB , unsigned char * from )
{
unsigned char n ;
    DB->Sema++ ;
    for (n=0; n < DB->Lng; n++)
       {  DB->Daten[n] = *from ;
          from++ ;
        } ;
    DB->Sema++ ;
}


/* DPR_Read copies data from VME-PROFI dualport RAM (DPR) -> user program
   repeat, until successful (constant, even-numbered  „sema“):
     while (DPR_Read(&DPR,&Buffer)) sleep(1) ; */

char DPR_Read ( DPR_Buffer *DB , unsigned char * to )
{
unsigned char Last ;
unsigned char n ;
    Last = DB->Sema ;
    if (Last & 1) return 1 ;
    for (n=0; n < DB->Lng; n++)
       {  *to = DB->Daten[n] ;
          to++ ;
        } ;
    if (Last == DB->Sema ) return 0 ;
    else return 1 ;
}
```

6. Service and Maintenance

The VME-PROF-S card does not require any special maintenance.

In case of a fault all card settings (jumpers and software setup) should be checked. Should you be unable to find the defect the card needs to be wrapped up carefully (packaging needs to be protected against electrostatic discharge) and ship it back to DMS. All returns must contain a detailed fault report (see Appendix Section 'DMS Return Form').

6.1. Troubleshooting

In this chapter you will find solutions for problems which may occur with the VME-PROF-S.

6.1.1. General troubleshooting

Problem: The dualport-RAM of the VME-PROF-S can´t be accessed, or appears in a wrong address range.

Possible fault	Solution
Wrong address setting	Check the address setting see chapter 2.1.1

Problem: Errors occur with selected higher baud-rates

Possible fault	Solution
Bus-cable, bus-termination or wrong installation of the bus-cable (to long stubs).	Select the cable type according to the used baud rate, bus-termination at both ends of the bus, installation without stubs. See chapter 3.2.1.1.

6.1.2. VME-PROF-S troubleshooting

Problem: No communication to the VME-PROF-S after changing of the baud rate

Possible fault	Solution
The VME-PROF-S automatically search the baud rate when the DPS firmware is enabled and sets the found value in DP->Baud ..	Check DP->Baud
The DPS firmware will not detect a changed baudrate while it is running.	Disable and the enable the DPS firmware. See chapter 4.1.

Problem: The VME-PROF-S-software did not read the input data. Output data are transferred correct.

Possible fault	Solution
Input sema are wrong. Input sema must have a constant, even value. Otherwise, the VME-PROF-S-software would not read the input data.	Set sema to $00. See chapter 5.1.2.3.

7. Diagrams and Appendix Section

7.1. Summary of Abbreviations

AM Code	Address Modifier Code
ASCII	American Standard Code for Information Interchange
CPU	Central Processing Unit
DMS	DMS Dorsch Mikrosystem GmbH
DPM1	DP-Master Class 1 (PROFIBUS DP controller for data exchange with DP-Slaves)
DPM2	DP-Master Class 2 (PROFIBUS DP controller for programming, configuration and diagnostics)
DPS	PROFIBUS DP Slave
DTB	Data Transfer Bus
EC	European Community
EPROM	Erasable Programmable Read-only Memory
ESD	Electrostatic Discharge
GAP	Address range beginning from the own address +1 up to the next active Master
GAP-update	During an GAP-update cycle, the Master checks all addresses (one address after each communication cycle) within his GAP range, whether a new Master appears, how want to be included into the token cycle.
GSD	Geräte-Stammdaten-Datei, device database information.
ID	Identifier
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical and Electronic Engineers
KB	Kilobyte, 1 KB = 1.024 Bytes
LED	Light Emitting Diode, Leuchtdiode
n.c.	not connected
OS-9	Multi-user and Multitasking Operating System by Microware
PNO	PROFIBUS user organization
PROFIBUS	a standardized field bus, specified in DIN 19245 / pr EN50170
PROFIBUS-DP	PROFIBUS for decentralized peripheral, DIN 19245 Part 1 + 3
PROFIBUS-FMS	PROFIBUS with Fieldbus Message Specification protocol DIN 19245 Part 1 + 2
VITA	VMEbus International Trade Association
VMEbus	Versa Module Eurocard Bus System
VME-PROFI(DPM1)	VME-PROFI with DP-Master Class 1 firmware
VME-PROFI(DPS)	VME-PROFI with DP-Slave firmware

7.2. References

[1] DMS Catalog, Dorsch Mikrosystem GmbH

[2] The VMEbus Specification (ANSI/IEEE STD 1014-1987), VMEbus International Trade Association

[3] PROFIBUS Norm DIN 19245 Part 1,2,3

[4] The rapid way to PROFIBUS DP Manfred Popp
PNO-Best.-Nr.: 4.071 (German) 4.072 (English), PROFIBUS Nutzerorganisation

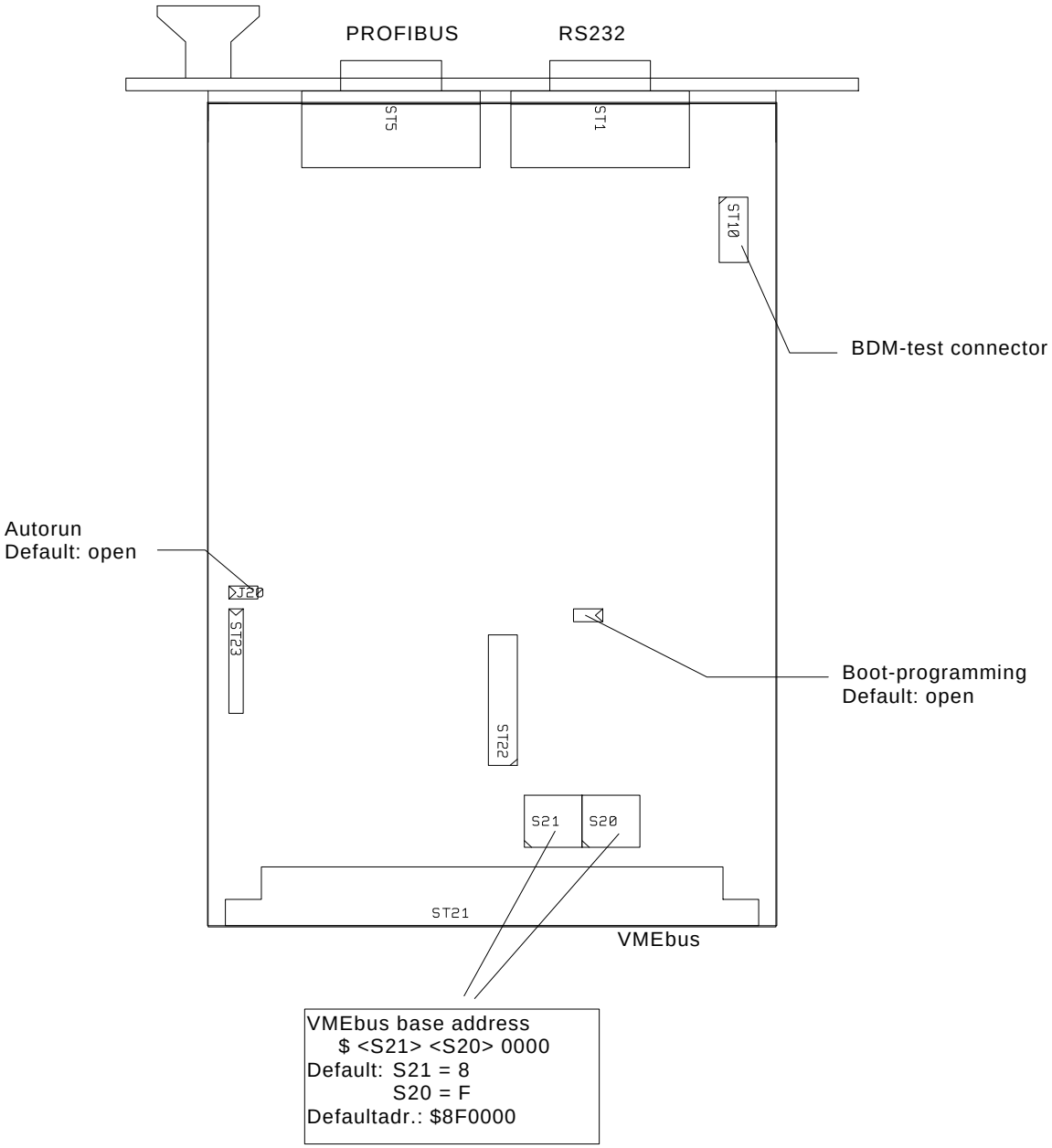
7.3. Pin Layout ST1

Pin No.	Line A	Line B	Line C
1	VD0	n.c.	VD8
2	VD1	n.c.	VD9
3	VD2	n.c.	VD10
4	VD3	-> 5b	VD11
5	VD4	-> 4b	VD12
6	VD5	-> 7b	VD13
7	VD6	-> 6b	VD14
8	VD7	-> 9b	VD15
9	GND	-> 8b	GND
10	n.c.	->11b	SYSFAIL*
11	GND	->10b	BERR*
12	DS1*	n.c.	SYSRESET*
13	DS0*	n.c.	LWORD*
14	WRITE*	n.c.	AM5
15	GND	n.c.	VA23
16	DTACK*	AM0	VA22
17	GND	AM1	VA21
18	AS*	AM2	VA20
19	GND	AM3	VA19
20	IACK*	GND	VA18
21	IACKIN*	n.c.	VA17
22	IACKOUT*	n.c.	VA16
23	AM4	GND	VA15
24	VA7	n.c.	VA14
25	VA6	IRQ6*	VA13
26	VA5	IRQ5*	VA12
27	VA4	IRQ4*	VA11
28	VA3	IRQ3*	VA10
29	VA2	IRQ2*	VA9
30	VA1	IRQ1*	VA8
31	n.c.	n.c.	n.c.
32	VCC	VCC	VCC

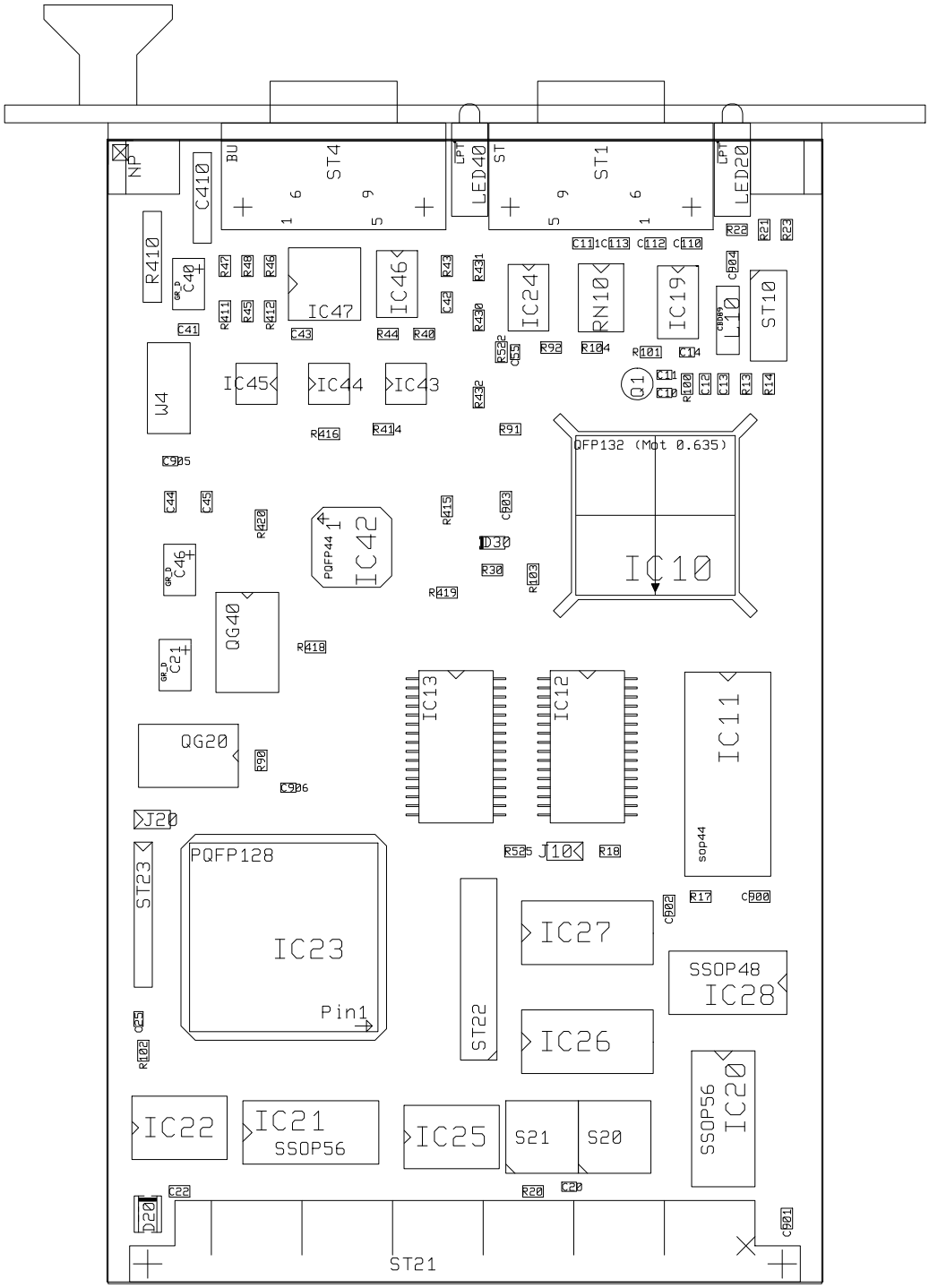
Table 8: Pin Layout ST1

* Low active signal
-> connected with Signal xx
n.c. not connected

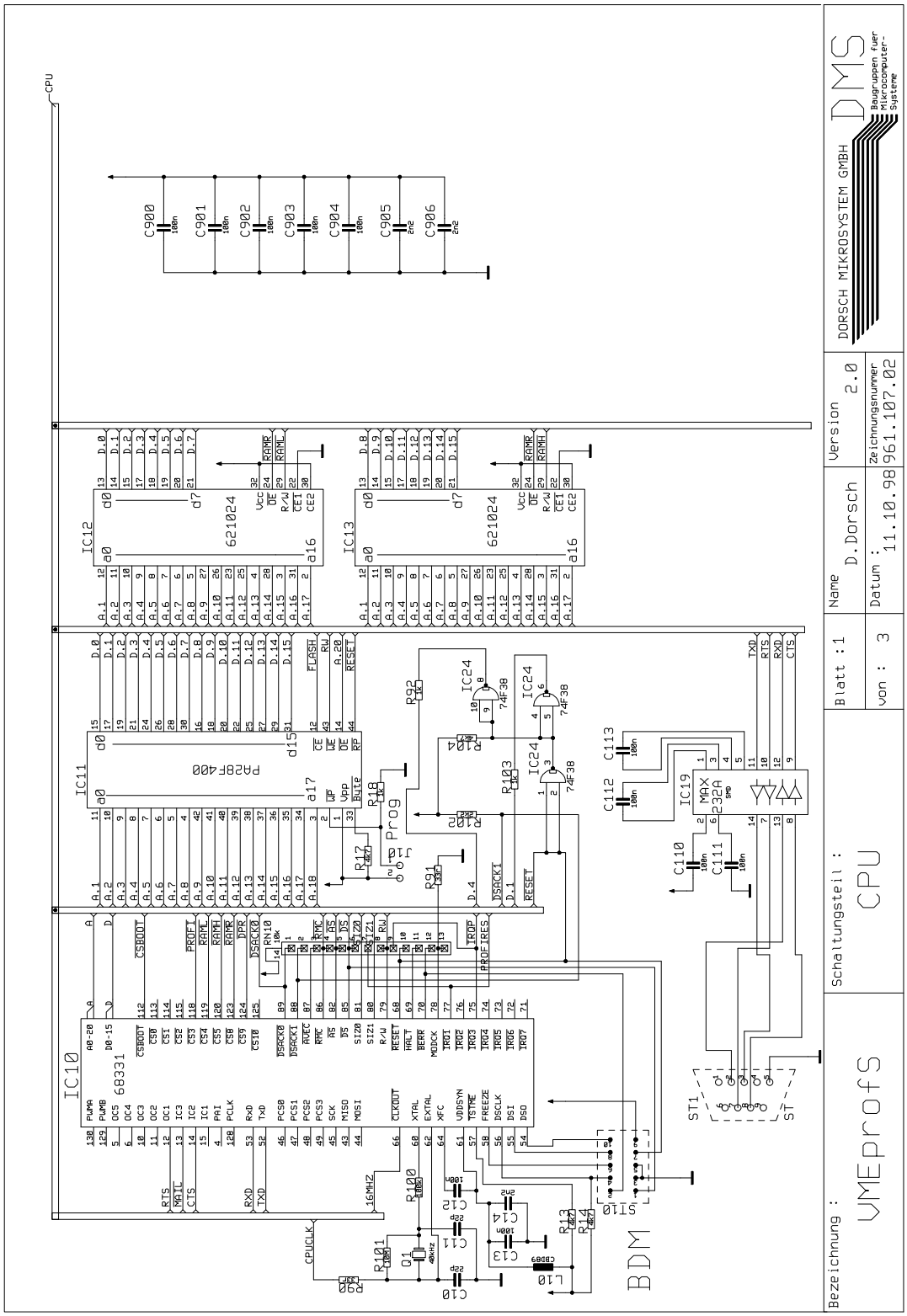
7.4. Jumper diagram

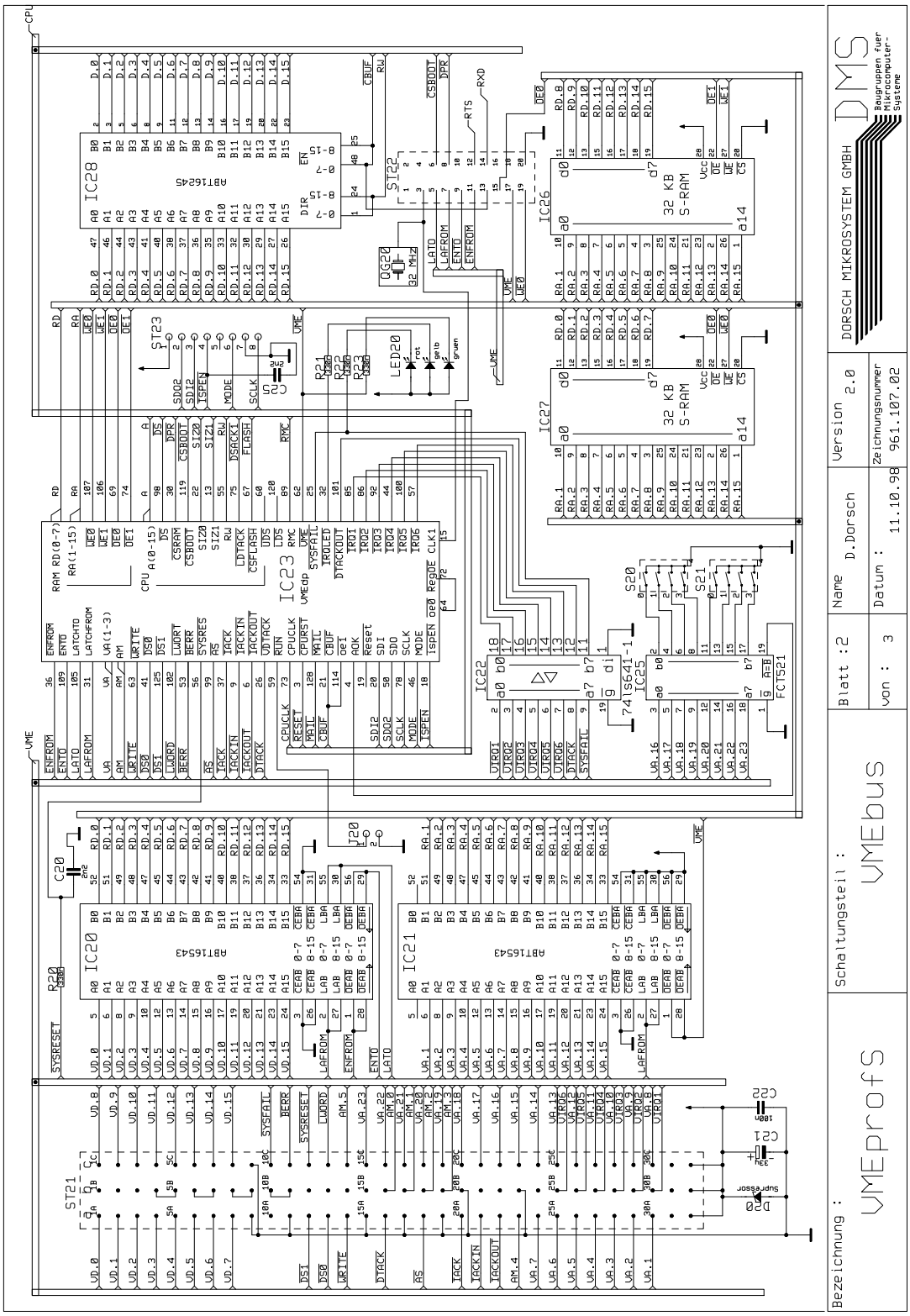


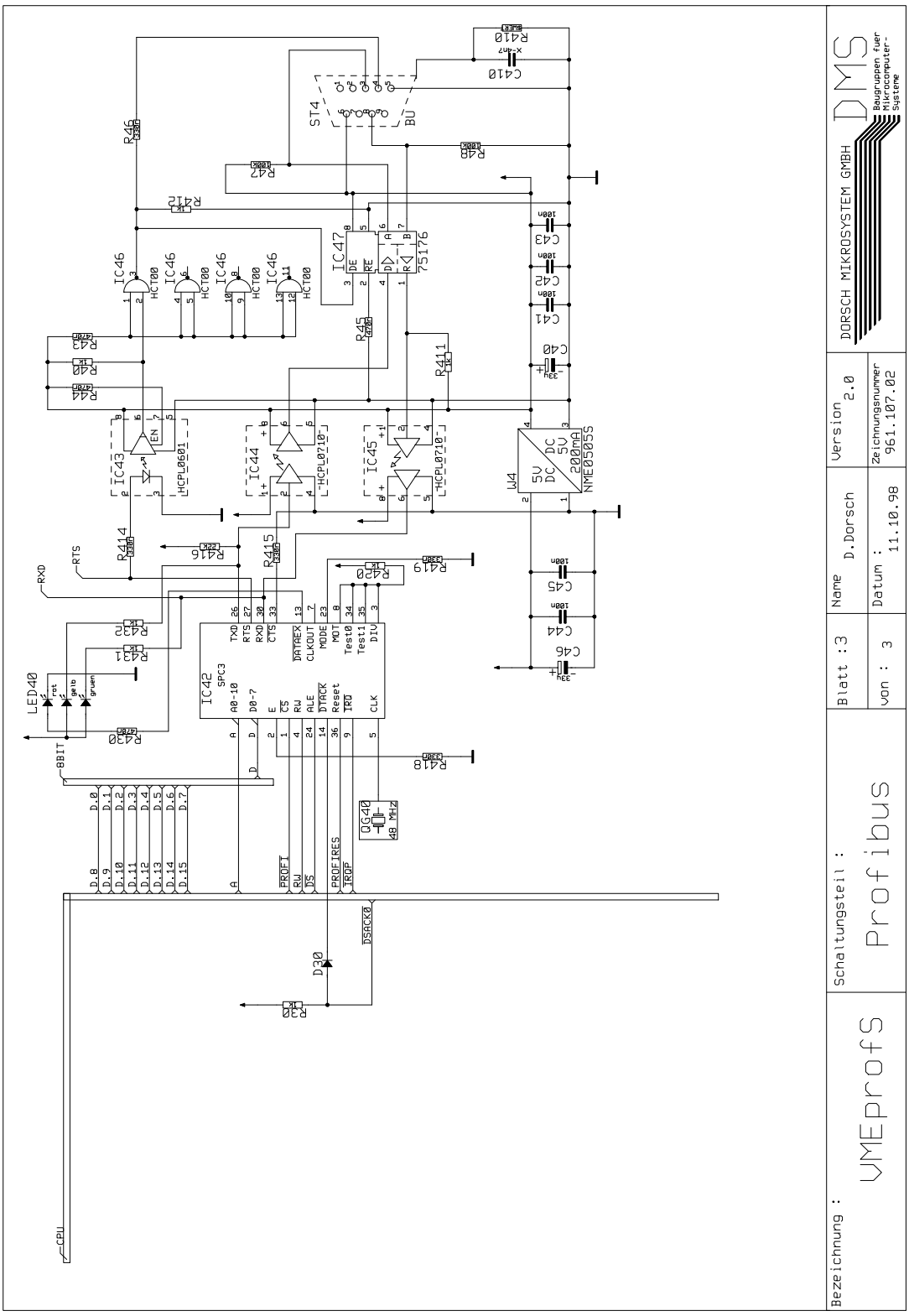
7.5. Component Mounting Diagram



7.6. Wiring Diagram




DORSCH MIKROSYSTEM GMBH
DMS
Baugruppen fuer Mikrocomputer-Systeme
Version 2.0
Zeichnungsnummer 961.107.02
Name D.Dorsch
Datum : 11.10.98
Blatt :2
von : 3
Schaltungsteil : VMEbus
Bezeichnung : VMEprofS
IC28
IC26
IC27
IC23
IC22
IC25
IC20
IC21
ST23
ST22
ST21
LED20
S20
S21
OG20
32 KB S-RAM
74ls641-1
FCT521
ABT16245
ABT16543


DORSCH MIKROSYSTEM GMBH
DMS
Baugruppen fuer Mikrocomputer-Systeme
Version 2.0
Zeichnungsnummer 961.107.02
Name D.Dorsch
Datum : 11.10.98
Blatt :3
von : 3
Schaltungsteil : Profibus
Bezeichnung : VMEprofS
IC42 SPC3
IC43 HCPL0601
IC44 HCPL0710
IC45 HCPL0710
IC46 HC100
IC47 75176
W4 NME0505S
LED40
QG40 48 MHz
ST4
D30
RXD
RTS
8BIT
CPU
PROFI
PROFIRES
DSACK0

7.7. Reader Comments

DMS Dorsch Mikrosystem GmbH
Abt.: Qualitätsmanagement
Holmlück 13-15

24972 Steinbergkirche
Germany

Sender (please fill in)

Name and Department: _____

_____

Company: _____

Address: _____

Phone/FAX: _____

Did you encounter any errors while reading through this technical manual? If so please fill in this form. Do you have any proposals on how to improve this manual? What subject would you like more information on?

Document ID: _____ Date: _____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

7.8. DMS Return Form

Please enclose the following return form with all returns to DMS.

Note: The customer bares the cost and risk of returns to DMS - even for warranty claims. DMS will bare the costs for returning the goods to the customer.

Device Name	Serial No.	Date

Contact person

Company : _____

Department: _____ Mr. / Mrs. / Ms: _____

Street : _____ Phone: ++ ___-_____-_____

City : _____

Kind of Service Required

[ ] Repair
[ ] Check device and repair if necessary

Hardware and software updates to the newest version

Hardware:
[ ] update (default)
[ ] do not update

Software:
[ ] update
[ ] do not update (default)

What kind of error did occur?

[ ] right from the beginning
[ ] later on
[ ] _____

Can the error be reproduced?

[ ] sporadic and rarely
[ ] approx. ____ minutes after switching on the device
[ ] approx. every ____ minutes
[ ] at a temperature of _____ degrees Celsius
[ ] very often
[ ] continuously
[ ] _____

Compared with other devices of this type...

[ ] the system operates without a problem with another device of the same type.
[ ] the device operates problem free in another system.
[ ] not applicable

Operating Conditions

[ ] DMS system : _____ [ ] other system: _____

[ ] DMS CPU : _____ [ ] other CPU : _____

Settings, Configurations, Software

_____

_____

Problem Description

_____

_____

_____