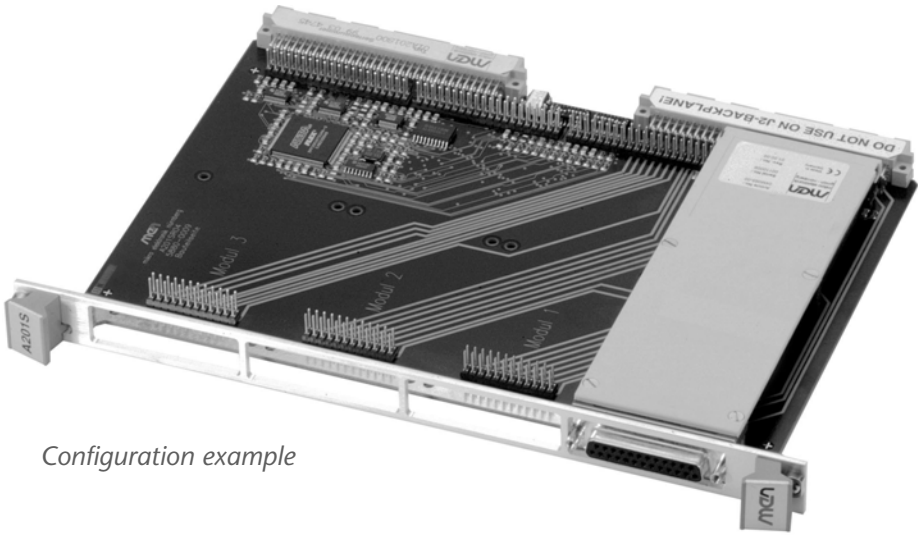
Embedded Solutions

A201S – 6U VMEbus M-Module™ Carrier Board



Configuration example

User Manual

mikro elektronik
gmbh · nürnberg

A201S – 6U VMEbus M-Module™ Carrier Board

The A201S is an M-Module™ carrier board for universal I/O on the VMEbus, allowing high flexibility in applications such as process and motion control, measuring and instrumentation, communication or special-purpose tasks. The M-Modules™ are screwed tightly on the carrier board, but the board needs only one slot on the VMEbus. Please note that since all three rows of the P2 connector are used for user I/O, board models with this connector are not compatible with VME64 backplanes.

An interrupt controller handles the M-Modules™ individually. In VMEbus D16 systems the I/O signals of the M-Modules™ can be accessed from P2/J2 inside the rack.

Technical Data

Mezzanine Slots

- Four M-Module™ slots
- Compliant with M-Module™ standard
- Characteristics: D08, D16, A08, INTA, INTC

Interrupt Controller

- Interrupt handling individually for each M-Module™
- Functional compatibility with A201N

Peripheral Connections

- Via front panel
- Via 96-pin P2 connector (rear I/O)

VMEbus

- Only one slot required on the VMEbus
- Models with P2 connector not compatible with VME64 backplanes (row B of the P2 connector is used for user I/O)
- Slave D08(EO):D16:A16:A24
- Interrupter D08(O)

Electrical Specifications

- Supply voltage/power consumption: +5V (-3%/+5%), 320mA typ. (without M-Modules™)

Mechanical Specifications

- Dimensions: standard double Eurocard, 233.3mm x 160mm
- Front panel: aluminum with 2 handles, cut-outs for front connectors of 4 M-Modules™
- Weight: 220g

Environmental Specifications

- Temperature range (operation):
  - 0..+60°C or -40..+85°C
  - Airflow: min. 10m³/h
- Temperature range (storage): -40..+85°C
- Relative humidity range (operation): max. 95% without condensation
- Relative humidity range (storage): max. 95% without condensation
- Altitude: -300m to + 3,000m
- Shock: 15g/11ms
- Bump: 10g/16ms
- Vibration (sinusoidal): 2g/10..150Hz
- Conformal coating on request

MTBF

- MTBF: 430,000h @ 50°C (derived from MIL-HDBK-217F)

Safety

- PCB manufactured with a flammability rating of 94V-0 by UL recognized manufacturers

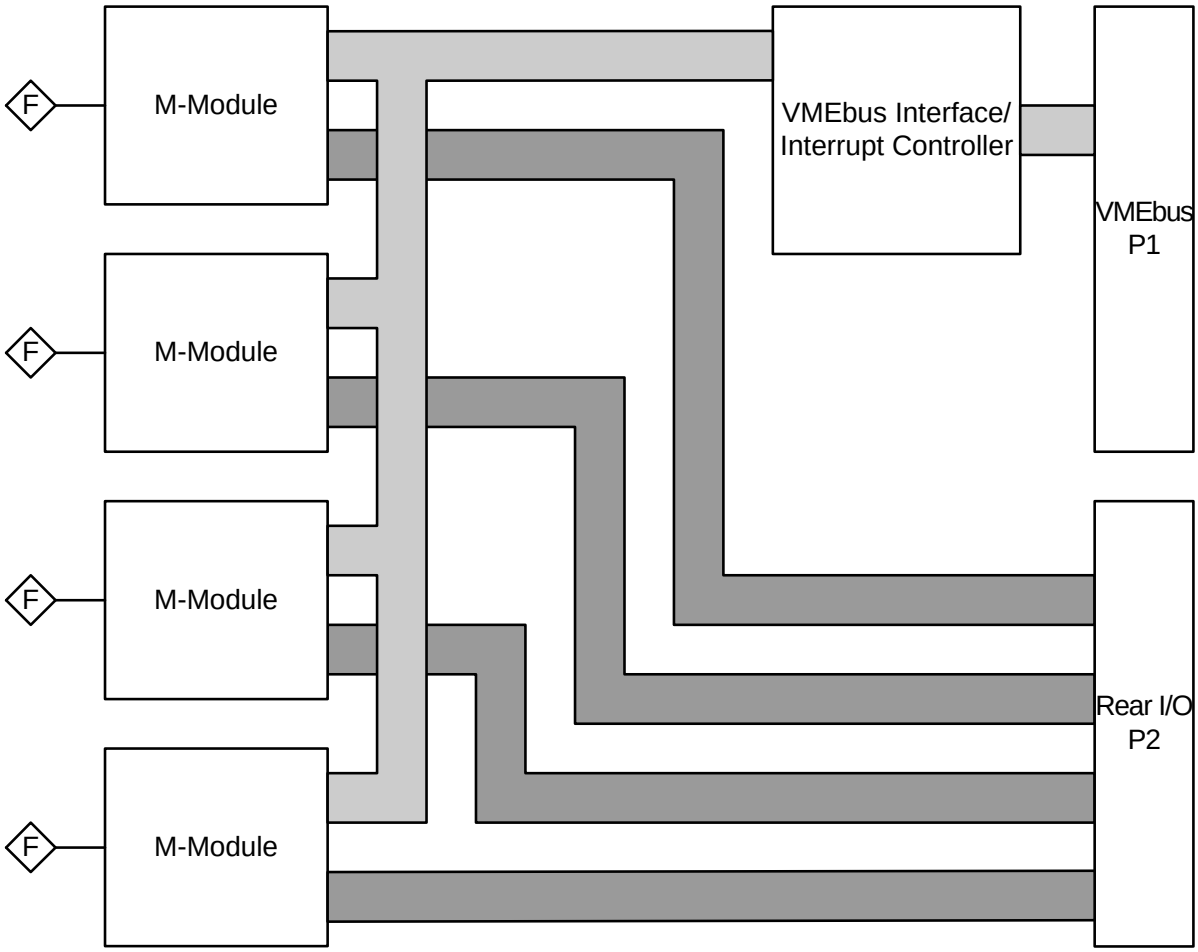
EMC

- Tested according to EN 55022 (radio disturbance), IEC1000-4-2 (ESD) and IEC1000-4-4 (burst)

Software Support

- M-Module™ drivers for Windows®, VxWorks®, Linux, QNX®, OS-9® as supported

Block Diagram



Product Safety

Electrostatic Discharge (ESD)

Computer boards and components contain electrostatic sensitive devices. Electrostatic discharge (ESD) can damage components. To protect the board and other components against damage from static electricity, you should follow some precautions whenever you work on your computer.

- Power down and unplug your computer system when working on the inside.
- Hold components by the edges and try not to touch the IC chips, leads, or circuitry.
- Use a grounded wrist strap before handling computer components.
- Place components on a grounded antistatic pad or on the bag that came with the component whenever the components are separated from the system.
- Store the board only in its original ESD-protected packaging. Retain the original packaging in case you need to return the board to MEN for repair.

About this Document

This user manual describes the hardware functions of the board, connection of peripheral devices and integration into a system. It also provides additional information for special applications and configurations of the board.

The manual does not include detailed information on individual components (data sheets etc.). A list of literature is given in the appendix.

History

Issue	Comments	Date
E0	First edition	1994-10-21
E1	Second edition (as of hardware rev. 1.x)	1994-11-23
E2	Third edition	1995-11-13
E3	Fourth edition	1998-06-26
E4	Fifth edition	2000-12-18
E5	General update, minor errors corrected	2005-07-22
E6	Added comments about incompatibility with VME64 backplanes	2008-07-24
E7	Clarified description of how to mount M-Modules	2010-07-19

Conventions

This sign marks important notes or warnings concerning proper functionality of the product described in this document. You should read them in any case.

italics — Folder, file and function names are printed in *italics*.

bold — **Bold** type is used for emphasis.

`monospace` — A `monospaced` font type is used for hexadecimal numbers, listings, C function descriptions or wherever appropriate. Hexadecimal numbers are preceded by "0x".

hyperlink — Hyperlinks are printed in blue color.

The globe will show you where hyperlinks lead directly to the Internet, so you can look for the latest information online.

IRQ# /IRQ — Signal names followed by "#" or preceded by a slash ("/") indicate that this signal is either active low or that it becomes active at a falling edge.

in/out — Signal directions in signal mnemonics tables generally refer to the corresponding board or component, "in" meaning "to the board or component", "out" meaning "coming from it".

Vertical lines on the outer margin signal technical changes to the previous edition of the document.

Legal Information

MEN Mikro Elektronik reserves the right to make changes without further notice to any products herein. MEN makes no warranty, representation or guarantee regarding the suitability of its products for any particular purpose, nor does MEN assume any liability arising out of the application or use of any product or circuit, and specifically disclaims any and all liability, including without limitation consequential or incidental damages.
"Typical" parameters can and do vary in different applications. All operating parameters, including "Typicals" must be validated for each customer application by customer's technical experts.
MEN does not convey any license under its patent rights nor the rights of others.
Unless agreed otherwise, MEN products are not designed, intended, or authorized for use as components in systems intended for surgical implant into the body, or other applications intended to support or sustain life, or for any other application in which the failure of the MEN product could create a situation where personal injury or death may occur. Should Buyer purchase or use MEN products for any such unintended or unauthorized application, Buyer shall indemnify and hold MEN and its officers, employees, subsidiaries, affiliates, and distributors harmless against all claims, costs, damages, and expenses, and reasonable attorney fees arising out of, directly or indirectly, any claim of personal injury or death associated with such unintended or unauthorized use, even if such claim alleges that MEN was negligent regarding the design or manufacture of the part.

Unless agreed otherwise, the products of MEN Mikro Elektronik are not suited for use in nuclear reactors and for application in medical appliances used for therapeutical purposes. Application of MEN products in such plants is only possible after the user has precisely specified the operation environment and after MEN Mikro Elektronik has consequently adapted and released the product.

ESM™, ESMini™, MDIS™, MDIS4™, MDIS5™, MENMON™, M-Module™, M-Modules™, SA-Adapter™, SA-Adapters™, UBox™, USM™ and the MBIOS logo are trademarks of MEN Mikro Elektronik GmbH. PC-MIP® is a registered trademark of MEN Micro, Inc. and SBS Technologies, Inc. MEN Mikro Elektronik®, ESMexpress®, MIPIOS® and the MEN logo are registered trademarks of MEN Mikro Elektronik GmbH.

Microsoft® and Windows® are registered trademarks of Microsoft Corp. Windows® Vista™ is a trademark of Microsoft Corp.OS-9®, OS-9000® and SoftStax® are registered trademarks of RadiSys Microware Communications Software Division, Inc. FasTrak™ and Hawk™ are trademarks of RadiSys Microware Communications Software Division, Inc. RadiSys® is a registered trademark of RadiSys Corporation. QNX® is a registered trademark of QNX Ltd. Tornado® and VxWorks® are registered trademarks of Wind River Systems, Inc.

All other products or services mentioned in this publication are identified by the trademarks, service marks, or product names as designated by the companies who market those products. The trademarks and registered trademarks are held by the companies producing them. Inquiries concerning such trademarks should be made directly to those companies. All other brand or product names are trademarks or registered trademarks of their respective holders.

Information in this document has been carefully checked and is believed to be accurate as of the date of publication; however, no responsibility is assumed for inaccuracies. MEN Mikro Elektronik accepts no liability for consequential or incidental damages arising from the use of its products and reserves the right to make changes on the products herein without notice to improve reliability, function or design. MEN Mikro Elektronik does not assume any liability arising out of the application or use of the products described in this document.

Please recycle

Germany
MEN Mikro Elektronik GmbH
Neuwieder Straße 5-7
90411 Nuremberg
Phone +49-911-99 33 5-0
Fax +49-911-99 33 5-901
E-mail info@men.de
www.men.de

France
MEN Mikro Elektronik SA
18, rue René Cassin
ZA de la Châtelaine
74240 Gaillard
Phone +33 (0) 450-955-312
Fax +33 (0) 450-955-211
E-mail info@men-france.fr
www.men-france.fr

USA
MEN Micro, Inc.
24 North Main Street
Ambler, PA 19002
Phone (215) 542-9575
Fax (215) 542-9577
E-mail sales@menmicro.com
www.menmicro.com

Contents

Figures

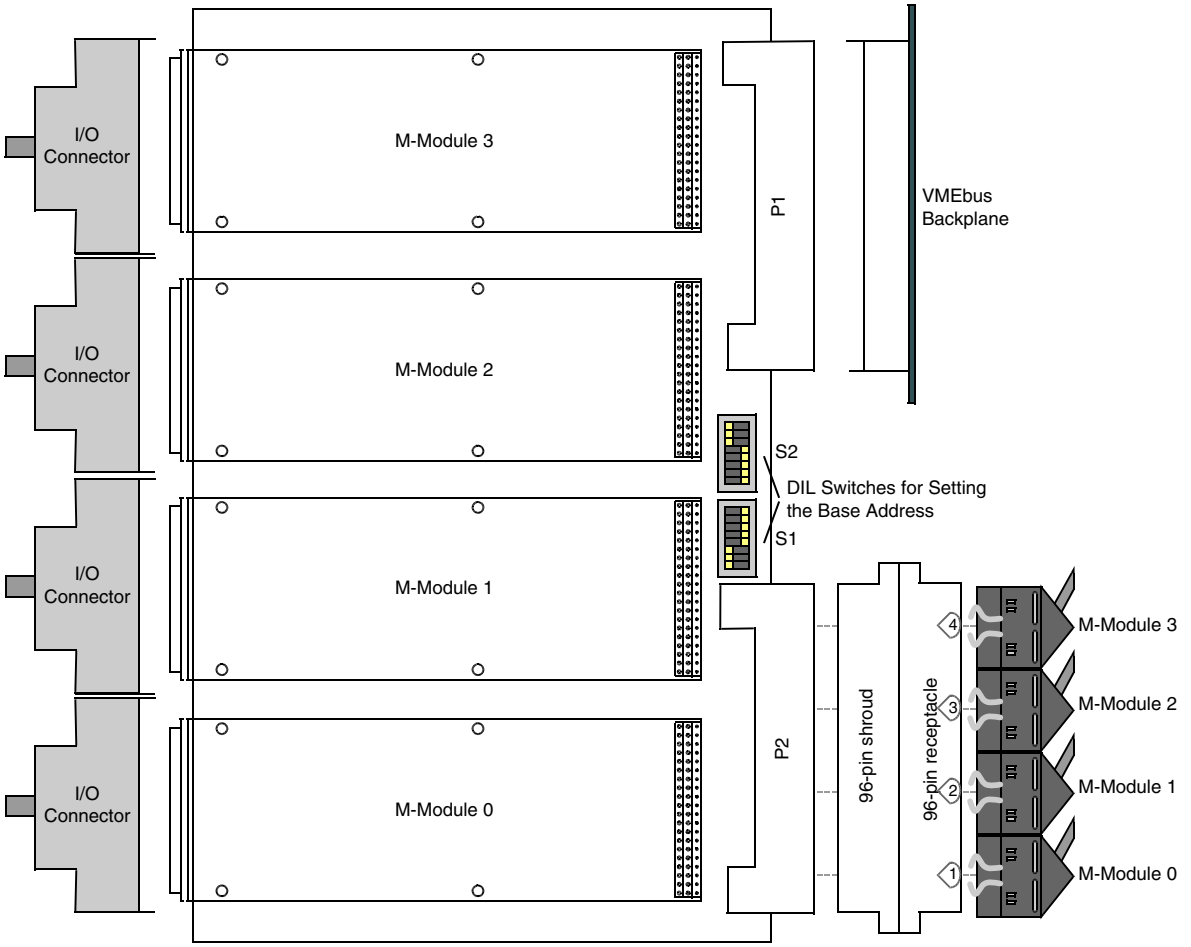
Tables

1 Getting Started

This chapter will give an overview of the carrier board and some hints for first installation in a system as a "check list".

1.1 Map of the Board

Figure 1. *Map of the board — top view*



1.2 Integrating the Board into a System

You can use the following hints and "check list" to install the carrier board into a VMEbus system for the first time and to test proper functioning of the board.

The A201S has an A24/D16 or A16/D16 VMEbus slave interface. This interface only requires the board's upper 96-pin connector (P1) on the board. With the standard version of the board, the lower connector (P2) can be used for connecting peripherals. In this case row B of the connector is also used, making the board incompatible with VME64 backplanes. If you use a 32-bit VMEbus system, you need to leave out the lower bus (P2) of the A201S VME slot. If this is not possible, you can use an alternative model of the A201S instead. This model does not have a P2 connector - which, of course, means that peripherals can only be connected via the front panel.

If it is required for the board to issue an interrupt via the bus, then the daisy chain must be established through to the A201S.

The carrier board is completely trimmed on delivery. Perform the following procedure without an M-Module installed!

- ☑ Power-down the system.
- ☑ The board is set for A24 accesses, the base address being 0xE00000. This base address is set using DIL switches. It may be necessary to set it to an address with which the master can access the board in A24/D16 mode.
  (If you have to change the base address, please refer to Chapter 3.2.1.1 Setting the Base Address on page 15.)
- ☑ Insert the A201S into your VMEbus system, making sure that the VMEbus connectors are properly aligned.
- ☑ Power-up the system.
- ☑ After power-up, load a suitable debugger.
- ☑ First, attempt to perform a read-word access to the base address plus 0x100, (i.e. 0xE00100 if the base address was not altered).
  With 32-bit masters it may be necessary to load a register on the master board to set the access mode. In any case you should be aware of the contents of the high-order byte of the 32-bit address. For instance, access may require using address 0xFFE00100 or 0xFCE00100 or any other address (depends on the master board).
- ☑ If a bus error occurs while you are attempting to read, check if the base address is set correctly and whether it is possible for the master to access the VMEbus at all at the selected address and using the correct mode. Then try again.
- ☑ Now attempt to perform a word access to the base address plus 0x102. Again, no bus error should occur. Write accesses to this memory location should be successful for the right half of the word. For instance, if 0x55 is written to the register it should be possible to read 0x*xx*55.
- ☑ You must have completed this test successfully before you begin to integrate an M-Module into the system (see Chapter 1.3 Installing M-Modules on page 13 and description in the respective M-Module user manual).

Note: Interrupts cannot be tested in this simple fashion.

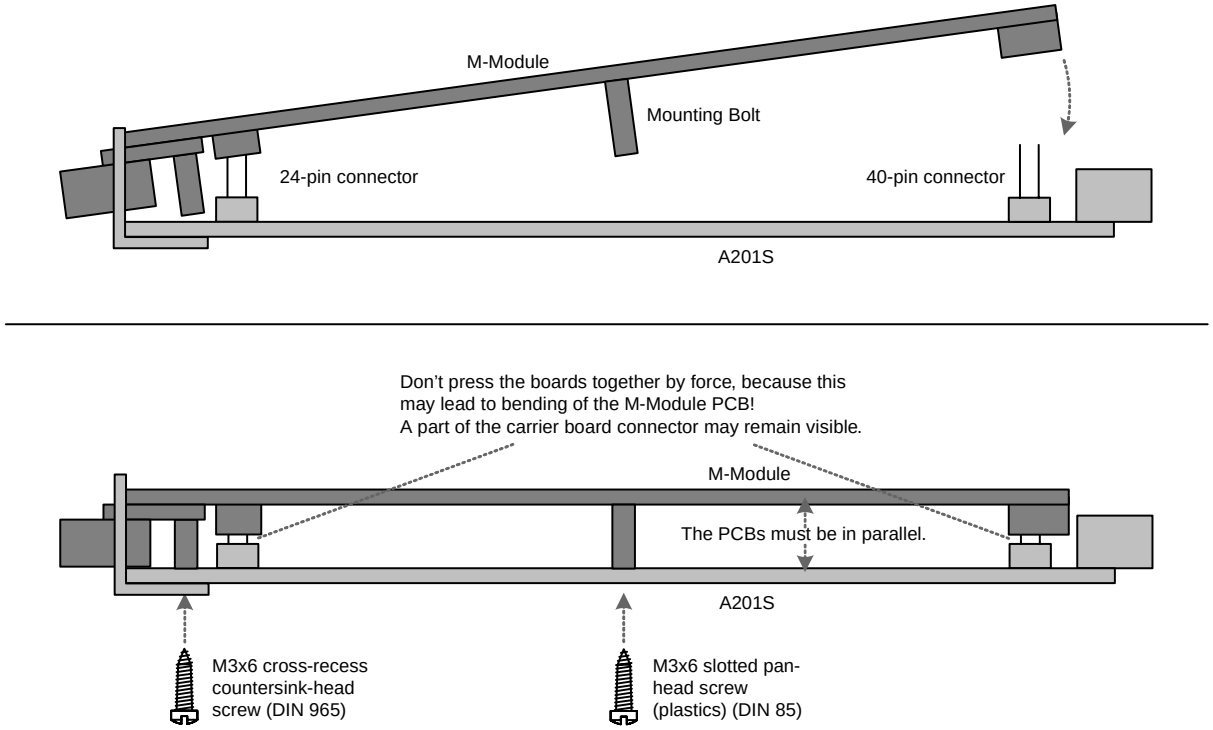
1.3 Installing M-Modules

Perform the following steps to install an M-Module:

- ☑ Hold the M-Module over the target slot of the A201S with the component sides facing each other.
- ☑ Put the M-Module's front connector through the front panel slot, holding the M-Module at a 45° angle.
- ☑ Align the 24-pin and 40-pin connectors of the M-Module and carrier board.
- ☑ Press the M-Module carefully but firmly on the A201S, making sure that the connectors are properly linked. Don't press the boards together by force, because this may lead to bending of the M-Module PCB! A part of the carrier board connector may remain visible. Make sure that the PCBs are in parallel, as shown in the figure below.
- ☑ Turn the A201S upside down and use four M-Module mounting screws to fasten the M-Module on the solder side of the A201S.

Note: You can order suitable mounting screws from MEN. For ordering information, see MEN's website.

Figure 2. *Installing an M-Module*



1.4 Installing Driver Software

For a detailed description on how to install driver software please refer to the respective documentation.

You can find any driver software available for download on MEN's website.

2 Address Organization

The A201S occupies an address space of 0x800 bytes on the VMEbus. These 0x800 bytes are divided into 4 identical parts. Each 0x200-byte part is assigned to one M-Module slot. 0x100 bytes are used for addressing the M-Module itself. The remaining 0x100 bytes for each M-Module slot are used to address a part of the interrupt controller.

This means that each M-Module on the A201S has the same address mapping. This greatly facilitates writing software since it is only necessary to take into account the base address of the M-Module, and not the base address of the carrier board as well. Each M-Module has its own interrupt vector register and its own control register. The 0x100 bytes for each M-Module used to address the interrupt controller are not fully coded. The two registers of the interrupt controller are replicated several times in this address space. Whether the M-Module actually codes the whole of the 0x100 bytes or not depends on the M-Module concerned.

Table 1. *Address organization*

Offset Address	Function	M-Module
0x000..0x0FF	M-Module	0
0x101	Control Register	
0x103	Vector Register	
0x200..0x2FF	M-Module	1
0x301	Control Register	
0x303	Vector Register	
0x400..0x4FF	M-Module	2
0x501	Control Register	
0x503	Vector Register	
0x600..0x6FF	M-Module	3
0x701	Control Register	
0x703	Vector Register	

The base address *base* of an M-Module is calculated by the formula

$$base = A201Sbase + modslot \cdot 0x200$$

base M-Module base address
A201Sbase base address of A201S
modslot M-Module slot number on A201S

Example

The base address set for the A201S is 0xE00000. An M-Module is plugged into M-Module slot 2. The M-Module base address is then

$$0xE00000 + 2 \cdot 0x200 = 0xE00400$$

For instance, if we are dealing with a 32-bit master which addresses the standard address area at 0xFFxxxxxx, then the M-Module at address 0xFFE00200 is selected. The corresponding interrupt control register then has address 0xFFE00301.

3 Functional Description

3.1 Power Supply

The 5V power supply from the VMEbus is sufficient for the carrier board. Some M-Modules (e.g. serial interfaces) need ±12V as well.

3.2 VMEbus Interface

3.2.1 Slave Interface

The A201S board is equipped with an A16/A24/D16 slave interface, i.e, only cycles with standard (24-bit) addresses and short (16-bit) address range are supported. For accesses from the VMEbus, the slave recognizes this type of cycle on the basis of the address modifier lines. The data bus interface of the A201S complies with the D16 specification. However, some M-Modules with a data bus width of only 8 bits permit only D08(O) accesses. The slave recognizes this type of access by the state of lines DS0*, DS1*, LWORD* and A1. The A201S will operate with masters which support so-called "address pipelining". The access time on the A201S depends on the M-Module concerned. DTACK* is generated 120ns after AS* at the earliest. The maximum time is limited to 10µs - in line with the M-Module Standard.

3.2.1.1 Setting the Base Address

The A201S occupies an area of 0x800 in the address space. Identical quarters of this - that is 0x200 - are reserved for each M-Module together with the interrupt handler.

The base address of the A201S can be varied in increments of 0x800 within the whole A16 or A24 address range. It is set using DIL switches, which remain accessible after the M-Modules are fit. There is one switch for each address bit from A11 to A23. If the switch is "on", the corresponding address bit is compared with 0. If the switch is "off", it is compared with 1. If the address is the same as the switch setting (taking address modifiers into account), a "select" signal for the board is generated. In the short address range, the switches corresponding to A16 to A23 are ignored.

The selection between short address range and standard address range is made by the SRT switch. If SRT is switched on, short accesses are possible; if SRT is switched off, standard accesses are allowed.

Figure 3. *Setting the base address — Default (A24)*

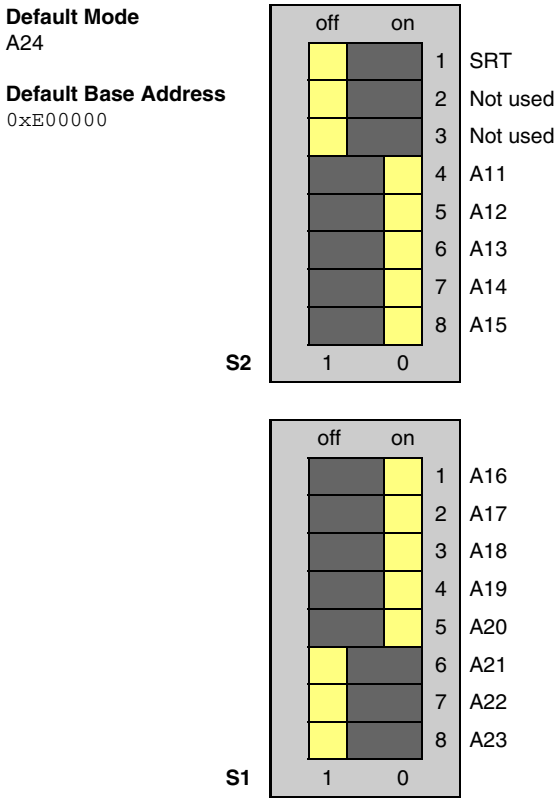
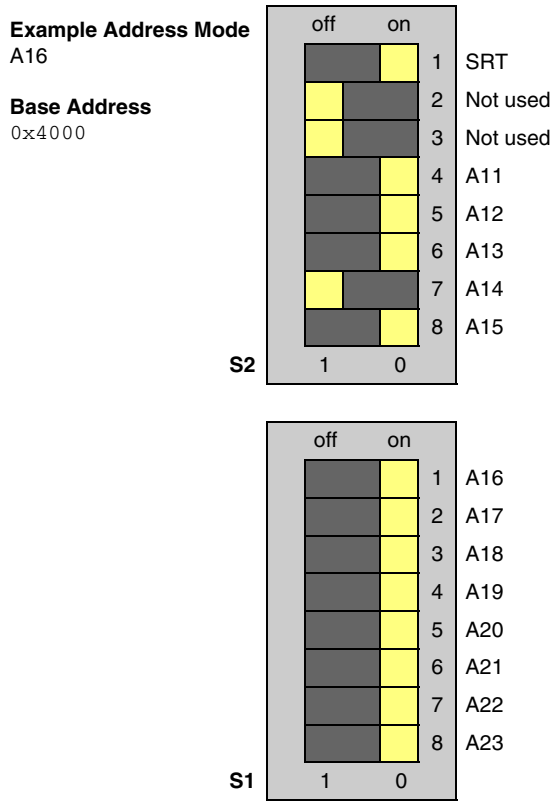


Figure 4. *Setting the base address — Example (A16)*



3.2.1.2 Address Modifiers

The VMEbus has 6 "address modifier" lines. These lines allow the master to transfer additional binary information to the slave during a data transfer cycle. The lines are used to divide the address space of the VMEbus into several classes. The following codes are permitted for the A201S:

Table 2. *Address modifier codes permitted on A201S*

HEX Code	AM					Function	SRT
	5	4	3	1	0		
3d, 39	H	H	H	L	H	Standard supervisory and non-privileged data access	off
2d, 29	H	L	H	L	H	Short supervisory and non-privileged data access	on

As mentioned above, SRT specifies standard or short access. The factory setting allows supervisor-mode and nonprivileged-mode access. Other address modes are possible in principle. They are specified in a programmable FLEX Logic component.

3.2.2 Interrupter

The interrupter has been implemented using a FLEX Logic IC. This chip permits interrupts to be issued at a programmable level independently for each M-Module. The A201S is a D08(O) interrupter. This means that the interrupter outputs status information on D0..D7 during an interrupt acknowledge cycle. Depending on which M-Module generates the interrupt it can be an RORA (= Release On Register Access) or an ROAK (= Release On Acknowledge) interrupt. This means that the interrupt request is reset either by the interrupt acknowledge cycle itself or by access to a specific register.

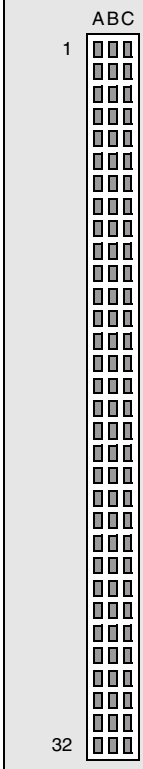
Since the interrupter is fully programmable, it is not necessary to set any jumpers or DIL switches.

3.2.3 VMEbus Connector P1

Connector types:

- 96-pin type-C plug connector according to DIN41612/MIL-C-55302/IEC603-2
- mating connector:
  type-C 96-pin receptacle according to DIN41612/MIL-C-55302/IEC603-2, available with solder/wire-wrap pins, for hand-soldering connection or for insulation piercing connection (IDC)

Table 3. *Pin assignment of the 96-pin VMEbus P1 connector*



A	B	C
D0	-	D8
D1	-	D9
D2	-	D10
D3	-	D11
D4	-	D12
D5	-	D13
D6	-	D14
D7	-	D15
GND	-	GND
SYSCLK	-	-
GND	-	-
/DS1	-	/SYSRST
/DS0	-	/LWORD
/WRITE	-	AM5
GND	-	A23
/DTACK	AM0	A22
GND	AM1	A21
/AS	AM2	A20
GND	AM3	A19
/IACK	GND	A18
/IACKIN	-	A17
/IACKOUT	-	A16
AM4	GND	A15
A7	/IRQ7	A14
A6	/IRQ6	A13
A5	/IRQ5	A12
A4	/IRQ4	A11
A3	/IRQ3	A10
A2	/IRQ2	A9
A1	/IRQ1	A8
-12V	-	+12V
+5V	+5V	+5V

3.3 M-Module Interfaces

A total of four M-Modules can be installed on the A201S. Peripheral equipment may be connected at the front using the M-Module's front connector or at the rear using the carrier board's second DIN 41612 connector (P2). In 32-bit systems, either the system's lower bus printed circuit board must be cut away here or the A201S must be ordered without P2. In the latter case, of course, the peripherals can only be connected at the front.

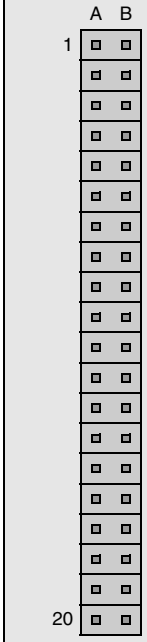
3.3.1 M-Module Connectors

The signals from the carrier board are fed to the M-Module via a 40-pin plug connector. This plug connector corresponds to a receptacle connector on the M-Module.

Connector types:

- Two 20-pin plugs, 2.54mm pitch, square pins ∅ 0.635mm gold
- Mating connector:
  Two 20-pin receptacles, high-precision, 2.54mm pitch, for square pins ∅ 0.635mm gold, 6.9mm height

Table 4. *Pin Assignment of the 40-Pin M-Module connector*



A	B
/CS	GND
A01	+5V
A02	+12V
A03	-12V
A04	GND
A05	-
A06	-
A07	GND12V
D08	D00
D09	D01
D10	D02
D11	D03
D12	D04
D13	D05
D14	D06
D15	D07
DS1	DS0
/DTACK	/WRITE
/IACK	/IRQ
/RESET	SYSCLK

3.3.2 Connecting Peripherals to P2

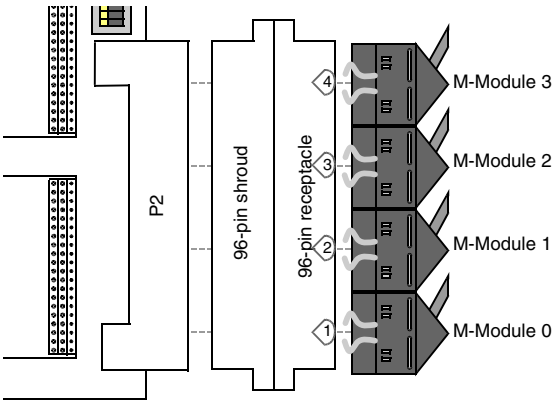
Normally peripheral signals are fed to M-Modules via the front panel connector (e. g. 25-pin D-Sub). However, many M-Modules offer the alternative to connect peripheral signals via the carrier board. In this case the signals are connected to the board's 96-pin P2 connector using 21-pin receptacles and fed to the M-Module through its 24-pin receptacle (see MEN's website for ordering information).

You can connect up to four 21-pin connectors to the 96-pin connector. Please note that pins 8a,b,c; 16a,b,c; 24a,b,c and 32a,b,c cannot be used.

Table 5. *Correspondence between 96-pin connector and 21-pin connectors*

	C	B	A	
1	3	2	1	M-Module 3
2	6	5	4	
3	9	8	7	
4	12	11	10	
5	15	14	13	
6	18	17	16	
7	21	20	19	
8	-	-	-	
...	...	...	...	...
25	3	2	1	M-Module 0
26	6	5	4	
27	9	8	7	
28	12	11	10	
29	15	14	13	
30	18	17	16	
31	21	20	19	
32	-	-	-	

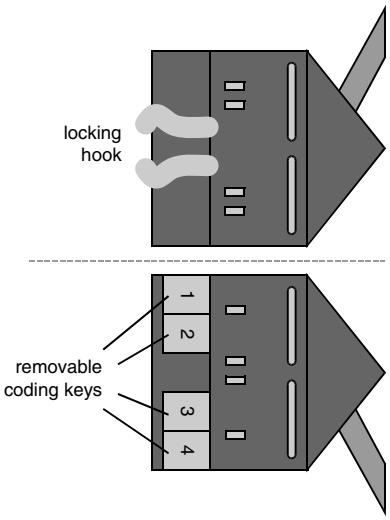
Figure 5. *Connection of 21-pin cables to P2*



The 21-pin receptacle has a locking hook matching the 96-pin receptacle and thus preventing wrong connection:

On its other side, the 21-pin receptacle has four removable coding keys. Make sure to remove the respective coding key before linking the 21-pin connector and the 96-pin receptacle. Otherwise you may damage the connectors!

Figure 6. *Locking hook and coding keys of 21-pin receptacle*



Assembled cables are available for connection to the P2 connector. The components used are from AMP. The wiring connections for the 21-pin M-Module connector are crimped. The cable is 2m long and has a pig tail, i.e. you can choose whichever connector you need on the other side of the cable. See MEN's website for ordering information.

Figure 7. *M-Module cable, 21-pin receptacle - pig tail*

The color coding for assignment of the individual wires of the cable to the pins of the connector is supplied with the cable.

3.3.3 16-MHz Clock Supply of M-Module Slots

Some M-Modules make use of the 16-MHz VMEbus clock as a time base. A couple of applications use this 16-MHz clock in a VMEbus system as the centralized synchronous timer for all M-Modules. For instance, this is the case for multichannel data acquisition systems, which must make sure that all sample procedures are synchronized.

Unfortunately there are also VMEbus systems that cause trouble with this signal. Some VMEbus system slot components (e.g. older components from Tundra) do not generate the clock signal when a reset occurs. Other systems have such bad signal quality that on some slots proper operation of M-Modules cannot be guaranteed.

This is why the standard models of A201S generate the 16-MHz clock locally. If you use several A201S boards within a system, the M-Modules on each board will operate synchronously, but the different A201S boards operate asynchronously.

For applications that need strictly synchronized operation of the entire system, the M-Module clock can also be generated from the VMEbus clock. For models that use the VMEbus SYSCLK please contact MEN.

If you use SYSCLK from the VMEbus, you should make sure that clock generation and signal quality correspond to standardized values.

3.4 Interrupt Controller

The FLEX Logic chip handles local interrupt sources with the VMEbus. It supports all signals used for the VMEbus interrupt protocol. Interrupt vectors from the local source of the interrupt can be passed on, and the chip also provides the capability of passing a pre-programmed vector. Eight internal registers (four status registers and four vector registers) are provided for general use.

3.4.1 Registers of the Controller

The interrupt controller contains eight programmable read-write registers. The four control registers control the activity of the chip, the other four are the vector registers, which contain the vector information for the IACK cycle. One pair of registers is allocated to the M-Module.

Control Registers (read/write)

7..6	5	4	3	2	1	0
-	X/IN	IRE	IRAC	L		

X/IN External/internal
This bit governs behavior during an IACK cycle. If the X/IN bit is 0, the chip replies with the /DTACK signal and the vector stored in its vector register, i.e. it replies internally. If the X/IN bit is set, the M-Module has to generate the vector and the /DTACK signal.

0 = Reply internally
1 = Reply externally

IRE Interrupt enable
This bit must be 1 to allow an interrupt to be generated at all. If this bit is 0, no interrupt is triggered on the VMEbus—even though an interrupt from the M-Module is pending.

0 = Disable
1 = Enable

IRAC Interrupt auto clear
If this bit is 1, the *IRE* bit is cleared during an IACK cycle (in response to this interrupt request) which disables the interrupt. In order to enable the interrupt again, the *IRE* bit must be set again by writing to the Control Register.

L Interrupt level
These bits select the line on which the interrupt request is to be generated.

0 0 0 = Disable interrupt generation
0 0 1 = Generate interrupt request on line /IRQ1
0 1 0 = Generate interrupt request on line /IRQ2
0 1 1 = Generate interrupt request on line /IRQ3
1 0 0 = Generate interrupt request on line /IRQ4
1 0 1 = Generate interrupt request on line /IRQ5
1 1 0 = Generate interrupt request on line /IRQ6
1 1 1 = Generate interrupt request on line /IRQ7

Vector Registers (read/write)

7	6	5	4	3	2	1	0
V7	V6	V5	V4	V3	V2	V1	V0

V7..V0 interrupt vectors
If the X/IN bit is '0', this vector is generated at D0..D7 during the IACK cycle.

3.4.2 Power-Up/Reset Behavior

At power-up, the control registers are all loaded with 0x00, the vector registers are set to the value 0x0F. This value corresponds to the 68000 vector for an uninitialized interrupt.

After a reset only the interrupt level is set to zero.

4 Appendix

4.1 Literature and Web Resources

- A201S data sheet with up-to-date information and documentation:
  www.men.de
- M-Module Standard:
  ANSI/VITA 12-1996, M-Module Specification;
  VMEbus International Trade Association
  www.vita.com

4.2 Finding out the Board's Article Number, Revision and Serial Number

MEN user documentation may describe several different models and/or hardware revisions of the A201S. You can find information on the article number, the board revision and the serial number on two labels attached to the board.

- **Article number:** Gives the board's family and model. This is also MEN's ordering number. To be complete it must have 9 characters.
- **Revision number:** Gives the hardware revision of the board.
- **Serial number:** Unique identification assigned during production.

If you need support, you should communicate these numbers to MEN.

Figure 8. *Labels giving the board's article number, revision and serial number*