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M27

16-Bit
Binary Output
M-Module

Hardware Documentation

20M027-00 E2

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Tel.: + 9 11 / 99 33 5-0
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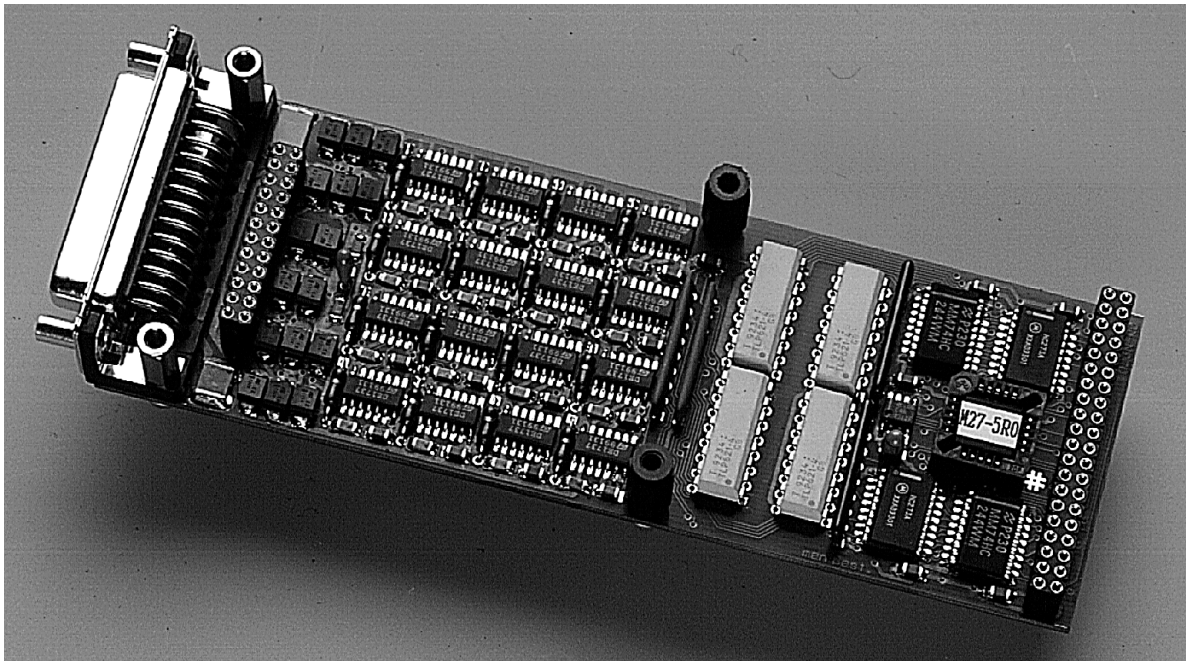
The M27 Module

The M27 is a 16-bit binary output module for industrial applications. The inputs are optically isolated with an isolation voltage of 500V DC.

The M27 with its open-collector outputs switches relays, lamps or other loads in typical process I/O applications. If the current exceeds 500mA an interface circuit ensures definite switching-off of the output concerned. The output registers can be read.

The M27 module is equipped with suppressor diodes for protection against overvoltage caused by inductive loads.

The M27 is the improved, fully software compatible version of the M3.



Features

Output Voltage:

- 6V..36V

Output Current:

- max. 500mA per channel
- no derating

Miscellaneous:

- load on supply voltage
- optical isolation
- thermal and short circuit protection

Peripheral Connections:

- via front panel on a shielded 25-pin D-Sub connector (female)
- via base board connector

M-Module Compliance:

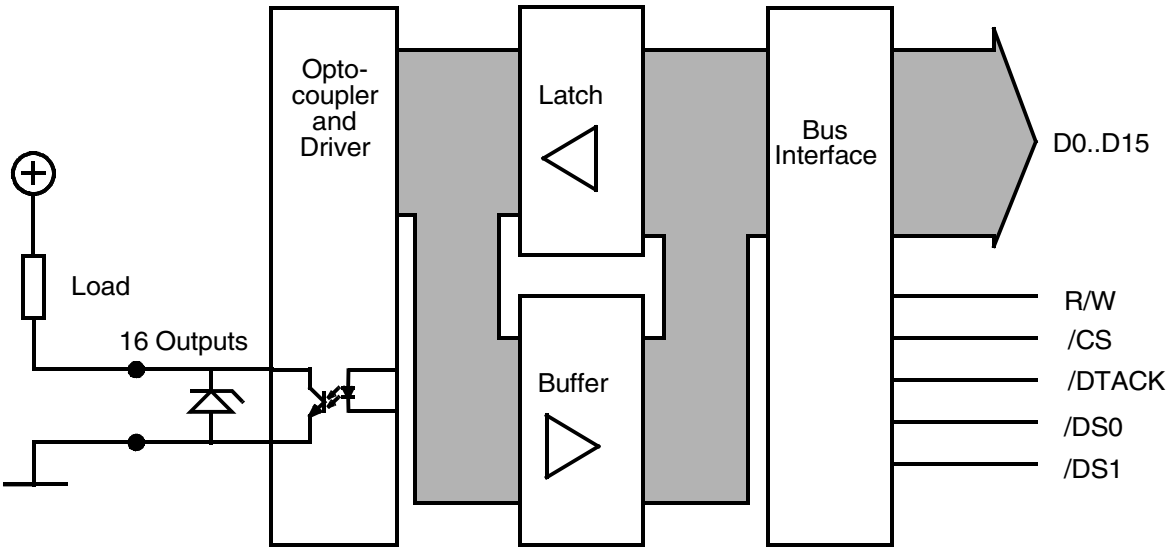
- A08, D16, IDENT

Software Support:

- MDIS driver concept

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Block Diagram



Ordering Information

04M027-00	M27 hardware
20M027-00	M27 hardware documentation
13M003-00	OS-9 driver software (MDIS)
13M003-20	LynxOS VME/68k driver software (MDIS)
13M003-30	HP-RT driver software (MDIS)
13M003-40	MS-DOS driver software (MDIS)
13M003-60	VxWorks VME/68k driver software (MDIS)
21M003-00	M3/M23/M27/M28 software documentation (for MDIS)

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About the Manual

This manual describes the installation of the M-Module, 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.

The manual describes the hardware of the board.

History of the Manual

Edition	Description	Technical Content	Date of Issue
E0	First edition	Manfred Schmitz	August 26, 1993
E1	Second edition	Manfred Schmitz	September 7, 1993
E2	Third edition	Manfred Schmitz	July 22, 1996

Using the Manual

Hexadecimal numbers are preceded by "0x", which is the usual C-language convention, for example: 0x800000 or 0xbfffff.

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1 Installation and Setup

1.1 First Steps

To test proper functioning of the module you can proceed as follows:

- Install the system with the M-Module base board but without the M27.
- Test the base board.
- If O.K., plug the module into slot 0 of the M-Module base board.
- The M-Module is completely trimmed on delivery.
- Initially, do not change any jumpers or switches.
- Load a suitable debugger.
- Access the base address as set, reading word by word.
- If a bus error is occurring now, the module is not plugged properly.
- Write the word 0x5a5a to the base address.
- You should be able to read back this value.
- Observe the installation manuals for operating system dependent software.

1.2 Connection of the Module

1.2.1 Power Supply

Power supply to the logic part is done via the base board. The necessary voltage is +5V. The optically isolated part is supplied with an external voltage (nominal voltage 24V). The module cannot operate unless this voltage is applied.

1.2.2 Peripherals

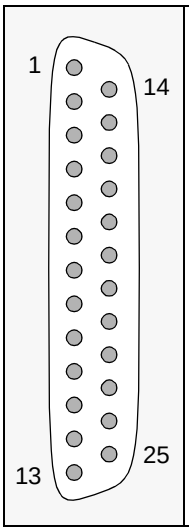
There are two possibilities for connecting peripherals:

- connection via 25-pin D-Sub connector or screw terminal (on request)
- connection via the base board.

When a base board with a 96-pin DIN 41612 PCB connection is used for peripheral signals (for example a 6U VMEbus base board), these are fed to the module through the female 24-pin connector. You can connect up to four 21-pin connectors to the 96-pin connector (cf. base board manual). When these connectors are used, for each module three pins of the DIN 41612 PCB connector cannot be used. The pin numbers for the 96-pin connector shown below are valid for module slot number 3. If other module slots (2, 1 or 0) are used, the value 8, 16 or 24 must be added as appropriate.

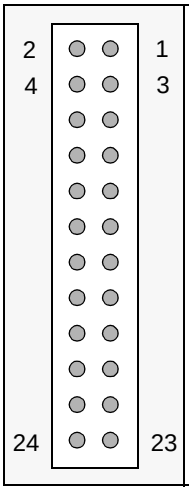
The M27 module has the following pin assignments:

Table 1a: Pin Assignment of the 25-Pin D-Sub Connector



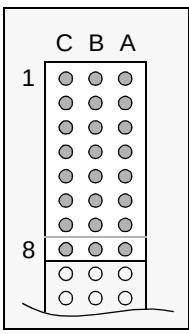
1	DO2	14	DO1
2	DO0	15	DO3
3	DO6	16	DO5
4	DO4	17	DO7
5	DO10	18	DO9
6	DO8	19	DO11
7	DO14	20	DO13
8	DO12	21	DO15
9	I+24V	22	I+24V
10	I+24V	23	IGND
11	IGND	24	IGND
12	IGND	25	IGND
13	IGND		

Table 1b: Female 24-Pin Connector



2	DO1	1	DO2
4	DO3	3	DO0
6	DO5	5	DO6
8	DO7	7	DO4
10	DO9	9	DO10
12	DO11	11	DO8
14	DO13	13	DO14
16	DO15	15	DO12
18	I+24V	17	I+24V
20	IGND	19	IGND
22	IGND	21	IGND
24	IGND	23	IGND

Table 1c: Signal Correspondence between 24-Pin Module and 96-pin Base Board Connector



	C	B	A
1	DO0	DO1	DO2
2	DO5	DO6	DO3
3	DO10	DO7	DO4
4	DO11	DO8	DO9
5	DO12	DO13	DO14
6	I+24V	I+24V	DO15
7	IGND	IGND	IGND
8	IGND	IGND	IGND

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Table 2: Signal Mnemonics

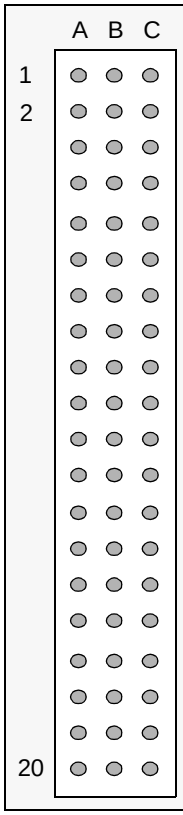
Signal	Function
DO15..DO0	Binary output lines
IGND	Isolated ground
I+24V	Isolated +24V power supply

1.2.3 Host Interface

The M27 module supports the following pin assignment of the 60-pin base board interface connector:

Note: Only two rows - A and B - of the 60-pin connector are mounted on the M27!

Table 3: Pin Assignment of the 60-Pin Female Connector



	A	B	C
1	/CS	GND	-
2	-	+5V	-
3	-	-	-
4	-	-	-
5	-	GND	-
6	-	-	-
7	-	-	-
8	A07	-	-
9	D08	D00	-
10	D09	D01	-
11	D10	D02	-
12	D11	D03	-
13	D12	D04	-
14	D13	D05	-
15	D14	D06	-
16	D15	D07	-
17	/DS1	/DS0	-
18	/DTACK	/WRITE	-
19	-	-	-
20	/RESET	-	-

2 Address Organization

When using the driver software supplied, you do not need to be familiar with the hardware of the M27 module in detail. However, familiarity with the address organization of the board is essential if you wish to write your own software for the module or do low-level development.

The 256-byte I/O area of the M27 module is hardware-mapped. The address at which individual functions can be addressed from the base board is computed from the base address of the module plus the address in the following table.

Table 4: Address Map

Address	D15..D8	D7..D0
0x00	Output Register 0 (r/w)	
0xfe	-	M-Module identification (r/w)

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3 Functional Description

3.1 Switching Loads

The M27 module can switch up to 16 loads individually. The load must be permanently wired to the external positive supply voltage. The "switches" on the M27 module make or break a connection with ground.

These "switches" use bipolar transistor technology. The TDE1737 devices from SGS-Thomson are monolithic amplifiers designed for high-current and high-voltage applications, specifically for driving lamps and relays and controlling stepper motors.

These devices are essentially blowout-proof. Current limiting is available to limit the peak output current to a safe value; adjustment requires only one external resistor. In addition, thermal shutdown with hysteresis is provided to keep the IC from overheating. If internal dissipation becomes too great, the driver will shut down to prevent excessive heating.

ESD protection for each output is implemented using a suppressor diode. This diode limits the output voltage to a typical 39V. Also, the isolated ground is prevented from drifting more than ±200V from protective ground.

The switching interface circuits are isolated from the system by optocouplers. For the module to operate, the isolated side must be supplied with the external voltage (nominal voltage 24V).

3.2 Programming

The module can be accessed using the appropriate module base address. The 16 output bits can be accessed on a word, byte or bit basis. Bit 0 of the word on the line corresponds to DO0 on the plug connector (pin 1 of the 25-pin D-Sub connector). The output registers can be read or written; so the bit instructions of the CPU can be used. It is not necessary to maintain "shadow" registers in memory.

If a bit is set to "1", the corresponding transistor is switched through - the switch is closed. After reset, all bits are "0", so all transistors are open.

Output Register (0x00) (read/write)

15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
DO15..DO0															

3.3 M-Module Identification

The M27 module is supplied with an identification EEPROM in accordance with the M-Module specification.

4 Appendix

4.1 Literature

- Specification for accessing the modules:
  M-Module Specification, MUMM association
- Interface circuit TDE1737:
  Industrial and computer peripheral ICs, Databook, 1st Edition,
  SGS-Thomson Microelectronics

4.2 Differences from Previous Versions

Table 5: Table of Revisions

Rev.	Comment	Restrictions
0.x	first version released	none known
1.x	second revision	none known
2.x	third revision	none known

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4.3 Technical Data

Table 6a: Electrical Specifications

Output voltage	8..36V; 10µA max. (open) 2V max.; 500mA (closed)
Input clampling voltage	39V/±15%
Isolation voltage	500V DC
Supply voltage range	+5V: 4.85V..5.25V / 50mA typ.
Mean Time Between Failures	58,000h/50°C

Table 6b: Mechanical Specifications

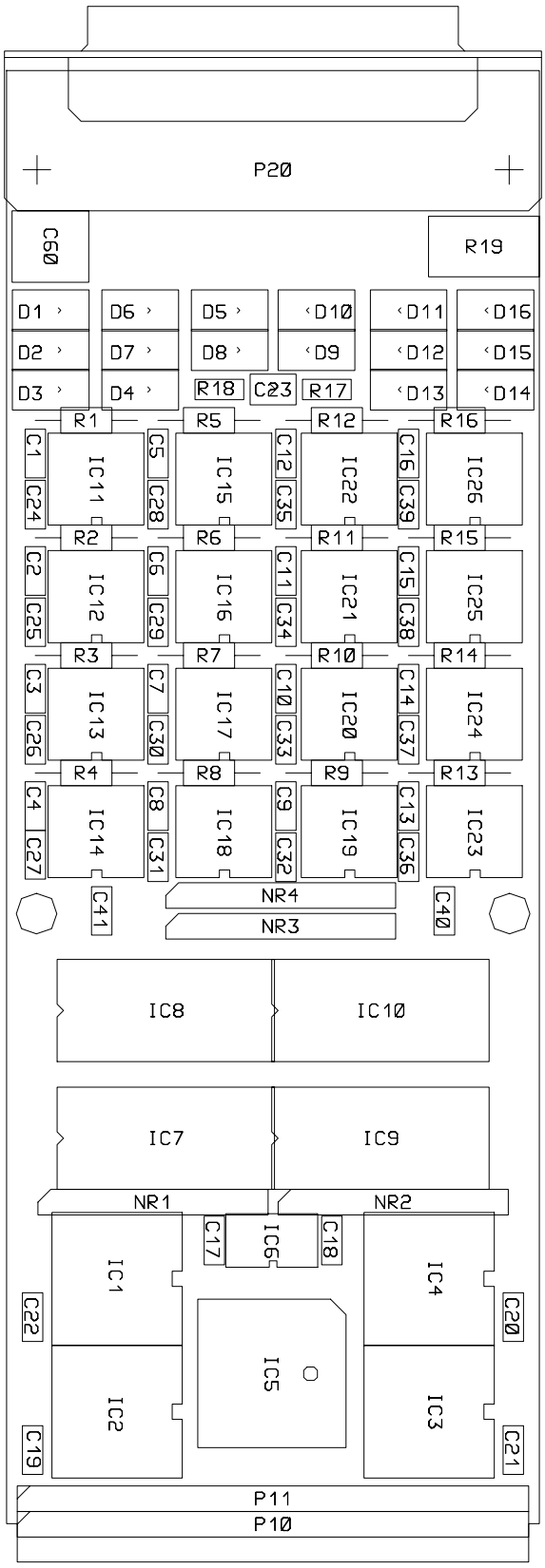
Dimensions	conform to M-Module Standard
Weight	tbd.

Table 6c: Environmental Specifications

Temperature range (operation)	0..60°C
Temperature range (storage)	-25..70°C
Relative humidity range (operation)	max. 95% without condensation
Relative humidity range (storage)	max. 95% without condensation
Altitude	-300m to + 3,000m
Shock	15g/0.33ms, 6g/6ms
Vibration	1g/5..2,000Hz

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4.4 Configuration Plan



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You can request the circuit diagrams for the current revision of the product described in this manual by completely filling out and signing the following non-disclosure agreement.

Please send the agreement to MEN by mail. We will send you the circuit diagrams along with a copy of the completely signed agreement by return mail.

MEN reserves the right to refuse sending of confidential information for any reason that MEN may consider substantial.

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for Circuit Diagrams provided by MEN Mikro Elektronik GmbH

between

MEN Mikro Elektronik GmbH
Neuwieder Straße 7
D-90411 Nürnberg

("**MEN**")

and

_____
_____
_____
_____

("**Recipient**")

We confirm the following Agreement:

MEN		**Recipient**	
Date:	_____	Date:	_____
Name:	_____	Name:	_____
Function:	_____	Function:	_____

Signature: Signature:

_____ _____

The following Agreement is valid as of the date of MEN's signature.

Neuwieder Straße 7
D-90411 Nürnberg
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The subject of this Agreement is to protect all information contained in the circuit diagrams of the following product:

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