SIMATIC NET

IM 183-1 PROFIBUS Interface Module

User Description Date Aug. 01ST, 96

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SIEMENS

SIMATIC NET

IM 183-1

Description for User

(PROFIBUS Interface Modul
according to DIN E 19245 Part 3)

Version: V1.1
Date: Aug., 01ST 1996

Liability Exclusion
We have tested the contents of this document regarding agreement with the hardware and software described. Nevertheless, deviatations can't be excluded, and we are not guaranteeing complete agreement. The data in this document is checked periodically, however. Necessary corrections will be contained in subsequent versions. We gratefully accept suggestions for improvement.

Subject to technical changes.

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1 Product Features

The IM 183-1 makes a customer-specific connection to a PROFIBUS DP network possible. The PROFIBUS interface is realized on the module through the SPC3, and the matching RS485 interface with isolation.
The basis is the user description of the ASIC used. This description is also relevant to the ASIC-specific data.

The board serves as hardware platform for firmware tests and customer demonstration, as well as as module in customer-specific systems.

Conditioned, above all, by the use of the ASIC SPC3, and the omission of the Dual Port RAM, there is no software compatibility with IM 318M. The connector pin assignment for RS232, RS485 and host-bus is largely retained. Likewise, the memory distribution for the program memory won't be changed. The memory distribution for the data memory, as well as the CS areas have to be adapted to the requirements of the SPC3.

The baudrate for RS485 is, in accordance with the ASIC used, up to 12 MBaud with SPC3.

The operating temperature range of the components used is 0º ... +70ºC.

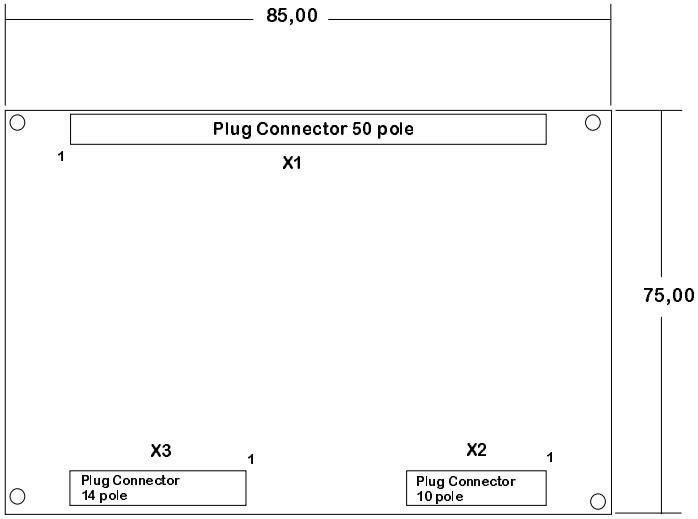
2 Mechanical Concept

The mechanical diagramatical representation of the module is shown in Figure 1.

The termination system consists of a 50-pole plug connector to the host bus, a 14-pole plug connector (stationary) for RS232, as well as a 10-pole plug connector (stationary) for RS485. These plug connectors are designed as connectors for connecting ribbon cables. A shield connection is not provided; the user has to lead it off directly at the 9-pole SUB-D connector.

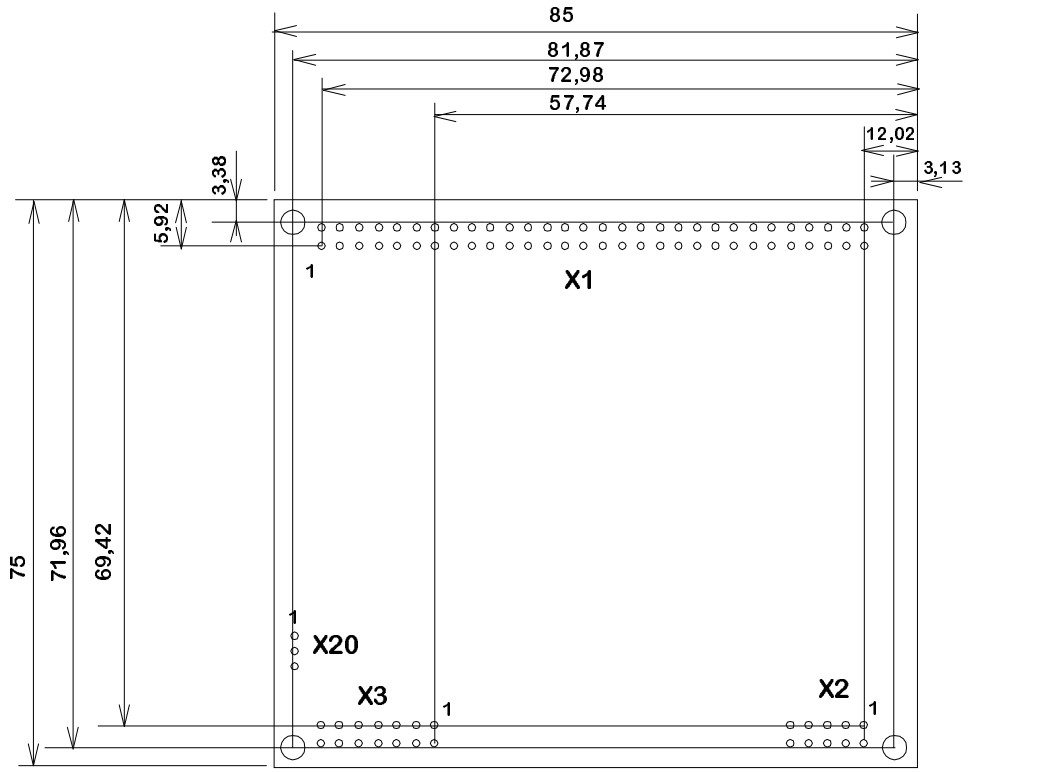
The printed board is mounted on both sides with components (solder side only with SMD components).

For the EPROM, a 28-pole DIL socket is provided.



- Figure 1 -

Dimensioned Drawing:

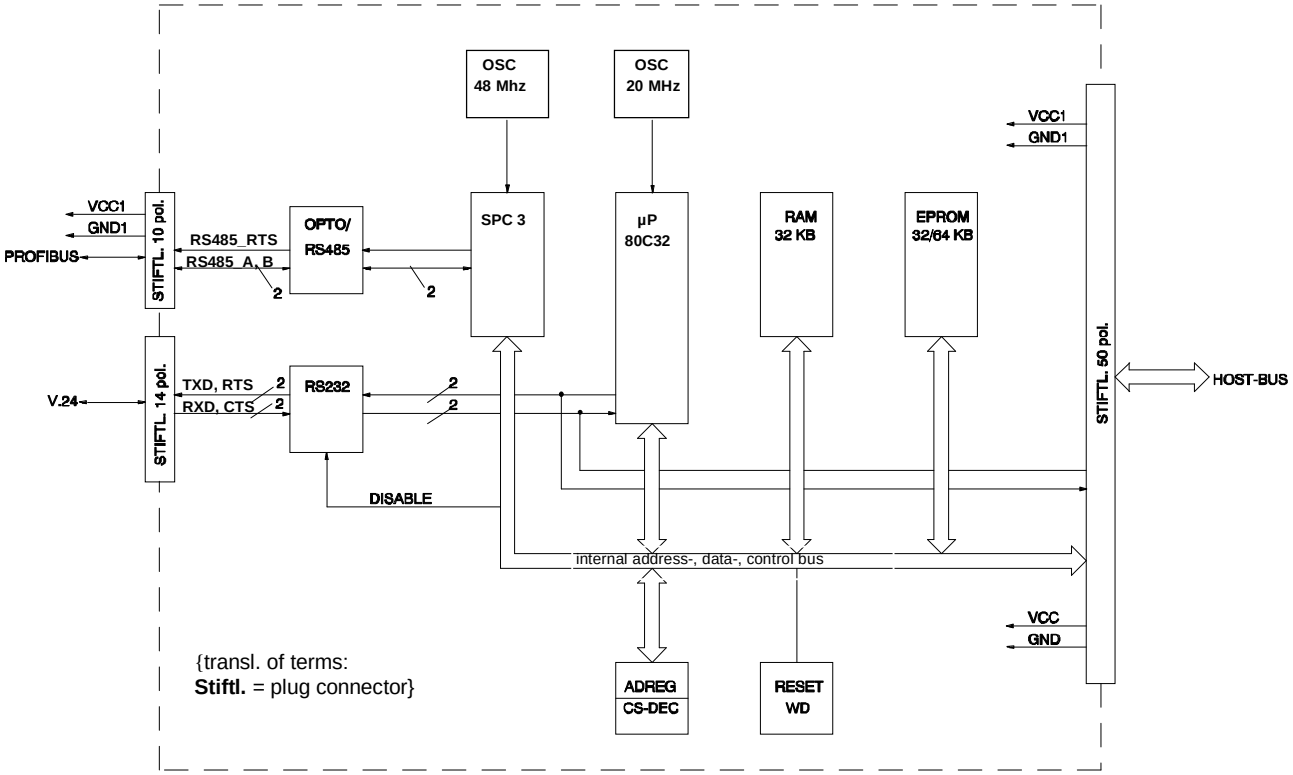


-Figure 2 -

The pin spacing of the plug connectors is 2.54 mm. The hole diameter of the four mounting holes is 3.2 mm.

3 Function

3.1 Block Diagram



- Figure 3 -

3.2 Function Description

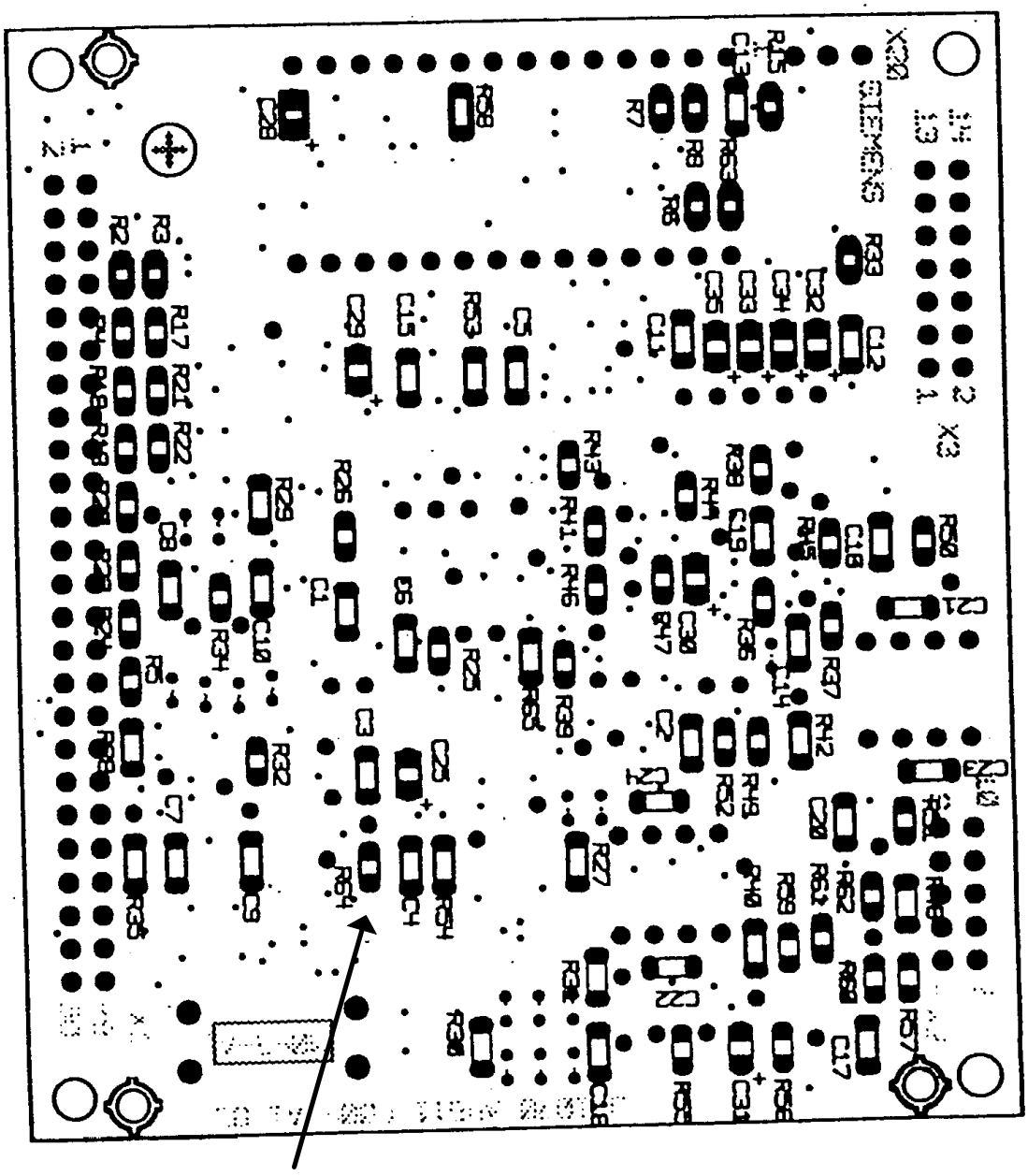
The following functionality is realized on the module:

- Processor 80C32/20 MHz
- 32 KB SRAM
- 32 KB and 64 KB EPROM, can be switched with jumper
- Oscillator Block, 20 MHz for the clock supply of the processor
- Address Latch Register for A (7:0)
- CS Decoder for the upper address bits A (15:12)
- Watchdog and RESET are generated with MAX705 block. The watchdog time is permanently set. The supply voltage fed in via the host interface is monitored. The watchdog can be switched off with a jumper.
- ASIC SPC3 for realizing the PROFIBUS interface with a maximum baudrate of 12 MBaud. An oscillator block 48 MHz for clock supply is permanently assigned to the SPC3.
- The SPC3 is reset with software, as is the case for IM318M (Port P3.4)
- The RS485 interface is laid out isolated for 12 MBaud maximum. Fast, noise-free opto-couplers and drivers are used. The signals of this interface are applied to a 10-pole plug connector. For isolation, a second, isolated supply voltage +5V is to be supplied via the 50-pole host interface (generation on the customer application). It is protected against pole reversal with a diode, and is loaded with 100 mA maximum. A fuse is to be provided on the customer application. The PROFIBUS signals of the ASIC are not available at the host interface.
- For the RS232 interface, the internal UART of the 80C32 is used. The signals are being driven and are applied to a 14-pole plug connector. In addition, the UART signals are applied to the host interface. The RS232 driver can be disabled via the Port P3.5 (low level).
- The supply voltage +5V for the module is supplied via the host interface (50-pole plug connector). It is protected against pole reversal with a diode. An exchangeable fuse is to be provided on the customer application. The address-/data bus and relevant control signals, as well as the port bits of the 80C32 are applied parallel to the plug connector. Since these signals are not additionally driven, connection lines are to be kept extremely short, or are to be driven externally. The signals are terminate with pull-up resistors.

Setup of the 80C32:
Essentially, it corresponds to that of the module IM318M.

- Operation with 20 MHz so that, if a timer is used, the UART operation with the standard baudrates 2400 to 19200 is possible.
- For ASIC SPC3, only XINTEV and XINT (PIN 9) is used as sum interrupt of the ASIC, and connected with INT0 80C32. The INT1 input of the 80C32 is available at the host interface.
- Port P0 and Port P2 are connected as address- and data bus.
- Port P1:
  P1.0 is for retriggering the watchdog
  P1.1 unassigned
  P1.2, P1.3 are assigned to RTS and CTS of the RS232 interface
  P1.4 to P1.7 can be used freely at the host interface
- Port P3:
  P3.0 to 3.4 and P3.6, P3.7 are assigned to interrupt- and control signals;
  P3.5 is unassigned at the host interface; disables with Low the RS232 driver
- The RESET is generated by a Reset/Watchdog block with integrated voltage monitoring. The host interface can trigger the Reset signal with RESET-IN. RESET-OUT is available at the host connector. The RESET can also be triggered by the integrated watchdog circuit, if the watchdog circuit is not being triggered cyclically by the main program through P1.0. For each triggering, P1.0 should be inverted twice by the program (edge generation). The watchdog time is permanently set in the block {chip} with 1.6 s.
- A 32 KB SRAM is available as user memory. There is no battery buffering.
- The program can be filed in a 32 KB or a 64 KB EPROM. The EPROM is plugged into a DIL socket. Switching is done with a jumper.

The hardware watchdog can be deactivated by unsoldering the resistor R64 (see Figure 4).



- Figure 4 -

4 Interface Description

4.1 Hardware Interfaces

4.1.1 Connector Host Interface

Type: Plug Connector 50-pole
Pos. No.: X1

PIN	Signal	Type	PIN	Signal	Type
1	AB0	O	2	AB1	O
3	AB2	O	4	AB3	O
5	AB4	O	6	AB5	O
7	AB6	O	8	AB7	O
9	AB8	O	10	AB9	O
11	AB10	O	12	XCS1	O
13	GND	I	14	XRD	O
15	GND	I	16	XWR	O
17	VCC	I	18	ABD0	I/O
19	ABD1	I/O	20	ABD2	I/O
21	ABD3	I/O	22	ABD4	I/O
23	ABD5	I/O	24	ABD6	I/O
25	ABD7	I/O	26	VCC	I
27	XCS2	O	28	XINT	I
29	XRESIN	I	30	XRESOUT	O
31	RXD	I	32	TXD	O
33	AB11	O	34	P3_5	I/O
35	GND1	I	36	GND1	I
37	GND	I	38	-	-
39	GND	I	40	VCC1	I
41	VCC1	I	42	P1_0	I/O(O)
43	P1_1	I/O(O)	44	P1_2/RTS	I/O(O)
45	P1_3/CTS	I/O(I)	46	P1_4	I/O
47	P1_5	I/O	48	P1_6	I/O
49	P1_7	I/O	50	VCC	I

Signal Name	Meaning
AB (7:0)	Address Bus. latched
AB(11:8)	Address Bus, Output Port P2
ABD (7:0)	Address-/Data Bus, multiplex
XCS1, XCS2	CS-Signals for host interface, low-active
XRD	Read, low-active
XWR	Write, low-active
XINT	Interrupt Input of host interface, low-active
XRESIN	Reset Input of host interface, low-active
XRESOUT	Reset Output, low-active
P1_0 bis P1_7	Port P1 Signals
RXD, TXD, RTS, CTS	UART Signals (TTL Level)
P3_5	Port P3 Signal, low level switches off RS232 driver
VCC, GND	5V Supply Voltage of control electronics (µP, ASIC)
VCC1, GND1	Isolated Supply Voltage for RS485 interface, 5V

4.1.2 Connector BUS Interface (RS485)

Type: Plug Connector 10-pole
Pos. No.: X2

PIN	Signal	Type	PIN	Signal	Type
1	-	-	2	VCC1	O
3	-	-	4	-	-
5	RS485_B	I/O	6	RS485_A	I/O
7	RS485_RTS	O	8	-	-
9	GND1	O	10	-	-

Signal Name	Meaning
RS485_A, RS485_B, RS485_RTS	Differential signals A,B and transmit request (TTL)
VCC1, GND1	isolated supply voltage, 5V

The supply voltage VCC1 may be used for supplying external devices. The maximum load is 100 mA.
The plug connector is designed for connecting a ribbon cable to a 9-pole SUB-D socket.

4.1.3 Connector Serial Interface (RS232)

Type: Plug Connector 14-pole
Pos. No.. X3

PIN	Signal	Type	PIN	Signal	Type
1	-	-	2	-	-
3	TXD	O	4	-	-
5	RXD	I	6	-	-
7	RTS	O	8	-	-
9	CTS	I	10	-	-
11	-	-	12	-	-
13	GND	O	14	-	-

Signal Name	Meaning
TXD	asynchronous serial transmit data RS232
RXD	asynchronous serial receive data RS232
RTS	transmit request RS232
CTS	transmit enable RS232
GND	reference potential of control electronics (µP, ASIC)

4.1.4 Jumper Settings

Pos. No.: X20

- 1-2 64 kByte EPROM program memory
- 2-3 32 kByte EPROM program memory

4.2 Software Interfaces

4.2.1 Memory Distribution

When accessing the bus, the processor distinguishes physically between data- and program memory, determined by the signal XPSEN. A differentiation between data memory and I/O area is not supported. In the 80C32 mode, SPC3 themselves generate the CS signal from the upper address bits internally. The start address of the SPC3 is permanently implemented with 0000H. The start address of the SRAM is therefore placed on 8000H. The address bit AB12 is inverted at the input of the ASIC, so that the start address is actually on 1000H. From the view of the processor, the SPC3 occupies an address space of 1.5 Kbyte.

Program Memory:

Address Area	Memory Size
FFFFH	32k x 8
8000H	
7FFFH	32k x 8
0000H	

Variants:

- 32 kB EPROM, mirrored
  Because of the incomplete address coding, the processor will find the same memory content in the area 0000H to 7FFFH as in the area 8000 to FFFFH.
- 64 kB EPROM in the area 0000H to FFFFH.

Switching takes place on the board with jumper:
- 1-2 64 kByte
- 2-3 32 kByte

Data Memory and CS Signal:

Address Area	Memory Size	Function
FFFFH 8000H	32 k x 8	SRAM
7FFFH 4000H	16 k x 8	free
3FFFH 3000H	4 k x 8	XCS2 (I/O for Host Interface
2FFFH 2000H	4 k x 8	XCS1 (I/O for Host Interface
1FFFH 1600H 15FFH 1000H	4 k x 8 (1,5 k x 8)	ASIC-Area (Area for SPC3)
0FFFH 0000H	4 k x 8	free

The CS signals are generated for accesses to the data memory as well as the program memory. Therefore, they are only valid with the R/W signal.

4.2.2 Port Assignment 80C32

Port	Signal	Type	Function
P0.0	ABD0	I/O	multiplexed address- and data bus, Bit 0
P0.1	ABD1	I/O	multiplexed address- and data bus, Bit 1
P0.2	ABD2	I/O	multiplexed address- and data bus, Bit 2
P0.3	ABD3	I/O	multiplexed address- and data bus, Bit 3
P0.4	ABD4	I/O	multiplexed address- and data bus, Bit 4
P0.5	ABD5	I/O	multiplexed address- and data bus, Bit 5
P0.6	ABD6	I/O	multiplexed address- and data bus, Bit 6
P0.7	ABD7	I/O	multiplexed address- and data bus, Bit 7
P2.0	AB8	O	Address Bus Bit 8
P2.1	AB9	O	Address Bus Bit 9
P2.2	AB10	O	Address Bus Bit 10
P2.3	AB11	O	Address Bus Bit 11
P2.4	AB12	O	Address Bus Bit 12
P2.5	AB13	O	Address Bus Bit 13
P2.6	AB14	O	Address Bus Bit 14
P2.7	AB15	O	Address Bus Bit 15
P3.0	RXD	I	serial reveive data RS232
P3.1	TXD	O	serial send data RS232
P3.2	XINT0	I	Sum Interrupt of the SPC3, low-active
P3.3	XINT1	I	Interrupt of the Host Interface, low-active
P3.4	XRESSPC	O	Software-Reset for the SPC3
P3.5	P3_5	I/O	unassigned, disables the RS232 driver with low level
P3.6	XWR	O	Write, low-active
P3.7	XRD	O	Read, low-active
P1.0	P1_0	O	Watchdog Retriggerung through Software
P1.1	P1_1	I/O, O	unassigned
P1.2	P1_2/RTS	O	Send Request RS232
P1.3	P1_3/CTS	I	Send Confirmation RS232
P1.4	P1_4	I/O	unassigned at host interface
P1.5	P1_5	I/O	unassigned at host interface
P1.6	P1_6	I/O	unassigned at host interface
P1.7	P1_7	I/O	unassigned at host interface

5 EMC Concept

The shield is connected externally in the application of the module (for example, on the casing). The RS485 interface is designed isolated.
In addition, the user has to take note that the ribbon cable for the bus connection is to be kept as short as possible. When arranging the wires, EMC is to be ensured.

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