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VMOD-4D

ModPack Carrier for VMEbus

Manual Order Nr. 14783

User's Manual

Issue 1

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Preface

Unpacking and Special Handling Instructions

This PEP product is carefully designed for a long and fault-free life; nonetheless, its life expectancy can be drastically reduced by improper treatment during unpacking and installation.

Observe standard anti-static precautions when changing piggybacks, ROM devices, jumper settings etc. If the product contains batteries for RTC or memory back-up, ensure that the board is not placed on conductive surfaces, including anti-static plastics or sponges. These can cause shorts and damage to the batteries or tracks on the board.

When installing piggybacks, switch off the power mains.

Furthermore, do not exceed the specified operational temperature ranges of the board version ordered. If batteries are present, their temperature restrictions must be taken into account.

Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, re-pack it as it was originally packed.

Revision History

Issue	Brief Description of Changes	Index	Date of Issue
1	First Issue	0	March, 1997

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1.1 Product Overview

The VMOD-4D is a user configurable industrial I/O module for use with ModPack piggybacks, providing four ModPack interfaces. The piggyback process side I/O is connected to two 50-pin D-Sub female connectors. Two of the four piggybacks are additionally connected to the VMEbus P2 connector.

The VMOD-4D is a 6U upgrade of the existing 3U VMOD-2 which may be used with all existing VMOD-2 piggybacks. Base addresses and interrupt handling is also compatible with the VMOD-2.

1.2 Hazards

The VMOD-4D can be fitted with piggybacks carrying voltages that are supplied externally. Care should be taken if working on the system while these voltages are present. Even if the VMEbus system is not powered, these external voltages are present on the piggyback.

If the P2 interface of the piggybacks is used, optoisolation on the piggybacks is reduced to a logical isolation because there is no barrier on the VMOD-4D. If noisy signals are connected, logical backplane signals on the VMEbus could be influenced.

1.3 Ordering Information

Product	Description	Order Nr.
VMOD-4D	Base module with four ModPack interfaces and two 50-pin D-Sub connectors on front panel	14319
VMOD-4D	Base module with four ModPack interfaces and one 50-pin D-Sub connector on front panel	14320

1.4 Related Publications

- *VMEbus Specifications Rev. C1*
- *ModPack Specifications*
- *CXC-MPI Specifications, Rev 2.5x*

1.5 Glossary of Terms

MP0, MP1, MP2, MP3	Abbreviation for the 4 ModPacks on the VMOD-4D

1.6 Specifications

External Interface	2 x 50-pin female D-Sub
VMEbus interface	A24:D8/16, A16:D8/16 slave
VMEbus address range	2 x 256 Byte standard (128 Byte per ModPack) 8 kByte extended range (2 kByte per ModPack)
Interrupt requester	Single level, IRQ1 .. 7, jumper selectable One interrupt request line per ModPack Interrupt vector generated by ModPack or VMOD-4
Power requirements	+5V DC, 120 mA typ., without piggybacks (+/- 12V if required by piggybacks)
Temperature range	0 .. 70°C standard -40 .. +85°C extended
Storage temperature	-55 .. +85°C
Operating humidity	5 .. 95% non-condensing
Board size	Double Eurocard, 4TE (1 slot)
ModPack connector	4 ModPacks Each system side connector - 3x15-pin pinrow Process side - 2 x 13-pin pinrow
VMEbus connector	2 x DIN41612 style C, 96-pin
Frontpanel connector	50-pin female D-Sub

Chapter 2

Functional Description

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2.1 VMOD-4D Address Map

The address map of the VMOD-4D is designed to be compatible to the VMOD-2(D) and to add additional flexiblity.

By using the jumpers J33 to J40, the highest address byte of the 24-bit address is completely variable for address selection. Furthermore, jumpers J6 to J9 enable the next half-byte to be free for selection. Jumper J10 is used to set the piggyback in a VMOD-2 compatible way. The four piggybacks appear at the following addresses:

$XX X4 00..7F

$XX X4 80..FF

$XX XC 00..7F

$XX XC 80..FF

In order to use the VMOD-2 address map, J10 must be opened (if the first byte is set to $FE). The following additional base addresses can be used if the jumper is set:

$XX X0 00..7F

$XX X0 80..FF

$XX X8 00..7F

$XX X8 80..FF

All the above settings use the standard access VMEbus address modifier. Additionally, short I/O access is also possible. (Different base addresses can be selected using the jumpers J6 to J10). For more information, please refer to *Chapter 3 Configuration* in this manual.

2.2 Interrupts

The VMOD-4D is able to request interrupts at all VMEbus levels IRQ1..7*. The level is unique for the board and installed by jumper setting. An interrupt vector must be supplied by the piggyback or by the VMOD-4D.

2.2.1 Interrupt Priority

On the VMOD-4D, an interrupt priority chain is realized in a way that all the four ModPacks are treated in a "fair" way. If only one piggyback sets it's interrupt active, it is acknowledged by the next valid acknowledge cycle. If more ModPacks request at the same time, the interrupts are acknowledged beginning with the ModPack with the lowest order of MP[0..3]. After being acknowleged, the ModPack is assigned the lowest priority. Any other ModPack being acknowledged afterwards gets the lowest priority so that every ModPack goes dynamically from lower to higher priority until being acknowledged.

Example

1. Interrupts from MP0, MP2, MP3 pending (start priority 0-1-2-3)
2. Valid acknowledge cycle -> MP0 is acknowledged (changing priority 3-0-1-2)
3. Valid acknowledge cycle -> MP2 is acknowledged (changing priority 2-0-3-1)
4. MP0 requests again
5. Valid acknowledge cycle -> MP3 is acknowledged (*not MP0*) (changing priority 1-0-2-3)

Table 2.1: Changing Priorities Example

Note: "0" represents the highest priority.

Pending IRQ from	MP0	MP1	MP2	MP3	ModPack to be Acknowledged Next
MP0, 2, 3 Pending	0	1	2	3	MP0
MP2, 3 Pending	3	0	1	2	MP2
MP0, 3 Pending	2	0	3	1	MP3
MP0 Pending	1	0	2	3	MP0
All IRQ's Handled	3	0	1	2	-

2.2.2 Interrupt Vector

Interrupt vectors from the VMOD-4D are only possible if they are supplied by the interrupting ModPack. So when an interrupt request is acknowledged by the VMEbus interrupt handler an acknowledge signal is send to the ModPack which is being acknowledged. With this signal the piggyback has to drive an interrupt vector D7.. D0 on the data bus.

2.3 ModPacks Routed to the P2 Connector

There are two board versions available; the standard version that has each of the two pigybacks routed to a 50-pin D-Sub female connector and another version with MP2 and MP3 reversed and routed to the P2 connector. This version has only one 50-pin D-Sub connector for MP0 and MP1.

If the latter board version is used, it has to be considered that the process side I/O of the ModPacks are in the vicinity of VMEbus digital signal lines of data, adresses, etc. If the process side signals are noisy, the VMEbus backplane signals could be influenced.

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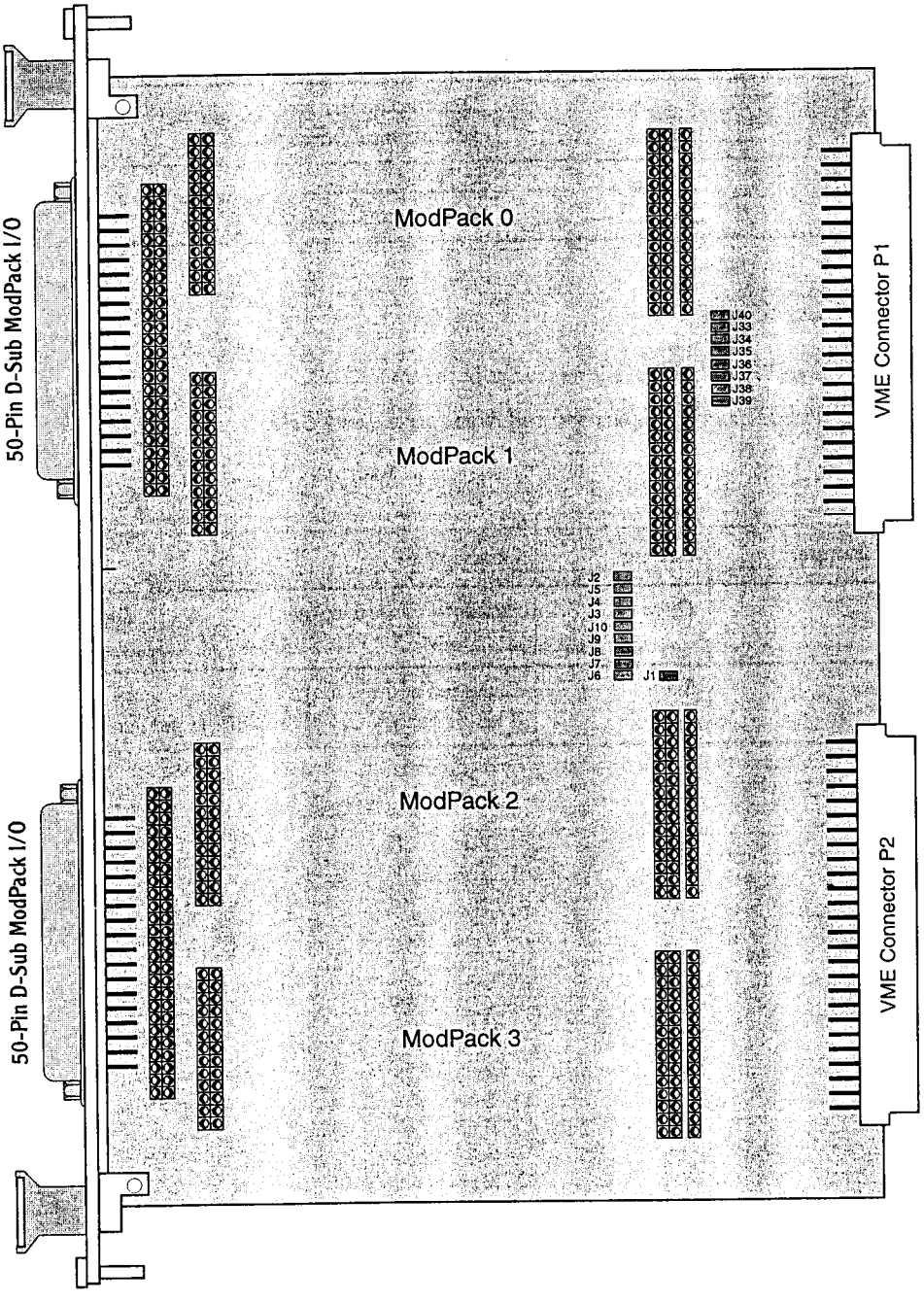
3.1 Jumper Locations and Functions



3.1.1 Access Mode

The access mode of the VMOD-4D is controlled with the jumper J1.

Jumper	Setting	Description
J1	*Open*	*Standard access mode Default* *Address modifier codes 39/3D*
	Set	Short I/O mode Address modifier codes 29/2D

3.1.2 Address Range

The jumper J2 controls the address range of the VMOD-4D.

Note: With J2 set, the jumpers J10 and J6 are set to Don't Care.

Jumper	Setting	Description
J2	*Open*	*Standard address range Default* *2x256 Byte for VMOD-4D = 128 Byte per ModPack*
	Set	Extended address range 8 kByte for VMOD-4D = 2 kByte per ModPack

3.1.3 Base Address

The jumpers J6 to J10 and jumpers J33 to J40 set the base address of the VMOD-4D board.

Jumper	Setting	Description
J6	Set	A12
J7	Set	A13
J8	Set	A14
J9	Set	A15
J39	Set	A23
J38	Set	A22
J37	Set	A21
J36	Set	A20
J35	Set	A19
J34	Set^	A18
J33	Set	A17
J40	Set	A16

Jumper	Setting	Description A11 .. A8
J10	Set	MP0/1: Hex 0 MP2/3: Hex 8
	Open	MP0/1: Hex 4 MP2/3: Hex C

The jumpers J6 to J9 and J33 to J40 corresspond directly to the VMEbus addresses. This means that the jumper setting can be compared directly with the VMEbus address lines.

The jumper J10 performs the adaption to base addresses based on the 3U VMOD-2(D) base board module. This means that the following base addresses apply:

J10 open (addresses which are used with the VMOD-2 and supported by existing drivers).

Piggyback 0 (MP0) = $87FE2400

Piggyback 1 (MP1) = $87FE2480

Piggyback 2 (MP2) = $87FE2C00

Piggyback 3 (MP3) = $87FE2C80

J10 set (the following additional base addresses are installed which are not used on the VMOD-2).

0 piggyback (MP0) = $87FE2000

1 piggyback (MP1) = $87FE2080

2 piggyback (MP2) = $87FE2800

3 piggyback (MP3) = $87FE2880

Addressing Examples

J2 open (J10 defines the address nibble A11 .. A8)

J39 A23	J38 A22	J37 A21	J36 A20	J35 A19	J34 A18	J33 A17	J40 A16	J9 A15	J8 A14	J7 A13	J6 A12
Open	Open	Open	Open	Open	Open	Open	Set	Set	Set	Open	Set
Open	Open	Open	Open	Open	Open	Open	Set	Set	Set	Open	Open
Open	Open	Open	Open	Open	Open	Open	Set	Set	Open	Set	Set
Open	Open	Open	Open	Open	Open	Open	Set	Set	Open	Set	Set

J10 A11 .. A8	Base Address	
Open	$FE2400	*MP0*
	$FE2480	*MP1*
	$FE2C00	*MP2*
	$FE2C80	*MP3*
Open	$FE3400	*MP0*
	$FE3480	*MP1*
	$FE3C00	*MP2*
	$FE3C80	*MP3*
Open	$FE4400	*MP0*
	$FE4480	*MP1*
	$FE4C00	*MP2*
	$FE4C80	*MP3*
Set	$FE4000	*MP0*
	$FE4080	*MP1*
	$FE4800	*MP2*
	$FE4880	*MP3*

J2 set (J10 and J6 = Don't Care)

J39 A23	J38 A22	J37 A21	J36 A20	J35 A19	J34 A18	J33 A17	J40 A16	J9 A15	J8 A14	J7 A13	J6 A12
Open	Open	Open	Open	Open	Open	Open	Set	Set	Set	Open	x
Open	Open	Open	Open	Open	Open	Open	Set	Set	Open	Set	x
Open	Open	Open	Open	Open	Open	Open	Set	Set	Open	Open	x
Open	Open	Open	Open	Open	Open	Open	Set	Open	Set	Set	x

J10 A11 .. A8	Base Address	
x	$FE2000	*MP0*
	$FE2800	*MP1*
	$FE3000	*MP2*
	$FE3800	*MP3*
x	$FE4000	*MP0*
	$FE4800	*MP1*
	$FE5000	*MP2*
	$FE5800	*MP3*
x	$FE6000	*MP0*
	$FE6800	*MP1*
	$FE7000	*MP2*
	$FE7800	*MP3*
x	$FE8000	*MP0*
	$FE8800	*MP1*
	$FE9000	*MP2*
	$FE9800	*MP3*

3.1.4 Interrupt Level

The interrupt levels are configured using the jumpers J3, J4 and J5.

J3	J4	J5	VME IRQ Level
Set	*Set*	*Open*	*IRQ1** *Default*
Set	Open	Set	IRQ2*
Set	Open	Open	IRQ3*
Open	Set	Set	IRQ4*
Open	Set	Open	IRQ5*
Open	Open	Set	IRQ6*
Open	Open	Open	IRQ7*

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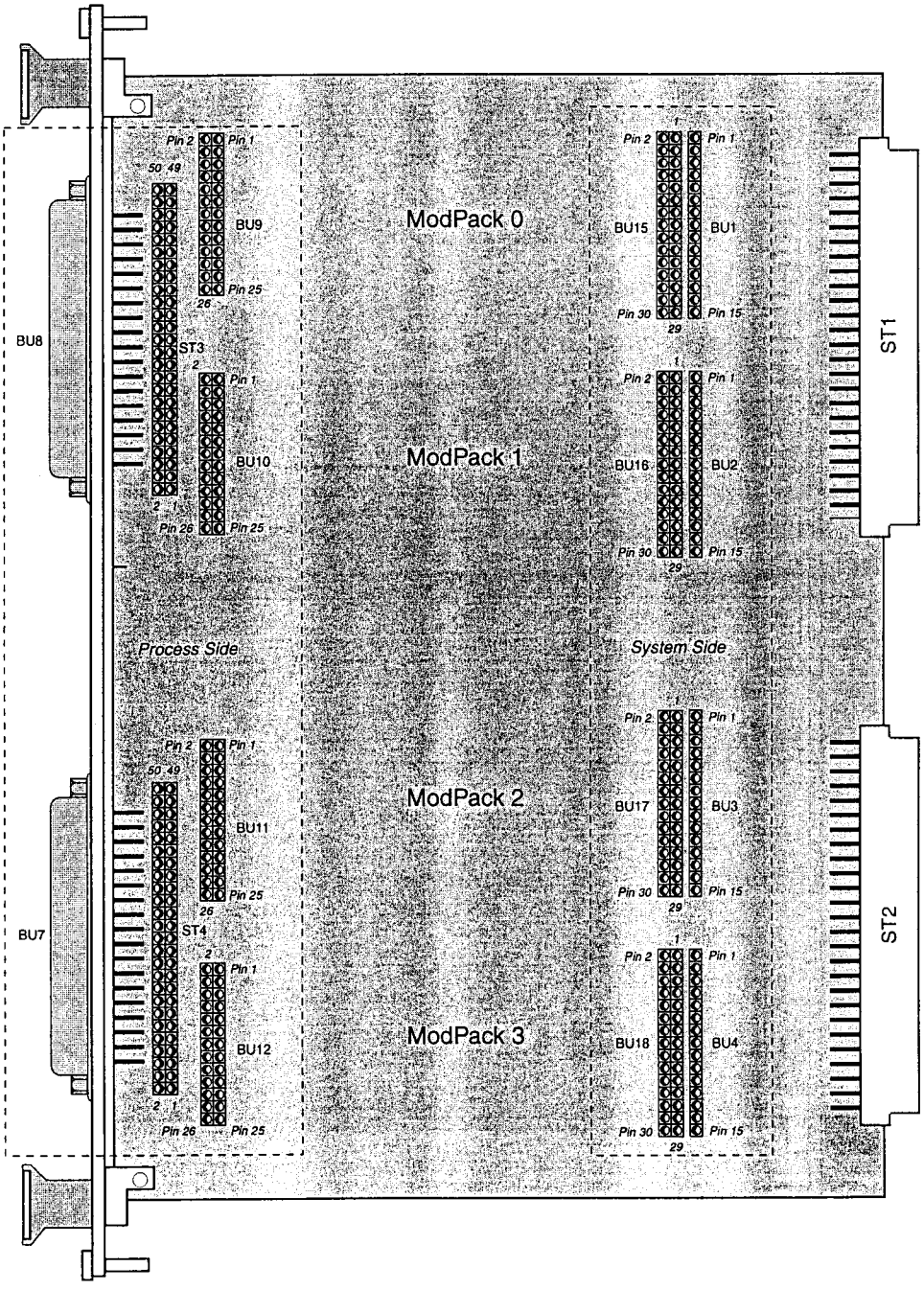
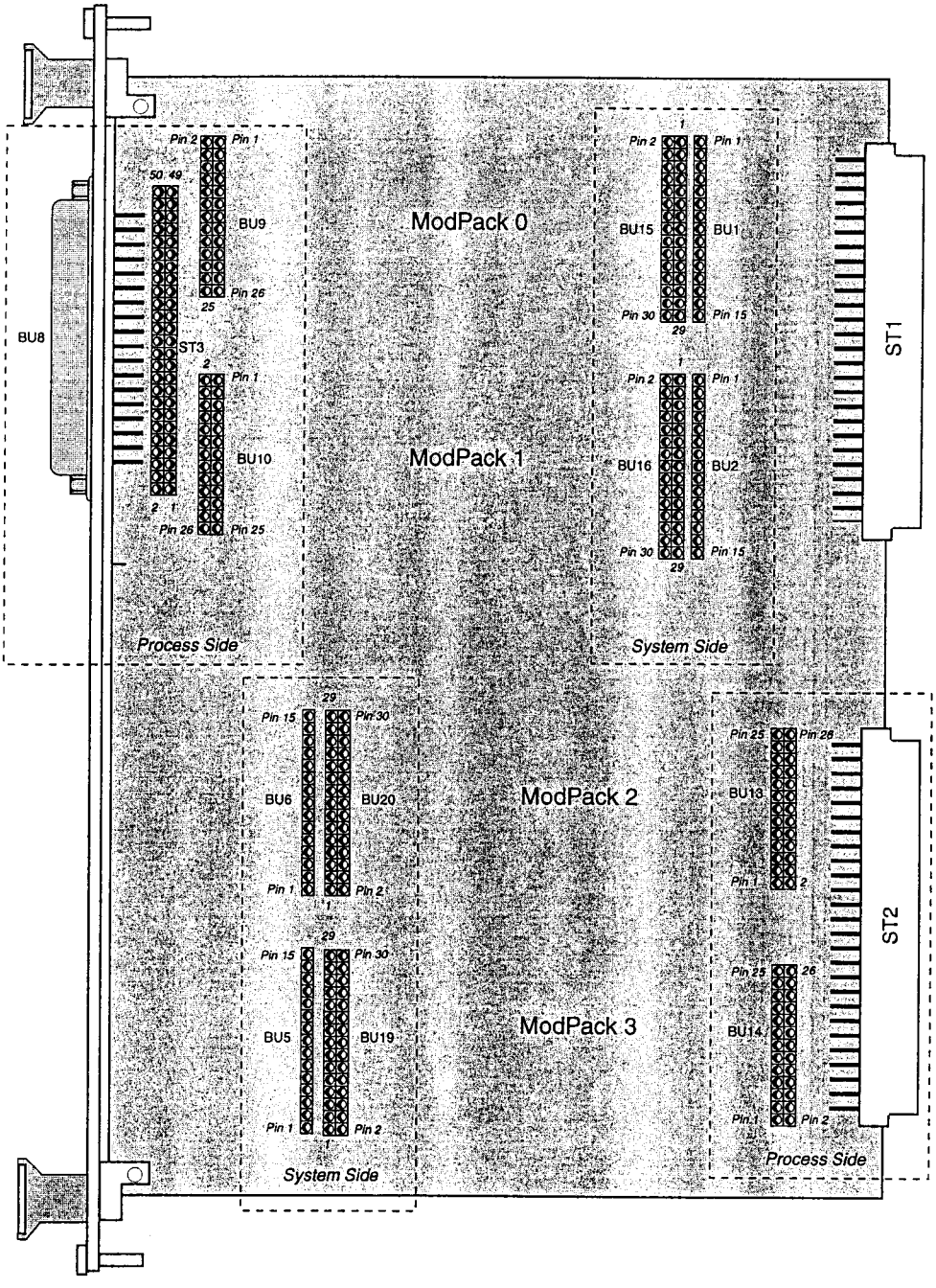
4.1 Connector Locations

Board version with Two 50-pin D-Sub Connectors (Ident Nr. 14319)



Board version with One 50-pin D-Sub Connectors (Ident Nr. 14320)



4.2 Connector Pinouts

Connector number references to the ModPacks (Version with Two 50-pin D-Subs)

System Side	System Side	Process Side	ModPack
BU1	BU15	BU9 - ST3 - BU8	MP0
BU2	BU16	BU10 - ST3 - BU8	MP1
BU3	BU17	BU11 - ST4 - BU7	MP2
BU4	BU18	BU12 - ST4 - BU7	MP3

4.2.1 System Side Pinouts

Pinout of BU1, BU2, BU3, BU4, BU5 and BU6

Pinout	Signal
1	GND
2	IA8
3	IA9
4	IA10
5	IA11
6	_IDSU
7	ID15
8	ID14
9	ID13
10	ID12
11	ID11
12	ID10
13	ID9
14	ID8
15	GND

Pinout of BU15, BU16, BU17, BU18, BU19 and BU20

Pinout	Signal	Pinout	Signal
1	GND	2	VCC
3	+12V	4	-12V
5	IR_W	6	CLK
7	RESET	8	_UDTACKx
9	INTAx	10	_CSx
11	INTx	12	IA7
13	ID7	14	_IDSL
15	ID6	16	_IAS
17	ID5	18	IA6
19	ID4	20	IA5
21	ID3	22	IA4
23	ID2	24	IA3
25	ID1	26	IA2
27	ID0	28	IA1
29	GND	30	VCC

where x=0, 1, 2, 3 and represents the piggybacks MP0, MP1, MP2 and MP3 respectively.

4.2.2 Process Side Pinouts

MP0:

BU8	ST3	BU9	BU9	ST3	BU8
50	50	1	2	50	50
33	48	3	4	47	49
16	46	5	6	45	32
48	44	7	8	43	15
31	42	9	10	41	47
14	40	11	12	39	30
46	38	13	14	37	13
29	36	15	16	35	45
12	34	17	18	33	28
44	32	19	20	31	11
27	30	21	22	29	43
10	28	23	24	27	26
17	49	25	26	49	17

MP1:

BU8	ST3	BU10	BU10	ST3	BU8
25	24	1	2	24	25
8	22	3	4	21	24
40	20	5	6	19	7
23	18	7	8	17	39
6	16	9	10	15	22
38	14	11	12	13	5
21	12	13	14	11	37
4	10	15	16	9	20
36	8	17	18	7	3
19	6	19	20	5	35
2	4	21	22	3	18
34	2	23	24	1	1
41	23	25	26	23	41

MP2:

BU7	ST4	BU11	BU11	ST4	BU7
50	50	1	2	50	50
33	48	3	4	47	49
16	46	5	6	45	32
48	44	7	8	43	15
31	42	9	10	41	47
14	40	11	12	39	30
46	38	13	14	37	13
29	36	15	16	35	45
12	34	17	18	33	28
44	32	19	20	31	11
27	30	21	22	29	43
10	28	23	24	27	26
17	49	25	26	49	17

MP3:

BU7	ST4	BU12	BU12	ST4	BU7
25	24	1	2	24	25
8	22	3	4	21	24
40	20	5	6	19	7
23	18	7	8	17	39
6	16	9	10	15	22
38	14	11	12	13	5
21	12	13	14	11	37
4	10	15	16	9	20
36	8	17	18	7	3
19	6	19	20	5	35
2	4	21	22	3	18
34	2	23	24	1	1
41	23	25	26	23	41

4.2.3 ST2 (VMEbus P2) Pinouts

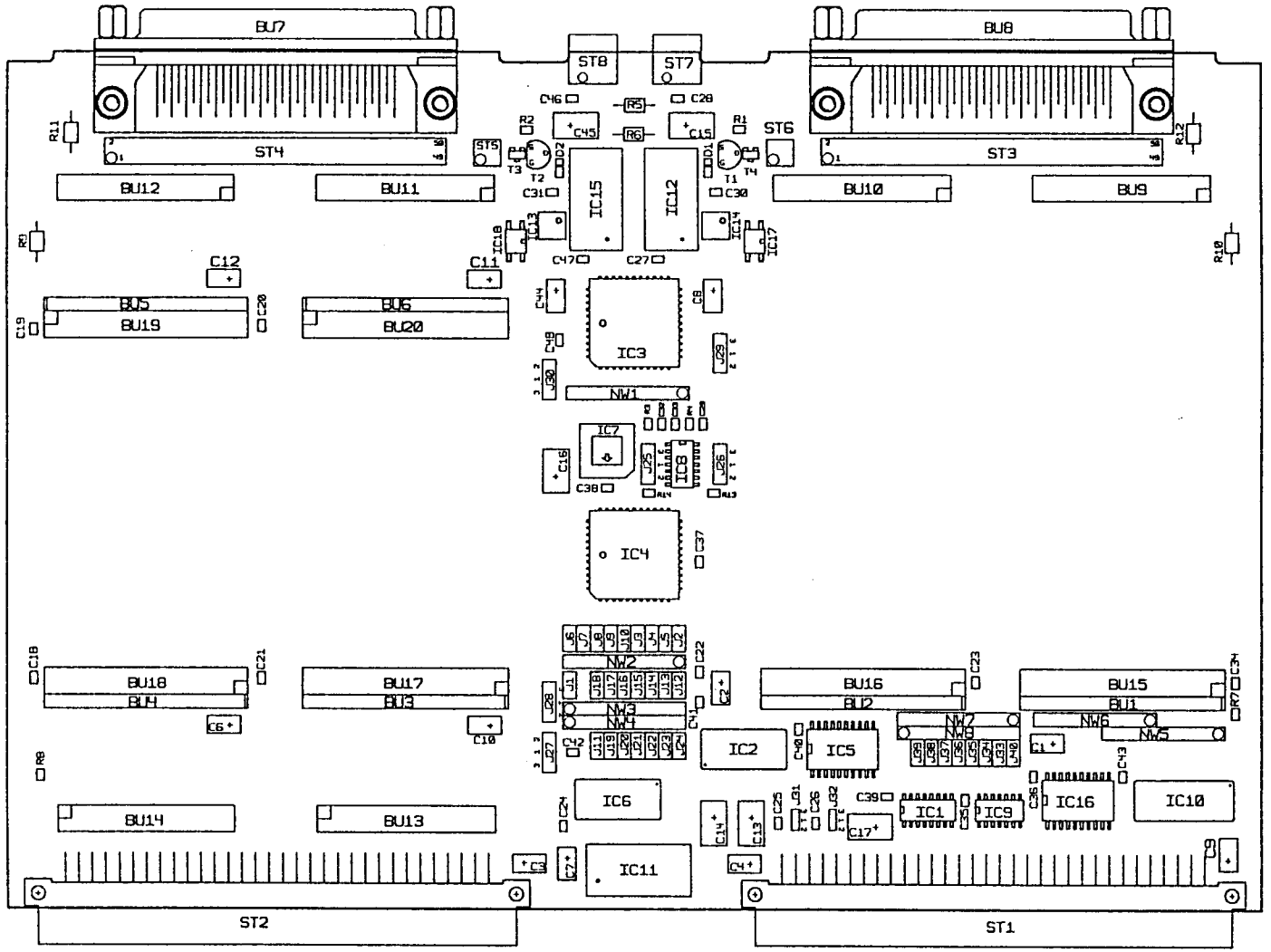
The following pinouts refer to the board version of the VMOD-4 with one D-Sub connector on the front panel.

MP2:

ST2	BU13	BU13	ST2
A1	1	2	A2
A3	3	4	A4
A5	5	6	A6
A7	7	8	A8
A9	9	10	A10
A11	11	12	A12
A13	13	14	A14
A15	15	16	A16
A17	17	18	A18
A19	19	20	A20
A21	21	22	A22
A23	23	24	A24
A25	25	26	A26

MP3:

ST2	BU14	BU14	ST2
C1	1	2	C2
C3	3	4	C4
C5	5	6	C6
C7	7	8	C8
C9	9	10	C10
C11	11	12	C12
C13	13	14	C14
C15	15	16	C16
C17	17	18	C18
C19	19	20	C20
C21	21	22	C22
C23	23	24	C24
C25	25	26	C26



ORIGINAL

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