Modular Computers ®

VMOD-2/VMOD-2D

VModular Industrial I/O Module

for VMEbus Applications

Manual ID 03139, Rev. Index 0200 of 12/10/97

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Preface

Warning!

The first index (PCB layout 00) of VMOD-2 was designed for improved noise immunity (via multi-layer shielding) and as such have insufficient clearance around the piggybacks I/O pins and the 50-way external interface connectors pins to ensure the 2.5kV breakdown isolation specified by certain piggybacks. Use index 01 or higher for such applications, or take additional measures to be taken to ensure system/user safety.

Revision History

REVISION HISTORY					
Manual/Product Title:	**VMOD-2/VMOD-2D**				
Manual ID Number:	**03139**				
Rev. Index	**Brief Description of Changes**	**PCB Index**		**Date of Issue**	
0100	Initial Issue	01	01	Feb. 1992	
0101	Changes to Address Range in 2.4	01	01	July 1994	
0200	Standard Preface, New Numbering System	01	01	Dec. 1997	

For your safety

This *PEP* product is carefully designed for a long, fault-free life. However, its life expectancy can be drastically reduced by improper treatment during unpacking and installation. Therefore, in the interest of your own safety and of correct operation of your new PEP product, please take care of the following guidelines:

- Before installing your new *PEP* product into a system, please, always switch off your power mains. This applies also to installing piggybacks.
- In order to maintain *PEP's* product warranty, please, do not alter or modify this product in any way. Changes or modifications to the device, which are not explicitly approved by *PEP Modular Computers* and described in this manual or received from *PEP* Technical Support as a special handling instruction, will void your warranty.
- This device should only be installed in or connected to systems that fulfill all necessary technical and specific environmental requirements. This applies also to the operational temperature range of the specific board version, which must not be exceeded. If batteries are present, their temperature restrictions must be taken into account.
- In performing all necessary installation and application operations, please, follow only the instructions supplied by the present manual.
- Keep all the original packaging material for future storage or warranty shipments. If it is necessary to store or ship the board, please, re-pack it in the original way.

Special Handling and Unpacking Instructions

Electronic boards are sensitive to static electricity. Therefore, care must be taken during all handling operations and inspections with this product, in order to ensure product integrity at all times.

- Do not handle this product out of its protective enclosure while it is not being worked with, or unless it is otherwise protected.
- Whenever possible, unpack or pack this product only at EOS/ESD safe work stations.
- Where safe work stations are not guaranteed, it is important for the user to be electrically discharged before touching the product with his/her hands or tools. This is most easily done by touching a metal part of your system housing.
- Particularly, 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. They can cause short circuits and damage the batteries or tracks on the board.

Safety Instructions for High Voltages

This chapter of the safety instructions applies to HV appliances (> 60 V) only.

Your new *PEP* product was developed and tested carefully to provide all features necessary to ensure the reknown electrical safety requirements. However, serious electrical shock hazards exist during all installation, repair and maintenance operations with this product. Therefore, always unplug the power cable to avoid exposure to hazardous voltage.

All operations on this device have to be carried out by sufficiently skilled personnel only.

Two Years Warranty

PEP Modular Computers grants the original purchaser of *PEP* products a ***TWO YEARS LIMITED HARDWARE WARRANTY*** as described in the following. However, no other warranties that may be granted or implied by anyone on behalf of *PEP* are valid unless the consumer has the expressed written consent of *PEP Modular Computers*.

PEP Modular Computers warrants their own products, excluding software, to be exempt of manufacturing and material defects for a period of 24 consecutive months from the date of purchase. This warranty is not transferable nor extendible to cover any other users or long-term storage of the product. It does not cover products which have been modified, altered or repaired by any other party than *PEP Modular Computers* or their authorized agents. Furthermore, any product which has been, or is suspected of being damaged as a result of negligence, unproper use, incorrect handling, servicing or maintenance, or which has been damaged as a result of excessive current/voltage or temperature, orwhich has had its serial number(s), any other markings or parts thereof altered, defaced or removed will also be excluded from this warranty.

If the customer's eligibility for warranty has not been voided, in case of any claim, he may return the product at the earliest possible convenience to the original place of purchase, together with a copy of the original document of purchase, a full description of the application the product is used on and a description of the defect. Pack the product in such a way as to ensure safe transportation (see our safety instructions).

PEP provides for repair or replacement of any part, assembly or sub-assembly at their own discretion, or to refund the original cost of purchase, if appropriate. In the event of repair, refunding or replacement of any part, the ownership of the removed or replaced parts reverts to *PEP Modular Computers*, and the remaining part of the original guarantee, or any new guarantee to cover the repaired or replaced items, will be transferred to cover the new or repaired items. Any extensions to the original guarantee are considered gestures of goodwill, and will be defined in the "Repair Report" issued by *PEP* with the repaired or replaced item.

PEP Modular Computers will not accept liability for any further claims resulting directly or indirectly from any warranty claim, other than the above specified repair, replacement or refunding. Particularly, all claims for damage to any system or process in which the product was employed, or any loss incurred as a result of the product not functioning at any given time, are excluded. The extent of *PEP Modular Computers* liability to the customer shall not exceed the original purchase price of the item for which the claim exist.

PEP Modular Computers issues no warranty or representation, either explicit or implicit, with respect to its products, reliability, fitness, quality, marketability or ability to fulfil any particular application or purpose. As a result, the products are sold "as is," and the responsibility to ensure their suitability for any given task remains of the purchaser. In no event will *PEP* be liable for direct, indirect or consequential damages resulting from the use of our hardware or software products, or documentation, even if PEP were advised of the possibility of such claims prior to the purchase of the product or during any period since the date of its purchase.

Please remember that no *PEP Modular Computers* employee, dealer or agent is authorized to make any modification or addition to the abovespecified terms, either verbally or in any other form written or electronically transmitted, without the company's consent.

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Chapter 1

Product Overview

1. Introduction

1.1 Product Overview

VMOD-2 is a "User Configurable" Industrial I/O module with the ability to fit any two (identical or different) standard sized VMOD piggybacks. Each fitted piggyback shares half of the front panel's 50-way connector allowing a flat-ribbon cable to be easily routed to either one or two end devices. The VMOD-2 may not only be used with all existing (VMOD) piggybacks, but will also accept the future generation of enhanced piggybacks, which may use the additional signal lines only provided on the VMOD-2.

Upgrade paths/Compatibility. The original VMOD is no longer available and if ordered will automatically be replaced with the new VMOD-2. The VMOD-2 can be used as a direct replacement for any application using an older style VMOD. Full electro-mechanical compatibility (and acceptance of the existing piggyback interfaces) is guaranteed.

The VMOD-2 may be used as a direct replacement for any existing VMOD and will accept the fitted piggybacks from that existing VMOD without any modification. (See also special note below)

A VMOD may be used in place of the new VMOD-2 with the loss of some new features, and then only with piggybacks developed up to the end of 1990. Any enhanced piggybacks which need additional signals from the VMOD-2 will not work on the old VMOD. To identify which piggybacks are only suitable for use on the VMOD-2 look for a four digit order number such as the PB-BIT has. i.e. 5230-11. Any and all piggybacks with three digit numbers 523-xx, will function with both VMOD and VMOD-2 modules alike.

1.2 Ordering Information

Table 1-1: VMOD-2 Ordering Information

Product	Description	Order No.
VMOD-2	VMEbus industrial I/O interface module with latching 50 pin front panel connector, but without the additional on-board 50 pin header.	5230-0
VMOD-2	VMEbus industrial I/O interface module with the 50 pin flat ribbon on-board header only. (the 50-pin front panel connector is omitted)	5230-1

<u>Special Note! Caution!</u>

VMOD-2 boards with an index 00 offer increased inter-board shielding by using tight-routed ground and Vcc planes in their multi-layer layout. This will compromise the 2.5 kV breakdown isolation offered by many VMOD-piggybacks. If the 2.5 kV fault isolation is important for the application, please use a VMOD-2 with a board index of 01 upwards since this will have an increased galvanic isolation gap around the 50-way external interface and 26-way piggyback I/O pin areas.

1.3 Glossary of Terms

This is a brief description of some of the abbreviations used throughout this manual.

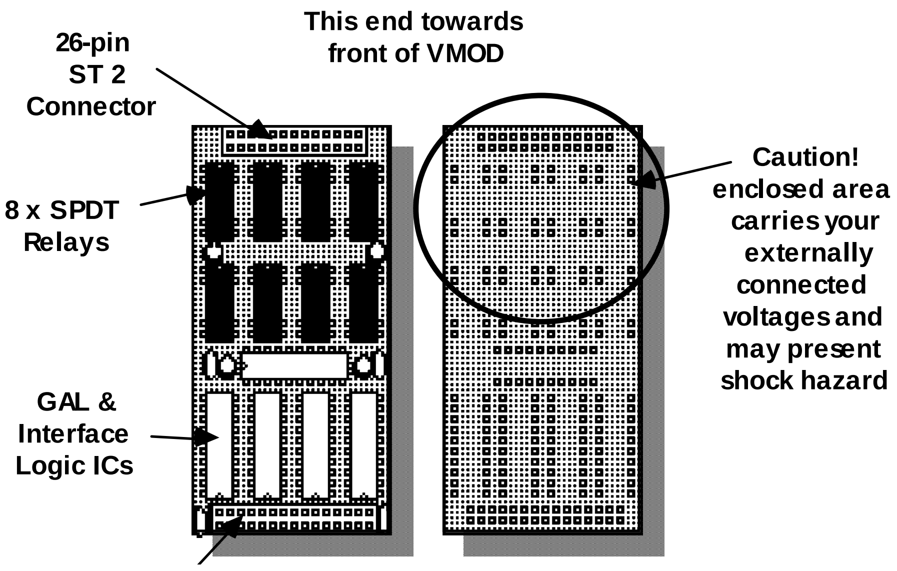
Table 1-2: Abbreviations

AB#	Address Block number (used in some tables in this manual to signify a 256 byte wide address block chosen out of a maximum permissible 32 addresses)
PBx	Piggyback (where x is the location "A" or "B")
PCB	Printed Circuit Board
PSU	Power Supply Unit

1.4 Hazards

The VMOD-2 can be fitted with one or two piggybacks carrying voltages classed as dangerous (i.e. over 50V dc). These are usually powered by external devices and therefore are not powered subject to the status of the VMEbus systems power switch. This can result in a VMOD/VMOD-2 being removed from a powered-down rack with an external device still connected and presenting its voltage to the solder-side of both the VMOD/VMOD-2 and the back of the respective piggyback. A typical example is the PB-REL an eight relay SPST switching module, which can in certain circumstances present an unsuspecting user with up to 175V dc when pulling out (or installing) a VMOD-2 with the external powered interface leads connected. (For continued fault isolation to 2.5 kV use a VMOD-2 of index 01 or higher).

Figure 1-1: VMOD-2 Hazard Example (PB-REL)



Caution!

When using Piggybacks with external interfaces or supplies carrying Voltages higher than 50V dc ensure that the solder pins on the rear side of the PB-xxx and the VMOD to which it fits, are not accessible (cannot be accidently touched) during use. These pins can be under power all the time the external interfaces are connected, when powered,

even when VMOD-2/VMEbus is not powered!

1.5 VMOD-2 Specifications

Table 1-3: VMOD-2 Specifications

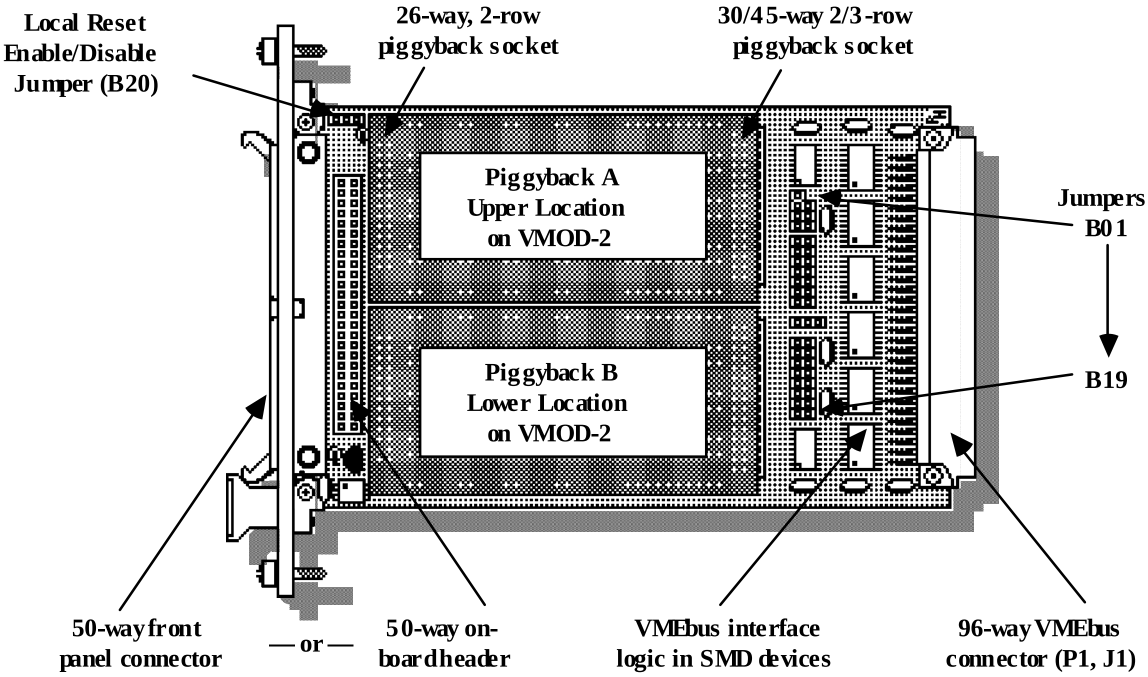
VMOD-2	Specification
External Interface	50-way flat band cable connector (upper half and lower half used by respective piggyback position) only accessible via the addition of VMOD/VMOD-2 piggyback (s) to the desired interface standard
VMEbus Interface	A24:D8/16, A16:D8/16 Slave
VME Address Range	Occupies 256 Bytes or 8 KBytes, A1....A11 to each piggyback. Base Address jumper selectable.
Interrupt Requester	Single-level , IRQ 1-7. Jumper selectable. Two lines for interrupt request, one per Piggyback. Interrupt vector generated by piggybacks, or by jumper settings on VMOD-2.
External Reset Inputs	Pins 25 and 26 of front-panel connector may be used to connect a NC (Normally closed) push-button reset switch, or for the creation of an "Emergency-Stop" loop, or for automatic detection of disconnection of interface. This facility may be disabled via jumper setting.
Power Requirements	+5V DC (±5%), 140 mA, excluding additional piggybacks demands
Temperature Range - Operating - Storage	 - 0° to +70°C (standard) - -40° to +85°C (extended, subject to fitted piggyback/-s) - -55° to +85°C
Operating Humidity	5 - 95% (non-condensing)
Board Size	Single-height Eurocard 100 x 160 mm (4 x 61/4")
VMOD to Piggyback Connectors (VME side)	A triple-row (to/from VMOD's VME side) per piggyback location. Providing Address, Data and necessary control line interfaces to selected PB type(s) fitted.

Table 1-3: VMOD-2 Specifications

VMOD-2	Specification
VMOD to Piggyback Connectors (User side)	A double-row (to/from user I/O side) set of connectors per piggyback location. These connectors are galvanically isolated for 2.5 kV (not on index 00 however) from the rest of the VMOD-2 circuits and are selected to their respective function according to actual piggyback(s) fitted.
VMEbus Connector	DIN 41612 style C, 96-pin
Front Panel Width	4 TE (20.3 mm)(1 slot)
Front Panel Connector	50-pin male ribbon cable header with retain/eject latches. Alternatively, no front connector, but a 50-pin on-board header (without retain/eject latches where interfaces are to be kept internal to rack/ equipment.
Piggybacks General	See respective piggyback's manual for exact specifications.
Piggyback Size	Width: 48 mm(1 7/8 inches) Length: 100 mm(3 15/16 inches) Depth: 12 mm (1/2 inch)
Mechanical/Electrical Interface	Held by either Two sets of twin row header pins, or a triple-row and double-row set of headers, providing all necessary communication paths and a mechanical mounting method.
Temperature Range: - Operating - Storage	 - 0° to +70°C (standard) - -40° to +85° (extended, for some piggybacks) - typically -55° to +85°C

1.6 VMOD-2 Board Overview

Figure 1-2: VMOD-2 Board Overview



The VMOD-2 is a simple low-cost product designed for maximum flexibility while keeping the single-height, single-slot modular concept of the PepCard. To ensure user/system security against fault conditions is maintained with and when using opto-isolated piggybacks, the VMOD-2 has a large area of unpopulated board space under the front half of both piggyback locations. This unused area is part of the VMOD-2's Galvanic isolation (see special note on page 1-1) and no additional wiring should be routed to/from components in the rear-most area of the VMOD-2 and the component groups (connectors) at the front of the VMOD-2. A "local-Reset" logic line is however routed to the three-pin jumper near the 50-pin front panel connector, but this follows distancing and opto-isolation rules to ensure that the galvanic capability of the opto-isolated piggybacks is not compromised.

The VMOD-2 is shown above with both the 50-way front panel connector and the 50-way on-board header. It can only be ordered with one or the other. Further the VMOD-2 is shown with the two piggyback locations occupied, which is how the majority of users employ their VMOD's, but is delivered without any piggybacks, these items being added to the above illustration to help see where the connectors and piggybacks are to be found/used.

Each of the two piggybacks are fitted so their 26-way connector pins fit into the corresponding 26-way socket-holes provided for each piggyback location. The rear connectors pins will then fit into the correct rows of the 30/45-way sockets regardless of whether the piggyback has a 30-pin or 15-pin connector.

All the jumpers, with the exception of B20 (local reset), are to be found at the back end of the VMOD-2 in several small groups. Jumper B01 is an "L" shaped group of three-pins nearest the top edge of the board, and the rest are consecutively numbered progressing down the VMOD-2 until the last (Jumper B19) is reached nearest the bottom of the board. The function of these jumpers, and a detailed illustration of their locations and pin-numbering, are to be found in chapter 3 of this manual.

The remaining components on this simple low-cost industrial base board are in CMOS SMD logic and GALs to ensure reduced power consumption/thermal generation over it's predecessor.

1.7 Advantages and Features of the VMOD-2 PepCard

The VMOD-2 is an improved version of the original VMOD, which was designed with a major objective in mind: to provide a low cost and easy to implement user configurable I/O interface for industrial interface applications and/or space-savings in many different customer applications.

This result is a maximized choice of design flexibility. The VMOD-2 provides a very cost-effective solution, with quick and easy implementation, and full compatibility with the extensive range of existing VMOD-piggybacks and the ability to accept the planed "enhanced" piggybacks of the second generation.

With the flexibility offered by the VMOD-2 and the existing range of industrial I/O modules, you are able to configure many complex and usually very intense interfaces, in a very quick and compact way. This may be especially important when needing to add interfaces to an already existing system, or where when using other products several additional slots or a larger rack/sub-frames or additional power supplies/cooling, were needed/used with their financial overhead.

Now with the VMOD-2 you may replace several of these existing cards, or external interface boxes, with a single VMOD-2, fitted with two piggybacks containing the desired interfaces, and also offering the added feature of a local reset input.

1.7.1 Features of the VMOD-2 Module

Features of the VMOD-2 are:

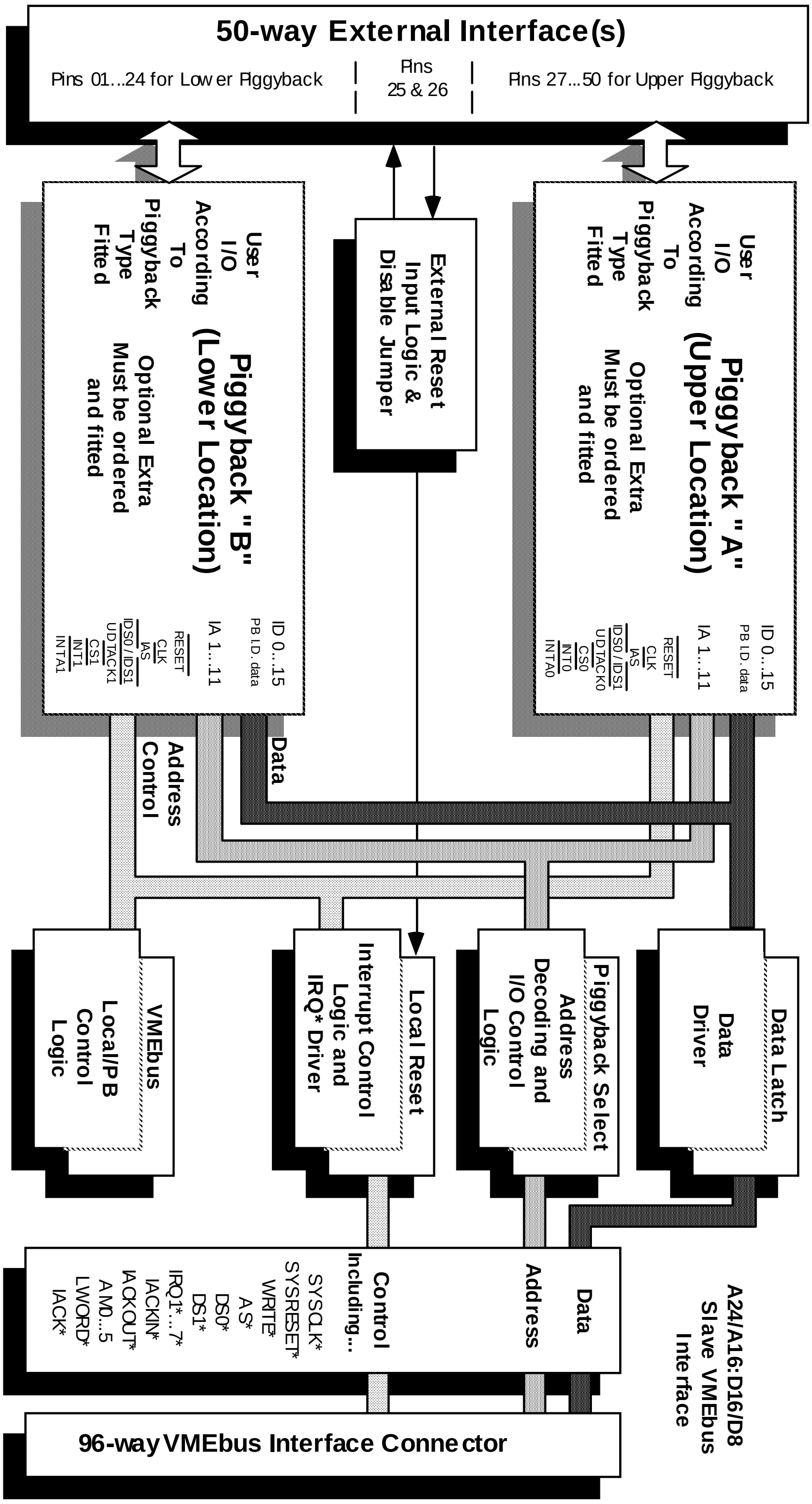
* Widest possible range of base address selection to allow up to thirty-two VMOD-2's to be used in any one system. (Previously only eight original VMOD's could be fitted due to their fixed base addresses).
* Each piggyback location now supports 11 address lines. (A1...A11 to each piggyback).
* Each piggyback location now has 8/16-bit Databus lines. (D0..D15 to each piggyback).
* Galvanic Isolation between each interface and to the VMOD-2's VMEbus circuitry depending upon the piggybacks fitted.
* External Reset facility, can be used to cause "local-reset" of the VMOD-2's piggybacks.
* Two Individually configurable piggyback locations, with board ID byte for remote (software) configuration identity checking.
* Compact size, VMOD-2 plus two piggybacks containing your chosen interface circuitry, are all contained within standard single-height, single-slot PepCard dimensions. Choice of interface connector options, so where needed the connection method can be kept internal, i.e. via a 50-pin on-board connector.
* Easy maintenance (i.e. swap-and-test, reduce service down-time)

Hardware Features:

* Full electro/mechanical compatibility with the existing VMOD piggybacks and with the very latest VMOD-2 enhanced piggybacks.
* All necessary VMEbus lines are made available to each of the piggybacks.
* 2.5 kV Galvanic VME to external isolation (not on index 00 boards), and PB to PB interfaces supporting opto-isolated piggybacks and the opto-isolated external "local" reset input circuits.
* Extended temperature versions of both the VMOD-2 and many of the currently available piggybacks, allowing combinations suitable for harsh industrial environments to be configured.

1.8 Functional Block Diagram of the VMOD-2

Figure 1-3: Functional Block Diagram



1.9 Related Publications

For more information regarding the VMEbus, please refer to:

* The VMEbus Specification, Revision C.1.

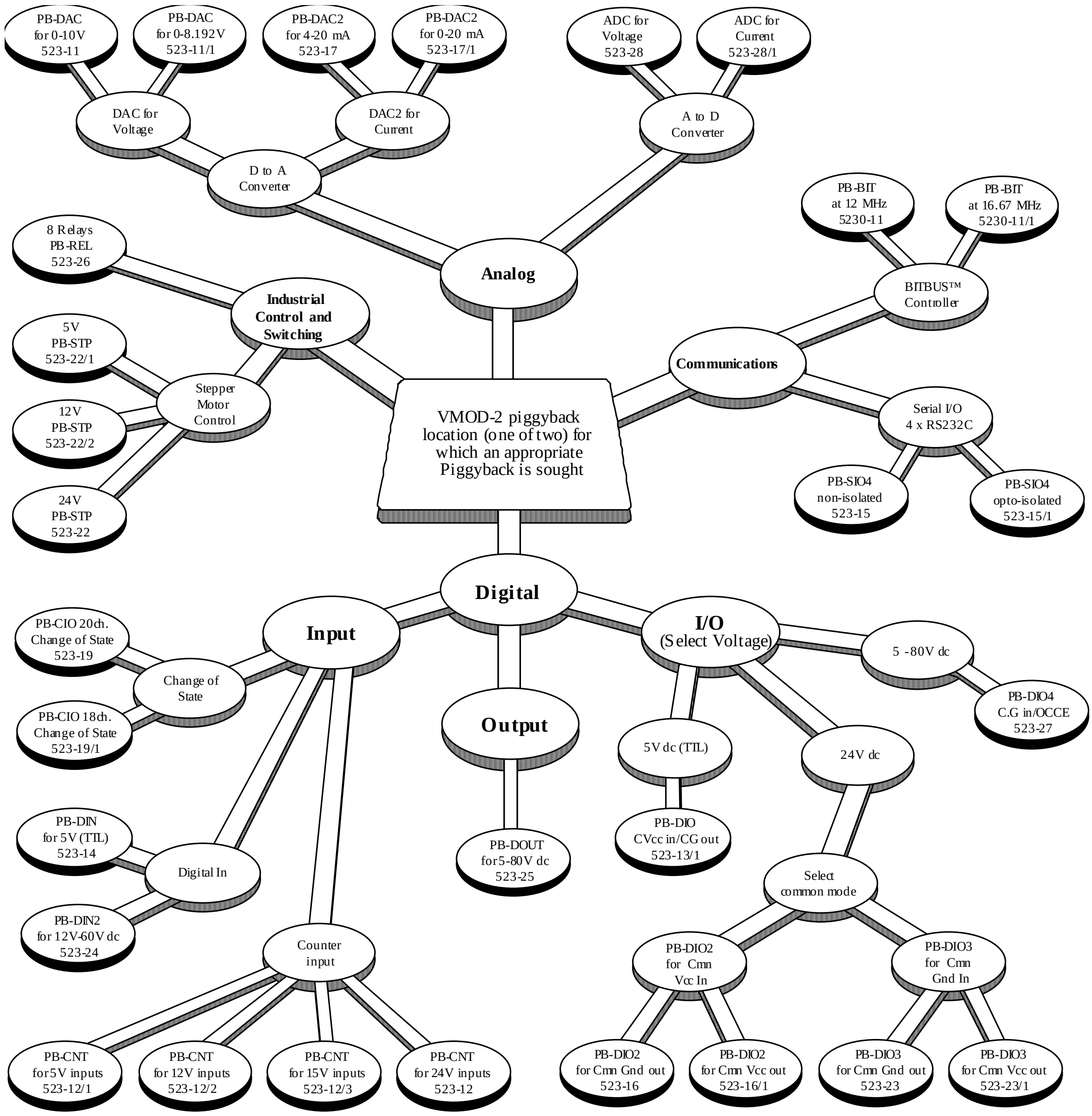
For details regarding the VMOD-piggybacks (or VMOD-2-piggybacks) , please refer to the respective products User's Manual.

1.10 Piggyback Selection Assistance

As there are so many different types of piggyback available for the VMOD-2, and many offer different options such as common ground or Vcc for their inputs, etc. the following selection help chart has been provided. It may be used in conjunction with the piggyback overview table on the next page. The prototyping piggyback is not shown in this figure.

All grey edged "coins" are decisions or group titles, all black edged coins are actual product names and order numbers.

Figure 1-4: Piggyback Selection Chart



1.10.1VMOD/VMOD-2 Piggybacks Overview

Your VMOD-2 can accept any two piggybacks from those listed in the following table. Some of the piggybacks have several different versions to allow their precise adaptation to your target application. i.e. The PB-DIO2 is available with it's outputs in a common ground or common Vcc mode. The differences are shown by italics, braces and brackets showing what characteristic is different in each order number type. The body text (normal) applies to all versions of that piggyback type.

Table 1-4: Piggyback Overview

PB-Name	Brief Description	Ch. @ V In	Ch. @ V Out	Order #
PB-DIO	20 Ch. Digital I/O with 68230 and 24-bit timer	10 ch. at 5V /10mA opto, Cmn Vcc	10 ch. at 5V/ 10mA opto, Cmn Ground	523-13/1
PB-DIO2	20 Ch. Digital I/O with 68230 and 24-bit timer	10 ch. 24V / 5mA opto, Cmn Vcc	10 ch. 24V/ 100mA opto, CG (CV)	523-16 (523-16/1)
PB-DIO3	20 Ch. Digital I/O with 68230 and 24-bit timer	10 ch. 24V / 5mA opto, Cmn Gnd	10 ch. 24V/ 100mA opto, CG (CV)	523-23 (523-23/1)
PB-DIO4	16 Ch. High Voltage Digital I/O	8 ch.12 to 80V / 5mA opto CG in pairs	8 ch 5 to 80V/500mA opto OC CE in pairs	523-27
PB-DIN	20 Ch. Digital Input 68230 and 24-bit timer	20 ch. 24V (5V) 10mA opto CV	-	523-14 (523-14/1)
PB-DIN2	12 Ch. Hi-V Digital Input	12 individual ch.s 12 to 60V 5mA	-	523-24
PB-DOUT	12 Ch. High Voltage Digital Output	-	12 individual ch.s 5 to 80V/500mA	523-25
PB-CIO	20 Ch. "Change of State" Z8536 Inputs	20 (18) CV ch.s opto 24V/7.5mA	(2 independant ch. 24V/5mA opto)	523-19 (523-19/1)

Table 1-4: Piggyback Overview

PB-Name	Brief Description	Ch. @ V In	Ch. @ V Out	Order #
PB-CNT	2x32-bit or 4x16-bit Counter, @ 500 kHz max. input speeds.	2/4 opto-isolated counter inputs, 24V/ 5mA (5V/ 10mA) [12V] {15V}	-	523-12 (523-12/1) [523-12/2] {523-12/3}
PB-SIO4	Quad Serial I/O 68681 RS232 + RTS and CTS	4 x RS232, non-opto (opto-isolated)		523-15 (523-15/1)
PB-STP	Single Axis multi-mode Stepper Motor Controller.	6 control lines @ 24V (5V) [12V] / 11mA opto-isolated	10 lines / 1 Axis 24V (5V) [12V] 8mA opto-isolated	523-22 (523-22/1) [523-22/2]
PB-REL	Eight SPDT Relays	-	8 x galv.-isolated	523-26
PB-DAC	4 ch 12-bit D to A Converter (10µs)	-	4ch. 0-10V±10V (0-8.192V±8.192V)	523-11 (523-11/1)
PB-DAC2	4 ch 12-bit D to A Converter (10µs)	-	4ch. 4-20 mA (0-20 mA)	523-17 (523-17/1)
PB-ADC	4 ch 12-bit D to A Converter (10µs)	8 ch. 0-10V±10V	-	523-28
PB-ADC-2	8 ch 10-bit A to D Converter (16µs)	8 ch. 0-20 mA		523-28/1

Table 1-4: Piggyback Overview

PB-Name	Brief Description	Ch. @ V In	Ch. @ V Out	Order #
PB-BIT	BITBUS™ Communic-ations Con-troller	80C152A. 12 (16.67) MHz. (2.4 Mbaud Sync.) 1.5 Mbaud self-clocked. 2 x 1 KByte FIFO		5230-11* (5230-11/1)*
PB-PRM	Prototyping	User definable I/O accord-ing to your own design		523-18

CG = Common Ground, CV = Common Vcc, opto = optoisolated, and OC CE = open colector-common emitter.

* = PB-BIT is not suited for use with the original VMOD. BITBUS is a registered trademark of the Intel corporation.

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Chapter 2

Functional Description

2. Functional Description

The VMOD-2 is a very simple and compact Modular Base-board accepting any two VMOD-Piggyback sub-modules for user-configurable I/O in any VMEbus system. It is better suited for use in conjunction with other VMOD-2's in a VMEbus system than the original VMOD, which only had eight different base addresses. This chapter will describe the "physical" interfaces of the VMOD-2, and the function of the external "local" reset interfaces.

Although this manual contains references to some VMOD piggybacks, you are asked to refer to the piggyback's own user manuals for comprehensive and up to date information regarding the individual piggyback products.

The VMOD-2 is designed to function as a slave module (any slot other than slot 1) in any 3U or 6U VMEbus system. in 6U (double-height) systems it is fitted in the upper backplane connector (P1, J1).

2.1 VMOD-2 Address Map

The VMOD-2 is addressed by setting appropriate jumpers for each selectable Address-line and/or the setting of an address modifier jumper (B03) to specify the desired addressing mode. A further jumper B16 can be set to provide increased address block widths when using the VMOD-2 with newer piggybacks using the additional address lines A7...A11. The first piggyback (upper location) is always available at the base address and the second piggyback (lower location) is available at base address plus either offset $80/$81 or $1000/$1001, subject to selected address block widths.

All existing "VMOD" (523-xx) piggybacks use the address lines A1...A6. Any new 5230-xx piggybacks (VMOD-2 only types) use not only the address lines A1...A6, but also A7...A11 which are provided on the VMOD-2 only.

Remember!

Any existing and/or new piggybacks with a "523-" order number, can be used on either an original VMOD or a VMOD-2, and when used on a VMOD-2 may be used in either 256 Byte or 8 KByte address block widths. Any new piggybacks with a "5230-" order number (only suitable for VMOD-2 use) with the address block width of 8 KBytes. A VMOD-2 can have a mix of old and new piggybacks fitted provided the address block width is set for the increased 8 KByte addressing mode, i.e. jumper B16 must be set.

Via the address offsets, the user can address specific piggyback devices (i.e. SCCs) by writing to the selected VMOD-2's base address plus an offset of the appropriate value (see specific piggyback user's manual).

Example of offsets where two PB-RELs are fitted to VMOD-2.

Addressing piggyback (i.e. PB-REL) fitted in location A (the upper position on VMOD-2)

- VMOD-2 BASE ADDRESS+$41= PB-REL's ID Vector (read only)
- VMOD-2 BASE ADDRESS+$01= PB-REL's 8-bit output port Register (read/write)

Addressing piggyback (i.e. PB-REL) fitted in location B (the lower position on VMOD-2)

- VMOD-2 BASE ADDRESS+$C1/$1041* = PB-REL's ID Vector (read only)
- VMOD-2 BASE ADDRESS+$81/$1001* = PB-REL's 8-bit output port Register (read/write)

* Actual offset for lower piggyback is subject to the setting of jumper B16 and could be $10xx if a 5230-xx piggyback is fitted into the upper piggyback location, and jumper B16 is set. I.e. 8 KByte address width is required.

Table 2-1: Default Setting of the VMOD-2 Base Address

Configuration for base address range $FE2400 to $FE24FF							
VMOD-2 Jumpers	B02	B12	B13	B14	B15	B16	Base Address
Default Settings	Set	Set	Open	Set	Set	Open	$FE2400
Address Lines	A15	A14	A13	A12	A11	in 256 Byte block	

A jumper set results in the related address line being assigned a logical low (0) function.

2.1.1 Selection of Address Block Widths

As mentioned in the preceding section, an important aspect regarding the use of the VMOD-2 is the option of block size selection, which must be taken into consideration when using the VMOD-2 in certain configurations and/or applications.

When using the VMOD-2 to replace an existing VMOD (as a one-to-one direct replacement), the VMOD-2 should be set to the narrower address range of 256 Bytes by opening the jumper B16. This ensures that the VMOD-2 presents an address width of only 256 Bytes identical to the old VMOD, and uses offsets of $01 and $80 for the two piggyback locations.

No new "5230-xx" piggybacks should be added to the VMOD-2 when used as a replacement for an older VMOD since when jumper B16 is open the enhanced (5230-xx) piggybacks will not have the use of additional address lines A7...A11 and will not therefore function correctly. Where using existing piggybacks and a VMOD-2 to substitute an older style VMOD, we recommend the jumper B16 is removed, which will ensure that your software will address both piggybacks correctly without any need of modification.

Table 2-2: Address Block Widths According to Jumper B16 Setting

Jumper B16 Setting	Set	Open
VMOD-2's Address Block Width	8 KByte	256 Byte
Upper Piggybacks address offset	$00/$01	$00/$01
Lower Piggybacks address offset	$1000/$1001	$80/$81
Address lines available to piggy-backs	A1.....A11	A1....A6

Special note!

The user's manuals for various piggybacks currently in existence, will continue to give details of their address offsets based on the 256 Byte address block spacing as described above. You can of course use the new 8 KByte spacing with all "523-xx" piggybacks, by simply increasing the offset from $80/$81 to $1000/$1001 for piggyback location B.

2.1.2 Address Range of the VMOD-2

Using the address widths given before, you are able to select from either thirty-two 256 Byte wide addresses, or from eight 8 KByte wide addresses,. i.e. your system can have 32 or eight VMOD-2s fitted subject to your address configurations. The address selection is acheived by decoding the state of five jumpers, B2, B12, B13, B14 and B15. Where a jumper Set returns a logical 0 for the respective address line and a jumper Open returns a logical 1 for the respective address line.

A full listing with all address setting permutations is given in section 3.1.6.

2.2 VMEbus Interrupts

2.2.1 Interrupt Generation on the VMOD-2

Each piggyback on the VMOD-2 is able to request/generate interrupts between levels 1 to 7. However the VMOD-2 will only be set for one level of interrupt for use on the VMEbus.

For each request from piggybacks, INT0* for piggyback location "A" and INT1* for "B", there is an acknowledge signal, INTA0* and INTA1* respectively. If two simultaneous interrupts are detected, the one which is first will disable any handling of the other until its been dealt with itself.

2.2.2 Interrupt Level Setting

As mentioned above the user can set his VMOD-2 to use any IRQ level from 1 to 7 as appropriate to his VMEbus systems application. The selection of these levels is subject to the setting of three jumpers B17, B18 and B19, where when all three are set the IRQ from the VMOD-2 is disabled. See section 3.1 (jumper configuration) for detailed settings.

2.2.3 Interrupt Vector Options

The user can select between several different ways to use his VMOD-2's Interrupt Vectors as the VMOD-2 is provided with a jumper (B1) with three different possibilities. See section 3.1 (jumper configuration) for detailed settings.

1). Vector can be generated by either or both piggybacks, if these piggybacks are intelligent enough. Most are.

2). Vector can be generated by the VMOD-2, using preset jumper coding, where non-intelligent piggybacks are being fitted. In this mode a further option to assign both piggybacks the same vector is provided by the setting of a three-pin jumper B11.

3). Vector can be generated by the lower piggyback ("B") and derived from jumper settings on the VMOD-2 for a non-intelligent piggyback fitted into the upper piggyback ("A") location.

The features of some piggybacks you may wish to use on your VMOD-2 are:

Table 4-3: Possible Piggybacks for VMOD-2

Dumb	PB-DAC	D to A converter piggyback
Dumb	PB-DAC-2	D to A converter piggyback
Dumb	PB-DIN2	Digital input piggyback
Dumb	PB-DIO4	Digital I/O piggyback
Dumb	PB-DOUT	Digital output piggyback
Dumb	PB-REL	Octo-Relay piggyback
Int Fixed	PB-ADC	A to D converter piggyback
Int Fixed	PB-CNT	Counter piggyback
Int Progr	PB-BIT	BITBUS™ communications piggyback
Int Progr	PB-CIO	Counter/I/O piggyback
Int Progr	PB-DIN	Digital Input piggyback
Int Progr	PB-DIO	Digital I/O piggyback
Int Progr	PB-DIO-2	Digital I/O piggyback
Int Progr	PB-DIO-3	Digital I/O piggyback
Int Progr	PB-SIO4	Quad serial piggyback
Int Progr	PB-STP	Digital I/O piggyback

Dumb = no on-piggyback vector generation ability.

Int Fixed = Vector is pre-fixed on-board the piggyback

Int Progr = programmable vector on piggyback

2.2.4 Interrupt Vector Setting

As described before, the user can set his VMOD-2's Interrupt Vectors as appropriate to his VMOD-2/Piggyback configurations needs. The selection of these vectors is subject to the binary code of bits D0...D7 as derived by the setting of jumpers B11 to B4 respectively. B11 is a three-pin type and can provide an identical or different vector for the two piggybacks. Three examples are given below where jumper B1 must be set to 1-2 to use these vectors.

Table 2-4: Interrupt Vector Selection

Interrupt Vector Bit	D7	D6	D5	D4	D3	D2	D1	D0
Jumper Numbers	B04	B05	B06	B07	B08	B09	B10	B11
Example Setting # 1	Open	Open	Open	Open	Set	Open	Set	1-3*
Upper PBs Vector	F				4			
Lower PBs Vector	F				5			
Example Setting # 2	Open	Open	Open	Open	Set	Open	Set	1-2*
Upper PBs Vector	F				4			
Lower PBs Vector	F				4			
Example Setting # 3	Open	Open	Open	Open	Set	Open	Set	Open
Upper PBs Vector	F				5			
Lower PBs Vector	F				5			

* = If jumper B11 is set for 1-3, D0 will return a "0" for piggyback "A" and a "1" for piggyback "B".

When jumper B11 is set to 1-2 the vector of both piggyback locations "A" and "B" will be the same (so D0 = 0).

When jumper B11 is open the vector of both piggyback locations "A" and "B" will also be the same (but D0 = 1).

2.2.5 Interrupt Vector Setting Examples

The following examples are provided to help VMOD-2 users to quickly understand when and how to set his VMOD-2's Interrupt Vectors as appropriate to his VMOD-2/Piggyback configurations needs.

Table 2-5: Interrupt Vector Configuration Examples

#	Configuration	Vector Modes	B1 Settings	B4...B11 Settings
1).	Two "intelligent" piggybacks (both able to generate interrupt vectors) are fitted to the VMOD-2 to use their own generated vectors.	Use Piggyback Generated Vectors	Jumper B1 is left open.	Jumpers B4...B11 are not decoded and can be left in any setting.
2).	Two "Dumb" piggybacks (both unable to generate interrupt vectors) are fitted to the VMOD-2 and need VMOD-2's set vectors.	Use VMOD-2 Jumper set Vectors	B1 is to be set to 1-2.	Jumpers B4...B11 are set for appropriate byte coding.
3).	One "intelligent" and one "Dumb" piggyback are to be fitted to the VMOD-2 and the user wants the intelligent piggyback to use it's on-board "Intelligent" vector generation in combination with "Dumb" jumper coding.	Use the "Dumb" piggyback in upper location, and fit the "intelligent" one in lower location.	B1 is to be set to bridge pins 1-3.	Jumpers B4...B11 are set for desired vector code to be assigned when piggyback "A" makes an IRQ.

2.3 External "Local" Reset Input

A new feature of the VMOD-2 is the ability to cause a "local" reset to the on-board piggybacks from two (previously unused) pins on the front panel connector. These pins accept external voltages between +5V min. and +48V max, across each VMOD-2.

Set jumper B20 to 1-2 if an external reset facility is not required.

The principals of the local reset input circuit are, that an opto-coupler is monitored for an external presence of current in through pin 26 and out to ground via pin 25 of the 50-way connector. If the flow of current is interrupted at any time, e.g. by disconnection of connectors, pressing a stop button, etc., the "local" reset is activated.

This facility may be enabled by setting the three-pin B20 jumper (linking jumper pins 1-3). Otherwise the VMOD-2 is delivered with this jumper set to 1-2, which is particularly important when using the VMOD-2 to replace an existing VMOD and not wanting to modify cables.

The External Reset is limited to the VMOD-2 and it's piggybacks, and will not reset the VME-bus unless your application software demands it to. I.e. via the polling of an output register to detect a "reset" state.

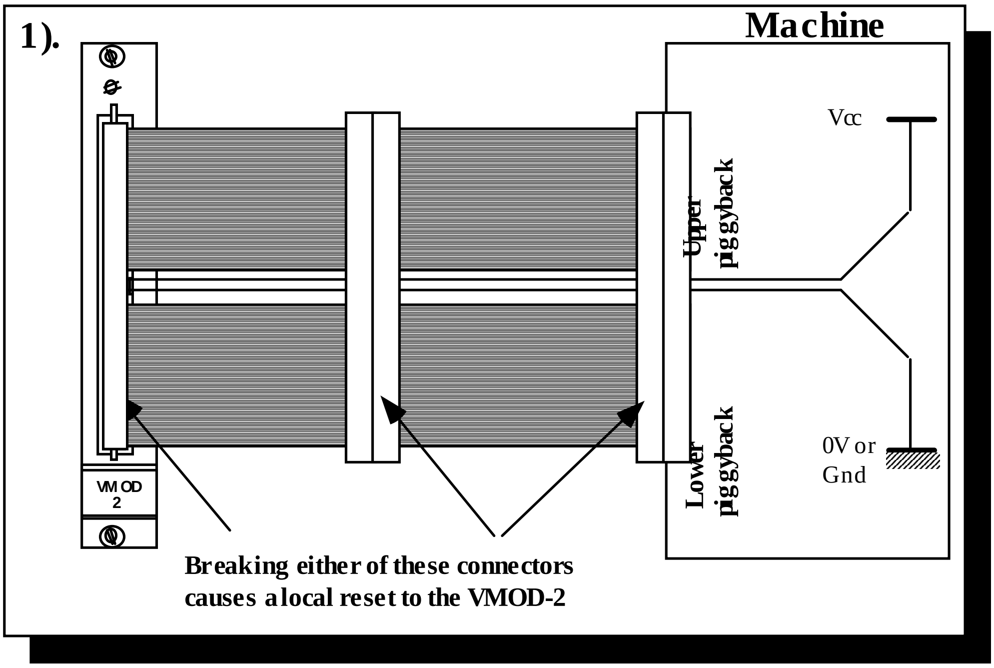
Special note!

There can be occasions when spurious interrupts are caused with the use of the "local" reset facility.

This can happen when a VMOD-2 IRQ is cleared by the local reset before the VMEbus system has had a chance to clear the interrupt itself.

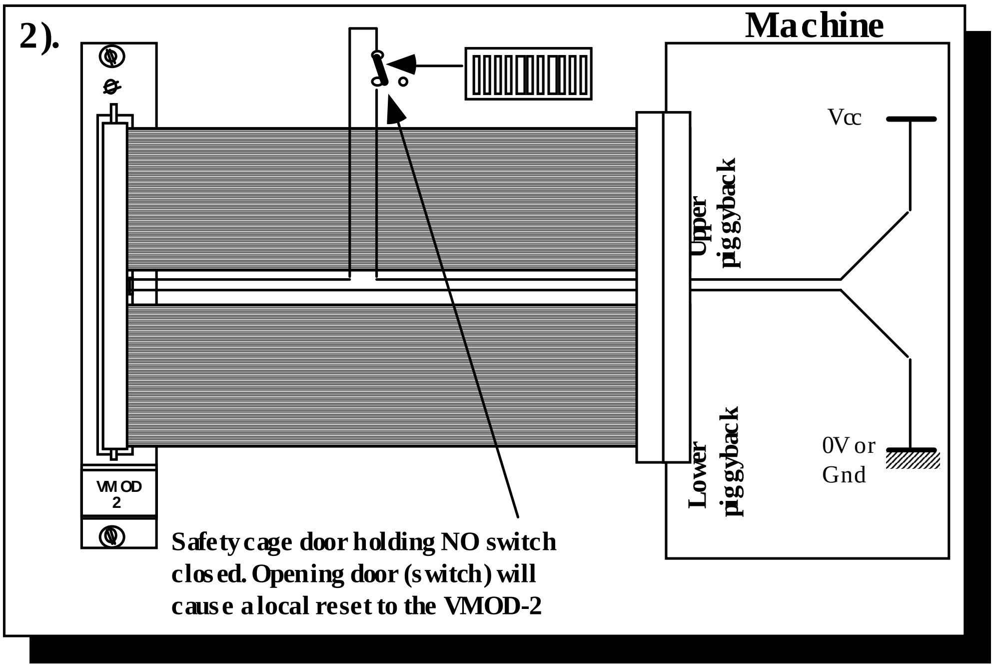
The two-pins (25 and 26) of the 50-way front panel connector, can be used to detect the following external events;

Figure 2-1: External Reset Connection — Example 1



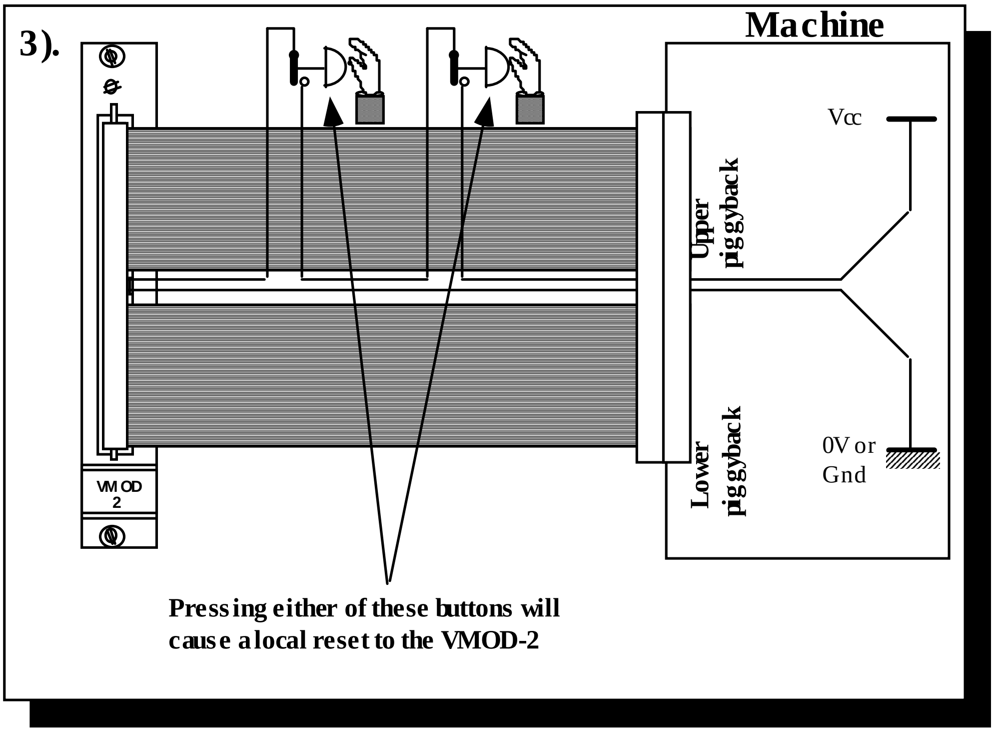
Detect breaking of any intermediate connectors between VMOD-2 and external device.	In this kind of mode their two wires are joined to Vcc and Gnd at the furthest end.

Figure 2-2: External Reset Connection — Example 2



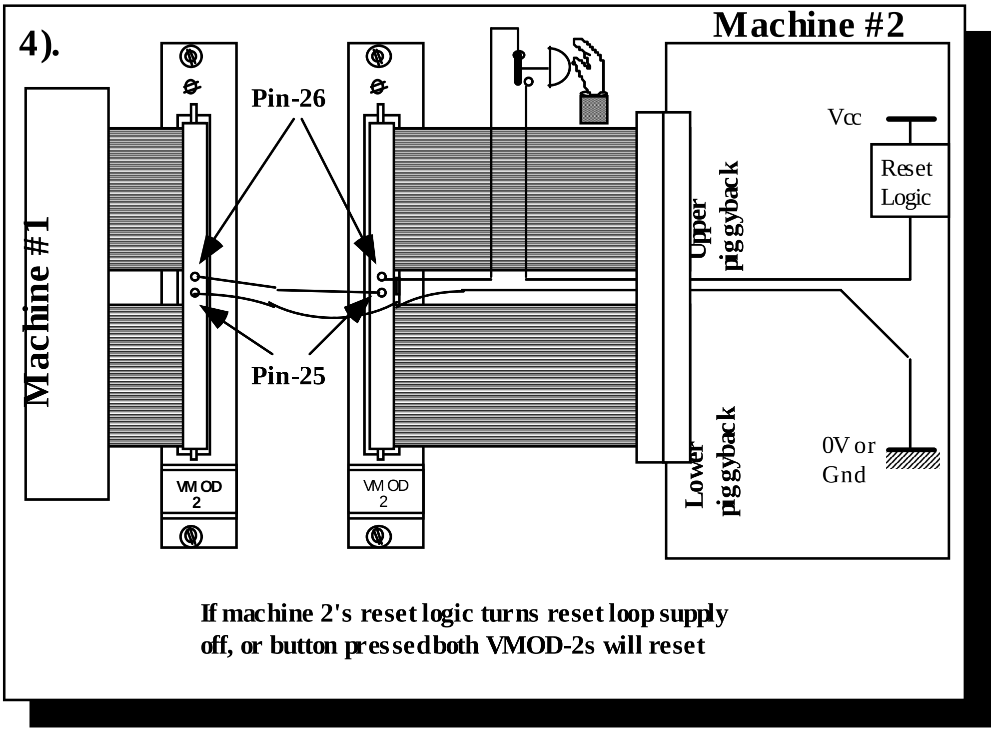
Detect the opening of safety-cage doors of any external device under VMOD-2's control.	The two wires are attached through "NO" terminals of the switch, which automatically opens when the door becomes "Unsafe" (opened).

Figure 2-3: External Reset Connection — Example 3



Pseudo "emergency stop" button chain for manual intervention, i.e. during motor control application development.	In this kind of mode their two wires being daisy chained through several NC switches, and joined to Vcc and Gnd at the most distant end.

Figure 2-4: External Reset Connection — Example 4



To synchronize the reset of two (or more) VMOD-2s (see voltage notes on next page).	The two wires are daisied through two VMOD-2s and the NC switch/logic before being joined to Vcc and Gnd at the most distant end.

Note: in example #4, the applied Vcc from machine #2 must be at least +10V to work the two VMOD-2s connected in series, This does not include p.d. on length of leads, connector contact resistance, etc.

2.4 ID Byte

An extremely important feature of the VMOD-2 is the ability to "ask it" per software what piggybacks are on board. Remembering that once configured and fitted one VMOD-2 is indistinguishable from others configured differently. Via this built-in identification feature you can interrogate the VMOD-2 to return an ID for each of the fitted piggybacks, and if this is integrated into your application software, may be used to check that any given tasks is valid for the fitted piggyback before execution.

The VMOD-2 can be tested per software in order to determine what type of piggybacks is fitted. If jumper B16 is not set it is offset $7F (location A) and offset $FF (location B), with jumper B16 set it is $107F (location A) and $10FF (location B). Where our "example" VMOD-2 fitted with two PB-RELs, would return a "$FC" Byte for both locations.

Some ID Bytes you may come across when interrogating your VMOD-2 for it's configuration are:

Table 2-6: ID Bytes

$EE	PB-BIT	BITBUS™ Communications piggyback
$EF	PB-DIO4	Digital I/O piggyback
$F0	PB-CNT	Counter piggyback
$F1	PB-DAC	D to A converter piggyback
$F1	PB-DAC-2	D to A converter piggyback
$F2	PB-DIO	Digital I/O piggyback
$F3	PB-DIN	Digital Input piggyback
$F4	PB-ADC	A to D converter piggyback
$F5	PB-CIO	Counter/I/O piggyback
$F7	PB-SIO4	Quad serial piggyback
$F8	PB-DOUT	Digital Output piggyback
$F9	PB-DIN2	Digital Input piggyback
$FB	PB-DIO-2	Digital I/O piggyback
$FC	PB-REL	Octo-Relay piggyback
$FD	PB-DIO-3	Digital I/O piggyback
$FE	PB-STP	Digital I/O piggyback

As piggybacks are being continually added to the VMOD-2 range, we recommend you check each employed VMOD/VMOD-2 piggyback's user manual for precise information regarding its individual ID Byte assignment.

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2.5 VMOD/VMOD-2 Connector Locations and Pin-outs

This section serves to give an overview of the piggyback interface connectors at both the VMOD-2's VMEbus end and the VMOD-2's (piggyback's) external I/O. Figure 2.4 shows an example configuration where two piggybacks are to be fitted to your VMOD-2, the first fits in the upper position (Position A), and the second, is fitted in the lower (B) position. This section commences with the two header type connectors (BU1a/BU1b and BU0a/BU0b) of the VMOD-2 which directly interface to the selected piggyback's ST1 and (where 3-row/45-pin interfaces are used) ST0 pin rows.

The lower case letters in the socket numbers refer to which piggyback location the connector is used for, i.e. BU1a is socket 1 for piggyback location A. An illustration giving details of all the VMOD-2's connectors is given below.

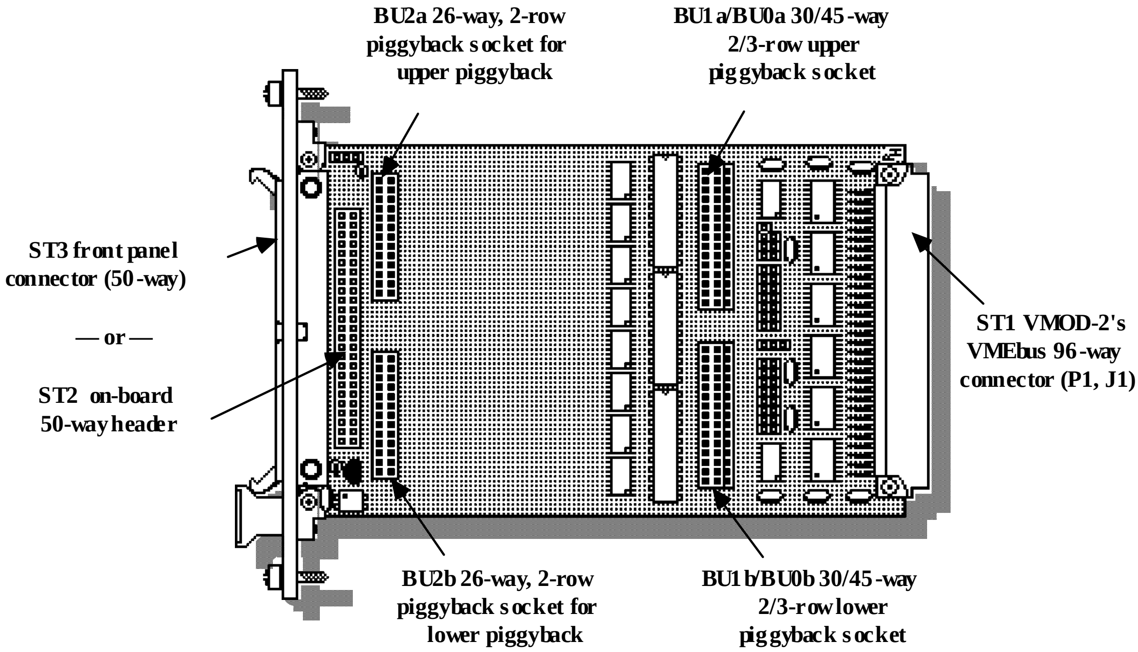
Caution!

When using the VMOD/VMOD-2 with any piggyback, take care to note that the terms ST1 and ST 2 used in the piggybacks user's manual and circuit diagrams, refer to the connectors of the Piggyback and equate to their Plug 1 and Plug 2 (ST from the German word "Stecker") these fit to BU1a and BU2a or BU1b and BU2b (BU = "Buchse" = Socket) on the VMOD/VMOD-2.

This is very important as the VMOD/VMOD-2 also have Plugs called ST1 (VMEbus connector) and ST2 (50-way header) which have no direct relationship to those of the piggybacks circuit diagrams as attached to the piggyback user's manual.

Look for the front connector overview in each VMOD-piggybacks user's manual, before making any interface leads/connections, and use with due caution, especially where high external voltages or unprotected external supplies are to be connected.

Figure 2-5: Overview of VMOD-2's Connector Locations



2.5.1 VMOD-2's (VMOD/VME End) Piggyback Connector BU1/0

The front two-rows of the three-row 30/45-pin sockets (BU1 and/or BU0) are used by all VMOD/VMOD-2 piggybacks. Some piggyback's, having three-row headers, also use the third row, BU0a or BU0b. The use of the third row does not however define a piggyback as being only suitable for use on the VMOD-2, as the original VMOD also had these third rows, and several existing VMOD-piggybacks use signals on the third row which are found on both the VMOD and the VMOD-2. Previously unused pins in the third row (BU0) are now fully utilized by the VMOD-2 and to help see which pins are only on the VMOD-2, we have shown these additional lines in bold/italics.

Table 2-7: VMOD/VMOD-2 BU1/0 Connector Pin-Outs

BU1 Connector				BU0 Connector	
Signal	**Pin #**	**Pin #**	**Signal**	**Pin #**	**Signal**
+5V (Vcc)	2	1	GND	1	GND
-12V	4	3	+12V	2	IA8
CLK	6	5	R/W*	3	IA9
UDTACK n*	8	7	RESET*	4	IA10
CSn*	10	9	INTAn*	5	IA11
IA7	12	11	INTn*	6	IDS1*
IDS0*	14	13	ID7	7	ID15
IAS*	16	15	ID6	8	ID14
IA6	18	17	ID5	9	ID13
IA5	20	19	ID4	10	ID12
IA4	22	21	ID3	11	ID11
IA3	24	23	ID2	12	ID10
IA2	26	25	ID1	13	ID9
IA1	28	27	ID0	14	ID8
+5V (Vcc)	30	29	GND	15	GND

Notes:

1). All signals marked with an "*" are Active Low.

2). Lower case "n" used with some signal lines above is for the location identifier 0 or 1, where 0 = signal for upper piggyback location and 1 = lower piggyback location.

3). ±12V is only needed by some piggybacks, and will only be available if your VMEbus backplane is connected to a PSU capable of supplying such voltages.

4). The orientation of the pin-number columns in the above connector overview (and that of the connector overview on the next page) relates to the pin-positions of the VMOD-2 when viewed as shown in figure 2.5 on the preceding page. I.e. their pin number 1s are top-right.

Remember!

If any of the piggybacks you wish to use need any of the signals shown bold/italic above (i.e. a 5230-xx type), a VMOD-2 set for an 8 KByte wide address area must be used. Any piggyback not needing these additional lines can be used on the VMOD-2 in either a 256 Byte or 8 KByte address width setting.

2.5.2 VMOD-2 External Interface Connectors BU2a and BU2b

The twenty-six pin double row sockets are totally isolated from the remaining circuits of the VMOD-2, and only connect the input/output side of the respective piggybacks 26-pin I/O header directly to the upper or lower half of the 50-way VMOD-2 front panel connector.

The actual pins used are subject to the design of the piggyback, but the pin interconnections between the two BU2 connectors and the 50-way front panel connector will always be the same. To determine what pin-s your signals will appear on when using any ready made piggyback, please see the piggyback's user manual which will give precise details of the external interfaces for use in both locations. If fault-tracing or designing your own piggybacks, the relationship of the respective piggyback locations (inputs/outputs) to the external connector is as given in the table below.

Table 2-8: ST2/ST3 Connector Pin-Outs

VMOD-2 50-Way ST2/ST3 Pins as Used When a Selected Piggyback is Fitted into the BU2 for Upper Location (A)					
		BU2 Pin #			
50	24	2	1	24	50
47	21	4	3	22	48
45	19	6	5	20	46
43	17	8	7	18	44
41	15	10	9	16	42
39	13	12	11	14	40
37	11	14	13	12	38
35	9	16	15	10	36
33	7	18	17	8	34
31	5	20	19	6	32
29	3	22	21	4	30
27	1	24	23	2	28
49	23	26	25	23	49
	VMOD-2 50-Way Pins Used When Piggyback is Fitted into the BU2 for Lower Location (B)				

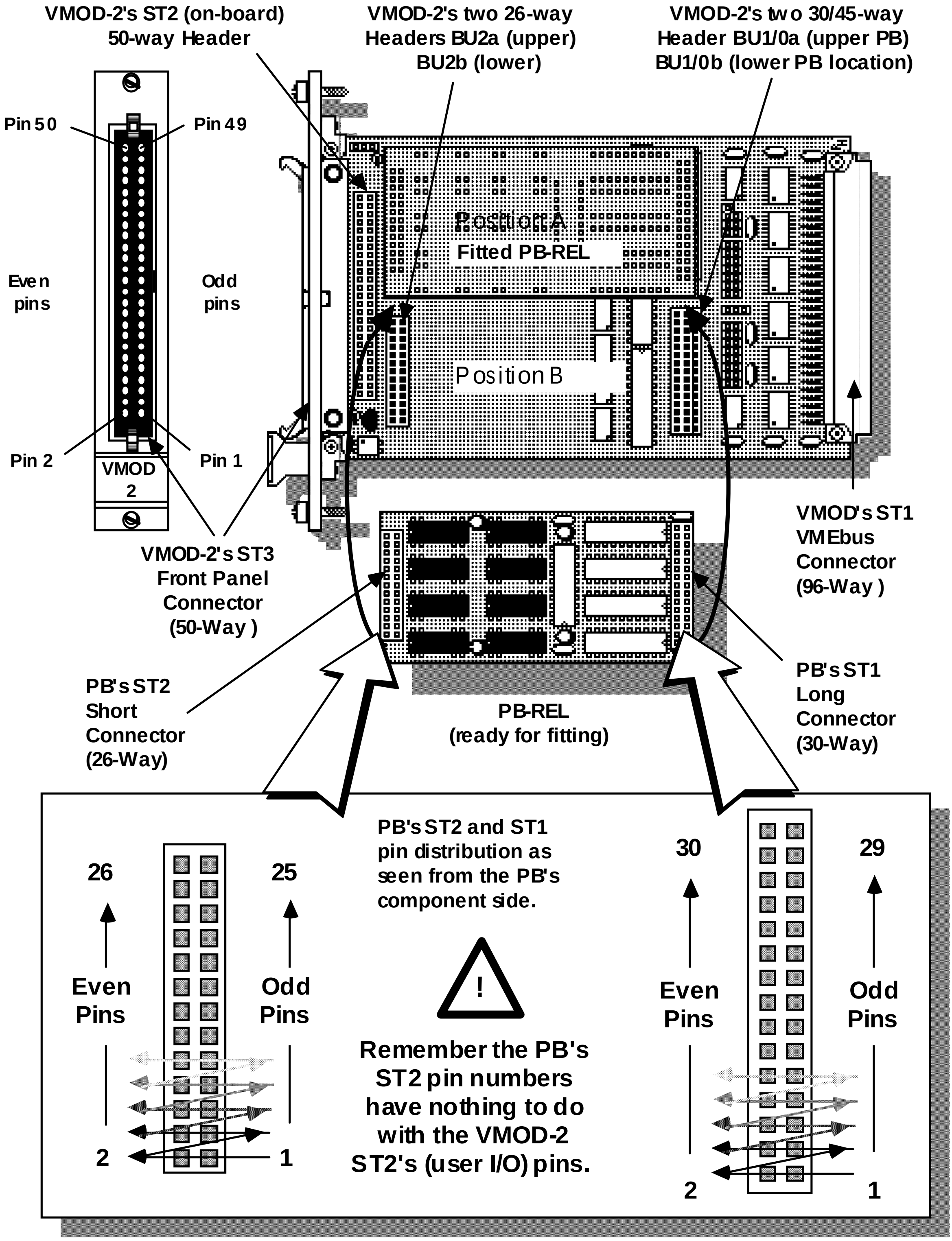
Caution!

The term "ST2" on the schematics at the back of any piggyback manuals, refer only to the ST-2 connector of the actual piggyback (which plugs into the above BU2) not to the VMOD-2's ST2. Take care not to confuse these when making connections to your VMOD-2 front panel.

Remember also that the pin-outs change when swapping the previously fitted piggybacks around or replacing them with different types. This is also true when moving several differently configured VMOD-2's around in your VMEbus system, where the external appearance of one VMOD-2 is indistinguishable from any other.

Please refer to respective piggybacks user's manual for the exact pin-outs which are presented to the external equipment (the VMOD's 50-way header) when such a piggyback is fitted.

Figure 2-6: VMOD-2 and VMOD-Piggyback Connector Overview



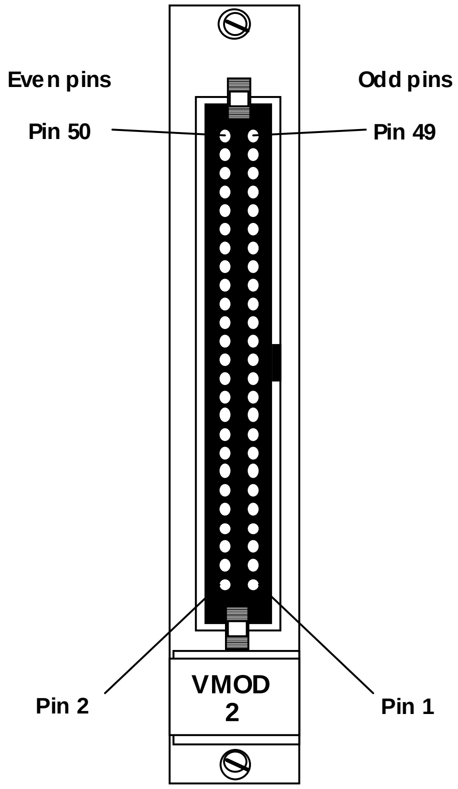
2.5.3 Pin Outs of the VMOD's Front Panel Connector with two VMOD-2s

The respective half of the VMOD-2's front panel 50-way connector (pins 1...24 for lower position and pins 27.....50 for upper) assume the relationship of the piggybacks (as fitted to VMOD-2) signals as routed from their ST2 (via the BU2a or BU2b) through connections as shown in table 2.5.2 on previous page.

The connector's pins 25 and 26 are used as an external reset (or emergency stop loop) on the VMOD-2, and were left "not used" on the original VMOD.

An option to have the VMOD-2 with no front panel connector, but rather a 50-way header behind a blank front panel will provide an identical pin-out to the standard 50-way front panel connector, and is provided for applications where the flat band cable is to be routed internally, or where an alternative front panel is to be fitted and used. Take care to note that the 50-way header is unpolarized, and can be accidently missconnected if the flat-ribbon connector is turned upside-down.

Figure 2-7: VMOD Front Panel Connector



Note.

In systems having more than one connector of this type, or when using several VMOD-2s with different piggybacks, it is advisable to put one or two drops of colored paint on the back of the connector and on the front panel of the VMOD-2 to which it was made for. The connector splits virtually in half (pins 1...24 and 27 to 50) for connection to the respective piggybacks location behind it. Pins 25 and 26 are used by the "local reset" input circuits where such feature is desired and thus enabled.

Table 2-9: VMOD-2 Front Panel Connector Pin-Outs

PB Name and Direction*	Signal*	VMOD Front (50-Way) Pin #s		Piggyback Position	PB ST2 Pins
		50		Upper (A)	1, 2
			49	Upper (A)	25, 26
		48		Upper (A)	3
			47	Upper (A)	4
		46		Upper (A)	5
			45	Upper (A)	6
		44		Upper (A)	7
			43	Upper (A)	8
		42		Upper (A)	9
			41	Upper (A)	10
		40		Upper (A)	11
			39	Upper (A)	12
		38		Upper (A)	13
			37	Upper (A)	14
		36		Upper (A)	15
			35	Upper (A)	16
		34		Upper (A)	17
			33	Upper (A)	18
		32		Upper (A)	19
			31	Upper (A)	20
		30		Upper (A)	21
			29	Upper (A)	22
		28		Upper (A)	23
			27	Upper (A)	24
		26		Reset GND	

Table 2-9: VMOD-2 Front Panel Connector Pin-Outs

PB Name and Direction*	Signal*	VMOD Front (50-Way) Pin #s		Piggyback Position	PB ST2 Pins
			25	Reset + Vcc	
		24		Lower (B)	1, 2
			23	Lower (B)	25, 26
		22		Lower (B)	3
			21	Lower (B)	4
		20		Lower (B)	5
			19	Lower (B)	6
		18		Lower (B)	7
			17	Lower (B)	8
		16		Lower (B)	9
			15	Lower (B)	10
		14		Lower (B)	11
			13	Lower (B)	12
		12		Lower (B)	13
			11	Lower (B)	14
		10		Lower (B)	15
			09	Lower (B)	16
		08		Lower (B)	17
			07	Lower (B)	18
		06		Lower (B)	19
			05	Lower (B)	20
		04		Lower (B)	21
			03	Lower (B)	22
		02		Lower (B)	23
			01	Lower (B)	24

An identical table with appropriate signal names ready added, is to be found in each piggyback manual.

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3.2 Fitting Piggybacks

Detailed descriptions on how to fit and use each piggyback is given in their respective user's manuals.

After fitting, please look under the fitted piggyback to ensure that every pin of it's front 26-pin connector is in a socket hole. If any holes are not occupied or any pins are left without a hole, there is a strong possibility that the piggyback is the wrong-way round and/or displaced in pin number/height.

For many piggybacks the last 15-pin row of 30/45-pin socket holes (connector nearest the VMEbus interface end of VMOD-2) will not be used. It is easier to see that all is well by checking the 26-pin interface at the front end first.

Pin-outs of the front panel 50-way connector will change according to the piggybacks fitted and if they are used in the upper or lower locations. Again please refer to the individual piggyback's user's manuals before making any interface cables.

3.1.7 Jumpers B17...B19 Setting Interrupt Level

The VMOD-2 user can set the three jumpers B17, B18 and B19 to use any IRQ level from 1 to 7 as appropriate to his VMEbus systems application. When all three jumpers are set the IRQ from the VMOD-2 is disabled.I

Table 3-10: IRQ Level selection

RQ Level Wanted	B17	B18	B19	
None	Set	Set	Set	
IRQ1*	Set	Set	Open	(Default)
IRQ2*	Set	Open	Set	
IRQ3*	Set	Open	Open	
IRQ4*	Open	Set	Set	
IRQ5*	Open	Set	Open	
IRQ6*	Open	Open	Set	
IRQ7*	Open	Open	Open	

3.1.8 Jumper B20 Enable/Disable "Local" Reset Input

The VMOD-2 user can take advantage of an external signal which when utilized will allow the two piggybacks to be "reset" whenever certain external conditions occur. The external two-wire signal is input onto pins 25 and 26 of the 50-way external interface, where the wiring and use of these two lines are as described in section 2.3.

Table 3-11: Local Reset Enable/Disable

Local Reset	Enabled	Disabled	see note below
Jumper B20	1-3	1-2	Open

Note.

Jumper B20 must be set to either 1-2 or 1-3. B20 left open is not allowed. If this jumper is left totally open (neither pin connected to pin 1) the logic is floating and may cause spurious resets or other unpredictable problems.

Table 3-9: Address Width (B16) and Range (B2 and B12...15) Selections

B16	AB Size	Address Block #s	B2 A15	B12 A14	B13 A13	B14 A12	B15 A11	Address Range From ... To	
Open	256 Byte	AB #31	Open	Open	Open	Open	Set	$FE F4 00	$FE F4 FF
Open	256 Byte	AB #32	Open	Open	Open	Open	Open	$FE FC 00	$FE FC FF
Set	8 KByte	AB#01..04	Set	Set	Set	x	x	$FE 00 00	$FE 1F FF
Set	8 KByte	AB#05..08	Set	Set	Open	x	x	$FE 20 00	$FE 3F FF
Set	8 KByte	AB#09..12	Set	Open	Set	x	x	$FE 40 00	$FE 5F FF
Set	8 KByte	AB#13..16	Set	Open	Open	x	x	$FE 60 00	$FE 7F FF
Set	8 KByte	AB#17..20	Open	Set	Set	x	x	$FE 80 00	$FE 9F FF
Set	8 KByte	AB#21..24	Open	Set	Open	x	x	$FE A0 00	$FE BF FF
Set	8 KByte	AB#25..28	Open	Open	Set	x	x	$FE C0 00	$FE DF FF
Set	8 KByte	AB#29..32	Open	Open	Open	x	x	$FE E0 00	$FE FF FF

x = B14 and B15 can be left at any setting when using 8 KByte address block widths. Default Setting bold/italic

Table 3-9: Address Width (B16) and Range (B2 and B12...15) Selections

B16	AB Size	Address Block #s	B2 A15	B12 A14	B13 A13	B14 A12	B15 A11	Address Range From ... To	
Open	256 Byte	AB #16	Set	Open	Open	Open	Open	$FE 7C 00	$FE 7C FF
Open	256 Byte	AB #17	Open	Set	Set	Set	Set	$FE 84 00	$FE 84 FF
Open	256 Byte	AB #18	Open	Set	Set	Set	Open	$FE 8C 00	$FE 8C FF
Open	256 Byte	AB #19	Open	Set	Set	Open	Set	$FE 94 00	$FE 94 FF
Open	256 Byte	AB #20	Open	Set	Set	Open	Open	$FE 9C 00	$FE 9C FF
Open	256 Byte	AB #21	Open	Set	Open	Set	Set	$FE A4 00	$FE A4 FF
Open	256 Byte	AB #22	Open	Set	Open	Set	Open	$FE AC 00	$FE AC FF
Open	256 Byte	AB #23	Open	Set	Open	Open	Set	$FE B4 00	$FE B4 FF
Open	256 Byte	AB #24	Open	Set	Open	Open	Open	$FE BC 00	$FE BC FF
Open	256 Byte	AB #25	Open	Open	Set	Set	Set	$FE C4 00	$FE C4 FF
Open	256 Byte	AB #26	Open	Open	Set	Set	Open	$FE CC 00	$FE CC FF
Open	256 Byte	AB #27	Open	Open	Set	Open	Set	$FE D4 00	$FE D4 FF
Open	256 Byte	AB #28	Open	Open	Set	Open	Open	$FE DC 00	$FE DC FF
Open	256 Byte	AB #29	Open	Open	Open	Set	Set	$FE E4 00	$FE E4 FF
Open	256 Byte	AB #30	Open	Open	Open	Set	Open	$FE EC 00	$FE EC FF

Table 3-9: Address Width (B16) and Range (B2 and B12...15) Selections

B16	AB Size	Address Block #s	B2 A15	B12 A14	B13 A13	B14 A12	B15 A11	Address Range From ... To	
Open	256 Byte	AB #01	Set	Set	Set	Set	Set	$FE 04 00	$FE 04 FF
Open	256 Byte	AB #02	Set	Set	Set	Set	Open	$FE 0C 00	$FE 0C FF
Open	256 Byte	AB #03	Set	Set	Set	Open	Set	$FE 14 00	$FE 14 FF
Open	256 Byte	AB #04	Set	Set	Set	Open	Open	$FE 1C 00	$FE 1C FF
Open	256 Byte	AB #05	Set	Set	Open	Set	Set	$FE 24 00	$FE 24 FF
Open	256 Byte	AB #06	Set	Set	Open	Set	Open	$FE 2C 00	$FE 2C FF
Open	256 Byte	AB #07	Set	Set	Open	Open	Set	$FE 34 00	$FE 34 FF
Open	256 Byte	AB #08	Set	Set	Open	Open	Open	$FE 3C 00	$FE 3C FF
Open	256 Byte	AB #09	Set	Open	Set	Set	Set	$FE 44 00	$FE 44 FF
Open	256 Byte	AB #10	Set	Open	Set	Set	Open	$FE 4C 00	$FE 4C FF
Open	256 Byte	AB #11	Set	Open	Set	Open	Set	$FE 54 00	$FE 54 FF
Open	256 Byte	AB #12	Set	Open	Set	Open	Open	$FE 5C 00	$FE 5C FF
Open	256 Byte	AB #13	Set	Open	Open	Set	Set	$FE 64 00	$FE 64 FF
Open	256 Byte	AB #14	Set	Open	Open	Set	Open	$FE 6C 00	$FE 6C FF
Open	256 Byte	AB #15	Set	Open	Open	Open	Set	$FE 74 00	$FE 74 FF

Table 3-8: Interrupt Vector Configuration Examples

#	Configuration	Vector Modes	B1 Settings	B4...B11 Settings
2b)	Two piggybacks, both unable to generate interrupt vectors but can send interrupt request are fitted to the VMOD-2 and use "Dumb" vectors (each with different vector)	Use a different Jumper set VMOD-2 Vector for each piggyback	B1 is to be set to 1-2.	Jumpers B4...B11 are set for appropriate byte coding. B11 is set to 1-3.
3)	One "intelligent" and one "Dumb" piggyback are to be fitted to the VMOD-2 and the user wants the intelligent piggyback to use it's on-board "Intelligent" vector generation in combination with "Dumb" jumper coding.	Use the "Dumb" piggyback in upper location, and fit the "intelligent" one in lower location.	B1 is to be set to bridge pins 1-3.	Jumpers B4...B11 are set for desired vector code to be assigned when piggyback "A" makes an IRQ.

3.1.6 Jumper B16 Selecting Address Block Width

Via the jumper B16, you are able to select if your VMOD-2 should occupy 256 Bytes of address space, or when using certain enhanced piggybacks (which need/use additional address decoding of A06...A11), in increased address steps of 8 KByte wide. The 256 byte wide steps are numbered as AB (Address Blocks) from 01 to 32 in the table below.

Whenever the 8 KByte option is selected (i.e. jumper B16 is set) four consecutive AB#s are occupied. These are also given to ensure that no address contention will occur when using several VMOD-2's (and/or other boards) in your VMEbus system.

Table 3-7: Interrupt Vector Selection (With Jumper B1 BeingCompletely Open)

Interrupt Vector Bit	D7	D6	D5	D4	D3	D2	D1	D0
Jumper Numbers	B04	B05	B06	B07	B08	B09	B10	B11
Jumper Decoding	May be any setting "Don't Care" since these settings are ignored							
Upper PBs Vector	Derived from "intelligent" piggyback							
Lower PBs Vector	Derived from "intelligent" piggyback							

See also table 3-8 below for further interrupt vector setting information, which may be helpful to you, in order to see how and when to use the three-pin setting options of jumpers B1 and B11.

3.1.5 Using Interrupt Vector

Jumpers B4... B11 as described in the preceding section, provide a binary coded interrupt vector, and may be freely programmed with each jumper representing an individual data bit, B4 = MSB and B11 = LSB.

The table below will help you to decide when and how to use which settings, according to what facilities your chosen piggybacks support.

Table 3-8: Interrupt Vector Configuration Examples

#	Configuration	Vector Modes	B1 Settings	B4...B11 Settings
1)	Two piggybacks, both able to generate interrupt vectors are fitted to the VMOD-2 and the user wants "intelligent" vectors.	Use Piggyback Generated Vectors	Jumper B1 is left open.	Jumpers B4...B11 are not decoded and can be left in any setting.
2a)	Two piggybacks, both unable to generate interrupt vectors but can send interrupt request are fitted to the VMOD-2 and use "Dumb" vectors (both the same vector)	Use the same Jumper set VMOD-2 Vector for both Piggybacks	B1 is to be set to 1-2.	Jumpers B4...B10 are set for appropriate byte coding. B11 is set to 1-2.

Table 3-5: Interrupt Vector Selection (With Jumper B1 Set to 1-2)

Example Setting #1	Open	Open	Open	Open	Set	Open	Set	1-3*
Upper PBs Vector	F				4			
Lower PBs Vector	F				5			
Example Setting #2	Open	Open	Open	Open	Set	Open	Set	1-2*
Upper PBs Vector	F				4			
Lower PBs Vector	F				4			
Example Setting #3	Open	Open	Open	Open	Set	Open	Set	Open
Upper PBs Vector	F				5			
Lower PBs Vector	F				5			

* = With jumper B11 set for 1-3, D0 will return a "0" for piggyback "A" and a "1" for piggyback "B".

With jumper B11 set to 1-2, the vector of both piggyback locations "A" and "B" will be the same (so D0 = 0).

With jumper B11being open, the vector of both piggyback locations "A" and "B" will also be the same (but D0 = 1).

Table 3-6: Interrupt Vector Selection (With Jumper B1 Set to 1-3)

Interrupt Vector Bit	D7	D6	D5	D4	D3	D2	D1	D0
Jumper Numbers	B04	B05	B06	B07	B08	B09	B10	B11
Example Setting #1	Open	Open	Open	Open	Set	Open	Set	1-2
Upper PBs Vector	F				4			
Lower PBs Vector	Derived from "intelligent" piggyback							
Lower PBs Vector	Derived from "intelligent" piggyback							

the number of address setting options decrease to just eight. See section 3.1.6 for the description of jumper B16s function and the entire "address setting options" table.

Table 3-3: Setting the VMOD-2 Base Address

Configuration for Base Address Range $FE2400 to $FE24FF						
VMOD-2 Jumpers	B02	B12	B13	B14	B15	Base Addr
Default Settings	Set	Set	Open	Set	Set	$FE2400
Address Lines	A15	A14	A13	A12	A11	

A jumper set results in the related address line being assigned a logical low (0) function.

Remember!

When replacing an existing "Original-VMOD" only eight addresses were available $FE0400 (as per default above), and addresses equal to AB#05, AB#09, AB#13, AB#17, AB#21, AB#25 and AB#29 as shown in table 3-6.

3.1.3 Jumper B3 Address Modifiers

Jumper B3 provides the VMOD-2 user with two different address modifier options. The user can have Short Access, 29/2D, or Standard Access, 39/3D/00.

Table 3-4: Selecting Address Modifiers (AM) Options

Address Modifier	Standard 39/3D/00	Short 29/2D
Jumper B3	Open	Set

3.1.4 Jumper B4...B11 Interrupt Vector

Jumpers B4... B11 provide a binary coded interrupt vector, B4 = MSB, which subject to the setting of jumper B01, may be used to give an interrupt vector for either or both piggybacks.

The user can have these settings ignored when using two "intelligent" piggybacks (i.e. capable of generating on-board interrupt vectors), by setting jumper B01 to fully open.

The jumper B11 is a three-pin type and can be used to differentiate when the user wants the piggybacks to have identical or different Interrupt Vector Addresses.

Table 3-5: Interrupt Vector Selection (With Jumper B1 Set to 1-2)

Interrupt Vector Bit	D7	D6	D5	D4	D3	D2	D1	D0
Jumper Numbers	B04	B05	B06	B07	B08	B09	B10	B11

Table 3-1: General Overview of the VMOD-2 Jumpers

Jumper Number	Default Setting	Brief Functional Description	See Ch. #
B17	Set	MSB of IRQ* level coding	3.1.7
B18	Set	2nd bit of IRQ* level coding	3.1.7
B19	Open	LSB of IRQ* level coding	3.1.7
B20	1-2	External "local" Reset input is Disabled.	3.1.8

* = Three pin jumper type with default having no pins connected.

3.1.1 Jumper B1, Selecting Interrupt Vector Options

Jumper B1 provides the selection of how your VMOD-2 or it's piggybacks may provide the interrupt vector to the VMEbus, as shown in the following table.

Table 3-2: Selecting Interrupt Vector Source (PB or VMOD-2)

Desired Vector Source	Jumper B1	Notes
From either of the two "Intelligent" PBs	Open	Default Setting
From VMOD-2's B4..B11 settings	Set 1-2	For 2 x "dumb" PBs
From "Intelligent" PB in "B" location (lower) & from VMOD-2 for "A"	Set 1-3	Ensure the PB fitted in the lower PB location supports this feature

Note!

If wanting mixed "Intelligent and Dumb" interrupt vector support, fit the "dumb" piggyback into the upper location (to use the VMOD-2's preset jumper vectors) and the "intelligent" piggyback into the lower location.

3.1.2 Jumpers B2, B12...B15 Selecting Base Address

Via the five jumpers B02, B12, B13, B14 and B15, you are able to set your VMOD-2's base address in steps of 256 Bytes, to any desired base address from $FE 04 00 to $FE FC 00. In all permitting up to 32 different address setting options. If jumper B16 is set, the address steps increase in width to 8 KByte (jumper settings of B14 and B15 are no longer interpreted), and

However, you are strongly recommended to check these delivered settings against the function set (your piggyback's needs) you require, in order to ensure that the VMOD-2 and your system will function correctly.

Table 3-1: General Overview of the VMOD-2 Jumpers

Jumper Number	Default Setting	Brief Functional Description	See Ch. #
B01	Open*	Interrupt vectors generated by PB's	3.1.1 & 4
B02	Set	Selects Address line A15's decoding to "0"	3.1.2
B03	Open	Standard Access 39/3D/00	3.1.3
B04	Open	Bit D7 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B05	Open	Bit D6 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B06	Open	Bit D5 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B07	Open	Bit D4 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B08	Open	Bit D3 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B09	Open	Bit D2 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B10	Open	Bit D1 of VMOD-2's Interrupt vector set to logical "1"	3.1.4
B11	Open*	Bit D0 of VMOD-2's Interrupt vector set to logical "1"	3.1.4 & 5
B12	Set	Selects Address line A14's decoding to "0"	3.1.2
B13	Open	Selects Address line A13's decoding to "1"	3.1.2
B14	Set	Selects Address line A12's decoding to "0"	3.1.2
B15	Set	Selects Address line A11's decoding to "0"	3.1.2
B16	Open	Address width selected for 256 Bytes.	3.1.6

3. Configuration

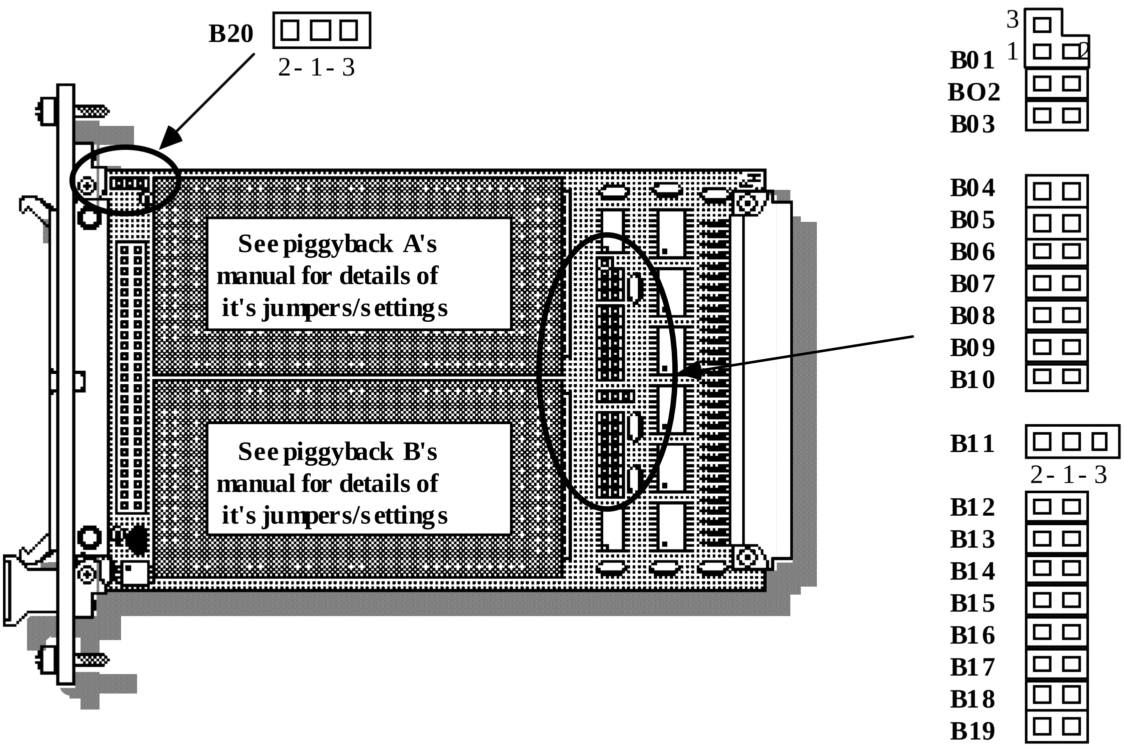
This section describes how to instal the VMOD-2's piggybacks, set the necessary jumpers, and in general prepare the VMOD-2 for system operation. Before you proceed with this section, please refer to the chosen piggybacks user's manuals, to see what restrictions or special needs are to be taken into account, regarding their use with the VMOD/ VMOD-2 base module.

3.1 Jumper locations and functions

The VMOD-2 possesses some twenty jumper selectable options, such as choice of physical Address Block Size, Base Address, Address Modifiers, etc. These may be via simple "set" or "open" two-pin jumpers, or through bridging two-pins of a three-pin jumper.

Figure 3-1 gives the VMOD-2's physical jumper locations, types and of especial importance for the three-pin types the locations of the pin numbers which are used as setting references throughout this chapter. Thereafter the jumpers are described individually in function order.

Figure 3-1: Jumper Locations Overview



The significance of the "2 1 3's" in the above figure is to define the pin setting choices which these three pin jumpers offer e.g. jumper set onto pins 1-2 or onto 1-3. Pin 1 is always in the middle of these three pin groups.

VMOD-2 is factory tested for full functionality, and is delivered in the configuration which best suits the majority of users (default settings), see table 3-1 on the next page.

Chapter 3

Configuration

Chapter 4

Installation

4. Installation

This section describes how to install the VMOD-2 fitted with one or two piggybacks for use in your VMEbus system. Before you proceed with this section please make sure that you have configured all of the necessary VMOD-2 jumpers as described in the preceding section.

4.1 VMEbus Connection

Caution!

Before installing or removing any VMEbus boards always turn off the power to the bus and any external peripherals.

Inserting or removing VMOD-2 modules while power is on could result in damage to the VME module or peripherals interface.

Please refer to the Piggyback/-s user's manual/-s for details on installing/removing VMOD to/ from your VMEbus system.

4.2 Installing the VMOD-2

The VMOD-2 may be plugged into any free VMEbus slot position (other than slot 1) in your VMEbus system.

Note: Check Piggybacks Fitting

(1/.) The connector at one end of the piggyback has less pins than that at the other end.

(2/.) The piggyback ST2 has two-rows which are to fit the front two-rows of the VMOD-2 26-pin, two-row interface socket BU2. Take care to ensure the piggyback is in its correct position/orientation.

In addition to the mechanical retention/support provided by the two piggyback interface connectors, the piggyback may (by customers with high vibration applications) be held to the motherboard by screws and stand off pillars, since at the front end of the piggyback and at the corresponding location on the VMOD-2, two holes per piggyback location, are provided for this purpose.

4.3 Chronological Installation Procedure (VMOD-2)

1/. Inspect the 96 way VMEbus Interface Connector and front panel header (50-way connector) for clean straight pins.

2/. Check the fitted piggybacks and desired VMOD-2 jumper settings suit your intended application. i.e. jumper B16 "Set" (for 8 KByte block width) when using any 5230-xx piggybacks.

3/. Check the desired external interface leads, lengths and connector orientations suit your intended application and match the connector types required for your targeted external devices.

4/. Ensure all power is off, including that to all other devices connected to the VMEbus system.

5/. Choose the desired slot for your VMOD-2 with it's chosen piggyback(s) , and if necessary reposition the other modules. For this chosen slot you must remove the IACK* daisy chain jumper. (See figure 4.3 on next page).

6/. Place the PCB into the card guides for the desired slot.

7/. Push the module into it's position carefully, checking that the flat ribbon cable (if connected to optional internal 50-way header) does not become snared or damaged. Once the insertion force of the 96 way VMEbus connector has been overcome, the front panel securing screws can be tightened up.

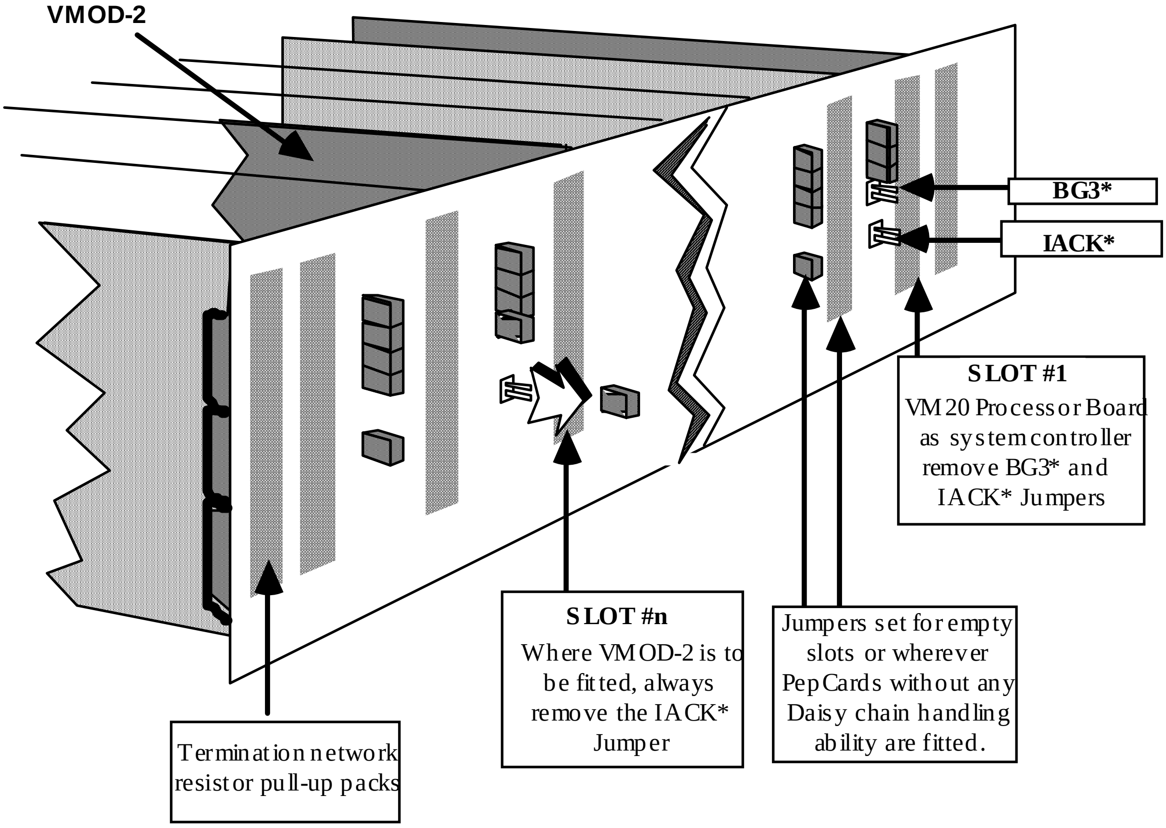
8/. To ensure reduced risk of shock hazard when using higher voltage piggybacks, fit covers to unused slots either side of the slot into which the VMOD-2 with such piggybacks is to be fitted.

9/. Connect the flat ribbon interface cables to your chosen external devices.

10/. Restore power only when you are satisfied that all the modules are correctly electrically and mechanically fitted.

Removing the VMOD-2 (or any other PepCard) is virtually the reverse procedure, where it is especially important to remember when removing any modules like the VMOD-2, with the option for externally powered devices, etc. to power down each of these external sources and/or disconnect the external connector, otherwise you may risk short-circuiting the external devices power supply outputs, with risk of damage to the interface leads, the interface on the piggyback and even the circuit traces on the VMOD module itself.

Figure 4-1:Location of jumpers on a VBP or VBP2 VMEbus backplane



4.4 Connecting the External Devices

If you are using any external leads which carry any voltage, do not plug the external leads into the front panel connector until after the VMOD-2/Piggyback(s) assembly has been installed in to the rack. The reasons are as follows;

1/. For any external voltages (either under or over 50 Vdc) a risk of electrical shorts exist if the assembled VMOD-2 is laid onto any conductive surfaces, including anti-static work-bench mats, etc.

2/. If your external power units are not protected by fuses (in all lines) there is a risk of lines being accidently shorted when the modules are pushed in/or pulled out of the rack. In particular their is a chance that lines from different external equipments can be shorted together or to the VMEbus system's frame ground if the solder side of the VMOD-2's BU2a and/or BU2b pins and/or the solder side of the piggyback ST2 or ST3 pins touch the front panel of the module already fitted in the adjacent slot.

3/. If the external voltages exceed 50 Vdc, personnel are exposed to risk of electrical shock from solder side of the piggyback and the VMOD-2, i.e. from solder pads under the VMOD-2 50-pin connector.

We also recommend that where possible no external power be present on the external con-nector when making/breaking the connection, as this can degrade the connectors life.

The recommended maximum cable length should be limited to 5 meters (~15 feet) to ensure minimum voltage drop/risk of cables becoming damaged/trapped, etc

Caution!

Ensure that the current ratings of the connected flat-band cables are never exceeded.

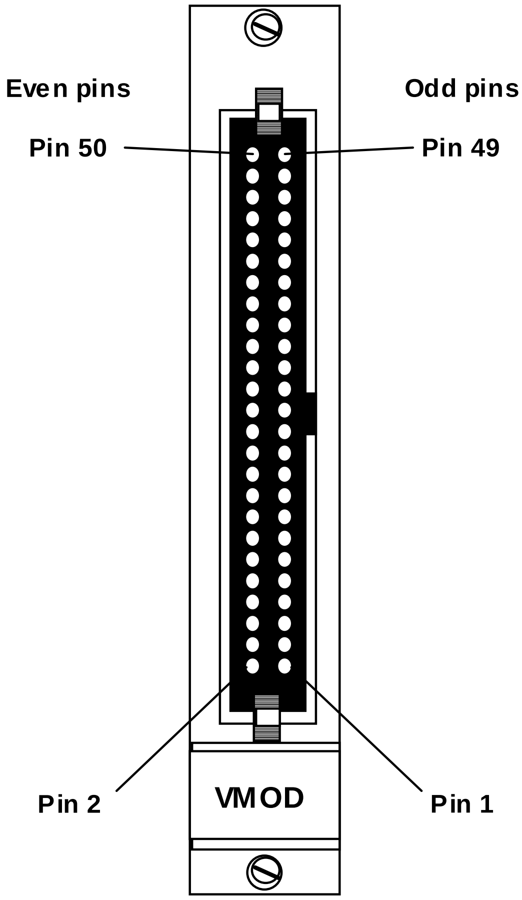
4.5 Front Panel Functions

The front panel of the VMOD-2 has only the 50-pin connector on it. The odd numbered pins of this connector are on the right side when looking at the connector from the VMOD-2's front (see figure 4.5 below). The even pins are on the left side of the connector and the lowest numbers for each (odd and Even) row are at the bottom ascending. Depending on where your VMOD-2 piggyback is fitted, you will need to use the lower half of this connector or the upper half.

The connector (front-panel connector only) is provided with a polarizing keyway to ensure that the made up cable cannot be inserted up-side-down (therefore to the wrong piggybacks and with reversed connections) if at any time it has been disconnected. Two retainer/ejectors lock the connector into place and/or help to eject it during disconnection.

To help differentiate between cables for interfacing with differently configured VMOD/VMOD-2s we recommend a drop of colored paint be placed on the back of the connector and onto the front panel of the VMOD to which this cable should fit. This could be very important and save considerable time later if reconfiguring your VMEbus system. Further, in very large systems, or where lot's of VMOD/VMOD-2's are in use, two drops of paint at the top and bottom of the connector and on the ends of the retaining latches could provide an at-a-glance confirmation of both piggyback types before making connections.

Figure 4-2: VMOD Standard front panel layout



The standard 3U high fascia may be replaced with a 6U (double height) front panel for use in 6U VMEbus systems. If making up your own double-height front panel, the VMOD must be so placed that it uses the upper connector of any desired VMEbus slot. Alterantly a suitable 6U fascia may be obtained from your local PepCard supplier, or even be specified for pre-assembled 6U VMOD-2 and/or piggyback configurations during the initial ordering stage.

4.6 Trouble-Shooting for VMOD-2/VMOD and VMEbus System

This section is intended to assist users of the VMOD-2 and/or some of it's piggybacks to quickly resolve any problems they may encounter in their application. It is by no means comprehensive, and relies upon the user feed-back to make us aware of any such experiences. Please also see similar table in the respective piggyback user's manual.

Table 4-1: Indications on Trouble-Shooting

Problem	Possible Cause or Solution	Action
None of the externally connected devices have correct or expected function with the VMOD-2's outputs	The external interface connector connects to the wrong half of the front panel connector (i.e. pins 01 to 24 instead of pins 27 to 50 for upper piggyback position). Move piggyback to other location if this appears to be the case, and test from there before rewiring your interface cable. a) the flat ribbon cable is fitted wrong way up into the IDC connector i.e Pin 1 is connected to wire #50, etc.	See Sect. 2.4.3 for precise front panel pin-outs.
	The piggyback has been accidently set back one whole pin-row so only half it's output connectors are connected to the external interface and it's inputs are misconnected to the VMOD's logic interface/power. a) The piggyback was displaced in the BU1/0 and BU2 connectors by 180° If you have made such a connection then the VMOD-2 has been designed that no damage to it or the piggyback should occur. Move the piggyback forward to the correct location and test for correct function. If the piggyback or VMOD-2 does become damaged through misconnections of this kind, the PEP warrantee is invalidated.	Check Physical configuration.
	Where opto-isolated piggybacks are used, your external supply has failed or has been turned off, gone into current limit, or has had a fuse failure.	Check PSU.

Table 4-1: Indications on Trouble-Shooting

Problem	Possible Cause or Solution	Action
An unknown problem prevents the selected piggyback(s)/VMOD-2 configuration from functioning.	If the VMOD-2 functioned before, and has been reconfigured for a new application/address/piggyback, steps 1 to 3 may help find/confirm the faulty area.	1) Replace previous known working configuration and try for correct function of VMOD-2. 2) Put piggyback into other location on VMOD-2 or if available onto another VMOD/VMOD-2 module and test for correct piggyback function.
	If the piggyback appears to function correctly with other VMOD-2s or in VMOD-2's other piggyback location the problem could be damaged or burnt out tracks which may not have used/ needed by the last piggyback fitted.	
	If the piggyback will not function with other VMODs or in VMOD's other location the problem is almost certainly due to the piggyback or the application software.	

4.7 General Notes for Using the System

Having designed a fully-functioning system, the only thing that remains is to keep it in good health. The three biggest areas of risk to your system are at the following times:

- Connecting peripherals, disk-drives, printers, terminals and external power sources.
- Adding or changing modules, address settings and locations, etc.
- Becoming complacent and not referring to the manuals when altering or adding modules.

The way to reduce these risk is;-

- to check the electrical compatibility of all devices which you intend to connect to your system, -
- to ensure that they are powered from the same mains supply branch (phase) and grounded to the same reference point, -
- to shut down all power before making or breaking any connections to

modules or attachments to the system, including power to the peripherals. -

- to observe sensible static protection procedures before handling any modules, piggy-backs or memory IC's.
- to keep all manuals handy, near to the system at all times and refer to them when the need arises.

Some Tips are:-

- PepCards are not over sensitive to static, but it is generally advisable to observe sensible procedures such as:
- When configuring the module do not take it out of the original packing unless necessary, the new clear packs may be opened and the jumpers set, piggybacks added, etc. without needing to remove the card. This also prevents you inadvertently shorting any on-board batteries, etc.
- When inserting modules into a system, just turn the power off, do not remove the mains lead!, as it's ground wire prevents the rack floating with dangerous static voltages, which could destroy circuits on the module you are trying to insert.
- Touch the front panel of the module you wish to insert, or the shell of the connector you wish to connect to any part of the rack , before fitting, to discharge any static from you the carrier.
- Disconnect any leads connected to a module before undoing it's front panel securing screws and pulling it out of the rack, put modules into the rack before connecting any front-panel connectors.
- Do not just pull modules straight out of a rack, check if they have cables to unplug behind the front panel (such as the VSBC-1's 40-pin parallel on-board headers) and ensure that these cables if fitted have enough play to allow the modules concerned to be removed far enough to detach these cables.
- Park "pulled" jumpers onto one of the pins they would normally bridge, so they are available for quick replacement should the configuration change later.
- Remember to check the mains input voltage selector switch before installing or using any PSU!
- Fill out the configuration card (in the appendix of this manual) with the up-to-date (latest) system configuration data, e.g. which module is fitted where and what addresses they are set to, etc. and refer to this when investigating any problems or requesting any form of support from PEP or it's authorized agents.

If you wish you may copy the configuration card, to write on the copy, keep a configuration history to return to, and keep the master clean for future use. Or you may choose to enter details in pencil, to enable erasures and corrections to be easily made.

In the event of any "mystery" problems, such as those where a card sent for repair is returned as having "no actual defect" or another tried card has the same symptoms. It is very often the actual configuration which has led to the "apparent fault". With the many thousands of combinations in which these cards could be employed, our repair department would never be able to reconstruct the configuration which gives your problem credence, just by co-incidence. Therefore if you could send a copy of this configuration card, along with the module and it's repair request form, to the place of original sale, then, in the event the card passes normal test, we will (if necessary) be able to set up a configuration, similar to yours, and test for satisfactory function, or give expert advice on system configuration problems your layout has (or may) encountered.

Sometimes these are simple things, which can be resolved without any test or repair being necessary, such as moving an address so it does not clash with that used by another card. If we save time investigating the fault, then you save time and cost involved with unnecessary testing and "back and forth" shipping and enquiring later.

Annex A

System Configuration Record

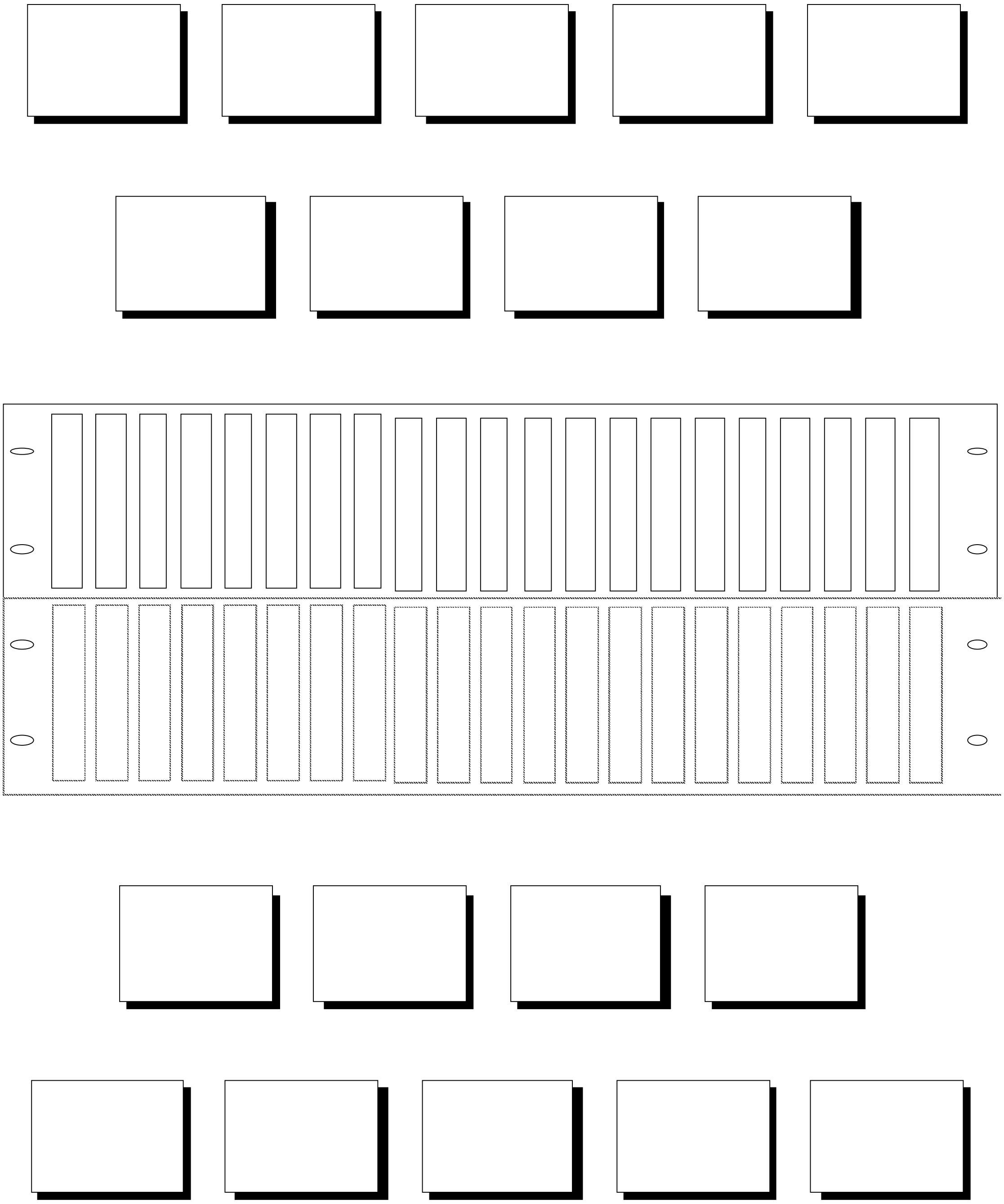
System Configuration Record

Use this form to keep an up to date record of your systems configuration

RACK #	MODULE (OR TYPE)	BASE ADDRESS	IRQ LEVEL & VECTOR	BACKPLANE JUMPERING: BG0* BG1* BG2* BG3* IACK*
POWER SUPPLY	MAKE	POWER OUTPUT	VOLTAGE INPUT	
VMEbus BACKPLANE	MAKE	SIZE	TERMINATION	
SLOT 1				
SLOT 2				
SLOT 3				
SLOT 4				
SLOT 5				
SLOT 6				
SLOT 7				
SLOT 8				
SLOT 9				
SLOT 10				
SLOT 11				
SLOT 12				
SLOT 13				
SLOT 14				
SLOT 15				
SLOT 16				
SLOT 17				
SLOT 18				
SLOT 19				
SLOT 20				
SLOT 21				
IIOC BACKPLANE	MAKE	SIZE		
FDD #0	MAKE	SIZE	FLOPPIES USED	
FDD #1	MAKE	SIZE	FLOPPIES USED	
HDD #0	MAKE	SIZE		
HDD #1	MAKE	SIZE		
SOFTWARE USED	TYPE	REVISION		

System Configuration Record

Use this side to keep an up to date record of your systems externaly connected peripherals



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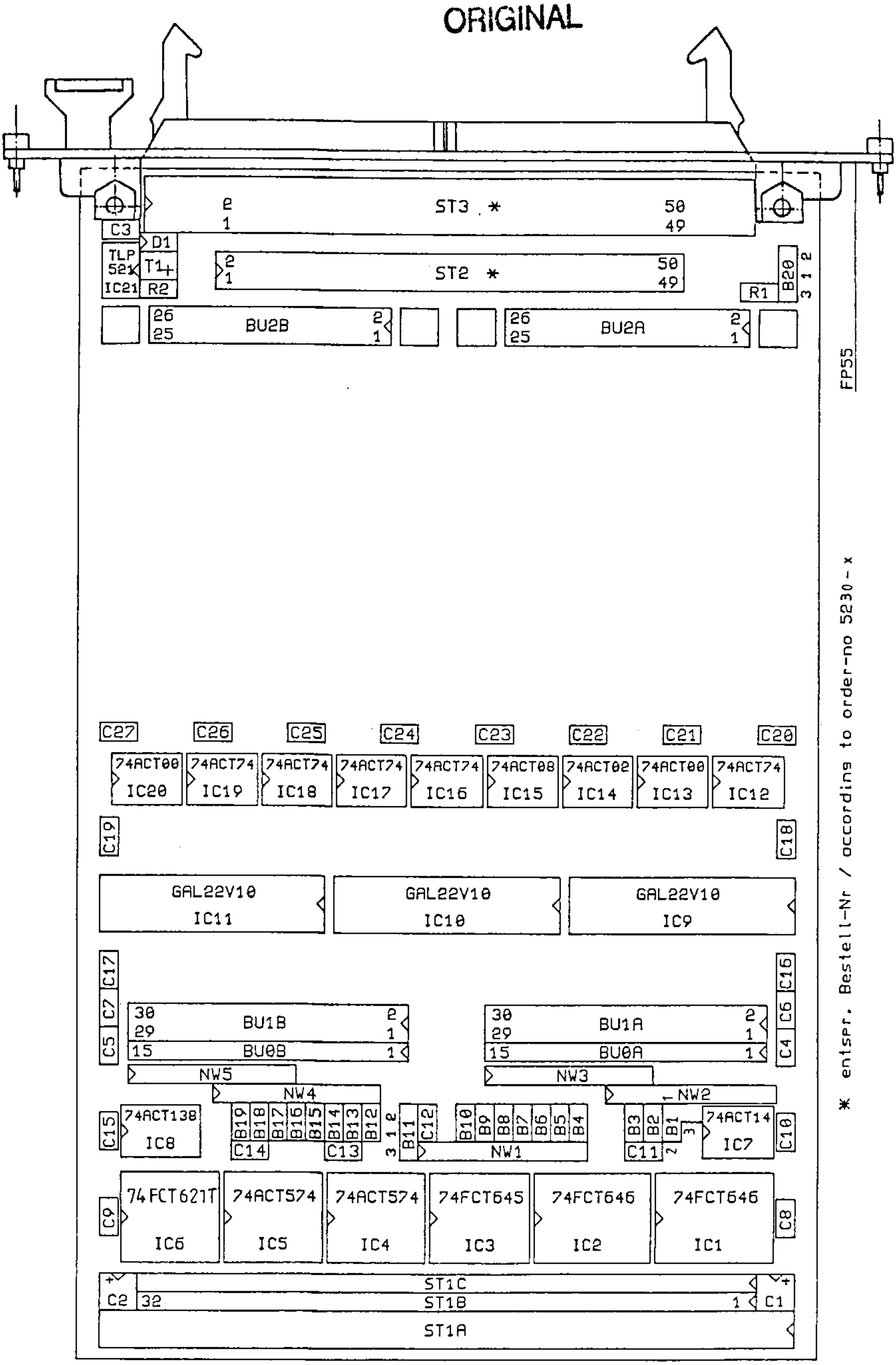
Annex B

VMOD-2 Board Layout

ORIGINAL



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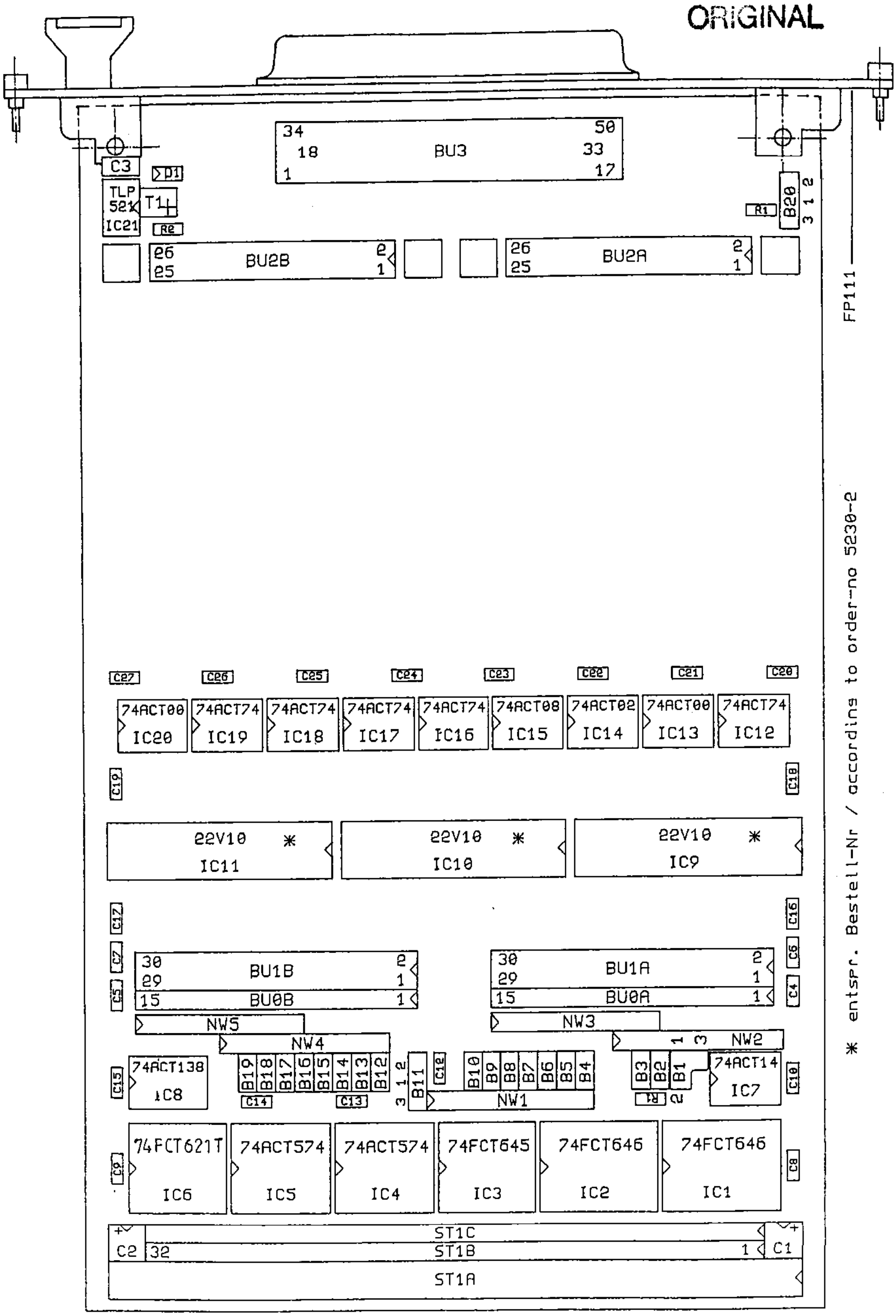
ORIGINAL



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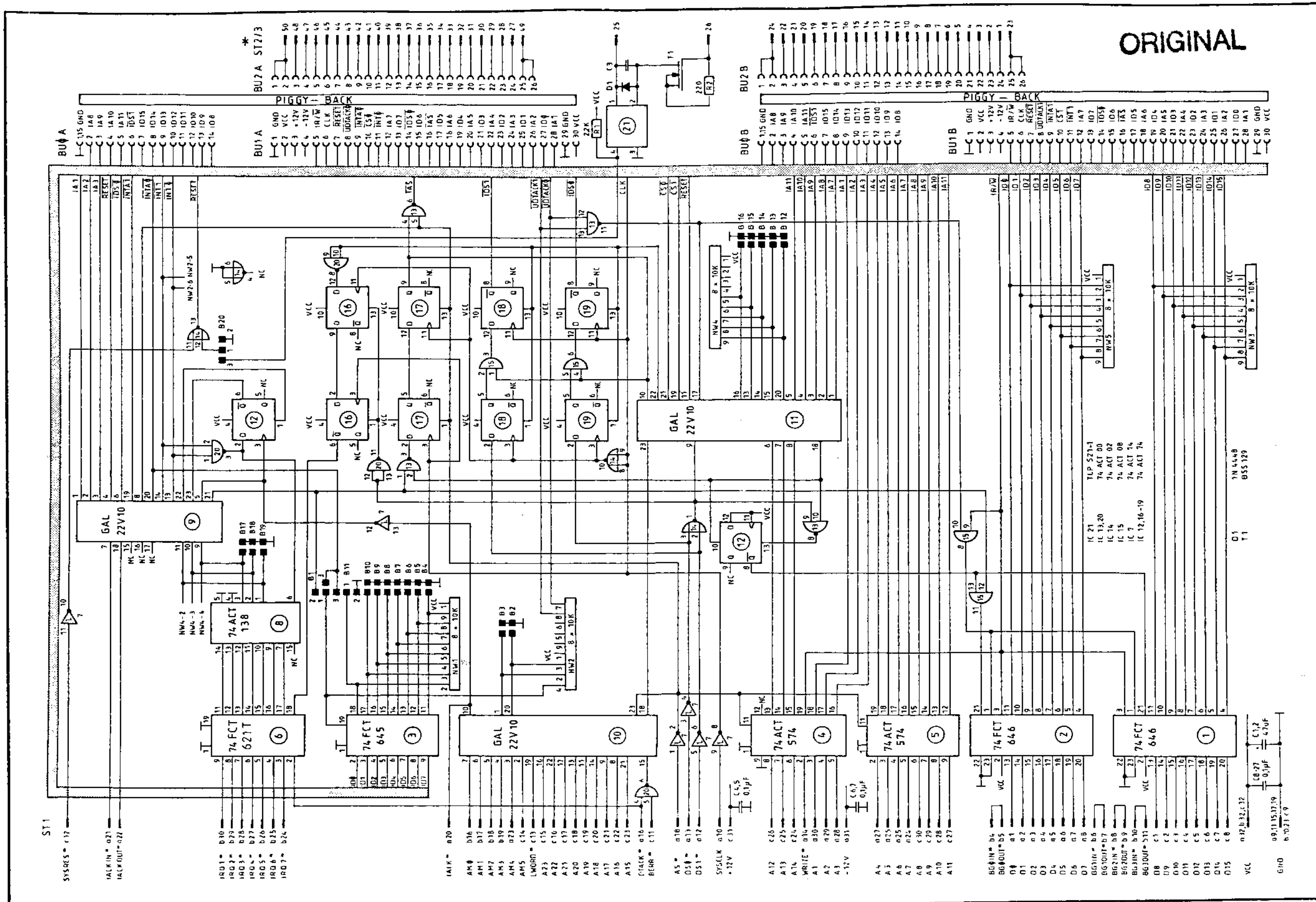
Annex C

VMOD-2 Schematics



* entspr. Bestell-Nr. / according to order-no 5230 - x

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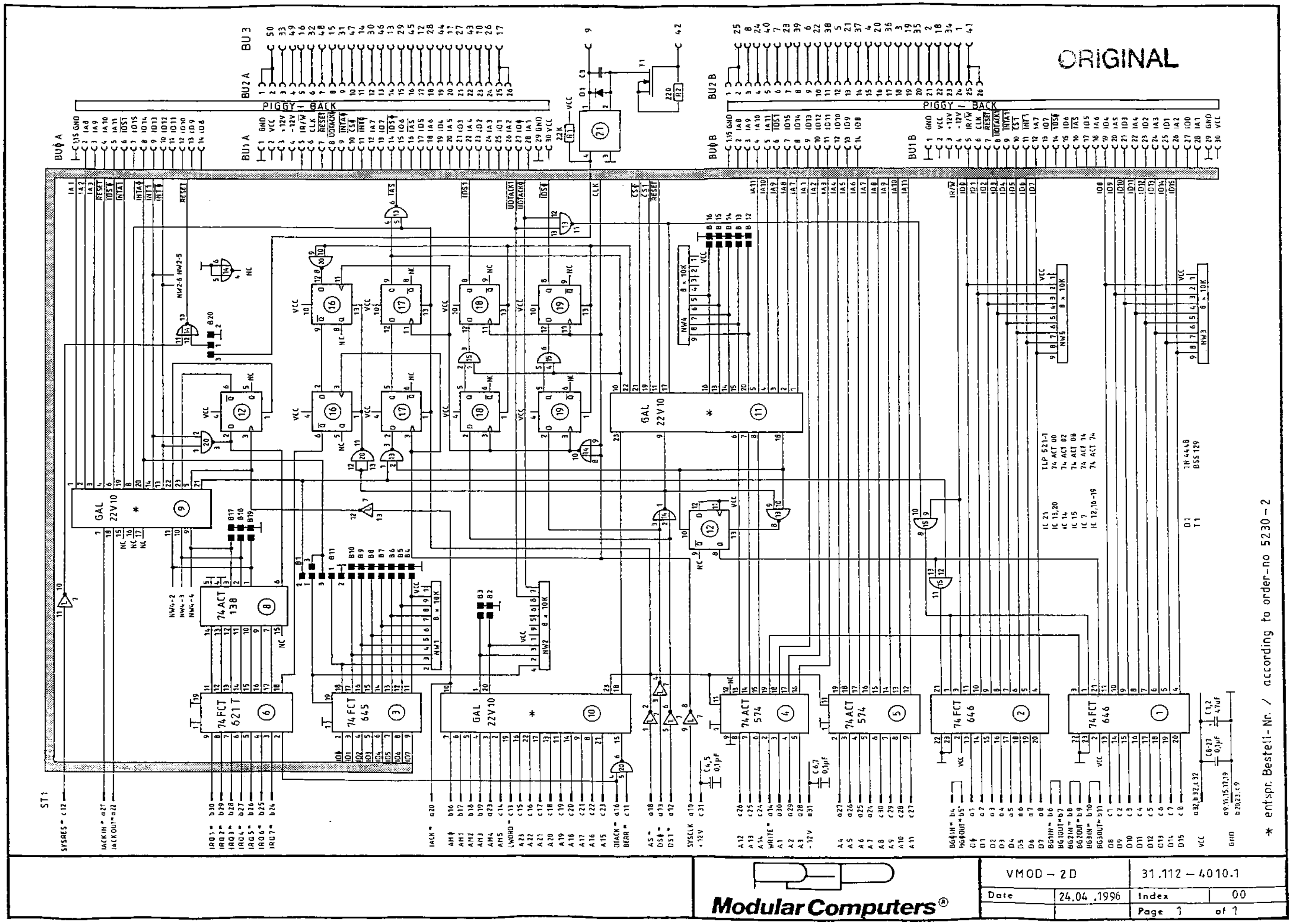
ORIGINAL
* entspr. Bestell-Nr. / according to order-no 5230-2
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