VMEbus REPEATER LINK

MODEL VMIVME-REPEAT L

INSTRUCTION MANUAL

DOCUMENT NO. 500-00RPTL-000 K

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RECORD OF REVISIONS

REVISION LETTER	DATE	PAGES INVOLVED	CHANGE NUMBER
A	04/13/88	Appendix A	88-0019 88-0020
B	6/20/88	Appendix A	88-0102 88-0103
C	10/10/90	All and Appendix A; Convert to New Format	89-0177
D	01/04/91	Appendix A	90-0112
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F	10/10/91	Cover, page ii, and Appendix A	91-0261
G	02/05/92	Cover, page ii, and Appendix A	92-0019
H	01/08/93	Cover, pages ii, v, vi, Sections 2 and 6, and Appendix A	92-0538
J	02/02/95	Cover, pages ii, v, vi, and Sections 5 and 6	95-0166
K	08/15/95	Cover, pages ii, vi, 3-1, and 3-5	95-0542

VMIC
SAFETY SUMMARY

THE FOLLOWING GENERAL SAFETY PRECAUTIONS MUST BE OBSERVED DURING ALL PHASES OF THE OPERATION, SERVICE, AND REPAIR OF THIS PRODUCT. FAILURE TO COMPLY WITH THESE PRECAUTIONS OR WITH SPECIFIC WARNINGS ELSEWHERE IN THIS MANUAL VIOLATES SAFETY STANDARDS OF DESIGN, MANUFACTURE, AND INTENDED USE OF THIS PRODUCT. VME MICROSYSTEMS INTERNATIONAL CORPORATION ASSUMES NO LIABILITY FOR THE CUSTOMER'S FAILURE TO COMPLY WITH THESE REQUIREMENTS.

GROUND THE SYSTEM

To minimize shock hazard, the chassis and system cabinet must be connected to an electrical ground. A three-conductor AC power cable should be used. The power cable must either be plugged into an approved three-contact electrical outlet or used with a three-contact to two-contact adapter with the grounding wire (green) firmly connected to an electrical ground (safety ground) at the power outlet.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the system in the presence of flammable gases or fumes. Operation of any electrical system in such an environment constitutes a definite safety hazard.

KEEP AWAY FROM LIVE CIRCUITS

Operating personnel must not remove product covers. Component replacement and internal adjustments must be made by qualified maintenance personnel. Do not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, always disconnect power and discharge circuits before touching them.

DO NOT SERVICE OR ADJUST ALONE

Do not attempt internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

DO NOT SUBSTITUTE PARTS OR MODIFY SYSTEM

Because of the danger of introducing additional hazards, do not install substitute parts or perform any unauthorized modification to the product. Return the product to VME Microsystems International Corporation for service and repair to ensure that safety features are maintained.

DANGEROUS PROCEDURE WARNINGS

Warnings, such as the example below, precede only potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed.

WARNING

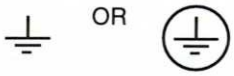
DANGEROUS VOLTAGES, CAPABLE OF CAUSING DEATH, ARE PRESENT IN THIS SYSTEM. USE EXTREME CAUTION WHEN HANDLING, TESTING, AND ADJUSTING.

SAFETY SYMBOLS

GENERAL DEFINITIONS OF SAFETY SYMBOLS USED IN THIS MANUAL

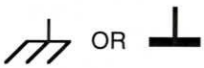
Instruction manual symbol: the product is marked with this symbol when it is necessary for the user to refer to the instruction manual in order to protect against damage to the system.

Indicates dangerous voltage (terminals fed from the interior by voltage exceeding 1000 volts are so marked).



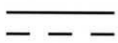
Protective conductor terminal. For protection against electrical shock in case of a fault. Used with field wiring terminals to indicate the terminal which must be connected to ground before operating equipment.

Low-noise or noiseless, clean ground (earth) terminal. Used for a signal common, as well as providing protection against electrical shock in case of a fault. Before operating the equipment, terminal marked with this symbol must be connected to ground in the manner described in the installation (operation) manual.



Frame or chassis terminal. A connection to the frame (chassis) of the equipment which normally includes all exposed metal structures.

Alternating current (power line).



Direct current (power line).

Alternating or direct current (power line).

WARNING

The WARNING sign denotes a hazard. It calls attention to a procedure, a practice, a condition, or the like, which, if not correctly performed or adhered to, could result in injury or death to personnel.

****
* CAUTION *
****

The CAUTION sign denotes a hazard. It calls attention to an operating procedure, a practice, a condition, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or all of the system.

NOTE: The NOTE sign denotes important information. It calls attention to a procedure, a practice, a condition, or the like, which is essential to highlight.

VMEbus REPEATER LINK
MODEL VMIVME-REPEAT L

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SECTION 1

INTRODUCTION

1.1 INTRODUCTION

VMIC's Repeater Link is a software transparent two-board set with interconnecting cables that allow the user to effectively extend a VMEbus chassis to more than 20 slots. The "extended" slots, however, are only operational for VMEbus slave modules.

The Repeater Link has several unique features, as specified below:

a. Supports 8-, 16-, and 32-bit transfers

b. Supports 16-, 24-, and 32-bit addressing

c. Supports all seven interrupt levels

d. Supports VMEbus slaves on a "slave only" VMEbus

e. Supports cables up to 50 feet long

f. Allows expansion to 19 x 19 slots, using 20-slot backplanes in a star configuration

g. Double Eurocard Form Factor

h. DIN type I/O connectors

i. Link includes one Model Repeat M, one Model Repeat S, and three interconnecting cables

1.2 FUNCTIONAL DESCRIPTION

The VMIVME-Repeat L is a two-board set that allows VMEbus slave I/O boards residing in one VMEbus chassis to be controlled by a VMEbus master residing in another chassis. The VMEbus chassis in which the VMEbus master resides is referred to as a master chassis, while the VMEbus slave board resides in a slave chassis. The two-board set is configured with one board designated for the master chassis, while the other board is designated for the slave chassis. A master VMEbus chassis can communicate with several slave chassis by using multiple Repeater Links.

The Repeater Link supports all seven interrupt levels. Interrupts are acknowledged by the IACKIN*/IACKOUT* daisy chain, which is routed through all of the slave chassis slots before being routed to the next VMEbus master chassis slot. Thus, any slot in the slave chassis can generate an interrupt.

1.3 REFERENCE MATERIAL LIST

The reader should refer to "The VMEbus Specification" for a detailed explanation of the VMEbus. "The VMEbus Specification" is available from the following source:

VITA
VFEA International Trade Association
10229 N. Scottsdale Road
Scottsdale, AZ 85253
(602) 951-8866

The following Application and Configuration Guides are available from VMIC to assist the user in the selection, specification, and implementation of systems based on VMIC's products:

TITLE	DOCUMENT NO.
Digital Input Module Application Guide	825-000000-000
Change-of-State Application Guide	825-000000-002
Digital I/O (with Built-in-Test) Product Line Description	825-000000-003
Synchro/Resolver (Built-in-Test) Subsystem Configuration Guide	825-000000-004
Analog I/O Products (with Built-in-Test) Configuration Guide	825-000000-005
Connector and I/O Cable Application Guide	825-000000-006

SECTION 2

PHYSICAL DESCRIPTION AND SPECIFICATIONS

REFER TO 800-00RPTL-000 SPECIFICATION

SECTION 3

THEORY OF OPERATION

3.1 OPERATIONAL OVERVIEW

The VMIC Repeater Link is comprised of a two-board set. One board is designated the VMIVME-Repeat-M, while the other is designated VMIVME-Repeat-S. The VMIVME-Repeat-M Board appears to the master VMEbus chassis as a VMEbus slave board. The VMIVME-Repeat-M has an address space of the combined address space of each slave board residing in the VMEbus slave chassis. The VMIVME-Repeat-S appears to the slave VMEbus chassis as a bus buffer residing in slot A1.

3.2 BLOCK DIAGRAMS

A typical Repeat Link configuration is shown in Figure 3.2-1. A typical block diagram of multiple repeat links is shown in Figure 3.2-2.

3.3 VMEbus DATA TRANSFER

The VMEbus compatibility logic of the Repeater Link supports 8-, 16-, and 32-bit data transfers on cables up to 50 feet in length.

3.4 INTERRUPT CAPABILITY

The Repeater Link allows interrupts from boards residing in the slave chassis to be processed by interrupt handlers in the master VMEbus chassis. This is accomplished by busing all seven interrupt request signals and the associated interrupt acknowledge signals. Interrupt priority is maintained by the IACKIN*/IACKOUT* daisy chain. The daisy chain is bused directly from the master chassis slot, in which the VMIVME-Repeat-M resides, to the first slot in the slave VMEbus chassis. The IACKOUT* signal in the last slot of the slave chassis is configured to provide the IACKOUT* signal to the master VMEbus chassis, if there are no boards in the slave chassis responsible for the interrupt. The configuration required by the Repeater Link is simply one jumper installed on the slave chassis backplane to allow the IACKIN*/IACKOUT* daisy chain to continue to the next slot of the master VMEbus chassis. The reader should refer to Figure 3.4-1 for an interrupt daisy chain structure. Figure 3.4-2 provides a simplified functional configuration allowing slave chassis interrupters.

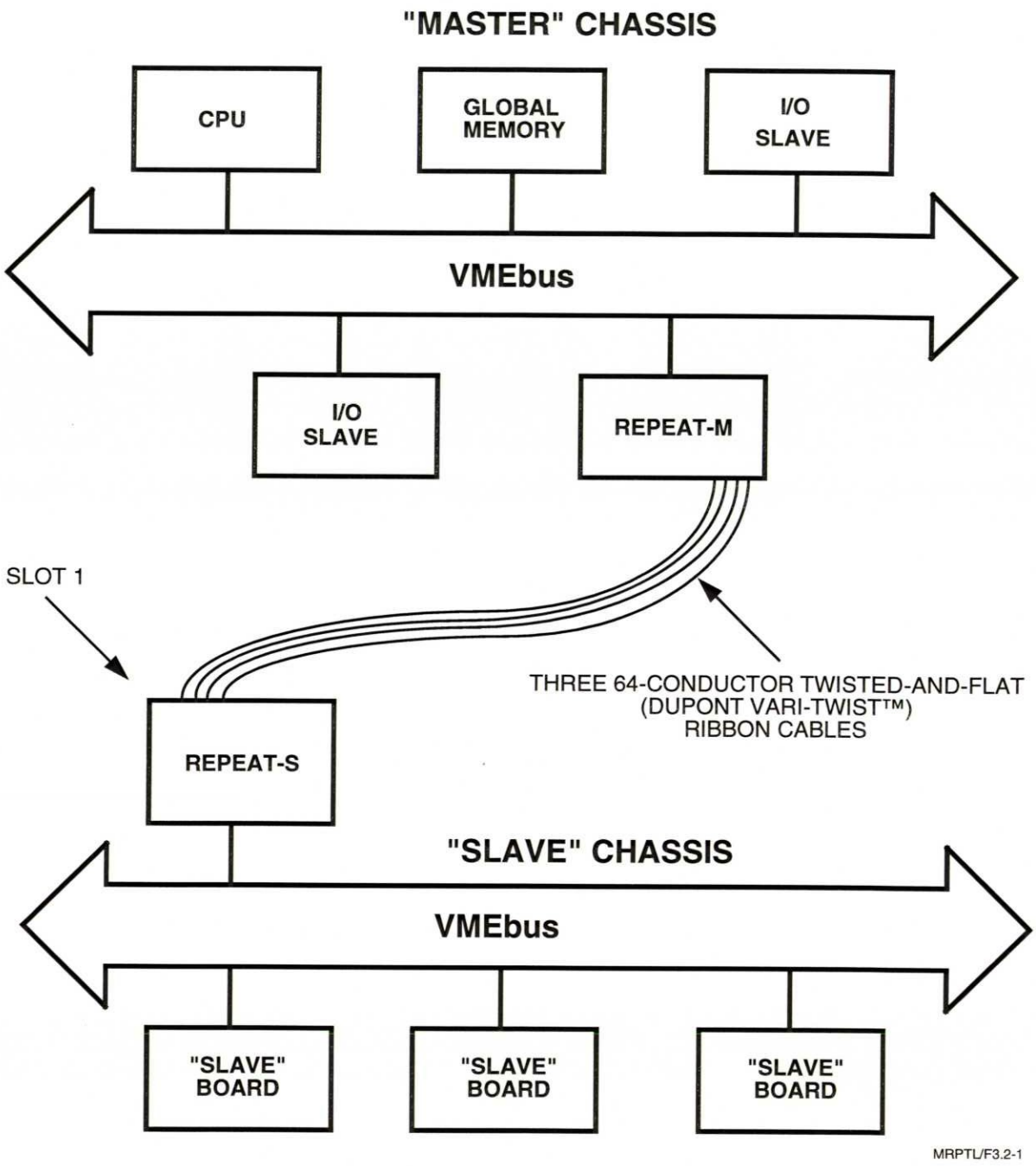

Figure 3.2-1. Typical VMEbus Configuration Using the VMIVME-Repeater Link

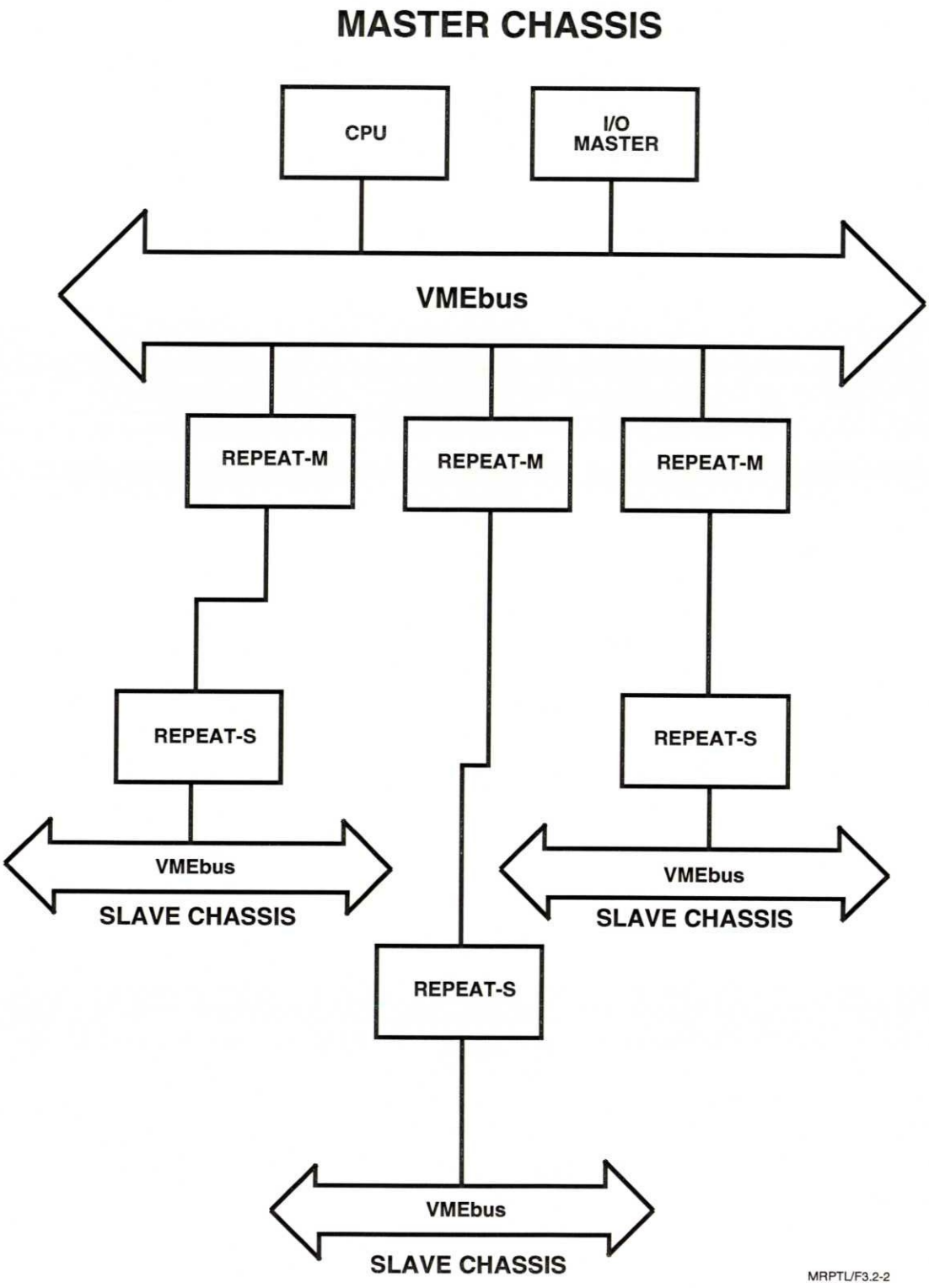

Figure 3.2-2. Multiple Slave I/O Chassis

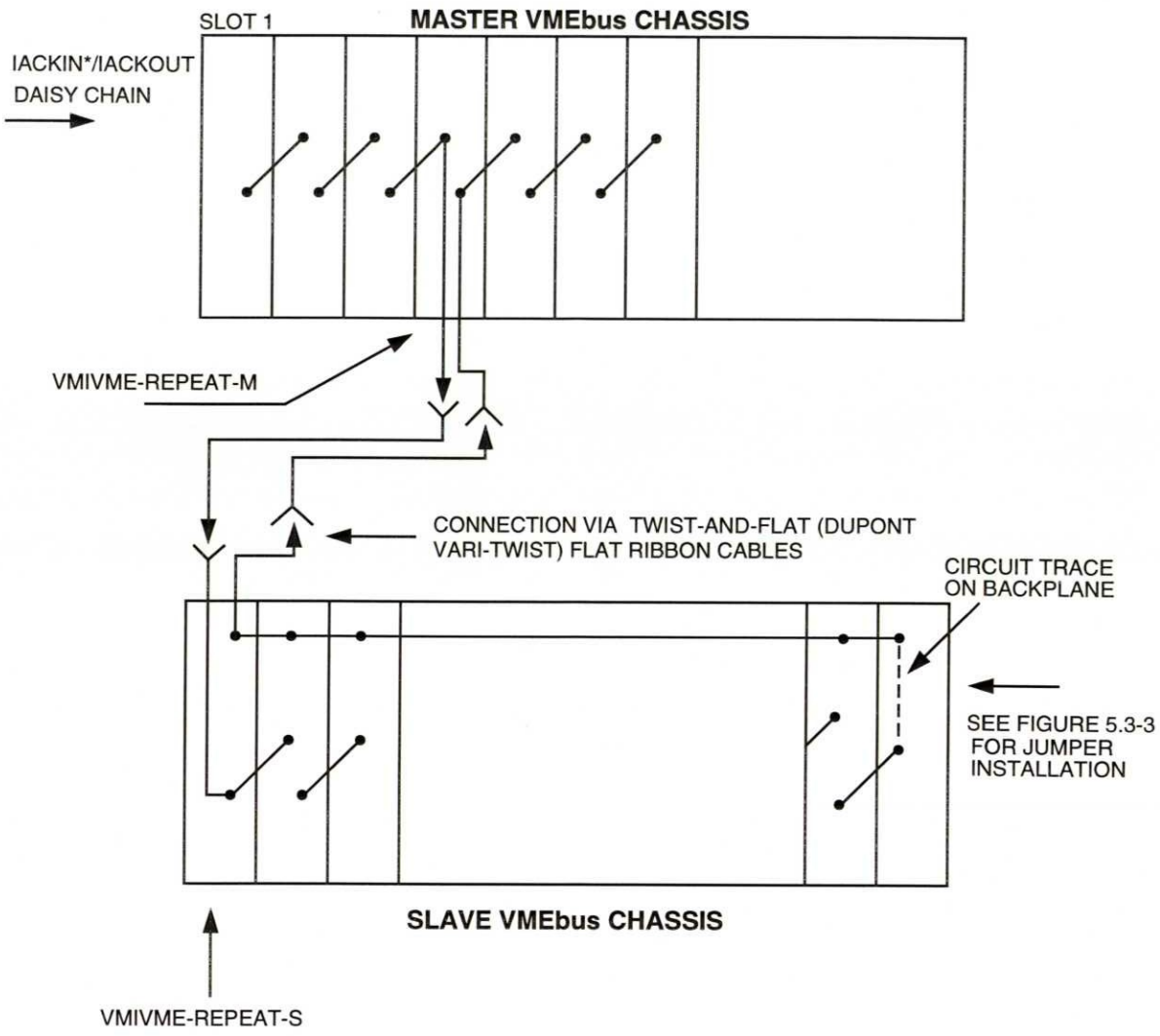

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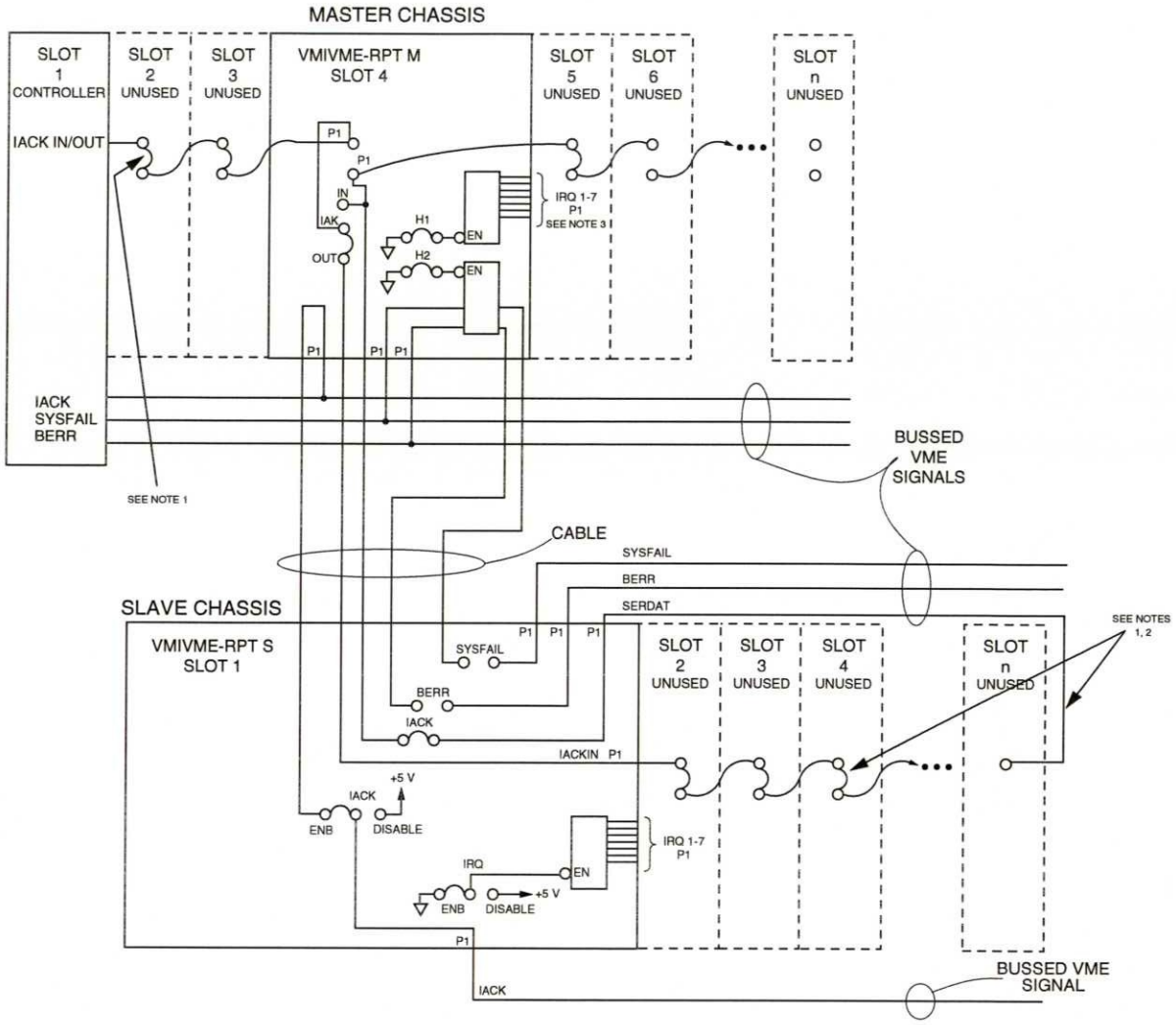
Figure 3.4-1. Interrupt Daisy Chain Structure



NOTES:
1. Any unused slots should propigate the IACKIN/OUT daisy chain.
2. Wire P1 pin A22 and P1 pin B22 together if an interrupter resides in the last slot.
   Wire P1 pin A21 and P1 pin B22 together if an interrupter does not reside in the last slot.
3. All connections denoted with a "P1" indicate that the signal enters or leaves the board via the P1 connector.

Figure 3.4-2. Example Configuration of Link Setup for Slave Chassis Interrupters

SECTION 4

PROGRAMMING

4.1 PROGRAMMING

The VMIC Repeater Link is software transparent. Boards residing in the slave VMEbus chassis respond to VMEbus transfers as if they were located in the master VMEbus chassis. Therefore, the Repeater Link requires no special programming considerations, due to the fact that all address signals are bused to the slave chassis.

SECTION 5

CONFIGURATION AND INSTALLATION

5.1 UNPACKING PROCEDURES

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*  CAUTION  *
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SOME OF THE COMPONENTS ASSEMBLED ON VMIC'S PRODUCTS MAY BE SENSITIVE TO ELECTROSTATIC DISCHARGE AND DAMAGE MAY OCCUR ON BOARDS THAT ARE SUBJECTED TO A HIGH ENERGY ELECTROSTATIC FIELD. UNUSED BOARDS SHOULD BE STORED IN THE SAME PROTECTIVE BOXES IN WHICH THEY WERE SHIPPED. WHEN THE BOARD IS TO BE LAID ON A BENCH FOR CONFIGURING, ETC., IT IS SUGGESTED THAT CONDUCTIVE MATERIAL BE INSERTED UNDER THE BOARD TO PROVIDE A CONDUCTIVE SHUNT.

Upon receipt, any precautions found in the shipping container should be observed. All items should be carefully unpacked and thoroughly inspected for damage that might have occurred during shipment. The board(s) should be checked for broken components, damaged printed circuit board(s), heat damage, and other visible contamination. All claims arising from shipping damage should be filed with the carrier and a complete report sent to VMIC, together with a request for advice concerning disposition of the damaged item(s).

5.2 PHYSICAL INSTALLATION

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**********
*  CAUTION  *
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DO NOT INSTALL OR REMOVE BOARDS WHILE POWER IS APPLIED.

De-energize the equipment and insert the board into an appropriate slot of the chassis, while ensuring that the board is properly aligned and oriented in the supporting card guides. Slide the board smoothly forward against the mating connector until firmly seated.

5.2.1 Chassis/Module System Configuration

- Install the VMIVME-Repeat-M into VMEbus master chassis, i.e., the chassis that contains CPUs, DMA devices, system controller, etc. The VMIVME-Repeat-M may be installed in any slot except slot 1, which is usually reserved for the system controller.

- Install the VMIVME-Repeat-S into VMEbus slave chassis, i.e., the chassis that contains slave I/O boards. The VMIVME-Repeat-S must be installed in the left-most slot, designated as slot A1, of the slave chassis.

5.3 REPEAT MASTER JUMPER INSTALLATION

Jumpers are provided on Repeat Master boards to disable interrupts from the slave chassis and to disable repeating of the SYS FAIL* and BERR* signals from the slave chassis.

If interrupts are not required in the slave chassis, interrupts can be disabled as shown in Figure 5.3-1. If interrupts are disabled, the interrupt processing through the daisy chain is faster. The factory configuration (interrupts enabled) is shown in Figure 5.3-2. The reader should refer to Figure 5.3-3 for jumper locations on the Master Repeat Board.

The SYS FAIL* and BERR* repeated signals can both be disabled by installing the H2 jumper. The factory configuration enables the SYS FAIL* and BERR* signals (jumper H2 removed).

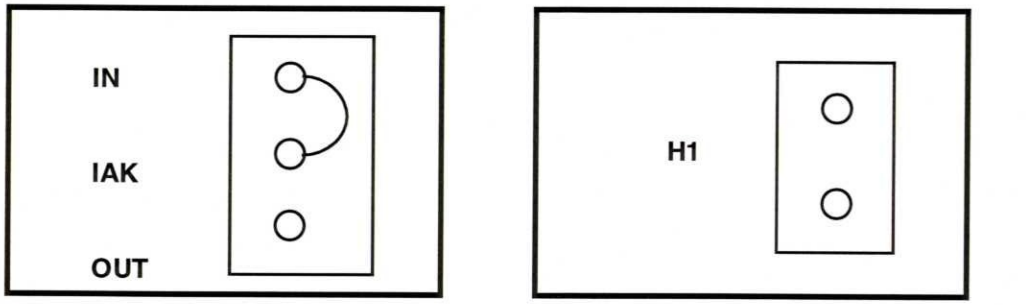


Figure 5.3-1. Repeat Master Board Configured with Interrupts Disabled

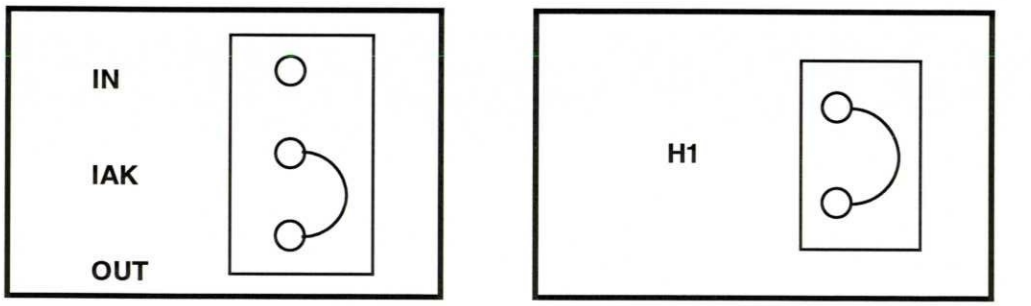


Figure 5.3-2. Repeat Master Board Configured with Interrupts Enabled (Factory Configuration Shown)

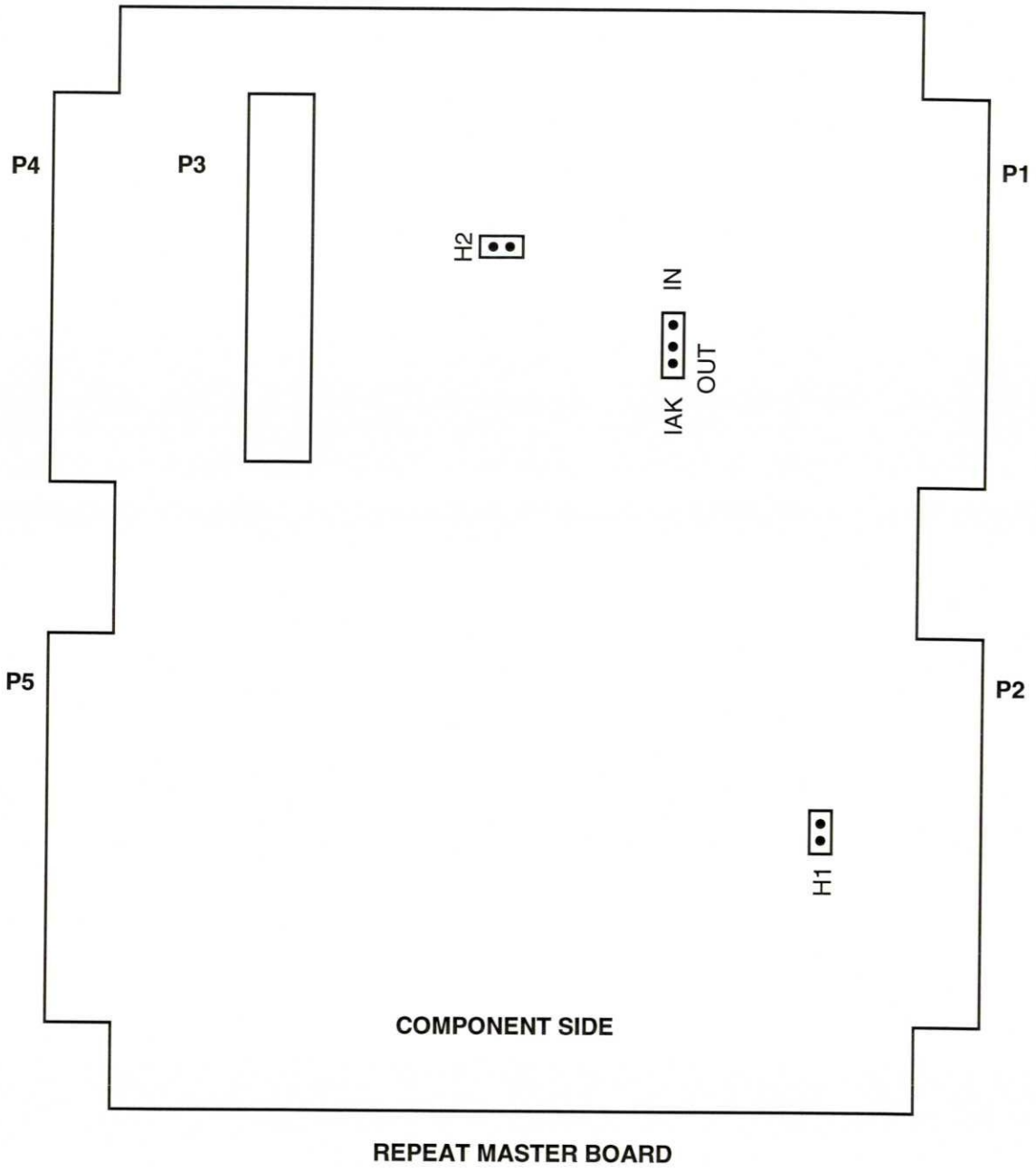


Figure 5.3-3. Jumper Locations

5.4 REPEAT SLAVE JUMPER INSTALLATION

Interrupts are enabled as shown in Figure 5.4-1 and they can be disabled as shown in Figure 5.4-2. The factory configuration is as shown in Figure 5.4-1 (interrupts enabled). The jumper locations are shown in Figure 5.4-3.

The "SYS FAIL" and "BERR" jumpers enable the SYS FAIL* and BERR* signals in the slave VMEbus chassis to be repeated to the master chassis. The SYS FAIL and BERR repeated signals may be disabled by removing the "SYS FAIL" and "BERR" jumpers, respectively. Both jumpers are installed at the factory.

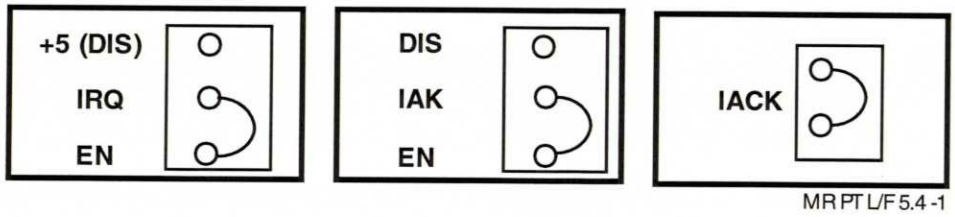


Figure 5.4-1. Slave Repeat Board Configured with Interrupts Enabled (Factory Configuration Shown)

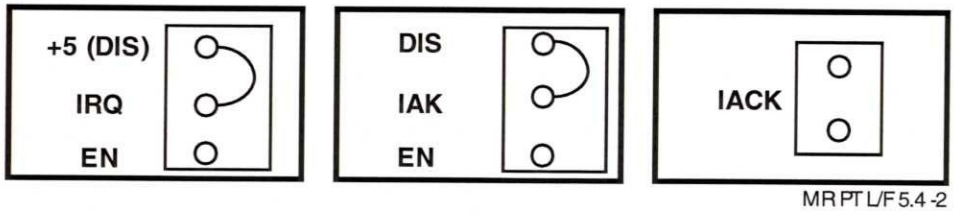


Figure 5.4-2. Slave Repeat Board Configured with Interrupts Disabled

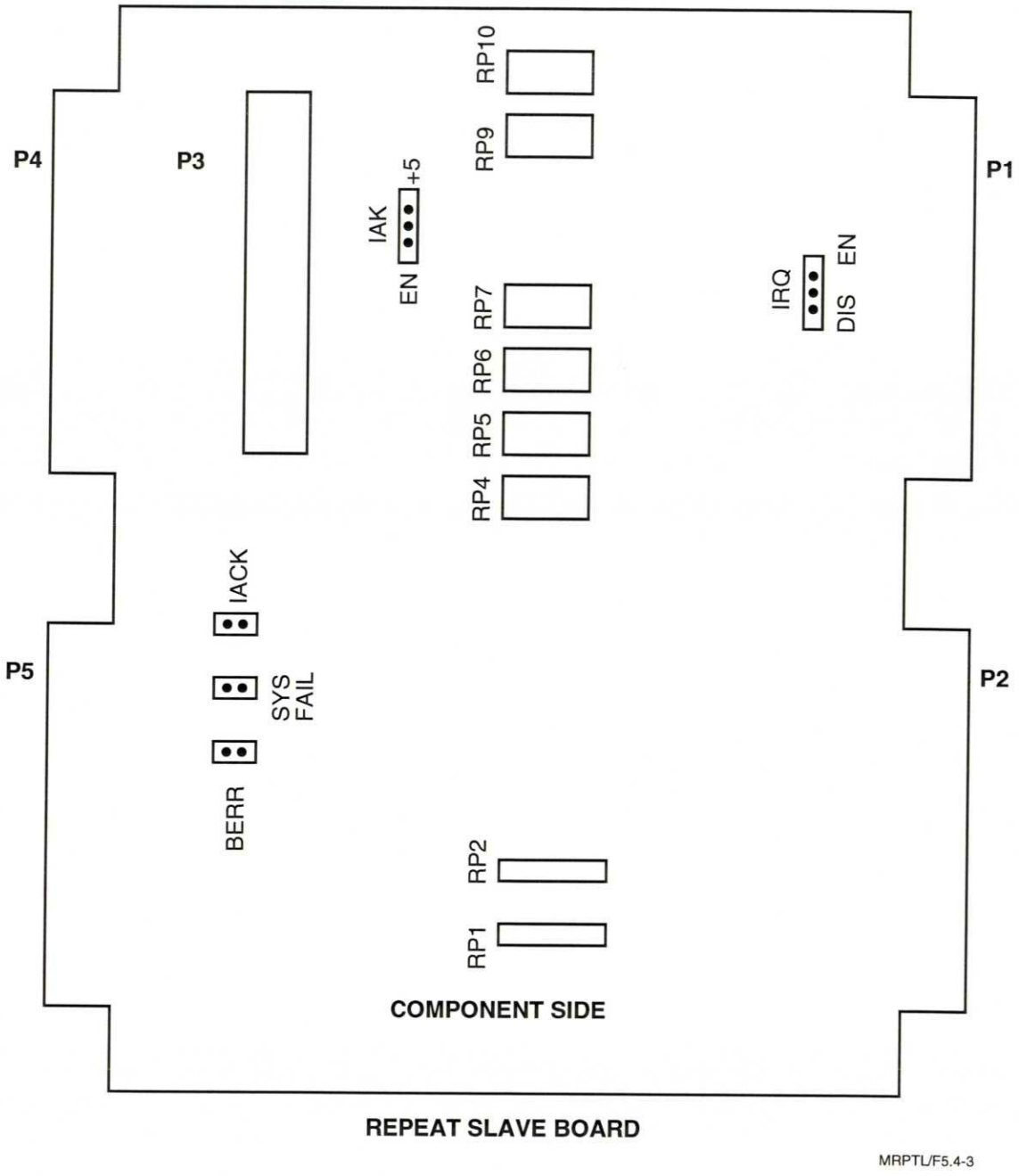


Figure 5.4-3. Jumper and Terminator Resistor Locations

5.5 CABLE INSTALLATION

The Repeater Link requires three 64-conductor Twist-and-Flat (Dupont VARI-TWIST™) ribbon cables between the VMIVME-Repeat-M Board and VMIVME-Repeat-S Board. The reader should refer to Figure 5.3-1 for connector locations.

a. Connect cable from VMIVME-Repeat-M P3 connector to VMIVME-Repeat-S P3 connector.

b. Connect cable from VMIVME-Repeat-M P4 connector to VMIVME-Repeat-S P4 connector.

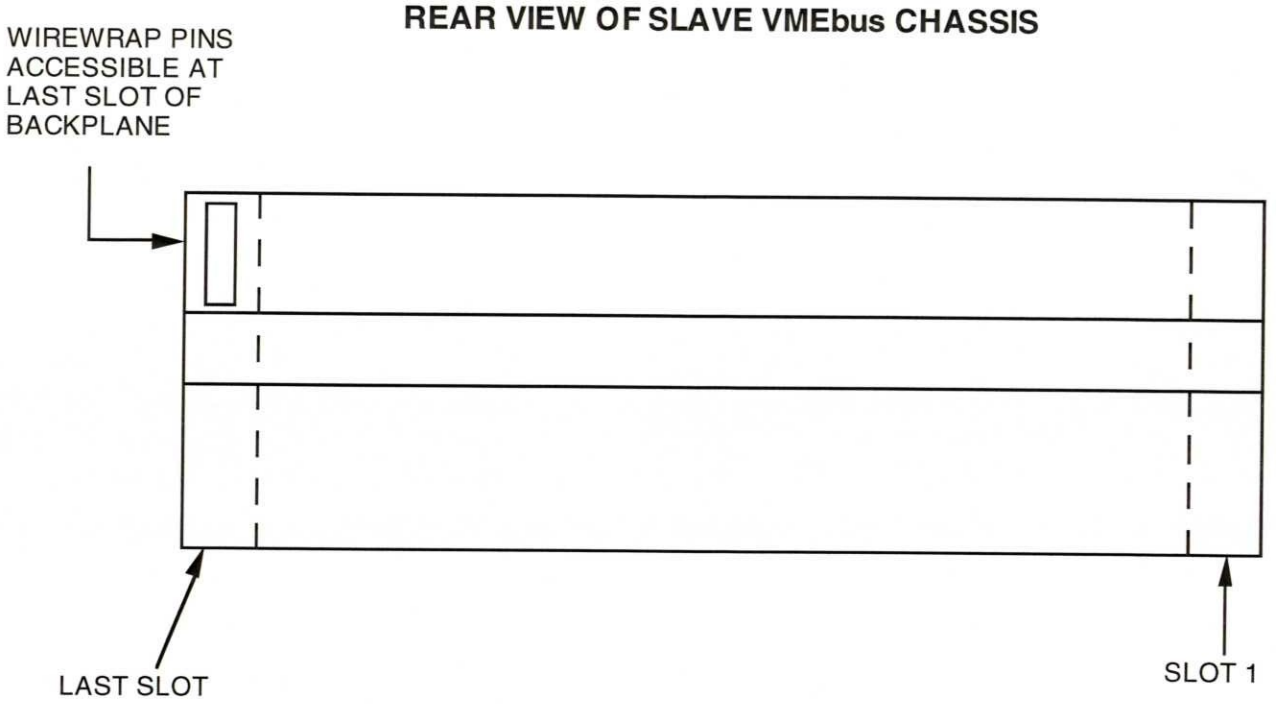
c. Connect cable from VMIVME-Repeat-M P5 connector to VMIVME-Repeat-S P5 connector.

5.6 SLAVE VMEbus CHASSIS INTERRUPT CONFIGURATION

The following configuration directions are not required for system operation if interrupt processing is not required by the master VMEbus.

a. The IACKIN*/IACKOUT* daisy chain must be maintained in all slots of the slave VMEbus chassis, i.e., jumpered or interrupter boards installed.

b. Install a wire jumper to connect IACKOUT* pin of the last slot of the slave VMEbus chassis to the SERDAT pin of the last slot. If the last slot of the slave chassis does not have an interrupt request board inserted, then the SERDAT pin must be connected to the IACKIN* pin instead of the IACKOUT* pin. The reader should refer to Figure 5.6-1 for a diagram of interrupt jumper configuration.



Install wire jumper between P1 A22 and P1 B22, if an interrupter resides in the last slot of the chassis. Install a jumper between P1 A21 and P1 B22, if an interrupter is not present.

MRPTL/F 5.6 -1

Figure 5.6-1. Interrupt Configuration Jumpers

5.7 POWER UP/POWER DOWN SEQUENCE

The Repeater Link does not bus any +5 VDC power between the two VMEbus chassis. The Repeat Link connects the ground of each chassis together via the three flat ribbon cables for enhanced noise immunity.

The following power up and power down sequence should be followed to ensure protection against false interrupts into the master VMEbus chassis subsystem, in the event that separate power supplies are used.

POWER UP SEQUENCE

a. Power up slave VMEbus chassis
b. Power up master VMEbus chassis

POWER DOWN SEQUENCE

a. Power down master VMEbus chassis
b. Power down slave VMEbus chassis

SECTION 6

MAINTENANCE

6.1 MAINTENANCE

This section provides information relative to the care and maintenance of VMIC's products. If the products malfunction, verify the following:

a. Software
b. System configuration
c. Electrical connections
d. Jumper or configuration options
e. Boards are fully inserted into their proper connector location
f. Connector pins are clean and free from contamination
g. No components of adjacent boards are disturbed when inserting or removing the board from the chassis
h. Quality of cables and I/O connections

If the products must be returned, contact VMIC for a Return Material Authorization (RMA) Number. **This RMA Number must be obtained prior to any return.**

6.2 MAINTENANCE PRINTS

User-level repairs are not recommended. The appendix to this manual contains drawings and diagrams for reference purposes only.

APPENDIX A

ASSEMBLY DRAWING, PARTS LIST, AND SCHEMATICS

ACKNOWLEDGEMENTS

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MEGAMODULE	VMEmanager
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SRTbus	VMEnetII
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UIOC

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