

VME Sync Board Installation Instructions

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**VME Sync Board Installation Instructions
Document Number 108-0112-002**

Silicon Graphics, Inc.
Mountain View, California

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Chapter 1

General Information

This manual provides instructions on installing the VME Sync board upgrade into the CHALLENGE™ L (deskside) and XL (rackmount) family of computer systems. This information is intended for Silicon Graphics system support engineers (SSEs) and other field-certified personnel only.

Note: The VME Sync board is not currently supported on the Onyx L and XL platforms.

The VME Sync board provides synchronous data communications front-end processing for the VMEbus and handles both SNA (system network architecture) and X.25 communications protocol.

The VME Sync board also provides four interface ports that can be configured as RS-232, V.35, or X.21.

Caution: Do not mix different interface modules on the same board. For example, you cannot install both RS-232 and V.35 modules on the same VME Sync board; the board must contain the same type of interface. You can, however, install different VME Sync board types in the same system.

Optional daughter boards (also called line interface modules—LIMs) are used to configure a port for either V.35 or X.21 operation. A set of PROMs provide the standard RS-232 capability. The CHALLENGE system can support up to four VME Sync boards depending on the availability of VME slots.

Note: This upgrade requires IRIX version 5.2 or later for proper operation.

1.1 Manual Organization

This manual is organized as follows:

Chapter 1, “General Information,” introduces the VME Sync board, describes the controls and indicators, and provides a brief hardware summary for the VME Sync board.

Chapter 2, “Installation,” provides kit content information, describes the jumpers and DIP switches, and describes how to install the upgrade into CHALLENGE systems.

Chapter 3, “Configuring the VME Sync Board” describes how to configure the board.

Appendix A, “VME Sync Board Error Messages,” describes the VME Sync error messages.

Appendix B, “Specifications” provides specifications for the VME Sync board.

1.2 Safety Precautions

This section provides important guidelines to follow during installation.



Warning: Installation of these upgrades requires specific training and technical knowledge. These instructions have been provided for use only by Silicon Graphics' system support engineers (SSEs) or other Silicon Graphics-trained personnel. This equipment utilizes electrical power internally that is hazardous if the equipment is improperly disassembled.

Caution: This equipment is extremely sensitive and susceptible to damage caused by electrostatic discharge (ESD). ESD is an electrical discharge (spark) caused by the buildup of electrostatic potential on clothing and other materials. You must use proper ESD preventive measures and observe these precautions:

- Connect a ground strap to your wrist when connecting/disconnecting peripherals.
- Be sure that you and all the electrical equipment that you handle during this installation are at ground potential to avoid damage from ESD.
- Keep the boards or drives in the antistatic bags provided. Remove a board or drive from its antistatic bag only when you are properly grounded to the chassis ground with a ground strap.

1.3 Controls and Indicators

The figure and tables in this section describe the controls, indicators, connectors, and jumpers on the VME Sync board. Figure 1-1 summarizes these connector features.

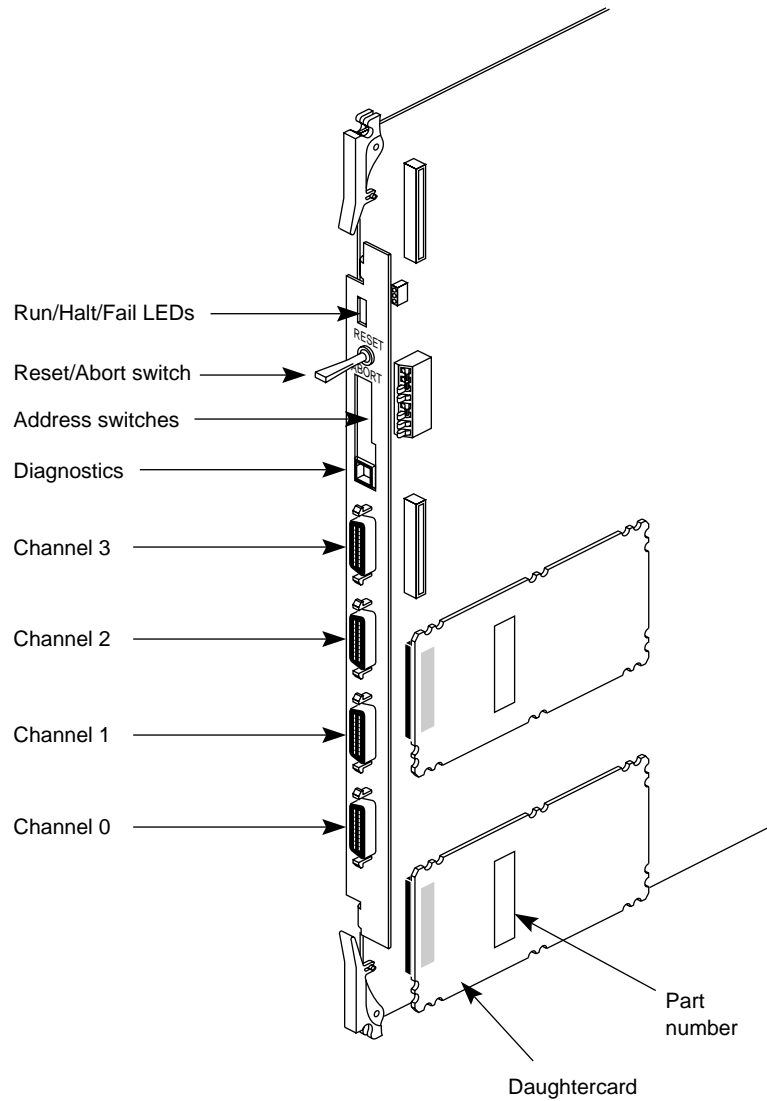


Figure 1-1 VME Sync Board Front Panel

Table 1-1 summarizes the board controllers and indicators.

Panel Designation	Function
Run/Halt/Fail	This three-LED indicator shows the current state of the board during operation. "Run" is the normal operating mode. "Halt" indicates that a double-bus error condition has occurred. "Fail" occurs when the SYSFAIL line goes high, indicating a catastrophic condition. See Table 1-2 through Table 1-9 for additional information.
Reset/"normal"/Abort switch	This is a 3-position momentary toggle switch. The switch is fixed in the middle position (which does not affect normal board operation). The Reset position resets the VME Sync board. The Abort position generates an NMI (nonmaskable interrupt) which is used for diagnostic testing. ^a
Status LEDs (0 through 7)	These eight LEDs illuminate during power-up, then turn off one by one, as the board cycles through the power-up tests. Afterwards, only one LED (0) should remain blinking.
Diag port	This diagnostic port is not intended for use in the field. The port is for the manufacturer's use only.
Port 0 to 3	These four mini-DB, 26-pin ports provide connection to the I/O panel.

Table 1-1 VME Sync Board Controls and Indicators

a. The Abort position is for the manufacturer's use only.

The Run, Halt, Fail States three-LED indicator shows the current state of the board during operation:

- "Run" is the normal operating mode.
- "Halt" indicates that a double-bus error condition has occurred.
- "Fail" occurs when the SYSFAIL line goes high, indicating a catastrophic condition.

Table 1-2 through Table 1-9 summarize these states. Figure 1-2 through Figure 1-9 provide the LED pattern information.

LED Pattern	Condition
Normal	Normal operating state.
See Figure 1-2.	

Table 1-2 Run, Halt, Fail States - Normal

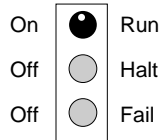


Figure 1-2 Normal

LED Pattern	Condition
Watchdog timeout	Watchdog timeout. See Section 2.2, “Verifying the Jumper and DIP Switch Settings,” for more information on this timeout.
See Figure 1-3.	

Table 1-3 Run, Halt, Fail States - Watchdog timeout

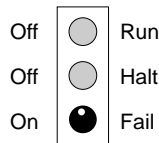


Figure 1-3 Watchdog timeout

LED Pattern	Condition
CPU halt	CPU halt by the 68020 processor on the VME Sync board that is caused possibly by a double-bus fault.

See Figure 1-3

Table 1-4 Run, Halt, Fail States - CPU halt

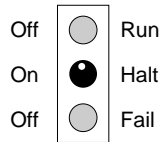


Figure 1-4 CPU halt

LED Pattern	Condition
CPU/SYSFAIL halt	Indicates both a CPU halt and a system fail halt.

See Figure 1-3

Table 1-5 Run, Halt, Fail States - CPU/SYSFAIL halt

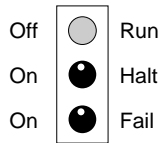


Figure 1-5 CPU/SYSFAIL halt

LED Pattern	Condition
No power	Power-off state (that is, no power is coming to the board).

See Figure 1-6

Table 1-6 Run, Halt, Fail States - No power

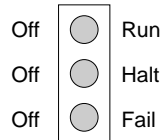


Figure 1-6 No power

LED Pattern	Condition
Board reset	Indicates that the board is in a power-up or reset state.

See Figure 1-3

Table 1-7 Run, Halt, Fail States - Board reset

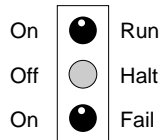


Figure 1-7 Board reset

LED Pattern	Condition
VMEbus access	Indicates local accessing of the VMEbus.
See Figure 1-8	

Table 1-8 Run, Halt, Fail States - VMEbus access

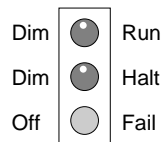


Figure 1-8 VMEbus access

LED Pattern	Condition
Board failure	Probable board failure.
See Figure 1-9	

Table 1-9 Run, Halt, Fail States - Board failure

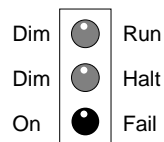


Figure 1-9 Board failure

1.4 Brief Hardware Summary

The VME Synchronous Communications (VME Sync) adapter is a third-party board produced by SBE, Inc. A Motorola 68020 is the main processor on the board. The VME Sync also comes with 1 MB of on-board, parity-protected dynamic RAM.

An AMD 85C30 dual-channel serial communications controller provides serial-to-parallel conversion and control. The SBE SPMCC programmable serial port microcontroller (with DMA) interfaces the 85C30 to the 68020 microprocessor and controls the receiving and transmission of data blocks.

The VMEbus interface is provided by a pair of ASICs that are produced by SBE, called the VBIC and VSAM.

The board also provides four multiprotocol full-duplex serial ports operating in RS-232, X.21, or V.35 mode. All ports are configured for DTE operation. An RS-232 port can transmit up to 64 Kbits per second. An X.21 or V.35 port can transmit up to 1.544 Mbits per second.

Chapter 2

Installation

This chapter describes how to install the VME Sync board upgrade into the CHALLENGE L (deskside) and XL (rackmount) systems.

Installation consists of the following major steps:

- verifying the kit contents
- checking the jumper and DIP switch settings on the board
- removing the RS-232 PROMs and installing daughter boards (if required)
- installing the VME Sync board into a system
- jumpering the backplane (if a VME slot or slots are skipped)
- connecting the board to the I/O panel
- installing software
- verifying installation

2.1 Kit Contents

Figure 2-1 shows the major components for the VME Sync board upgrade (marketing code, C8-VMESYNC). The marketing codes for the different interfaces are:

- RS-232 (C8-RS232)
- X.21 (C8-X.21)
- V.35 (C8-V.35)

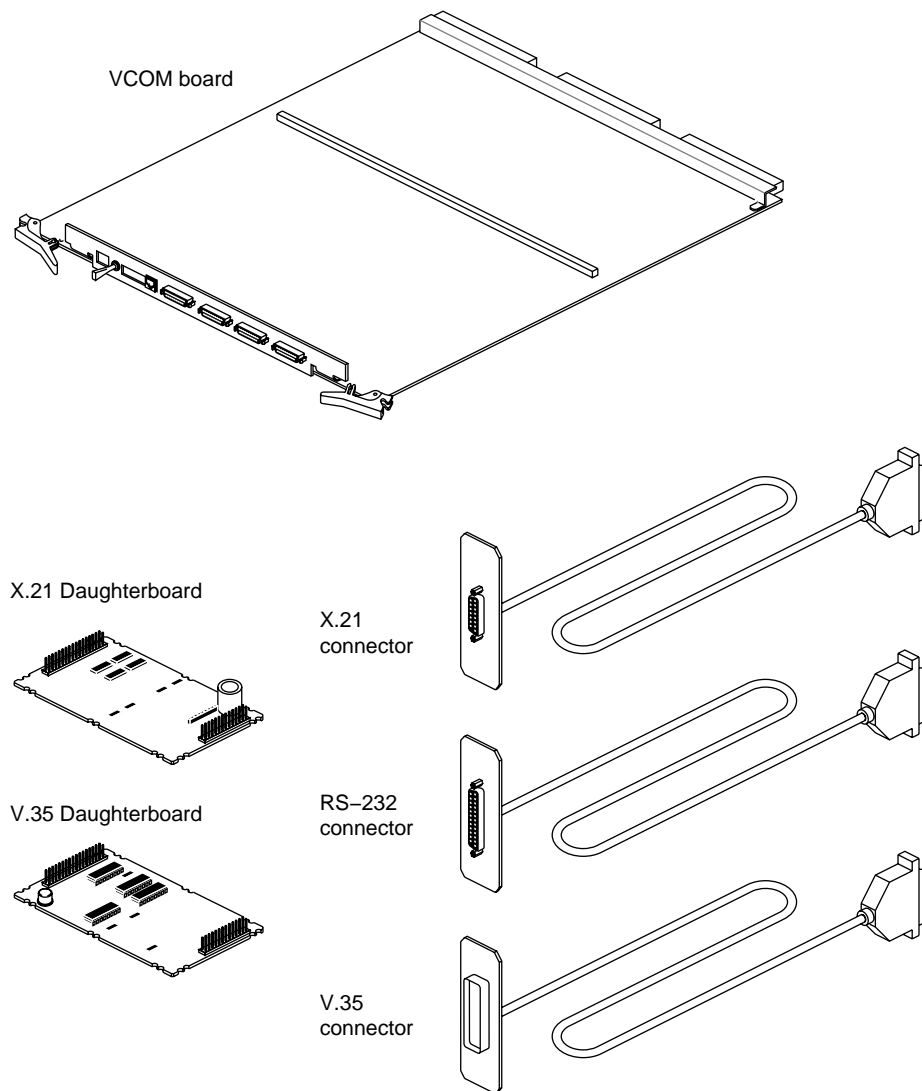


Figure 2-1 Major Components of VME Sync board Upgrade Kit

2.2 Verifying the Jumper and DIP Switch Settings

The VME Sync board should already be configured with the correct jumper settings and DIP switch selections (see note below). However, you should double check the settings as outlined in this section.

Note: DIP switches 7 and 8 may need to be changed. These switches are preset for a board address of 0 (a single VME Sync board configuration). See Table 2-27 for additional information.

2.2.1 Jumper Settings

Figure 2-2 illustrates the proper VME Sync board jumpering and Table 2-13 describes the jumper functions.



Figure 2-2 VME Sync Board With Required Jumper and DIP Switch Settings (Board 0 Configuration Shown)

Note: Jumper blocks J18 through J37 do not exist on the board. Their positions are reserved for possible future use.

Jumper Number/Name	Function
J1-Mailbox Reset	When jumpered, it allows the host CPU to reset the VME Sync board by writing to a mailbox register in the VSAM device (an ASIC that helps provide the VMEbus interface.)

See Figure 2-3

Table 2-1 Jumper Description - J1

Jumper



Figure 2-3 JJP1-Mailbox Reset

Jumper Number/Name	Function
J2-Asserting SYSRESET to the VMEbus	When jumpered, it allows a local reset (from the VME Sync board) to reinitialize the VMEbus.

See Figure 2-4

Table 2-2 Jumper Description - J2

No jumper



Figure 2-4 J2- SYSRESET

Jumper Number/Name	Function
J3-Cache Disable	When not jumpered, it enables the on-chip cache memory of the 68020 so that a copy of recently executed instructions and most recently accessed data is retained. This is potentially useful in shortening processing time, as re-executed instructions may not need to be fetched from program memory.

See Figure 2-5

Table 2-3 Jumper Description - J3

No jumper



Figure 2-5 J3 Cache Disable

Jumper Number/Name	Function
J4-Watchdog Timeout Function	This header provides a means of monitoring the software integrity on the VME Sync board. The 68020 must refresh the watchdog timer on a regular basis; if it does not, a timeout will occur and the SYSFAIL LED will go on. When jumpered, it either causes the 68020 to halt or cause a full reset of the VME Sync board. No jumper indicates that a timeout has no effect on the VME Sync hardware. The board will then attempt to continue operation.

See Figure 2-6

Table 2-4 Jumper Description - J4

No jumper



Figure 2-6 J4 - Watchdog Timeout Function

Jumper Number/Name	Function
J5, J6—EPROM Bank 1 Device Selection	These two jumper blocks (J5 and J6) indicate the size and type of PROM or RAM devices installed at the bank 1 location. The Silicon Graphics configuration has a 32K x 8 EPROM.

See Figure 2-7

Table 2-5 Jumper Descriptions - J5, J6

J5—jumper A1/A2, B1/B2, C1/C2
 J6—jumper B2/C2

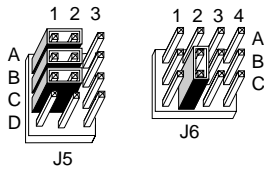


Figure 2-7 J5, J6 - EPROM Bank 1

Jumper Number/Name	Function
J7—EPROM Bank 0 Device Selection	This jumper block indicates the size and device type of the EPROM installed at bank 0. The Silicon Graphics board version has a 64K x 8 EPROM at this location.

See Figure 2-8

Table 2-6 Jumper Description - J7

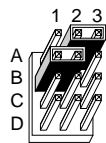


Figure 2-8 J7 - EPROM Bank 0

Jumper Number/Name	Function
J8-COM device Interrupt Priority Scheme	When not jumpered, it sets up a round-robin priority scheme to determine the order that the VBIC handles interrupt requests. The VBIC is paired with the VSAM to provide the VMEbus interface for the board
See Figure 2-9	

Table 2-7 Jumper Description - J8

No jumper



Figure 2-9 J8 - COM Device Interrupt

Jumper Number/Name	Function
J9-COM Port Interrupt Enable	This header sets the number of ports that can issue interrupt requests to the VBIC interrupt controller to either four (no jumper) or eight (with jumper). The VME Sync board is set for four ports.
See Figure 2-10	

Table 2-8 Jumper Description - J9

No jumper



Figure 2-10 J9-COM Port Interrupt

Jumper Number/Name	Function
J10, J11–Device Speed	These two headers set the maximum access speed and minimum write pulse. The VME Sync board is set for an access speed of 250 ns and a minimum write pulse of 150 ns.
See Figure 2-11	

Table 2-9 Jumper Descriptions - J10, J11

Jumper pins A

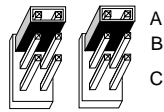


Figure 2-11 J10, J11 - Device Speed

Jumper Number/Name	Function
J12–Local Bus Timeout Disable	When jumpered, it enables a local bus timeout to avoid locking up the processor due to programming error or hardware failure.
See Figure 2-12	

Table 2-10 Jumper Description - J12

Jumper



Figure 2-12 J12 - Local Bus Timeout Disable

Jumper Number/Name	Function
J13-VMEbus System Controller	When not jumpered, it assumes that the VME Sync board will not be configured as the VMEbus system controller.
See Figure 2-13	

Table 2-11 Jumper Description - J13

No jumper



Figure 2-13 J13 - VMEbus System Controller

Jumper Number/Name	Function
J14 through J17-Diag Port Configuration (not used)	Not applicable
J18 through J37	These jumper blocks do not exist on the board and are reserved for future use.

Table 2-12 Jumper Descriptions - J14 through J17, J18 through J37

Jumper Number/Name	Function
J38, J39-Transmit Clock Source	These jumper blocks set the transmit clock source for channel 3 from the receive clock for RS-232 operation.
See Figure 2-14	

Table 2-13 Jumper Descriptions - J38, J39



Figure 2-14 J38, J39 - Transmit Clock Source

Jumper Number/Name	Function
J40–SYNC Input to the 85C30	The 85C30 serial communications controller has one SYNC input for each channel. No jumper indicates that the SYNC input is not connected.

See Figure 2-15

Table 2-14 Jumper Description - J40

No jumper



Figure 2-15 J40 - SYNC Input

Jumper Number/Name	Function
J41, J42–Jumpering for X.21 Module	These headers enable the software to determine if an X.21 module is installed or not. No jumpers indicate that an X.21 module is <i>not installed</i> . However, jumpers must be installed at this location for X.21 operation.

See Figure 2-16

Table 2-15 Jumper Descriptions - J41, J42

No jumper



Figure 2-16 J41, J42 - Jumpering for X.21

Jumper Number/Name	Function
J43–SYNC Input to the 85C30	The 85C30 serial communications controller has one SYNC input for each channel. No jumper indicates that the SYNC input is not connected.
See Figure 2-17	

Table 2-16 Jumper Description - J43

No jumper



Figure 2-17 J43 - SYNC Input to the 85C30

Jumper Number/Name	Function
J44, J45–Transmit Clock Source	These jumper blocks set the transmit clock source for the channel 2 port on the board. These jumpers indicate that the port will receive the transmit clock on pins 12 and 15 of the 34-pin connector.
See Figure 2-18	

Table 2-17 Jumper Descriptions - J44, J45



J44 J45

Figure 2-18 J44, J45 - Transmit Clock Source

Jumper Number/Name	Function
J46, J47-Transmit Clock Source	These jumper blocks set the transmit clock source for the channel 1 port on the board. These jumpers indicate that the port will receive the transmit clock on pins 12 and 15 of the 34-pin connector.
See Figure 2-19	

Table 2-18 Jumper Descriptions - J46, J47

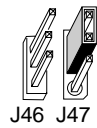


Figure 2-19 J46, J47 - Transmit Clock Source

Jumper Number/Name	Function
J48-SYNC Input to the 85C30	The 85C30 serial communications controller has one SYNC input for each channel. No jumper indicates that the SYNC input is not connected.
See Figure 2-20	

Table 2-19 Jumper Description - J48

No jumper



Figure 2-20 J48-SYNC Input to the 85C30

Jumper Number/Name	Function
J49, J50–Jumpering for X.21 Module	These headers enable the software to determine if an X.21 module is installed or not. No jumpers indicate that an X.21 module is <i>not installed</i> . However, jumpers must be installed at this location for X.21 operation.

See Figure 2-21

Table 2-20 Jumper Descriptions - J49, J50

No jumper



Figure 2-21 J49, J50–Jumpering for X.21 Module

Jumper Number/Name	Function
J51–SYNC Input to the 85C30	The 85C30 serial communications controller has one SYNC input for each channel. No jumper indicates that the SYNC input is not connected.

See Figure 2-22

Table 2-21 Jumper Description - J51

No jumper



Figure 2-22 J51–SYNC Input to the 85C30

Jumper Number/Name	Function
J52, J53–Transmit Clock Source	These jumper blocks set the transmit clock source for channel 0 from the receive clock for R2-232 operation.
See Figure 2-23	

Table 2-22 Jumper Descriptions - J52, J53



Figure 2-23 J52, J53–Transmit Clock Source

Jumper Number/Name	Function
J54 through J57–Frame Ground Options	These headers enables frame ground connection. No jumper indicates that frame ground is not connected.
See Figure 2-24	

Table 2-23 Jumper Descriptions - J54 through J57

No jumper



Figure 2-24 J54 through J57–Frame Ground Options

2.2.2 DIP Switch

The VME Sync board has a DIP switch bank that is located near the top of the board in back of the front panel status display. See Figure 2-2. For proper operation, the DIP switches should be set according to Figure 2-25 (with switches 1, 2 and 5 in the open position and switches 3, 4, and 6 in the closed position).

Note: DIP switches 7 and 8 indicate the board address number. Table 2-27 describes the available settings.

Caution: If the system has multiple VME Sync boards, ensure that they each have a different board address number.

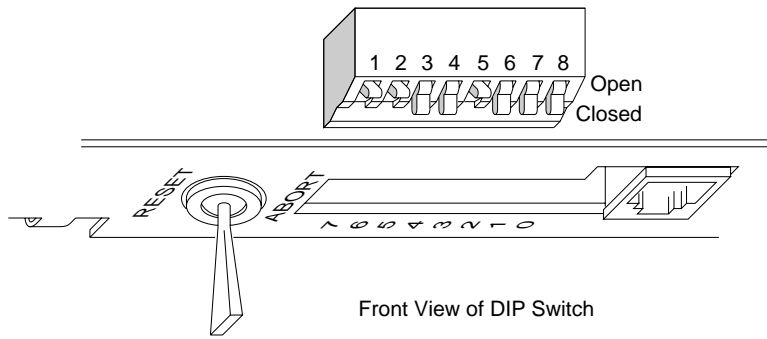


Figure 2-25 VME Sync Board DIP Switch

Position of Switches 7 and 8	Corresponding Board Number
(7) Closed, (8) closed—default setting	0 (first VME Sync board)

See Figure 2-26

Table 2-24 Settings for Board Address Number 0

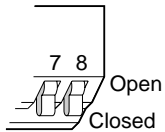


Figure 2-26 Setting 0 (First VME Sync Board)

Position of Switches 7 and 8	Corresponding Board Number
(7) Closed, (8) open	1 (second VME Sync board)

See Figure 2-27

Table 2-25 Settings for Board Address Number 1

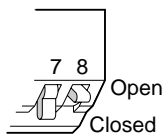


Figure 2-27 Setting 1 (Second VME Sync Board)

Position of Switches 7 and 8	Corresponding Board Number
(7) Open, (8) closed	2 (third VME Sync board)
See Figure 2-28	

Table 2-26 Settings for Board Address Number 2

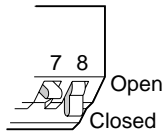


Figure 2-28 Setting 2 (Third VME Sync Board)

Position of Switches 7 and 8	Corresponding Board Number
(7) Open, (8) open	3 (fourth VME Sync board)
See Figure 2-29	

Table 2-27 Settings for Board Address Number 3

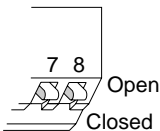


Figure 2-29 Setting 3 (Fourth VME Sync Board)

2.3 Installing the Line Interface Modules (LIMs)

The VME Sync board comes standard with RS-232 PROMs installed in all four channels. See Figure 2-30. If this is the desired configuration, go to Section 2.4, “Installing the VME Sync Board,” to continue installation.

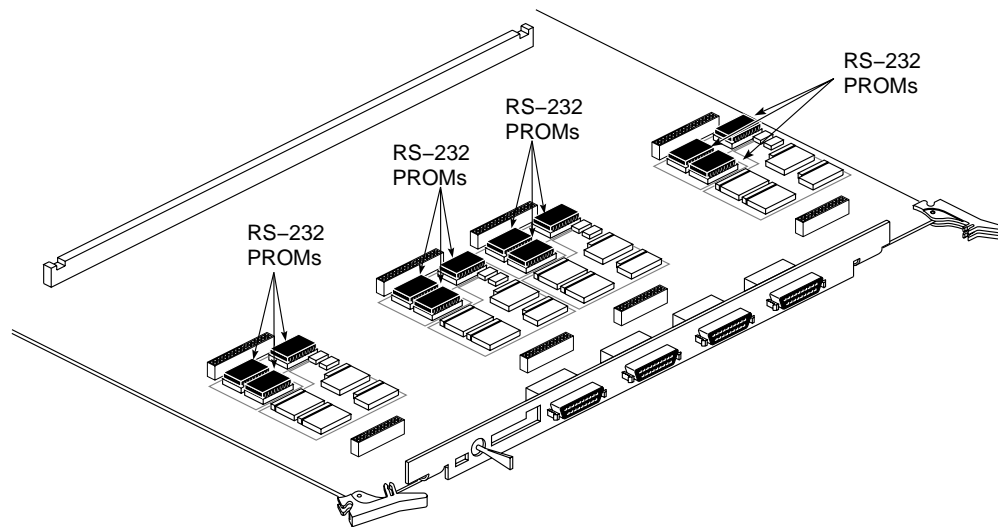


Figure 2-30 VME Sync Board with RS-232 PROMs Installed (Default Configuration)

If you need to change the ports to either X.21 or V.35 daughter boards, remove the RS-232 PROM and install the LIMs as follows.

Caution: Remember, you cannot intermix different interface types on the same board. For example, you cannot have both RS-232 and X.21 LIMs on the same board. In addition, be sure the X.21 or V.35 daughter boards are jumpered according to Figure 2-31 and Figure 2-32.

1. Place the VME Sync board and LIM on an antistatic surface.
2. Use a chip puller to remove the RS-232 PROMs (see Figure 2-30).

Note: Discard the PROMs when you are finished.
3. If you are installing a V.35 LIM, remove the jumpers from jumper blocks 39, 44, 47, and 52. See Figure 2-2 for the location of these jumpers.
4. If you are installing an X.21 LIM, remove the jumpers from jumper blocks 39, 44, 47, and 52, and then install them on jumper blocks 41, 42, 49, and 50. See Figure 2-2 for the location of these jumpers.
5. Install the required LIMs component side down in the VME Sync board. See Figure 2-33.

Caution: Be sure to install the LIM in the proper orientation. The VME Sync board and LIM can be damaged if not properly installed.

The VME Sync board is now ready to be installed into the chassis.

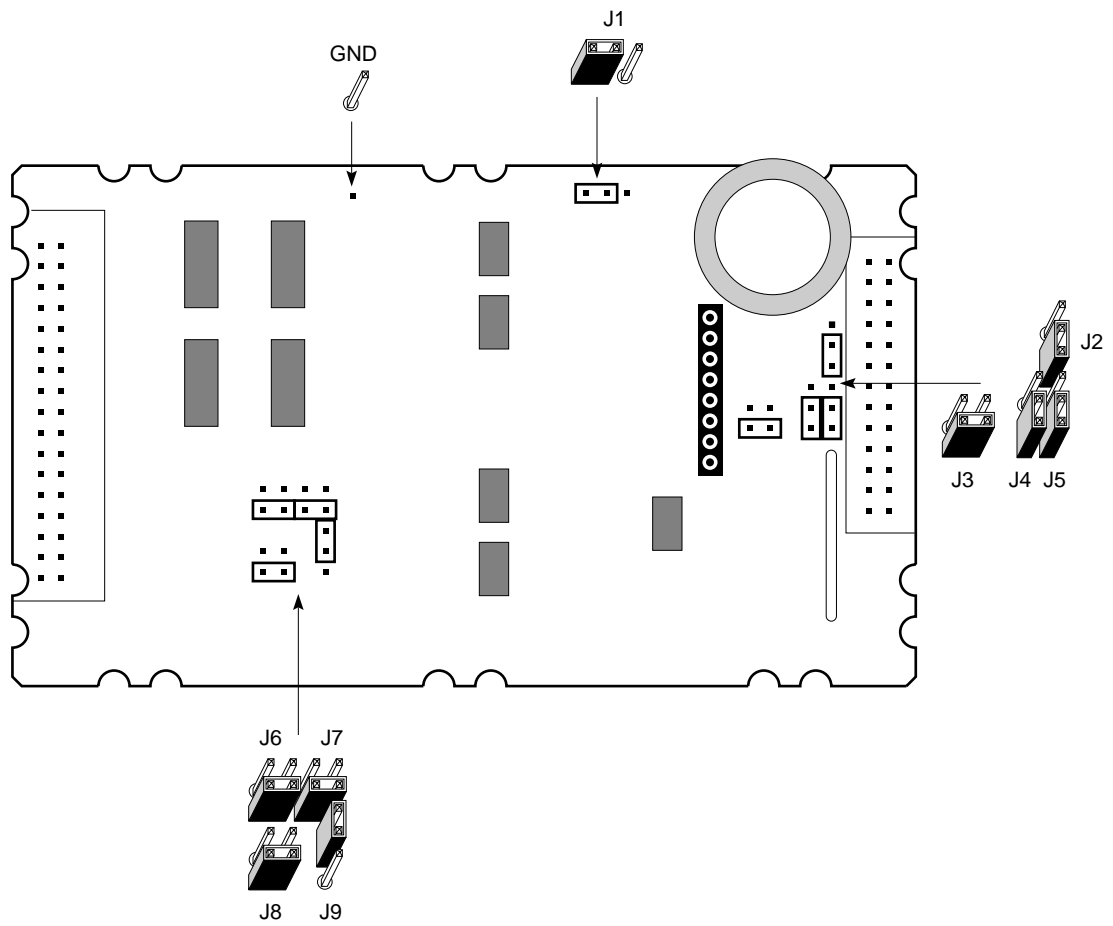


Figure 2-31 X.21 Default Jumpering (DTE)

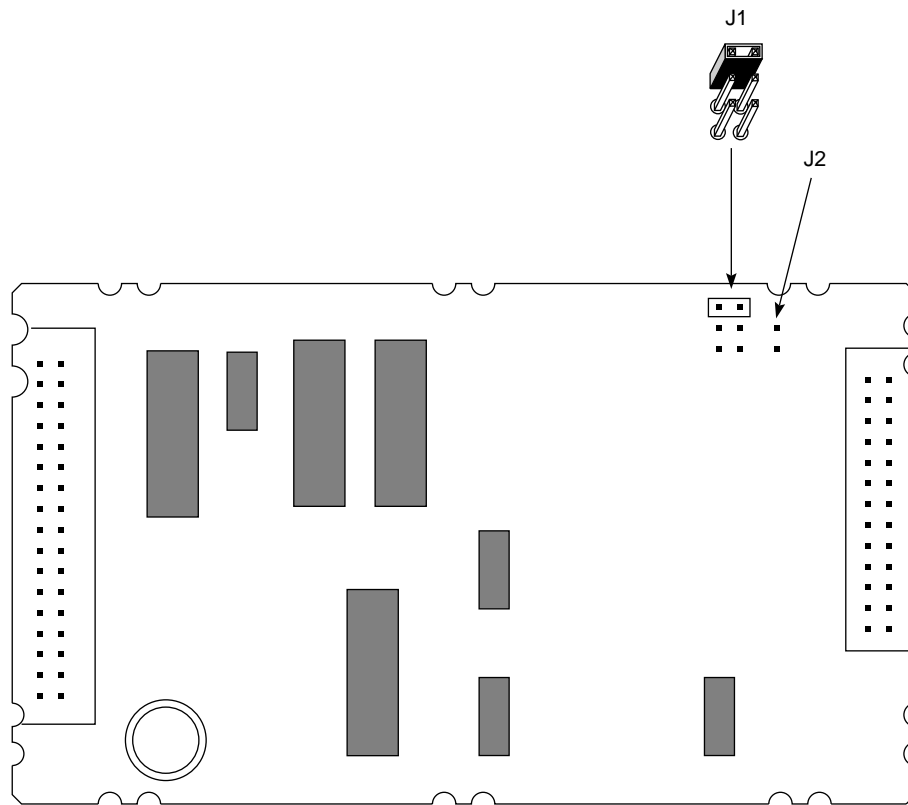


Figure 2-32 V.35 Default Jumpering (DTE)

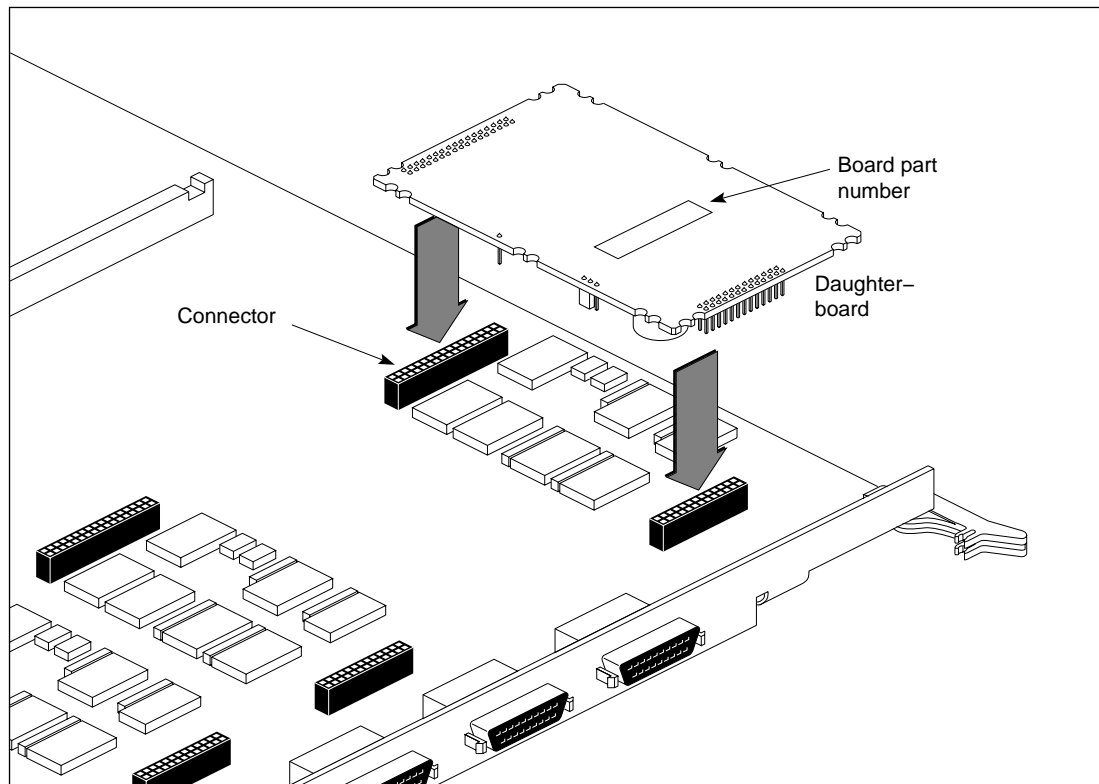


Figure 2-33 Installing an X.21 or V.35 Daughter board

Note: The X.21 and V.35 daughter boards or line interface modules (LIMs) are physically similar. The only way to differentiate between the two boards is by the part number. See Figure 2-33 for the location of the number. The X.21 daughter board part number is 25190 and the V.35 daughter board part number is 25188.

2.4 Installing the VME Sync Board

See Figure 2-34 and follow these instructions to install the VME Sync board into a CHALLENGE L (deskside) and XL (rackmount) system.

Caution: The components are extremely sensitive to ESD (electrostatic discharge). Use proper antistatic procedures while handling all components.

1. Prior to your arrival, have the customer back the system up. Afterwards, power off the system using a command such as the following:

```
shutdown -y -g0
```

2. Remove all cables from the I/O door, then open up the door.
3. Select the appropriate board number address for the VME Sync board, using the on-board DIP switches. See Table 2-27 in Section 2.2.2, "DIP Switch," for more information.

Caution: If you are installing more than one VME Sync board, ensure that each board is assigned a different board number address. See Table 2-27.

Note: If you are installing only one board, the VME Sync board should already be correctly configured as board number 0. Depending on the number of available VME slots, a system can support up to four VME Sync boards.

4. Pick an available VME board slot (refer to Table 2-28). When installing VME boards, use the leftmost available slot first and continue installing boards to the right without skipping any slots. This sequence is required since the backplane loops the signals from the left slot to the next slot to the right. Any skipped or open slot interrupts the signal flow to subsequent slots.

Caution: Even if you are using a VME slot located farthest to left, it is a good idea to check the backplane for possible jumpers from a previous installation. If backplane jumpers for this slot are installed, remove them.

Note: If you need to skip a VME slot, remember to install backplane jumpers in the appropriate location. See Section 2.5, “Jumpering a Skipped VME Slot,” for more details.

System Chassis	VME Slot Positions
CHALLENGE L (deskside)	7, 8, 9, 10, and 11
CHALLENGE XL (rackmount)	Cardcage 1 (N/A) Cardcage 2 (17 through 21) Cardcage 3 (All VME-1 through 21)

Table 2-28 VME Slot Positions for CHALLENGE Systems

5. Install the board into the VME slot. You should hear and feel the board snap into the board ejectors and backplane connectors. The board is now seated in the backplane.
6. Resecure the board lock bars across the top and bottom of the boards in the cardcage as applicable.
7. Next, remove a spare I/O plate from the I/O panel for each channel on the board (up to four per board).

Caution: If you have a CHALLENGE L (deskside) system, *do not* select an I/O plate that is directly in front of the VME Sync or CPU board. Use a blank I/O plate that is either to the right or left of the VME Sync or CPU board. The VME Sync board connectors on the I/O plate are particularly tall and wide and could butt against the connector shells on the VME Sync or CPU board. This would also prevent the I/O door from fully closing.

8. Reattach any I/O cables that have been removed.
9. With the I/O door still open, power on the system and watch the LEDs on the front panel of the VCOM board(s).
 - All eight LEDs should flash simultaneously on power-on.
 - As the VME Sync board cycles through the internal power-on tests, the board LEDs should turn off one-by-one, until only one LED (0, the bottom one) remains

flashing. LED 0 provides the *heartbeat* for the VME Sync and should continue to pulse on and off to indicate normal board operation.

10. Close the I/O door. See Caution in step 7, if there are any door closing problems.

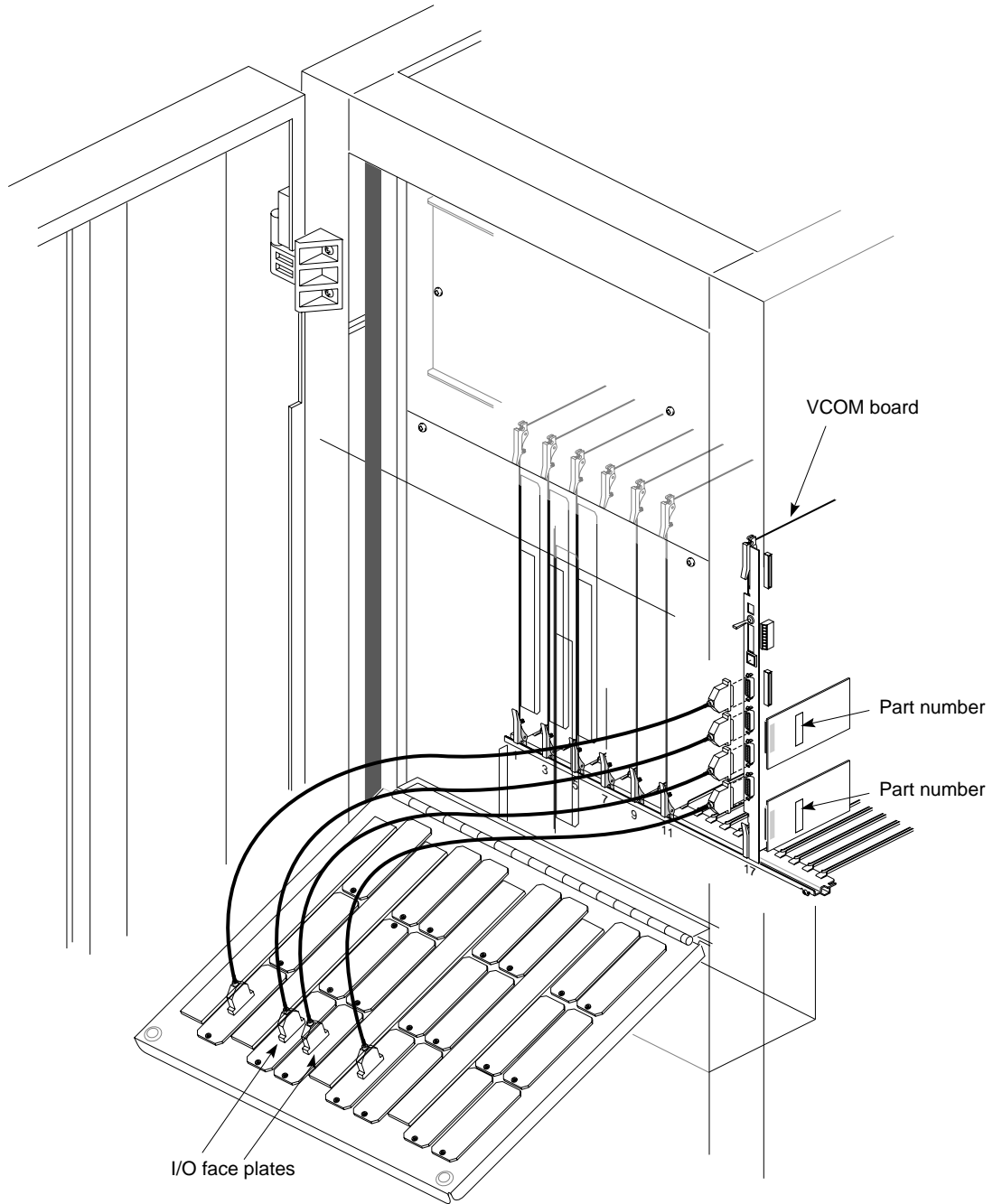


Figure 2-34 Installing the Board

2.5 Jumpering a Skipped VME Slot

VME boards should be installed left to right, starting with the first available slot on the left. However, skipping a slot is occasionally required to fit oversized VME boards or improve air flow. A slot can be skipped if jumper blocks are placed on the appropriate VME jumper block pins (or headers) located on the rear of the backplane (see Figure 2-35).

Note: If you install the VME boards in order (from left to right) without skipping, starting with the VME slot farthest to the left, then no jumpering is required.

The general guideline is to insert jumpers into the jumper banks corresponding to the VME slot number that you are skipping. For example, if you are skipping the first VME slot, you need to insert jumpers into jumper bank 1. See the following additional examples:

- If you are skipping the first VME slot (for example, slot 7 in a CHALLENGE L system) to use the next VME slot, you must place five jumpers in the jumper bank, designated as slot 1 (see Figure 2-35).
- If you are skipping the first two VME slots and wish to use the third VME slot, you must place jumpers in jumper banks 1 and 2.
- If you wish to skip over VME slots, for example, from the first VME slot to the third VME slot, you must place jumpers in bank 2.

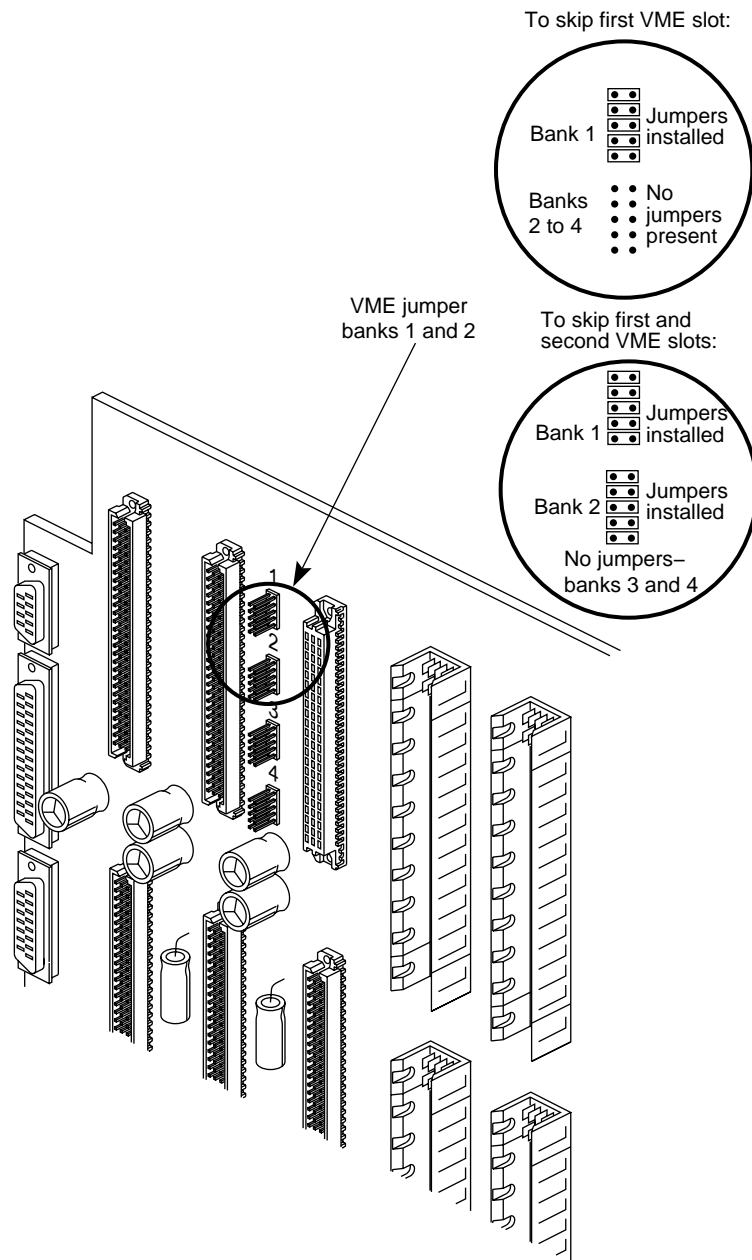


Figure 2-35 Installing VME Jumper Blocks on Rackmount (XL) Backplane (Example Only)

2.6 Installing and Reconfiguring the VME Sync Board Software

Follow these instructions to install and reconfigure the VME Synchron board software:

Note: The VME Sync board requires IRIX version 5.2 for proper support.

1. Power-on the system, open up a shell, and become superuser.
2. Insert the VME Sync CD-ROM and use *inst* to install the software. For example,

```
inst -f /CDROM/dist/vsc
```

3. Rebuild the kernel by entering the following command at the shell prompt as superuser:

```
autoconfig -v
```

This command announces the presence or absence of all optional boards in the system as follows:

```
exprobe spaced vc adapter n
vc, adapter n exprobe space
```

The variable *n* indicates the VMEbus or adapter number.

4. Reboot and reconfigure the system.

2.7 Verifying Hardware Installation

After powering on the system and receiving the system shell prompt, type *hinv*. You should get a display similar to the following:

```
VME Synchronous Communications board 0
VME bus: adapter 0
```

The *hinv* command does not recognize the VME Sync board(s) until the driver from the VME Sync software has been installed and configured into the kernel.

Chapter 3

Configuring Software for the VME Sync Board

This chapter provides information for configuring the software for the VME^{*} Sync board. Included are procedures that configure the board for the first time and reconfigure the board to change the current setup. Additionally, this chapter describes how to create a system script that configures and starts the board automatically on subsequent system boots.

This chapter contains these sections:

- “Initially Configuring the VME Sync Board.”
- “Reconfiguring the VME Sync Board.”
- “Configuring the VME Sync Board for an Automatic System Boot.”

3.1 Initially Configuring the VME Sync Board

This section provides a procedure for initially configuring the VME Sync board. It describes downloading files to the board that allow the board to communicate with the host system. Additionally, it describes configuring the board to run the SX.25 and SNA gateway applications.

3.1.1 Overview of the Configuration Procedure

Following are the major tasks for configuring software so the VME board can communicate with the host system and ultimately run a synchronous protocol such as X.25 or SNA.

1. Check your system’s hardware and software.
2. Install the VME Sync board software on your system.
3. Create the ASCII configuration files.
4. Create binary images of the configuration files.
5. Reset the board.
6. Download the microcode image file.

* Throughout this guide, references to “the VME Sync board” mean “the VME Sync board.”

7. Download the configuration files.
8. Prepare the networking protocol software to use the VME Sync board.

3.1.2 Preparing to Configure the VME Sync Board

The first step in configuring the VME Sync board is to ensure that your system has the correct hardware and software installed:

- The VME Sync board has been installed in the system and the jumpers and other hardware on the board have been configured correctly. Follow the procedure in the *VME Sync Board Installation Instructions*.
- The IRIX 5.2 (or later) operating system software is running on your system. For installation instructions, refer to the *IRIS® Software Installation Guide*, which came with your system.
- To use the VME Sync board for X.25 communications, the SX.25 software is installed on your system. For installation instructions, refer to the *SX.25 Administrator's Guide*.
- To use the VME Sync board for SNA communications, check that the IRIS SNA SERVER software is installed on your system. For installation instructions, refer to the *IRIS® Software Installation Guide* and the *IRIS SNA SERVER Release Notes*.

3.1.3 Installing the VME Sync Board Software

Follow this procedure to install the VME Sync board software from the distribution media onto your system:

1. Power-on your system, open up a shell, and become superuser.
2. Insert the VME Sync board CD-ROM and use *inst* to install the software. For example,

```
inst -f /CDROM/dist
```

3. Rebuild the kernel by entering the following command at the shell prompt as superuser:

```
autoconfig -v
```

This command announces the presence or absence of all optional boards in the system as follows:

```
exprobe spaced vc adapter n  
vc, adapter n exprobe space
```

Note: The variable *n* indicates the bus or board number. If there are four VME Sync boards installed in the system, there should be four different adapter numbers.

4. Reboot the system and continue by creating the configuration files.

All VME Sync board software utilities are installed in the directory */opt/vcom/bin*.

3.1.4 Creating the Configuration Files

You need an ASCII configuration file for each channel (or port) that is to be active on the VME Sync board.

Sample configuration files are located in the directory `/opt/vcom/etc` and are named `wan_sample.*`. You can rename and copy these files into `/var/opt/vcom/cfg` or create your own files within `/var/opt/vcom/cfg` by using a system editor and using the naming conventions and content recommendations as follows.

3.1.4.1 Naming Conventions

Each configuration file must be named using the format `/var/opt/vcom/cfg/xcf_input.<BoardnumChannel>`.

The naming conventions for the configuration files are:

- Each file must reside in the directory `/var/opt/vcom/cfg`.
- Each file must use the same basename (that is, `xcf_input`).
- The file extension is determined by the channel location on the board and comprises the board number (0-3) and channel letter (A-D). The channel letter must be uppercase.

For example, the filename for the second port on the third board is named `/var/opt/vcom/cfg/xcf_input.2B`.

3.1.4.2 File Contents

The ASCII configuration files `xcf_input.*` contain parameters and values in the format `PARAMETER=VALUE`. Each file must contain these parameters and values:

```
MAXFRAME=1024
BAUD=0
PHY_IF=DTE
SDLC_ENC=NRZ
```

These parameters and their values define the behavior of the port. The parameters and their values are case insensitive. Their meaning and permissible values are:

- `MAXFRAME=1024`—Defines the maximum length of the frame. Permissible values are from 134-4104. The default value is 262.
- `BAUD=0`—Defines the baud rate of the channel. This value should be set to 0. Setting this value to 0 causes the board to use the external clock on the modem to set this value. (This is the recommended setting. It should be changed by Silicon Graphics SSEs only.)

- *PHY_IF=DTE*—Defines the channel as a DTE. (This is the recommended setting. It should be changed by Silicon Graphics SSEs only.)
- *SDLC_ENC=NRZ*—Defines the channel as NRZ (non-return to zero). (This is the default setting.) The other permissible value is NRZI (non-return to zero inverted).

After you have made a configuration file for each port on each board that is to be used, continue by running the *xcf(1M)* preprocessor on these files, as described in the next section.

3.1.5 Creating the Binary Image Files

The *xcf(1M)* utility processes the configuration information in the *xcf_input.** ASCII configuration file and transforms the text into a binary image. Later, this image is downloaded to the VME Sync board using the *vcom_cfg(1M)* utility, as described in the section “Downloading the Configuration Files to the Board.”

The location of *xcf* is */opt/vcom/bin/xcf*. The syntax of the *xcf* command is

```
xcf [-bBoardnum ] [ -cChannel ]
```

where:

- b*Boardnum* Specifies the board number to be configured. The range of board numbers is 0-3. If this option is not specified, all boards will be configured.
- c*Channel* Specifies the channel in the range A-D to be configured. If this option is not specified, all channels will be configured.

The input configuration filename is */var/opt/vcom/cfg/xcf_input.<BoardnumChannel>* where *Boardnum* is the board number (0-3) and *Channel* is the channel (A-D). For details about creating these files, refer to “Creating the Configuration Files.”

With no arguments, *xcf* generates 16 binary configuration files: one for each of four boards times the four channels, using the default values.

Note: These 16 files are created regardless of the number of boards that are present in the system or the number of existing configuration files.

The *xcf* command creates output binary image files in the directory */var/opt/vcom/etc*. The output filename uses the same suffix as the input filename, and the *wancfg* basename is used instead of *xcf_input*. The format of the output filenames is

```
wancfg.<BoardnumChannel>
```

Caution: The files */var/opt/vcom/etc/XNET* and */var/opt/vcom/etc/XNET.lck* are also created by *xcf* and are used by the VME Sync board software utilities to retrieve information about the board configuration. Do not modify or remove either of these files.

3.1.6 Resetting the Board

Reset the board using the `vcom_rst(1M)` command. The location of the `vcom_rst` command is the directory `/opt/vcom/bin`. The syntax of the command is

```
vcom_rst Boardnum
```

where *Boardnum* specifies the board you want to reset.

Continue by downloading the board microcode image, as described in the section “Downloading the Microcode Image File to the Board.”

3.1.7 Downloading the Microcode Image File to the Board

Before the board can run, it must have its processing code downloaded from the Silicon Graphics host system. The `vcom_vld(1M)` command downloads this image file, which, by default, is contained in the file `/opt/vcom/mcode/wan.lod`. The syntax of the `vcom_vld` command is

```
vcom_vld [ -a ] [ -c ] [ mcode_file [ Boardnum ... ] ]
```

where:

- a downloads the microcode image file to all boards
- c configures the board by automatically executing `vcom_cfg(1M)`

Hint: Using the `-c` option allows you to skip the procedure in the next section, “Downloading the Configuration Files to the Board.”

mcode_file the microcode image file, by default, `/opt/vcom/mcode/wan.lod`

Boardnum ... one or more board numbers to be downloaded. This option must be used if the `-a` option is omitted

3.1.7.1 Some `vcom_vld` Command Examples

Following are examples of the `vcom_vld` command.

Example 1

To load all boards in the system, type

```
vcom_vld -a
```

Note: Be sure to continue to the next section, “Downloading the Configuration Files to the Board,” if you did not use the `-c` option.

Example 2

To load and configure all boards in the system, type

```
vcom_vld -a -c
```

3.1.8 Downloading the Configuration Files to the Board

The board and channel configuration information is contained in binary image files (*wancfg.**) that were created with *xcf*. (Refer to “Creating the Binary Image Files,” for more information.) These files can be downloaded in one of two ways:

- Using the *-c* option to the *vcom_vld(1M)* command (refer to “Downloading the Microcode Image File to the Board,” for more information).
- Using the *vcom_cfg(1M)* command, as described in this section.

The *vcom_cfg* utility must be run before any synchronous communication can occur, or to reconfigure ports at any time. The location of *vcom_cfg* is in the directory */opt/vcom/bin*. The syntax of the *vcom_cfg* command is

```
vcom_cfg [ -a ]
```

or

```
vcom_cfg [Boardnum[Channel]]
```

where:

-a	loads all ports on all boards
Boardnum	loads one or a range of specified boards (0-3)
Channel	loads one or a range of specified ports (A-D)

3.1.8.1 Some *vcom_cfg* Command Examples

The following shows some examples of the *vcom_cfg* command.

Example 1

To load all ports on all boards in the system, type

```
vcom_cfg -a
```

Example 2

To load board 1, ports A-C, type

```
vcom_cfg 1 A B C
```

3.1.9 Preparing for the Networking Protocol Software

Once the board software has been configured and downloaded, as described in the preceding sections, a protocol such as X.25 or SNA can be configured to run on the VME Sync board.

The VME Sync board can be used in an X.25 network using the optional SX.25 product. The procedure for configuring X.25 to run on the VME Sync board is fully described in the *SX.25 Administrator's Guide*.

For SNA networking, the VME Sync board runs the optional IRIS SNA SERVER software. The procedure for configuring the IRIS SNA SERVER software to run on the VME Sync board is fully described in the *IRIS SNA SERVER Administration Guide*.

3.2 Reconfiguring the VME Sync Board

Occasionally, you may find it necessary to change a board configuration. This could happen, for example, if you wanted to change a parameter within one of the ASCII configuration files or if you decided to change the number of channels you use on a board.

Reconfiguring a board is similar to configuring a board. The following steps outline the procedure. Reference the associated sections if you need a detailed explanation of the step.

1. Become superuser (*root*).
 2. Bring down any application (such as SX.25 or SNA) that may be running on the board. Refer to the application's documentation for this procedure.
 3. Terminate the *snetd*(1M) daemon process. From the shell prompt type
killall snetd
 4. Modify the ASCII board configuration files as described in "Creating the Configuration Files," if necessary.
- Note:** This step is optional.
5. Create binary images of the configuration files by running the *xcf*(1M) preprocessor on the configuration files as described in "Creating the Binary Image Files."
 6. Reset the board with the *vcom_rst*(1M) utility as described in "Resetting the Board."
 7. Run the *vcom_vld*(1M) utility to download the microcode image to the board's processor as described in "Downloading the Microcode Image File to the Board."

Hint: You can use the *-c* configuration option to the *vcom_vld* command and skip the next step.

8. Run the *vcom_cfg*(1M) utility to download the configuration files to the board, as described in "Downloading the Configuration Files to the Board."
9. Start the *snetd*(1M) daemon. From the shell prompt type
snetd
10. Bring up the optional network protocol application such as the SX.25 or IRIS SNA SERVER as described in "Preparing for the Networking Protocol Software."

3.3 Configuring the VME Sync Board for an Automatic System Boot

A system startup file automatically downloads and configures board software each time the system is rebooted. It assumes the binary configuration files are current and complete, as described in “Creating the Configuration Files.”

Note: The script contains commands described in the sections “Resetting the Board,” and “Downloading the Microcode Image File to the Board.” Be sure to refer to these sections for the complete command syntax and descriptions.

The script file is named `/etc/rc2.d/S29vsc` for VME machines and `/etc/rc2.d/S29isc` for Indigo 2 or CHALLENGE M.

Following is the contents of an example script:

```
/opt/vcom/bin/vcom_rst -b 1-4  
/opt/vcom/bin/vcom_vld -a -c
```

These commands reset and load the microcode and channel configurations to all boards.

Be sure to use your current configuration parameters in place of the example values listed above.

Appendix A

Software Messages and Error Recovery

This appendix lists the messages produced by the VME Sync board and suggests user responses. The messages are organized into sections according to message type.

- VME Sync board utility error messages
- VME Sync board driver messages

A.1 VME Sync Board Utility Error Messages

Following are error messages produced by the VME Sync board software utilities.

A.1.1 *xcf* Error Messages

```
ABORT: illegal adapter number <boardnum>.
ABORT: illegal channel ID <channel>
WARNING: input file foo not found - using defaults
WARNING: Bits foo and bar both set - ignored
WARNING: invalid keyword = FOO
FOO: value out of range, must be between [x, y].
```

Generally, out of range values and illegal combinations cause the utility to set the parameter to the default value and a warning message to be printed to stderr.

A.1.2 *vcom_stat* Status Messages

```
Original kernel initialization
Restarted
Board is downloaded and configured
```

A.2 VME Sync Board Driver Messages

This section lists the error messages that are produced by the VME Sync board software drivers. In these messages, “%d” is a decimal number and “%x” or “0x%x” is a hexadecimal number.

Following are messages that may be corrected by re-executing the start-up procedure. If that does not clear the error condition, report the message to SGI Customer Support.

```
VSC #d, unconfigured but downloaded board
VSC: board #d is not on line
VSC: attempt to open board #d before downloading
VSC: do not use the cloneopen mechanism
```

Following are status messages that require no action.

```
PNB_ALLOC ( free=0x%x, amount=%d)
PNB_ALLOCB ( free=0x%x, bufsize=%d, pri=0x%x)
PNB_BCREL (free=0x%x)
PNB_BUFCALL ( free=0x%x bufsize=%d pri=0x%x func=0x%x arg=0x%x)
PNB_FREE ( free=0x%x mp=0x%x)
PNB_FREEB ( free=0x%x mp=0x%x)
PNB_FREEMSG ( free=0x%x, mp=0x%x)
PNB_INIT: vc_barray at 0x%x, bcfree at 0x%x
vc_open: q 0x%x devp 0x%x dev 0x%x flags 0x%x sflags 0x%x
vc: open emajor=%d, imajor=%d
vc: opened proto=DLD_PROTO, brd=%d.
vc: successful open, proto=%s_PROTO, brd=%d, sm=%d, *devp=0x%x.
vc: closed proto=DLD_PROTO, brd=%d.
vc: closed: brdno=%d, sm=%d, q=0x%x
vc: re-opened stream, %s_PROTO, brd=%d, sm=%d
vc: clone device=0x%x opening, q=0x%x:
vc_sendclose: allocate failed
vc_putdown: mbcopytosrv failed on 0x%x bytes
vc_promsg: M_ERROR rptr 0x%x
vc_close: q 0x%x flags 0x%x
```

Following are messages which should be reported to SGI Customer Support.

```
VSC #%d aborted, illegal board size = 0x%x
VSC #%d missing, mbx failure
VSC #%d missing, MGO failure
VSC #%d missing, mem window failure
VSC #%d aborted, not processing slave SHM queues
VSC #%d aborted, not processing host SHM queues
VCOM ABORT - kernel unable to allocate any message buffers
M_IOCTL: cmd 0x%x bp 0x%x mlen %d
vc_do_sysmap( brdno=%d ) failed,
setup_shmqs( brdno=%d ) failed,
chk_presence( brdno=%d ) failed,
get_vector() = 0 failed,
vme_ivec_set(vec=0x%x)=-1 failed,
vme_ivec_alloc()=-1 failed, brdno=%d,
pio_mapalloc() = 0 failed,
pio_badaddr() != 0 failed,
pio_mapalloc() = 0 failed,
pio_badaddr() != 0 failed,
setup_shmqs( brd=%d ) = 0x%x failing ***
map_short_pio( brd=%d ) = 0x%x failing ***
map_ram_pio( brd=%d ) = 0x%x failing ***
get_vector( brd=%d ) = 0x%x failing ***
board %d power-up tests timed out. ***
aborted, failed power-up tests, sts=0x%x ***
do_sysmap( brdno=%d ) = 0x%x failing ***
#%d aborted, not responding to sysmap ***
vc_edtinit( brdno=%d ) failing, retval = %d ***
```


Appendix B

VME Sync Board Specifications

Table B-1 lists the specifications for the VME Sync board.

Parameter	Specifications
Dimensions (height x width x depth)	15.7 in x 14.4 in. x .68 in. (400 mm x 367 mm x 15.7mm) ^a
Environmental	
Storage Temperature	-40 to 85 degrees C
Operating Temperature	0 to 70 degrees C (at board surface)
Relative Humidity	0 to 95% (noncondensing).
Power	+5V +/- 5% at 4.5A typical +/-12V +/-5% at 400 mA typical (without LIM modules)
Agency	
VMEbus	IEEE 1014-87 compliance
MTBF	Approximately 50,000 hours ^b

Table B-1 VME Sync Board Specifications

- a. This board complies with the VME specification for a 9U board
- b. Predictions are based on MIL-HDBK-217E part stress analysis method and assumes an ambient temperature of 55 degrees (C).

Caution: The board(s) should be brought to operating temperature in a noncondensing environment. The rate of change in the ambient air temperature should not exceed 2 degrees (C) per minute.

