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LeMans
VX8 Carrier Board
Installation Guide

Document Number 500-00328

Revision 2.03

April 2002

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Preface

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- EN50082-1 Electromagnetic Immunity

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Board products with the CE marking have been tested in a representative system to show compliance with the preceding requirements. A proper installation in a CE-marked system shall maintain the required EMC/safety performance.

Document Change History

Rev.	Date	Changes	Section
2.03	April 2002	Added support for Windows 2000	All

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1 Introduction

1.1. Purpose of This Manual

This manual provides the information you need to install and configure the VX8 Carrier Board and Support Software. It provides a brief description of the VX8 hardware and software, and it details the steps required to install the VX8 Carrier Board, C4x Support Software, and the VX8 Instrument Driver. You will also want to refer to the following two manuals when developing applications using the VX8 Carrier Board:

- *The VX8 Carrier Board Technical Reference Manual (TRM)*
- *The VX8 Carrier Board Programming Guide*

1.2. General Overview

The VX8 Carrier Board is part of Spectrum's series of VXIbus boards based upon Texas Instrument's TMS320C4x DSPs. The VX8 Carrier Board delivers high performance signal processing based on a modular DSP architecture that allows you to create powerful DSP-based systems for the VXI environment.

1.2.1. Hardware Overview

The VX8 Carrier Board is a VXIbus Master/Slave DSP board catered to high performance applications with large volumes of data throughput.

Base Configuration

The base configuration of the VX8 features:

- Two embedded 60 MHz TMS320C40 DSPs (for a base subsystem of 120 MFLOPs),
- 1 MB of SRAM per C40 (512 Kbytes per local and global buses),
- A VXIbus interface,
- Front panel connections for C4x Communication Ports,
- An asynchronous dual UART (RS-232),
- A JTAG front panel interface.

Optional Features

Optional features for the VX8 include:

- Upgrades to shared DRAM,
- Upgrades to embedded C40 local and global bus SRAM,
- The addition of TIM-40 modules,
- The addition of a high-throughput HP Local Bus interface.

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By populating the VX8 with up to six TIM-40 modules, you can increase the processing power to a maximum of 840 MFLOPS, providing high performance parallel computing for demanding applications. Adding the HP Local Bus provides efficient data transfer compatible with a wide range of Agilent Technologies VXI I/O modules.

The backbone of the VX8 is the Global Shared Bus which interconnects the VXI interface and the HP Local bus with the shared DRAM and the global SRAM of the embedded C40's or the TIM-40 modules. The VXI interface can access C40/TIM global SRAM and the shared DRAM. The HP Local Bus can only access the C40/TIM global SRAM. Other C40s/TIMs can access C40/TIM SRAM using the shared Global Bus but the recommended method is to make use of the dedicated point-to-point communication ports and use the shared global bus for data transfers on and off the VX8. *Figure 1* illustrates the configuration of a fully loaded VX8 Carrier Board. The un-shaded areas represent the VX8 Carrier Board's base configuration.

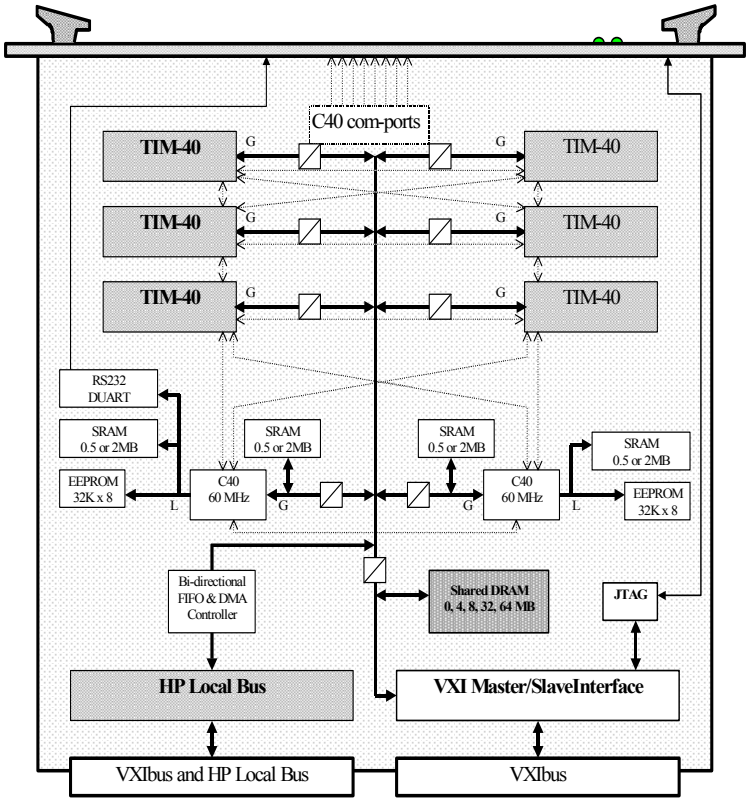


Figure 1 VX8 Carrier Board Configuration

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Front Panel The front panel of the VX8 has a variety of connectors and status LEDs as shown in the following illustration. Refer to the *VX8 Carrier Board Technical Reference Manual* for details.

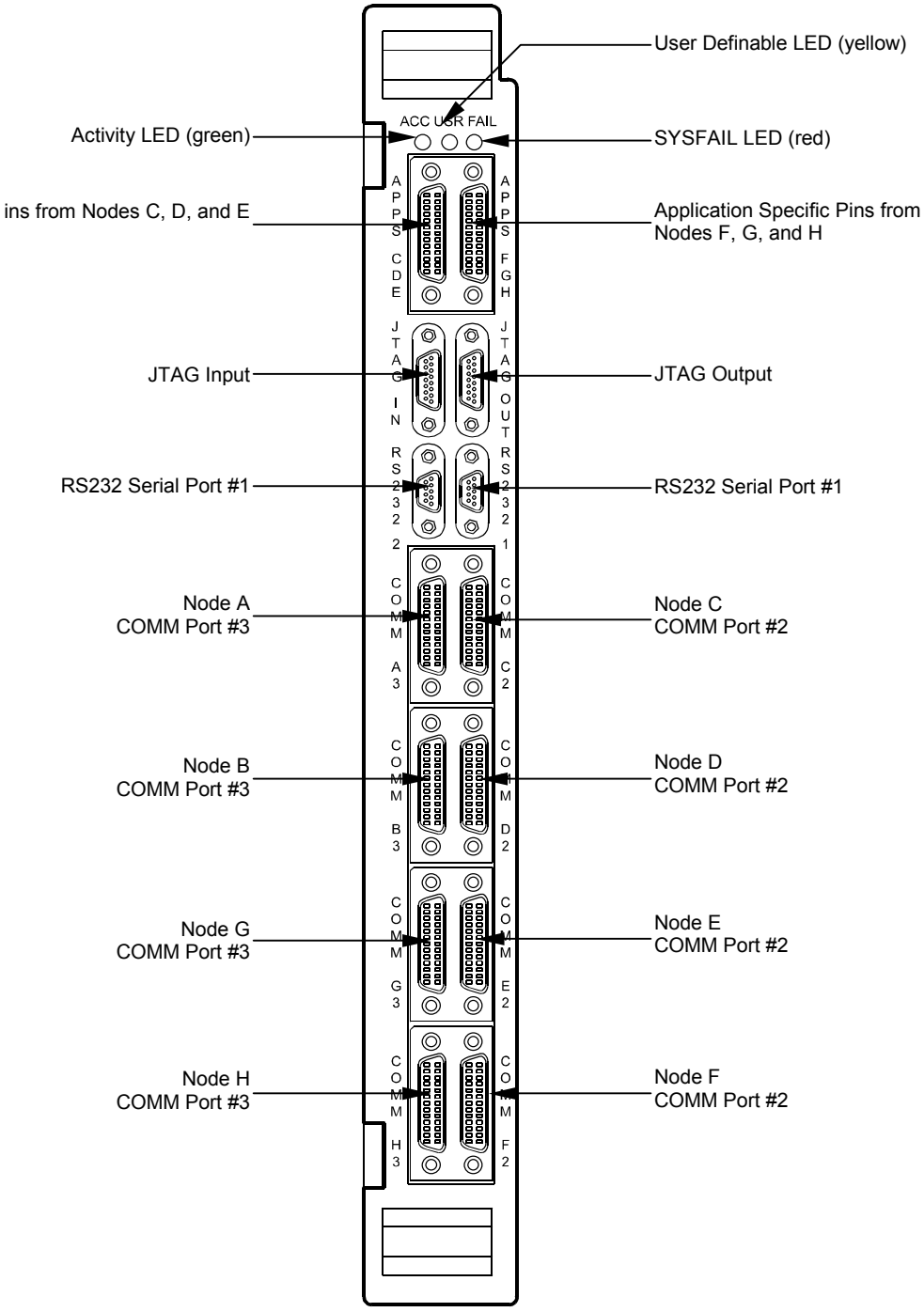


Figure 2 VX8 Front Panel

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1.2.2. Software Overview

The VX8 Support Software offers Standard Instrument Control Library (SICL) and Virtual Instrument Software Architecture (VISA) support. It provides the hardware initialization, hardware control, host communications, and the DSP library functions that you need to develop VXI system applications. The VX8 Support Software includes examples to help you in your development process.

The VX8 Support Software includes two libraries: the Host Library (VX8 Instrument Driver) and the C4x DSP Library (VX8 C4x Support Software Library.)

Host Library The Host Library provides an easy-to-use host interface to the VX8 board and its TIM-40 modules. The software allows you to manage individual boards as well as VX8 systems. It provides interfaces for system initialization, code download, control functionality, and data transfer between the host and VX8 Carrier Board.

C4x DSP Library The VX8 C4x Support Software Library provides C4x-callable functions that optimize data transfers and simplify the task of configuring and controlling the VX8. Supported functionality includes:

- VXIbus routines (SCV64 DMA configuration and direct VXI master transfers),
- Global Bus routines (accesses from a DSP to the Global Shared or DRAM Shared Bus)
- HP Local Bus routines (bus configuration and data transfer),
- Node B DUART initialization, data transfer, and interrupt routines,
- User defined LED control,
- Node A initialization Kernel routine (VXIbus A16 register access from the host and VX8 initialization after a board reset.)

PEROM programming utilities are also available. These enable you to embed your DSP application code in EEPROM so the DSP can execute it when you power up the board.

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2 Hardware Installation and Configuration

This chapter describes the following hardware installation and configuration procedures:

- TIM-40 module installation
- DRAM memory SIMM installation
- Jumper configuration
- A16 Logical Address configuration (DIP switch S1)
- VX8 Carrier Board installation into chassis (before you install the VX8 board into a VXI chassis, you'll want to configure or install the above items.)

Most of the configuration procedures mentioned above require the removal of the top shield covering the top of the VX8 printed circuit board (PCB). You can configure, however, DIP switch S1 without removing the top shield (see the section *Setting the VXIbus A16 Logical Address*.)

To install TIM-40 modules, DRAM, or configure the VX8 jumpers remove the top shield according to the steps in the procedure *Removing the Top Shield*.

To set the A16 Logical Address on DIP switch S1, see the procedure *Setting the VXIbus A16 Logical Address*.

If you are adding DRAM memory or TIM-40 modules to your VX8 after you have installed the VX8 into your VXI mainframe, you will have to first remove the VX8 from the mainframe. See the procedure *Removing the VX8 from a VXI Mainframe*.

Before you start

You will need the following tools:

- Phillips #1 screwdriver
- Grounding wrist strap
- Flat-tipped screwdriver
- Nut driver (for metric M3 size nuts)



Static electricity can damage your computer, VX8 Carrier Board, and other modules. When handling modules:

- Use a grounding wrist strap and follow the instructions provided with the strap.
- Do not wear clothing that is subject to static charge buildup, such as wool or synthetic material. Cotton is best for this type of work.
- Do not handle integrated circuits in carpeted areas.
- Do not remove any device from its anti-static bag until you are ready to install it.

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- Avoid touching circuit leads as much as possible. In particular, avoid touching the front panel connectors of the VX8 Carrier Board.

2.1. Removing the VX8 from a VXI Mainframe

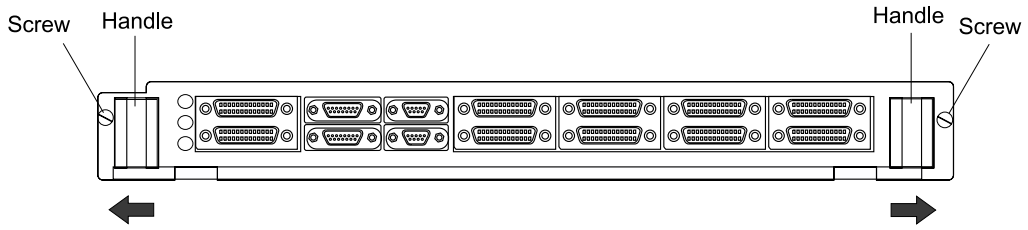
If you are adding DRAM memory or TIM-40 modules after you have installed the VX8 into your VXI mainframe, you will have to first remove the VX8 from the mainframe. To remove a VX8 from a VXI Mainframe:

1. Shut down the operating system as described in the documentation provided with your controller.

2. Turn off the power for the VXIbus mainframe.

3. With a flat-tipped screwdriver, remove the two screws at the corners of the VX8 front panel.

4. Apply outward pressure to the handles on the front panel to disconnect the VX8 from the back-plane connectors and, holding the handles, pull the board out of the mainframe. Place the board on a firm, static-free surface.



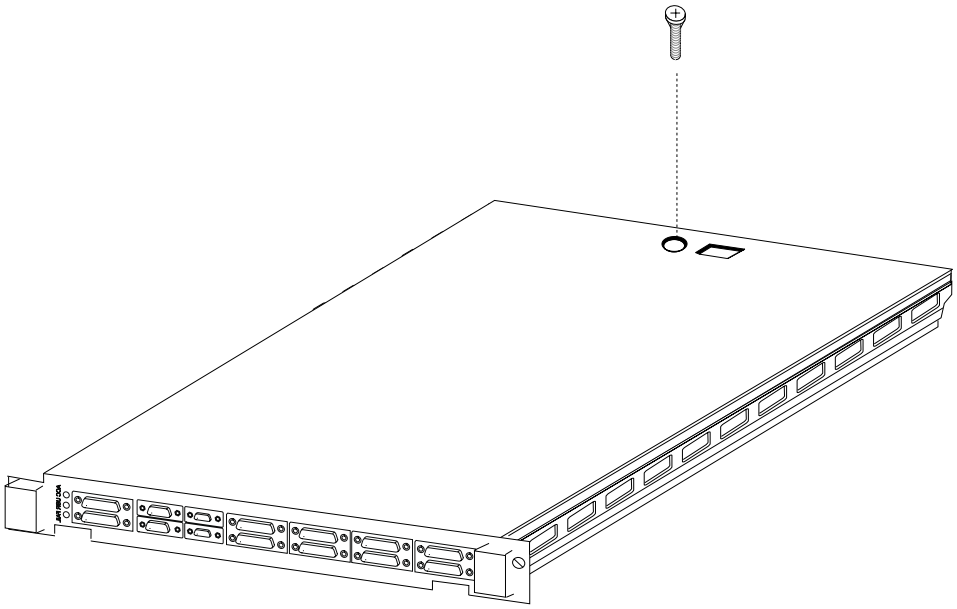
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2.2. Removing the Top Shield

> **Caution:** Do not remove the bottom shield of the VX8. There are no user configurable components on the bottom of the board.

To remove the top shield from the VX8, follow these steps:

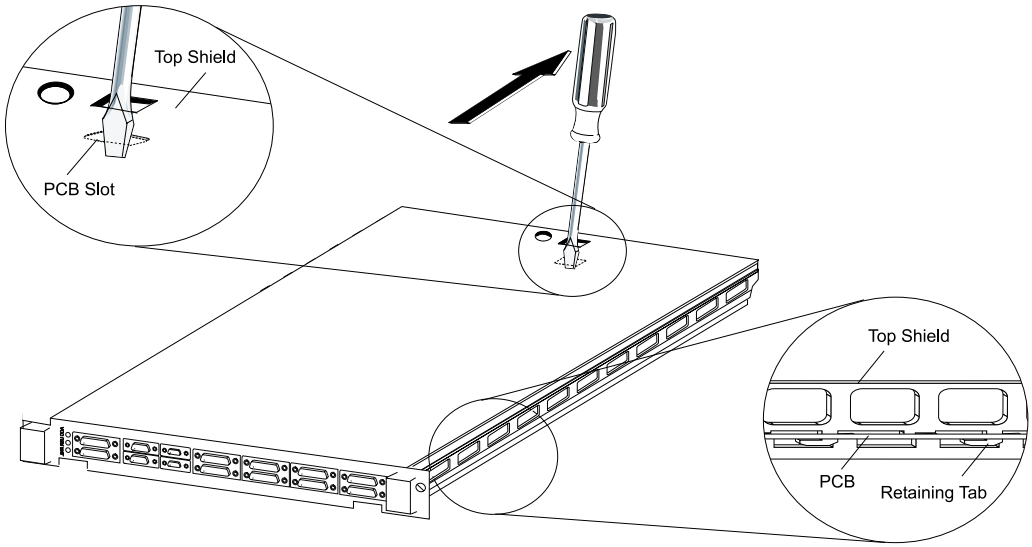
1. Remove the screw located at the back of the VX8 using a Philips #1 screwdriver.



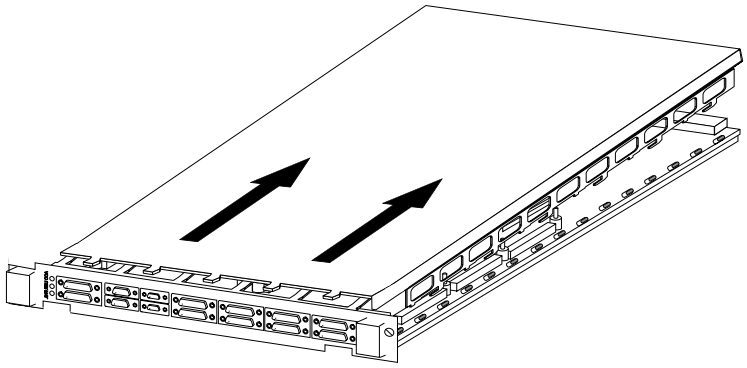
2. Insert a flat-bladed screwdriver in the slot of the top shield at the back of the unit as shown in the next figure. Ensure you insert the tip of the screwdriver's blade into the corresponding slot in the PCB.

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3. Using the screwdriver as a lever, ease the top shield back so that the shield's retaining tabs clear their corresponding slots on the PCB. Do not use excessive force.



4. Tipping the back of the top shield away from the PCB, lift the top shield from the VX8.



You can now install TIM-40 modules or VX8 jumpers using the procedures described in the following sections.

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2.3. Installing TIM-40 Modules

Improper handling procedures for TIM modules installed on a LeMans carrier can lead to permanent damage of a module or carrier. To minimize the risk of damage, follow the procedures described below for module installation and extraction. Remember to always observe the following ESD precautions.

2.3.1. ESD Precautions



Note: Observe all necessary precautions regarding handling of ESD sensitive components during the handling and transportation of these assemblies.

Note: Perform the installation and extraction operations described below in a static safeguarded work environment.

Note: Ensure proper grounding of all personnel performing the work outlined below (tested wrist strap, foot strap or conductive shoes).

Note: Handle all ESD sensitive devices and assemblies in a safe manner to minimize the risk of electrostatic damage.

2.3.2. TIM Module Insertion Instructions

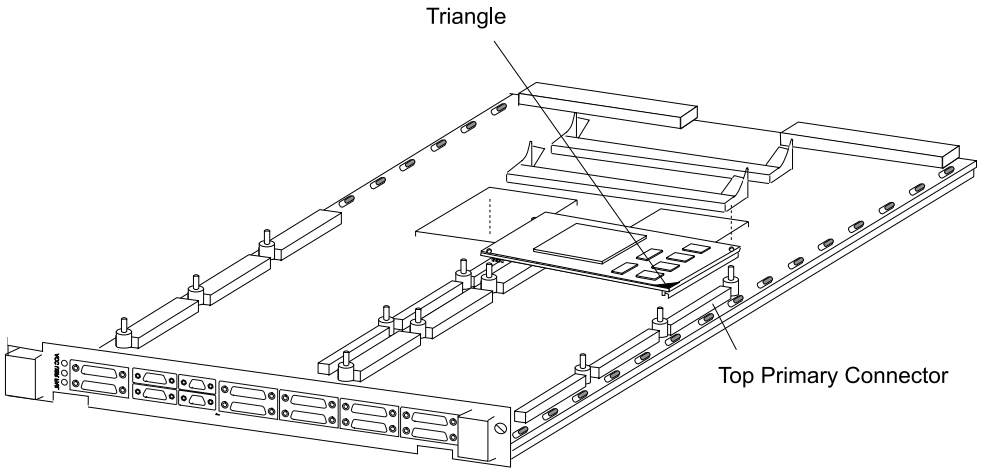
The VX8 has six TIM-40 sites. To install a TIM-40 module onto a site follow these steps:

Note: If a TIM-40 module requires Global Bus access, ensure you configure the module to use the external clock on the VX8 board and not the oscillator on the TIM-40 module. Refer to the particular TIM-40 module User's Guide for information regarding external clock configuration.

---

1. If you have already installed the VX8 into your VXI mainframe, follow the procedures described in *Removing the VX8 from a VXI Mainframe*.
2. Remove the top shield from the VX8 as described in the section *Removing the Top Shield* and locate the TIM-40 site on the VX8 in which you will install the module.
3. Align the module over the TIM-40 site so that the triangle printed on the top right corner of the module PCB is adjacent to the top primary connector of the carrier board.

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4. Place your fingers on the PCB surface of the TIM module above the connectors (See *Figure 3*).
5. Apply vertical pressure, alternately pushing on either side of the connector pins (a rocking motion) until the module seats properly on the carrier board.

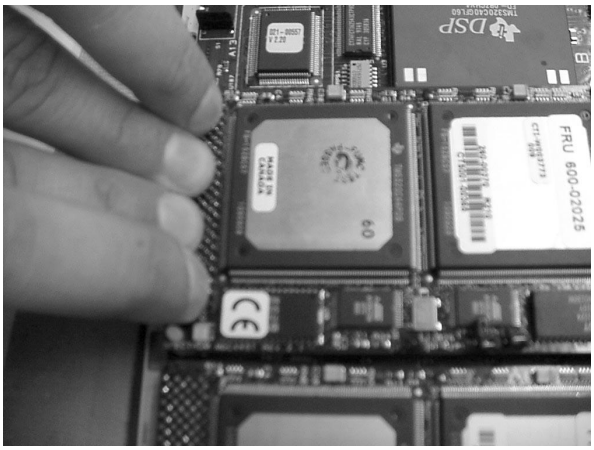


Figure 3 Correct Connector Seating

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Caution: **NEVER** apply force on the DSPs (See *Figure 4*). Pressure applied at an angle can cause the pins to skew sideways (See *Figure 5*).

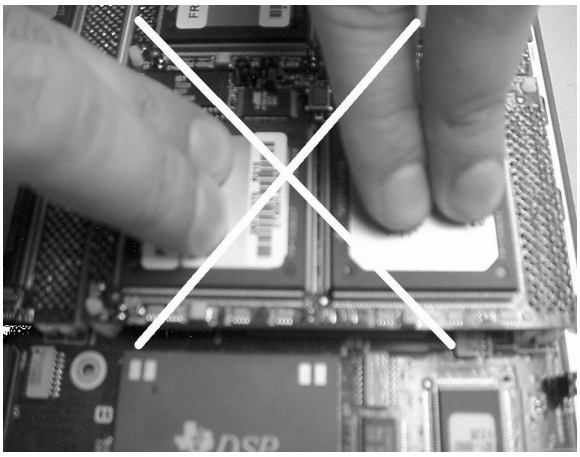


Figure 4 Incorrect Pressure Point

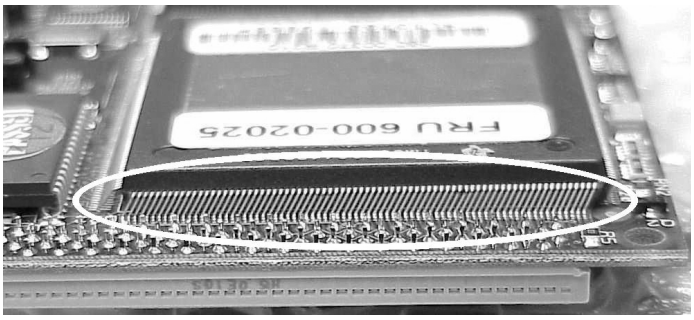
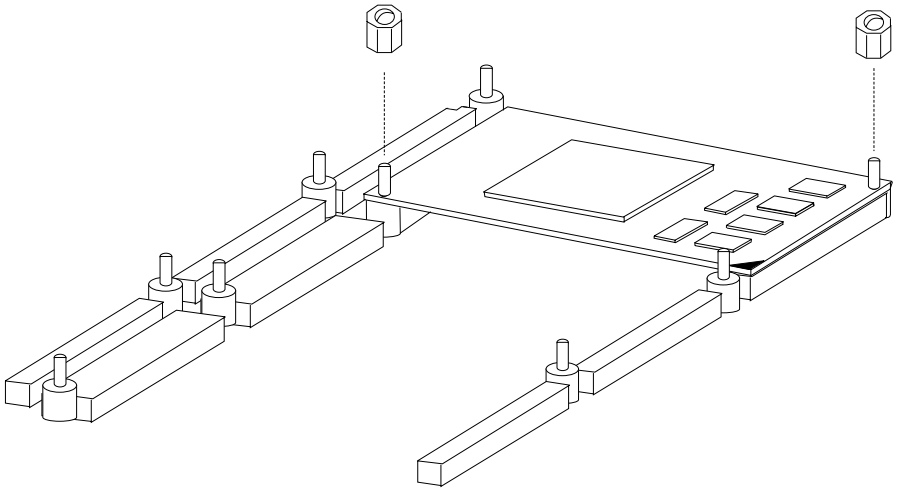


Figure 5 DSP Pin Skew Damage

6. Using a nut driver, fasten the module to the VX8 with the nylon nuts provided. There are two holes for these nylon screws at diagonal corners of the TIM-40 site. Do **not** over-tighten.



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2.3.3. TIM Module Extraction Instructions

To safely extract a TIM module you must have free access to at least one of the longer sides of the module. For example, if TIM modules are present in all sites (see **Figure 6**) and you wish to remove the module in site "G", you must first remove the module from site "C", then the one from site "E". By following this sequence, you will always have access to one of the modules longer sides.

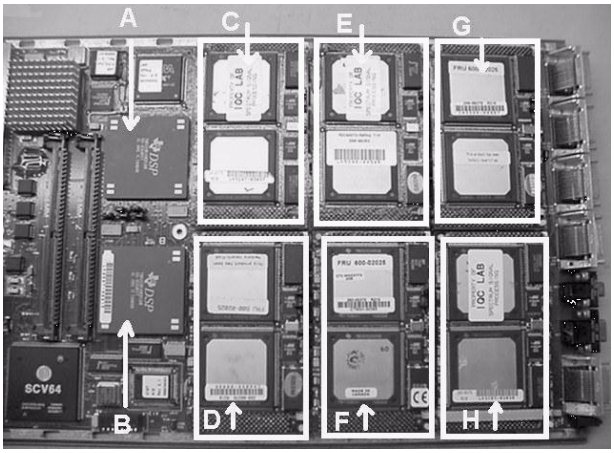


Figure 6 Module Extraction Order

To extract a module:

1. Place your fingers along the modules longer edge with the freer access (see **Figure 7**)
2. Gently pull the module up and push it down (a rocking motion) to disengage the connectors.

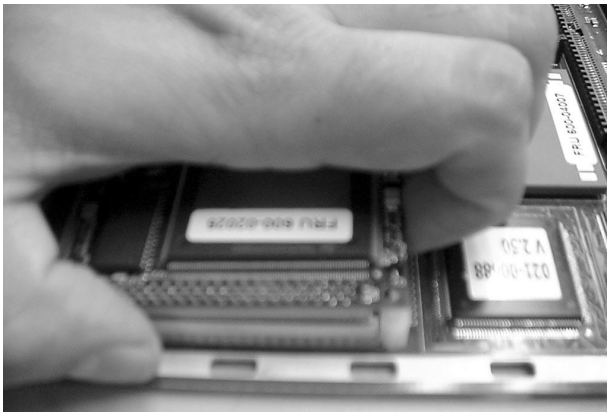


Figure 7 Safe TIM Module Extraction

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Caution: **NEVER** use prying tools to remove a TIM module (see **Figure 8**). Doing so can damage the pins of adjacent DSPs (see **Figure 9**).

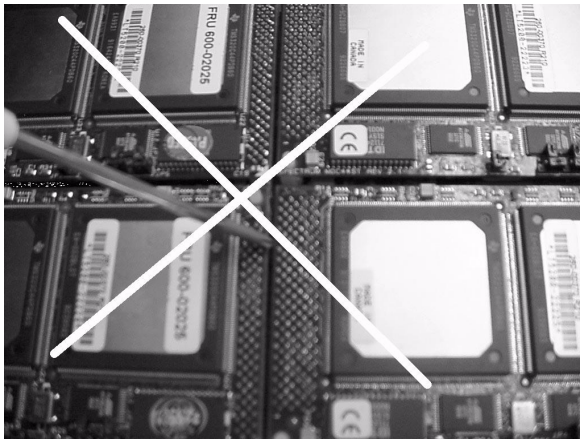


Figure 8 Prying Tool Restriction

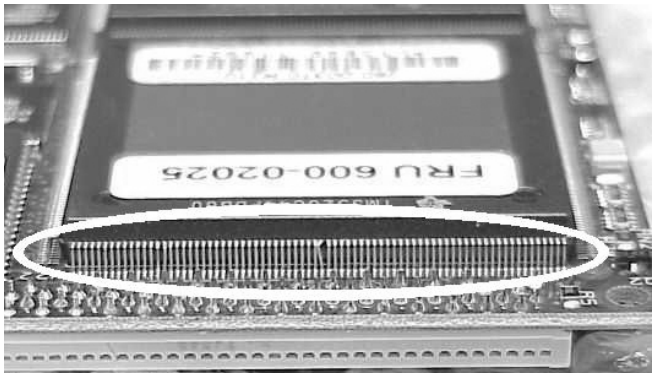


Figure 9 Prying Tool Damage

2.4. DRAM Memory Requirements

The VX8 Carrier Board supports up to 2 Banks of shared DRAM in its two 72-pin SIMM sockets: SIMM 1 and SIMM 2. The SIMM sockets, which you can leave un-populated, support both 4 and 32 Mbyte 60 ns SIMMs. You can use the following types of DRAM memory modules:

- 60ns Fast Page Mode 1Mx32 or 1Mx36 PC DRAM SIMMs
- 60ns Fast Page Mode 8Mx32 or 8Mx36 PC DRAM SIMMs

It is important to use DRAM SIMMs that meet the timing requirements of the VX8 Carrier Board. Use one of the following Micron DRAM SIMMs or an equivalent:

Manufacturer	4 Mbyte	32 Mbyte
Micron	MT8D132M-6	MT16D832M-6

You cannot mix 4 Mbyte and 32 Mbyte SIMMs on the same VX8. For example, you cannot put a 4 Mbyte SIMM in SIMM 1 and a 32 Mbyte SIMM in SIMM 2.

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2.5. Installing DRAM SIMMs

As previously described, you can use either of two sizes of SIMM memory: 1M x 32 (4 Mbyte) or 8M x 32 (32 Mbyte). Three jumpers (JP3, JP4, and JP5) must be set according to the size of memory used in the sockets. The following table lists the allowable installation configurations for DRAM memory in the two SIMM sockets and the jumper settings for each configuration.

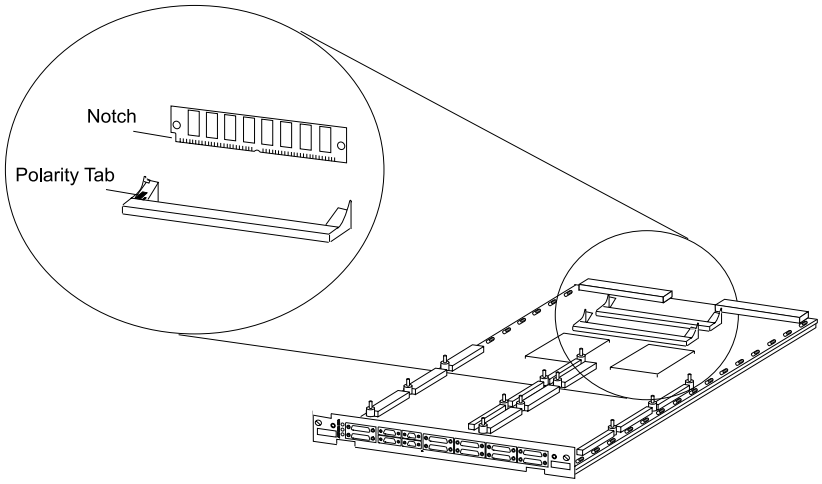
Table 1 DRAM Sizes and Jumper Settings

SIMM 1	SIMM 2	Total DRAM	JP3	JP4	JP5
-	-	0 Mbyte	1M	1M	1M
4 Mbyte	-	4 Mbyte	1M	1M	1M
4 Mbyte	4 Mbyte	8 Mbyte	1M	1M	1M
32 Mbyte	-	32 Mbyte	8M	8M	8M
32 Mbyte	32 Mbyte	64 Mbyte	8M	8M	8M

Note: If you install only one SIMM module, it must be in the SIMM 1 socket.

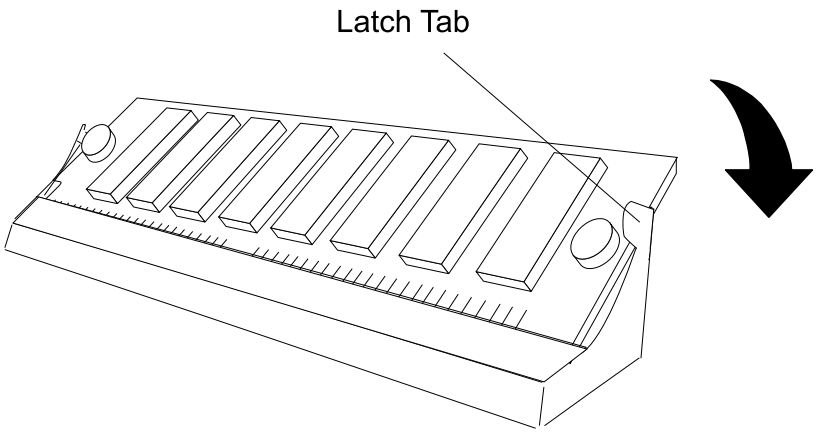
To install DRAM memory modules into the VX8 follow these steps:

1. If you have already installed the VX8 into your VXI mainframe, follow the procedures described in *Removing the VX8 from a VXI Mainframe.*
2. Remove the top shield from the VX8 as described in the procedure *Removing the Top Shield* and locate the DRAM memory SIMM sockets.
3. Grasp the DRAM module along its top edge and position it over the socket so that the notch on the SIMM module aligns with the polarity tab in the lower left of the socket.



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4. Insert the SIMM module into the socket at a 30° angle from vertical. Gently push it to firmly seat it into the socket.
5. Carefully rotate the SIMM module back and down until its edges snap behind the latch tabs of the socket. Apply equal pressure along the top of the SIMM module so that both edges engage the tabs at the same time.



6. Set jumpers JP3, JP4, and JP5 according the type of memory installed as shown in the preceding table. For further information on jumper locations and settings, see the next section.

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2.6. Jumpers and DIP Switches

The following figure shows the location of the DIP switch and jumpers on the VX8.

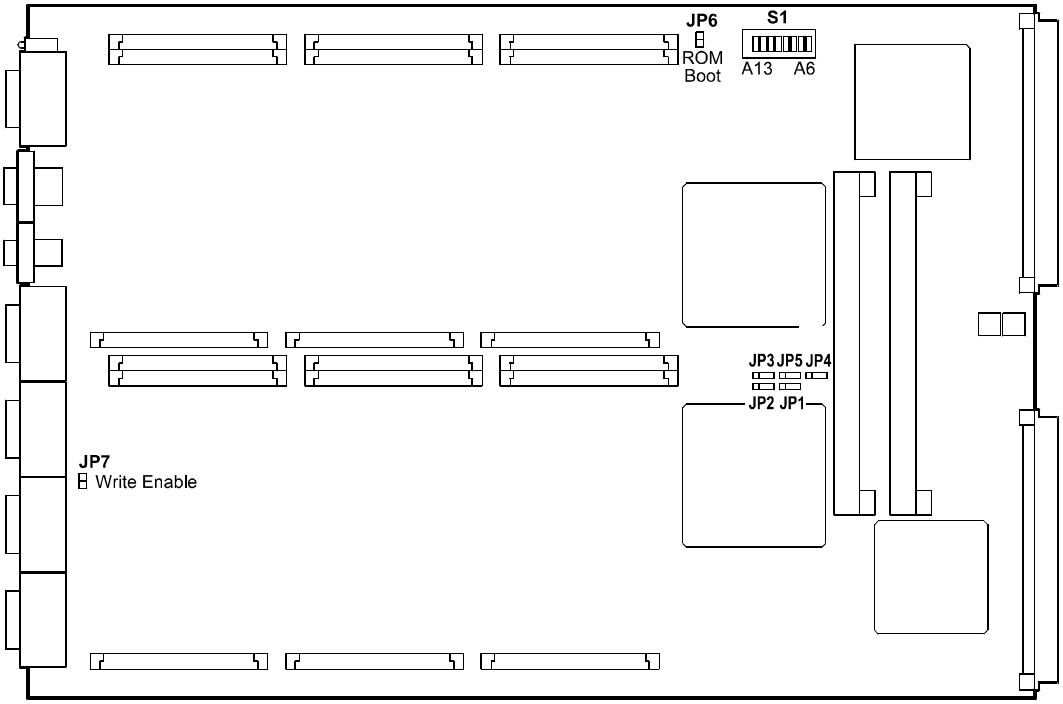


Figure 10 VX8 Jumper and Switch Locations

The following table summarizes the jumper settings.

Table 2 Boot Source Jumpers (JP1 and JP4)

Jumper	Pins	Function
JP1	1-2	TCLK1 is TTL buffered CLK10
	2-3*	TCLK1 is ECLTRG1 (SYNCLK)
JP2	1-2*	ECLKTRG0 and ECLKTRG1/CLK10 buffers disabled
	2-3	ECLKTRG0 and ECLKTRG1/CLK10 buffers enabled
JP3 to 5	1M	Set all for 1 M x 32-bit DRAM SIMMs
	8M*	Set all for 8 M x 32-bit DRAM SIMMs
JP6	OUT*	Node B C40 boots from first active communication port
	IN	Node B C40 boots from local bus PEROM
JP7	IN	Node A Boot Kernel PEROM Write Protection disabled
	OUT*	Node A Boot Kernel PEROM Write Protection enabled

* Default setting

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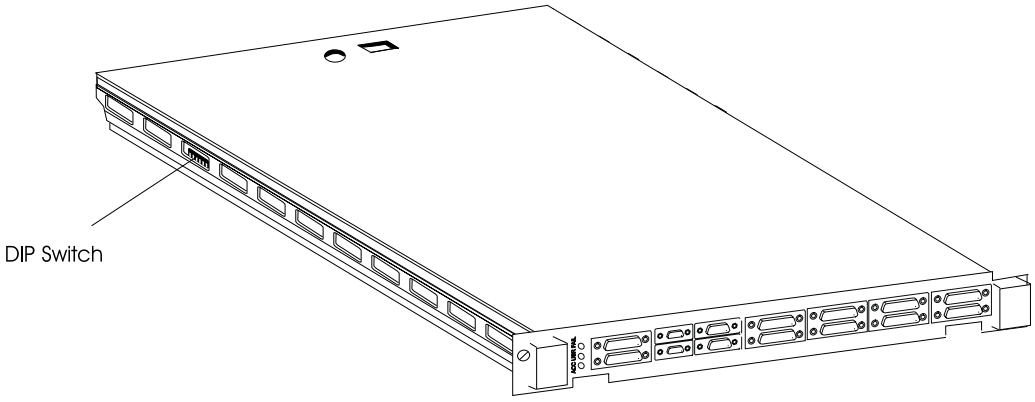
2.6.1. Setting the VXIbus A16 Logical Address

DIP Switch S1 sets the VXIbus A16 Logical Address. You can access this DIP switch through the openings in the side of the top shield—without removing the top shield cover.

To set the A16 address:

1. If you have already installed the VX8 into your VXI mainframe, follow the procedures described in *Removing the VX8 from a VXI Mainframe*.

2. Set the switches on the DIP switch to the desired A16 address according to the following figure and table. Use a small screwdriver, or similar tool, to reach through the hole in the side of the shield.



Switch 8 defines the most significant bit (MSB) of the 8 bit logical address in A16 space. Switch 1 defines the least significant bit (LSB). The figure below illustrates the switch settings required to define an address of 11110000 binary or 240 decimal. It represents the 240th logical address in the A16 space. Note that a switch is "0" when ON, and "1" when OFF.

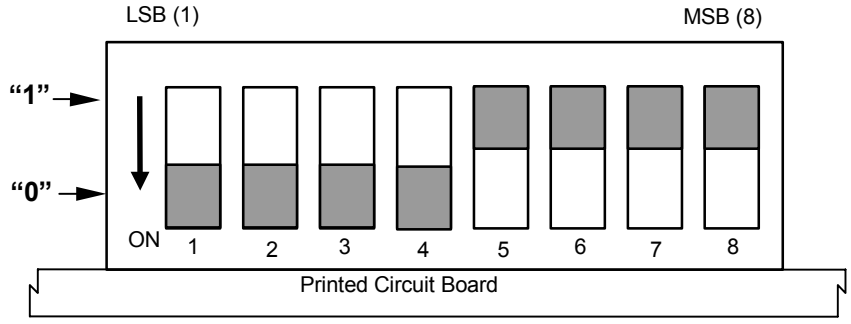


Figure 11 A16 Address DIP Switch

Note: Ensure that you never configure two devices to use the same A16 logical address.

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Table 3 DIP Switch A16 Addresses

Pos.	DIP Switch Positions 4321															
8765	0000	0001	0010	0011	0100	0101	0110	0111	1000	1001	1010	1011	1100	1101	1110	1111
0000	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0001	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
0010	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47
0011	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63
0100	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79
0101	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95
0110	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111
0111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127
1000	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143
1001	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159
1010	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175
1011	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191
1100	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207
1101	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223
1110	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239
1111	***240****	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255

* Default setting

Observe these precautions for the following A16 address:

Address	Precaution
0	Do not use. The VXIbus Resource Manager (RM) reserves this address.
1 to 15	Do not use. Mainframe extension devices typically reserve these addresses.
255	Do not use. Dynamically configured systems reserve this address.

2.6.2. Selecting the Node B Boot Mode

You can set the Node B TMS320C40 DSP to boot either from the first active communication port or from its Local Bus PEROM, by jumper JP6.

Jumper JP6 selects whether Node B boots from Communication Port (JP6 removed) or from Local Bus PEROM (JP6 installed). The default is for booting from Communication Ports. Node B is integral to booting and loading code to all processors on a VX8 Carrier Board. You should only configure this jumper for booting from PEROM if an embedded solution (no download from host) is required, or if the booting method does not use the Spectrum supplied drivers.

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2.6.3. Setting the Node A Kernel PEROM Write Enable

Jumper JP7 is used to prevent accidental writes to Node A's Boot Kernel PEROM. The default is for write-protect, with the jumper removed. If you install the jumper, then the PEROM is unprotected, and software can erase and overwrite its contents.

Note: The VX8 Carrier Board includes a second PEROM provided for TIM-40 compatibility (IDROM) or for use by the application.

Caution: Do **not** alter the contents of the Boot Kernel PEROM unless you are re-programming it with a firmware update supplied by Spectrum. The code contained in this PEROM is mandatory for proper functioning of the VX8 Carrier Board. If you accidentally erase or corrupt this PEROM, the VXI resource manager will assume the board is dead and will place the VXI in reset via the reset bit in the A16 register. You will then have to manually take the board out of reset and use an XDS to reprogram the Boot Kernel PEROM through the front panel JTAG.

2.6.4. DRAM Memory Installation

Jumpers JP3, JP4, and JP5 select the size of the DRAM SIMMs that are installed in the VX8 Carrier Board. If you do not install any DRAM SIMMs, the jumper positions are irrelevant.

Note: All three jumpers must be changed at once, and all three jumpers must be in the 1M position if 1Mx32 (4 Mbytes) SIMMs are used or in the 8M position if 8Mx32 (32 Mbytes) SIMMs are used.

Refer to the *DRAM Shared Bus* section of the *VX8 Carrier Board Technical Reference Manual* for further details regarding DRAM SIMMs. The base configuration is for no SIMMs installed, and the jumpers in the 8M positions.

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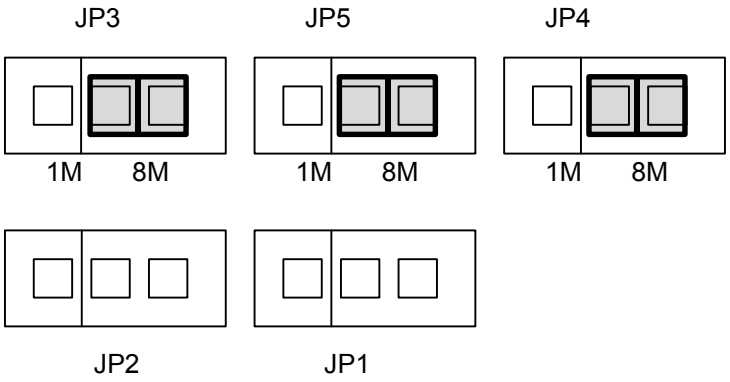


Figure 12 DRAM Jumper Settings

2.6.5. TIM-40 TCLK1/UDP12 Sources

Jumpers JP1 and JP2 control the functionality of the VXI defined ECL signals CLK10, ECLTRG0 and ECLTRG1. These ECL signals are TTL buffered on the VX8 Carrier Board, and are routed to the TIM-40 module TCLK1 (timer pin 1) and User Defined Pin 12. The TTL buffered version of ECLKTRG0 (SYNDAT) routes to a clock buffer.

JP1 selects the source of TCLK1.

- To route the TTL buffered CLK10 to TCLK1 through a clock buffer, install a jumper in position 1-2.
- To route ECLTRG1 (SYNCLK) to TCLK1 through a clock buffer, install a jumper in position 2-3. This is the default setting.

The buffers that provide CLK10, ECLTRG0 and ECLKTRG1 are enabled or tri-stated depending upon JP2.

- To disable the ECLKTRG0 and ECLKTRG1/CLK10 buffers, install a jumper in position 1-2. This is the default setting.
- To enable the ECLKTRG0 and ECLKTRG1/CLK10 buffers so that they route to the TIM-40 modules, install a jumper in position 2-3.

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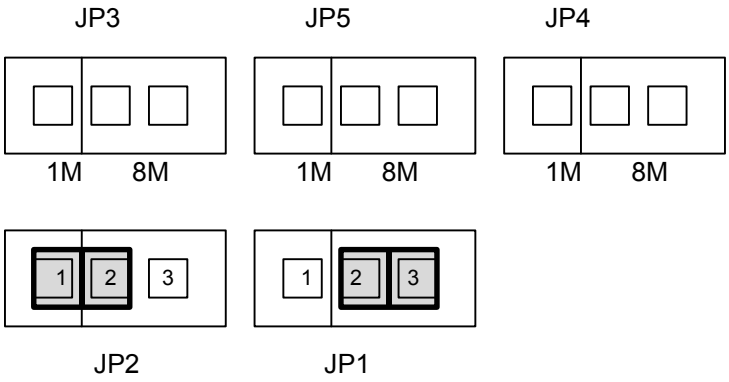
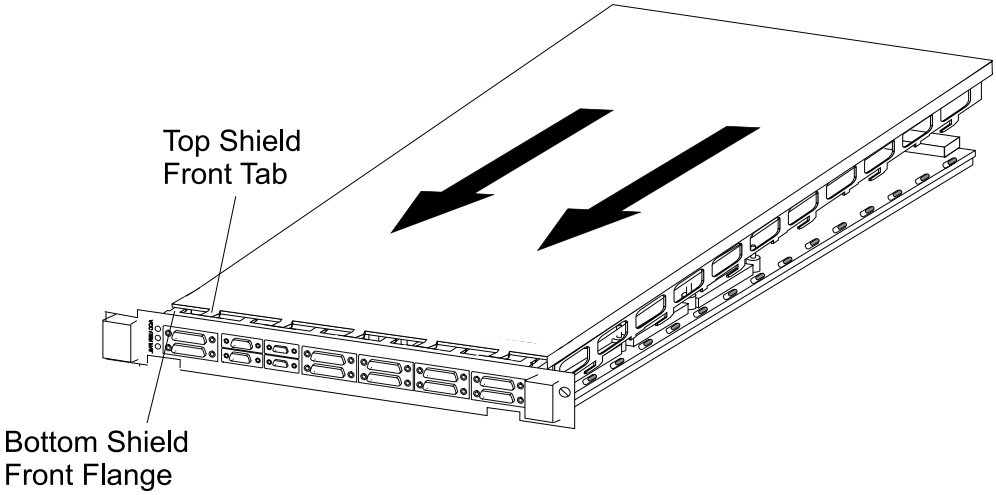


Figure 13 CLK10, ECLTRG0 and ECLTRG1 Jumpers

2.7. Replacing the Top Shield

To replace the top shield on to the VX8, follow these steps:

1. Position the shield so that all front tabs slide under the front flange of the bottom shield attached to the VX8. Ensure the tabs of both shields mesh.



2. Slide the shield forward and tip it downward so that that the tabs on the side of the shield are inserted into the slots in the PCB.
3. Using the screwdriver as a lever, ease the top shield forward so that the shield's retaining tabs seat in their corresponding slots on the PCB. Do not use excessive force.
4. Replace the screw in the back of the cover.

You can now install the VX8 into a VXI rack according to the following procedure.

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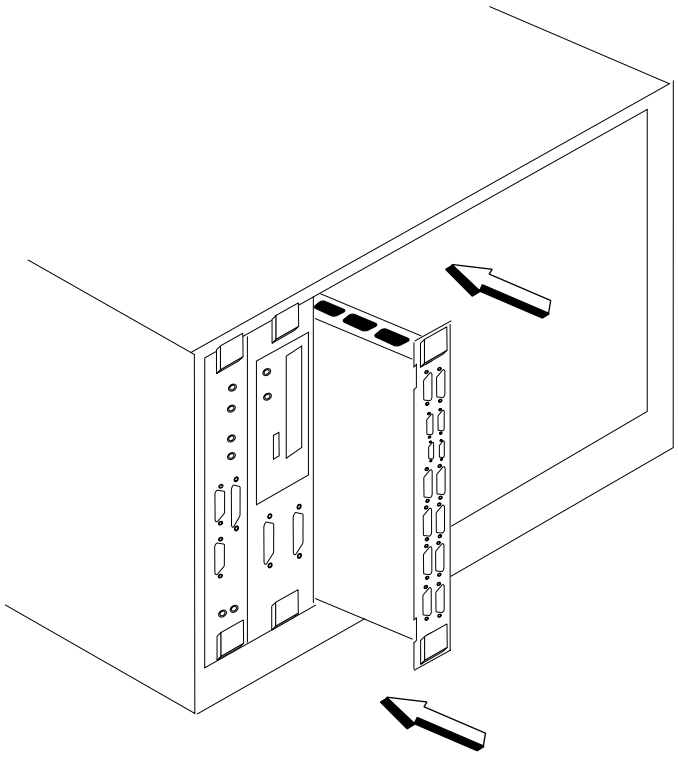
2.8. Installing the VX8 in a VXI Mainframe

Caution: The HP Local Bus specification for the VX8 Carrier Board uses ECL signaling levels on both the A and C sides. Install only ECL compatible modules adjacent to the VX8 Carrier Board or you could damage the system.

The VX8 module implements keying for this VXI implementation. Do not force incompatibly keyed modules into adjacent slots.

Only install the VX8 Carrier Board in a VXI rack with the power OFF.

1. Power down the VXI mainframe.
2. Select a slot in the mainframe for the VX8 Carrier Board. Note that the HP Local Bus Interface routes only to adjacent slots. A data source sending data to the VX8 must be installed on the A side (left). You must install data sinks receiving data generated by the VX8 on the C side (right).
3. Configure the VX8 board. Ensure that you configure and properly install TIM-40 modules, memory modules and user defined jumper settings (especially VXIbus A16 Logical Address).
4. Place the card edges of the VX8 Carrier Board into the module guides of the mainframe and slide the board into the chassis until the board connects firmly with the back-plane connectors. If your board is equipped with long handled ejectors, then make sure that the ejectors properly seat on the mainframe before final board insertion.



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5. Install the mounting screws to attach the front panel of the VX8 Carrier Board to the mainframe.

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3 VX8 C4x Support Software Installation

The LeMans SDK CD-ROM included with the VX8 Developer's Kit contains installation procedures which install support functions and example programs for programming the VX8 Carrier Board.

Use the installed files with the TI (Texas Instruments) assembly and "C" language tools, and the TI debugger, to develop applications for the VX8 DSPs.

The installation procedures require you to select a directory path. This document refers to these paths symbolically, as listed in the following table.

Table 4 Symbolic Path Names

Symbolic Value	Default value	Description
<*VXIPNPPATH*>	C:\VXIPNP	Installation path for VISA
<*InstallPath*>	C:\VXIPNP\WINNT\ssVX8	Installation path for C4x Support Software (this section) and VX8 Instrument Driver (Section 4)

Note: The VISA installation procedure defines the system variable VXIPNPPATH. If you defined a value for this path other than the default value shown above, you must also set the installation paths for the C4x Support Software and Instrument Driver software to match the following convention:

<*InstallPath*> := <*VXIPNPPATH*>\WINNT\ssVx8

The CD-ROM also includes the *LeMans Installation Guide* (this document), the *LeMans Programming Guide*, and the *LeMans Technical Reference Manual.* All guides are in PDF format and are located in the DOCS directory of the CD-ROM. Use Windows Explorer to navigate the LeMans SDK CD-ROM and access the manuals. You will need Acrobat Reader to view the documents.

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3.1. Directory Structure

The installation procedure used to install the VX8 C4x Support Software sets up the following directory structure under the directory root (<*InstallPath*>) you specify. The default directory root is C:\VXIPNP\WINNT\ssVX8.

The following table describes the directory structure when you have completed the installation of both the C4x Support Software and the VX8 Instrument Driver. The VX8 Instrument Driver installation (see *section 4*) creates the shaded sub-directories, any portions of the tree to reach the sub-directories and the highlighted items in the **bin**, **etc**, **include** and **lib** directories.

Table 5 VX8 Developer's Kit Disk Contents

Directory	Contents
bin	This directory provides the files required to recompile the Vx8 C4x Support Software. (and VX8 Instrument Drivers).
etc	Contains linker command files. (and SDF Files).
examples	
dsp	
c40	This directory provides “C” language source code examples that demonstrate how to perform interrupt handling and data transfers on the VXIbus, HP Local Bus, and the RS-232 DUART. **readme.txt** files are provided with each example
c44	This directory contains examples using the **vx8c44ss.lib** for use with TMS320C44 DSP-based TIM-40 modules. The example code is the same as in **\c40**, except that the build procedure links with **vx8c44xx.lib** instead of **vx8c40ss.lib**.
host	***Created during VX8 Instrument Driver Installation***
c	
multsicl	This directory contains a host-based example using the **SICL** instrument driver.
multvisa	This directory contains a host-based example using the ***VX8*** instrument driver.
include	This directory provides the Include files for the VX8. **vx8.h** is the main include file that should be included in your code. (and VX8 host support include files).
lib	This directory contains the C4x library and host archive. (and VX8 host support library).
src	
dsp	
alib	This directory provides the “C” language source code for the VX8 C4x Support Software functions.
kernel	This directory contains the source for the comm LOAD and Node A kernels. These are for reference only. The user does not require this code for normal use of the C4x library.
host	***Created during VX8 Instrument Driver Installation***
alib	This directory provides the “C” language source code for the VX8 Host Support Software functions.

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3.2. Requirements

You should be familiar with VISA and/or SICL software development. Knowledge of ANSI C software development on VME/VXIbus systems and TMS320C4x software development in ANSI C/assembly is vital.

VX8 Support Software for HP-UX 10.2/VISA/SICL was developed on an HP V743 Embedded controller with HP-UX 10.2 and VISA G.01.00. Use this version of the VX8 Support Software with the following hardware and software configurations:

Hardware	Software
• VXI mainframe chassis with a minimum of 2 slots (for slot 0 controller and a single VX8 card) • VXI slot 0 controller (HP V743 VXI Embedded Controller for example) • VX8 Carrier Board • Windows NT/Windows 2000 PC and an external JTAG interface for TMS320C4x DSP software development	• ANSI-C compiler • DOS based TI TMS320C4x development tools • Windows NT or Windows 2000 • Code Composer 4.1

The VX8 Windows NT/Windows 2000 Instrument driver supports the following hardware and software configurations:

Hardware	Software
• VXIbus mainframe chassis with a minimum of 2 slots (for slot 0 controller and a single VX8 card) • VXI slot 0 controller (HP V743 VXI Embedded Controller for example) • VX8 Carrier Board • Windows NT/Windows 2000 PC with an external JTAG interface for TMS320C4x DSP software development. This can be the same PC as the host.	• Microsoft Visual C compiler version 6.0 • Code Composer 4.1 • VISA (version 2.5 or later) • Windows NT/Windows 2000

3.3. Installing the VX8 C4x Support Software

To install the VX8 C4x Support Software:

Note: Logon to an account with administrator privilege.

Note: Insert the LeMans SDK installation CD-ROM in your development host machine CD drive.

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Note: Follow the on-screen instructions.

Note: The CD-ROM is auto run enabled. Select the C4x Support Software option to install it. If the screen does not appear you can also install the software by opening the CD drive in Windows Explorer, navigating to the **Software** folder on the CD-ROM, and running the installation file **Vx8C4xSupportxxx.exe** (***xxx*** *is a two or three digit Spectrum release number*).

Note: When prompted, enter the path where you want the VX8 C4x Support Software installed. The default directory is C:\VXIPNP\winnt\ssvx8 (<*InstallPath*>).

Note: Make sure that the paths for the VX8 C4x Support Software include files (<*InstallPath*>\include) and library (<*InstallPath*>\lib) are included in the C_DIR environment variable used by the TI C compiler. In addition, ensure that the path for the VX8 Support Software include files is also included in the A_DIR environment variable used by the TI C assembler. If you are using TI's debug monitor, make sure that the path for the C source files (<*InstallPath*>\src) are included in the D_SRC environment variable if you wish to view the code while debugging.

3.4. Software Configuration Notes

Each VX8 must be set up with a non-contending VXIbus Logical Address (LA). It is assumed that there will be enough VXI/VME resources for each VX8 in the system.

You must configure the Resource Manager (RM) so that it correctly reflects the resources the application software expects. This is particularly important with respect to the resources assumed by the SCV64 device on each VX8 in a system. The RM configuration files will provide a facility to force the assignment of interrupt handler levels (IEEE 1155 RULE 3.4.11 [3]).

Note: Since the VX8 does not have message based interrupt configuration capabilities, you will have to specify the interrupt levels and interrupt handler levels in the RM configuration files **as well as** in the VX8 configuration integrated within the DSP application program. The DSP application program must set up the interrupts on the SCV64 by calling the **VX8_SCV64EnableInterrupt()** function in the C4x Support Software.

Two files manage the VX8 system configuration: a hardware system definition file (SDF), and a software load definition file (LDF). It is your responsibility to ensure that the VX8 hardware configuration matches the configuration expected by your software application.

The DSP application software will be required to do several things:

- All DSP code should de-assert the TIM-40 defined /CONFIG line after boot and wait for all nodes to be loaded before proceeding with normal operations. C initialization code (boot_a.asm, boot_b.asm, and boot_tim.asm) normally takes care of de-

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assertion of /CONFIG. IIOF3 is generally used for /CONFIG on Spectrum's TIM-40 modules.

- If VXIbus interrupts are required, the DSP application software must set up the interrupt handler levels and interrupter level on the SCV64 and these levels must correspond to the levels defined in the RM configuration files for the VX8 in question. The Node A Embedded C40 carries out initial SCV64 set up and A16 Register servicing. SCV64 interrupt capability should not be enabled until the end of the VX8 load process since DSP applications will not be ready to handle interrupts until software loading has completed.

- Do not initiate COMM port transfers until the loading process is complete. This will prevent DSPs that are attempting to boot via COMM port from being corrupted. We suggest the use of a flag by the Host to signal the DSP to resume code execution.

When building the DSP application software for the Node A DSP, you must link in and map the A16 ISR (BOOT_IIOF3Isr) for the VX8 as the IIOF3 ISR in the interrupt vector pointer. The VX8 will not respond to VXI A16 configuration register commands without the Node A A16 ISR resident. The **boot_a.asm** C initialization code performs this automatically.

Note: When building code, you must link the supplied **boot_?.obj** first. When building code under TI Tools version 5.0, you must use the -v0 flag to force COFF version 0 output files.

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3.5. Using the Example Code

The example programs are included on VX8 C4x Support Software development disk. Refer to the **readme.txt** files provided with each example for instructions on setting up and running the examples.

If you are using ‘C4x based TIM-40 modules, you should run the examples in the **examples\c44** directory. These examples link to **vx8c44ss.lib**.

See the *VX8 Carrier Board Programming Guide* for additional documentation of the examples.

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4 VX8 Instrument Driver Installation

The instrument driver provides host applications with a software interface to basic routines for configuring, controlling, and communicating with the VX8. There are two supplied versions of the instrument driver, one for SICL I/O libraries and one for VISA I/O libraries. Both versions are standard ANSI C, support multiple VX8s in a system, and allow the host to open multiple sessions to any single VX8.

4.1. HP-UX 10.2 VISA/SICL Instrument Driver Installation

The following section details the installation procedure for the HP-UX 10.2 VISA/SICL instrument driver.

4.1.1. CD Contents

The contents of the VX8 Support Software CD contains the following fileset:

Table 6 VX8 Developer's Kit Tape Fileset

File	Description
ssvx8.depot	SSVX8 Programming environment, A.00.04

When installed, the VX8 Support Software tape will generate the directory structure described in the following table. Please refer to the **readme.txt** files found in the */opt/vxipnp/hpux/ssvx8/etc* directories for more information about the directory contents.

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Table 7 VX8 Developer's Kit Tape Installed Directory Structure

Directory Structure	Description
/opt/vxipnp/hpux	- HP-UX VXIpnp root directory
/bin	- Bin directory containing shared libraries and batch files
/include	- Top level include files from installed VXI software components
/lib	- Archive (static) libraries from installed VXI software components
/etc	- linker command files, SDF files, readme.txt
/src/dsp/alib /kernel	- VX8C4x Support Software Source directory - VX8C4x Support Software kernel software directory
/src/host/alib	- VX8 Instrument Driver source root directory
/examples/dsp/c40 /c44	- 'C40 DSP examples directory - 'C44 DSP examples directory
/examples/host/multvisa /multsicl	- Multiplication examples

4.1.2. Requirements

You must have SICL or VISA installed on your system before the VX8 Instrument Driver can function.

4.1.3. Installing the VX8 SICL Instrument Driver from CD

The host system for loading the VX8 Host Support Software CD must be a HP-UX 10.2 workstation.

You will also need a CD-ROM drive to read the contents of the compact disk.

To install the software:

1. Become super user (root).
2. Insert the CD in your CD-ROM drive.
3. Mount the CD as a file system. Run SAM (System Administration Manager) and go into disks-> filesystems ->disks. Highlight the CD and right click. Choose **Add, Not using LVM**. Mount the CD to the directory `/cdrom`

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4. On some systems register the software depot by typing at the command line:

   ```
   swreg -ldepot /cdrom
   ```

5. `swinstall` the depot. Run `swinstall` from the command line (type 'swinstall'). Specify the source as `/cdrom`. Select the vx8 software and select **Install (Analysis)** from the Actions menu to install the software.

The VX8 Host Support Software is loaded onto your system. The VX8 software is installed in the */opt/vxipnp/hpux* directory. The instrument driver source and VX8 C4x Support Software files can be found in the */opt/vxipnp/hpux/ssvx8* directory. Please refer to the **readme.txt** files found in */opt/vxipnp/hpux/ssvx8/etc* for more information about the directory contents.

To remove filesets from your HP-UX workstation, invoke the *swremove* utility. Select the VX8 fileset with a "y" and then select "Begin Removal" to remove the VX8 Support Software from your system.

4.2. Windows NT/Windows 2000 VX8 Instrument Driver Installation

This section describes how to install the Windows NT/Windows 2000 VX8 instrument driver. The VX8 Instrument driver contains functions which will allow your host application software, configure, control, and communicate to a system of VX8 devices.

4.2.1. Installation Description

The VX8 Windows NT/Windows 2000 VX8 Instrument Driver installation will install the software into several directories on your computer.

The root directory you specify during installation defines the installation location for the VX8 Instrument Driver Source code and include files. The default directory is C:\VXIPNP\winNT\ssvx8 (<*InstallPath*>).

Refer to *Table 5* for directory components created or added to by the VX8 Instrument Driver installation.

This installation procedure also defines two system environment variables (SSP_INSTALL_ROOT and SSP_PATH) and modifies a third (PATH) as shown in the following table.

Variable	Value
SSP_INSTALL_ROOT	C:\VXIPNP\WINNT\ssVX8
SSP_PATH	C:\VXIPNP\WINNT\ssVX8\bin
PATH	C:\VXIPNP\WINNT\ssVX8\bin

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4.2.2. Requirements

You should be familiar with VISA and/or SICL software development. Knowledge of ANSI C software development on VME/VXIbus systems and TMS320C4x software development in ANSI C/assembly is vital.

VX8 Instrument Driver for Windows NT/Windows 2000 frameworks was developed on an NI VXI-MXI2 environment and compiled under MSVC 6.0. Use this version of the VX8 Support Software with the following hardware and software configurations:

Hardware	Software
• VXI mainframe chassis with a minimum of 2 slots (for slot 0 controller and a single VX8 card) • VXI slot 0 controller (NI VXI-MXI2 for example) • VX8 Carrier Board • IBM compatible PC capable of running Windows NT or Windows 2000 • External JTAG interface for TMS320C4x DSP software development.	• MSVC 6.0 • Code Composer 4.1 • Windows NT or Windows 2000 • VISA (VXIpnp VISA 2.5 or later)

4.2.3. Installing the VX8 VISA Instrument Driver

To install the VX8 VISA Instrument Driver:

Note: Logon to an account with administrator privilege.

Note: Insert the LeMans SDK installation CD-ROM in your development host machine CD drive.

Note: Follow the on-screen instructions.

Note: The CD-ROM is auto run enabled. Select the VX8 Instrument Driver option to install it. If the screen does not appear you can also install the software by opening the CD drive in Windows Explorer, navigating to the **Software** folder on the CD-ROM, and running the installation file **Vx8InstDriverxxx.exe** (***xxx*** *is a two or three digit Spectrum release number*).

Note: When prompted, enter the path where you want the VX8 Instrument Driver installed. The default directory is C:\VXIPNP\winnt\ssvx8 (<*InstallPath*>).

Note: If you have not yet done so, install the VX8 C4x Support Software as described in section 3.3.

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4.2.4. Software Configuration Notes

The VX8 Instrument Driver was compiled as a Win32 DLL under MSVC 6.0. The compiler environment on the host should be set in the following manner:

ssvx8.h is the main include file that should be included in your application software.

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Additional Include Directories (for default installation):

<*VXIPNPPATH*>WinNT\include

<*VXIPNPPATH*>WinNT\ssVX8\include

Additional Preprocessor Definitions:

_VISA

Additional Library paths:

<*VXIPNPPATH*>WinNT\lib\msc

4.2.5. Hardware Configuration Notes

Each VX8 must be set up with a non-contending VXIbus Logical Address (LA). It is assumed that there will be enough VXI/VME resources for each VX8 in the system.

You must configure the Resource Manager (RM) so that it correctly reflects the resources the application software expects. This is particularly important with respect to the resources assumed by the SCV64 device on each VX8 in a system. The RM configuration files will provide a facility to force the assignment of interrupt handler levels (IEEE 1155 RULE 3.4.11 [3]).

Note: Since the VX8 does not have message based interrupt configuration capabilities, you will have to specify the interrupt levels and interrupt handler levels in the RM configuration files **as well as** in the VX8 configuration integrated within the DSP application program. The DSP application program must set up the interrupts on the SCV64 by calling the **VX8_SCV64EnableInterrupt()** function in the C4x Support Software.

Two files manage the VX8 system configuration: a hardware system definition file (SDF), and a software load definition file (LDF). It is your responsibility to ensure that the VX8 hardware configuration matches the configuration expected by your software application.

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5 System Definition File Setup

The System Definition File (SDF) is a text-based file defining the hardware configuration of your VX8 System. The SDF modularly defines the hardware components in a logical manner. From top down, a VX8 System is composed of boards and COMM port connections. Boards are comprised of TIM-40 modules, COMM port connections, and a base address. TIM-40 modules are comprised of processors and their COMM port connections, and processors are comprised of attributes.

Use a text editor to modify the SDFs provided by Spectrum to specify the TIM-40 modules on your VX8 system.

For further details on the SDF and for examples of the different SDFs provided by Spectrum refer to the *System Definition File (SDF)* section of the *VX8 Carrier Board Programming Guide*.

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