ISA Sync Upgrade
Owner's Guide

CONTRIBUTORS

Written by Susan Thomas and Pablo Rozal
Edited by Christina Cary
Illustrated by Dan Young and Dany Galgani
Production by Gloria Ackley, Chris Glazek, and Julia Lin
Engineering contributions by Bob Horen, Irene Kuffel, Stephan Chun, Randy Nelson,
    and Stephen Hill

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Introduction

The *ISA Sync Upgrade Owner's Guide* provides instructions for installing the ISA Sync board and ISA software into your CHALLENGE™ M system. This manual also describes how to configure the ISA upgrade for your system.

Caution: This upgrade version requires version 5.3 of the IRIX™ operating system for proper operation.

The ISA Sync board provides serial data communications front-end processing that supports both the X.25 and SNA (system network architecture) communications protocols.

The ISA Sync board provides one of three interfaces:

- two EIA-232-C ports
- two X.21 ports
- two V.35 ports

The ISA Sync board also uses one ISA slot. Up to four boards can be installed in each system.

Note: This version of the upgrade provides two additional interface options (X.21 and V.35). An earlier version of the upgrade provided only EIA-232-C and used IRIX version 5.2.

Manual Organization

This manual includes the following chapters:

"Introduction" provides an overview of the board, describes typographical conventions that are used in text, and points to manuals that are related to the ISA Sync board.

Chapter 1, "ISA Sync Board Controls and Indicators," describes the controls and indicators on the ISA Sync board.

Chapter 2, "Installing the ISA Sync Upgrade," describes the installation of the ISA Sync board and its associated software into the CHALLENGE M system.

Chapter 3, "Configuring Software for the ISA Sync Board," describes how to configure the board software.

Appendix A, "Software Messages and Error Recovery," describes the informational and error messages that may be displayed by the software and suggests actions to take to resolve them, if necessary.

Appendix B, "ISA Sync Board Specifications," provides the hardware specifications for the ISA Sync board.

Related Documentation

The manuals in this section may help you obtain additional information.

• The owner's guide you received with your computer system.

• The *VME/ISA Synchronous Communications Administrator's Guide* describes the administration procedures for the ISA and VME Sync boards.

Audience

The ISA Sync board is designed for customer installation and configuration. No special training or experience is necessary.

Typographical Conventions

These type conventions and symbols are used throughout this guide:

Italics   Filenames, variables, IRIX command arguments, command
                          flags, titles of publications, icon names.

Screen type   Code examples, file excerpts, and screen displays
                          (including error messages).

Bold Screen type
                          User input

()   (Parentheses) Following IRIX commands, they surround
                          the reference page (man page) section where the command
                          is described.

[]   (Brackets) Surrounding optional syntax statement
                          arguments.

IRIX shell prompt for the superuser (*root*).

Product Support

Silicon Graphics offers a comprehensive product support and maintenance
program for their products. For information about using support services for
this product, refer to the release notes that accompany it.

ISA Sync Board Controls and Indicators

Figure 1-1 and Table 1-1 describe the controls, indicators, connectors, and DIP switches on the ISA Sync board.
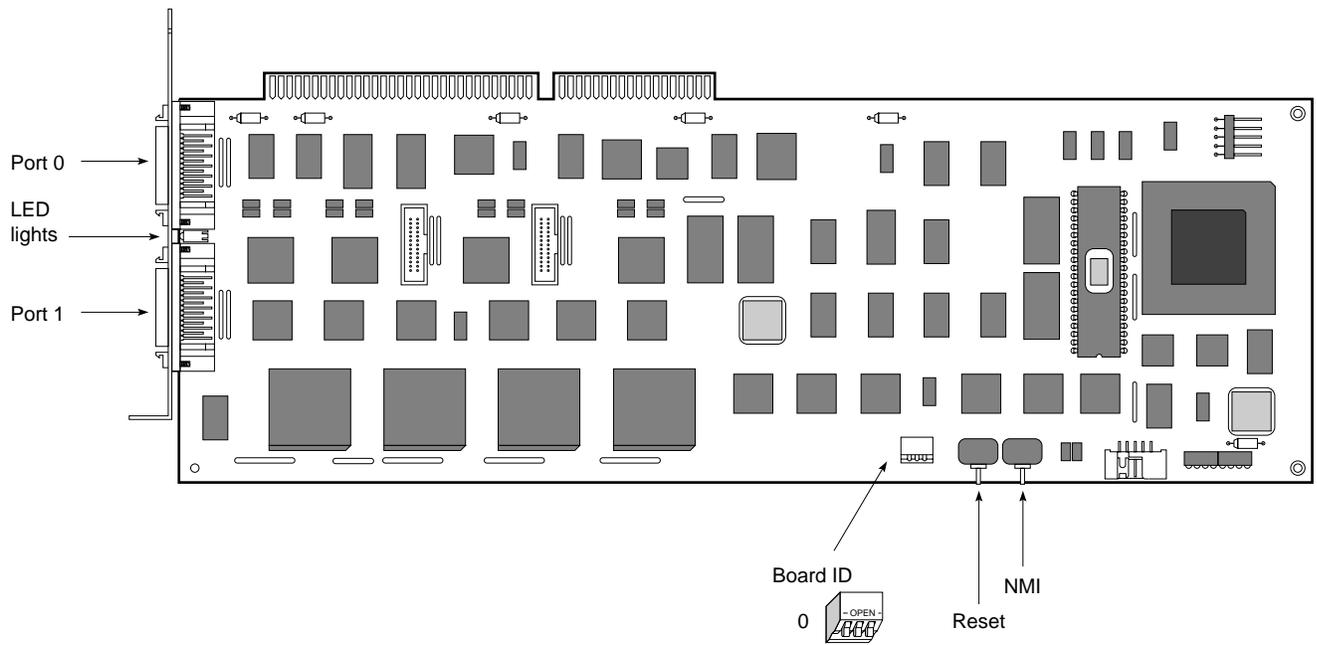
Figure 1-1   ISA Sync Board

Table 1-1   ISA Sync Board Controls and Indicators

Designator	Function
Front panel red and green LED lights	Show board status—green is lit for normal operation, red for board halt/failure
Board RST (reset) switch	Momentary contact switch for system reset (not accessible after installation)
Board NMI switch	Momentary contact switch for non-maskable interrupt (not accessible after installation)
Ports 0 and 1	These two ports provide mini-DB26 connectors to attach to an SGI provided cable.
Board ID switch	Defines the board number address (see Figure 1-2)
X.21 Resistor packs (RP15 and RP17) See Figure 1-3.	These resistor packs install only on ISA boards with X.21 connections. CAUTION: If these resistor packs are present in a non-X.21 board, remove them before installation. Board damage can result if you install a non-X.21 board together with the resistor pack.

Board 0   Board 1

```
     OPEN                      OPEN

   1  2  3                   1  2  3
```

Board 2   Board 3

```
     OPEN                      OPEN

   1  2  3                   1  2  3
```
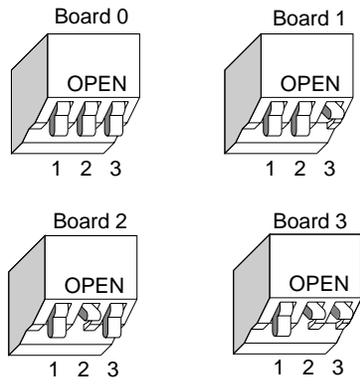
Figure 1-2   Board ID Address Settings

RP16

Port 0

RP16
RP17

RP14
RP15

Port 1

RP12
RP13

RP10
RP11

Note: Resistor packs must be installed at locations RP15 and RP17 for
X.21 operation.

RP14
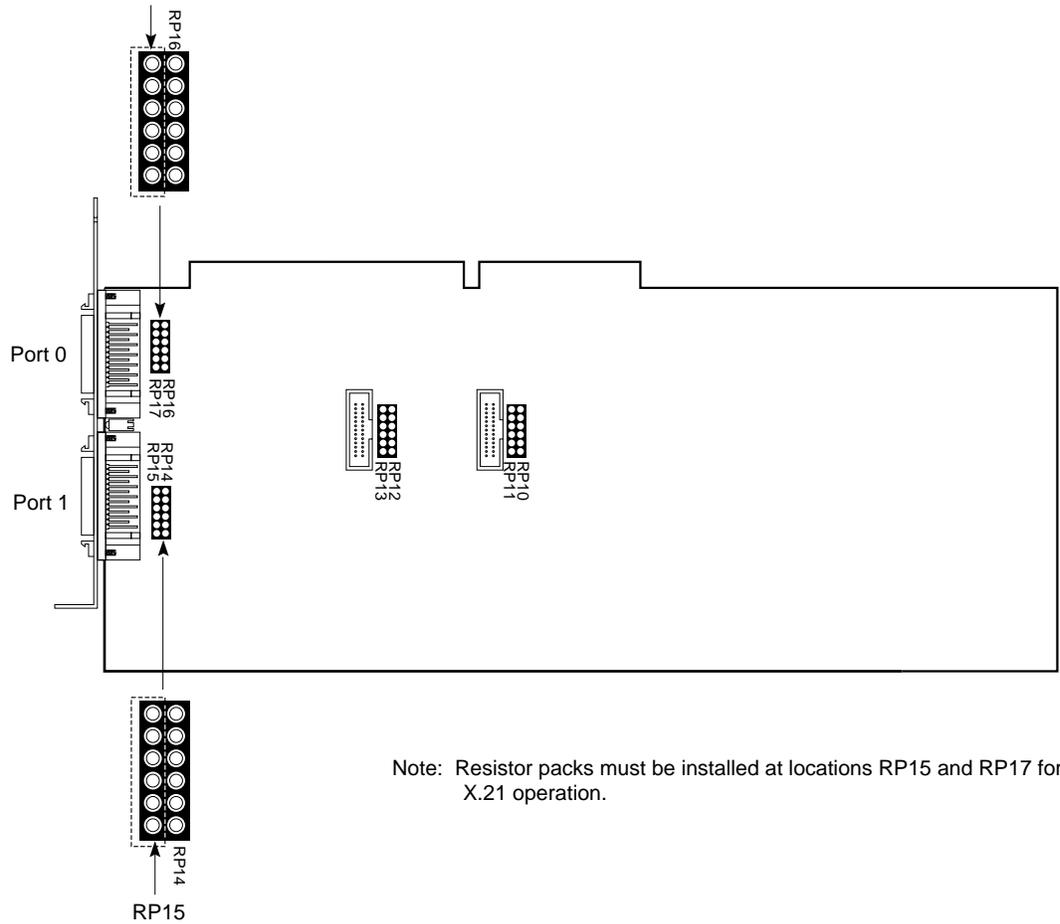
RP15

Figure 1-3   Resistor Pack Placement for X.21 ISA Sync Board Configuration

Caution: Resistor packs RP15 and RP17 apply only to X.21 operation. If
these resistor packs are present in a non-X.21 board configuration, remove
the resistor packs before installing the board into the system. Be sure to wear
a wrist strap if you need to remove the resistor packs.

Installing the ISA Sync Upgrade

This chapter tells you how to install the ISA Sync board and its software in the CHALLENGE M system.

Before You Begin

Before you begin to install the ISA Sync upgrade into your system, you should check that the upgrade kit is complete and the board DIP switch settings are correct.

Kit Contents

The ISA Sync board upgrade kit should contain the following items, as shown in Figure 2-1:

- ISA Sync board
- CD-ROM
- *VME/ISA Synchronous Communications Adminstrator's Guide*
- two interface cables (with either EIA-232-C, X.21, or V.35 connectors)
- *ISA Sync Upgrade Owner's Guide*

ISA Sync Board

ISA Interface Cable

ISA Sync Board
Installation Instructions

VME/ISA Synchronous
Communications
Administrator's Guide

CD–ROM
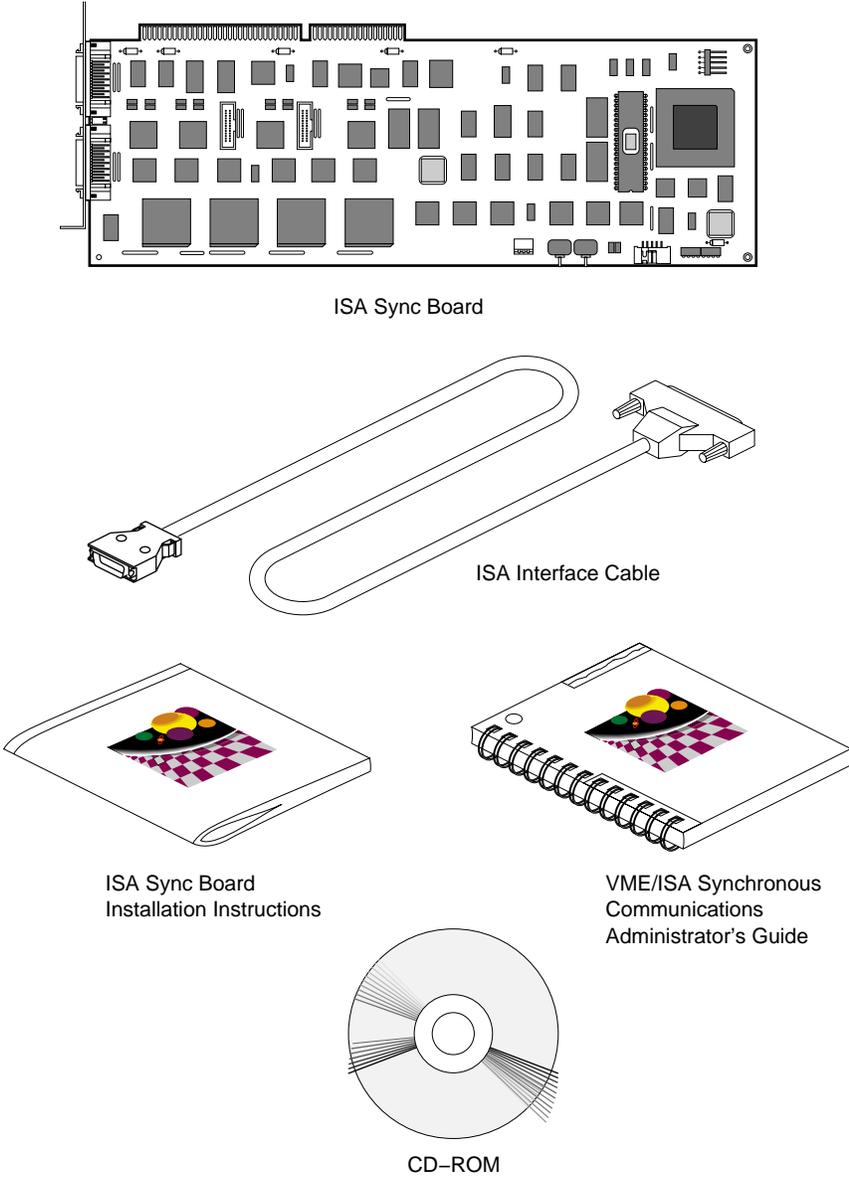
Figure 2-1   ISA Sync Board Upgrade Kit Contents

Checking Board ID DIP Switches

The board ID DIP switch bank, on the bottom of the board (see Figure 1-1 and Figure 1-2), is factory set for ID 0 (all three switches in the closed or down position). If you are installing more than one ISA Sync board, ensure that each board has a different ID. You can install up to four ISA Sync boards in a CHALLENGE M system.

Caution: Be sure to double-check if the board ID is correctly set before starting the installation.

Installing the ISA Sync Hardware

To install the ISA Sync hardware, you must shut down the system, remove the cover, install the board, replace the cover, and install the cables.

Shutting Down and Powering Off the System

To shut down and power off the system, follow these steps:

1. Open the front cover.

2. Press and release the power switch on the front of the system to shut down the software and power off the system.

   The system powers off automatically.

3. Disconnect the power cable from the back of the system.

Removing the Cover

To remove the cover, follow these steps:

1. Remove the front bezel.

   - Press down on the tabs on each side of the bezel, as shown in Figure 2-2.

   - Pull the bezel down and away from the chassis.

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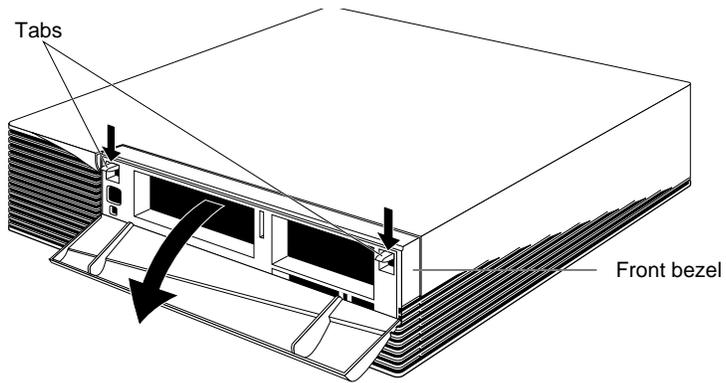
Tabs

Front bezel

Figure 2-2   Removing the Front Bezel From the CHALLENGE M Chassis

2.   Remove the top cover.

■   Press up on the tabs on each side of the drive openings and pull up on the cover.

■   Rotate the cover back and away from the chassis, as shown in Figure 2-3.

Tabs
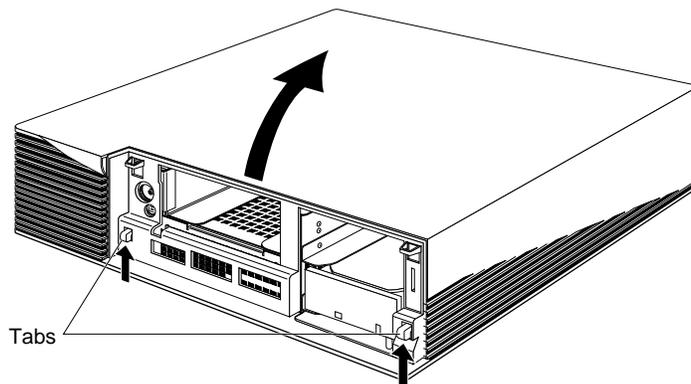
Figure 2-3   Removing the Top Cover From the CHALLENGE M Chassis

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Installing the ISA Sync Board

To install the ISA Sync board, follow these steps:

Caution: If you have a non-X.21 board, ensure that resistor packs are not present at locations RP15 and RP17; see Figure 1-3 as required.

1. Ground yourself to a metal part of the CHALLENGE M chassis.

    Caution: The ISA Sync board is extremely sensitive to static electricity; you must wear the wrist strap while installing it. The wrist strap prevents the flow of static electricity, which could damage the board.

    ■   Put the wrist strap over your wrist, making sure it is tight against your arm.

    ■   Attach its alligator clip to a metal part of the CHALLENGE M chassis.

2. Move the system or position yourself so that you are facing the ISA slots.

    The ISA slots are located on the left side of the system, behind the internal fan, as shown in Figure 2-4.
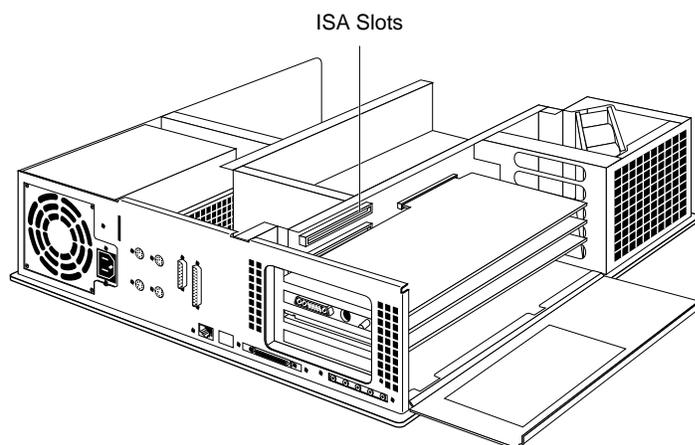
Figure 2-4   Locating the ISA Slots

3. Open the metal panel located in front of the ISA slots by pulling up on the door and lowering it, as shown in Figure 2-5.
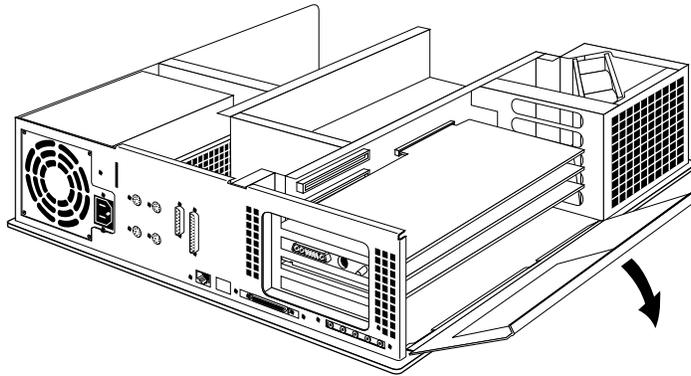
Figure 2-5   Opening the Metal Panel in Front of the ISA Slots

4. Remove the small cover over the slot in the back of the system in which you are installing the ISA Sync board.

    ■   Remove the screw that attaches the cover to the system. The screw is located inside the system on the outer end of the cover.

5. Install the board(s).

    Caution: If you are installing more than one ISA Sync board, ensure that each board has a different ID (see Figure 1-1 and Figure 1-2).

    ■   Align the right side of the board with the metal grooves on the right.

    ■   Align the connector on the left side of the board with the connector opening on the left. Push the board into the slot until the connector on the back of the board is securely connected to the port on the backplane, as shown in Figure 2-6.

    Note: You may install the ISA Sync board into any available ISA slot. If you have multiple ISA Sync boards (up to four), you can put any board into any slot. The slot location or order does not matter.

6. Insert and tighten the screw that holds the board to the chassis.

    The screw opening is located on the metal bracket on the upper left side of the board.
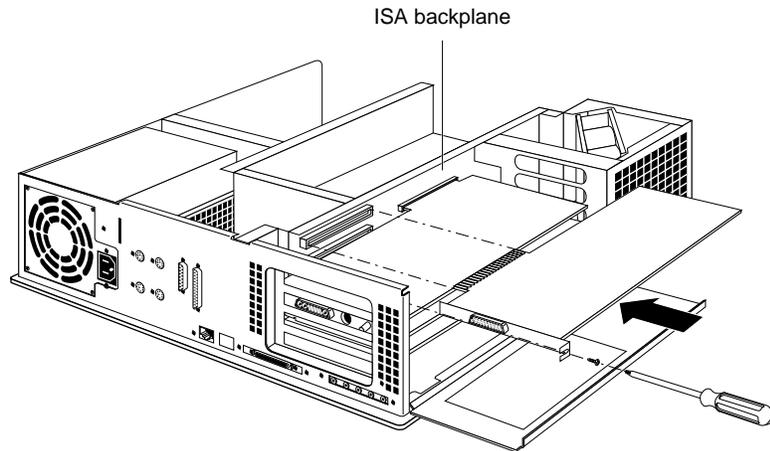
Figure 2-6   Installing the ISA Sync Board

7. Tip the metal panel up until it snaps into place, as shown in Figure 2-7.
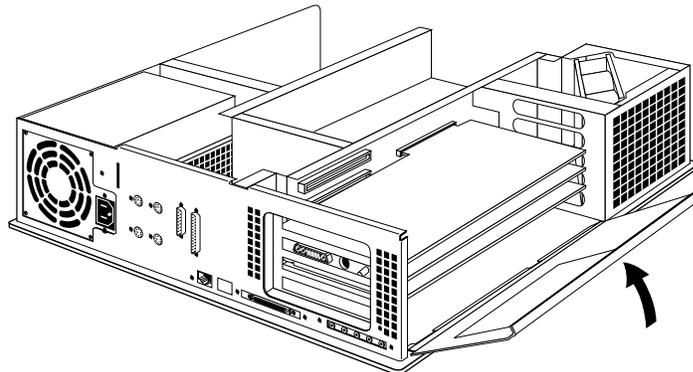
Figure 2-7   Closing the Metal Panel in Front of the ISA Slots

Replacing the Cover

To replace the cover, follow these steps:

1. Place the prongs on the underside of the cover into the slots under the top ridge of the backplane of the chassis, as shown in Figure 2-8.

2. Lower the cover onto the chassis until it snaps into place.
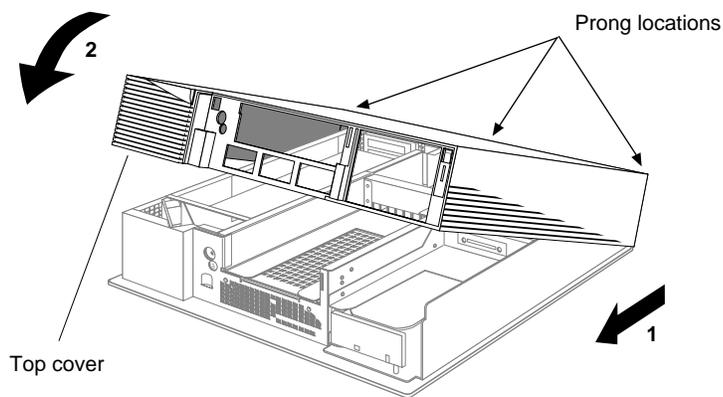
Figure 2-8   Replacing the Top Cover of the CHALLENGE M Chassis

3. Replace the front bezel.

   ■ Place the tabs on the bottom of the bezel in the grooves in the front of the chassis, as shown in Figure 2-9.

   ■ Tilt the bezel up until it snaps into place.
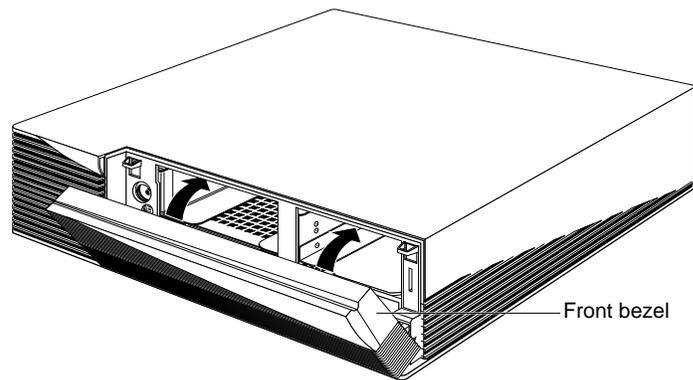
Figure 2-9   Replacing the Front Bezel on the CHALLENGE M Chassis

4.   Reconnect the power cable to the connector on the back of the system.

You are finished installing the ISA Sync board and are ready to attach the cables.

Attaching the Cables

Attach one end of each interface cable (EIA-232, X.21, or V.35) to a port on the ISA Sync board panel and the other end to a communications device.

Installing the ISA Sync Board Software

Follow the procedure in this section to install the ISA Sync board software from the distribution media onto your system.

Caution: The ISA Sync upgrade requires IRIX version 5.3 for proper operation. This version of the ISA software is not compatible with IRIX 5.2. If you attempt to load this new version of the ISA software with IRIX 5.2, the system crashes when you try to boot the system.

In addition, if you have an earlier version of the ISA software (running on IRIX 5.2), be sure to remove that version of the software before installing IRIX 5.3. Use the "remove" option from the *inst* program or the *versions remove* command to delete the necessary subsystems.

1. Power on your system, open a shell, and become superuser.

2. Insert the ISA 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
    ```

    The variable n indicates the ISA bus or adapter (board) number.

4. Reboot the system and continue by creating the configuration files, as described in Chapter 3, "Configuring Software for the ISA Sync Board."

All utilities are installed in the directory */opt/vcom/bin*.

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Verifying the Hardware Installation

Power on the system. At the system shell prompt, type *hinv*. You should see a display similar to the following:

```
ISA Synchronous Communications Board 0
```

The *hinv* command does not recognize the ISA Sync board until the drivers from the ISA Sync board CD-ROM have been loaded.

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Configuring Software for the ISA Sync Board

This chapter provides information for configuring the software for the ISA Sync board. Included are procedures that configure the board for the first time. 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:

- "Configuring the ISA Sync Board."
- "Configuring the ISA Sync Board for an Automatic System Boot."

Configuring the ISA Sync Board

This section provides a procedure for initially configuring the ISA Sync board. It describes how to download files to the board that allow the board to communicate with the host system. It also describes how to configure the board to run the SX25 and SNA gateway applications.

Overview of the Configuration Procedure

Following are the major tasks for configuring software so the ISA Sync 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. Create the ASCII configuration files.
3. Create binary images of the configuration files.
4. Reset the board.
5. Download the microcode image file.

6. Download the configuration files.

7. Prepare the networking protocol software to use the ISA Sync board.

Preparing to Configure the ISA Sync Board

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

- The ISA Sync board has been installed in the system and the address DIP switches on the board have been configured correctly. Follow the procedure in Chapter 2, "Installing the ISA Sync Upgrade."

- The IRIX 5.3 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 ISA Sync board for X.25 communications, check that the SX25 software is installed on your system. For installation instructions, refer to the *SX25 Administrator's Guide*.

- To use the ISA 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*.

Creating the Configuration Files

You need an ASCII configuration file for each channel (or port) that is to be active on the ISA 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 file content recommendations as follows.

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.

File Content Requirements

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_IP=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. Only
  Silicon Graphics system support engineers (SSEs) can change it.

- *PHY_IP=DTE*—Defines the channel as a DTE. This is the recommended
  setting. Only Silicon Graphics system support engineers (SSEs) can
  change it.

- *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).

- *ELECTRICAL_IF*—(EIA_232, CCITT_X21, CCITT_V35) Defines the electrical signaling protocol. The default is EIA_232.

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.

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 ISA 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 [**-b***Boardnum*] [**-c***Channel*]

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 ISA Sync board software utilities to retrieve information about the board configuration. Do not modify or remove either of these files.

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 -b*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."

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/x25.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 this 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 is, */opt/vcom/mcode/x25.lod*.

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

Two *vcom_vld* Command Examples

Following are two 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
```

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).

Two *vcom_cfg* Command Examples

The following shows two 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
```

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 ISA Sync board.

The ISA Sync board can be used in an X.25 network using the optional SX25 product. The procedure for configuring X.25 to run on the ISA Sync board is fully described in the *SX25 Administrator's Guide*.

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

Configuring the ISA 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/init2.d/vcom* or */etc/rc2.d/S29vcom*.

Following are 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.

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

Software Messages and Error Recovery

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

- ISA Sync board utility error messages
- ISA Sync board driver messages

ISA Sync Board Utility Error Messages

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

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*.

vcom_stat Status Messages

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

ISA Sync Board Driver Messages

This section lists the error messages that are produced by the ISA 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 startup procedure. If that does not clear the error condition, report the message to Silicon Graphics 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_bcarray 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 that should be reported to Silicon Graphics 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 ***
```

ISA Sync Board Specifications

The specifications for the ISA Sync Board are listed in Table B-1.

Table B-1   ISA Sync Board Specifications

Parameter	Specifications
Dimensions (length x width)	14 in. x 4.75 in. (356 mm x 121 mm)
Environmental	
Storage Temperature	-40 to 65 degrees C
Operating Temperature	0 to 50 degrees C
Relative Humidity	0 to 95% (noncondensing)
	Caution: The board 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.
Power	+5 VDC - 2.0A +12 VDC - 0.5A -12 VDC - 0.5A
	Note: These values do not include the current required for the termination of the driven serial communications signal lines.
Agency Compliance	FCC, VCCI, CISPR-22, DoC, VDE
MTBF	Approximately 30,000 hours
	Note: Predictions are based on MIL-HDBK-217E part stress analysis method and assume an ambient temperature of 55 degrees (C).

Glossary

CCITT

The International Consultative Committee for Telephony and Telegraphy, the X.25 regulatory body.

DCE

Data circuit-terminating equipment.

DTE

Data terminal equipment. The user equipment (computer, terminal, and so on) connected to a network.

ISO

International Standards Organization. An international organization comprising the standards bodies of each country. ISO has issued standards on many topics, including the OSI Reference Model for networking.

LAN

A local area network, where several hosts and devices are located near one another and connected physically by cables.

OSI Reference Model

Open System Interconnection Reference Model. A seven-layer model describing desirable network services and how and where they should be provided.

PAD

Packet assembler or disassember. A means of interfacing a character terminal to an X.25-based network.

SNA

Systems Network Architecture. A set of communications protocols developed by IBM for synchronous transmission of data.

WAN

A wide area network. Computers with long distances between them connected by, for example, telephone lines.

X.25

The CCITT recommendations covering network access protocols for ISO layers 1, 2, and 3 made in 1980, 1984, and 1988.

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