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1. Documentation for XL Users

This document describes how to operate the XL400 and XL1200. Once you have learned a few basic facts about the machine, you will find that using the XL is much like using other Symbolics-family computers.

The following document contains installation instructions:

Genera 8.1 Software Installation Guide

Users who are new to the Genera software environment will find useful introductory information in the following documents:

Genera Workbook

A set of hands-on exercises that encourage you to get started actively using various parts of the system.

Genera User's Guide

Conceptual material explaining how to use Genera, the editor, the mail system, the help facilities, the printer, the garbage collector, and other facilities.

Genera Handbook

Information on each of the function keys, the mouse functions, and a dictionary of commands.

The following sections of the document *Internals* are useful for XL systems programmers:

"Ivory-Only Subprimitives"

Information on how to use Ivory subprimitives to increase the performance of memory-intensive programs.

"SCSI Interface"

Documentation of how to physically attach a SCSI device to the XL and how to use the software interface to communicate with the device.

"VMEbus Interface"

Documentation of how to use the software interface to the VMEbus, to control VME peripherals.

The following document is intended for the Site Administrator:

Site Operations

Reference information on the tools used for site operations, such as the namespace editor, the FEP commands, the LMFS and FEP file systems, the mailer, and the print spooler.

2. XL Family System Description

The Symbolics XL-family machines consist of an Ivory-based Processor/Memory/VMEbus interface board, an I/O board, an optional Memory Expansion Board, and system peripherals. The system boards conform to the 9U x 400 mm Eurocard form factor and the VMEbus specification (Revision C.1). The VMEbus will provide connectivity to industry-standard VME products, such as bulk mass storage (non-paging) devices, standard peripherals, and color graphics subsystems.

The XL can be configured as a standalone machine, or in a network.

The processor accommodates seven VME slots. The XL boardset uses two of the slots. Up to three full-height 5.25-inch I/O devices may be configured in the package. These devices may be a combination of ESDI fixed disk drives and SCSI peripherals, including tape, fixed disk, or optical disk drives.

The XL family supports the full Genera environment. In addition, a set of layered products is available on the XL family.

When using the XL, you will be aware of four functional components:

Processor	The processor processes and stores data.
Display	The display includes the video screen and accompanying electronic components, and connections for the other components.
Keyboard	The keyboard enables you to communicate with the XL by typing commands and other information.
Mouse	The mouse provides a fast way to give the XL certain instructions, to provide graphic input, and to point to specific areas of the screen.

Taken together, the display, keyboard, and mouse are called the console.

2.1. The XL Processor

Fan

The processor is cooled by an internal fan. It is important not to block air flow to the fan. The fan takes air in at the bottom and sends air out at the top.

It is a variable-speed fan with a thermostat which controls the fan's speed. In normal operations (in an office or computer-room environment), the fan should be on low speed. In a warmer environment, or if several boards are plugged in, the fan will run at a higher speed.

Controls at the Front of Machine

At the front of the machine there is a panel with two switches.

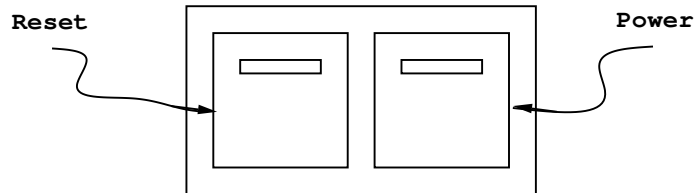


Figure 1. Front Panel of the XL

Power switch (the rightmost)

This switch is normally pressed in. The green light indicates that power to the machine is turned on. To power down the machine, you can press this switch to release it.

VMEbus reset switch (the leftmost)

Unlike the power switch, this is a momentary switch. Normally the switch is in the out (off) position. When you press the switch, you reset the VMEbus (in other words, SYSRESET* is asserted on the VMEbus). This action has an effect on each device on the VMEbus. The effect on the Ivory processor is to cold boot the FEP. The main memory and disk memory are preserved. You will notice that the display reverts to its initial state while the FEP kernel is cold booted, and then you will see the "FEP Command:" prompt. At that point you first give the Hello command, and then you can warm boot (by giving the Start command) or cold boot (by giving the Boot command), but you cannot Continue. See the section "Warm Booting" in *Genera User's Guide*.

When you remove the front machine cover, you see three slots. If a tape unit is present, it must occupy the top slot. Disks can occupy any of the three slots.

Optional Tape Cartridge Unit

The optional tape cartridge unit provides another means of entering, storing, and retrieving information. It is normally used to install new software or to back up data stored on the disk. The unit, if present, is located at the front of the machine, under the two switches.

The tape unit is a MCD-405/SCSI 3M tape drive. The tapes are DC 2000 cartridge tapes, which must be formatted in the gammamat format.

To insert a tape cartridge, just push the cartridge gently into the tape unit until it clicks into place. When you first insert a tape, the tape unit spends about ninety seconds performing initialization and "re-tensing" the tape cartridge.

To remove a cartridge, push the button to eject the cartridge, and then pull the cartridge out of the unit.

Controls and Connectors at the Back of Machine

At the back of the machine, near the floor, you will see the main power switch and the power cable.

Main power switch This is the main power switch to the system. If it glows red, power is on. Note that for the processor to be powered up, both the main power switch at the back and the power switch at the front of the machine must be turned on. Normally, you would use the power switch in front to power the machine up and down, because that switch is more convenient to reach than the main power switch.

Power cable This power cable connects the processor with the power source. The power cord should be connected to a source of 110 volt, 12 amp, AC power.

At the back of the machine, near the floor, on the right-hand side of the machine is a standard SCSI connector.

Inside the machine you will see two boards connected by an IMbus. The leftmost board is the main board (also called CPU board). The rightmost board is the I/O board. The main board must be in slot one, since that slot provides VMEbus arbitration and control.

2.1.1. Controls and LEDs on the XL Ivory Main Board

The Ivory main board has one control. Near the top of the back end of the board is a small pushbutton labelled RESET, which corresponds to the RESET button on the front panel. Pushing this button initializes the main and I/O boards, thus initializing Ivory (which has the effect of cold booting the FEP) without initializing any other board on the VMEbus.

The Ivory main board has the following connector on it:

IMbus connector System bus (160 pins) connector used by the XL boardset.

The Ivory's main board has four lights arranged in a vertical row, near the top of the board, as shown in Figure 2.

- Red light (indicates a hardware fault)
- Green light (indicates machine is running)
- Yellow light
- Yellow light

Figure 2. LEDs on the Ivory Main Board

Red light (labelled `FAULT`)

When it is on, a hardware fault has occurred and you should call Symbolics Customer Service for assistance. When the red light is on, the other lights give debugging information about the state of the machine. Note that the red light normally turns on for a short time during processor initialization, which occurs at power-up, init, and VME reset.

Green light (labelled `RUN`)

Should be on in normal operations. Unless the red light is on, the green light indicates that the FEP is operating. If the green light is on and the yellow lights are blinking, Lisp is active. If the green light is on and the yellow lights are off, the machine is in the FEP.

Yellow lights (labelled `U0` and `U1`)

When the green light is on, the yellow lights blink when Lisp is active.

While the machine is booting, it cycles through different light patterns for a brief period of time.

2.1.2. Connectors and LEDs on the Ivory I/O Board

There are several connectors on the Ivory I/O board. Starting from the top:

Serial connector A standard 25-pin serial connector.

IMbus connector System bus (160 pins) connector used by the XL boardset.

Direct-drive display connector

This connector is intended for a 100 MHz monitor. This connector is reserved for future use by Symbolics.

Phase-encoded video connector

This is where the standard Symbolics display should be attached, via a Hirose cable.

Ethernet connector This is a connector for an Ethernet transceiver cable.

The I/O board has five lights arranged in a vertical row, near the top of the board. Figure 3 describes what these lights mean.

- +12Volts (power to Ethernet transceiver)
- RCV (Ethernet Receive detected)
- CD (Ethernet Collision detected)
- XMT (Ethernet Transmit detected)
- SCSI (SCSI termination power supplied)

Figure 3. LEDs on the Ivory I/O Board

The top four lights give information about Ethernet activity. In normal operations, the top light should be solidly on (because power is flowing to the Ethernet transceiver), and the middle three lights should be flickering, indicating that traffic is flowing between this machine and the Ethernet.

The bottom light is normally on, which means that the I/O board is supplying termination power (5 volts) to the SCSI bus. If you have changed the configuration of the I/O board to get termination power from a SCSI device (and not from the I/O board), the bottom light is off. For information on how to control which device supplies the termination power, see the section "Attaching a SCSI Device" in *Internals*. For information on the SCSI software interface, see the section "SCSI Interface" in *Internals*.

2.2. The Display Hardware

The Symbolics display is air-cooled. No fans are required. Air flows through vents in the back of the cabinet by convection. It is normal for the top of the display to feel warm to the touch. When possible, avoid placing the display in direct sunlight with the power on.

CAUTION: Never place objects so they block air flow. Do not place objects containing liquids on or near the top of the display. Spilled liquids can seriously damage the display.

The display controls and connectors are located at the rear of the unit. The AC power controls are on the left side of the rear of the display. They are the AC power switch, AC line cord connector, and fuse.

The connectors on the rear of the display connect the unit to other devices. Each connector is labeled.

The keypad, mouse, and keyboard connectors on the front of the console permit the connection of these devices to the display.

The processor connector on the rear of the console connects the display to the processor using a cable provided by Symbolics.

You can clean the Symbolics display screen periodically with TFC Optical Cleaner and a soft cloth or paper towel. We recommend using only the TFC Optical Cleaner (which is manufactured by OCLI, Inc.), because other cleaning solvents might permanently damage the anti-glare coating on the display screen.

For more information, see the section "The Display" in *Genera User's Guide*.

2.3. The Keyboard

There are 88 keys on the Symbolics keyboard. The keyboard has unlimited rollover, meaning that a keystroke is sensed when the key is pressed, no matter what other keys are held down at the time.

The keys are divided into three groups: special function keys, character keys, and modifier keys. Special function keys and character keys transmit something. They have black labels and are typed in sequence. Modifier keys are intended to be held down while a function or character key is typed, to alter the effect of the key. They have red labels.

Function Keys	FUNCTION, ESCAPE, REFRESH, CLEAR INPUT, SUSPEND, RESUME, ABORT, NETWORK, HELP, TAB, BACKSPACE, PAGE, COMPLETE, SELECT, RUBOUT, RETURN, LINE, END, and SCROLL
Character Keys	a b c d e f g h i j k l m n o p q r s t u v w x y z 0 1 2 3 4 5 6 7 8 9 : - = ' \ () ; ' , . / and the space bar.
Modifier Keys	LOCAL, CAPS LOCK, SYMBOL, SHIFT, REPEAT, MODE LOCK, HYPER, SUPER, META, and CONTROL

The following keys are reserved for use by the user (for example, for custom editor commands or keyboard macros):

```
CIRCLE
SQUARE
TRIANGLE
HYPER
```

To get information about the keyboard, press the SYMBOL and HELP keys simultaneously.

You can have keys repeat if they are held down. This feature is disabled by default, but you can enable it by setting **si:*kbd-auto-repeat-enabled-p*** to **t**.

```
(setf si:*kbd-auto-repeat-enabled-p* t)
```

The speed of repetition is controlled by **si:*kbd-repetition-interval***. See the variable **si:*kbd-repetition-interval*** in *Genera User's Guide*.

You can exempt certain keys from auto-repetition using the function **si:set-auto-repeat-p**. For example, to make SQUARE one of the keys that do not auto-repeat, you would type:

```
(si:set-auto-repeat-p #\Square nil)
```

See the function **si:set-auto-repeat-p** in *Genera User's Guide*.

You can customize key bindings; see the section "Setting Key Bindings in Init Files" in *Genera User's Guide*.

If you have a MacIvory or a UX400S, there is a mapping from those keyboards to the Symbolics special keys. For the MacIvory, see the section "Using the Genera Application on a MacIvory" in *MacIvory User's Guide*. For the UX400S, see the section "Symbolics UX Keyboard Templates" in *User's Guide to the Symbolics UX*.

2.4. The Mouse

The mouse is a pointing device that can be moved around on a flat surface. These motions are sensed by Genera, which usually responds by moving a cursor around on the screen in a corresponding manner. The shape of the cursor varies, depending on context.

There are three buttons on the mouse, called Left, Middle, and Right. Typically you point at something with the mouse and specify an operation by clicking the mouse buttons. "Chorded clicks", indicated by a modifier key (c-, m-, c-m, sh-, c-sh, m-sh, and s-) perform different actions than single clicks. In any specific context, there are up to 96 operations that can be performed with the mouse, invoked by Left, Middle, Right, and chorded clicks. Some of these operations are local to particular programs such as the editor, and some are defined more widely across the system.

Typically the operations available by clicking the mouse buttons are listed in the mouse documentation lines at the bottom of the screen. The mouse documentation lines change as you move the mouse around or run different programs.

Sometimes holding a mouse button down continuously for a period of time is also defined to perform some operation, for example, drawing a curve on the screen. This is indicated by the word "Hold". For example, "Middle Hold" means to press the middle mouse button down and hold it down, releasing it only when the operation is complete. "sh-Left Hold" means hold down the SHIFT key and press the left button, then release the SHIFT key but hold the left button down until the operation is complete.

3. Operating the XL

The operation of your XL-family machine depends on the tasks you want to perform. However, a few important items are common to all aspects of XL operation.

3.1. Powering the XL up and Down

We discuss powering up and down briefly here, but for complete information on booting, see the section "Starting Up" in *General User's Guide*.

Powering Up

Ordinarily, leave your XL processor and console turned on all the time. If you do power down, however, follow these steps to power up the unit:

1. Turn on the display AC power switch.
2. Turn on the processor AC power switch. In a few seconds the display screen will give this prompt:

FEP Command:

You should type the following:

Hello

Press the RETURN key to activate the command.

3. A few lines of text appear on the screen. Then you see again:

FEP Command:

Now you should type:

Boot

Press the RETURN key to activate the command.

4. Numbers and text appear on the screen as the machine performs start-up routines. After a few minutes, a full-screen display appears. This display is called the herald. It describes your system. Beneath the herald you'll see:

Please login.

Command:

You're now ready to enter commands.

Powering Down

Caution: Be sure all the information you want to save has been stored on the disk. Once you've entered the Halt Machine command, you have stopped the computer. If you use the Boot command to power up, anything you have not saved on disk — such as text or mail — is immediately lost.

To activate each of the following commands, press RETURN.

1. Type the command:

Logout

2. Type the command:

Halt Machine

This command then asks whether you are sure you want to halt the machine. Answer yes. This brings you back to the prompt you saw when you powered up:

FEP Command:

Type the command:

Shutdown

This command asks whether you are sure. Answer yes.

3. Now you have two choices:

- You can leave things as they are. This is the better choice when you don't have to turn the AC power off.
- You can turn your AC power off manually, using the power switches on the console and processor.

3.2. Using Local Commands on the XL

You can customize your display by using Local commands. These commands are called Local commands because they affect the display only.

The commands are implemented by pressing the LOCAL key on the keyboard, and holding it down while pressing the appropriate character key.

This key controls local console functions on XL-family and 3600-family machines:

LOCAL-D	Makes the screen dimmer.
LOCAL-B	Makes the screen brighter.

LOCAL-Q	Makes the audio quieter.
LOCAL-L	Makes the audio louder.
LOCAL-G	Rings the bell.
LOCAL- <i>n</i> LOCAL-C	Changes the contrast of the screen. <i>n</i> is a digit between 1 and 4. 4 is greatest contrast.
LOCAL-T	(Test Mode). Sends input from the keyboard to the console serial port as ASCII characters. Since most users do not have anything connected to the serial port, this effectively usurps console input.
LOCAL-O	Exits from Test Mode.
LOCAL-ABORT	Resynchronizes the console, resetting all LOCAL settings to their initial state.

Related Lisp functions:

tv:screen-brightness

sys:console-volume

LOCAL does not work on MacIvory or UX-family machines.

3.3. When Things Go Wrong with the XL

This section provides solutions to some common situations. If you experience a problem with your XL-family machine, try the suggestions listed here. If the problem persists, contact your Symbolics service representative for further assistance. Note the status of the XL board LEDs to tell your Symbolics service representative.

- When nothing happens when keys are pressed — screen is bright or fuzzy and no characters appear
 - Check the cable from the processor to the display.
 - Check the processor: power on, cable OK.
- When keystrokes have no effect
 - Check the bottom center of the screen. If "Run" appears with a steady or flashing underline, then the XL is processing. Wait until you see "User Input" instead of "Run", and try again.
 - Check the keyboard: is it plugged into the display?
 - Check the clock (lower left corner of the screen). If the clock is not running, check the processor (as described above).

If the clock is running, the system is functioning. Try these steps, one at a time, seeing if Lisp responds to commands after each one:

Press `ABORT`.

Press the `CONTROL` and `ABORT` keys together.

Press the `CONTROL`, `META`, and `ABORT` keys together.

See the section "Recovering From Errors and Stuck States" in *Genera User's Guide*.

- When the mouse does not work
 - Check the cable: is it plugged into the display?
- When the screen is dark
 - Press any key. The screen saver might be operating.
 - Press and hold the `LOCAL` key, and press and hold the `B` key. This increases the brightness of the display.
 - Check the display AC power cord and power switch.
 - Power cycle the console.
 - Check the processor.
- When you hear random noise from the display speaker
 - Power cycle the console.
 - Try to warm boot, by giving the `Start` command.
 - Press and hold the `LOCAL` key, and press and hold the `Q` key. This quiets the display audio.
- As a last resort
 - Press the VMEbus reset switch on the front panel of the machine. Then give the `Hello` command to the FEP, and give the `Start` command to warm boot.

For more information and suggestions, see the section "Recovering From Errors and Stuck States" in *Genera User's Guide*.

Note that you are warned at boot time if the Floating Point Accelerator (FPA) could not be enabled:

Warning: Floating point coprocessor is missing, defective, or disabled.

The XL is capable of running without a Floating Point Accelerator, so you can continue to use your machine, although performance will be reduced. You should call Symbolics Customer Service to have the FPA repaired.

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