# ZLX Graphics Accelerator Modules

# Owner's Guide

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## Guide Overview

### Purpose

This guide provides general information on the ZLX graphics accelerator modules (PMAGC–DA, and PMAGC–EA), and specific information for servicing the modules. The information is independent of hardware platform. For hardware installation information, see your hardware systems documentation.

### Audience

This guide is intended for anyone seeking general information on the ZLX modules, and for Digital service personnel seeking specific service information.

### Contents

This guide provides the following information:

- Description of the module
- Setting jumpers
- Installation
- Confirming proper installation
- Running self-tests
- Stereo viewing
- Module layouts
- Information for Digital service engineers

### Conventions

The following conventions are used in this guide:

| | |
|---|---|
| `lowercase` | Lowercase monospaced letters indicate a command that you must enter exactly as shown. For example: the `show config` command. |
| **CAUTION:** | Cautions provide information to prevent damage to equipment or software. Read these carefully. |
| **IMPORTANT:** | Important notations provide information to allow your system to work properly. |

## Description of the Modules

### Purpose

The ZLX graphics accelerator modules are TURBOchannel-based 2D/3D graphics accelerators. They enable the use of applications requiring accelerated 2D or 3D graphics, such as mechanical CAD, molecular modeling, scientific visualization, simulation, and animation. When used with the J300 Sound and Motion module, the ZLX graphics accelerator modules integrate graphics with multimedia applications.

### Module Variations

There are two variations of the ZLX graphics accelerator module, as summarized in Table 1.

**Table 1 Module Variations**

| Designation | Order No. | Occupies | Memory |
|---|---|---|---|
| ZLX-L1 Module | PMAGC–DA | 2 slots | 4 Mpixels |
| ZLX-L2 Module | PMAGC–EA | 3 slots | 8 Mpixels |

### Software

The ZLX graphics accelerator modules require DEC Open3D software and the appropriate operating system version, as shown in Table 2.

**Table 2 Software Versions**

| Module Variation | Open3D Software | DEC OSF/1 Software | OpenVMS Software |
|---|---|---|---|
| ZLX L1 | 2.4 | 3.0 | 6.1 |
| ZLX L2 | 2.4 | 3.0 | 6.1 |

Refer to the DEC Open3D installation guide for software installation procedures.

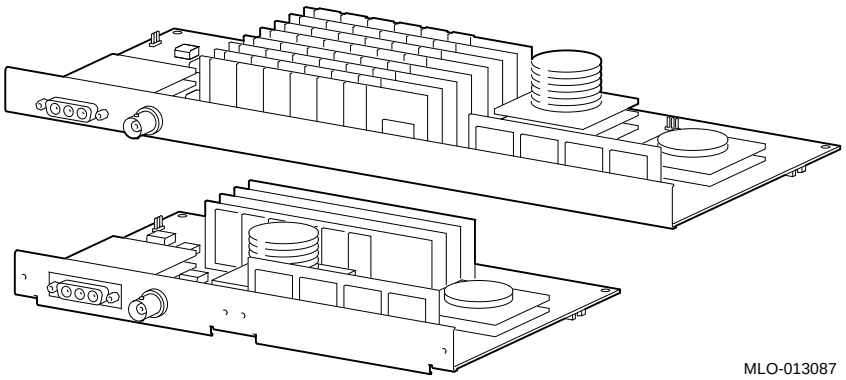
### Monitors

The ZLX graphics accelerator modules support 66 Hz monitors, such as the VRT19-D and VRT16-D, and 72 Hz monitors, such as the VRT19-H and the VRT16-H.

## Illustrations

The ZLX-L1 and ZLX-L2 modules are shown in Figure 1.

**Figure 1 ZLX-L1 and ZLX-L2 Graphics Accelerator Modules**



## Setting Jumpers

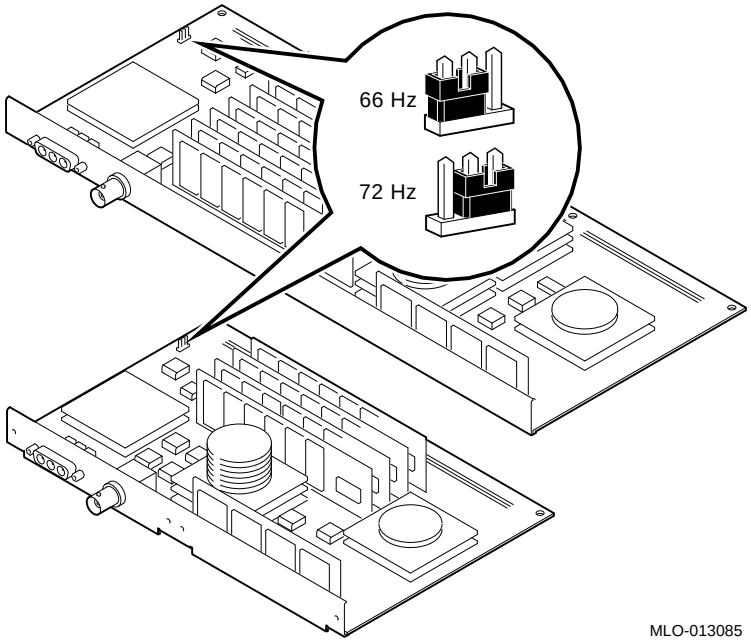
### Two Jumpers

The ZLX graphics accelerator modules contain two configurable parts, a jumper for selecting the monitor, and a jumper for updating the EEPROM firmware. The locations of these jumpers are shown in Figure 2, and Figure 3.

### Monitor Jumper

Monitor jumpers allow the ZLX graphics accelerator module to work with monitors that use 66 Hz and 72 Hz refresh rates. Set the jumpers as shown in Figure 2.

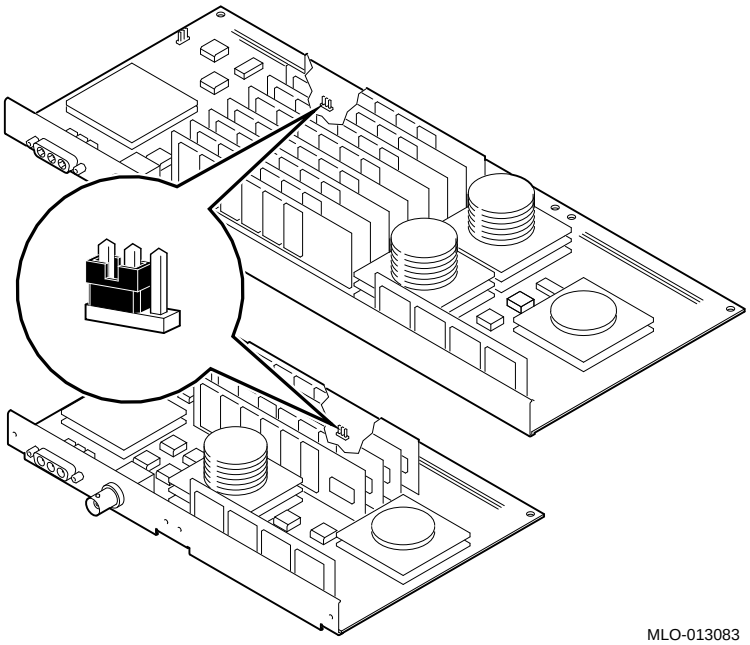
**Figure 2 L1 and L2 Monitor Jumpers**



## EEPROM Jumper

The jumper for the EEPROM is normally in the position shown in Figure 3. To prevent firmware from being changed, move the jumper to the other position.

**Figure 3 L1 and L2 EEPROM Jumper Location**



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## Installation

See the system documentation, or options documentation, that came with your workstation for installation instructions.

**CAUTION: Module Damage**

To avoid damage from static discharge, you must wear an antistatic wrist strap. Instructions for use are on the strap envelope.

**IMPORTANT: Grounding Module**

When installing a module inside a system, make sure that you use the screws that came with the module to fasten the module to the enclosure, thus grounding the module.

## Confirming Proper Installation

### Procedure

To confirm that the module is installed properly, do the following:

| Step | Action |
|---|---|
| 1 | Turn on the monitor. |
| 2 | Turn on any peripheral devices connected to the system unit. |
| 3 | Turn on the system. |
| 4 | Enter the `sho config` command. |

**Successful Installation:** PMAGC, PMAGC–DA, or PMAGC–EA appears in the configuration display and no errors are reported.

**Unsuccessful Installation:** The module designation does not appear in the configuration display. Move the module to another slot and try again. If the module still does not appear in the configuration display, contact your Digital service representative.

## Running Self-Tests

### Console Mode

Self-tests are run in console mode.

**Note**

References to slot numbers are used in the examples. Although a module physically occupies 2 or 3 slots, only one of those slots is recognized by the system. This is the slot number that appears in the `sho config` display.

### Command Format

The command format for running a test is `t tc# testname`. For example, for a module residing in TURBOchannel slot 2, to run the `vdac` test, type the following at the prompt:

```
>>> t tc2 vdac
```

### Available Module Tests

To determine which self-tests are available, type:

```
>>> t tc2 ?
```

`tc2` is the TURBOchannel slot used for the module.

**Table 3 Self-Tests**

| Test | Function |
|---|---|
| `init` | Initializes the PMAGC module. |
| `cnfg` | Prints PMAGC configuration message. This includes version numbers for firmware and chips, the size of the visible pixel map (VSIZE), the size of the update array (USIZE), and the video refresh frequency. |
| `initc` | Initializes PMAGC module for console use. |

(continued on next page)

**Table 3 (Cont.) Self-Tests**

| Test | Function |
|---|---|
| putc | Draws a character on the console and updates the cursor position. It handles control characters: backspace, newline, and carriage return. |
| sram | Tests SRAM. |
| sramaddr | Tests SRAM addressing. |
| sramv | Tests SRAM. |
| sramdump | Prints SRAM contents. |
| vdac | Tests Bt463 I/O and functionality. |
| vdacsi | Tests serial input to Bt463. |
| vdacstat | Prints Bt463 state. |
| curs | Tests Bt431 I/O. |
| cursstat | Prints Bt431 state. |
| fb | Tests VDRAM data bits. |
| fbaddr | Tests VDRAM addressing. |
| fbdump | Prints VDRAM contents. |
| fbinit | Initializes VDRAM. |
| pva | Tests PVA I/O. |
| pvaint | Tests PVA interrupts. |
| pvadma | Tests PVA DMA. |
| pvatlb | Tests PVA tlb. |
| pvastat | Prints PVA state. |
| pv | Tests PV I/O. |
| pvfunc | Tests PV functionality. |
| pvstat | Prints PV state. |
| pat | Displays test patterns. |
| reset | Toggles reset line on PMAGC module. |

## Available Scripts

Scripts are groups of tests and provide a convenient way to run related tests consecutively. You run scripts using the same format as the individual tests.

**Table 4 Scripts**

| Name | Function |
|---|---|
| `cnsltest` | Tests console functionality. It runs `cnsltest` for all modules that have a console driver. Tests include opt 1 1, pva 0, vdac 0, fbinit 0 -1, and opt 1 0. |
| `pst-q` | Runs quick test of overall functionality. This script is for power-up, not for troubleshooting. Tests include pva1, sram 1, sramaddr, curs 0 1, curs 1 1, vdac 2, pv 1, fbaddr, and fbinit. |
| `pst-t` | Runs thorough test of overall funcionality. This script is for power-up, not for troubleshooting. Tests include pva1, sram 1, sramaddr, curs 0 1, curs 1 1, vdac 4, pv 1, pvaint 4, pvadma 14 1, pvatlb 7, fb 00000000, fb FFFFFFFF, fbaddr, vdacsi, pvfunc 10, and fbinit. |
| `pst-m` | Runs manufacturing test. This script is for troubleshooting, and runs all of the diagnostics. Tests include pva1, sram 3, sramaddr, curs 0 1, curs 1 1 vdac 5, pv 1, pvaint 4, pvadma 14 0, pvadma 14 1, pvatlb 7, fb 00000000, fb FFFFFFFF, fb 55555555, fb AAAAAAAA, fbaddr, vdacsi, pvfunc 10, pat, and fbinit. |
| `script tstall` | Runs all tests. |

## Stereo Viewing

StereoGraphics, a leading manufacturer of true stereo viewing systems, produces equipment to allow stereo viewing applications to work with your ZLX graphics accelerator module.

For more information, please contact them at:

StereoGraphics
2171 East Francisco Boulevard
San Rafael, California 94901
Telephone: (415) 459-4500
FAX: (415) 459-3020

### Stereo Monitor

Stereo viewing requires that the video monitor support a special stereo frequency mode. The VRC21–HA/H4 video monitor supports this stereo mode as well as video monitors available from other vendors.

## Appendix A - Handling Problems Worksheet

If you have a problem, please fill in the following information before calling for assistance. It will help your Digital representative to identify the problem quickly.

System Name/Model Number? _____

System Serial Number? _____

Module Information (from `sho config` command)?

_____

Operating System & Version? _____

DEC Open3D software version? _____

Monitor Name/Model Number? _____

Setting of Monitor Jumper? _____

Setting of EEPROM Jumper? _____

Error Received? _____

Tests Attempted & Results?

_____

_____

_____

_____

_____

_____

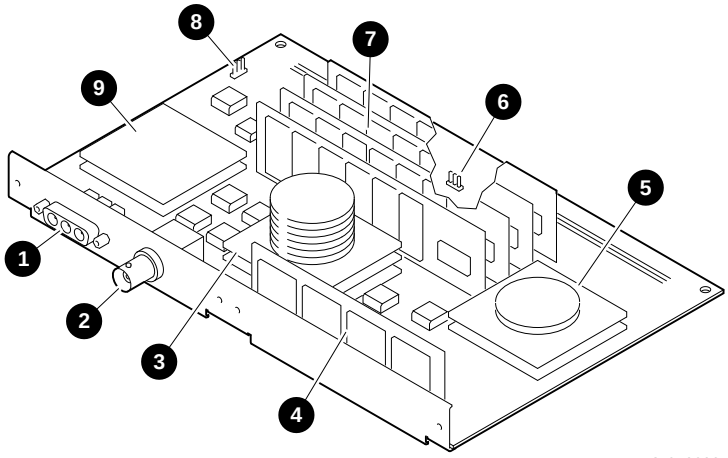
_____

_____

# Appendix B - Module Layouts

## PMAGC–DA

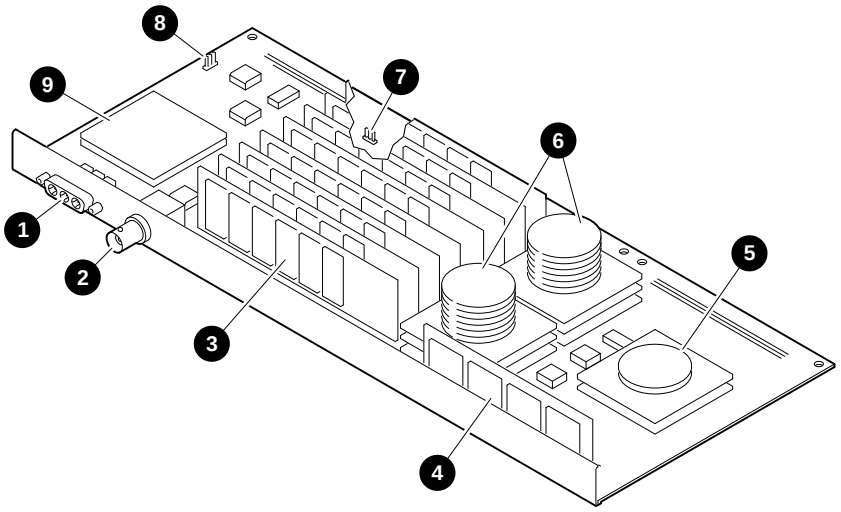
The following illustration shows the layout for the PMAGC–DA module.




1. Video port
2. Stereoscopic viewing port
3. Rendering chip
4. Coprocessor memory
5. PVA (ASIC) Chip
6. Flash EEPROM jumper
7. Memory
8. Monitor jumper
9. Video digital/analog converter (VDAC)

## PMAGC–EA

The following illustration shows the layout for the PMAGC–EA module.




❶ Video port

❷ Stereoscopic viewing port

❸ Memory

❹ Coprocessor memory

❺ PVA (ASIC) Chip

❻ Rendering chips

❼ Flash EEPROM jumper

❽ Monitor jumper

❾ Video digital/analog converter (VDAC)

# Appendix C - For Digital Service Use

## FRU/Order Numbers

See Table 5 to order field replaceable units (FRUs) for the customer.

**Table 5 Module FRUs**

| FRU | Order Number |
|---|---|
| ZLX–L1 Module | 54–23767–01 |
| ZLX–L2 Module | 54–23769–01 |
| Antistatic wrist strap | 12–36175–01 |
| Cable | 17–02906–01 |

## Power Up Self-Test (POST)

The power-up self-test runs the `cnsltest`, `pst-q`, `pst-t`, or `pst-m` scripts, depending on the environment variables.

## Error Message Format

Errors use the following format:

```
?TFL: 0/testname(PMAGC) (+1+ yyyyyy)
```

- `0` is the slot number
- `testname` is the name of the test
- `1` is the test number. If the test has multiple subtests, this is the subtest that failed.
- `yyyyyy` is the specific test failure information

## Other Error Messages

A "Test not found" error uses the following format:

```
?TNF: testname
```

`testname` is the name of the test that does not exist.

If the test generates a bus error, the following message appears:

```
?UEX: testname
```

`testname` is the name of the test that was running when the bus error was generated.

## Firmware Updates

When updating firmware, the EEPROM jumper must be in the "Program" position, as shown in Figure 3. To prevent updates, move the jumper to the other ("Secure") position.

## Module Support

For ZLX graphics accelerator modules support, the system needs to be at a minimum revision level, as shown in Table 6.

**Table 6 Minimum Required Revision Levels**

| Platform | Etch Revision | Circuit Revision |
|---|---|---|
| DEC 3000 Model 900 | SYS B<br>IO B | A01<br>E03 |
| DEC 3000 Model 800 | SYS B<br>IO A | B01<br>A01 |
| DEC 3000 Model 700 | SYS A<br>IO B | A01<br>A01 |
| DEC 3000 Model 600 | SYS A<br>IO A | A02<br>E03 |
| DEC 3000 Model 500 | SYS D<br>IO F | J05<br>J06 |
| DEC 3000 Model 400 | SYS D<br>IO F | H09<br>H10 |
| DEC 3000 Model 300 | SYS C<br>IO D | C05[1]<br>E01 |

[1]Revision C modules for Digital internal use only

# How to Order Additional Documentation

## Technical Support

If you need help deciding which documentation best meets your needs, call 800-DIGITAL (800-344-4825) and press 2 for technical assistance.

## Electronic Orders

If you wish to place an order through your account at the Electronic Store, dial 800-234-1998, using a modem set to 2400- or 9600-baud. You must be using a VT terminal or terminal emulator set at 8 bits, no parity. If you need assistance using the Electronic Store, call 800-DIGITAL (800-344-4825) and ask for an Electronic Store specialist.

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| Canada | Phone: 800-267-6215<br>Fax: (613) 592-1946 | Digital Equipment of Canada Ltd.<br>100 Herzberg Road<br>Kanata, Ontario, Canada K2K 2A6<br>Attn: DECdirect Sales |
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[1]Call to request an Internal Software Order Form (EN–01740–07).

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**Owner's Guide**

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Thank you for your assistance.

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| Clarity (easy to understand) | ☐ | ☐ | ☐ | ☐ |
| Organization (structure of subject matter) | ☐ | ☐ | ☐ | ☐ |
| Figures (useful) | ☐ | ☐ | ☐ | ☐ |
| Examples (useful) | ☐ | ☐ | ☐ | ☐ |
| Index (ability to find topic) | ☐ | ☐ | ☐ | ☐ |
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For software manuals, please indicate which version of the software you are using: _____

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