

Standard Drawing Library

Installation Manual

for the

VxWorks[®] Real-time Operating System

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Preface

This manual contains the information necessary to install the Standard Drawing Library and the other Scaleable Graphics Libraries for use with Wind River Systems' VxWorks Real-time Operating System running on a Motorola MVME1603 or MVME1604.

See the **SDL C Reference Manual** for descriptions of the C Graphics Functions provided by the Standard Drawing Library.

See the **SDL Programming Manual** for programming examples.

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Overview

This guide describes the installation process to install the Peritek Standard Drawing Library on a UNIX host for use with VxWorks 5.2 on a Motorola MVME1603-001 PowerPC-based target platform. Figure 1 shows a typical system configuration consisting of a host development platform, a MVME1603-001 CPU card in a VME chassis, a VGA monitor, an Ethernet link and a serial link.

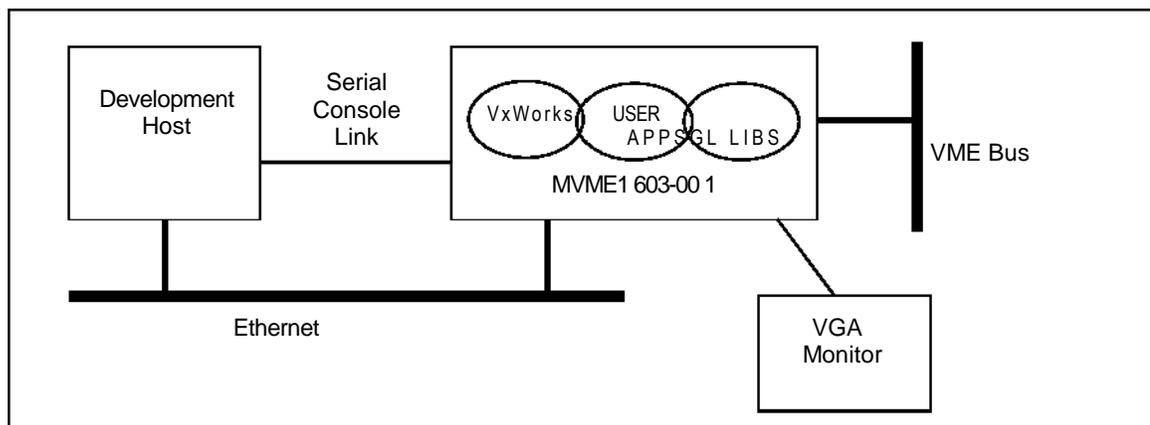


Figure 1: Typical System Configuration

The Standard Drawing Library (SDL™) is the base library of the Scaleable Graphics Libraries (SGL) system. The SDL consists of a driver library for a specific graphics output hardware or device, and user configuration files supplied in source form. A family of optional libraries are also available to be linked with the SDL. The optional libraries require the SDL, which must be installed first. The Scaleable Graphics Libraries are linked with user written application programs on the host development platform using cross development tools and downloaded to the target system (or ROMed) for execution. The SGL system for VxWorks/PowerPC was developed with the Green Hills PowerPC tool chain, version 1.8.7.

After the software is installed, users may customize the configuration for their particular application. The SDL and graphics drivers come pre-configured for a standard VGA display (640x480x8) with four fixed width and 12 proportionally spaced fonts and a 256 color palette. Additional fonts are available in the optional font library.

Any optional libraries may be installed after the SDL is installed by using the same procedure outlined in installation Step 1 below.

Installation Steps

The SGL system is distributed on CDROM or via ftp in Unix tar format. The steps involved in installation are:

- Create a directory for the SGL libraries and configuration files
- Read the files from the distribution media to disk
- Review the default configuration and edit if necessary
- Download and run the demonstration program

QUICK START FOR EXPERIENCED USERS

- (a) Create a directory to contain the sgl files (e.g. **/usr/local/sgl**),
- (b) Using *tar*, read the files off the distribution media into the sgl directory,
- (c) Edit the **Makefile** file in the **demo** directory to adjust the directory paths for your system,
- (d) Download the demo program from the **demo** directory to your VxWorks target and start it by typing **main** at the VxWorks console prompt. The demonstration program runs continuously until killed from the shell.

DETAILED STEP BY STEP INSTRUCTIONS**STEP 1: CREATE THE DIRECTORY AND READ THE TAPE**

- (a) Change to the desired installation directory, e.g.:

```
% cd /usr/local
```
- (b) Create a directory to put the SGL files and libraries in:

```
% mkdir sgl
```
- (c) Change to the **sgl** directory:

```
% cd sgl
```
- (d) Insert the SDL distribution tape (floppy) into the tape (floppy) drive.
- (e) Extract the tape's (floppy's) contents using **tar**:

```
% tar xvf /dev/devname
```

where *devname* is the tape or floppy device (e.g. st0, mt, fd0).
- (f) Repeat steps (d) and (e) for any optional SGL libraries or products.

STEP 2: REVIEW THE DEFAULT CONFIGURATION

The Standard Drawing Library and drivers come pre-configured and ready to use. However, several files are supplied in source form to allow user customization of the installed fonts, color palette and, with some drivers, the desired screen resolution. The files **fonts.c**, **palette.c** and **userinit.c** and are contained in the **user** directory. To review the default configuration, use the following steps.

- (a) Change directories to the **user** directory:

```
% cd user
```

- (b) List, view or edit the **fonts.c** file:

```
% more fonts.c
```

This file contains the list of fonts to be installed and made available to user application programs. The default configuration includes all 16 supplied fonts. To change the list of installed fonts, refer to the next section of this guide: *Installing Fonts*.

- (c) List, view or edit the **palette.c** file:

```
% more palette.c
```

This file contains the red-green-blue (RGB) values programmed into the color palette or lookup table (LUT) in the graphics hardware. The default configuration contains 256 entries. To change individual color entries or the entire palette, refer to the *Installing A Palette* section of this guide. The **colors.h** include file supplied as part of the SDL contains macro definitions matching color names to palette indices. If a different palette is used, or if any palette entries are modified, this include file will no longer be valid.

- (d) List, view or edit the **userinit.c** file:

```
% more userinit.c
```

This file sets the video mode (screen resolution and bits per pixel), the color/grayscale flag and the number of fonts installed. The default value for the video mode is set to the macro value M640X480X8, as defined in the driver include file (**include/drv/drivertype.h**). The supported values for this parameter are shown in Table 2. The **_grayscale** flag is set to one to select a palette with 256 shades of gray. The default value of zero selects the color palette defined in the file **palette.c**. Depending on the graphics hardware and driver being used, settings other than the defaults may not be supported. The **_numFonts** variable is set to match the number of fonts installed in the **fonts.c** file. The macro NUM_FONT is defined in the **fonts.c** file.

- (e) Edit the supplied Makefile to set the paths for the development tools (compiler, librarian, linker, etc.) to the correct pathnames for your cross development environment. If no changes were made to any of the configuration source files, this step can be skipped; although if future changes are anticipated, now would be a good time to put in the correct pathnames.
- (f) If any changes were made to the configuration source files, recompile the **userinit.c** file:

```
% make
```

STEP 3: DOWNLOAD AND RUN THE DEMO PROGRAM

A pre-compiled and linked demonstration program can be downloaded to the target system to verify proper installation and operation of the hardware and software.

- (a) If any changes were made to the configuration source files, change directories to the **demo** directory and re-link the demo program with the updated **userinit.o** (see *the Rebuilding the Demo Program* section for additional details):

```
% cd ../demo %
make
```

- (b) Connect a VGA monitor to the target hardware and powerup the hardware and monitor.
- (c) Start VxWorks on the target system and at the shell prompt, download the demo program and run it:

```
> cd "/usr/local/sgl/demo"
> ld<demo
> main
```

The demonstration program runs continuously until killed from the shell.

Video Mode	Resolution	Colors
M640X480X8	640h x 480v	256
M800X600X8	800h x 600v	256
M1024X768X8	1024h x 768v	256
M1152X900X8	1152h x 900v	256
M1280X1024X8	1280h x 1024v	256

Table 1: Supported Video Modes

Installing Fonts

The fonts used by user application programs must be installed during SDL initialization. The selection of installed fonts is controlled by the user by editing the sample **fonts.c** file, located in the **user** directory. This file is included by the **userinit.c** file. (A listing of **userinit.c** is shown at the end of this guide.)

The **fonts.c** file contains three items: a macro defining the number of fonts to be installed, an extern declaration for each font to be installed and a global array of pointers to font structures. The sample **fonts.c** distributed as part of the SDL library installs all 16 of the fonts included in the base distribution. (A listing of **fonts.c** is shown at the end of this guide.)

If all of these fonts are not used, the unused fonts can be removed from the table to save memory. To remove a font, edit the **_fontTable** array and delete the entry for the font to be removed. To add a font to the table, add the name of the font structure to the list of fonts in the extern declaration and add a pointer to the font structure to the **_fontTable** array. If the number of entries in the **_fontTable** array has changed, edit the **NUM_FONTS** macro definition to show the correct number of fonts to be installed.

If changes are made to the **fonts.c** file, recompile **userinit.c** and re-link the application program with the updated **userinit.o** file.

To select a particular font, use the **setFont()** library call and pass it the index number in the **_font Table** array of the desired font.

Additional fonts are available with the optional **Font Library** which provides a set of 200+ fixed width and proportionally spaced fonts to select from.

Installing A Palette

The default color palette used by SDL is programmed from values contained in the file **palette.c**, located in the **user** directory. This file is included by the **userinit.c** file.

The **palette.c** file may be edited to create a custom palette for special applications. The **palette.c** file contains the definition of the global array **_DAC_color_256**. This array contains 256 sets of three byte (R-G-B) entries. Depending on the hardware used, each RGB entry may be an 8-bit value (0-255) or a 6-bit value (0-63). Most VGA/SVGA chips are limited to 6-bit values.

The color for any given index may be changed by simply editing the RGB values for that index. In addition, there are eight unused entries at the end of the table that can be used for user defined colors.

If changes are made to the **palette.c** file, recompile **userinit.c** and re-link the application program with the updated **userinit.o** file.

To select a particular color, use the **setForeground()** or **setBackground()** library call and pass it the macro name for the desired color from the **colors.h** file.

Additional tools for interactively editing SDL color palettes are available with the optional **Color Library**.

Rebuilding the Demo Program

A sample Makefile is included with the demonstration program to allow the user to recompile and/or relink the program. The Makefile and demo source code are located in the **demo** subdirectory. The Makefile must be edited to change the pathnames to locate the cross development compiler, linker, librarian, etc. Once the Makefile is edited, the user can simply type **make** to recompile and relink the demo.

The sample Makefile can also be used as a template for building user application programs. The macro definitions that need to be edited to reflect your directory structure are:

INCLUDES, CC, LD, AR, SGL_BASE_DIR and PROG

Refer to the comments in the Makefile for a description of each of these macros.

If optional productivity libraries have been installed, their names should be added to the list of libraries that define the ALL_SGL_LIBS macro when using this Makefile as a template.

Listings of User Configuration Files

fonts.c

```

/* ===== $Id: fonts.c,v 1.11 1996/05/20 01:15:15 billr Exp $ ===== */
/*****
/*
/*          RASTER GRAPHICS INC          */
/*          COPYRIGHT   (C) 1995  RASTER GRAPHICS INCORPORATED   */
/*          ALL RIGHTS RESERVED          */
/*****
/* FILE NAME      : fonts.c          */
/* DATE CREATED:  5/15/95          */
/* PROJECT NAME:  SDL          */
/* DESCRIPTION   : Set of 16 basic fonts for SDL          */
/* AUTHOR        : BR          */
/* REVISIONS     :          */
/* NOTES         :          */
/* FUNCTIONS     :          */
/*****

/* Note: <sdl.h> must be #included before this file */

#define NUM_FONTS  19
/* the default font is index 0 */
extern sRGFont helvR12,      /* font  0 - Helvetica 12pt Normal */
               helvR08,      /* font  1 - Helvetica  8pt Normal */
               helvR10,      /* font  2 - Helvetica 10pt Normal */
               helvR14,      /* font  3 - Helvetica 14pt Normal */
               helvR18,      /* font  4 - Helvetica 18pt Normal */
               helvR24,      /* font  5 - Helvetica 24pt Normal */

```

```

c1R6x6,          /* font 6 - Clear Normal Fixed 6x6 */
c1R8x8,          /* font 7 - Clear Normal Fixed 8x8 */
c1R8x16,         /* font 8 - Clear Normal Fixed 8x16 */
fix12x24rk, /* font 9 - Misc Normal Fixed 12x24 Roman-Kana */
helvB14,        /* font 10 - Helvetica 14pt Bold */
helvB18,        /* font 11 - Helvetica 18pt Bold */
helvB24,        /* font 12 - Helvetica 24pt Bold */
helvBO14,       /* font 13 - Helvetica 14pt BoldOblique */
helvBO18,       /* font 14 - Helvetica 18pt BoldOblique */
helvBO24,       /* font 15 - Helvetica 24pt BoldOblique */
rgbold36,       /* font 16 - RGI Bold Fixed 36x78 */
rgswiss44,      /* font 17 - RGI Fixed 44x70 */
cursor;         /* font 18 - Cursors */
spRGFont _fontTable[NUM_FONTS] = {
&helvR12, /* font 0 */
&helvR08, /* font 1 */
&helvR10, /* font 2 */
&helvR14, /* font 3 */
&helvR18, /* font 4 */
&helvR24, /* font 5 */
&c1R6x6, /* font 6 */
&c1R8x8, /* font 7 */
&c1R8x16, /* font 8 */
&fix12x24rk, /* font 9 */
&helvB14, /* font 10 */
&helvB18, /* font 11 */
&helvB24, /* font 12 */
&helvBO14, /* font 13 */
&helvBO18, /* font 14 */
&helvBO24, /* font 15 */
&rgbold36, /* font 16 */

```

```
    &rgswiss44, /* font 17 */  
    &cursor    /* font 18 */  
};
```

palette.c

```

/* ===== $Id: palette.c,v 1.4 1995/08/11 00:21:37 billr Exp $ ===== */
/*****
/*
/*          RASTER GRAPHICS INC                      */
/*    COPYRIGHT   (C) 1995  RASTER GRAPHICS INCORPORATED  */
/*          ALL RIGHTS RESERVED                      */
/*****
/* FILE NAME      : palette.c                        */
/* DATE CREATED: 7/30/95                            */
/* PROJECT NAME: SDL                                */
/* DESCRIPTION :                                     */
/* AUTHOR       : LW                                 */
/* REVISIONS   :                                     */
/* NOTES       :                                     */
/* FUNCTIONS   :                                     */
/*****

/*
* default 256 color palette from XFree86
*/

unsigned char _DAC_color_256[] =
{
    0, 0, 0,    0, 0, 42,    0, 42, 0,    0, 42, 42,    /* 0 1 2 3 */
    42, 0, 0,    42, 0, 42,    42, 21, 0,    42, 42, 42,    /* 4 5 6 7 */
    21, 21, 21,    21, 21, 63,    21, 63, 21,    21, 63, 63,    /* 8 9 10 11 */
    63, 21, 21,    63, 21, 63,    63, 63, 21,    63, 63, 63,    /* 12 13 14 15 */
    0, 0, 0,    5, 5, 5,    8, 8, 8,    11, 11, 11,    /* 16 17 18 19 */
    14, 14, 14,    17, 17, 17,    20, 20, 20,    24, 24, 24,    /* 20 21 22 23 */
    28, 28, 28,    32, 32, 32,    36, 36, 36,    40, 40, 40,    /* 24 25 26 27 */
    45, 45, 45,    50, 50, 50,    56, 56, 56,    63, 63, 63,    /* 28 29 30 31 */
    0, 0, 63,    16, 0, 63,    31, 0, 63,    47, 0, 63,    /* 32 33 34 35 */
    63, 0, 63,    63, 0, 47,    63, 0, 31,    63, 0, 16,    /* 36 37 38 39 */
    63, 0, 0,    63, 16, 0,    63, 31, 0,    63, 47, 0,    /* 40 41 42 43 */
    63, 63, 0,    47, 63, 0,    31, 63, 0,    16, 63, 0,    /* 44 45 46 47 */
    0, 63, 0,    0, 63, 16,    0, 63, 31,    0, 63, 47,    /* 48 49 50 51 */
    0, 63, 63,    0, 47, 63,    0, 31, 63,    0, 16, 63,    /* 52 53 54 55 */
    31, 31, 63,    39, 31, 63,    47, 31, 63,    55, 31, 63,    /* 56 57 58 59 */
    63, 31, 63,    63, 31, 55,    63, 31, 47,    63, 31, 39,    /* 60 61 62 63 */
    63, 31, 31,    63, 39, 31,    63, 47, 31,    63, 55, 31,    /* 64 65 66 67 */
    63, 63, 31,    55, 63, 31,    47, 63, 31,    39, 63, 31,    /* 68 69 70 71 */
    31, 63, 31,    31, 63, 39,    31, 63, 47,    31, 63, 55,    /* 72 73 74 75 */
    31, 63, 63,    31, 55, 63,    31, 47, 63,    31, 39, 63,    /* 76 77 78 79 */
    45, 45, 63,    49, 45, 63,    54, 45, 63,    58, 45, 63,    /* 80 81 82 83 */
    63, 45, 63,    63, 45, 58,    63, 45, 54,    63, 45, 49,    /* 84 85 86 87 */
    63, 45, 45,    63, 49, 45,    63, 54, 45,    63, 58, 45,    /* 88 89 90 91 */
    63, 63, 45,    58, 63, 45,    54, 63, 45,    49, 63, 45,    /* 92 93 94 95 */
    45, 63, 45,    45, 63, 49,    45, 63, 54,    45, 63, 58,    /* 96 97 98 99 */
    45, 63, 63,    45, 58, 63,    45, 54, 63,    45, 49, 63,    /* 100 101 102 103 */
    0, 0, 28,    7, 0, 28,    14, 0, 28,    21, 0, 28,    /* 104 105 106 107 */
    28, 0, 28,    28, 0, 21,    28, 0, 14,    28, 0, 7,    /* 108 109 110 111 */
    28, 0, 0,    28, 7, 0,    28, 14, 0,    28, 21, 0,    /* 112 113 114 115 */
    28, 28, 0,    21, 28, 0,    14, 28, 0,    7, 28, 0,    /* 116 117 118 119 */
    0, 28, 0,    0, 28, 7,    0, 28, 14,    0, 28, 21,    /* 120 121 122 123 */
    0, 28, 28,    0, 21, 28,    0, 14, 28,    0, 7, 28,    /* 124 125 126 127 */
    14, 14, 28,    17, 14, 28,    21, 14, 28,    24, 14, 28,    /* 128 129 130 131 */
    28, 14, 28,    28, 14, 24,    28, 14, 21,    28, 14, 17,    /* 132 133 134 135 */
    28, 14, 14,    28, 17, 14,    28, 21, 14,    28, 24, 14,    /* 136 137 138 139 */
    28, 28, 14,    24, 28, 14,    21, 28, 14,    17, 28, 14,    /* 140 141 142 143 */
    14, 28, 14,    14, 28, 17,    14, 28, 21,    14, 28, 24,    /* 144 145 146 147 */
}

```



```

/*          COPYRIGHT   (C) 1995  RASTER GRAPHICS INCORPORATED          */
/*          ALL RIGHTS RESERVED                                          */
/*          */                                                          */
/*    This software is licensed software subject to the terms of the    */
/*    RGI Source Code License Agreement. Refer to the file LICENSE     */
/*    for details.                                                       */
/*****
/* FILE NAME      :userinit.c                                           */
/* DATE CREATED:7/30/95                                                 */
/* PROJECT NAME:SDL                                                      */
/* DESCRIPTION   :User initialized data for sdl                          */
/* AUTHOR        :BR                                                     */
/* REVISIONS     :                                                       */
/* NOTES         :                                                       */
/* FUNCTIONS     :userinit                                              */
/*          */                                                          */
/*****

/* if you want fat line support for diagonal lines, uncomment this define */
#define INCLUDE_FATLINES /* */

#include <sdl.h> /* include SDL's header file */
#include <extern.h>
#include <drv/rgmouse.h>

/* DECLARE THE FONTS TO INCLUDED */
/* the default font is index 0 */

#ifdef WANT_ALL_FONTS
# include "allfonts.c"
#else
# include "fonts.c"
#endif

/* DECLARE THE COLOR PALETTE TO BE USED */

#include "palette.c"

/*****
/* FUNCTION NAME      :userinit                                          */
/* DESCRIPTION        :initialize a few global variables that are under the */
/*                    user's control.                                     */
/* AUTHOR            :BR                                                 */
/* DATE CREATED      :7/30/95                                           */
/* RETURNS           :void                                               */
/* FUNCTIONS CALLED  :none                                               */
/* CALLED BY         :drivers/xxx/initgraphics.c - initGraphics          */
/* REVISIONS         :                                                       */
/* NOTES             :                                                       */
/*****

void userinit()
{

    /* ASSIGN THE VARIABLE _videoMode TO THE DESIRED VIDEO MODE and PANEL TYPE */
    /* see the Installation Manual and sdl.h for valid modes and panel types */
    _videoMode = M640X480X8 /*| P_SHARP_640X480X18_TFT*/ ;

    /* ASSIGN THE VARIABLE _numFonts TO THE NUMBER OF INCLUDED FONTS */
    _numFonts = NUM_FONTS; /* from fonts.c */

    /* ASSIGN THE VARIABLE _paletteTable TO DESIRED COLOR PALETTE */

```

```

_paletteTable = rgi_palettel;

/* SET _grayscale VARIABLE TO 1 FOR 256 LINEAR SHADES OF GRAY */
_grayscale = 0;

_useMouse = FALSE;
_useKeyboard = FALSE;

/* mouse type only used when _useMouse is non-zero */
_mouseType = MOUSE_PS2;

/* optionally relocate frame buffer memory (driver specific) */
/*
 * By default, the RG-100 frame buffer is a 16M block starting at
 * 0xc2000000 on the MVME2600, due to conflicts with the Universe
 * chip memory address space. The default value can be changed if
 * your system has other PCI devices mapped into PCI memory space.
 * Just keep in mind that the RG-100 requires a contiguous 16M address space.
 * N.B. Your VxWorks image *must* be rebuilt to support a larger PCI
 * memory size. In the file mv2600.h, change the value of the define
 * for CPU_PCI_MEM_SIZE from the default 0x01000000 (16M) to 0x02000000
 * (32M) - or large enough to cover where you located the RG-100.
 */
/*_graphicsBase = 0xc2000000;*/ /* uncomment to change the default */

/* optional packages */
#ifdef INCLUDE_FATLINES
    fatLineFunc = fatline;
#endif
}

```