

AEG

User Guide

REAL/VU[®] Graphical Environment

216-860001-000

MODCOMP



User Guide

REAL/VU[®] Graphical Environment

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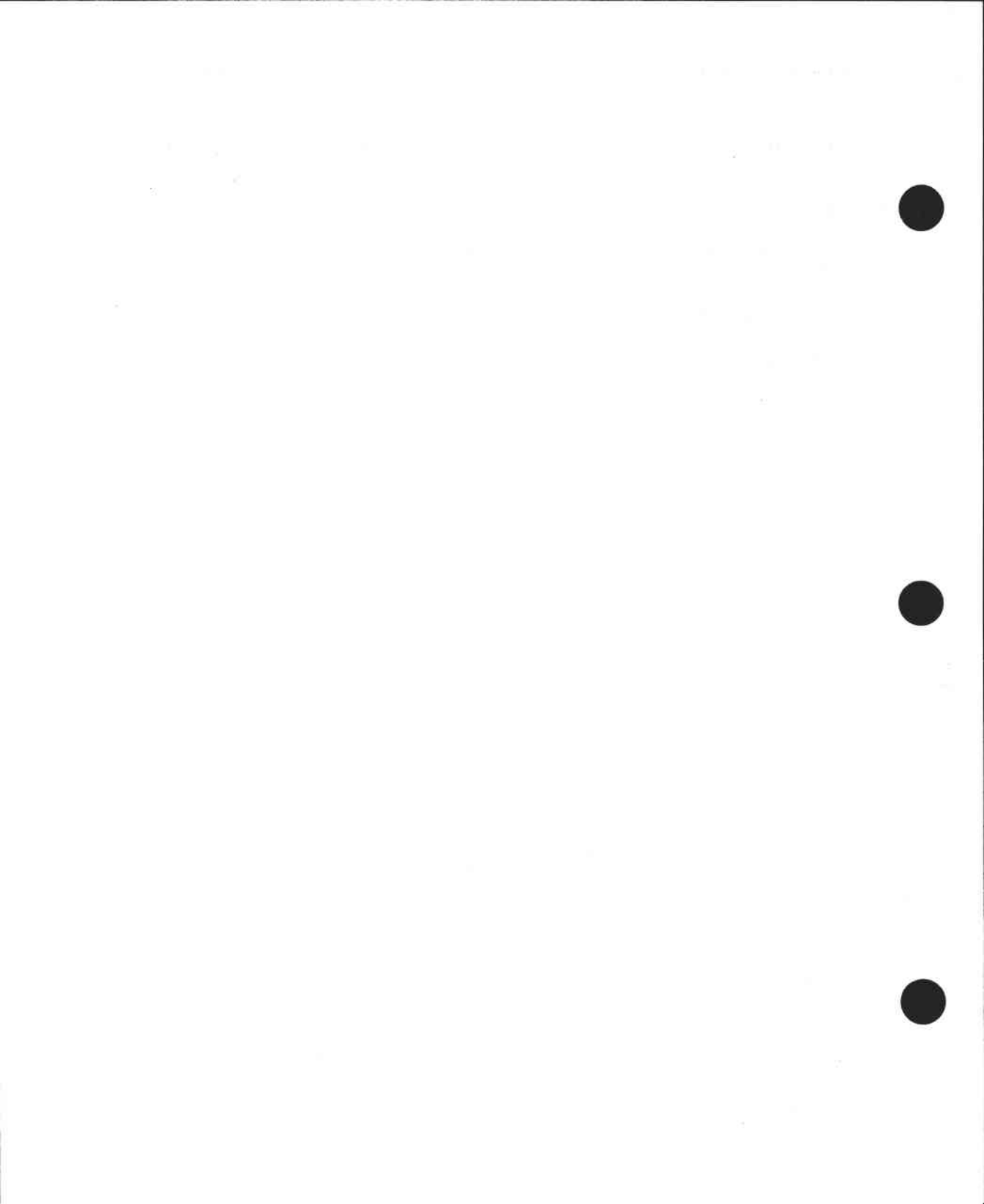
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Manual History

216-860001

REAL/VU Graphical Environment, User Guide

Revisions are listed in reverse chronological order. Detailed summaries are provided for the five most recent revisions.

Revision 000 (Initial Issue) 01/92

Initial issue to document new product.



About This Manual

The REAL/VU Graphical Environment is a comprehensive software product that provides an industry-standard, network-based windowing system, graphical user interface, and graphics development environment. The REAL/VU Graphical Environment is an add-on software product to the REAL/IX Operating System for use on MODCOMP open architecture computer systems.

This manual covers hardware setup, software installation and configuration, terminal setup, starting and exiting a REAL/VU session, and customization. It is written for system administrators, programmers, and installation personnel.

The term "open architecture system", in its simplest form, implies that a user may add a variety of vendors' components to a single system. This is possible when certain industry-accepted standards have been implemented in the system. MODCOMP open architecture systems are based on such software and hardware standards as the UNIX System V operating system, VMEbus and SCSI bus interfaces, and CPUs built around standard microprocessors. By building on these standards, open architecture systems provide computer solutions that are portable and compatible.

The REAL/IX Operating System¹, which runs on all MODCOMP open architecture system hardware platforms, allows applications to be ported easily between traditional UNIX systems and MODCOMP open architecture systems. Furthermore, by using VMEbus and SCSI bus interfaces, MODCOMP open architecture systems ensure compatibility among a wide range of peripheral and I/O devices and the ability to expand as needs dictate. MODCOMP open architecture systems meet networking and communications needs with such industry standards as Ethernet and TCP/IP and have the flexibility to accommodate new standards as they are developed.

The rest of this section lists sources of related information and defines the typographical conventions and special symbols used in this manual.

¹The REAL/IX Operating System, featuring realtime and multiprocessing capabilities, is the MODCOMP implementation of the UNIX System Laboratories UNIX System V operating system.

Related Publications

Refer to the following manuals for additional information. Contact your MODCOMP Sales Representative to order.

REAL/IX Operating System, Software Set Up Guide

Gives instructions for installing the operating system (either for the first time or as an upgrade) and doing the initial set up of the system.

REAL/IX Operating System, System Administrator's Guide

Gives instructions and background information about administering the REAL/IX Operating System.

Volume One: Xlib Programming Manual

Explains how to program for the Xlib C language interface.

Volume Two: Xlib Reference Manual

Describes in detail the functions of the Xlib C language interface.

Volume Three: X Window System User's Guide

Explains how to use the X Window System and describes the standard clients.

Volume Four: X Toolkit Intrinsic Programming Manual

Explains how to program for the Xt Intrinsic library.

Volume Five: X Toolkit Intrinsic Reference Manual

Describes in detail the functions of the Xt Intrinsic library.

OSF/Motif Programmer's Guide

Explains how to program for the OSF/Motif user interface libraries.

OSF/Motif Programmer's Reference

Describes in detail the functions of the OSF/Motif user interface libraries.

OSF/Motif User's Guide



Explains how to use the OSF/Motif user interface.

OSF/Motif Style Guide

Describes a consistent set of behavior guidelines for all OSF/Motif application programmers.

Documentation Conventions

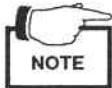
Following are the documentation conventions used in this manual.

Convention	Usage
bold	commands, routines, system call names, file names, literal text in examples Examples: sysadm(1M) , select * from emp, etc/passwd (a number in parentheses [as in sysadm(1M)] denotes the reference section where the related item can be found in the <i>REAL/IX Command and Utilities Reference Manual</i>)
<i><italics></i>	user-supplied variables, variable text in examples Examples: <i><install_directory></i> , <i>usetup oracle <user_id></i>
monospace	system output Examples: Enter employee name, 1 record created
[MONOSPACE]	function name keys Example: [SELECT] refers to the "Select" key
	means to press the key indicated. In this example it is the RETURN key.
 WARNING!	highlights information that, if not observed, could cause bodily injury. Specific warnings are listed in the index.

Convention**Usage**



highlights information that, if not observed, could cause the system or a procedure or practice to fail or could damage existing data on the system. Specific cautions are listed in the index.



highlights relevant information that does not require a warning or caution



identifies material that is indirectly related to the subject matter being discussed. For instance, a procedure may specify one way of doing a task, and the HINT explains why it is done this way or suggests alternative ways to accomplish the same task.

Chapter 1

Introduction

This chapter describes the audience, required product knowledge, the REAL/VU® Graphical Environment product, components, and system requirements.

Audience and Required Knowledge

This manual is written for system administrators, programmers, and installation personnel. Installation personnel should be familiar with `sysadm installpkg` and the REAL/IX® Operating System; programmers should be familiar with X Window System™ and the OSF/Motif™ Graphical User Interface.

Product Overview

The REAL/VU Graphical Environment software is a comprehensive product that provides an industry-standard, network-based windowing system, graphical user interface, and a graphics development environment. It runs under the REAL/IX Operating System on MODCOMP® open architecture systems. Features of the REAL/VU Graphical Environment include:

- REAL/VU Network Display Terminals support
- X Window System support (version 11, release 4)
- Implementation of the OSF/Motif Graphical User Interface standard for application development
- Tools for developing menus, icons, graphical displays, and graphics-based applications, and defining screen graphics
- XRremote protocol for graphic interface support across a serial connection

Components

The REAL/VU Graphical Environment product consists of:

□ Three REAL/VU software modules:

▪ User

This software consists of the standard client programs and associated online manual pages and support files.

There are a number of sample user configuration files in the directory `/usr/lib/X11/userfiles` you can use as templates for customization. See the *README* file in this directory for a description of these files.

▪ Development

This software includes the X Window System and Motif libraries, header files, and library manual pages.

▪ Network Display Terminal Fonts

This software contains the fonts used by the REAL/VU Network Display Terminals. These fonts may also work with other X terminals; see the manual provided with your terminal for more information.



The fonts are contained in the directory `/usr/lib/X11/ncd/fonts`, not `/usr/lib/X11/fonts` as indicated in the vendor manuals. This directory, `/usr/lib/X11/ncd/fonts`, is the default directory accessed by the REAL/VU Network Display Terminals.

□ Unsupported applications

A tape of unsupported clients is provided as a courtesy; using them does not affect operation of the REAL/VU Graphical Environment. For more information see the file `/usr/nosupport/bin/X11/README` and Appendix B.

□ Source code for useful or entertaining programs including Motif demonstration programs

- Vendor manuals for X Windows and OSF/Motif products

Requirements

The REAL/VU Graphical Environment product requires the following:

- A MODCOMP open architecture system with:
 - At least one Intelligent Ethernet controller card (VLAN-E2) to support either Thicknet or ThinNet connections
 - At least one MODCOMP REAL/VU Network Display Terminal (models 4625, 4626, 4627, or an equivalent X terminal) with Ethernet connectors
 - A minimum of 25 megabytes of disk space for the software
- REAL/IX Operating System (Release C.0 or later) with the appropriate VLAN-E2 card and Internet protocols installed and configured



Chapter 2 Hardware Setup

This chapter describes hardware configurations and connections for the REAL/VU Network Display Terminal and the MODCOMP open architecture system.

Components

Table 2-1 provides descriptions of connections shown in figures in the following section.

Table 2-1. Components

Item	Description
1	Standard Ethernet transceiver cable
2	Thin Wire BNC transceiver
2A	Two-port direct connect transceiver, with non-intrusive tap
2C	Two-port direct connect transceiver, with intrusive N-Series tap
2D	Ethernet transceiver, with intrusive N-Series tap
2E	Multiport transceiver (8 ports)
3	ThinNet resistor terminator (50 ohms)
4	ThinNet coaxial cable, RG58 (20 feet)
5	ThinNet BNC T connector
6	RS232C console cable
8	Thick (IEEE 802.3) Ethernet cable

Configurations

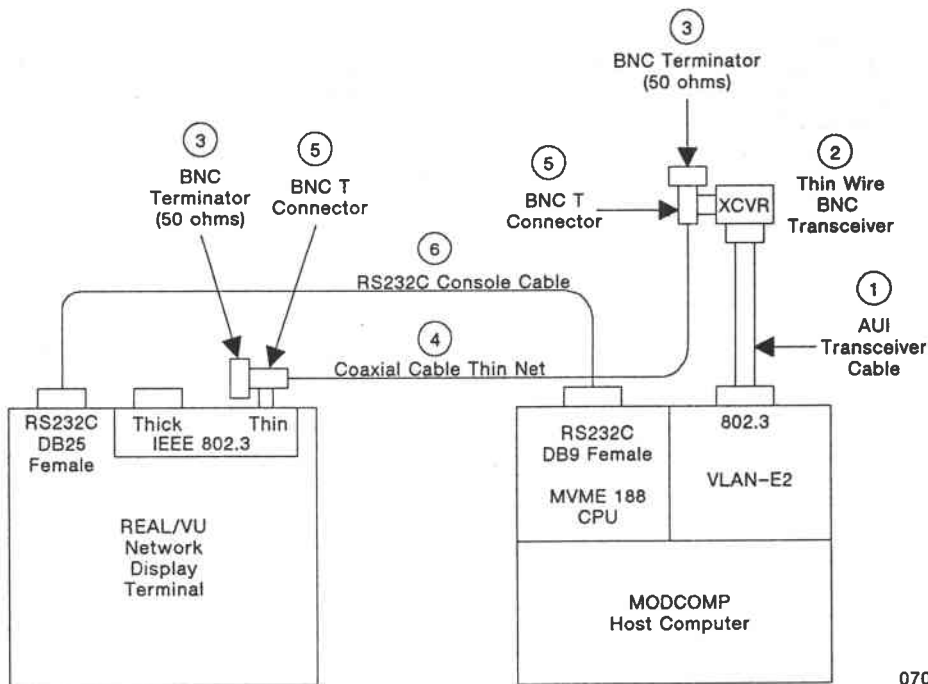
All configurations shown in this section (except the first) are *direct connection* configurations. That is, the REAL/VU Network Display Terminal (or the X terminal) is connected directly to the MODCOMP open architecture system (host computer) using an external transceiver and standard AUI transceiver cables. All configurations show an optional RS232C console cable connection for system console emulation.



REAL/VU Network Display Terminals are PROM-based units that can be used as system consoles. If you are using an X terminal other than a REAL/VU Network Display Terminal, make sure it can function as a system console over a serial interface.

No Existing Network

Figure 2-1 illustrates connections when you do not have to tap into an existing Ethernet/IEEE 802.3 network. This configuration is the simplest and least expensive solution as a direct link (4) can be made between the host computer and the REALVU Network Display Terminal or X terminal using a ThinNet coaxial cable.

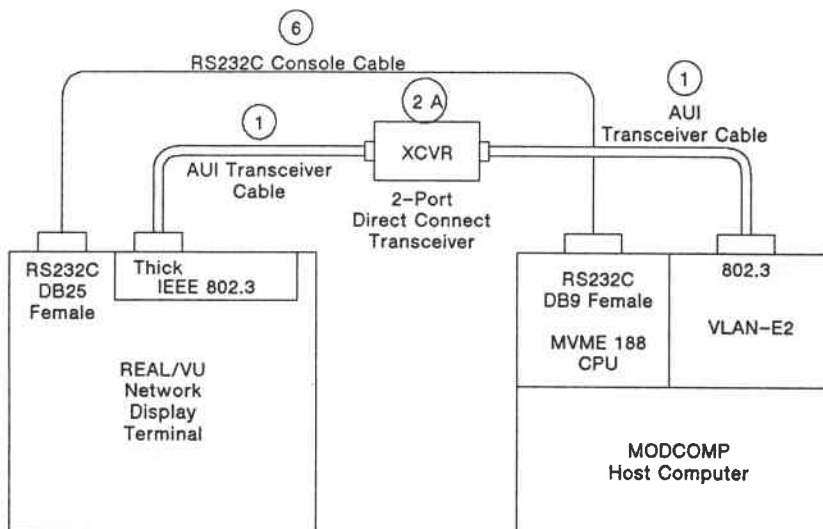


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Figure 2-1 No Existing Network

No Tap

Figure 2-2 illustrates a direct connection using a two-port external transceiver (2A) with no tap connection into the Ethernet network.

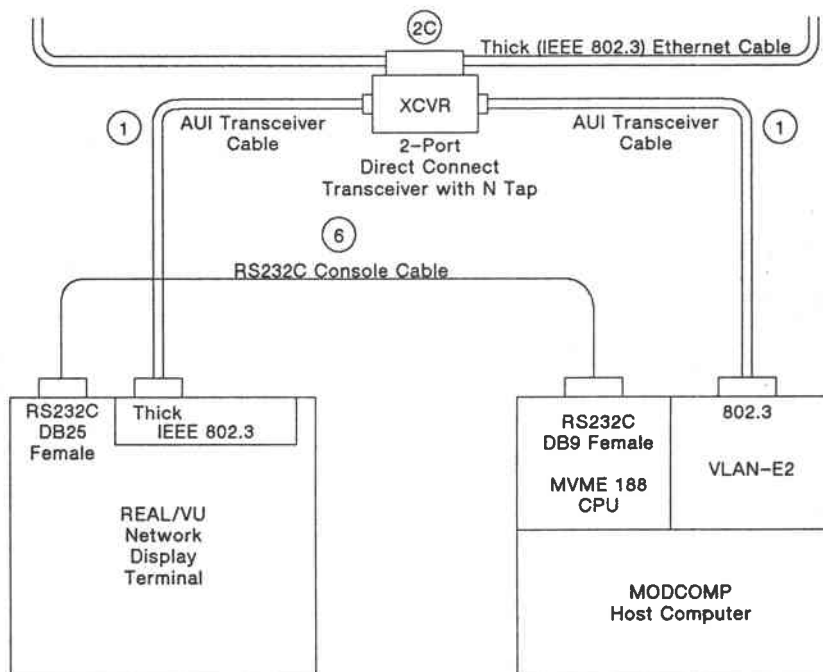


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Figure 2-2 No Tap

Two-Port Tap

Figure 2-3 illustrates connections for tapping into a thick IEEE 802.3 network using a two-port direct connect transceiver with an intrusive N-Series tap (2C).

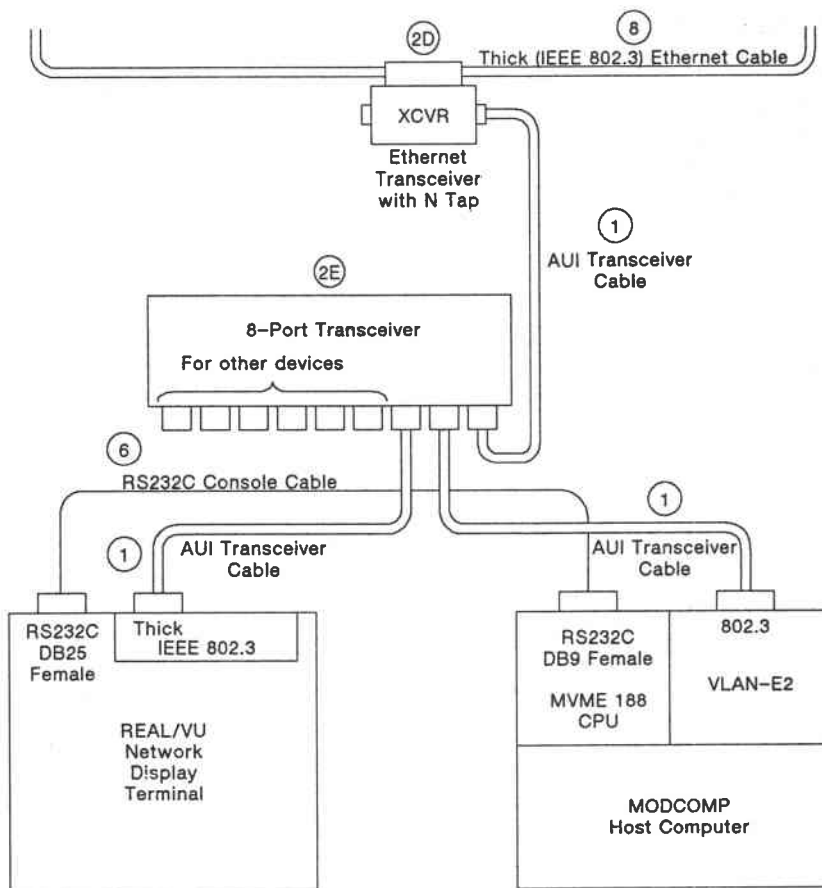


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Figure 2-3 Two-Port Tap

Eight-Port Tap

Figure 2-4 on the following page illustrates connections for tapping into a thick IEEE 802.3 network using an eight-port transceiver (2E) and an Ethernet transceiver with an intrusive N-series tap (2D). This flexible configuration is recommended whenever more than one X terminal or host computer is running in the network. A four-port or other multi-port transceiver can be used in place of the eight-port unit.



07041

Figure 2-4 Eight-Port Tap

Tap Into Existing Thick Network

Figure 2-5 illustrates connections for tapping into an existing thick network. The REAL/VU Network Display Terminal and the host computer tap into the network using separate Ethernet transceivers using intrusive N-Series taps (2D).

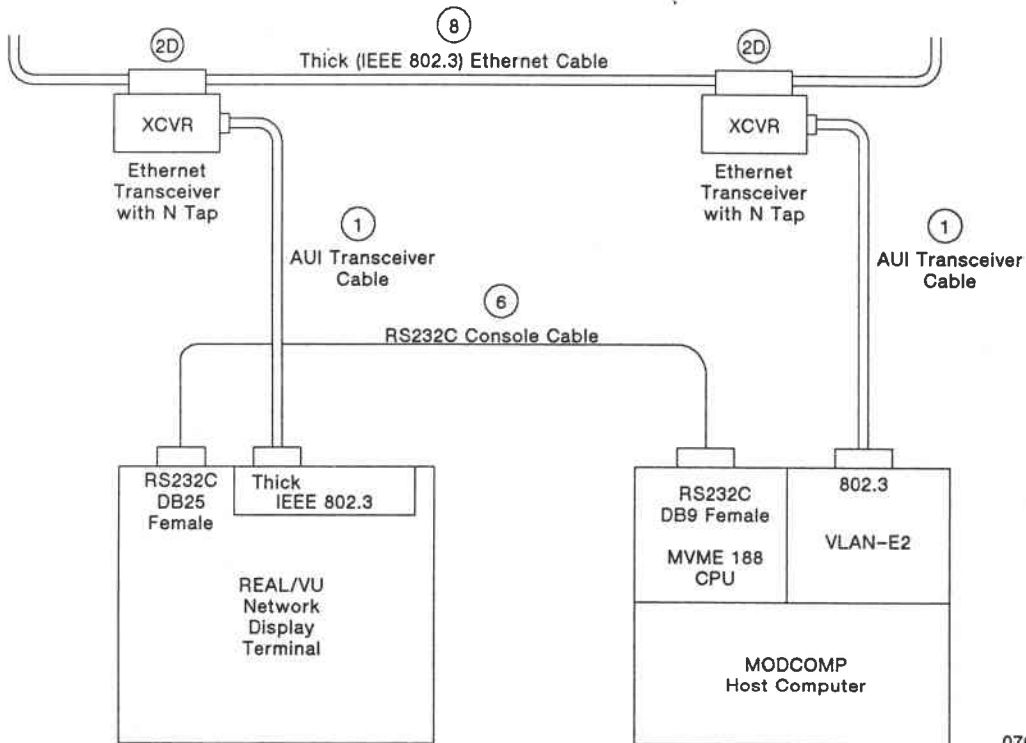
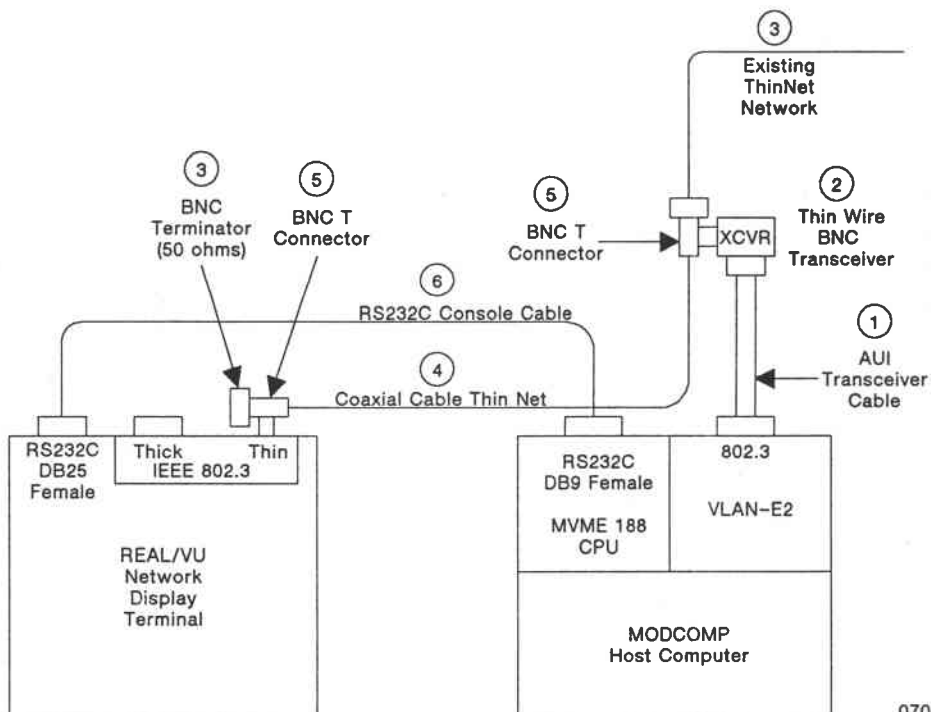


Figure 2-5 Tap Into Existing Thick Network

Tap Into Existing Thin Network

The configuration shown in Figure 2-6 illustrates connections for tapping into an existing thin network (3). The REAL/VU Network Display Terminal and the host computer tap into the network using separate N-type intrusive transceivers (2).



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Figure 2-6 Tap Into Existing Thin Network

XRemote

If you have XRemote terminal software, you can use the terminal's serial port as the only connection to the host system by connecting directly to a host serial port, or indirectly through a modem/telephone line connection. For instructions on configuration and connecting your terminal, see the *XRemote User's Manual* that accompanies the terminal software.

Chapter 3

Software Installation

This chapter describes how to install the REAL/VU Graphical Environment software on an open architecture system.

Pre-Installation

This section describes tasks you need to accomplish before installing the REAL/VU Graphical Environment software.

1. Install and configure the REAL/IX Operating System, the appropriate Intelligent Ethernet controller card, and Internet protocols.
2. Decide which software modules to install (USER, DEVELOPMENT, NTD FONTS)
 - If you wish to use the REAL/VU Graphical Environment as an interface to the REAL/IX Operating System, you must install the USER module
 - If you wish to build your own applications for the REAL/VU Graphical Environment, you must install the DEVELOPMENT module
 - If fonts are required for your terminal, you must install the NETWORK TERMINAL DISPLAY FONTS module

Note that one system (or two, if you desire redundancy) can supply fonts for all terminals on the same network. Because these fonts require a significant amount of disk space, analyze which systems they should be installed on.

3. Review terminal needs

The installation script will attempt to create a remote configuration file for REAL/VU Network Display Terminals. To do so, it requires that the network address of the host computer be found in */etc/hosts*, and the node name returned by `uname -n` be the first name following the address.

4. Review disk space needs

You need approximately 50,000 blocks of disk space to install the complete REAL/VU Graphical Environment package. Most of the space required by the package will be located in directories under */usr/opt/REALVU*. To save space in the */usr* file system, you can mount another file system at either */usr/opt* or */usr/opt/REALVU*.



Certain demonstration programs and unsupported tools are installed in the directory /usr/nosupport/bin/X11. The programs, data files, and scripts in this directory are not supported by MODCOMP. To increase available disk space, you can delete these files without affecting the operation of the REAL/VU Graphical Environment.

5. Verify disk space

Make sure you have enough space available before installing the software. The installation script will verify that sufficient disk space is available before permitting the installation to proceed. If sufficient space is not available, see the *REAL/IX System Administrator's Guide* for details on how to expand and reconfigure the file system.

6. Check for additional file systems

Be sure that any additional file systems are created and mounted before installing the REAL/VU Graphical Environment.

Installation Procedure

Installation of all three software modules takes about ten minutes. To install the REAL/VU Graphical Environment software, perform the following steps:

1. Insert the REAL/VU Graphical Environment tape cartridge in the drive.
2. Log in at the console as *root* (you will need to know the *root* password).
3. Change the current working directory to the *root* directory:

```
cd /
```

4. Shut down the system to single-user mode:

```
shutdown
```

5. Mount the */usr* file system:

```
mountall
```

6. Invoke the `sysadm(1M)` script,

```
sysadm installpkg
```

and follow the directions on your screen.

7. Unmount all file systems and reboot the system when the installation is complete.

Removing Software

Follow these steps prior to removing the REAL/VU Graphical Environment software:

1. Backup the */usr* file system.

Before removing the REAL/VU Graphical Environment software we recommend that you do a backup in case you've changed or added some files in the */usr/lib/X11*, */usr/include/X11*, and */usr/bin/X11* directories when customizing the system. (For example, you may have changed the */usr/lib/X11/system.mwmrc* file or some files found under the */usr/lib/X11/app-defaults* directory.)

2. Determine which files have been changed or added in the */usr* file system and copy them to tape or to a scratch partition on another file system.

This eliminates the need to re-customize these files when you reinstall the REAL/VU Graphical Environment. For information on how to find all modified files since your last installation of REAL/VU Graphical Environment software, see the section "Saving Customized Files" in Chapter 2 of the *REAL/IX Software Set Up Guide*.

The following removal process takes about ten minutes:

1. Insert the REAL/VU Graphical Environment tape cartridge in the drive.

2. Log in at the console as *root* (you will need to know the *root* password).

3. Change the current working directory to the root directory:

```
cd /
```

4. Shut down the system to single-user mode:

```
shutdown
```

5. Mount the file systems:

```
mountall
```

6. Invoke the *sysadm(1M)* script:

```
sysadm removepkg
```

Follow the directions on the screen.

After the removal process is complete, a directory called */usr/opt/REALVU* remains. If you do not need the files saved in this directory, you can remove them.

Chapter 4

Terminal Setup

This chapter describes setting parameters for the REAL/VU Network Display Terminal.

Configuring the Terminal

The following terminal configuration procedure assumes the REAL/VU Network Display Terminal is connected to the network as described in Chapter 2.

1. Access the terminal configuration Main Menu by pressing the <SetUp> key.

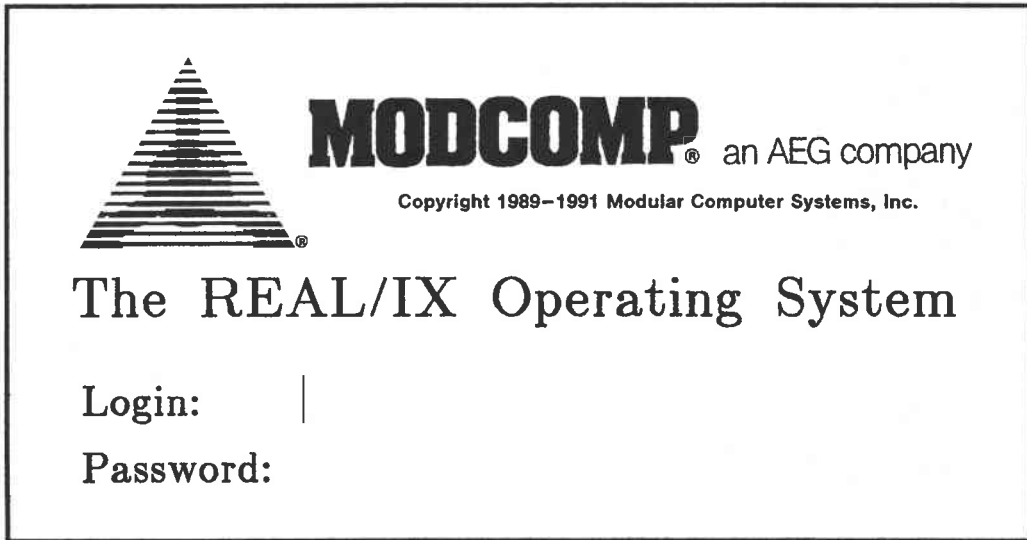
Use the left mouse button to select icons within the menus. Use the keyboard to enter characters for variables such as the network address.

2. Access the appropriate menu and set the following terminal parameters to the specified values:

PARAMETER	SETTING
Network Parameters menu	
Remote Configuration	Yes
Configuration Server	<enter your system's network address>
Protocol Parameters menu	
Determine Addresses	from NVRAM
System's IP Address	<enter the terminal's network address>
Subnet Mask	FF.FF.00.00

3. Return to the Main Menu, and select **Save Power-On Values** from the terminal Main Menu.
4. Click twice on **Reset Server** on the Main Menu.

After a few moments the login screen should appear as shown in Figure 4-1; if it doesn't, see the following section, "If Problems Occur."



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Figure 4-1 Login Screen

If Problems Occur

If the login prompt does not appear within a few seconds, try the following procedure:

1. Set the terminal parameters to the values specified in Appendix A, *Terminal Parameters*.



The parameters specified in Appendix A are for the Model 4627 REAL/VU Network Display Terminals. Other models may use a slightly different set of parameters. Consult your terminal manual for specific information.

2. Select **Save Power-On Values** from the terminal Main Menu.

3. Click twice on **Reset Server** on the Main Menu.
4. After the terminal finishes resetting (the gray background and "X" cursor will appear), set the following parameters to the specified values:

PARAMETER	SETTING
X Server Parameters menu	
Virt. Term. at Reset	XDM
Display Manager access	Direct
Display Manager Server	<your system's network address>



If you do not use Remote Configuration (the method used by the Simple Terminal Configuration Procedure), you will have to change these parameters to the values specified above each time the terminal is reset or powered on. Consult your terminal manual for information on how to use Remote Configuration.

5. Click twice on **Restart Session** (not **Reset Server**) on the **X Server Parameters** menu.
- A login prompt should appear. If you have further problems, consult your terminal manual.



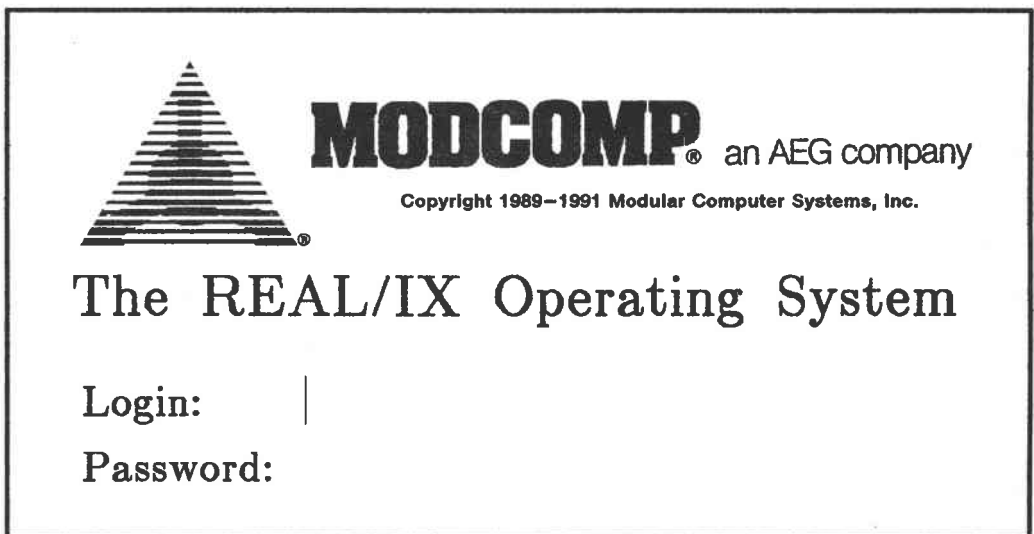
Chapter 5

A REAL/VU Session

This chapter describes how to start and exit a REAL/VU session, and how to use the help feature.

Starting a Session

A REAL/VU session begins at the login screen that appears at the completion of installation.



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1. Enter your login name at the prompt and press and release the <Return> key.

2. Enter your password name at the prompt and press and release the <Return> key.

Within a few moments, xterm and the Motif Window Manager (mwm) are running using the default configuration.

XRemote

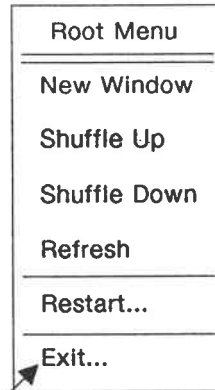
If you have installed XRemote software for your terminal, follow the same login procedure shown previously. After logging in, you can switch to XRemote by executing the following command:

```
xinitremote
```

Within a few moments, xterm and the Motif Window Manager (mwm) are running using the default configuration. See `xinitremote(1)` and your terminal's XRemote User's Manual for more information about configuring and customizing your XRemote environment.

Exiting a Session

To exit the REAL/VU session, choose the **Exit** option from the pop-up Root Menu shown below. To access the Root Menu, move the cursor to a background field outside any windows and press the mouse button.



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Help

This section describes the online help available in the REAL/VU Graphical Environment.

xman

xman is a manual page browser. You can select any of the online manual pages for formatting and viewing. Take time to become familiar with **xman**; it will help you to learn about the REAL/VU Graphical Environment. For introductory information on **xman**, see the chapter "Other Clients" of the *X Window System User's Guide*; for more detailed information see "Reference Pages" in the same book.

Recommended **xman** browsing:

- xman** manual page

This describes the **xman** utility.

- X** manual page

The **X(1)** manual page explains general concepts of the REAL/VU Graphical Environment. To it, use **xman** or enter **man X|pg** at the shell prompt.

□ Standard REAL/VU programs

In the **xman Sections** menu, **REAL/VU clients** presents manual pages for all the standard programs for the REAL/VU Graphical Environment.

□ Library functions

The section **REAL/VU Libraries** presents manual pages for REAL/VU library functions for developing REAL/VU client programs.

To start **xman**, select **Manual Pages** from the default root menu.

Chapter 6

Configuration Considerations

This chapter discusses considerations for configuring your REAL/VU Graphical Environment.

Sample Configuration Files

The directory `/usr/lib/X11/userfiles` contains sample configuration files you can use as templates. See the README file in this directory for more information.

Using Xdm

The X Display Manager `xdm` provides a simple, reliable, and convenient means to initiate a REAL/VU session. It is recommended that `xdm` be the only method used to start a session.

The default `xdm` greeting is "The REAL/IX Operating System". You can change this by accessing the file `/usr/lib/X11/xdm/Xresources` and entering the following command:

```
xlogin*greeting: Any string you like
```

On a network with multiple hosts, it is a good idea to include the name of the host in the greeting. Note that only `bin` or the superuser has permission to change this file.

By default, the `xdm` daemon will be started whenever the system enters multi-user mode. To disable `xdm`, delete the files `/etc/rc2.d/S51xdm` and `/etc/rc0.d/K10xdm`. To re-enable `xdm`, link these two files to `/etc/init.d/xdm`.

If the `xdm` daemon process is killed, `xdm` will stop accepting new sessions (no login prompt appears). You can determine if this situation exists on your system by checking the file `/usr/lib/X11/xdm/xdm-pid`. This file contains a process id; if no `xdm` process with this process id exists, then `xdm` will not start new sessions. To remedy the problem, restart `xdm` by entering the command:

```
/usr/bin/X11/xdm
```

at the shell prompt. (You must be superuser to do this.) If all your terminals use X Display Manager Control Protocol (XDMCP), you can do this at any time. If you use non-XDMCP terminals, make sure there are no active sessions on these terminals before restarting `xdm`. If you restart `xdm` while sessions are active on these terminals, these sessions *will be terminated without warning*.

XDMCP is a network protocol by which an autonomous display can request login service from a remote host. Although `xdm` can also monitor a set of terminals directly, XDMCP is by far the more reliable of these two methods; it is recommended that XDMCP be used with any server that supports it. All REAL/VU Network Display Terminals support XDMCP, and under the terminal configuration procedure described in Chapter 4, they will use XDMCP.

See `xdm(1)` and the *X Window System User's Guide* for more information.

Specifying a Default Server

The `DISPLAY` variable defines the default server that REAL/VU clients use to communicate. When `xdm` starts a session, it sets this variable automatically. Be careful not to override the setting in your `.profile` file. To set this variable in your `.profile` for sessions not initiated by `xdm`, use the following form:

```
DISPLAY=${DISPLAY:-servername}
```

where `servername` is the name of the server you wish to use. This sets the `DISPLAY` variable only if it has not already been set by `xdm`. You should use `xdm` unless there is a very good reason not to.

Using the `.xsession` File

If you have a `.xsession` file in your home directory, `xdm` executes the shell commands in it to initiate your session (very much like a `.profile` file). The last command in the file should be of the form:

```
exec <process>
```

where the lifetime of `<process>` defines the lifetime of the session; that is, when `<process>` terminates, the other processes associated with the session are also terminated.

Using xterm

xterm is a REAL/VU client that emulates a terminal running a shell. The following files, variables, and clients should be considered.

□ *.profile*

xterm will not invoke your *.profile* by default. You must specify the *-ls* option (for *login shell*). However, if your *.xsession* file is properly configured, it may eliminate the need to invoke *.profile*.

□ TERM variable

xterm automatically sets the TERM variable for the proper type of emulation. Be careful not to override the setting of this variable in your *.profile* file. To set this variable in your *.profile* for sessions that use a different type of terminal, use the following form:

```
TERM=${TERM:-terminaltype}
```

where *terminaltype* is the name of the terminal you wish to use. This sets the TERM variable only if it has not already been set by **xterm**.

□ Resizing

Most programs do not automatically detect a change in the size of an **xterm** window. The window should not be resized while one of these programs is executing within the window. Note that *vi(1)* does detect and handle window size changes correctly.

The *resize(1)* client must be used to adjust the environment to the new window size. You may cause this client to be invoked automatically whenever the window size is changed by placing into your *.kshrc* or *.profile* file the following command:

```
trap 'eval `resize`' 20
```

See *resize(1)* for more information.

Adding Directories to Your PATH

Supported REAL/VU clients are installed in the directory */usr/bin/X11*; unsupported clients are installed in */usr/nosupport/bin/X11*. Add these directories to your PATH if you wish to use these clients. *xdm* automatically provides a PATH that includes these directories, but this may be overridden by your *.profile* file.

Using Korn Shell

It is strongly recommended that the Korn shell be used as the default shell in the REAL/VU environment.

□ `set +o bgnice`

The Korn shell normally uses `nice` to reduce the priority of background processes. In the REAL/VU environment, most clients are started as a background process, yet they must still retain a good interactive response. Use `set +o bgnice` (in your *.kshrc* or *.profile* file) to disable this automatic "nicing" of processes.

□ `set -o monitor`

The `set -o monitor` option provides tighter control over background processes. This may be desirable in the REAL/VU environment. See `ksh(1)` for more information.

Specifying Resources

This section describes clients, files, and variables used for specifying resources with the REAL/VU Graphical Environment. See the *X Window System User's Guide* for more information.

□ `xrdb`

`xrdb` is a client that downloads files containing resource specifications to a server so the information is available to all clients, no matter what system they are running on. It can also pass the file through the C preprocessor before downloading; it includes definitions that describe characteristics of the server, so that resources can be chosen based on these characteristics (including number of colors available, size of display, etc.). See `xrdb(1)` for more information.

□ *.Xdefaults*

In the past, resource specifications were provided by the file *.Xdefaults* in the user's home directory. This file is now obsolete. It cannot be used in conjunction with *xrdb*; if any resources have been downloaded using *xrdb*, the *.Xdefaults* file will not be read.

A convention has been established to name a file *.Xresources* in the user's home directory. This file contains resources to be downloaded to the server using *xrdb*. If the defaults have been installed, this file may already exist. If not, create a file with the name *.Xresources*.

□ XENVIRONMENT

The shell environment variable `XENVIRONMENT` can be set to the name of a file containing resource specifications. If this variable is not defined, a file named *.Xdefaults-hostname* in the user's home directory is used (if present). *hostname* is the name of the host on which the affected clients are running. This file is read whether or not resources have been downloaded using *xrdb*.

This method of specifying resources is intended to replace the *.Xdefaults* file; it is recommended that only the newer form be used. It is possible to set `XENVIRONMENT=${HOME}/.Xdefaults`. This produces behavior similar to the old method. Note that `XENVIRONMENT` should contain the full pathname of the file.

Remember that resources specified using *.Xdefaults* or `XENVIRONMENT` are available only to clients running on the host on which the resource file resides, while resources downloaded using *xrdb* are available to all clients on a particular server, regardless of which host they are running on.

Configuring Remote Printers

Remote printer support is provided by configuring the `lp(1)` spooler to print to a printer connected to the serial port of a REAL/VU Network Display Terminal. The following scripts are installed in */usr/spool/lp/model*:

<code>realvu.dumb</code>	Supports printers that recognize CR, LF, and FF
<code>realvu.lj</code>	Supports HP LaserJet III
<code>realvu.ljII</code>	NOT SUPPORTED: for HP LaserJet Series II



The `realvu.ljll` script contains a workaround for a flow control problem in the HP LaserJet Series II. This script is not supported; characters may still be lost under certain circumstances. The script is provided as a convenience for those who must use a LaserJet II. The supported `realvu.lj` script should be used for the LaserJet III and for LaserJet II-compatible printers that do not exhibit this problem.

The name you assign to the printer must be associated with the network address of the terminal to which it is connected in the file `/etc/hosts`. We recommend that you assign a unique alias to the printer. This allows you to move the printer to another terminal by simply moving the alias in the `/etc/hosts` files without changing the name of the terminal or reinstalling the printer with a new name.

The `lpadmin(1)` command is used to install new printers. When installing a printer to use one of the REAL/VU model scripts, the `lpadmin` command is used as follows:

```
lpadmin -p<printer_name> -m<model_script> -v/dev/null
```

For example, if printer `netlp1` is connected to terminal `rvul`, you should add something resembling the following to `/etc/hosts`:

```
130.30.1.5   rvul netlp1
```

If installing an HP LaserJet III printer, use the command:

```
lpadmin -pnetlp1 -mrealvu.lj -v/dev/null
```

See `lpadmin(1)` for more information on how to install and enable new printers.

Finally, on the **Serial Parameters** menu of your REAL/VU Network Display Terminal, the parameter **Use Port for** must be set to **Printer Daemon**. Set the other parameters to the appropriate values for your printer's serial port.

Chapter 7

REAL/VU Tools

This chapter describes the Mshell utilities and xpref tool for customizing the user environment.

Mshell Utilities

The `mshell` utilities are software tools that allow you to quickly create Motif-based shell scripts. These utilities are also useful for converting existing shell scripts written for alphanumeric terminals into Motif-based shell scripts. See `mshell(1)` for more information.



For examples of using mshell scripts, see the subdirectory /mshelldemos on the Unsupported Tools tape.

The Mshell commands for writing shell scripts that use the X Window System are:

- `mdialog [-W | -C] -P message`
- `mfilese1 [-D dirpath] [-M filemask]`
- `mform [-C n] [-F filename]`
- `mmenu [-F filename]`
- `mradiobox [-F filename]`
- `mscale -T title -L minimum -H maximum [-S default]`
- `mstring [-C n] -P label`
- `mtext [-F filename]`

Each command represents a frequently-used user interface component using widgets provided by the OSF/Motif widget set. For example, to get a yes or no decision from the session user, use the command **mdialog** which pops up a dialog box.

The file `/usr/lib/X11/userfiles/.Xresources` lists resources you can change to alter the appearance of different commands. For example, to change the background of a menu to red, change the resource with the following command:

```
mmenu*background: red
```

This resource applies to all instances of the command **mmenu**. To distinguish menus produced by different shell scripts, enter an additional command:

```
mmenu -name script_name ...
```

To change the background for this menu, add the following line to your resource file:

```
script_name*background: red
```

The **mshell** options include all of the standard X Toolkit command line options.

Typing **echo \$DISPLAY** displays the default host and display number for any of the **mshell** commands.

mdialog

The `mdialog` command is used to display one of three dialog boxes:

□ YES/NO dialog box

Contains two buttons labeled "OK" and "CANCEL". User selects "OK" to continue or "CANCEL" to cancel an action.

□ INFO dialog box

Contains one button labeled "OK". User acknowledges the message in the box.

□ WAIT dialog box

Contains no button. User is notified of a time-consuming process.

Syntax:

```
mdialog [-W | -C] -P message
```

The `mdialog` options include all of the standard X Toolkit command line options as well as the following additional options:

-W

If the wait dialog flag is specified, the command must be executed in the background. The shell script should save the command's pid (use `$$`) and kill the command as soon as it is no longer needed.

-C

If the info dialog flag is specified, the user receives a message to be acknowledged.

-P *message*

The string defined by the variable *message* is the string displayed as the label of the dialog box.

mfilese1

The **mfilese1** command displays a file selector box. When the user clicks the "OK" button, **mfilese1** prints the current selection to *stdout*. Selecting the "CANCEL" button causes the command to exit with status 1.

Syntax:

mfilese1 [-D *dirpath*] [-M *filemask*]

The **mfilese1** options include all of the standard X Toolkit command line options as well as the following additional options:

-D *dirpath*

Specifies the absolute pathname of the directory to be displayed. Default = *"/*.

-M *filemask*

Filemask, for example **.c*. Default = *'*'*.

mform

The **mform** command (Class: MForm) displays a title and a number of labels and textfield pairs. It is used to enter multiple values in a form.

Syntax:

```
mform [-C n] [-F filename]
```

The **mform** options include all of the standard X Toolkit command line options as well as the following additional options:

-C *n*

Specifies columns where *n* is the maximum number of columns in the text field. Default = 30 columns.

-F *filename*

The file option specifies that the command reads the form items from this file; otherwise, from *stdin*. Default = *stdin*.

In the following example, **mform** is reading the menu structure from *stdin*:

```
eval `mform <<-EOF
title
first label
second label
EOF`
```

Use the Return key to move from textfield to textfield. After the last textfield, the button labeled "DONE" receives the focus. Press the Return key if all the entered data is correct. Otherwise, press the down-arrow key to move to the first textfield.

mform produces the following output:

```
FIELD1="string1"
FIELD2="string2"
```

The strings *string1* and *string2* can then be referenced by using the environment variables FIELD1 and FIELD2.

mmenu

The `mmenu` command (Class: MMenu) displays a menu title and several menu selections. The command reads the menu information from *stdin* or from some other specified file. The first line read is used as the title; all succeeding lines are used as menu selections.

Syntax:

```
mmenu [-F filename]
```

The `mmenu` options include all of the standard X Toolkit command line options as well as the following additional options:

-F filename

Specifies the source file for the menu information. Default = *stdin*.

In the following example, `mmenu` is reading the menu information from *stdin*:

```
index=`mmenu <<-EOF
Menu Title
first selection
:M:second selection
third selection
EOF`
```

When a selection is chosen through a mouse click, `mmenu` prints the index between 1 and N (the number of menu selections) to *stdout*. The example above uses the shell variable "index" to save this information.

The special sequence ":M:" preceding the second selection causes `mmenu` to name this button widget "submenu_btn" instead of "menu_btn". This enables the developer to change the color of buttons that lead to a submenu instead of simply executing a command. See `Mshell.ad` for an example.

mradiobox

The **mradiobox** command (Class: MRadiobox) displays a title, several toggle buttons, and a pushbutton. The command reads the radiobox items from *stdin* or some other specified file. The first line read is used as the title, all succeeding lines are used as radiobox selections.

The radiobox selection style is "one-of-many." When the pushbutton is selected with a mouse click, **mradiobox** prints the index of the currently-selected toggle button (between 1 and the number of toggle buttons) to *stdout*.

Syntax:

mradiobox [-F *filename*]

The **mradiobox** options include all of the standard X Toolkit command line options as well as the following additional option:

-F *filename*

Specifies the source file for radiobox items. Default = *stdin*.

mscale

The **mscale** command (Class: MScale) displays a title, a scale, and a button labeled "OK". The **mscale** command is used to request a numeric value from the user. After the developer clicks on the button labeled "OK", **mscale** prints the currently selected value to *stdout*.

Syntax:

```
mscale -T title -L n -H n [-S n]
```

The **mscale** options include all of the standard X Toolkit command line options as well as the additional options described below:

-T *title*

Specifies the string displayed as the label of the scale.

-L *n*

The low (L) value of the scale. The minimum value is specified by *n*.

-H *n*

The high (H) value of the scale. The maximum value is specified by *n*.

-S *n*

The set (S) value for the scale. Default value is specified by *n*.

mstring

The **mstring** command (Class: MString) displays a label and a textfield. The **mstring** command is used to request a single string value from the user. The Return key causes **mstring** to print the entered string to *stdout*.

Syntax:

```
mstring [-C n] -P label
```

The **mstring** options include all of the standard X Toolkit command line options as well as the following additional options:

-C *n*

Specifies the maximum number (*n*) of characters in the textfield. Default = 30.

-P *label*

Specifies the string displayed as the label of the textfield.

mtext

The **mtext** command (Class: MText) displays a text widget and an "OK" button. The **mtext** command is used to display the specified text file. If the file contains more than 24 lines, a vertical scrollbar is created. A click on the "OK" button terminates this command.

Syntax:

mtext [-F *filename*]

The **mtext** options include all of the standard X Toolkit command line options as well as the following additional option:

-F *filename*

Specifies the source file to be displayed. Default = *stdin*.

xpref

The **xpref** tool provides a Motif-based interface for changing several parameters, for example: bell volume, pitch and duration; keyclick volume or font path. See the manual pages for **xpref** for further information.



Chapter 8

Building Clients

This chapter describes how to create programs within the REAL/VU Graphical Environment. These clients respond to the X Window System or the Motif environments.

Building X Clients

Compiling

When compiling X Window System clients, the definitions `-DSYSV` `-DUSG` should be passed to the C preprocessor.

Linking

When linking X Window System clients, the linking sequence should be:

```
<object files> -lXaw -lXmu -lXt -lXext -lX11
```

Not all of the above library specifications may be required for a particular client.

The unshared libraries are used by default. If you wish to use the shared libraries when linking, you must specify:

```
-L/usr/opt/REALVU/lib/shared
```

This directive must precede all of the library specifications in the linking sequence shown above.

Building Motif Clients

Compiling

When compiling Motif clients, the definitions `-DSYSV` `-DUSG` `-D_NO_PROTO` should be passed to the C preprocessor.

Linking

When linking Motif clients, the linking sequence should be:

```
<object files> -lMrm -lXm -lXmu -lXt -lXext -lX11
```

Not all of the above library specifications may be required for a particular client.

The unshared libraries are used by default. If you wish to use the shared libraries when linking, you must specify:

```
-L/usr/opt/REALVU/lib/shared
```

This directive must precede all of the library specifications in the linking sequence shown above.

Comment Section

The comment section of an executable file describes the REAL/VU source files used to build the program. This section can grow quite large when a client is built, sometimes to more than 30% of the total size of the program. (Use the REAL/IX *size(1)* command with the *-f* option to determine the size of the comment section.) Because much of the information in this section may be redundant, we recommend that you compress (remove redundant entries) from the comment section on each REAL/VU client that is built using the REAL/IX *mcs(1)* command.

Appendix A Terminal Parameters

The parameters listed in this appendix are for the Model 4627 REAL/VU Network Display Terminals. Other models may use a slightly different set of parameters. Consult your terminal manual for specific information.

To access the terminal configuration Main Menu, press the <SetUp> key. Use the left mouse button to select icons within the menus. Use the keyboard to enter characters for variables.

X Server Parameters

PARAMETER	SETTING
Retain X Settings	No
Backing Store	By Request
Keyboard Type	<leave as set by terminal>
DW Compatibility	No
Diagnostics Logging	No
Permit Old X Bugs	Yes
Disable Error Popup	No
Virt. Term. at Reset	None
Font Diagnostics	No

XDM Parameters menu

Display Manager access	Direct
Dead Session Detection	Off
Wait for last client	Off
Action on failure	Persist
Display Manager Server	<your system's network address>
Hibernation time (min)	3
Death timeout (sec)	30

Network Parameters

PARAMETER	SETTING
Server Code	In PROM
Boot X at Reset	Yes
Config file access	TFTP
Primary Font access	TFTP
Secondary Font access	TFTP
System Hostname	<your terminal's name>
TCP/IP Access Control	Off
Remote Configuration	No
Configuration Server	<your system's address>
Primary Font Server	<your system's address>
Secondary Font Server	<your system's address>
NCDnet Access Control	Off

Protocol Parameters

TCP/IP Parameters menu

Determine Addresses	From NVRAM
Which Interface	Ethernet
System's IP Address	<your terminal's network address>
IP Routing Method	Default Gateway
Broadcast Address	255.255.255.255
Type of Name Service	IEN-116
Default Domain Suffix	<blank>
Primary Name Server	0.0.0.0
Default Telnet Host	<your system's address>
Boot Server	<your system's address>
Subnet Mask	00.00.00.00
Default Gateway	0.0.0.0
Secondary Name Server	0.0.0.0

NCDnet Parameters menu

Which Interface	None
System's NCDnet Addr	0.0
Designated Router	0.0
Default CTerm Host	0.0

Serial Port Parameters

PARAMETER	SETTING
Auxiliary Port Parameters menu	
Data Bits	8
Stop Bits	1
Parity	None
Handshake	None
Use Port for	Terminal Session
Baud Rate	9600
Hangup Method	None



Appendix B

Unsupported Tools

This appendix describes considerations when using the unsupported tools.

The unsupported tools tape (also called the *nosupport* tape), contains clients not supported by MODCOMP. These useful clients are offered as a courtesy; if you choose not to install this software, the operation of the REAL/VU Graphical Environment is not affected.

The unsupported clients reside in the directory */usr/nosupport/bin/X11*; the file */usr/nosupport/bin/X11/README* describes these clients and how to use them. There are no manual pages for many of these clients.

Note the following about this software:

- ❑ This software is NOT SUPPORTED; it is supplied AS IS
- ❑ There are no expressed or implied warranties of any kind for the software and MODCOMP assumes no liability whatsoever
- ❑ Copyright restrictions do apply, so read and follow any copyright restrictions and instructions
- ❑ MODCOMP takes no responsibility for any problems found in these tools, nor do we guarantee they will run on your particular system configuration; use these tools at your own risk
- ❑ MODCOMP does not guarantee that these tools will run on future releases of REAL/IX; source code is included in releases when available so you can resolve problems
- ❑ Online copies of the available documentation is provided

The tape is a single image in `cpio(1)` format. To obtain a list of the files on this tape, execute the following command:

```
cpio -itvB </dev/rmt/ctape
```

You can install the entire tape into your current directory by executing the following command:

```
cpio -idmvB </dev/rmt/ctape
```

These clients are distributed in source form. Each client (or set of clients) occupies a separate directory. If there is a file named *Imakefile* in the directory, you can build the client by executing the following commands:

```
cd <directory_name>  
xmkmf  
make includes  
make depend  
make
```

If there is no *Imakefile*, read the accompanying documentation and the *makefile* to learn how to build the client.

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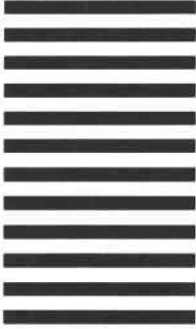
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