X-DOS

Users Manual

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Preface

This manual contains information to install, configure, and execute the Micro X software on your PC. Micro X implements the protocol specification of the X Window System over an Ethernet network.

About this Guide

The four chapters address the fundamentals of Micro X including installation and operation procedures. The appendix provide additional information on a variety of topics. Contents of the manual include:

Chapter 1	**Introduction**: A general description of Micro X.
Chapter 2	**Prerequisites**: The minimum requirements needed for installing and running Micro X.
Chapter 3	**Installing Micro X**: How to install Micro X onto existing equipment and how to configure your network.
Chapter 4	**Starting Micro X**: Instructions on how to start using X Windows with your Micro X server.
Appendix A	**X Window System Clients**: Contains a brief description of the X Window System and some popular MIT and public domain client applications.
Appendix B	**Micro X Files**: A brief description of system files, programs, files, and fonts used by Micro X.
Appendix C	**xdm**: Contains a description of the X Display Manager Control Protocol.
Appendix D	**Host Access List**: Describes X authorization.
Appendix E	**Fonts**: Information about fonts and the font compiler.
Appendix F	**VGA Chipsets & Drivers**: A list of VGA drivers.
Appendix G	**Installation Worksheet**: Fill it out prior to installation.
Appendix H	**Network Errors**: A list of network errors.
Appendix I	**X.BAT Command Line**: Only for experienced users.
Appendix J	**SLIP**: Serial Line IP usage.
Appendix K	**REXEC & RSH**: Usage of the REXEC & RSH commands.
Glossary	**Glossary**: Glossary of terms.

The best approach to this manual

If you have recently purchased the Micro X software, refer to Chapters 1 and 2. Refer to Chapter 3 for installation procedures for your PC, host, and network configuration.
If Micro X is currently installed, please refer to Chapter 4 for operating instructions.

Suggested Reading

For more information on the X Window System, the following publications are highly recommended:

Introduction to the X Window System
Oliver Jones. Prentice Hall.
Introduction to the X Window System. Volumes I, II, and III.
O'Reilly & Associates, Inc.
X Window System Administrator's Guide. Volume Eight
O'Reilly & Associates, Inc.
X Window System, C Library and Protocol Reference.
Robert W. Scheifler, James Gettys, Ron Newman. Digital Press.

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Chapter 1 Introduction

Welcome to Micro X! Micro X is an MS-DOS program that will turn an AT compatible PC into an X Window System server. This guide includes instructions for installing Micro X onto your computer.

Micro X

Micro X is an X server which will allow X client programs located on other computers on the local area network to connect to your computer, and which will use your computer to display the results.

Advantages of Micro X

Using Micro X to access host computers and workstations provides several advantages:

- ⇨ Graphical display of X applications from the host computer.
- ⇨ Multiple windows running different tasks (perhaps, on several different computers) simultaneously.
- ⇨ The ability to run a wide range of commercially available X software packages.
- ⇨ Use of an intuitive point-and-click graphical user interface.
- ⇨ Micro X supports twm, OSF/Motif, and Open Look.

Micro X X Server

The X server performs the following functions:

- ⇨ Supports the X Window System protocol, which allows X client programs to communicate with your PC.
- ⇨ Provides standard graphics and software response to user input and client applications.
- ⇨ Controls the keyboard and mouse interfaces.
- ⇨ Performs the network tasks required for your PC to connect to host computers over Ethernet.

X Window System

The X Window System, also referred to as "X", was developed by the Massachusetts Institute of Technology (MIT) using the C programming language for workstations running UNIX; however it is not confined to a particular operating system, network, or to a specific combination of hardware. The X Window System is divided into two parts:

1) the X server and
2) the X client programs.

These two parts can reside on the same computer or be separated over a network. As implemented by Micro X, the X server resides on your PC, where it provides graphics display capabilities and monitors user input, and the clients reside on a remote computer, Thus, the computational power for the application program does not need to reside on your PC, which can then use its resources to display graphics, track the mouse, and use the keyboard functions. The remote computer, which can range from a workstation to a minicomputer to a supercomputer, executes the client and performs all of the client's computational functions.

Clients

Clients are programs which perform a variety of tasks and reside on one or more remote computers. Note that it is possible for X servers and X clients to run on the same computer; however, as implemented by Micro X, X clients always run on remote computers while the X server runs on your PC. See Appendix A for a list of some X clients.

Chapter 2 Prerequisites

This chapter will prepare you for running the Micro X software package. Specifically, you will learn:

- Hardware prerequisites.
- What is included in the Micro X package.

Hardware Prerequisites

- **Micro X** works on IBM Personal Computer AT's and compatibles.
- **Sufficient memory** - Micro X requires a minimum of 2MB.
- **Graphics Card** - Micro X requires a standard VGA card with 256KB of video memory for 640x480 monochrome mode or one of the supported VGA cards (A partial list of cards include: Ahead, ATI, Everex, Genoa, Oak, Paradise, STB, Trident, Tseng Labs, Video7, Western Digital, and ZyMOS).
- **VGA Monitor or better** - Micro X requires a resolution of 640x480 or better.
- **Mouse** - Micro X requires a PS/2, Microsoft, or compatible 2 or 3 button mouse with driver.
- **Ethernet card** - You should have an Ethernet card that supports the packet driver protocol. Typical supported cards are 3Com/ 3C501-03-05-23, 3Com/Etherlink/MC, Cabletron/1-2-3000, Micom-Interlan/NI5010-5210, Western Digital/WD8003E, and Novell/NE1-2000.
- **Hard Disk** - Minimum of 4MB of free space.

Software Prerequisites

- DOS 3.0 or better
- Microsoft or compatible mouse driver

Micro X Includes

- X Server - An MS-DOS executable file that turns your PC or terminal into an X server.
- Fonts - Micro X includes some of the standard X11 fonts.
- Font Compiler - Allows you to install new X fonts.
- Packet Drivers - The Clarkson (Crynwr) Packet drivers for non-intelligent Ethernet cards.
- NCSA telnet & NCSA ftp programs

Chapter 3 Installing Micro X

PC Installation

In this example, we will install Micro X on a PC configured with a NE2000 Ethernet card (non-intelligent), a 640x480 VGA monitor, and a standard VGA card that can display 640x480 in monochrome. We will be installing from Drive A onto the Hard Disk Drive labeled C.

Insert the disk labeled “Micro X Disk 1” into Drive A.

Enter: **a:install**
Press: **<ENTER>**

Install Introduction

A screen will show the version and types of responses expected. Remember that a normal entry is the **<ENTER>** key. Make sure that you have the proper selection highlighted (or flashing). The **<ESC>** key will terminate the installation procedure at any time.

To begin the installation:

Press: **<ENTER>**

DRIVE SELECTION

Use the arrow keys to highlight your selection. For this example we will chose Drive C.

Select: **Drive C**
Press: **<ENTER>**

DIRECTORY SELECTION

You may select \MICROX by pressing **<ENTER>** or edit this field for another selection. We will use \MICROX.

Entry: **MICROX**
Press: **<ENTER>**

Transport Selection

You will be given a selection of currently supported communications transports. This is the transport which would be installed on your PC. If you do not have a communications transport installed, the desired selection would be Standard. The standard selection has an integrated TCP/IP transport. If you do not know which transport you are running, ask your system administrator.

A list of transports will be shown. Select the transport which matches your system. Use the arrow keys to make your selection.

Selection: **Standard**
Press: **<ENTER>**

AUTOEXEC.BAT MODIFICATION

The AUTOEXEC.BAT file may be automatically modified if selected. If not, the user should copy the shown information for later inclusion to the AUTOEXEC.BAT file. Normally the user should let Micro X do the modification. Remember to re-boot the PC system after finishing the installation for these changes to take effect.

Enter: **y**

INSTALLX

The second part of the installation process starts here. It may be run separately later by using the command INSTALLX. Data shown in **( )**'s are valid responses. Data shown in **[ ]**'s are default values used if only **<ENTER>** is pressed. We would run INSTALLX separately (other than this initial installation) if one of the following changed:

> xdm revision, remote host IP addr, REXEC/RSH modifications, vga parameters, CONTINUOUS or RETURN TO DOS

This information is used to properly configure your VGA driver and the batch file used to run Micro X (called X.BAT). The X.BAT file may be configured manually by editing it with a suitable text editor; however, we recommend that only experienced users make changes using this method. INSTALLX may always be used to recreate these files.

Micro X will be placed in an 'active' or 'passive' mode by the first part of the INSTALLX program. The 'active' mode means that the Micro X X server will actively query (using the X Display Manager Control Protocol, XDMCP for short) either a specific remote host or broadcast a query for any available remote host to contact the Micro X X server to start an X session. For a remote host to respond to this query, it must be running the X Display Manager (X11R4 or X11R5). If a remote host responds to the query as sent by the Micro X X server, the *xdm* program on that host will put a window containing a login prompt of some sort on the Micro X X server, allowing the user to log into the remote host.

The 'passive' mode is used with the X11 Release 3 (X11R3) *xdm* program, which does not use the XDMCP queries sent by the 'active' mode of Micro X. X11R3 *xdm* programs manage X servers according to parameters given in the configuration files for *xdm* on the remote host running the program. The Micro X X server, when used in the 'passive' mode, waits for the X11R3 *xdm* to manage it, instead of actively requesting management.

If the user wishes to start an X session by telnetting into a remote host, and starting an X session in the background, or by using the rsh or rexec commands to remotely start an X session via an automated start-up script, Micro X must also be used in the 'passive' mode.

ACTIVE/PASSIVE MODE

The following chart summarizes these modes:

Start-up		xdm selection		Mode
X11R4 xdm running?	**yes ⇨**	"**4**"	⇨	***Active*** Micro X looks for a host by an XDMCP query or broadcast.
no ⇩				
X11R3 xdm running?	**yes ⇨**	"**3**"	⇨	***Passive*** Micro X waits for the R3 xdm to manage him.
no ⇩				
REXEC/RSH startup?	**yes ⇨**	"**R**"	⇨	***Passive*** X.BAT uses REXEC or RSH to execute a script file on the host.
no ⇩				
Telnet startup?	**yes ⇨**	"**3**"	⇨	***Passive*** tn is used to start the session in the background, then Micro X waits for action from the host.
no ⇩				
Host Startup? startup?	**yes ⇨**	"**3**"	⇨	***Passive*** Micro X waits for action from the host.
no ⇩				
Start-up from another node?	**yes ⇨**	"**3**"	⇨	***Passive*** Micro X waits for action from the host.
? ⇩				

Micro X Mode

You should refer to the previous page to determine the correct mode for your X server operation. If you are confused, it may be best to select "3" (Passive) and continue. You can, after finishing this part of the installation, refer to Chapter 4 or to Making the X Connection to determine your proper mode of startup. You can then run INSTALLX from the DOS prompt to make any necessary changes.

Enter: **4**
Press: **<ENTER>**

R4/R5 xdm **Active**

You will select this mode if your primary remote host (or at least one host on the network) is running either an X11R4 or X11R5 *xdm*.

R3 xdm **Passive**

You should choose this selection if one of the following conditions is true for your site:

1. Your remote host system is running an X11R3 *xdm*.
2. You want to manually start your X session from another node.
3. Your want to manually start X from your PC.

RSH/REXEC **Passive**

You should choose this selection if you wish to start your session using a start-up script on the remote host. RSH/REXEC will allow the user to execute a command from the PC to be executed on the remote host. This command should be a script file (Xstart) in the users home directory on the remote host. Micro X provides a generic Xstart script file in the \MICROX\XBIN directory. This script file (perhaps modified) will need to be transferred (ftp'ed) to the remote host and made executable.

R4/R5 XDM

You will select this mode if your primary remote host (or at least one host on the network) is running either an X11R4 or X11R5 *xdm*. Next you will need to decide if you should query a specific host to manage your display, or if you should broadcast a request for any available host to perform this task.

Enter: **1**
Press: **<ENTER>**

If you select option 2, you will skip the next question as you will not need the specific address of a host.

HOST IP ADDRESS

This will be the IP address of your remote (host) computer. In the following example, 192.1.1.1 was selected as the host.

Enter: **192.1.1.1**
Press: **<ENTER>**

Skip forward to the monitor selection section: **MONITOR**

R3 XDM

You should choose this selection if one of the following conditions is true for your site:

1. Your remote host system is running an X11R3 *xdm*.
2. You want to manually start your X session from another node.
3. Your want to manually start X from your PC.
   telnet to a host
   execute a command script file which:
   - puts unix to sleep
   - starts a window manager and an xterm

   exit telnet
   start X and wait for the host .

Skip forward to the monitor selection section: **MONITOR**

REXEC / RSH

You have the choice of using REXEC or RSH. The difference between the two commands is that a host contacted via REXEC will require a password, where using RSH to contact the host will require that you be on a list of "trusted" computers and users verification. You may need to consult the system administrator of the remote host to use RSH, as additional configuration may be needed at the host for this method to work.

Enter: **1**
Press: **<ENTER>**

You will be asked for information to create a command line which will connect to a specific host, which will be incorporated into the X.BAT file. The form of the Xstart command for unix or VMS can be found in Appendix K. You may enter either the IP address or the name of the host (if you are using a nameserver or if you have the host's name configured in your CONFIG.TEL file).

Hostname
The host IP address used in the example is **192.1.1.1**.

Enter: **192.1.1.1**
Press: **<ENTER>**

Host login
The example login name is **demo**.

Enter: **demo**
Press: **<ENTER>**

Host command
The name of the script file in this example is **Xstart**. Note that the script file resides on the remote host.

Enter: **Xstart xpc:0**
Press: **<ENTER>**

A sample Xstart file is included in \MICROX\XBIN. The Xstart file was set-up for a standard X11 distribution and may need to be edited. The user could ftp this file to the remote host, using his login and password. If the file has been transferred to the remote host, it will need to have its

permissions changed. The following unix command should allow the script file to execute:

chown 775 Xstart

The command line in our example, 'Xstart xpc:0' contains not only the script name on the remote host ('Xstart' in this case) but an additional argument, the name of the 'display'. In X parlance, from the user's perspective, every X server has a display name in this form:

hostname:displaynumber.screennumber

X client programs use this information to decide how best to connect to the X server and which screen should be used by default (on X displays with multiple monitors). This can be confusing at first. The parts of the display name are:

hostname - which machine the X display is physically connected to. If the host name is not given, the X client program assumes that it is to connect to a server on the same machine, which will never be the case with a Micro X based X server.

displaynumber - in X, the word "display" is normally used to refer to collections of monitors that share a common keyboard and mouse. Most PC compatible machines tend to have only one keyboard, and therefore only one display. A larger, multiuser system may have more than one display, so that more than one person could be using X simultaneously, To avoid confusion, each display on a machine is assigned a display number (starting at 0) when the X server for that display is started. On a computer running Micro X, the display number will always be 0. The display number must always be given in a display name.

screennumber - some displays share a single keyboard and mouse among two or more monitors. Since each monitor has its own set of windows, each monitor, or screen, is assigned a screen number (beginning at 0) when the X server for that display is started. This part of the display name is not required; if it is not given, then screen 0 will be used.

What this means is that the display name which has been given in the example command line is composed of the name of the PC running Micro

X (in this case, a machine called ‘xpc’) followed by a ‘:0’. As is the case with the rest of the example, this is site-specific and you should substitute your Micro X machine name for ‘xpc’.

If your remote host is running VMS the form of the Xstart command would be:

@Xstart [xpc:0]

The @ sign is needed for VMS.
Refer to Appendix K for more information on RSH, REXEC, and the script files.

VGA DRIVER

The user is given an opportunity to change the installed VGA driver to another one. The INSTALL program set your driver initially to STDVGA.DRV. The user will be limited to a 640x480 monochrome display. If the answer to this question is "yes" then the selection of VGA drivers will be shown. The selection of drivers will show the color and monochrome resolutions supported by each. Pressing the escape key will exit the selection screen without making a change. The user will be required to used this selection to select a driver which can run either in color or higher resolutions.

For this example, we will be running in mono at 640x480.

Press: **<ENTER>**

MONITOR

There are only two choices, color or black & white (monochrome).
The system has a color monitor, so the choice used here is **b**.

Press: **<ENTER>**

RESOLUTION

The supported resolutions (depending on VGA card/monitor & driver) are:
1 = 640x480, 2 = 800x600, and 3 = 1024x768.
The example monitor only supports 640x480, so the correct choice in this case will be '1'.

Enter: **1**
Press: **<ENTER>**

The resolution selection applies to color and monochrome. If your monitor was not running the selected resolution, you may have to adjust the screen size and position.

CONTINUOUS/RETURN TO DOS

In this example, the system is being configured to return to DOS, making 'y' the correct response.

Press: **<ENTER>**

FINISHED

Restart the system now for the changes to take effect.

RE-INSTALL

There may be several reasons to do a re-install. You may have corrupted some files, or changed your VGA card, or installed different TCP/IP software. Fortunately, in many cases you will not need to do a full re-install of Micro X from the distribution media.

START RE-INSTALL

To do a re-install of the Micro X, we must specify the same drive and subdirectory. Start by inserting Disk 1 into the proper drive, let's say A:, and type:

Enter: **a:install**
Press: **<ENTER>**

The same DRIVE and SUBDIRECTORY should be entered as was done for the initial installation.

Re-Install X Server

It may be necessary to re-install the X server if files in the MICROX\XBIN directory become unusable or if there is a problem loading the X server executable program.

Re-Install VGA Drivers

A re-installation of (S)VGA drivers will be necessary if the graphics card has been changed.

Re-install Fonts

All fonts may be erased and a complete installation of fonts may be done.

Chapter 4 Starting Micro X

Starting:

Typing ‘x’ at the DOS prompt will give the user the form of the X command..

Type ‘x mono’ at the DOS prompt for the monochrome X server.
Type ‘x color’ at the DOS prompt for the color (256 colors) X server.

If an xdm selection had been made during installation, a login window should appear. Enter your login name and password. If RSH or REXEC had been selected, then a local entry of a login and password (not required for RSH) will need to be entered. The user should then see a tiled screen with a moveable (by the mouse) X cursor. If your session does not start then proceed to the **Making the X Connection** supplement.

DOS Hot-Key

You may suspend the execution of Micro X by using the “hot key to DOS”. To activate this hold down the “ALT” and “CTRL” keys and press the “SysRq” key. This will give you a DOS prompt. You may use any DOS command at this point except for network related commands, whether for TCP/IP, or for other networks which may be connected to the network card. To return to Micro X, type:

Enter: **exit**
Press: **<ENTER>**

If you wish, you may even install new fonts at this point. Once you have finished, return to Micro X by using the DOS exit command, and issue the command ‘xset fp rehash’ on your remote host to force Micro X to read in the new fonts. Once you have completed this command, any new fonts you have installed will be available to X clients.

Micro X will do TCP processing while suspended so your clients will keep their connections to the server, but no x requests will be processed.

Exiting Micro X

If you have chosen to return to DOS after logging out of your X session, then Micro X will exit to DOS when you log out of your xdm session. If you have chosen to stay in Micro X when you log out, or if you are unable to log out of your session for some reason, then you may use the “Hot Key Exit” key. The “Exit” key is activated by holding down the “ALT” and “CTRL” keys and simultaneously pressing “ESC”. This will cleanly shutdown Micro X and close all X clients.

Appendix A X Window Clients

The following is a brief description of some of the X Window System clients that are available from MIT. These clients may already reside on one or more of the host computers on your network.

bitmap	Bitmap editor for X.
mwm	Motif window manager for X.
olwm	Open Look window manager for X.
twm	Tab (Tom's) window manager for X.
uwm	A window manager for X.
xcalc	Scientific calculator for X.
xclock	Analog/digital clock for X.
xdm	X display manager. This is a login daemon for X. A list of servers is kept in a configuration file on a UNIX host (X11R3 versions). When a server becomes active, a login window is placed on the screen.
xdpr	Dump an X window directly to printer.
xedit	Text editor for X.
xfd	Font displayer for X.
xhost	Security feature that restricts access to the server by providing a list of hosts that are authorized to connect to the server.
xload	Load average display for X.
xlsfonts	Server font list displayer for X.
xpr	Print an X window dump.
xset	User preference utility for X. This is used to control server parameters, such as key click, bell pitch, and mouse acceleration.
xterm	Terminal emulator for X.
xwd	Dump an image of an X window into a file.

For more information, contact your system administrator.

Appendix B Micro X Files

System Files:

AUTOEXEC.BAT

The mouse driver may be started from AUTOEXEC.BAT if is a .COM or a .EXE file. If it is a loadable driver (e.g. if it is a .SYS file), you will load it in your CONFIG.SYS file. The Ethernet packet driver is started from AUTOEXEC.BAT. The path is modified by Micro X. The environment variables CONFIGTEL and X11 are set in AUTOEXEC.BAT.

Program Files:

The programs are in a directory that is in your PATH, usually called xbin.

X.BAT

Starts the Micro X X server, one of X3M.EXE or X3C.EXE.

X3M.EXE

The monochrome Micro X X server.

X3C.EXE

The 256 color Micro X X server.

RGB.EXE

Converts an RGB file, which contains color values for named colors, into the RGB.BIN file, which lives in the X11 directory.

BDFTOSNF.EXE

Converts a font in the BDF format to an SNF (Server Natural Format) font. SNF fonts have an extension of .SNF and live in subdirectories under the X11\FONTS directory.

MKFNTDIR.EXE

Scans a directory of SNF fonts and creates the file FONTS.DIR which contains a listing of the font names and the .SNF files where they are found.

SHOWSNF.EXE
Shows the parameters of an .SNF font. Useful for debugging only.

Files

Micro X keeps a number of files in the directory specified by the X11 environment variable.

RGB.BIN
The color name database. This file has been created previously by the RGB.EXE program from the RGB.TXT file, which is readable. This file is used by the server to map the name of a color into its red, green, and blue values. If your monitor does not display a given color as you wish it to appear, you can edit the RGB.TXT file and run RGB.EXE to adjust the RGB values for the colors in question.

HOSTS.XO
This file contains a list of IP addresses (one per line) from which your server will allow clients to connect. If you are running X in the revision 4 mode with X authorization, a client does not need to be run on a host in this file to connect if it sends the correct authorization information at startup. If this file is missing and you are running in revision 3 mode, then a client from any host is allowed to connect. If it is missing and you are running in revision 4 mode, then all clients must send the correct authorization information before they are allowed to connect.

FONTS

This directory contains the default fonts for the server.
By default it contains three subdirectories: MISC, 75DPI and 100DPI. The MISC directory contains the default text font and the default cursor font, from which most of the mouse cursors are obtained.

Appendix C xdm

Micro X uses the standard protocol specified by the X Consortium for use with X terminals, the X Display Manager Control Protocol, or XDMCP. XDMCP is used by X terminals to control the *xdm* program on a host on the network, The X terminal sends a request to the xdm host, the host and the X terminal send a few XDMCP messages between themselves, and then the xdm program brings up a login window on the X terminal. XDMCP is a part of revision 4 of X version 11 and is available from Sun as part of SunOS 4.1 or from DEC as part of Ultrix 4.2. If you have a host on your network with these versions or later, you should run Micro X in the Revision 4 (Active) mode if you want to use *xdm* to manage your Micro X X server.

xdm goals

A major goal of providing a display manager program is to integrate the X terminal completely into a networked environment. As nearly as possible the “log-in window” should automatically appear after the X server is started.
Once you log in, an automatic initialization procedure should run to bring up applications and position their windows as specified in your personal session “profile” script. After you log out of the X session, all connections should be closed, the terminal should be reset to a known state, and a new log-in window should appear, ready for the next user. This scenario can be achieved by having the X server communicate with a display manager program between user sessions.

If you are running X11R4, you do not need to make any additions to the host. However, if your are running X11R3, you may need to add a line to the “Xservers” file on the host in the directory /usr/lib/X11/xdm. The line you must add is “PC:0 foreign PC” where PC is the name of your personal computer.

xdm functions

The xdm utility is designed primarily for use with X terminal type devices. The following describes the X11R3 functions. When *xdm* starts:

1. xdm-config: xdm reads in various configuration parameters from a file named /usr/lib/X11/xdm/xdm-config.
2. Xservers: One of the parameters is the name of a file specifying the displays on which xdm will manage login sessions.
   :0 local /usr/bin/X11/X :0 [xserver]:0 foreign
3. Xdm spawns a subprocess for each display. For a local X display, the subprocess starts the X server; for connections to a remote display, it opens the network connection.
4. Once connected to a display, the subprocess displays a dialog window containing fields for entering a name and a password.
5. A user enters a name and password; xdm verifies them and executes a startup script /usr/lib/X11/xdm/Xstartup.
6. The subprocess in charge of the session looks for a script file named .xsession in the user's home directory. This file is similar to the .xinitrc file used by xinit. It should list the commands for starting selected X clients. Typically, this includes xterm. If there is no .xsession, xdm's startup script (Xstartup) usually runs xterm.
7. From this point on, the user can interact with the system through the xterm window.
8. When the user logs off the system, xdm runs a cleanup script named /usr/lib/X11/xdm/Xreset. At the end of this, xdm returns the dialog window display and waits for another user to log on.

Appendix D Host Access List

When an X client attempts to open an X display, the server checks to see if that client is authorized to connect before it allows the connection. If the client is not authorized, it gives a message such as:

```
Xlib:   Connection to “server:0.0” refused by server
Xlib:   Server is not authorized to connect to host
Error:  Can’t open display
```

The X11R3 release gave only one method of authorizing clients to connect. That method is giving access based on the IP address of the host on which the client runs, also known as “xhost”. The disadvantage of this method is that when you give access to a host, call it “host1”, everyone who has an account on “host1” can access your display. Once they have access, they can move or delete windows, or even worse.

X11R4 introduced a new method of authorizing clients, called X authorization, or MIT-MAGIC-COOKIE-1. When you log in using X11, revision 4, xdm creates a file named “.Xauthority” in your home directory. In this file is a 16-byte key, or cookie, that is sent to the server as part of the connection setup information by X11R4 clients. If your client is running on a host that is not in the “xhost” list, but the client sends the correct cookie, then it will still be allowed to connect. Thus, when using X11R4, your “xhost” access list will typically be empty but clients will still be able to connect.

Micro X obtains the “magic cookie” from xdm using XDMCP. The cookie is generated by a random generator in xdm. If Micro X is started this way, the initial “xhost” access list is empty, and access is restricted. If it is not started with XDMCP, then access control is disabled (any client is allowed to connect).

If you use a revision 4 xdm to get your login window, and want to bring up older (R3) clients on your display, you need to add the hosts on which those clients run to your access list. To do this, simply add the host using the xhost command before bringing up the window.
You can make a permanent list of hosts that are in the access list of Micro X by putting those hosts in a file named "HOSTS.X0" in the \MICROX\LIB directory. You may want to do this in two cases:

1. You use Micro X in the non-XDMCP mode (any client can connect), and want to limit the access list to "trusted" hosts.
2. You use it in the XDMCP mode (only R4 clients with correct cookie allowed) and want to allow R3 clients from specific host(s) to connect to your server.

To make this permanent list, change to the \MICROX\LIB directory and edit the file "HOSTS.X0" (that's a zero, not an O) with a standard text editor such as EDLIN. On each line of this file put an IP address (such as "192.1.1.1").

Access Matrix - xdm vs HOSTS.X0

	HOSTS.X0 created	HOSTS.X0 not created
xdm running	**hosts in file** **hosts w/magic cookie**	**hosts w/magic cookie**
xdm not running	**hosts in file**	**any hosts**

Appendix E Fonts

Micro X comes supplied with all of the fonts available from the MIT X distribution. These fonts are placed in mandatory and optional groups according to their usefulness. If you have a need for fonts that are not supplied you can install your own fonts with the Micro X font complier. You must start with the BDF version of the font(s) you wish to install. If you do not have the BDF version you may extract it from a server on which the font is installed with a public-domain program called getbdf (not supplied). Use the bdftosnf program to compile the BDF font(s) into the SNF equivalent(s). The syntax is slightly different from the bdftosnf program on the MIT distribution. Use this syntax:

```
bdftosnf -t font1.bdf -o font1.snf
```

After you have compiled the fonts you wish to install, run the mkfntdir program on the font directory. This program updates the FONTS.DIR file to show the new font(s) installed. If you have just compiled your font(s) in the current directory, give the mkfntdir program no arguments.

Appendix F VGA Chipsets & Drivers

Driver	Chip Set	VGA Mfg.	Model	Color Modes
AHEAD.DRV	V5000	Ahead	Wizard	1,2,3
ATI3.DRV	28800-5	ATI	Wonder	1,2,3
			Ultra	1,2
			Vantage	1,2
EVEREX.DRV	8800-CS	Everex	VGA	1,2
GENOA.DRV	GVGA	Genoa	6400	1,2
			6300	1,2
HEADLAND.DRV	HT208	Headland	1024i	1,2
STDVGA.DRV	VGA			
OAK.DRV	037/067/077	OAK		1,2,3
TRIDENT0.DRV	8800	Trident		1
	POACH51	ZyMOS		1
TRIDENT1.DRV	8900	Trident		1,2,3
TSENG4.DRV	ET-4000	Tseng Labs		1,2,3
TSENG3.DRV	ET-3000	Tseng Labs		1,2
	EM-16	STB		1,2
WDC00.DRV	90C00	W. Digital	Paradise	1,2
	90C11	W. Digital		1,2
	90C30	W. Digital	1D	1,2,3
WDC1A.DRV	90C10	W. Digital		1
	PGVA1A	W. Digital		1

Color modes: 1 = 640x480 2 = 800x600 3 = 1024x768

These drivers can be found in the directory \MICROX\LIB. Micro X uses a file called VGA.DRV as its VGA driver. The Install program looks at the VGA card. If it recognizes the card, it copies the proper driver into VGA.DRV. If you are not getting color or higher resolutions, the install program did not recognize your card and has copied STDVGA.DRV into VGA.DRV. STDVGA.DRV supports only 640x480 Mono. If your VGA card has a supported chipset that INSTALL has not recognized, then INSTALLX could be run to select a different VGA driver.

Appendix G Network Errors

These errors only occur during the startup of the X server.

Error	Description
-1	bad packet vector Driver not loaded or bad vector in CONFIG.TEL.
-2	packet driver could not return info Internal packet driver error.
-3	incorrect packet class for driver Classes are 1=Ethernet, 6=SLIP, & 0=WILDCARD.
-4	unsupported packet class Packet driver is not Ethernet or SLIP.
-5	could not get IP handle Another program has handle and has not released it.
-6	could not get ARP handle Another program has handle and has not released it.
-7	could not get my Ethernet address Internal packet driver error.
-9	real-mode packet interface failure Internal Micro X error.
-13	bootp failure Trying to run BOOTP w/o a BOOTP server on the net.
-14	RARP failure Trying to run RARP w/o a RARP server on the net.
-31	RARP not supported Attempt to use RARP in an unsupported version.

Appendix H X.BAT Command Line

The following information should only be used by the experienced user. These are the options to the X3C.EXE and X3M.EXE commands. X.BAT resides in \MICROX\XBIN.

use: **X3C [:(display)] [option] [option] [...]**

or

X3M [:(display)] [option] [option] [...]

-a #	mouse acceleration (pixels)
bc	enable bug compatibility
-broadcast	broadcast for XDMCP
-class display-class	specify display class to send in manage
-co string	color database file
-dpi int	screen resolution in dots per inch
-f #	bell base (0-100)
-fc string	cursor font
-fn string	default font name
-fp string	default font path
-help	prints message with these options
-I	ignore all remaining arguments
-indirect host-name	contact named host for indirect XDMCP
-query host-name	contact named host for XDMCP
-mode #	screen mode
-nomouse	allow server to run with no mouse
-once	Terminate server after one session
-port port-num	UDP port number to send messages to
-s #	screen-saver timeout (seconds)
-t #	mouse threshold (pixels)
-to #	connection time out
v	video blanking for screen-saver
-v	screen -saver without video blanking
-3bs	turn off mouse 3-button simulate mode
-su	turn off save-under support
-bs	turn off backing store support

Appendix I SLIP

SLIP (Serial Line Internet Protocol)

Micro X can be used with a serial line to an IP router running SLIP. You can then use your X station remotely, using a high-speed modem. We recommend a serial speed of at least 9600 baud.
First, determine your IP address. It is set by the router at the other end of the serial line. You must know it to use Micro X. When you have found your IP address, edit the config.tel file. Find a line that starts:

myip=

and enter your IP address after the equal sign.

example: myip=192.1.34.10

Next, set up the serial connection from the IP router to your PC. When the connection is up, start the SLIP packet driver. If you are running at 9600 baud, enter one of the following commands (or put it in your AUTOEXEC.BAT file):

If you are using COM1, use this command:

\MICROX\PKDRVR\slip8250 0x60 SLIP 4 0x3f8 9600

If you are using COM2, use this command:

\MICROX\PKDRVR\slip8250 0x60 SLIP 3 0x2f8 9600

To use the SLIP driver, your serial card must be set with interrupts enabled.

SLIP8250

usage:

SLIP8250 [-n] [-d] [-w] packet_int_no [-h] [driver_class] [int_no] [io_addr] [baud_rate] [send_buf_size] [recv_buf_size]

The driver_class should be SLIP, KISS, AX.25, or a number.

The SLIP8250 driver is not strictly an Ethernet adapter, however some software packages (such as KA9Q's NET and NCSA Telnet) support Serial Line IP (SLIP). SLIP must be specially supported because it doesn't use ARP and has no hardware addresses prepended to its packets. The parameters are as follows:

- The -h flag is included if you wish to use hardware handshaking (the packet driver will then suspend the transmission of characters while CTS is low).

- The driver_class is the class that is returned to a client of the packet driver spec in the driver_info call.

- The int_no is the hardware interrupt number, defaults to 4(COM1).

- The io_addr is the hardware I/O address, defaults to 0x3f8 (COM1).

- The baud_rate defaults to 4800 baud.

- The send_buf_size and recv_buf_size default to 3000 each.

Appendix J REXEC & RSH

RSH and REXEC are both de-facto protocols created with BSD4.1 (TCP/IP code from Berkeley). Once the connection is established, both protocols function identically. The difference between the two commands is in the information sent at startup to authenticate the user. Both protocols, by default, use two TCP connections. One connection is used for standard input and standard output. The second connection is used for standard error and signals to be delivered to the remote process (e.g. interrupt).

REXEC

Usage: **REXEC hostname [-l user] command-line**

Upon startup, the REXEC program sends to the remote REXEC daemon:

1. socket number for second connection
   (optional - can be 0 for no second connection)
2. user name
3. password
4. command to be executed.

The REXEC daemon authenticates the user based on the user name and password given and if successful, gives the command to be executed to the user's shell to be interpreted.

Sun's PC-NFS does not have an REXEC command.

RSH

Usage: **RSH hostname [-l user] command-line**

The RSH daemon requires that the client RSH program connect to the server from a "privileged" port number. Privileged port numbers are in the range 512-1023. On a multi-user machine, users (not the super-user) cannot bind a socket to a port number less than 1024.

Upon startup, the RSH program sends to the remote RSH daemon:

1. socket number for second connection
   (optional - can be 0 for no second connection)
2. user name on the local machine
3. user name on the remote machine
4. command to be executed.

The RSH daemon assumes that the user name given by the RSH program is correct (which is the reason for the privileged port) and authenticates the user based on that information.

Sun's PC-NFS RSH command does not use the [-l user] option.

UNIX Usage

Usage: **REXEC or RSH hostname [-l user] command-line**

Xstart xpc:0 (example shows passing display name)

```
:
#!/bin/sh
if [ "$1" ]; then
DISPLAY=$1
export DISPLAY
fi
(sleep 10
/usr/bin/X11/twm &
/usr/bin/X11/xterm -n hostname -ls &) > xerrs 2>&1 < /dev/null &
```

VMS Usage

Usage: **REXEC or RSH hostname [-l user] @command-line**

Xstart

```
$!Xstart
$!start the detached process
$!
$run -
                /detached -
                /input=xtest.com -
                /output=xtest.log -
                /error=xtest.err -
                sys$system:loginout
```

xtest.com

```
$!xtest.com
$!This routine actually starts the various applications on the X Client
$!
$WAIT 00:00:10.00
$SET DISPLAY/CREATE/NODE=xpc/TRANSPORT=TCPIP/SERVER=0
$SPAWN/NOWAIT RUN SYS$SYSTEM:DECW$SESSION
$SPAWN/NOWAIT RUN SYS$SYSTEM:VUE$MASTER
$SPAWN/NOWAIT RUN SYS$SYSTEM:DEW$BOOKREADER
$CREATE/TERMINAL=DECTERM/DETACHED
$RUN SYS$SYSTEM:DECW$WINMGR
```

Glossary

ASCII	Stands for American Standard Code for Information Interchange. A standard code for representing characters as binary numbers, used on most computer terminals, micro computer, and printer.
BOOTP	The Bootstrap Protocol by which a network node determines its IP address and various other network parameters. To use this protocol, a BOOTP server must be running on the network.
CLIENT	Programs that perform a variety of tasks and reside on one or more host computers.
Config.tel	A file that contains configuration information for non-intelligent Ethernet boards. If you are not using BOOTP, this file contains the IP address of the PC, the netmask of the network on which the PC is connected, and the default gateway. If you are using NCSA telnet, this file contains a list of hosts, and their IP Addresses.
Default Gateway	If the PC is in communication with a host that is not on the local network, it sends the packets destined for that host to the default gateway.
Ethernet	A type of local area network originally developed by Xerox Corporation.
Font	A collection of characters with a consistent size and style that an X application can display on a screen.
Font Compiler	A program that converts on representation of a font into a form that the server can use more readily.
Host	A multi-user computer on the network. In our example, a host runs X clients.
IP Address	Internet Protocol Address. Each node on an IP network must have a unique 32 bit address.
MS-DOS	Microsoft Corporation’s Disk Operating System for the PC.
Netmask	A 32 bit number which is used to determine which bits of an IP address define the network.
Network Node	Any device that is connected to the network.

Open Look	AT&T's window manager supported by Sun and Solbourne, among others.
OSF/Motif	Open Software Foundation's window manager supported by DEC, IBM, HP, CDC, and others.
Packet Driver	A program that makes most Ethernet cards look the same to an application.
Packet Driver Protocol	Protocol used to communicate between an application and the packet driver.
Server	A device on a network that provides a particular service to other devices on the network.
Source Code	The ASM, C, etc. code modules that comprise a program.
TCP/IP	Stands for Transmission Control Protocol/Internet Protocol developed by the United States Department of Defense. One of several software protocols that can connect computers together. This protocol is one which can be used to exchange information between an X server and X clients.
X	Short for the X Window System.
X Display Server	A host that has a screen, mouse, and keyboard which are used by the X Window System.
Xdm	X display manager. This is a login daemon for X. When a server becomes active, a login window is placed on the screen.
X Terminal	A terminal that implements the X Window protocol.
X Window System	Developed by MIT, the X Window System provides a portable, network-transparent window system.

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