Installing the Model 5390 Communications Server

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This is to certify that the SynOptics Communications Model 5390 Communications Server is shielded against the generation of radio interference in accordance with the application of Council Directive 89/336/EEC, Article 4a. Conformity is declared by the application of EN 55 022:1987 Class B (CISPR 22:1985/BS 6527:1988).

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This equipment is in the 1st category (information equipment to be used in commercial and/or industrial areas) and conforms to the standards set by the Voluntary Control Council for Interference by Data Processing Equipment and Electronic Office Machines that are aimed at preventing radio interference in commercial and/or industrial areas.

Consequently, when this equipment is used in a residential area or in an adjacent area thereto, radio interference may be caused to equipment such as radios and TV receivers.

Electromagnetic Emissions

Meets requirements of:

FCC Part 15, Subparts A and B, Class A
EN 55 022 (CISPR 22:1985), Class B
General License VDE 0871, Class B (AmtsblVfg No. 243/1991 and Vfg 46/1992)
VCCI Class 1 ITE

Contents

Figures

Tables

Preface

Welcome to the SynOptics® Model 5390 Communications Server. The Model 5390 Communications Server is designed to reside in the Model 5000 chassis produced by SynOptics Communications®, Inc. The Model 5390 server provides asynchronous ports for modem and terminal attachment. Each port provides signals for simultaneous hardware flow control and modem control.

The Model 5390 Communications Server operates in diverse network environments. The server can communicate with any system that supports the TCP/IP, LAT, and ARA protocols. The Model 5390 server TCP/IP implementation is derived from the 4.3 BSD distribution of UNIX, as are the implementations of serveral higher-level Internet protocols. The server also supports TN3270 emulation that allows aynchronous personal computers using 3278 emulation to communicate with IBM host computers.

Purpose

This guide describes the Model 5390 Communications Server and its role in the Lattis System 5000™ architecture; explains the installation, connection, and configuration processes; describes the ROM monitor commands; and provides reference information that includes configuration menus, technical specifications, and troubleshooting information.

Audience

This guide is intended for network installers or administrators who are responsible for installing, configuring, or maintaining an Ethernet network. These persons are presumed to have the following background:

- Understanding of Ethernet, Internet Protocol (IP), and network management concepts and terminology
- Basic understanding of common telecommunication and networking concepts and practices
- Working familiarity with accepted tools and procedures for installing and operating sensitive electronic equipment
- Previous contact with SynOptics networking and network management products

Conventions

This section describes the conventions used in this manual.

Special Message Formats

This manual uses the following formats to highlight special messages:

NOTE: *This format is used to highlight information of importance or special interest.*

CAUTION: *This format is used to highlight information that will help you prevent equipment failure or loss of data.*

WARNING: *This format is used to highlight material involving possibility of injury or equipment damage.*

Two-tiered Procedure Format

The procedural steps in this manual are presented in a two-tiered format. The first tier describes the step very briefly, but precisely. An experienced user may only need to read the first tiers to complete the task. The second tier describes the step in more detail and includes results of performing the step.

Use of Enter, Type, and Press

This guide uses enter, type, and press to describe the following actions:

- When you read "enter," type the text and press the Enter or Return key.
- When you read "type," type the text, but do not press the Enter or Return key.
- When you read "press," press only the alphanumeric or named key.

Other Conventions

This manual uses the following typographical conventions:

italics	Book titles and UNIX file, command, and directory names.
`courier font`	Screen text, user-typed command-line entries.
Initial Caps	Menu titles and window and button names.
[Enter]	Named keys in text are shown enclosed in square brackets. The notation [Enter] is used for both the Enter key and the Return key.
[Ctrl]+C	Two or more keys that must be pressed simultaneously are shown in text linked with a plus (+) sign.

Related Publications

For more information about using the Model 5390 Communications Server, refer to the following publications:

- *Release Notes for the Model 5390 Communications Server* (SynOptics part number 896-050-A) includes changes to the Model 5390 Communications Server publication library, plus new information not available when the publications were printed.

- *Quick Installation for the Model 5390 Communications Server* (SynOptics part number 893-737-A) shows you how to quickly set up the Model 5390 Communications Server for operation.
- *Setting Up the Model 5390 Communications Server* (SynOptics part number 893-739-A) introduces the Model 5390 Setup utility menus and screens and shows you how to configure basic Model 5390 parameters and serial port parameters.
- *Using the Model 5390 Communications Server* (SynOptics part number 893-740-A) introduces the command line interpreter (CLI) for users with terminals connected to the Model 5390 Communications Server.
- *Administering the Model 5390 Communications Server* (SynOptics part number 893-741-A) gives instructions for configuring and administering the Model 5390 server software in a network environment.
- *Quick Installation for the Model 5390 Communications Server Flash Daughterboard* (SynOptics part number 893-736-A) shows you how to install the flash daughterboard EEPROM on the Model 5390 server.

To purchase individual SynOptics product publications, order by part number from SynOptics Press at the following numbers. You may also request a free catalog of SynOptics Press product publications.

- Phone: 1-800-845-9523
- FAX: U.S./Canada: 1-800-582-8000, International: 1-916-939-1010

Configuration Support and Technical Assistance

For help installing or configuring your System 5000 network, contact your reseller. For assistance with post-installation technical support, contact your local reseller or the SynOptics Technical Response Center at (800) 473-4911. Outside the United States or Canada, call (408) 764-1000.

Chapter 1 Overview of the Model 5390 Server

This chapter introduces the Model 5390 Communications Server and covers the following topics:

- A summary of the Model 5390 server functionality and capabilities
- A physical description of the Model 5390 server
- A summary of the Model 5390 front-panel features

Functional Description

The Model 5390 Communications Server is designed to reside in the Model 5000 chassis produced by SynOptics. The Model 5390 server is a product of joint development between SynOptics Communications, Inc. and Xylogics, Incorporated. The Model 5390 server provides 24 asynchronous ports for modem and terminal attachment. Each port is composed of an RJ-45 connector that provides eight signals for simultaneous hardware flow control and modem control. Each port operates at rates up to 115.2 kilobytes per second (KB/s).

The Model 5390 server is a diskless device. The server obtains operational code over the network either from a host running the Model 5390 server or from another Model 5390 server configured as a load server. You can also boot a Model 5390 server from the optional flash EEPROM (self-booting).

The Model 5390 Communications Server features are as follows:

- Dual 486SLC, 20-MHz processor design. One processor controls the serial ports while the second controls the network data flow and protocol stack.
- Four megabytes (MB) of dynamic random access memory (DRAM) are standard on the Model 5390 server and can be expanded to 8 MB.
- An extensive set of power-up diagnostics checks the system before the application software is loaded.

- The Model 5390 server can boot from a UNIX host, other BootP/TFTP hosts, other Model 5390 servers, and the optional flash read-only memory (ROM) daughterboard resident on the Model 5390 server.
- Standard Xylogics Annex3 images run on the Model 5390 server so that the normal software release cycles provide an update path for the communications server.
- The ability to connect the Model 5390 server to any of 12 Ethernet backplane segments.
- A watchdog timer that the software resets at regular intervals. The watchdog timer reboots the Model 5390 server in the unlikely event of an internal software error. This feature allows the Model 5390 server to run for long periods of time without intervention.
- The ROM monitor interactive command interpreter accesses the ROM functions.

ROM Monitor Commands

The ROM monitor is an interactive command interpreter that accesses the ROM functions. ROM monitor commands are issued through a terminal connected to the service port on the front panel of the Model 5000 chassis. Using the ROM monitor commands you can:

- Modify and display a set of EEPROM parameters.
- Execute interactive diagnostic tests.
- Receive information and statistics for the hardware configuration and the network.
- Boot the Model 5390 server manually.

For more information, refer to Chapter 4, “ROM Monitor Commands."

Common Management Bus

The management section of the backplane is the common management bus (CMB), a high-speed, multimaster, shared-memory communication channel that connects all modules installed in the hub to one another and to the supervisory module. The modules installed in the hub use the CMB to acquire and distribute configuration and status information.

The supervisory module is an intelligent interface between the Model 5000 chassis and user-installed modules. The supervisory module provides the following services to other modules across the CMB:

- Maintains chassis component information and environmental status
- Stores the primary module configurations
- Restores the module configuration after the module power is cycled or the module is reset

The supervisory module also supports configuration terminal support through the service port on the front panel of the chassis.

Backplane Ethernet Segment Banks

The chassis backplane Ethernet bus consists of 12 Ethernet segments, divided into two banks of six segments each: segments 1 through 6 and segments 7 through 12. Each Model 5390 server installed in the chassis can be configured to access one bank of six segments, either segments 1 through 6 or segments 7 through 12.

Within a segment bank, the specific segment to which a Model 5390 server is connected is initially determined by setting the segment selection jumper on the module (used for initial installation power-up). For more information on selecting a segment bank or segment within a bank, see “Setting the Backplane Ethernet Segment” in Chapter 2, “Installing the Model 5390 Server.”

Service Port Management

The service port, located on the front panel of the chassis, provides a switched serial communication link between the service port and any module in the hub, including the supervisory module. By connecting a terminal to this port, you can change the configuration parameter values for the Model 5390 server installed in the hub.

For more information about using the service port, see "Using a Service Port Terminal" in Chapter 3, "Initializing and Configuring the Model 5390 Server." See this same chapter for information about setting configuration parameters.

Physical Description

The Model 5390 Communications Server (see Figure 1-1) is a mechanical assembly that consists of a metal module frame containing the server baseboard and the plastic front panel. The server can also include an optional flash daughterboard. The assembly includes inserter/extractor levers and captive retaining screws at the top and bottom of the module front panel. The Model 5390 Communications Server occupies a single slot in the Model 5000 chassis.

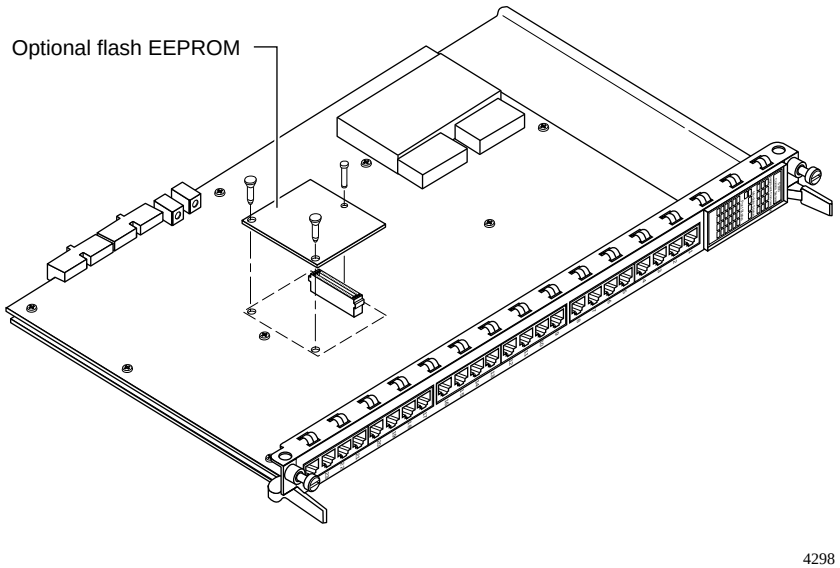


Figure 1-1. Model 5390 Communications Server

Asynchronous Serial Ports

The Model 5390 Communications Server has 24 asynchronous serial ports.

Each port has seven active pins, plus ground, to provide the following standard RS-232 asynchronous signals for modem and flow control:

- Transmit data (TxD)
- Receive data (RxD)
- Data terminal ready (DTR)
- Clear to send (CTS)
- Data set ready (DSR)
- Request to send (RTS)
- Carrier detect (DCD)

Figure 1-2 shows the Model 5390 server connectors and the port-numbering scheme. Chapter 2, “Installing the Model 5390 Server,” lists the signal and pin assignments for the RJ-45 connector.

LED Displays

The Model 5390 server has an LED display located near the top of the front panel (see Figure 1-2).

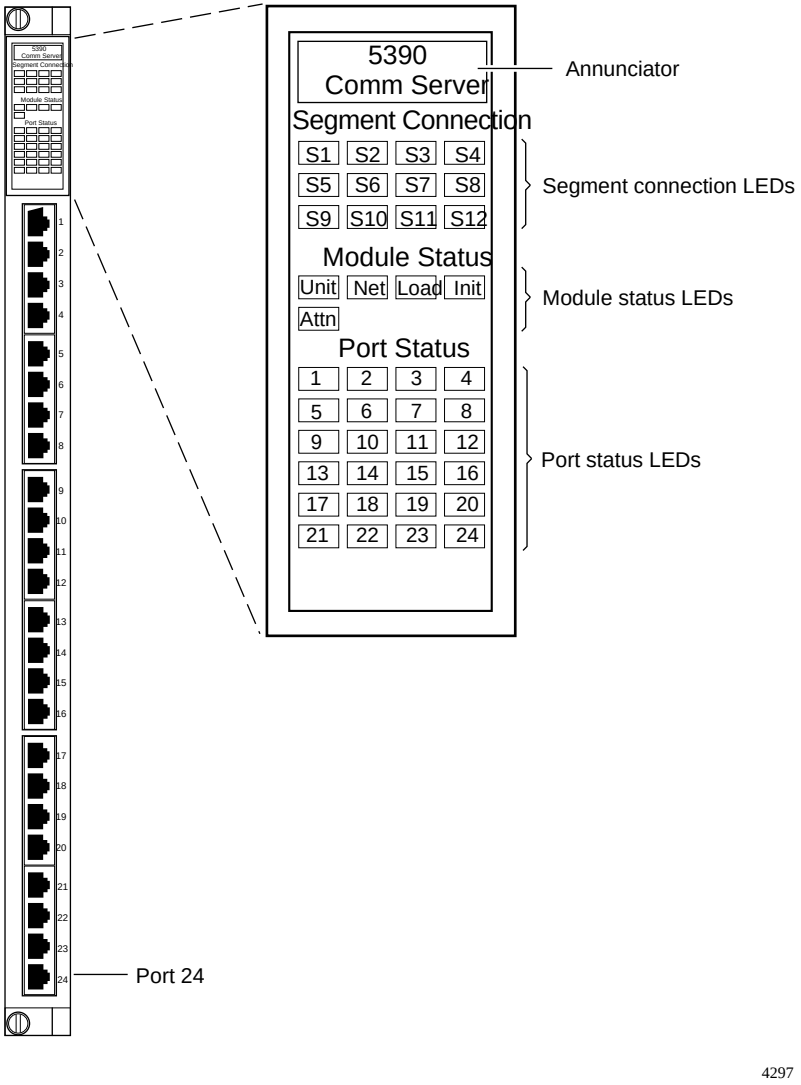


Figure 1-2. Front panel of the Model 5390 server

The LED display is an intelligent display consisting of two major elements: a single, bicolor LED (displaying in either green or amber) referred to as the "annunciator," and a 4-column by 11-row matrix of bicolor LEDs (displaying in either green or amber).

Annunciator

When power to the module is on and within the appropriate range, the annunciator (see Figure 1-2) backlights the model number of the module and indicates–by its color–the operational condition of the module (see Table 1-1).

Table 1-1. Annunciator conditions

Color	Condition
Green	The module is performing normally.
Amber	Some portion of the module has failed, or the module is being initialized.
Off	The module is not receiving +5 volt power, or the power level is below the reset limit (4.65 volts).

LED Indicators

The LED indicators on the Model 5390 server front panel are arranged in three groups:

- Segment Connection
- Module Status
- Port Status

Segment Connection LEDs

The Segment Connection LEDs consist of one group of 12 LEDs, labeled S1 through S12. These 12 LEDs indicate whether a particular backplane Ethernet LAN segment is being used by the Model 5390 server. A steady green Segment Usage LED indicates that the Model 5390 server is connected to that backplane Ethernet LAN segment; otherwise, the LED is off.

Module Status LEDs

The Module Status LEDs are a group of five indicators. They display the status of the activity of the Model 5390 server (see Table 1-2).

Table 1-2. Module Status LED indicators

LED	Description
Init	Turns green when the Model 5390 server begins the initialization process after a power-up or reset. This is the first LED that lights after power-up or reset. The Init LED turns off after the diagnostics have successfully completed.
Unit	Turns green after the Model 5390 server passes the power-up diagnostics. Turns amber if the power-up diagnostics fail.
Net	Turns green after the Model 5390 server verifies that a valid Ethernet connection exists.
Attn	Turns amber when the Model 5390 server requires operator attention, that is, in monitor mode or when the diagnostic tests fail.
Load	Turns green when the Model 5390 server is loading the operational image or dumping a RAM image if there is a failure. The LED turns amber if a load error is detected.

Port Status LEDs

The Port Status indicators are numbered 1 through 24. They display serial port configuration status during normal operations. All the server ports are configured at the factory, therefore, all the indicators turn green when the module is booted for the first time. If an error condition exists for a configured port, the LED turns amber. A port status LED remains turned off, if the port is not configured for use.

Optional Flash Daughterboard

The Model 5390 server has an optional flash daughterboard that attaches to the baseboard. The flash daughterboard allows the communications server to boot without using a load server. Figure 1-1 illustrates how the flash daughterboard is oriented on the Model 5390 baseboard.

Chapter 2 Installing the Model 5390 Server

This chapter outlines the procedures for installing the Model 5390 Communications Server software, preparing the server for installation, installing it, and verifying that it is operating correctly.

This chapter includes the following information and procedures:

- Software files
- Preparing for software installation
- Installing the software on the host
- Setting up the host server
- Equipment you need to install the module
- Locating and setting jumpers
- Verifying the installation
- Making connections

Installing the Software

Before you install the Model 5390 module, prepare the host system by installing the Model 5390 Communications Server software. This section contains procedures for installing the software on a host. Chapter 3, "Initializing and Configuring the Model 5390 Server," contains procedures for downloading the necessary files to the Model 5390 Communications Server.

NOTE: *If your Model 5390 server contains the flash EEPROM, you can boot the server without installing the software, If you wish to boot the server in this manner, install the Model 5390 module then see "Booting from the Flash EEPROM" in Chapter 3, "Initializing and Configuring the Model 5390 Server."*

Software Files

The distribution tape contains two types of files:

- One type resides on the Model 5390 server and is downloaded from the installation host.
- Another type resides on the host and requires a UNIX host with a C compiler and TCP/IP network protocols on which to compile and execute.

The distribution tape contains the Model 5390 operational code and host-resident Model 5390 support tools. The tools are distributed in C language source form with appropriate make files. The Model 5390 operational code is already built. The host-resident Model 5390 support utilities are listed in Table 2-1.

Table 2-1. Host-resident support utilities

Utility	Description
aprint	The Model 5390 utility (intended for sites that cannot modify the Berkeley spooler).
ch_Passwd	The Model 5390 user password change utility.
erpcd	The expedited remote procedure call daemon that listens for Model 5390 server requests on a reserved UDP port (121). The daemon contains two programs: bfs, the block file server used by the Model 5390 server to access host-resident files; and acp, the access control protocol (ACP) program that responds to host-based security requests.
ien116d	The IEN-116 name server.
na	The Model 5390 server network administrator utility.
rtelnet	A pseudo-tty device creations utility that allows such UNIX programs as tip and uucp to access serial devices attached to Model 5390 ports.
timserver	The time server that updates the Model 5390 time-of-day clock.

Preparing for Software Installation

To prepare to install the Model 5390 server software, follow these steps:

1. **Select the directory that will serve as the root of the Model 5390 source tree. The */usr/5390* directory is assumed to be the default.**

   The directory requires approximately 3 MB of memory to read the tape and approximately twice this amount to build the programs.

2. **If you intend to install the host-resident Model 5390 software tools, select the directory that will contain the compiled Model 5390 tools.**

   The Model 5390 server installation procedures use the */annex* directory in the examples.

   The directory requires approximately .5 MB of memory.

3. **Select the directory in which the boot images and dump files will be stored.**

   The */usr/spool/erpcd/bfs* directory is assumed to be the default.

   The directory you select will require 2.5 MB of free storage space for the boot images and 1 to 3 MB for dump files for each Model 5390 server serviced by this file server.

Installing the Software on the Host

This section provides procedures to download files using a UNIX host or a non-UNIX host. After you download files using a UNIX host, perform the procedure to run the installation script.

Loading Files Using a UNIX Host

NOTE: *Keep different versions of the Model 5390 software in separate directories.*

To install the software for the Model 5390 server on a UNIX-compatible host, follow these steps:

1. **Insert the distribution tape into the tape drive.**

2. **Become a superuser on your host system by entering the following command at the prompt:**

   ```
   su
   ```

3. **Enter the password at the password prompt.**

4. **Create a directory to serve as the root of the Model 5390 software tree, if it does not already exist, by entering the following command at the UNIX prompt:**

   ```
   mkdir /usr/annex
   ```

5. **Change to the new directory by entering the following command:**

   ```
   cd /usr/annex
   ```

6. **Extract the contents from the distribution tape by entering the following command (*device_name* is the device from which you are loading):**

   ```
   tar -xvf /dev/device_name
   ```

   If, on your system, you cannot use the *tar* command to create directories, first make sure you are in the directory into which you want to load the files, and then enter the following commands:

   ```
   tar -xvf /dev/device_name extract-it

   extract-it /dev/device_name
   ```

Verifying File Installation

To verify that all the files on the distribution tape have been extracted, follow these steps:

1. **Enter the following command:**

   ```
   tar -xvf /dev/device_name > 5390.files
   ```

2. **Compare the list of files to the files on the tape to verify that all the files have been extracted.**

Loading Files Using a TFTP Host

NOTE: *Make sure that TFTP is running on your host. This protocol is not supplied with the Model 5390 software.*

To load the software from a host that is not UNIX-compatible or if you choose to use TFTP, follow these steps:

1. **Insert the distribution tape into the tape drive.**
2. **Load files from the *bfs* directory (in your annex directory) to your *tftp* directory by entering the following command:**

   ```
   cp bfs/* /tftpboot/annex/
   ```

3. **Create any other necessary download files (*config.annex*, *motd*) in the same *tftp* directory.**

   To expedite the download, create empty download files for those that you do not need.

Go to "Installing the Communications Server" later in this chapter.

Running the Installation Script on a UNIX Host

NOTE: *You must be a superuser to run the installation script. You cannot run the install-annex script from /u* or from / unless the -k option is turned on.*

Running the *install-annex* script generates a configuration of your system and installs the Model 5390 server host utilities and man pages. Any prompt that has a default displays it in brackets. Press [Enter] to choose the default.

The configuration sequence of the installation script generates two files:

- *src/Makefile*
- *src/make.config*

These files compile and install the Model 5390 tools.

To run the *install-annex* script, follow these steps:

1. **Enter the following command:**

```
./install-annex
```

The installation script is displayed, similar to the following example:

```
        Annex-UX R8.0 Host Utilities Installation Script

**********************************************************************
**It is recommended that you run this install-annex script as root.**
**********************************************************************

This installation shell script will examine your system and possibly
ask you questions to generate the needed configuration to allow you to
compile the annex host utilities.

You can abort the script at any time and restart it without any ill
effects.
Once install-annex completes the configuration section, you will only need
to use

            "make all"     and      "make install"

from the "src" directory to later re-build or re-install the utilities.
At any question prompt you can escape to a shell by typing "!".
When you exit that shell you will bounce back to the question prompt. Many
of the questions will have default answers in square brackets; typing
carriage return will give you the default.

Type carriage return to continue. Your cursor should be here--> [Enter]
```

2. **Press [Enter] to continue the installation script.**

Text is displayed similar to the following example:

```
Beginning configuration.
Locating common programs...
ar is in /bin/ar.
awk in /bin/awk.
cat is in /bin/cat.
cc is in /usr/ucb/cc.
chown is in /usr/etc/chown.
chmod is in /bin/chmod.
cp is in /bin/cp.
date is in /bin/date.
echo is in /bin/echo.
expr is in /bin/expr.
grep is in /bin/grep.
mkdir is in /bin/mkdir.
mv is in /bin/vm.
ranlib is in /bin/ranlib.
rm is in /bin/rm.
sed is in /bin/sed.
Don’t worry if any of the following aren’t found...
inetd is in /usr/etc/inetd.
pack is in /bin/pack.
strip is in /bin/strip.
```

NOTE: *If cc is not found, stop. You must install a compiler on your system before continuing, or boot using TFTP. If your compiler is not in the standard directory, edit the install-annex script to add the compiler directory to the pth variable.*

The installation script prompts you for the machine type and operating system of the host.

```
Select the most appropriate machine type

 1.Sun                              10.Hewlett Packard
 2.Encore 90 Family or Multimax     11.Decstation (ULTRIX)
 3.UNISYS                           12.MIPS
 4.UNISYS S Series CTIX             13.Silicon Graphics
 5.NCR                              14.SCO UNIX
 6.Pyramid                          15.AT&T Star Server FT
 7.Sequent PTX                      16.Interactive UNIX
 8.Sequent Dynix                    17.ICL DRX/6000
 9.IBM RS/6000 (AIX)                18.OG AViiON (DG/UX)
 0.Generic (no special code needed or machine not listed

Enter Machine Type #:
```

3. Select the machine type of the host on which you are installing the software.

NOTE: *If you select SCO UNIX, Sun, or Interactive UNIX, you are prompted for the type of installation: binary or source files. If you select binary installation, the Model 5390 server installs the binaries in /usr/annex and the operational image in /usr/spool/erpcd/bfs, and exits.*

If your machine is not listed in the menu, refer to Appendix B, “Host-specific Installation Instructions,” for more details. Otherwise, choose generic.

When you choose generic, the script prompts you for the type of operating system.

```
Select the most appropriate OS

 1.4. [23]BSD UNIX (& UMAX BSD)
 2.System V UNIX (& UMAX V)
 3.XENIX System V
 4.MACH
 5.SVR$

Enter OS #:
```

4. **Enter the number of the operating system you are using.**

NOTE: *If you chose from the machine-type menu and your host has only one OS, you will not be prompted for operating system type.*

If you select SYS_V UNIX, the script requests the following information:

```
Does your system have any auxiliary libraries for the network
code? [n]:
```

If you answer yes, you are prompted with the following question:

```
Enter any additional loader options for the network
libraries.
(ex: "-lnet" or '-lsocket")
Loader options:
Does your system have any alternate include directory for
network code? [n]:
```

If you answer yes, you are prompted with the following question:

```
Where are the network include files located?
```

5. **Enter the directory name where the network include files are located.**

The script prompts you for the network software package:

```
What kind of Network Software does your OS have?

 1.4. [234]BSD or compatible
 2.Excelan EXOS package
 3.CMC package
 4.Wollongong WINS package
 5.None. Use user-level SLIP (SysV/XENIX only)
 6.TLI. Transport Layer Interface

Enter Net S/W Type #:
```

NOTE: *If your host is in the machine type menu and has only one network software package, you will not be prompted with this question.*

6. **Enter the number of the network software package, if you have more than one network software package installed.**

After you answer these questions, the script verifies that the desired functions are installed on your system and the following text is displayed:

```
Checking your system for these features...
#include <sys/types.h> ok
#include <netinet/in.h> ok
bcopy () ok
bzero () ok
dup2 () ok
gethostbyname () ok
gethostbyaddr () ok
gethostname () ok
getservbyname () ok
hton1 () ok
htons () ok
ntoh1 () ok
ntohs () ok
inet_addr () ok
inet_ntoa () ok
recvfrom () ok
recvmsg () ok
sendmsg () ok
sendto () ok
index ok
rindex ok
select ok
u_char ok
u_short ok
u-long ok
hostent ok
servent ok
```

If a function is not found, one of the following messages displays next to the missing function:

```
not found, adding
```

or

```
not found, substituting
```

The script asks where to install the Model 5390 utilities, download files, and man pages.

```
Where do you want the 5390 utilities installed? [/usr/annex]
[Enter]

Select a directory for the 5390 operational images and boot
files.

BFS directory name [/usr/spool/erpcd/bfs]: [Enter]

Do you want to install manual pages at this time? [n]: [Enter]

What kind of on-line manual page layout do you have?
Select the most appropriate on-line manual page layout:
 1. v7/BSD (/usr/man/man?)
 2. SystemV (/usr/{catman,man}/[apu]_man/man?)
 3. None (don't install on-line manual pages automatically)

Enter on-line manual page type #: [1] [Enter]
```

You have several location options for installing man pages, based on the type of system you have; you also have the option of not installing man pages.

NOTE: *Typically, the Model 5390 utilities are installed in /usr/annex or in /etc and the Model 5390 download files are stored in /usr/spool/erpcd/bfs.*

If you select number 1 from this menu, to install the man pages using BSD page layout, you are asked for the directories in which these manual pages reside:

```
How should the on-line manual pages be installed?

 1. One directory (i.e., under /usr/man/man1)
 2. Multiple directories (i.e., under /usr/man in man1, man5,
man8)

Enter on-line manual page layout type [1] [Enter]
```

If you select number 1 from this menu, to install man pages in one directory, you are asked the following questions:

```
How are manual page extensions handled in /usr/man/man1?

 1. They use a fixed extension like ".1"
 2. They use the extension of the manual page
(i.e., ".1", ".5", ".8" - note that this is not typical)

Enter manual page extension type: [1] [Enter]

What is the extension used? [1] [Enter]
```

If you select number 2 from the same menu, to install the man pages in multiple directories, you are prompted by the following question:

```
What directory should be used/ [/usr/man/man1] [Enter]
```

Whatever manner you choose to install the man pages, the following display indicates that the configuration portion of the script is complete:

```
Executing "du -s bin/[A-Z]*"

    1454          bin/IUNIX
    1228          bin/SCO
    1026          bin/SOL2
    810           bin/SUN
To save room on your system, the above directories can be
removed. They contain the pre-compiled binary images for the
various host-based utilities. Since this installation will not be
making use of these files, it should now be safe to remove them.
However, if you do choose to remove these directories, you should
know that you will not be able to re-run the script for a binary
install. (You can always restore from the distribution kit if you
need to do a binary installation.)

Remove these directories? [Y/N]: [Enter]

Creating configuration files........complete.
```

NOTE: *The default man page for rtelnet is actually src/newrtelnet/rtelnet.8. If you want to use the "old" rtelnet command instead, copy src/rtelnet/rtelnet.8 to an appropriate location. To use the "old" rtelnet, enter the following command while in the rtelnet directory: make install*

The script prompts you to compile and install the Model 5390 tools:

```
Shall I compile the tools for you? [y]: [Enter]
```

If you answer y, the following text is displayed:

```
Compiling the tools; output being saved in "Build.out"

*** Building libannex ***
*** Building netadm ***
*** Building na ***
*** Building erpcd ***
*** Building ien-116 ***
*** Building timserver ***
*** Building rtelnet ***
*** Building aprint ***
```

NOTE: *You must be running as root if you answer y to the next question. If you are not, answer n and install the tools by hand.*

```
Shall I install the tools for you? [y] [Enter]
```

If you are running as root and you answer y to the question, the following text is displayed:

```
Installing the tools; output being save in "Install.out"

*** Installing Annex-UX R8.0 images ***
*** Installing manual pages ***
*** Installing libannex ***
*** Installing netadm ***
*** Installing na ***
*** Installing erpcd ***
*** Installing ien-116 ***
*** Installing timserver ***
*** Installing rtelnet ***
*** Installing aprint ***

Done.
```

If you did not compile and install the tools, the following text is displayed:

```
Installation not completed.
To compile the tools use "cd src ; make"
To install the tools and manual pages use "cd src ; make
install"

Done.
```

At this point the software installation procedure is complete. If you need to rebuild or reinstall the Model 5390 software in the future, you need to run only the *make* and *make install* scripts from the *src* directory.

Setting Up the Host Server

Before you install the Model 5390 server and download the software to it, you need to make the following edits to the host files.

To edit the host files, follow these steps:

1. **Use vi to add the following line to the */etc/services* file that defines a UDP port for the *erpcd* daemon.**

```
erpc      121/udp      # annex erpc listener
```

2. **Change your default directory to where the host tools are installed (the default is the */usr/annex* directory) by entering the following command:**

   ```
   cd /usr/annex
   ```

3. **Log in as root and start the *erpcd* daemon by entering the following command:**

   ```
   ./erpcd
   ```

   The *erpcd* daemon is located in the directory where you installed the Model 5390 utilities.

   As a daemon, *erpcd* detaches itself and returns your terminal to the UNIX shell. To verify that the *erpcd* daemon is running on UNIX System V systems, enter the following command:

   ```
   ps -ef | grep erpcd
   ```

   You can verify that the *erpcd* daemon is running on Berkeley UNIX systems by entering the following command:

   ```
   ps -aux | grep erpcd
   ```

4. **Update your *rc* file to start the *erpcd* daemon when the system is booted. Use vi to edit the file.**

   For UNIX System V systems make sure the network daemons are started first, then update your *tcp* start-up file in *rc2.d* by adding the following lines:

   ```
   if [ -f /annex-directory/erpcd ]; then

   /annex-directory/erpcd & (echo -n 'erpcd') > /dev/console fi
   ```

   For Berkeley UNIX systems, add these lines to the *rc.local* file

NOTE: *The security server (acp) is disabled with the distribution. If you wish to enable the security server, edit the /etc/services file and remove the pound sign (#) in front of the line defining acp.*

Additional host set-up procedures may involve name and time servers. Refer to *Administering the Model 5390 Communications Server* for information about various set-up procedures.

After the Model 5390 software is loaded on the file server host, install the hardware.

Installing the Communications Server

Installing the Model 5390 server involves seating the backplane connectors to the Model 5000 chassis backplane, verifying the installation, and connecting devices.

Preparing for Hardware Installation

This section explains how to prepare the Model 5390 server for installation in the chassis.

Tools and Equipment

To connect and power up the Model 5390 server, you need the following tools and equipment:

- A 3/16-inch flat-tip screwdriver
- An antistatic mat and wrist strap (attached to an antistatic leash)
- The service port cable and a terminal

Connecting devices to the Model 5390 server requires eight conductor cables with RJ-45 connectors. DB-25 adapters may be required, depending on the device.

CAUTION: *System 5000 equipment uses electronic components that are sensitive to static electricity. Static discharge from your clothing or other fixtures around you can damage these components. You should take all possible precautions to prevent static discharge damage when working with printed circuit boards.*

If possible, place all printed circuit boards on an antistatic mat until you are ready to install them. If you do not have an antistatic mat, wear a discharge leash to free yourself of static before touching any of the printed circuit boards, or free yourself of static by touching the metal of the chassis before handling a printed circuit card.

Setting the Backplane Ethernet Segment

Figure 2-1 shows the locations of the configuration jumpers on the Model 5390 Communications Server. There are two sets of jumpers that you set:

- Backplane Ethernet segment bank selector (J6, J7, J8)
- Backplane Ethernet segment selection jumper (J1).

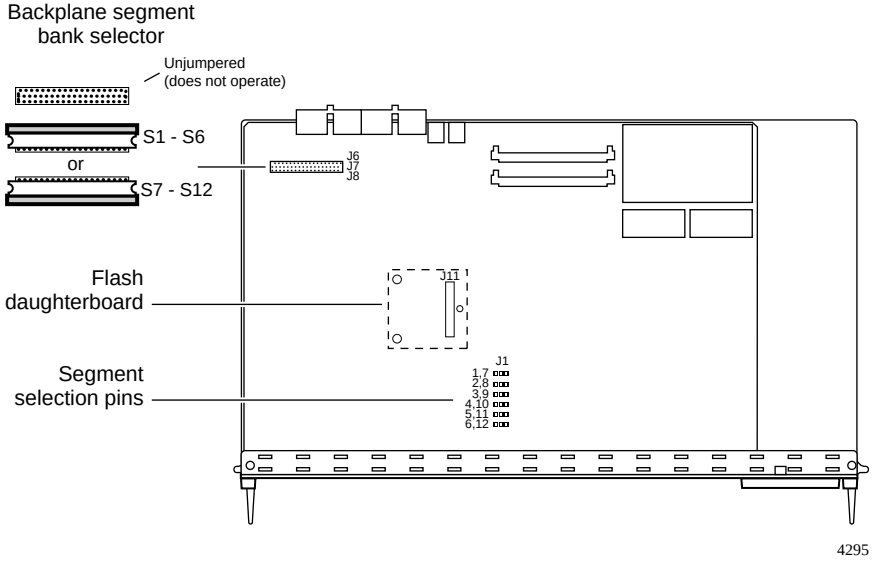


Figure 2-1. Jumper and connector locations

Backplane Ethernet Segment Bank Selector

The segment bank selector (see Figure 2-1), consisting of three rows of 30 pins (J6, J7, J8) and a gang jumper, determines whether the module connects to backplane Ethernet segments 1 through 6 or segments 7 through 12 at power up. When the gang jumper is installed between J6 and J7, the module has access to segments 1 through 6; when the gang jumper is installed between J7 and J8, the module has access to segments 7 through 12.

NOTE: *When the segment bank selector is installed between J6 and J7, the printed circuit card handle is nearest the backplane edge of the Model 5390 server. To install the jumper between J7 and J8, remove the jumper, rotate it 180° (so that the printed circuit card handle is nearest the front-panel edge of the Model 5390 server) and push it onto the pins of J7 and J8.*

The specific segment connection for the Model 5390 server is determined by the segment selection jumper (described in "Segment Selection Jumper" later in this chapter).

NOTE: *Network management software cannot override the bank selector setting. The setting (segments 1–6 or 7–12) can only be set while the module is outside the chassis.*

Segment Selection Jumper

J1 (see Figure 2-1) is a 12-pin header used to set the default segment selections. Segment selection jumper settings are listed in Table 2-2. Placing a jumper on the pins selects the segment within the Ethernet segment bank For example, a jumper in the 1,7 position selects either segment 1 or 7, depending on the position of the Ethernet bank selector.

Table 2-2. Segment selection jumper settings

Position	Segments 1–6	Segments 7–12
1, 7	Segment 1	Segment 7
2, 8	Segment 2	Segment 8
3, 9	Segment 3	Segment 9
4, 10	Segment 4	Segment 10
5, 11	Segment 5	Segment 11
6, 12	Segment 6	Segment 12

NOTE: *Network management software can override this jumper setting, so an installed module might connect to a different segment (within the bank) than is indicated by the jumper setting.*

Installing the Server Module

To install and secure the module in the chassis, follow these steps:

1. **Remove the blank filler panel from the chassis slot where you intend to install the module.**
2. **Verify that the module jumpers are set correctly, as described in "Setting the Backplane Ethernet Segment" earlier in this chapter.**
3. **Extend the inserter/extractor levers to their fully extended positions (see Figure 2-2).**

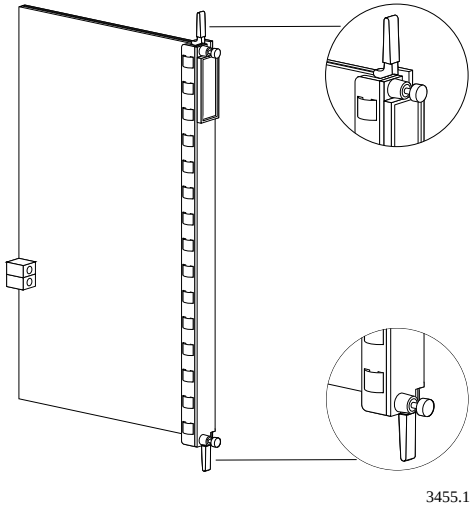


Figure 2-2. Inserter/extractor lever

4. Align the top and bottom edges of the module in the card guides of the target slot, and push the module into the chassis until the inserter/ extractor levers just engage the front edges of the chassis (see Figure 2-3).

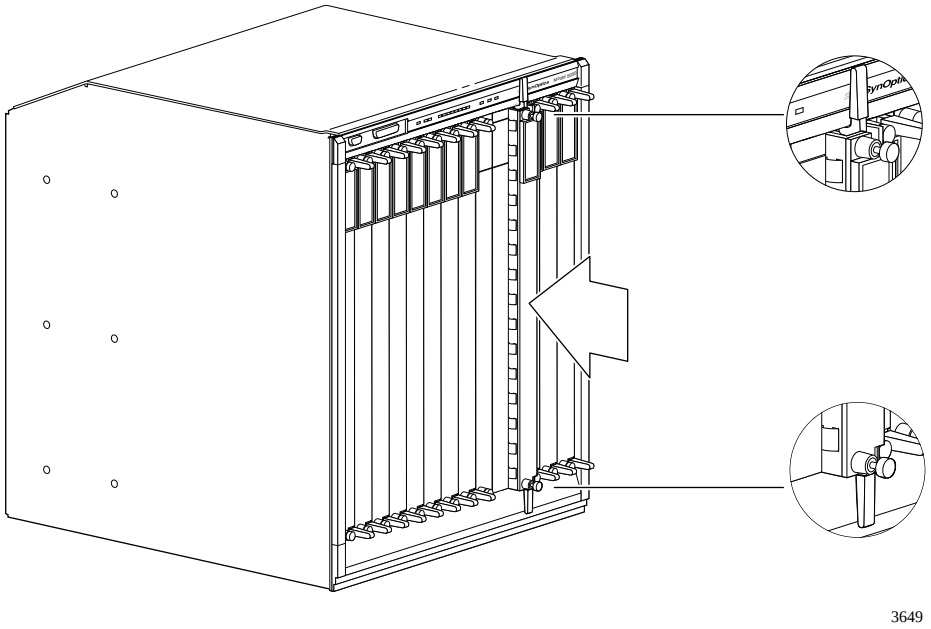


Figure 2-3. Inserting the module

5. Seat the module backplane connectors by simultaneously pushing the inserter/extractor levers toward the center of the module front panel (see Figure 2-4).

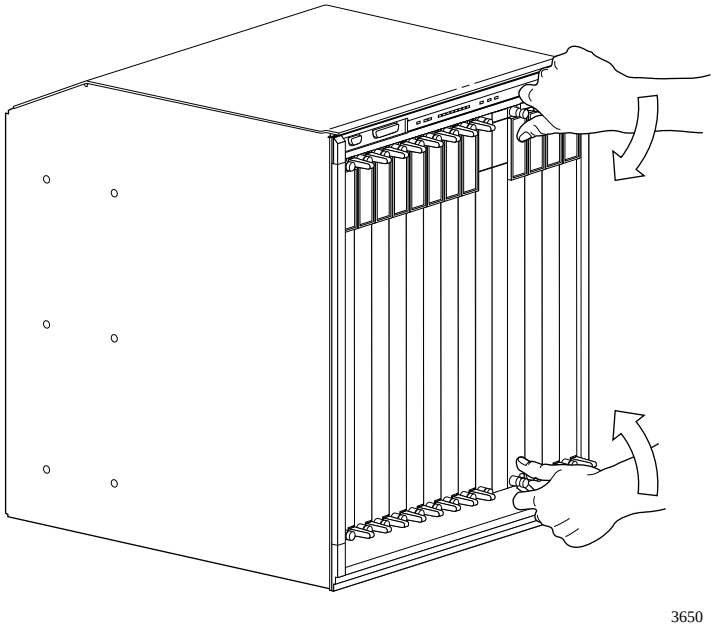


Figure 2-4. Seating module connectors

When the front panel of the module is flush with the front of the chassis, the module backplane connectors are properly seated.

6. Use the flat-tip screwdriver to tighten the captive retaining screws at both ends of the module front panel.

NOTE: *The captive retaining screws on the module must be tightened to at least 4 inch-pounds, but no more than 8 inch-pounds of torque.*

Verifying the Installation

After installing and connecting the Model 5390 server, verify that you have performed the installation correctly by observing the LED indicators and system operation displays on the front panel of the Model 5390 server (see Figure 2-5).

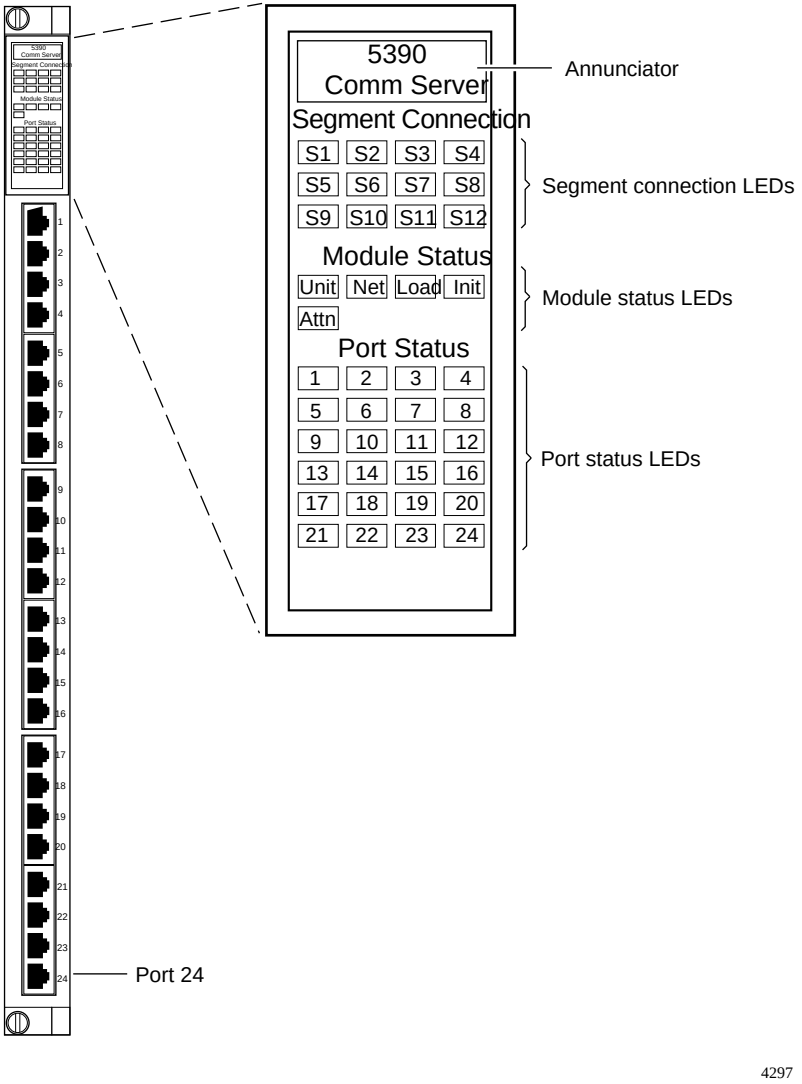


Figure 2-5. Module LED display

NOTE: *The Model 5390 server performs a series of self-test diagnostics each time the Model 5390 server is reset or powered up. These tests take about 30 seconds to complete and cannot be deactivated. While these tests are running, the annunciator remains amber. For information about possible error conditions that may occur, refer to Chapter 5, "Troubleshooting."*

LED Indicators

When the Model 5390 server is operating correctly, the front-panel LEDs (see Figure 2-5) should appear as follows:

- Annunciator: The annunciator should be green after the Model 5390 server successfully completes the self-tests.
- Segment Connection LEDs: A steady green indicates which Ethernet LAN segment the module is using.
- Module Status LEDs:
  - Init: Turns green when the Model 5390 server begins the initialization process after a power-up or reset. Typically, this is the first LED that lights after power-up. The Init LED turns off after the initial diagnostics have successfully completed.
  - Unit: Turns green after the Model 5390 server passes the power-up diagnostics.
  - Net: Turns green after the Model 5390 server verifies that a valid Ethernet connection exists.
  - Attn: The attention LED should be off. Turns amber if the Model 5390 server is in monitor mode.
  - Load: Turns green when the Model 5390 server is loading the operational image or dumping a RAM image if there is a failure.
- Port Status LEDs: All the port status indicators turn green.
- Verify that the hub front-panel LEDs are properly illuminated.

If the Model 5390 server LEDs do not light in the proper manner, or if the system operation displays indicate problems, refer to Chapter 5, "Troubleshooting," for additional information.

Making Connections

The Model 5390 server has 24 asynchronous ports that you can use for modem, serial printers, ISDN terminal adapter (TA), and terminal attachment. The connectors are RJ-45 with RS-232 signaling.

To connect devices to the Model 5390 server, plug the connectors into the ports on the front panel (see Figure 2-4).

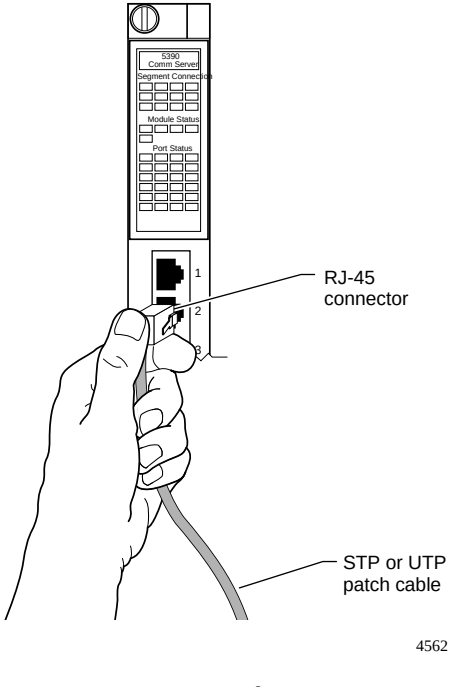


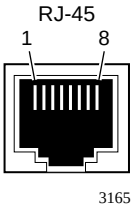
Figure 2-6. Connecting devices to the Model 5390 server

For information about how to configure modems for the Model 5390 server see “Configuring Server Ports for Devices” in Chapter 3, “Initializing and Configuring the Model 5390 Server.”

Table 2-3 lists the RJ-45 port pin assignments.

Table 2-3. RJ-45 port pin assignments

Pin #	Signal name	Direction
1	RTS	Out
2	DTR	Out
3	TXD	Out
4	DCD	In
5	RXD	In
6	GND	
7	DSR	In
8	CTS	In



You do not have to connect serial devices to install the Model 5390 server; however, you must connect a terminal to the service port before setting up and booting the Model 5390 server. To connect a terminal to the service port, see "Using a Service Port Terminal" Chapter 3, "Initializing and Configuring the Model 5390 Server."

Serial Devices

The Model 5390 server user ports conform to the RS-232 signaling specification. However, it is possible to exceed the cable limits of the specifications given good-quality cables that are run in an electrically quiet environment and grounded at one end only. SynOptics only guarantees operation with cables that conform to the appropriate specification. Table 2-4 lists the recommended cable lengths.

CAUTION: *The Model 5390 server can incur damage if the cables conduct such transients as those caused by lightning strikes.*

RS-423 drivers and receivers are used on the data lines (TxD and RxD) to increase the signaling distances. Use Table 2-4 as a guide for determining the maximum cable length versus data rate.

Table 2-4. Recommended cable lengths

Data rate	Maximum cable length: feet	Maximum cable length: meters
19,200 and below	250	76
38,400	200	60
57,600	100	30
115,200	Less than 50	15

Chapter 3 Initializing and Configuring the Model 5390 Server

This chapter describes how to set up, configure, and download the operational software to the Model 5390 Communications Server.

This chapter includes the following information:

- Connecting a terminal to the chassis service port
- Connecting to the Model 5000 chassis and entering monitor mode
- Automatically initializing the server
- Downloading the image software
- Booting from the flash EEPROM

Using a Service Port Terminal

If your network does not include a BootP server, you must connect a terminal to the service port on the chassis front panel and manually configure the Model 5390 server so that it can then use TFTP to acquire its configuration and image files.

To configure the Model 5390 server through the chassis service port, you need:

- A TTY-compatible terminal or a portable computer with a serial port and the ability to emulate a TTY-compatible terminal. The terminal should be set up for:
  - 9600 b/s (default)
  - 8 data bits
  - No parity
  - 1 stop bit
  - No handshaking
  - Standard ASCII code

- An RS-232 modem cable with a female DB-9 connector to connect to the service port on the chassis front panel. The other end of the cable must have a connector appropriate to the serial port on your computer or terminal. (Most terminals or computers use a male DB-9 or DB-25 connector.) The cable should use the pin assignments in Table 3-1.

Table 3-1. Service port pin assignments

Terminal		Function	To service port	Function
DB-9 pins	DB-25 pins		DB-9 pins	
2	3	Receive data	2	Transmit data
3	2	Transmit data	3	Receive data
5	7	Signal ground	5	Signal ground

NOTE: *RS-232 signals on other pins, such as DTR, CTS, and CD, are ignored.*

Connecting the Terminal

To connect the terminal to the service port, follow these steps:

1. **Connect the terminal (or a computer in terminal emulation mode) to the chassis service port with the RS-232 cable described earlier in this section.**
2. **Set the terminal protocol as described earlier in this section.**
3. **Turn on the terminal; adjust contrast and brightness as required.**
4. **Press [Enter] or [Ctrl]+T to display the Slot Selection menu.**

   The Slot Selection menu (Figure 3-1) shows the system date and time, lists the modules installed in the chassis by slot number, and lists the available commands.

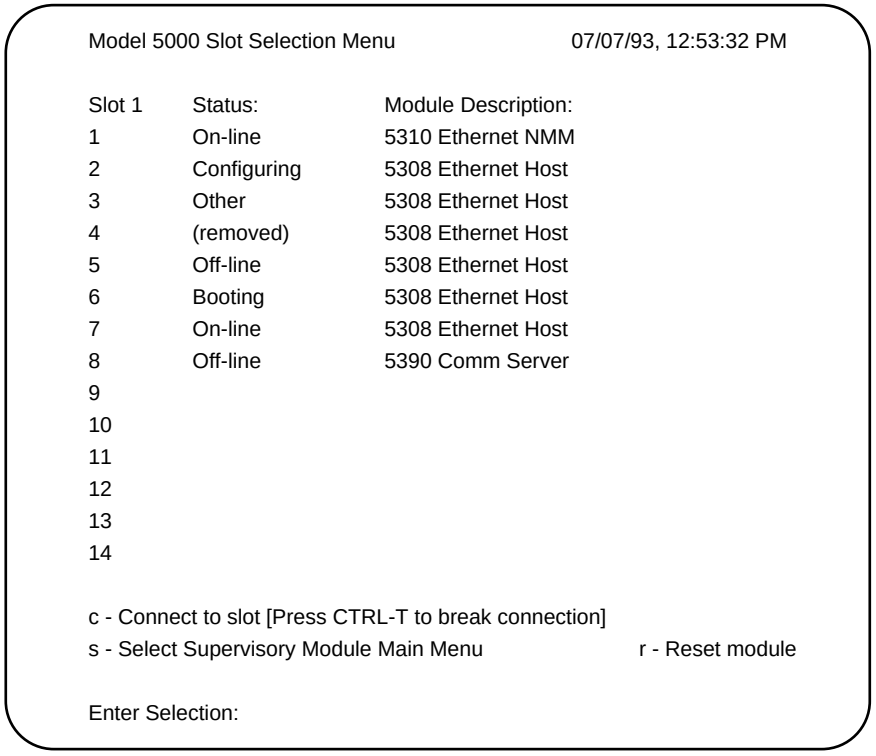


Figure 3-1. Slot Selection menu

Use this menu to reset the Model 5390 server. For more information, see "Initializing the Model 5390 Server" later in this chapter.

Initial Setup and Accessing the Model 5390 Monitor

After installing the Model 5390 software on the file server host (refer to Chapter 2, “Installing the Model 5390 Server” for procedures to install the software), collect the following information, which is required to determine the Model 5390 boot parameters:

- Where are the download files on the host (tftp only)?
- Are the Model 5390 server and host on the same subnet or are they separated by a gateway?
- Are the Model 5390 server and the host connected by serial ports using the Serial Line Internet Protocol (SLIP)?
- Is the host going to use tftp or erpcd (requires a UNIX host) to serve the Model 5390 download code.

The Model 5390 server needs these parameters to perform an initial boot when loading the software. Enter these parameters into the Model 5390 EEPROM using the ROM monitor commands, which are accessed through the service port terminal. For more information about these commands refer to Chapter 4, “ROM Monitor Commands.”

The Model 5390 server supports the Bootstrap Protocol (BootP) and the Reverse Address Resolution Protocol (RARP) which can be used to obtain some of the information listed. If you have a host running BootP or RARP to serve the Model 5390 server the information, the server will boot without user intervention. For more information about using these protocols, see “Automatic Initialization of the Model 5390 Server” later in this chapter.

See “Initializing the Model 5390 Server” later in this chapter for the procedure for manually booting the server.

Model 5390 Server Parameters

The Model 5390 Communications Server requires that certain parameters be set by the ROM monitor before it can boot from a host. Once the Model 5390 server is booted, you can change these parameters using the Model 5390 server *na* utility or the command level interpreter (CLI) command, admin. These parameters are explained in *Administering the Model 5930 Communications Server.* A brief description of these parameters follows:

Internet address:	A unique 32-bit universal identifier that is specified in dotted-decimal notation.
Subnet mask:	Defines which portion of the Internet address is the network (all ones), the subnet (all ones), and the host (all zeros) address.
Preferred load host address:	The Internet address of the host from which you want to boot.
Load/dump gateway Internet address:	The Internet address of the gateway, for which you will be prompted, if the preferred load host is on a different network.
Broadcast address:	An Internet address with a host id of all ones or all zeros (for 4.2 BSD) to which all hosts on a particular network will respond.
Type of IP encapsulation:	Specifies the method for accessing the physical and network layer of the transmission media. The default is: ethernet.

Initializing the Model 5390 Server

This section describes how to set up the Model 5390 server, make the connection to the System 5000 hub for the first time, and enter monitor mode to configure the module.

To initialize the Model 5390 server and enter monitor mode, follow these steps:

1. **Use a terminal connected to the chassis service port to verify that the Model 5390 server is operating properly.**

   The Slot Selection menu is displayed. The Model 5390 Communications Server should be listed next to the slot number in which it is installed.

2. **Reset the Model 5390 server by typing r and then entering the slot number of the chassis that contains the server.**

   The following prompt is displayed:

   ```
   Are you sure you want to RESET this module? (Y/N):
   ```

3. **Answer the question by entering y.**

4. **Within 10 seconds, connect to the Model 5390 server by typing c and then entering the slot number of the chassis that contains the server.**

5. **Wait for the following prompt:**

   ```
   To enter “Monitor Mode” please depress the SPACE key within
   10 seconds.
   ```

   The prompt counts down from 10 seconds.

6. **Press the space bar within 10 seconds.**

   After a few seconds, the following messages are displayed:

   ```
   Monitor Mode selected, please wait for Confidence tests to
   complete.
   ```

   ```
   System Reset - Entering Monitor Mode
   ```

   Then the monitor prompt is displayed:

   ```
   monitor::
   ```

   To return to the Slot Selection menu from monitor mode, press [Break].

7. **Verify the Model 5390 server hardware configuration by entering the following command at the monitor prompt:**

```
config
```

The following text is displayed:

```
ROM Software Rev #
Board ID:           Serial Number
Memory size: 4 Meg
Flash Size:          Flash ID:
EEPROM size:

Total number of ports: 24

ASYNC Config
  Number of ports: 24
  Max Port speed: 115.2 Kbps
Hub Config
  Slot Position:
  CMB HW Revision:
  EEPROM Revision:
  Jumper Segment Selection:
  EEPROM Segment Selection:
```

8. **To verify and record the Model 5390 Ethernet address for future reference, enter the following command at the monitor prompt:**

```
addr –d
```

The following information is displayed:

```
Ethernet address (hex): 00-80-2D-00-18-B6
Internet address: <invalid or uninitialized>
Subnet mask: <invalid or uninitialized>
Preferred load host address: <any host>
Broadcast address: 0.0.0.0
Type of IP packet encapsulation: ethernet
Load Broadcast:Y
```

9. **Verify that the Model 5390 server is online by entering the following command:**

   ```
   net

   Enter Segment to be used [1]:
   ```

   A “pass” or “fail” message is displayed. If fail is displayed, try verifying the network from another device.

Once the Model 5390 server is online, you can download the image software to the server. See “Downloading the Image Software from a Host System” later in this chapter.

Automatic Initialization of the Model 5390 Server

The Model 5390 server supports BootP and RARP. The ROMs use these protocols to obtain boot information without requiring any manual setup on the Model 5390 server.

- BootP allows a diskless client to determine its Internet address, the Internet address of the server, and the name of the file to be loaded into memory.
- RARP maps a hardware address into an Internet address.

The ROMs invoke this system of acquiring boot information when a boot is initiated and the Model 5390 server Internet address is not initialized. Under this condition, the Model 5390 server first tries to get boot information via BootP; if BootP fails, it tries to get boot information via RARP. If neither protocol is successful, the Model 5390 server either prompts the user for the Internet address (if in monitor mode) or it flashes the Attn and Load LEDs to indicate the Internet address is not set (if in normal mode).

For a successful BootP retrieval, bootpd must be running on a host on the same network as the Model 5390 server and must have the appropriate information in the bootptab file. The Model 5390 server BootP implementation adheres to rfc951, rfc1048, and rfc1084. A sample bootptab file entry used to initialize the Model 5390 server named “terminator” follows:

```
5390default:\
        :sm=255.255.255.0:gw=132.245.22.66:\
        :hn:vm=auto:to=-18000:
terminator:ht=1:ha=00802d004879:ip=132.245.22.226:tc=5390default
:
```

In this example:

- *sm* is the subnet mask.
- *gw* is the load/dump gateway address.
- *vm* is the Vendor Magic Cookie.
- *ht* is host type (1=Ethernet).
- *ha* is the Model 5390 hardware address (Ethernet address).
- *ip* is the Model 5390 Internet address.

When the Model 5390 server receives a BootP response with the *sm*, *gw*, and *ip* parameters set, it sets the respective parameters: *subnet_mask*, *load_dump_gateway*, and *inet_addr*. The Vendor Magic Cookie must be set to *auto*. This indicates that the BootP daemon should respond to the client (Model 5390 server in this case) with whatever format the client requests; the Model 5390 server (client) always requests in the dotted-decimal notation format (for example, 99.130.83.99). The *bootpd* daemon adds the address of the host on which it is running as the server address in the BootP response message. The ROMs use the server address as the preferred load host and store it in the *pref_load_addr* parameter.

NOTE: *The bootpd daemon must be running on the Model 5390 server preferred load host.*

If the Model 5390 server does not receive a successful BootP response, it uses RARP to get the boot information. For a successful RARP retrieval, TCP/IP must be running on a host that is on the same network as the Model 5390 server, and the host ARP table must be initialized with the Model 5390 server Internet and Ethernet addresses (see the arp man page, arp –s).

The only boot information that RARP provides is the Model 5390 server Internet address. The ROMs save this information in the *inet_addr* parameter. The ROMs use default information for the subnet mask and preferred load host. This means the ROMs will broadcast their requests.

NOTE: *If both BootP and RARP fail, the Model 5390 server prompts for the appropriate information.*

The host that serves the Model 5390 server its boot information must be running on the same network as the Model 5390 server because the Model 5390 server only broadcasts BootP and RARP queries.

Downloading the Image Software from a Host System

You can download the image software (operational software) from a host system or another Model 5390 server. The Model 5390 server is configured with default parameters at the factory, so that the first time you boot the server, you load the Model 5390 server software. To configure the Model 5390 server for your specific needs, use the ROM monitor commands. Each command is described in Chapter 4, "ROM Monitor Commands."

To load the image software on the Model 5390 server, follow these steps:

1. **On the service port terminal enter the following command at the monitor prompt:**

   ```
   addr
   ```

   The following prompt is displayed:

   ```
   Enter module IP address::
   ```

2. **Enter the IP address for the Model 5390 server.**

   You are prompted to enter the server subnet mask, preferred load host, preferred dump host, IP packet encapsulation, and load broadcast. The defaults are listed after each prompt.

3. **Modify the parameter next to each prompt, or press [Enter] to select the default.**

4. **To verify that the EEPROM is clear, enter the following command at the monitor prompt:**

   ```
   erase
   ```

NOTE: *Use the erase command if the image is corrupted, you are upgrading the Model 5390 server, or the server is self-booting.*

The system displays information similar to the following:

```
  1) EEPROM (i.e. configuration information)
  2) FLASH  (i.e. self boot image)
Enter 1 or 2::1
Erase all non-volatile EEPROM memory? (y/n) [n]::y
  Erasing <16352 or 8160 bytes> of non-volatile memory. Please
wait...
                                          16K->|Data 0xff
  ..........................................
                                          16K->|Data 0x0
  ..........................................
Initialized checksum record installed
```

5. **If you are booting the Model 5390 server using a Serial Line Internet Protocol (SLIP) network interface, you must:**

   a. Modify the port parameters for the SLIP network interface, by entering the following command:

      ```
      slip [port]
      ```

   b. List the SLIP network interface in the load/dump interface list, by entering the following command:

      ```
      sequence [–d] | [interface[,interface] . . .]
      ```

6. **To boot the server, enter the following command:**

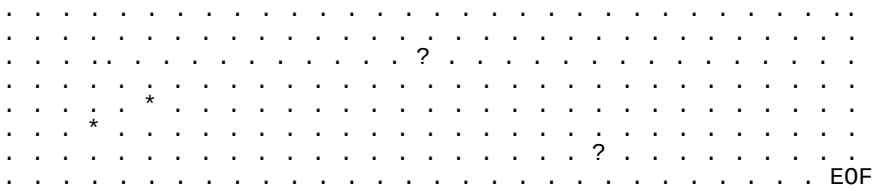
   ```
   boot
   ```

   The screen displays information similar to the following:

   ```
   Enter boot file name[oper.42.enet]:: [Enter]

   Requesting boot file ”oper.42.enet”.
   Unanswered requests shown as ’?’,transmission errors as ’*’.

   Requesting boot from 192.9.200.88 via Ethernet...
   Booting BFS file using open delay of 8
   Booting BFS file from 192.9.200.88
   Header received OK. Received data blocks shown as ’.’.
   ```



After the download is complete, the Unit and Net LEDs remain on. If and of the LEDs indicate a problem, refer to Chapter 5, “Troubleshooting.”

Once the Model 5390 server is booted, monitor mode is no longer operational. The Model 5390 server is up and running.

Command Level Interpreter

You are now at the Model 5390 server command level interpreter (CLI). The CLI prompt is not displayed on the service port terminal. You can only access it from a terminal connected to one of the Model 5390 serial ports.

After the Model 5390 software is loaded, the operation code, the CLI banner, and the prompt are displayed.

Configure the ports for your applications (see *Administering the Model 5390 Communications Server* for this information). You can change the Model 5390 server parameters either at the host by running the *na* utility in the directory in which it is installed or at a CLI port using the superuser CLI admin command.

Since all parameters and changes are stored in nonvolatile memory (EEPROM), parameters are not lost when the unit is turned off. However, after configuring the Model 5390 server, it is a good idea to save the parameters in a file using the *na* utility write command. If the Model 5390 server is ever replaced, you can configure the new server quickly by using the *na* utility read command.

Booting Using BFS

To use BFS to boot the Model 5390 server, enter the *boot* command.

If you do not enter a file name with the command, you are prompted for one (the default file name is displayed at the prompt: oper.42.enet). Press [Enter] to boot using the default file name.

The following is an example of a screen display when you type this command:

```
Enter boot file name [oper.42.enet]:: [Enter]

Requesting boot file "oper.42.enet".
Unanswered requests shown as '?',transmission errors as '*'.

Requesting boot from 132.246.6.26 via Ethernet...
Booting BFS file using open delay of 8
Booting from 132.246.6.26
Header received OK. Received data blocks shown as '.'.
. . . . . .
. . . . . ? . . . . . .
. . . . . .
. . . * . . . . . *
. . . . . ? . . . . . .
. . . . . EOF
```

The download takes between 30 and 60 seconds for an Model 5390 server booting over the local network. If you are booting over a SLIP interface, the speed of the serial line affects the amount of time needed for the download. The length of time can be anywhere from 5 minutes for a 19200 baud line, to 80 minutes for a 1200 baud line.

After the download is complete, the Power, Unit, and Net LEDs remain lit. If these LEDs do not, refer to Chapter 5, "Troubleshooting."

Booting Using TFTP

To set up directories and files, and use TFTP to boot the Model 5390 server, follow these steps:

1. **Enter the following command at the monitor prompt:**

   ```
   image
   ```

   As prompted, enter the following information:

   - Appropriate boot image name
   - Boot directory
   - Dump filename

   The default image file name is:

   ```
   oper.42.enet
   ```

   The following example shows how the image command is used to set up a Model 5390 server boot from the */tftpboot/annex/* directory. When you enter the load directory name, make sure you end the pathname with a backslash character.

```
Image name: <invalid or uninitialized> Default: “oper.42.enet”
Enter Image name::oper.42.enet
Image name: “oper.42.enet”
TFTP load directory:
Enter TFTP load directory::/tftpboot/annex
TFTP Dump path/filename: <uninitialized> Default :
“dump.134.117.6.34”
Enter TFTP Dump path/filename::/tftpboot/annex/dump.134.117.6.34
Using current TFTP Dump path/filename.
monitor::
```

2. **Enter the following command:**

   ```
   boot
   ```

The boot command display looks like this:

```
Enter boot file name[oper.42.enet]:: [Enter]

Requesting boot file "oper.42.enet".
Unanswered requests shown as '?',transmission errors as '*'.

Requesting boot from 192.9.200.88 via Ethernet...
Booting BFS file using open delay of 8?
Booting TFTP file using open delay of 8
Booting TFTP file from 192.9.200.88
Header received OK. Received data blocks shown as '.'.
. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . .
. . . . . EOF
```

Once the Model 5390 server is booted, monitor mode is no longer operational. The Model 5390 server is up and running.

Booting from the Flash EEPROM

You will want to boot a Model 5390 server from the flash EEPROM if there is no load host or if another Model 5390 server does not act as a load host.

To boot a Model 5390 server from the flash EEPROM, follow these steps:

NOTE: *Anytime you want to return to the monitor prompt, press [Ctrl]+C.*

1. **On the service port terminal, press [Enter] or [Ctrl]+T to display the Slot Selection menu.**
2. **Press s.**

   The Supervisory Module Main Menu is displayed.
3. **Press m to select the Module Information menu.**

   The following prompt is displayed:

   ```
   Enter slot # (1-14):
   ```

4. **Enter the slot number of the Model 5390 server you want to boot.**

   The module information and status are displayed and you are prompted to reset the module, set the module configuration to default, or return to the previous menu.

5. **Press d to select the module configuration default.**

   The following message is displayed:

   ```
   Are you sure you want to set module DEFAULT configuration?
   (Y/N):
   ```

6. **Press y.**

   The Slot Selection menu is displayed.

7. **Press r to reset the module.**

   The following message is displayed:

   ```
   Are you sure you want to RESET this module? (Y/N):
   ```

8. **Press y; then press [Escape] twice.**

   The Slot Selection menu is displayed.

9. **Within 10 seconds, press c to connect to the Model 5390 server.**

   The following prompt is displayed:

   ```
   Enter slot # (1-14):
   ```

   If you do not make the connection in time, reset the server by pressing [Ctrl]+T to return to the Slot Selection menu and following the prompts.

10. **Enter the slot number for the Model 5390 server you are booting.**

11. **Wait for the following prompt:**

    ```
    To enter “Monitor Mode” please depress the SPACE key within
    the next 10 seconds.
    ```

12. **Press the space bar within 10 seconds.**

    If you do not press the space bar within the allotted time, press [Ctrl]+T and reset the server again.

    After a few seconds, the following text is displayed:

    ```
    Monitor Mode selected, please wait for Confidence tests to
    complete.

    System Reset - Entering Monitor Mode
    ```

    Then the monitor prompt is displayed:

    ```
    monitor::
    ```

13. **Enter the following command at the monitor prompt:**

    ```
    addr
    ```

    The following prompt is displayed:

    ```
    Enter module IP address::
    ```

14. **Enter the IP address for the Model 5390 server.**

    You are prompted to enter the server subnet mask, preferred load host, preferred dump host, IP packet encapsulation, and load broadcast. The defaults are listed after each prompt.

15. **Enter the information next to each prompt or press [Enter] to select the default.**

16. **Enter the following command at the monitor prompt:**

    ```
    sequence
    ```

    The following prompt is displayed:

    ```
    Enter interface sequence [net]::
    ```

17. **Enter the following command:**

    ```
    self
    ```

    The monitor prompt is displayed:

    ```
    monitor::
    ```

18. **Boot the Model 5390 server by entering the following command and filename at the monitor prompt:**

    ```
    boot oper.42.enet
    ```

    Once the Model 5390 server has booted, the Model 5390 monitor mode is no longer active.

Using SLIP or PPP

To establish a SLIP or PPP interface, follow these steps:

1. **At the host system prompt, enter the *telnet* command and the IP address for the server as shown in the following example:**

    ```
    telnet IP address
    ```

2. **On a command level interpreter (CLI) line in superuser mode, set up a SLIP or PPP interface by editing the configuration file to include at least the following information:**

    ```
    %rotary
    %gateway
     5390 *
    net default gateway REMOTEADDRESS metric 1 hardwired
    end
    %macros
    %service
    ```

    The REMOTEADDRESS is the IP address used in the port remote_address field of the SLIP or PPP interface.

NOTE: *You can follow the instructions in step 2 to create a message of the day (motd) file in your local file system.*

Configuring Server Ports for Devices

This section describes how to configure modems, serial printers, and terminals connected to the Model 5390 server from a UNIX workstation that has the *na* utility installed.

Use the *na* utility to address and configure Model 5390 server ports. Then reset the Model 5390 server to ensure the changes take effect. (See "Initializing the Model 5390 Server" earlier in this chapter for information about how the reset the server.)

NOTE: *The following port configurations assume that the Model 5390 server is in its default configuration. To set the Model 5390 server back to its default configuration, enter the erase command at the monitor prompt.*

The Model 5390 server ports are factory-set with the following defaults:

- 9600 b/s (default)
- 8 data bits
- No parity
- 1 stop bit

Terminals

To configure terminals connected to the Model 5390 server, follow these steps:

1. **Connect the terminal to the Model 5390 server port.**
2. **Set the terminal to the default port configuration as follows:**
   - 9600 b/s (default)
   - 8 data bits
   - No parity
   - 1 stop bit

Serial Printer

To configure a Model 5390 server port for a serial printer, follow these steps:

1. **Connect the printer to a port on the Model 5390 server.**
2. **Set the port parameters by entering the following commands at the prompt:**

```
%na [Enter]
command: annex [IP address of the Model 5390 server] [Enter]
command: port [port number] [Enter]
command: set port speed [speed of printer, do not use
autobaud] [Enter]
command: set port type hardwired [Enter]
command: set port mode slave [Enter]
command: reset [port number] [Enter]
command: quit [Enter]
%
```

3. **Send data to the printer by using the *aprint* command as shown in the following example:**

```
% aprint  -A[IP address of Annex]  -L12  filename
```

   In this example, the command sends the file to a printer that is connected to port 12 on the Model 5390 server.

Modems

The Model 5390 server supports inbound, outbound, and bidirectional modems.

Inbound Modems

Set the port parameters for inbound modems by entering the following commands and information at the prompt:

```
%na [Enter]
command: annex [IP address of the Model 5390 server] [Enter]
command: port [port number] [Enter]
command: set port speed [speed of modem or autobaud] [Enter]
command: set port control_lines modem_control [Enter]
command: set port type dial_in [Enter]
command: reset [port number] [Enter]
command: quit [Enter]
%
```

Outbound Modems

To set the port parameters for outbound modems, follow these steps:

1. **Set the port parameters by entering the following commands and information at the prompt:**

```
%na [Enter]
command: annex [IP address of the Model 5390 server] [Enter]
command: port [port number] [Enter]
command: set port speed [speed of modem, do not use autobaud]
[Enter]
command: set port control_lines modem_control [Enter]
command: set port type dial_in [Enter]
command: set port bidirectional_modem Y [Enter]
command: set port mode slave [Enter]
command: set port broadcast_direction network [Enter]
command: reset [port number] [Enter]
command: quit [Enter]
%
```

2. **Connect to the modem using a *telnet* command similar to the following example:**

```
%telnet 192.9.200.57 5008
```

   In this example, the command connects you to a Model 5390 server at address 192.9.200.57 on port 8 using the Telnet protocol and configures the server at the given IP address.

Bidirectional Modems

To set the port parameters for bidirectional modems, follow these steps:

1. **Set the port parameters by entering the following commands and information at the prompt:**

```
%na [Enter]
command: annex [IP address of 5390] [Enter]
command: port [port number] [Enter]
command: set port speed [speed of modem, do not use autobaud]
[Enter]
command: set port control_lines modem_control [Enter]
command: set port type dial_in [Enter]
command: set port mode adaptive [Enter]
command: set port bidirectional_modem Y [Enter]
command: reset [port number] [Enter]
command: quit [Enter]
%
```

2. **Make a network connection (for an outgoing call) to the modem using a *telnet* command similar to the following example:**

   ```
   %telnet 192.9.200.57 5008
   ```

   In this example, the command connects you to a Model 5390 server at address 192.9.200.57 on port 8 using the Telnet protocol and configures the server at the given IP address.

Chapter 4 ROM Monitor Commands

This chapter describes the ROM monitor commands and includes the following information:

- A list of the ROM monitor commands
- Command definitions
- How to use the commands
- Examples of the commands
- Sample displays resulting from the commands

Access these commands through a terminal connected to the service port when the Model 5390 server is in monitor mode. See “Initial Setup and Accessing the Model 5390 Monitor” in Chapter 3, “Initializing and Configuring the Model 5390 Server.”

The ROM monitor commands allow you to set a minimum number of EEPROM parameters. Some of these parameters, like the unit Internet address, are required for booting the Model 5390 server; some parameters, like the broadcast address, are required if the network configuration differs from the supplied defaults. See “Command Descriptions” later in this chapter for a list of the commands.

Other parameters, although not required, are recommended for the Model 5390 server initial boot. Setting these parameters, rather than using the assigned defaults, minimizes errors during the initial boot. For example, setting the parameter that defines the preferred load host enables the Model 5390 server to load by requesting assistance from a specific host, rather than by broadcasting that request to all hosts on the Ethernet.

You can define the same parameters using the network administrator (*na*) program as you can using the ROM monitor. *Administering the Model 5390 Communications Server* describes the *na* program in detail. ROM monitor commands generally provide data about current EEPROM parameters. When appropriate, they also display a prompt that allows the operator to change those parameters. Default or current values for parameters are displayed in brackets. For example:

```
Enter broadcast address [132.245.6.255]:
```

At the prompt, enter a different value, or press the Enter key to leave the displayed value unchanged.

You can use unique abbreviations for all ROM monitor commands except erase. For example, enter *boot* as bo, and enter *net* as n. If you enter an abbreviation that is not unique, an error message describing the command as ambiguous is displayed on the console terminal.

Command Descriptions

The ROM monitor commands are described in the following subsections in the order listed in Table 4-1. To display a list of commands on the service port terminal, enter a question mark at monitor prompt.

Table 4-1. ROM monitor commands

Command	Description
addr	Displays and sets EEPROM values relevant to network addressing, including the Model 5390 server Internet address
boot	Manually boots and loads the Model 5390 server operating code
config	Displays the current hardware configuration and revision levels
erase	Erases nonvolatile memory
help	Displays the list of ROM Monitor commands
image	Displays and/or sets the load image and tftp load dump names
ipx	Will be supported in future releases
lat	Defines the local area transport (LAT) key
net	Executes an Ethernet transceiver loopback test
mop	Will be supported in future releases
ping	Sends a message to a remote machine
ports	Shows the current status of all ports and tests specified port(s)
sequence	Displays and edits the load/dump interface list
slip	Defines a serial port as a Serial Line Internet Protocol (SLIP) network interface
stats	Displays current network statistics gathered by the ROM

addr

The *addr* command displays and sets several Model 5390 server operating parameters:

- Internet address
- Subnet mask
- Preferred load host Internet address
- Load/dump gateway Internet address
- Broadcast address
- Preferred dump address
- IP encapsulation type
- Load broadcast

The *addr* command displays the unit ROM-resident Ethernet address in hexadecimal notation. (For an explanation and description of Internet addresses, refer to *Administering the Model 5390 Communications Server*.) The command syntax is:

```
addr [-d]
```

If you enter the *addr* command without the *–d* argument, the console displays the Ethernet address in hexadecimal form and prompts you for each Internet address. Enter Internet addresses using the standard dotted-decimal notation.

The *addr –d* command displays the Ethernet address, the four Internet addresses, the subnet mask, the preferred load host address, the broadcast address, and the IP encapsulation type, but it does not accept changes.

The Model 5390 server must have an Internet address in the EEPROM before it can load its operational image across the Ethernet. Therefore, you must enter the Internet address before booting the Model 5390 server. If you do not define a subnet mask, the Model 5390 server creates one, predicated on the Internet address.

The Model 5390 server tries to boot from a preferred load host. If you do not define a preferred load host, the Model 5390 server broadcasts its load request and loads software from the first host that responds. If the part of the Internet address containing the network address differs from the preferred load or dump host, that host must be reached through a gateway. The *addr* command prompts you for the gateway Internet address.

The Model 5390 server uses the broadcast address parameter when loading a file. If this parameter contains a specific address (for example, 132.245.6.255), the Model 5390 server uses only that address for broadcast. If the value is all zeros (0.0.0.0), the ROM monitor tries various combinations of broadcast addresses, involving combinations of all zeros or all ones, and subnet or network broadcasts. The Model 5390 server broadcasts its request three times for each possible combination of broadcast addresses.

You can specify the IP encapsulation type as either ethernet (all lowercase) for Ethernet, or ieee802 for IEEE 802.2/802.3. The default IP encapsulation is ethernet. Many systems have hardware Ethernet interfaces that are IEEE 802.3 compliant, but very few actually perform 802.3 IP packet encapsulation. Do not change this parameter unless you know absolutely that your Ethernet performs 802.2/802.3 IP packet encapsulation. An incorrect IP encapsulation type prevents your Model 5390 server from booting.

Examples

Examples of the *addr* command follow:

```
Enter Internet address [192.9.200.214]:: [Enter]
Enter Subnet mask [255.255.255.0]:: [Enter]
Enter preferred load host Internet address [192.9.200.88]:: [Enter]
Enter Broadcast address [192.9.200.0]:: [Enter]
Select type of IP packet encapsulation (ieee802/ethernet) [<ethernet>]::
[Enter]
   Type of IP packet encapsulation: <ethernet>
```

NOTE: *You are prompted for the gateway address only if the Internet address differs from the preferred load host address. If these addresses are the same, the Model 5390 server assumes there is no gateway.*

```
Ethernet address (hex): 00-80-2D-00-18-B6
Internet address: 192.9.200.214
Subnet mask: 255.255.255.0
Preferred load host address: 192.9.200.88
Load/dump gateway Internet address: 192.9.200.88
Broadcast address: 192.9.200.0
Type of IP packet encapsulation: <ethernet>
```

boot

The *boot* command requests the loading of appropriate Model 5390 server operating software from a cooperating host. The command syntax is:

`boot [–lv | filename]`

The *boot* command accepts a filename for the Model 5390 server image. If the filename is not specified, *boot* displays the default filename and prompts for one. If you do not provide a filename, or have not defined one for the Model 5390 server, *boot* requests the default file: *oper.42.enet*. Optionally, you can enter a filename using the *image* command.

NOTE: *Typing the letter q interrupts the boot.*

The Model 5390 server boots from the defined preferred load host. If the preferred load host is not defined or does not respond, the Model 5390 server broadcasts on the Ethernet and loads from the first host that responds.

To initiate loading, the Model 5390 server sends a load request message to the selected host. After receiving a response, the Model 5390 server loads its operational code to RAM memory. When loading is complete, it transfers control to the newly loaded program. The Model 5390 server displays a symbol on the console for each data block received during the boot.

When the Model 5390 server begins to boot, it displays the load server host Internet address. If the unit does not boot successfully after several attempts, it displays a “boot attempt failed” message. In the following example of the *boot* command (which is booting using bfs), a period (.) indicates received data blocks, a question mark (?) indicates unanswered requests, and an asterisk (*) indicates transmission errors.

NOTE: *A successful boot disables the console terminal.*

Examples

The *boot* command display looks like this:

```
Enter boot file name[oper.42.enet]:: [Enter]

Requesting boot file "oper.42.enet".
Unanswered requests shown as '?',transmission errors as '*'.

Requesting boot from 192.9.200.88 via Ethernet...
Booting BFS file using open delay of 8
Header received OK. Received data blocks shown as '.'.
. . . . . .
. . . . . .
. . . . . ? . . . . . * . . . . . .
. . . . . * . . . . . ? .
. . . . . .
. EOF
```

The next example shows a boot using TFTP. The Model 5390 server always tries to open a file using BFS first. If unsuccessful, the Model 5390 server uses TFTP to open the file.

```
Enter boot file name[oper.42.enet]:: [Enter]

Requesting boot file "oper.42.enet".
Unanswered requests shown as '?',transmission errors as '*'.

Requesting boot from 192.9.200.88 via Ethernet...
Booting BFS file using open delay of 8
?
Booting TFTP file using open delay of 8
Booting TFTP file from 192.9.200.88
Header received OK. Received data blocks shown as '.'.
. . . . . .
. . . . . .
.. . . . ? . . . . . * .
. . . . . * . . . . . .
. . . . . .
. . . . . ? . . . . . .
. . . . . EOF
```

The *boot –l* command downloads and saves the operational image to nonvolatile memory, and then executes the image. The command display looks like this:

```
Enter boot file name [oper.42.enet]:: [Enter]

  Requesting boot file "oper.42.enet".
  Unanswered requests shown as '?', transmission errors as '*'.

Requesting boot from 192.9.200.88 via Ethernet...
      Booting BFS file using open delay of 8


Booting from 192.9.200.88
Header received OK.  Received data blocks shown as '.'.
. . . . . .
. .
. . . . . .
. .
. . . . . .
. . . .
. . . . . .EOF
           Saving image into storage device ...

Erasing device
|----------------------------|
............................
Erase completed
   Storing image

   ............
   Storage completed
   Beginning execution of image ...
Annex Command Line Interpreter   *   Copyright 1991 Xylogics,
Inc.
```

NOTE: *After executing a boot -1 command, the ls command may not show the newly loaded image.*

The *boot –v* command displays the boot in verbose mode. This output includes the turnaround time in milliseconds for each request. This value equals the time lapse between sending the request and receiving the proper reply from the host. When the boot is complete, verbose output includes a display of network statistics:

```
Enter boot file name [oper.42.enet]:: [Enter]

 Requesting boot file "oper.42.enet".
  Unanswered requests shown as '?', transmission errors as '*'.

  Requesting boot from 192.9.200.88 via Ethernet...
  Booting from 192.9.200.88 (42 msec)
   Header received OK.  Received data blocks shown as msec
turnaround time.
4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4
4 4 4 4
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 5 4 4
4 4 4 4
4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4
4 4 4 4
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 24 4 4 6 4 10 4 6
4 4 4 4
73 4 4 5 4 4 4 4 4 9 4 4 11 4 4 4 4 4 4 4 4 4 4 4 4 4 4 3 4 4 4 4 4
4 5 4 4
4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 11 6 4 4 4 4
4 4 5 4
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4
5 4 4 5
4 4 4 4 4 6 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 4 4
4 4 4 4
4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 4 6 EOF

     Ethernet Statistics

     Frames Received:   1031         Frames Sent:                1030
     CRC Errors:        0            Carrier Sense Losses:       0
     Alignment Errors:  0            Clear to Send Losses:       0
     Resource Drops:    9            Collisions Detected:        9
     Bus Wait Drops:    0            Excessive Collision Losses: 0
     Bad Types/Lengths: 0
```

See "stats" later in this chapter for a description of the Ethernet statistics.

config

The *config* command displays the current configuration information and revision levels. The *config* command also displays the System 5000 hub information as it relates to the Model 5390 server. The command syntax is:

```
config
```

Example

The following is an example of a Model 5390 server configuration display when you enter the *config* command:

```
ROM Software Rev # 0750
Board ID 42 - Serial Number 205446
Memory size: 4 Meg
Flash Size: N/AFlash ID: N/A
EEPROM size: 65504

Total number of ports: 24

ASYNC Config
  Number of ports: 24
  Max Port speed: 115.2 Kbps

Hub Config
  Slot Postion: 4
  CMB HW Revision: 1
  EEPROM Revision: 0.0
  Jumper Segment Selection: 1
  EEPROM Segment Selection: 1
```

erase

The *erase* command erases the contents of nonvolatile memory, including the Model 5390 server Internet address. The *erase* command also restores the parameters to their factory defaults. The command syntax is:

```
erase
```

If the self-boot option is installed, the *erase* command prompts for the nonvolatile memory to erase: EEPROM or flash. Entering 1 at the prompt causes the Model 5390 server to erase the EEPROM memory (configuration information); entering 2 at the prompt causes the Model 5390 server to erase the flash memory (self-boot image).

Examples

The command display looks like this:

```
  1) EEPROM (i.e. configuration information)
  2) FLASH  (i.e. self boot image)
Enter 1 or 2::1
Erase all non-volatile EEPROM memory? (y/n) [n]::y
  Erasing <16352 or 8160 bytes> of non-volatile memory. Please
wait...
                                          16K->|Data 0xff
  ..........................................
                                          16K->|Data 0x0
  ..........................................
Initialized checksum record installed
```

If the self-boot option is not installed, the command display looks like this:

```
Erase all non-volatile EEPROM memory? (y/n) [n]::y
 Erasing <16352 or 8160 bytes> of non-volatile memory. Please
wait...
                                          16K->|Data 0xff
  ..........................................
                                          16K->|Data 0x0
  ..........................................
Initialized checksum record installed
Erasing <65472 bytes> of non–volatile EEPROM memory
```

NOTE: *The erase command does not erase the Ethernet address.*

help

Entering the *help* command or *?* displays brief descriptions of the Model 5390 server ROM monitor commands.

image

The *image* command sets and displays the name of the image file containing the Model 5390 server software. The command syntax is:

```
image [–d | filename]
```

The *filename* argument permits up to 100 characters. To return the image name to its default, enter a pair of double-quote characters (“”). The default image name is *oper.42.enet*.

Examples

The *image* command display looks like this:

```
Enter Image name: [″oper.42.enet″]:: [Enter]
Enter TFTP Load Directory [″/usr/spool/erpcd/bfs/″]:: [Enter]
Enter TFTP Dump path/filename [″dump.192.9.200.88″]:: [Enter]
```

The *image –d* command display looks like this:

```
Image name: ″oper.42.enet″
TFTP Load Directory : ″/usr/spool/erpcd/bfs/″
TFTP Dump path/filename: ″dump.192.9.200.88″
SELF image name: ″oper/oper.42.enet/A7.0.7″
```

NOTE: *The SELF image name is displayed only if the self-boot image is loaded.*

ipx

The *ipx* command will be supported in future releases of the software.

lat

The *lat* command defines the local area transport key used to access hosts in a DECnet network. The command syntax is:

lat

When you enter the *lat* command, the following prompt is displayed.

```
Enter LAT key [ ]
```

mop

The *mop* command will be supported in future releases of the software.

net

The *net* command executes an Ethernet transceiver loopback test on the local area network. The command syntax is:

```
net
```

When you enter the *net* command, the following prompt is displayed.

```
Enter Segment to be used [1]:
```

This transceiver loopback test sends out a short test packet from the Model 5390 server through the transceiver to test the integrity of the network. The test can be executed either by attaching the Model 5390 server to the Ethernet or by attaching an Ethernet loopback connector to the network port.

The Ethernet transceiver loopback test causes the Net LED to turn off. If the unit passes this test, the service port terminal displays Passed. If the Model 5390 server fails, the service port terminal displays an error message. Failing this test indicates that one of the following is bad: the Model 5390 server, its transceiver cable, its transceiver, or the Ethernet. Isolate the failure by using this test and the Ethernet loopback connector.

ping

The *ping* command sends a message to a remote machine.

ports

The *ports* command tests serial line ports, exercising both the data lines and the control lines for each serial port specified. The syntax for this command is:

```
ports [–d]
```

Each serial port to be tested must be looped back with a RJ-45 loopback plug to test both the data lines and the control lines. Attach this plug to the port you are testing on the Model 5390 server.

NOTE: *Do not run the ports command for a port to which a device is connected. The test will transmit data to the device and toggle its control lines.*

When invoked, the command displays the current status of all ports and prompts for a list of ports to test. You can separate the port numbers with a comma or a space, or you can enter the list as a range of ports, such as 1–8.

If you enter the *ports* command with the *–d* argument, only the data lines are tested. The outgoing control lines are asserted during this test.

After the ports test displays its output on the service port terminal, it displays the updated port status.

Example

The command display looks like this:

```
Individual Port Tests
Some important notes:
 – All Serial Ports (1–24) which are to be tested require a
loopback
   plug in order to pass the Data Line and Control Line loopback
tests.
   WARNING. If there is a device instead of a loopback plug
connected to
   the port being tested, the device will have data transmitted to
it
   and its Control Lines toggled.
  You may enter a list of ports to test, separated by space or
commas.
  You may also enter ranges of ports, such as 2-8.
Ports with Faulty Control Lines:
Ports with Faulty Data Lines:
Enter port number of range of ports to test (Return to exit)::3
Enter the number of times to loop on this test [1]:: [Enter]
Abort the loop if an error occurs (y/n) [n]:: [Enter]
```

Pressing [Enter] after the prompt “Enter port number or range of ports to test” returns you to the monitor prompt. The service port terminal displays the test results.

Keep the following points in mind:

- The *ports -d* display excludes the line “Ports with faulty Control Lines.”
- Only ROM revisions 0701 and greater support the ports -d command.

sequence

The *sequence* command edits the load/dump interface list. This list determines the order of the network interfaces, and either the local area network (LAN) or the SLIP interface the Model 5390 server will use for loading and dumping. The default, net, uses the LAN interface. The list can contain up to four interfaces. If the Model 5390 server fails to boot using the first interface, it tries the next, and then the next interface, and then repeats the sequence. The command syntax is:

```
sequence [–d] | [interface[,interface] . . .]
```

Specify the LAN interface by selecting net; specify each SLIP interface as sl*nn*, where nn is a port number; and specify self-boot by selecting *self*. Separate each interface with a comma or a space. Enter the interface list as an argument to the command; otherwise, the console displays a list of available interfaces and prompts for a new list.

Examples

In the following example, interfaces are assigned to the load/dump sequence list. Ports 2, 4, and 15 can be added to the list because they were configured earlier as SLIP interfaces:

```
Enter a list of 1 to 4 interfaces to attempt to use for
downloading code or upline dumping. Enter them in the order they
should be tried, separated by commas or spaces. Possible
interfaces are:
  Ethernet: net
  SL/IP: sl2,sl4,sl15
  SELF: self
Enter interface sequence [net]::s12,net
  Interface sequence: sl2,net
```

NOTE: *The SELF option appears only if the self-boot image is loaded.*

The *sequence –d* command displays the current load/dump interface list. You cannot specify both the *–d* argument and the interface list with the same command. The command display looks like this:

```
Interface sequence: sl2,net
```

Entering a number for a port that has not been properly configured for SLIP causes the following message to display:

```
port nn is not configured for SL/IP
```

slip

The *slip* command defines a serial port as a Serial Line Internet Protocol (SLIP) interface. This command defines a number of port parameters. The command syntax is:

```
slip [port]
```

After entering the command, you are prompted for each parameter. The port is the number of the serial port to be configured with this command. If you do not enter a port number, you are prompted for one. Table 4-1 lists the information for which the *slip* command prompts.

Table 4-2. Slip command prompts

Prompt	Description
Allow SLIP on this port	Modifies the port mode. A y response changes the port to a SLIP interface. An n response changes the port mode to CLI. The port is not available as a SLIP interface and the SLIP parameters are ignored. The default is n.
Enter local endpoint address	Specifies the Model 5390 server Internet address for this SLIP interface. The Model 5390 server boots over the SLIP interface only if this address is set.
Enter subnet mask	Specifies the Model 5390 server subnet mask for this SLIP interface.
Enter remote endpoint address	Specifies the Internet address of the remote end of the SLIP interface.
Enter remote load/dump host address	Specifies the Internet address of the remote host to which load and dump requests are sent. This address is required only if the host at the remote end is a gateway and not the load host. By default, this is the same as the remote end-point address.
Should this interface be used for memory dumps	Enables the Model 5390 server to use a SLIP interface for memory dumps. The default is y.
Enter the baud rate	Specifies the baud rate of the serial interface. The default is 9600.
Enter the number of stop bits	Press the Enter key to accept the default (one). Generally, SLIP implementations require the default.
Enter the parity	Press the Enter key to accept the default (none). Generally, SLIP implementations require the default.

The *slip* command automatically sets the number of data bits to 8 for all SLIP interfaces. The number of data bits does not include the start, stop, or parity bits.

Example

The *slip* display looks like this:

```
Line number (1–16)::5
Allow SL/IP on this port? (y/n) [n]::y
Enter local endpoint address [0.0.0.0]::192.9.200.214
    Local endpoint address: 192.9.200.214
Enter subnet mask [255.0.0.0]::[Enter]
    subnet mask: 255.0.0.0
Enter remote endpoint address [0.0.0.0]:: 192.9.200.0
    Remote endpoint address: 192.9.200.0
Enter remote load/dump host address [default 192.9.200.88]::
[Enter]
    Remote load/dump host address: 192.9.200.88
Should this interface be used for memory dumps? (y/n) [y]:: [Enter]
Enter the baud rate [9600]:: [Enter]
Enter the number of stop bits (1,1.5,2) [1]:: [Enter]
Enter the parity (none,even,odd) [none]:: [Enter]
```

NOTE: *Pressing [Ctrl]+C interrupts the slip command; the parameters remain unchanged until the command completes normally.*

stats

The *stats* command displays current network statistics gathered by the ROM. Use *stats* along with the boot command to help isolate problems. Table 4-3 describes the network statistics displayed by the *stats* command. The syntax is:

```
stats
```

Example

The *stats* display looks like this:

```
Ethernet Statistics

Frames Received:  752  Frames Sent:               744
CRC Errors:       1    Carrier Sense Losses:        0
Alignment Errors:  0    Clear to Send Losses:        0
Resource Drops:    4    Collisions Detected:       210
Bus Wait Drops:    0    Excessive Collision Losses:  0
Bad Types/Lengths: 0
```

Table 4-3. Network statistics

Statistic	Description
Frames Received	The number of frames received.
CRC Errors	The number of CRC checksum errors detected.
Alignment Errors	The number of frames received misaligned with a CRC error.
Resource Drops	The number of packets dropped because the ROM code could not buffer them quickly enough. The ROM code cannot always handle back-to-back incoming packets, especially when broadcasting a remote-lpbk request message. The Model 5390 server accepts the first response it receives and drops all others. Dropped packets are normal.
Bus Wait Drops	The number of packets dropped due to waiting too long for a bus to become available.
Bad Types/ Lengths	The number of unknown packet types if Ethernet IP encapsulation is being used. The number of packets with illegal lengths if IEEE 802.2/802.3 IP encapsulation is being used.
Frames Sent	The number of frames sent.
Carrier Sense Losses	The number of times packets could not be transmitted because the Model 5390 server lost the carrier sense signal – usually the result of excessive traffic on the Ethernet.
Clear to Send Losses	The number of times packets could not be transmitted because the Model 5390 server lost the clear to send signal – usually the result of excessive traffic.
Collisions Detected	The number of times the Model 5390 server had to retry transmissions automatically – usually the result of normal Ethernet traffic. These retries do not cause the *boot* command to display ‘‘*”.
Excessive Collision Losses	The number of times the Model 5390 server could not transmit packets because there were too many collisions – usually the result of excessive traffic on the Ethernet. The *boot* command displays these retries as “*”.

Chapter 5 Troubleshooting

This chapter describes how to isolate and correct problems that may occur during Model 5390 server operation and determine when it is necessary to remove and replace a module.

This chapter includes the following information:

- Troubleshooting guide
- Conditions for replacing a module
- Preparations and precautions
- Removing a module
- Preparing and completing a hot swap

Front Panel Indicators

You can use the front panel on the Model 5390 server to determine some of the failures that may occur on the module. The Model 5390 server front panel has an annunciator, 12 Segment Connection LEDs, five Module Status LEDs, and 24 Port Status LEDs. The Module Status LEDs are labeled Init, Unit, Net, Attn, and Load. The Segment Connection LEDs are labeled S1 through S12. The Port Status LEDs are numbered 1 through 24. You can set values by using the *na* utility on a UNIX host, using SNMP (if UNIX is configured for it) or enter Model 5390 monitor mode from the service port terminal, become a superuser and use the *admin* command. Figure 5-2 illustrates the Model 5390 server front panel.

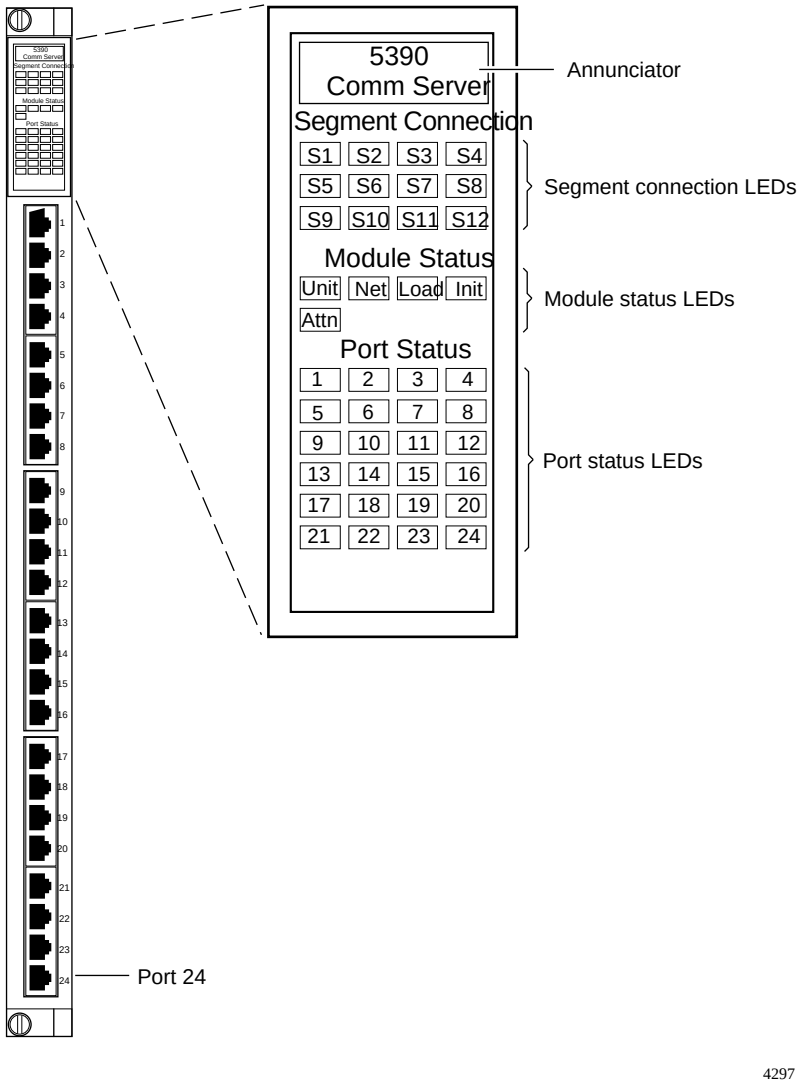


Figure 5-1. Model 5390 server front panel indicators

Table 5-1 lists the operating conditions for the Module Status LED displays.

Table 5-1. Module Status LED indicators

LED	Description
Init	Turns green when the Model 5390 server begins the initialization process after a power-up or reset. This is the first LED that lights after power-up or reset. The Init LED turns off after the diagnostics have successfully completed.
Unit	Turns green after the Model 5390 server passes the power-up diagnostics.Turns amber if the power-up diagnostics fail.
Net	Turns green after the Model 5390 server verifies that a valid Ethernet connection exists.
Attn	Turns amber when the Model 5390 server requires operator attention, that is, in monitor mode or when the diagnostic tests fail.
Load	Turns green when the Model 5390 server is loading the operational image or dumping a RAM image if there is a failure. The LED turns amber if a load error is detected.

Table 5-2 lists abnormal operating conditions reported by the LED displays, points to possible causes, and recommends corrective actions.

Table 5-2. Troubleshooting guide

Condition	Possible cause	Corrective action
Annunciator is amber.	You reset the module or cycled power by removing the module and reinserting it.	None required. The annunciator should turn green when the module successfully completes the power-up diagnostics.
	Detectable module component failure.	Use a service port terminal to check the self-test diagnostic messages to determine whether you can resolve the problem; otherwise, replace the module.
Annunciator is off; other module annunciators are off; chassis LEDs off.	No power to chassis.	Turn on power to the chassis.
Annunciator is off; other module annunciators are off; chassis LEDs are on.	Chassis power is below required module threshold.	Check chassis power supply LEDs and power supplies.
Annunciator is off; other module annunciators are on; chassis LEDs are on.	Module is not seated properly.	Reseat the module.
	No power to module (blown fuse; failed DC-to-DC converter).	Replace the module.
The Attn and Unit LEDs in the Module Status indicators are amber.	The Model 5390 server did not pass its diagnostics or is not working normally.	Reset the Model 5390 server.

Power-up Diagnostic Messages

Power-up diagnostics run when the Model 5390 server is powered up or reset. During the power-up process the following text is displayed on the service port terminal:

```
To enter "Monitor Mode" please depress the SPACE key within 10
seconds.
```

If you press the space bar within 10 seconds, the following text is displayed:

```
Monitor Mode selected, please wait for Confidence tests to
complete.
```

If you do not press the space bar within the time allotted, the following text is displayed:

```
Defaulting to Normal Boot Mode.
```

If an error occurs the following text is displayed:

```
Fatal Error
```

Boot Failures

Generally, two problems cause boot failures:

- The load server host is not responding
- The Model 5390 server is not configured properly

The Model 5390 server requests a boot either from a predefined load host, or by broadcasting a boot request. When the host responds, the Model 5390 server loads its operations code.

Model 5390 server requires setting certain configuration parameters. Enter these parameters with ROM monitor commands for the initial boot sequence. Refer to Chapter 4, “ROM Monitor Commands,” for more information on these commands.

Correcting the Model 5390 Module Parameters

The following parameters must accurately reflect both the Model 5390 server and the network environment in which it operates in order for the server to boot correctly. Verify the Model 5390 server Internet address using the *addr* command. If your network configuration does not support the factory defaults, verify the following parameters using the *addr* command:

- The broadcast address.
- The subnet mask.
- The load/dump gateway address (which you must specify if the preferred load server host is located on another network or subnet).
- The IP encapsulation type. Many systems have hardware Ethernet interfaces that are IEEE 802.3 compliant, but very few actually perform 802.3 IP packet encapsulation. Use the default, Ethernet, unless you know absolutely that your LAN performs 802.2/802.3 IP packet encapsulation.

Unless otherwise stated, if you are using a SLIP interface to boot the Model 5390 server, obtain the following information using the *slip* command:

- Whether the port is configured as a SLIP interface
- The default Internet address for the SLIP network interface
- The default Internet address for the remote end of the SLIP connection
- The default Internet address for the load/dump host (this must be specified if the remote end is a gateway and not a load host)
- Whether the SLIP network interface is included in the load/dump interface list (use the sequence command)
- The baud rate
- The number of stop bits
- The parity

You can use the defaults for the name of the image file containing the Model 5390 server software and the address of the preferred load server host. If the value for the image name is incorrect, the Model 5390 server cannot boot. Correct the name using the image command. If the address for the preferred load server host is incorrect, the boot takes longer, since the Model 5390 server has to broadcast for a host. Correct the load host address using the *addr* command.

Confirm that the Model 5390 server boot parameters are correct by using the appropriate ROM monitor commands. Modify any boot parameters that are incorrect or missing. Boot the Model 5390 server by entering the *boot* command at the service port terminal.

Load Server Host Not Responding

The Model 5390 server can boot from one of four types of hosts acting as a load server host:

- A UNIX host on the local area network
- A UNIX host at the end of a SLIP interface
- Another Model 5390 server
- Any host (UNIX or non-UNIX) using TFTP

The following sections discuss troubleshooting for each of these load server hosts.

UNIX Host on the LAN

When troubleshooting a UNIX host on the LAN, make sure that:

- The host is booted and functioning properly.
- The host can communicate with other network nodes using standard UNIX networking features and utilities.
- All Model 5390 server software is installed properly on the host. Refer to Chapter 2, “Installing the Model 5390 Server.”
- The *erpcd* daemon or TFTP server, which loads the operational image to the Model 5390 server, is running.

In test mode, both the Model 5390 server and the *erpcd* daemon on the load server host display boot progress reports. The Model 5390 server displays reports on the service port terminal; the *erpcd* daemon displays reports on the terminal that invokes test mode.

- To place the Model 5390 server into test mode, reset the server using the Slot Selection menu. Refer to Chapter 3, “Initializing and Configuring the Model 5390 Server.”
- To place the *erpcd* daemon on the load server host into test mode, kill the *erpcd* program (requires superuser privileges) and restart it using the *–D* option:

  ```
  # /etc/erpcd –D
  ```

When the Model 5390 server boots, the service port terminal displays the load server host Internet address and indicates whether it receives a response to the open file request and to any of the read file requests. The host progress report indicates receipt of any file server requests and the responses to such requests. The host displays erpc_return 0 if it successfully receives a request and is sending out an affirmative response. If any Model 5390 server-related files are missing or cannot be installed, contact technical support.

UNIX Host on a SLIP Interface

When troubleshooting a UNIX host at the end of a SLIP network interface, make sure:

- The host is booted and functioning properly.
- The SLIP link is connected correctly.
- The Internet addresses are correct for both sides of the SLIP link.
- All Model 5390 server software is installed properly on the host. Refer to Chapter 2, “Installing the Model 5390 Server.”
- The *erpcd* daemon or TFTP server, which loads the operational image to the Model 5390 server, is running.

A PC host running the XENIX operating system has both the *erpcd* and *slipd* daemons (provided with the distribution and installed in the */etc* file) running in the background on the PC. Reset the Model 5390 server and set the *erpcd* daemon on the load host to test mode:

- For the Model 5390 server, reset the server using the Slot Selection menu. Refer to Chapter 3, “Initializing and Configuring the Model 5390 Server.”
- For erpcd on the load server host, as superuser, kill the *erpcd* program and restart it using the *–D* option:

```
# /etc/erpcd –D
```

Another Model 5390 Server

When troubleshooting an Model 5390 server configured as a load server host:

- Use the CLI telnet command to access the unit and verify that it is up and running.
- Communicate with the unit on the Ethernet using the superuser CLI *ping* command.
- Verify the server configuration using the *na* command.

Administering the Model 5390 Communications Server provides more information on these commands.

A Model 5390 server that has been reconfigured as a load server host, but not rebooted, cannot boot another Model 5390 server on the network. Rebooting the Model 5390 load server host ensures that the parameters are set.

Conditions for Replacing a Module

Replace a Model 5390 server with another module of the same type under any of the following conditions:

- If the annunciator on the module front panel remains off, indicating that the module is not receiving +5 volt power or that the power level is below the reset limit (4.65 volts) when other modules in the hub are receiving normal operating power. For more information, see Table 5-2.
- If the annunciator remains amber, indicating that some portion of the module has failed and a check of the self-test messages indicates that the problem cannot be fixed. For more information, see Table 5-2.

Module Configuration Management

Each module installed in a Model 5000 chassis operates according to software parameter values and hardware option settings. You can use these to customize module operation for that particular hub. This combination of software and hardware values is the module configuration, of which there are actually two types:

- "Primary" configuration, which is the set of base values built into the module at the time it is manufactured. A user cannot change this configuration.
- "Default" configuration, which is the permanent configuration plus any changes to jumper or switch settings. The default configuration is valid for any hub slot at any time. Each module must have a default configuration. This configuration is stored in two places: on the module itself and on the supervisory module. You can change this configuration through a network management module (NMM) or through a terminal connected to the chassis service port.

The supervisory module stores the primary configurations of all modules installed in the hub. Each user-installed module also stores a working copy of its configuration information. When a change is made to this working copy, the module stores the new user configuration in its onboard nonvolatile memory.

The supervisory module periodically polls user-installed modules in the hub across the common management bus (CMB). As part of the poll, the NMM collects module configuration information and stores the information in its local nonvolatile memory for use in comparing and/or restoring a module configuration after a power cycle or reset.

What happens to a module when it is inserted in the hub depends on a combination of conditions:

- If you remove a module, change jumper settings, and reinsert the module in its original slot, the new jumper settings take effect immediately. The supervisory module records the new configuration information in its nonvolatile memory.
- If you replace a module in a slot with a different type of module, the new module is directed to use its default configuration.
- If the supervisory module is not operational, a module whose configured slot number matches its installed location can use its own stored configuration; otherwise, the module reverts to its default configuration.

To preserve the configuration parameters of the Model 5390 module you are replacing, follow the procedures in "Preparing for a Hot Swap" and "Completing the Hot Swap" later in this chapter.

CAUTION: *Verify that the backplane segment bank selector is set for the correct segment bank before installing a replacement module. For more information on jumper and switch settings, see "Installing the Communications Server" in Chapter 2, "Installing the Model 5390 Server*."

Preparing for a Hot Swap

The Model 5390 server can be inserted into or removed from a chassis without interrupting service to other modules within the 5000 hub. This ability is referred to as “hot swapping.”

Observe the guidelines presented in “Preparing for Hardware Installation” in Chapter 2, “Installing the Model 5390 Server."

To prepare to hot swap a Model 5390 server, follow these steps:

1. **At a UNIX host system, write the parameters for the currently installed Model 5390 server to a host file to preserve them.**

   Use the *na write* command or retrieve all the configuration management information base (MIB) parameters in an Small Network Management Protocol (SNMP) applications and save the values to a host database. Do this frequently to save any recent configuration parameter changes.

   For example, enter the following commands and information at the UNIX prompt:

   ```
   na 5390-01

   write 5390-01.config
   ```

2. **Put the configuration files on a network host.**

   If the configuration files are stored in the local memory, the configuration files must either be offloaded and stored on a host somewhere in the network, or be reentered after the replacement Model 5390 server is operational.

   For example, enter the following command and information at the UNIX prompt:

   ```
   read 5390-01.config
   ```

3. **Offload the filters file in the Model 5390 server local EEPROM.**

   If you do not do this, the filters are redefined after the replacement Model 5390 server is operational.

4. **Configure the replacement Model 5390 server to define any software options (LAT, Appletalk/ARAP, dynamic networking, tn3270).**

   The Model 5390 server being replaced and the new module must be registered for the same software options for the hot swap to be successful.

Removing a Module

To remove a Model 5390 Communications Server, follow these steps:

1. **Using the flat-tip screwdriver, loosen the two captive retaining screws on the module until they pop free of the chassis.**
2. **Push the top and bottom inserter/extractor levers away from the center of the Model 5390 front panel to release the module from the backplane connector.**
3. **Slide the module out of the chassis.**

   Grip the front panel with one hand while supporting the bottom of the module with the other hand.
4. **Place the module on an antistatic mat.**

NOTE: *If a module is removed from the chassis permanently or for more than a few minutes, you should install a filler panel on the empty chassis slot to maintain the cooling air flow within the chassis.*

Completing the Hot Swap

To complete the hot swap of the Model 5390 server, follow these steps:

1. **Verify that the jumper settings on the replacement module are the same as the settings on the original module.**
2. **Use the procedures outlined in "Installing the Communications Server" in Chapter 2, "Installing the Model 5390 Server," to insert the replacement module into the Model 5000 chassis.**
3. **Boot the replacement Model 5390 server.**
4. **From a UNIX host that is running the *na* utility, use the *na read* command and the host file you created to store the saved configuration parameters into the local EEPROM.**

   You can use the SNMP application to issue sets from the saved script or database.

   If you need to save the configuration files in the Model 5390 server EEPROM, reenter them or load them into memory.

   If applicable, put the filters file into EEPROM.

5. Set the configuration parameters *acp_key, vcli_password, password,* and the port parameter *port_password* to the same values as the original Model 5390 server.

Set these parameters manually through the *admin* or the *na* utility, or through some SNMP application, since they cannot be saved and restored by the *na write* and *na read* commands or by the SNMP *get* and *set* commands.

You can set values by using the na utility on a UNIX host, using SNMP (if UNIX is configured for it) or enter Model 5390 monitor mode from the service port terminal, become a superuser and use the *admin* command.

Appendix A Technical Specifications

This appendix contains specifications for the Model 5390 Communications Server. The list of specifications includes the following information:

- Microprocessors and memory
- Network protocol and standards compatibility
- Data rate
- Electrical, physical, and environmental specifications
- Electromagnetic emissions
- Safety agency approvals

Microprocessor

CPU:	Two 20-MHz 486SLC processors

Memory

DRAM (SIMMs):	4 MB
EEPROM:	64 KB
Flash PROM:	Optional, 2 MB

Network Protocol and Standards Compatibility

Ethernet Revision 2.0/IEEE 802.3 standards
ARAP
RFC 768 (UDP)
RFC 783 (TFTP)
RFC 791(IP)
RFC 792 (ICMP)
RFC 793 (TCP)
RFC 826 (ARP)
RFC 854 (TELNET)
RFC 868 (TIME)
RFC 950 (Subnets)
RFC 1034, 1035 (DOMAIN)
RFC 1055 (SLIP)
RFC 1058,1388 (RIP)
RFC 1144 (CSLIP)
RFC 1155 (SMI)
RFC 1157 (SNMP)

RFC 1213 (MIB II)
RFC 1196 (FINGER)
RFC 1316 (Character MIB)
RFC 1317 (RS232 Like MIB)
RFC 1331, 1332 (PPP)
RFC 1398 (Ethernet MIB)

Port Data Rate and Encoding

Up to 115.2 Kb/s; RS-232 signalling (RS-423 drivers); RJ-45 connectors

Electrical Specifications

Power requirements:	The Model 5390 draws –48 volts from the power supply backplane and has DC-DC converters to create +5, +12, and –12 volts. The estimated current requirement from each converter is: +5 V, 5 amps +12 V, .5 amp –12 V .5 amp The DC-DC converters are protected with a 5–amp slow-blow fuse.
System ground:	The isolated return pins of the converters are connected to signal ground of the Model 5390 server. Signal ground is connected to chassis ground at the RJ–45 connector shields.
Power consumption:	37 W at 48 VDC
Thermal rating:	120 BTU/hr maximum

Physical Specifications

Dimensions:	(H) 19.0 × (W) 1.2 × (D) 11.0 inches (H) 48.3 × (W) 3.0 × (D) 28.0 centimeters
Weight:	4.2 lbs (1.9 kg)

Environmental Specifications

Operating temperature:	41° to 104 F (5° to 40° C)
Storage temperature:	–13° to 158° F (–25° to 70° C)
Operating humidity:	85% maximum relative humidity, noncondensing
Storage humidity:	95% maximum relative humidity, noncondensing
Operating altitude:	10,000 ft (3,048 m) maximum
Bump:	70 m/s^2, 22 ms
Sedimentation:	1.5 mg/m^2 hr, (3s2)
Vibration, sinusoidal:	2–9 Hz, 3.5 mm
	9–200 Hz, 10 m/s^2
	200–500 Hz, 15 m/s^2
Shock:	300 m/s^2, 6 ms
Free fall:	ISO 4180–2
Bump:	100 m/s^2, 11 ms

Electromagnetic Emissions

Meets requirements of: FCC Part 15, Subpart B, Class A
VDE 0871 Class B
VCCI Class 2
EN 55 022, Class B (CISPR22)

Safety Agency Approvals

UL 1950 with D3 deviations, CSA 22.2 #950 with D3 deviations, IEC 905/EN 60 950 (TUV), OCB designed to meet UL 94–V0 flammability requirements

Immunity

Meets requirements of: ESD–IEC 80 -2:
Air discharge to 15 KV (Level 4)
Contact discharge to 4 KV (Level 2)
RF Susceptibility–IEC 80 - 4:
3 V/m from 27 to 500 MHz (Level 2)
Fast Trans–IEC 80 - 4:
Mains: 2 KV amplitude (Level 3)
Signal lines: 0.5 KV amplitude (Level 2)
Surge–IEC 80 - 5:
Mains: 2.0 KV line to line
2.0 KV line to ground (level 3)
Signal lines:
0.5 KV line to line (Level 1)
0.5 KV line to ground

Appendix B Host-specific Installation Instructions

This appendix includes installation instructions for the following manufacturers:

- Tahoe (CCI Power 6/32)
- Convergent
- Xenix PC
- ARIX 825
- ARIX/CMC
- SCO TCP/IP
- Siemens MX300 and MX500
- Concurrent
- Motorola 88K
- Prime
- Bull
- Dell

The following instructions have been tested on the hardware platforms and operating system software listed under each manufacturer. These instructions are not guaranteed to work since they are not tested for every version of operating system (OS) that runs on these machines.

Determine whether or not your host has an alternate include directory for the network code and, if so, where it is located. Also, locate the directory in which the include files reside.

Tahoe (CCI Power 6/32)

To install the Model 5390 distribution software on the Tahoe system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Tahoe
   ```

2. **From this point, select the appropriate OS and network software.**

Convergent

To install the Model 5390 distribution software on the Convergent system, follow these steps:

1. **Run the *install–annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Convergent
   ```

   This sequence sets up the proper machine, OS, and network software for this machine.

2. **Continue through the *install–annex* script.**

Xenix PC

To install the Model 5390 distribution software on the Xenix PC system, follow these steps:

1. **Run the *install–annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: PC
   Enter OS #: Xenix
   Enter Net S/W Type #: EXOS
   ```

2. **Select the default for all other questions in the *install–annex* script.**

ARIX 825

The following set of instructions was tested using the ARIX 825 hardware platform and the Arete 8000S 3.32 Vers 3.3.3 ARIX V3.1 operating system software running Excelan network software. These instructions are not guaranteed to work with all ARIX 825 systems, but should provide guidelines for other ARIX 825 machines and software releases.

To install the Model 5390 server distribution software on the ARIX 825 system, follow these steps:

1. **Run the *install-annex* script. Enter the following information and answer the questions as shown:**

```
Enter Machine Type #: Generic
Enter OS #: SYSTEM V UNIX (& UMAX V)
Enter Net S/W Type # EXOS
Does your system have any auxiliary libraries for the network code?
[n]: y
Enter any additional loader options for the network libraries:
-lsocket -lnfs.c
Does your system have alternate include directory for network code?
[n]: y
Where are the network include files located?
/usr/include/EXOS
```

2. **Do not compile the tools at the end of the installation script. That is, answer n to the following question:**

   ```
   Shall I compile the tools for you? [y] n
   ```

3. **Copy the */usr/include/sys/time.h* file to the *src/inc/sys/time.h* file.**

4. **Copy the */usr/include/rpc/netdb.h* file to the *src/inc/rpc/netdb.h* file.**

5. **Edit the copy of the *netdb.h* file to comment out the definitions of *servent* and *hostent*.**

6. **Compile and install the tools by entering the following commands at the prompt as shown:**

   ```
   #cd src
   #make
   #make install
   ```

ARIX/CMC

The following set of instructions is not guaranteed to work with all CMC systems, but should provide guidelines for other CMC machines and software releases.

To install the Model 5390 distribution software on the ARIX/CMC system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Generic
   Enter OS #: System V UNIX (& UMAX V)
   Enter Net S/W Type #: CMC Package
   ```

2. **Do not compile the tools at the end of the installation script. That is, answer n to the following question:**

   ```
   Shall I compile the tools for you? [y]: n
   ```

3. **Add the following lines to the *src/inc/config.h* file:**

   ```
   #define big_endian
   #define need_sendto
   #define sendto xylo_sendto
   ```

   Also, remove the line *have_msghdr*, if defined.

4. **Copy the */usr/include/sys/socket.h* file to the *src/inc/sys/socket.h* file.**

5. Edit this new file and change the following as shown:

```
/*
 * Message header for recvmsg and sendmsg calls.
 */
struct msghdr {
        caddr_t      msg_name;/* optional address */
        int          msg_namelen;/* size of address */
        int          msg_base;/* base address of data */
        int          msg_len;/* size of data */
        caddr_t      msg_accrights;/* access rights sent/
received */
        int          msg_accrightslen;
};
```

to:

```
#ifdef  NOTDEF
/*
 * Message header for recvmsg and sendmsg calls.
 */
struct msghdr {
        caddr_t      msg_name;/* optional address */
        int          msg_namelen;/* size of address */
        int          msg_base;/* base address of data */
        int          msg_len;/* size of data */
        caddr_t      msg_accrights;/* access rights sent/received
*/
        int          msg_accrightslen;
};
#endif
```

6. Compile and install the *erpcd* daemon by entering the following commands:

```
#cd src

#make

#make install
```

7. Edit the *src/inc/config.h* file again to remove the following lines:

```
#define need_sendto

#define sendto xylo_sendto
```

8. Compile and install the *na* utility by entering the following commands:

```
# cd src/na

# make -f ../make.config -f Makefile install
```

SCO TCP/IP

The following set of instructions were tested using a Compaq 386/20 portable and the Xenix System V Version 2.3.2 (for Intel 80386) operating system software. These instructions are not guaranteed to work with all TCP/IP packages; refer to the accompanying manuals for the package you are using for more information.

To install the Model 5390 distribution software on the SCO TCP/IP system, follow these steps:

1. **Run the *install-annex* script. Enter the following information and commands and answer the questions as shown:**

```
Enter Machine Type #: Generic
Enter OS #: System V UNIX (& UMAX V) (Do not use XENIX System V)
Enter Net S/W Type #: 4.[234]BSD
Does your system have any auxiliary libraries for the network code?
[n]: y
Enter any additional loader options for the network libraries:
-lsocket
Does your system have alternate include directory for network code?
[n]: n
```

2. **Do not compile the tools at the end of the installation script. That is, answer n to the following question:**

   ```
   Shall I compile the tools for you? [y]: n
   ```

3. **The SCO TCP/IP package requires special compiler flags. To use these flags, change the following line in the *src/make.config* file from:**

   ```
   CFLAG= -DINETD -DGENERIC -DSYS_V  -I../inc
   ```

   to:

   ```
   CFLAG= -DINETD -DGENERIC -DSYS_V  -DLAI_TCP -Di386 -pack -
   I../inc
   ```

   Normally, SCO Xenix does not supply a crypt routine. The Model 5390 security feature, Access Control Protocol (ACP), requires the routine to encrypt passwords.

4. **Create the following dummy routine:**

```
char *crypt(key,salt)
char *key;
char *salt;
{
    statuc charbuff[200];

    strcpy(buff,key);
    return uff;


}
```

5. **Place this routine in the *src/libannex/crypt.c* file.**

6. **In the *src/make.config* file, change the following lines from:**

```
LIBANX_C = erpc_subr.c srpc.c api_if.c
LIBANX_O = erpc_subr.o srpc.o api_if.o
```

   to:

```
LIBANX_C = erpc_subr.c srpc.c api_if.c crypt.c
LIBANX_O = erpc_subr.o srpc.o api_if.o crypt.o
```

   When the *-pack* option is used with the Xenix software, the Model 5390 *fprintf* routine does not work.

7. **To allow the Model 5390 *fprintf* routine to operate correctly, create a routine called *_fprintf* and have it call the original *fprintf* routine.**

   The *_fprintf* routine should be:

```
#include<stdio.h>

xylo_fprintf(chan,f,ala,a2,a3,a4,a5,a6,a7,a8,a9,
        a10,a11,a12,a13,a14,a15,a16,a17,a18,a19,a20)
unsigned long  chan;
{
        unsigned long  newchan;

        newchan == chan;
        if(chan == ((unsigned int)stdout - 2)) newchan =
stdout;
        if(chan == ((unsigned int)stderr -4 )) newchan =
stderr;

        return
fprintf(newchan,f,ala,a2,a3,a4,a5,a6,a7,a8,a9,a10,
        a11,a12,a13,a14,a15,a16,a17,a18,a19,a20);
```

8. **Place this routine in the *src/libannex/fprintf.c* file.**

9. **Change the following lines in the *src/make.config* file from:**

```
LIBANX_C=erpc_subr.c srpc.c api_if.c crypt.c
LIBANX_O=erpc_subr.o srpc.o api_if.o crypt.o
```

to:

```
LIBANX_C=erpc_subr.c srpc.c api_if.c crypt.c fprintf.c
LIBANX_O=erpc_subr.o srpc.o api_if.o crypt.o fprintf
```

10. **Compile the *src/libannex/fprintf.c* file without the *-pack* flag, by editing the *src/libannex/Makefile* file.**

After these lines:

```
clean:
  ${RM} -f $(LIBANX_O)
  ${RM} -f libannex.a
```

add the following lines:

```
fprintf.o:fprintf.c
  ${CC} -c fprintf.c
```

11. **Force the software to use the modified routine instead of the standard routine by adding the following line to the head of the *src/inc/config.h* file:**

```
#definefprintf  xylo_fprintf
```

12. **Copy the */usr/include/sys/socket.h* file to the *src/inc/sys/socket.h* file.**

13. Edit this new file and change the following:

```
/*
 * Message header for recvmsg and sendmsg calls.
 */
struct msghdr {
  caddr_t      msg_name;     /* optional address */
  int          msg_namelen;  /* size of address */
  int          msg_base;     /* base address of data */
  int          msg_len;      /* size of data */
  caddr_t      msg_accrights;/* access rights sent/received
*/
  int          msg_accrightslen;
};
```

to:

```
#if 0
/*
 * Message header for recvmsg and sendmsg calls.
 */
struct msghdr {
  caddr_t      msg_name;     /* optional address */
  int          msg_namelen;  /* size of address */
  int          msg_base;     /* base address of data */
  int          msg_len;      /* size of data */
  caddr_t      msg_accrights;/* access rights sent/received
*/
  int          msg_accrightslen;
};
#endif
```

14. Compile and install the tools by entering the following commands at the prompt as shown:

```
#cd src

#make

#make install
```

Siemens MX300 and MX500

To install the Model 5390 distribution software on the Siemens MX300 and MX500 system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: MX
   ```

2. **Continue through the *install-annex* script.**

Concurrent

To install the Model 5390 distribution software on the Concurrent system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Concurrent
   ```

2. **Continue through the *install-annex* script.**

Motorola 88K

To install the Model 5390 distribution software on the Motorola 88K system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Motorola
   ```

2. **Continue through the *install-annex* script.**

Prime

To install the Model 5390 distribution software on the Prime system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Prime
   ```

2. **Continue through the *install-annex* script.**

Bull

To install the Model 5390 distribution software on the Bull system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Bull
   ```

2. **Continue through the *install-annex* script.**

Dell

To install the Model 5390 distribution software on the Dell system, follow these steps:

1. **Run the *install-annex* script. Enter the following information as shown:**

   ```
   Enter Machine Type #: Dell
   ```

2. **Continue through the *install-annex* script.**

A

B

C

D

E

F

G

H

I

J

L

M

N

O

P

R

S

T

U

V

W

X