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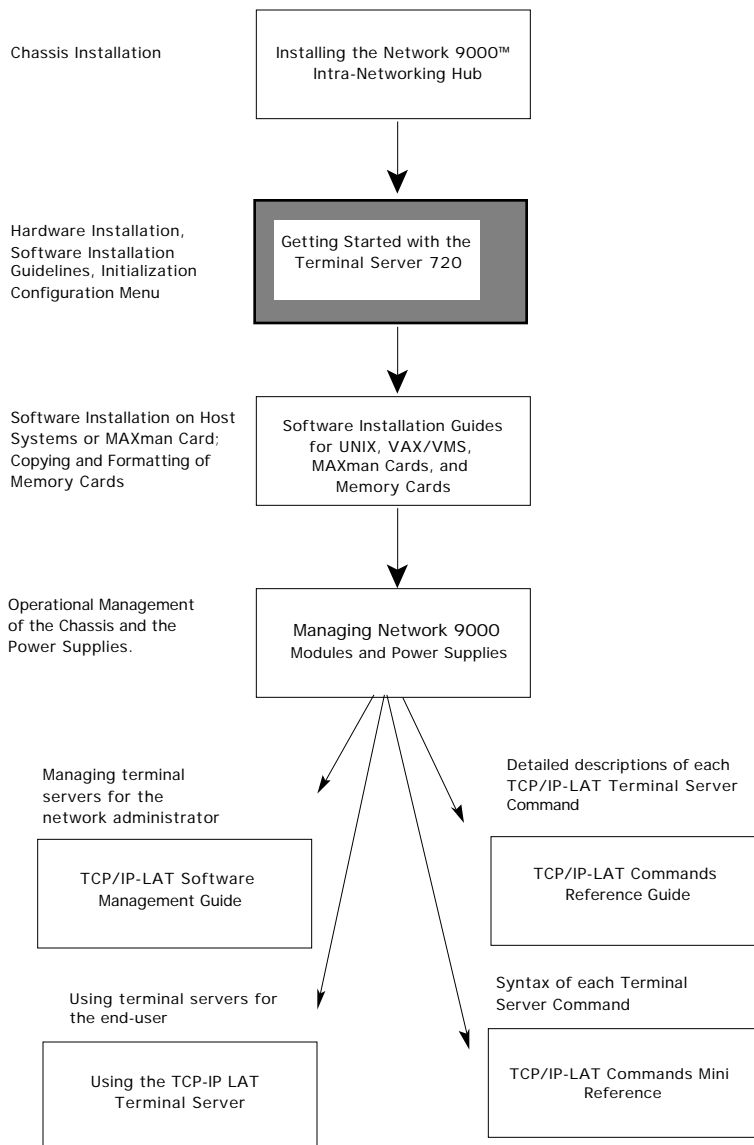
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Preface

How To Use This Guide

This Guide is intended to be used in series with other Xyplex product documentation. This set of documentation is organized to make the installation of Network 9000 products easy, and to help you get started using the Terminal Server 720 in the shortest possible time. The following documentation map shows the order in which you should use various Xyplex documentation. The shaded block indicates where this Guide fits in the installation process.

Network 9000™ Documentation Map



What this Guide Covers

This Getting Started Guide covers installation of the Xyplex Terminal Server 720 processor module and the available I/O modules and cabling options.

This guide is organized as follows:

Chapter 1	Introducing the Terminal Server 720
Chapter 2	Installation Notes
Chapter 3	I/O and Cabling Considerations
Chapter 4	Operation and Software Configuration
Chapter 5	Memory Upgrades
Appendix A	Specifications
Appendix B	Order Codes
Appendix C	Configuration Menu
Appendix D	Trouble Analysis
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Chapter 1: Introduction, provides a brief overview of the features and options available with the Terminal Server 720 and the typical applications (for example, types of devices one could connect to the unit) of the product. This chapter also covers product prerequisites, such as which software release is required in order to use the product, and shows the location and purpose of the controls and indicators on the unit.

Chapter 2: Installation Notes, describes installation issues that are specific to the Terminal Server 720, including making sure that software is loaded on the unit in order to complete the installation.

Chapter 3: I/O and Cabling, describes the available I/O module(s) and cables.

Chapter 4: Operation and Software Configuration, describes some of the important software-related activities that you will need to perform in order to use the Terminal Server 720. These include how you become a privileged user, how to configure the terminal server Internet networking configuration, and how to format and update a memory card.

Chapter 5: Memory Upgrades, shows where Terminal Server 720 SIMM sockets are located.

Appendix A: Technical Specifications

Appendix B: Order Codes

Appendix C: Configuration Menu, explains the purpose of the Configuration Menu (which is to create and manage load/dump configurations), and describes how to use the initialization configuration menu to perform the following tasks:

- Select and view the protocols for image and parameter loading, and dumping (create load/dump configurations)
- Specify information for directed TFTP loading
- Select a network segment
- Initialize parameters
- Revert to stored configuration
- Revert to factory defaults
- Enable display of load status messages
- Configure memory
- Exit

Appendix D: Troubleshooting, describes what to do if you encounter a problem during installation or server operation. This appendix explains how the terminal server indicates self-test errors, how to reset the unit, and possible solutions to problems you might encounter when using the unit.

Chapter 1

Introducing the Terminal Server 720

1.1 About the Terminal Server 720

The Terminal Server 720 is an option for the Network 9000 Intra-Networking Hub. The Terminal Server 720 provides a method of connecting asynchronous serial devices such as terminals, personal computers, and modems to the network, so that users can connect to VAX/VMS[®] host computers, UNIX[®] host computers, and IBM host computers that support TN3270. Serial printers can also be connected to the server's serial ports, which allows them to be shared among multiple hosts, personal computers, or file servers on a network. Figure 1-1 shows a front view of the processor module. Figure 1-2 shows the Terminal Server 720 networking environment.

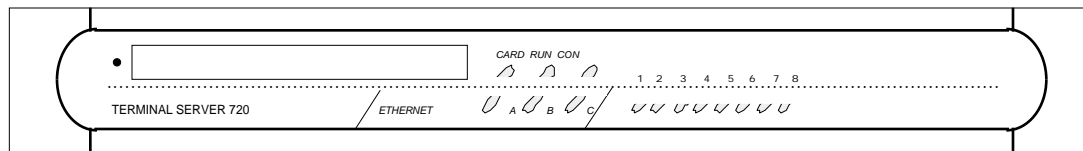


Figure 1-1. Terminal Server 720 Module Front View.

The following are some of the key features of the Terminal Server 720:

Designed for Ease of Start-up -- The Terminal Server 720 includes factory defaults for operation which allow you to get the unit running easily after hardware installation. Refer to section 2.6.1 for a description of the default activity of the Terminal Server 720.

TCP/IP-LAT and TN3270 Support -- Concurrent support for TCP/IP, DEC Local Area Transport (LAT[®]), and TN3270 protocols.

Expandable Memory -- The server is shipped with 2 MB of factory installed base memory. A 2 MB unit can be expanded to 4 MB, using two 1 MB SIMM memory modules.

Memory Card -- An optional memory card, from which the unit can load its operating software. "Flash" memory cards are available from Xyplex. These memory cards are readable/writable, can be updated with a newer software version, and can store parameters

Serial Port I/O and Cabling Options -- There are three serial I/O and cabling schemes available for the Terminal Server 720.

- Model 721 16-port I/O module. Two 50-pin TELCO connectors provide six-wire connections for sixteen serial devices, using a variety of wiring schemes, such as extension cables, distribution panels, splitters, octopus cables, punch-down blocks, modular (MODtap™) cabling, and DECconnect™ cabling. These ports support modem control signals and communication speeds from 75 bps to 115.2 Kbps.
- Model 723 20-port I/O module. Twenty RJ-45 connectors provide eight-wire connections for twenty serial devices using modular cabling. These ports support modem control and concurrent hardware flow control, and communication speeds from 75 bps to 115.2 Kbps.
- Model 724 24-port I/O module. Three 50-pin TELCO connectors provide six-wire connections for twenty-four serial devices, using the same wiring schemes available for the Model 721 I/O module. These ports support modem control signals and communication speeds from 75 bps to 115.2 Kbps.

☞ When using port speeds higher than 64 kbps, you must be careful to use a cabling scheme that minimizes the potential for "cross-talk" problems. Cabling methods, such as punch-down blocks used in conjunction with bundled 50-wire cables can suffer from cross-talk at these data rates. It is recommended that you use separate shielded cables for each port (for example, a Xyplex octopus cable), when using the TELCO I/O modules, or short cable lengths.

Network Software Loading -- If you order a server without a memory card, the unit loads its operating software from a network host called a *load server*. The load server is typically a UNIX™ or VAX/VMS™ system, a Xyplex loader (a MAXman unit, for example), or a Network 9000 product equipped with a memory card. The load server downloads a software image to the server, over the network, whenever the server is powered on or re-initialized. The load server can support other types of Xyplex devices as well.

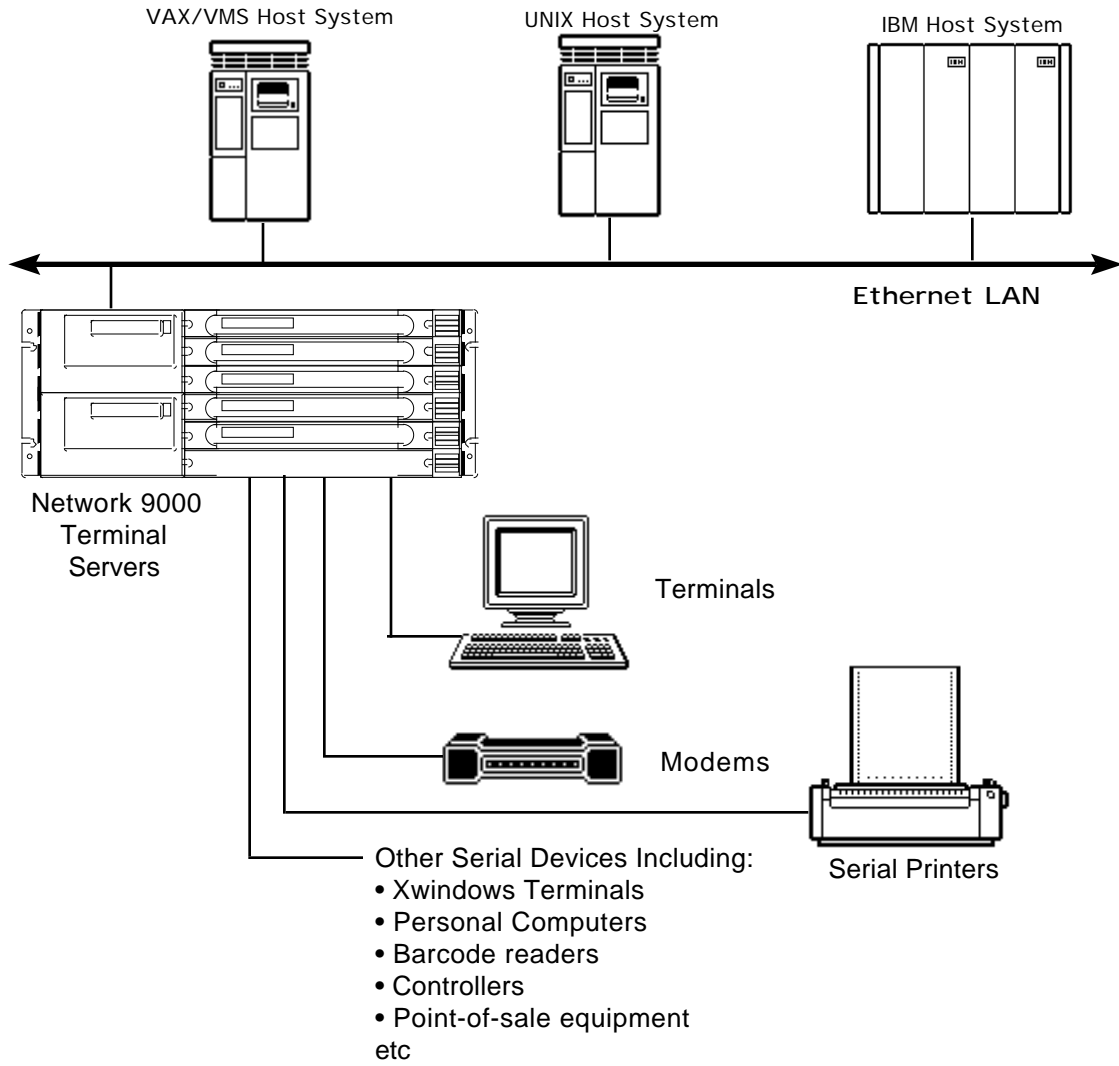


Figure 1-2. Network Using a Terminal Server 720 Unit.

1.2 Controls and Indicators

Figure 1-3 shows the location and purpose of all controls and LED indicators on the Terminal Server 720 cards.

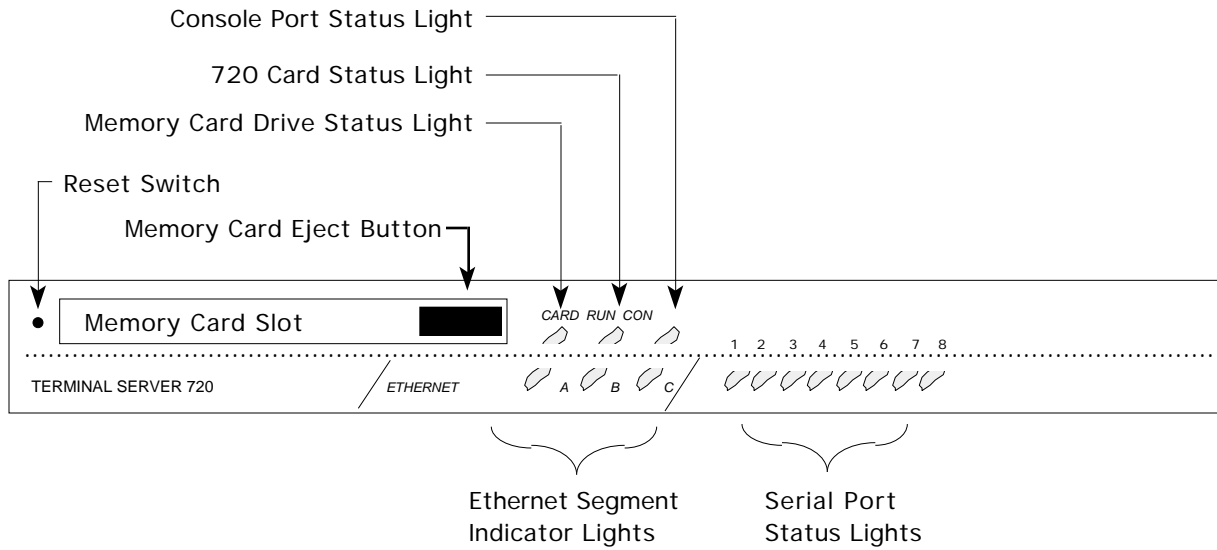


Figure 1-3. Terminal Server 720 Controls and Indicators.

1.3 Product Prerequisites

The Terminal Server 720 processor module and associated I/O modules can be ordered as part of a Network 9000 chassis configuration, or can be added separately to an installed Network 9000 unit. Each Terminal Server 720 processor module requires one Network 9000 chassis processor module slot. Each associated I/O module requires one Network 9000 chassis I/O module slot.

The server requires Xyplex TCP/IP-LAT software, Release 4.3 or greater. The unit is configured at the factory to load its software from a memory card, if one is inserted in the card slot. If a card is not present, the unit requests software from a network load server, which can be:

- Another Terminal Server 720 or other Network 9000 product that is equipped with a memory card which contains the correct load image.
- A VAX/VMS system, from which the unit can load via DEC Maintenance Operations Protocol (MOP)
- A UNIX system running:
 - Bootstrap protocol (BOOTP) and Trivial File Transfer Protocol (TFTP), or:
 - Reverse Address Resolution Protocol (RARP) and TFTP, or
 - Trivial File Transfer Protocol (for "Directed" TFTP)
- Other Xyplex loader units, such as a MAXman unit.

The load server sends a software image to the server, over the network, whenever the unit is powered on or re-initialized. By default, the terminal server requests software from each type of load server, until a load server responds with a load offer. (Appendix C includes a flow chart showing the order in which the unit uses protocols to load. Appendix D provides a description of the software loading process.) You can have multiple load servers on the network.

1.3.1 Changing the Software Loading Method

You can specify the protocols which the server uses to load software and which protocols will be used. For example, you can configure the unit to load exclusively from a specific type of load server, to use a specific protocol first and another next, or you can configure the unit to load from the memory card only. You use the initialization configuration menu (refer to Appendix C) to change the software loading method. Alternatively, you can use DEFINE CHASSIS commands to change the software loading method (refer to the *Guide to Managing Network 9000 Devices and Power Supplies* for more information).

1.4 Parameter Storage and Loading


The Terminal Server 720 uses and stores two sets of parameters: the "initialization parameters" and the permanent "operational parameters."

Initialization parameters refer to values that the Network 9000 unit uses during the software loading process. Initialization parameters include which protocols should be used to load software and operational parameters. These parameters are stored in the Control Storage of the AC input module of the Network 9000 chassis (the Ethernet address of the chassis slot is also stored there, although the unit cannot alter this). You can change most of these parameters via a unit's initialization configuration menu (refer to Appendix C for more information) or by the commands listed in the *Guide to Managing Network 9000 Devices and Power Supplies*.

Operational parameters (e.g., those affected by DEFINE or SET commands) affect the operation of the software after initialization. Typically, operational parameters affect serial ports (e.g., speed, parity, character size, etc), the availability of local services, Internet characteristics (e.g., internet-address, domain-name, subnet-mask, etc), and LAT characteristics, etc. You can configure the unit to load its operational parameters from a flash memory card (not supported on OTP cards), if one is available, or from a network host, called a parameter server, using the initialization configuration menu (refer to Appendix C for more information). Alternatively, you can use DEFINE CHASSIS commands to change the parameter loading method (refer to the *Guide to Managing Network 9000 Devices and Power Supplies* for more information).

The Terminal Server 720 is configured at the factory to store parameters locally on a flash memory card, if one is available, on the memory card of another unit in the hub acting as a parameter server, or remotely in a file at any properly configured parameter server. You use commands to change the parameter storing method. Operational parameters can be stored redundantly so that if one parameter server is not available during a reboot other parameter servers may be used.

Some units, including the Terminal Server 720, support the use of two sets of operational parameters. One set is "permanent" the other "temporary." The permanent parameters are stored at parameter servers or on a flash memory card. You use DEFINE and PURGE commands to change these parameters, and LIST commands to view information about them. The temporary parameters are not stored. You use SET and CLEAR commands to change these parameters, and SHOW or MONITOR commands to view information about them. Temporary parameters are only in effect until the next time the unit is reinitialized, a port is logged out, changed with another SET or CLEAR command, or the unit "learns" information from the network which overrides an existing temporary parameter.

 The term operational parameters is used in this guide to refer to parameters which affect the operation of the software after initialization. Readers of the TCP/IP-LAT Documentation Set should note that the term operational parameters is used there to refer only to the set of temporary parameters (mentioned above).

Chapter 2

Installation Notes

2.1 Prepare for the Installation



Before you begin the installation of the Terminal Server 720 processor module and an I/O module, you must have completed the installation procedure for the Network 9000 Chassis. If this has not been completed, refer to the guide *Installing the Network 9000 Chassis*.

Make sure that you have the following items:

Software at a load server or a Memory Card -- The Terminal Server 720 terminal server can load software locally from a memory card, or remotely from a network load server. If the unit will load software from a load server, you should make sure that you have installed software at the load server(s) before you install the hardware. You should follow the installation and configuration instructions contained in the *Software Installation Guide* supplied with your software kit. Load image names will be listed in the Software Kit Information supplied with your kit. (The Terminal Server 720 has a hardware type of 76.)

Serial device cables -- Should be available for connection to the terminal server.

- Refer to Chapter 3 for serial device cabling considerations.

Terminal -- You need a VT100 or ANSI-compatible terminal, or a PC with terminal emulation software in order to configure the Terminal Server 720 terminal server.

Tools -- You need a small Phillips-head screwdriver to secure modules in a Network 9000 chassis slot.

2.2 Unpack and Inspect the Terminal Server

Follow these steps:

1. Carefully unpack the terminal server shipping carton(s).
2. Inspect the contents and make sure that you received all parts listed on the shipping order.

Each terminal server is shipped with the basic items listed in Table 2-1. If any item is missing, contact Xyplex or the distributor where you bought the unit.

Table 2-1. Items Supplied with Terminal Server 720

Item	Quantity
Terminal Server 720 processor module	1
Sixteen-Port I/O module (model 721), Twenty-Port I/O module (model 723) or Twenty-four-Port I/O module (model 724)	1
<i>Terminal Server 720 Getting Started Guide</i> (this manual)	1

3. Place all packing materials back into the shipping carton and save the carton. (If you need to return the terminal server to Xyplex or your distributor, you should return it in the original carton.)
4. If the terminal server has been damaged in shipping or any parts are missing, notify your Xyplex representative or distributor immediately.

2.3 Install the Terminal Server and I/O Card

Network 9000 processor and I/O modules are very easy to install. If you have previously installed a Network 9000 processor or I/O module, simply locate an empty slot in the Network 9000 chassis and use the same procedure to install the Terminal Server 720 processor and I/O modules. (Slot 1 cannot be used for a Terminal Server 720.) If you have not previously installed a processor and I/O module in the chassis, refer to the instructions contained in Chapter 4 of the guide *Installing the Network 9000 Chassis*.

2.4 Connect the Device Cables

Connect the serial device cables to the connectors on the I/O module. While this activity can be completed at any time during or after the installation process, you will need to have one terminal connected to a serial port in order to configure the server software. Refer to Chapter 3 for cabling options.

2.5 Install the Memory Card - If Available

If the Terminal Server 720 is equipped with a memory card, insert the memory card into the card slot on the front of the unit.



Xyplex recommends that you wear the grounded wrist strap, supplied with the Network 9000 chassis when you insert the card. If it is not available, ground yourself by placing one hand on the Network 9000 chassis (or another grounded object) before you insert the Memory card, to avoid discharging static electricity into the Terminal Server 720.

Markings on the memory card indicate which end you insert into the Terminal Server 720 (insert the end which has two rows of small square holes). You can eject the memory card by pressing the Eject Button. Figure 2-1 shows which end of the memory card to insert into the Memory Card Slot. Figure 2-2 shows the location of the Memory Card Slot and Eject Button.

Insert this end.

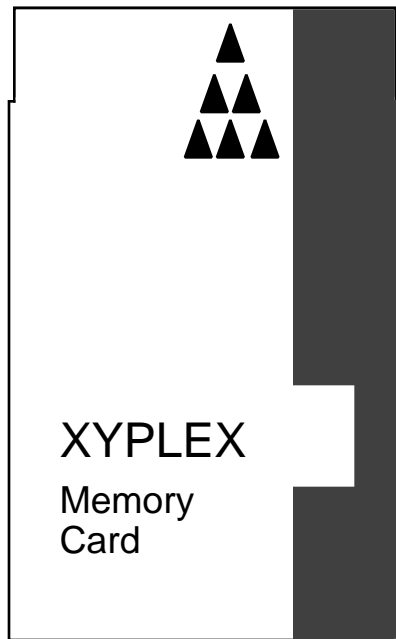


Figure 2-1. Memory Card.

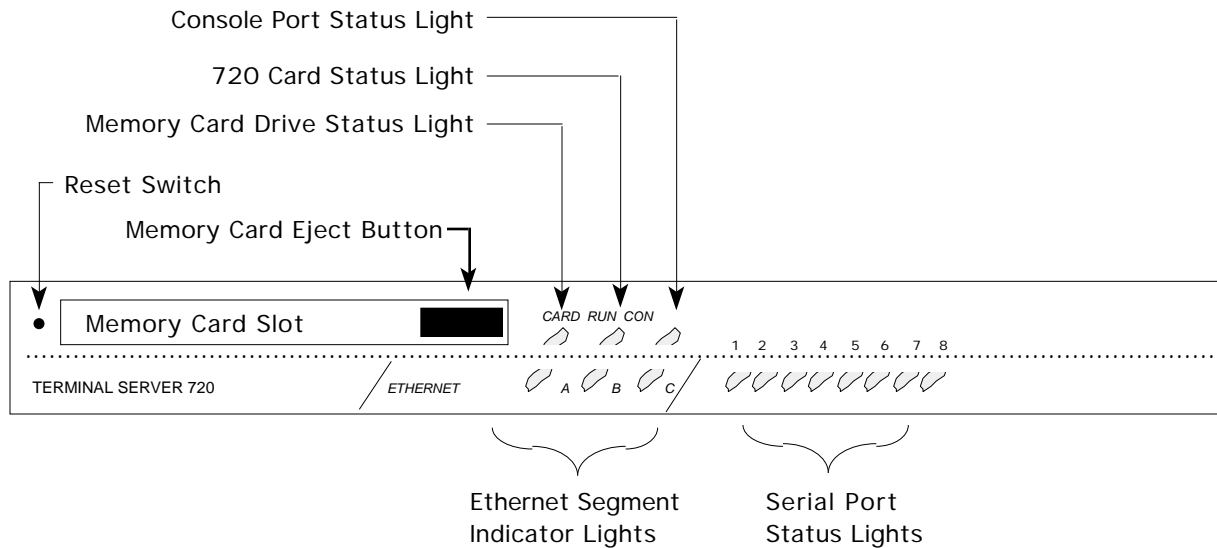


Figure 2-2. Terminal Server 720 Controls.

The serial port status lights shown in Figure 2-2 are used in several ways. During the initialization process, the lights indicate that self-tests are being performed, and if any self-test fails, they indicate an error code. After the unit has been received a load image and parameters, the lights indicate when a port is actively being used. In this case, each light can indicate activity for more than one port. For example, if LED 1 is lit, this can indicate that there is activity on ports 1, 9, or 17. LED 2 indicates activity on ports 2, 10, or 18, etc.¹

2.6 Initialize the Terminal Server 720

When you apply power to the Network 9000 Chassis, all modules in the chassis, including Terminal Server 720 units initialize themselves and begin to try to load software and operational parameters. If you have installed the Terminal Server 720 into an already functional Network 9000 Hub, you may need to reset the unit manually, as described below.

The unit is configured at the factory to use a default set of initialization parameters in order to obtain a software image. This means that, for most configurations, the unit should be able to be loaded without any configuration changes. Loading is made particularly easy if you have inserted a memory card which contains the appropriate load image into the Memory Card Slot, since the unit will load from the memory card. If a card is not present or the appropriate image is not on the card, the unit requests to be loaded by a host system that has the TCP/IP-LAT software installed, or a Network 9000 module that has a Memory card which contains the appropriate load image. (By default, network load requests are transmitted on midplane Ethernet LAN segment A.) The unit is also configured at the factory to store parameters locally on a flash memory card, if one is installed, and remotely at properly configured parameter servers.

¹ Each LED indicates port activity on the same numbered port (ports 1 through 8 are shown by LEDs 1 through 8, respectively) and those ports whose numbers are multiples of 8 added to the LED number

To reset the terminal server manually, follow these steps:

1. Make a simple "tool" from an ordinary paper clip by bending one end outward. You need this tool to press the RESET switch located behind the terminal server's front panel.
2. Look for the small hole to the left of the Memory Card Slot (see Figure 2-2).
3. Use the paper clip tool to press the RESET switch once. This halts all terminal server operations -- the server will no longer send or receive network data or data from its connected devices. The terminal server enters a halt state; all front panel lights illuminate.



All ongoing sessions and data are lost when you reset the unit.

4. Press the RESET switch again. The terminal server performs a self test of its circuitry, which takes about 20 seconds. Check the lights on the front panel (see Figure 2-2) while the test is under way.


Regardless of how the unit is reset, the light pattern should appear as follows during the self test:

Front Panel Light Activity	Meaning
All lights ON	Testing lights (approximately 1 second).
CARD, RUN, CON, A, B, and C (Ethernet) lights OFF	Self Test begins.
Lights ON, from right (8 status light) to left (1 status light)	Self Test is running.
RUN flashes rapidly	Successful completion of Self Test.

If the lights do not behave as indicated, refer to the Appendix D. When the Self Test completes, the terminal server requests load service or begins loading software.

An Ethernet (A, B, or C) LED on the front panel (see Figure 2-2) illuminates as soon as the terminal server detects network activity (normally about 2 seconds). Within 15 seconds the unit transmits software load requests on the network or begins to load from the memory card.

The RUN and Ethernet (A, B, or C) LEDs blink during loading. Loading takes from 10 to 60 seconds, depending on whether you are loading from a local memory card, or if from a network load server, on the amount of network activity and the speed of the load server. The light pattern should appear as follows:

Front Panel Light Activity	Meaning
Ethernet A, B, or C LED ON	Terminal server detects network activity on Ethernet segment to which it is attached..
CARD LED ON	Unit is loading from a Memory card (light ON for approximately 15 seconds).  The Terminal Server 720 is accessing the Memory card. <u>Do not</u> remove the card while the CARD light is ON.
RUN and Ethernet (A, B, or C) LEDs blink simultaneously	Software load in progress.
Port lights go ON, sequentially from right (Port 8 status light) to left (Port 1 status light). Then, lights go OFF from left to right.	Unit has finished loading the software image, and is decompressing it.
RUN LED flashes slowly Ethernet (A, B, or C) LED flashes when Ethernet packets are received	Software loading has completed. Terminal server is in normal operating state.


If the LEDs do not behave as indicated, refer to the Appendix D.

2.7 Initialize Connected Serial Devices

Connect a terminal to a terminal server serial port, turn its power ON, and press RETURN (or ENTER) a few times until the terminal server recognizes your device. Note that the terminal server serial port automatically adjusts to the communication speed of your terminal (75 bps - 38.4K bps, using 8-bit characters with no parity, or 7-bit characters with even parity; above 38.4K bps you must specify a fixed port speed). When the terminal server responds, it generates the following message which appears on your screen:

```
Welcome to the Xyplex terminal server
Enter username>
```

Type in your name, your initials, or a nickname -- whatever you would like to be known as while you are connected, then press RETURN again. You can type up to 16 characters (numbers or letters). This name is your identifier during this session. If you choose, you can change it each time you make a connection to the terminal server.

 Until permanent operational parameters are stored, the server will display the following message when you log in:


```
Xyplex -901- Default parameters in use.
```

This is a normal message.

After you enter your username, the terminal server responds with the following prompt:

```
Xyplex>
```

The Terminal Server 720 is now ready to accept commands to configure the terminal server and its ports. For example, you can obtain on-screen information about the terminal server commands by typing HELP and pressing the RETURN or ENTER key.

 Some commands require a higher privilege level. Section 4.4 describes how you become a privileged user.

Chapter 3

I/O and Cabling Considerations

3.1 Overview to Cabling

There are various serial I/O and cabling schemes available for the Terminal Server 720.

- The model 723 twenty-port I/O module. Twenty RJ-45 connectors provide connections for twenty serial devices using modular cabling. These ports support concurrent hardware and software flow control, at communication speeds from 75 bps to 115.2 Kbps. Section 3.2 covers cabling options for this I/O module.
- The model 721 sixteen-port I/O module. Two 50-pin TELCO connectors provide connections for sixteen serial devices, using a variety of wiring schemes, such as extension cables, distribution panels, splitters, octopus cables, punch-down blocks, modular (MODtap™) cabling, and DECconnect™ cabling. These ports support modem control (but not concurrent hardware and software flow control) at communication speeds from 300 bps to 115.2 Kbps. Section 3.3 covers cabling options for this I/O module.
- Model 724 24-port I/O module. Three 50-pin TELCO connectors provide six-wire connections for twenty-four serial devices, using the same wiring schemes available for the Model 721 I/O module. These ports support modem control signals and communication speeds from 75 bps to 115.2 Kbps. Section 3.3 covers cabling options for this I/O module.

☞ When using port speeds higher than 64 kbps, you must be careful to use a cabling scheme that minimizes the potential for "cross-talk" problems. Cabling methods, such as punch-down blocks used in conjunction with bundled 50-wire cables can suffer from cross-talk at these data rates. It is recommended that you use separate shielded cables for each port (for example, an octopus cable), when using the TELCO I/O modules, or short cable lengths.

This chapter describes the cabling and signal distribution considerations for Terminal Server 720. Some of the cabling and distribution items are available from Xyplex. Other cabling items are supplied by the customer. Depending on your application, there are different cabling schemes that you can use. Figure 3-1 provides an overview of the cabling and distribution options available to you.

Serial connections are made at connectors on the I/O module. A signal listing is included for each cabling option so you will be able to understand how to wire/connect to devices.

For each cabling option, pinouts are included so you will be able to wire/connect to serial devices. Refer also to the Customer Device Wiring Considerations description in Section 3.3.2 (RJ-45) or 3.3.12 (Telco) for information regarding DTE-to-DTE and DTE-to-DCE (crossover and straight through) connections.

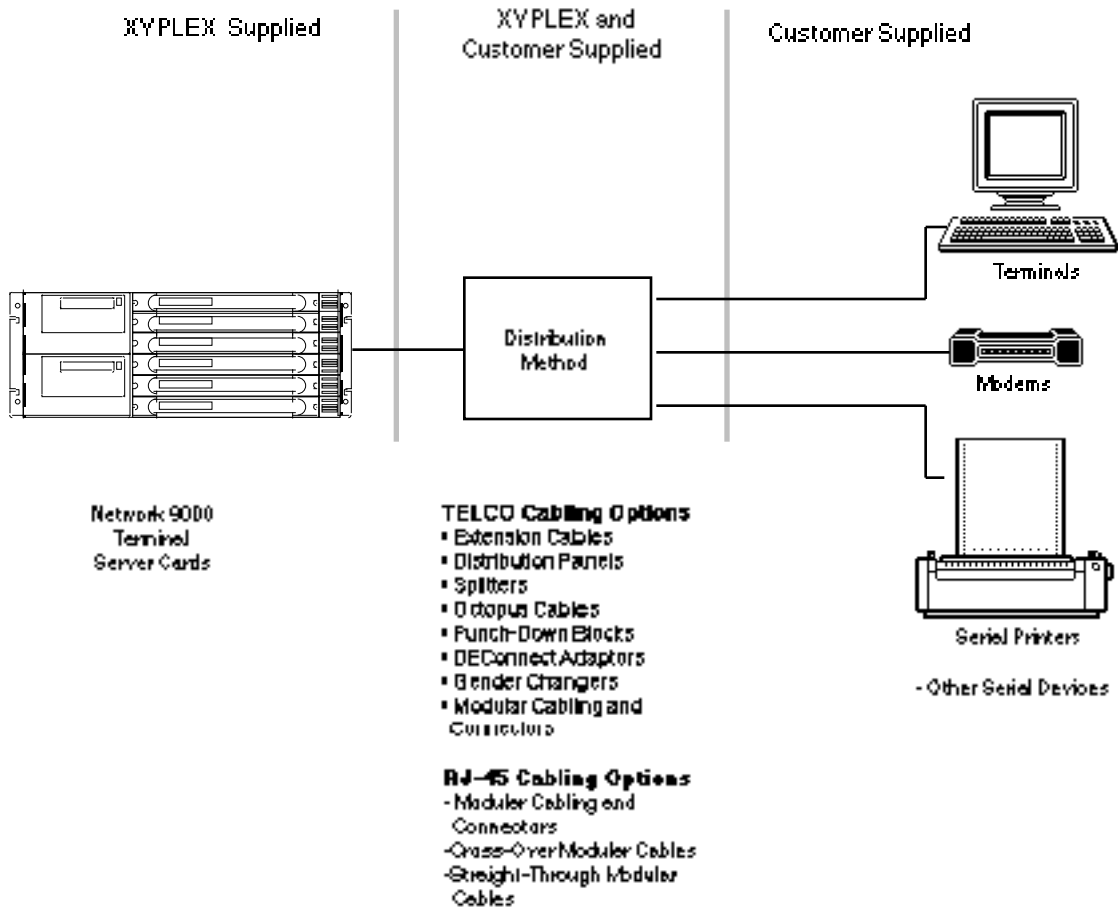


Figure 3-1. Cabling Overview.

The following signal abbreviations will be used throughout this chapter:

Abbreviation	Signal Name	Type	Available For:
DTR	Data Terminal Ready	Output	RJ45, Telco
XMT	Transmit Data	Output	RJ45, Telco
RTS	Request to Send	Output	RJ45
GND	Ground	-	RJ45, Telco
RCV	Receive Data	Input	RJ45, Telco
DCD	Data Carrier Detect	Input	RJ45, Telco
RNG	Ring Indicator	Input	RJ45, Telco
CTS	Clear to Send	Input	RJ45
DSR	Data Set Ready	Input	RJ45

3.2 RJ-45 Cabling Options

The 20-port I/O modules use modular cables that are designed for easy cable connections. The cabling options available from Xyplex include (Chapter 6 lists the order codes for these items):

- Crossover cables (male RJ-45 to male RJ-45, 10 and 25 feet)
- Straight-through cables (male RJ-45 to male RJ-45; lengths: 1, 10, and 25 feet)
- "Octopus" cables (a single 50-pin male or female Telco connector, or a 36-pin male or female Telco DECconnect connector, fanning out to eight male RJ-45 connectors)
- DECconnect crossover cable (male RJ-45 to male MMJ, 10 and 25 feet)
- Modular adaptors:
 - Female RJ-45 to male DB-25, supporting RING signal
 - Female RJ-45 to male DB-25, supporting RTS/CTS flow control (Modems that perform compression/decompression typically use this type of flow control.)
 - Female RJ-45 to female DB-25
 - Female RJ-45 to female MMJ
 - Female RJ-45 to female RJ-45
 - Male RJ-45 to female RJ-12
 - Male RJ-45 to female MMJ
- Customer cable-making kits

Standard cabling items available from Xyplex allow you to connect to any serial device that uses a male or female DB-25 connector. All you need is the appropriate modular cable (crossover cable for connecting to a DTE device, straight-through cable for connecting to a DCE device), and the correct modular adaptor (male or female DB-25 connector), which is essentially an RJ-45-to-DB25 adaptor.

Xyplex also supplies DECconnect-compatible crossover cables and modular adaptors for use with the 20-port I/O modules. These cables are described later in Section 3.2.4

3.2.1 Making Your Own RJ-45 Cables

If you make your own cables, you should be very careful when using the crimping tool. Make sure that the RJ-45 connector is fully inserted into the die set cavity of the crimping tool, and that the wire is fully inserted into the RJ-45 connector, before crimping. The die set might be fragile, and could break if the RJ-45 connector is not properly seated before you squeeze the handle.

Also, Xyplex recommends that you use different colored wires for straight-through and crossover cables, in order to keep track of the cable type.

3.2.2 Device Wiring Considerations (RJ-45)

Using the model 723 I/O module, you will normally connect the serial device cables to the 8-pin RJ-45 jacks on the I/O module. It does not matter which port you connect a device to; the I/O module provides full support to each port. The female RJ-45 jack shown in Figure 3-2 shows the signal assignments of the 8-pin jacks.

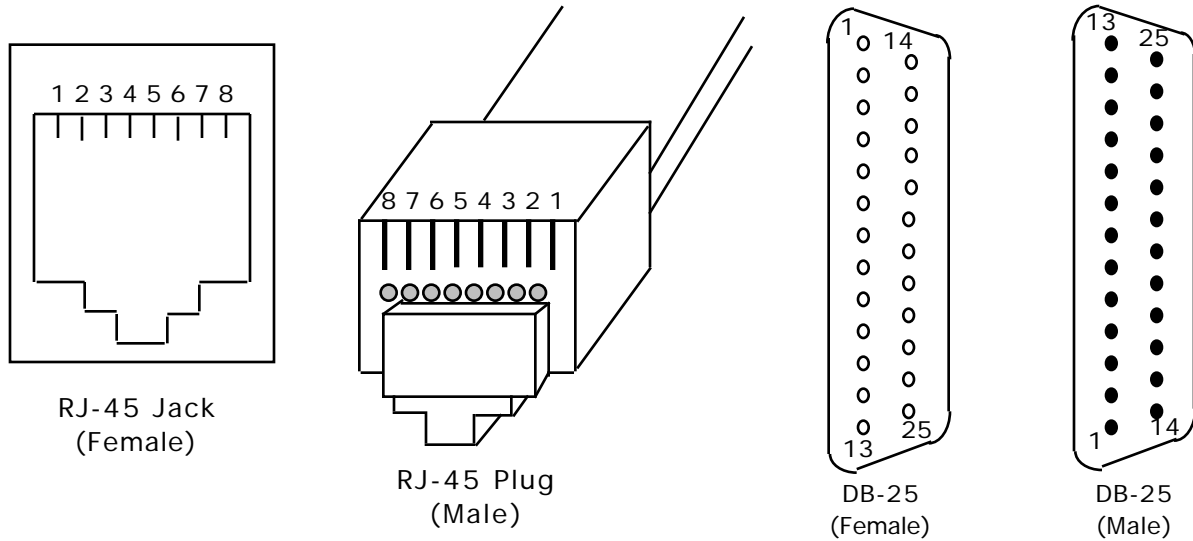


Figure 3-2. RJ-45, DB-25 Pins

Female RJ-45 Pin	Signal
1	RNG/CTS (input)
2	DTR (output)
3	XMT (output)
4	XMTGND
5	RCVGND
6	RCV (input)
7	DSR/DCD (input; see note after Figure 3-3)
8	RTS (output)

You should also give special consideration to the wiring scheme when connecting a device such as a terminal to a serial port. Using modular cabling options (see section 3.2.3), signals are directed to the correct pins by the adaptor. If you wish to make your own cables, you must construct the cable with the appropriate wiring scheme. The terminal server is considered a DTE device.

If you want to connect to another DTE device, you will need a crossover wiring scheme somewhere in the cabling. (Communication between DTE-to-DTE devices requires a crossover.) To make a modular cable with a crossover, you need only crimp the RJ-45 connector in the same direction at both ends. This crosses all wires in the cable. Figure 3-3 shows the crossover wiring scheme. Typically, to connect a standard terminal to a serial port you would use a crossover cable with female DB-25 adaptor at the terminal end.

The crossover connects the terminal server transmit data (XMT) line to the receive data (RCV) line of the user DTE device. Similarly, the terminal server receive data (RCV) line crosses over to the transmit data (XMT) line of the user DTE device. The other signals are crossed over in a similar manner (see Figure 3-3).

If you want to connect a DCE device to a terminal server serial port, straight-through wiring is required. To make a modular straight-through cable, you need only crimp the RJ-45 connector in opposite directions at both ends. Figure 3-4 shows the straight-through wiring scheme.

3.2.3 Modular Adaptors (RJ-45 to DB-25)

You can obtain adaptors with male and female DB-25 connectors from Xyplex. These adaptors direct signals from the RJ-45 connector on the cable to the correct pin on the DB-25 connector. Figures 3-3 and 3-4 show how devices are cabled when you use these adaptors.

Flow Control and Modem Control

The model 721 20-port I/O module's serial ports can be set up to support RTS/CTS flow control, modem control, or both of these concurrently. Section 5.6 of the *Software Management Guide* describes flow control options and explains how to set up flow control at a port. The adaptors shown in Figures 3-3 and 3-4(b) support RTS/CTS flow control. Terminal Server 720 RJ-45 serial ports can also be set up to support modem control. Section 5.5 of the *Software Management Guide* describes modem control options and explains how to set up modem control at a port. The adaptor shown in Figure 3-4(a) supports modem control, by supporting the RING signal.

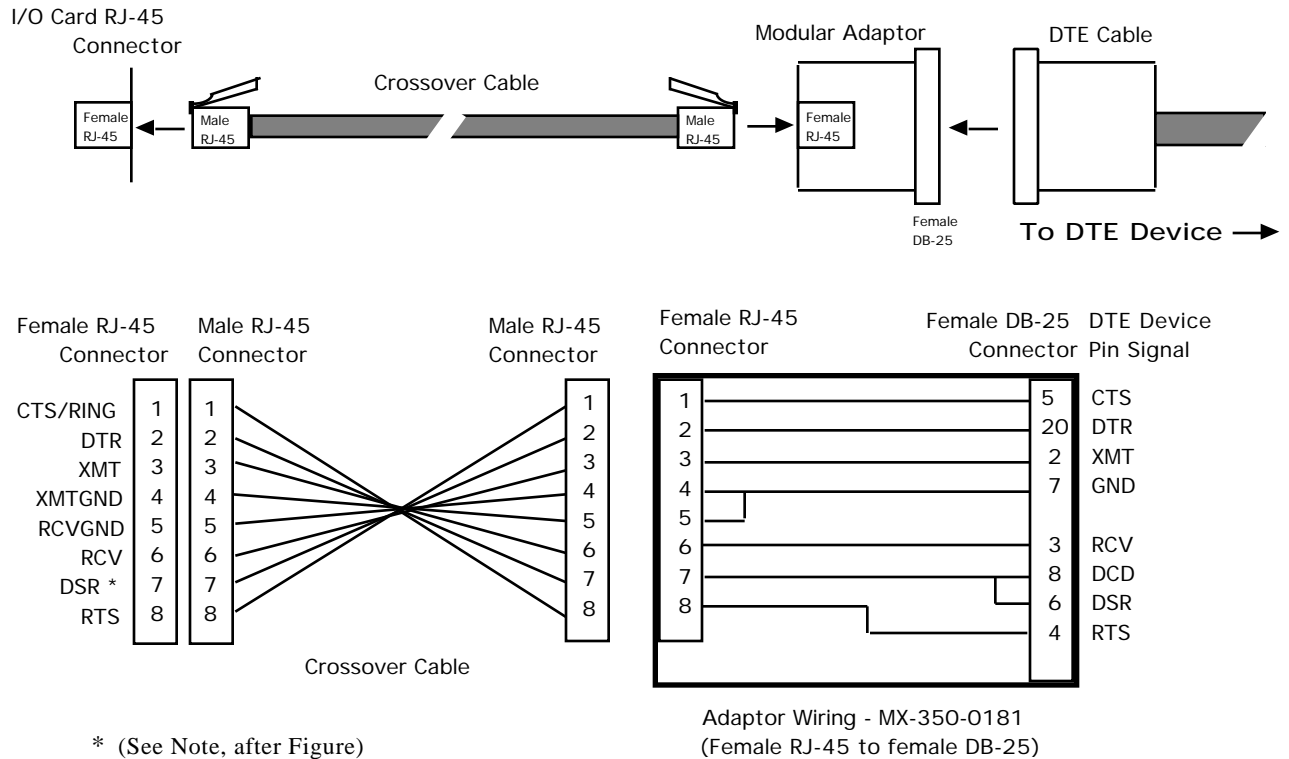
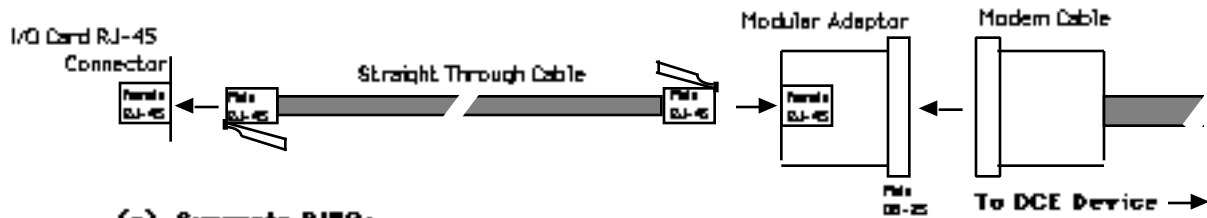


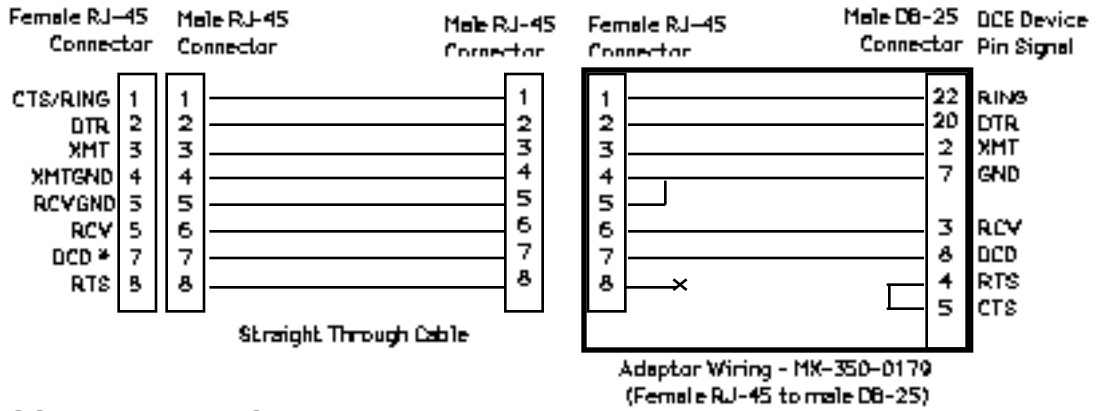
Figure 3-3. Terminal Server to DTE Adaptor Wiring

Note In order to expand the functionality of the serial interface, the RJ-45 modular cabling allows you to connect different signals to pin 7 of the server. (This pin is an input to the terminal server serial port.) When a DCE device is connected to a terminal server serial port, the device's DCD output is connected to pin 7. In this case, the signal at pin 7 is referred to as DCD.

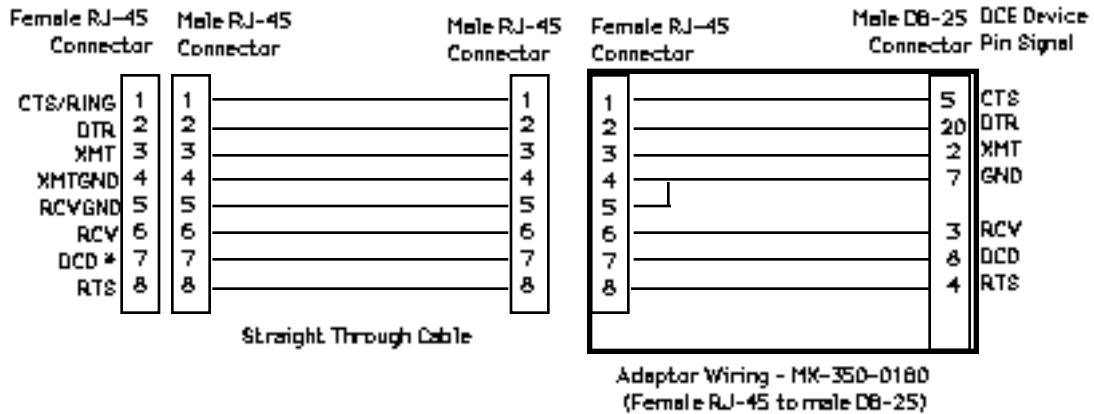
When a DTE device is connected to a terminal server serial port, the device's DTR output is connected to pin 7 of the terminal server. In this case, the signal at pin 7 is referred to as DSR. (This cabling scheme also provides DECconnect compatibility, since DECconnect does not support the DCD signal.)



(a) Supports RING-



(b) Supports RTS/CTS:



* (See Note, before Figure 3-4)

Figure 3-4. Adaptor Wiring, Server to DCE

3.2.4 DECconnect RJ-45 Cables

Figure 3-5 shows the DECconnect-compatible cables available from Xyplex and shows how the cables are wired. The Male RJ-45 connector is attached to the server. The MMJ connector attaches to the DECconnect-compatible device (DTE). The cable is a crossover cable that uses the six inner pins of the server port and makes the signals available at the MMJ connector. The cable is constructed using standard six-wire cable.

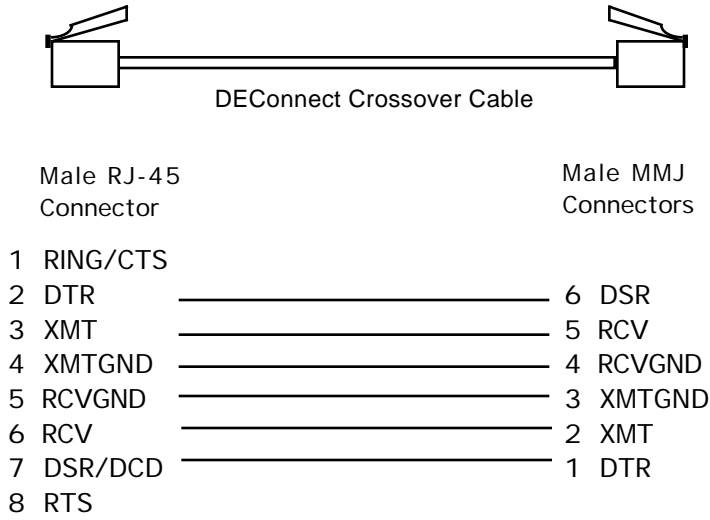


Figure 3-5. RJ-45 DECconnect Cable

If you have existing DECconnect cables that you want to use with the RJ-45 serial ports, the one-foot straight through cable and the RJ-45 to MMJ adaptor or modular adaptor allow you to use these cables without making any changes. You can also use the male RJ-45 to female MMJ adaptor. You should also note that DECconnect cables do not support hardware flow control.

3.2.5 Octopus Cables

An octopus cable fans out a single 50-pin male or female Telco connector, or a 36-pin male or female Telco DEConnect connector, to eight male RJ-45 connectors. These cables enable you to connect RJ-45 serial ports to existing wiring in your facility. For example, you can use octopus cables to connect the RJ-45 serial ports to a punch down block.

Figure 3-6 shows an octopus cable with a 50-pin Telco connector:

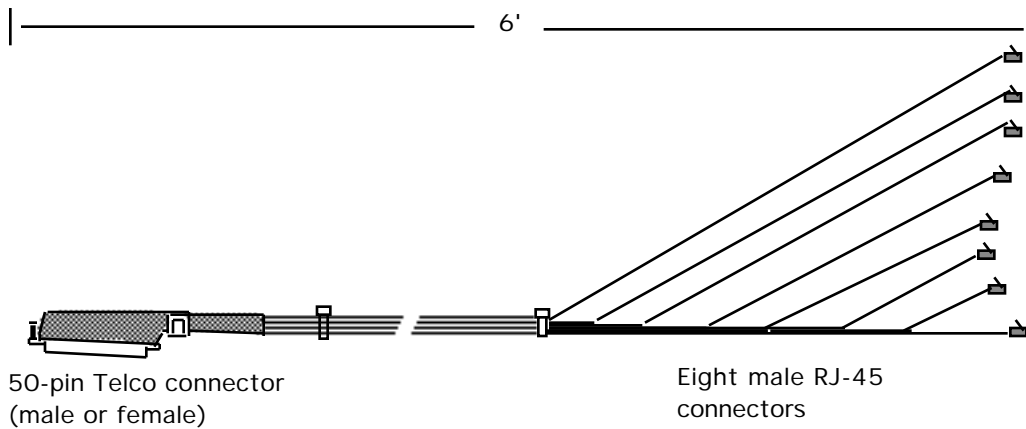


Figure 3-6. Octopus Cable with 50-pin Telco Connector

Figure 3-7 shows an octopus cable with a 36-pin female Telco DEConnect connector. Figure 3-8 shows an octopus cable with a 36-pin male Telco DEConnect connector.

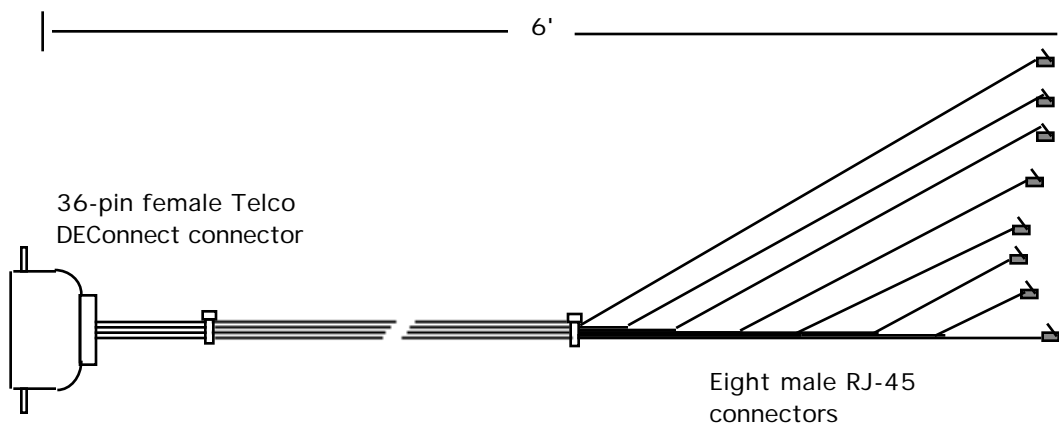


Figure 3-7. Octopus Cable With 36-pin Female DEConnect Connector

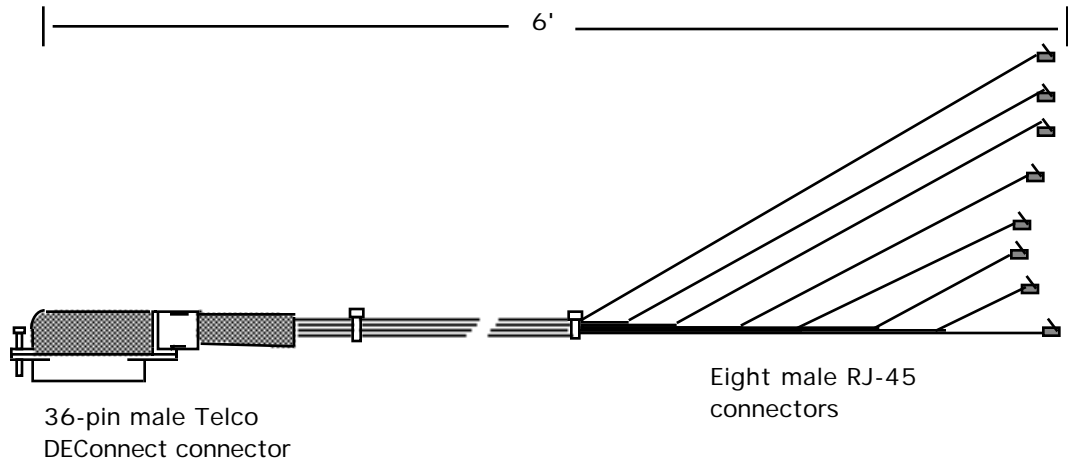


Figure 3-8. Octopus Cable With 36-pin Male DEConnect connector

Connecting to a Distribution Panel

By using two types of octopus cable, you can connect RJ-45 serial ports to a distribution panel that has DB-25 connectors. This enables you to adapt RJ-45 cabling to Xyplex Telco-style cabling. Xyplex offers octopus cables that fan out a 50-pin Telco connector to eight male or female DB-25 connectors. These cables are available in 3', 6', 10', 25' and 50' lengths. You can connect the unit to the distribution panel via the two octopus cables as shown in Figure 3-9. (You might need an extension cable to connect the two cables.)

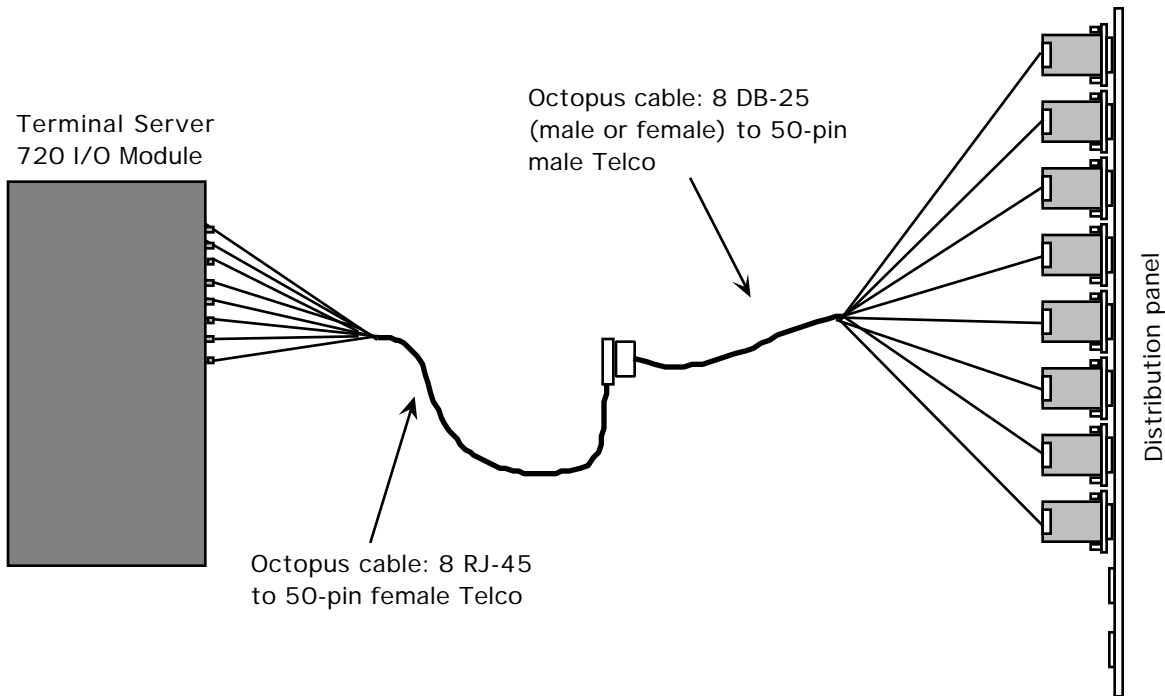


Figure 3-9. Connecting RJ-45 Ports to a DB-25 Distribution Panel

3.3 Telco Cabling Options

The model 721 16-port I/O module and model 724 24-port I/O module can be used with a variety of cabling options that are designed for easy cable connections. The cabling options available from Xyplex include:

- Extension cables
- Distribution panels
- Splitters
- Octopus cables
- Punch-down blocks
- Modular (MODtap™) cabling
- DECconnect™ cabling

Standard cabling items available from Xyplex allow you to connect to any serial device that uses a male or female DB-25 connector.

Xyplex also supplies DECconnect-compatible crossover cables and modular adaptors for use with the 20-port I/O modules. These cables are described later in this chapter.

3.3.1 Rear Panel Connection (Telco)

The Model 721 I/O module has two 50-pin female Telco/Amphenol connectors with bail locks, as shown in Figure 3-10. The Model 724 I/O module is similar to the Model 721, but has three 50-pin female Telco/Amphenol connectors with bail locks. The bail locks swing in toward the male connector and latch to secure the connection. Standard Xyplex cables use connectors with the bail locks.

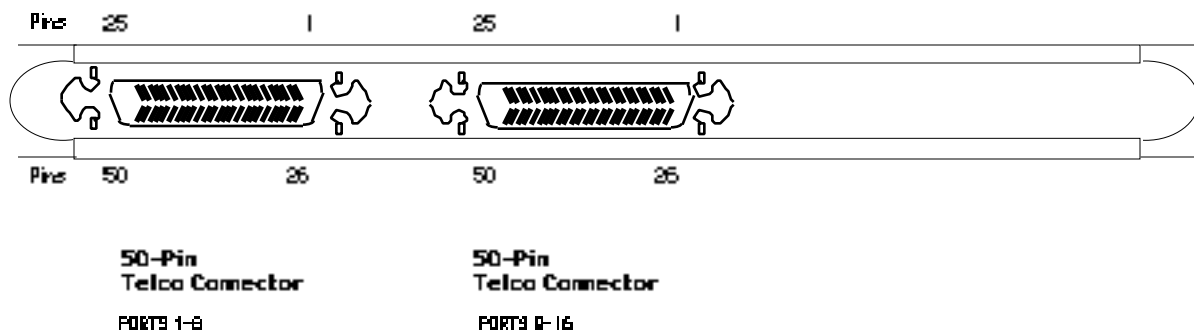


Figure 3-10. Sixteen-Port I/O Module, With 50-Pin Telco Connectors.

Table 3-1 lists the Telco 50-pin connector pin assignments for the Terminal Server 720 sixteen-port I/O module. Typically, an extension cable, with either a straight-out or bottom-entry male connector is mated to the Telco connector (section 3.3.2).



The model 721 and 724 I/O modules do not support hardware flow control.

Table 3-1. Telco 50-Pin Pinout, By Port Number

	Telco Pin	Signal Name	Telco Pin	Signal Name
Port 1, 9, 17	28	DTR n	03	RNG n
	27	XMT n	02	GND n
	26	RCV n	01	DCD n
Port 2, 10, 18	31	DTR n	06	RNG n
	30	XMT n	05	GND n
	29	RCV n	04	DCD n
Port 3, 11, 19	34	DTR n	09	RNG n
	33	XMT n	08	GND n
	32	RCV n	07	DCD n
Port 4, 12, 20	37	DTR n	12	RNG n
	36	XMT n	11	GND n
	35	RCV n	10	DCD n
Port 5, 13, 21	40	DTR n	15	RNG n
	39	XMT n	14	GND n
	38	RCV n	13	DCD n
Port 6, 14, 22	43	DTR n	18	RNG n
	42	XMT n	17	GND n
	41	RCV n	16	DCD n
Port 7, 15, 23	46	DTR n	21	RNG n
	45	XMT n	20	GND n
	44	RCV n	19	DCD n
Port 8, 16, 24	49	DTR n	24	RNG n
	48	XMT n	23	GND n
	47	RCV n	22	DCD n

Note 1: Ports 1 through 8 are on connector A. Ports 9 through 16 are on connector B. Ports 17 through 24 on connector C.

Note 2: Pins 25 and 50 are not used.

Note 3: The signal definitions are:

Signal	Definition	Type
DTR n	Data Terminal Ready	Output (From server to terminal)
XMT n	Transmit	Output (From server to terminal)
DCD n	Data Carrier Detect	Input (From terminal to server)
RCV n	Receive	Input (From terminal to server)
GND n	Logic Ground	Common
RNG n	Ring	Input (From terminal to server)

where: n is the port number.

3.3.2 Extension Cables

Two basic types of extension cables of various lengths are available as shown in Figure 3-11. Both types have 50-pin Telco (male) connectors at one end and either a 50-pin Telco (female) connector, or a 50-pin bottom-entry connector (male or female) at the other end. (Refer to paragraph 3.3.10 for a DECconnect-style extension cable.)

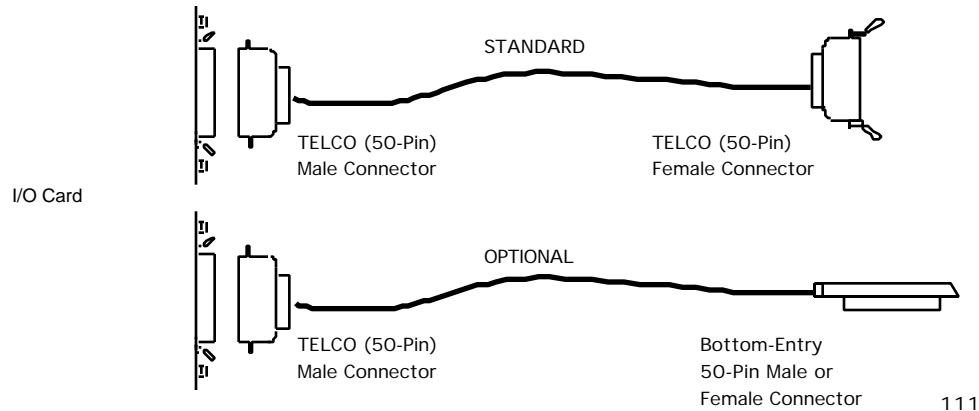


Figure 3-11. Extension Cables.

The available lengths for each type are:

Telco Male to Telco Female

0.91 m (3')
 3.05 m (10')
 7.62 m (25')
 15.24 m (50')

Telco Male to Bottom-Entry Female/Male

3.05 m (10') to bottom-entry female
 7.62 m (25') to bottom-entry female
 7.62 m (25') to bottom-entry male

Either the Telco male to Telco female or the Telco male to bottom-entry male can connect directly to the I/O module. These extensions cables provide a straight through connection so combinations of various male-to-female cable lengths can be connected together to give you the length you require.

These extension cables can be used to or from the I/O module to the following cabling options:

- Octopus Cables
- Distribution Panel
- Modular Splitter
- Punch-Down Block
- Extend existing cable

3.3.3 Octopus Cables

An octopus cable fans out the 8 serial ports from a 50-pin Telco connector to DB25 connectors (6-pins used per connector). An octopus cable can be ordered with either 8 male or female DB25 connectors as shown in Figure 3-12. The following cable lengths are available for both octopus cable types:

- 0.91 m (3 ft)
- 1.83 m (6 ft)
- 7.62 m (25 ft)
- 15.24 m (50 ft)

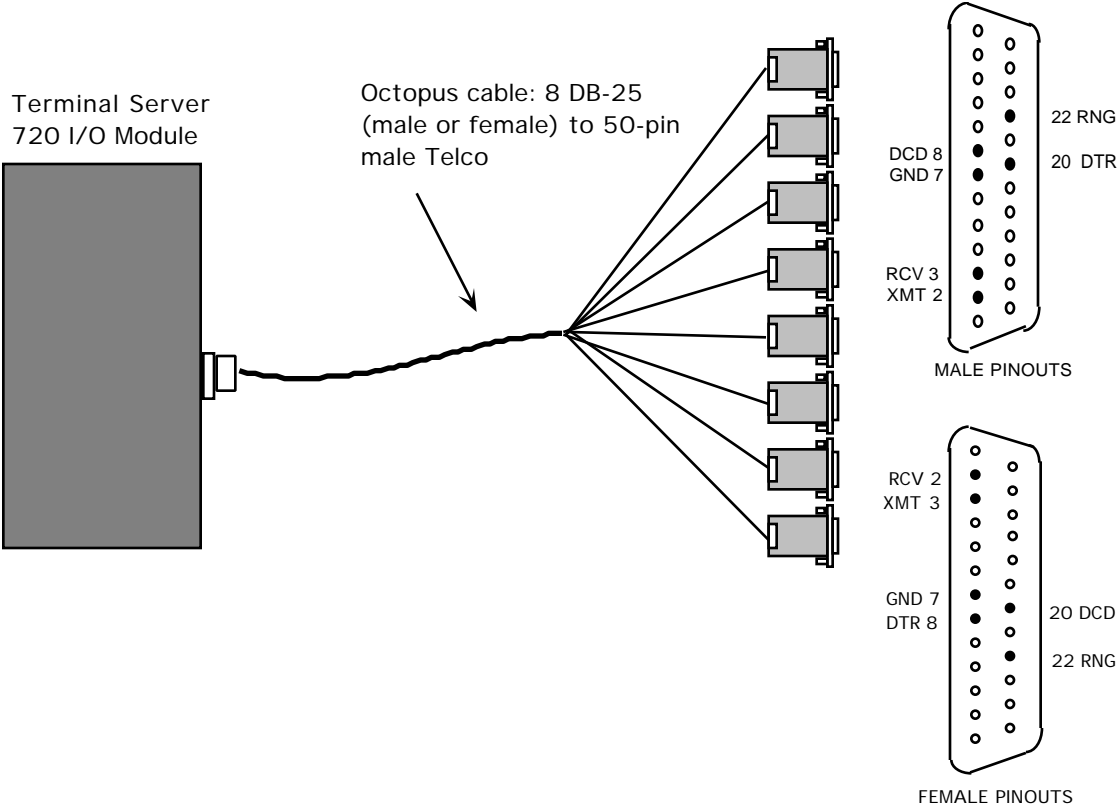


Figure 3-12. Octopus Cable (Male and Female), Connected to I/O Module.

Figure 3-13 shows possible terminal server (DTE) connections to a terminal (DTE) and a modem (DCE) using an Octopus cable with male DB-25 connectors installed in a distribution panel (section 3.3.4).

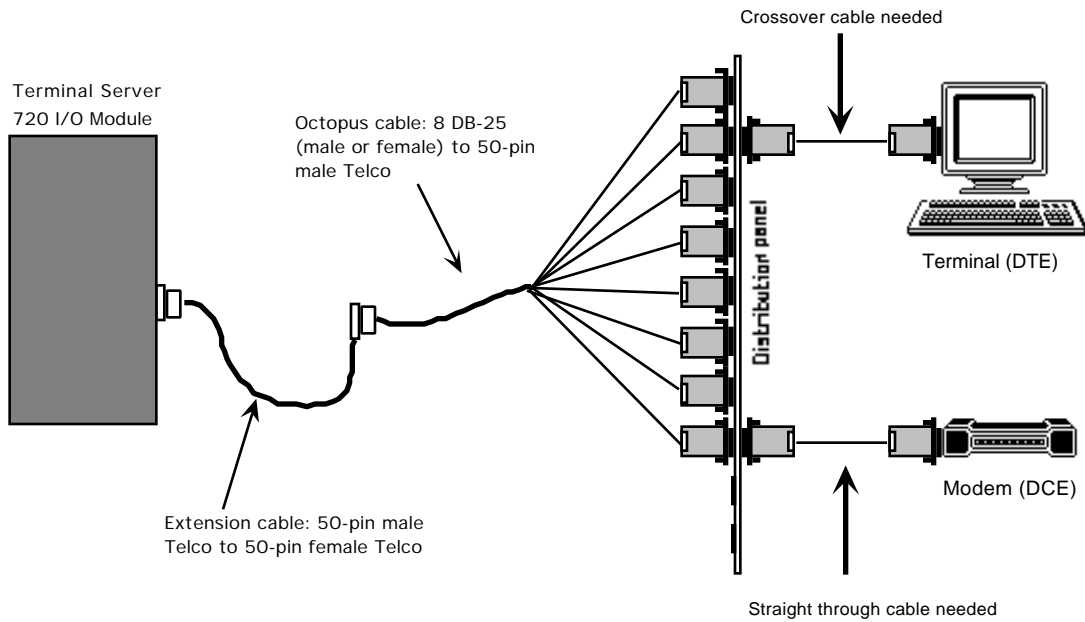
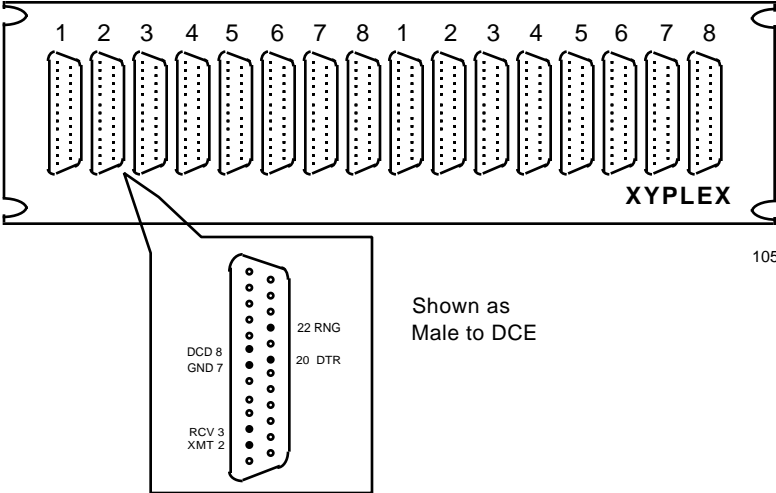


Figure 3-13. Terminal Server (DTE) To DTE/DCE Applications.

3.3.4 Distribution Panels (16-Port, DB-25)

A 16-port distribution panel with two 1.83 m (6 ft) Octopus cables (Male DB-25 connectors) installed is available (Figure 3-14). Alternately, a blank distribution panel and hardware kit (not shown) can be ordered that accepts 2 Octopus cables with male or female connectors. These distribution panels are most commonly used as a distribution point for terminal connections.



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Figure 3-14. 16-Port Distribution Panel.

3.3.5 Modular Splitters

A modular splitter is a rack-mount distribution panel that fans out to eight 6-pin ports through RJ-12 jacks as shown in Figure 3-15. The splitter has 3 groups of 8 ports as shown and requires three 50-pin extension cables. A modular splitter works best with a 50-pin female bottom-entry extension cable. A single 8-port splitter requiring one 50-pin input is also available.

Modular splitter applications include: office drops, MOD-TAP™ and DECconnect™ wiring.

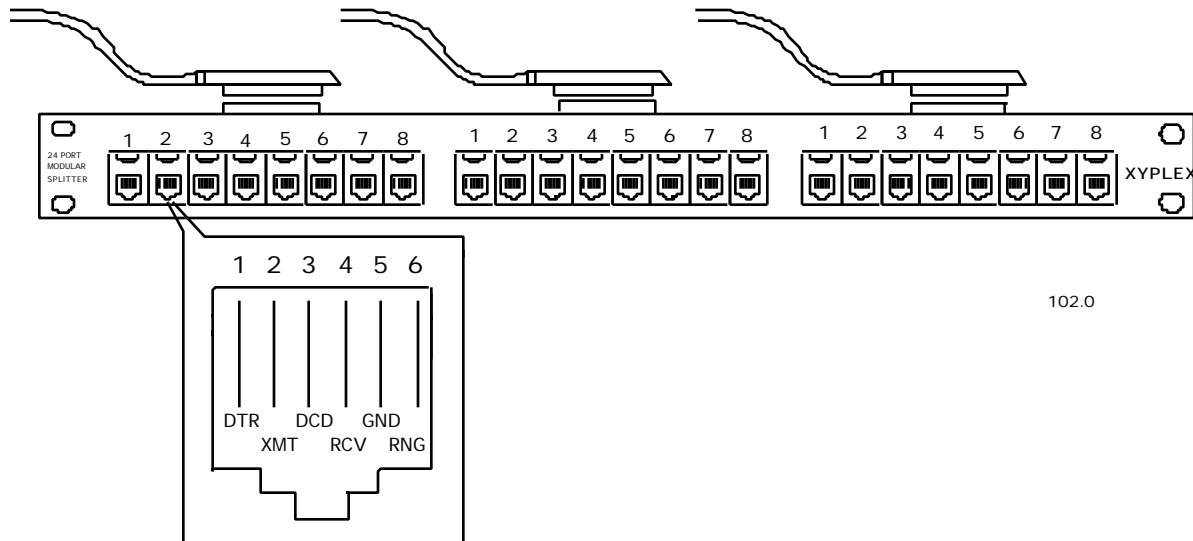


Figure 3-15. 24-Port Modular Splitter

3.3.6 Modular Cables and Connectors

Xyplex can supply the following modular items for wiring from a splitter to your devices:

- 6-wire cable 7.62 m (25')
- SYS Connector, Blue and Grey (MOD-TAP #060988-523-30)
- DROP Connector, White and Grey (MOD-TAP #06-988-260-20)

Other cabling options (not available from Xyplex) include:

- SYS Adaptor, female RJ-12 to male DB-25, Blue and Grey (MOD-TAP #06-888-523-30)
- DROP Adaptor, female RJ-12 to male DB-25, White and Grey (MOD-TAP #06-888-260-20)

Standard Xyplex-supplied cabling items allow you to connect to any serial device which uses a male or female DB-25 connector. All that is required is the modular cable, and the correct modular adaptor (male or female DB-25 connector), which is essentially an RJ-12-to-DB25

adaptor. The DROP adaptors are used in server-to-DTE connections (cross over is performed by the adaptor). The SYS adaptors are used for server-to-DCE connections.

3.3.7 Punch Down Block (66M Style)

The 66M style punch-down block is a 50-pins by 4 rows distribution terminal block used in wiring closets and telephone wiring applications. A 50-pin Telco/Amphenol male connector is mounted on each side of the block as shown in Figure 3-16. Xyplex recommends that bottom-entry extension cables be used with velcro fasteners. (There are no bail-lock latches on the block for the other type of connector.) Two 50-pin rows are associated with each pin. One row connects to the input connector and the other row accepts the wiring to the telephone wiring, with 6 pins per port. Table 3-2 describes the connections for Xyplex supplied 66M punch-down blocks. (For the Model 724 24-port Telco I/O module, you need to use two 50-pin punch-down blocks.)

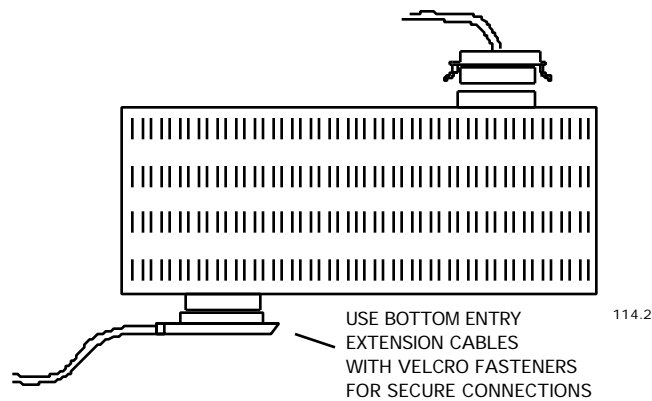


Figure 3-16. 66M Punch Down Block.

Table 3-2. Pinouts for 66M Punch Down Block.

Connection Number (Row)	TELCO Connector 1	TELCO Connector 2	Signal
1	26	26	RCV1 or RCV9
2	1	1	DCD1 or DCD9
3	27	27	XMT1 or XMT9
4	2	2	GND1 or GND9
5	28	28	DTR1 or DTR9
6	3	3	RNG1 or RNG9
7	29	29	RCV2 or RCV10
8	4	4	DCD2 or DCD10
9	30	30	XMT2 or XMT10
10	5	5	GND2 or GND10
11	31	31	DTR2 or DTR10
12	6	6	RNG2 or RNG10
13	32	32	RCV3 or RCV11
14	7	7	DCD3 or DCD11
15	33	33	XMT3 or XMT11
16	8	8	GND3 or GND11
17	34	34	DTR3 or DTR11
18	9	9	RNG3 or RNG11
19	35	35	RCV4 or RCV12
20	10	10	DCD4 or DCD12
21	36	36	XMT4 or XMT12
22	11	11	GND4 or GND12
23	37	37	DTR4 or DTR12
24	12	12	RNG4 or RNG12
25	38	38	RCV5 or RCV13
26	13	13	DCD5 or DCD13
27	39	39	XMT5 or XMT13
28	14	14	GND5 or GND13
29	40	40	DTR5 or DTR13
30	15	15	RNG5 or RNG13
31	41	41	RCV6 or RCV14
32	16	16	DCD6 or DCD14
33	42	42	XMT6 or XMT14
34	17	17	GND6 or GND14
35	43	43	DTR6 or DTR14
36	18	18	RNG6 or RNG14
37	44	44	RCV7 or RCV15
38	19	19	DCD7 or DCD15
39	45	45	XMT7 or XMT15
40	20	20	GND7 or GND15
41	46	46	DTR7 or DTR15
42	21	21	RNG7 or RNG15
43	47	47	RCV8 or RCV16
44	22	22	DCD8 or DCD16
45	48	48	XMT8 or XMT16
46	23	23	GND8 or GND16
47	49	49	DTR8 or DTR16
48	24	24	RNG8 or RNG16
49	50	50	not used
50	25	25	not used

3.3.8 Gender Changer (Telco 50-Pin, Male-To-Male)

A Gender Changer is a connector adaptor that can be used in any application requiring the opposite connector gender between 2 existing cables, or a cable and a device such as a modular splitter or customer-supplied punch-down block.

3.3.9 DECconnect™ 36-Pin Serial Interface Connections

The Xyplex 50-pin terminal server interface is easily integrated into the DEC RS-423 36-pin environment. The conversion to 36-pins occurs in the cabling to the serial devices by using a 50-pin Telco to 36-pin Telco DECconnect adaptor cable.

3.3.10 DECconnect Adaptor Cables

Conversion from the 50-pin (6 pins per port) interface to the DECconnect 36-pin DEC RS-423 interface is accomplished in the cabling with a Xyplex 50-pin Telco (Male) to 36-pin Telco (Male or Female) cable (Figure 3-17). Note that there are 4 pins per port at the 36-pin end (Table 3-3).



Figure 3-17. Telco 50-Pin (Male) To Telco 36-Pin (Female) Cable.

Table 3-3. Telco 36-Pin Pinout

	Telco Pin	Signal Name	Telco Pin	Signal Name
Port 1 or 9:	1	XMT $_n$	19	XMT $_n$ GND
	2	RCV $_n$	20	RCV $_n$ GND
Port 2 or 10:	3	XMT $_n$	21	XMT $_n$ GND
	4	RCV $_n$	22	RCV $_n$ GND
Port 3 or 11:	5	XMT $_n$	23	XMT $_n$ GND
	6	RCV $_n$	24	RCV $_n$ GND
Port 4 or 12:	7	XMT $_n$	25	XMT $_n$ GND
	8	RCV $_n$	26	RCV $_n$ GND
Port 5 or 13:	9	XMT $_n$	27	XMT $_n$ GND
	10	RCV $_n$	28	RCV $_n$ GND
Port 6 or 14:	11	XMT $_n$	29	XMT $_n$ GND
	12	RCV $_n$	30	RCV $_n$ GND
Port 7 or 15:	13	XMT $_n$	31	XMT $_n$ GND
	14	RCV $_n$	32	RCV $_n$ GND
Port 8 or 16:	15	XMT $_n$	33	XMT $_n$ GND
	16	RCV $_n$	34	RCV $_n$ GND

Note 1: Pins 17, 18, 35 and 36 are not used.

Note 2: The signal definitions are:

Signal	Definition	Type
XMT $_n$	Transmit	Output (From server to terminal)
RCV $_n$	Receive	Input (From terminal to server)
GND	Logic Ground	Common

where n is the port number.

3.3.11 DECconnect Style Modular Splitters

Eight-port and 24-port DECconnect style modular splitters with type MMJ connectors are available. The splitters are similar to that shown in Figure 3-15. The 8-port splitter requires 1 DECconnect adaptor extension; the 24-port splitter requires 3 DECconnect adaptor extensions.

3.3.12 Device Wiring Considerations (Telco)

Consideration must be given to the wiring scheme when a device such as a terminal or serial printer is to be connected to a serial port. The serial ports are considered DTE devices. To connect the port to another DTE device (such as a VT200 terminal), you will need a crossover wiring scheme somewhere in the cabling. (Communication between DTE-to-DTE devices requires a crossover.) To connect the port to a DCE device (such as a modem), straight-through wiring is required. In the standard Xyplex-supplied modular cabling options, listed in section 3.3.8, signals are directed to the correct pins in the adaptor (for example, the crossover is made in the DROP adaptor, so that only one type of six-wire cable needs to be used) If you wish to make your own cables, you must construct the cable with the appropriate wiring scheme. Figure 3-18 illustrates a simple version of both crossover and straight-through wiring schemes (this wiring diagram represents the minimum needed to connect a simple terminal).

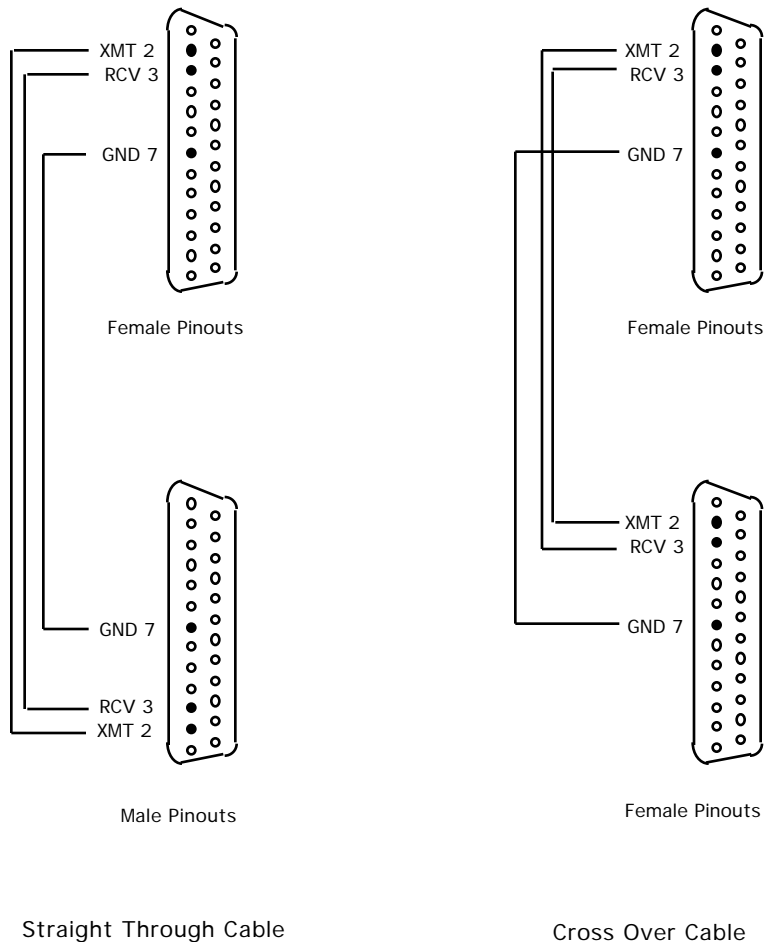


Figure 3-18. Crossover and Straight-Through Wiring Schemes.

The crossover cable connects the serial port transmit data (XMT) line to the receive data (RCV) line of the DTE device. Similarly, the RCV line crosses over to the XMT line of the DTE device.

Chapter 4

Operation and Software Configuration

4.1 Introduction

The terminal server maintains a database of operational parameters (or characteristics), such as characteristics which allow the unit to communicate on a TCP/IP or LAT network, and characteristics that specify how the serial ports communicate with devices. (These parameters can also be maintained in the initialization parameters database). You can configure these parameters with standard Xyplex TCP/IP-LAT software commands. This chapter describes how you use the standard commands to configure TCP/IP-related characteristics.

4.2 Logging On to a Port and Obtaining Help

In order to configure the terminal server, you must be logged on to a terminal server serial port or console port. This section describes how you do this. When your terminal is properly connected to the terminal server serial port, turn its power ON, then press RETURN (or ENTER) a few times -- until the terminal server recognizes your device. Note that the terminal server serial port automatically adjusts to the communication speed of your terminal (75 bps - 38.4K bps, using 8-bit characters with no parity, or 7-bit characters with even parity; line speeds higher than 38.4K bps must be set manually). When the terminal server responds, it generates the following message which appears on your screen:

```
Welcome to the Xyplex Terminal Server 720
Enter username>
```

Type in your name, your initials, a nickname -- whatever you would like to be known as while you are connected, then press RETURN again. You can type up to 16 numbers or letters. This name helps to identify the port you are on in case you experience a problem. If you choose, you can change it each time you make a connection to the terminal server. After you enter your username, the terminal server returns the command prompt:

```
Xyplex>
```


The Terminal Server 720 is now ready to accept commands to configure the terminal server and its ports.

Obtaining Help.

Type HELP and press the RETURN or ENTER key to obtain on-screen information about terminal server commands.

4.3 Configuring TCP/IP Characteristics

Sections 4.5 through 4.7 describes the TCP/IP-LAT software commands that you can use to configure the Internet-related characteristics for the Terminal Server 720 unit. All of the commands described in the remaining sections require you to be in "privileged mode," which is described in the next section.

 Xyplex TCP/IP-LAT Software contains many commands which you can use to configure a Terminal Server 720 terminal server. This Guide does not cover all of these commands. Rather, this chapter is designed to assist the user in performing a few of the more commonly-required activities. If you need more information about the commands available with Xyplex TCP/IP-LAT Software, you should order the "TCP/IP-LAT Standard Documentation Set" from Xyplex. The order code for this set is DOC-CS-001.

4.4 Becoming a Privileged User

To configure Internet-related characteristics and use card management commands for the Terminal Server 720 unit, you will need to be in "privileged mode." Type the command:

```
Xyplex> SET PRIVILEGED
```


and press the RETURN (or ENTER) key. The terminal server will display the following prompt:

```
Password>
```

Type the privileged password for the unit (the factory default is the word SYSTEM, however, this can be changed by the terminal server manager), and press the RETURN (or ENTER) key. Note that the port does not display the password as you type it. If you have typed the correct password, the terminal server will display the following prompt:

```
Xyplex>>
```


You can now type the privileged terminal server commands described in the remainder of this chapter.

 For security, you should now change the privileged password, using the DEFINE SERVER PRIVILEGE PASSWORD command. Use HELP for more information about this command.

4.5 Assigning an Internet Address

To set up the unit to operate as an Internet node, you need to assign values for the SERVER INTERNET ADDRESS and SERVER INTERNET SUBNET MASK characteristics. The default for the INTERNET SUBNET MASK characteristic is set up so that the server will calculate a subnet-mask based on the internet-address that you supply.

The following example shows how you would assign an internet-address for a terminal server and change the SERVER INTERNET SUBNET MASK characteristic. In this example, the server internet-address will be set to 128.3.0.100, and the server will be in a class B network.

 The following examples show the use of DEFINE commands (which change parameters in the permanent database) and SET commands (which change parameters temporarily). Alternatively, you can use only the DEFINE command and re-initialize the terminal server.

First, specify the *internet-address*:

```
Xyplex>> DEFINE SERVER INTERNET ADDRESS 128.3.0.100
Xyplex>> SET SERVER INTERNET ADDRESS 128.3.0.100
```

(Note that the keyword "SERVER" indicates that the characteristic that you are specifying is a server-wide characteristic. The keyword "INTERNET" indicates that you are assigning an Internet-related characteristic. This model is used throughout the command syntax used by the TCP/IP-LAT software.)

Next, specify the *internet-subnet-mask*. (By default the *internet-subnet-mask* will be automatically calculated, based upon the class of network you specified for the *internet-address*. If you later change the *internet-address* of the server, the *internet-subnet-mask* is again re-calculated. You do not need to change *internet-subnet-mask* if you want the server to use the *internet-subnet-mask* that the server calculated. Typically, you would only specify an *internet-subnet-mask* if you are using sub-netting.) The following command shows how you would specify a standard *internet-subnet-mask* for a class B network.

```
Xyplex>> DEFINE SERVER INTERNET SUBNET MASK 255.255.0.0
Xyplex>> SET SERVER INTERNET SUBNET MASK 255.255.0.0
```

If you assign a specific *internet-subnet-mask*, you should consider disabling the automatic calculation of the *internet-subnet-masks* by the server. This will prevent the server from later re-calculating the *internet-subnet-mask* if you change the *internet-address*. To do this, use the commands:


```
Xyplex>> DEFINE SERVER INTERNET SUBNET MASK AUTOCONFIGURE DISABLED
Xyplex>> SET SERVER INTERNET SUBNET MASK AUTOCONFIGURE DISABLED
```

4.6 Configuring Domain Name Server Support

To set up the terminal server to operate with a Domain Name Server (such as NIS or the Berkeley Internet Name Domain Server), you need to assign values for two SERVER INTERNET characteristics: DOMAIN ADDRESS and DEFAULT DOMAIN SUFFIX. To allow users to connect to the server via a *domain-name*, you need to assign a value for the SERVER NAME characteristic.

The SERVER INTERNET DOMAIN ADDRESS specifies the *internet-address* at which a Domain Name Server is located. You can specify up to two Domain Name Servers (primary and secondary).

The following is an example of how you would specify a default *domain-name-suffix* .XYPLEX.COM, and set up the the server to use two Domain Name Servers, which are located at *internet-addresses* 128.3.0.200 and 128.3.0.250. Finally, in this example, you will assign the *domain-name* TS720.XYPLEX.COM to a terminal server. This procedure assumes that you already have a working Internet network, and one or more Domain Name Servers. To permit TCP/IP connections and make services available to users, you may also need to configure your host systems to support *domain-name* resolving using tools that are specific to the operating systems you are using. Refer to the system documentation supplied with the host operating systems for specific instructions.

 The following examples show the use of DEFINE commands (which change parameters in the permanent database) and SET commands (which change parameters in the operational database). Alternatively, you can use only the DEFINE command and re-initialize the terminal server.

First, specify the default *domain-name-suffix* the server will use to develop fully qualified *domain-names*:

```
Xyplex>> DEFINE SERVER INTERNET DEFAULT DOMAIN SUFFIX .XYPLEX.COM
Xyplex>> SET SERVER INTERNET DEFAULT DOMAIN SUFFIX .XYPLEX.COM
```

Next, specify the *internet-address(es)* of any primary and secondary Domain Name Servers:

```
Xyplex>> DEFINE SERVER INTERNET PRIMARY DOMAIN ADDRESS 128.3.0.200
Xyplex>> SET SERVER INTERNET PRIMARY DOMAIN ADDRESS 128.3.0.200
Xyplex>> DEFINE SERVER INTERNET SECONDARY DOMAIN ADDRESS 128.3.0.250
Xyplex>> SET SERVER INTERNET SECONDARY DOMAIN ADDRESS 128.3.0.250
```

Optionally, specify the *domain-name* of the server to allow connections to the server by *domain-name*:

```
Xyplex>> DEFINE SERVER INTERNET NAME TS720.XYPLEX.COM
Xyplex>> SET SERVER INTERNET NAME TS720.XYPLEX.COM
```

The TCP/IP-LAT software also supports limited use of the server to resolve domain-names. This support does not allow the server to be a general Domain Name Server for the network, but it does allow the server to resolve *domain-names* when the server is directly asked to resolve a *domain-name* (i.e., the server has been designated to be a primary or secondary name server for a host or for another server). Typical applications of this support include:

- using one server as the primary or secondary Domain Name Server for other servers in the network
- using the server to resolve *domain-names* on a small network that does not use a host for name serving
- using the server to resolve *domain-names* in conjunction with the rotary connections feature.

Upon receipt of a request, the server will examine the domain-name table in the operational database. The server will send a domain-name response for any *domain-names* contained in the database.

To specify *domain-names* that will be permanently stored by the terminal server, you must first specify the *default-domain-suffix* (as described earlier in this section). Then, use the SET and DEFINE DOMAIN commands to identify names to be resolved by the server. For example, to specify that the server will resolve the *domain-name* "HOST1.XYPLEX.COM" with the internet-address 128.1.2.3, use the commands:

```
Xyplex>> DEFINE DOMAIN HOST1.XYPLEX.COM 128.1.2.3
Xyplex>> SET SET DOMAIN HOST1.XYPLEX.COM 128.1.2.3
```

4.7 Summary of Internet-Related Commands

The following commands enable you to assign and view the values for Internet addressing that the terminal server will use.

SHOW/LIST/MONITOR SERVER INTERNET CHARACTERISTICS - This command displays the current settings for the internet-address, and related internet-address and domain-name resolution characteristics.

Example:

```
Xyplex>> SHOW SERVER INTERNET CHARACTERISTICS
```

DEFINE/SET SERVER - These commands alter the settings for the internet-address, and related internet-address and domain-name resolution characteristics. Use DEFINE commands to change parameters in the permanent database and SET commands to change parameters in the operational database. Alternatively, you can use only the DEFINE command and re-initialize the terminal server.

INTERNET ADDRESS	Specifies the Internet address for this terminal server. An <i>internet-address</i> consists of four numbers separated by periods (.). Valid values for each of the four numbers are whole numbers in the range of 1 through 254 (the numbers 0 and 255 are permitted in some circumstances). An example of an <i>internet-address</i> is: 128.10.2.30. Default: 0.0.0.0. <u>You cannot change this parameter while there are any active Telnet sessions on this terminal server.</u>
------------------	---

Example:

```
Xyplex>> DEFINE SERVER INTERNET ADDRESS 128.3.0.100
```

INTERNET BROADCAST ADDRESS	Specifies the Internet address that is used in Internet Broadcast messages. Some applications can send a message requesting information to all nodes on an Internet network. The server uses the broadcast address to determine whether or not it should respond to such a message. <u>You cannot change this parameter while there are active Telnet sessions on this terminal server.</u> Default: 255.255.255.255.
----------------------------------	---

Example:

```
Xyplex>> DEFINE SERVER INTERNET BROADCAST ADDRESS 255.255.255.255
```

INTERNET DEFAULT
DOMAIN SUFFIX

Specifies the default *domain-name* specification, which the terminal server uses to develop a complete (fully-qualified) *domain-name*, whenever the user specifies an incomplete *domain-name*. The terminal server appends the suffix to the incomplete *domain-name*. Specify the *domain-name-suffix*, beginning with a period character (.). The *domain-name-suffixes* must not end with a period character. Do not enclose the name in quotation marks. Separate each domain-name suffix with the vertical bar character (|). The default *domain-name* for this characteristic is "" (i.e., the null value).

The maximum total characters of all names together, including vertical bars '|' and dots '.', cannot exceed 115 characters. The entire command line cannot exceed 132 characters. Each *domain-name* is limited to a maximum of 50 characters. One of the suffixes may be "no suffixes" which is specified by a single dot. The keyword NONE indicates no suffixes.

Example *domain-name-suffix* list: .XYPLEX.COM|.EDU

Example:

```
Xyplex>> DEFINE SERVER INTERNET DEFAULT DOMAIN SUFFIX .XYPLEX.COM|.EDU
```

INTERNET PRIMARY
DOMAIN ADDRESS

Specifies the *internet-address* at which a Domain Name Server is located. (Domain Name Servers are network hosts where the server attempts to resolve a domain-name.) The terminal server can use up to two Domain Name Servers (primary and secondary) to resolve a domain-name. The terminal server will use the secondary Domain server to resolve a domain-name if it cannot do so using the primary Domain server. Default: 0.0.0.0.

INTERNET
SECONDARY DOMAIN
ADDRESS**Example:**

```
Xyplex>> DEFINE SERVER INTERNET PRIMARY DOMAIN ADDRESS 128.3.0.15
```

INTERNET PRIMARY
GATEWAY ADDRESS

Specifies the *internet-address* at which a TCP/IP gateway can be located. The terminal server can use up to two Internet gateways (primary and secondary) to locate a device on an external network. The terminal server will first attempt to use the primary gateway to route a transmission to a remote device until it determines that the primary gateway has failed. Then the terminal server will use the secondary gateway. Default: 0.0.0.0.

INTERNET
SECONDARY
GATEWAY ADDRESS

Example:

```
Xyplex>> DEFINE SERVER INTERNET PRIMARY GATEWAY 128.3.0.128
```

INTERNET NAME

Specifies the *domain-name* by which the terminal server is known on the network. The specified *domain-name* must be a fully qualified *domain-name* (i.e., the name will not be concatenated with the default Internet *domain-name-suffix*).

Use the following syntax rules to specify a fully-qualified *domain-name*: the name can consist of up to 50 ASCII characters, including the letters A through Z (lower-case letters are treated as upper-case letters), the numbers 0 through 9, the underscore (_) and hyphen (-) characters. Separate each segment within a *domain-name* specification with a period. The left-most segment identifies the individual network object. The remaining segments identify the domain where the object is located. Do not enclose *domain-names* in quotation marks ("). Examples of a *domain-name* are: SRI-NIC.ARPA or UNIXHOST.ENG.XYPLEX.COM.

Note that a fully qualified *domain-name* must contain at least one period.

Example:

```
Xyplex>> DEFINE SERVER INTERNET NAME SERVER720.XYPLEX.COM
```


**INTERNET SUBNET
MASK**

Specifies the Internet *subnet-mask* for the terminal server. The purpose of a *subnet-mask* is to assist the terminal server in distinguishing Internet addresses that can be reached directly from those that must be reached via an IP Gateway. Each device running TCP protocols contains a subnet mask. When a user attempts to form a TCP connection with a destination Internet node, the destination Internet address is logically ANDed with the subnet mask. The unit's own Internet address is also logically ANDed with the subnet mask. The two results of these operations are compared. If they are equal, then the destination is assumed to be reachable without the assistance of an IP Gateway. If they are not equal, then the unit will attempt to reach the destination via an IP Gateway.

The *subnet-mask* is defined using the same format as an Internet address, with ones for the network and/or sub-network portion(s).

You can also use the AUTOCONFIGURE option to specify that the software will automatically determine the *internet-subnet-mask*. When you allow the terminal server to automatically determine the *internet-subnet-mask*, the terminal server changes the *internet-subnet-mask* for either the permanent or operational database whenever the *internet-address* changes. AUTOCONFIGURE is the default. If you plan to use sub-netting in your network, you should not enable the AUTOCONFIGURE option.

Example:

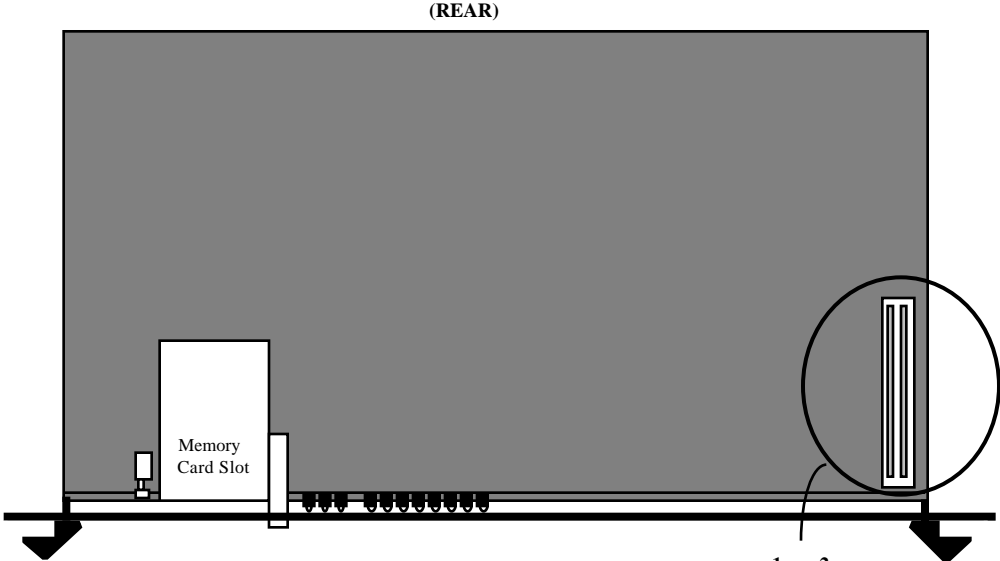
```
Xyplex>> DEFINE SERVER INTERNET SUBNET MASK AUTOCONFIGURE ENABLED
```

```
Xyplex>> DEFINE SERVER INTERNET SUBNET MASK 255.255.0.0
```

Chapter 5

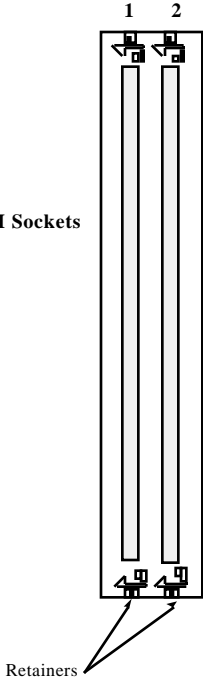
SIMM Locations

A Terminal Server 720 can be upgraded with SIMM memory. This allows you to support additional features, and have more resources available to users. The following figure shows the location of the SIMM sockets on the Terminal Server 720 card. You will need this information in order to install or remove SIMMs. Refer to the Installation Instructions supplied with the SIMM kit.



SIMM Sockets

Note: If you add SIMMs, the Terminal Server 720 will detect that additional memory has been added. However, if you remove SIMMs, you must update Initialization parameters using the Initialization Configuration Menu. Refer to Appendix C.



Appendix A

Technical Specifications

Item	Description										
Terminal Signals	<p>Model 723 I/O Module: Transmit Data, Receive Data, Transmit Ground, Receive Ground, Data Set Ready/Data Carrier Detect (DSR/DCD), Data Terminal Ready (DTR), Ring/Clear-to-Send (RNG/CTS), and Ready-to-Send (RTS)</p> <p>Model 721 and 724 I/O Modules: Transmit Data, Receive Data, Ground, Data Carrier Detect (DCD), Data Terminal Ready (DTR), and Ring (RNG/CTS)</p>										
Terminal Cabling	<p>Model 723 I/O Module: Modular RJ-45</p> <p>Model 721 I/O Module: two 50-pin Telco</p>										
Cable Lengths	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Serial Speed</th> <th style="text-align: left;">Length</th> </tr> </thead> <tbody> <tr> <td>19.2 Kbps or less</td> <td>305 meters (1000 feet)</td> </tr> <tr> <td>38.4 Kbps</td> <td>152 meters (500 feet)</td> </tr> <tr> <td>57.6 Kbps</td> <td>60 meters (200 feet)</td> </tr> <tr> <td>115.2 Kbps</td> <td>30 meters (100 feet)</td> </tr> </tbody> </table>	Serial Speed	Length	19.2 Kbps or less	305 meters (1000 feet)	38.4 Kbps	152 meters (500 feet)	57.6 Kbps	60 meters (200 feet)	115.2 Kbps	30 meters (100 feet)
Serial Speed	Length										
19.2 Kbps or less	305 meters (1000 feet)										
38.4 Kbps	152 meters (500 feet)										
57.6 Kbps	60 meters (200 feet)										
115.2 Kbps	30 meters (100 feet)										
Memory Card Interface	Accepts industry standard JEIDA/PCMCIA Memory cards.										
Serial Line Speed	75 to 115.2K bps										
Maximum Sessions Per Port ¹	8										
Maximum Sessions Per Unit ¹	200										
Controls	Reset push button switch										
<p>¹ The maximum sessions per unit/port depends on the amount of memory the unit has available. This varies based on the software features that are enabled. Refer to the <i>TCP/IP-LAT Software Release Notes</i> for more information.</p>											

Item	Description
Memory	Base 2 MB DRAM, expandable to 4 MB with two 1 MB SIMM memory modules.
Environment	10% to 90% humidity, noncondensing, 0° - 45° C (32° - 113° F)
Power	<p>Model 720 Processor Module:</p> <p>Typical: +5Vdc - 1.5A +12 Vdc - 0.0A -12 Vdc - 0.0A 7W, 23.34 BTU/Hr</p> <p>Model 721 I/O Module:</p> <p>Typical: +5Vdc - 1.1A +12 Vdc - 0.4A -12 Vdc - 0.4A 15.1W, 50.3 BTU/Hr</p> <p>Model 723 I/O Module:</p> <p>Typical: +5Vdc - 1.3A +12 Vdc - 0.6A -12 Vdc - 0.6A 20.9W, 69.7 BTU/Hr</p> <p>Model 724 I/O Module:</p> <p>Typical: +5Vdc - 1.4A +12 Vdc - 1.5A -12 Vdc - 0.6A 29.1W, 72.9 BTU/Hr</p>
Software	Xyplex TCP/IP-LAT Software, V4.3 or later
Ethernet Interface	Ethernet/IEEE 802.3 Connection provided by Network 9000 Chassis

Appendix B

Order Codes

B.1 Processor and I/O Module Order Codes

Product Name and Description	Order Code
Terminal Server 720 processor module	N9-720-000
Sixteen-Port I/O module (model 721), Twenty-Port I/O module (model 723) or Twenty-four-Port I/O module (model 724)	N9-000-721 N9-000-723 N9-000-724

B.2 Model 723 I/O Module Cabling Order Codes

RJ-45 Straight Through and Crossover Cables

Straight through cable, male RJ-45 to male RJ-45, 7.62 m (25 feet)	MX-151-3025
Crossover cable, male RJ-45 to male RJ-45, 7.62 m (25 feet)	MX-151-3026
Straight through cable, male RJ-45 to male RJ-45, 3.05 m (10 feet)	MX-151-3027
Crossover cable, male RJ-45 to male RJ-45, 3.05 m (10 feet)	MX-151-3028
Straight through cable, male RJ-45 to male RJ-45, 0.305 m (1 foot)	MX-151-3033

"Octopus" Cables

"Octopus" cable, eight male RJ-45 to one female 50-pin Telco connector, 1.83 m (6 feet), used to adapt MAXserver 1000 Series cabling to Xyplex TSERV-Style cabling		MX-151-3034
"Octopus" cable, 8 male RJ-45 to 1 male 50-pin Telco		MX-151-3035
"Octopus" cable, 8 male RJ-45 to 1 male 36-pin Telco DEConnect		MX-151-3036
"Octopus" cable, 8 male RJ-45 to 1 female 36-pin Telco DEConnect		MX-151-3037
"Octopus" cable, 8 female DB-25 to 50-pin male	.915 m (3 feet)	MX-151-3085
Telco, "null modem" wired:	1.83 m (6 feet)	MX-151-3109
	3.05 m (10 feet)	MX-151-3095
"Octopus" cable, 8 male DB-25 to 50-pin male	.915 m (3 feet)	MX-151-3088
Telco, wired "straight-through":	1.83 m (6 feet)	MX-151-3098
	3.05 m (10 feet)	MX-151-3101
	15.24 m (50 feet)	MX-151-3103

Product Name and Description	Order Codes
Modular Adaptors	
Modular adaptor, female RJ-45 to male DB-25, supporting RING signal, with red/gray casing	MX-350-0179
Modular adaptor, female RJ-45 to male DB-25, supporting CTS/RTS flow control, with red/gray casing	MX-350-0180
Modular adaptor, female RJ-45 to female DB-25 (supports CTS/RTS flow control), with red/white casing	MX-350-0181
Modular adaptor, female RJ-45 to female MMJ connector	MX-350-0190
Modular adaptor, female RJ-45 connector to female RJ-45 connector Coupling used to connect 2 RJ-45 and/or RJ-12 style modular cables	MX-350-0191
Modular adaptor, male RJ-45 to female RJ-12, used to adapt MAXserver 1000 Series cabling to TSERV-style cabling	MX-350-0197
Modular adaptor, male RJ-45 to female MMJ	MX-350-0198
DECconnect Cables	
Crossover cable, male RJ-45 to male MMJ, 7.62 m (25 feet; see Figure B-4)	MX-151-3032
Crossover cable, male RJ-45 to male MMJ, 3.05 m (10 feet; see Figure B-4)	MX-151-3031
Cable-Making Products	
Cable, 8-wire, with silver casing (recommended for making cross-over cables), 305 m (1000 feet)	MX-150-0110
Male RJ-45 connectors, quantity 100	MX-170-0399
Crimping tool for RJ-45 male connectors	MX-350-0186
Crimping tool for MMJ male connectors	MX-350-0194
Conversion kit to convert crimping tool to accept RJ-45 plugs	MX-350-0195
Conversion kit to convert crimping tool to accept MMJ plugs	MX-350-0196

B.3 Model 721 I/O Module Cabling Order Codes

Product Name and Description	Order Code
Distribution Panels and Adaptors	
Modular Splitter, 8-Port (requires 1 50-Pin extension cable)	MX-151-3083
Modular Splitter, 24-Port (requires 3 50-Pin extension cables)	MX-151-3081
Modular Splitter, 8-Port, DEConnect Style, 36-Pin Female (requires 1 36-Pin DEConnect Adaptor cable, MX-151-3111)	MX-151-3061
Modular Splitter, 24-Port, DEConnect Style, 36-Pin Female (requires 3 36-Pin DEConnect Adaptor cables, MX-151-3111)	MX-151-3062
Distribution Panel, 16-Port, Male DB-25 (includes 2 six-foot Octopus cables)	MX-151-3080
Distribution Panel, 16-Port, Male DB-25 with 2 panel-mounted 50-pin connectors (requires 2 extension cables, MX-151-079)	MX-151-3080
Distribution Panel (Blank), 16-Port (requires 2 six-foot Octopus cables)	MX-151-3107
Punch Down Block (66M Style) (requires 2 50-Pin extension cables)	MX-151-3082
Gender Changer (Telco 50-Pin, Male-to-Male)	MX-151-3090
Extension Cables (Wired Straight Through)	
3' Extension, 50-Pin Telco Male-to-Female	MX-151-3089
10' Extension, 50-Pin Telco Male-to-Female	MX-151-3104
25' Extension, 50-Pin Telco Male-to-Female	MX-151-3105
50' Extension, 50-Pin Telco Male-to-Female	MX-151-3106
10' Extension, 50-Pin Telco Male-to-Bottom-Entry Female	MX-151-3112
25' Extension, 50-Pin Telco Male-to-Bottom-Entry Female	MX-151-3116
25' Extension, 50-Pin Telco Male-to-Bottom-Entry Male	MX-151-3117
DECconnect Adaptor Cables	
6' 50-Pin Telco to 36-Pin female	MX-151-3110
8' 50-Pin Telco to 36-Pin male	MX-151-3111
25' 50-Pin Telco Male to 36-Pin Bottom-Entry Female	MX-151-3063

Product Name and Description	Order Code
Octopus Cables	
3' 8 Female DB25 Connectors	MX-151-3085
6' 8 Female DB25 Connectors	MX-151-3109
10' 8 Female DB25 Connectors	MX-151-3095
25' 8 Female DB25 Connectors	MX-151-3096
50' 8 Female DB25 Connectors	MX-151-3097
3' 8 Male DB25 Connectors	MX-151-3088
6' 8 Male DB25 Connectors	MX-151-3108
10' 8 Male DB25 Connectors	MX-151-3101
25' 8 Male DB25 Connectors	MX-151-3102
50' 8 Male DB25 Connectors	MX-151-3103
Modular Cabling	
Cable, 6-wire straight-through, 7.62 m (25'), male RJ-12 to male RJ-12	MX-350-0156
SYS Adaptor, female RJ-12 to female DB-25, Blue and Grey (MOD-TAP #06-988-523-30)	MX-350-0157
DROP Adaptor, female RJ-12 to female DB-25, White and Grey (MOD-TAP #06-988-260-20)	MX-350-0158

Appendix C

Initialization Configuration Menu

C.1 Overview

Each Network 9000 unit provides an Initialization Configuration menu (hereafter referred to as the "Configuration Menu," or simply the "Menu") that you use to:

- View current settings of initialization parameters. Change the settings when necessary.
- Change the protocol which the unit uses to load parameters.
- Change the protocol which the unit uses to receive a software load image, or change the name of the load image that it requests.
- Change the protocol which the unit uses to transmit dump files.
- Instruct the operating software, once loaded, to initialize server and port parameters.
- Configure multiple initialization (load/dump) configurations.

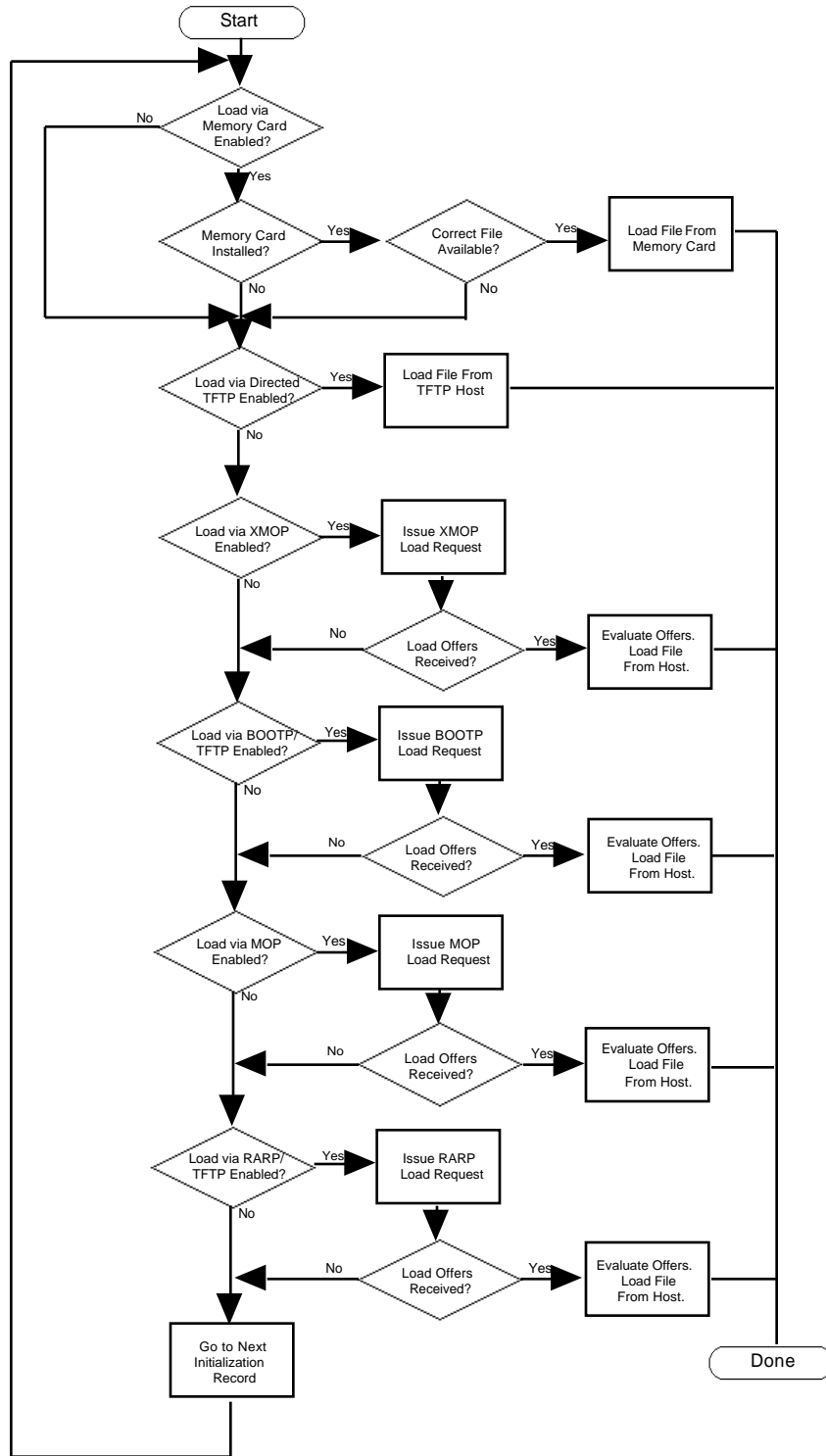
The primary objective of the Configuration Menu is to ensure that the unit can load a software image and its operational parameters. The secondary objective of the Menu is to give the network manager some flexibility in specifying how the unit loads a software image and its parameters, as well as provide some backup or redundancy to make sure that the unit can load in case one of the loading mechanisms is temporarily unavailable. (For example, to specify which protocols or methods will be used and in which order, or to avoid using one or more protocols.) To meet these objectives, the Configuration Menu lets you create up to three unique "load/dump configurations," numbered 1, 2, and 3. (In this case, load refers to loading both image and parameters.)

If for any reason there are no service offers for loading and/or dumping made as a result of the first (primary) load/dump configuration, the unit will try the secondary load/dump configuration. If there are no service offers from that configuration, the unit will try the third (tertiary) load/dump configuration. If there are still no service offers, the unit will wait and then try again, beginning with the primary configuration. Only the primary default load/dump configuration is enabled at the factory.

C.1.1 Factory Defaults

The unit is configured at the factory to use a default set of initialization parameters in order to obtain a software image. This means that, for most configurations, the unit should be able to be loaded without any configuration changes. Loading is made particularly easy if you have inserted a memory card which contains the appropriate load image into the Memory Card Slot, since the unit will load from the memory card. If a card is not present or the appropriate image is not on the card, the unit requests to be loaded by a host system that has the Xyplex TCP/IP-LAT software installed, or a Network 9000 card that has a Memory card which contains the appropriate load image. (The default order in which protocols are tried is: Memory Card, Directed TFTP, XMOP, BOOTP/TFTP, MOP, and RARP/TFTP. The flow chart on the next page depicts the order in which protocols are tried. By default, network load requests are transmitted on midplane Ethernet LAN segment A.) The unit is also configured at the factory to store parameters locally on a flash memory card, if one is installed, and remotely at any properly configured parameter servers.

XMOP is used for loading from a Xyplex load server. MOP is used for loading from a VAX/VMS host. BOOTP, RARP, and DTFTP (Directed Trivial File Transfer Protocol) are used for loading from a UNIX host. Typically, you only need to use DTFTP when loading across a router or when the load host does not support BOOTP or RARP.



C.2 How to Bring Up the Configuration Menu

To access the Configuration menu, follow these steps:

1. Using a straightened paper clip, press the RESET switch once to enter reset mode. (Figure 3-2 shows the location of the switch.) All lights on the front panel should illuminate.
2. Press the RESET switch again, and hold the switch in. With the switch held in, observe the port lights. The port lights should first go off then light in sequence from 1 to 8. Then port lights 1 through 4 will go off in sequence. Then all lights will go on and then off again. When this sequence has completed, release the RESET switch. Next, the unit performs the standard self-test diagnostics. (The self test requires about 20 seconds to complete.)
3. When the RUN light flashes rapidly (indicating that the self test has completed), *autobaud* any serial port by pressing RETURN a few times at a terminal connected to the port. Once the serial port has selected a port speed, it generates the following message:

```
Terminal Server, Type 76, Rev x
Ethernet address 08-00-87-00-46-DD, port 1
Configuration in progress. Please wait.
```

4. Type the password "ACCESS" (note that there is no prompt) and press RETURN. The menu shown in Figure C-1 appears:

```

                                     Welcome to the Configuration Menu.

Terminal Server Configuration Menu

  1. Display unit configuration
  2. Modify unit configuration
  3. Initialize server and port parameters
  4. Revert to stored configuration
  S. Exit saving configuration changes
  X. Exit without saving configuration changes

Enter menu selection [X]:
```

Figure C-1. Example Terminal Server Configuration Menu

Configuration Menu

If the menu does not appear, you might see one or more of the following warning messages:

- (1) WARNING: Stored configuration data is invalid; using defaults
 Press any key to continue
- (2) WARNING: Stored configuration data is corrupt; using defaults
 Do you wish to preserve any existing server and port parameters (Y/N) [N]?
- (3) WARNING: Configuration data not accessible; retry (Y/N) [Y]?

Message 1 -- indicates that the Terminal Server 720 has accessed configuration information in the chassis Control Storage, which has a valid checksum, but pertains to a different module type. This message appears when you have replaced another Network 9000 module type with a Terminal Server 720. For example, the message will appear if you replace a managed 10Base-T/10Base-FL concentrator or bridge/router module with a Terminal Server 720.

Press any key to bring up the configuration menu. The Terminal Server 720 will use the initial default configuration as the basis for any additional changes you make. Select option S from the configuration menu to replace the previous (invalid) configuration information.

Message 2 -- indicates that the Terminal Server 720 has accessed configuration information in the chassis Control Storage, but that the data is corrupt (i.e., the checksum is invalid.)

If the Terminal Server 720 currently has operational parameters stored on a parameter server or memory card, answer Y to the prompt that follows; the Terminal Server 720 will retrieve the stored parameters when you re-initialize the card. Do not answer Y to the prompt unless there are parameters stored on a parameter server or memory card; if the Terminal Server 720 cannot find a parameter file, the module will search for it indefinitely.

Answer 'N' to the prompt if no parameters are available at a parameter server. In this case, the module will use default parameters when you re-initialize the card. Do not answer No to the prompt if parameters are stored at a parameter server; if you do so, the module will search for and destroy any parameter files that are stored by parameter servers¹.

Message 3 -- indicates that the Terminal Server 720 cannot access configuration information in the Control Storage of the Network 9000 chassis. Typically, this means that the Management Bus of the chassis is very busy -- perhaps because someone has established a CHASSIS CONSOLE session. However, on rare occasions, this message might indicate that the chassis Control Storage has become defective.

If the configuration information remains inaccessible after multiple retries, call your Xyplex support representative. (In the U.S. and Canada, call 1-800-435-7997. For international calls, the number is +508-264-9903.)

¹ If you inadvertently answer this prompt incorrectly, exit from the configuration menu without saving changes (using option X). Then, access the menu again and enter the correct response.

C.3 Terminal Server Configuration Menu Options

At the "Enter menu selection" prompt of the Terminal Server Configuration Menu, type the number corresponding to the configuration action you want to perform, then press RETURN. (The default choice is X -- exiting without saving configuration changes.) The following list describes each of the options. Each option is described in more detail in a subsequent section.

Option	Description
1. Display unit configuration	View a list of both the previously-stored configuration values and the values that will be used after you exit from the menu (using Option S -- "Exit saving configuration changes").
2. Modify unit configuration	Change the method by which the unit loads its software; change the name of the load image that it requests, if any; change the method by which the unit requests parameter service and dumps memory; specify the total configured memory; and enable/disable load status messages.
3. Initialize server and port parameters	Instruct the operating software, once loaded, to use factory default values for all server and port parameters. All current server and port parameters will be lost when you exit from the menu (using Option S "Exit saving configuration changes").
4. Revert to stored configuration	Cancel any changes you have made without exiting from the menu. The unit reverts to the configuration values that were last saved. Typically, you would select this option if you had changed some settings, and then decided to undo the changes and begin again.
S. Exit saving configuration changes	Exit from the menu and store the changes that you have made.
X. Exit without saving configuration changes	Exit from the Configuration menu without saving the configuration changes that you have made (i.e., use the configuration that was last saved).

The dialog associated with each menu choice is described in the sections that follow. After you exit from the Terminal Server Configuration Menu, the unit loads software and parameters.

For each prompt shown in the Terminal Server Configuration Menu, the default choice is shown in square brackets, []. For example, [A] indicates that "A" is the default choice for a prompt. Press RETURN to select the default choice.

For many prompts, the default value for the prompt can change. The first time you run the Terminal Server Configuration Menu, the default value shown is the factory default value. After you exit from the Terminal Server Configuration Menu, having saved changes, the default value shown for a prompt is the currently-stored value, not the factory default value.

C.3.1 Option 1 - Display Configuration

To select this option, answer 1 to the "Enter menu selection" prompt of the Terminal Server Configuration Menu. The dialog displays a Display Unit Configuration Menu, which is shown in Figure C-2:

```

Display Unit Configuration Menu

  1. Load/dump configuration #1 (Enabled)
  2. Load/dump configuration #2 (Disabled)
  3. Load/dump configuration #3 (Disabled)
  M. Miscellaneous unit configuration
  X. Exit to main menu

Enter menu selection [X]:
    
```

Figure C-2. The Display Unit Configuration Menu.

Display Unit Configuration Menu - Choices 1, 2, and 3.

If you select choices 1, 2, or 3 of the Display Unit Configuration Menu, the menu will display a list of currently stored configuration values and the new configuration values for the specified load/dump configuration. This display is similar to the list shown in Figure C-3.

	Stored Configuration	New Configuration
Status:	Enabled	Enabled
Image load method:	CARD XMOP MOP BOOTP RARP	CARD XMOP MOP BOOTP RARP
Parameter load method:	CARD XMOP MOP BOOTP RARP	CARD XMOP MOP BOOTP RARP
Dump method:	XMOP MOP BOOTP RARP	XMOP MOP BOOTP RARP
CARD/XMOP/MOP filename:	XPCSRV20	XPCSRV20
Default unit IP addr:	0.0.0.0	0.0.0.0
DTFTP host IP addr:	N/A	N/A
DTFTP gateway IP addr:	N/A	N/A
DTFTP filename:	N/A	N/A
Network interface:	Segment A	Segment A

(Type any key to continue)

Figure C-3 (part 1 of 2). Sample Unit Configuration Display

	Stored Configuration	New Configuration
Status:	Disabled	Disabled
Image load method:	N/A	N/A
Parameter load method:	N/A	N/A
Dump method:	N/A	N/A
CARD/XMOP/MOP filename:	N/A	N/A
Default unit IP addr:	N/A	N/A
DTFTP host IP addr:	N/A	N/A
DTFTP gateway IP addr:	N/A	N/A
DTFTP filename:	N/A	N/A
Network interface:	N/A	N/A
(Type any key to continue)		

Figure C-3 (part 2 of 2). Sample Unit Configuration Display.

Figure C-3, part 1 depicts how this display might appear for an enabled load/dump configuration (the values shown here are those of the factory default load/dump configuration). Figure C-3, part 2 depicts how this display might appear for a disabled load/dump configuration.

The DTFTP (Directed Trivial File Transfer Protocol) information is present when DTFTP is listed as an Image load method. (Typically, you only need to use this when loading across a router or when the load host does not support BOOTP or RARP.) Similarly, the CARD/XMOP/MOP load filename is present when CARD, XMOP, or MOP is listed as an Image load method.

Press any key; the unit returns you to the Display Unit Configuration Menu (Figure C-2).

Display Unit Configuration Menu - Choice M.

If you select choice M of the Display Unit Configuration Menu, the menu will display a list. This display is similar to the list shown in Figure C-4.

	Stored Configuration	New Configuration
Load status messages:	Enabled	Enabled
Memory installed:	2 Megabytes	2 Megabytes
	(Found 2 Megabytes)	
(Type any key to continue)		

Figure C-4. Sample Miscellaneous Configuration Display

Press any key; the unit returns you to the Display Unit Configuration Menu (Figure C-2).

Display Unit Configuration Menu - Choice X.

If you select choice X of the Display Unit Configuration Menu you will be returned to the Terminal Server Configuration Menu (Figure C-1).

C.3.2 Option 2 - Modify Unit Configuration

To select this option, answer 2 to the "Enter menu selection" prompt of the Terminal Server Configuration Menu. The menu displays a Display Unit Configuration Menu, which is shown in Figure C-5:

```

Modify Unit Configuration Menu

  1. Load/dump configuration #1 (Enabled)
  2. Load/dump configuration #2 (Disabled)
  3. Load/dump configuration #3 (Disabled)
  M. Miscellaneous unit configuration
  D. Set unit configuration to defaults
  X. Exit to main menu

Enter menu selection [X]:
    
```

Figure C-5. The Modify Unit Configuration Menu.

Modify Unit Configuration Menu - Choices 1, 2, and 3.

If you select choices 1, 2, or 3 of the Modify Unit Configuration Menu, the menu prompts one of the following (depending on which number load/dump configuration you choose to modify):

```

Initialize load/dump configuration #1 to defaults (Y,N) [N]?
Initialize load/dump configuration #2 to defaults (Y,N) [N]?
Initialize load/dump configuration #3 to defaults (Y,N) [N]?
    
```

Valid answers to this prompt are Y (Yes) and N (No).

- If you answer 'Y', the unit returns all configuration options to their factory default values, which are (Initialization Configuration 1 only; Configurations 2 and 3 are disabled):

Parameter load method:	CARD, XMOP, MOP, BOOTP, RARP
Image load method:	CARD, XMOP, MOP, BOOTP, RARP
Dump Method:	XMOP, MOP, BOOTP, RARP
CARD/XMOP/MOP load filename:	XPCSRV20
Default unit IP address:	0.0.0.0
Directed TFTP values	0.0.0.0 or N/A
Network Interface	Segment A

The menu prompts one of the following (depending on which number load/dump configuration you choose to modify):

```
Enable load/dump configuration #1 (Y,N) [Y]?
Enable load/dump configuration #2 (Y,N) [Y]?
Enable load/dump configuration #3 (Y,N) [Y]?
```

Valid answers to this prompt are Y (Yes) and N (No). If you answer this prompt Y, the unit enables the specified load/dump configuration. If you answer this prompt N, the unit disables the specified load/dump configuration. After answering the prompt, the menu displays the message "Type any key to continue". Press any key; the unit returns you to the Modify Unit Configuration Menu (Figure C-5)

- If you answer No to the "Initialize load/dump configuration (#1, #2, or #3) to defaults?" prompt, the configuration menu generates a series of prompts which are described in the following steps.
1. The configuration menu prompts:

```
Enable ALL methods for image loading (Y,N) [N]?
```

Valid answers to this prompt are:

Y -- Use any software loading method: CARD (Memory card), DTFTP (Directed Trivial File Transfer Protocol), XMOP (Xyplex proprietary protocol), MOP (DEC Maintenance Operations Protocol), BOOTP (Bootstrap Protocol), RARP (Reverse Address Resolution Protocol). Note that host setup activity is required for MOP, BOOTP, and RARP protocols.

N -- Use specific method(s).

- a. If you answer Y, proceed to Step 2.
- b. If you select N, the configuration menu prompts:

```
Toggle (CARD,DTFTP,XMOP,MOP,BOOTP,RARP) image load methods [C,D,X,M,B,R]:
```

Valid answers to this prompt are C (Memory card), D (Directed Trivial File Transfer Protocol), X (Xyplex Proprietary protocol), M (DEC MOP loader), B (BOOTP) or R (RARP). You can select up to six methods.

Selecting C enables the unit to load software from a Memory card. Selecting D enables the unit to load via directed TFTP. Selecting X enables the Terminal Server 720 to load from a Xyplex MAXserver Manager or at another Network 9000 module which has a memory card. Selecting M enables the unit to load software via the DEC MOP loader protocol. Selecting B enables the unit to load software from a BOOTP host. Selecting R enables the unit to load software via RARP.

Select specific protocol(s) by removing letters from or adding letters to the brackets. To remove a letter, type the letter and press RETURN. The prompt reappears; however, the letter you typed does not appear within the brackets. To add a letter to those within the brackets, type the letter and press RETURN. The prompt reappears and the letter you typed is included within the brackets.

When the letters within the brackets represent all the protocols you want to use, press RETURN.

2. The configuration menu prompts:

```
Enable ALL methods for parameter loading (Y,N) [Y]?
```

Valid answers to this prompt are:

Y -- Use any parameter loading method: XMOP (Xyplex proprietary protocol), MOP (DEC Maintenance Operations Protocol), BOOTP (Bootstrap Protocol), RARP (Reverse Address Resolution Protocol)

N -- Use specific method(s).

a. If you answer Y, proceed to Step 3.

b. If you select N, the configuration menu prompts:

```
Toggle (CARD,XMOP,MOP,BOOTP,RARP) parameter load methods [C,X,M,B,R]:
```

Valid answers to this prompt are C (Memory card), X (Xyplex Proprietary protocol), M (DEC MOP loader), B (BOOTP) or R (RARP). You can select up to four parameter loading methods.

Selecting C enables the unit to store and load parameters from a Memory card. Selecting X enables the Terminal Server 720 to store and load parameters at a Xyplex MAXserver Manager or at another Network 9000 module which has a memory card. Selecting M enables the unit to store and load parameters via the DEC MOP loader protocol. Selecting B enables the unit to store and load parameters at a BOOTP/TFTP host. Selecting R enables the unit to store and load parameters via RARP/TFTP.

Select specific protocol(s) by removing letters from or adding letters to the brackets. To remove a letter, type the letter and press RETURN. The prompt reappears; however, the letter you typed does not appear within the brackets. To add a letter to those within the brackets, type the letter and press RETURN. The prompt reappears and the letter you typed is included within the brackets.

When the letters within the brackets represent all the protocols you want to use, press RETURN.

3. The configuration menu prompts:

```
Enable ALL methods for dumping (Y,N) [Y]?
```

Valid answers to this prompt are:

Y -- Use any dumping method: XMOP (Xyplex proprietary protocol), MOP (DEC Maintenance Operations Protocol), BOOTP (Bootstrap Protocol/Trivial File Transfer Protocol (TFTP)), RARP (Reverse Address Resolution Protocol/TFTP)

N -- Use specific method(s).

- a. If you answer Y, proceed to Step 5.
- b. If you select N, the configuration menu prompts:

```
Toggle (XMOP,MOP,BOOTP,RARP) dump load methods [X,M,B,R]:
```

Valid answers to this prompt are X (Xyplex Proprietary protocol), M (DEC MOP loader), B (BOOTP) or R (RARP). You can select up to four methods. The prompt appears again after you enter your selection, enabling you to enter another dumping method. Press RETURN to proceed to the next prompt.

Selecting X enables the unit to dump its memory contents to a Xyplex MAXserver Manager when a crash occurs (you cannot enable dumping to a flash memory card). Selecting M enables the unit to dump memory via the DEC MOP loader protocol. Selecting B enables the unit to dump memory at a BOOTP host. Selecting R enables the unit to dump memory via RARP.

4. If you have selected the CARD, XMOP, or MOP loading method(s), you will see the following prompt. (If you do not see this prompt, proceed to Step 5.)

```
CARD/XMOP/MOP image filename (16 characters max) [XPCSRV20]:
```

This prompt requests the CARD/XMOP/MOP load file name. There are two types of valid answers to this prompt -- file names or numerical values. Valid file names consist of up to 16 characters, which can be letters and numbers, the underscore character (`_`), the hyphen character (`-`), and the period (`.`) character. The default load file name is XPCSRV20. (The actual name of the load file is XPCSRV20.SYS.) In the default load filename (XPCSRV20), the .SYS suffix is implicit.

In place of a filename, you can specify a numerical values. A numerical value specifies to a Xyplex loader (another Network 9000 card with a memory card installed, or a MAXserver Manager card) that it should determine the appropriate load file based on:

- The requesting unit's hardware type, or:
- A node entry in the client database of a MAXserver loader or another Network 9000 unit.

You can also use numerical values to specify that a MOP (Maintenance Operations Protocol) loader is to determine the appropriate load file based on information contained in the NCP (Network Control Program) database.

Valid numerical values consist of the pound-sign character (#) and a number in the range of 0 through 128. Xyplex load servers respond to the numbers #1 through #5. The default numerical value is #1. The numerical value #1 allows you to specify a load file name via the NCP commands at a VAX/VMS load server, or via client entries on a MAXserver loader or Network 9000 Card with a Memory card. Numerical values #2 through #4 are reserved for use by Xyplex. The numerical value #5 requires a Xyplex load server, which can be a Network 9000 card with a Memory card or a MAXserver Manager card (MAXMAN), to ignore the load request -- unless the load server's client database contains a node entry for the requesting terminal server. (The numerical value #5 is useful when you want to require that a specific Xyplex load server be used to load the unit.) Numerical values #6 through #128 are currently undefined.

Type your answer and press RETURN.

5. If Directed TFTP is enabled, the following prompts appear:

Enter unit IP address [0.0.0.0]:

Enter the Internet address of the Terminal Server 720 unit, or press RETURN to accept the default address, 0.0.0.0. You must supply a non-zero Internet address if (in step 1) you have specified all image loading protocols or Directed TFTP (DTFTP) as an image loading method.

Enter host IP address [0.0.0.0]:

Enter the Internet address of the load host, or press RETURN to accept the default address, 0.0.0.0. You must supply a non-zero Internet address if (in step 1) you have specified all image loading protocols or Directed TFTP (DTFTP) as an image loading method.

Enter gateway IP address [0.0.0.0]:

If the load host is not on the same network as the unit, enter the Internet address of a gateway.

Enter TFTP load filename []:

Enter the name of the file to load (max. 64 characters)

6. The configuration menu prompts:

```
Select network interface segment (A,B,C) [A]:
```

Specify which Ethernet network interface segment to which the Terminal Server 720 shall be attached. Valid answers are A, B, or C. After you have selected a segment and pressed the RETURN key, the menu will prompt:

```
(Type any key to continue)
```

Press any key; the unit returns you to the Modify Unit Configuration Menu (Figure C-5).

Modify Unit Configuration Menu - Choice M.

If you select choice M of the Modify Unit Configuration Menu, the menu prompts:

```
Display Load status messages (Y,N) [Y]:
```

It might be necessary to prevent the unit from generating status messages during the software loading process, if a device such as a bar code reader, which cannot interpret status messages, is connected to a serial port. To disable load status messages, enter 'N'. Otherwise, leave the default (Y) intact.

The configuration menu prompts:

```
Total installed memory in megabytes (2,4) [2]:
```

The prompt indicates the amount of installed memory for which the unit has been configured. If you remove memory, you must change this value. (Preferably, you should change this value before you remove the memory.) Also, if you have enabled more software features than the unit can support with the reduced memory, you will not be able to re-initialize the unit after you remove the SIMMs. If this happens, you must re-install the SIMMs and configure the TCP/IP-LAT software image for fewer features.

SIMMs should only be installed or removed by qualified personnel. Refer to the Installation Instructions supplied with your SIMM kit on how to install and remove SIMM memory modules².

The unit automatically detects added memory. Therefore, you do not need to increase the "installed memory" value when you install additional memory. If you choose to increase the value anyway, do not do so before you install the additional memory. If you do, the unit will generate the following warning message:

```
WARNING: After saving the new configuration, you must turn the
unit off and install the additional memory specified (x MB).
```

² The order code for for a 2 MByte SIMM memory upgrade kit is MX-500-5744.

Configuration Menu

(This message appears only while you are using the Configuration menu.)

In addition, you will be prompted to turn off the unit and install the memory if you attempt to exit the Configuration menu, saving changes (Option S). Also, the front panel lights will flash an error code the next time the unit is initialized, if you have not yet installed the memory.

The configuration menu prompts:

(Type any key to continue)

Press any key; the unit returns you to the Modify Unit Configuration Menu (Figure C-5).

Modify Unit Configuration Menu - Choice D.

If you select choice D of the Display Unit Configuration Menu, you will be prompted:

```
Initialize ALL configuration data for this unit to defaults (Y,N) [N]?
```

Valid answers are Y (Yes) or N (No). If you answer Y, all load/dump configurations and miscellaneous settings (load messages enabled/disabled and amount of installed memory) will be returned to their factory default settings. If you answer N, they will not be returned to their factory default settings. After you have answered Y or N, the menu will prompt:

```
(Type any key to continue)
```

Press any key; the unit returns you to the Modify Unit Configuration Menu (Figure C-5).

If you answered Y, and the load/dump configurations and miscellaneous settings were already at their factory default settings, you would see the message:

```
Configuration is already set to defaults
```

Modify Unit Configuration Menu - Choice X.

If you select choice X of the Display Unit Configuration Menu you will be returned to the Terminal Server Configuration Menu (Figure C-5).

C.3.3 Option 3 - Initialize server and port parameters

To select this option, answer 3 to the "Enter menu selection" prompt of the Terminal Server Configuration Menu (Figure C-1). The server prompts:

```
When the software has been loaded, should
default server and port parameters be used (Y,N) [N]?
```

Valid answers are Y (yes) and N (no). Type your answer and press RETURN; the unit returns you to the Configuration menu.

The parameter initialization takes effect after you exit from the Configuration menu and the unit loads its image (assuming that you specify that the unit should save the changes -- Option S). Changes you have made through the ROM Configuration menu take place after you exit from the menu.

If you decide that you do not want to revert to the initial values, you can again select Option 3 from the Configuration menu, and answer No to the preceding prompt, or exit without saving the changes (i.e., select Option X).

C.3.4 Option 4 - Revert to stored configuration

To select this option, answer 4 to the "Enter menu selection" prompt of the Terminal Server Configuration Menu (Figure C-1). The configuration menu prompts:

```
Revert to the stored configuration (Y,N) [N]? y
```

Valid answers are Y (Yes) and N (No). If you answer No, the unit returns you to the Configuration menu. If you answer Yes, the unit displays the messages:

```
Configuration reset to stored values.
```

```
(Type any key to continue)
```

Press any key; the unit returns you to the Configuration menu (Figure C-1). You can then exit from the Configuration menu using Option S or X.

C.3.5 Option S - Exit Saving Configuration Changes

To select this option, answer S to the "Enter menu selection" prompt of the Terminal Server Configuration Menu (Figure C-1). If you have made any changes, the configuration menu prompts:

```
Save changes and exit (Y,N) [Y]?
```

If the unit is configured to store parameters locally, you see this message:

```
Updating configuration data; please wait...
```

If you have not made any changes, the configuration menu displays:

```
No changes made. Exit Configuration menu (Y,N) [Y]?
```

To exit from the Configuration menu, press RETURN. If you do not want to exit from the menu, type 'N' and press RETURN; the Configuration menu appears.

C.3.6 Option X - Exit Without Saving Configuration Changes

To select this option, answer X to the "Enter menu selection" prompt. If you have made changes, the configuration menu prompts:

```
Exit without saving changes (Y/N) [N]?
```

Valid answers to this prompt are Y (Yes) and N (No). To exit the Configuration menu, type 'Y' and press RETURN. If you do not want to exit from the menu, simply press RETURN; the Configuration menu appears.

If you have not made any changes, the configuration menu displays:

```
No changes made. Exit Configuration menu (Y,N) [Y]?
```

To exit from the Configuration menu, press RETURN. If you do not want to exit from the menu, type 'N' and press RETURN; the Configuration menu appears.

Appendix D

Troubleshooting

D.1 Overview

Refer to this chapter if you experience a problem with your terminal server. This chapter describes:

- Normal terminal server operations
- How the terminal server indicates errors
- How to reset the terminal server
- What to do if the Ethernet (A, B, or C) light on the front panel goes out
- How to Troubleshoot Internet Software Loading Problems

D.2 Normal Terminal Server Operations

The terminal server automatically runs self tests when you apply power to the unit or use the RESET button to initialize the unit. Upon successful completion of the self tests, the terminal server loads software from a memory card, or over the network from a load server.


During the self test and software loading, the lights (LEDs) on the front panel flash to reflect various types of activity. During self-test, you should observe the following light activity:

Front Panel Light Activity	Meaning
All lights ON	Testing lights (approximately 1 second).
CARD, RUN, CON, A, B, and C (Ethernet) lights OFF	Self Test begins.
Lights ON, from right (8 status light) to left (1 status light)	Self Test is running.
RUN flashes rapidly	Successful completion of Self Test.

When the Self Test completes, the terminal server begins loading software.

The Ethernet (A, B, or C) light on the front panel (see Figure D-2) illuminates as soon as the terminal server detects network activity (normally about 2 seconds). Within 15 seconds the unit transmits software load requests on the network or begins to load from the memory card.

The RUN light and the Ethernet (A, B, or C) light blink during loading. Loading takes from ten to sixty seconds, depending on the amount of network activity and the speed of the load server. The light pattern should appear as follows:

Front Panel Light Activity	Meaning
Ethernet A, B, or C light ON	Terminal server detects network activity on Ethernet segment to which it is attached.
CARD light ON	Unit is loading from a Memory card (light ON for approximately 15 seconds).  The Terminal Server 720 is accessing the Memory card. <u>Do not</u> remove the card while the CARD light is ON.
RUN and Ethernet (A, B, or C) lights blink simultaneously	Software load in progress.
When loading from a memory card, or when using another Network 9000 card as a load server, Port lights go ON, sequentially from right (Port 8 status light) to left (Port 1 status light). Then, lights go OFF.from left to right.	Unit has finished loading the software image, and is decompressing it.
RUN light flashes slowly Ethernet (A, B, or C) light flashes when Ethernet packets are received	Software loading has completed. Terminal server is in normal operating state.

D.3 Startup Error Codes

If front panel lights do not behave as described in Section D.2 when you power up or initialize the Terminal Server 720, the unit might be displaying an error code. A special pattern of diagnostic codes indicate that a hardware or software error has occurred.

When a startup error occurs:

1. The port lights flash 10 times quickly.
2. One or more port lights illuminate (this is the first pass error code).
3. All port lights flash sequentially.
4. One or more lights illuminate (this the second pass error code).

This sequence repeats. Figure D-1 illustrates the self test error code sequence.

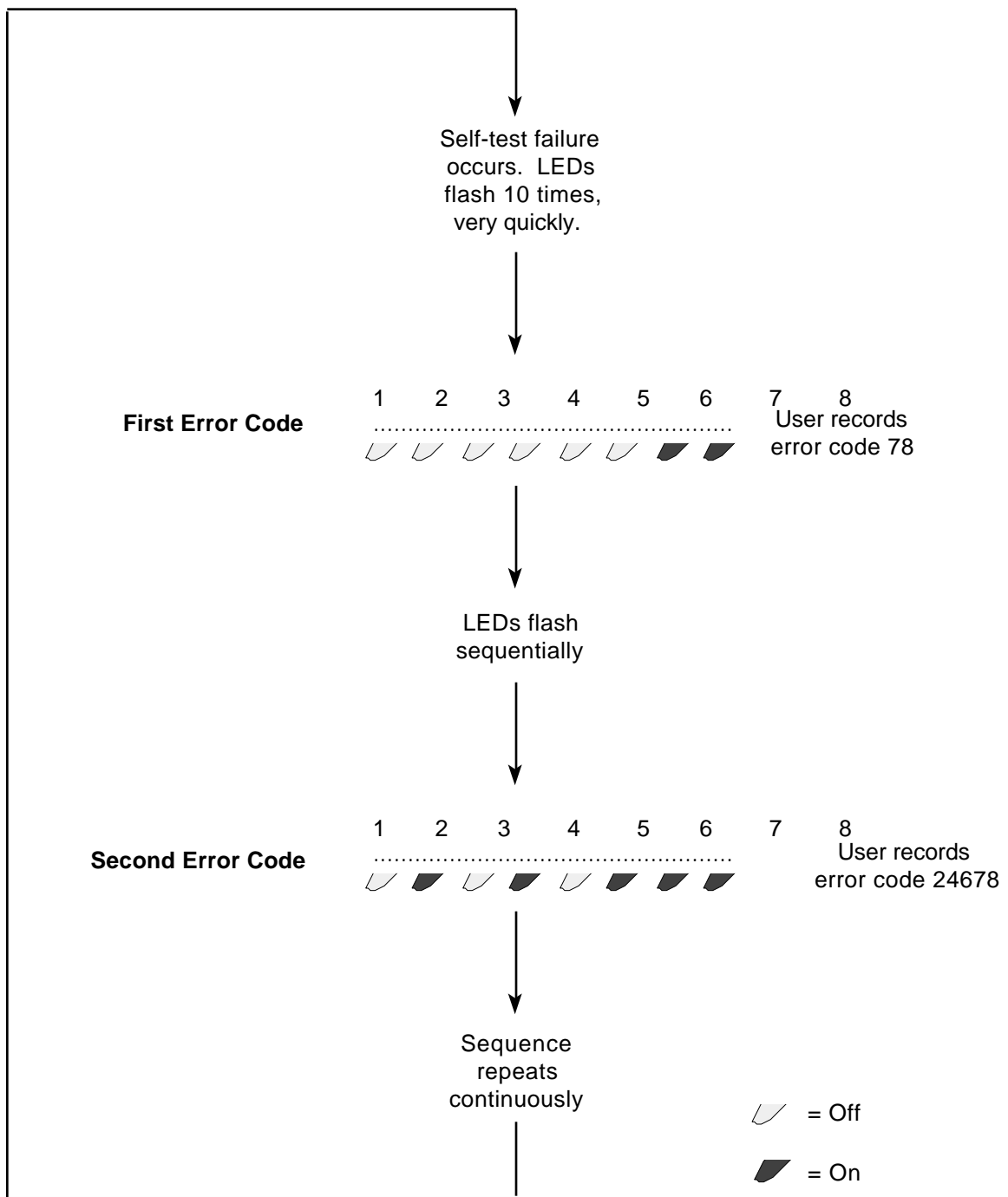


Figure D-1. Self Test Error Code Sequence

Write down the numbers of the first and second pass error codes (the lights that are ON) and contact your Xyplex Customer Support 1-800-435-7997 (U.S.A) or +508-264-9903 (International). Your representative will provide further instructions on how to handle the condition.

Common Error Codes

If you see this error code, the Terminal Server 720 has been configured for more memory than is actually installed:

First Pass 3, 4, 6, 7

Second Pass 3

To correct the error, you must either configure the server for less installed memory, using the Initialization Configuration menu, or install additional SIMM memory. (The SIMM memory installation should only be performed by qualified personnel.) The Configuration menu is described in Chapter 4. Use Option 2, Modify Unit Configuration, to specify the amount of installed memory.

If you see one of these error codes, you must use the Initialization Configuration menu to re-initialize the unit:

First Pass 3, 4, 8

Second Pass 2, 8

or

First Pass 3, 4, 6, 7

Second Pass 3, 6

Appendix C explains how to access the Initialization Configuration menu. Select Option 2, Modify Unit Configuration, from the menu.

If you see the following error code during operation, the control storage for the slot in which the terminal server is installed is corrupted. This is different from normal error code display in that it is not fatal (i.e., normal port, Local Management Bus, and network activities are maintained).

First Pass 3, 4, 6, 7

Second Pass 1, 2, 3, 4, 5, 6, 7, 8

The fault can be corrected remotely by having a network manager issue one of the Network 9000 DEFINE CHASSIS SLOT commands which affects the initialization records.

Afterwards, the error code goes is no longer displayed and normal LED activity resumes (flashing RUN and segment LEDs, port activity, etc).

D.4 Loading Messages

If you press RETURN at a terminal connected to a serial port during the first minute after the unit is powered up (after the self test has completed), network loading messages will be displayed. If you want to see the sequence of message responses that occur during the load process, follow the steps in Section D.4.1 after power on. (Note that when the Terminal Server 720 is loading from a Memory card, you do not see any messages, and you cannot access the terminal server.)

D.4.1 Example Network Load Procedure

The following example load procedure assumes that a terminal is physically connected to a serial port and that the unit is loading software from the network. Press RETURN every 5 - 10 seconds to observe all of the message types.

Complete these steps:

1. Power-up the terminal and press RETURN several times to *autobaud* the port to the baud rate of the terminal. Type any character (except the RETURN key or the CTRL-T command); the port light should go out. (This exercise is useful when debugging cables.) If the server appears to have selected a port speed (LED goes on), but you do not see any response when you press the RETURN key, type the BREAK character to re-initialize the port autobaud sequence, then press RETURN several times.
2. Observe a message similar to the following one:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx, port x  
Initializing...
```

This message appears for approximately 10 seconds. You can compare the Ethernet address displayed with the equipment label on the unit.

3. Next, several messages similar to the following appear:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx, port x  
Requesting network load service
```

Only the last line is different. This message lasts for approximately 20 to 60 seconds (20 seconds for each load/dump configuration that you have enabled; there is no indication that the unit is trying another load/dump configuration - the message stops when a service offer is received). If you do not receive the next message after this time elapses, you are not configured on a load server. Install software on a load server using the procedures described in the *Software Installation Guide* supplied with your software kit.

4. Next, you should observe a message similar to the following:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Evaluating service offers
```

If you typed a CTRL-T after a port speed had been selected, a message similar to the following appears:

```
Received load service offers:
```

Host Address	protocol	merit	filename
xx-xx-xx-xx-xx-xx	0809	9C000037	XPCSRV20

One to ten load server addresses are displayed. The terminal server selects the load server with the highest merit value. If two or more load servers have the same merit value, the terminal server selects the first load server listed. The load server selection algorithm proceeds to find the load server with the highest merit value that is on line. After checking the list of servers, the cycle repeats until a load server responds.

5. After the load server is chosen, and has responded, several messages similar to the following appear:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Loading over Link L1 from server AA-00-04-00-D1-04, message 554
```

These responses indicate the load server from which the terminal server is loading and the message number the unit has received.

6. After the server has successfully completed loading, press RETURN. The server displays the logon prompt:

```
Welcome to the Xyplex Terminal Server
Enter username> _
```

D.5 Resetting the terminal server

You can reset the Terminal Server 720 to force it to run a self test or to re-initialize the unit. All connections are terminated when you reset the unit.

To reset the terminal server, follow these steps:

1. Make a simple "tool" from an ordinary paper clip by bending one end outward. You need this tool to press the RESET button located behind the terminal server's front panel.
2. Look for the small hole to the left of the Memory Card Slot (see Figure D-2).
3. Use the paper clip tool to press the RESET button once. This halts all terminal server operations -- the server will no longer send or receive network data or data from its connected devices. The server enters a halt state; all front panel lights illuminate.

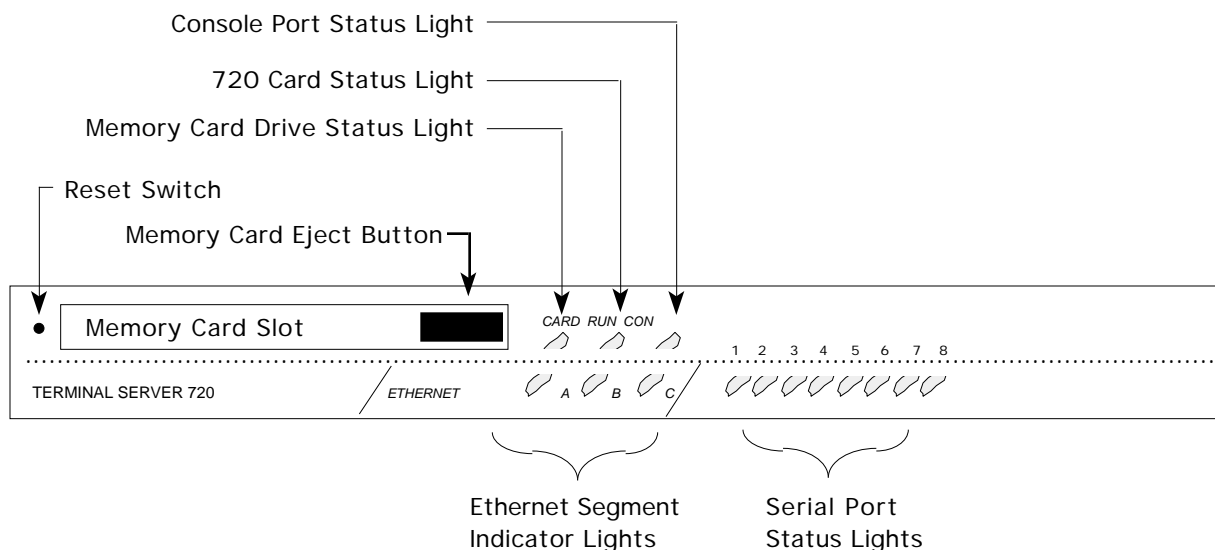


Figure D-2. Reset Switch Location

4. Press the RESETE button again. The terminal server begins its Self Test, as described in Section D.3.
 - If the Terminal Server 720 detects an error, the front panel lights illuminate as described in Section D.3. This error sequence continually repeats until the error is corrected or you power off the terminal server. During this time, no data is exchanged over the Ethernet cable or server ports.
 - If the Terminal Server 720 does not detect an error, it will begin loading software from the Memory card or the request a network load (if no Memory card is present). Once loaded, the Terminal Server 720 resumes normal operations.

D.6 If the Ethernet Segment (A, B, or C) Light Is Out

When the Ethernet Segment (A, B, or C) light on the terminal server front panel is ON, the server is communicating with the network. If you are unable to communicate with the network and the Ethernet Segment (A, B, or C) light is not ON, check the following:

- Make sure that the Ethernet transceiver cable, 10Base-T network cable, or FOIRL cable is securely connected to the I/O module connector (LIC, bridge, or 10Base-T/10Base-F interface) for the midplane LAN Ethernet segment.
- There may be a problem with the network segment itself. Check whether any other devices connected to that network segment are experiencing communications problems.
- Check whether a diagnostic code is being displayed on the front panel lights (indicating a terminal server hardware or software error).

If none of these checks indicate a problem and the Ethernet (A, B, or C) light is still not ON, call Xyplex Customer Support at 1-800-435-7997 (U.S.A) or +508-264-9903 (International).

D.7 Server Problem Analysis

Following is a list of problems you might encounter with the terminal server. The list includes descriptions of correct operations and possible solutions:

Problem: While loading from the network, no messages appear after you type several RETURNS. (Note that when the Terminal Server 720 is loading from a Memory card, you do not see any messages, and cannot access the terminal server.)

Correct Operation:

The port normally autobauds to the correct baud rate when you press several RETURNS. Once a port speed has been selected, the port light illuminates (see Figure 2-2). In the first 20 seconds after power up, the server runs the self tests and does not respond to the RETURNS. Twenty seconds after power up, however, the port displays a message in response to a RETURN. (Note: you can disable the messages using the Initialization Configuration Menu.)

Possible Solutions:

You may have disabled message display using the Initialization Configuration Menu. This does not prevent the unit from loading. If you want to see the messages, use the Initialization Configuration Menu and enable the messages again.

Determine whether the port is receiving characters properly. Type several RETURNS and make sure the PORT light is ON steadily. This indicates that the Terminal Server 720 has received characters and selected a communication speed. The port will autobaud for port speeds between 75 and 38.4K bps. If your device is set to a higher port speed, manually select a speed and disable autobauding.

If the port is receiving characters, the Terminal Server 720 might have autobauded to the wrong speed. Press the BREAK key to re-initialize the autobaud sequence, then type several RETURNS.

If the port is not receiving characters, a cable or device problem may exist. Try changing the type of cable used (e.g., change from straight-through to crossover). Note that a Terminal Server 720-to-DTE device configuration requires a crossover cable connection. Refer to Chapter 3 for cable descriptions.

Problem: You are trying to load from a memory card and the CARD light does not go ON.

-- or --

You are trying to load from a memory card and the CARD light goes ON and then OFF quickly.

Correct Operation:

The CARD light should illuminate for approximately 15 seconds when the Terminal Server 720 loads software from a Memory card.

Possible solutions:

If the CARD light does not go ON, make sure that the card is inserted properly. Also, make sure that the Terminal Server 720 is configured to load from the Memory card, using the Initialization Configuration menu. (Refer to Appendix C.) By default, a Terminal Server 720 is configured to load from the card; however, someone might have changed this setting.

If the CARD light goes ON and then OFF quickly during loading, either the card is not a validly formatted card or it does not contain the correct files in the correct location. After the Terminal Server 720 has been loaded (either from the network or from another memory card) and is running, check the card for files using the SHOW MANAGER FILES command.

Problem: The Terminal Server 720 does not appear to load from the network, or is slow to load from the network.

Correct Operation:

The load server downloads a software image and (optionally) parameters to the Terminal Server 720, over the network, whenever the unit is powered on or re-initialized.

The terminal server should load within two minutes after power up if it is properly configured on a load server. The RUN light flashes rapidly (3 times per second -- 3 Hz) after successful completion of the self tests. During the software loading process, the terminal server sends help messages to any terminal attached directly to one of the serial ports. Be sure to type RETURNS continually -- first to autobaud the terminal speed, and then to receive an updated message with each RETURN you enter.

After the software and (optionally) parameters have been downloaded from the load server, the RUN light should blink once every second. Then, if you type several RETURNS at a terminal connected to any serial port, the following message should appear:

```
Welcome to the Xyplex terminal server.
```

```
Enter username>_
```

Possible Solutions:

The Terminal Server 720 generates several messages during the load process, which can help you resolve loading problems. To see the messages, press RETURN several times at a terminal connected to a serial port, when the unit begins the loading process. (When you do this, the serial port adjusts to the communication speed of the terminal. This process is called "autobauding". The port will autobaud for port speeds between 75 and 38.4K bps. The port light should go ON when you press RETURN.

It is possible to disable display of the loading messages using the Initialization Configuration Menu. This does not prevent the unit from loading. If you want to see the messages, use the Initialization Configuration Menu and enable the messages again.

If you type CTRL-T now, the unit will display the load server offer table when it receives load offers. (Only one CTRL-T is required.)

Refer to the following message descriptions for assistance in correcting loading problems. Note that each RETURN generates a single message. You must press RETURN every 5 - 10 seconds to receive updated messages. Also, if the load process takes place very quickly, you might miss some of the messages.

1. A message similar to the following one appears for approximately 10 seconds after the self tests complete.

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Initializing...
```

2. A message similar to the following one is displayed while the server is waiting for a response to the load request. If this message does not appear after you type several RETURNS, the Terminal Server 720 could be at fault. Call Xyplex Customer Support at 1-800-435-7997 (U.S.A) or +508-264-9903 (International).

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Requesting network load service
```

This message stops when a service offer is received. If the message remains displayed for more than 20 to 60 seconds after you type several RETURNS (20 seconds for each for each load/dump configuration that you have enabled; there is no indication that the unit is trying another load/dump configuration), either the Terminal Server 720 is not configured on a load server, or it cannot communicate with a load server. Check that the Terminal Server 720 is in the RUN state and that the Ethernet transceiver cable, 10Base-T network cable, or FOIRL cable is properly installed. If necessary, install software on a load server using the procedures described in the *Software Installation Guide* supplied with your software kit.

3. A message similar to the following one is displayed if the Terminal Server 720 has received a load offer from a load server:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Evaluating service offers
```

If you typed a CTRL-T after "autobauding" your terminal, messages similar to these will appear when the unit has stopped accepting load offers:

Received load service offers:

Host Address	protocol	merit	filename
xx-xx-xx-xx-xx-xx	0809	9C000037	XPCSRV20

One to ten load server addresses are displayed (typically, just one). The Terminal Server 720 selects the load server with the highest merit value.

If you do not see this message, the load server may not be configured properly. If you have a VAX/VMS load server, you should make sure that the logical name "MOM\$LOAD" is defined properly. (Refer to the *Software Installation Guide* supplied with your VMS software kit.) If you have a UNIX load server, refer to section D.9 for more details on troubleshooting Internet loading problems.

4. When the Terminal Server 720 chooses a load server, a message similar to this one appears:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Loading over Link L1 from server xx-xx-xx-xx-xx-xx, message 0
```

Link L1 refers to the Ethernet transceiver cable, 10Base-T network cable or FOIRL cable; that is, the unit is loading via the LAN. If the message count remains at zero while you type RETURNS continuously, the load server was configured to load the Terminal Server 720, but encountered a problem with the load file or directory. Check the file name and directory at the load server.

5. After the Terminal Server 720 loads a file, it checks the contents of the file for proper identification and size. One of the following messages can appear if the Terminal Server 720 encounters a file problem:

```
Server xx-xx-xx-xx-xx-xx; File error: not a load file.
```

This message type appears if the load server attempted to load a file that is incompatible with the Terminal Server 720. (The load file did not have a Xyplex ASCII identification string header.) This can happen if, for example, the file is a DECserver 200 load file.

```
Server xx-xx-xx-xx-xx-xx; File error: corrupted data.
```

This message type indicates that the load server attempted to load a file that is compatible with the Terminal Server 720, but the file has been corrupted. Correct this problem by installing a new file in the load server. Refer to the *Software Installation Guide* supplied with your software kit.

```
Server xx-xx-xx-xx-xx-xx; File error: not executable.
```

No 680xx CPU identifier appears in the file header. This is a Xyplex file, but it cannot be executed by the unit. Resolve this problem by installing the proper file in the load server. Refer to the *Software Installation Guide* supplied with your software kit.

```
Server xx-xx-xx-xx-xx-xx; Timed out, will retry.
```

This message type indicates that the Terminal Server 720 gave up waiting for the load server to send a load file image. When this happens, the server restarts the load request process. If the message count was not zero, and the "timed out" message was displayed, it is possible that your network experienced communication problems. Note that if there is no progress of the message count number beyond zero, a load server problem exists. A network or host problem probably exists if the message count remains stuck at a number other than zero.

6. If a failure occurs during the load process, the server will abort the load process and send a small dump file (approximately 60 bytes) to a server that is configured to accept a dump file. Sometimes, the dump file, when analyzed by Xyplex, will provide information that is useful in resolving the problem. Call Xyplex Customer Support at 1-800-435-7997 (U.S.A) or +508-264-9903 (International).

The Terminal Server 720 uses the same algorithm for the dump server as for selecting the load server. Normally, messages similar to these appear:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Requesting dump service
```

This type of message is displayed while the Terminal Server 720 waits for a response to its dump request. If this message remains displayed for more than 30 seconds after you type several RETURNS, the terminal server is not configured on a dump server, or it cannot communicate to a dump server.

7. A message similar to the following one is displayed if the Terminal Server 720 received a dump offer from a server.

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx, port x  
Evaluating dump service offers
```

If you typed a CTRL-T after a port speed had been selected, messages similar to these will appear when the unit has stopped accepting dump service offers:

```
Received dump service offers
```

Host Address	protocol	merit	filename
xx-xx-xx-xx-xx-xx	0809	9C000037	

8. The Terminal Server 720 selects the dump server with the highest merit value. If two or more dump servers have the same merit value, the Terminal Server 720 will select the first dump server listed.

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx, port x  
Maintenance dump over Link L1 to 08-00-2B-05-8B-78, message 0
```

Link L1 refers to the Ethernet transceiver cable, 10Base-T network cable or FOIRL cable; that is, the server is dumping via the LAN. If a failure occurs during the dump process, the Terminal Server 720 will abort the dump and attempt to dump to the next dump server, until the dump server list is exhausted. After the dump process completes, the Terminal Server 720 selects the load server with the next highest merit value on the load offer list. If the load list is exhausted, the Terminal Server 720 will restart the loading process.

9. If the Terminal Server 720 is configured to load parameters from the network (rather than on the memory card), the unit requests a parameter file from the parameter server¹. If a parameter file is not sent from the server, the Terminal Server 720 will wait indefinitely for the parameter file.

The following message types can be generated during the parameter file load sequence. The process is similar to the load process:

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Requesting parameter load service
```

A message similar to the preceding one is displayed while the Terminal Server 720 waits for a response to the parameter load request. If this message remains displayed for more than 5 seconds after you type several RETURNS, the Terminal Server 720 is not configured on a load server for parameter load service. Refer to the *Software Installation Guide* supplied with your software kit.

```
Terminal Server, Type 76, Rev x.xx.x
Ethernet address 08-00-87-xx-xx-xx, port x
Loading parameters over Link L1 from server xx-xx-xx-xx-xx-xx,
message 0
```

Link L1 refers to the Ethernet transceiver cable, 10Base-T network cable, or FOIRL cable; that is, the server is loading parameters via the LAN. If the message count remains at zero after you type several RETURNS, the load server is properly configured, but does not have a defined parameter file.

¹ By default, the Terminal Server 720 loads its runtime parameters from the memory card. However, you can configure the unit to load parameters from a network parameter server, or from either a card or a network parameter server, using the Initialization Configuration menu. The Configuration menu is described in Appendix C.

Problem: One of the following messages is displayed:

Unknown error, will retry.

Internal error or unexpected MOP loader message.

Network boot, restarting.

The load process was rebooted by the load server. This is not an error indication unless it keeps repeating.

Bad MOP transfer address.

Transfer address was outside of legal memory range. The DEC MOP protocol attempted to transfer the server CPU to an address that is not supported by the terminal server.

Bad transfer address.

Execution address pointer was outside of legal memory range.

Load address range error.

Load image extended outside of legal memory range.

Correct Operation:

These messages should only occur during the network loading process, and only after the port speed has been selected. With the exception of the "Network boot, restarting" message, you should not receive any of the preceding messages.

Solution:

Call Xyplex Customer Support at 1-800-435-7997 (U.S.A) or +508-264-9903 (International).

D.8 Overview to Troubleshooting Internet Loading Problems

Following the software installation, you should attempt to initialize all units so that they load the new release of software. If you are using a UNIX host for a load server, and the loading process fails, the most likely reasons are:

1. BOOTP or RARP is not properly configured or are not running at the UNIX load host.
2. TFTP is not properly configured or is not running at the UNIX load host.
3. There is a problem with UNIX file protections or ownership for either the load image or the parameter file.

The fastest way to identify the cause of the loading failure is to initialize a unit which has a terminal connected to a serial port, wait until it passes self-test diagnostics, and then repeatedly press the RETURN key in order to observe the messages that are displayed during the loading sequence. You can then isolate the loading problem by observing how far the unit gets in the loading process. The following is a description of the messages you will see during the loading process, and a description of the problem you may have encountered. Sections D.9 through D.12 describe how to resolve the specific problems you may encounter.

- a. After you initialize the unit, and it completes self-test diagnostics, press the RETURN key, once every few seconds. You will observe a message similar to the following one:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx Port 1  
Initializing...
```

This message appears for approximately 10 seconds.

- b. Next observe a message similar to the following one:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx Port 1  
Requesting network load service
```

The last line changed. This message lasts for approximately 20 to 80 seconds (20 seconds for each load/dump configuration you have enabled; the message stops when a service offer is received).

- c. Next observe a message similar to the following one:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx Port 1  
Evaluating service offers
```

If you don't observe this message, after the 80 second period (mentioned in step b) has elapsed, the most likely reason for loading failure is that BOOTP or RARP is not properly configured for loading the unit or it is not running at the UNIX host. Refer to section D.9 or D.10 to troubleshoot this problem.

d. Next, observe several messages similar to the following:

```
Terminal Server, Type 76, Rev x.xx.x  
Ethernet address 08-00-87-xx-xx-xx Port 1, IP address 192.12.119.26  
Loading file /XYPLEX/xpcsrv20.sys  
Loading over Link L1 from server UNIXHOST, IP address 192.12.119.20, message 0
```

(Your unit's Internet address, load file name, and load server name and Internet address will be different.) This message indicates that the unit has been informed by the host of its Internet address (i.e., BOOTP or RARP is running), and which load image it will receive. If the unit subsequently times out, without getting to any additional loading messages, either TFTP is not configured or running at the load host, or there is a problem with the file protections for the load images at the UNIX host. Refer to sections D.11 and D.12 to troubleshoot these problems. If the unit subsequently crashes, the most likely cause is that it is attempting to load the wrong image.

e. Following the completion of the above messages, the welcome message or logon prompt for the unit is displayed. You have successfully loaded the unit.

D.9 Troubleshooting RARP Problems

Use the following procedure to determine if RARP is properly configured and running at the UNIX host:

Verify that the rarp daemon (rarpd) is running. Use the command:

```
% ps -aux | grep rarpd
```

Look for rarpd in the right hand column of the resulting display. Figure D-3 shows the display on a SUN Workstation.

```
% ps -aux | grep rarpd  
root      258  0.0  0.0   56   0 ?  IW   Sep 10 0:00  /urs/etc/rarpd le0 unixhost  
sysmgr   1620  0.0  2.9   40  200 p3  S    17:05   0:00  grep rarpd
```

Figure D-3. Example ps Display.

If rarpd is not running, the only process that you will see listed will be the "grep rarpd" process. If the display indicates that rarpd is not running, restart the rarp daemon manually, or reboot the system. To start rarpd manually, you will need to know the name of the Ethernet interface. Use the command:

```
% netstat -i
```

Figure D-4 shows an example of the resulting display.

```

% netstat -i
Name Mtu Net/Dest Address Ipkts Ierrs Opkts Oerrs Collis Queue
le0 1500 192.12.119 unixhost 309494 2 62698 0 1014 0
lo0 1536 loopback 127.0.0.1 487350 0 487350 0 0 0
%

```

Figure D-4. Example netstat Display.

Check the left hand column of this display for the name(s) of the available interface(s). Then, start rarpd. For example, on a SUN Workstation, to start rarpd you would use a command in the form (check the documentation supplied with your UNIX system for the correct command):

```
% /usr/etc/rarpd interface-name `hostname`
```

where *interface-name* is the name of the Ethernet interface obtained from the netstat display, and `hostname` specifies to the rarp daemon that it must translate this variable to use the correct node name. Make sure that you use back quotation marks in `hostname`. In the above example, you would type the command:

```
% /usr/etc/rarpd le0 `hostname`
```

If it still does not appear that RARP is working properly, check the entries in the files /etc/ethers and /etc/hosts. (The /etc/ethers file lists Ethernet addresses and host names, but not Internet addresses. The /etc/hosts file lists Internet addresses and host names, but not Ethernet addresses.) These files allow RARP to translate the request for an Internet address from the Ethernet address supplied by the unit. RARP looks up the Ethernet address in /etc/ethers file to obtain a host name, then uses the UNIX function gethostbyname() to obtain the Internet address which it sends back to the requesting unit.

What gethostbyname() actually does is dependent on host configuration. If you are not running a name server, gethostbyname() simply looks up the name in /etc/hosts. If you are using a domain name server, gethostbyname() makes the request to the domain name server (and usually will fall back to the /etc/hosts file if it does not receive an answer). If you are running NIS, gethostbyname() makes the request to the NIS system.

When using NIS (or any other name server), you generally have one host configured to be the name server for the entire network, and you only add names on that host. NIS has a set of utilities for updating the NIS database. (Read the MAN page on ypmake for more information.) A problem will occur when the /etc/hosts file is updated, but the NIS have not been notified of the changes (so when rarpd called gethostbyname(), NIS will not answer).

A sample entry in the /etc/ethers file for a Sun system would look like:

```
08:0:87:0:12:9a my-server
```

The name "my-server" has a matching entry in the /etc/hosts or /etc/rc.hosts file. A sample entry in the /etc/hosts file for a Sun system would look like:

```
192.12.119.18 my-server
```

For further information, refer to the documentation supplied with your UNIX operating system.

D.10 Troubleshooting BOOTP Problems

Use the following procedure to determine if BOOTP is properly configured and running at the UNIX host:

Verify that BOOTP is running. Use the command:

```
% netstat -a
```

Figure D-5 shows an example of a portion of the resulting display on a Sun Workstation. Look for a line that lists *.bootps. If this line is not listed, BOOTP may not be configured.

netstat -a					
udp	0	0	*.bootps	*.*	LISTEN
udp	0	0	*.tftp	*.*	LISTEN

Figure D-5. Example netstat -a Display.

To verify that BOOTP is configured, check the /etc/services file for a BOOTP entry. Use the command:

```
% grep bootp /etc/services
```

For example, on a Sun Workstation, this entry will look like:

```
bootp 67/UDP
```

If there is no entry in the etc/services file, add one. If there is an entry, check for a bootp entry in the /etc/inetd.conf file. Use the command:

```
% grep bootp /etc/inetd.conf
```

There should be a line in the /etc/inetd.conf file which contains bootp in it, and that is not treated as a comment (# is the comment character). For example, on a Sun Workstation, this entry will look like:

```
bootp dgram udp wait root /usr/etc/in.bootpd in.bootpd -s
```

If there is no entry for bootp in the /etc/inetd.conf file, add one. If there is an entry, but it begins with the comment character, remove the character.

For further information, refer to the documentation supplied with your UNIX operating system.

D.11 Troubleshooting TFTP Problems

Use the following procedure to determine if TFTP is properly configured and running at the UNIX host:

To verify that TFTP is properly running at the load server, you will use TFTP to get a file from the TFTP home directory. To do this, first change to a directory other than the directory where the load images and parameter files are stored. For example:

```
% cd /usr
```

Then type a command of the form:

```
% tftp load-server-internet-address
```

where *load-server-internet-address* represents the Internet address of the host where the load images and parameter files are located (you can do this from the same host). TFTP will respond with a tftp> prompt. At the prompt, type the command:

```
tftp> get tftp-home-directory/default.dmp
```

If the get operation is successful, then TFTP is configured properly on the UNIX load server host. (You can delete the copied default.dmp file.) If the get operation is not successful, try to get another file (for example, /etc/inetd.conf) to see if the problem is with the way TFTP is configured, or if there is simply a problem with the ability of TFTP to locate or access files from the TFTP home directory. (If the second get operation is not successful, then TFTP is not configured properly on the load server.)

To verify that TFTP is configured, check the /etc/services file for a TFTP entry, using the command:

```
% grep tftp /etc/services
```

For example, on a Sun Workstation, this entry will look like:

```
tftp 69/UDP
```

If there is no entry in the etc/services file, add one. If there is an entry, check for a tftp entry in the /etc/inetd.conf file. Use the command:

```
% grep tftp /etc/inetd.conf
```

There should be a line in the /etc/inetd.conf file which contains tftp in it, and that is not treated as a comment (# is the comment character). For example, on a Sun Workstation, this entry will look like:

```
tftp dgram udp wait root /usr/etc/in.tftpd in.tftpd -s /tftpboot
```

If there is no entry for `tftp` in the `/etc/inetd.conf` file, add one. If there is an entry, but it begins with the comment character, remove the character. If there is an entry that does not begin with the comment character, the most likely problem is with the location, file protection or file ownership for the directory which contains the load images and parameter files. Refer to section D.12 to troubleshoot this problem.

D.12 Troubleshooting TFTP Directory or File Problems

TFTP directory and file problems generally fall into the following categories

- files located in an incorrect directory (pathname),
- directory not properly specified
- incorrect file permissions
- incorrect file ownership

Section 3.2.4 of the *Software Installation Guide* for Unix Load Servers describes how to identify the correct TFTP home directory. Use the following guidelines to troubleshoot the remaining problems:

Directory Not Properly Specified

Some secure TFTP implementations require a leading back-slash (`/`) character for the name of the TFTP home directory. If your implementation requires this, check the pathname specified in the Initialization Configuration Menu for Directed TFTP load requests, or check the directory pathname in the `/etc/inetd.conf` file for the correct path.

File Permission

All load images and parameter files must have read permissions. Parameter files must also have write permissions, so that TFTP can store any changed permanent parameters. Load images are usually copied off the distribution media with the correct permissions. Parameter files (and their corresponding backup files), however, are a copy of a default file that is on the media. When you create a default parameter file and backup parameter file for a unit, the new files may not have the correct permissions, so you may need to manually assign the correct permissions. Use the following command to make sure the parameter files and backup files have read and write permissions:

```
% chmod 666 *.prm *.bck
```

For RARP loading, make sure that all unit-specific load image names have the correct file permissions. Use the commands:

```
% chmod 444 x*.img
```

File Ownership

It is also important to understand the file ownership requirements for files that will be loaded via TFTP. Typically, TFTP implementations require that all files in the TFTP home directory have the same owner as the TFTP daemon (tftpd) in order for TFTP to have access to the files. For example, while many implementations require the files to be owned by root, on Sun Workstations the default owner is the special user id "nobody (-2 -2)".

To determine if there is a file ownership problem, check the owner of the files with the command:

```
% ls -la
```

If the owner of the file does not match, use the `chown` command on the directories to make their owner whatever tftp is running as (e.g. - "nobody"). For example, on a Sun Workstation you would use the command:

```
% chown nobody *.img
```

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