MUXserver 100 Network

Reference Manual

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PREFACE

The *MUXserver 100 Network Reference Manual* presents information needed to set up, manage, monitor, and troubleshoot the MUXserver 100 and remote DECmux II. For information about routine operation of the MUXserver 100 remote terminals, refer to the *MUXserver 100 User's Pocket Guide.*

This guide is intended for anyone who is responsible for maintaining and managing a MUXserver 100 Remote Terminal Server. In this guide, that person is the server manager.

This guide is composed of the following sections:

Chapter 1	provides an overview of the MUXserver 100 and of the server managers environment.
Chapter 2	provides in-depth information on using the MUXserver 100 commands to set up the server, and the composite links and remote ports of the DECmux II units.
Chapter 3	discusses the MUXserver 100 commands you use to manage and monitor the server, DECmux II units, and remote ports.
Chapter 4	contains a troubleshooting guide for the MUXserver 100, DECmux II units, composite links and remote ports.
Chapter 5	contains a complete alphabetical reference of the MUXserver 100 commands.
Chapter 6	contains a complete description of the DECmux II commands.

Chapter 7 outlines the diagnostic tests available on the MUXserver 100 and the DECmux II unit.

Chapter 8 contains the specification for both the MUXserver 100 and the DECmux II unit.

Appendix A provides a listing and explanation of all MUXserver 100 status and error messages except those relating to the communications processor (that is, those relating to the composite communications links).

Appendix B provides a listing and explanation of the status and error messages for the communications processor in the MUXserver 100 and the DECmux II unit.

RELATED MUXSERVER 100 REMOTE TERMINAL SERVER DOCUMENTS

- *MUXserver 100 VMS/MicroVMS Software Installation Guide*

  Describes the installation and configuration of the server software or VMS/MicroVMS systems.

- *MUXserver 100 User's Pocket Guide*

  Summarizes the MUXserver 100 remote terminal user's environment.

- *MUXserver 100 Network Installation Manual*

  Describes environmental requirements and installation for both the MUXserver 100 and the DECmux II units.

- *MUXserver 100 Network Identification Card*

  Contains identification information entered by the hardware installers, system managers, and the network manager.

- *LAT Network Manager's Guide*

  Discusses the Local Area Transport (LAT) architecture, the LAT Control Program (LATCP), and network troubleshooting.

CONVENTIONS USED IN THIS GUIDE

Convention	Meaning
UPPERCASE	Uppercase in commands and examples given indicates that you should enter the characters as shown (enter either uppercase or lowercase).
[]	Square brackets indicate that the enclosed text is optional. If there is more than one option, you can choose one and only one of the options. Do not type the brackets when you enter the command.
{}	Braces indicate that the enclosed text is required and you must choose one and only one of the options. Do not type the braces when you enter the command.
<KEY>	Indicates that you should press the specified key. <CTRL/X> indicates that you should press the <CTRL> key at the same time as the <x> key, where x is a letter. Note that unless otherwise specified, every command line is terminated by pressing the <RET> key.

All numbers are decimal unless otherwise noted. All Ethernet addresses are given in hexadecimal.

NOTE

Generally you can abbreviate command keywords to the first three characters or the number of characters that make the keyword unique.

NOTES, CAUTIONS, AND WARNINGS

Where notes, cautions, and warnings are used in this document, they highlight specific types of information as follows:

NOTE	Calls attention to information in text that may be of special importance.
CAUTION	Calls attention to information in text essential to avoiding system or equipment damage.
WARNING	Calls attention to information in text essential to the safety of personnel.

FCC USER STATEMENT

NOTICE:

This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC rules, which are designed to provide reasonable protection against such radio frequency interference. Operation of this equipment in a residential area may cause interference in which case the user at his own expense will be required to take whatever measures may be required to correct the interference.

CHAPTER 1
THE MUXserver 100 ENVIRONMENT

1.1 GENERAL INFORMATION

The MUXserver 100 is a high performance, low-cost remote terminal server for use on an Ethernet Local Area Network (LAN). It allows up to sixteen terminals to connect to computer systems on the Local Area Network. The terminals are physically connected to two DECmux II units which may be at separate remote geographic locations. Each DECmux II unit communicates with a MUXserver 100 by means of a statistically multiplexed synchronous link (referred to as the COMPOSITE link) which is provided by either an RS-232 Synchronous Modem for large distances or RS-422 Long Line Drivers for local links. Each remote terminal appears to have direct connection to the computer systems and resources available on the Local Area Network. Remote users can switch among several data processing tasks as quickly and conveniently as local terminal users connected by means of a DECserver 100.

Figure 1-1 shows how the MUXserver 100 fits into a computer network called a Local Area Network (LAN). Local area networks serve relatively small areas; ranging, for example, from a section of a building to a college campus. Users remote from the LAN can now access all the LAN facilities.

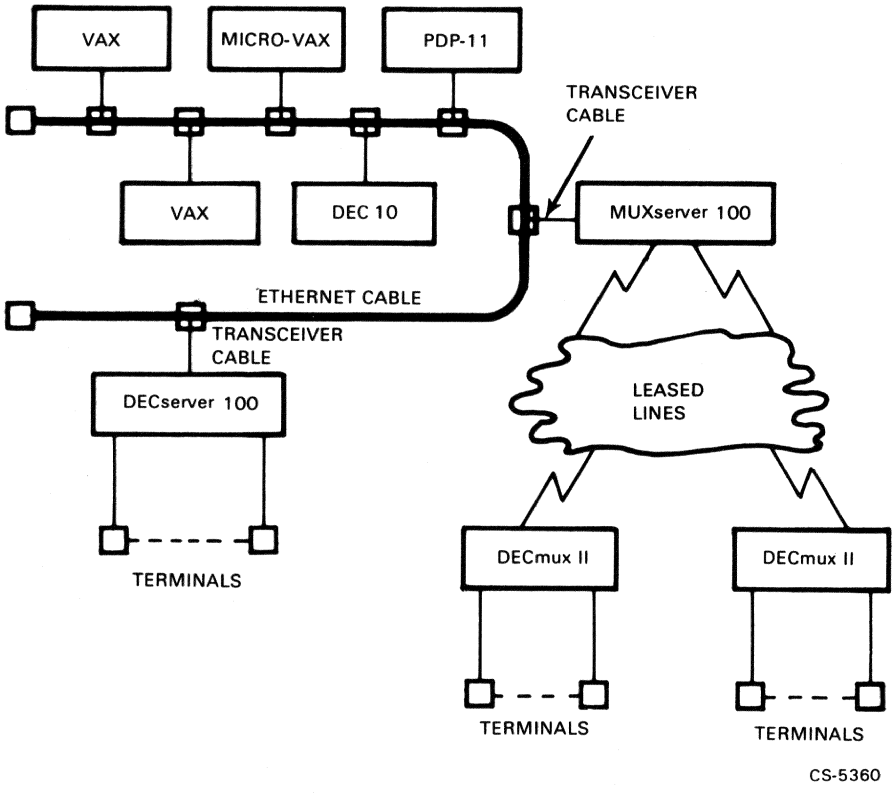

Figure 1-1 Local Area Network (LAN)

1.2 LOCAL AREA NETWORKS AND THE LAT ARCHITECTURE

The individual computers on the LAN are called network nodes. The MUXserver 100 and the nodes it communicates with must support the Local Area Transport (LAT) architecture. The LAT architecture manages the sessions that the MUXserver 100 establishes between its remote terminals and network nodes.

Support of the LAT architecture requires that LAT software reside on both the MUXserver 100 and on the nodes with which it interacts. The LAT software that resides on the MUXserver 100 is called server software. The server software is down-line loaded to the server from one of the nodes on the network. The LAT software residing on the other LAT nodes is the service node software, so called because it resides on nodes that provide services to MUXserver 100 terminal users.

To down-line load the server, a system manager first installs the server software on an Ethernet node which supports the Digital Network Architecture (Phase IV). That node is then a load host. When power is applied to the MUXserver 100, the load host down-line loads the software over the network to the server. The MUXserver 100 INITIALIZE and RESTART commands also generate a down-line load.

System managers can install the server software on a number of load hosts. DIGITAL™ recommends that the network manager establish a minimum of two load hosts on every LAT network, with at least one load host for every ten MUXserver 100 units on larger networks.

1.3 WIDE AREA NETWORKS AND STATISTICAL MULTIPLEXERS

As shown in Figure 1-1, the terminals at the remote site connect directly to DECmux II statistical multiplexers which communicate over composite links by means of the leased lines to the MUXserver 100 on the LAN. The interface to the leased lines being by means of suitable modems. This wide area network gives remote users access to LAN facilities from any geographic location which has access to the leased lines.

1.3.1 Statistical Multiplexing

The DECmux II unit and MUXserver 100 use a statistical multiplexing technique for communication that allocates time to each data channel in relation to how much time the channel needs. Unlike the simplest form of time division multiplexing, where time slots are allocated to channels irrespective of whether data is ready for transmission or not, with statistical multiplexing, no time slots go empty unless all communications are complete.

A typical transmission from terminals connected to a DECmux II unit to a computer system on the LAN is as follows.

1. At random intervals, data from the terminals arrive at the asynchronous ports of the DECmux II unit. The data words may be at various baud rates, and may have odd, even, or no parity bits.
2. The DECmux II unit receives the characters, discards all the start, stop, and parity bits, and stores the data in a buffer.
3. Using a protocol that is understood by the DECmux II unit and MUXserver 100, the DECmux II unit determines how much data to take from each incoming data channel.
4. The DECmux II unit places the data into the information field of a high level data link control (HDLC) frame, as specified by HDLC (see Figure 1-2).
5. The DECmux II unit sends the HDLC frame over the communications line to the MUXserver 100 connected to the LAN.
6. The MUXserver 100 recovers the data from the HDLC frames (that is, demultiplexes it) and transfers it to the appropriate node on the LAN using the CSMA/CD Ethernet Protocol.

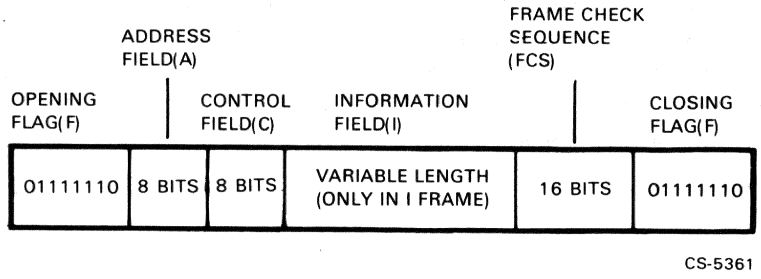

Figure 1-2 HDLC Frame Format

1.3.2 Composite Links

The 'composite link' is the communications mechanism between the DECmux II and the MUXserver 100 or between two DECmux II units. The composite link may use the Public Data Network and, as such, will be configured as an RS-232 synchronous link by means of modems. Short haul links not using the Public Data Network can be configured as either Synchronous RS-232 Null Modem lines (for distances less than 50 feet (15 meters)) or as Synchronous RS-422 long line driver connections (for distances less than 3280 feet (1 kilometer)). In either configuration, the composite link is transparent to the remote asynchronous terminal user. Link speeds ranging from 1200 baud to 19.2 K baud are selectable for RS-232-C, with up to 38.4 K baud for RS-422.

1.3.3 Multiplexer Configuration

Figure 1-3 and Figure 1-4 show the default configurations available on the MUXserver 100. The MUXserver 100 determines which configuration is used by monitoring the 'composite link' connections at power up. Both Figure 1-3 and Figure 1-4 show the composite links being provided as RS-232 MODEM connections, which are the Default Factory Settings. To change any of the composite links to RS-422 or to vary link speed, the MUXserver 100 and each DECmux II unit must be individually set up. See Chapter 2, Section 2.5 (SETTING UP THE COMPOSITE LINK PARAMETERS).

The maximum multiplexer configuration supported by the MUXserver 100 is two DECmux II units giving a total of 16 remote asynchronous terminals. A partial configuration consisting of only one DECmux II (eight remote terminals) connected to either Port A or Port B of the MUXserver 100 is also valid.

The choice of multiplexer configuration greatly depends on the geographic location of the remote users. Some factors which may influence the selection are:

1. If all 16 remote users are at one site, Figure 1-4 should be used with the composite link between the two DECmux II units being either RS-232 Null Modem (for distances less than 50 feet (15 meters)) or RS-422 long line drive (for distances less than 3280 feet (1 kilometer)). This provides the least cost implementation avoiding additional modems, leased lines, and so on.

2. For separate remote sites, where MODEM connections are required for each composite link, Figure 1-3 is recommended. This ensures the best response time for users by limiting the number of asynchronous channels multiplexed on any one composite link to eight.

In any network involving the MUXserver 100 and one or two DECmux II units, the MUXserver 100 must be the MASTER (this is the default setting), and the two DECmux II units must be SLAVES (this is also the default setting). If either DECmux II unit is set to MASTER mode, communications between the MUXserver 100 and that DECmux will fail.

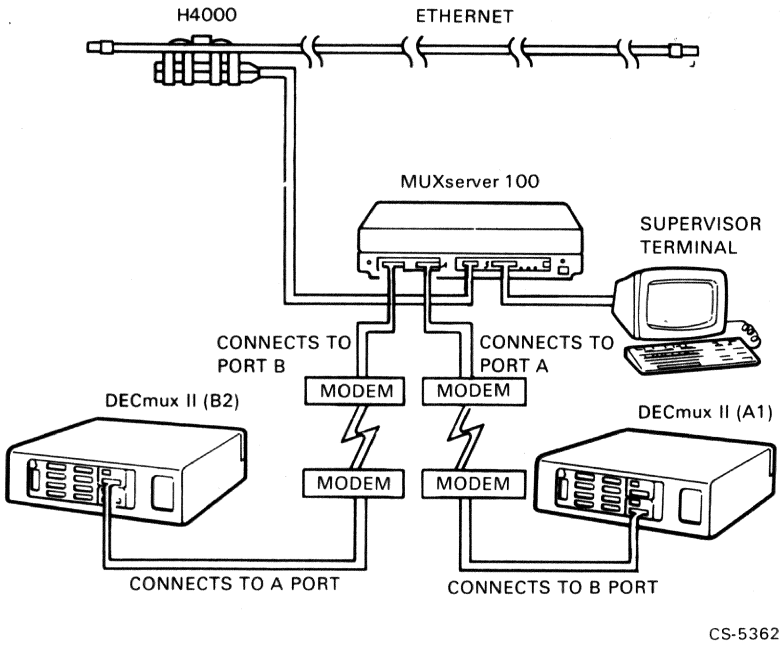

Figure 1-3 Default Multiplexer Configuration No. 1

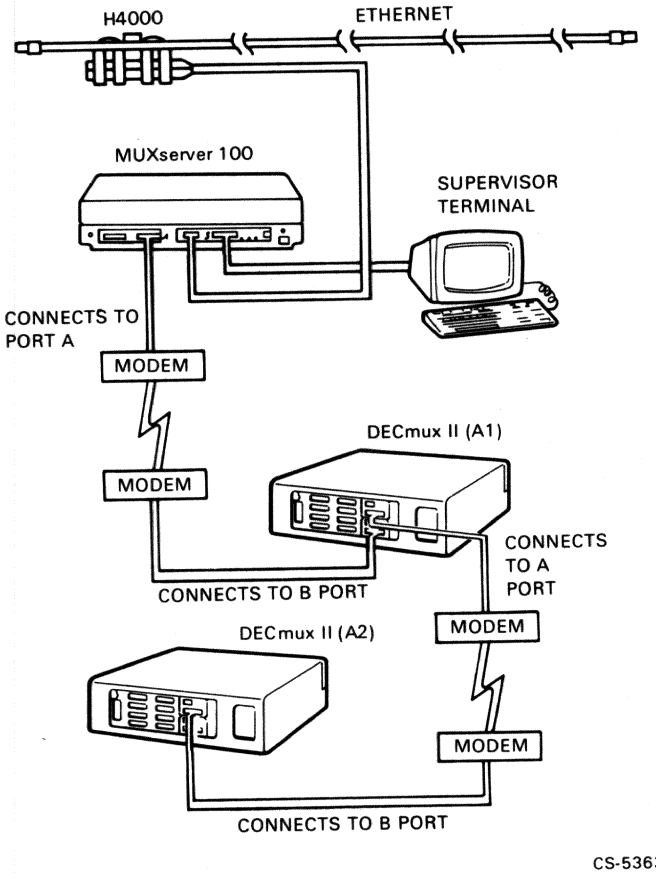

Figure 1-4 Default Multiplexer Configuration No. 2

1.3.4 Asynchronous Ports - Mapping

MAPPING is the concept used to define asynchronous logical links. The default settings for the multiplexer configurations shown in Figure 1-3 and Figure 1-4 has all 16 asynchronous lines connected to the MUXserver 100 and hence the LAN. The functional flexibility of the MUXserver 100 and the DECmux II unit allows for other logical asynchronous link combinations.

Using the 'MAP' command, the network manager can establish logical connections other than the default settings outlined above. For example, asynchronous ports on the first DECmux II unit can be mapped to make logical connections to a similar number of asynchronous ports on the second DECmux II unit. The remaining ports on the two DECmux II units will still be mapped and connected to the MUXserver 100 and the LAN. See Chapter 5, Section 5.16 (MAP) for details of the MAP command.

1.4 THE SERVER MANAGER ENVIRONMENT

The server manager is the person responsible for the operation of the MUXserver 100, the DECmux II units, the composite link communication links, and the remote asynchronous terminals.

As the server manager, you can make certain that each terminal user has ready access to the network services he or she requires.

Four broad categories of tasks can be assigned to the server manager:

- Setting up the MUXserver 100, the DECmux II units and their network terminals.
- Managing the routine operations of the server DECmux II units and terminals.
- Monitoring the status and utilization of the MUXserver 100, composite links, DECmux II units, terminals, network nodes and Ethernet.
- Troubleshooting the MUXserver 100, DECmux II units, composite links and terminals.

1.4.1 The Supervisor Ports

The MUXserver 100 and the DECmux II units each have a separate Supervisor Port which provides access to the set up facilities of the network. These ports are intended for the exclusive use of the Server Manager to control, monitor and manage the server environment. Access to all supervisor functions are 'Password' controlled. On the MUXserver 100, the supervisor port can also be used as a standard terminal connection to the LAN. This facility does not exist on the DECmux II units.

The individual Supervisor Ports on the DECmux II units need only to be used in the following circumstances.

1. *When the composite link parameters are being changed from the default settings.* These parameters must be set so that each end of the link is compatible before communication is possible.

   Once this link is established, the 'supervisor' functions of the remote DECmux II units (*with the exception of diagnostic test* - see 2. below) are accessible to the server manager from the MUXserver 100 supervisor port, (that is, he can CONNECT to a remote DECmux II supervisor port. See Chapter 5, Section 5.5 (CONNECT)).

2. *Running Test Diagnostics.* Test diagnostics are provided in each DECmux II unit and the MUXserver 100 to expedite network maintenance. Running these tests disrupts network communications including the composite links.

   Test facilities for individual terminals are provided by the START TEST [PORT number] command from the MUXserver supervisor port without disrupting the network (see Chapter 5, Section 5.39 (START TEST)). However, to run the comprehensive diagnostics available in each DECmux II unit, connection to its local supervisor port is required.

3. *Remote access to the MUXserver 100 supervisor port.* The Server Manager may access the supervisor port of the MUXserver 100 from a remote site by first logging on to the DECmux II supervisor port (password controlled) then connecting to the MUXserver 100 supervisor port (also password controlled). This facility allows all the supervisor port 'Communications Commands' of the MUXserver 100 to be executed with the following exceptions:

- Test diagnostics; and,
- The CONNECT command. Once you are 'connected' to a remote supervisor port you must first 'disconnect' before 'connecting' to a second destination.

1.4.2 Privileged and Non-Privileged Commands

The supervisor port of the MUXserver 100 has dual functions. It can be used as a normal user terminal connected to the LAN and has access to the 'non-privileged' (LOCAL) commands available to all terminal users. A list of these commands is given in the 'HELP' command when entered in response to a LOCAL> prompt.

The second is a network management function which is password controlled and provides access to the 'privileged' commands required to set up, monitor and control the network. Access to the 'PRIVILEGE MODE' is restricted to the supervisor port of the MUXserver 100.

Access to the 'privileged mode' from the 'local' (or non-privileged mode) is gained by entering 'SET PRIVILEGE' in response to the LOCAL> prompt on the MUXserver 100 supervisor port. The system prompt in the privileged mode is still LOCAL>. A list of the commands available in 'privileged mode' is given in Chapter 5 and will be listed after entering 'HELP'.

NOTE

A sub-directory of privileged commands which specifically relate to the 'composite link communications' are accessible by means of the 'COMM' command. These commands are given in Chapter 5, Section 5.3 (COMMUNICATIONS), and are listed by entering HELP in response to the COM> prompt.

1.5 DATABASES ON THE MUXserver 100

Two databases are defined in MUXserver 100 memory: the permanent database, and the operational database. Both contain characteristics for the server and its attached terminals. The server software uses these characteristics to carry out its functions.

When a terminal user logs in, the permanent characteristics for that terminal are copied from the permanent database to the operational database. They then become the terminal's operational characteristics.

When you initialize the server, the permanent server characteristics are copied to the operational database. These characteristics are then the operational characteristics for the server.

When users modify port characteristics using the SET PORT command, these changes are only temporarily stored in the operational characteristics database.

The permanent database itself remains unchanged when terminal users log in and when you initialize the server. However, you can change the characteristics in the permanent database with the DEFINE PORT and DEFINE SERVER commands.

When the MUXserver 100 arrives at your facility, the permanent database contains the factory specified characteristics for the server and the terminals. They are copied to the operational database when you first install and initialize the server. After modifying the permanent database, you can restore the factory specified values by using the software reset procedure (refer to Chapter 2, Section 2.9 (SETTING CHARACTERISTICS TO FACTORY SPECIFICATIONS)).

1.6 THE TERMINAL USER ENVIRONMENT

The MUXserver 100 provides two modes of operation for the terminal user: local mode, and service mode.

1.6.1 Local Mode

In local mode you communicate directly with the MUXserver 100. The server software interprets your terminal input directly without transmitting it to a network node. Your terminal entries are assumed to be commands in the MUXserver 100 command set.

There are two kinds of MUXserver 100 commands: those intended for the terminal user, and those intended for the server manager.

The commands for the terminal user are non-privileged because they affect only the user's terminal. The user has non-privileged status.

The privileged commands for the server manager are only accessible from the Supervisor Port of the MUXserver 100 and are password controlled to avoid unauthorized access.

In local mode, the MUXserver 100 issues status and error messages in response to many commands. The messages appear on your terminal. All messages employ a standard format and describe the status or error in a brief comment. Appendix A lists each message with a more detailed explanation.

1.6.2 Service Mode

Service mode is an environment nearly identical to that of a terminal connected directly to a network computer system. Most terminal input and output is directed to and from a particular node on the local area network.

Three definitions are useful in discussing service mode:

- Service node - a network computer system to which MUXserver 100 remote terminal users have access.
- Service - a resource offered to MUXserver 100 remote terminal users by one or more service nodes. A service can be equivalent to a service node name or it can represent resources available from one or more service nodes.
- Session - the interaction between a terminal user and a service node.

Each terminal user can have up to six sessions in effect at the same time. One session is active and zero to five sessions are temporarily inactive. Commands such as BACKWARDS and FORWARDS (issued in local mode) allow the terminal user to switch among sessions.

This multiple session capability allows the terminal user to perform several tasks at once. For example, the user can be editing a report in one session, and then switch to another session to access file data for the report.

Typically, a terminal user spends most of his or her time in service mode using one or more service sessions.

As the server manager, you may also spend a considerable amount of time in service mode. The *MUXserver 100 User's Pocket Guide* furnishes details about access to service mode and about the terminal user's environment.

CHAPTER 2
SETTING UP THE MUXserver 100 AND ITS TERMINALS

This chapter contains the information you need to set up the MUXserver 100, the DECmux II units, and the remote terminals for routine operation.

Sections 2.2 and 2.3 show you how to set up the login and privileged passwords. Setup for the server is covered in Section 2.4, the composite link parameters in Section 2.5, setting up the network MAP in Section 2.6, and the port characteristics in Section 2.7. Sections 2.8 and 2.9 discuss initializing the MUXserver 100 and resetting characteristics to factory specifications.

When your MUXserver 100 and DECmux II units are initially installed, the factory specified values are in effect for the port characteristics, the server characteristics, the composite link parameters, and the passwords.

You use the information in this chapter to set up new values for the characteristics and the passwords. Then you initialize the server to make your setups operational.

Subsequent setups for the ports become operational when each terminal user logs in. Subsequent setups for the MUXserver 100, DECmux II units, and passwords take effect each time the server is initialized.

2.1 ENTERING PRIVILEGED STATUS

Privileged Mode operation is only available from the Supervisor Port of the MUXserver 100.

To begin setup, enter <RETURN> several times and type your name in response to the 'ENTER username >' prompt. This gives you access to the non-privileged mode and the LOCAL> prompt; then request privileged status to gain access to the privileged commands. Type the SET PRIVILEGED command. In response to the Password> prompt, type the privileged password. If your MUXserver 100 has just been installed, the factory specified password, "system", is in effect.

```
ENTER USERNAME>  SMITH

LOCAL>   SET PRIVILEGED

PASSWORD>   SYSTEM (not echoed)

LOCAL>
```

Your terminal is now the privileged terminal, and you can enter privileged commands at that terminal. You can begin to set up the desired operating parameters for the MUXserver 100 and its network.

2.2 SETTING UP THE PRIVILEGED PASSWORD

Password Security is provided at the supervisor port of the MUXserver 100 and also on the supervisor ports of the remote DECmux II units. To prevent unauthorized access, your first task should be to set up new passwords.

2.2.1 Setting Up the Privileged Password On the MUXserver 100

Use the DEFINE PRIVILEGED PASSWORD command. Here is an example using the password A1B2C3:

```
LOCAL>   DEFINE PRIVILEGED PASSWORD

PASSWORD>   A1B2C3 (not echoed)

VERIFICATION>   A1B2C3 (not echoed)

LOCAL>
```

For security, the password you enter is not echoed on your terminal.

The new password is stored in the permanent database. It becomes operational when you initialize the MUXserver 100. If your MUXserver 100 is already running and you want to make the new privileged password take effect immediately, refer to Chapter 3, Section 3.1 (MANAGING THE MUXserver 100).

The procedure, outlined in Section 2.2.1 (Setting Up the Privileged Password On the MUXserver 100), provides protection to all the 'PRIVILEGED' commands that affect the MUXserver 100 but NOT the remote DECmux II units.

2.2.2 Setting Up the Password On the DECmux II

Password security is provided on each of the remote DECmux II units and the factory default setting is 'SYSTEM'.

To set the PASSWORD on the DECmux II units, follow either of the following two procedures.

1. Setting the PASSWORD by connecting a terminal directly to the supervisor port of the DECmux II unit. An example using the password NEWPASS is as follows.

   a. On power-up, the terminal display is

```
DMFZA - Startup test - Firmware Version Vx.x-xx

012345678*
```

   b. Press <RETURN> key and on response to the 'PASSWORD>' prompt, enter SYSTEM; that is

```
Password>SYSTEM (not echoed)
SYS>
```

   c. To enter, verify, and save the new Password, proceed as follows:

```
SYS>PASSWORD
Old password:SYSTEM   }  Passwords
New password:NEWPASS  }  are not
Verify:NEWPASS        }  echoed
SYS>SAVE
Save complete
```

d. Having entered, verified and saved the new Password, exit the Supervisor Port by entering EXIT, that is,

```
SYS>EXIT
```

NOTE

Repeat for second DECmux II unit if applicable.

2. Setting the PASSWORD by 'connecting' to the remote DECmux II unit from the Supervisor Port of the MUXserver 100. (This method is only possible if the composite link communications has been established. Refer to the link status messages on your MUXserver 100 supervisor terminal after power on.)

   The sequence of commands to 'connect' to the DECmux II unit communicating with the 'A' Port of the MUXserver 100 is as follows.

```
LOCAL>    SET PRIVILEGE

PASSWORD>    (Enter Password)

LOCAL>
```

   You are now in the privileged mode of the MUXserver 100.

```
LOCAL>    COMM

COM>
```

   This gives you access to the sub-directory of commands affecting the composite links. Type HELP for a listing of these, or see Chapter 5, Section 5.3.

```
COM>     CONNECT A1

PASSWORD>
```

You must now enter the PASSWORD for entry to the supervisor port of the DECmux II unit. The factory default setting is 'SYSTEM'.

```
PASSWORD>   SYSTEM (not echoed)

A1>
```

The 'A1>' prompt indicates you are connected to the first DECmux II unit by means of the A port of the MUXserver 100.

To set the new password to NEWPASS the sequence continues as follows.

```
A1>   PASSWORD
Old password:   SYSTEM
New password:   NEWPASS
Verify:   NEWPASS
A1>   SAVE
Save complete
```

Having entered, verified, and saved the new password, exit the connection to the remote DECmux II unit by entering DISCONNECT.

```
A1>   DISCONNECT
```

This returns you to the MUXserver 100 and the communications subdirectory, that is, COM> prompt.

This process needs to be repeated for each DECmux II unit. The numbering system (that is, A1, A2 and B2) is shown in Figure 2-1 and Figure 2-2.

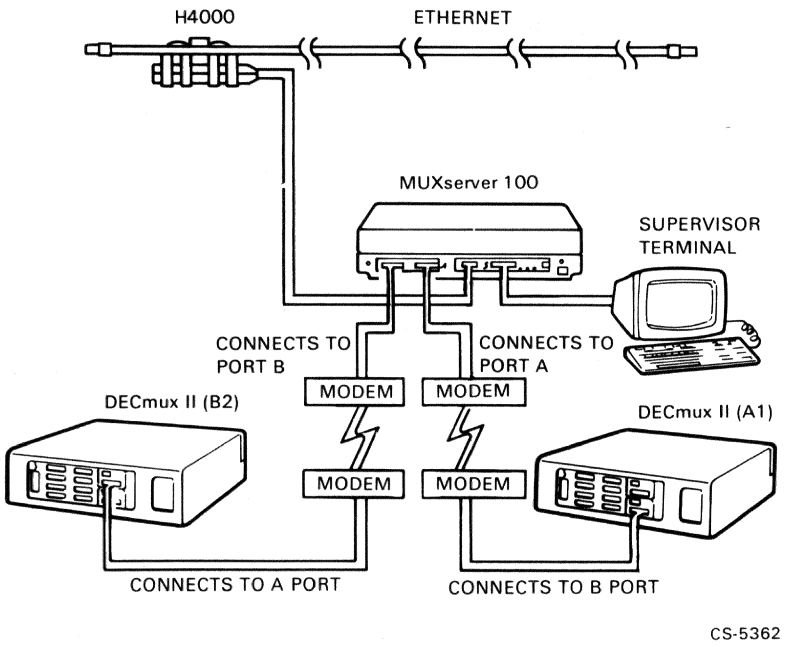

Figure 2-1 Numbering System for the First Default Multiplexer Configuration

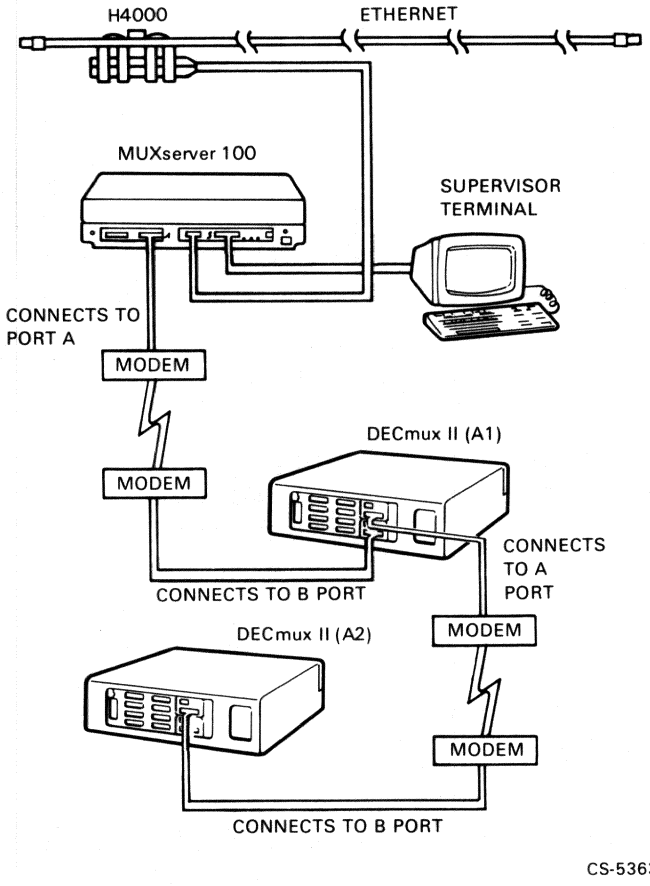

Figure 2-2 Numbering System for the Second Default Multiplexer Configuration

NOTE

The numbering system for the 'CONNECT' command is relative to the unit executing the command. For example if you are 'connecting' to the MUXserver 100 from a remote DECmux II unit, the numbering scheme is relevant to that DECmux unit.

To identify the numbering system which applies from any supervisor port, first type the MAP command whose display includes this information. See Section 2.6, SETTING UP THE NETWORK MAP.

2.3 SETTING UP THE LOGIN PASSWORD

You can require that any or all of the terminal users enter a password when they log in. This is called the login password. The factory specified login password is "access". If you define the LOGIN characteristic as ENABLED for a terminal, the login password is required at that terminal (see Section 2.7.5, Port Administration Characteristics). It is recommended that you set up a new password after initial installation of the server and terminals.

To set up the login password, enter the DEFINE LOGIN PASSWORD command. Here is an example using the password D4E5F6:

```
LOCAL>    DEFINE LOGIN PASSWORD
PASSWORD>    D4E5F6  (not echoed)
VERIFICATION>    D4E5F6  (not echoed)
LOCAL>
```

Your new login password is stored in the permanent database. It becomes operational when you initialize the MUXserver 100 or if the applicable user logs into the server. If you wish to have it take effect immediately, refer to Chapter 3, Section 3.1 (MANAGING THE MUXserver 100).

2.4 SETTING UP THE SERVER CHARACTERISTICS

You can display the current server characteristics by entering the SHOW SERVER command.

```
LOCAL>    SHOW SERVER
```

or

```
LOCAL>    SHOW SERVER
```

SHOW SERVER lists the characteristics stored in both the permanent and operational databases. Refer to Chapter 5, Section 5.33 (SHOW SERVER) for a sample of the SHOW SERVER display.

When you set up the server characteristics, normally you want the values you choose for the characteristics to be retained each time you initialize the server. Therefore, you use the DEFINE SERVER command which updates the permanent database.

Following setup, you can change the server characteristics from privilege mode. Use the DEFINE SERVER command to modify the permanent characteristics. These changes become operational when you initialize the server, or if the applicable user logs into the server. Use the SET SERVER command to modify the operational characteristics. These changes become operational immediately, but do not stay in effect after initialization or subsequent login by affected user.

To set up the server characteristics, specify a value for each with the DEFINE SERVER command. Chapter 5 contains the command description and the syntax for DEFINE SERVER. Table 2-1 lists the server characteristics. Sections 2.4.1 through 2.4.3 describe the server characteristics.

Table 2-1 Server Characteristics

Characteristic	Function
CIRCUIT TIMER	specifies the interval between server messages on the Ethernet, in milliseconds.
DUMP	determines whether up-line dumping occurs.
HEARTBEAT	enables or disables collision detect circuitry, checking.
KEEPALIVE TIMER	specifies the interval between server messages when no data is transmitted.
IDENTIFICATION	designates the identification of the server.
LOGIN LIMIT	limits the number of login attempts.
NAME	assigns a server name.
NUMBER	specifies a server number.
SOFTWARE	specifies the file name of the MUXserver 100 software load image.

2.4.1 Network Operation Characteristics

Three server characteristics, namely CIRCUIT TIMER, KEEPALIVE TIMER, and HEARTBEAT, affect the operation of the network. More details about these characteristics appear in the *LAT Network Manager's Guide.*

CIRCUIT TIMER

The circuit timer value defines the interval in milliseconds (ms) between messages transmitted from the terminal server to a service node. Your choice of the timer value affects the response time at the terminals attached to the server and also the loading of the service nodes. You should coordinate it with your network manager and the node system managers.

If you choose a low value for CIRCUIT TIMER, the response time for the terminals is decreased, but the demand upon service nodes increases. A long interval minimizes node loading, but extends user response time.

The default for CIRCUIT TIMER is 80 milliseconds. This is the value recommended for interactive terminal use on timesharing systems. It should only be changed after consulting with the network manager. To improve response time, you can reduce the circuit timer value if your network has lightly loaded service nodes. If the network and the service nodes are used very heavily, a longer circuit timer value increases service node performance.

KEEPALIVE TIMER

The value you choose for KEEPALIVE TIMER is less critical for overall performance than the circuit timer value. The KEEPALIVE TIMER defines the interval, in seconds, between messages in which no data is being transmitted. The server sends status messages on the Ethernet at these intervals. Discuss the KEEPALIVE TIMER choice with your network manager.

The default value for KEEPALIVE TIMER is 20 seconds. This is recommended for normal Ethernet environments. For a heavily loaded Ethernet, you should consider using a value between 20 and the maximum of 180.

HEARTBEAT

Collision detect circuitry senses the collision of messages transmitted on the Ethernet. HEARTBEAT is a characteristic that indicates the status of the collision detect circuitry at the MUXserver 100 transceiver.

For all DIGITAL Ethernet transceivers, and others supporting collision detect circuitry, the HEARTBEAT characteristic should be enabled for error-free operation. If your transceiver does not support the testing of collision detect circuitry, enter DISABLED for HEARTBEAT. The default is ENABLED.

Discuss the HEARTBEAT characteristic with your network manager.

2.4.2 Loading and Dumping Characteristics

The DUMP and SOFTWARE characteristics affect down-line load and up-line dump operations.

DUMP

If the server software detects a fatal error, it performs a fatal bugcheck and reinitializes. When you define DUMP as ENABLED, you enable up-line dumps of server memory when fatal bugchecks occur. An up-line dump normally goes to the same load host that down-line loaded the server software. If that host is not available, the dump is directed to any available load host on the network.

It is recommended that you support up-line dumping by setting DUMP to its default, ENABLED. If you enter DISABLED, up-line dumping is not performed.

You should inform the system managers for the load hosts if you change the DUMP characteristic.

SOFTWARE

When you initialize the server, the software load image is down-line loaded. The server sends a message to a load host that identifies the requested image.

The default file name for SOFTWARE is MS1601ENG.SYS. Normally you do not modify this file name. However, if you and a host system manager wish to load a different software load image, specify its file name with the SOFTWARE characteristic. The directory for the new file name remains the system load default directory.

2.4.3 Server Administration Characteristics

A number of server characteristics can assist you in server administration.

IDENTIFICATION

The server identification appears in the SHOW SERVER command, and it can be useful if you have responsibility for a number of servers. The server passes the identification to service nodes in its messages. IDENTIFICATION is a value of 1 to 16 keyboard characters enclosed in quotation marks. There is no default for IDENTIFICATION.

NAME

NAME specifies the server name. The name is useful for identifying the server (it appears in the SHOW SERVER display), and service nodes can use it to identify reachable servers on the Ethernet. You should make sure that NAME matches the DECnet node name given the MUXserver 100 when the server software was installed on a load host. See the system manager of the load host.

Service node system managers can display the server name using a network management command.

The server name is a string of 1 to 16 keyboard characters enclosed in quotation marks. The default name is "LAT-xxxxxxxxxxxx", where "x...x" is the Ethernet address of the MUXserver 100.

NUMBER

NUMBER specifies a value from 0 to 32767 which you can use in any way to identify a MUXserver 100. It appears in the SHOW SERVER display. The default is 0.

CONSOLE

CONSOLE identifies a console terminal. The console displays status messages for down-line loading, up-line dumping and bugchecks. The console terminal for the MUXserver 100 is the supervisor port and is shown as Unit 1 in the SHOW SERVER display.

LOGIN LIMIT

LOGIN LIMIT is a tool for enhancing security by restricting access to the terminals and server. When LOGIN is enabled at a terminal, a prospective user is allowed a limited number of attempts to log in. If the user fails to type the correct password, the terminal port disables for a period of one minute. You specify the permitted number of attempts per minute with LOGIN LIMIT. The default value is three attempts per minute. You can enter any number from 0 to 250, or you can enter NOLIMIT. If you specify 0, you disable access to the server for all terminals that have the terminal characteristic LOGIN ENABLED.

2.5 SETTING UP THE COMPOSITE LINK PARAMETERS

On a normal composite link, the link speed will be determined by the speed of the external modems used. The link speed for RS-232 links must be set up to be compatible with that of the modems used, with a maximum of 19.2K baud. For RS-422 links, a speed setting of 19.2K baud or 38.4K baud is recommended.

Changing composite link parameters requires separate access to the supervisor ports of the MUXserver 100 and the DEXmux II units; however, once set at installation time, will not normally require further changes.

2.5.1 Setting Link Speed and Line Type On the MUXserver 100

Modifying the composite link speed requires a programmed change only. Changing line type (that is, RS-232 and RS-422) requires a programming change and an additional DIP switch selection. Please see your DIGITAL Field Service representative. All programmed parameter changes must be executed from the Supervisor Port 'privilege mode'. The procedure is outlined in the following sequence.

```
LOCAL>    COMM
COM>
```

The COMM command gives you access to the sub-directory of commands which apply to the composite link. For a listing of these, type HELP in response to the 'COM>' prompt or see Chapter 5, Section 5.3 (COMMUNICATIONS).

The SYSTEM command allows the operator to set the parameters for the A and B synchronous composite ports. Table 2-2 lists these parameters, their initial default values, and allowed options.

Table 2-2 Composite Port Parameters

Parameter	Default	Options
Speed	9600 baud	1200,2400,4800,9600, 19200,38400 baud
Modem Control	ENABLE	ENABLE, DISABLE (NOTE 1)
Line Type	RS-232	RS-232, RS-422 LONG LINE DRIVE (NOTE 2)

NOTES

1. **This parameter has no significance in RS-422 Long Line Drive mode and is not prompted by the display.**
2. **The same connectors are used for both RS-232 and RS-422 Long Line Drive. The MUXserver 100 has a default setting for RS-232 and requires both internal DIP switch and program settings to change to RS-422. (See Section 2.5.1.1.)**

The programmed settings for both SPEED and line type are illustrated in the following example.

The Operator is prompted for each parameter. The current value is displayed. To leave a value unchanged type RETURN. To list valid alternatives to a prompt type "?" followed by RETURN.

```
COM>   SYSTEM

For port A
Speed [9600]??
Options:
1200,2400,4800,9600,9.6K,19200,19.2K,38400,38.4K
Speed: [9600]?19.2K
Long line driver [NO]?Y

For port B
Speed [9600]?
Long line driver [NO]?
Modem [YES]??
Options: YES,NO
Modem: [YES]?

Master or Slave MUX [MASTER]??
Options: MASTER,SLAVE

Master or Slave MUX [MASTER]?MASTER
COM>
```

The last parameter requested is the mode of the MUXserver 100. The MUXserver 100 has a default setting of Master; all DECmux II units are supplied default as SLAVEs. In any network the MUXserver 100 must be the only MASTER.

The system command alone does not alter the operational parameters of the composite ports. To implement the operational changes selected with the 'system' command, execute the following command sequence and select the appropriate DIP switch settings for 'line type' changes.

```
COM>SAVE
Save complete
COM>RESTART
```

This procedure saves the settings in permanent memory and then reinitializes the MUXserver 100 implementing these parameters.

2.5.1.1 Switch Selection of RS-232 or RS-422 Long Line Drive - The switch selection for RS-232 or RS-422 is shown in Figure 2-5. The default factory settings are for RS-232.

Any change in switch setting requires access to the inside of the MUXserver 100 and, as such, should be performed by DIGITAL Field Service.

NOTE

Having set the appropriate composite Port parameters, check to ensure the correct cables are also used. See Chapter 1, Section 1.7 of the *MUXserver 100 Network Installation Manual* for details of the appropriate cables.

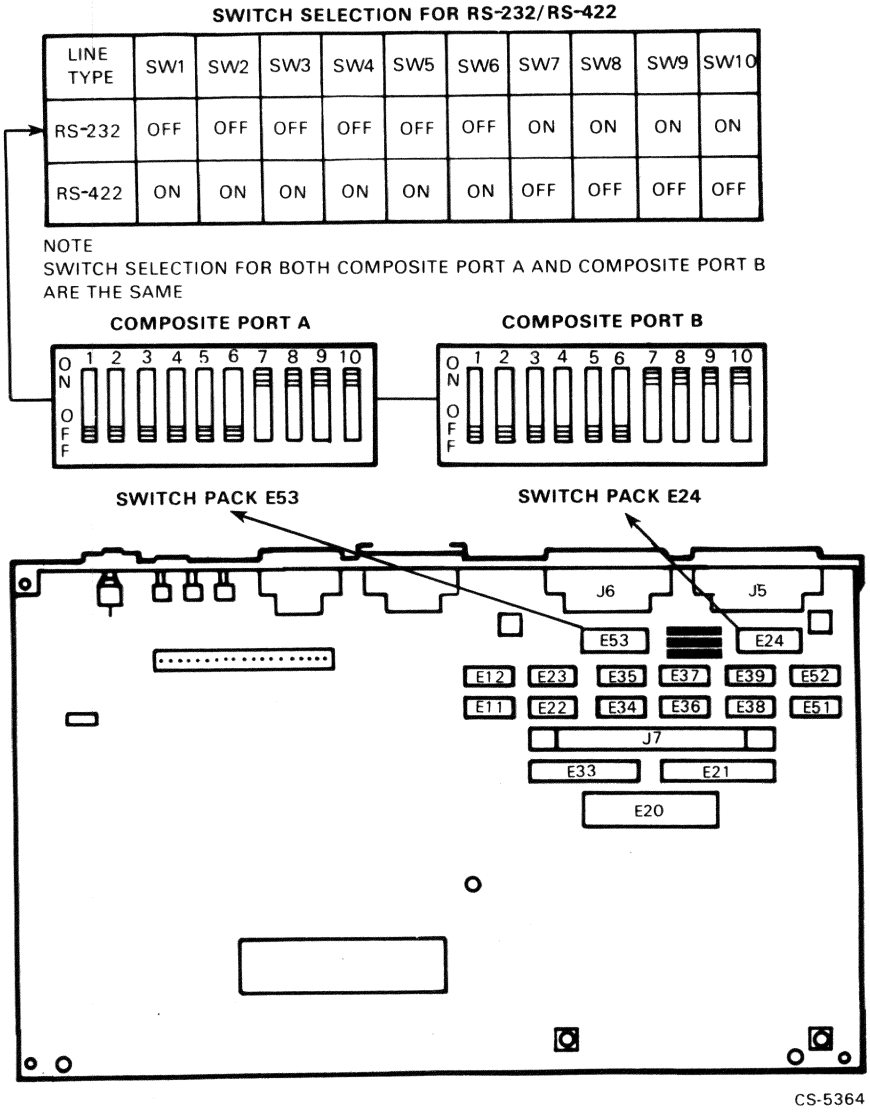

Figure 2-3 RS-232/RS-422 Switch Selection

2.5.2 Setting Link Speed and Line Type on the DECmux II Unit

Modifying the composite link parameters requires a programmed change only on the DECmux II unit. Connect a terminal directly to the supervisor port of the DECmux II unit, and execute the following procedure.

- On power up the terminal display is

```
DFMZA - Startup test - Firmware Version Vx.x-xx
012345678*
```

- Enter <RETURN> and in response to the 'Password>' prompt enter the password. The factory setting is SYSTEM. This gives the SYS> prompt indicating you are logged into the Supervisor Port. Enter HELP for a listing of all the commands available or see Chapter 6, Section 6.3.5 (HELP Command).

The SYSTEM command allows the operator to set the parameter for the A and B synchronous composite ports. Table 2-3 lists these parameters, their initial default values, and allowed options.

Table 2-3 Composite Port Parameters

Parameter	Default	Options
Speed	9600 baud	1200,2400,4800,9600, 19200,38400 baud
Modem Control	ENABLE	ENABLE, DISABLE (NOTE 1)
Line Type	RS-232	RS-232, LONG LINE DRIVE (NOTE 2)

NOTE

1. **This parameter has no significance in Long Line Drive mode and is not prompted by the display.**
2. **Separate connectors are provided for RS-232 and Long Line Drive RS-422.**

The programming sequence for all composite port parameter changes are illustrated in the following example.

The operator is prompted for each parameter. The current value is displayed. To leave a value unchanged, type RETURN. To list valid alternatives to a prompt, type "?" followed by RETURN.

```
SYS>SYSTEM
For port A
Speed [9600]??
Options:
1200,2400,4800,9600,9.6K,19200,19.2K,38400,38.4K
Speed:  [9600]?19.2K
Long line driver [NO]?Y

For port B
Speed [9600]?
Long line driver [NO]?
Modem [YES]??
Options: YES,NO
Modem [YES]?

Master or Slave mux [SLAVE]??
Options: MASTER,SLAVE

Master or Slave mux [SLAVE]?
SYS>
```

The last parameter requested is the mode of the DECmux II unit. All units are supplied default as SLAVE, and in any network the MUXserver 100 must be the only MASTER. For all DECmux II units, ensure that this parameter is set to SLAVE.

Having selected the changes to the composite port parameters it remains to SAVE them in non-volatile memory, then connect these to operational parameters by reinitializing the DECmux II unit using the RESTART command.

```
SYS>  SAVE
Save Complete
SYS>  RESTART
```

NOTE

If the composite link communications already exists, and it is necessary to change link parameters, it is possible to 'connect' to the remote DECmux II unit, and make the changes.

If a link parameter is to be altered, first alter the remote port of the link with a SYSTEM, SAVE, RESTART sequence; then alter the local port, and then change the link or modem speed.

CAUTION

Care should be exercised when altering composite link parameters remotely by means of a CONNECT. On a normal modem link the speed is determined by the external modem, and the DECmux II port speed settings must match the modem speed exactly.

2.6 SETTING UP THE NETWORK MAP

The mapping concept allows the server manager to modify the logical asynchronous line connections in the network. The factory setting of the MUXserver 100 has all 16 asynchronous lines of the remote DECmux II units mapped to the MUXserver 100, and, hence, the LAN.

Alternatively you may choose to sacrifice some of the asynchronous lines into the MUXserver 100 and establish logical asynchronous connection between ports on one DECmux II unit, and ports on the other DECmux II unit. The rule which applies is that each asynchronous port on a DECmux II unit must map to exactly one other port on either the MUXserver 100 or the second DECmux II unit.

To change the MAP, the server manager needs to be in the 'privilege mode' on the supervisor port of the MUXserver 100. Alternatively, the MAP can be changed by connecting to the Supervisor Port from a remote DECmux II unit. To change the MAP, enter the following sequence.

```
LOCAL>    SET PRIVILEGE
PASSWORD>    (Enter the 'privilege' password)
LOCAL>    COMM
COM>    MAP
```

The COMM command gives you access to the sub-directory of commands which apply to the composite links and remote DECmux II units. Enter HELP for a listing of the available commands or see Chapter 5, Section 5.3 (COMMUNICATIONS).

```
COM>    MAPHELP
```

This command provides specific HELP with the MAP command.

To alter the MAP, enter the MAP command.

```
COM>    MAP

Multiplexer port map

Mux.:  B2-up            Self-Master-up   1 1 1 1 1 1 1 1  A1-down
Port:  0 1 2 3 4 5 6 7  2 3 4 5 6 7 8 9  0 1 2 3 4 5 6 7  0 1 2 3 4 5 6 7
Conn:  A B C D E F G H  A B C D E F G H  I J K L M N O P  I J K L M N O P
```

NOTES

1. **The asynchronous ports of the MUXserver 100 (shown as 'Self-Master) are listed as 2 through 9, then 10 through 17. Port 1 is the Supervisor Port and, as such, cannot be mapped.**
2. **The numbers A1, B2, and so on, refer to the numbering scheme identifying each DECmux in the network. These are used with the CONNECT command, (for example, see Section 2.2.2 b).**
3. **The UP, DOWN reference gives the status of the composite link connecting that DECmux II unit. Note that a link has to have been previously UP for the MUXserver 100 to know that it exists and is DOWN.**

Using the following rules, establish the desired MAP.

- The letters under the ports show the mappings; ports with the same letters map together.
- Use <space> to move to the right, <backspace> or <delete> to move to the left.
- Any letter or number shows a mapping; "." shows an unused port.

- Each port must map to exactly one other port on a different multiplexer. Error messages will be given for three or more occurrences of the same letter, or if two ports on the same multiplexer are mapped together, or if a port is mapped to nowhere. (For explanations of the error messages refer to APPENDIX B).
- Control-C aborts the command.
- Control-Z terminates input, keeps the new mapping and returns the 'COM>'.

Having established a MAP, save it in non-volatile memory using the SAVE command. These then become operational with a RESTART or INITIALIZE command, that is,

```
COM>    SAVE
Save Complete
COM>    RESTART
```

or

```
COM>    SAVE
Save Complete
COM>    EXIT (Exits the COMM sub-directory)

LOCAL>    INITIALIZE    DELAY 0
```

2.7 SETTING UP THE PORT CHARACTERISTICS

The terminal characteristics are set up at the MUXserver 100 by means of its supervisor port, or from the remote user terminal using the DEFINE PORT command. When configured, the MUXserver 100 downloads this information to the remote DECmux II unit and the relevant port.

When you set up the port characteristics, you set up the characteristics for the asynchronous port and not the terminal itself.

You can list the current port characteristics using the SHOW PORT command. This command shows the characteristics which are stored in both the permanent and operational databases.

To display the characteristics for a specific port, for example port 3, enter the following:

```
LOCAL> SHOW PORT 3
```

To list the characteristics for all the ports, enter this command:

```
LOCAL> SHOW PORT ALL
```

To set up the characteristics for the ports, use the DEFINE PORT command. DEFINE PORT modifies the permanent database, and the setup characteristics become operational each time a terminal user logs in.

Following setup, you and the remote terminal users can modify the permanent characteristics with the DEFINE PORT command, or modify the operational characteristics with the SET PORT command. Certain port characteristics require privileged status to be changed and hence can only be changed by means of the supervisor port.

To set up the port characteristics, specify a value for each with the DEFINE PORT command. Chapter 5 (MUXserver 100 COMMAND DESCRIPTIONS) has the command description and syntax for define port. Table 2-4 lists the port characteristics. Sections 2.7.1 through 2.7.5 describe the port characteristics.

NOTE

Keep a record of the characteristics you define for each port in the back of your *MUXserver 100 Pocket Users Guide*. If the MUXserver 100 unit should fail, the permanent database may be lost. A record (in a notebook, or in a file on service node) can expedite setting up the ports on a new MUXserver 100.

Table 2-4 Port Characteristics

Characteristic	Function
ACCESS	specifies the type of access allowed to this port.
AUTHORIZED GROUPS	restricts the terminal to specified groups of service nodes.
AUTOBAUD	enables the server to determine the terminal speed, character size, and parity automatically.
AUTOCONNECT	enables the server to connect the terminal to a specified service at login or after abnormal service terminations automatically.
AUTOPROMPT	determines if the host's login prompt is sent to the port.
BACKWARD SWITCH	specifies the keyboard character used to switch to the previous session while in service mode.
BREAK	specifies action when break key is used.
BROADCAST	enables the receipt of broadcast messages from other terminals.
CHARACTER SIZE	specifies the number of data bits in each character exchanged between the terminal and the server.
DEDICATED SERVICE	specifies a permanent service for the terminal.
FLOW CONTROL	specifies whether the terminal and server can control data flow to and from the terminal.
FORWARD SWITCH	specifies the keyboard character used to switch to the next session while in service mode.
INACTIVITY LOGOUT	port is logged out if not used for a length of time.
INPUT FLOW CONTROL	specifies whether the server can control data flow from the terminal.

Table 2-4 Port Characteristics (Cont)

Characteristic	Function
INTERRUPT	enables ACCESS DYNAMIC port users to interrupt a remote output.
INPUT SPEED	specifies the speed for transmissions from the terminal to the server.
LOCAL SWITCH	specifies the keyboard character used to enter local mode from service mode.
LOSS NOTIFICATION	specifies whether the user is signaled when data characters are lost due to data errors or overruns.
MESSAGE CODES	specifies whether 3-digit codes appear with server messages.
NAME	specifies the port name.
OUTPUT FLOW CONTROL	specifies whether the terminal can control data flow from the server.
OUTPUT SPEED	specifies the speed for transmissions from the server to the terminal.
PARITY	specifies terminal parity.
PASSWORD	determines if a password is required for a server login.
PREFERRED SERVICE	specifies a preferred service for the port.
SESSION LIMIT	restricts the number of terminal service sessions.
SPEED	specifies input and output speed for transmissions between the server and the terminal.
TYPE	specifies the terminal type.
USERNAME	specifies a login user name.
VERIFICATION	determines whether session verification messages appear.

2.7.1 Session Control Characteristics

You can specify terminal characteristics to assist in coordinating terminal users' access to network services.

SESSION LIMIT

If you wish to limit the number of service sessions for any terminal user, you can modify that terminal's SESSION LIMIT. You can set SESSION LIMIT to values of 0, 1, 2, 3, 4, 5, or 6. If you enter the value zero, the terminal user cannot establish any sessions with the CONNECT command or the autoconnect function. The user is limited to local mode. The default for SESSION LIMIT is 4.

DEDICATED SERVICE

The DEDICATED SERVICE feature is designed for terminal users who require only one service for an extended period. The server connects the user directly to the dedicated service when he or she presses any key on the terminal.

With a dedicated service, the terminal reacts like a terminal connected directly to a service node, and local mode is not available for the terminal. The user need have no knowledge of the MUXserver 100 or its local commands in order to use the terminal.

To enable a dedicated service, VAX, for terminal 12, enter the following:

```
LOCAL>    DEFINE TERMINAL 12 DEDICATED SERVICE VAX
LOCAL>    LOGOUT TERMINAL 12
```

To disable the dedicated service, VAX, at terminal 12, type the following:

```
LOCAL>    DEFINE TERMINAL 12 DEDICATED SERVICE NONE
LOCAL>    LOGOUT TERMINAL 12
```

NOTE

You cannot use the SET TERMINAL command to establish a dedicated service for a terminal if that terminal is currently logged in. Use the DEFINE TERMINAL command or wait until the terminal user logs out.

PREFERRED SERVICE

A terminal user may access a particular service often, but still require resources available elsewhere on the Ethernet. If you assign a preferred service to a terminal and enable AUTOCONNECT, the server connects the terminal directly to that service at terminal login (as in the case of a dedicated service). However, with a preferred service, the user can switch to local mode at any time and then make connections to other services.

If you assign a preferred service without AUTOCONNECT enabled, the server does not connect the terminal upon login. However, the CONNECT command can be used without a service name. The server makes the connection to the preferred service.

The default for PREFERRED SERVICE is NONE.

AUTOCONNECT

AUTOCONNECT permits automatic connections to network services, and is recommended for most terminal users.

How the server functions with AUTOCONNECT enabled depends upon whether you also specify PREFERRED SERVICE, DEDICATED SERVICE, or neither.

- With a PREFERRED SERVICE, the server:
  - Connects the terminal to the preferred service at login.
  - Automatically attempts to re-establish the current session if the connection for the session fails.
  - Connects to the preferred service if the user enters the CONNECT command without a service name.
- With a DEDICATED SERVICE, the server:
  - Connects the terminal to that service at login.
  - Attempts to re-establish the connection if the service session fails.
- With neither a PREFERRED SERVICE nor a DEDICATED SERVICE defined, the server attempts to re-establish any service connection that terminates abnormally.

With AUTOCONNECT, attempts to reconnect are made at 20 second intervals, and they continue until the user enters local mode. Unless a dedicated service is in effect, a status message appears at the terminal indicating that the server is trying to restart a session. The new connection can be made to any service node that supplies the same service. In a cluster environment, for example, this feature provides automatic fail-over to a working service node in the cluster.

AUTOCONNECT is especially helpful when a user wishes the server to repeat connection attempts to a non-operational service node. When the node comes up, the server software notifies the user with an audible beep signal and a message. The default for AUTOCONNECT is DISABLED.

GROUP CODES

GROUP CODES help you define the environment for the MUXserver 100 ports. Each service node and each port is assigned one or more group codes. If any group code applies to both a port and a service node, then the port user is authorized to use that node's services.

You limit the port user to certain available services by specifying group codes for the port. The port user can use services offered only by his or her authorized service nodes. Also, with the SHOW commands, the user receives information for the authorized services only.

The network manager normally coordinates the assignment of group codes for the service nodes and servers. The MUXserver 100 supports group codes in the range 0 to 127 only. Group codes are discussed further in the *LAT Network Manager's Guide.*

When you enter a code list for GROUP CODES, use commas (,) to separate code digits. A hyphen separating two code digits denotes a range of groups. ENABLED gives the terminal access to the listed groups; DISABLED denies access. For example, with the following DEFINE TERMINAL command, access to groups 1, 3, and 5 through 16 is added to any previously defined group access.

```
LOCAL>   DEFINE PORT GROUP CODES
1, 3, 5 - 16 ENABLED
```

The default is GROUP CODE 0 ENABLED. When all ports and service nodes implement this default, each port has access to all services on the Ethernet.

2.7.2 Port Data Characteristics

A number of port characteristics determine the make-up of the data transmitted between the terminal and server.

AUTOBAUD

AUTOBAUD is a means by which the server, at terminal login, automatically senses the terminal's speed, parity, and character size. The server then adjusts its port characteristics accordingly.

For AUTOBAUD to function correctly, the terminal's internal parameters must be set as follows:

- The terminal's input speed and output speed must be the same. The permissible speed values are listed in the DEFINE PORT command description in Chapter 5.
- The terminal must have one of the following character size and parity combinations: CHARACTER SIZE 8 and PARITY NONE, or CHARACTER SIZE 7 and PARITY EVEN.

These are the default parameters for all terminals in the DIGITAL VT series. Consult the terminal operator's guide if necessary.

If you wish to operate the terminal with different input and output speeds, or with other combinations of character size and parity, set up AUTOBAUD to DISABLED. Then define speed, character size, and parity as discussed in the following sections. By default AUTOBAUD is enabled.

SPEED, INPUT SPEED, OUTPUT SPEED

If you do not enable AUTOBAUD, you must define a terminal speed characteristic. The input and output speeds of a terminal are expressed in bits per second (bps). The permissible speed values are listed in the DEFINE PORT command description in Chapter 5. Normally, all you need to specify is a value for SPEED. Enter values for INPUT SPEED and OUTPUT SPEED only if the two are different.

The default value for the speed characteristics is 9600 bps.

CHARACTER SIZE

Each character that is transmitted from terminal to server is made up of 7 or 8 data bits. Server software automatically formats the characters for transmission from the server to the service node. Define CHARACTER SIZE as 7 if a terminal only supports 7-bit operation; otherwise define it as 8. The operator's guide for the terminal you are using can assist you in determining character size. The default value is 8.

If you have AUTOBAUD enabled, the server automatically sets the character size.

PARITY

PARITY provides a means for the MUXserver 100 to check terminal characters for transmission errors. If a terminal supports PARITY, the parity can be ODD or EVEN. If parity is not supported on a terminal, enter the default NONE. With AUTOBAUD enabled, the server sets terminal parity automatically.

NOTE

The MUXserver 100 does not support space parity. Older DIGITAL terminals, such as the LA36, may require setting up with jumpers to operate with the server. Refer to the terminal operator's guide for details.

2.7.3 Flow Control Characteristics

The MUXserver 100/DECmux II provides the facility to share a communications link between eight or sixteen ports, the potential combined data rate from these ports usually exceeds the date rate of the composite link, hence the need for flow control. Flow control is needed on all inputs to the DECmux II unit, and as the DECmux II unit is capable of outputting data faster than some terminals can accept it, flow control is needed on output also.

The normal means of flow control on the MUXserver 100 is XON/XOFF. The XOFF or Control-S character is used to request a stop in the data flow and the XON or Control-Q character to request a start in the data flow.

The SET PORT command on the MUXserver 100 can be used to enable or disable the XON/XOFF flow control for input or output.

The alternate means of flow control is to use the RS-232 modem lines DTR (Data Terminal Ready) and DSR (Data Set Ready). The DECmux II has this facility which can be set using the PORT command on the DECmux II. See Chapter 6, Section 6.3.9 (PORT COMMAND).

The DECmux II unit will only send characters to a device when DSR is high, and sets DTR high when it is able to receive characters. The SET PORT command of the MUXserver 100 does not override DTR/DSR setting of flow control on the DECmux II unit.

DECmux II/MUXserver/Host links use internal flow control to prevent problems. The data transmitted (to the host) does not change except that all input XON and XOFF characters will be removed. If the MUXserver 100 port characteristics are set for no output flow control, then all characters will be passed to the host unchanged.

The setting of the host input flow control determines the action taken if characters are received by the host from the MUXserver 100. If the host is set for terminal input flow control then no data will be lost. Setting the host for no input flow control will cause the host to discard any characters it cannot store or process.

Recommendations for flow control settings:

- For interactive terminals equipped for XON/XOFF:

  DECmux II PORT flow control to XON/XOFF.
  MUXserver 100 PORT Input flow control enabled.
  MUXserver 100 PORT Output flow control enabled.
  VAX/VMS Host SET TERM/HOSTSYNC/TTSYNC
  Other Hosts XON/XOFF enabled for input and output.

- For an interactive terminal using DTR/DSR:

  DECmux II PORT flow control to DTR/DSR.
  MUXserver 100 PORT Input flow control enabled.
  MUXserver 100 PORT Output flow control enabled.
  VAX/VMS Host SET TERM/HOSTSYNC/TTSYNC
  Other Hosts XON/XOFF enabled for input and output.

- For an interactive terminal using DTR/DSR and requiring data transparency:

  DECmux II PORT flow control to DTR/DSR.
  MUXserver 100 PORT Input flow control disabled.
  MUXserver 100 PORT Output flow control disabled.
  VAX/VMS Host SET TERM/NOHOSTSYNC/NOTTSYNC
  Other Hosts XON/XOFF disabled.

  In this case, output data should not be lost but input data could be.

- For Micro computer file transfer:

  DECmux II PORT flow control to XON/XOFF.
  MUXserver 100 PORT Input flow control disabled.
  MUXserver 100 PORT Output flow control disabled.
  VAX/VMS Host SET TERM/NOHOSTSYNC/NOTTSYNC/PASSALL or PASTHRU
  Other Hosts XON/XOFF disabled, transparent or pass all mode.

CHANGING FLOW CONTROL SETTINGS

The default setting for flow control on a DECmux II unit is XON/XOFF, and on the MUXserver 100 is input and output flow control enabled.

The PORT command (see Chapter 6, Section 6.3.9) is used to change the DECmux II setting, and the SET or DEFINE PORT to change the MUXserver 100 settings. The DECmux II unit will use DTR/DSR if set; otherwise, it uses the MUXserver 100 settings for flow control (XON/XOFF characters only).

2.7.4 Switch Characteristics

Several terminal characteristics allow the terminal user to switch between local and service modes, and between service sessions.

LOCAL SWITCH

The local switch character can be used to enter local mode from service mode. You can set up any keyboard character as the local switch, but an unused control character is recommended. The default is NONE. (The [BREAK] key, if enabled, can be used to enter local mode from service mode.)

FORWARD SWITCH, BACKWARD SWITCH

The characters you specify in FORWARD SWITCH and BACKWARD SWITCH allow the user, in service mode, to transfer between two service sessions. The FORWARD SWITCH character activates the "next" session. This is the second session from the top in the SHOW SESSIONS display. The BACKWARD SWITCH character activates the "previous" session; the session at the bottom of the SHOW SESSIONS list. If there are only two sessions in effect, both characters restart the noncurrent session.

Choose separate characters for each of the switches. Do not select characters that the terminal user is likely to enter routinely while using a service. The user interrupts the current session when he or she presses a switch character. Undefined control characters such as [CTRL/D] are recommended for these switch characteristics.

The default for these switch characters is NONE.

2.7.5 Port Administration Characteristics

A number of port characteristics affect the day-to-day administration of a port.

PASSWORD

PASSWORD is an important security tool. This characteristic is a privileged command parameter. It permits you to require that a terminal user enter a password to gain access to server functions. LOGIN ENABLED permits access only with a password. LOGIN DISABLED permits access without a password.

You specify the password using the DEFINE LOGIN PASSWORD command (see Section 2.3, SETTING UP THE LOGIN PASSWORD). LOGIN is disabled by default to simplify MUXserver 100 installation. It should be enabled for normal use in environments where security is important.

USERNAME

Each terminal user normally enters a user name at login. His or her user name is any string of 1 to 12 keyboard characters. Alternatively, you can specify it with the USERNAME port characteristic. The default for USERNAME is the value for the terminal NAME characteristic.

A terminal user can, for convenience, enter [CTRL/Z] after the user name prompt at login. His or her user name then defaults to the value for the port's NAME characteristic.

NOTE

You can specify a user name only with the SET PORT command. The user name is not a part of the permanent database and cannot be specified using the DEFINE PORT command.

TYPE

There are three terminal types, and each functions differently while in local mode.

- HARDCOPY - for use with paper-output terminals. The delete key echoes deleted characters between backslashes (\). The DIGITAL LA120 is an example of a hardcopy terminal.
- SOFTCOPY - for use with video terminals. The delete key erases deleted characters from the screen, and moves the cursor one character to the left. All server displays build upward line-by-line from the bottom of the screen. The DIGITAL VT52, for example, is a softcopy terminal.
- ANSI - for use with video terminals supporting ANSI escape sequences. The delete key functions as in SOFTCOPY terminals. However, the screen clears before all terminal displays, and the displays build downward line-by-line from the top of the screen. Terminals in the DIGITAL VT100 and VT200 series can be set up as type ANSI.

The default type is HARDCOPY.

NAME

The entry for the NAME characteristic is the port name. You can specify the user's name, the location of the port, or any other convenient identification. The NAME appears in the SHOW TERMINAL display. It can be up to 12 characters long, and the default is PORT_nn, where nn is the port number.

BROADCAST

With BROADCAST set to ENABLED, the terminal user receives local broadcast messages sent from the other MUXserver 100 terminals. The messages appear while the terminal is in either local or service mode. You can disable BROADCAST to prevent incoming messages from overwriting data on the terminal screen. The default is ENABLED.

MESSAGE CODES

Each MUXserver 100 message has a message code. For example, in the following error message, the number 701 is the message code.

```
LOCAL - 701 - Command syntax error
```

If you define MESSAGE CODES as DISABLED, the message code does not appear. The default is ENABLED.

VERIFICATION

Verification messages are informational notes sent to the terminal when the user initiates, terminates, or switches sessions. If a lot of switching is done, you can enter DISABLED for VERIFICATION, and these informational messages do not appear. This does not affect the receipt of warning and error messages. The default for VERIFICATION is ENABLED.

2.8 MUXserver 100 INITIALIZATION

You can initialize the MUXserver 100 in one of three ways:

1. By electrical power-up.
2. By entering the INITIALIZE command.
3. By entering RESTART in response to the COM> prompt. See Section 2.5, SETTING UP THE COMPOSITE LINK PARAMETERS.

The following sequence occurs at initialization. When you enter the INITIALIZE command, the sequence begins at Step 1. When you enter RESTART, the sequence begins at Step 2. When you power-up the server, the sequence begins at Step 3.

1. The MUXserver 100 sends warning messages to users at regular intervals. These indicate that initialization is about to begin.
2. The server disconnects all active ports from network services.
3. The server diagnostic self-test executes (refer to Chapter 4, Section 4.1, WHAT TO DO FIRST).

4. A load host down-line loads the operational server software, and the server becomes operational.

   The screen output on a terminal connected to the MUXserver 100 Supervisor Port provides a clear indication of success or failure of the down-line load, diagnostic messages and the status of the composite links. Any change in the status of the composite links is output automatically on the MUXserver 100 Supervisor Port Terminal.

5. The user presses [RET] several times, and, depending on the terminal's characteristics, one or more of the following occurs:

   a. If AUTOBAUD is enabled for a terminal, the server adjusts the remote terminal port for the terminal's speed, character size, and parity.

   b. If PASSWORD is enabled at a terminal, a pound sign prompt (#) appears at the terminal with an audible beep signal.

   c. Except when a dedicated service is defined for a terminal, the user name prompt (Enter username>) appears, and the user types his/her user name.

   d. With AUTOCONNECT enabled, connection to a preferred or dedicated service is carried out.

   e. If no dedicated or preferred service is defined, the local mode prompt (Local>) appears.

Options for the INITIALIZE command alter the initialization process outlined above:

- You can suspend the beginning of initialization for a specified number of minutes. The server transmits warning messages at regular intervals to alert terminal users. (INITIALIZE ABORT allows you to cancel the initialization).
- You can inhibit the CONNECT command and the AUTOCONNECT function at each port. This option is useful if you want the terminals to remain in local mode when initialization is completed.
- You can cause the server to execute nonstandard diagnostic self-tests.

Chapter 5, Section 5.12 (INITIALIZE) contains the command description and syntax for the INITIALIZE command.

2.9 SETTING CHARACTERISTICS TO FACTORY SPECIFICATIONS

This feature is available on both the MUXserver 100 and the DECmux II units to allow a complete system reset to factory default values.

2.9.1 Resetting the MUXserver 100 to Factory Settings

The software reset feature permits you to change the data in the permanent database to DIGITAL factory specifications. This feature is useful, for example, if you forget the passwords you set up with the DEFINE PRIVILEGED PASSWORD command or the DEFINE LOGIN PASSWORD command. DIGITAL recommends that software reset be executed only when absolutely required.

To cause a software reset, locate the RESET button on the back of the MUXserver 100 hardware unit. Simultaneously press this button while you switch the power ON/OFF switch on the front of the unit OFF then ON. An immediate server initialization occurs; all permanent and operational database parameters are reset to factory specifications.

NOTE

DIP switches will not change. To reset RS-422 back to RS-232, see Section 2.5.1.1.

Following the reset procedure, the privileged password is "system", and the login password is "access". To maintain security, you should change these passwords (see Section 2.2, SETTING UP THE PRIVILEGED PASSWORD, and Section 2.3, SETTING UP THE LOGIN PASSWORD).

2.9.2 Resetting the DECmux II Unit to Factory Settings

A similar feature exists on the DECmux II unit to reset the supervisor password, composite link parameters and asynchronous port parameters to factory default values. The DECmux II unit has a RESET SWITCH which is inside the unit. To reset to factory settings proceed as follows.

NOTE

DIGITAL recommends that reset to factory settings on a DECmux II unit only be performed by a qualified service technician.

WARNING

This procedure requires power to be applied with the protective cover removed. Damage to the hardware/user could result if not done correctly.

1. Turn off the power and remove the power cord.
2. Remove the top cover from the DECmux II unit.
3. Locate the red push button switch beside the fan.
4. Press the RED RESET SWITCH and, while holding it down, reconnect power to the unit, that is, power up the unit with the reset switch ON.
5. After the DECmux II unit has completed its diagnostic tests (indicated by the GREEN indicator on the front of the unit), remove power and replace the top cover.

The unit has now been reset to factory default values.

Following the reset procedure, the supervisor port PASSWORD on the DECmux II is "SYSTEM". To maintain security you should change this password. (See Section 2.2, SETTING UP THE PRIVILEGED PASSWORD.)

2.10 SETTING UP PRINTERS

You can replace any DECmux II port device with an asynchronous, serial printer (or other applications terminal). This allows MUXserver 100 users to obtain hardcopy printouts from network services. Printer ports have remote access and sessions between printers and service nodes are remote sessions.

Whether a service node can initiate remote requests for connections to MUXserver 100 printers depends upon its operating system and its version of the LAT service node software.

Service nodes with printer support software — VAX or MicroVAX systems running (1) VMS Version 4.2 or later and (2) LATplus/VMS Version 1.0 or later that supports MUXserver 100 printers. These systems can initiate remote requests.

Service nodes without printer support cannot send remote requests to use MUXserver 100 printers. Service nodes with printer support can send remote requests to the MUXserver 100. The requests are placed in the server queue, and the server establishes remote sessions automatically.

The system managers of these service nodes need to know the names you give to the remote access ports on your server (the value for the NAME port characteristic). They can then use LAT Control Program commands to create a "path" from virtual ports on their service nodes to the printer ports on your MUXserver 100.

Use the DEFINE PORT command to set up these port characteristics values for each printer port.

Table 2-5 Setting Up Port Characteristics for a Printer

Characteristic	Value
ACCESS	REMOTE or DYNAMIC
AUTOBAUD	DISABLED
AUTOPROMPT	DISABLED
CHARACTER SIZE	The operational character size for the printer.
PARITY	The operational parity for the printer.
SPEED	The operational speed for the printer.

Log out the printer port with the privileged LOGOUT command. This moves a copy of the port characteristics from the server's permanent database to its operational database.

Here are examples of the commands to set up a printer at port 8:

```
LOCAL> DEFINE PORT 8 ACCESS REMOTE
LOCAL> DEFINE PORT 8 AUTOBAUD DISABLED AUTOPROMPT DISABLED
LOCAL> DEFINE PORT 8 NAME SYS$PRINT
LOCAL> LOGOUT PORT 8
```

The printer does not have a dedicated service. A number of service nodes can send remote requests for printer connections and these requests are placed in the server queue. When the server encounters a remote request in the queue, it starts a remote session between the printer and the service node.

CHAPTER 3
MANAGING AND MONITORING

As the server manager, you normally have responsibility for managing and monitoring the MUXserver 100, the composite links, DECmux II units and the remote terminals. This chapter discusses the MUXserver 100 commands that you can use to assist you. Chapter 5, MUXserver 100 COMMAND DESCRIPTIONS, covers each command in more detail.

3.1 MANAGING THE MUXserver 100

The commands described in this section help you do the following:

- Ensure that only authorized persons gain access to MUXserver 100 facilities.
- Manage the access to service mode for keyboard and non-keyboard terminal.
- Communicate with the terminal users.
- Manage the MUXserver 100 from a remote console.

3.1.1 Security Management

The SET PRIVILEGED command gives you privileged status and makes your terminal the privileged terminal (refer to Chapter 2, Section 2.1, ENTERING PRIVILEGED STATUS). This command requires the privileged password which helps maintain the security of the server and terminals. For example, to acquire privileged status with the privileged password, A1B2C3, use this command:

```
LOCAL>    SET PRIVILEGED
Password>    A1B2C3 (not echoed)
```

You return to nonprivileged status by logging out or by entering the SET NOPRIVILEGED command.

```
LOCAL>    SET NOPRIVILEGED
```

The privileged commands cannot be used until you re-enter privileged status with the SET PRIVILEGED command.

In Chapter 2, Section 2.2.1 (Setting Up the Privileged Password on the MUXserver 100) and Section 2.3 (SETTING UP THE LOGIN PASSWORD) discuss how you set up the privileged and login passwords. To maintain security, change these passwords regularly. Use the SET LOGIN PASSWORD or SET PRIVILEGED PASSWORD command to select a new password. This password takes effect immediately.

You should also set up the new password with DEFINE LOGIN PASSWORD or DEFINE PRIVILEGED PASSWORD. The new password then remains in effect each time the server is initialized.

For example, to change the privileged password from A1B2C3 to G7H8I9, enter the following:

```
LOCAL>    SET PRIVILEGED PASSWORD
Password>  G7H8I9  (not echoed)
Verification> G7H8I9 (not echoed)

LOCAL>  DEFINE PRIVILEGED PASSWORD
Password>  G7H8I9  (not echoed)
Verification>  G7H8I9  (not echoed)
LOCAL>
```

The SET PRIVILEGED command can only be used from the supervisor port of the MUXserver 100. (See Section 3.1.4, Remote Management of the MUXserver 100 (By Means of the Ethernet).

Password security also exists on the supervisor port of each DECmux II unit. To maintain security these should also be change regularly. (Refer to Chapter 2, Section 2.2.2, Setting Up the Password On the DECmux II.)

3.1.2 Service Mode Management

As the server manager, you can control the terminal users' access to service mode. In Chapter 2, Section 2.4 (SETTING UP THE SERVER CHARACTERISTICS) to Section 2.7 (SETTING UP THE PORT CHARACTERISTICS) describe how to use terminal and server characteristics to do this. You can also use the privileged form of several MUXserver 100 commands.

As the server manager, you can use the privileged form of the LOGOUT command to log out any of the ports. The port you specify can be of any type, including the users' interactive ports. The command terminates all service sessions at the specified port. For example, to disconnect port 4 from all its sessions, enter the following:

```
LOCAL> LOGOUT PORT 4
```

Use caution when logging out a user's port. When you log out a port you abruptly stop all service sessions and data may be lost.

3.1.3 Communication with Terminal Users

The privileged BROADCAST command lets you send messages to one particular terminal or to all the terminals. This command can help you manage the server and terminals. For example, if you change the group codes for the terminals, you can use BROADCAST to alert the users of the change.

Here is a BROADCAST command that transmits the message, "You can now use the service RESEARCH", to terminal or port 3.

```
LOCAL> BROADCAST PORT 3 "You can now use the service RESEARCH"
```

The following command sends the same message to all the terminals.

```
LOCAL> BROADCAST ALL "You can now use the service RESEARCH"
```

Note that a terminal receives BROADCAST messages only when its BROADCAST characteristic is enabled (see Chapter 2, Section 2.7.5, Port Administration Characteristics).

3.1.4 Remote Management of the MUXserver 100 (By Means of the Ethernet)

If you are responsible for several MUXserver 100 systems, it may be convenient for you (or the network manager) to manage them all from a central location. The server software permits you to use MUXserver 100 commands at a single remote terminal rather than at terminals attached to each server.

The terminal, called a remote console, is connected locally to a node on the same Ethernet as the servers. The node must have DECnet Phase IV software. From the remote console, you have access to any MUXserver 100 and can use the MUXserver 100 commands. Figure 3-1 shows a remote console on an Ethernet.

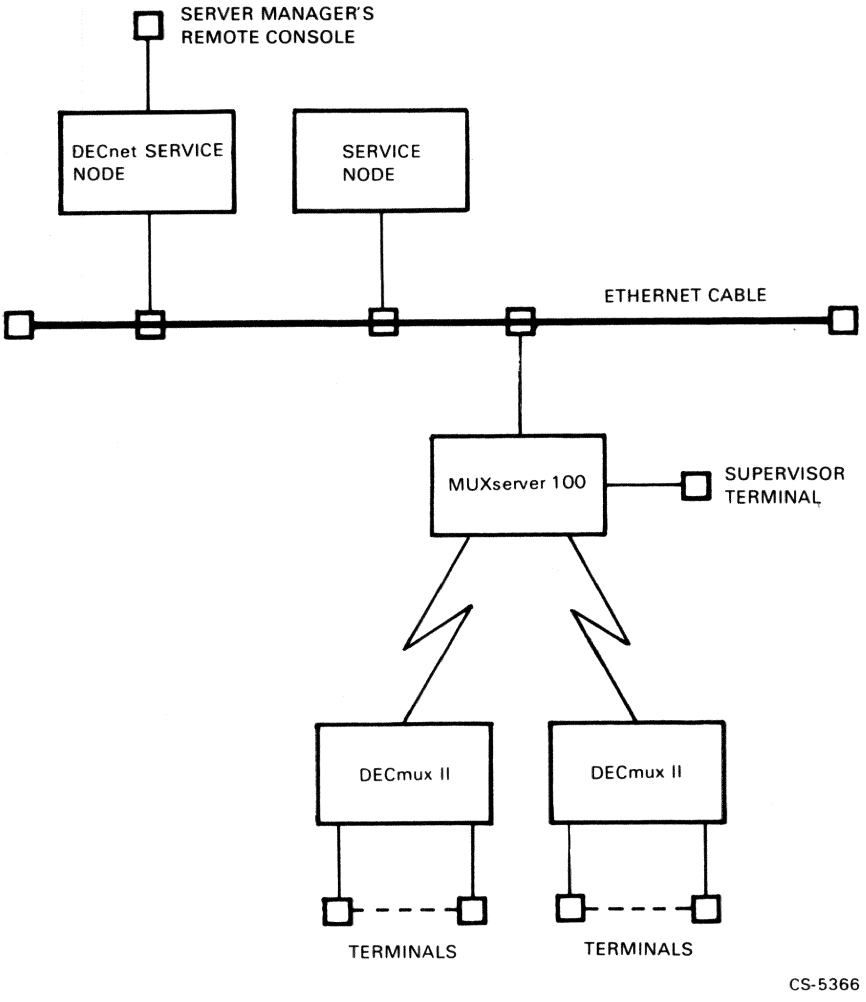

Figure 3-1 Server Manager's Remote Console on an Ethernet

3.1.4.1 Setting Up a Remote Console - To set up a remote console, use the network control facility for the node system where the console terminal is attached. The system manager and the operating system documentation can assist you. For most operating systems, a single network management command establishes the link to the MUXserver 100.

To disconnect the remote console from the server, you enter another command that returns you to the node system's command mode. This command also depends upon the operating system being used.

As an example of setting up a remote console, here is the procedure for the VAX/VMS operating system.

Type the following commands to gain access to the Network Control Program (NCP). [The dollar sign ($) is the system prompt].

```
$ NCP
```

When you receive the NCP prompt, enter either the NCP CONNECT NODE or CONNECT VIA command. Here is the syntax for each:

CONNECT NODE server-node-name

CONNECT VIA UNA-0 PHYSICAL ADDRESS Ethernet-address

Use the CONNECT NODE command if the node is a load host which has the MUXserver 100 configured in its database.

Use the CONNECT VIA command if the server has not been configured in the node's database. The system manager can assist you.

When the NCP CONNECT command executes successfully, press <RET> on the terminal. The following message and a pound sign (#) prompt appear (an audible beep signal accompanies the prompt):

```
Console connected (press CTRL/D when finished)
#
```

The prompt indicates that the link to the server has been made and you must enter the login password. Following successful login, you can begin using MUXserver 100 commands.

To terminate a remote console session on the VAX/VMS node, enter <CTRL/D>. The service node prompt re-appears. Control passes again to the VAX/VMS system.

3.1.4.2 Using MUXserver 100 Commands on a Remote Console - The MUXserver 100 pound sign (#) prompt appears when you successfully connect the remote console through any node (regardless of the node's operating system).

You first enter the MUXserver 100 login password. (The terminal characteristic LOGIN is always enabled for the remote console). If it has not been changed, the password is "access". Following successful login, the user name prompt (Enter user-name>) appears, and you are in local mode on the MUXserver 100.

The remote console is not physically connected to a terminal port on the MUXserver 100 unit. This affects some of the MUXserver 100 commands that you can enter.

You can issue any MUXserver 100 command at the remote console except for the following:

DEFINE PORT for the remote console
SET PORT for the remote console
SHOW PORT for the remote console

You can, however, issue these three commands for any of the "regular" ports.

Information about the remote console does not appear for the following commands typed at any terminal:

SHOW SESSIONS ALL
SHOW TERMINAL ALL
SHOW USERS

The terminal characteristics for the remote console are fixed and defined as follows:

ACCESS LOCAL
AUTHORIZED GROUPS ALL ENABLED
AUTOBAUD DISABLED
AUTOCONNECT DISABLED
AUTOPROMPT ENABLED
BACKWARD SWITCH NONE
BROADCAST DISABLED
DEDICATED SERVICE NONE
FLOW CONTROL DISABLED
FORWARD SWITCH NONE
LOCAL SWITCH ^
LOSS NOTIFICATION ENABLED
MESSAGE CODES ENABLED

PASSWORD ENABLED
PREFERRED SERVICE NONE
SESSION LIMIT 1
TYPE HARDCOPY
VERIFICATION ENABLED

The characteristics SPEED, CHARACTER SIZE, and PARITY are irrelevant for the remote console.

Here are other notes about MUXserver 100 commands for the remote console:

- You can enter the CONNECT command to use network services. However, you can have only one active session (up to six are possible at the other terminals).
- If you connect to a service node with the remote console, you should not activate another remote console session from that node.
- You can use privileged commands if you know the privileged password for the SET PRIVILEGED command. This includes all communications commands connecting to a remote DECmux II unit, and so on.
- Use the fixed local switch character (^) to enter local mode.

Personal computer (PC) file transfers are not supported over the remote console.

3.2 MONITORING THE MUXserver 100 (By Means of the Network Remote Console or Supervisor Port Terminal)

MUXserver 100 SHOW commands enable you to monitor the server, its terminals, and the interaction among the service nodes. This section discusses what to look for in the SHOW command displays. Chapter 5, MUXserver 100 COMMAND DESCRIPTIONS, describes the command syntax for each command. Chapter 5 also has examples of the displays and descriptions of the data fields in the displays.

3.2.1 Show Counters

A counter is a number that shows how many times a certain event has occurred. The server software keeps track of Ethernet and LAT message transmissions using counters. The SHOW COUNTERS data appears under two headings: Ethernet Counters and Server Counters.

- Ethernet Counters lists the counters for datagrams sent between the server and all nodes on the Ethernet.
- Server Counters lists the counters for messages transmitted between the server and the LAT service nodes.

Two other commands are associated with counters: ZERO COUNTERS and MONITOR. ZERO COUNTERS resets all the LAT counters and Ethernet counters to zero. MONITOR generates a continuously updated SHOW COUNTERS display. When you enter MONITOR, a SHOW COUNTERS display appears, and the counter totals change while the display is on your terminal screen.

Counters can help you estimate MUXserver 100 traffic on the network for different time periods. For example, if you zero the counters at the start of each day, you can gain information about day-to-day server usage.

Your network manager can use the data to calculate the average utilization of the Ethernet and the service nodes. Also, the counters can be combined with those from other servers to calculate the network's capacity to handle more traffic.

SHOW COUNTERS is also useful for detecting possible network problems. Use the following guidelines when you examine the SHOW COUNTERS display.

For the Ethernet Counters:

- Normally, the counters on the right hand side of the display should be 0 except those for Block Check Error, Framing Error, and User Buffer Unavailable. These should accumulate at a rate of less than 2 counts per day. It is normal to experience some errors when nodes are added to the Ethernet.
- The value for Frames Sent, Deferred should be less than 5% of the value for Frames Sent.
- The value for Frames Sent, 1 Collision and for Frames Sent, 2+ Collisions should be less than 1% of that for Frames Sent.

For the Server Counters:

- The Messages Retransmitted value should be less than 1/1000 of the value for Messages Transmitted.
- The Duplicates Received value should be less than 1/1000 of the value for Messages Received.
- The values for Illegal Messages Rcv'd and Illegal Slots Rcv'd should be 0.

Counters in excess of these guidelines may indicate a network problem. Contact your network manager and refer to Chapter 4, Section 4.5 (PROBLEMS INVOLVING SERVICE MODES).

3.2.2 Show Nodes

When you enter a specific node name in the SHOW NODES command, the counter values for that service node appear in the display. The following guidelines apply:

- The Messages Retransmitted value should be less than 1/1000 of the value for Messages Transmitted.
- The Duplicates Received value should be less than 1/1000 of the value for Messages Received.
- The value for Illegal Messages Rcv'd should be 0.

If the SHOW NODES data exceeds these guidelines, contact your network manager.

The Status column in the SHOW NODES display can help you monitor the use of service nodes. The status indicates how many terminal users are connected to each node.

3.2.3 Show Server

You use the SHOW SERVER display when you define server characteristics. You can also use it as a maintenance tool.

The display for the privileged SHOW SERVER command lists Server Status and Software Status. It also identifies the load host and dump host.

The numbers for Server Status should be all zeros. A hardware error produces non-zero values.

A Software Status other than Normal indicates that a fatal bugcheck occurred prior to the latest power-up of the MUXserver 100. The status shows the values for server system parameters at the time of the fatal bugcheck. It also notes the Ethernet address of the host that received the up-line dump of the server memory following the fatal bugcheck.

Refer to the troubleshooting procedures in Chapter 4, Section 4.2 (PROBLEMS AFFECTING ALL PORTS) if abnormal data appears for Server Status or Software Status.

3.2.4 Show Port

Three counters in the SHOW PORT display can indicate possible problems. These are the counters for Framing Errors, Parity Errors, and Overrun Errors. Under most conditions, all three counters are zero.

If the Overrun Errors value accumulates to more than 1 or 2 per day, you may have flow control problems. If the terminal supports XON/XOFF flow control, make sure that this parameter is enabled (refer to the operations guide for the terminal). Also, set up the terminal characteristic, FLOW CONTROL, to ENABLED (see Chapter 2, Section 2.7.3, Flow Control Characteristics).

If the counter for Framing Errors or Parity Errors accumulates to greater than about 20 per day, you may have terminal line problems. refer to the troubleshooting procedures in Chapter 4, Section 4.3 (PROBLEMS INVOLVING THE COMPOSITE LINKS).

3.2.5 Show Users

The SHOW USERS command is a tool for general monitoring of the terminals' use. You can use it to determine which terminals are in use at any time and to identify the terminal users.

3.2.6 Show Queue

Each remote connection request in the server queue has an entry identifier and a queue position. You can monitor the status of an entry relative to other queue entries with the SHOW QUEUE command. SHOW QUEUE also lists the service node that made the remote request for a connection and the port name of the requested port.

Use the SHOW QUEUE display to do the following; (see also Section 3.1.4, Remote Management of the MUXserver 100 (By Means of the Ethernet)):

- Determine the current size of the queue.
- Examine information about any or all of the queued remote connection requests.
- Estimate how deleting entries with REMOVE QUEUE will affect queue positions.
- Monitor the frequency of requests for connections to specific printers or applications devices.

The MONITOR QUEUE command generates a SHOW QUEUE display that changes on your screen as remote connection requests are queued and dequeued.

NOTE

Frequent use of MONITOR QUEUE and other MONITOR commands require more MUXserver 100 resources than most other local mode commands. On a heavily utilized server, they should only be used when necessary.

3.3 MONITORING THE REMOTE DECmux II NETWORK

The MUXserver 100 SHOW COMMUNICATIONS command enables you to monitor the composite communications links. Chapter 5, Section 5.28 (SHOW COMMUNICATIONS) describes the command and its display in detail.

3.3.1 Show Communications

The SHOW COMMUNICATIONS command allows general monitoring of the state of the composite communications lines. RS-232 lines which are not in use will have zero for all counters; RS-422 lines not in use will show a variety of errors.

In normal use the Received CRC Errors and Total received errors should be the same, and both should be a small percentage of the total received packets.

A high count in Received CRC Errors usually indicates a noisy communications line or a fault in the cables from the modem to the MUXserver 100.

The count of Transmit Errors and Transmit timeouts should remain low. A rapidly increasing number of Transmit errors results from loss of transmit clock from the modem to the MUXserver 100.

Transmit timeouts show problems with the Remote DECmux II or complete loss of the communications links.

3.3.2 Communications

The privileged command COMMUNICATIONS (or COMM) allows the network manager to access the sub-directory of commands which apply to the composite communications links and connection to remote DECmux II units. Enter the HELP command in response to the COM> prompt for a list of these commands. See Chapter 5, Section 5.3 (COMMUNICATIONS) for details.

3.3.2.1 Status - The STATUS command is a privileged communications command which is entered in response to the 'COM>' prompt. The status command shows the same counters as the SHOW COMMUNICATIONS command. This command can also be executed from the supervisor port of a remote DECmux II unit to display the link status information for the composite links connected to that DECmux II unit.

3.3.2.2 Map - The MAP command is a privileged communications command which is entered in response to the 'COM>' prompt. The Heading line of the MAP command shows the logical status of the remote DECmux II units.

A map block will be displayed for any DECmux II unit detected since the last system load. The Positional name of the MUXserver 100 will be followed by -up or -down. A remote DECmux II unit is considered down if there has been no valid data from it for 20 seconds. Refer to Chapter 2, Section 2.6 (SETTING UP THE NETWORK MAP).

CHAPTER 4
MUXserver 100 TROUBLESHOOTING

When you troubleshoot the MUXserver 100, you try to solve problems affecting the server, DECmux II units, and their attached terminals.

A problem can occur as a result of a failure in one of the ten network components shown in Figure 4-1.

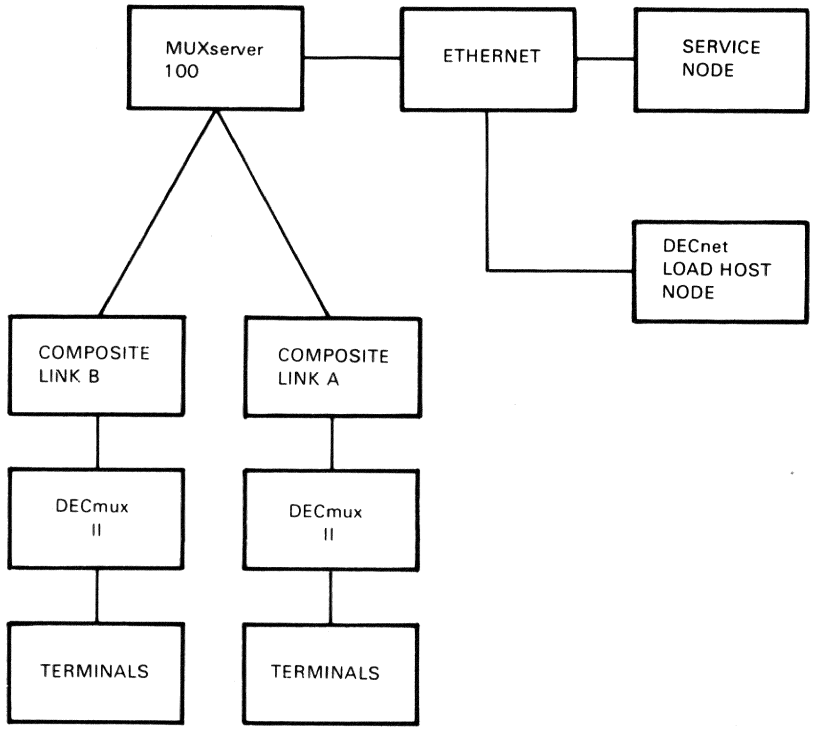

Figure 4-1 Network Components

Each network component is broken down into its constituent parts in Figure 4-2. These parts can be hardware (represented by the solid-line boxes) or software (represented by the dashed-line boxes). Refer to these figures as a guide when you use the information in this chapter.

You can replace some of the components and their parts yourself, or you can call a DIGITAL representative to replace them for you. Many of the parts must be replaced by a qualified DIGITAL service representative.

This chapter consists of the following sections:

- Section 4.1, WHAT TO DO FIRST, suggests initial steps to take when you become aware of a problem.
- Section 4.2, PROBLEMS AFFECTING ALL PORTS, discusses how to troubleshoot problems that involve all the terminals. These problems may result from a failure in the MUXserver 100.
- Section 4.3, PROBLEMS INVOLVING THE COMPOSITE LINKS, discusses how to troubleshoot problems that affect the composite links. These problems may affect all terminals if the multiplexer configuration shown in Figure 4-1 is used or may affect only groups of eight terminals.
- Section 4.4, PROBLEMS AFFECTING INDIVIDUAL PORTS, discusses how to troubleshoot problems that affect one or more individual terminals, but not all the terminal connections to a particular DECmux II unit.
- Section 4.5, PROBLEMS INVOLVING SERVICE NODES, and Section 4.6, PROBLEMS INVOLVING THE ETHERNET, cover problems involving service nodes on the Ethernet network and the Ethernet interface itself.
- Section 4.7, DIGITAL SERVICE, describes how to use the maintenance services provided by Digital Equipment Corporation.

Sections 4.2 through 4.6 list the possible causes of a problem and the corrective action required to solve the problem.

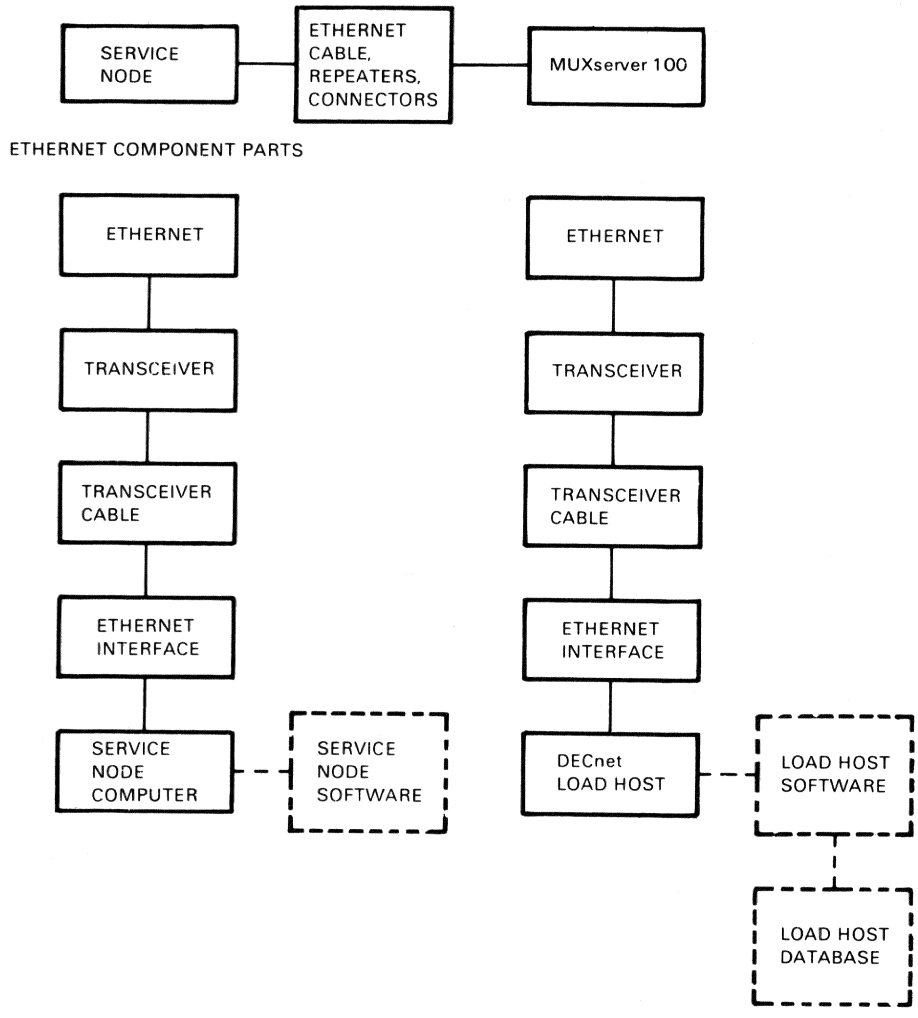

Figure 4-2 Breakdown of LAT Network Components (Sheet 1 of 2)

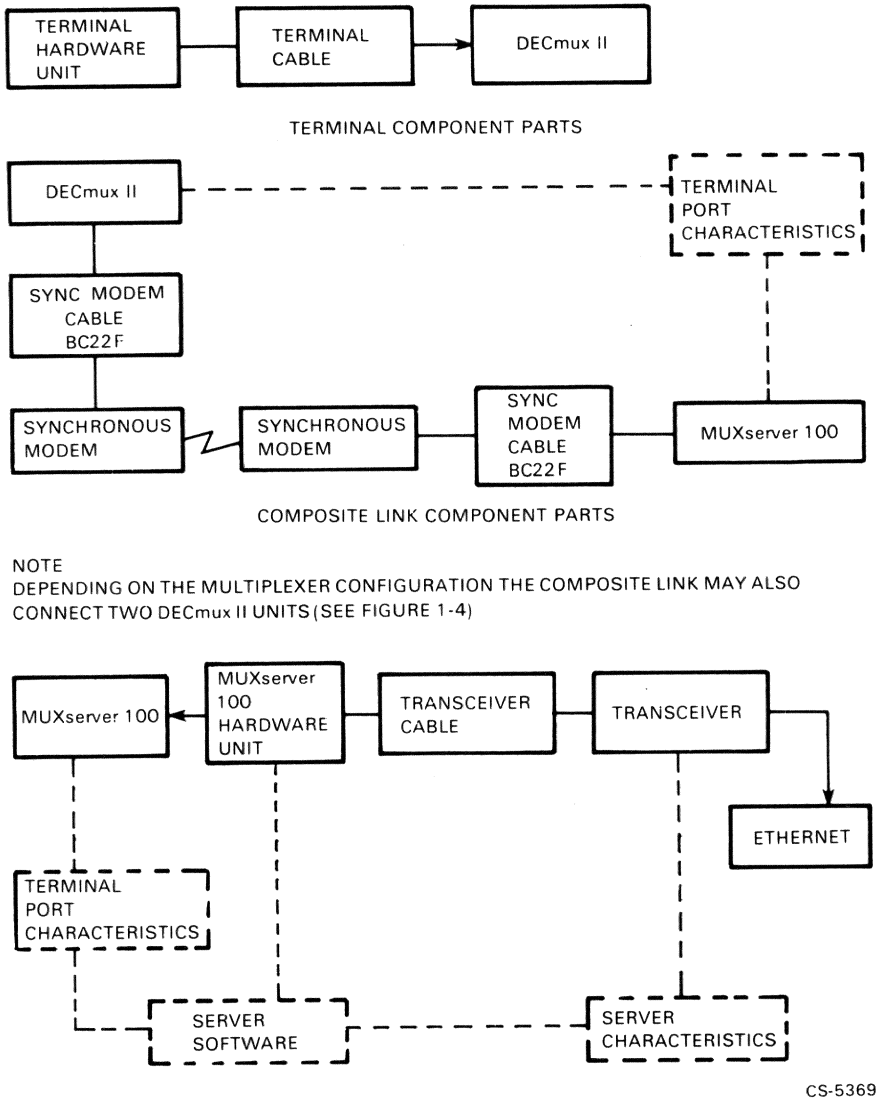

Figure 4-2 Breakdown of LAT Network Components (Sheet 2 of 2)

4.1 WHAT TO DO FIRST

To begin troubleshooting, find out first if the problem affects all the ports or only some of the ports.

- When the problem involves all the ports, do the following:

  1. If message number 913 appears on the supervisor port terminal, go no further in this sequence of steps. Refer directly to Section 4.2.5, Message Number 913 Appears.
  2. If the terminal users can still enter MUXserver 100 commands at their terminals, have them finish their active sessions. Then have them log out their terminals. If they cannot use their terminals, go on to Step 3.
  3. Initialize the MUXserver 100 by turning the power switch OFF, wait for ten seconds, then turn it on again. (This is a "power-up" of the server). The server executes its diagnostic self-test. After about 20 seconds, the green light on the server stays off or comes on, and status messages are output to the supervisor port terminal.
  4. If the green light on the back of the unit stays off, go on to Section 4.2.1, Server Green Light Off.

- If the green light stays on take note of the error message displayed on the Supervisor Port terminal. If an ERROR MESSAGE appears, refer to Appendix A, Section A.2.5 (Supervisor Port Message Codes 900-999). The text in this appendix will refer you to a trouble shooting procedure on this chapter.
- If the message indicates that the 'Downline Load is Complete' but 'Composite Link A' or 'Composite Link B' is DOWN, refer to Section 4.3, PROBLEMS INVOLVING THE COMPOSITE LINKS.
- If the problem affects only terminals associated with a particular DECmux II unit, refer to Section 4.3.
- If the problem affects individual terminals, refer to Section 4.4, PROBLEMS INVOLVING INDIVIDUAL PORTS.

The diagnostic self-test is an important feature of the MUXserver 100. During the self-test, internal software checks the state of a number of hardware components. The green light on the server shows the result of the test.

When a condition generates message number 913, the server initializes itself automatically.

After completion of a self-test, you can reinitialize the MUXserver 100 by pressing <CTRL/P> on the supervisor port terminal. You need not power-up the server. This reinitialization works if the problem involves down-line loading of the server software.

NOTE

The supervisor port terminal receives status messages that make the troubleshooting process much easier. For server installation, this terminal must be configured to operate with a speed of 9600 bps and a character size of 8 bits with no parity. Following installation, you can use the DEFINE PORT command to set up other values for speed, character size, and parity.

4.2 PROBLEMS AFFECTING ALL PORTS

This section describes what to do after you initialize the MUXserver 100 for problems that affect all the remote terminals. The green light on the MUXserver 100 unit is in one of two states, approximately 20 seconds after you initialize the server.

- Off - the server has no power or has a serious hardware problem (see Section 4.2.1, Server Green Light Off).
- On continually - this indicates that the processors in the MUXserver 100 are operating and it is performing self diagnostic tests and attempting to down-load its operational software. To determine the source of the problem interpret the error messages displayed on the supervisor port terminal.

  If the display indicates

  ```
  IMAGE LOAD COMPLETE
  ```

  this indicates that the Ethernet interface is operational and that the software has correctly downloaded into the MUXserver 100.

If the display then indicates

```
COMPOSITE LINK A DOWN
```

and/or

```
COMPOSITE LINK B DOWN
```

this indicates that there is a communications failure with the remote DECmux II units. Refer to Section 4.3, PROBLEMS INVOLVING THE COMPOSITE LINKS.

4.2.1 Server Green Light Off

Problem Power is not reaching the MUXserver 100.

Correction: Secure the power cable at the server and wall outlet and check that the ON/OFF switch on the unit is ON.

Correction: Check the wall outlet using another appliance or light; or plug the server power cord into another outlet. If no power is available, check the circuit breaker for the outlet.

Correction: Ensure that the voltage select switch is set to the correct voltage for your country (120V for North America, 240V for Australia and New Zealand). Refer to the *MUXserver 100 Network Installation Manual* to determine the correct setting.

Correction: Determine if the fuse has blown on the MUXserver 100 unit. If necessary, replace the fuse as shown in the *MUXserver 100 Network Installation Manual.*

Correction: Replace a defective server power cable with a new cable (you can use the power cord for a VT100 terminal).

Problem A hardware error has occurred which makes the MUXserver 100 nonoperational. The server cannot function.

Correction: There is no corrective procedure for this problem. Return the unit to Digital Equipment Corporation for service or replacement (see Section 4.7, DIGITAL SERVICE).

4.2.2 Error Messages on the Supervisor Port Terminal

If you see the GREEN light is continually ON, and ERROR messages have been output to the supervisor port terminal, this indicates that the MUXserver has detected a non-fatal problem during self test. Typically the format of the error message is as follows.

```
Local -911- WARNING - Non-fatal hardware error detected
Server status nnnn, terminal status n n n n n n n n n n n n n n n n n
```

The message contains a status code nnnn for the server itself, and a status code n (17 of them) for each of the server's terminal ports (that is, 16 remote terminals plus the supervisor port). For both codes, the ns are either 1 or 0.

Section 4.4.2, Error Messages Displayed, Green Light On, discusses the terminal status codes.

The location of the number 1 in the server status code tells you what error was detected. (Note that there can be from 1 to 4 ones in the 4-digit code.)

4.2.2.1 nnn1 - Server Parameters Checksum Error -

Problem The server characteristics in the server's permanent database have been damaged. The factory set defaults are now in effect.

Correction: Re-enter the desired server characteristics using the DEFINE SERVER command (see Chapter 5, Section 5.7, DEFINE SET SERVER). Reinitialize the server with the INITIALIZE command or a power-up to bring these parameters into effect. If this action fails to correct the problem, the memory used to store the characteristics is faulty. You can continue to use the server with the factory default characteristic, or see Section 4.7, DIGITAL SERVICE, for information about returning the unit to DIGITAL.

4.2.2.2 nn1n - Hardware Revision Level Checksum Error -

Problem The server's nonvolatile memory is faulty.

Correction: There is no correction for this problem. You can continue to use the server. However, performance enhancements based upon hardware revisions are not in effect. This means that the MUXserver 100 may run slightly slower than it would otherwise. If you wish to return the unit to DIGITAL, refer to Section 4.7, DIGITAL SERVICE.

With this problem, asterisks (*) appear in the hardware revision field in the SHOW SERVER display.

4.2.2.3 n1nn - Ethernet Loopback Error - The following error message appears on the console terminal:

```
Local -910-Image load not attempted, network
          communication error
```

Problem There is a faulty or loose transceiver cable.

Correction: Check the cable that runs from the MUXserver 100 unit to the transceiver, DELNI, or Etherjack. Be sure the cable is securely connected at both ends. Check the cable for any signs of damage.

If you have an H4080 turnaround connector, you can verify the operation of the transceiver cable. Replace the transceiver with the H4080 and then initialize the server by entering <CTRL/P>. If the continual green light and the n1nn status persist after the next self-test, the cable is likely to be at fault. If the error message disappears the transceiver or Ethernet tap may be malfunctioning (see below).

NOTE

When the green light glows steadily with the H4080 replacement, the server attempts to down-line load the server software. Since the H4080 is not connected to the network, the down-line load fails.

If you do not have an H4080 turnaround connector, you should connect the server to a transceiver cable that you know is working. Make sure all cable connections are secure, and then press <CTRL/P>. If the server still shows a status of n1nn, see Section 4.7, DIGITAL SERVICE, for information about services offered by DIGITAL to assist you in problem resolution. If the error message disappears you should replace the original transceiver cable or use the cable you know to be workable.

Problem The transceiver is faulty.

Correction: If you have an H4080 turnaround connector, you can verify the operation of the server's transceiver interface and transceiver cable. Remove the cable from the H4000 transceiver and connect it to the H4080. Initialize the server with <CTRL/P> to start its self-test.

The following results occurring together indicate that the transceiver or the Ethernet tap are faulty: (1) the green light on the MUXserver 100 is steady (2) the supervisor port terminal displays the messages below at approximately 30 second intervals:

```
Local -902- Waiting for Image Load
Local -912- Load failure, timeout
```

If you do not have an H4080 turnaround connector, connect the MUXserver 100 to a known good transceiver. Press <CTRL/P>. If the green light stays on and the error message disappears, the original transceiver or its Ethernet tap is likely to be faulty.

NOTE

DIGITAL does not support all non-DIGITAL transceivers. Refer to the MUXserver 100 Software Product Description for information about supported transceivers.

Problem The Ethernet tap is bad.

Correction: Move the transceiver to a new location and reinstall. Press <CTRL/P>. If the green light glows continuously and there are no error messages, the new Ethernet is good, and the MUXserver 100 will work normally. If the problem persists, the transceiver is probably bad. Replace it with another transceiver and retry.

4.2.2.4 1nnn - Ethernet Heartbeat Error -

Problem The transceiver is a non-DIGITAL transceiver that was made to conform to the Ethernet Version 1.0 specification. Some manufacturers transceivers conform to the earlier Ethernet specification which did not include the heartbeat signal. All DIGITAL transceivers conform to Version 2.0 and supply this signal.

Correction: If you are using a non-DIGITAL transceiver, you should disable the server's heartbeat detection action by defining the server characteristic, HEARTBEAT, as DISABLED. Enter the DEFINE SERVER HEARTBEAT DISABLED command (see Chapter 5, MUXserver 100 COMMAND DESCRIPTIONS). Reinitialize the server to make this change operational.

NOTE

The steady green light and error message status 1nnn still appear even with HEARTBEAT disabled. However, the server will function normally.

Problem There is a transceiver fault or a cabling problem.

Correction: Refer to Section 4.2.2.3, n1nn - Ethernet Loopback Error.

4.2.3 No Supervisor Port Messages

The Supervisor terminal has no display when the server initializes.

Problem The supervisor terminal is faulty.

Correction: Refer to Section 4.4, PROBLEMS AFFECTING INDIVIDUAL PORTS, for troubleshooting steps for problems that affect individual ports.

Problem The supervisor terminal's characteristics are not set up correctly.

Correction: Refer to Section 4.4 for troubleshooting steps for problems that affect individual ports.

NOTE

For server installation, the supervisor port terminal must be configured to operate with a speed of 9600 bps and a character size of eight bits with no parity. Following installation, you can use the DEFINE PORT command to set up the console terminal with other values for speed, character size and parity.

4.2.4 Down-line Loading Problems

If you have a down-line load problem, the user name prompt (Enter username>) does not appear on the terminals. Also, no terminals will respond to keyboard entries.

Two sequences of 900 series messages on the supervisor port terminal indicate down-line loading problems. Each is covered in the following sections.

NOTE

Have event logging enabled for events 0.3 and 0.7 on all DECnet load hosts that may be down-line loading the server. Refer to the DECnet load host documentation for information about event logging, or see the system manager for the DECnet load host.

4.2.4.1 Down-line Load Starts, Then Fails - The following sequence of message appears on the supervisor port terminal at 30 second intervals:

```
Local -902- Waiting for image load
Local -903- Loading from host load-host-address
Local -912- Load failure, timeout
```

Problem The directory with the software image on the load host is not defined. For example, on a load host running VAX/VMS (V4.0), the directory with the MUXserver 100 software image, MOM$LOAD, is not defined.

Correction: Have the system manager execute the commands required to define the directory. For VAX/VMS (V4.0), he should enter the following statement in the system startup file on the load host, and then execute the command itself.

```
$DEFINE/SYSTEM/EXEC/NOLOG MOM$LOAD SYS$SYSROOT:[DECSERVER]
```

Problem The MUXserver 100 unit has been incorrectly configured on the load host, or the server software has not been installed properly.

Correction: Perform the procedures outlined in Section 4.2.4.2, Downline Load Does Not Start.

Problem The server characteristic, SOFTWARE, has been changed. The new file name for the server software image is not defined on the load host.

Correction: Normally the server SOFTWARE characteristic should be defined as MS1601ENG.SYS. Chapter 2, Section 2.4 (SETTING UP SERVER CHARACTERISTICS) tells you how to reset SOFTWARE to MS1601ENG.SYS. The load host system manager can ensure that the file name on the load host is correct. For example, the file specification for the server software on a VAX/VMS load host should be MOM$LOAD:MS1601ENG.SYS.

4.2.4.2 Down-line Load Does Not Start - The following sequence of messages appears on the supervisor terminal at 30 second intervals:

```
Local -912- Load failure, timeout
Local -902- Waiting for image load
```

Problem The load host does not contain a node database entry for the server, or does not contain the proper node information.

Correction: Verify that: (1) the load host contains a node entry for the server, (2) all information pertaining to down-line loading is correct.

For example, for a VAX/VMS load host, ask the system manager to do the following:

1. Execute the command file MSVACONFIG.COM in the directory with the logical name SYS$SYSROOT:[DECSERVER]. This is the procedure that he or she uses to configure a MUXserver 100 in the host's database.
2. Enter number 1 in the Menu of Options. This option displays the DECnet address, DECnet node name, Ethernet address, and up-line dump file for the server. For example:

```
DECnet Address : DECnet Node Name : Ethernet Address : Dump File
-------------------------------------------------------------------
55.126              LAT4              08-00-2B-00-16-AC ASDMP16AC.SYS
```

If the information is wrong, the system manager can correct it by running MSVACONFIG.COM and choosing item 2 in the Menu of Options.

3. Enter the following NCP command using the server's DECnet node name. This command lists the server's characteristics stored in the host's database.

```
NCP>SHOW NODE LAT4 CHARACTERISTICS
```

Here is an example of the display that this command generates:

```
Node Volatile Characteristics as of 2-OCT-1984 16:40:53

Remote node =    55.126 (LAT4)

Service circuit =UNA-0
Hardware address=08-00-2B-00-16-AC
Load file       =SYS$SYSROOT:[DECSERVER]MS1601ENG.SYS
Dump file       =SYS$SYSROOT:[DECSERVER]ASDMP16AC.SYS
```

If the information in step 3 is complete and correct, the server is configured properly on the load host. If it is not, the system manager can make corrections using AUSCONFIG.COM. He or she may also need to use NCP commands to correct the "Load file" file name.

Problem The server's DECnet load host is not available.

Correction: Check to be sure the server's DECnet load host is available on the network. Be sure that the load host has the network properly turned on and that the Ethernet circuit is in the ON state. Use the load host's Network Control Program (NCP) as documented in the load host's DECnet documentation to verify that the network is up, that the Ethernet connection is on, and that service is enabled. An example of the NCP commands necessary to perform these checks and the NCP output is shown as follows.

```
NCP>   SHOW EXECUTOR STATUS

Node Volatile Status as of 19-AUG-84  13:12:00

Executor node = 4.6 (BOSTON)

State                =on
Physical address =AA-00-04-00-06-10

NCP>   SHOW ACTIVE LINES STATUS

Active Line Volatile Status as of 19-AUG-84 13:12:15

Line                 State
UNA-0                on

NCP>   SHOW ACTIVE CIRCUITS STATUS

Active Circuit Volatile Status as of 19-AUG-84 13:12:25

Circuit  State  Loopback   Adjacent      Block
                Name       Node          Size

UNA-0    on                4.36(LAB01)   576

NCP>   SHOW ACTIVE CIRCUIT CHARACTERISTICS

Active Circuit Volatile Characteristics

    Circuit  =  UNA-0

    State                          = on
    Service                        = enabled
    Designated router              = 4.1 (TWO)
    Cost                           = 3
    Router priority                = 16
    Hello timer                    = 15
    Type                           = Ethernet
    Adjacent node                  = 4.1 (TWO)
    Listen timer                   = 45
```

Problem The server's DECnet load host is not on the same Ethernet.

Correction: Have the network manager assign one of the nodes on the server's Ethernet to be a load host for the MUXserver 100. Have the load host's system manager add the server to his database by running the MSVACONFIG program.

Correction: Reconfigure the network to ensure that the load host is on the same physical Ethernet as the server.

Problem Transmissions between the MUXserver 100 and the load host fail because of Ethernet circuit problems.

Correction: Have the system manager of a DECnet Phase IV node execute the NCP LOOP CIRCUIT command with the MUXserver 100 as the target node. The *LAT Network Manager's Guide* describes the LOOP CIRCUIT command. The NCP facility shows the results of the loopback test at the DECnet node.

4.2.5 Message Number 913 Appears

If message number 913 appears on the supervisor port terminal, it means that the MUXserver 100 detected an internal fatal error (fatal bugcheck).

A software problem, or bug, is likely to cause only intermittent fatal bugchecks of the MUXserver 100. Your unit may operate again for a period of time and then fail again. If there is more than one server on the Ethernet, the bug is likely to affect all the units.

If the fatal error was a hardware error, the problem probably affects only one of several MUXserver 100 units. The hardware problem may be intermittent and only occasionally affect the unit.

After a fatal bugcheck, the server automatically executes its self-test and requests a down-line load of the server software. If the green light is off or an error message is displayed after the self-test, go to Section 4.2.1, Server Green Light Off, or 4.2.2, Error Message On the Supervisor Port. Otherwise, take the following steps.

Problem A fatal hardware error has been detected.

Correction: There is no corrective procedure for this problem. If the failures happen often enough to be disruptive, return the unit to Digital Equipment Corporation and install a replacement. Record the values for the five parameters in the 913 error message. Forward this information and the server up-line dump file to DIGITAL (see Section 4.7, DIGITAL SERVICE). Up-line dumping after a fatal bugcheck is discussed below.

If the replacement unit works correctly, it is likely that a hardware error caused the first unit to crash.

Two non-standard self-tests can help you confirm a hardware failure in the original unit. If you can enter commands at the supervisor terminal, execute these tests by issuing the following INITIALIZE commands:

INITIALIZE DIAGNOSE FULL

INITIALIZE DIAGNOSE FULL COUNT number

Chapter 5, Section 5.14 (INITIALIZE) has the complete command description for the INITIALIZE command.

Use the first command to check for a hardware error that causes a crash each time you use the server (non-intermittent error). Use the second to check for intermittent errors.

The self-test for the first command takes about 90 seconds. The length of the self-test for the second command depends on the value you specify for number. When you increase number by 1, you add about 90 seconds to the length of the test. For example, a value of 320 for number, generates a test of about eight hours duration.

Problem A fatal software error has been detected.

Correction: There is no corrective procedure for this problem. Record the values for the five parameters in the error message. Send this data and up-line dump file to DIGITAL (see Section 4.7, DIGITAL SERVICE).

A fatal bugcheck automatically causes an up-line dump of server memory to an appropriate host node. If you have several dump hosts defined, you can determine the host that received the up-line dump by typing the privileged SHOW SERVER command. The Ethernet address of the dump host appears in the display.

The file name of the dump file on the host is:

ASDMPnnnn.SYS

Here 'nnnn' are the last four digits of the server's Ethernet address. For example, a MUXserver 100 with Ethernet address 08-00-2B-00-16-AC generates a dump file at SYS$SYSROOT:[DECSERVER]ASDMP16AC.SYS on a VAX/VMS dump host.

If error message number 914 appears on the supervisor terminal, the up-line dump is not successful. There may be Ethernet problems inhibiting transmissions between the server and the up-line dump host. Refer to Section 4.6, PROBLEMS INVOLVING THE ETHERNET.

4.2.6 Terminal Port or Terminal Hardware Problems

If the situations discussed in Sections 4.2.1 (Server Green Light Off) to 4.2.5 (Message Number 913 Appears) do not apply, the behavior of the terminals is the primary indicator for troubleshooting.

Problem The terminals exhibit one or more of the following kinds of behavior:

- The terminals have no display, and do not respond to keyboard entries.
- The terminals have a screen display but are non-responsive.
- Not all the characters appear on the terminal screens.
- Nonsense characters appear on the terminals.

Correction: Attach a loopback connector, H325, in place of the terminal, and use the command

```
LOCAL> START TEST PORT n LOOPBACK
```

Wait a few minutes, then stop the test and note the result.

```
LOCAL> STOP TEST PORT n
```

This verifies the port operation. (Note: check that input and output speed are the same.) This will identify a terminal port from a Terminal Hardware Problem. For a terminal hardware problem, refer to Section 4.4, PROBLEMS ADDRESSING INDIVIDUAL PORTS, and carry out the troubleshooting procedures outlined.

If it is a terminal port problem, check other terminal ports to determine if all 8 ports on the DECmux II unit are affected. If so, go to Section 4.3, PROBLEMS INVOLVING THE COMPOSITE LINKS, for composite link problems.

If the problem is limited to one or two terminal ports, suspect a faulty DECmux II unit and return it for repair.

Go to Section 4.4 and carry out the troubleshooting procedures for individual terminals. If you solve the problem for one of the terminals, apply that solution to all the terminals.

4.3 PROBLEMS INVOLVING THE COMPOSITE LINKS

The status of the composite links are output to the supervisor port terminal of the MUXserver 100 immediately after the completion of the image load and hence diagnostic self tests. Any change in status of the links will also be output to the supervisor port providing a session is not currently in progress.

NOTE

The link status message refers to Port A and Port B of the MUXserver 100. If the multiplexer configuration given in Figure 4-1 is in use, the MUXserver 100 will show PORT B as being DOWN (as it is not used) and it will not show the status of the composite link between the two DECmux II units.

For a complete indication of the composite link status, use the MAP command (see Chapter 5, Section 5.16, MAP). This command may be selected from the 'privileged mode' on the supervisor port of the MUXserver 100 by entering COMM then MAP or from the supervisor port of either DECmux II unit by entering MAP. Exit the MAP command by entering <CTRL/C>.

If a DECmux II unit is not shown on the MAP, or the link to a particular DECmux II is shown as DOWN, then the composite link communications has failed.

Troubleshooting composite link failures requires access to the units at both ends of the failed link. The checks and tests are the same for a MUXserver 100 and the DECmux II and are initiated from the supervisor port on each unit.

The most likely source of error on composite links tends to be associated with incorrect installation. A list is as follows.

- The DECmux II units at the remote sites are not installed or powered up correctly. See the *MUXserver 100 Network Installation Manual*, Section 3.
- Incorrect Cabling. Check Section 1.7 of the *MUXserver 100 Network Installation Manual* for correct cables and pin assignments. Note particularly that RS-232 cables should be limited to distances less than 50 feet (15 meters) and RS-422 to distances less than 3280 feet (1 kilometer).
- Incorrect multiplexer configuration. A composite link must always connect from an 'A' port to a 'B' port.
- Composite link parameters are not compatible at each end of the link and do not match the MODEM characteristics.
- A DECmux II unit is incorrectly configured in MASTER mode. The MUXserver 100 must be configured as MASTER and the DECmux II units as SLAVE. These are the factory default settings.
- The DIP switch selection for RS-422/RS-232 line type on the MUXserver 100 does not match the programmed line type selection. See Chapter 2, Section 2.5 (SETTING UP THE COMPOSITE LINK PARAMETERS).

The following steps should be followed when troubleshooting composite link failures.

4.3.1 Check the GREEN Light of the DECmux II

Problem The GREEN light on the front of the DECmux II is not ON. (This light indicates that the DECmux II unit has powered ON correctly and has passed its self diagnostic tests. When the unit is powered ON, the green LED will flash briefly and then remain OFF for several seconds while self test diagnostics are run. It should come ON permanently if all the self tests pass.)

Correction: Connect a terminal to the supervisor port and power up the unit again. The start-up display listing the diagnostic tests by numbers can be monitored.

NOTE

If the terminal speed is not set to 9600 baud, *this does not indicate a fault* - the start-up message will be garbled. *If the green LED does not stay on permanently, the DECmux II is faulty.* Return it for repair (refer to Section 4.7, DIGITAL SERVICE).

4.3.2 Green LED on Steady, DSR Light Off (RS-232 Lines ONLY) (This Applies to Both the MUXserver 100 and the DECmux II)

Problem The Red DSR LED on the back of the MUXserver 100 or the DECmux II are OFF.

Correction: The two red LED indicators on the rear connector panel indicate the status of the composite port DATA SET READY conductors. The ON state indicates successful connection to a modem on the respective composite port. The OFF state indicates that the modem is either in the process of connecting or not connected.

If the DSR LED is OFF when there is an RS-232 composite link connection to that port, check the cable connections. Communications cannot occur with this DSR light OFF.

4.3.3 All Indicators OK - Check Composite Link Parameters

Problem Incorrect link parameters

Correction: Log in to the supervisor port of the DECmux II and/or MUXserver 100 at each end of the failed composite link. Use the 'SYSTEM' command to check the following parameters.

- Speed
- Long Line Drive (RS-422) or RS-232
- If RS-232, is MODEM enabled?

NOTE

The parameters must be identical and match exactly the characteristics of the modems used for RS-232.

- Is the DECmux II configured as SLAVE and the MUXserver 100 configured as MASTER?

NOTE

If two DECmux II units form the failed composite link, both must be configured as SLAVE.

This procedure checks the programmed settings only. The MUXserver 100 also requires DIP switch settings to change from the default setting of RS-232. See Chapter 2, Section 2.5 (SETTING UP THE COMPOSITE LINK PARAMETERS).

4.3.4 Error Message - 'Synchronous Port Connection Error'

Problem Following the start-up procedure, the above error is displayed on the terminal connected to the supervisor port.

Correction: This message is given if the DECmux II unit or MUXserver 100 detects an illegal network connection. Most common cause is a loopback connector left connected to a composite link port or a modem set to loopback mode.

4.3.5 Diagnostic Tests

Having exhausted item 4.3.1 to 4.3.4, the functionality of each of the composite link components can be verified by using the diagnostic test facilities on the DECmux II and the MUXserver 100. Figure 4-3 summarizes all the loopback tests available from the MUXserver 100 supervisor port. The 'LOOP' command and the 'START TEST PORT n LOOPBACK' command are entered in response to the LOCAL> prompt. All the others are selected by means of the TEST command in the communications sub-directory (that is, in response to the COM> prompt).

4.3.5.1 Diagnostic Tests with the Composite Link Installed -

- On the MUXserver 100

  With all the composite link components connected, log on to the 'privileged mode' of the supervisor port and enter 'COM' to access the COMMUNICATIONS sub-directory of commands.

  Select the 'TEST' command and answer 'YES' to the prompted question. Select the 'Composite Port External Test' (Test No 3) in response to the displayed prompt and select the failed composite port (that is, 'A' if Port A is the suspect connection). This test will verify the functionality of this link.

  Refer to Chapter 7, Section 7.2.2.4 (Offline Test 4 - Composite External Port Test) for details of the 'Composite External Port' test.

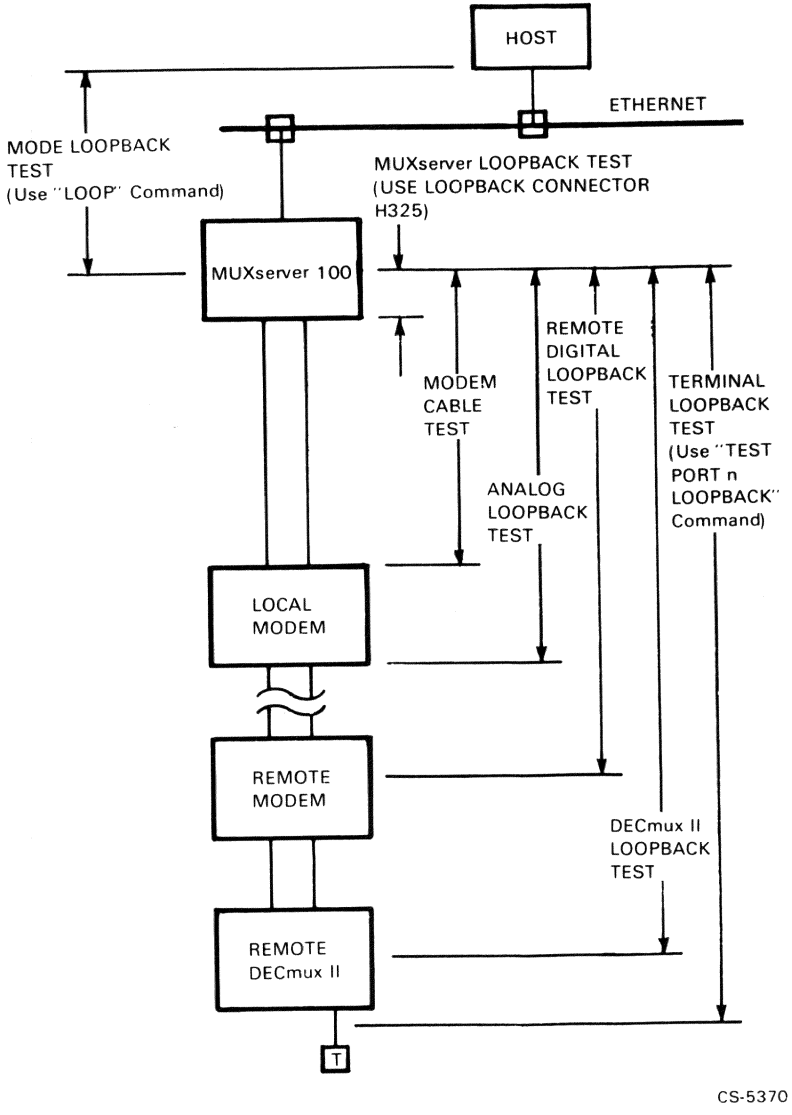

Figure 4-3 Diagnostic Test Loopback Points

4.3.5.2 Diagnostic Tests Using LOOPBACK Connectors - The following procedure applies equally to the MUXserver 100 and the DECmux II. Each involve running the TEST command as in Section 4.3.5.1 (Diagnostic Tests with the Composite Link Installed).

The procedure is as follows.

1. For RS-232 composite links.

   Place a loopback connector (Part #H325) on the suspect composite port replacing the BC22F cable connection. Run the 'Composite Port External test' as discussed in Section 4.3.5.1.

2. For RS-422 composite links on the MUXserver 100.

   Using the Test cable, Part No. 70-22411-01 (see Chapter 1, Section 1.11 of the *MUXserver 100 Network Installation Guide* for pin connection details), connect Port A to Port B. Using the 'SYSTEM' command, configure both Ports A and B as RS-422 with equal speed settings. Similarly, configure the DIP switches for RS-422 (see Chapter 2, Section 2.5, SETTING UP THE COMPOSITE LINK PARAMETERS). Run the 'Composite Port External test' as discussed in Section 4.3.5.1.

   NOTE

   Be sure to select both ports A and B in response to the displayed prompt, (that is, respond with <RETURN>).

3. For RS-422 composite links on the DECmux II unit.

   Using the Test cable, Part No 70-20984-01 (see Chapter 1, Section 1.11 of the *MUXserver 100 Network Installation Guide* for pin connection details), connect Port A to Port B. Configure both ports and run the 'Composite Port External Test' as discussed in 2 above.

NOTE

If this test fails recheck that:

- **The composite port parameters are correct. You must have RS-232 selected when running test 1. When running RS-422 Loopback test as in step 2, both composite ports must be set for RS-422 and the same speed**

  and

- **The correct DIP switch selection has been chosen for the line type on the MUXserver 100. See Chapter 2, Section 2.5 (SETTING UP THE COMPOSITE LINK PARAMETERS).**

If the above checks have been made and the *test fails*, the unit is *faulty* and should be returned for repair. (See Section 4.7, DIGITAL SERVICE.)

If the test *passes* on both units, this verifies that they (that is, DECmux II or MUXserver 100) are not faulty, and the problem exists in the remaining composite link components. The next step is as follows.

— For RS-422 composite links, this can only mean a faulty cable or cable connections. Check the connections as per the pin assignments given in Chapter 1, Section 1.7 of the *MUXserver 100 Network Installation Manual* and replace the cable if necessary.

NOTE

Be sure to reset the composite port parameters if these were changed when conducting the tests specified in steps 2 and 3 above. (See Chapter 2, Section 2.5.)

— For RS-232, the 'Composite Port External Test' can be re-run with the following loopback facilities

(a) A loopback connector H325 attached to the end of synchronous modem cable BC22F, (that is, replace the modem).

This verifies the cable.

and

(b) Place the modem in loopback mode. This verifies the link up to and including the modem.

(c) Repeat this process from the other end of the link.

Steps (a), (b) and (c) must identify the faulty component. Replace the faulty component and retest the link.

4.4 PROBLEMS AFFECTING INDIVIDUAL PORTS

This section describes troubleshooting procedures to take when you experience a problem that appears to affect only some of the server's ports.

4.4.1 Terminal Display is Wrong

Refer to Table 4-1. Locate the text that describes the behavior of the terminal. Go down the list of possible problems, in order, and then to the problem number listed for each. Carry out the corrective action described in the section that addresses the problem.

If you cannot correct the problem, refer to Section 4.6, PROBLEMS INVOLVING THE ETHERNET for information about services offered by DIGITAL for problem resolution.

Problem 1 The terminal is receiving no power. The terminal's power indicator is off.

Correction: Be sure the terminal is plugged into an outlet that has power. Check the power switch position to be sure the terminal is on. If the terminal has a fuse or circuit breaker, try replacing or resetting it. On most terminals, if you fail to see the cursor after approximately one minute, you can assume that the terminal either has no power or is faulty.

Problem 2 The terminal is faulty.

Correction: Switch the terminal to its off-line mode (refer to the terminal operator's guide). If the problem behavior persists when you enter characters, the terminal is probably faulty.

Correction: If possible verify the operation of the terminal at another location. Use the same terminal characteristics when performing this operation.

Problem 3 There is a loose or faulty terminal cable.

Correction: Be sure the terminal cable is secure at both the terminal server and the terminal. If the cable is made of several sections, be sure all junctions are secure. Inspect the cable for any cuts or crimps. If the cable is not loose or damaged, try another terminal cable.

NOTE

Check with Section 1.10 of the *MUXserver 100 Network Installation Manual* for the correct cable, pin assignments and maximum cable lengths.

Table 4-1 Terminal Behavior and Possible Problems

Behavior	Problem	Problem Number
No display and nonresponsive	No power to terminal	1
	Faulty terminal	2
	Loose or faulty terminal cable	3
	Terminal speed set incorrectly	4
	Terminal parity or character size set incorrectly	5
	Terminal failing to autobaud	6
	Dedicated service not available	7
	Faulty terminal port on server	9
Not all characters displayed	Flow control disabled	8
	Terminal parity or character size set incorrectly	5

Table 4-1 Terminal Behavior and Possible Problems (Cont)

Behavior	Problem	Problem Number
Nonsense characters displayed	Faulty terminal 2	
	Loose or faulty terminal cable	3
	Terminal speed set incorrectly	4
	Terminal parity or character size set incorrectly	5
	Terminal failing to autobaud	6
	Faulty terminal port on server	9
A working terminal no longer responds	Faulty terminal	2
	Loose or faulty terminal cable	3
	Terminal input speed set incorrectly	4
	Dedicated service not available	7
	Faulty port on DECmux II	9

Problem 4 The terminal speed is set incorrectly.

Correction: Following the procedure described in the terminal operator's guide, set the terminal speed to match the speed specified in the server's database; or modify the server's database to match the terminal's speed. The server supports the following speeds - 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, and 19200 bits/second. If your terminal cannot be set to one of these speeds, you will not be able to use the terminal with the MUXserver 100 remote terminal server. If you intend to use the autobaud feature with the terminal, the input and output speeds of the terminal must be set to the same setting (see Chapter 2, Section 2.5.2, Setting Link Speed and Line Type On the DECmux II).

Problem 5 The terminal parity or character size is not set correctly.

Correction: Following the procedure described in the terminal operator's guide, set the terminal parity and character size to match the character size and parity specified in the server's database. Alternatively, modify the server's database to match the terminal's character size and parity. The server supports odd, even, and no parity terminals and character sizes of seven and eight. If your terminal cannot be set to one of these parity and character size settings, you will not be able to use the terminal with the MUXserver 100. If you intend to use the autobaud feature (see Chapter 2, Section 2.7.2, Port Data Characteristics) with the terminal, the parity and the character size settings of the terminal must be:

- 8-bit character size and no parity
- 7-bit character size and even parity

If you cannot set the terminal to one of these settings, the terminal cannot be used with autobaud. You must set up the speed, character size and parity for the terminal port to match those for the terminal itself.

NOTE

The MUXserver 100 does not support space parity. Older DIGITAL terminals, such as the LA36, may require setting up with jumpers to operate with the server. Refer to the terminal operator's guide for details.

Problem 6 The terminal is failing to autobaud.

Correction: If the terminal is not properly set up, the server will be unable to autobaud the terminal. At an operable terminal, enter the SHOW TERMINAL command for the suspect terminal. See if the problem terminal is set up as an autobaud terminal. If autobauding is used, the terminal must be set up in one of the following configurations:

- Character size 8 and parity none or character size 7 and parity even.
- Input and output speed (no split speeds allowed) set to: 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 3600, 4800, 9600, or 19200 bits/second.

Problem 7 The dedicated service is not available.

Correction: If a terminal has a dedicated service and that service is not available, the terminal will appear to be nonresponsive. Use another terminal to verify if a dedicated service is set for the problem terminal. If one is set, verify that the service is available. If the service is available, verify that the problem terminal and the service have a common group code enabled.

Problem 8 Flow control is disabled.

Correction: Set the FLOW CONTROL characteristic for the terminal to ENABLED using both the SET PORT and DEFINE PORT commands (refer to Chapter 5, Section 5.7, DEFINE SERVER). This puts flow control in effect at the terminal's port on the server. Ensure that the flow control characters XON (CTRL/Q) and XOFF (CTRL/S) are enabled at the terminal itself. (Refer to the terminal operator's guide.)

Problem 9 The terminal port in the server is faulty.

Correction: Verify that the port hardware is faulty. Plug a loopback connector in the terminal's rear panel jack. Enter the START TEST PORT LOOPBACK command using the faulty terminal's number. (Since you must disconnect a terminal to install the loopback connector, you cannot execute START TEST PORT LOOPBACK for the terminal you are using). Check the error counters. If the error counters are nonzero, then the port is faulty. Continue using the server with the faulty port, or return the MUXserver 100 to DIGITAL (see Section 4.6, PROBLEMS INVOLVING THE ETHERNET).

NOTE

When you use the START TEST PORT LOOPBACK command, the input and output speeds for the terminal port must be the same.

4.4.2 Error Messages Displayed, Green Light ON

After power-up, if the MUXserver 100 detects an error, it outputs a message to the supervisor port terminal. The error message number 911 shows the results of the automatic server self-test (refer to Section 4.2.2, Error Messages On the Supervisor Port Terminal). In the error message, a 2-digit code is displayed for the supervisor port and a 1-digit code for each remote user port.

If a "1" appears in the status code for a terminal (regardless of the 4-digit server code), you have one of the following possible problems.

Problem A status of 1 for a remote user port or n1 for the supervisor port indicates a checksum error. The characteristics for the indicated terminal no longer pass the internal checksum test. The factory specified defaults are in effect.

Correction: Use the DEFINE PORT command to again set the terminal characteristics values to those you choose.

Initialize the server with a power-up. If the same error occurs, you can continue to use the server with the factory specified terminal characteristics, or return the server for repair or replacement as described in Section 4.6, PROBLEMS INVOLVING THE ETHERNET.

Problem A status of 1n indicates a supervisor port hardware error.

Correction: There is no corrective procedure for this condition. Return the MUXserver for repair as described in Section 4.7, DIGITAL SERVICE.

4.4.3 PC File Transfer Fails

A terminal user can operate a personal computer (PC) as a MUXserver 100 remote terminal. He or she can use the server to transfer files to and from service nodes. A file transfer can fail if the terminal or service node is set up incorrectly.

Problem Terminal characteristics are set up incorrectly.

Correction: Use the SET SESSION command to eliminate all special characters in effect for the terminal. The following command should be entered:

SET SESSION PASSALL
or
SET SESSION PASTHRU for ASCII data only

In addition, character size must be set on eight for file transfers.

Problem The service node terminal characteristics are set up incorrectly.

Correction: Refer to the service node or PC documentation for information about setting up characteristics for file transfers. For example, on a VAX/VMS (V4.0) service node, use the following command to set up the characteristics (the command here is continued to a second line):

```
$ SET
TERMINAL/PASSALL/NOHOSTSYNC/NOTTSYNC/NOBROADCAT
$ /EIGHTBIT/NOWRAP
```

4.4.4 A Line Printer Fails at a Remote Access Port

A line printer is a port device attached to a remote access port. A problem in one of the following areas can cause VMS-initiated printing jobs to fail:

- The printer is set up incorrectly on the VAX/VMS or MicroVMS service node. (For details, refer to the *LATplus/VMS Service Node Management Guide.*)
- The printer port is set up incorrectly on your MUXserver 100.
- The printer is set up incorrectly.
- The printer device or its server port is malfunctioning.

The *LATplus/VMS Service Node Management Guide* tells the system manager how to address printer problems at the service node. Section 4.3.1 (Check the Green Light of the DECmux II) in this manual discusses problems involving the printer device and its port. The following material discusses problems related to setting up the printer on your MUXserver 100.

Problem VMS-initiated PRINT tasks do not execute on the printer. The printer stalls with a "checkpointed" error in the VMS SHOW QUE/FULL display.

Correction: The printer port must have the ACCESS port characteristic set up to REMOTE or DYNAMIC. Use the DEFINE PORT command to assign this value for ACCESS.

Correction: The application port on the VMS service node is not correctly mapped to the remote access port on the server. Ensure that the VMS system manager has the correct value for the server NAME characteristic, and for the port's NAME characteristic.

Correction: Check the AUTOBAUD characteristic for the printer port. Ensure that it is defined as DISABLED.

Problem VMS-initiated printing sessions are disconnected before printing tasks are completed.

Correction: With ACCESS DYNAMIC at the port and INTERRUPTS ENABLED, local users can disconnect remote sessions and start local sessions. Determine whether printing requirements justify the port's being used exclusively for a printer. If so, use the DEFINE PORT or SET PORT command to set ACCESS to REMOTE.

Correction: With ACCESS DYNAMIC, you can limit the local user's access by setting INTERRUPTS to DISABLED. Then the port user cannot stop ongoing remote sessions.

Problem Remote connection requests in the server queue are delayed in being connected to a printer on an ACCESS DYNAMIC port.

Correction: No printing tasks can execute until a local user disconnects his or her sessions and logs out. You can define the port characteristic INACTIVITY LOGOUT as ENABLED. Then if a local user has no active sessions, the server logs the user out automatically when the INACTIVITY TIMER expires. Assign a value to INACTIVITY TIMER with the SET SERVER or DEFINE SERVER command.

Correction: If printing requirements justify it, set ACCESS to REMOTE so that only remote sessions are serviced at the port.

4.5 PROBLEMS INVOLVING SERVICE NODES

Problems can occur which involve the interaction between the MUXserver 100 and one or more service nodes. If the same problem appears to involve a number of service nodes and more than one server, it may be an Ethernet malfunction (refer to Section 4.6, PROBLEMS INVOLVING THE ETHERNET). However, if the problem occurs during communication with a particular service, it is likely to be associated with a service node's hardware (including its Ethernet interface), or the service node LAT software.

A terminal user often becomes aware of service node problems when error messages appear. The messages tell why a connection cannot be established or why a service session has been terminated.

4.5.1 Message Timing Problem

An error has occurred involving the timing of messages transmitted between the MUXserver 100 and a service node. One of the error messages in the following groups may appear:

```
Local -201- Connection to 'name' not established
No response within timeout period

Local -206- Connection to 'name' terminated
No response within timeout period
```

Problem The service node exceeded a timeout limit.

Correction: Attempt to reconnect to the service. This condition usually means that the service node has crashed, or is otherwise unreachable. You can check its status by entering the SHOW NODES command with the node name. Report the problem to the system manager of the service node.

```
Local -224- Connection to 'name' not established
              Circuit timer out of range

Local -264- Connection to 'name' not established
              Circuit timer out of range
```

Problem The server circuit timer value is out of the range specified by the service node's system manager.

Correction: Determine the correct circuit timer range. Enter the SET SERVER CIRCUIT TIMER command to reset the timer value (refer to Chapter 2, Section 2.6, SETTING UP THE NETWORK MAP). If this solves the problem, enter the new timer value with DEFINE SERVER CIRCUIT TIMER. This command places the new value in the permanent database.

4.5.2 LAT Protocol Errors

A service node or the MUXserver 100 detected messages that violate the LAT protocol. An error message in the following groups may appear:

```
Local -202- Connection to 'name' not established
              Communication protocol error

Local -207- Connection to 'name' terminated
              Communication protocol error
```

Problem A protocol error occurs in a message received from a service node. A connection attempt fails, or an existing session terminates.

Correction: Attempt to reconnect to the service. This condition indicates a possible problem with the LAT software on the service node. Report the problem to the system manager of the service node.

```
Local -226- Connection to 'name' not established
              Invalid message or slot received

Local -266- Connection to 'name' terminated
              Invalid message or slot received
```

Problem The service node is receiving MUXserver 100 messages that violate the LAT protocol.

Correction: Try the CONNECT command again. If the connection to the service fails, initialize the server again to down-line load the server software. If the error messages appear again for CONNECT, there may be a hardware problem affecting the random access memory (RAM). Refer to Section 4.6 (PROBLEMS INVOLVING THE ETHERNET) for information about DIGITAL services to assist you further.

4.5.3 Group Codes Mismatch

The following messages at a terminal may indicate a group codes mismatch.

```
Local -711- Service name not known

Local -716- Access to service name denied
```

Problem Service node group codes do not match the group codes for the terminal.

Correction: Confirm the mismatch by entering the SHOW SERVICES service-name command at the terminal. If the service node does not appear in the display, the group codes do not match. Determine the group codes that are in effect for the service node. Then adjust the group codes for the terminal as described in Chapter 2, Section 2.7.1 (Session Control Characteristics).

4.5.4 Service Node Software Not Running

One of the following error messages may appear:

```
Local -711- Service name not known

Local -715- Service name not currently available
```

Problem The LAT service node software is not running on any service node offering the service.

Correction: Ask the system manager of a node that offers the service to restart the service node software. The *MUXserver 100 Software Installation Guide* and the *LAT Network Manager's Guide* contain details about the procedure.

4.5.5 Service Node Not Available

The following message may appear when a terminal user tries to connect to a service:

```
Local -715- Service name not currently available
```

Problem A service node has shut down either normally or due to a system crash. Enter the SHOW NODES ALL command to determine if the service node has "unreachable" status.

Correction: Attempt to connect again to the service. If other service nodes offer the service, the MUXserver 100 establishes a session. If no session is established, contact the system manager of the non-operational service node.

4.6 PROBLEMS INVOLVING THE ETHERNET

In Chapter 3, Section 3.2.1 (Show Counters) contains guidelines for monitoring the Ethernet using the SHOW COUNTERS display. The SHOW COUNTERS data is your primary tool for detecting Ethernet problems. However, down-line load or up-line dump failures also indicate possible Ethernet problems.

Problem The counters listed on the right hand column of the SHOW COUNTERS display exceed guidelines.

Or Message 915 (supervisor port terminal only) indicates that a transmission failed after several attempts during a down-line load or up-line dump.

Or Down-line loads or up-line dumps fail intermittently.

Correction: Use the privileged LOOP command to test the circuits between the MUXserver 100 and any node on the Ethernet. The command syntax is discussed in detail in Section 5.15 LOOP. The server software displays either message 512 or 513 on your terminal to indicate whether this loopback test succeeds or fails. If the test fails, coordinate with your network manager to resolve the Ethernet problem.

Ask the system manager of the load host to check the load host's Ethernet counters. If the counters indicate a possible Ethernet problem, the system manager can use the NCP LOOP CIRCUIT command to test the Ethernet between the load host and the MUXserver 100. If the test is unsuccessful, contact the network manager.

4.7 DIGITAL SERVICE

The hardware and software service options available from DIGITAL are described in the *MUXserver 100 Network Installation Guide.* One hardware option and one software option are in effect for your MUXserver 100 system. Contact your DIGITAL sales representative for more information.

4.7.1 Before You Contact DIGITAL

To help ensure a prompt solution to your problem, do the following before you contact DIGITAL:

- Perform any troubleshooting procedures described in this chapter. If possible be sure to use a supervisor port terminal while performing troubleshooting procedures. A supervisor port terminal provides much more information about the trouble than would otherwise be the case.
- Write down your server's serial number, its software version number, and the information on the ECO Status label.
- If possible, make a note of what activity was taking place when the server failed. Also, be prepared to describe the troubleshooting steps you took and any results these steps produced.

4.7.2 Repackaging the Server for Shipment

If you return the MUXserver 100 to DIGITAL for repair or replacement, repack the unit properly. If possible you should use the original shipping carton and packaging material.

4.7.3 Forwarding Up-line Dump Data

If a fatal bugcheck (message 913) caused an up-line dump of the server memory image (see Section 4.2.5, Message Number 913 Appears), send the dump file to DIGITAL. Copy the file to 1600 bpi magtape, a TU58 cartridge, or an RX01, RX02 or RX50 diskette. Indicate the format of the copy (BACKUP, FLX, or other) on the media. Forward the data to the address available from your DIGITAL representative.

CHAPTER 5
MUXserver 100 COMMAND DESCRIPTIONS

This chapter is an alphabetical reference of all MUXserver 100 commands. Chapters 2 and 3 provide guidelines for using some of the commands and for setting various characteristics.

NOTE

Privileged commands can only be executed by means of the supervisor port of the MUXserver 100, or by means of the remote console. (See Chapter 3, Section 3.1.4, Remote Management of the MUXserver 100 (By Means of the Ethernet).)

In the syntax for MUXserver 100 commands, a keyword is a word that appears in uppercase letters. A parameter is an optional part of the syntax. A value is a number or word that you specify. The preface discusses the conventions used in the commands' syntax.

You can enter MUXserver 100 commands in either uppercase or lowercase characters (or a combination of both), and command lines can be up to 132 characters in length. You can type a command line on two terminal display lines. Do not press <RET> or any other character at the end of the first terminal line. Separate the words in a command line by one or more spaces.

If you enter a command incorrectly, one of the following error messages appears:

```
Local -701- Command syntax error
Local -702- Keyword "word" not known or ambiguous
Local -703- Value invalid or out of range, "nnnnnn"
Local -704- Privileged command or option
```

Refer to Appendix A for an explanation of these error messages. Check the command syntax and re-enter the command. Each of the following command descriptions has the syntax for the command it describes. It also indicates whether the entire command requires privileged status or whether individual parameters require privileged status.

The examples show the command with keywords abbreviated to three letters. If you wish, you can abbreviate keywords to fewer than three characters if the word remains unique.

"Normal Response" shows an example of the message you normally receive from the server when you enter the command. If there is no command response, the Local> prompt indicates successful execution of the command.

"Error Response" lists examples of the possible messages you can receive if the command does not execute successfully.

5.1 BACKWARDS

Use this command to resume the previous session.

The previous session is the session that appears at the bottom of the SHOW SESSIONS display.

If you have only one active session, that session resumes, and message 102 appears. If you have two active sessions, your non-current session resumes.

Syntax:

BACKWARDS

Example:

```
Local> BACK
```

Normal Response:

```
Local -012- METDATA session 3 resumed
Local -102- No other session(s) active
```

Error Response:

```
Local -712- No connection established
Local -2nn- Connection to METDATA terminated
            termination reason text
```

5.2 BROADCAST

Use this command to send a message to other MUXserver 100 terminal users.

You can specify that a particular terminal receive the message, or you can transmit to all terminals. The message appears on a destination terminal even if the terminal has a currently active service session. The message does not appear if the destination terminal is logged out, or if BROADCAST is disabled for the terminal.

Syntax:

BROADCAST {PORT *number*} *message-text*
{ ALL }

where

PORT *number* — specifies the terminal that receives your message. The port number can be in the range 1 to 17. The message appears only at a terminal if that port has BROADCAST ENABLED as a port characteristic.

ALL — specifies that the message is to be sent to all terminals on the server. This is privileged.

message-text — is the text of the message. If you enclose the text in quotation marks, it is broadcast exactly as entered. If you omit the quotation marks, the message is broadcast entirely in uppercase characters. The length of the text is limited to 125 characters.

Example:

```
Local> BRO PORT 7 "Now logged in"
```

This command sends the string in quotes to terminal 7.

Normal Response: (at terminal 7)

```
Local - 501 - From Port 2, John Jones
              Now logged in.
```

Error Response:

```
Local -611- Broadcast disabled on terminal 7
```

5.3 COMMUNICATIONS

Use this privileged command to gain access to the 'communications sub-directory'. These commands are used exclusively for setting up and monitoring the composite links and the remote DECmux II units.

Once this command is entered, you are in the communications sub-directory as indicated by the 'COM>' prompt, and you have access to the sub-directory commands listed as follows.

CONNECT
DISCONNECT
EXIT
HELP
MAP
MAPHELP
RESTART
SAVE
SHOW
STATUS
SYSTEM
TEST

You leave the communications sub-directory by typing EXIT in response to the COM> prompt.

Syntax:

COMMUNICATIONS

Example:

```
LOCAL> COMM
COM> (now enter sub-directory commands)
:
COM> EXIT
LOCAL>
```

Error Response:

```
Remote MUXserver 100 connected.
```

This message indicates that a connection already exists from a remote DECmux II supervisor port into the supervisor port of the MUXserver 100. Only after this connection has been disconnected (use the DISCONNECT command at the remote DECmux II unit) can the 'COMM' command be executed.

5.4 CONNECT

NOTE

A separate 'CONNECT' command also exists in the communications subdirectory. See Section 5.5.

Use this command to establish a session with a service. Once the connection is established, you remain in service mode until you enter the local switch character, until the service terminates the connection, or until you log out from the service. If a service terminates a session, the server notifies you and returns your terminal to local mode. If the service you request is not available, you receive a message informing you of this, and the terminal remains in local mode.

If you enter only the keyword CONNECT, the MUXserver 100 connects you to a preferred service, if one is specified.

If terminal n is a non-keyboard device (for example, a printer), you can type CONNECT PORT n to connect it.

Syntax:

CONNECT [POrt [port number][service name [NODe node name]
[DEStination port name]]

where

Port Number	Specifies the number of a user port. This is privileged. In most cases the terminal number is omitted, and the terminal from which you issue the command is connected.
Service Name	Specifies the name of a service. Service names are 1 to 16 characters in length. If you do not enter a service name, the server completes a connection to the preferred service.
Port Name	Specifies a port on a service node for the connection request. Use this option when another LAT terminal server offers services at its ports. Enter the node name of the server with NODE node-name.

Examples:

```
Local> CON
Local> CON SALES
Local> CON PORT 3 PRINTSERVICE
Local> CON METDATA NODE NEWSERVER DESTINATION BLUE
```

The first command connects the current port to its preferred service. The second connects the current port to the service SALES. The third command connects port 3 to the service PRINTSERVICE. The last command connects the current port on the MUXserver 100 to the service METDATA offered at port BLUE on the terminal server NEWSERVER.

Normal Response:

```
Local -010- 1 other session(s) active
Local -010- Connection to METDATA established as session 2
```

Error Response:

```
Local -013-Continuing attempts to connect to METDATA
Local -711-Service METDATA not known
Local -714-Preferred service has not been defined
Local -715-Service PRINTSERVICE not currently available
Local -716-Access to service METDATA denied
Local -718-Session limit reached
Local -719-No memory to complete operation
Local -2nn-Connection to SALES not established rejection
           reason text
```

5.5 CONNECT (Part of the Communications Sub-directory)

NOTE

A separate 'CONNECT' command exists for establishing a connection from a user terminal to a node on the Ethernet. See Section 5.4.

This command is executed from the privileged mode communications sub-directory and is used to access the supervisor port of remote DECmux II units from the supervisor port of the MUXserver 100 (see the COMMUNICATIONS command). The composite links must be established for this connection to succeed.

Syntax:

CONNECT [Xn]

Parameters:

Xn - is the remote multiplexer to connect to. It can be any of the following, depending on the network configurations:

A3,A2,A1,B2,B3

The naming convention for the remote DECmux II parameter is relative to the MUXserver 100. A1 is the first DECmux II unit connected to the A port of the MUXserver 100.

Use the MAP command to identify the network configuration.

The remote DECmux II unit will require a password to be entered. Following this, the prompt is displayed as Xn>, where Xn is the relative identification of the DECmux II unit to which you are connected.

Example:

```
COM> CONNECT A1
PASSWORD> (Enter the password - SYSTEM is the default setting.)
A1>
```

The first command connects the supervisor to the first DECmux II unit on the A port. The response is a request for the password for that DECmux II unit. After the password is correctly entered, commands for the remote DECmux II unit (see Chapter 6) can be entered. Terminate the connection using the DISCONNECT or EXIT commands.

If you do not know the password for the remote DECmux II unit, a Control-C will return you to the COM> prompt.

Error Response:

```
REMOTE MUX UNREACHABLE
COM>
```

or

```
REMOTE MUX BUSY
COM>
```

'REMOTE MUX UNREACHABLE' indicates that the composite link to that DECmux II unit is down. 'REMOTE MUX BUSY' indicates that someone is already logged into the supervisor port of that DECmux II unit. He/she must EXIT before your connection can be made.

5.6 {DEFINE} PORT
{SET }

Use these commands to specify port characteristics.

The DEFINE command alters a port's characteristics in the server's permanent database. These changes do not take effect until the next login for the port. The SET command alters the port characteristics in the server's operational database. These changes take effect immediately, but revert to the permanent characteristics at the next login.

With privileged status, you can change the characteristics of any port or all the ports. With nonprivileged status you can only change the characteristics of the port you are using.

Syntax:

```
{DEFINE} [PORT {number}]     ACCESS {DYNAMIC}
{SET   } [PORT {ALL   }]            {LOCAL  }
                                    {NONE   }
                                    {REMOTE }
                             AUTHORIZED  [GROUPS]
                                    {code-list}   {ENABLED }
                                    {ALL       }   {DISABLED}
                             AUTOBAUD      {ENABLED }
                                           {DISABLED}
                             AUTOCONNECT   {ENABLED }
                                           {DISABLED}
                             AUTOPROMPT    {ENABLED }
                                           {DISABLED}
                             BACKWARD [SWITCH]      {character}
                                                    {NONE     }
                             BREAK  {LOCAL   }
                                    {REMOTE  }
                                    {DISABLED}
                             BROADCAST     {ENABLED }
                                           {DISABLED}
                             CHARACTER     [SIZE]  {7}
                                                   {8}
                             DEDICATED     [SERVICE]
                                    {service-name}
                                    {NONE         }
                             FLOW   [CONTROL]      {ENABLED }
                                                   {DISABLED}
                             FORWARD [SWITCH]      {character}
                                                   {NONE     }
                             INACTIVITY LOGOUT     {ENABLED }
                                                   {DISABLED}
                             INTERRUPT     {ENABLED}
                                           {DISABLED}
                             LOCAL   [SWITCH]      {character}
                                                   {NONE     }
                             LOSS   [NOTIFICATION]{ENABLED }
                                                   {DISABLED}
                             MESSAGE [CODES]       {ENABLED }
                                                   {DISABLED}
                             NAME    "port-name"
                             PARITY  {ODD}
                                     {EVEN}
                                     {MARK}
                                     {NONE}
                             PASSWORD{ENABLED }
                                     {DISABLED}
                             PREFERRED [SERVICE]  {service-name}
                                                  {NONE         }
                             SESSION {LIMIT number}
                                     {NOLIMIT}
                             {INPUT} SPEED speed
                             {OUTPUT}
                             TYPE    {ANSI}
                                     {HARDCOPY}
                                     {SOFTCOPY}
                             USERNAME "username"
                             VERIFICATION {ENABLED}
                                          {DISABLED}
```

Where

PORT {number}
{all }

specifies which port(s) the command affects. This is a privileged parameter. You can enter a particular port number, or you can specify all the ports by typing all. A nonprivileged user enters the command without this parameter and the command affects only the port he or she is using.

ACCESS specifies access for the device using the server port.

- LOCAL gives the port user access to the MUXserver 100 local mode command set. The user can communicate interactively with the server and connect to all service nodes on the network. LOCAL is the default for ACCESS.
- REMOTE allows access to the port device by service node applications. An interactive user cannot log into a REMOTE port. The port device (typically a line printer) is under the control of a remote service node. This is a privileged port parameter.
- DYNAMIC allows either remote access or local access to the port. If a local user is not logged in, the port can accept connections from remote service nodes. However, a remote access request from a service node cannot interrupt an ongoing local session. Whether a local login attempt stops an ongoing remote session depends upon the current value of the INTERRUPT characteristic.
- NONE disables the port. This may be set when the port device malfunctions. This is a privileged port parameter.

AUTHORIZED GROUPS specifies groups consisting of service nodes and ports. The port must be in the same group as a service node to have access to the node. You can specify group codes in the range 0 to 127. To modify the list, enter group numbers separating each by a comma (,); a hyphen (-) between two numbers denotes a range of groups (see the example below). Enter ENABLED to provide access to the nodes in the list. Enter DISABLED to inhibit access to those nodes. The default is group code 0 ENABLED. This is privileged.

AUTOCONNECT allows the server to connect the port to a service automatically. In the absence of a dedicated or preferred service, AUTOCONNECT operates only upon abnormal termination of a connection, or upon failure to establish a requested connection. With a dedicated service or preferred service and AUTOCONNECT ENABLED, a connection is automatically made to the service when the port user logs in. The default for AUTOCONNECT is DISABLED.

AUTOPROMPT determines whether a system's login prompt (for example, Username: on a VMS system) is transmitted automatically to the port when a connection is made to a service. If you set the port to ACCESS REMOTE, AUTOPROMPT should be disabled. The default is ENABLED.

BACKWARD SWITCH specifies a switch character that allows you to resume your previous session directly. BACKWARD SWITCH performs the same function as the BACKWARDS command without the requirement to re-enter local mode. The default is NONE.

BREAK determines how the <BREAK> character is handled during a session.

- LOCAL causes the server to interpret <BREAK> as a local switch character — a signal to switch the port to local mode. The server does not send the character to the connected service. This is the default.

- REMOTE causes the server to ignore the <BREAK> character and pass it along to the connected service.
- DISABLE causes the server to disregard the <BREAK> character altogether. The server neither interprets it as a local switch nor sends it to the connected service.

BROADCAST — specifies whether the port receives messages sent from other ports. ENABLED permits reception. The default is ENABLED.

CHARACTER SIZE — specifies the number of bits in data characters exchanged between the port and the server. Permissible values are 7 and 8. The default is 8.

DEDICATED SERVICE — enables the port device, when logged in, to be connected permanently to a single service. This configuration simulates a direct, local interface between the port device and a service node. Local mode is inoperable when a DEDICATED SERVICE is specified, and AUTOCONNECT is automatically ENABLED. The default is NONE. This is privileged.

FLOW CONTROL — specifies whether the port recognizes XON/XOFF characters that temporarily inhibit and then restart the transfer of data between port device and server. FLOW CONTROL affects data transfer in both directions. ENTER ENABLE for INPUT FLOW control in one direction and not the other. INPUT specifies whether the port device recognizes flow control characters sent from the server. OUTPUT specifies whether the port device transmits flow control characters to the server. The default for FLOW CONTROL is ENABLED which enables XON/XOFF flow control. The default for both INPUT FLOW CONTROL and OUTPUT FLOW CONTROL is ENABLED.

FORWARD SWITCH — specifies a switch character that allows you to resume your next session directly. FORWARD SWITCH performs the same function as the FORWARDS command without the requirement to re-enter local mode. The default is NONE.

INACTIVITY LOGOUT	determines whether the server automatically logs out a MUXserver 100 port after a period of inactivity. The server logout happens (1) when there are no active sessions at the port and (2) when the port user has entered no MUXserver 100 commands for a specified timeout period. You specify the timeout period with the INACTIVITY TIMER server characteristic. The default is DISABLED. This is a privileged parameter.
INTERRUPT	lets you specify whether a local user can interrupt a remote session at an ACCESS DYNAMIC port to start a local session. With INTERRUPTS enabled, a user presses the <BREAK> key to disconnect a remote session (the port characteristic BREAK must be set to LOCAL). With INTERRUPTS disabled, a local user must wait until the remote session ends or until it is disconnected at the MUXserver 100 privileged port. The default is ENABLED. This is a privileged parameter. INTERRUPT applies only to ports with ACCESS set to DYNAMIC.
LOCAL SWITCH	specifies a switch character that you can use to reenter local mode from service mode. Choose any keyboard character. The default is NONE. You can use the <BREAK> key to enter local mode if you set up the BREAK port characteristic as LOCAL.
LOSS NOTIFICATION	specifies whether you are alerted that a typed character is lost due to data error or overrun. If enabled, the server transmits a BEL character (an audible beeping sound) for each character that you must reenter. The default is ENABLED.
MESSAGE CODES	specifies whether message codes appear with status and error messages. Message codes are 3-digit numbers used to categorize messages. The default is ENABLED, which permits the codes to appear.

NAME

defines a port name of up to 12 keyboard characters. Use the name, for example, to identify the normal port user or the location of the port device. The port name appears after Name: in the SHOW PORTS display. The default is no name. This is privileged. The following characters in any combination are valid for NAME:

A through Z
a through z
0 through 9
$
- (hyphen)
_ (underscore)

PARITY

specifies the port parity. The legal parity types are ODD, EVEN, MARK or NONE. The default is NONE.

PASSWORD

this privileged parameter specifies whether a password is required for a user to log in. If ENABLED, login at the port includes the prompt and a bell sound. At the prompt, the user must enter the login password (as set by the DEFINE/SET SERVER LOGIN PASSWORD command). An incorrect password terminates the login sequence. With DISABLED, the default value, there is no password protection for the port.

PREFERRED SERVICE

specifies a preferred network service. When you log in or enter CONNECT without specifying a service name, the server attempts a connection to the preferred service. With a preferred service, you can enter local mode at any time. The default is NONE. (See AUTOCONNECT.)

SESSION LIMIT

limits the number of permitted service sessions. You can specify a value from 0 to 6. NOLIMIT permits six sessions and the default is 4. This is privileged.

[INPUT] SPEED
[OUTPUT]

specifies the port speed in bits per second. Permissible values are 75, 110, 134, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, and 19200. Specify INPUT or OUTPUT if you want the input and output speeds to be different. The input speed is the speed from the port device to the server. The output speed is the speed from the server to the port device. The default for all options is 9600 bps.

TYPE

specifies the port device type. Specify one of three types, as follows:

- ANSI - for use with video devices that support ANSI escape sequences. The delete key erases deleted characters from the screen, and moves the cursor one character to the left. The screen clears before all port device displays, and the displays build downward, line-by-line, from the top of the screen. Terminals in the DIGITAL VT100 and VT200 series can be set up as type ANSI.
- HARDCOPY - for use with paper-output devices. The delete key echoes deleted characters between backslashes (\). The DIGITAL LA120 is an example of a hardcopy terminal.
- SOFTCOPY - for use with video devices. The delete key functions as in ANSI devices. All server displays build upward line-by-line from the bottom of the screen. The DIGITAL VT52, for example, is a softcopy terminal. The default type is HARDCOPY.

USERNAME

specifies a user name of 1 to 12 keyboard characters. Your username appears in the SHOW USERS display and after Port: in the SHOW PORT display. Normally, you type a user name when you log into the port device. However, you can specify it with this parameter. The user name characteristic is entered only in the server's operational database, and you can specify it only with the SET PORT command.

VERIFICATION — specifies whether the server sends informational messages when you connect, disconnect, or switch sessions. DISABLED inhibits informational messages; ENABLED permits display of the messages. This command does not affect error and warning messages. The default is ENABLED.

Examples:

```
Local> DEF POR 2 ACCESS DYNAMIC INTERRUPT ENA
Local> SET POR 8 AUTH 1,2,6-19, 25 ENA SES LIM 3
Local> DEF AUTOC ENA PRE DEVELOP
```

The first example defines access for port 2 as either local or remote, and enables the port user to interrupt a remote session. The options in the second example affect how port eight can be used in service mode, and are in effect only until the port is logged out. In the third example, a preferred service is permanently assigned to the port.

5.7 {DEFINE} SERVER {SET }

Use these commands to specify MUXserver 100 characteristics. These are privileged commands.

The DEFINE command alters the server's permanent database and the changes do not take effect until the next initialization procedure. The SET command alters the server's operational database. These changes take effect immediately but do not remain in effect after an initialization.

Syntax:

```
{DEFINE}  SERVER   BROADCAST   {ENABLED }
{SET   }                       {DISABLED}
                   CIRCUIT   [TIMER] milliseconds
                   CONSOLE   {number}
                             {NONE   }
                   DUMP    {ENABLED }
                           {DISABLED}
                   HEARTBEAT{ENABLED }
                           {DISABLED}
                   IDENTIFICATION    "identification"
                   INACTIVITY TIMER   mins
                   KEEPALIVE   [TIMER]   secs
                   LOCK    {ENABLED }
                           {DISABLED}
                   LOGIN   {LIMIT number}
                           [LIMIT NONE   }
                   LOGIN PASSWORD
                   NAME    server-name
                   NUMBER    number
                   PRIVILEGED PASSWORD
                   QUEUE [LIMIT]      {depth}
                                      {NONE }
                   RESTRANSMIT   [LIMIT] number
                   SOFTWARE    "filename"
```

where

BROADCAST	lets you specify whether the BROADCAST command is available to users on port devices. ENABLED allows use of the BROADCAST command. DISABLED does not. ENABLED is the default.
CIRCUIT TIMER	specifies the interval between messages sent from the MUXserver 100 to service nodes. The value can range from 30 to 200 milliseconds. A short circuit timer value minimizes user response time, but maximizes service node loading. The default is 80, and this is recommended. Do not SET this parameter while any sessions are active.
CONSOLE	designates one MUXserver 100 port as the console port. The console is used for status displays and for troubleshooting functions. The default is 1; meaning port number 1, which is the MUXserver 100 supervisor port.
DUMP	specifies whether up-line dumping of server memory is performed when a fatal bugcheck occurs. The default is ENABLED.
HEARTBEAT	specifies whether the server checks collision detection circuitry. You should enable HEARTBEAT for error free operation with all DIGITAL transceivers. However, certain other transceivers do not support collision detection. For these transceivers, specify DISABLED to ignore heartbeat errors on all message transmissions. The default is ENABLED.
IDENTIFICATION	specifies the identification for the MUXserver 100. You can enter the location of the server, printer services offered by the server, or any other information. This data appears in the SHOW SERVER display and is transmitted by the server to service nodes in LAT messages. Enter a string of 1 to 16 keyboard characters enclosed in quotation marks ("). The default no identification string. Do not set this parameter while any sessions are active.

INACTIVITY TIMER — determines the timeout period (in minutes) for ports with INACTIVITY LOGOUT enabled. The server automatically logs out ports that are inactive for a period greater than the timer value you specify. The default is 30 minutes. The range of timer values is 1 to 120 minutes.

KEEPALIVE TIMER — specifies the interval between messages for circuits on which no data is being transmitted. The value can range from 10 to 180 seconds. The default is 20 and this is recommended. Do not SET this parameter while any sessions are active.

LOCK — determines whether interactive port users can use the LOCK command (see the LOCK command description in this chapter). If you enter DISABLED, interactive users cannot use the LOCK command to lock their ports. If security is an important consideration, use the default value, ENABLED, to permit the port users lock their ports.

LOGIN LIMIT — specifies the permitted frequency of login attempts at any terminal attached to the MUXserver 100. The frequency is expressed in attempts per minute. The range is 0 to 250 and the default is 3.

LOGIN PASSWORD — changes the password that interactive users type when they log in. When you enter this parameter, the MUXserver 100 prompts you for your password and a verification. The password is a string of 1 to 6 keyboard characters. Here is an example using the password D4E5F6.

```
local>  DEF LOG PAS
Password>  D4E5F6 (not echoed)
Verification>  D4E5F6 (not echoed)
```

Error Response:

```
Local -741- Invalid password
Local -742- Password verification error
```

This command defines D4E5F6 as the server login password. In this case, password becomes effective after the next server initialization.

The default password is "access". The default is in effect when the MUXserver 100 is delivered to your facility and when you reset the server characteristics to factory settings (see Chapter 2, Section 2.7, SETTING UP THE PORT CHARACTERISTICS).

NAME

specifies a name for the server. This name is useful for identifying the server and is transmitted by the server to service nodes in LAT messages. It appears in the display for the SHOW SERVER command. Enter a string of 1 to 16 keyboard characters. The default is LAT_xxxxxxxxxxxx, where xxxxxxxxxxxx is the Ethernet address for the MUXserver 100. The Ethernet address appears on the back of the MUXserver 100 hardware unit. Also, the hardware installers record the address on the MUXserver 100 Terminal Server Identification Card. Do not SET this parameter while any sessions are active. The following characters in any combination are permitted for NAME:

A through Z
a through z
0 through 9
$
- (hyphen)
_ (underscore)

NUMBER

specifies a number for the server. This number is useful for identifying the server, and is transmitted by the server to service nodes in LAT messages. It appears in the SHOW SERVER display. Use a value in the range 0 to 32767. The default is 0. Do not SET this parameter while any sessions are active.

PRIVILEGED PASSWORD

allows you to select the password required for a port user to make his or her port the privileged port. The user must know the privileged password when he or she enters SET PRIVILEGED to gain access to the privileged server commands. The default privileged password is "system". The default is in effect when your MUXserver 100 is delivered and when you reset the server characteristics to factory specifications (see Chapter 2, Section 2.7, SETTING UP THE PORT CHARACTERISTICS).

The privileged password is a string of 1 to 6 keyboard characters. When you specify this parameter in SET/DEFINE SERVER, a password prompt and a verification prompt appear. Enter the same string in response to both prompts. Here is an example using the password A1B2C3:

```
Local> DEFINE SERVER PRIVILEGED PASSWORD
Password> A1B2C3
Verification> A1B2C3
```

Error Response:

```
Local -741- Invalid password
Local -742- Password verification error
```

In this example, A1B2C3 is stored in the server permanent database and takes affect at the next server initialization.

QUEUE LIMIT

restricts the number of queued requests (the depth of the queue) for remote access to server ports. If you wish to limit the queue, specify a number between 0 and 40. The value you enter is the maximum number of requests permitted in the queue. If you enter 0, the queue is disabled. If you enter NONE, the queue depth is not limited and 40 queue entries are permitted. The default is 24.

RETRANSMIT LIMIT — specifies the number of times a LAT message is retransmitted to a service node in the event of a transmission failure. Choose a value in the range 4 to 30. The default is 8.

SOFTWARE — specifies the file name of the server software load image. During initialization, the image is down-line loaded from a load host to the server. The file name is 0 to 9 characters enclosed in quotation marks ("). The default is MS1601ENG.SYS. Refer to the *MUXserver 100 Software Installation Guide* for more details.

Examples:

```
Local>  DEF SER NAME "SALES-4" IDENT "TECH SALES"
Local>  SET SER CIR 60 KEE 30
```

Error Response:

```
Local -728- Parameter cannot be modified with connection
            established
Local -730- Parameter cannot be modified - try again
```

5.8 DISCONNECT

Use this command to terminate sessions.

If you enter only the keyword DISCONNECT, the server disconnects your current session (the session at the top of the SHOW SESSIONS list).

Specify a port number in the privileged DISCONNECT command when you wish to stop a remote session — a connection between a process on a service node and a device (typically a line printer) at a MUXserver 100 port.

Syntax:

DISCONNECT [PORT number] [SESSION number]
[ALL]

where

PORT number	is a port where a device is attached that has been set up as an applications terminal (for example, a line printer) for a service node. Port number has the port characteristic ACCESS set to REMOTE or DYNAMIC. This is privileged. You cannot enter the number of a port with ACCESS LOCAL or a port with ACCESS DYNAMIC and an active local session.
SESSION number	specifies the session to be disconnected. If you do not specify a session, the server terminates the current session. You cannot use this option if you specify a port number.
ALL	specifies that all sessions associated with the port are to be disconnected.

Examples:

```
Local>  DIS
Local>  DIS SES 1
Local>  DIS ALL
```

The first command disconnects the current session for the port where the command is entered. The second command disconnects session 1 for the port being used. The third command disconnects all sessions for the port being used.

Normal Response:

```
Local -011- Session 1 disconnected from METDATA
Local -014- All sessions disconnected
```

Error Response:

```
Local -712- No connection established
Local -717- Session 1 not established
Local -721- No dedicated service on port nn
```

5.9 DISCONNECT (Part of the Communications Sub-directory)

NOTE

A separate DISCONNECT command exists to terminate a session on an Ethernet mode. See Section 5.8, DISCONNECT.

Use this command to terminate access to the supervisor port of a remote DECmux II unit (see the CONNECT command for information on accessing a remote DECmux II unit).

An error message is given if you are not connected to a remote DECmux II unit.

A CONTROL-C character or EXIT will also disconnect you from a remote DECmux II unit.

Syntax:

A1> DISCONNECT

Example:

```
A1> DISCONNECT
COM>
```

Error Response:

You are not connected anywhere.

5.10 FORWARDS

Use this command to resume the next session.

The next session is the second session in the SHOW SESSIONS display list.

If you have only one active session, that session resumes, and message 102 appears. If you have two active sessions, your non-current session resumes.

Syntax:

FORWARDS

Example:

```
Local>  FOR
```

Error Response:

```
Local -012- METDATA session 1 resumed
Local -102- No other session(s) active
```

Normal Response:

```
Local -712- No connection established
Local -2nn- Connection to METDATA terminated termination
            reason text
```

5.11 HELP

Use this command to display on-line help.

HELP displays are different for privileged and nonprivileged users. If you are using a nonprivileged port, only nonprivileged commands and characteristics appear.

If you enter only the keyword HELP, the server generates a display of the most frequently used commands (nonprivileged status) or the entire MUXserver 100 command set (privileged status).

If you are in the communications sub-directory (that is, COM> prompt), the HELP command will show the commands available for setting up and monitoring the composite links and remote DECmux II units.

Syntax:

```
HELP  [ MORE ]
      [ PORT ]
      [SERVER]
```

where

MORE	displays additional commands (nonprivileged status only).
PORT	displays the syntax for entering terminal characteristics in the SET PORT and DEFINE PORT commands.
SERVER	displays the syntax for entering server characteristics in the SET SERVER and DEFINE SERVER commands. This is privileged.

Examples:

```
Local>  HEL
Local>  HEL PORT
Local>  HEL SER
```

5.12 INITIALIZE

Use this command to reinitialize the server, perform an orderly shutdown of normal operations, and execute one of several types of diagnostic self-test. This is a privileged command.

The green light (LED) on the MUXserver 100 indicates the result of the self-test. When the self-test starts, the light is turned off. When the test is completed, the light assumes one of the following states:

- On continuously; the server passed the basic self-test and is running. If errors occurred, these will be displayed on the supervisor port terminal.
- Off; the self-test failed. A fatal hardware error was detected.

If the value for COUNT is greater than 1, several repetitions of the self-test occur. The light reflects the most serious error condition detected in any of the test events.

Syntax:

```
INITIALIZE [DELAY mins] [DISABLE] [DIAGNOSE {BRIEF} [COUNT number]]
                                            {FULL}  [LOOP         ]
                                            {NORMAL}
```

and

INITIALIZE CANCEL

where

DELAY — delays the beginning of initialization for the specified number of minutes. The MUXserver 100 prints warning messages at regular intervals to alert terminal users. The value can range from 0 to 65535. The default is one minute.

DISABLE	inhibits the CONNECT command and the AUTOCONNECT function following initialization. Enter INITIALIZE again without the DISABLE parameter to enable CONNECT and AUTOCONNECT.
DIAGNOSE BRIEF	executes the part of the standard self-test that is internal to the MUXserver 100 unit. This parameter does not test the server's connection to the Ethernet.
DIAGNOSE FULL	executes an extended version of the self-test that performs an in-depth memory test. The test takes approximately 90 seconds to execute.
DIAGNOSE NORMAL	executes the standard self-test. This is the default parameter.
COUNT	allows the self-test you choose to repeat n times. The number n can range from 1 to 32767, and the default is 1.
LOOP	specifies that the self-test is to run indefinitely. You must remove the server's power to stop the test.
INITIALIZE CANCEL	terminates a previously requested initialization. CANCEL takes effect only if the previous initialization has not yet begun (see DELAY).

Examples:

```
Local> INI DEL 2 DIA FULL
Local> INI CAN
```

The first command delays initialization for two minutes, and generates the non-standard self-test to carry out an in-depth memory test. The second command aborts an initialization that has not yet taken effect.

Normal Response: (on all terminals)

```
Local -699- WARNING -- Local area service ending in 2 minutes
```

5.13 LOCK

Use this command to disable your port and prohibit access by unauthorized users.

The LOCK command does not disconnect current service sessions. When you issue the LOCK command, the server prompts you for a password and a verification of the password. The LOCK password is a string of 1 to 6 keyboard characters.

Upon password verification, the server prints a short informational message and prompts you to re-enter the password to unlock the port. The port cannot be used until you enter the correct password. When you type the correct password, the port is unlocked and the Local> prompt returns. If you type an incorrect password, the password prompt is reissued.

Syntax:

```
LOCK
Lock password>
Verification>
Unlock password>
```

where

password	is the LOCK password you choose. The password is a string of 1 to 6 keyboard characters.

Normal Response:

```
Local -109- Port 3 locked
```

Error Response:

```
Local -741- Invalid password
Local -742- Password verification error
```

NOTE

Remember the LOCK password. You can unlock a terminal only with the password or by logging it out from the supervisor port terminal in privileged mode.

5.14 LOGOUT

Use this command to log out a port.

LOGOUT logs out a port from the MUXserver 100 and disconnects any sessions associated with the port. When you log in again, the server resets the port characteristics to those defined in its permanent database.

If you enter only the keyword LOGOUT, the command affects only the port you are using.

Syntax:

LOGOUT [PORT number]

where

PORT — specifies the port to be logged out. The number must be in the range 1 to 17. This parameter is privileged.

Example:

```
Local> LOG POR 1
```

The command logs out terminal 1 and disconnects all service sessions for the terminal.

Normal Response: (on the logged out terminal)

```
Local - 020- Logged out port 1
```

5.15 LOOP

Use this command to test the physical connections between the server and another node on the Ethernet. This is a privileged command. The server transmits a message indicating whether the test is successful.

The nodes in the loop test need not be service nodes. Also, the command permits you to enlist the assistance of an intermediary node in testing the circuits.

Syntax:

LOOP *address1* [HELP {TRANSMIT} ASSISTANT *address2*]
{RECEIVE}
{FULL}

where

address1	specifies the Ethernet address of the node with which the server is attempting to communicate. The Ethernet address is a 12-digit hexadecimal number. You type the number in six groups of two digits each; separating the groups with hyphens (-).
HELP TRANSMIT	indicates that the node with *address2* relays the outgoing transmission from the server to the node with *address1.*
HELP RECEIVE	indicates that the node with *address2* relays the returning transmission from the node with *address1* to the server.
HELP FULL	indicates that the node with *address2* relays both the outgoing and returning transmissions between the node with *address1* and the server.
ASSISTANT *address2*	specifies the Ethernet address of the node that supports the TRANSMIT, RECEIVE, or FULL assist.

Examples:

```
Local>  LOO 10-1F-23-43-1A-00 HEL TRA ASSIST AA-99-01-43-1A-00
Local>  LOO 10-1F-23-43-1A-00
```

The first command causes the server to transmit a signal to the node with Ethernet address 10-1F-23-43-1A-00. The outgoing transmission is relayed by an assistant node with address AA-00-01-43-1A-00. In the second example, the test transmission goes directly to node 10-1F-23-43-1A-00 without assistance.

Normal Response:

```
Local -512- Loop test successful
Local -513- Loop test failure
```

5.16 MAP (Part of the Communications Sub-directory)

This command is privileged and is executed in the communications sub-directory (that is, in response to the COM> prompt). It is used to modify the logical asynchronous link connections between the DECmux II units and the MUXserver 100. The default settings have each asynchronous port on the DECmux II units mapped in a logical connection to the MUXserver 100 and the LAN. Alternative connections are possible, for example, with logical asynchronous links established between ports on the DECmux II units. The MAP command is used to establish these logical links (see Chapter 2, Section 2.6). Use the MAP HELP command for assistance.

The output from this command is designed for an ANSI video terminal.

Enter MAP to produce a display showing blocks of information for each multiplexer known in the Network.

Syntax:

COM> MAP

MAP Example:

```
Multiplexer port map
Mux.:  B2-up              Self-Master-up    1 1 1 1 1 1 1 1  A1-down
Port:  0 1 2 3 4 5 6 7  2 3 4 5 6 7 8 9   0 1 2 3 4 5 6 7  0 1 2 3 4 5 6 7
Conn:  A B C D E F G H  A B C D E F G H   I J K L M N O P  I J K L M N O P
```

The first line of each block identifies the multiplexer and displays its status. Labels used are:

Self	The MUXserver 100 (or a remote DECmux II unit, if the connect command is in effect).
Xn,	Where X is the letter A or B, and n is a number 1, 2, or 3. This gives the port to which the MUXserver 100 is connected and its distance from the Self Mux; for example, A2 is connected to the A port and is the second Mux on that port.
Master	The MUXserver 100 must be MASTER and hence, control the MAP configuration. (See the SYSTEM Command for details of Master and Slave.)

Slave	This DECmux II unit is a SLAVE, and its MAP information is downloaded from the MASTER.
UP	This indicates that the composite link communications have been established with this DECmux II unit.
DOWN	This indicates that the composite link communications have failed.

The second line labels the ports of the multiplexers. MUXserver 100 ports are labeled 2 to 17; DECmux II ports are labeled 0 to 7.

The third line shows the connections on the network. Ports are connected into pairs indicated by the SAME letter or number on this line under the two ports. A period '.' shows an unconnected port.

The MAP can only be changed from the supervisor port of the MUXserver 100 (that is, the MASTER) or by connecting to this port from a remote DECmux II. The MAP can be displayed but not changed at a SLAVE DECmux II unit.

Connections are changed by typing new letters on the third line. Use the <space bar> to move forward and the <RUBOUT>, <DELETE> or <BACKSPACE> keys to move backwards. Type letters or a period to change entries.

The RETURN key will move the cursor back to the start of the line; the Control-Z key will terminate entry of data. The line will then be checked for correctness.

If errors are found, a message will be displayed. Common errors are:

- Trying to connect three (or more) ports together.
- Leaving a port with a letter, but no corresponding connection.
- Trying to connect two ports together on the same MUXserver 100.

If no errors are found, the prompt for the next command will be displayed.

To cancel the MAP display entry, type a CONTROL-C.

The MUXserver 100 comes factory set with a default MAP suitable for the preferred configurations shown in Figure 1-3 and Figure 1-4. Normally, it is not necessary to change from this MAP. To restore the default map, enter period '.' in all positions of the MAP.

NOTE

To make a changed map permanent, the SAVE command must be performed. To implement these changes, a RESTART or INITIALIZE is required on the MUXserver 100.

Example: (see Figure 2-1 for multiplexer configuration)

```
COM>  MAP
Multiplexer port map
Mux.:  B2-up              Self-Master-up    1 1 1 1 1 1 1 1  A1-down
Port:  0 1 2 3 4 5 6 7  2 3 4 5 6 7 8 9   0 1 2 3 4 5 6 7  0 1 2 3 4 5 6 7
Conn:  A B C D E F G H  C D E F G H       K L M N O P      A B K L M N O P
```

In this example, Port 0 of DECmux B2 is shown logically connected to Port 0 of DECmux A1. Similarly, Port 1 of B2 is mapped to Port 1 of A1. Because of these connections, Ports 2, 3, 10 and 11 of the MUXserver 100 are not used.

NOTE

The system generates its own link numbering scheme based on the information entered prior to the execution of CTRL/Z. If the MAP function is re-entered, the characters used to identify the links may differ from those previously entered, but a check will show they represent the same links.

5.17 MAPHELP (Part of the Communications Sub-directory)

This command is privileged and is executed in the communications sub-directory (in response to the COM> prompt). It provides help information on the use of the MAP command.

Syntax:

MAPHELP

Example:

```
COM>MAPHELP

The letters under the ports show the mappings, ports with
the same letters map together.

Use "blank" to move to the right "backspace" or "delete"
to move to the left.

Any letter or number shows a mapping, "." shows an
unused port.

Control-Z terminates input.

Each port must map to exactly one other port on a
different multiplexer, error messages will be given
for three or more occurrences of the same letter,
or if two ports on the same multiplexer are mapped
together, or if a port is mapped to nowhere.
```

5.18 MONITOR COMMUNICATIONS

Use this command to provide a continuously updated SHOW COMMUNICATIONS display. This is a privileged command.

You can use it to monitor the composite links. Stop the display by typing any character. The local prompt then appears.

Syntax:

MONITOR [COMMUNICATIONS]

Example:

```
LOCAL> MONITOR COMMUNICATIONS
```

NOTE

If your terminal is a video terminal that supports ANSI escape sequences, set the terminal to TYPE ANSI for the optimal display of the MONITOR COMMUNICATIONS command.

5.19 MONITOR COUNTERS

Use this command to provide a continuously updated SHOW COUNTERS display. This is a privileged command. You can use it to monitor traffic through the terminal server. Stop the display by typing any character. The local prompt then appears.

Syntax:

MONITOR [COUNTERS] [NODE node-name]

where

Node-name is the name of a LAT service node.

Example:

```
LOCAL>  MONITOR COUNTERS
```

NOTE

If your terminal is a video terminal that supports ANSI escape sequences, set the terminal to TYPE ANSI for the optimal display of the MONITOR command.

5.20 MONITOR QUEUE

Use this command to generate a continuously updated SHOW QUEUE display. This is a privileged command. Stop the display by typing any character. The local prompt then appears.

Syntax:

MONITOR QUEUE

Example:

```
MON QUE
```

This command example produces a changing display of remote requests as they are queued and dequeued by the MUXserver 100.

5.21 REMOVE QUEUE

Use this command to delete requests from remote sessions. You can remove a particular entry in the server queue or all entries. The SHOW QUEUE display lists the current queue entries.

When you remove an entry from the server queue, the server sends message to the service node that requested the remote session. The message indicates that the entry has been deleted.

Syntax:

```
REMOVE QUEUE [ENTRY entry-ID]
             [ALL           ]
```

where

entry-ID	is the entry identification number that appears in the display for the SHOW QUEUE command.
ALL	specifies all entries in the queue.

Example:

```
Local> REM QUE ENT 10D
```

This command removes the queued request that has entry ID 10 in the SHOW QUEUE display.

Error Response:

```
Local -705- Entry 019 not in queue
```

5.22 RESTART (Part of the Communications Sub-directory)

This command is executed from the privileged mode communications sub-directory (that is, in response to COM> prompt) and is used to 'initialize' the MUXserver 100 and force a restart of all remote DECmux II units.

It is the equivalent of the PRIVILEGE command INITIALIZE DELAY 0 on the MUXserver 100 and a power off and on on all DECmux II units. Its function is to implement parameters changed in the MAP and SYSTEM commands. Note changes must be saved using the SAVE command prior to a RESTART.

To prevent accidental restarting of the network, a warning message is displayed first.

Syntax:

RESTART

Example:

```
COM>  RESTART
```

WARNING

A restart will disrupt network users. Do you really want to restart [NO]?Y Restarting...

5.23 RESUME

Use this command to resume a session from local mode.

If no sessions are in effect, you receive an error message. If you terminate a service session with DISCONNECT, the RESUME command does not restart the session.

Syntax:

RESUME [SESSION *number*]

where

number indicates the service session you wish to restart. Obtain session numbers by entering the SHOW SESSIONS command. By entering RESUME with no number, the server resumes the top session in the SHOW SESSIONS display list.

Example:

```
Local>  RES
Local>  RES SES 3
```

The first command restarts the current session established for this terminal. The second command activates session 3 in the SHOW SESSIONS list.

Normal Response:

```
Local -012- SALES session 1 resumed
```

Error Response:

```
Local -712- No connection established
Local -717- Session 3 not established
```

5.24 SAVE (Part of the Communications Sub-directory)

This command is executed from the privileged mode communications sub-directory (that is, in response to the COM> prompt). It writes the current setting of the communications parameters into the MUXserver 100 permanent data base.

It must be executed after any change of parameters made using the MAP or SYSTEM commands. To transfer these parameters to the operational data base, follow the SAVE command with the RESTART command.

Syntax:

SAVE

Example:

```
COM>  SAVE
```

Normal Response:

```
COM>  SAVE
Save Complete
COM>
```

5.25 SET NOPRIVILEGE

Use this command to set your terminal to nonprivileged status when it is in privileged status.

Syntax:

SET NOPRIVILEGE

Example:

```
LOCAL>  SET NOP
```

5.26 SET PRIVILEGED

Use this command to set the supervisor port for privileged operations. You can enter this command in nonprivileged status, but you must know the privileged password. Only the supervisor port or the remote console can be privileged and not both together.

By default, upon login, the supervisor port is nonprivileged. When you set it for privileged operations, a prompt appears for you to enter the privileged password. The password is a string of 1 to 6 keyboard characters.

When you have entered the privileged mode correctly, the prompt becomes LOCAL>.

Syntax:

SET PRIVILEGED [OVERRIDE]

Password:

password

where

OVERRIDE	allows the supervisor port (or remote console) to transfer the privileged status if it is already in use.

Example:

```
Local>  SET PRI OVE
Password>  A1B2C3 (not echoed)
```

This command overrides the privileged status, if allocated to another port, and transfers it to your port.

NOTE

Be sure to exit the privileged mode (SET NOPRIVILEGE) after you perform any privileged operations. If a terminal is left in privileged status, unauthorized users can change passwords.

Error Response:

```
Local -741- Invalid password
Local -743- Another port already privileged
```

5.27 SET SESSION

Use SET SESSION to determine how certain characters are handled during a session. The session can be NORMAL, PASSALL, or PASTHRU.

For a user with an interactive port device, including a PC in terminal emulator mode, the NORMAL option enables all special MUXserver 100 characters and messages at the port. The server carries out the actions initiated by the characters (for example, switching sessions or switching to local mode) or sends messages to the port (for example, a BROADCAST note from another port).

For PC file transfers, the PASSALL and PASTHRU options disables these characters and messages at the port. This ensures that ongoing file transfers are not corrupted by extraneous data, and that unintentional session switching does not occur.

These are the special MUXserver 100 characters and messages:

- XOF and XON flow control characters
- LOCAL, FORWARD, and BACKWARD switch characters
- LOSS NOTIFICATION and BROADCAST messages

The BREAK character is not affected by PASSALL and PASTHRU. It is handled as you specify with the BREAK port characteristic.

Syntax:

```
SET SESSION {NORMAL }
            {PASSALL }
            {PASTHRU}
```

where

NORMAL	enables the special MUXserver 100 characters and messages (see the list above) at the port. This is the default.
PASTHRU	disables all switch characters and MUXserver 100 messages at the port used for the session. Use this option for ASCII file transfers.
PASSALL	disables all switch characters, MUXserver 100 messages, and XON/XOFF flow control. Use this option for binary file transfers.

Example:

```
Local> SET SESS PASSALL
```

This command is used for a local session involving a PC binary file transfer. It disables all switch characters, flow control characters, and MUXserver 100 messages at the port.

Error Response:

```
Local -741- Invalid password
Local -743- Another port already privileged
```

5.28 SHOW COMMUNICATIONS

Use this command to display the counter information about messages transmitted and received by the server on the composite links.

The counters represent data accumulated since the server was initialized. If a communications counter reaches 65535 it is then reset to ZERO.

Syntax:

SHOW COMMUNICATIONS

Example:

```
LOCAL>  SHOW COMM
```

Normal Response:

```
              * Communications COUNTERS *

                                        A          B
Frames Received:                    29276          0
Information Frames Received:         8221          0
Frames Received with CRC Errors:        4          0
Total Receive Errors:                   4          0

Frames Transmitted:                 58177          0
Information Frames Transmitted:     33130          0
Transmit Errors:                        5          0
Transmit Timeouts:                      3          0
```

Descriptions of Data Fields in SHOW COMMUNICATIONS display. The counters are displayed in columns for the A and B ports.

Frame Received	Number of frames received should increase by 1 to 10 per second, depending on traffic.
Information Frames Received	Number of messages received which contain user data.
Frames with CRC Errors	Number of messages with errors detected by the CRC check. Should be less than 1% of Frames received.
Total Receive Errors	Normally the same as CRC errors. A difference shows a serious line problem or a potential MUXserver 100 failure.
Total Frames Errors	Total number of messages transmitted. Should increase by 1 to 10 per second depending on traffic.
Information Frames Transmitted	Number of messages transmitted which contain user data.
Transmitted Errors	Number of errors detected in errors transmitted. A high count usually indicated a Transmit Clock problem.
Transmit Time Outs	No response was received by the MUXserver 100 from a DECmux II unit. Usually indicates a communications link failure.

NOTE

It is common for a small number of errors to occur. Large numbers of errors (more than 10 per minute) usually indicate a communications line problem.

5.29 SHOW COUNTERS

Use this command to display counter information about messages transmitted and received by the server on the Local Area Network.

The counters represent data accumulated since the counters were last set to zero. The information under ETHERNET COUNTERS applies to low-level data link transmissions between the MUXserver 100 and all nodes on the Ethernet. The information under SERVER COUNTERS applies only to communications between the server and the other nodes that implement the LAT architecture.

You can interrupt the SHOW COUNTERS display with [BREAK]. The local prompt reappears.

Syntax:

SHOW COUNTERS

Example:

```
LOCAL> SHO COU
```

Normal Response:

```
                    * ETHERNET COUNTERS *

Seconds Since Zeroed:          1223 Excessive Collisions:        0
Bytes Received:             1728681 Carrier Check Failure:       0
Bytes Sent:                  789753 Frame Too Long:              0
Frames Received:              12891 Heartbeat Absent:            0
Frames Sent:                  11627 Late Collision:              0
Multicast Bytes Rcv'd:         1781 Data Underrun:               0
Multicast Bytes Sent:           196 Block Check Error:          0
Multicast Frames Rcv'd:         178 Framing Error:              0
Multicast Frames Sent:            2 Data Overrun:               0
Frames Sent, Deferred:           12 System Buffer Unavailable:  0
Frames Sent, 1 Collision:         1 User Buffer Unavailable:    0
Frames Sent, 2+ Collisions:       0

                    * SERVER COUNTERS *

Message Received:             12128 Duplicates Received:        5
Messages Transmitted:         10846 Illegal Messages Rcv'd:     0
Messages Retransmitted:           9 Illegal Slots Rcv'd:        0
Non-Circuit Messages Rcv'd:       2 Duplicate Node Count:       0
Non-Circuit Messages Trmt'd:      3
```

Here are descriptions of the data fields in the SHOW COUNTERS display.

Seconds Since Zeroed	shows the elapsed time since the counters were last set to zero.
Bytes Received	shows the total number of bytes contained in datagrams successfully received by the server.
Bytes Sent	shows the total number of bytes contained in datagrams successfully transmitted by the server.
Frames Received	shows the total number of datagram frames successfully received by the server.
Frames Sent	shows the total number of datagram frames successfully transmitted by the server.
Multicast Bytes Received	shows the number of bytes received by the server that were transmitted in multicast frames.
Multicast Bytes Sent	shows the number of bytes transmitted by the server in multicast frames.
Multicast Frames Received	shows the total number of multicast frames received by the server.
Multicast Frames Sent	shows the total number of multicast frames sent by the server.
Frames Sent, Deferred	shows the number of times that frame transmissions by the server were deferred during the initial transmission attempt.
Frames Sent, 1 Collision	shows the number of times that a frame was successfully transmitted by the server on the second attempt after a collision during the first attempt.
Frames Sent, 2+ Collisions	shows the number of times that a frame was successfully sent by the server after collisions during the first two or more attempts.
Excessive Collisions	shows the number of times a message transmission was aborted due to 16 successive collisions.
Carrier Check Failure	shows the number of times the Ethernet carrier signal was lost during a transmit.

Frame Too Long	shows the number of times a frame was received with the byte count greater than 1518 bytes (the maximum allowed by Ethernet).
Heartbeat Absent	shows the number of times that no heartbeat signal was detected when the server characteristic HEARTBEAT was enabled.
Late Collision	shows the number of times a collision occurred after the Ethernet slot time elapsed.
Data Underrun	shows the number of times the server hardware failed to transmit because it was unable to keep up with the data rate.
Block Check Error	shows the number of times a received frame failed the CRC data integrity check.
Framing Error	shows the number of times a frame was received with one or more incomplete bytes.
Data Overrun	shows the number of times server hardware lost an incoming frame because it was unable to keep up with the data rate.
System Buffer Unavailable	shows the number of times no system buffer was available in the server for an incoming frame.
User Buffer Unavailable	shows the number of times no user buffer was available in the server for an incoming frame which passed through the system buffer.
Messages Received	shows the number of LAT messages successfully received by the server.
Messages Transmitted	shows the number of LAT messages successfully transmitted by the server.
Messages Retransmitted	shows the number of LAT messages that the server retransmitted because they were not acknowledged by the service nodes.
Duplicates Received	shows the number of LAT messages that the server received more than one.
Illegal Messages Received	shows the number of LAT messages with an illegal format received by the server.

Illegal Slots Received	shows the number of LAT messages with an illegal slot format received by the server.
Duplicate Node Count	shows the number of times a service node became available with different Ethernet addresses.
Non-Circuit Messages Xmitted	shows the number of LAT messages transmitted that were not associated with a circuit. This includes messages exchanged to establish remote sessions and remote requests.
Non-Circuit Messages Received	shows the number of LAT messages received that were not associated with a circuit. This includes messages exchanged to establish remote sessions and remote requests.

5.30 SHOW NODES

Use this command to display information about the service nodes in the server.

Nodes are authorized or unauthorized depending upon group code access. They are reachable or unreachable depending upon whether they currently accept connections from MUXserver 100 terminals.

You can interrupt a SHOW NODES display with [BREAK]. The local prompt reappears.

Syntax:

SHOW NODES [*node-name*]
[ALL]

where

node-name	specifies the service node for which information is displayed. If you do not enter a node name, information appears for all authorized service nodes with REACHABLE or UNKNOWN status. If you enter a node name, you receive a display with more detailed data about the specified node. The counters in this display apply to messages exchanged between the MUXserver 100 and the specified service node.

ALL — displays information for authorized nodes that are REACHABLE, UNKNOWN, or currently UNREACHABLE. For the privileged SHOW NODES ALL command, all nodes appear, whatever their status, that are authorized for at least one of the MUXserver 100 terminals.

Examples:

```
Local> SHO NOD ALL
Local> SHO NOD SALES
```

The first command produces information about all service nodes that are REACHABLE, UNREACHABLE, or UNKNOWN. The second command generates detailed information about the service node SALES.

Normal Response: (for the SHOW NODES ALL command)

```
Node Name    Status          Announcement

HDWENG        Reachable      HDWENG -- Hardware Engineering
METDAT        Unreachable    METDAT -- Weather Data
SALES       32Connected      SALES  -- VAX-11/780 System
```

Normal Response: (for SHOW NODE SALES)

```
SALES       32Connected       SALES -- VAX-11/780 System

Physical Address:AA-00-01-2C-1E-01 Seconds Since Zeroed:    71289
Messages Received:            178762 Duplicates Received:       77
Messages Transmitted:         202827 Illegal Messages Rcv'd:     0
Messages Retransmitted:           91 Illegal Slots Rcv'd:        0
                                     Duplicate Node Count:       0
```

The data fields in the SHOW NODES listings contain the following information.

Node Name — lists the name of the service node as defined in the server's node database.

Status — shows the current reachability status of the service node:

- Reachable - indicates that no sessions are active, but the service node is accessible.

- Unreachable - indicates that communication with the service node has been inactive for more than 30 minutes, or an active service session has timed out. The node may also specifically signal that it is unreachable.
- nn Connected - shows that nn sessions with this node are currently active, and that the node is reachable.
- Unknown - indicates that no sessions are active, and that the node has not been heard from recently.

Announcement	gives a brief description about the service node as entered by the system manager.
Physical Address	lists the Ethernet address of the service node.
Messages Received	lists the number of LAT messages successfully received by the server.
Messages Transmitted	lists the number of LAT messages successfully transmitted by the server.
Messages Retransmitted	lists the number of LAT messages that the server retransmitted because they were not acknowledged by the service node.
Duplicates Received	shows the number of LAT messages that the server received more than once.
Illegal Messages Received	shows the number of LAT messages with an illegal format received by the server.
Illegal Slots Received	shows the number of LAT messages with an illegal slot format received by the server.
Duplicate Node Count	shows the number of times a service node became available with different Ethernet addresses.

5.31 SHOW PORTS

Use this command to display information about MUXserver 100 ports.

This information includes the characteristics that you assign with the DEFINE and SET PORT commands. SHOW PORT displays the characteristics that reside in both the server's operational and permanent databases. The characteristics in parentheses are the permanent characteristics. They take effect each time the port user logs in.

Show port commands entered at privileged and nonprivileged ports differ slightly.

You can interrupt a show port display with <BREAK>. The local prompt reappears.

Syntax:

```
SHOW PORTS [number ][BRIEF]
           [ACCESS {DYNAMIC}][FULL ]
           [       {NONE }]
           [       {REMOTE }]
           [ALL                 ]
```

where

number	specifies a particular port for which information is displayed. The number must be in the range 1 to 8. If you enter show port only, the default port is the port you are using.
ALL	states that information for all ports is to be included in the display.
ACCESS	limits the display to only those ports with ACCESS set to the value you choose. ACCESS is the ACCESS port characteristic (see the DEFINE/SET PORT command).
BRIEF	generates a one-line-per-port display for the ports you specify with number, ALL, or ACCESS. BRIEF is the default if you enter ACCESS or ALL.
FULL	produces a complete listing of all port characteristics and some error counters. FULL is the default if you specify a port number or if you enter only SHOW PORT.

Example:

```
Local> show port 1


Port:  1  Fred T Spoons  Name:   PORT_01      (PORT_01)

Access:       LOC (LOC) Interrupts:    DIS  (DIS)Char Size:     8    (8)
Autobaud:     ENA (ENA) Local Switch: NONE (NONE)Parity:       NONE(NONE)
Autoconnect: ENA (ENA) Loss Notif'n: ENA  (ENA)I/P Speed:     9600(9600)
Autoprompt:   ENA (ENA) Message Codes:ENA  (ENA)I/P Flow:      ENA (ENA)
Backd Switch:NONE(NONE)Password:      DIS  (DIS)O/P Speed:     9600(9600)
Break:        LOC (LOC) Session Limit:4     (4)  O/P Flow:     ENA (ENA)
Broadcast:    ENA (ENA) State:         ENA (ENA)Framing Errors:      0
Forwd Switch:NONE(NONE)Type:         ANSI (ANSI)Parity Errors::     0
Inactivity:   DIS (DIS) Verification: ENA (ENA)Overrun Errors:      0

Preferred Service:NONE  (NONE)
Current Session:  NONE
Group Codes:      0-255 (0-255)
```

5.32 SHOW QUEUE

Use this command to show information about the entries in the server queue. These entries are requests from VMS service nodes for connection to application terminals (usually line printers) at server ports.

Syntax:

SHOW QUEUE

Example:

```
Local>  SHOW QUE
```

Normal Response:

```
Position      Entry      Node        Request

1             002        SALES1      PORT_2
2             004        HDWENG      LA100
```

This display tells you the following:

Position	indicates the position of the remote request in the server queue. Entries are queued on a first-in-first-out basis.
Entry	is the entry identification number for the remote request.
Node	is the name of the service node that sent the remote connection request to the server.
Request	shows the server port identification (see Name: in the SHOW PORTS FULL display). This corresponds to a device name for the printer that is set up by the system manager of the requesting service node.

5.33 SHOW SERVER

Use this command to display information about the MUXserver 100.

The command displays server characteristics that are stored in the server's permanent and operational databases. The characteristics enclosed in parentheses are those in the permanent database. These values do not take effect until the next server initialization.

The keyword SERVER in this command can be abbreviated to no fewer than five characters (see the example below).

You can interrupt a SHOW SERVER display with [BREAK]. The local prompt reappears.

Syntax:

SHOW SERVER

Example:

```
Local> SHO SERV
```

Normal Response: (for nonprivileged SHOW SERVER)

```
Address:  AA-00-03-49-F1-00     Uptime:     25 13:14:52
Name:     Marketing Pod         (Marketing Pod)
Location: BLDNG 4, SECT 2       (BLDNG 4, SECT 2)
Software: AUSPOS000            (AUSPOS000)
Number:               175       (175)
Circuit Timer:         80        (80)
Keepalive Timer:       20        (20)
Console Port:           1        (1)
Login Limited:          3        (3)
Dump:                 ENA       (ENA)
Heartbeat:            ENA       (ENA)

Load Host: AA-00-03-F3-C1-05    METDATA
```

Normal Response: (for privileged SHOW SERVER command)

```
Address:  AA-00-03-49-F1-00     Uptime:     5 17:58:29
Name:     Marketing Pod         (Marketing Pod)
Location: BLDNG 4, SECT 2       (BLDNG 4, SECT 2)
Software: AUSPOS000            (AUSPOS000)
Number:               175       (175)
Circuit Timer:         80        (80)
Keepalive Timer:       20        (20)
Console Port:           1        (1)
Login Limit:            3        (3)
Dump:                 ENA       (ENA)
Heartbeat:            ENA       (ENA)

Server Status:     00  0000        0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0
Software Status: PC=00204E,SP=01FED2,SR=002500,MEM=000000,CODE=004
Dump Host: AA-00-04-00-CD-10
Load Host: AA-00-03-FC-C1-05      METDATA
```

The fields that can be specified by DEFINE SERVER and SET SERVER are discussed in the command descriptions for those commands. Here is a description of the other data fields in the SHOW SERVER listing:

Uptime — shows the time since the last server initialization. A 3-digit figure indicates the number of full days of uptime. Three 2-digit figures separated by colons (:) indicate part of an additional day in hours, minutes, and seconds.

Server Status — lists the following codes from left to right across the display:

- A 2-digit hardware status code. The code is nonzero if a fatal hardware error was detected during the self-test at the last initialization. This code normally does not appear unless the error is intermittent.
- A 4-digit code of ones and zeros that describes a nonfatal hardware error.
- A series of seventeen 1-digit codes (one code for each terminal) that describes nonfatal terminal checksum errors.

Software Status — displays the word "Normal" or shows server memory data and the upline dump host when a fatal software error has occurred.

Dump Host — shows the Ethernet address of the node that received the last upline dump of server memory.

Load Host — shows the Ethernet address and node name of the node that last down-line loaded the server.

5.34 SHOW SERVICES

Use this command to display information about the services you are authorized to use while in service mode.

Nodes are authorized or unauthorized depending upon group code access. If at least one authorized node offers a particular service, then you can use that service.

Entering only the keywords SHOW SERVICES generates a one-line-per-service display. The information includes service name, status, and service announcement. Only those services with AVAILABLE or UNKNOWN status are included.

You can interrupt a SHOW SERVICES display with [BREAK]. The local prompt reappears.

Syntax:

SHOW SERVICES [*service-name*]
[ALL]

where

service-name displays a list of all nodes that supply the specified service. Included in the display are each node's reachability status, service announcement, and rating for dynamic load balancing.

ALL generates a one-line-per-service display. The information is similar to that with SHOW SERVICES, except that services with UNAVAILABLE status are also included. The privileged SHOW SERVICES ALL command lists all services, whatever their status, that are authorized for at least one of the MUXserver 100 terminals.

Examples:

```
LOCAL> SHO SER ALL
LOCAL> SHO SER DEVELOP
```

The first command lists all services on the Ethernet. The second command produces information about the service nodes offering the specific service DEVELOP.

Normal Response: (for SHOW SERVICES ALL)

```
Service Name        Status          Announcement

DEVELOP             Available       Software Development
METDATA             Unavailable     Weather Information
SALES               Available       Monthly Sales Data
VMSMAIL             Available       Mail server
```

Normal Response: (for SHOW SERVICES DEVELOP)

Service DEVELOP - Available

```
Node Name   Status        Rating Announcement

HDWENG      Unknown       62     HDWENG  -- Hardware Engineering
METDAT      Unreachable    0     METDATA -- Weather Programs
SALES       Reachable     23     SALES   -- VAX-11/780 System
```

Here are descriptions of the headings in the SHOW SERVICES displays:

Service Name — shows the title that identifies the network service.

Node Name — shows the name of the service node as defined in the database of each node that offers the service.

Service Status — shows the current reachability status of the service:

- Available - indicates that one or more service nodes which offer the service has the status REACHABLE.
- Unavailable - indicates that none of the service nodes which offer the service is REACHABLE or UNKNOWN.
- Unknown - indicates that none of the service nodes which offer the service is REACHABLE, and one or more is UNKNOWN.

Node Status — shows the current availability of the service node:

- Reachable - indicates that no sessions are active, but the service node is accessible.
- Unreachable - indicates that communication with the service node has been inactive for more than 30 minutes, or an active service session has timed out. The node may also specifically signal that it is unreachable.
- nn Connected - shows that nn sessions with this node are currently active, and that the node is reachable.
- Unknown - indicates that no sessions are active, and that the node has not been heard from recently.

Rating — shows the relative capability for a service node to process new sessions: the higher the rating number, the greater the capability.

Announcement provides a description of the service.

5.35 SHOW SESSIONS

Use this command to display information about your service sessions.

The command lists session number, service name, and service description. SHOW SESSIONS places the current session at the top of its display list. When you terminate a session, the session below it in SHOW SESSIONS takes its place in the display.

When you enter only the keywords SHOW SESSIONS, the server generates a list of the sessions for the terminal you are using.

You can interrupt a SHOW SESSIONS display with [BREAK]. The local prompt reappears.

Syntax:

```
SHOW SESSIONS [PORT number]
              [ALL         ]
```

where

PORT *number*	displays a list of sessions for the specified terminal.
ALL	displays a list of sessions for all terminals attached to the MUXserver 100.

Example:

```
Local> SHO SES PORT 2
```

This command displays the session information for port 2.

Normal Response: (for SHOW SESSIONS)

```
PORT      2: John Doe          Connected     DEVELOP
- Session 2: DEVELOP            VAX-11/780 SYSTEM
- Session 3: METDATA            Weather Programs
- Session 4: SALES              VAX-11/780 SYSTEM
- Session 1: DEVELOP            *** Disconnected ***
```

Here the service DEVELOP, not the terminal user, ended session 4. The terminal user can still resume session 4 to determine why the service node stopped the session.

Normal Response: (for SHOW SESSIONS ALL)

```
Port 1: John Doe                    Connected     DEVELOP
- Session 2: DEVELOP                VAX-11/780 SYSTEM
- Session 3: METDATA                Weather Programs
- Session 1: SALES                  VAX-11/780 System

Port 3: Richard Roe                 Local Mode
- Session 1: DEVELOP                Software Development

Port 4: Jack Jones                  Local Mode

Port 5: John Smith                  Connected     METDATA
- Session 1: METDATA                Weather Programs

Port 6: Mary Patrick                Local Mode
- Session 3: HWDENG                 Hardware Engineering
- Session 1: SALES                  VAX-11/780 System

Port 7: Pat O'Dea                   Local Mode
- Session 2: METDATA                Weather Programs
```

5.36 SHOW USERS

Use this command to display information about active server users.

The command generates a one line listing for each user. The terminal number, user name, status, and service (if connected) appear in the display. The status shows whether the user's terminal is currently in local mode, or connected to a service.

You can interrupt the SHOW USERS display by entering [BREAK]. The local mode prompt reappears.

Syntax:

SHOW USERS

Example:

```
LOCAL> SHO USE
```

Normal Response:

```
Port          Username          Status          Service

Port 1:       John Doe          Connected       DEVELOP
Port 3:       Richard Roe       Local Mode
Port 4:       Jack Jones        Local Mode
Port 5:       John Smith        Connected       METDATA
Port 6:       Mary Patrick      Local Mode
Port 7:       Pat O'Dea         Local Mode
```

5.37 SHOW (Part of the Communications Sub-directory)

This command is executed from the privileged communications sub-directory (that is, in response to the COM> prompt) and displays information about the composite communications links.

The display shows the Master or Slave Status of the MUXserver 100 (a MUXserver 100 is always a Master), the firmware revision number and the Composite Ports A and B, speed, line type and modem setting.

Syntax:

SHOW

Example:

```
COM>  SHOW

DSRZA MASTER - Firmware Version V1.0

Port A  38400 baud long line driver
Port B  38400 baud long line driver
```

5.38 STATUS (Part of the Communications Sub-directory)

This command is executed from the privileged communications sub-directory (that is, in response to the COM> prompt) and shows the counters for the composite Ports A and B.

For a description of the counter see the SHOW COMMUNICATIONS command.

Syntax:

STATUS

Example:

```
COM>  STATUS
```

DSRZA Statistics (Firmware Version x.x)

```
        TOTAL DATA  TOTAL CRC             TOTAL DATA  TOTAL XMIT
LINK    FRAMESFRAMESREC'D REC'D DSRCTS &FRAMESFRAMESXMIT  TIME-
        REC'D REC'D ERRORSERRORS    CD   XMIT  XMIT  ERRORSOUTS

Port A 2619  2523  0      0      ON ON   2326  2215  0      4
Port B 1233  1145  8      7      ON ON   1244  1236  0      2
```

5.39 START TEST

Use this command as a tool to test a port's operation.

The command generates a continuous stream of ASCII characters which are transmitted directly to a device attached to a server port.

If you enter only the keywords START TEST and a port number, the server sends a continuous stream of characters to the port device. This continues until you press any key at that device. You also stop the test when you specify the port in the STOP TEST command.

Syntax:

START TEST [PORT number] [WIDTH number] [COUNT number]

where

PORT number	specifies the port where the test output appears on the port device. This is privileged. If you enter no number, the test data appears on the port device you are using.
WIDTH number	specifies the screen width of the lines of ASCII output. The width can vary between 1 and 132 characters, and the default is 72 characters.
COUNT number	specifies how many lines of ASCII characters are output. If you do not specify a number, lines appear until you stop the output.

Examples:

```
Local> START TES  POR 8  WID 32  COU 5
Local> START TES
```

The first command causes port 8 to receive a stream of five lines of keyboard characters. Each line is 32 characters wide. The second command generates a continuous test output at the local port device.

Normal Response:

```
0123456789:;<=>?@ABCDEFGHIJKLMNO
123456789:;<=>?@ABCDEFGHIJKLMNOP
23456789:;<=>?@ABCDEFGHIJKLMNOPQ
3456789:;<=>?@ABCDEFGHIJKLMNOPQR
456789:;<=>?@ABCDEFGHIJKLMNOPQRS
```

Error Response:

```
Local -731- Terminal not configured for loopback test
Local -733- Terminal 7 already under test
```

5.40 STOP TEST PORT

Use this command to terminate test activity generated by the START TEST PORT command. This is a privileged command.

If the test involved the loopback function, the result of the test appears on the privileged terminal (that is, supervisor port terminal or the remote console).

Syntax:

STOP TEST PORT *number*

where

number specifies the terminal for which the command terminates testing.

Example:

```
Local> STO TES PORT 3
```

This command stops TEST TERMINAL activity at terminal 3.

Normal Response:

```
Local -511- Test complete 6000 bytes written,
0 error(s) detected
```

Error Response:

```
Local -732- Port 3 not under test
```

5.41 SYSTEM (Part of the Communications Sub-directory)

This command is executed from the privileged communications sub-directory (that is, in response to the COM> prompt) and is used to set the parameter for the A and B synchronous composite ports. Table 5-1 lists these parameters, their initial default values and allowed options.

Table 5-1 Composite Port Parameters

Parameter	Default	Options
Speed	9600 baud	1200,2400,4800,9600 19200,38400 baud
Modem Control	ENABLE	ENABLE, DISABLE (NOTE 1)
Line Type	RS-232	RS-232, LONG LINE DRIVE (NOTE 2)

NOTE

1. **This parameter has no significance in Long Line Drive mode and is not prompted by the display.**
2. **The same connectors are provided for both RS-232 and RS-422 line types. Different cabling is required (refer to the *MUXserver 100 Network Installation Manual*, Chapter 1, Section 1.7). When changing line type, DIP switches have to be configured inside the MUXserver 100. See Chapter 2, Section 2.5.1.1 (Switch Selection of RS-232 or RS-422 Long Long Drive).**

When the SYSTEM command is executed, it prompts you with questions about the links and displays the current values. To leave a value unchanged, enter a <RETURN>. To view a list of alternative actions, type a question mark (?) and a <RETURN>. To enter a new value, type the desired value.

Syntax:

SYSTEM

Example:

```
COM>  SYSTEM

For port A
Speed [9600]??
Options: 1200,2400,4800,9600,9.6K,19200,19.2K,38400,38.4K
Speed [9600]?19.2K
Long line driver [NO]??

For port B
Speed [9600]?
Long line driver [NO]?
Modem [YES]??
Options: YES,NO
Modem [YES]?

Master or Slave MUX [MASTER]??
Options: MASTER,SLAVE

Master or Slave MUX [MASTER]?SLAVE

COM>
```

5.42 TEST (Part of the Communications Sub-directory)

This command is executed from the privileged communications sub-directory (that is, in response to the COM> prompt) and is used to test the composite communications links. It requires an ANSI terminal to display correctly.

The execution of TEST destroys normal communications links, and as a precaution, you are prompted for a specific YES/NO response to continue the TEST.

A displayed menu allows you to select one of the following options:

1. Restart the Network.
2. Composite port internal logic test.
3. Composite port external test.
4. Modem control test.

Option 1

Selection of this option restarts the MUXserver 100. It is the method used to exit testing and return to normal operation.

Option 2

Tests all of the composite port logic except the line drivers and receivers. It should be run before Option 3 if a communication problem is suspected.

Option 3

Tests the composite ports in normal operational mode. You can select which ports (A,B or both) you wish to test, all other parameters are taken from the current communications parameters set by the SYSTEM command and the DIP switches for line type (RS-232 or RS-422).

This test requires an external loopback for any port being tested.

The loopback can be:

An H325 loopback connector.
A modem with internal loopback.
A modem with remote loopback.
A DECmux II unit (which will act as loopback automatically).
A loopback cable #70-22411-01 for RS-422 loopback.

By changing the position and type of loopback, most problems in communications links can be isolated.

Option 4

This test requires an H325 loopback connector in both ports. It will display an error message for any modem line not correctly looped back or which has failed.

Syntax:

TEST

Example:

```
COM>  TEST
```

WARNING

Testing will destroy all user links and require a DSR restart. Do you really want to test [NO]?Y

```
                    DSRZA
                MUXSERVER 100
             OFFLINE DIAGNOSTIC

Test number (<CR> to resume normal operation, ^C to stop test)?

  1          Restarting Network
  2          Asynchronous port external test
  3          Asynchronous internal logic test
  4          Modem control test
```

5.43 ZERO COUNTERS

Use this command to reset the counters for the Ethernet, server, and terminals. This is a privileged command.

ZERO COUNTERS does not zero the uptime counter in the SHOW SERVER display. This is reset only after an initialization or power-up of the MUXserver 100.

Syntax:

ZERO [COUNTERS] [NODE node-name]

where

NODE-name — specifies that the counter values for transmissions between the server and the LAT services node node-name are set to zero.

Example:

```
LOCAL> ZER
LOCAL> ZER NOD SALES 1
```

CHAPTER 6
DECmux II OPERATION

This chapter describes the DECmux II unit in normal operations. (For diagnostic information, see Chapter 7, Section 7.2, TESTING DECmux II.)

The default settings of DECmux II parameters are suitable for many installations.

The composite port line speed is the most likely parameter needing change; the default is 9600. It should be set to the same speed as the modem (see Section 6.3.14, System Command, and 6.3.11, Save Command, for details).

6.1 CONTROLS AND INDICATORS

6.1.1 Indicators

The DECmux II unit has three indicators: one on the front bezel and two on the rear connector panel. Their locations are shown in Figure 6-1.

6.1.1.1 Start-up Indicator - The green LED start-up indicator, located on the front bezel, is a three-state indicator. It indicates power supply OK, start-up diagnostic running, and start-up diagnostic complete.

Following power-up, the LED will flash briefly, indicating that the power supply is OK. The indicator will then turn off for several seconds, indicating that the start-up diagnostic is being run. On successful completion of the start-up diagnostic, the indicator will turn on permanently, indicating that the DECmux II unit is now operational.

If the start-up indicator follows any pattern other than the one described above, turn the DECmux II main power off, wait 20 seconds, and reapply the main power. If the second attempt is not successful, the unit is faulty and will require service.

6.1.1.2 Data Set Ready Indicators - The two red LED indicators on the rear connector panel indicate the status of the composite port DATA SET READY conductors. The ON state indicates successful connection to a modem on the respective composite port. The OFF state indicates that the modem is either in the process of connecting or not connected.

6.1.2 Controls

All DECmux II control functions are executed by means of the supervisor port, or by means of a CONNECT command through the network from the MUXserver 100 or second DECmux II unit.

A terminal such as the VT220 is required to access the control functions by means of the supervisor port; however, it is not necessary for the terminal to remain permanently connected after the DECmux II unit has been set up and its operational parameters saved in non-volatile memory.

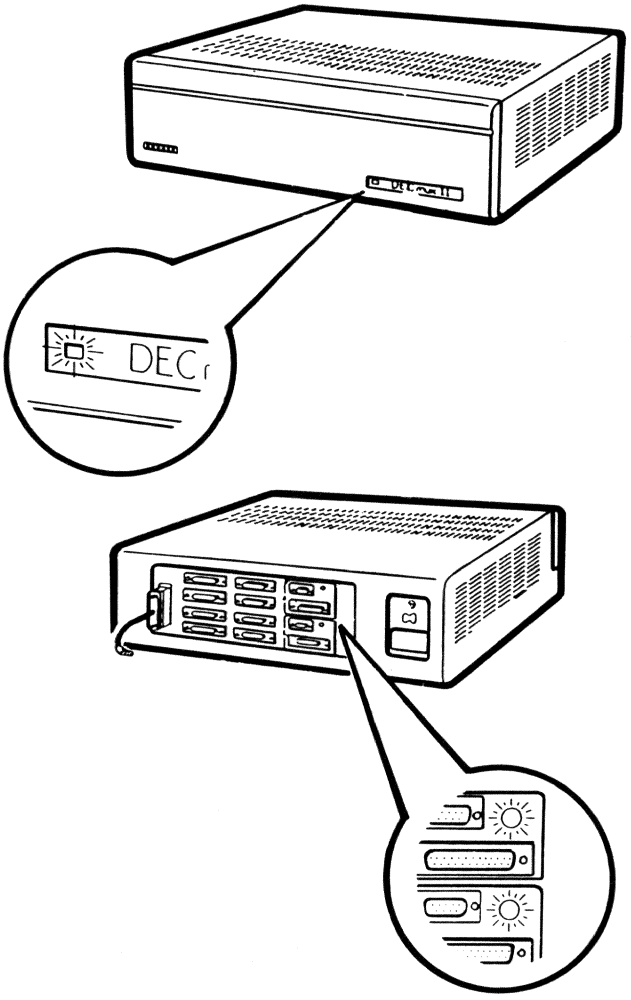

Figure 6-1 DECmux II Indicators

6.2 OPERATION

6.2.1 Starting Your DECmux II

This section assumes that the DECmux II has been installed and configured as specified in the *MUXserver 100 Network Installation Manual*, Chapter 3.

To start your DECmux II unit, connect the main power cord and apply main power. The remainder of the DECmux II start-up process is automatic. The DECmux II unit will run its internal start-up diagnostic and establish connection with the MUXserver 100.

If you have a terminal connected to its supervisor port, the following message will be displayed:

```
DECmux II - STARTUP TEST - FIRMWARE VERSION Vx.x-xx
012345678*
```

The Vx.x indicates the current firmware version installed in your DECmux II unit. All DECmux II units in your MUXserver 100 Network should be installed with the same firmware version number.

The series of characters on the next line (that is, 012345678*) indicates the execution and completion of the sub tests of the DECmux II start-up diagnostic; the * indicates completion of the start-up process.

The DECmux II unit will now establish communication with the MUXserver 100.

Your DECmux II unit has now completed its start-up process and is ready for operation.

6.2.2 Master/Slave

Each DECmux II unit used with the MUXserver 100 must be set up with SLAVE status. This status can be checked by means of the MAP command (refer to Section 6.3.6).

In a valid network, there must be exactly one MASTER. The MUXserver 100 is always the MASTER.

The purpose of the network master, is to initiate establishment of the network and to down-line load the asynchronous port map into each DECmux II unit. If you initialize your master, the complete network will be reset.

6.2.3 Multiplexer Network

As mentioned in Section 6.1.2 (Controls), all composite link and DECmux II control functions are performed on the supervisor terminal of a DECmux II unit or as a COMMUNICATION sub-directory command in the MUXserver 100.

6.2.3.1 Remote Supervisor Commands - In addition to executing the control commands on the local DECmux II unit or MUXserver 100 to which the supervisor terminal is physically connected (as specified in Section 6.3, DECmux II COMMAND PROCESSOR SUMMARY), a subset of control commands can be performed on remote DECmux II units or the MUXserver 100 by means of the network. This is enabled using the CONNECT and DISCONNECT commands as specified in Sections 6.3.1 and 6.3.3, respectively. The following commands can be executed by means of the CONNECT command on remote devices.

Command	Section	
COPY	6.3.2	(DECmux II only)
DISCONNECT	6.3.3	
HELP	6.3.5	
MAP	6.3.6	
MAPHELP	6.3.7	
PASSWORD	6.3.8	(DECmux II only)
PORT	6.3.9	(DECmux II only)
RESTART	6.3.10	
SAVE	6.3.11	

6.2.4 DECmux II Offline Diagnostic

A group of internal diagnostic programs are resident within the DECmux II unit. These diagnostic programs may be evoked by means of the supervisor terminal in the event that diagnosis of either the DECmux II unit or the network is necessary. The diagnostic programs are started by entering the command processor (refer to Chapter 7, Section 7.2).

The diagnostic programs enable diagnosis and testing of the following:

- Internal DECmux II logic
- Asynchronous ports and cables
- Attached terminals
- Composite ports and cables
- DECmux II, MUXserver 100 and modems

6.3 DECmux II COMMAND PROCESSOR SUMMARY

The DECmux II command processor enables operational parameters of the DECmux II unit and multiplexer network to be controlled and monitored by means of the supervisor terminal.

The command processor commands are detailed in Sections 6.3.1 through 6.3.16. To enter the command processor, perform the following:

- Type carriage return.
- Following the PASSWORD> prompt, type in your password.
- The default password is SYSTEM.
- Following the SYS> prompt type the required command. If you are a new user, try HELP first.

The SYS> prompt specifies that the command processor is active. If you change a DECmux II parameter and wish to save the new value, be sure to use the SAVE command. Refer to Section 6.3.11 for SAVE command operation.

NOTE

After you have finished with the command processor, be sure to log out. Failure to log out will inhibit remote access to your DECmux II unit by means of the CONNECT command.

To log out of the command processor, type EXIT following the SYS> prompt.

6.3.1 CONNECT Command

This command allows the supervisor of a DECmux II unit to log on as supervisor to the MUXserver 100 or other DECmux II unit in the network, and perform system control and supervisor commands as specified in Section 6.2.3.1, Remote Supervisor Commands.

Syntax:

CONNECT Xn

Parameters:

Xn - Is the remote multiplexer to connect to, and can be any one of the following, depending on the network configuration:

A3, A2, A1, B1, B2, B3

The naming convention for the remote-mux parameter is relative to the DECmux II unit, which is executing the command. For example, B3 refers to the DECmux II unit connected to the B port of your DECmux II by routing through two other DECmux II units. A1 will be the first DECmux II unit or MUXserver 100 along on your A composite port.

Use the MAP command (Section 6.3.6) to identify each multiplexer.

Following successful connection to a remote DECmux II unit, you will be prompted for the password. On entering the password, the Xn> prompt will be returned to your Supervisor terminal, indicating the DECmux II unit you are connected to. The Xn> prompt will be any one of the following: A1, A2, A3, B1, B2 or B3.

A MUXserver 100 appears on the MAP as two units. It is only possible to connect to one of these, labeled MASTER. Attempting to connect to the other will give the message "Remote Mux Busy".

6.3.2 COPY Command

This command causes the parameters of the previously selected asynchronous port to be duplicated in all seven other asynchronous ports. This command is intended to simplify initialization of asynchronous ports. The port parameters will be altered immediately. If you wish to retain your new parameters following the next power down/up sequence of your DECmux II unit, be sure to execute the SAVE command.

NOTE

The asynchronous port parameters are downloaded from the MUXserver 100 following initialization. Apart from programming specific parameters (for example, DTR/DSR, MODEM, ECHO and TERM/HOST), there should be no need to vary the asynchronous port parameters.

Syntax:

COPY

Example:

```
SYS>  COPY
SYS>
```

6.3.3 DISCONNECT Command

The DISCONNECT command returns control of a remote multiplexer to its local supervisor port, and reconnects the CONNECTed supervisor port to controlling its own operations and parameters. This command has no meaning if the operator has not previously completed a CONNECT command successfully and will indicate such with a suitable error message.

Syntax:

DISCONNECT

Example:

```
A1>  DIS
SYS>
```

6.3.4 EXIT Command

The EXIT command logs out the operator from supervisor control.

To re-enter the supervisor control, the operator must log on as described in Section 6.3, DECmux II COMMAND PROCESSOR SUMMARY.

Syntax:

EXIT

Example:

```
SYS>  EX
```

6.3.5 HELP Command

The HELP command displays HELP text.

Syntax:

HELP

Example:

```
SYS>HELP
DFMZA Commands:
CONnect     -Connects this terminal to a remote DFMZA
             supervisor port
COPy        -Copies the latest port set up to all ports
DISconnect  -Reverse of connect
EXit        -Leave supervisory mode
Help        -Display this text
Map         -Display and change port mapping
MaPHelp     -Instructions for use of Map command
PASSword    -Change password
POrt        -Change port parameters, requires port number
             or "S" for supervisory port
REStart     -Restart multiplexer, for Master restarts the
             whole nework
SAve        -Save port parameters, system parameters, and
             port mapping in non-volatile memory
Show        -Display port parameters
STatus      -Display system communications status
SYstem      -Change system communications parameters
TEST        -Enter test mode
?           -Display allowed options
CTRL-C      -Exit from current command to SYS prompt
SYS>
```

6.3.6 MAP Command

The MAP command allows the System Manager using privileged commands in the MUXserver 100 to set up the logical connections between asynchronous ports of DECmux II multiplexers and the MUXserver 100 in the network. It allows the operator of a SLAVE to view the link map only.

Syntax:

MAP

Evoking the MAP command will produce the following network map display.

```
Multiplexer port map

Mux.: B2-up              Self-Master-up   Self             A1-down
Port: 0 1 2 3 4 5 6 7    0 1 2 3 4 5 6 7  0 1 2 3 4 5 6 7  0 1 2 3 4 5 6 7
Conn: A B C D E F G H    A D G I J K L M  B E H N J O M P  C F N I K L P O
```

There are three lines to the map display.

Line 1 labels the network multiplexers and displays their status. First line definitions are as follows:

Self;	The DECmux II unit to which the supervisor port is currently connected. This can be a physical connection or a logical connection through the network.
Xn;	Where "X" can be either A or B and "n" is a number in the range of 1 to 3. This is the relative multiplexer position; for example, A2 would be the second MUX along on the "A" composite port from the DECmux II, SELF. B3 would be the third MUX along on the "B" composite port of SELF.
MASTER;	Is the MUXserver 100.
UP;	The composite link communications to this multiplexer is UP.
DOWN;	The composite link communications to this multiplexer is DOWN.

Line 2 labels the port number of each multiplexer. There is a maximum of 32 asynchronous ports in a valid network configuration, eight on each DECmux II unit and 16 on the MUXserver 100.

Line 3 is the asynchronous port connection line. There is a maximum of 16 logical asynchronous connections in a network. There are two ends to a connection, 32 ends. Asynchronous link connections are made by typing characters on Line 3 as specified in Section 6.3.6.1, Link Selection (Only Possible on the Master).

A MUXserver 100 will appear as two adjoining MUXes.

Example:

```
SYS>MAP

Multiplexer port map


Mux.: B2-MASTER-UP      B1-up           Self            A1-down
Port: 0 1 2 3 4 5 6 7   0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7 0 1 2 3 4 5 6 7
Conn: A B C D E F G H   A D G I J K L M B E H N J O M P C F N I K L P O
SYS>
```

NOTE

This is the map display you would expect when logged into the supervisor port of DECmux II (A1) in the multiplexer configuration shown in Chapter 1, Figure 1-4. The B1 and B2 MUX displays are in fact the MUXserver 100. To change the MAP, you must connect to B2, the MASTER. Trying to connect to B1 results in the message "Remote MUX Busy". The MUXserver 100 prevents any connection to B1.

6.3.6.1 Link Selection (Only Possible on the MASTER) - Entering an alphanumeric character "0-9" or "A-Z" on Line 3 will select one end of that logical link number for the port at the current cursor position. Enter the same character at the position required for the other end of the link. Each logical link used must have exactly two ends selected. The link ends must terminate in different multiplexers.

The port at the current cursor position may be deselected by typing a period character ".".

6.3.6.2 Port Selection - Ports may be selected by moving the cursor left or right.

Use the "space" key to move to the right, and the "RUBOUT" key to move to the left. Entering a link number causes the cursor to move to the next port to the right.

6.3.6.3 Exiting the MAP Command - Entering CONTROL-Z by pressing both the "control" and "Z" key simultaneously will cause the MAP command to be exited and the SYS> prompt to be given, providing the mapping parameters are valid.

The SAVE command must be entered (see Section 6.3.11) to retain the new mapping parameters in the non-volatile memory.

To cancel the MAP command, type CONTROL/C.

NOTE

The system generates its own link numbering scheme, based on the information entered prior to the execution of CTRL/Z. If the MAP function is re-entered, the characters used to identify the links may differ from those previously entered, but a check will show they represent the same links.

6.3.7 MAP HELP Command

The MAP HELP command prints the text shown below. This text is described in Section 6.3.6.

Syntax:

MAPHELP

Example:

```
SYS>MAPHELP
MAP HELP

The letters under the ports show the mappings, ports with
the same letters map together.

Use "blank" to move to the right, "backspace" or "delete"
to move to the left.

Any letter or number shows a mapping; "." shows an unused
port.

Control-Z terminates input.

Each port must map to exactly one other port on a
different multiplexer.  Error messages will be given
for three or more occurrences of the same letter, or if
two ports on the same multiplexer are mapped together, or
if a port is mapped to nowhere.

SYS>
```

6.3.8 PASSWORD Command

The PASSWORD command allows the operator to change the password that protects the supervisor port from unauthorized use.

The password is initially factory-set to "SYSTEM". The password may contain any sequence of eight printable characters.

The system will prompt for the current password, and then the new password. It will then request verification of the new password as shown below. If the old password is not correct, or the two entries do not match, then the password will not be changed. Neither the new or old passwords will be echoed. It is recommended that the password be changed after installation.

Syntax:

PASSWORD

Example:

```
SYS>PASSWORD
Old password:SYSTEM          } Passwords
New password:NEWPASS         } are not
Verify:NEWPASS               } echoed
SYS>SAVE
Save complete
SYS>
```

It is necessary to enter the SAVE command (see Section 6.3.11) to retain the new password in non-volatile memory.

6.3.9 PORT Command

NOTE

Unless you are specifically setting parameters other than speed, character size, parity and XON/XOFF flow control, you SHOULD NOT use the PORT command in a MUXserver 100 configuration.

The PORT command allows selection of the asynchronous port parameters. These parameters are changed immediately on completion of the command. All asynchronous ports mapped in a logical connection to the MUXserver 100 have the live speed, character size, parity and XON/XOFF flow control downloaded from the MUXserver 100. Only asynchronous logical connections from one DECmux II unit to another DECmux II unit require the port parameters to be set at the DECmux II units. Special DECmux II features (for example, DTR/DSR flow control) can be set through the supervisor port of the DECmux II unit using the PORT command.

Syntax:

PORT Port-Number

Parameters:

Port-Number

Is the asynchronous port number selected. The range is "0" to "7" and "S" where 0 through 7 are the asynchronous ports, and "S" is the supervisor port.

The system will prompt for the parameters and display the current setting as shown below. If no change is required for a parameter, just type RETURN. To display the alternatives for a parameter type "?" followed by return.

The parameters, their alternate values and initial defaults are shown in Table 6-1.

There is no PORT command on the MUXserver 100.

On DECmux II ports mapped to a MUXserver 100, the terminal speed, parity, character size and XON/XOFF flow control are overridden by the MUXserver 100 settings for the ports.

Table 6-1 Asynchronous Port Parameters

Parameter	Default	Options
Speed (Note 1)	9600	AUTOBAUD, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200, 192.K, 1200/75, 75/1200, 2400/150, 150/2400
Data Bits	8	5, 6, 7 or 8
Parity	NONE	NONE, EVEN, ODD
Stop Bits (Note 2)	1	1, 1.5, 2
Flow Control	XON/XOFF	XON/XOFF, DTR/DSR
Echo	NO ECHO	NO ECHO, LOCAL ECHO
Modem (Note 3)	NO MODEM	MODEM CONTROL ON MODEM CONTROL OFF
Connected to (Note 4)	TERMINAL	HOST, TERMINAL

NOTE 1

AUTOBAUD should *not* be used for asynchronous lines mapped to a MUXserver 100. The AUTOBAUD option should only be used on DECmux II to DECmux II connections and in such cases, is only available if modem control is ON. AUTOBAUD of a line is accomplished by the entry of a <RETURN> as the first input character to a port. The speed will then be fixed until the DECmux II unit is initialized or the link is hung-up. AUTOBAUD will only operate within the range 1200 to 19200 baud.

NOTE 2

The choice of 1.5 stop bits is limited in use to the combination involving 5 data bits.

NOTE 3

Refer to Section 6.4, ASYNCHRONOUS PORT MODEM CONTROL, for a discussion of the Asynchronous Port Modem interface. Modem should *not* be set when connected to a MUXserver 100.

NOTE 4

Changing this parameter adapts the DECmux II unit to interface correctly to a computer or a terminal. Setting it to HOST will suppress the link status messages and enable an XOFF timeout to prevent port hangups. *Do not use this feature when connected to the MUXserver 100.*

Example:

```
SYS>PORT 4
Port speed (baud) [4800]??
Options: AUTOBAUD, 75,110,134.5,150,300,600,1200,1800,2000,
2400,4800,9600,9.6K,19,200,19.2K,1200/75,2400/150,75/1200,150/2400
Port speed (baud) [4800]?9600
Bits per character [7]??
Options: 5,6,7,8
Bits per character [7]??
Parity [EVEN]??
Options: NONE,ODD,EVEN
Parity [EVEN]?NONE
Stop bits per character [2]??
Options: 1,2
Stop bits per character [2]?1
Flow control [XON/XOFF]??
Options: XON/XOFF,DTR/DSR
Flow control [XON/XOFF]?
Local echo [ON]?OFF
Modem [YES]?NO
Connected to [TERMINAL]?
SYS>
```

6.3.10 RESTART Command

The RESTART command resets the multiplexer. It has the same effect as a power-up initialization, described in Section 6.2.1 (Starting YoUR DECmux II). Because this command will interrupt normal operation of the network, the operator is asked to confirm the operation, as shown in the example below.

If the RESTART command is executed from a CONNECTed remote supervisor port, the link will be DISCONNECTed automatically first. A RESTART of a SLAVE MUX only restarts that MUX, not the network.

Syntax:

RESTART

Example:

```
SYS>RESTART
WARNING - a restart will disrupt network users.
Do you really want to restart [NO]?Y
Restarting...

DFMZA - Startup test - Firmware Version Vx.x-xx
```

6.3.11 SAVE Command

The SAVE command stores all the current asynchronous and synchronous port and mapping parameters in the non-volatile memory. On system initialization, the port parameters will be taken from the non-volatile memory. Also, on initialization of the MUXserver 100, the link mapping table will be downloaded and used to initialize the DECmux II units.

Syntax:

SAVE

The SAVE command should be issued after the following commands, if they have modified parameters:

COPY, PASSWORD, PORT, SYSTEM, MAP

If the unit is operating correctly, then the system will issue the response "Save complete".

Example:

```
SYS>SAVE
Save complete
SYS>
```

6.3.12 SHOW Command

The SHOW command displays the parameters of all eight asynchronous ports and the two composite ports. It also displays the firmware revision level and the unit serial number. A typical display is shown below.

Syntax:

SHOW

Example:

```
SYS>SHOW

DFMZA - Slave - Firmware version Vx.x-xx - Serial number SNXXXXXX
Port A  38400 baud long line driver
Port B  38400 baud long line driver
Port  Speed Data-bits Parity Stop-bits Flow-control Echo Modem Connection

  0    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  1    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  2    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  3    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  4    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  5    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  6    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
  7    9600      8      NONE      1       XON/XOFF   OFF   NO    TERMINAL
SYS>
```

6.3.13 STATUS Command

This command displays the data transmission statistics for the two composite ports.

This display is used to monitor link activity and line error rates.

The parameters displayed are:

Firmware revision level
Receive and Transmit data frame and error counts
Modem control signal status

Syntax:

STATUS

Example:

```
SYS>STATUS
DFMZA Statistics (Firmware Version x.x-xx)


        TOTAL   DATA    TOTAL   CRC                     TOTAL   DATA    TOTAL   XMIT
LINK    FRAMES  FRAMES  REC'D   REC'D   DSR CTS &       FRAMES  FRAMES  XMIT    TIME-
        REC'D   REC'D   ERRORS  ERRORS      CD          XMIT    XMIT    ERRORS  OUTS

Port A  2619    2523      0       0     ON  ON          2326    2215      0       4
Port B  1233    1145      8       7     ON  ON          1244    1236      0       2

SYS>
```

In normal operation, over good quality communication channels, the error rate (ratio of total line errors sent or received to total frames sent or received) should be low, but is unlikely to be zero, except for a recently initialized DECmux II unit.

On poor quality communications lines, the error rates will be high and will have significant impact on the total link throughput, due to the error correction protocol. However, even on very poor quality lines, the DECmux II unit and MUXserver 100 will present error free transmission to the asynchronous links.

6.3.14 SYSTEM Command

The SYSTEM command allows the operator to set the parameters for the A and B synchronous composite ports. Table 6-2 lists these parameters, their initial default values, and allowed options. The operator is prompted for each parameter. The current value is displayed. To leave a value unchanged, type RETURN. To list valid alternatives to a prompt, type "?" followed by <RETURN>.

Table 6-2 Composite Port Parameters

Parameter	Default	Options
Speed (Note 1)	9600 baud	1200,2400,4800,9600,19200, 38400 baud
Modem Control (Note 2)	ENABLE	ENABLE, DISABLE
Line Type (Note 3)	RS-232	RS-232, LONG LINE DRIVE

The last parameter requested is the mode of the MUXserver 100. All units are supplied default as SLAVEs. For all DECmux II units, ensure that this parameter is set to SLAVE.

This command does not alter the operational parameters of the composite ports. To modify the operational parameters, first execute the SYSTEM command, retain with the SAVE command, and then reinitialize the DECmux II unit with the RESTART command.

CAUTION

Care should be exercised when altering composite link parameters remotely by means of a CONNECT. On a normal modem link, the speed is determined by the external modem, but the DECmux II port speed settings must match the modem speed exactly.

If a link parameter is to be altered, first alter the remote port of the link with a SYSTEM, SAVE, RESTART sequence; then alter the nearer port, and then change the link or modem speed.

The composite links are not normally intended to be altered remotely and will not normally require changes after installation.

Syntax:

SYSTEM

Example:

```
SYS>SYSTEM

For port A
Speed [9600]??
Options: 1200,2400,4800,9600,9.6K,19200,19.2K,38400,38.4K
Speed [9600]?19.2K
Long line driver [NO]?Y

For port B
Speed [9600]?
Long line driver [NO]?
Modem [YES]??
Options: YES,NO
Modem [YES]?

Master or Slave mux [MASTER]??
Options: MASTER,SLAVE

Master or Slave mux [MASTER]?SLAVE
SYS>
```

NOTE

In long line drive mode, the B port provides the clock, which is internally generated. All composite links must be from a B port to an A port. This modem parameter has no significance in Long Line Drive mode and is not requested. Separate connectors are provided for RS-232-C and Long Line Drive RS-422-A.

6.3.15 HALT Command

To suspend execution of a command, type CONTROL-C (|^C). This is the HALT command. This character is generated by holding down the CONTROL and C keys simultaneously.

6.3.16 TEST Command

The TEST command is used to put the DECmux II unit into Test mode. This will suspend normal operation, and for this reason, the operator is warned of this effect and asked to verify the operation, as shown below.

When maintenance mode is successfully entered, the test menu will be displayed. (The eight off-line tests are described in Chapter 7, Sections 7.2.2.1 through 7.2.2.8.)

To select a test, enter the number of the test from the menu when prompted to do so.

To restart the system, type <RETURN> at the Test Menu. This will cause the multiplexer to reinitialize.

Syntax:

TEST

Example:

```
SYS>TEST
WARNING - testing will destroy all user links and require
a DFMZA restart.
Do you really want to test [NO]?N
SYS>TEST
WARNING - testing will destroy all user links and require a
DFMZA restart.
Do you really want to test [NO]?Y

                        DFMZA
                   8 LINE STAT MUX
                OFFLINE DIAGNOSTIC

Test number (<CR> to resume normal operation, ^C to stop test)?

1       Basic option test
2       Asynchronous port external test
3       Asynchronous internal logic test
4       Composite port external test
5       Composite port internal logic test
6       Broadcast test
7       Echo test
8       Modem control test
```

6.4 ASYNCHRONOUS PORT MODEM CONTROL

NOTE

'No Modem' control should be selected for any port connected to a MUXserver 100. This is the default setting. The MUXserver 100 does not support MODEM control.

Although each of the asynchronous ports on the DECmux II units can be set to support modem control, it cannot be used with the MUXserver 100. Only asynchronous link from one DECmux II unit to a second DECmux II unit can use MODEM control. The determining parameters are set through the DECmux II supervisor port and saved in non-volatile memory.

If both ends of a DECmux II to DECmux II asynchronous link are set to MODEM control and XON/XOFF flow control, the end-to-end link will behave as a null modem connection. The local DSR signal will be propagated to the remote DTR signal, and the remote DSR signal will be propagated to the local DTR signal. The DECmux II unit does not interpret these signals in any way. The CD, RI, CTS inputs are ignored in this mode.

If the asynchronous link XON/XOFF flow control is enabled, and NO MODEM control is selected at either the local or remote ports, then DTR will be asserted at both ports, and all other Data Set input signals will be ignored. No MODEM control should be selected for ports using DTR/DSR flow control. The flow control is performed by controlling the state of the DTR signal, and monitoring the state of the DSR input. DTR high indicates that the device is ready to receive data.

CHAPTER 7
DIAGNOSTICS

The MUXserver 100 diagnostics are run at power-up, and after an INIT or RESTART command. Options on the INIT command select extended diagnostics.

7.1 DIAGNOSTIC MODULES

Self-test provides four main routines that run the following diagnostic tests on the Terminal Server logic:

- Module A Server Memory and Timer Tests
- Module B UART Transmit/Receive Tests
- Module C Network Interface (NI) Transmit/Receive Tests
- Module D Hardware Exerciser

The Self-Test diagnostic is a step-by-step probe of the Server hardware with each test module being called and executed in sequence. The first test module (Module A) is entered following a Power-Up Sequence or when Self-Test is entered by means of the Initialize Mode (see the INITIALIZE Command). On a "Successful Pass" indicator, each test proceeds to the next unless a fatal error calls the HALT/SAVE Mode.

7.1.1 Module A - Server Memory and Timer Tests

Module A executes from Program ROM and performs the following tests:

Test 1 Program RAM Basic Read/Write Test - All Program RAM memory locations are tested except for the upper 128 bytes (unless the Power-Up flag is set).

Test 2 Program ROM CRC Test - Performs CRC-16 calculations on all Program ROM locations including the stored CRC value.

Test 3 PA PROM Checksum Test - Performs a 16-bit checksum calculation on all Ethernet physical address PROM locations according to "The Ethernet" specification.

Test 4 EEPROM Checksum Test - Performs an 8-bit checksum calculation on all EEPROM locations.

Test 5 Program RAM Dynamic Read/Write Test - Performs dynamic tests of Program RAM using a modified moving inversion algorithm. This test is performed only if the long memory test (DIAGNOSE FULL) is set in the INITIALIZE Mode (see Chapter 5, Section 5.12, INITIALIZE Command) or in Manufacturing Mode.

Test 6 Refresh Timer Test (IPL7) - Tests Refresh Timer interrupts at IPL Level 7.

Test 7 Watchdog Timer Test (IPL4) - Sets the CPU to IPL7 and loads the counter with a 10 ms value. Decrements the IPL of the CPU and checks that the timer interrupts with the correct vector address when the CPU is at level IPL3.

Test 8 EEPROM Read/Write Test - Verifies that the EEPROM can be written and read. This test is not enabled in the Manufacturing Mode or Self-Test (LOOP) Mode (see INITIALIZE Command).

7.1.1.1 Module B - UART Transmit/Receive Test - Perform this module only in manufacturing test mode. This module requires a loopback connector on the supervisor port. The tests are input and output to the supervisor port.

7.1.1.2 Module C - Network Interface (NI) Transmit/Receive Tests - An image of Module C is written to Program RAM from where it executes the following LANCE tests (except for Test 7) in the internal loopback mode:

Test 1 Internal Loopback Test - Transmits internal data frame loops using the LANCE physical Ethernet address as both the destination and source. (A test failure is fatal.)

Test 2 CRC Logic Test - This test performs the following three subtests:

A. Transmit CRC Logic Test - Transmits a data frame with the Transmit CRC enabled. Compares the received CRC with a pre-calculated value.

B. Receive CRC Logic Test - Transmits a data frame with a pre-calculated CRC value and the Transmit CRC disabled. Compares the precalculated value with the received CRC.

C. Receive Bad CRC Test - Transmits a data frame with a bad CRC value and the Transmit CRC disabled. Checks that the receive CRC logic detects the error.

Test 3 Collision Test - Transmits a data frame with the Collision Detect bit set in the Mode Register. The LANCE should set the Retry Error bit after the 16th detection and retry failure of the transmission.

Test 4 Multicast Address Test - Tests the ability of the LANCE to accept or reject data frames with the Multicast Bit set in the destination address.

Test 5 Physical Address Test - Transmits a data frame with a destination address not equal to the LANCE. Makes checks on transmit status and unexpected interrupts.

Test 6 Data Chaining, Byte Swap, Broadcast Address Test - Transmits a data frame to the broadcast address with the Byte Swap bit set.

Test 7 External Loopback Test - Transmits loopback data frames to verify the path from the LANCE through the SIA and transceiver. This test is normally enabled but may be disabled in the INITIALIZE Mode. See (DIAGNOSE BRIEF) Section 5.12 INITIALIZE Command.

Test 8 Communications Memory Test - Verifies that the communications processor is working correctly and that the shared memory interface is operating correctly.

7.1.1.3 Module D - Hardware Exerciser - An image of Module D is written to and executes from Program RAM.

Test 1 Maximum Activity Test - This test passes internal loopback data frames through the LANCE and synchronous ports. This forces maximum internal Server activity including bus contention between LANCE, DMAs and the memory accesses.

7.1.2 Error Types

Server hardware failures are considered to be fatal (hard) errors or non-fatal (soft) errors, depending on their effect on the Server's operation.

Soft Errors — Soft errors consist of failures that may not interfere with normal Server operation but can affect its overall efficiency.

On its completion, Self-Test sets the GREEN OK LED indicator to ON and pushes a status parameter longword onto the stack, identifying the error, for later evaluation by the Server software.

Hard Errors — Hard errors are failures that can disable the Server or cause unreliable or unpredictable operation.

Self-Test turns off the GREEN OK LED indicator and calls the Error routine. Unexpected traps and all Manufacturing Mode test failures are hard errors.

7.1.2.1 Soft Errors - Soft errors consist of the following types of failures:

- EEPROM Checksum Error (not in the ECO/LANCE revision area)
- LANCE Error (heartbeat or external loopback error)
- Terminal Port Error

Field replacement of the Server is normally not necessary but may be desirable. The Server always tries to enter a normal operating state.

Table 7-1 describes the soft error types. Table 7-2 describes the status parameter longword that Self-Test pushes onto the stack before issuing a downline load request.

Table 7-1 Non-Fatal (Soft) Error Types

Error Type	Description
EEPROM Checksum Error	EEPROM is divided into several functional areas with a parameter checksum maintained in each area. Any checksum error not in the ECO/LANCE revision area of EEPROM area is considered to be a soft error.
LANCE Error	When the Server is operating in the external loopback mode, Self-Test flags an external loop failure in the status longword. The external loopback mode can be disabled, selecting the internal loopback mode.
Terminal Port Error	If the supervisor port produces errors, Self-Test will flag it in the status longword.

Table 7-2 Error Status Parameter Longword

Bits	Error Name/Description
High Word	
<15>	Error detected on the UART
<14>	EEPROM Checksum Error in the parameter area for Port 1
<13>	Not used
<12>	EEPROM Checksum Error in the ECO/LANCE revision area
<11>	NI Heartbeat Error
<10>	NI External Loopback Error
<09>	EEPROM Checksum Error in the diagnostic test parameter area
<08>	EEPROM Checksum Error in the Server parameter area
<07:00>	EEPROM Checksum Error in the parameter areas for terminal ports 10-17
Low Word	
<15:08>	EEPROM Checksum Error in the parameter checks for terminal ports 2-9
<07>	Power-Up Flag
<06:00>	Fatal Error Code

7.1.2.2 Hard Errors - Hard errors consist of the following types of failures:

- Program RAM Data Error (in the extended read/write test)
- Program ROM CRC Error
- EEPROM Checksum Error (in the ECO/LANCE revision area)
- Timer Error
- JAM Error
- LANCE Error
- Supervisor Port Error
- Communications Processor or Shared Memory Error
- Communications Ports Error

Table 7-3 describes the hard error types. Table 7-4 describes the hard error codes written to EEPROM.

Table 7-3 Fatal (Hard) Error Types

Error Type	Description
Program RAM Data Error	Any Program RAM data error detected by the dynamic memory tests.
Program ROM CRC Error	Any error detected on a CRC-16 calculation of the diagnostic software in Program ROM.
EEPROM Checksum Error	A checksum error in the ECO/LANCE revision area of EEPROM.
Timer Error	Any failure detected by the Refresh or Watchdog Timer tests.
JAM Error	The test failed to unjam from Program ROM and continue from Program RAM. Testing must be completed from Program ROM.
LANCE Error	Any error detected during Initialization or on an Internal Loopback operating test.
Communications Processor or Shared Memory Error	If the communications processor fails any of its tests or the shared memory interface to the communications processor fails.
Communication Port Error	If either of the Composite Communication ports fails, the server is inoperable.

Table 7-4 Fatal (Hard) Error Codes Written to EEPROM

Error Code	Test Name
Module A	
01	Program RAM Read/Write Data Test
02	Program ROM CRC Test
03	PA PROM Checksum Test
04	EEPROM Checksum Test
05	Program RAM Dynamic Read/Write Data Test
06	Refresh Timer Test
07	Watchdog Timer Test
08	EEPROM Read/Write Data Test
Module B	
10	Incorrect Character
11	Receive Timeout
12	Transmit Timeout
13	Unexpected Rx Interrupt
14	Unexpected Tx Interrupt
Module C	
50	LANCE Internal Loopback Test with Multiple Data Frames
51	LANCE Accept Broadcast Address Test
52	Transmit CRC Logic Test
53	Receive CRC Logic Test (Good CRC)
54	Receive CRC Logic Test (Bad CRC)
55	Collision Detection and Retry Test
56	Accept Multicast Address Test
57	Reject Multicast Address Test
58	Reject Physical Address Test
5A	External Network Interface (NI) Loopback Test
5B	Network Interface (NI) Heartbeat Test (Soft Error)
5C	Shared Memory Test Error
5D	Access Timeout, 8085 Processor not Responding

Table 7-4 Fatal (Hard) Error Codes Written to EEPROM (Cont)

Error Code	Test Name
Module D	
42	N1 Error in Exerciser
Communications	
1E	Communications Memory failure
31	Rom 0 Checksum failure
32	Rom 1 Checksum failure
33	Rom Checksum failure
34	Clock Interrupt failure
36	Communication/DMA failure

7.1.3 ODT

To enable some indications of the cause of a test failure, the MUXserver 100 enters ODT mode. To enter ODT by choice, enter the following:

```
LOCAL> SET SERVER ODT ENABLED
LOCAL> ODT
* (Enter ODT Commands)
* NS
* G
LOCAL> SET SERVER ODT DISABLED
```

This is indicated by the appearance of the '*' prompt.

The following commands are useful.

7.1.3.1 Examine (E) Command - To open a word location, type E followed by a space and the address to be displayed. If an odd address is entered, the low order bit is masked out and the even (word) address is opened. Pressing the RETURN key (<RET>) terminates the command.

For example:

```
*E 1000 <RET>          - Entry
001000 = 0123          - Six-digit response
```

If the command location 1000 is open and no change is desired, pressing RETURN closes the location. ODT returns the asterisk prompt and another command may be issued.

If the contents of the currently open word location are to be changed, type the new contents before pressing RETURN to close the location.

For example:

```
*E 1000<RET>                  - Entry
001000 = 0123 3210<RET>       - Response and change
```

Pressing the LINE FEED key (<LF>) instead of RETURN closes the currently open word location and opens the next sequential word location.

For example:

```
*E 1000<RET>                  - Entry
001000 = 0123<LF>             - Response
001002 = 4567                 - Response
```

7.1.3.2 Examine Byte (EB) Command - To open a byte location, type EB followed by a space and the address to be displayed. Pressing the RETURN key (<RET>) executes the command.

For Example:

```
*EB 1000<RET>          - Entry
001000 = 23            - Response
```

or

```
*EB 1001<RET>          - Entry
001001 = 01            - Response
```

If the command location 1000 is open and no change is desired, pressing RETURN closes the location. ODT returns the asterisk prompt and another command may be issued.

If the contents of the currently open byte location are to be changed, type the new contents before pressing RETURN to close the location.

For example:

```
*EB 1000<RET>          - Entry
001000 = 23  54<RET>   - Response and change
```

Pressing the LINE FEED key (<LF>) instead of RETURN closes the currently open byte location and opens and displays the next sequential byte location.

For example:

```
*EB 1000<RET>          - Entry
001000 = 23<LF>        - Response
001001 = 01            - Response
```

7.1.3.3 Register Dump (R) Command - Typing R dumps the longword contents of the following CPU internal registers:

Address registers (A0-A7
Data registers (D0-D7)
Program Counter (PC)
Status Register (SR)

The register contents are displayed in the following format:

```
*R<RET>

A0 = nnnnnnnn  A1 = nnnnnnnn  A2 = nnnnnnnn  A3 = nnnnnnnn
A4 = nnnnnnnn  A5 = nnnnnnnn  A6 = nnnnnnnn  A7 = nnnnnnnn
D0 = nnnnnnnn  D1 = nnnnnnnn  D2 = nnnnnnnn  D3 = nnnnnnnn
D4 = nnnnnnnn  D5 = nnnnnnnn  D6 = nnnnnnnn  D7 = nnnnnnnn
PC = nnnnnnnn  SR = nnnn
```

Here, n represents a hexadecimal digit. Register A7 is always the Supervisor Stack Pointer because the Self-Test and LAT programs execute in the Supervisor mode.

For a failure in TEST Mode the contents of the D0 register will be the status word described in Table 7-2.

7.2 TESTING DECmux II

The DECmux II unit contains extensive internal tests, designed to check the operation of the DECmux II unit, the synchronous links, and the asynchronous line terminals.

The phases of testing are:

- Self test of the DECmux II unit executed at power-up.
- Local loopback testing, using turnaround connectors.
- Remote loopback testing using a DECmux II unit or MUXserver 100 (see Figure 7-1).

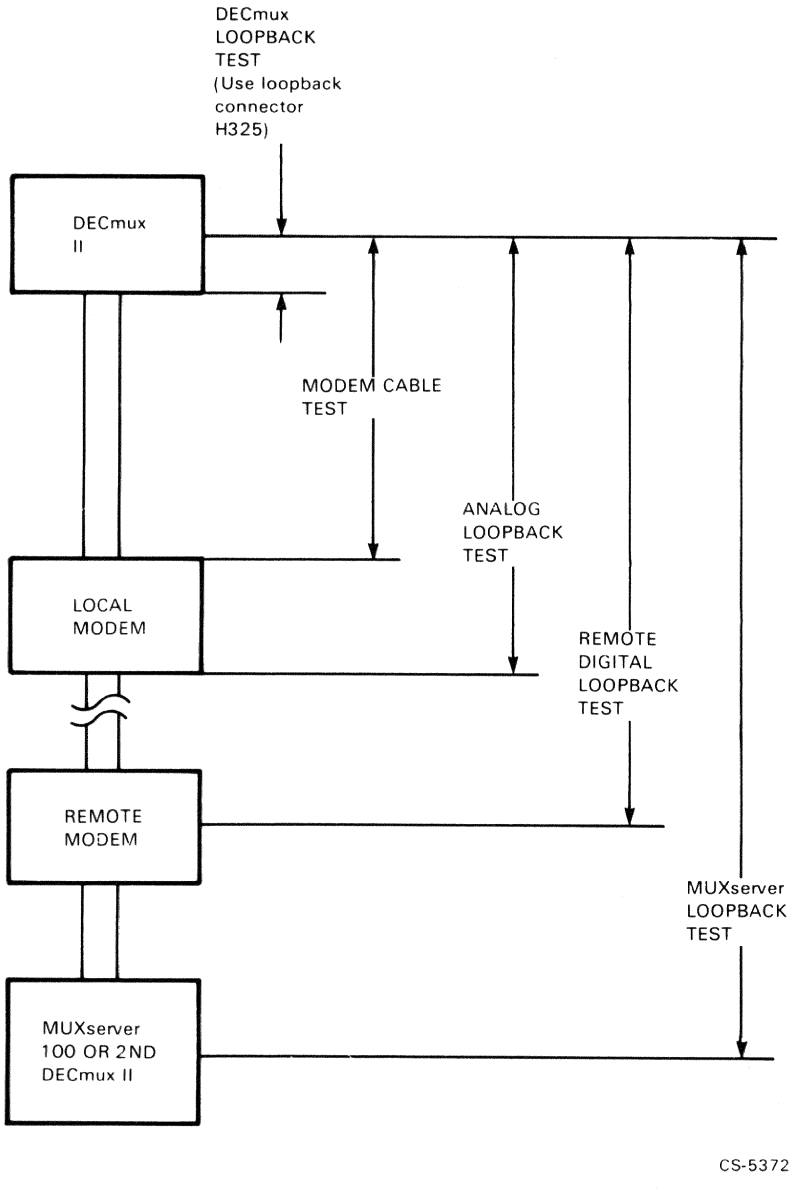

Figure 7-1 DECmux II Loopback Points

7.2.1 TEST Command

The TEST command is used to put the DECmux II unit into Test mode. This will suspend normal operation, and for this reason, the operator is warned of this effect and asked to verify the operation, as shown below.

When maintenance mode is entered successfully the test menu will be displayed. The eight off-line tests are described in Sections 7.2.2.1 through 7.2.2.8.

To select a test, enter the number of the test from the menu when prompted to do so.

To restart the system, type <RETURN> at the Test Menu. This will cause the multiplexer to reinitialize.

Syntax:

TEST

Example:

```
SYS>TEST
WARNING - testing will destroy all user links and require a DFMZA
restart.
Do you really want to test [NO]?N
SYS>TEST
WARNING - testing will destroy all user links and require a DFMZA
restart.
Do you really want to test [NO]?Y

                              DFMZA
                         8 LINE STAT MUX
                        OFFLINE DIAGNOSTIC

Test number (<CR> to resume normal operation, ^C to stop test)?

    1         Basic option test
    2         Asynchronous port external test
    3         Asynchronous internal logic test
    4         Composite port external test
    5         Composite port internal logic test
    6         Broadcast test
    7         Echo test
    8         Modem control test
```

During all the tests any errors detected will cause an error message to be printed on the bottom line of the screen. Additional error messages will cause the previous ones to scroll up in an eight line scrolling region. Messages passing through the top of the scrolling region will be lost.

The TEST command must be executed from the local supervisor port. You cannot CONNECT to another DECmux II unit or MUXserver 100 and use the TEST command.

7.2.2 DECmux II Diagnostic Summary

The DECmux II diagnostics are evoked through the supervisor terminal by first entering the command processor and then typing TEST following the SYS> prompt.

NOTE

Evoking the Test mode in a DECmux II will terminate operation at that multiplexer.

7.2.2.1 Offline Test 1 - Basic Option Test - The Basic Option Test is a repeat of the DECmux II power-up self-test. When started from the Test Menu, it continuously loops through the tests until the HALT (CONTROL C) command is given.

Each test cycle prints a single line of characters, "012345678*". Each character is a successful completion code for a sub-test module. These completion codes and the test modules to which they relate are shown in Table 7-5. These codes are listed for information only, as there are no field repairable components.

Table 7-5 Basic Option Sub-Test

Completion Code	Test Completed
0	Processor running
1	RAM pattern test
2	1st Firmware ROM Checksum
3	2nd Firmware ROM Checksum
4	Composite ROM Checksum
5	Clock Test
6	Silo Test
7	Asynchronous Internal Loopback
8	Synchronous Internal Loopback
*	Non-Volatile Memory Checksum

WARNING

Test 1 destroys memory locations needed by Test 4. If you have run Test 1, you must restart the DECmux II unit before running Test 4.

7.2.2.2 Offline Test 2 - Asynchronous Port External Test - It is necessary to fit a loopback connector (Part No. H325) to each of the asynchronous ports being tested.

When the Asynchronous Port External Test is selected, the operator will be prompted for the details of the ports to be tested and their parameters, as shown in Figure 7-2(a). Enter each parameter followed by RETURN. When all required ports and parameters have been entered, type RETURN in response to the prompt for Port Number. This will start the test.

The test display is shown in Figure 7-2(b). For each port, the line characteristics are listed and the number of test passes recorded.

This test exercises each port by sending out serial data, which is received immediately on the same port, due to the presence of the loopback connector. The receive data is then read internally from the SILO buffer by the microprocessor and compared with the data which was previously sent over that channel. The test is performed only at the selected line parameters.

```
                    DFMZA
                 8 LINE STAT MUX
                OFFLINE DIAGNOSTIC

Test number (<CR> to resume normal operation, ^C to
stop test)? 2

Port No 0   SPEED 9600  CHAR LEN 8   PARITY N   STOP BTS 1
Port No 1   SPEED 134   CHAR LEN 7   PARITY O   STOP BTS 1
Port No 2   SPEED 300   CHAR LEN 7   PARITY E   STOP BTS 2
Port No 3   SPEED 1200  CHAR LEN 8   PARITY N   STOP BTS 1
Port No 5   SPEED 75    CHAR LEN 5   PARITY O   STOP BTS 1.5
Port No 7   SPEED 4800  CHAR LEN 8   PARITY N   STOP BTS 1
Port No
```

Figure 7-2(a) Asynchronous Port External Test

```
                    DFMZA
                 8 LINE STAT MUX
                OFFLINE DIAGNOSTIC

                Asynchronous port external test
Port No          0     1     2     3     4     5     6     7
SPEED         9600   134   300  1200   ERR    75   ERR  4800
CHAR LEN      8      7     7     8     *     5     *     8
STOP BTS      1      1     2     1     *     1.5   *     1
PARITY        N      O     E     N     *     O     *     N

PASS          384    5     12    48    0     3     0     192
```

Figure 7-2(b) Asynchronous Port External Test Display

7.2.2.3 Offline Test 3 - Asynchronous Internal Logic Test - The Asynchronous Internal Logic Test runs immediately after being selected. The test will show a display similar to Figure 7-3. The number of successful passes of the test are displayed. The test loops continuously until the HALT (CONTROL-C) command is executed. The response to the HALT command may take up to 30 seconds, as the command will not be recognized until the end of the current test cycle.

The test transmits data over all eight asynchronous ports. The data is looped back internally to the port input and read from the input SILO by the microprocessor. The received data is compared against the originally transmitted data. The test exercises each port at all the available speeds and port parameters. For this reason each test cycle can take up to 30 seconds.

```
DFMZA
8 LINE STAT MUX
OFFLINE DIAGNOSTIC

Asynchronous internal logic test

PASS     11
```

Figure 7-3 Asynchronous Internal Logic Test

7.2.2.4 Offline Test 4 - Composite External Port Test - This test requests the operator to select the composite port to be tested: A, B, or both, as shown in Figure 7-4.

Before typing A, B, or RETURN, you must insert the appropriate loopback connector for the system configuration currently in use. The configuration is set up with the "SYSTEM" command. If it is set for long line drive and you use an RS-232 loopback, expect errors. Also, if a loopback connector is connected when not in maintenance mode, expect the error message "SYNCHRONOUS PORT CONNECTION ERROR", because you have the port looped back on itself.

The test then runs immediately and displays the number of passes. The test will select either RS-232 MODEM/NO MODEM, or LONG LINE DRIVE, depending on the system setup. The link speed will also be taken from the system setup.

The operator must ensure that the channel(s) being tested are looped back. Loopback may be achieved in a variety of ways. These are listed in order of increasing distance from the DECmux II unit under test.

NOTE

The message "PORT X Modem Status Change" can be displayed three or four times at the start of testing an RS-232 configured port, as the modem connection is established.

WARNING

Test 1 destroys memory locations needed by Test 4. If you have run Test 1, you must restart the DECmux II unit before running Test 4.

```
                DFMZA
          8 LINE STAT MUX
        OFFLINE DIAGNOSTIC

Select port(s) [A,B,<CR>=both] B

PASS      0     235
```

Figure 7-4 Composite External Port Test

Long Line Drive (RS-422)

1. Attach test cable (Part No. 70-20984-01) between the Port A and Port B long line drive 9 pin connectors.
2. At a remote DECmux II unit. If the remote connection is to a B port, then insert the test cable (70-20984-01) between the B port and the cable end. (Note that the second DECmux II unit must have its B-port set to the same speed). If the remote connection is an A port, then simply connect the test cable to the cable end. This difference is caused by the fact that B ports are the clock source and A ports receive the clock transmitted by the other port.
3. Use auto-loopback through the remote MUXserver 100 or DECmux II unit. The remote multiplexer will automatically detect that the loopback test is running and echo all data being sent to it. It will also prevent spurious messages being sent to the unit under test.

RS-232-C

1. Insert loopback connector H325 directly into the RS-232-C composite port

   or

2. Insert loopback connector H325 into the modem cable at the modem end

   or

3. Switch modem to local loopback mode

   or

4. Switch modem to remote loopback mode

   or

5. Use auto-loopback through the remote MUXserver 100 or DECmux II unit. The remote multiplexer will automatically detect that loopback test is running and echo all data being sent to it. It will also prevent spurious messages being sent to the unit under test from the rest of the network.

The test will run continuously until the HALT (CONTROL-C) command is executed.

7.2.2.5 Offline Test 5 - Composite Internal Logic Test - This test is the same as Offline Test 4 except that both channels are always tested and the loopback is internal. See Section 7.2.2.4.

7.2.2.6 Offline Test 6 - Broadcast Test - This test requests the operator to enter ports and their line characteristics. The input format is identical to Offline Test 2. (See Section 7.2.2.2, Offline Test 2 - Asynchronous Port External Test.)

After the last asynchronous port details have been entered, RETURN is typed in response to the prompt for Port number. The test then starts immediately. The test pass count is displayed, as shown in Figure 7-5(a). Each of the selected ports then broadcasts a single line test message, as shown in Figure 7-5(b). The message is broadcast continuously until the HALT command (CONTROL-C) is executed.

Messages are transmitted continuously without regard to flow control. This may cause display problems on some terminals, at high speeds.

```
                          DFMZA
                     8 LINE STAT MUX
                   OFFLINE DIAGNOSTIC

             Broadcast test
Port No      0     1     2      3     4     5       6     7
SPEED        9600  4800  ERR    300   110   ERR     ERR   1200
CHAR LEN     8     8     *      7     7     *       *     8
STOP BTS     1     1     *      2     2     *       *     1
PARITY       N     N     *      O     E     *       *     N

PASS         168   86    0      9     5     0       0     25
```

Figure 7-5(a) Asynchronous Port Broadcast Test

```
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
0123456789ABCDEFGHIJKLMNOPQRSTUVWXYZ THE QUICK BROWN FOX JUMPS OVER THE LAZY DOG
```

Figure 7-5(b) Asynchronous Port Broadcast Message

7.2.2.7 Offline Test 7 - Echo Test - This test requests the operator to enter ports and their line characteristics. The input format is identical to Offline Test 2 (See Section 7.2.2.2).

After the last port details have been entered, RETURN is typed in response to the prompt for port number. The test then starts immediately. No further information will be displayed on the screen during the test, other than that shown in Figure 7-6. The test operates continuously until the HALT (CONTROL-C) command is executed on the supervisor port.

To test each of the selected ports, connect a terminal set to the correct speed and characteristics, to the port. All characters typed on the keyboard should be echoed on the terminal exactly as input.

```
                    DFMZA
              8 LINE STAT MUX
             OFFLINE DIAGNOSTIC

            Echo test
Port No     0     1     2     3     4     5     6     7
SPEED       9600  4800  ERR   300   110   ERR   ERR   1200
CHAR LEN    8     8     *     7     7     *     *     8
STOP BTS    1     1     *     2     2     *     *     1
PARITY      N     N     *     0     E     *     *     N
```

Figure 7-6 Asynchronous Port Echo Test

7.2.2.8 Offline Test 8 - Modem Control Test - This test exercises the modem control signals of the eight asynchronous ports and the two composite ports.

Ensure that a loopback connector (Part No. H325) is inserted in all eight asynchronous ports and the two composite RS-232-C ports. The DSR A and B indicators should be on. When selected, the test runs immediately and the cumulative number of passes is displayed as shown in Figure 7-7. If a hardware fault exists or a loopback connector is not fitted, messages reporting the failure will appear at the bottom of the screen.

The test continues until the HALT command (CONTROL-C) is executed.

```
DFMZA
8 LINE STAT MUX
OFFLINE DIAGNOSTIC

Modem control test

PASS    109
```

Figure 7-7 Composite and Asynchronous Port Modem Control Test

CHAPTER 8
SPECIFICATIONS

The MUXserver 100 is available in two configurations:

DSRZA-BA - 110V version

DSRZA-BB - 240V version

8.1 DSRZA-XX SYSTEM UNIT

Dimensions	3.75 in. (9.525 cm) high 18 in. (45.72 cm) wide 12 in. (30.48 cm) deep
Weight	15 lbs (6.8 kg)
Power	
DSRZA-BA	
110V nominal	Single-phase, 3-wire 90-128V RMS 50-60 Hz Line Frequency
Fuse	Reg. BLO 3A, 250V
DSRZA-BB	
240V nominal	Single-phase, 3-wire 174-256V RMS 50-60 Hz Line Frequency
Fuse	1A, 250V Low Breaking Current

Wattage	32W typical, 50W maximum
Connectors	Three RS-232-C, 25 pin connectors (Supervisor Port, Port A and Port B)
	One Ethernet Transceiver cable connector, 15 pin
Cables Supplied	One RS-422 test cable
Operating Temperature Range	41°F (5°C) to 122°F (50°C)
Humidity	10% to 95% relative humidity
Maximum Wet Bulb	32°C (90°F)
Minimum Dew Point	2°C (36°F)
Storage Temperature Range	-40°C (-40°F) to 66°C (151°F)

8.1.1 Composite Port Interface

Physical	Two composite ports, Port 'A' and Port 'B'. Each port has a DB25-P, RS-232-C connector. The same connector is used for both RS-232-C and RS-422 long line drive connectors.
Protocol	DEC proprietary.
Speed	Each composite port will operate within the following baud range. When using RS-232 connections, speed must be selected to match that of available modems.
	1200, 2400, 4800, 9600, 19200 and 38400 baud (38400 baud for RS-422 only).

8.1.2 Supervisor Port

Physical	Data lines only asynchronous port terminating at DB25-P. RS-232-C connector.
Format	Asynchronous start/stop, having eight data bits, one stop bit, no parity.
Protocol	Full duplex with XON/XOFF flow control.
Speed	Selectable from one of the following: 300, 600, 1200, 2400, 4800 and 9600 AUTOBAUD.

8.1.3 Ethernet Interface

Physical — One 15 pin D type female connector. One cable carrying three differential signal twisted pairs and one power pair.

Table 8-1 Ethernet Characteristics

Characteristic	Value or Definition
Topology	Branching bus
Transmission Medium	Coaxial cable using Manchester-encoded digital baseband signaling
Data Rate	10 million bits per second (10 MHz)
Maximum Separation of Stations	2.8 km (1.74 miles)
Maximum Number of Stations	1,024 stations
Network Control	Multi access with equal distribution to all stations
Access Control	Carrier Sense Multiple Access with Collision Detection (CSMA/CD)
Data Frame Length	72 to 1526 bytes (including preamble) with a variable data field of 46 to 1500 bytes

8.2 DECmux II SPECIFICATION

The DECmux II unit is available in two configurations:

DFMZA-BA - 110V version

DFMZA-BB - 240V version

8.2.1 DFMZA-XX System Unit

Dimensions	4.5 in. (11.43 cm) high 13.5 in. (34.29 cm) wide 8.8 in. (22.52 cm) deep
Weight	6.5 lbs (2.95 kg)
Power	
DFMZA-BA	
110V nominal	Single-phase, 3-wire 90-128V RMS 50-60 Hz Line Frequency
DFMZA-BB	
240V nominal	Single-phase, 3-wire 174-256V RMS 50-60 Hz Line Frequency
Fuse	0.75 A (time delay)
Wattage	15W typical, 33W maximum
Connectors	Eleven RS-232-C, 25 pin connectors (Eight Asynchronous ports, two Composite ports, one Supervisor port) Two RS-422-A, 9 pin connectors (Two Composite Ports) One AC main receptacle
Cables Supplied	One RS-422 test cable
Operating Temperature Range	41°F (5°C) to 122°F (50°C)
Humidity	10% to 90% relative humidity
Maximum Wet Bulb	32°C (90°F)
Minimum Dew Point	2°C (36°F)
Storage Temperature Range	-40°C (-40°F) to 66°C (151°F)

8.2.2 Composite Port Interface

Physical	Two composite ports, Port 'A' and Port 'B'. Each port has two connectors: one DB25-P RS-232-C connector, and one RS-422 long line drive connector. Port 'A' long line drive connector is a DE9-P and Port 'B' is a DE9-S.
Protocol	Subset of HDLC.
Speed	Each composite port will operate within the following baud range. When using RS-232 connections, speed must be selected to match that of available modems. 1200, 2400, 4800, 9600, 19200 and 38400 baud (38400 baud for RS-422 only).

8.2.3 Asynchronous Ports

Physical	Total of eight ports. Each port is terminated at DB25-P CCITT V.24/EIA RS-232-C.
Format	Asynchronous start/stop, having 7 or 8 data bits, 1 or 2 stop bits, odd, even or no parity.
Protocol	Full duplex with optional, local echo, DTR/DSR or XON/XOFF flow control and modem control on each port.
Speed	Selectable from one of the following: 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2000, 2400, 4800, 9600, 19200 Split Speed 1200/75, 75/1200, 2400/150, 150/2400 or Autobaud (2400 through 19200 baud).

8.2.4 Supervisor Port

Physical	Data lines only asynchronous port terminating at DB25-P. RS-232-C connector.
Format	Asynchronous start/stop, having eight data bits, one stop bit, no parity.
Protocol	Full duplex with XON/XOFF flow control.
Speed	Selectable from one of the following: 300, 600, 1200, 2400, 4800 and 9600 Autobaud.

APPENDIX A
STATUS AND ERROR MESSAGES FOR THE MUXserver 100

This appendix describes all status and error messages issued by the MUXserver 100. All messages describe the status or error in a self-explanatory sentence.

A 3-digit message code appears with each message. The message codes help categorize the messages. You can disable the codes for any terminal using the SET TERMINAL or DEFINE TERMINAL command (refer to Chapter 5, MUXserver 100 COMMAND DESCRIPTIONS). The message codes are enabled by default.

A.1 CLASSES AND FORMATS OF MESSAGES

There are five classes of status and error messages. Each is distinguished by its message code series as shown in Table A-1.

Table A-1 Classes of Status and Error Messages

Message Codes	Types of Messages
000-099 and 500-599	Informational messages - normal responses to user commands.
100-199 and 600-699	Warning messages - warnings about events that may not be expected or valid.
200-299	Connection error messages - reasons for terminating or not establishing service connections.
700-799	User error messages - explanations of why user commands may not be honored.
900-999	Supervisor Port messages - status and error messages issued from the MUXserver 100 ROM software.

All MUXserver 100 messages appear in one of two formats. If the 3-digit message codes (represented by nnn) are enabled, they have this format:

Local *-nnn- status or error message text*

If message codes are disabled, they have the following format:

Local - *status or error message text*

Message codes always appear for the 900 series of messages.

Messages with codes of 0 to 499 are intended for use with all DIGITAL terminal servers. Messages with codes of 500 to 999 are specific for the MUXserver 100.

A.2 MESSAGE LISTINGS AND EXPLANATIONS

This section lists each message in its class and presents explanatory text for each listing. Italic type marks the parts of messages that vary with network and MUXserver configurations. For example, name stands for the name of a service on a particular Ethernet.

A.2.1 Informational Messages (Message Codes 000-099 and 500-599)

Local -010- Connection to *name* established as session *n*

Issued following a successful connection to a service. The service name and session number are displayed. This message only appears if VERIFICATION is enabled.

Local -011- Session *n* disconnected from *name*

Issued following a normal termination of a session; for example, one terminated with the DISCONNECT command. This message only appears if VERIFICATION is enabled.

Local -012- *name* session *n* resumed

Issued following resumption of a session. The service name and session number are displayed. This message only appears if VERIFICATION is enabled.

Local -013- Continuing attempts to connect to *name*

Issued when AUTOCONNECT is enabled following an unsuccessful connect request or abnormal termination. This message follows an error message which explains the unsuccessful connection or termination. The server reissues this message if the reason for the connection failure changes.

Local -014- All sessions disconnected

Issued following a DISCONNECT ALL command.

Local -019- Port n locked

Issued following a successful LOCK command.

Local -020- Logged out port n

Issued after the terminal user enters LOGOUT, or after the terminal is logged out from the privileged terminal.

Local -501- From port n, username message test

Appears at a terminal when that terminal is sent a broadcast message from another terminal. The header line includes the terminal number and user name of the sender.

Local -511- Test complete nn bytes written, nn error(s) detected

Issued following a STOP TEST PORT command when a loopback test is stopped. It displays the number of bytes written/read during the test, and the number of errors or data discrepancies detected. The number of errors would normally be zero. Refer to Chapter 4, Section 4.3, PROBLEMS INVOLVING THE COMPOSITE LINKS, if the number of errors is non-zero.

Local -512- Loop test successful

Appears on the supervisor port terminal following successful execution of a LOOP command. This message indicates that the loop attempt is successful with no data corruption. Refer to Chapter 4, Section 4.5, PROBLEMS INVOLVING SERVICE NODES.

Local -513- Loop test failure

Appears on the privileged terminal following an unsuccessful execution of a LOOP command. This message indicates that either the LOOP response timed out, or that the data returned in the message is corrupted. Refer to Chapter 4, Section 4.5.

A.2.2 Warning Messages (Message Codes 100-199 and 600-699)

Local -101- n other session(s) active

Issued following a connect request, if the user has at least one other session active.

Local -102- No other session(s) active

Issued following a FORWARDS command, BACKWARDS command, or switch character, when only one session is active. The current session is successfully resumed.

Local -103- WARNING no local switch character established

Issued if the BREAK character is set to REMOTE or DISABLED and no LOCAL SWITCH character has been defined. Refer to Chapter 2, Section 2.5, SETTING UP THE COMPOSITE LINK PARAMETERS to set up a local switch character.

Local -601- Internal memory error in terminal parameters
System defaults in effect

Issued during the terminal logging in sequence. The permanent parameters for this terminal are corrupted, and the factory-set defaults are in effect. Refer to Chapter 4, Section 4.4.2, ERROR MESSAGES DISPLAYED, GREEN LIGHT ON.

Local -602- Internal memory error in server parameters
System defaults in effect

Issued during the terminal logging in sequence. The server's permanent characteristics are corrupted, and the factory-set defaults are in effect. Refer to Chapter 4, Section 4.2.2.

```
Local -611- Broadcast disabled on port n
```

Appears following a broadcast command when broadcast is disabled on the specified port(s). The specified terminal does not receive the message.

```
Local -699- WARNING - Local area service ending
            in n minutes
```

Issued at regular intervals to all terminals following an INITIALIZE command. The server will be reinitialized in the number of minutes shown. There is no additional notice following the one minute message.

A.2.3 Connection Error Messages (Message Codes 200-299)

```
Local -201- Connection to name not established
            No response within timeout period
```

Appears when a connect request (or autoconnect attempt) is unsuccessful. The service node did not respond within 10 seconds. The probable cause is that the service node is down. This condition causes the service node status to change to UNREACHABLE. Refer to Chapter 4, Section 4.5, PROBLEMS INVOLVING SERVICE NODES.

```
Local -202- Connection to name not established
            Communication protocol error
```

Appears when a connect request (or autoconnect attempt) is unsuccessful because of a LAT protocol error in a message sent by a service node. Refer to Chapter 4, Section 4.5.

```
Local -206- Connection to name terminated
            No response within timeout period
```

Appears when an existing connection is abnormally terminated because the service node does not respond within 10 seconds. The probable cause is that the service node is down. This condition causes the service node status to change to UNREACHABLE. Refer to Chapter 4, Section 4.5.

Local -207- Connection to name terminated
Communication protocol error

Appears when an existing connection is abnormally terminated because of a LAT protocol error in a message sent by a service node. Refer to Chapter 4, Section 4.5.

Local -2nn- Connection to name not established
Rejection reason text

Appears when a connect request (or autoconnect attempt) is unsuccessful because the service node rejects the connect request. The rejection reason text explains why the node rejected the request.

Code Rejection Reason

nn = 21 Insufficient node resources
nn = 22 System shutdown in progress
nn = 23 Node user disconnect
nn = 24 Circuit timer out of range
nn = 25 Invalid service class
nn = 26 Invalid message or slot received
nn = 27 Time limit expired
nn = 28 No progress being made
nn = 29 Service not offered on requested port
nn = 30 Object port name not known
nn = 31 Invalid password

For messages 224 and 226, refer to the troubleshooting procedures in Chapter 4, Section 4.5.

Local -2nn- Connection to name terminated
Termination reason text

Appears when an existing connection is abnormally terminated by the service node. The rejection reason text explains why the node terminated the connection.

Code Termination Reason

nn = 61 Insufficient node resources
nn = 62 System shutdown in progress
nn = 63 Node user disconnect
nn = 64 Circuit timer out of range
nn = 65 Invalid service class
nn = 66 Invalid message or slot received
nn = 67 Time limit expired
nn = 68 No progress being made
nn = 69 Service not offered on requested port
nn = 70 Object port name not known
nn = 71 Invalid password

For messages 264 and 266, refer to the troubleshooting procedures in Chapter 4, Section 4.5.

A.2.4 User Error Messages (Message Codes 700-799)

Local -701- Command syntax error

Issued when a command is entered incorrectly. The keyword is recognized, but the command options do not follow the correct syntax; or no command keyword is entered.

Local -702- Keyword "word" not known or ambiguous

Appears when a command is entered incorrectly. The keyword specified in word is not recognized by the server software, or not enough characters are entered to make the keyword unique.

Local -703- Value invalid or out of range, "nnnnnn"

Issued when a user-specified value is entered incorrectly. The value entered in nnnnnn is invalid or out of range.

Local -704- Privileged command or option

Issued when a nonprivileged user enters a privileged command or command option.

Local -705- Entry entry-ID not in queue

Appears when you specify a nonexistent entry in the REMOVE QUEUE command. Use SHOW QUEUE to check the queue entries.

Local -709- Service service-name not offered by node node-name

Issued when the server does not recognize a service name or node name that you specify in a CONNECT command. Use SHOW SERVICES and SHOW NODES to check service names and node names.

Local - TBS

Appears when you specify a nonexistent entry in the REMOVE QUEUE command. Use SHOW QUEUE to check the queue entries.

Local -710- Node name not known

Appears when the node name specified in the SHOW NODES *node-name* command is not known to the MUXserver 100. Either the node name is invalid, or the node is not authorized for the user. See Chapter 4, Section 4.5.

Local -711- Service name not known

Issued when the specified service name in a CONNECT *service-name* command (or autoconnect attempt) or a SHOW SERVICES *service-name* command is not known to the MUXserver 100. Either the service name is invalid, or the service is not authorized for the user. See Chapter 4, Section 4.5.

Local -712- No connection established

Appears when a DISCONNECT or RESUME command is entered, and no connection is established for the current or specified session.

Local -713- Connection already established

Issued when a CONNECT TERMINAL n command is entered, and a connection is already established on terminal n. Terminal n is a non-keyboard device, and only one session may be active at non-keyboard devices.

Local -714- Preferred service has not been defined

Appears when a CONNECT command is entered with a service name. No preferred (or dedicated) service has been set up.

Local -715- Service name not currently available

Issued when a CONNECT command is entered (or autoconnect attempted) and no node offering the specified service is currently reachable. See Chapter 4, Section 4.5.

Local -716- Access to service name denied

Issued when a connection to a service is attempted, and the user is not authorized access to the service. The user's terminal has no group code in common with any service node that offers the service. See Chapter 4, Section 4.5.

Local -717- Session n not established

Appears when a DISCONNECT SESSION n or RESUME SESSION n is entered, and session n does not exist.

Local -718- Session limit reached

Issued when a CONNECT command is issued, and the terminal already has the maximum number of sessions active. An additional session cannot be established. The session limit is defined in a privileged SET TERMINAL command, and can range from 0 to 4.

Local -719- No memory to complete operation

Appears when a command cannot be executed. The memory that the server reserves for storing information about services and nodes is shared with that used for additional service sessions. This memory is currently fully utilized. You can wait and try later. For a more permanent solution, define group codes so that the total number of nodes available to all terminal users is more reasonable. If 100 or fewer nodes are known to the server, there should be no resource problems. A user always has access to at least ONE session. Chapter 2, Section 2.7.1 (Session Control Characteristics) discusses group codes.

Local -722- Server disabled

Appears when a CONNECT command is issued and the server is disabled (following an INITIALIZE DISABLE command). Connect requests are not honored when the server is disabled. Refer to Chapter 2, Section 2.8, MUXserver 100 INITIALIZATION.

Local -723- Fatal Ethernet Port error

Appears when a connect request is issued, and a fatal Ethernet port error is detected. An INITIALIZE from the privileged terminal (or power-up) is required to correct this condition. After initialization, refer to Chapter 4, Section 4.2.2, ERROR MESSAGES ON THE SUPERVISOR PORT TERMINAL.

Local -725- Access to node node-name denied

Appears when you specify a node with CONNECT and the node is not among your authorized groups.

Local -726- Node node-name not available

Issued when you specify a node with CONNECT and the node is currently unreachable. Enter SHOW NODES to see which nodes have status reachable.

Local -728- Parameter cannot be modified with connection established

Issued when characteristics specified in a SET SERVER command cannot be changed while connections exist at any terminal. Wait until the terminal users end their sessions; or enter the DEFINE SERVER command to change the characteristics, and then the INITIALIZE command to make them operational.

Local -729- Parameter cannot be modified dynamically

Appears if a characteristic specified in a SET PORT command cannot be modified using SET PORT. Use DEFINE PORT to change the characteristic. The change takes effect when the terminal user next logs in.

Local -730- Temporary resource conflict - try again

Issued when an internal conflict in resources occurs, and a command cannot be executed. These conflicts are of brief duration. The command should be re-entered.

Local -731- Port not configured for loopback test

Appears when the START TEST PORT LOOPBACK command is entered without a terminal number. You cannot loopback to your own terminal.

Local -732- Port n not under test

Issued when a STOP TEST PORT n command is entered for a terminal n that does not have a test running.

Local -733- Port n already under test

Issued when you enter the privileged command START TEST PORT n for a terminal n that is already undergoing a test. You can stop the first test by typing STOP TEST PORT n.

Local -741- Invalid password

Issued when one of the following happens:

- You type an invalid password in response to the SET PRIVILEGED command.
- You type a password of more than six characters when you enter these commands:

  - DEFINE PRIVILEGED PASSWORD
  - SET PRIVILEGED PASSWORD
  - DEFINE LOGIN PASSWORD
  - SET LOGIN PASSWORD
  - LOCK

  Re-enter the command with the correct password or password syntax.

Local -742- Password verification error

Appears for a LOCK, SET PASSWORD, or DEFINE PASSWORD command. The verification password does not match the original password. Re-enter the entire command again.

Local -743- Another port already privileged

Issued for a SET PRIVILEGED command when another terminal is already privileged. Only one terminal can be privileged at a time. In the case of a malfunctioning terminal, the privilege can be transferred using the SET PRIVILEGED OVERRIDE command.

A.2.5 Supervisor Port Messages (Message Codes 900-999)

These messages appear: (1) when you enter the INITIALIZE command, (2) when you power-up the MUXserver 100, (3) when a fatal error occurs. They appear only on the console terminal, and message codes are always enabled for these messages.

```
Local -901- Initializing MUXserver address -
            ROM BL7, H/W Rev A.A
```

Appears at the start of MUXserver 100 initialization approximately 20 seconds after power-up or the INITIALIZE command. The message displays the following information:

- The Ethernet address, *address*, of the server
- The version number of the internal ROM software
- The current hardware revision level.

```
Local -902- Waiting for image load
```

Issued after the server sends a request-for-load to load hosts. One display of this message is normal for each initialization. However, if the load fails, or no load host volunteers, this message repeats every 30 seconds. Refer to Chapter 4, Section 4.2.4, Downline Loading Problems.

```
Local -903- Loading from host address
```

Issued when a load host with the Ethernet address, *address*, volunteers to down-line load the server. One such message is normal for each initialization.

```
Local -904- Image load complete
```

Appears when a down-line load has successfully completed. Following this message, the LAT server software takes control of the MUXserver 100.

Local -905- Waiting for image dump

Issued following a crash of the MUXserver 100. The DUMP characteristic is enabled for the server, and the server has requested a volunteer host to perform an up-line dump. This message appears once for each up-line dump.

Local -906- Dumping to host address

Issued after the MUXserver 100 receives a dump volunteer and an up-line dump has started. This message appears once for each up-line dump.

Local -907- Image dump complete

Issued when the MUXserver 100 has successfully completed an up-line dump. The self-test code takes control of the server.

Local -908- Resetting console terminal

Appears following a fatal bugcheck (message 913). After the fatal error, internal ROM software uses the current console terminal characteristics for status messages. Following up-line dump, the supervisor port terminal characteristics are reset to those stored in the permanent database. This message indicates when the reset occurs.

Local -910- Image load not attempted, network communication error

Issued following the self-test if an Ethernet loopback test fails during the self-test. A down-line load cannot possibly be successful, and could cause network problems. A power-up or initialization ([CTRL/P]) is required to clear this condition. Refer to Chapter 4, Section 4.2.2, Error Messages on Supervisor Port Terminal.

```
Local -911- WARNING - Non-fatal hardware error detected
Server code nnnn, terminal codes n n n n n n n n n n n n n n n n n n
```

Appears if the self-test detects nonfatal hardware errors during its execution. Each code digit can be a 0 or a 1; a 1 means that an error has been detected for the appropriate condition.

The number 1 at the various positions in the server code indicates the following errors:

- 1nnn - Ethernet heartbeat error
- n1nn - Ethernet loopback error
- nn1n - Hardware revision level checksum error
- nnn1 - Server parameters checksum error

The number 1 at either of the two positions in the terminal codes indicates the following:

- 1 - Port parameters checksum error

Refer to the troubleshooting procedures in Chapter 4, Section 4.2.2.

Local -912- Load failure, timeout

Appears if a down-line load sequence is interrupted, and a load message is not received for 30 seconds. The load sequence is restarted. Refer to Chapter 4, Section 4.2.4, Downline Loading Problems.

Local -913- Fatal Bugcheck PC=nnnnnn, SP=nnnnnn, SR=nnnn, MEM=nnnnnn, CODE=nnn

Issued when a MUXserver 100 crash occurs and is recorded in an orderly fashion. The message displays the PC, SP, and SR at the time of crash. If an address error occurs, the illegal address is displayed in MEM. The CODE gives the reason for the crash. Refer to Chapter 4, Section 4.2.5, Message Number 913 Appears.

Local -914- Timeout, dump aborted

Appears when a timeout condition occurs during an up-line dump, and the dump is aborted. Following this message, the diagnostic self-test executes. Refer to Chapter 4, Section 4.2.5.

Local -915- Transmission failure after ten attempts

Issued when the load or dump protocol has to retry a single message 10 times. Refer to Chapter 4, Section 4.5, PROBLEMS INVOLVING SERVICE NODES.

Local -916- Illegal load image, load aborted

Appears if the server software being down-line loaded specifies illegal sections of MUXserver 100 memory. Ask the system manager of the load host to reinstall the server software and then try again to initialize the server.

APPENDIX B COMMUNICATIONS PROCESSOR MESSAGES FOR MUXserver 100 AND DECmux II

The communications processor in the MUXserver 100 controls the composite synchronous links and the remote DECmux II units. The protocols for communications and error/status messages are the same for the communications processor in the MUXserver 100 and the processor in the DECmux II unit. The following messages are therefore common to both devices.

B.1 COMMUNICATIONS PROCESSOR MESSAGES

The following error messages from the communications processor appear on the Supervisor Port.

Ambiguous or illegal command

The command interpreter could not understand what was typed after a prompt. Retype the command; see "HELP" for a list of commands.

Ambiguous or illegal value

The value typed in response to a question was not understood.

Retype the value, or type a question mark (?) for a list of allowed inputs.

Cancel

The Control-C just typed canceled the execution of the current command.

Could not find mapping for a port

Port mapping letters must come in pairs; only one instance of a letter was found. Examine the map displayed and make any necessary changes.

Default not available

There is no default response for the question being asked. You must enter a value.

Disconnect complete

Typing the control-C key while connected, forces a Disconnect.

Error in password validation

Either the old password did not match that stored in the Multiplexer or the two entries of the new password were different.

Try the PASSWORD command again.

Illegal MUX identifier

The CONNECT command requires a multiplexer identifier of one letter and one number, (for example, CONNECT A1).

Retype the CONNECT command with a correct multiplexer identifier.

Illegal or missing PORT number (DECmux II only)

The PORT command requires a port number between 0 and 7 inclusive or the letter "S", (for example, PORT 5).

Retype the PORT command with a valid port identifier.

Only one connection at a time please

The CONNECT command does not allow a connection from a MUX you are connected to. DISCONNECT and try again.

Only two ports may be mapped together, extra deleted

The MAP command requires exactly two occurrences of any letter, the command processor found three or more. Examine the map displayed and make any necessary changes.

Remote MUX busy

Someone else is connected to the mux you are trying to access.

NOTE

When using the MAP command on the Supervisor Port of a remote DECmux II unit, the MUXserver 100 appears as two separate eight-line MUXes. If you then try to CONNECT to that MUX which is not labeled MASTER, and which is in fact part of the MUXserver 100, you will receive the "Remote MUX Busy" message. Always CONNECT to the MUX labeled MASTER.

Remote mux unreachable

No response was obtained from connect request. The target multiplexer does not exist, is turned off, or a communications link has failed.

Ports on the same mux cannot be mapped to each other

The MAP command processor found two ports on the same multiplexer mapped together; this is not allowed. Examine the map displayed and make any necessary changes.

Save command failed

Hardware failure, try SAVE again and call DIGITAL Field Service if the problem persists.

Save complete

Message when SAVE command executes normally.

Synchronous port connection error

This message is given if the Multiplexer 100 detects an illegal network connection. Most common cause is a loopback connector in a composite link port or a modem set to loopback mode.

The "A" port on every multiplexer must be connected to the "B" port on another multiplexer.

The port map has not been loaded from the Master.

This message appears as a response to the MAP command if the Slave multiplexer has not communicated with the Master multiplexer, or if there is no Master on the network.

Test command not allowed on remote DECmux II units

As execution of the TEST command stops normal operation, including remote connections it is not allowed if you are CONNECTED to a remote Multiplexer.

You are not connected anywhere

You typed a DISCONNECT command which reverses a connect, when you were not connected to a remote Multiplexer. Use the EXIT command to prevent use of the supervisor port, until the password is reentered.

B.2 TEST MODE MESSAGES

B.2.1 Multi-Protocol Serial Controller Chip (MPSCC) Test Error Messages

These have the general form:

Port X mm...mm HH HH

Where X is A or B, mm...mm is the message text, and HH are two Hex numbers which have very differing meanings for each message and are described with each message.

Change in modem status

A status line from the modem has changed value. Generally, this error can be ignored, especially at the start of a test.

The first Hex byte is the Hardware status from the MPSCC. Significant bits are:

Bit	Meaning
3	Carrier Detect Status
4	Synchronization Status
5	Clear to Send Status

Data compare error

The data received was different from that sent, but no CRC error was detected. Indicates DFMZA hardware problem, or unusual communications error. The first status byte is the expected data and the second the received data. Only the first error in any frame is reported.

DMA address/count error

Internal error in DMA I.C.. This is a fatal Hardware error.

Incorrect status RR1

This is a CRC error, or Data overrun error. It can occur occasionally without affecting normal communications. The first status byte is the Hardware status from the MPSCC. Significant bits are:

Bit	Meaning
7	End-of-frame received, should be set
6	CRC error, should be reset
5	Receive overrun, should be reset
3-1	Residue count, should be 011

Common errors and their hex display are:

Value	Meaning
C7	CRC error
A7	Receive data overrun
E7	CRC error and Receive data overrun

Length error

The length of the frame received was different from that sent, but no CRC error was detected. Indicates DFMZA hardware problem, or unusual communications error. The first status byte is the actual length of the message received.

Call DIGITAL Field Service if this occurs regularly.

Length error detected

A hardware error has been detected. Call DIGITAL Field Service.

Message out of order

The test frames are numbered. If a frame is lost, or if an extra frame is inserted this message will appear. It is usually accompanied by other error messages. The two data bytes are the number of the frame expected and the number of the frame received.

Rx complete timeout

The test program detected the start of a message but not the end. Possible causes of this message are:

- No loopback connector, or other form of loopback.
- Excessive noise on a communications link.
- Loss of clock signal

Occasional (less than one in 100) occurrences of this message on long communications lines is considered acceptable. More errors than this will reduce the line utilization.

Rx start timeout

The multiplexer transmitted a message, but never received it back. Possible causes of this message are:

- No loopback connector, or other form of loopback.
- Excessive noise on a communications link.
- Loss of clock signal.

Occasional (less than one in 100) occurrences of this message on long communications lines is considered acceptable.

Tx timeout

No completion interrupt on transmitting a message. Usually due to no synchronous clock, or no communications link, or no loopback connector.

Receive timeout port N

Loopback connector missing (Test 2) or Hardware error (Test 2 & 3).

Transmit flag failed to set on port N

Hardware error.

Unexpected receive character from port N

Character typed on port N during Test 2 or hardware error (Test 2 or 3).

B.2.2 Other Test Program and Hardware Related Errors

Error in clock interrupt frequency XX

Hardware error. Notify DIGITAL Field Service.

Invalid parameter

Typed entry is not recognizable; try again or check documentation.

Invalid test numbers

Tests are numbered 1 to 8. Try again.

NVR checksum failure

The contents of the Non-Volatile Ram have been lost. All port parameters must be re-entered and SAVEd.

Time out waiting for MPSCC interrupts

Internal logic test has failed. Hardware problem. Notify DIGITAL Field Service.

Unexpected Rx interrupt

Internal logic test has failed. Hardware problem. Notify DIGITAL Field Service.

Unexpected interrupt from MPSCC chip

Hardware problem. Notify DIGITAL Field Service.

B.2.3 Modem Line Test

The message for this test shows when a modem signal fails to respond to a change on the controlling DTR signal.

A typical message is:

Port 2 DTR-OFF found DSR CD RI on

Messages will occur repeatedly for any port which does not have a loopback connector in place. If a message occurs for a port which has a loopback connector in place, the hardware is faulty.

B.2.4 Asynchronous Ports Error Messages

Character mismatch port N good MMM bad MMM

The character read from the port was not that sent. Hardware error or faulty loopback connector.

Overrun error on port N

Hardware error, or loopback faulty connector.

Overrun fail to set on port N

Hardware error.

GLOSSARY

bugcheck — A process by which the MUXserver 100 detects fatal errors and reinitializes.

cluster — A group of VAX computer systems operating logically as a single service node.

collision — A condition that occurs when two nodes on the Ethernet transmit at the same time.

composite link — The synchronous RS-232 or RS-422 communications link connecting the MUXserver 100 to a DECmux II unit or one DECmux II unit to another. For RS-232 synchronous link, the composite link incorporates the complete end to end communications channel including modems and the Public Data Network.

database — An area of MUXserver 100 memory that holds the terminal and server characteristics. There are two databases of this kind: the permanent database and the operational database.

failover — A feature by which the server attempts a connection to another service node automatically when a connection terminates abnormally. The server tries to connect to a service node offering the same service. AUTOCONNECT must be enabled for failover.

initialize — To start a procedure that: (1) disconnects all MUXserver 100 service sessions, (2) runs the diagnostic self-test, (3) down-line loads the server software from a load host, and (4) transfers control to the server software. You can initialize the server with the INITIALIZE command or by power-up.

local mode — A terminal user's environment when he or she interacts with the server using MUXserver 100 commands.

nonprivileged status — An operating mode in which a terminal user has access only to the nonprivileged MUXserver 100 commands.

port — The hardware on the MUXserver 100 that transmits and receives data to and from a terminal, a remote DECmux II unit, or the Ethernet transceiver. Server and terminal characteristics are effective at the terminal ports, composite ports, and at the Ethernet port.

privileged status — An operating mode in which a terminal user has access to the privileged terminal and to the privileged MUXserver 100 commands. Normally, the server manager is the only user with privileged status.

ROM — An acronym for Read Only Memory; the part of the MUXserver 100 memory where microcode instructions are stored to implement the self-test, down-line loading, up-line dumping, and maintenance messages. Unlike the server (LAT) software, instructions stored in ROM are not down-line loaded.

self-test — A diagnostic test that verifies MUXserver 100 hardware components. You can specify various types of self-tests with the INITIALIZE DIAGNOSE command.

server software — The software that implements the LAT protocols on the MUXserver 100.

service — A resource provided by network computer systems that is available to MUXserver 100 terminal users. A service can be offered by one or more systems.

service mode — A terminal user's environment when his or her terminal is connected to a service.

service node — A computer system that provides services to a MUXserver 100 terminal user.

service node software —The software that implements the LAT protocols on a service node.

session — A connection or interaction between a terminal user and a service.

supervisor port terminal — A MUXserver 100 terminal on which the 900 series of MUXserver 100 messages appears. The only terminal that can be used to enter privileged mode directly.

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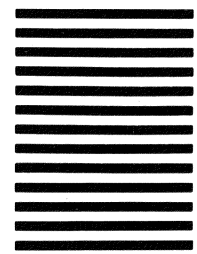

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