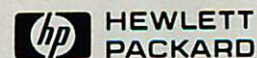


# Distributed Systems Network



DSN/X.25 for the HP 3000  
Reference Manual



**Distributed Systems Network**

# **DSN/X.25 for the HP 3000**

**Reference Manual**



**HEWLETT  
PACKARD**

19420 HOMESTEAD ROAD, CUPERTINO, CA 95014

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# LIST OF EFFECTIVE PAGES

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Effective Pages	Date
all.....	Feb 1984

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X.25 is a communications standard defined by the CCITT (Comité Consultatif International pour Telegraphique et Telephonique -- International Advisory Committee for Telegraphy and Telephony). According to the CCITT, X.25 defines the "interface between data terminal equipment (DTE) and data circuit-terminating equipment (DCE) for terminals operating in the packet mode on public data networks." A further explanation of this rather complex definition is given in the first section.

DSN/X.25 will work on either MPE IV or MPE V/E. However, the number of logical devices you can configure will be different.

The first section also defines Public Data Networks and Packet Assembler-Disassemblers (PADs), and explain their uses. However, since all networks are somewhat different, you will need to check your network documentation for specific information.

Section 2 elaborates on the uses of a PAD, including block mode operation. It also explains how to write block mode applications that are not exclusively VPLUS, how to modify existing block mode applications to be used on a terminal connected to a PAD, and how to use the HP 2334A Cluster Controller.

The third section describes X.3 and X.28, the standards that govern the interface between PADs and asynchronous devices.

The next two sections describe how to configure X.25 nodes and I/O devices. Section 4 explains the Network Configurator, used to configure X.25, while Section 5 covers System I/O configuration.

Section 6 describes the different parameters of the DSCONTROL command, used to enable the link to the PDN.

Section 7 explains how to run DSLIST to determine the version of X.25 installed on the system.

Finally, Section 8 compares HP's implementation of X.25 on the HP 3000 to the CCITT X.25 Standard.

Appendices A-E cover facets of the system that might not be of interest to all users, but are useful for those who want a fuller understanding of the system.

Appendix A lists the various error codes and their meanings. These codes are separated by function, to make it easier to find each code.

Appendix B covers DSDUMP and CSDUMP, the CS trace file analyzing programs, and gives examples of each.

Sample subscription forms for several common networks are included as Appendix C.

Appendix D contains packet formats for X.28 and X.29

Finally, Appendix E is a copy of the standard ASCII character chart.



# PREFACE (continued)

Users of this manual should be familiar with the basic operating principles of the HP 3000 computer system using the MPE operating system, and should also be familiar with the subjects covered in the following manuals:

For MPE-IV:

- *HP 3000 Computer Systems, MPE Commands Reference Manual (30000-90009)*
- *HP 3000 Computer Systems, MPE Intrinsic Reference Manual (30000-90010)*
- *HP 3000 Computer Systems, System Manager/System Supervisor Reference Manual (30000-90014)*
- *HP 3000 Computer Systems, Console Operator's Guide (32002-90004)*

For MPE-V:

- *HP 3000 Computer Systems, MPE V Commands Reference Manual (32033-90006)*
- *HP 3000 Computer Systems, MPE V Intrinsic Reference Manual (32033-90007)*
- *HP 3000 Computer Systems, MPE V System Operation and Resource Management Reference Manual (32033-90005)*

For both:

- *IMAGE/3000 Reference Manual (32215-90003)*
- *HP 3000 Computer Systems, Communications Handbook (30000-90105)*

# PREFACE (continued)

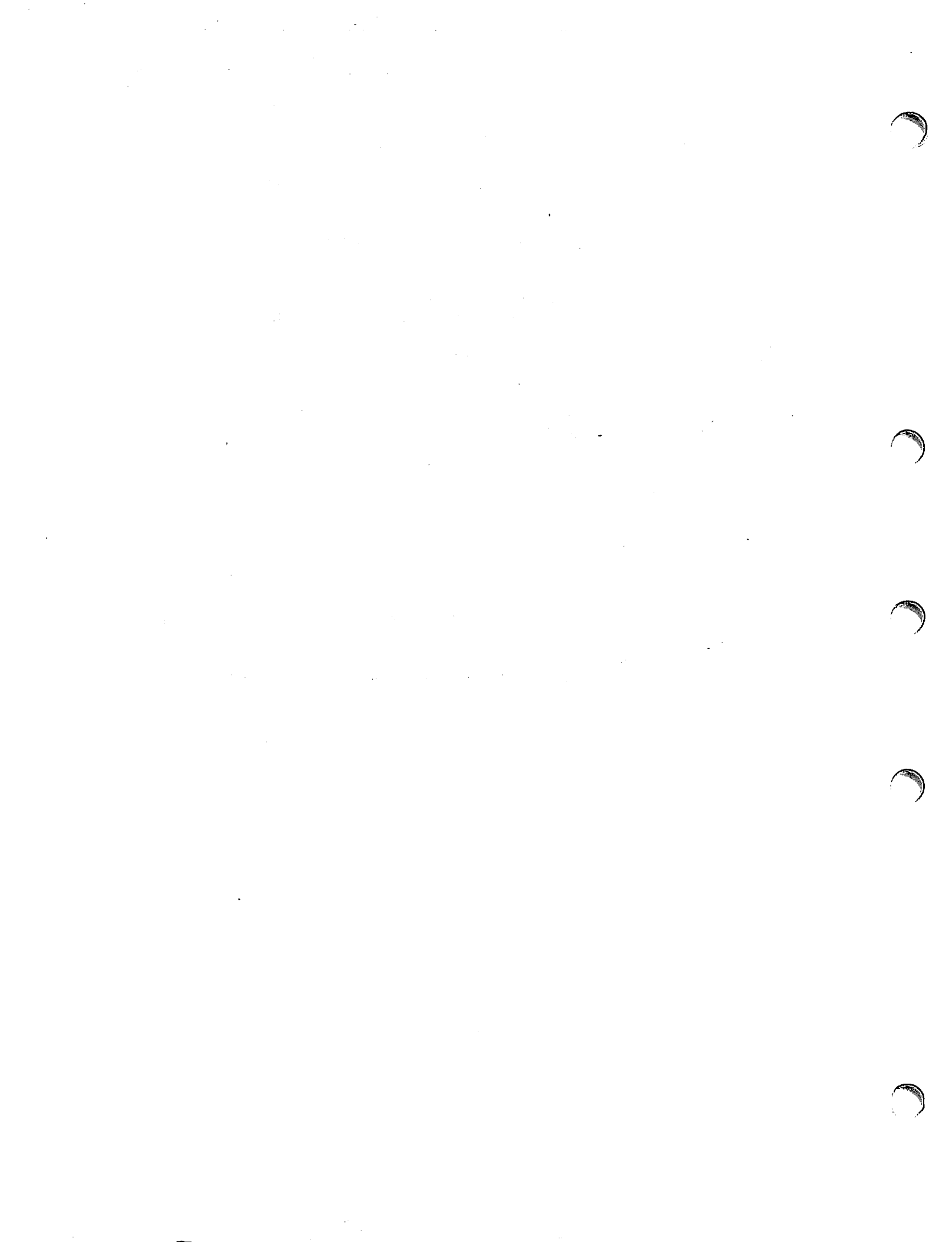
If you have DSN/DS software, you should use the following manuals:

- *DSN/DS HP 3000 to HP 3000 User/Programmer Reference Manual (32189-90001)*
- *DSN/DS HP 3000 to HP 3000 Network Administrator Reference Manual (32189-90002)*

If you become involved in the selection or connection of the various network components, you should make use of the appropriate component manuals, including the following:

- *HP 30010A Intelligent Network Processor (INP) Installation and Service Manual (30010-90001)*
- *HP 30020A Intelligent Network Processor (INP) Installation and Service Manual (30020-90001)*
- *HP 30020B Intelligent Network Processor (INP) Installation and Service Manual (30020-90005)*
- *HP 30010A/30020A/B Intelligent Network Processor (INP) Diagnostic Procedures Manual (30010-90002)*
- *HP 2334A Reference and Service Manual (02334-90001)*

Parts of this manual were drawn from the *DSN/DS 3000 User/Programmer Reference Manual*. Other parts are completely new. The *DSN/DS 3000 User/Programmer Reference Manual* has been updated to reflect these changes. However, if you do not own a copy of the DS/3000 software, it is not necessary for you to order the DS manual.



# CONVENTIONS USED IN THIS MANUAL

NOTATION	DESCRIPTION
COMMAND	Commands and keywords are shown in CAPITAL LETTERS. The names must contain no blanks and be delimited by a non-alphabetic character (usually a blank).
<i>parameter</i>	Lowercase italics denote a parameter that must be replaced by a user-supplied variable. For example:  CLOSE <i>filename</i>
[ ]	An element inside brackets is optional. Several elements stacked inside a pair of brackets means the user may select any one or none of these elements. Example: $\left[ \begin{array}{c} A \\ B \end{array} \right]$ user may select A or B or neither.  When brackets are nested, parameters in inner brackets can only be specified if parameters in outer brackets or comma place-holders are specified. Example: [ <i>parm1</i> [, <i>parm2</i> [, <i>parm3</i> ]]] may be entered as:  <i>parm1,parm2,parm3</i> or <i>parm1,,parm3</i> or <i>,,parm3</i> , etc.
{ }	When several elements are stacked within braces the user must select one of these elements. Example: $\left\{ \begin{array}{c} A \\ B \end{array} \right\}$ user must select A or B.
...	An ellipsis indicates that a previous bracketed element may be repeated, or that elements have been omitted.
<u>user input</u>	In examples of interactive dialogue, user input is underlined.
<b>CONTROL</b>	Control characters are indicated by <b>CONTROL</b> followed by the character. Example: <b>CONTROL</b> Y. (Press Y and <b>CONTROL</b> simultaneously.)
<input type="text"/>	Indicates a special key on the keyboard, such as the carriage return key or the backspace key.
<<COMMENT>>	Programmer's comments in listings appear within << >> .
** Comment **	Writer's comments appear in this form.



# ACRONYMS USED IN THIS MANUAL

CCITT	Comité Consultatif International pour Telegraphique et Telephonique: the International Advisory Committee for Telegraphy and Telephony. An advisory body that provides data communications recommendations such as X. 25.
DS	Distributed System. HP's data communications product that permits data communications between HP systems, such as the HP 3000 and HP 1000.
DSN	Distributed Systems Network. HP's series of programs that permit data communications between HP systems and terminals. DS and X. 25 are examples.
LC	Line Characteristics. A table used in NETCONF containing information pertaining to a particular line.
LDEV	Logical Device Number. The identification number for a particular device on the HP 3000.
PAD	Packet Assembler-Disassembler. Software and/or hardware that allows an asynchronous device, such as a terminal, to communicate with a network.
PDN	Public Data Network. A public data communications service devoted to data transmission.
PSN	Packet Switching Network. A special type of a PDN that uses packet switching rather than circuit switching. See Section I for a fuller explanation.
PVC	Permanent Virtual Circuit. A PDN's equivalent of a leased line, in that it is a permanent connection between two nodes.
RN	Remote Node. A table used in NETCONF that references devices attached to an HP 2334A, or remote nodes when using X. 25 with DS.
SVC	Switched Virtual Circuit. A PDN's equivalent of a dial-up line, in that it is a temporary connection between two nodes.



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## WHAT IS A PUBLIC DATA NETWORK?

A Public Data Network (PDN) is a public communications service devoted to data transmission (usually digital). It is not the same as the network used for telephones, but it is sometimes offered as a special service over telephone networks. Outside the United States, PDNs are usually administered by the government. In the United States, there are competing private (though regulated) PDNs such as Telenet, Tymnet, and Uninet.

A PDN consists of switching nodes that route messages, and trunk lines that connect the switching nodes. It can be owned by a government agency, as is the case in many European countries, or by a private company, as is the case in the United States. Two well-known PDNs are Telenet in the United States and Transpac in France.

PDNs are often represented as "clouds" in illustrations. This is because the information path in the network is transparent to the user. The information enters the network and reaches its destination, and the way it gets there is irrelevant to the user.

Some networks provide optional services, called **facilities**. These facilities might include reverse charging ("collect calls"), alternate packet sizes, or a closed user group, which means that only certain nodes are allowed to call each other. Facilities can be national or international. Networks with facilities are sometimes called **value-added networks**.

So what makes up a PDN? The user must have a computer or terminal to interface to the PDN. For dedicated access links, the PDN will provide a modem and a line into the network. The user's system is known as **data terminal equipment (DTE)**, while the entry point to the network is known as **data circuit-terminating equipment (DCE)**. Some systems go further and define **DTE-P**, which is a computer or intelligent terminal that can send packets, and **DTE-C**, which is a non-intelligent terminal that uses asynchronous mode. For a DTE-C, you need a **Packet Assembler-Disassembler (PAD)**, which is described later.

## Types of PDNs

There are two types of PDNs: packet-switching networks (PSNs), such as X.25 networks, and circuit-switching networks, such as X.21 networks. Packet-switching networks use a **packet protocol**. That is, messages are divided into several pieces of a specific, pre-determined maximum size, and are reassembled at their destination. For instance, if a message is 1000 bytes long, and the network's packet size is 128 bytes, the message will be converted to 7 packets of 128 bytes each, plus one packet of only 104 bytes.

The HP 3000 creates these packet-sized pieces of data and attaches addressing and sequencing information to them. This information is called a **header** since it precedes the data. The data with this header is called a **packet**. To prepare the packet for transmission, another header and a trailer (control information that follows the data) are attached, and is then known as a **frame**. Using the information in the headers or trailers, the network sends the frames to their destination. See Figure 1-1.

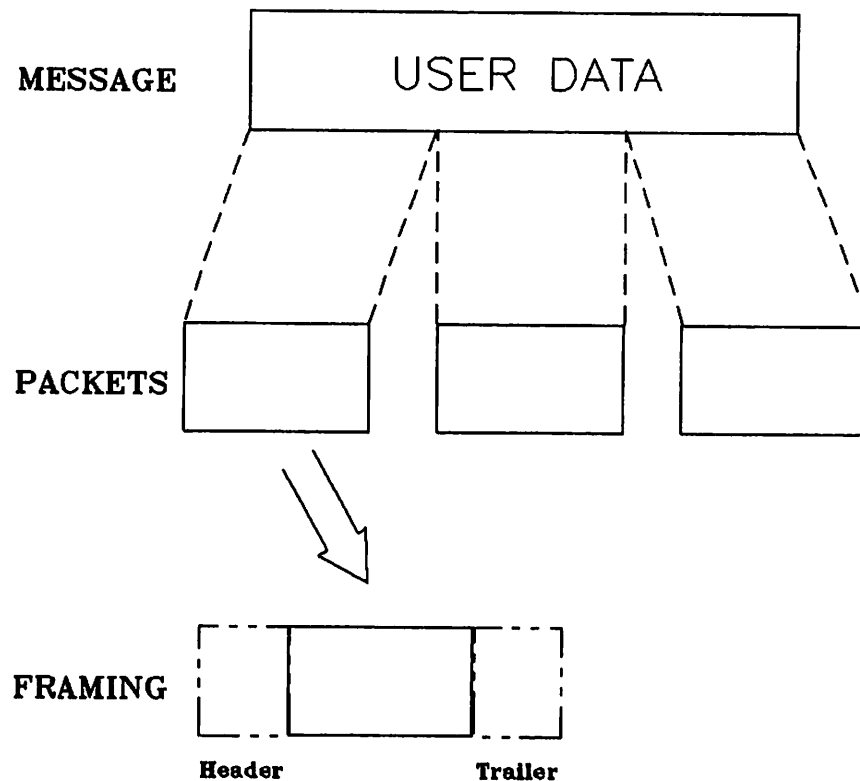


Figure 1-1. Making data into packets.

Circuit-switching networks always involve a physical connection -- two wires are actually connected and data flows over them. While the two nodes are using the wires, no one else can use them. For this reason, circuit-switching networks usually charge by time and distance.

Unlike the physical connection that circuit-switching networks use, packet-switching networks use what is known as a virtual connection. This way, no message can monopolize the line. Packets from several sources can travel across the same wire, and packets from the same message can follow different paths to their destination. This means that packet-switching networks are usually more efficient than circuit-switching networks. For this reason, packet-switching networks usually charge by time and number of packets rather than by distance, because the distance traveled over the line is insignificant.

As you can see, PSNs have several advantages. Because they use packet-switching instead of circuit-switching, they are usually less expensive than making a direct connection to another computer. They tend to be more reliable than direct connections, because there are alternate paths within the network to any destination. Therefore, if a path to one node fails, the node can still be reached through another path. Finally, any system that connects to the PDN can reach any other system without requiring separate paths.

Compare Figure 1-2 to Figure 1-3. Notice that, in Figure 1-2, the network designer has determined that the six systems will require 11 lines. Even then, Systems 1 and 2 can't communicate directly with System 5, System 1 can't communicate directly with System 6, and System 2 can't communicate directly with System 4. In Figure 1-3, however, only six lines are needed, and all the systems can communicate directly with each other.

## CONNECTING USER SYSTEMS

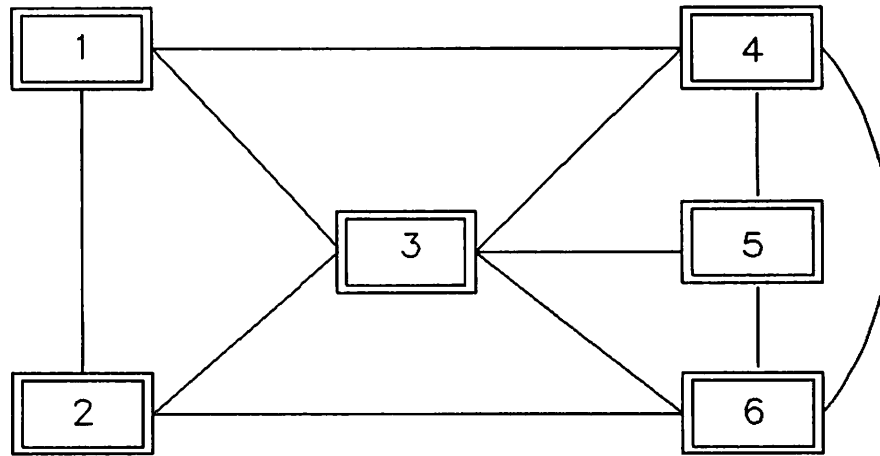


Figure 1-2. Systems without a PDN.

## CONNECTING USER SYSTEMS (with a PDN)

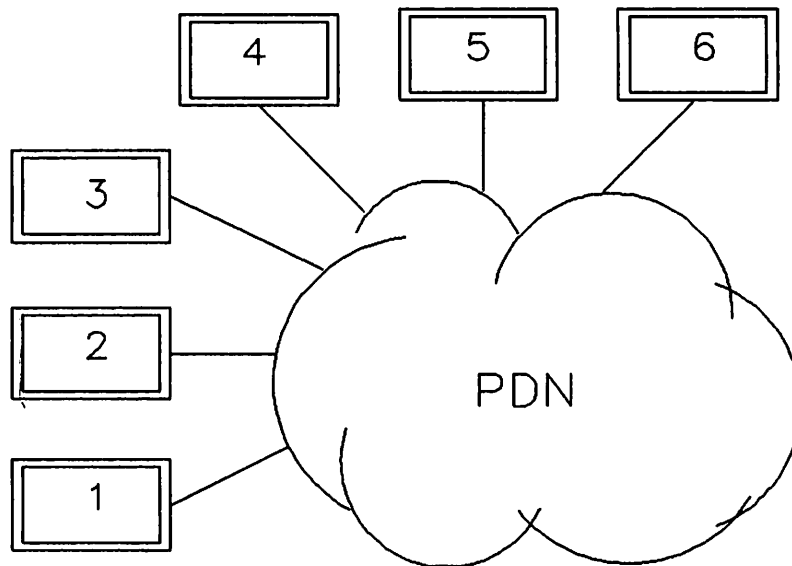


Figure 1-3. Systems with a PDN.

## Types of Connections

There are two types of virtual connections (also known as virtual circuits): permanent (PVC) and switched (SVC). A PVC is a constant association between two systems, similar to a leased line. It requires no call set-up or call clearing. An SVC, on the other hand, is temporary. The local system must establish the virtual circuit to the remote system. After the data has been sent, the call must be cleared. DSN/X.25 for the HP 3000 supports only SVCs.

Another type of connection uses datagrams. This is a very primitive connection method. The datagram information must be small enough to fit into one packet, and no acknowledgement or sequencing is provided. At the moment, no PDNs support datagrams.

## X.25 AND PUBLIC DATA NETWORKS

To allow as many potential users as possible to use a network, a standard for connecting to a network has been recommended. This standard is called X.25, and defines the interface to a network. The system can operate any way it wishes, as long as it follows the standard when it interfaces with the network.

X.25 is a recommendation defined by the Comité Consultatif International pour Telegraphie et Telephonie (CCITT), most recently in October 1980. The CCITT is a European organization that has made many other recommendations concerning various data communication devices.

The X.25 standard defines a multi-layered architecture. Each layer has its own responsibilities, one of which is getting the data to the next layer properly.

### X.25 Layers

The first layer, the **Physical Layer**, is concerned with the physical interface to the network. Eventually, the standard for this layer will be X.21, a 15-pin digital interface currently used in some Scandinavian countries. In the meantime, an interim standard known as X.21 bis (for bisync interim standard) is being used. It is identical to a standard known as RS232, which is widely used around the world.

The second layer is known as the **Frame Level Logical Layer**, or the **Data Link Layer**. The standard for this layer is a full-duplex protocol known as Link Access Protocol Balanced (LAP-B). LAP-B provides point-to-point service, as opposed to end-to-end service. In end-to-end services, the protocol guarantees the information's integrity from the sending node to the receiving node, no matter how many nodes the information passes through between them. Point-to-point protocols guarantee that data from one node will arrive error-free at the next adjacent node.

Finally, there is the layer known as the **Packet Level Logical Layer**, or simply the **Packet Layer**. This layer divides a message into packet-sized pieces, and adds addressing and sequencing information.

You, as the user, do not access X.25 directly. You must use HP DSN/DS, which interfaces with X.25 to send your messages. Therefore, X.25 is nearly transparent to the user; the only person who needs to be concerned about it is the network administrator, who needs to configure X.25 into the system. (If you are a network administrator, see Sections 4 and 5.)

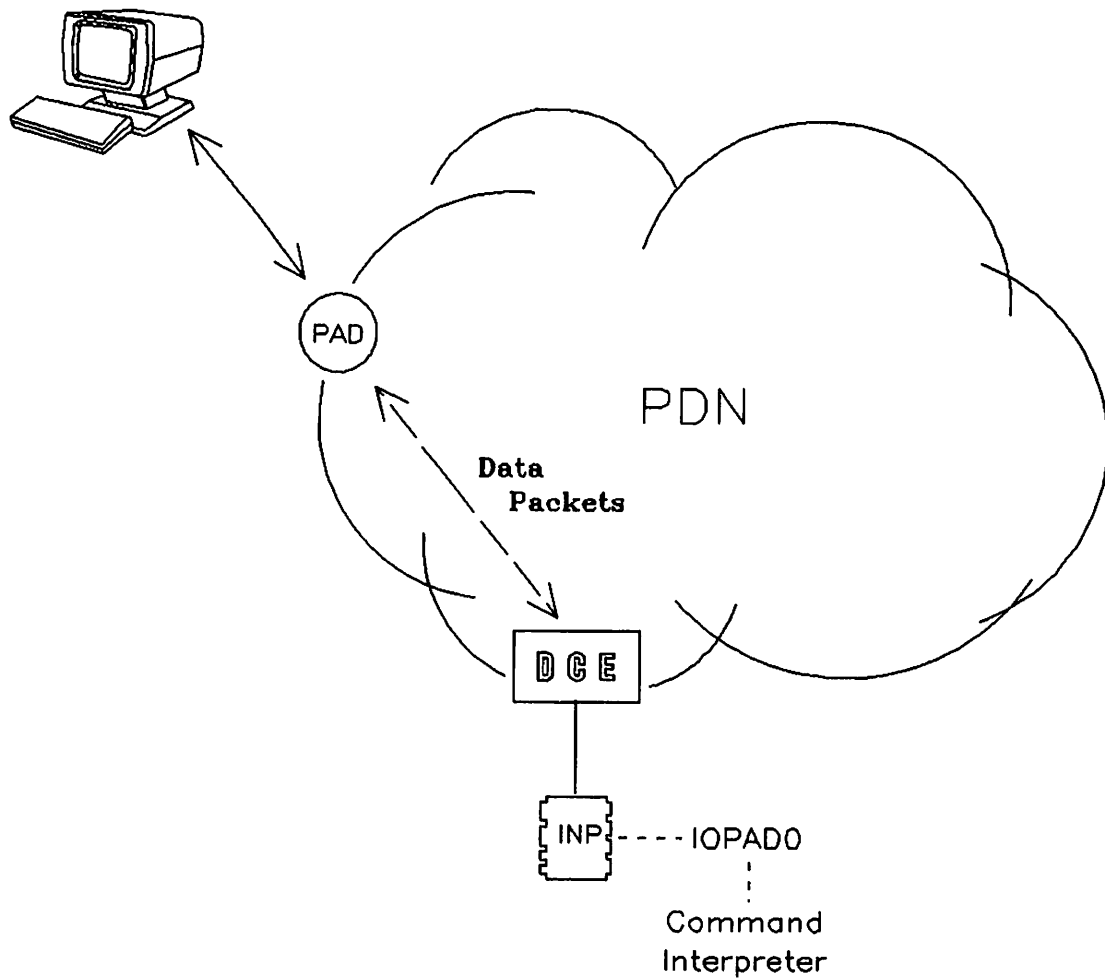
Just because two systems support X.25 does not mean they can communicate with each other. The X.25 recommendation has several optional features that are decided by each implementation. Communication depends on which features were chosen for your implementation. Check with your PDN and network administrator to see which remote systems you can communicate with.

## X.25 ON THE HP 3000

DSN/X.25 for the HP 3000 provides for SVCs, but not for PVCs. Each PAD terminal session (explained below) uses its own virtual circuit. You are allowed to have up to 256 virtual circuits per Intelligent Network Processor (INP). (In practice, the PDN will probably not allow you to use that many, because of the PDN resources required.)

X.25 defines the interface for systems or intelligent terminals to connect to a network, but most users would like to connect dumb terminals to a network. To allow these terminals to connect to a network, a device called a **Packet Assembler-Disassembler (PAD)** was developed. Its function is to receive the asynchronous information from a terminal, convert it to packets, and pass it on to the network. When the X.25 software receives the data from the Intelligent Network Processor (INP), it determines that the data was sent by a PAD terminal, and sends the data to a special driver called IOPAD0. When the HP 3000 sends back information, the PAD converts it into asynchronous characters and routes it to the terminal. See Figure 1-4.





**Figure 1-4. The data route between the terminal and the computer.**

To allow this terminal-computer interaction, several protocols are necessary. CCITT Recommendation X.28 controls the interface between the terminal and the PAD, X.29 specifies the interface between the PAD and the host computer, and X.3 specifies the PAD parameters (see Section 3 for more detail). See Figure 1-5.

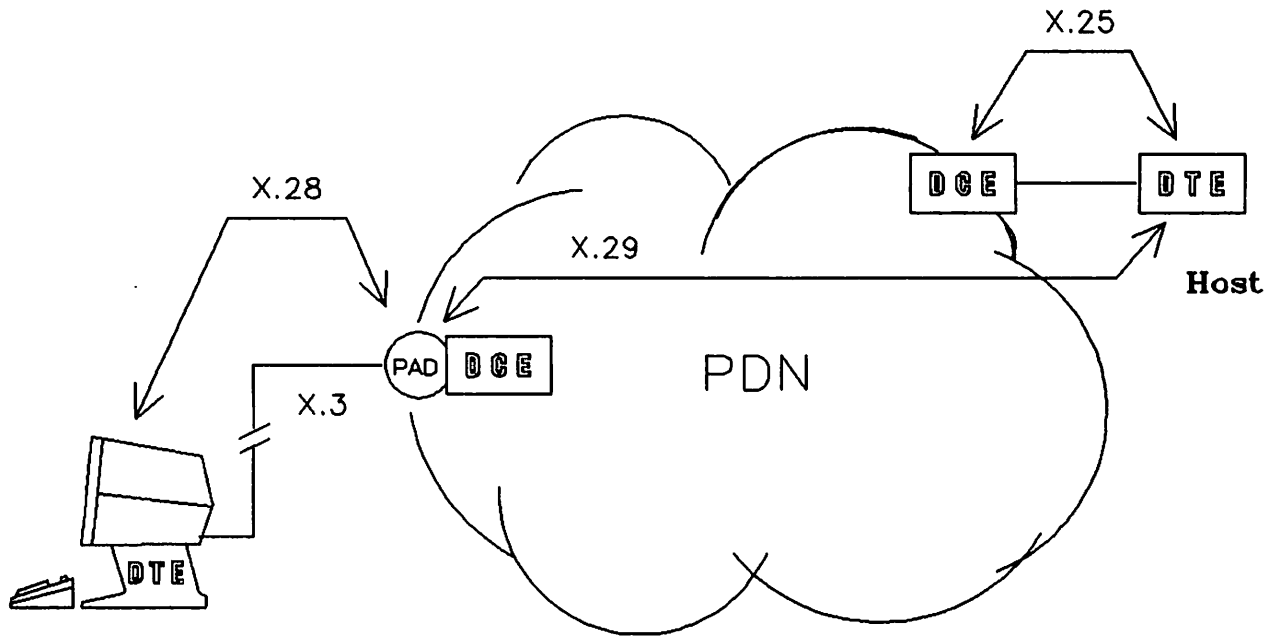


Figure 1-5. CCITT Recommendation map.

Most PDNs provide the PAD as a front-end processor on the DCE. (See Figure 1-6.) The PAD can be used with either a dial-up line or a leased line, and can be used only with point-to-point terminals.

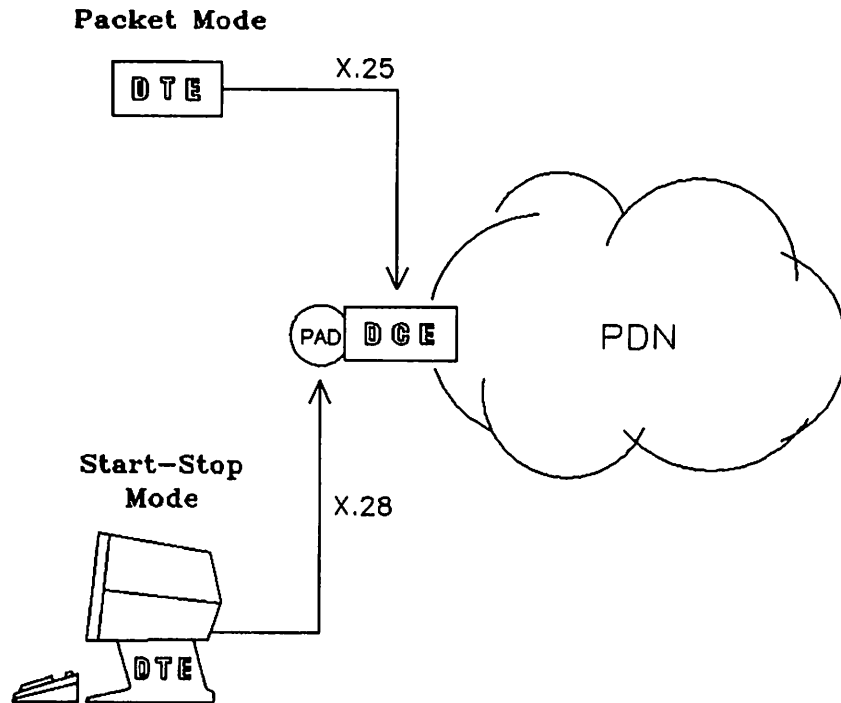


Figure 1-6. X.25 compared with a PAD.

Some computer vendors provide PADs. HP provides the HP 2334A X.25 Cluster Controller, which allows up to 16 terminals and printers to access a network. This device requires a leased line to the network.

Normally, all communications must be initiated by the terminal rather than by the computer. This is because the computer is given an address at configuration time, while terminals can dial to numerous PAD ports of varying addresses. Thus, there is no way for a computer to contact a particular terminal. Nor can one terminal communicate with another. But using the 2334A Cluster Controller, a computer can communicate with a terminal because each Cluster Controller has an address, and assigns a sub-address to each connected terminal or printer.

As of this printing, HP's X.25 using character mode over a PAD has been certified on Telenet, a United States network, the United States' Tymnet, Britain's PSS, Germany's Datex-P, France's Transpac, Belgium's DCS, Canada's Datapac, the Netherlands' DNI, and Switzerland's Telepac. Block mode over a PAD is currently certified on Telenet, Datapac, DNI, and Telepac. Certification on other networks should be accomplished soon.

Certified means that HP's X.25 has been tested on the PDN and works correctly. New networks are being developed all the time, so the certification process goes on continuously. If the PDN you wish to use is not listed, check with your HP Systems Engineer for a current list of certified networks.

## CONNECTING TO A PDN

If you are using DS/X.25, connection to a PDN is easy. Simply use the normal DS commands that you'd use on a leased connection. See the *DSN/DS 3000 User/Programmer Reference Manual* for details.

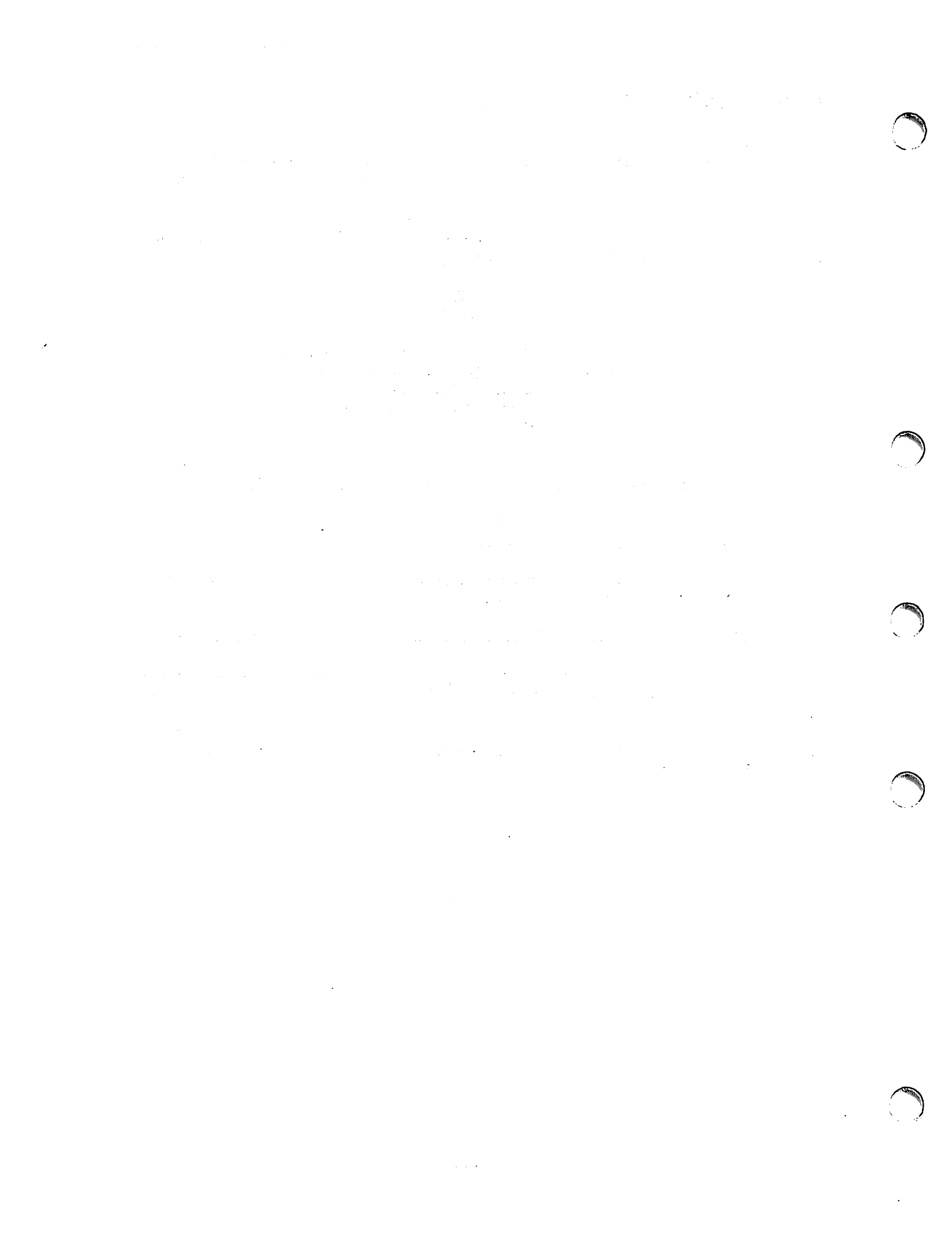
Connecting to a PAD is slightly more complicated, since each network is slightly different and has variations in its PAD commands. In general, the procedure is as follows:

<b>NOTE</b>
-------------

The following procedure is a non-specific example, comprised of several different networks' procedures. You must ask your network administrator, or the company who owns the PDN, for details relating to your own network.

- 1) Select the proper transmission speed, parity setting, and transmission mode. (Your network administrator can give you this information.)
- 2) Access the network (usually through the telephone).
- 3) The network will respond with a welcome message, and may ask for your terminal identifier. The PDN supplier should give you this information.
- 4) The network will return a prompt. Type the command that connects you to the remote system.
- 5) Press **RETURN**. If there is a virtual circuit available, the remote HP 3000 system will respond with a `:`. You will then be attached to the remote HP 3000, and can use it just like any other user of the system.

At times you may wish to access the PAD directly, perhaps to change one or more of its parameters. See Section 3 for this information.



## CONFIGURING THE TERMINAL

### Block Mode

For an HP terminal to use block mode communications over a PAD, the terminal must support block mode. In addition, this terminal must support bidirectional XON/XOFF flow control. It must also support automatic keyboard locking when **ENTER** is pressed. The HP 2624B, HP 2622A, and HP 2623B terminals with updated ROMs, and all HP 2627A terminals support these features. Other terminals will be added in the future. Contact your HP Sales Representative for more information on equipping your terminals with new ROMs.

The following steps will explain how to connect to the remote HP 3000 so that you may run block mode programs over a PAD. The first step makes sure that you have the correct ROMs; the second step sets the G and H straps; the third step sets baud rate and parity, and also enables XON/XOFF flow control; the fourth step explains how to connect to the HP 3000 over a PAD; the final step demonstrates how to log on to use the block mode capability.

#### 1. ROM CHECKING.

For your HP 2624B, HP 2622A, or HP 2623B terminal to support automatic keyboard locking, you need certain ROMs in your terminal. To check whether you have these ROMs, perform the following procedure. (Automatic keyboard locking is standard with HP 2627A terminals. If you are using an HP 2627A terminal, skip to Step 2.)

- Press **AIDS**. A set of softkeys will appear at the bottom of your screen. They will be similar to the following, although they need not be exactly the same.



Figure 2-1. Softkeys shown in response to pressing **AIDS**.

- Press **F3**, **service keys**. Your softkeys will change to those shown in Figure 2-2.



Figure 2-2. Softkeys shown in response to pressing service keys.

Again, these titles might not match exactly. The key you want is , the IDENTIFY ROMS key.

- Press . A list of character ROMs and firmware ROMs will appear on your screen. The following must be among the firmware ROMs for the HP 2624B terminal:

1818-1701  
1818-3139  
1818-3140  
1818-3141  
1818-3142  
1818-3143

The following must be among the firmware ROMs for the HP 2622A terminal:

1818-3199  
1818-3200  
1818-3201  
1818-3202 (optional: for thermal printer)  
1818-3203

The following must be among the firmware ROMs for the HP 2623B terminal:

1818-3223 2334  
1818-3224 2334  
1818-3225 2334  
1818-3226 2334  
1818-3227 2334  
1818-3228 2334

## 2. THE TERMINAL CONFIGURATION SCREEN.

Now you are ready to configure your terminal for using block mode over a PAD.

- Press **AID5** again. The set of softkeys shown in Figure 2-1 will appear at the bottom of your screen.
- Press **f8**, **config keys**. Your softkey display will change again:

```

port1  port2  terminal
config config config

```

Figure 2-3. Softkeys shown in response to pressing **config keys**.

Notice that **f5** is labelled **terminal config**. The labels on your keys may not correspond exactly. (In particular, **f3** and **f4** may be labelled **datacom1 config** and **datacom2 config**, or **datacomm config** and **ext dev config**, respectively.)

- Press **f5**, the **terminal config** key.

Your screen will change to a menu of various terminal characteristics, with the active values already listed. The screen is depicted in Figure 2-4.

```

                TERMINAL CONFIGURATION
                .
                .
                .
InhHndShk(G) NO  Inh DC2(H) NO
                .
                .
                .
SAVE  NEXT  PREVIOUS  DEFAULT  POWER ON  ACTIVE  DISPLAY  config
CONFIG CHOICE CHOICE  VALUES  VALUES  VALUES FUNCTNS  keys

```

Figure 2-4. Softkeys shown in response to pressing the **terminal config** key.



## Using the PAD

All you need to be concerned with are the specific items shown in Figure 2-4, which are the parameters governing the G and H straps, and the softkey definitions. The default setting for these straps is NO; you need to open them (change it to YES).

- Press **^ 4**, the **DEFAULT VALUES** key, to display the default values.
- **TAB** the cursor to the field labelled InHndShk(G)
- Press **^ 2**, the **NEXT CHOICE** key. The NO will change to a YES.
- **TAB** to the InH DC2(H) field, and follow the same procedure to change the NO to a YES.
- All other fields should have their default values. The screen should look like that shown in Figure 2-5.
- Press **^ 1**, the **SAVE CONFIG** key, to keep this configuration. Your softkeys will change back to those shown in Figure 2-1.

TERMINAL CONFIGURATION

```

      .
      .
      .
InhHndShk(G) YES  Inh DC2(H) YES
      .
      .
      .

```

SAVE CONFIG	NEXT CHOICE	PREVIOUS CHOICE	DEFAULT VALUES	POWER ON VALUES	ACTIVE VALUES	DISPLAY FUNCTNS	config keys
----------------	----------------	--------------------	-------------------	--------------------	------------------	--------------------	----------------

Figure 2-5. The TERMINAL CONFIGURATION screen after making the correct changes.

### 3. THE PORT CONFIGURATION SCREEN.

For the rest of the configuration, you need to use a different configuration screen, one that covers topics directly related to data communications.

- Press **[F8]**, the **config keys** key. Your softkeys will be displayed as they were in Figure 2-3.
- Press **[F3]**, **port1 config** (or **datacom1 config**). (You may also use **port2 config** or **datacom2 config** if your terminal is so equipped) Your screen will change to the one shown in Figure 2-6.



```

                                FULL DUPLEX HARDWIRED  PORT 1

BaudRate            Parity 0'S . . .
                                Chk Parity NO

RecvPace Xon/Xoff . . .
XmitPace Xon/Xoff

.
.
.

SAVE  NEXT  PREVIOUS  DEFAULT  POWER ON  ACTIVE  DISPLAY  config
CONFIG CHOICE CHOICE  VALUES  VALUES  VALUES FUNCTNS  keys

```

Figure 2-7. The FULL DUPLEX HARDWIRED screen after making the correct changes.

#### 4. CONNECTING TO THE PAD.

Using the instructions from your network administrator, or the PDN-supplied documentation, dial your PDN, connect to the HP 3000, and receive a colon (:) prompt.

#### 5. LOGGING ON.

Now that your terminal is ready, log on as `termtype 24`. To do this, log on normally, with `;TERM=24` following your logon message. You might type:

```
HELLO SUZANNE.FLAHERTY;TERM=24
```

This tells the HP 3000 that you are using your terminal as a block mode 262X terminal with automatic keyboard locking, communicating through a PAD, on a public data network. Block mode will not work correctly over a PAD without this information.

## 6. SUMMARY.

To summarize steps 1-5:

1. Make sure your terminal has the correct ROMS to support automatic keyboard locking.
2. Set InhHndShk and Inh DC2 on the Terminal Configuration screen to YES.
3. In the FULL DUPLEX HARDWIRED screen, change BaudRate to correspond with the PAD, set Parity to O'S, Chk Parity to NO, and RecvPace and XmitPace to Xon/Xoff.
4. Connect to the PAD.
5. Log on to the remote HP 3000 using TERM=24.

## Character Mode

The following HP terminals will operate across a PAD in character mode:

HP 2382A

HP 2621A, 2621B, 2621P, 2622, 2623, 2624A, 2624B, 2626A, 2627

HP 2635, 2640B, 2642<sup>1</sup>, 2644<sup>1</sup>, 2645A<sup>1</sup>, 2647<sup>1</sup>, 2648<sup>1</sup>

(<sup>1</sup> Not including cassette tape or diskette transfers)

The following HP desktop and personal computers will operate across a PAD in terminal emulation mode:

HP 85

HP 87

HP 120

HP 125

HP 9826 (Series 200, Model 26)

HP 9836 (Series 200, Model 36)

HP 9835<sup>2</sup>

HP 9845<sup>2</sup>

(<sup>2</sup> These desktop computers should be set to character mode, not line mode)

To connect to a remote HP 3000 to run in character mode over a PAD, simply follow steps 3 and 4, listed above under "Block Mode." Additionally, if you are using an HP 2635, you must set the line length manually using the terminal switches. (See the HP 2635 manual for more details.)

## USING THE TERMINAL IN BLOCK MODE

### Pure VPLUS/3000 Applications

If you use VPLUS/3000 intrinsics exclusively to access the terminal, no program modifications are required. Just the terminal configurations mentioned above are necessary, including logging on as `termtype 24`.

You must have a VPLUS/3000 version of at least B.03.15 to use it over a PAD.

### Non-VPLUS/3000 Applications

<b>NOTE</b>
-------------

It is strongly recommended that user application programs use only VPLUS/3000 to control the terminal functions.

If your application does not use VPLUS/3000 exclusively to access the terminal, you must follow these steps for your application to work correctly.

1. You need file numbers for your `$STDIN` and `$STDLIST` devices to be used with certain intrinsics. You do this by using `FOPEN` on your PAD terminal, after it has been logged on.

You need to use `FOPEN` twice, once for the `$STDIN` and once for the `$STDLIST` number. After you have obtained these file numbers from the `FOPEN` intrinsic, use the `$STDIN` filename when using `FCONTROLS` and `FREADs`, and the `$STDLIST` filename when using `FWRITEs`.

When you `FOPEN` your terminal, you should use a record size that is a multiple of the packet size your network uses. This results in a more efficient usage of your network. If you are using carriage control, you must subtract one byte from your record size. That is, if your record size would be 2048 without carriage control, you should define it as 2047 if there is carriage control. If you used 2048, the system would add one byte for carriage control (giving you 2049), and then add another byte to make it an even number (giving you 2050). This would mean that your record size would not be a multiple of your packet size, and you would waste a great deal of packet space.

If your application will be used by both PAD and non-PAD terminals, you should have your program check the terminal type to ensure that its record size is opened correctly. See Figure 2-8.

```

<< Get file number of $STDIN, opened with default >>
<< record size. >>

INFILE := FOPEN(,%244);

<< L'TERMTYPE is logical variable of terminal >>
<< type. Determine the terminal type using >>
<< FCONTROL 39. >>

FCONTROL( INFILE, 39, L'TERMTYPE );

<< If terminal type = 24, block mode PAD terminal >>

IF INTEGER( L'TERMTYPE ) = 24
THEN
    << Yes, block mode PAD terminal >>
    BEGIN
        << Setting record size of PAD terminal >>

        << Open $STDLIST with record size of 2048 >>
        << bytes. Note that if $STDLIST were to be >>
        << open with carriage control, FOPTION would >>
        << be %614 and the record size would be 2047. >>

        OUTFILE := FOPEN(,%214,, -2048);

    END
ELSE
    BEGIN

        << Open $STDLIST with the desired record size >>
        << for a non-PAD terminal. >>

    END;
    <<Not a block mode PAD terminal >>

```

Figure 2-8. Example of checking terminal type.

Note that this fragment does not check for failures of the FOPEN or FCONTROL intrinsics. A real application program should include these error checks and provide for error recovery, if possible.

2. Your program must never issue any FCONTROL calls or send any terminal escape sequence that would:
  - a. Change the terminal type from its value of 24.
  - b. Change the terminal speed to anything but the speed of the modem and the acceptable speed for the PAD.
  - c. Change the terminal parity setting to anything but zero parity with no parity checking.

- d. Alter the transmit and receive pacing from XON/XOFF. This flow control is necessary to prevent the PAD from being overrun by the terminal.
  - e. Change any straps (other than G and H, below) from their default settings.
3. Your program should open the G and H straps on the terminal. (While the user is supposed to set these straps, it's usually a good idea to allow for user error.) These straps control the normal DC1/DC2 flow control, and must remain open while block mode transfers are taking place. To open these straps, you must issue `(ESCAPE)&slglH` to the terminal, where `(ESCAPE)` is the escape key (decimal 27). This sequence only sets the straps in non-volatile memory, which means that if you hard-reset your terminal, the straps must be reopened.
  4. You need to put the terminal into block mode and page mode. To do this, send the escape sequences `(ESCAPE)&k1B` (for block mode) and `(ESCAPE)&s1D` (for page mode).
  5. Before your first block mode read, your program must issue the following FCONTROLS, where *filenum* is the file number you received for `$STDIN` from Step 1:
 

`FCONTROL(filenum, 13, last)` to disable echo, where *last* is the previous value of the echo setting (0=echo on and 1=echo off), and is returned from the FCONTROL call;

`FCONTROL(filenum, 29, 0)` to enable user block mode transfers.

`FCONTROL(filenum, 41, %14436)` to set the terminal into unedited terminal mode, set the subsystem break character to `(CONTROL)Y`, and set the read termination character to RS (%36). Unedited terminal mode means that the terminal will not recognize characters used for correction, such as `(BREAK)`. A subsystem break is a "soft interrupt," which allows the user to interrupt the program without suspending it.
  6. Your program also needs to invoke automatic keyboard locking. When autolock has been enabled, the keyboard will lock each time `(ENTER)` is pressed, preventing data duplication. To enable this feature, send the escape sequence `(ESCAPE)&k1K` to the terminal. This sequence only needs to be sent once.

<b>NOTE</b>
-------------

This sequence does not itself lock the keyboard; pressing `(ENTER)` does that. It only enables keyboard locking. If you wish to lock the keyboard before the user sends any data, send the escape sequence `(ESCAPE)c` to the terminal.

Immediately before each read request, your program must send the escape sequence `(ESCAPE)b` to the terminal. This sequence unlocks the keyboard.



## Using the PAD

7. When your application program is completed, or before a character mode read, your program should send these escape sequences to the keyboard:

`[ESCAPE]&kOK` (disables automatic keyboard locking)  
`[ESCAPE]b` (unlocks the keyboard)  
`[ESCAPE]&kOB` (returns to character mode)  
`[ESCAPE]&sOD` (returns to line mode)  
`[ESCAPE]&sOgOH` (closes G and H straps)

Then, your program must perform the following FCONTROL calls, where *filenum* is the file number of \$STDIN, from Step 1:

FCONTROL(*filenum*, 12, *last*) to enable echo, where *last* is the previous value of the echo setting (0=echo on and 1=echo off), and is returned from the FCONTROL call;

FCONTROL(*filenum*, 28, 0) to disable user block mode transfers;

### NOTE

The following FCONTROL call must always be done after disabling user block mode transfers, never before.

FCONTROL(*filenum*^fo, 41, 0) to enable editing of input data, and restore the default subsystem break and read termination characters.

If you wish to resume block mode reads within this application, your program must perform Steps 3-6 again.

Figures 2-9 and 2-10 illustrate Steps 3-6, and Step 7, respectively:

```

EQUATE
  NORETURN = %320,      << carriage control      >>
  ESC = %33;           << for escape sequences  >>
ARRAY
  OUTBUF(0:65);
BYTE ARRAY
  B'OUTBUF(*) = OUTBUF;
PROCEDURE SET'BLOCK'MODE;
BEGIN
LOGICAL PARAM;          << required for FCONTROL >>

  << set terminal flow control and straps      >>
MOVE B'OUTBUF := (
  ESC, "&s1g1H",          << open G and H straps >>
  ESC, "&k1B",            << enable block mode >>
  ESC, "&s1D",            << enable page mode >>
  ESC, "&k1K");          << enable autolock >>
FWRITE(STDLIST, OUTBUF, -22, NORETURN);
FCONTROL(STDIN, 13, PARAM); << turn off echo >>
FCONTROL(STDIN, 29, PARAM); << enable block mode >>
PARAM := %14436
FCONTROL(STDIN, 41, PARAM); << set unedited mode >>
END; << set'block'mode >>

```

Figure 2-9. Preparing for a Block Mode Read.

```

PROCEDURE SET'CHAR'MODE;
BEGIN
LOGICAL PARAM;          << required for FCONTROL >>

  << set terminal flow control and straps      >>
MOVE B'OUTBUF := (
  ESC, "&s0g0H",          << close G and H straps >>
  ESC, "&k0B",            << disable block mode >>
  ESC, "&s0D",            << disable page mode >>
  ESC, "b",              << unlock keyboard >>
  ESC, "&k0K");          << disable autolock >>
FWRITE(STDLIST, OUTBUF, -24, NORETURN);
FCONTROL(STDIN, 12, PARAM); << enable echo >>
FCONTROL(STDIN, 28, PARAM); << disable block mode >>
PARAM := 0;
FCONTROL(STDIN, 41, PARAM); << enable edit mode >>
END; << set'char'mode >>

```

Figure 2-10. After a Block Mode Read.

## Using Intrinsic With Block Mode

### FCONTROLS.

All FCONTROLS work except as noted below:

1. The following FCONTROLS are no-operations. They return CCE but have no effect:

0	general device control
2	complete input/output
10	change terminal input speed
11	change terminal output speed
23	disable parity checking
24	enable parity checking
37	allocate a terminal

2. The following FCONTROLS return CCL. The file error is FSERR42 (OPERATION INCONSISTENT WITH DEVICE TYPE):

3	read Hardware Status Word
5	rewind file
6	write EOF
7	space forward to tape mark
8	space backward to tape mark
9	rewind and unload tape
18	disable tape mode
19	enable tape mode
36	set parity

3. The following FCONTROL return CCL. The file error is FSERR42 (UNIMPLEMENTED FUNCTION):

26	disable binary transfers
27	enable binary transfers

4. The following FCONTROLS work, but not the same as with local terminals:

25	define line termination character	This FCONTROL does not change the data forwarding condition at the PAD. However, once the data has been forwarded to the remote system, IOPAD0 will scan the data for this character and complete the read with an end of line indication (FSERR 31) if found.
41	set unedited mode	This will disable editing of data received by IOPAD0. Depending on the PDN, the PAD may still edit certain characters out of the data (such as <u>BACKSPACE</u> ) before forwarding the data to IOPAD0. Also, the subsystem break character and read terminating character cannot be changed from their default values (EM and CR for character mode reads, EM and RS for block mode reads). The supplied values will be ignored.

**OTHER INTRINSICS.**

FDEVICECONTROL is not supported.

**FSETMODE**

Terminal Control by the User is supported. (See the *MPE Intrinsic Reference Manual*.)

**Recovering From a Hard Reset**

If you hard reset your terminal -- that is, press **BREAK**, or turn your terminal on and off -- then type RESUME and press **REFRESH** (**F4**), your terminal will hang. Instead, after the hard reset, do the following:

- Press **AIDS**.
- Press **config keys**, **F8**.
- Press **terminal config**, **F5**.

Your screen will change to the following:

```

.
.
.
Line/Page(D) LINE
.
.
.

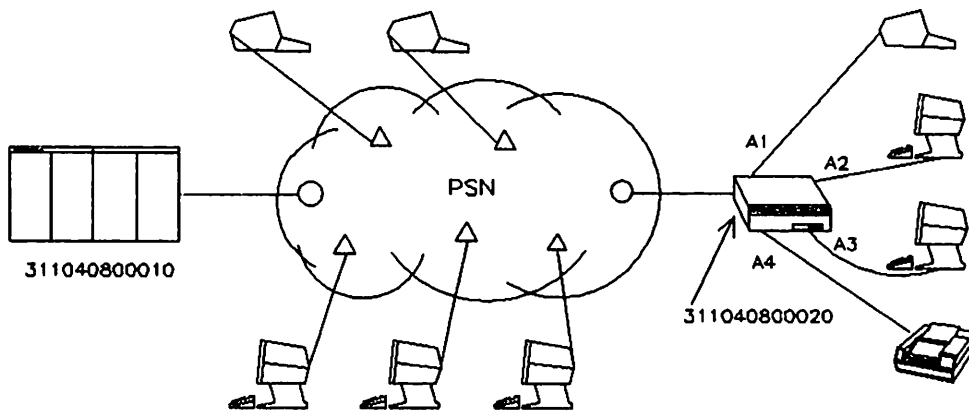
```

- Press **TAB** until you get to Line/Page.
- Press **NEXT CHOICE**, **F2**, to change **LINE** to **PAGE**. Press **SAVE CONFIG**, **F1**, to save this configuration.
- Press **MODES**.
- Press **BLOCK MODE**, **F3**.
- Press **USERKEYS** to get the VPLUS menu again.
- Press **REFRESH**, **F4**, to get VPLUS back.
- When you are finished with VPLUS, you must re-enter the terminal configuration screen and change **PAGE** mode back to **LINE** mode. You must also press **MODES** again, and press **BLOCK MODE**, **F3**, to turn off block mode.

## USING THE HP 2334A

Terminals connected to the HP 2334A will act just like terminals connected to an HP 3000 through a PDN PAD. However, since the HP 2334A has a network address and each terminal or printer on the HP 2334A has a port address, it is possible for a user or application on the HP 3000 to initiate communication to a device connected to the HP 2334A. This is useful for applications that FOPEN the terminal or a remote printer. Such applications can issue an FOPEN with the device parameter being the LDEV number or class name of the HP 2334A device or make use of file equations. The HP 2601, 2602, and 2631 printers are supported in a non-spooled environment only.

### Accessing a Specific Device



NOTE: THE 2334A IS AN HP-SUPPLIED PAD AND CAN SUPPORT A TOTAL OF 16 DEVICES

KEY:

- IS A NETWORK SWITCHING NODE (DCE)
- △ IS A NETWORK-SUPPLIED PAD

Figure 2-11. A sample system with an HP 2334A.

See pages 5-42 to 5-45 for the I/O and NETCONF configuration for this example.

In this case, the user or application program would like to access a specific device connected to the HP 2334A. Therefore, the user must specify which port the device is connected to on the HP 2334A by using the appropriate PDN address and port subaddress. This specification is done indirectly through the I/O configuration and the NETCON database.

**USING FILE EQUATIONS.**

```
:FILE OUT;DEV=REMOTEA1
```

```
:FCOPY FROM=OUTPUT;TO=*OUT
```

This sequence of commands would cause the file OUTPUT to be listed on the terminal connected to the HP 2334A port A1.

**PROGRAMMATIC ACCESS.**

The following program segment illustrates how to FOPEN the printer connected to the HP 2334A port A4:

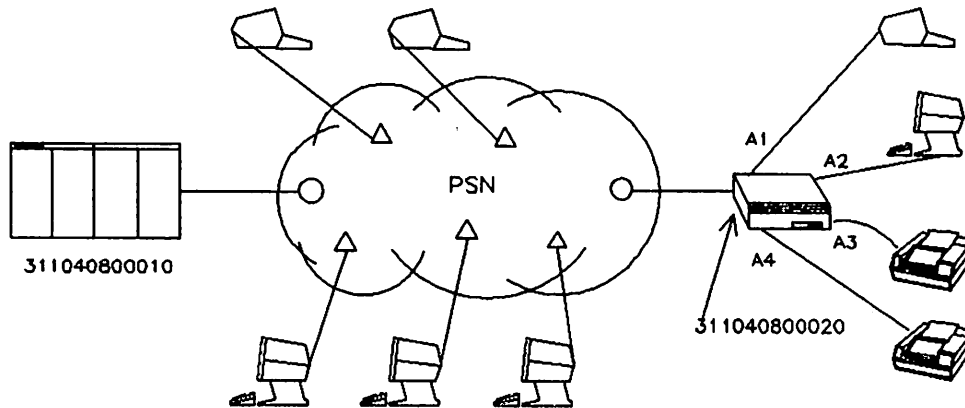
```
byte array device (0:8) := "REMOTEA4 ";
```

```
filenum:=FOPEN(formaldesignator,foptions,aoptions,recsize,device)
```

**NOTE**

The DEV parm in the file equation or device parameter in the FOPEN intrinsic may contain either the class name (as in these examples) or the LDEV of the IOPAD0 or IOPAD1 driver associated with the terminal or printer connected to the HP 2334A.

## Accessing Devices in the Callable Port Pool



NOTE: THE 2334A IS AN HP-SUPPLIED PAD AND CAN SUPPORT A TOTAL OF 16 DEVICES

KEY:

○ IS A NETWORK SWITCHING NODE (DCE)

△ IS A NETWORK-SUPPLIED PAD

Figure 2-12. A sample system with an HP 2334A and a callable port pool.

See pages 5-45 to 5-48 for the I/O and NETCONF configuration for this example.

In this case, the user or application program would like to access one of the two non-spooled line printers connected to the HP 2334A. These devices are defined to be members of the "Callable Port Pool" during offline configuration of the HP 2334A.

### USING FILE EQUATIONS.

```
:FILE OUT;DEV=REMOTELP
```

```
:FCOPY FROM=OUTPUT;TO=*OUT
```

This sequence of commands would cause the file OUTPUT to be listed on one of the printers connected to the HP 2334A.

### PROGRAMMATIC ACCESS.

The following program segment illustrates how to FOPEN one of the printers connected to the HP 2334A.

```
byte array device (0:8) := "REMOTELP ";
```

```
filenum:=FOPEN(formaldesignator, foptions,aoptions,resize,device)
```

**NOTE**

The DEV parm in the file equation or device parameter of the FOPEN intrinsic may contain either the class name (as in these examples) or the LDEV of the IOPAD0 or IOPAD1 driver associated with the terminal or printer connected to the HP 2334A.

**Possible Error Messages**

Since spooling is not supported for devices attached to the HP 2334A, when you try to access one of these devices and it is in use by another user on your HP 3000 you will receive the error message from the file system DEVICE UNAVAILABLE (FSERR55), and the SHOWDEV command will indicate that LDEV is unavailable.

If you try to access a device attached to the HP 2334A, but the link from the HP 3000 to the PDN has not been enabled by the DSCONTROL xxx;OPEN command or the device is in use by someone on a different HP 3000 connected to the PDN and is therefore unavailable from the HP 2334A's point of view, you will receive one of two possible error messages, depending on whether or not you are using header pages.

If you are trying to access a printer attached to the HP 2334A and the operator has used the HEADOFF command to disable the printing of header pages for this device you will receive the error message UNIT NOT READY (FSERR24). Otherwise you will receive I/O ERROR WHILE PRINTING HEADER/TRAILER (FSERR70) error message.



## USING THE TERMINAL IN CHARACTER MODE

### Terminal Restrictions on the PAD

There are certain restrictions on the use of a terminal running through the PAD. Some of these restrictions are:

- Some control sequences (such as CONTROLX and CONTROLY, but not CONTROLS, CONTROLQ or CONTROLH) must be forwarded with RETURN.
- All data must be forwarded with RETURN.
- The PAD terminal cannot be used as a console terminal.
- Binary transfers between the PAD terminal and the HP 3000 are not supported.

### Using a Microcomputer with a PAD

- All peripherals and terminals that you hook up to a PAD must support XON/XOFF flow control.
- File transfer programs on micros cannot make use of the DC1 "read trigger" used for flow control on a hardwired terminal.

For example, the HP 125 has a file transfer program called LINK/125. It waits for the DC1 read trigger that every hardwired terminal driver puts out when a read has been posted by the HP 3000. LINK/125 then sends a record of the file to the HP 3000. In this way, the HP 125 never sends the next record before the 3000 is ready to read it.

On a PAD terminal, however, DC1 has another meaning: XON. The IOPAD0 driver cannot send an XON to the terminal, because the PAD uses XON/XOFF for flow control. For example, if the PAD had XOFFed the terminal because the PAD's buffers were full, and then LINK/125 sent a DC1 to the terminal, (which IOPAD0 would see as an XON), the terminal would start transmitting again, and the PAD would miss data.

In order to have file transfer, you must write your own program for both the HP 3000 and the micro. The program on the 3000 would be responsible for writing a prompt character (not XON or XOFF) to the micro before reading each record. The program on the micro would have to wait for the prompt character before sending the next record.

- Binary transfers are not supported. Also, special end-of-record characters are not recognized by the PAD. Thus, all records must end with RETURN in order to be transmitted to the HP 3000.

## Characteristics of the PAD

The terminal running across a PAD behaves slightly differently than a local terminal. You will notice the following differences:

- In a local environment, a line feed is sent immediately to the terminal when a read is completed. However, a terminal on the PAD receives the line feed at the beginning of the next write to the terminal. This method is more economical, since the line feed is sent as the first item in the next write data packet rather than being sent in a packet by itself.
- Writes to the terminal are buffered until the next I/O request is processed. Thus it is possible that a write to the terminal will be delayed if a large amount of data processing is done between terminal I/O operations.
- Some network PADs will not echo escape sequences entered from the keyboard.
- Some network PADs do not echo the backspace character ((CONTROL)H). Nevertheless, the preceding character will be edited out by the terminal driver when the data reaches the HP 3000.



## **X.28 COMMANDS**

CCITT Recommendation X.28 controls the interface between the terminal and the Packet Assembler-Disassembler (PAD). Various commands specified by this recommendation allow you to communicate with the PAD for such tasks as manipulating the virtual circuit and changing various PAD parameters.

Some networks may have extra commands, or may use these commands in a different way. As always, contact your network administrator for assistance.

### **SETTING UP THE VIRTUAL CIRCUIT.**

This command is network-specific. Ask your network administrator for the proper command for your network.

### **LISTING X.3 PARAMETERS.**

PAR? **(RETURN)**

Entering this command will list the current values of all the X.3 parameters (described later in this chapter) in this form:

PAR1:value,2:value...

Or, to check on the values of specific parameters, you can use the following variation. Let's say you want the value of parameters 8 and 9:

PAR? 8,9 **(RETURN)**

The PAD will respond with:

PAR8:0,9:0

and you will find that 8 and 9 each have the value 0.

### **CHANGING X.3 PARAMETERS.**

*SET parameter number:desired value[,parameter number:value[,...parameter number:value]]* **(RETURN)**

Let's say you want to change the value of 8 to 0, and 9 to 3:

SET 8:0,9:3 **(RETURN)**

## CHANGING AND LISTING PARAMETERS.

SET? *parameter number:desired value* [, *parameter number:value* [, ... *parameter number:value* ] ] (RETURN)

This command is like entering a SET command, followed by a PAR command. It works the same way as an ordinary SET command, but responds with the new value of the parameter. Again, let's say you want to change the value of parameter 8 to 0, and 9 to 3:

SET? 8:0,9:3

The PAD will respond with:

PAR8:0,9:3

## CALLING A STATUS REQUEST.

STAT (RETURN)

This command tells you the status of your circuit, that is, whether it is FREE or ENGAGED.

## RESETTING THE VIRTUAL CIRCUIT.

RESET (RETURN)

This command resets your virtual circuit. All protocol sequence numbers are set to 0. Any data in transit will be lost.

## CLEARING THE VIRTUAL CIRCUIT.

CLR (RETURN)

This command clears your virtual circuit. It differs from RESET in that CLR completely disconnects the virtual circuit, while RESET keeps the circuit connected.

## TRANSMITTING AN INTERRUPT PACKET.

INT (RETURN)

This command sends an interrupt packet to the remote HP 3000 and has the same effect as pressing (BREAK) would have during a normal local session.

## SELECTING AN X.3 PARAMETERS PROFILE.

PROF [*identifier*] (RETURN)

This command resets the X.3 parameters to the profile specified in the *identifier* parameter as defined by the PDN. If no profile identifier is provided, the X.3 parameters will be set according to the initial profile values specified when the terminal is connected to the PAD.

## PAD Service Signals

You will only receive these signals if Parameter 6 (PAD Service Signals) is set to 1 or 4. (Default is 1.)

**Table 3-1. PAD Service Signals.**

Format	Meaning
RESET DTE	The remote DTE has reset the virtual circuit
RESET ERR	Reset due to local procedure error
RESET NC	Reset due to network congestion -- there are too many users on the network
CLR	Clear indication -- the PAD is clearing your virtual circuit
COM	Call connected -- you have successfully connected to the remote HP 3000 (response to the PDN-specific set-up command). Press <b>RETURN</b> to get the initial colon (:) prompt from the HP 3000.
ERROR	The PAD did not recognize the command you just tried to enter. Check the manual, and try again.
ENGAGED	Call established (response to STAT command)
FREE	Call not established (response to STAT command)
PAR <i>param:value</i>	Response to SET command

## X.3 PARAMETERS

While X.28 controls the PAD itself, CCITT Recommendation X.3 specifies the PAD parameters for terminals. These parameters contain information about the terminal's characteristics, and define what action should be taken by the PAD on specific input (such as pressing **BREAK**). These parameters can be pre-set by the network, set by the terminal user, or set by the remote computer.

There are a total of eighteen parameters defined by X.3. Parameters 1-12 are required on all PDNs, while parameters 13-18 are optional. Your network may or may not implement them. Please contact your network administrator.

The following is a list of the parameters and their meanings, according to the X.3 standard. Some PDNs may not follow the standard exactly. HP's default selection, set by the HP 3000, is printed in bold type.

### Required Parameters

Table 3-2. Parameter 1: Escape From Data Transfer

Values	Meaning
0	Escape not possible
<b>1</b>	Possible with DLE ( <b>CONTROL</b> P)
32 - 126	Possible with defined character

This parameter specifies whether or not you can escape from data transfer mode to command mode. In other words, this parameter determines whether or not you can give the PAD X.28 command signals once you have started data transfer.

**Table 3-3. Parameter 2: Echo**

Values	Meaning
0	No echo
1	Echo

This parameter determines whether or not the PAD echoes characters that are entered from the terminal. Default is echo on.

If this parameter is set to 0, your keyboard input will not appear on the screen.



Table 3-4. Parameter 3: Data Forwarding Signal

Values	Meaning
0	No data forwarding character
1	Alphanumerics
2	<b>RETURN</b>
4	ESC, BEL, ENQ, ACK
8	DEL, CAN, DC2
16	ETX, EOT
32	HT, LF, VT, FF
64	All other characters in columns 0 and 1 (that is, those characters whose hexadecimal ASCII representation begins with a 0 or a 1), plus DEL.

This parameter signals to the PAD when a packet should be sent. For example, if this parameter is set to 0, a packet will be sent only when full, or when the timer expires (see Parameter 4). With the parameter set to 2, a packet will be sent whenever you press **RETURN**, and so on. While 0 uses the network most efficiently, it is not suitable for interactive use. Therefore, the default value is 2, **RETURN**.

Values of 4, 8, 16, 32, and 64, although they are defined separately, cannot be used individually. Instead, X.3 defines combinations of these values. Therefore, only the following numbers may be entered for this parameter:

- 0
- 2
- 6 (a combination of 2 and 4)
- 18 (a combination of 2 and 16)
- 126 (a combination of 2, 4, 8, 16, 32, and 64)

**Table 3-5. Parameter 4: Idle Timer**

Values	Meaning
0	No time out
1 - 255	Increments of 1/20 of a second

Setting this parameter to other than 0 forces a packet creation after the defined number of seconds, if there is data in the PAD's buffer.

**Table 3-6. Parameter 5: Ancillary Device Control**

Values	Meaning
0	No use of XON and XOFF for flow control
1	Use of XON and XOFF for flow control

This parameter allows flow control using XON and XOFF (DC1 and DC3) from the PAD to the terminal.

**Table 3-7. Parameter 6: PAD Service Signals**

<b>Values</b>	<b>Meaning</b>
0	No service signals
1	Service signals other than prompt
4	Prompt service signals

This parameter selects whether or not PAD service signals are transmitted. (Refer to Table 3-1.)

As in Parameter 3, only certain combinations of these values are valid. These combinations are:

- 0
- 1
- 4
- 5 (a combination of 1 and 4)

Table 3-8. Parameter 7: Procedure on **BREAK**

Values	Meaning
0	No action
1	Interrupt packet sent
2	Reset packet sent
4	Indication of break PAD message
8	Escape from data transfer
16	Discard output

This parameter defines what the PAD will do after receiving a **BREAK** signal from the terminal.

As in Parameter 3, only certain combinations of these values are valid. These combinations are:

- 0
- 1
- 2
- 8
- 21 (a combination of 1, 4 and 16)

**Table 3-9. Parameter 8: Discard Output**

Values	Meaning
0	Normal data delivery
1	Discard output

This parameter defines what will happen to the output of the HP 3000. That is, if this parameter is set to 1, your terminal will be used as an input-only device.

**Table 3-10. Parameter 9: RETURN Padding**

Values	Meaning
0	No padding
1 - 7	Number of padding characters

Mechanical devices such as printing terminals can take some time to RETURN after printing a line. Padding characters, usually blanks, give the terminal time to get back to the beginning of the line. Without these padding characters, the first few characters at the head of a new line could be lost.

**Table 3-11. Parameter 10: Line Folding**

Values	Meaning
0	No line folding
1 - 255	Characters per line

This parameter determines how many characters are printed per line. That is, if this parameter is set to 20, and the output line is 80 characters long, then RETURN and line feed will be inserted by the PAD to convert the line into four 20-character lines.

Table 3-12. Parameter 11: Terminal Speed

Values	Meaning
0	110 bit/sec
1	134.5
2	300
3	1200
4	600
5	75
6	150
7	1800
8	200
9	100
10	50
11	75/1200
12	2400
13	4800
14	9600
15	19200
16	48000
17	56000
18	64000

This parameter is used for information only. It cannot be changed.

**Table 3-13. Parameter 12: PAD Flow Control**

<b>Values</b>	<b>Meaning</b>
0	No use of XON and XOFF
1	Flow control with XON and XOFF

This parameter is the counterpart to Parameter 5. It allows the terminal to use XON and XOFF (DC1 and DC3) to halt the PAD's transmission of data.

## Optional Parameters

Parameters 13-18 are optional. HP DSN/X.25 on the HP 3000 does not attempt to set them; your network administrator will tell you if your network supports them. They are mainly editing features.

**Table 3-14. Parameter 13: Linefeed Insertion**

Values	Meaning
0	No LF insertion
1	Insert LF after each <b>RETURN</b> to terminal
2	Insert LF after each <b>RETURN</b> from terminal
4	Insert LF after each <b>RETURN</b> sent as echo to the terminal

With this parameter set to a value other than 0, the PAD automatically inserts a LF if it senses a **RETURN**.

As in Parameter 3, only certain combinations of these values are possible. These combinations are:

- 0
- 1
- 4
- 5 (a combination of 1 and 4)
- 6 (a combination of 2 and 4)
- 7 (a combination of 1, 2 and 4)



**Table 3-15. Parameter 14: Linefeed Padding**

Values	Meaning
0	No LF padding
1 - 7	Number of padding characters

As in Parameter 9, this parameter allows padding characters to give the terminal time to execute the linefeed.

**Table 3-16. Parameter 15: Editing**

Values	Meaning
0	No editing during data transfer
1	Editing during data transfer

This parameter tells the PAD whether to recognize editing characters, such as **BACKSPACE**.

Table 3-17. Parameter 16: Character Delete

Values	Meaning
0 - 127	Character delete character

The value of this parameter indicates which ASCII character should be used as a character delete character (CONTROLH). For example, a value of 32 would mean that the blank would be used. (See Appendix E for a list of ASCII values and their corresponding characters.)

Table 3-18. Parameter 17: Line Delete

Values	Meaning
0 - 127	Line delete character

As in Parameter 16, the value of this parameter indicates which ASCII character should be used as a line delete character (CONTROLX). (See Appendix E for a list of ASCII values and their corresponding characters.)

Table 3-19. Parameter 18: Line Display

Values	Meaning
0 - 127	Line display character

As in Parameters 16 and 17, the value of this parameter indicates which ASCII character should be used as a line display character. The line display character reprints a line. It is useful when you have heavily edited a line, and you wish to see what you have done. (See Appendix E for a list of ASCII values and their corresponding characters.)



# SYSTEM I/O CONFIGURATION DIALOGUE

SECTION

4

DSN/X.25 operation requires the installation and configuration of one communications interface for each physical link to a Public Data Network (PDN). If you are configuring X.25 for use with DS, see the *DS/DS 3000 User/Programmer Reference Manual*.

This section explains how to configure the following:

- Intelligent Network Processor (IOINP0)
- DSN/X.25 Line Monitor (communications driver IODSX)
- DSN/X.25 PAD Terminals (IOPAD0) -- one for each session that will be allowed on your system from a terminal through a Packet Assembler/Disassembler (PAD).
- DSN/X.25 PAD printers (IOPAD1) -- one for each HP 2601, HP 2602, or HP 2631 printer attached to an HP 2334A X.25 Cluster Controller, which is in turn attached to the PDN through a leased line.

The same communications INP can be used by another HP 3000 data communications subsystem (such as DSN/MRJE) when it is not being used by DSN/X.25. In such a case, the communications interface is configured once for each subsystem -- each time with a unique logical device number, but always with the same DRT number (Device Reference Table -- the "electrical address" of a device). Keep in mind that the following dialogue applies only when the interface is used for DSN/X.25 activity, and that a response that is optional for DSN/X.25 may not be optional for one of the other subsystems. Configuration guidelines pertaining to the other subsystems are given in the reference manual for each subsystem. Configuration summary tables for each of the communications interface types are included in the Communications Handbook.

For any data communications subsystem to function, CS/3000 modules must be present on the system. It is presumed in this configuration description that the CS/3000 subsystem has already been installed.

If you are making any other changes to the MPE I/O system, refer to the *System Manager / System Supervisor Reference Manual for MPE IV systems*, or the *System Operation and Resource Management Reference Manual for MPE V systems*.

Configuration is accomplished through an interactive dialogue between you and the computer system. As the questions or prompts appear on your console, enter the appropriate replies through the console keyboard for your desired system configuration.

## NOTE

In all responses, Y or N can be used for YES or NO. A **RETURN** is equivalent to NO.

## System I/O Configuration Dialogue

Prior to entering the dialogue, log onto the system and input at least a file reference to a magnetic tape, as follows:

```
:FILE name;DEV=TAPE
:SYSDUMP*name
```

The dialogue commences as follows:

STEP NO.	DIALOGUE
1	ANY CHANGES? <u>YES</u>
2	SYSTEM ID = HP 32002v.uu.ff? <u>RETURN</u>
3	MEMORY SIZE= xxx? <u>RETURN</u>
4	I/O CONFIGURATION CHANGES? <u>YES</u>
5	LIST I/O DEVICES? <u>YES</u>

All I/O devices currently configured on the system are listed with the following column headings:

LOG DEV	Logical device number.
DRT #	Hardware device address (Device Reference Table number) configured on the interface board.
UNIT #	Hardware unit number of device on its controller.
CHAN	Channel number of device on its controller.
TYPE	Device type.
SUBTYPE	Device subtype.
TERM TYPE	Terminal type.
TERM SPEED	Terminal speed.
REC WIDTH	Record width in decimal words.
OUTPUT DEV	Device class name or device ldn.
MODE	J = Accept jobs A = Accept data I = Interactive device D = Duplicative device S = Spooled device
DRIVER NAME	Driver name.
DEVICE CLASSES	Class name assigned to the interface.

<b>NOTE</b>
-------------

The prompt in Step 6, below, appears only if a communications subsystem (CS) device was previously configured into the system.

**STEP NO.      DIALOGUE**

6                LIST CS DEVICES? YES

A list of all CS devices currently assigned to the system is printed with the following column headings:

LDN	Logical device number.
PM	Port Mask. (Not used by INP)
PRT	Protocol.
LCL MOD	Local mode.
TC	Transmission code.
RCV TMOUT	Receive timeout (in seconds).
CON TMOUT	Connect timeout (in seconds).
MODE	O = Dial out. I = Manual answer. A = Automatic answer. D = Dual speed. H = Half speed. C = Speed changeable.
TRANSMIT SPEED	Transmission speed (characters per second.)
TM	Transmission mode.
BUFFER SIZE	Default buffer capacity, in words.
DC	Driver changeable or not changeable.
DRIVER OPTION	Driver options.

**STEP NO.      DIALOGUE**

If you have a switched device, such as those that are connected through a dial-up telephone line, then you receive the following additional information:

LDN	INP logical device number.
CTRL LEN	Not currently implemented.
PHONE NUMBER LIST	A single telephone number -- the default for the data communications line.
LOCAL ID SEQUENCE	The default identification of the local computer.
REMOTE ID SEQUENCE	The default identification of the remote computer.

**HIGHEST DRT=xx?**

In the output, xx is a value denoting the present highest DRT entry number that can be assigned to a device.

To change xx, enter the new value desired. If the highest-numbered device in the configuration is a device that uses more than one DRT entry (such as a terminal controller with one or two data set controllers), be sure to enter the highest of the DRT numbers.

To maintain the current xx, enter **RETURN**.

**LOGICAL DEVICE #?**

To specify a device to be added or removed, enter the logical device number of that device.

This prompt is repeated later in the configuration dialogue, so that you can return to this point to configure more than one device.

Entering 0 or **RETURN** will take you to Step 43.

**STEP NO.      DIALOGUE**

9                    DRT #?

To add a device, enter its DRT entry number. For a communications driver, PAD terminal driver, or PAD printer driver, you must assign the logical device number of the associated INP, preceded by a number sign (#).

To remove a device and return to Step 8, enter zero.

10                   UNIT #? 0

Enter zero for IOINP0, IOPAD0, IOPAD1, or for the DSN/X. 25 Communications Driver (IODSX).

11                   SOFTWARE CHANNEL #? 0

12                   TYPE?

Enter the device type, where

16 = PAD Terminal (IOPAD0)

17 = Intelligent Network Processor (IOINP0)

41 = Communications Driver (IODSX)

32 = PAD printer attached to HP 2334A (IOPAD1)

<b>NOTE</b>
-------------

When configuring device type 16, consider the maximum number of terminals supported by your system. Each terminal configured is added to the total number of terminals already on the system. Your HP Sales Rep can give you this information.



System I/O Configuration Dialogue

**STEP NO.      DIALOGUE**

13            SUBTYPE?

Communications Interface: For an INP, enter 0, 1, or 3, where  
0 = switched line with modem  
1 = nonswitched line with modem  
3 = hardwired line, synchronous transmission

Communications Driver:  
For IODSX, enter 0.

PAD Terminal:  
For IOPAD0, always enter 0.

PAD printer with attached HP 2334A:  
For IOPAD1, always enter 2.

**NOTE**

If you are configuring a terminal (type 16), the dialogue continues to Step 14. If you are configuring an INP (device type 17), the dialogue skips to Step 16. For all other device types, the dialogue skips to Step 30.

14            For MPE V:

ENTER [TERM TYPE #], [DESCRIPTOR FILENAME] ?

This question is asked only if the device type is 16, or if it is 32 with a subtype of 14 or 15. Term Type is always 0 for PAD terminals.

For MPE IV:

TERM TYPE? 0 (or **RETURN**)

This question is asked only if device type is 16. Term Type is always 0 for PAD Terminals.

15            SPEED IN CHARACTERS PER SECOND? 0 (or **RETURN**)

This question is asked only if Type is 16, then the dialogue skips to Step 30.

16            RECEIVE TIMEOUT?

Enter the positive number of seconds the CS device will wait to receive text before terminating the read mode. Entering **RETURN** provides a 20-second timeout.

**NOTE**

For all timeout responses, entering 0 disables the timeout. The maximum timeout is 32000 seconds. X.25 displays an error when the communications software (CS) disconnects because of a timeout.

**STEP NO.      DIALOGUE****17              LOCAL TIMEOUT?**

Enter the positive number of seconds a connected local station will wait to transmit or receive before disconnecting. Entering **RETURN** provides a 60-second timeout. (Your response is not used for DSN/X.25 activity.)

**18              CONNECT TIMEOUT?**

Enter the positive number of seconds the local station will wait after one attempt to make a connection to a remote station. Entering **RETURN** provides a 900-second timeout. For an INP, 300 is recommended.

**NOTE**

Steps 19 through 21 apply only to CS devices with switched lines connected through a modem (dial telephones, subtype 0). For CS devices with nonswitched lines connected through a modem (private lines, subtype 1), the dialogue skips to Step 22. If the CS device is a hardwired INP (subtype 3), the dialogue skips to Step 24.

**19              DIAL FACILITY?**

Enter YES if manual dial-up is required. Enter the INP LDEV# if the AUTO DIAL feature is used. Enter NO if no dial facility is required. A NO response causes the next two steps to be skipped.

**20              ANSWER FACILITY?**

Enter YES if the local modem can answer calls, either manually or automatically. Enter NO if it cannot. A NO response causes the next step to be skipped.

**21              AUTOMATIC ANSWER?**

Enter YES if the local modem can automatically answer calls. Enter NO if manual answering is required.

## System I/O Configuration Dialogue

### STEP NO.      DIALOGUE

22              DUAL SPEED?

Enter YES if the local modem is dual speed (European models). Enter NO if it is single speed. A NO response causes the next step to be skipped.

23              HALF SPEED?

Enter YES if the local modem is to operate at half speed. Enter NO if it is to operate at full speed. The dialogue skips to Step 25.

24              SPEED CHANGEABLE?

For an INP, enter YES if the speed of the line is changeable. Enter NO if the line speed is fixed. In general, the speed is changeable when the communications interface provides the clocking, and it is not changeable when a single-speed modem or other external device provides the clocking. You must respond YES if the console operator will be using the speed parameter in the :DSCONTROL command to override the configured transmission speed (see Step 25).

**STEP NO.      DIALOGUE****25                TRANSMISSION SPEED?**

For INP (Type 17) devices, enter the transmission speed of the line in characters per second (Bit Rate/8).

The transmission speed you specify is ignored for modems that provide internal clocking signals. This allows modems of different speeds to be used without reconfiguring the Operating System. The speed specified is used if the modems are eliminated and the controllers are hardwired together.

The speed you specify becomes the default. The console operator can override the default by including the speed parameter in the :DSCONTROL command, if you answered YES to Step 24.

**26                TRANSMISSION MODE?**

Enter the appropriate number for the transmission mode in use. The mode numbers are:

0 = Full duplex  
1 = Half duplex

Configure the INP to operate in Full Duplex (0) if your facility uses one of the following:

- A leased line with four-wire, point-to-point installation.
- A dial network with two lines (four-wire equivalent).
- A dial network with Wide Band Service.
- Any Direct Connect cable between two INPs.

Configure the communications interface to operate in Half Duplex (1) if your facility uses the following:

- A dial network with a single-line (two-wire) installation.

Your response must agree with the characteristics of the communications line.

System I/O Configuration Dialogue

**STEP NO.      DIALOGUE**

27            PREFERRED BUFFER SIZE?

Enter, in words, the desired buffer size, to a maximum of 1024 words for an INP. For X.25, this value is calculated depending on the packet size defined in NETCONF and any value entered here will be overridden by the X.25 software.

28            DRIVER CHANGEABLE? NO

29            DRIVER OPTIONS? 0

**NOTE**

The dialogue skips to Step 37.

30            RECORD WIDTH?

For all PAD Terminals, enter 40.

For a PAD printer with attached HP 2334A, the record size is the physical carriage width of the remote device, usually 66 (i.e., 132 bytes).

31            OUTPUT DEVICE?

For the communications driver, or PAD printer attached to HP 2334A enter 0.

For a PAD terminal, enter the logical device number to be used for the corresponding job/session listing device, usually the LDEV of this device.

32            ACCEPT JOBS/SESSIONS?

For the communications driver or PAD printer attached to HP 2334A, enter NO.

For PAD terminals, enter YES.

33            ACCEPT DATA? NO

**STEP NO.      DIALOGUE**

34            INTERACTIVE?

For the communications driver or PAD printer attached to HP 2334A, enter NO.

For PAD terminals, enter YES.

35            DUPLICATIVE?

For the communications driver or PAD printer attached to HP 2334A, enter NO.

For PAD terminals, enter YES.

36            INITIALLY SPOOLED? NO

37            DRIVER NAME?

Enter the name of the driver for this device as follows:

IOINP0 = INP

IODSX = Communications driver, while utilizing the X.25 capability

IOPAD0 = PAD terminals, while utilizing the X.29/X.25 capability

IOPAD1 = PAD printer attached to HP 2334A

**NOTE**

Steps 38 through 41 apply to CS devices with switched (dial-up) lines (types 17 and 18, subtype 0). The dialogue for all other devices skips to Step 42.

System I/O Configuration Dialogue

**STEP NO.      DIALOGUE**

38              PHONELIST?

Enter YES or NO.

You can supply one number (usually a frequently dialed number) which will be the system default.

A NO response causes the next step to be skipped.

39              PHONE NUMBER?

Enter a string of numbers and hyphens, but not more than 30 characters. This number will be included in the I/O request on the system console when a user OPENS a dial-up (manual call) line.

40              LOCAL ID SEQUENCE?

This question does not apply to X.25. Press RETURN.

**STEP NO.      DIALOGUE**

41            REMOTE ID SEQUENCE?

This question does not apply to X.25. Press **RETURN**.

42            DEVICE CLASSES?

Enter a list containing a device class name (up to eight alphanumeric characters, beginning with a letter). Class names are separated from each other by commas. These names are left to the discretion of the System Supervisor. They will be used in certain commands and intrinsics when any member of a group of devices (such as any disc drive) can be referenced. No name need be entered.

**NOTE**

For IODSX entries, the node names defined in the RN Table (see Section 5) cannot be specified as a device class name. Device class names appear in the table printed in Step 5.

The dialogue now prints the LOGICAL DEVICE #? prompt described in Step 8. If all I/O configuration is complete, press **RETURN** and the dialogue continues at Step 43. Otherwise, enter a logical device number and repeat the configuration procedure from Step 8.

43            MAX # OF OPENED SPOOLFILES= xxx? **RETURN**44            LIST OF I/O DEVICES? YES

To print a listing of the new input/output device configuration, enter YES. This list appears in the format described in Step 52.

45            LIST CS DEVICES? YES

Enter YES to list the characteristics of the new CS device configuration.

**NOTE**

Step 46 only appears if you are using MPE V.

46            TERMINAL TYPE CHANGES?

Enter NO.



## System I/O Configuration Dialogue

- | STEP NO. | DIALOGUE                        |
|----------|---------------------------------|
| 47       | CLASS CHANGES? <u>RETURN</u>    |
| 48       | LIST I/O DEVICES? <u>RETURN</u> |

### NOTE

The prompt in Step 49 appears only if a CS device is configured or if additional drivers exist (for the CS driver-changeable option in Step 28). If neither case exists, the dialogue skips to Step 51.

- |    |                                       |
|----|---------------------------------------|
| 49 | ADDITIONAL DRIVER CHANGES? <u>NO</u>  |
| 50 | I/O CONFIGURATION CHANGES? <u>NO</u>  |
| 51 | SYSTEM TABLE CHANGES? <u>NO</u>       |
| 52 | MISC CONFIGURATION CHANGES? <u>NO</u> |
| 53 | LOGGING CHANGES? <u>NO</u>            |
| 54 | DISC ALLOCATION CHANGES? <u>NO</u>    |
| 55 | SCHEDULING CHANGES? <u>NO</u>         |
| 56 | SEGMENT LIMIT CHANGES? <u>NO</u>      |
| 57 | SYSTEM PROGRAM CHANGES? <u>NO</u>     |
| 58 | SYSTEM SL CHANGES? <u>NO</u>          |

The NO response assumes CS/3000 modules are already present on the system.

**STEP NO.      DIALOGUE**

59            ENTER DUMP DATE?

RETURN      Copies the modified MPE. When this copy is used to COLDSTART the system, the account structure and all files remain intact.

mm/dd/yy    where mm/dd/yy is some date in the future. Copies the modified MPE and the current account, but no files.

mm/dd/yy    where mm/dd/yy is usually the date of the most recent system backup. Copies the modified MPE, the current account structure, and any files that were changed on or since the specified date.

0            Copies the entire system (MPE, the current account structure, and all files).

60            ENTER DUMP FILE SUBSETS?

Enter RETURN, or enter a filename or series of filenames. (Example: @.PUB.SYS)

61            LIST FILES DUMPED? YES or NO

62            The console operator must now use the =REPLY command to assign the magnetic tape drive on which you have arranged for a fresh tape reel to be mounted.

After the SYSDUMP is complete, the tape produced should be used to COLDSTART the system. During COLDSTART, the old I/O device configuration is replaced with the new one from your SYSDUMP tape.

See pages 5-36 to 5-49 for configuration examples.



## INTRODUCTION

One of the features of the Network Configurator/Network Data Base is the ability to define the network configuration once, then store it away in an IMAGE/3000 data base, and have it automatically used whenever you use the network. In addition, you can later alter the configuration, and again store it away for future use.

The data associated with the configuration is stored in an IMAGE data base in the PUB group of the SYS account. The data in the data base is manipulated by means of the Network Configuration Utility (NETCONF), which also resides in PUB.SYS. Although the Distributed Systems Network (DSN) products have read-only access to the data base so the subsystems can determine the options selected for a particular line, the network manager can change the network configuration.

Information in the NETCON databases serves two basic purposes: first, to validate and accept CALL REQUEST packets from other computers when they connect to IODSX pseudodevices; second, to route calls from the local HP 3000 to other remote HP 3000s or HP 2334s.

The NETCON database contains INP and network IDs. These IDs are used when sending a CALL REQUEST packet, which is the result of an FOPEN intrinsic.

## ENVIRONMENT

The network configuration information is held in an IMAGE/3000 data base in PUB.SYS. The data base consists of the following files:

- NETCON (Root File)
- NETCON01
- NETCON02
- NETCON03
- NETCON04
- NETCON05

It will be necessary, since the configuration information is kept in a data base, to make a backup copy periodically onto magnetic tape, for purposes of recovery. It is recommended that the backup be taken each time the network configuration is changed, since the data base is only updated by the Network Configuration Utility (NETCONF). By doing this, a secure backup will be held of the latest network configuration.

When backing up the data base, the DBSTORE operation must be done by a user of the PUB.SYS account. It is assumed that this user is also the network manager, as only the network manager would have access to the data base maintenance password.

The data base must be RELEASED using DBUTIL, so that all users may have read access to the data base. See the *IMAGE/3000 Reference Manual*.

## The NETCONF Utility

The purpose of NETCONF is to obtain from the network manager all of the information necessary to describe the network connection(s), the parameter values and options chosen at subscription time, and all information related to the way the connection(s) will be used.

The NETCONF utility can be run by any user with read access to the data base. Only the data base creator has write access to the data base, and it is assumed that the creator is the network manager.

Run NETCONF by entering:

```
RUN NETCONF.PUB.SYS
```

## USING NETCONF

### Data Base Organization

The network configuration data is arranged into two sets (or tables) of information.

The first set of data is known as the Remote Node (RN) table and is only referenced if you are using an HP 2334A X.25 Cluster Controller, or are using X.25 with DSN/DS (see the DSN/DS reference manual in this case). This table contains information for all devices connected to the HP 2334A that will be called from users or applications on the system. One entry is required for each of these devices.

The second set of data is known as the Line Characteristics (LC) table and contains information pertaining to a particular line (logical device number). There must be an entry in this table for every line from this node and, unlike the RN table, each entry must be unique.

The two tables are related by the line identifier (LDEV number). For every line identifier referenced in the Remote Node table with System Type of HP3000 or HP1000, there should be an entry in the LC table, and vice versa. NETCONF warns of any unsatisfied or illegal relationships when exiting; however, no attempt is made to insist on their being satisfied.

## The Commands

The Network Configuration Utility (NETCONF) has eight first-level commands:

ADD	HELP
CHECK	LIST
DELETE	PRINT
EXIT	UPDATE

Any of these commands can be initiated after NETCONF has issued its identifying banner. The commands may (optionally) be abbreviated to one character, as any other input is ignored. The mode of NETCONF is conversational. After one of the commands has been specified, a series of prompts to the user is issued, as appropriate, for the relevant inputs.

To terminate NETCONF command execution during an interactive session on HP terminals, press **CONTROL**Y. This action terminates the current command and prompts for another first-level command.

Refer to the information manual for your particular PDN for the recommended (or required) configuration parameters for X.25 connections.

<b>NOTE</b>
-------------

The following description of the interactive dialogue, initiated by these commands, is presented in a format similar to the one used for the System I/O Configuration Dialogue in Section 4. For additional clarification of this format, refer to "Conventions Used in This Manual."

Shaded material represents NETCONF prompts.

# ADD

## THE A[DD] COMMAND

This command is used to add a new entry to either the Remote Node (RN) table or the Line Characteristic (LC) table. Note that only the creator of the data base can add entries. After specifying the ADD command, the dialogue proceeds as follows:

### STEP NO.      DIALOGUE

0                REMOTE NODE (RN) OR LINE CHARACTERISTICS (LC) TABLE?

Enter one of the following replies:

RN    = When this is specified, you will be adding an entry to the Remote Node table, and the dialogue proceeds from there. Skip to Step 1.0.

LC    = When this is specified, you will be adding an entry to the Line Characteristics table, and the dialogue proceeds from there. Skip to Step 2.0.

RETURN = When you reply with RETURN, you will receive the following prompt:

CONTINUE ADDING (YES OR NO)?

YES    = This response takes you back to the ADD prompt (Step 0).

NO     = This response takes you out of the ADD command and prompts for another first-level command.

INPUT MUST BE RN OR LC

If this message appears, the response was not one of the above. You will be prompted again with the ADD prompt (Step 0).

## Adding to the RN Table

The following prompts cover the remote node characteristics.

### STEP NO.      DIALOGUE

#### 1.0            REMOTE NODE NAME?

Enter a logical node name. This name can be up to eight alphanumeric characters (the first being an alphabetic character).

**NOTE**

For devices connected to the HP 2334A, these node names are not used. However, the network administrator must assign a unique class name to each device on the HP 2334A that will be opened by a user or application on the system.

#### NODE NAME SHOULD BE UP TO 8 ALPHANUMERIC CHARACTERS

This message appears when the node name is greater than eight alphanumeric characters or when the first character is numeric. You will be prompted again for a logical node name (Step 1.0).

#### 1.1            REMOTE COMPUTER TYPE (HP3000, HP2334, OR HP1000)?

RETURN = The default Remote Computer type (HP 3000) is used.

HP3000 = The type of the Logical Node being addressed is an HP 3000. This type applies only when using DSN/DS and X.25.

HP2334 = The type of the Logical Node being addressed is a device connected to an HP 2334.

HP1000 = The type of the Logical Node being addressed is an HP 1000. This type applies only when using DSN/DS and X.25.

#### INPUT MUST BE HP3000 OR HP1000 OR HP2334

This message is received if the response was not one of the above. You will be prompted again for the Remote Computer type (Step 1.1).



# ADD

## STEP NO. DIALOGUE

### 1.2 LOGICAL DEVICE NUMBER TO BE USED?

Enter a logical device number. This can be a numeric value between 1 and 255 for MPE IV, or between 1 and 999 for MPE V/E. For a terminal connected to the HP 2334A, use the LDEV of the IOPAD0 device. For a printer connected to the HP 2334A, use the LDEV of the IOPAD1 device.

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 255 (MPE IV)

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 999 (MPE V/E)

This message appears when a line identifier that is not in the range of 1 to 255 (for MPE IV) or 1 to 999 (for MPE V/E) has been specified. You will be prompted again for a Logical Device number (Step 1.2).

### 1.3 LINE TYPE (X25 OR X21)?

Press **RETURN** for the default value, X.25. X.21 is not available unless you are running DS as well. Skip to Step 1.3.1.

INPUT MUST BE X25 OR X21

This message appears when the response was not one of the above. You will be prompted again for the Line Type (Step 1.3).

**STEP NO.      DIALOGUE****1. 3. 1      REMOTE X25 PDN ADDRESS?**

Enter one of the following replies:

**(RETURN)** = The default network address, NULL, will be used. Skip to Step 1. 4.

**An X. 25 PDN Network Address =** This will be assigned by the relevant PDN across which you will be talking to the remote node. It should be a numeric address up to 15 digits in length, and it is the actual PDN address of the remote node. If you are using DATEX-P, TELEPAC, or TRANSPAC, telephone numbers that from a different country than the network's country of origin will begin with a 0. Skip to Step 1. 4.

**X25 ADDRESS SHOULD BE UP TO 15 DECIMAL DIGITS**

This message appears if the specified address is greater than 15 decimal digits or if a non-numeric network address was entered. You will be prompted again for the X. 25 PDN address (Step 1. 3. 1).

# ADD

## STEP NO. DIALOGUE

1.4 CONTINUE ADDING (YES OR NO)?

YES = This will take you back to the ADD prompt (Step 0).

NO or any input except YES = This will take you out of the ADD command and prompt for another first-level command.

### ADDITION COMPLETE

This message appears when the Remote Node characteristics have been added to the Remote Node (RN) table.

### DUPLICATE ENTRY - NEW ENTRY NOT ADDED

This message appears when there was already an entry in the Remote Node table with these relationships.

### DATA BASE IS FULL - NEW ENTRY NOT ADDED

This message appears when the data base is full. To correct this situation, exit from NETCONF and enlarge the size of the IMAGE data base. Refer to the *IMAGE/3000 Reference Manual*.

## Adding to the LC Table

The following prompts cover the general line characteristics.

### STEP NO.      DIALOGUE

#### 2.0            LOGICAL DEVICE NUMBER?

Enter a Line Identifier (logical device number). This can be a numeric value between 1 and 255 for MPE IV, or between 1 and 999 for MPE V/E, and it must refer to the logical device number of the DS/X.25 line supervisor (IODSX).

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 255 (MPE IV)

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 999 (MPE V/E)

This message appears if a line identifier not in the range 1 to 255 (for MPE IV) or 1 to 999 (for MPE V/E) has been specified. You will be prompted again for a Logical Device number (Step 2.0).

DUPLICATE ENTRY - NEW ENTRY NOT ADDED

This message appears if there was already an entry in the LC table with the same Logical Device number.

#### 2.1            LINE TYPE ( X25 OR X21 )?

This question does not apply to this product. Press **RETURN** for the default, X.25.

INPUT MUST BE X25 OR X21

This message appears if the response was not one of the above. You will be prompted again for a Logical Device number (Step 2.1).

# ADD

## STEP NO. DIALOGUE

### 2.1.1 CONNECTION DIRECT OR VIA PDN?

This prompt is issued only if the connection protocol is X.25.

DIRECT = The line connection will be via a point-to-point or full duplex link. Skip to Step 2.1.1.1.

PDN = The line connection will be via Public Data Network. Skip to Step 2.1.1.2.

#### INPUT MUST BE DIRECT OR PDN

This message appears if the response was not one of the above. You will be prompted again for the connection type (Step 2.1.1).

**STEP NO.      DIALOGUE****2. 1. 1. 1      MASTER (DCE) OR SLAVE (DTE) MODE?**

This prompt is issued only if the connection protocol is X. 25 and line connection is DIRECT. Enter one of the following responses:

DTE = The node is set up to act as a DTE, and a local address of 8 is assigned. Note that one end of the connection must be set up as the DTE, while on the destination node it must be set up as a DCE. Skip to Step 2. 2.

DCE = The node is set up to act as a DCE, and a local address of 9 is assigned. Skip to Step 2. 2.

INPUT MUST BE DCE OR DTE

This message appears if the response was not one of the above. You will be prompted again for the DTE or DCE mode (Step 2. 1. 1. 1).

**2. 1. 1. 2      LOCAL X25 PDN ADDRESS?**

This prompt is issued only if the connection protocol is X. 25 and line connection is via PDN. Enter one of the following responses:

RETURN = The default local address of all zeroes is used.

Local X25 PDN address = This is the actual local address (from address) assigned by the PDN at subscription time. It should be a numeric address up to 15 digits in length.

X25 ADDRESS SHOULD BE UP TO 15 DECIMAL DIGITS

This message appears if the specified address is greater than 15 decimal digits or if a non-numeric network address has been specified. You will be prompted again for the local X. 25 PDN address (Step 2. 1. 1. 2).

# ADD

## STEP NO. DIALOGUE

### 2.1.3 NAME OF PDN?

This prompt is issued only if the connection protocol is X.25 and the line connection is via PDN. Enter one of the following responses:

Name of PDN = The PDN name. It must be no longer than eight alphanumeric characters. If you are using one of the following networks, it must be spelled exactly as shown:

TELENET	TYMNET
TRANSPAC	EURONET
DATAPAC	DDX-1
DATEX-P	DATANET
PSS	CTNE
NORDIC	DATEX-L

**(RETURN)** = The default PDN name of all blanks is used. If you are using TRANSPAC, you must respond with **(RETURN)**.

PDN NAME SHOULD BE UP TO 8 ALPHANUMERIC CHARACTERS

This message appears if the PDN name is greater than eight alphanumeric characters. You will be prompted again for a PDN name (Step 2.1.3).

### 2.2 PRIMARY REMOTE NODE TO BE CONNECTED TO ON THIS LINE?

If you are using DSN/X.25 only, this question does not apply, so use the null default by pressing **(RETURN)**. If you are using DS and X.25, see the *DSN/DS 3000 Network Administrator's Reference Manual*.

NODE NAME SHOULD BE UP TO 8 ALPHANUMERIC CHARACTERS

This message appears if the node name is greater than eight alphanumeric characters or if the first character was numeric. You will be prompted again for Primary Node name (Step 2.2).

The following prompts, covering low-level (Level 2) characteristics, are issued only if the connection protocol is X.25.

**NOTE**

For direct connect X.25 lines, all Level 2 parameters must be configured exactly the same as the corresponding Level 2 parameters on the remote system. For PDN X.25 lines, all Level 2 parameters must be agreed upon with the PDN.

**STEP NO.      DIALOGUE****2.3              RESPONSE TIMER (MILLISECONDS) ?**

Enter one of the following replies:

**(RETURN)** = The default value of 200 is used.

**Response Timer** = This value must be an integer in the range of 1 to 9999. It is defined as T1 in the X.25 standard and it specifies the period of time the HP 3000 will wait before retransmission of a frame can be initiated. (In the case of a PDN connection, this is usually dictated by that PDN.)

**NOTE**

For most HP 3000 installations, a value of 3000 is recommended.

RESPONSE TIMER SHOULD BE IN THE RANGE 1 TO 9999

This message appears if your reply was either non-numeric or not in the range of 1 to 9999. You will be prompted again for Response Timer (Step 2.3).



# ADD

## STEP NO. DIALOGUE

2.4 RETRY COUNT (1..255) ?

Enter one of the following replies:

**RETURN** = The default value of 8 is used.

Retry Count = This must be a numeric value in the range of 1 to 255. It is defined as N2 in the X.25 standard and it specifies the maximum number of retransmissions of frames that will be attempted following the expiration of the response timer. (In the case of a PDN connection, this is usually dictated by that PDN.)

RETRY COUNT SHOULD BE IN THE RANGE 1 TO 255

This message appears if your response was either non-numeric or not in the range of 1 to 255. You will be prompted again for Retry Count (Step 2.4).

**STEP NO.      DIALOGUE**

**2.5              WINDOW SIZE (FRAMES) ?**

Enter one of the following replies:

**RETURN** = The default value of 2 is used.

Window size = Window size specifies the maximum number of sequentially numbered I-frames that a DTE/DCE may have outstanding (unacknowledged) at any given time. The minimum value of this parameter is 1, and the maximum value is 7. (In the case of a PDN connection, this is usually dictated by that PDN.)

**NOTE**

For optimum performance, the Level 2 window size should be 7.

WINDOW SIZE SHOULD BE IN THE RANGE 1 TO 7

This message appears if your response was either non-numeric or not in the range 1 to 7. You will be prompted again for Packet Size (Step 2.5).

# ADD

The following prompts cover the upper-level (Level 3) characteristics.

<b>NOTE</b>
-------------

For direct connect X. 25 lines, all Level 3 parameters must be configured exactly the same as the corresponding Level 3 parameters on the remote system. For PDN X. 25 lines, all Level 3 parameters must be agreed upon with the PDN.

STEP NO.	DIALOGUE
----------	----------

2.6	<b>LOW VC NUMBER (0..4095) ?</b>
-----	----------------------------------

Enter one of the following replies:

**RETURN** = The default value of 0 is assigned as the low virtual circuit number.

Virtual Circuit Number = This must be an integer in the range of 0 to 4095. It represents the low end of the virtual circuit identification numbers. (In the case of a PDN connection, this is usually dictated by that PDN.)

<b>NOTE</b>
-------------

All virtual circuits specified here will be used as 2-way switched virtual circuits.

**LOW VC SHOULD BE IN THE RANGE OF 0 TO 4095**

This message appears if your response was not numeric or if it was not in the range of 0 to 4095. You will be prompted again for the Low VC Number (Step 2.6).

**STEP NO.      DIALOGUE****2.7              HIGH VC NUMBER (0..4095) ?**

Enter one of the following replies:

**(RETURN)** = The default value of the Low Virtual Circuit Number + 255 is assigned as the high virtual circuit number.

**Virtual Circuit Number** = This must be an integer in the range of 0 to 4095, and it represents the high end of the virtual circuit identification numbers. It has to be greater than the low virtual circuit number, but no more than 255 above that value. (In the case of a PDN connection, this is usually dictated by that PDN.)

HIGH VC SHOULD BE IN THE RANGE nnnn TO mmmm

This message appears if your response was

- non-numeric,
- not in the range of 0 to 4095,
- less than the low virtual circuit number,
- greater than the low virtual circuit number + 255

You will be prompted again for the high virtual circuit number (Step 2.7).

**NOTE**

All virtual circuit numbers are used as 2-way switched virtual circuits on the HP 3000.

**2.8              PACKET SIZE (32..1024) ?**

Enter one of the following replies:

**(RETURN)** = The default packet size (128 bytes) is used.

**Packet Size** = This must be a numeric value in the range of 32 to 1024. It represents the packet size (in bytes) that will be used across this connection. (In the case of a PDN connection, this is usually dictated by that PDN.)

PACKET SIZE SHOULD BE IN THE RANGE 32 TO 1024

This message appears if your response was either non-numeric or not in the range of 32 to 1024. You will be prompted again for the packet size (Step 2.8).

# ADD

## STEP NO. DIALOGUE

### 2.9 MODULO COUNT (8 OR 128) ?

Enter one of the following replies:

**(RETURN)** = The default of 8 is used.

Modulo Count = This is the counting scheme used for packets across this connection. (In the case of a PDN connection, this is usually dictated by that PDN.)

#### NOTE

The modulo count has no major effect on performance.

### 2.10 WINDOW SIZE (PACKETS) ?

Enter one of the following replies:

**(RETURN)** = The default value of 2 is used.

Window Size = This must be a numeric value in the range of 1 to 7 (for a modulo count of 8) or in the range of 1 to 15 (for a modulo count of 128). It represents the window size (in packets) that will be used across this connection. (In the case of a PDN connection, this is usually dictated by that PDN.)

#### NOTE

For optimum performance, the Level 3 window size should be 7 if a modulo count of 8 is being used at Level 3. For a modulo count of 128, any window size greater than 7 has approximately the same performance.

WINDOW SIZE SHOULD BE IN THE RANGE 1 TO 7

This message appears if your response was either non-numeric or not in the range of 1 to 7 when a modulo count of 8 is being used.

WINDOW SIZE SHOULD BE IN THE RANGE 1 TO 15

This message appears if your response was either non-numeric or not in the range of 1 to 15 when a modulo count of 128 is being used. After receiving either of these messages, you will be prompted again for the window size (Step 2.10).

**STEP NO.      DIALOGUE**

2.11      **CONTINUE ADDING (YES OR NO)?**

YES    = This will take you back to the ADD prompt (Step 0).

NO or any input except YES = This will take you out of the ADD command and prompt for another first-level command.

**ADDITION COMPLETE**

This message appears when the line characteristics have been added to the Line Characteristics (LC) table.

**DATA BASE IS FULL - NEW ENTRY NOT ADDED**

This message appears when the data base is full. To correct this situation, exit from NETCONF and enlarge the size of the IMAGE data base. Refer to the *IMAGE/3000 Reference Manual*.

# CHECK

## THE C[HECK] COMMAND

This command is used to check the relationships, and report any discrepancies, between the RN and LC tables. Three basic checks are performed; and since they are always done, there is no dialogue following the command.

The first check scans the Remote Node table. For every Line Identifier (LDEV number) that is used with System Type of HP3000 or HP1000, it checks that there is a corresponding entry in the LC table. No check is done for RN type HP2334. If there is no such entry, the following warning is printed:

```
LDEV nnn is not entered in the LC table
```

The second check scans the LC table. For each entry, it checks that the primary node name specified for a logical device has a corresponding entry in the Remote Node table. If there is no such entry, the following warning is printed:

```
aaaaaaaa ( using LDEV nnn ) is not entered in the RN table
```

For systems with only DSN/X.25 configured, an RN entry is not needed, so this message can be ignored. If you wish to eliminate this error message, define a dummy remote node with a null address (see page 5-37).

The third check also scans the LC table. For each entry, it checks that all RN entries with the same LDEV have the same line type as the LC entry. For each entry in the RN table where the line types do not match, the following warning is printed:

```
aaaaaaaa (LDEV nnn) line type differs from LC line type
```

## THE D[DELETE] COMMAND

This command is used to remove data entries from the RN table or the LC table. Note that only the creator of the data base can delete entries. After specifying the DELETE command, the dialogue proceeds as follows:

STEP NO.	DIALOGUE
----------	----------

0	REMOTE NODE (RN) OR LINE CHARACTERISTICS (LC) TABLE?
---	--

Enter one of the following replies:

RN = When this is specified, you will be deleting an entry from the Remote Node table, and the dialogue proceeds from there. Skip to Step 1. 0.

LC = When this is specified, you will be deleting an entry from the Line Characteristics table, and the dialogue proceeds from there. Skip to Step 2. 0.

RETURN = When you reply with RETURN, you will receive the following prompt:

CONTINUE DELETING (YES OR NO)?

YES = This response takes you back to the DELETE prompt (Step 0).

NO = This response takes you out of the DELETE command and prompts for another first-level command.

INPUT MUST BE RN OR LC

If this message appears, the response was not one of the above. You will be prompted again with the DELETE prompt (Step 0).



# DELETE

## Deleting from the RN Table

The following prompts cover the remote node characteristics.

### STEP NO.      DIALOGUE

#### 1.0            REMOTE NODE NAME?

Enter a remote node name. This name can be up to eight alphanumeric characters (the first being an alphabetic character).

#### NODE NAME SHOULD BE UP TO 8 ALPHANUMERIC CHARACTERS

This message appears when the node name is greater than eight alphanumeric characters or when the first character is numeric. You will be prompted again for a logical node name (Step 1.0).

#### NO SUCH ENTRY IN THE RN TABLE

This message appears if a legal remote node name has been specified, but there is no entry in the RN table for it. You will be prompted for another first-level command.

If a valid remote node name has been specified, you are about to delete an entry or entries from the RN table. NETCONF also prompts to enable you to delete a corresponding entry from the LC table. Since there can be multiple entries in the RN table for the name you have specified, NETCONF repeats the following sequence of prompts until all entries have been covered, whereupon you will be prompted for a first-level command.

**STEP NO.      DIALOGUE**

RN TABLE ENTRY WITH NODE NAME = xxxxxxxx USING LDEV = nnn

**CONFIRM DELETION (YES OR NO) ?**

Enter one of the following replies:

NO or any input except YES (including **RETURN**) = This reply results in the message:

ENTRY NOT DELETED

The delete is not confirmed, and processing proceeds. If there are further entries in the RN table satisfying the Remote Node Name specified, this step will be repeated; otherwise, you will be prompted for a first-level command.

YES = This reply results in the message:

ENTRY HAS BEEN DELETED

The entry has been deleted from the RN table, and processing proceeds. If there is an LC entry corresponding to this entry (having the same logical device number), processing proceeds to the next step; if there is not a corresponding LC entry and there are further entries in the RN table satisfying the remote node name specified, this step will be repeated. Otherwise, you will be prompted for a first-level command.

# DELETE

## STEP NO. DIALOGUE

ASSOCIATED LC TABLE ENTRY WITH LDEV = nnn

**CONFIRM DELETION (YES OR NO) ?**

Enter one of the following replies:

NO or any input except YES (including RETURN) = The delete will not be confirmed, and processing proceeds. If there are further entries in the RN table satisfying the logical node name specified, the previous prompt is repeated; if there are not, you will be prompted for a first-level command.

YES = The entry is deleted from the LC table, and processing proceeds. If there are further entries in the RN table satisfying the logical node name specified, the previous prompt is repeated; if there are not, you will be prompted for a first-level command.

## Deleting from the LC Table

STEP NO.     DIALOGUE

2.0           **LOGICAL DEVICE NUMBER?**

Enter a line identifier (logical device number). This can be a numeric value between 1 and 255 for MPE IV, or between 1 and 999 for MPE V/E, and it must refer to the logical device number of the DS/X.25 line supervisor (IODSX).

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 255 (MPE IV)

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 999 (MPE V/E)

This message appears if a line identifier not in the range 1 to 255 (for MPE IV) or 1 to 999 (for MPE V/E) has been specified. You will be prompted again for a logical device number (Step 2.0).

NO SUCH ENTRY IN THE LC TABLE

This message appears if a legal line identifier was specified, but there is no entry in the LC table for it. You will be prompted for another first-level command.

A valid logical device number has been specified, and you are about to delete an entry from the LC table. NETCONF also prompts to enable you to delete a corresponding entry or entries from the RN table.

STEP NO.     DIALOGUE

LC TABLE ENTRY WITH LOGICAL DEVICE NUMBER = nnn

**CONFIRM DELETION (YES OR NO) ?**

Enter one of the following replies:

NO or any input except YES (including RETURN) = The delete will not be confirmed, and processing proceeds. You will be prompted for a first-level command.

YES = The entry is deleted from the LC table, and processing proceeds. If there is an entry (or entries) in the RN table corresponding to this line identifier, processing proceeds to the next step; if not, you will be prompted for a first-level command.

# DELETE

## STEP NO.      DIALOGUE

ASSOCIATE RN TABLE ENTRIES USING LDEV = nnn

**CONFIRM DELETION (YES OR NO) ?**

Enter one of the following replies:

NO or any input except YES (including RETURN) = The delete is not confirmed, and you will be prompted for a first-level command.

YES = All entries in the RN table that use this line identifier (LDEV) are deleted, and you will be prompted for a first-level command.

## THE E[XIT] COMMAND

This command is used to terminate the execution of the Network Configurator. Prior to termination, a call is automatically made to the CHECK command, and any discrepancies in the relationship between the RN and LC tables are printed. (If you are configuring DSN/X.25 only, you need not make an RN table entry, and the warning message may be ignored. If this warning message is undesirable, you can configure a dummy node with a null address. See page 5-37.)

If there are no discrepancies, NETCONF terminates. If there are discrepancies, processing proceeds as follows:

STEP NO.	DIALOGUE
----------	----------

	<b>IS IT OK TO EXIT ?</b>
--	---------------------------

Enter one of the following replies:

NO or any input except YES (including **RETURN**) = You will be prompted for a first-level command.

YES = NETCONF terminates execution.

# HELP

## THE H[ELP] COMMAND

This command provides a basic description of each of the commands in the Network Configuration Utility (NETCONF) command set. Since the commands are only being described, there is no follow-up dialogue in the HELP command. Only a very basic description of functionality is provided by the HELP command; so when more detail is required, refer to the descriptions presented in this manual.

## THE L[IST] COMMAND

This command provides a display on your terminal screen of the current content of the network configuration data base. The data is arranged in the Remote Node (RN) and Line Characteristics (LC) tables, under the following headings:

Remote Node Table				
Node Name	System Type	Ldev No	Line Type	Remote PDN Address/Phone Number

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node

Line Characteristics Table (X25)									
Ldev No	Local X25 Address	Level 2			Level 3				
		T1 Timer	Retry Count	Win-dow	Low VC	High VC	Packet Size	Win-dow	Mod Cnt



# LIST

<b>NOTE</b>
-------------

The Line Characteristics Table (X. 25) will not be printed unless there are entries in the LC table that have the X. 25 line type. If there are any X. 25-related entries in the general LC table, then the LC (X. 25) table will contain entries only for those X. 25-related LDEVs.

Since all of the information is automatically provided upon specifying the LIST command, there is no following dialogue.

## **THE P[PRINT] COMMAND**

The PRINT command lists the current contents of the Remote Node (RN) and Line Characteristics (LC) tables to a line printer and validates the node name and logical device relationship between the two tables. It executes the LIST and CHECK commands, with the output device being a line printer rather than \$STDLIST. The formal designator is NETLIST and the default device name is LP. FILE equations are permitted, which enables you to specify a file or device to which the data base contents are to be printed.

If you configure only DSN/X.25, you need not configure an RN, which will result in a warning message. This message can be ignored. If you wish to eliminate it, configure a dummy node with a null address (see page 5-37).

# UPDATE

## THE U[PDATE] COMMAND

This command is used to update entries in the Remote Node (RN) or Line Characteristics (LC) table which already exist. Note that only the creator of the data base can update the data base. After specifying the UPDATE command, the dialogue proceeds as follows:

### STEP NO.      DIALOGUE

0                REMOTE NODE (RN) OR LINE CHARACTERISTICS (LC) TABLE?

Enter one of the following replies:

RN    = When this is specified, you will be modifying an entry in the Remote Node table, and the dialogue proceeds from there. Skip to Step 1. 0.

LC    = When this is specified, you will be modifying an entry in the Line Characteristics table, and the dialogue proceeds from there. Skip to Step 2. 0.

RETURN = When you reply with RETURN, you will receive the following prompt:

CONTINUE UPDATING (YES OR NO)?

YES    = This response takes you back to the UPDATE prompt (Step 0).

NO     = This response takes you out of the UPDATE command and prompts for another first-level command.

INPUT MUST BE RN OR LC

If this message appears, the response was not one of the above. You will be prompted again with the UPDATE prompt (Step 0).

## Updating the RN Table

The following prompts cover the remote node characteristics.

STEP NO.	DIALOGUE
----------	----------

1.0	<b>REMOTE NODE NAME?</b>
-----	--------------------------

Enter a remote node name. This name can be up to eight alphanumeric characters (the first being an alphabetic character).

**NODE NAME SHOULD BE UP TO 8 ALPHANUMERIC CHARACTERS**

This message appears when the node name is greater than eight alphanumeric characters or when the first character is numeric. You will be prompted again for a remote node name (Step 1.0).

**NO SUCH ENTRY IN THE RN TABLE**

This message appears if a legal remote node name was specified, but there is no entry in the RN table for it. You will be prompted for another first-level command.

Prior to issuing any prompts, NETCONF first prints all entries in the RN table that qualify with the remote node name specified. Since there can be multiple entries in the RN table for the remote node name that you have specified, you will be prompted for the logical device number associated with the remote node name.

# UPDATE

## STEP NO.      DIALOGUE

### 1.2            LOGICAL DEVICE NUMBER ?

Enter one of the following replies:

**RETURN** = You will be prompted again for an LDEV.

A Logical Device Number = This must be the LDEV that specifies which of the entries in the RN table for a particular remote node name you wish to update.

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 255 (MPE IV)

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 999 (MPE V/E)

This message appears when a non-numeric LDEV or an LDEV that is not in the range of 1 to 255 for MPE IV, or 1 to 999 for MPE V/E, has been specified. You will be prompted again for a logical device number (Step 1.2).

NO SUCH ENTRY IN THE RN TABLE

This message appears if a valid LDEV was specified, but none of the qualifying RN entries uses this line identification. You will be prompted for a first-level command.

All other prompts, responses, and error messages are the same as for the ADD command. For each variable in the entry, the current value is printed, followed by a prompt for a new value. A **RETURN** maintains the current value.

## Updating the LC Table

STEP NO.      DIALOGUE

2.0            LOGICAL DEVICE NUMBER?

Enter a line identifier (logical device number). This can be a numeric value between 1 and 255 for MPE IV, or 1 and 999 for MPE V/E, and it must refer to the logical device number of the DS/X.25 line supervisor (IODSX).

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 255 (MPE IV)

LOGICAL DEVICE SHOULD BE IN THE RANGE OF 1 TO 999 (MPE V/E)

This message appears if a line identifier not in the range of 1 to 255 for MPE IV, or 1 to 999 for MPE V/E, has been specified. You will be prompted again for a logical device number (Step 2.0).

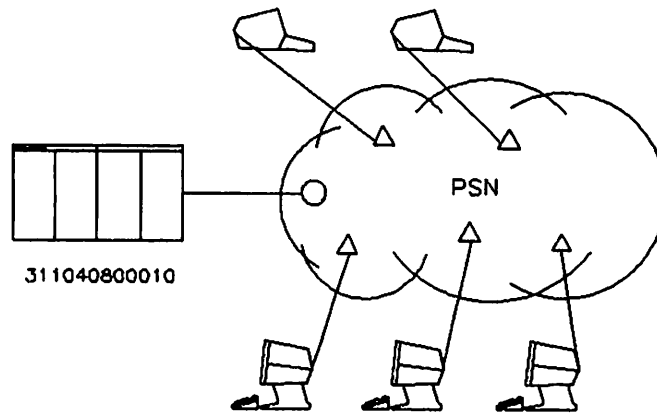
NO SUCH ENTRY IN LC TABLE

This message appears if a legal line identifier was specified, but there is no entry in the LC table for it. You will be prompted for another first-level command.

This procedure follows that of adding to the LC table. For each variable in the entry, the current value is printed, followed by a prompt for a new value. A RETURN maintains the current value. All other prompts, responses, and error messages are the same as for the ADD command.

## CONFIGURATION EXAMPLES

### X.25 Only



KEY:

- IS A NETWORK SWITCHING NODE (DCE)
- △ IS A NETWORK-SUPPLIED PAD

### I/O CONFIGURATION.

You need to configure an INP, the X.25 device (IODSX), and one PAD terminal driver (IOPAD0) for each user who will log on from a remote terminal at the same time. For example, if there are 10 remote terminals but only 5 will be logged on at any point in time, then you need to configure only 5 IOPAD0 devices. The following sample I/O configuration assumes that all remote terminal users may need to log on at the same time.

LOG DEV #	DRT #	U N	C H	T Y	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	1			0	0		IOINP0	CSINP
60	#16	0	0	41	0			128	0		IODSX	
61	#16	0	0	16	0	??	??	40	61	J ID	IOPAD0	PADTERM
62	#16	0	0	16	0	??	??	40	62	J ID	IOPAD0	PADTERM
63	#16	0	0	16	0	??	??	40	63	J ID	IOPAD0	PADTERM
64	#16	0	0	16	0	??	??	40	64	J ID	IOPAD0	PADTERM
65	#16	0	0	16	0	??	??	40	65	J ID	IOPAD0	PADTERM

```

LDN PM PRT LCL TC  RCV  LCL  CON  MODE  TRANSMIT  TM  BUFFER D DRIVER
      MOD   TMOUT TMOUT TMOUT  SPEED      SIZE  C  OPTIONS
16  0  X   X  X  20   60   900    C 1200    0 1024  N  0
  
```

The TRANSMIT SPEED should match the speed of the link to the PDN.

**NETWORK DATABASE CONFIGURATION.**

You need to define the X.25 line parameters in the line characteristics table, but no entry is required in the remote node table. However if an LDEV is defined in the Line Characteristics Table and there is no corresponding entry in the remote node table, NETCONF will display a warning message when exiting because of this unsatisfied relationship but will make no attempt to insist on its being satisfied. If this warning message is undesirable you may define a dummy remote node with a null address.

Network Configuration Utility - Wed, Nov 1, 1972, 11:27 PM  
 Version: A.05.07000 (C) Hewlett-Packard Co. 1981

Remote Node Table				
Node Name	System Type	Ldev No	Line Type	Remote PDN Address/Phone Number
NULL*	HP3000	60	X25	

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node
60	X25	PDNNAME	DTE	



## X.25 Network Configurator

Line Characteristics Table (X25)									
Ldev No	Local X25 Address	Level 2			Level 3				
		T1 Timer	Retry Count	Win-dow	Low VC	High VC	Packet Size	Win-dow	Mod Cnt
60	311040800010	3000	20	7	1	20	128	2	8

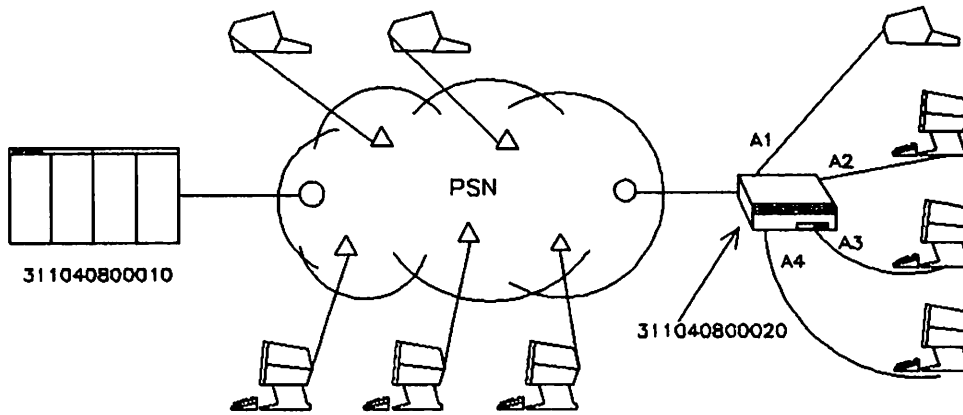
Valid Configuration

**NOTE**

All parameters must be agreeable with the PDN.

\*This entry is optional.

## X.25 and the HP 2334A as a PAD



NOTE: THE 2334A IS AN HP-SUPPLIED PAD AND CAN SUPPORT A TOTAL OF 16 DEVICES

KEY:

- O IS A NETWORK SWITCHING NODE (DCE)
- Δ IS A NETWORK-SUPPLIED PAD

### I/O CONFIGURATION.

In this example, the HP 2334A is being used as a replacement for the PDN PAD and the terminals will be used as log on devices only. Therefore, in addition to the devices required in the first example, you must configure one IOPAD0 for each terminal connected to the HP 2334A that will log on to the HP 3000 at the same time. The following sample I/O configuration assumes that all remote terminal users may need to log on at the same time.

LOG DEV #	DRT #	U N	C H	T Y	SUB TYPE	TERMINAL TYPE	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	1		0	0		IOINP0	CSINP
60	#16	0	0	41	0		128	0		IODSX	
61	#16	0	0	16	0	?? ??	40	61	J ID	IOPAD0	PADTERM
62	#16	0	0	16	0	?? ??	40	62	J ID	IOPAD0	PADTERM
63	#16	0	0	16	0	?? ??	40	63	J ID	IOPAD0	PADTERM
64	#16	0	0	16	0	?? ??	40	64	J ID	IOPAD0	PADTERM
65	#16	0	0	16	0	?? ??	40	65	J ID	IOPAD0	PADTERM
66	#16	0	0	16	0	?? ??	40	66	J ID	IOPAD0	PADTERM
67	#16	0	0	16	0	?? ??	40	67	J ID	IOPAD0	PADTERM
68	#16	0	0	16	0	?? ??	40	68	J ID	IOPAD0	PADTERM
69	#16	0	0	16	0	?? ??	40	69	J ID	IOPAD0	PADTERM

LDN	PM	PRT	LCL MOD	TC	RCV TMOUT	LCL TMOUT	CON TMOUT	MODE	TRANSMIT SPEED	TM	BUFFER SIZE	D C	DRIVER OPTIONS
16	0	X	X	X	20	60	900		C 1200	0	1024	N	0

## X.25 Network Configurator

The TRANSMIT SPEED should match the speed of the link to the PDN.

### NETWORK DATABASE CONFIGURATION.

Information required for NETCONF is the same as the first example.

Network Configuration Utility - Wed, Nov 1, 1972, 11:27 PM  
Version: A.05.07000 (C) Hewlett-Packard Co. 1981

Remote Node Table				
Node Name	System Type	Ldev No	Line Type	Remote PDN Address/Phone Number
NULL*	HP3000	60	X25	

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node
60	X25	PDNNAME	DTE	NULL

Line Characteristics Table (X25)									
Ldev No	Local X25 Address	Level 2			Level 3				
		T1 Timer	Retry Count	Win- dow	Low VC	High VC	Packet Size	Win- dow	Mod Cnt
60	311040800010	3000	20	7	1	20	128	2	8

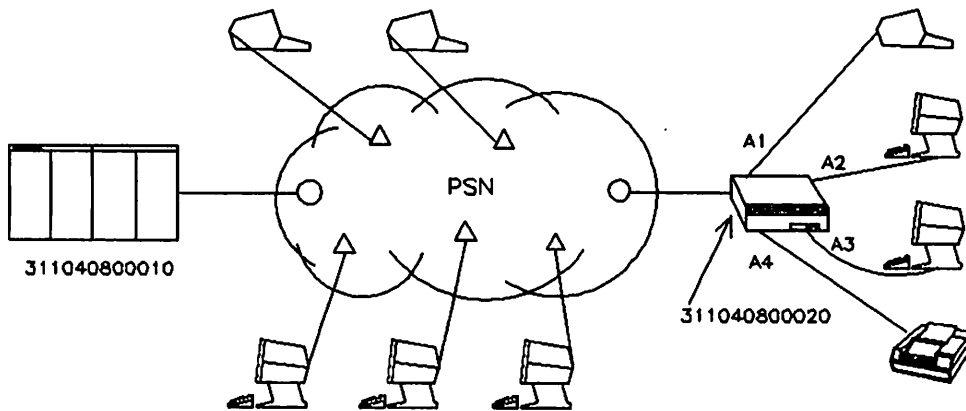
Valid Configuration

**NOTE**

All parameters must be agreeable with the PDN.

\*This entry is optional. See page 5-37 for an explanation.

## X.25 and the HP 2334A for FOPEN Support



NOTE: THE 2334A IS AN HP-SUPPLIED PAD AND CAN SUPPORT A TOTAL OF 16 DEVICES

KEY:

- IS A NETWORK SWITCHING NODE (DCE)
- △ IS A NETWORK-SUPPLIED PAD

### I/O CONFIGURATION.

In this case, an HP 3000 user or application would like to FOPEN specifically any one of the devices connected to the HP 2334A, as well as allow the terminals connected to the HP 2334A to be used as log on devices. In this case, you configure one IOPAD0 driver for each terminal, and one IOPAD1 driver for each printer connected to the HP 2334A. For IOPAD1 devices, REC WIDTH should be the physical carriage width of the remote printer, usually 66 words (i.e. 132 bytes), and OUTPUT DEV should be 0.

Note that spooled operation is not supported for printers connected to the HP 2334A.

Each of the devices connected to the HP 2334A that will be FOPENd should have a unique class name. The PAD driver uses the LDEV number or class name to determine the address for the outgoing call from the NETCON database, therefore node names assigned to HP 2334A devices have no significance. In the following example, the node names assigned to devices connected to the HP 2334A are identical to their class names for ease of documentation.

Incoming calls from PAD terminals are allocated the first IOPAD0 device available in the I/O configuration. Therefore, IOPAD0 devices that may be used for outgoing calls should be configured with higher LDEV numbers than IOPAD0 devices to be used for incoming calls.

LOG DEV #	DRT #	U N I T	C H A P T E R	T Y P E	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	1			0	0		IOINPO	CSINP
60	#16	0	0	41	0			128	0		IODSX	
61	#16	0	0	16	0	??	??	40	61	J ID	IOPADO	PADTERM
62	#16	0	0	16	0	??	??	40	62	J ID	IOPADO	PADTERM
63	#16	0	0	16	0	??	??	40	63	J ID	IOPADO	PADTERM
64	#16	0	0	16	0	??	??	40	64	J ID	IOPADO	PADTERM
65	#16	0	0	16	0	??	??	40	65	J ID	IOPADO	PADTERM
66	#16	0	0	16	0	??	??	40	66	J ID	IOPADO	REMOTEA1
67	#16	0	0	16	0	??	??	40	67	J ID	IOPADO	REMOTEA2
68	#16	0	0	16	0	??	??	40	68	J ID	IOPADO	REMOTEA3
69	#16	0	0	32	2	??	??	66	0		IOPAD1	REMOTEA4

LDN	PM	PRT	LCL MOD	TC	RCV TMOUT	LCL TMOUT	CON TMOUT	MODE	TRANSMIT SPEED	TM	BUFFER SIZE	D C	DRIVER OPTIONS
16	0	X	X	X	20	60	900		C 1200	0	1024	N	0

The TRANSMIT SPEED should match the speed of the link to the PDN.

#### NETWORK DATABASE CONFIGURATION.

In addition to the entries required in the first example, you must have one entry in the remote node table for each device on the HP 2334A that will be FOPENd to identify the remote address to be used for the outgoing call to the HP 2334A. The system type for devices connected to the HP 2334A is HP2334 and the LDEV number for these entries should be the LDEV of the IOPAD0 or IOPAD1 driver, not the IODSX device.

Addresses for ports on the HP 2334A use the optional subaddress field in the PDN addressing recommendation. Therefore, port A1 is subaddress 11, A2 is 12, A3 is 13, A4 is 14, B1 through B4 are 21-24, C1 through C4 are 31-34, and D1 through D4 are 41-44. See the sample NETCONF tables below.

Also, the NETCONF checking function allows the remote node table entries with the HP2334 System Type to have no corresponding Line Characteristics Table entries. Therefore, for node names with the HP2334 type, the warning message about entries in the remote node table with no corresponding Line Characteristics Table entry will be suppressed when using the NETCONF CHECK, PRINT, or EXIT commands.

X.25 Network Configurator

Network Configuration Utility - Wed, Nov 1, 1972, 11:27 PM  
 Version: A.05.07000 (C) Hewlett-Packard Co. 1981

Remote Node Table				
Node Name	System Type	Ldev No	Line Type	Remote PDN Address/Phone Number
NULL*	HP3000	60	X25	
REMOTEA1	HP2334	66	X25	31104080002011
REMOTEA2	HP2334	67	X25	31104080002012
REMOTEA3	HP2334	68	X25	31104080002013
REMOTEA4	HP2334	69	X25	31104080002014

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node
60	X25	PDNNAME	DTE	

Line Characteristics Table (X25)									
Ldev No	Local X25 Address	Level 2			Level 3				
		T1 Timer	Retry Count	Win- dow	Low VC	High VC	Packet Size	Win- dow	Mod Cnt
60	311040800010	3000	20	7	1	20	128	2	8

Valid Configuration

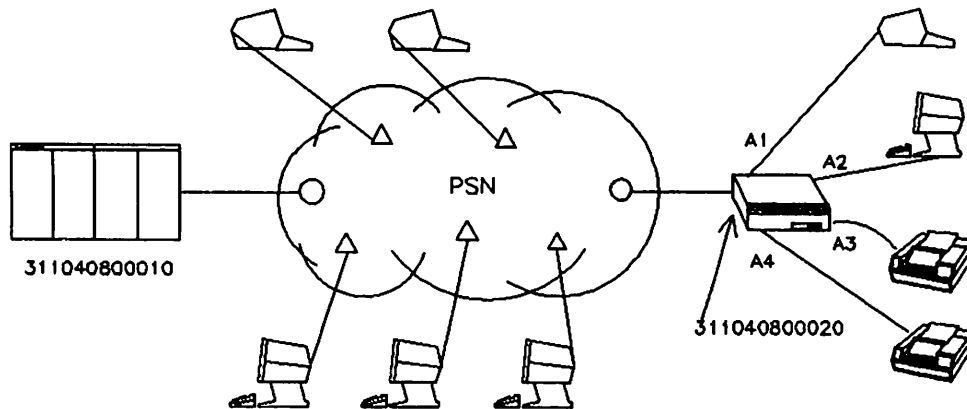
**NOTE**

All parameters must be agreeable with the PDN.

\*This entry is optional. See page 5-37 for an explanation.



## X.25 and the HP 2334A Callable Port Pool



NOTE: THE 2334A IS AN HP-SUPPLIED PAD AND CAN SUPPORT A TOTAL OF 16 DEVICES

KEY:

- IS A NETWORK SWITCHING NODE (DCE)
- △ IS A NETWORK-SUPPLIED PAD

### I/O CONFIGURATION.

In this case, the terminals connected to the HP 2334A will be used as log on devices only, and the printers will be FOPENd by applications on the HP 3000, but the applications don't care which printer is used. At the time you do the offline configuration of the HP 2334A, you specify that the ports connected to the printers are to be members of the "Callable Port Pool". This implies that calls coming into the HP 2334A with no port subaddress, or a subaddress of value 00 will be connected to available ports in the Callable Port Pool.

On the HP 3000, you configure an IOPAD0 device for each terminal connected to the HP 2334A, and an IOPAD1 device for each remote printer connected to the HP 2334A. REC WIDTH for IOPAD1 devices should be the physical carriage width of the remote printer usually 66 words (i.e. 132 bytes), and OUTPUT DEV should be 0.

Note that spooled operation is not supported for printers connected to the HP 2334A.

The printers connected to the HP 2334A do not require a unique class name in this case. The file system will allocate the first available LDEV in the class to the FOPEN, and the LDEV will be used to obtain an address from the Remote Node Table.

LOG DEV #	DRT #	U N I T	C H A P T E R	T Y P E	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	1			0	0		IOINP0	CSINP
60	#16	0	0	41	0			128	0		IODSX	
61	#16	0	0	16	0	??	??	40	61	J ID	IOPADO	PADTERM
62	#16	0	0	16	0	??	??	40	62	J ID	IOPADO	PADTERM
63	#16	0	0	16	0	??	??	40	63	J ID	IOPADO	PADTERM
64	#16	0	0	16	0	??	??	40	64	J ID	IOPADO	PADTERM
65	#16	0	0	16	0	??	??	40	65	J ID	IOPADO	PADTERM
66	#16	0	0	16	0	??	??	40	66	J ID	IOPADO	PADTERM
67	#16	0	0	16	0	??	??	40	67	J ID	IOPADO	PADTERM
68	#16	0	0	32	2	??	??	66	0		IOPAD1	REMOTELP
69	#16	0	0	32	2	??	??	66	0		IOPAD1	REMOTELP

LDN	PM	PRT	LCL MOD	TC	RCV TMOUT	LCL TMOUT	CON TMOUT	MODE	TRANSMIT SPEED	TM	BUFFER SIZE	D C	DRIVER OPTIONS
16	0	X	X	X	20	60	900		C 1200	0	1024	N	0

The TRANSMIT SPEED should match the speed of the link to the PDN.

#### NETWORK DATABASE CONFIGURATION.

In this case, the Remote Node Table entries for the printers connected to the HP 2334A will not specify a port subaddress in the PDN address field. When the HP 2334A receives the call request with no subaddress, the call will be assigned to an available port in the callable port pool (the 2 printers, in this case). If all ports in the port pool are engaged, the call will be cleared, and the application will receive an error message saying the device was not available.

The system type for devices connected to the HP 2334A is HP2334, and the LDEV number for these entries should be the LDEV of the IOPAD1 driver, not the IODSX device. The NETCONF checking function allows the Remote Node Table entries with the HP2334 System Type to have no corresponding Line Characteristics Table entries. Therefore, for node names of type HP2334, the warning message about entries in the Remote Node Table with no corresponding Line Characteristics Table entry will be suppressed when using the NETCONF CHECK, PRINT, or EXIT commands.

X.25 Network Configurator

Network Configuration Utility - Wed, Nov 1, 1972, 11:27 PM  
 Version: A.05.07000 (C) Hewlett-Packard Co. 1981

Remote Node Table				
Node Name	System Type	Ldev No	Line Type	Remote PDN Address/Phone Number
NULL*	HP3000	60	X25	
REMOTEP1	HP2334	68	X25	311040800020
REMOTEP2	HP2334	69	X25	311040800020

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node
60	X25	PDNNAME	DTE	

Line Characteristics Table (X25)									
Ldev No	Local X25 Address	Level 2			Level 3				
		T1 Timer	Retry Count	Win- dow	Low VC	High VC	Packet Size	Win- dow	Mod Cnt
60	311040800010	3000	20	7	1	20	128	2	8

Valid Configuration

<b>NOTE</b>
-------------

All parameters must be agreeable with the PDN.

\*This entry is optional. See page 5-37 for an explanation.



# DSCONTROL CONSOLE COMMAND

SECTION

6

Before establishing a DSN/X.25 communications link, the console operator's :DSCONTROL command must be used to OPEN a line, so that it is available to DSN/X.25 users. The :DSCONTROL command allows you to enable or disable the DSN/X.25 subsystem on a specific communications link.

For easy reference, this command is shown in the following format:

- **SYNTAX**                      Shows the format of the command.
- **PARAMETERS**                Describes the variables in the command.
- **OPERATION**                  Describes the command in detail.
- **EXAMPLES**                   Shows the command in use.

# :DSCONTROL

## SYNTAX

```
:DSCONTROL x25device[:function [:function [:... function]]]
```

where the command syntax has the following meaning:

<i>function</i>	--	OPEN [, <i>open option</i> [,... <i>open option</i> ]]
	--	SHUT
	--	TRACE,ON [ <i>trace options</i> ]
	--	TRACE,OFF
	--	MON [, <i>mon option</i> ]
	--	MOFF
	'	
<i>open option</i>	--	MASTER
	--	SLAVE
	--	[SPEED=] <i>linespeed</i>
<i>trace options</i>	--	[,[ALL]],[, <i>mask</i> ],[, <i>numentries</i> ],[,WRAP],[, <i>filename</i> ]]]]]
<i>mon option</i>	--	DS
	--	CS

## PARAMETERS

<i>x25device</i>	The logical device number or the device class name of the DSN/X.25 communications device. On your system's I/O configuration listing, the device is back referenced by a pound sign (#) to a previously defined INP and the driver name is IODSX.
OPEN	Establishes a communications link with the PDN. Makes the line available for remote communication via the DSN/X.25 Subsystem.
SHUT	Initiates line shutdown. All user virtual circuits are cleared and the line is disconnected.
TRACE,ON	Activates the TRACE facility to provide a record of communications activities. Trace parameters are positional. The line must have already been opened since the last system start, or the OPEN keyword must also be included (to open the line).

TRACE,OFF

Deactivates the TRACE facility, so that no records are kept of DSN/X.25 actions, states, and events. Also closes the trace file. The trace file must be closed before any dump formatting can be done.

MON [ ,DS ]  
          [ ,CS ]

Activates internal communication monitoring activity to give additional information on a subsequent memory dump of the system. The line must be open for the use of MON.

MON           Requests monitoring of all levels of activity.

MON,DS       Requests monitoring at the DSN/X.25 level of internal software operation.

MON,CS       Requests monitoring at the Communication System level of internal software operation.

Default: No monitoring.

Used only for system troubleshooting.

MOFF

Deactivates internal DSN/X.25 monitor records. Line must be open for the use of MOFF.

MASTER

Limits DSN/X.25 line activity to outgoing requests only. No incoming PAD sessions are allowed.

SLAVE

Limits DSN/X.25 line activity to incoming PAD sessions only; no outgoing requests are allowed.

Default: Both MASTER and SLAVE processing are allowed.



# :DSCONTROL

## *linespeed*

Transmission rate in characters per second (Bit Rate/8). This parameter is effective only if your system generation for the line selected SPEED CHANGEABLE. Specify *linespeed* if yours is a European installation with modems running at half speed, or if the line is hardwired and you want to override the configured default.

The SPEED= keyword in the OPEN option may be omitted from a :DSCONTROL command. For example, the following two commands have exactly the same effect:

```
:DSCONTROL 60;OPEN,MASTER,SPEED=25000
```

```
:DSCONTROL 60;OPEN,MASTER,25000
```

Remember, both ends of the line must operate at the same speed.

Default: System configuration values.

## ALL

Generates trace records for all line activity.

Default: Records are written only for transmission errors.

## *mask*

An octal number preceded by a percent sign (%nn). Used to select type of trace entries generated. Refer to page B-1 for an explanation of the mask bits.

Default: %37 (all except PSTN).

## *numentries*

Decimal integer for the maximum number of entries in a trace record, not greater than 24 for the INP. The requested value of *numentries* must be a multiple of 8.

Default: 24.

### NOTE

When using DSN/X.25, there is not enough space left on the INP to trace using the default number of entries, 24. The user must specify *numentries* = 16.

## WRAP

Trace entries that overflow the trace record overlay the prior trace record entries.

Default: Overflow entries are discarded.

*filename*

A name for the trace file.

Default: DSTRCxxx.PUB.SYS (where xxx is the LDEV of the X25 device).

## OPERATION

Unless :DSCONTROL is issued from the master console, this command requires the user to have CS capability. In addition, all users except the console operator are granted access to :DSCONTROL only if they are ALLOWed to use the command and are ASSOCIATED with the specified X.25 device.

If an X.25 device class includes more than one X.25 device, the functions specified in the :DSCONTROL command apply to all devices in that class. If you have not been ALLOWed to use this command, you can only control those devices in the device class with which you have been ASSOCIATED (if any).

Only one DSN/X.25 communications device can be active (OPEN) on an INP at any given time. Once opened (with the :DSCONTROL command), a communications link can be shared by multiple DSN/X.25 users. It cannot, however, be shared by users of other communications subsystems supported by your system (for example, DSN/MRJE). Thus, you must SHUT the DSN/X.25 communications device before the controller can be opened for use by another subsystem.

Before issuing a :DSCONTROL command, use the :SHOWDEV command to check whether a communications link is already established. The LDEV for the INP port will be UNAVAILable if the communications link is in use by any subsystem; the LDEV for the DSN/X.25 communication driver, IODSX, will be AVAILable if it is currently OPEN for use by DSN/X.25 users.

If you include more than one function in a :DSCONTROL command, each function (with its subparameter list) must be separated by a semicolon. A function that duplicates or conflicts with a previous function overrides that function. Functions can appear in any order but are executed in the following order:

1. OPEN/SHUT
2. TRACE
3. MON/MOFF
4. COMP/NOCOMP

The default name of the trace file is:

DSTRCxxx.PUB.SYS

where xxx is the logical device number of the X25 device.

# **:DSCONTROL**

## **EXAMPLES**

To open X.25 line number 55, thereby making it available for use by the DSN/X.25 subsystem, enter:

```
:DSCONTROL 55;OPEN
```

To permit the local HP 3000 to process only master (outgoing) requests on X.25 line number 55, enter:

```
:DSCONTROL 55;OPEN,MASTER
```

To activate the CS Trace facility for X.25 line 55 (the line is already open), enter:

```
:DSCONTROL 55;TRACE,ON,ALL,,16
```

To open the line named REMSYS and provide internal monitoring, enter:

```
:DSCONTROL REMSYS;OPEN;MON
```

To shut line 55, enter:

```
:DSCONTROL 55;SHUT
```

## SOFTWARE VERSION REPORT

The DSLIST program provides a list of the software module version numbers for the DSN/X.25 modules and CS modules installed on your system. A list of DSN/DS module version numbers will also be provided, if it is installed on the system. This list must be available for all troubleshooting activities, and it must accompany each Service Request (SR) that you submit to your HP Systems Engineer (SE).

In order to obtain the list, you must have READ access to the DSN/X.25 program files in PUB.SYS. The command syntax is:

```
:RUN DSLIST.PUB.SYS
```

If you are using MPE IV, all your version numbers will begin with A, and cannot be earlier than A.06.00. If you are using MPE V/E, all your version numbers will begin with B, and cannot be earlier than B.01.00.

### Version Report Example

**DSN/X.25 WITH DSN/DS 3000.**

```
:RUN DSLIST.PUB.SYS
```

```
HEWLETT PACKARD 30131B.01.00 DSLIST/3000 WED, APR 7,1982, 1:18 PM
```

DSN/DS HP32189A:

MODULE	VERSION
SL DSSEGS	v.uu.ff, INTERNAL FIX xxx
SL DSRTECALL	v.uu.ff, INTERNAL FIX xxx
DSMON	v.uu.ff, INTERNAL FIX xxx
DSTEST	v.uu.ff, INTERNAL FIX xxx
DS2026	v.uu.ff, INTERNAL FIX xxx
DS2026CN	v.uu.ff, INTERNAL FIX xxx
DSCOPY	v.uu.ff, INTERNAL FIX xxx
IODSO	v.uu.ff, INTERNAL FIX xxx
IODSTRM0	v.uu.ff, INTERNAL FIX xxx
IODSTRMX	v.uu.ff, INTERNAL FIX xxx

DSN/X.25 HP32191A:

MODULE	VERSION
DSMONX	v.uu.ff, INTERNAL FIX xxx
IODSX	v.uu.ff, INTERNAL FIX xxx
IOPADO	v.uu.ff, INTERNAL FIX xxx

CS SUBSYSTEM HP30131A:

MODULE	VERSION
SL COMSYS	v.uu.ff, INTERNAL FIX xxx
SL DSIOM	v.uu.ff, INTERNAL FIX xxx

DSLISL and System Verification

DSDUMP v.uu.ff, INTERNAL FIX xxx  
NETCONF v.uu.ff, INTERNAL FIX xxx

END OF PROGRAM  
:

DSN/X.25 WITHOUT DSN/DS 3000.

:RUN DSLISL.PUB.SYS  
HEWLETT PACKARD 30131B.01.00 DSLISL/3000 WED, APR 7, 1982, 1:18 PM

DSN/DS HP32189A:  
MODULE VERSION  
\*\*\* NOT INSTALLED \*\*\*

DSN/X.25 HP32191A:  
MODULE VERSION  
DSMONX v.uu.ff, INTERNAL FIX xxx  
IODSX v.uu.ff, INTERNAL FIX xxx  
IOPADO v.uu.ff, INTERNAL FIX xxx

CS SUBSYSTEM HP30131 :  
MODULE VERSION  
SL COMSYS v.uu.ff, INTERNAL FIX xxx  
SL DSIOM v.uu.ff, INTERNAL FIX xxx  
DSLISL v.uu.ff, INTERNAL FIX xxx  
DSDUMP v.uu.ff, INTERNAL FIX xxx  
NETCONF v.uu.ff, INTERNAL FIX xxx

END OF PROGRAM  
:

# COMPARISON TO CCITT X.25

SECTION

8

The HP 3000 implementation of X.25 level 3 follows closely the CCITT 1980 X.25 recommendation. Specific choices however have been made about particular features and facilities.

We shall indicate here all the modifications or choices we have made in our implementation. Only chapters describing the X.25 level 3 will be considered.

Preliminary notes:

WE in this appendix refers to the HP X.25/3000 subsystem.

- We do not support DATAGRAMS.
- We do not support PERMANENT virtual circuits.
- We may act as DCE (when connected to a private network) and as DTE (when connected to a public or a private network).

## NOTE

CHAPTER and PARAGRAPH numbers indicated are those of the CCITT 1980 X.25 recommendation. Paragraphs not listed here are implemented without any change.

## Chapter 3

### THE PACKET LEVEL DTE/DCE INTERFACE.

## NOTE

We require the data fields of packets to contain an integral number of octets.

#### 3.1 Logical Channels.

We refer to logical channels as virtual circuits. A virtual circuit number in our terminology is really the concatenation of the Logical Channel Group Number (most significant) and the Logical Channel number (least significant). We thus support VC numbers from 0 to 4095. However only 255 consecutive VC numbers may be used at any given time on any one physical X.25 line from a HP 3000.

### 3.2 Basic Structure of Packets.

We support all packet types in table 3.1 except DCE/DTE DATAGRAM and DATAGRAM SERVICE SIGNAL packets.

#### 3.4.1 Diagnostic Packet.

We do not support the DIAGNOSTIC packet and incoming DIAGNOSTIC packets are ignored.

## Chapter 4

### PROCEDURES FOR VIRTUAL CIRCUIT SERVICES.

#### 4.2.1 Call Request Packet.

We always send the calling (if configured by NETCONF) and the called DTE address in our CALL REQUEST packets.

#### 4.1.11 Call Progress Signals.

We do not use or issue any Call Progress Signals.

#### 4.3.2 User Data Field Length of Data Packets.

We support maximum User Data field lengths of 32,64,256,512 and 1024 octets. We can also support any maximum User Data field lengths in the range 32 octets to 1024 octets if required by any public or private network. We do not support negotiation of the maximum User Data field on a per call basis.

<b>NOTE</b>
-------------

The User Data field must contain an integral number of octets.

#### 4.3.3 Delivery Confirmation Bit.

We do not make any use of the D-bit in the General Format Identifier. We accept DATA packets with any D-bit setting but do not respond to any other packets with the D-bit set. We always set the D-bit to zero in any outgoing packets.

#### **4.3.4 More Data Mark.**

For outgoing packets we set the M bit to 1 only in full data packets and always set the M bit to zero in the last data packet of a packet sequence.

For incoming packets we send a RESET packet if the M-bit is set to one in a partially full DATA packet. The last packet of a packet sequence should have the M bit equal to zero.

We do not do any splitting or recombination of packets when acting as DCE.

#### **4.3.6 Qualifier Bit.**

The Q bit is used by us only for purposes of the X.29 PAD support. Any incoming data packet with Q bit equal to one is assumed to be a PAD control packet (as defined in X.29). We send data packets with Q bit equal to one only for X.29 PAD control packets.

#### **4.4.1.1 Numbering of Data Packets.**

We support both modulo 8 and the extended packet numbering scheme with modulo 128.

#### **4.4.1.2 Window Description.**

Negotiation of window sizes on a per call basis is not supported.

#### **4.4.1.3 Flow Control Principles.**

A P(S) sequence error is regarded as a local procedure error only if it is not the first duplicate packet. An exception is the DATEX-P network where even the first duplicate packet is a local procedure error. The above local procedure error causes a RESET packet with diagnostic 1 to be sent out.

A P(R) sequence error causes a RESET packet with diagnostic 2 to be sent out.

#### **4.4.1.4 Delivery Confirmation.**

We send an RR packet for a data packet received after one second or after receiving half of the window whichever is earlier. The above is true only if we do not have a data packet waiting to be sent on the same virtual circuit. If we do have a data packet waiting to be sent on the same virtual circuit then we send this data packet with the appropriate value of P(R) as an acknowledgement.

The D-bit is NOT used by us for end to end acknowledgement.

#### **4.4.1.6 DTE and DCE Receive Not Ready (RNR) Packets.**

We never send RNR packets.



#### **4.4.2 Throughput Characteristics and Throughput Classes.**

We do not support throughput class negotiation on a per call basis.

## **Chapter 5**

### **PROCEDURES FOR DATAGRAM SERVICE.**

We do not support Datagram Service.

## **Chapter 6**

### **PACKET FORMATS.**

#### **6.2.1 Call Request and Incoming Call Packets.**

The called and calling addresses (configured by NETCONF) are always inserted in a CALL REQUEST packet. The calling address is expected in all INCOMING CALL packets except for a PAD call. This calling address is verified by finding a matching remote address in the NETCON database in the Remote Node Table. If the calling address is not found in the Remote Node Table then a CLEAR packet with diagnostic 68 (decimal) is sent out. If there are several nodes with the same remote address configured then the calling address is matched to the first such node accessed from the NETCON database. All addresses sent and received can be up to 15 decimal digits.

The Facility Length Field, Facility Field and the Call User Data Field are not used in any way in the CALL REQUEST packet. For the INCOMING CALL packet all facilities information is ignored. The only use made of the Call User Data field in INCOMING CALL packets is to recognize PAD calls when the first byte of the Call User Data Field is one (0000 0001). The INCOMING CALL packet can be up to 99 bytes in length for proper recognition.

#### **6.2.2 Call Accepted and Call Connected Packets.**

The address fields and the facilities fields are not put to any use when sending or receiving CALL CONNECTED or CALL ACCEPTED packets. The above packets are recognized while receiving only if they are up to 99 bytes in length.

#### **6.2.3 Clear Request and Clear Indication Packets.**

We always send CLEAR REQUEST or CLEAR INDICATION packets as five byte packets, including the packet header, and cause and diagnostic code fields. When receiving the above packets they can have a length of up to 40 bytes for proper recognition.

#### **6.2.4 DTE and DCE Clear Confirmation Packets.**

The CLEAR CONFIRMATION packets are recognized when receiving them when they have a length of up to 40 bytes.

#### **6.4 Datagram and Datagram Service Signal Packets.**

Not supported.

#### **6.5.2 DTE and DCE Receive Not Ready (RNR) Packets.**

We do not issue RNR packets but accept them.

#### **6.5.3 Reset Request and Reset Indication Packets.**

When we send a RESET REQUEST or a RESET INDICATION packet the cause and the diagnostic code are always inserted. The cause is always 0.

When receiving RESET packets, special action is taken if the remote node is a HP3000 (as opposed to a PAD or HP1000). If a diagnostic of 002 is received then all packets in the current read (if we are reading at a high level) are discarded and the read is restarted. If a diagnostic of 001 is received then all packets in the current write (if we are writing at a high level) are discarded and the write is restarted.

If the remote node is not a HP3000 then no use is made of the cause and diagnostic codes except to record them for trace purposes.

#### **6.6.1 Restart Request and Restart Indication Packets.**

When sending a RESTART REQUEST or RESTART INDICATION packet we always set the cause to 0.

When receiving a RESTART REQUEST or RESTART INDICATION packet we do not use the cause and diagnostic codes in any way except to record them for a trace.

#### **6.7 Diagnostic Packets.**

We do not issue DIAGNOSTIC packets and ignore them if received.

#### **6.8.2 Fast Select Facility.**

We do not support the fast select facility.

## **Chapter 7**

### **OPTIONAL USER FACILITIES.**

#### **7.1 Procedures for Optional User Facilities.**

We do not support any facility negotiation on a per call basis.

## Comparison to CCITT X.25

### **7.1.1 Extended Packet Sequence Numbering.**

We support modulo 128 numbering as an optional configurable facility.

### **7.1.2 Nonstandard Default Window Sizes.**

We support window sizes of 1 to 7 for modulo 8 numbering and 1 to 15 for modulo 128 numbering of data packets.

### **7.1.3 Default Throughput Classes Assignment.**

We support this facility and different values may be selected by the user.

### **7.1.4 Packet Retransmission.**

We will send REJECT packets only to directly connected computers and not to PDN's. If we receive a REJECT packet, we will retransmit up to 3 packets (for each REJECT).

### **7.1.5 Incoming Calls Barred.**

The user can set up this facility with the administration, and its presence will be transparent to DSN/X.25. The user can also open the line with the MASTER option (using DSCONTROL) set to bar INCOMING CALLS and thereby have control from the HP3000 end. When the MASTER option is set on a line all INCOMING CALLS get cleared with diagnostic code 34 (decimal).

### **7.1.6 Outgoing Calls Barred.**

The user can set up this facility with the administration, and its presence will be transparent to DSN/X.25. The user can also open the line with the SLAVE option (using DSCONTROL) set to bar OUTGOING CALLS and thereby have control from the HP3000 end. When the SLAVE option is set on a line the user will get a DSEERROR when trying to send a CALL REQUEST packet (by using the DSLINE command with DSN/DS or FOPENing a device connected to the HP2334A with DSN/X.25).

### **7.1.7 One-way Logical Channel Outgoing.**

We do not support this facility.

### **7.1.8 One-way Logical Channel Incoming.**

We do not support this facility.

### **7.1.9 Closed User Group.**

This facility is supported only for one closed user group and has to be agreed upon with the administration.

**7.1.10 Closed User Group with Outgoing Access.**

We do not support this facility.

**7.1.11 Closed User Group with Incoming Access.**

We do not support this facility.

**7.1.12 Incoming Calls Barred Within a Closed User Group.**

We support this if agreed to by the administration. The user has to configure the appropriate virtual circuit values.

**7.1.13 Outgoing Calls Barred Within a Closed User Group.**

We support this if agreed to by the administration. The user has to configure the appropriate virtual circuit values.

**7.1.14 Bilateral Closed User Group.**

We do not support this facility.

**7.1.15 Bilateral Closed User Group with Outgoing Access.**

We do not support this facility.

**7.1.16 Reverse Charging.**

We will accept reverse-charge calls only from PADs and will reject any other reverse charge calls.

**7.1.17 Reverse Charging Acceptance.**

The user can use this facility upon agreement with the administration.

**7.1.18 RPOA Selection.**

We do not support this facility.

**7.2.1 Nonstandard Default Packet Sizes.**

We support this facility.

Comparison to CCITT X.25

**7.2.2 Flow Control Parameter Negotiation.**

We do not support this facility.

**7.2.3 Throughput Class Negotiation.**

We do not support this facility.

**7.2.4 Fast Select.**

We do not support this facility.

**7.2.5 Fast Select Acceptance.**

We do not support this facility.

**7.2.6 D Bit Modification.**

We do not support this facility.

**7.3 Datagram Facilities.**

We do not support any DATAGRAM facilities.

**7.4 Formats for Optional User Facilities.**

We do not support any of the formats described in this section since we do not support any facilities on a per call basis.

**ANNEX I: RANGE OF LOGICAL CHANNELS.**

We support up to 255 consecutive logical channels in the range 0-4095. Our configuration can only recognize a low virtual circuit number and a high virtual circuit number. It is up to the user and the administration to decide how the above numbers are chosen.

As a DCE we choose the lowest virtual circuit number available for an incoming call and as a DTE we choose the highest virtual circuit number available for an outgoing call.

**ANNEX 4.**

We always implement the DTE timeouts whether acting as DCE or DTE.

**ANNEX 5.**

The codes in Table F-1 are generated by DSN/X.25/3000. Most of the codes are CCITT standards and are used as such. Some CCITT codes have further qualified meanings on the HP3000 and are mentioned below. Some codes are special to the HP3000.

Table F-1. DSN/X.25/3000 codes.

Sent on packet	Diagnostic code	Standards Reference	Meaning
Reset	001	CCITT	Invalid P(S)
	002	CCITT	Invalid P(R)
	003	HP	Invalid P(S) in unanticipated data
	005	HP	Looping detected in reset error recovery
	027	CCITT	Packet type invalid for state d1.
	032	HP	Outgoing reset request
	038	CCITT/HP	Invalid packet length (long/short) CCITT: Packet too short
	045	HP	Invalid DS message
Clear	020	CCTT	Packet type invalid for state p1
	021	CCITT	Packet type invalid for state p2
	023	CCITT	Packet type invalid for state p3
	024	CCITT	Packet type invalid for state p4
	032	HP	Packet type invalid for state p6
	038	CCITT/HP	Invalid packet length on call request. CCITT: Packet too short
	039	HP	Unanticipated data packet(s) too long. CCITT: Packet too long
	049	CCITT	Timer expired on call request
	050	CCITT	Clear retry -- timer expired
	064	CCITT	Call setup problem
	068	CCITT	Invalid calling address
Restart	052	CCITT	Restart retry -- timer expired
	250	HP	Link status change, i.e., down -> up or up -> down

# ERROR CODES AND MESSAGES

APPENDIX

A

The following is a summary of the error code numbers and messages that may be encountered. The messages, as listed here, have been grouped into several categories. For example, the first group contains all messages pertaining to DSN/X.25 functional problems. Each group is identified with an explanatory heading, and the messages are listed in numerical sequence within each category for easy reference.

## DSN/X.25 FUNCTIONAL ERRORS

These messages report a functional problem within the system.

204 UNABLE TO ALLOCATE AN EXTRA DATA SEGMENT FOR DS/3000. (DSERR 204)

Probably an MPE configuration problem with maximum number of DSTs.  
This number can be increased using SYSDUMP.

205 UNABLE TO EXPAND THE DS/3000 EXTRA DATA SEGMENT. (DSERR 205)

Probably a conflict with local MPE configuration limit size for XDSs.  
This number can be increased by using SYSDUMP.

217 INSUFFICIENT AMOUNT OF USER STACK AVAILABLE. (DSERR 217)

221 INVALID DS MESSAGE FORMAT. INTERNAL DS ERROR. (DSERR 221)

231 INVALID FACILITY IN CONNECTION REQUEST. (DSERR 231)

233 VIRTUAL CIRCUIT IS NOT AVAILABLE. (DSERR 233)

235 DS MESSAGE SEQUENCING ERROR. (DSERR 235)

236 COMMUNICATIONS HARDWARE HAS DETECTED AN ERROR. (DSERR 236)

237 CANNOT CURRENTLY GAIN ACCESS TO THE TRACE FILE. (DSERR 237)

238 COMMUNICATIONS INTERFACE ERROR. INTERNAL FAILURE. (DSERR 238)

239 COMMUNICATIONS INTERFACE ERROR. TRACE MALFUNCTION. (DSERR 239)

240 LOCAL COMMUNICATION LINE WAS NOT OPENED BY OPERATOR. (DSERR 240)

242 INTERNAL DS SOFTWARE ERROR ENCOUNTERED. (DSERR 242)

243 REMOTE OR PDN IS NOT RESPONDING. (DSERR 243)

244 COMMUNICATIONS INTERFACE ERROR. LINE RESET OCCURRED. (DSERR 244)

245 COMMUNICATIONS INTERFACE ERROR. RECEIVE TIMEOUT. (DSERR 245)



## Error Codes and Messages

- 246 COMMUNICATIONS INTERFACE ERROR. REMOTE DISCONNECTED. (DSERR 246)  
No DTR (Data Terminal Ready signal) on CPU's modem.  
You need to plug a device in.
- 247 COMMUNICATIONS INTERFACE ERROR. LOCAL TIME OUT. (DSERR 247)
- 248 COMMUNICATIONS INTERFACE ERROR. CONNECT TIME OUT. (DSERR 248)
- 249 COMMUNICATIONS INTERFACE ERROR. REMOTE REJECTED CONNECTION. (DSERR 249)  
Local HP3000 is not in remote CPU's NETCON Remote Node (RN) table.
- 250 COMMUNICATIONS INTERFACE ERROR. CARRIER LOST. (DSERR 250)
- 251 COMMUNICATIONS INTERFACE ERROR. LOCAL DATA SET FOR THE DS LINE WENT NOT READY. (DSERR 251)
- 252 COMMUNICATIONS INTERFACE ERROR. HARDWARE FAILURE. (DSERR 252)
- 253 COMMUNICATIONS INTERFACE ERROR. NEGATIVE RESPONSE TO THE DIAL REQUEST BY THE OPERATOR. (DSERR 253)
- 254 COMMUNICATIONS INTERFACE ERROR. INVALID I/O CONFIGURATION. (DSERR 254)
- 255 COMMUNICATIONS INTERFACE ERROR. UNANTICIPATED CONDITION. (DSERR 255)
- 256 REQUEST QUEUED BEHIND PREVIOUS REQUEST. (DSERR 256)

## DSCONTROL INFORMATORY MESSAGES

These messages convey status information. The ! will be replaced by a numeric value.

- 300 DS DEVICE !: MASTER AND SLAVE ACCESS SHUT.
- 301 DS DEVICE !: SLAVE ACCESS OPENED; MASTER ACCESS SHUT.
- 302 DS DEVICE !: MASTER ACCESS OPENED; SLAVE ACCESS SHUT.
- 303 DS DEVICE !: MASTER AND SLAVE ACCESS OPENED.
- 304 DS DEVICE !: TRACE ACTIVATED USING TRACE FILE !.
- 305 DS DEVICE !: TRACE DEACTIVATED.
- 306 DS DEVICE !: MONITORING ACTIVATED.
- 307 DS DEVICE !: MONITORING DEACTIVATED.
- 308 DS DEVICE !: DEBUG MODE ACTIVATED.
- 309 DS DEVICE !: DEBUG MODE DEACTIVATED.
- 310 DS DEVICE !: SPECIAL DEBUG MODE ACTIVATED.

## DSCONTROL ERROR MESSAGES

These messages point out an error in syntax or warn of the consequences of a request. The ! will be replaced by a numeric value.

4100 NUMBER OF PARAMETERS EXCEEDS MAXIMUM OF !. (CIERR 4100)

4101 EXPECTED AT LEAST TWO PARAMETERS: A DS DEVICE CLASS/NUMBER AND A FUNCTION KEYWORD. (CIERR 4101)

4102 EXPECTED A DEVICE CLASS NAME OR LOGICAL DEVICE NUMBER FOR ONE OR MORE DS DEVICES. (CIERR 4102)

4103 USER IS NOT ASSOCIATED WITH DS DEVICE !. NO CONTROL FUNCTIONS EXECUTED FOR THIS DEVICE. (CIWARN 4103)

4104 USER IS NOT ALLOWED TO USE :DSCONTROL AND IS NOT ASSOCIATED WITH THE DS DEVICE(S). (CIERR 4104)

4105 EXPECTED ONE OR MORE OF THE CONTROL FUNCTIONS: OPEN, SHUT, MON, MOFF, COMP, NOCOMP, TRACE, OR DEBUG. (CIERR 4105)

4106 INVALID CONTROL FUNCTION. EXPECTED ONE OF: OPEN, SHUT, MON, MOFF, COMP, NOCOMP, TRACE, OR DEBUG. (CIERR 4106)

4107 MASTER OVERRIDES PREVIOUS MASTER/SLAVE OPTION. (CIWARN 4107)

4108 SLAVE OVERRIDES PREVIOUS MASTER/SLAVE OPTION. (CIWARN 4108)

4109 SPEED OPTION OVERRIDES PREVIOUS SPEED OPTION. (CIWARN 4109)

4110 OPEN OVERRIDES PREVIOUS OPEN/SHUT FUNCTION. (CIWARN 4110)

4111 SHUT OVERRIDES PREVIOUS OPEN/SHUT FUNCTION. (CIWARN 4111)

4112 TRACE OVERRIDES PREVIOUS TRACE FUNCTION(S). (CIWARN 4112)

4113 DEBUG OVERRIDES PREVIOUS DEBUG FUNCTION(S). (CIWARN 4113)

4114 MON OVERRIDES PREVIOUS MON/MOFF FUNCTION. (CIWARN 4114)

4115 MOFF OVERRIDES PREVIOUS MON/MOFF FUNCTION. (CIWARN 4115)

4118 EXPECTED A ";" , "," , OR RETURN AS DELIMITER. (CIERR 4118)

4119 EXPECTED EITHER A ";" OR RETURN AS DELIMITER. (CIERR 4119)

4120 EXPECTED A "=" AS DELIMITER FOR SPEED OPTION. (CIERR 4120)

4121 EXPECTED A "," AS DELIMITER BETWEEN OPTIONS. (CIERR 4121)

4122 ILLEGAL OPEN/SHUT OPTION. EXPECTED ONE OF: MASTER, SLAVE, SPEED, OR LINESPEED VALUE. (CIERR 4122)

Error Codes and Messages

- 4123 EXPECTED A POSITIVE DOUBLE VALUE FOR LINESPEED. (CIERR 4123)
- 4124 CS CAPABILITY REQUIRED TO USE :DSCONTROL. (CIERR 4124)
- 4125 PM CAPABILITY REQUIRED TO USE DEBUG FUNCTION. (CIERR 4125)
- 4126 DEBUG FUNCTION MAY ONLY BE USED BY SYSTEM CONSOLE. (CIERR 4126)
- 4127 EXPECTED NO OPTION FOR DEBUG OR ONE OF THE FOLLOWING: ON, OFF, OR POSITIVE INTEGER VALUE. (CIERR 4127)
- 4128 EXPECTED NO OPTION FOR MON/MOFF OR ONE OF THE FOLLOWING: CS OR DS. (CIERR 4128)
- 4130 SPEED OPTION IGNORED FOR SHUT FUNCTION. (CIWARN 4130)
- 4131 EXTRANEOUS ";" IGNORED. POSSIBLE MISSING FUNCTION? (CIWARN 4131)
- 4132 EXTRANEOUS "," IGNORED. POSSIBLE MISSING OPTION? (CIWARN 4132)
- 4133 CREATION OF DS MONITOR PROCESS FAILED. (CIERR 4133)
- 4135 DS MONITOR UNABLE TO RUN AS A SYSTEM PROCESS. (CIERR 4135)
- 4136 CS DEVICE ! IS UNAVAILABLE FOR USE. (CIERR 4136)
- 4137 DS DEVICE MUST BE OPEN PRIOR TO USE. (CIERR 4137)
- 4138 USER SPECIFIED TRACE FILE NOT ALLOWED WHEN MORE THAN ONE DEVICE IN DEVICE CLASS. (CIERR 4138)
- 4139 DS DEVICE ! CURRENTLY CONTROLLED ELSEWHERE. (CIWARN 4139)
- 4140 DS DEVICE !: OPEN/SHUT NOT EXECUTED DUE TO ABOVE. (CIWARN 4140)
- 4141 DS DEVICE !: TRACE NOT EXECUTED DUE TO ABOVE. (CIWARN 4141)
- 4142 DS DEVICE !: MON/MOFF NOT EXECUTED DUE TO ABOVE. (CIWARN 4142)
- 4144 DS DEVICE !: DEBUG NOT EXECUTED DUE TO ABOVE. (CIWARN 4144)
- 4145 NO DS DEVICES REMAINING TO BE CONTROLLED. (CIWARN 4145)
- 4147 EXPECTED AN "=" AS DELIMITER FOR RETRY FUNCTION. (CIERR 4147)
- 4150 DS INTERNAL FIX NUMBERS DIFFER. (CIWARN 4150)
- 4151 INCOMPATIBLE OR MISSING NONCRITICAL DS MODULE: DSCOPY, DSTEST, DS2026, OR DS2026CN. (CIWARN 4151)
- 4152 CRITICAL DS MODULES ARE INCOMPATIBLE, NO CONTROL FUNCTIONS EXECUTED. (CIERR 4152)
- 4153 MISSING CRITICAL DS SOFTWARE, NO CONTROL FUNCTIONS EXECUTED. (CIERR 4153)

# TRACING DSN/X.25 LINE ACTIVITY

APPENDIX

B

The CS/3000 Trace Facility is used to provide a record of the line actions, states, and events that occur during DSN/X.25 operation. When problems occur during operation, the trace facility provides a means to pinpoint the problem area.

When you need access to an HP 3000 over an X.25 line, DSN/X.25 transforms your request into one or more CS line driver actions. An action is something that the CS driver performs, and an event is an external happening that requires an action from the driver according to the driver's state.

The trace facility is invoked only at the operator's request. Tracing can be invoked for any communication line that DSN/X.25 uses. The trace request is made before or after the :DSCONTROL OPEN command (that is, before or during line activity). Once invoked for a particular communications line, the trace facility continues to record line activity until the operator terminates it. The trace facility keeps track of actions, states and events in the form of trace entries.

The trace entries are grouped into trace records for the CS line driver and are stored in a user-specified trace file. The contents of a trace file can be formatted and printed through the use of trace dump utility programs, described later in this appendix. Refer to the *HP 3000 Computer Systems Communications Handbook*, Appendix I, for additional information on the CS Trace Facility.

## INITIATING THE CS/3000 TRACE FACILITY

To invoke the CS/3000 trace facility, include the following trace parameter in the :DSCONTROL command:

```
;TRACE,ON[, [ALL] [, [mask] [, [numentries] [, WRAP] [, filename]]]]
```

where

**ALL** generates trace records for all CS driver calls. If ALL is not specified, then trace records are written only when a driver call completes with a transmission error. So, if ALL is omitted, only I/O errors are traced. The word ERROR appears on the trace listing.

**mask** indicates the type of activities to be traced, as follows (PCMP entries are generated automatically):

%000, or omitted, means use the driver default mask (%037, so all entries except PSTN are generated)

%001 = generate PSTX entries

%002 = generate PSCT entries

%004 = generate PRTX entries

%010 = generate PRCT entries

## Tracing and DSN/X.25 Line Activity

%020 = generate POPR and PEDT entries

<b>NOTE</b>
-------------

POPR and PEDT entries do not apply to X.25

%040 = generate PSTN entries

%100 = generate INP interconnect entries

*numentries*

is a decimal integer for the maximum number of trace entries in a trace record. It cannot be greater than 248. The value actually used by the trace facility will be the largest integer multiple of eight that is not greater than the number you enter. For an INP running DSN/X.25, the value may not exceed 16. (If the value requested in this case is greater than 16, a warning message will be printed and the maximum default of 16 will be used.) If *numentries* is set to zero or omitted, there will be a maximum of 16 trace entries per trace record. It is not possible to change the value of *numentries* once a trace file has been built. If the value you choose is inadequate, you will have to purge the file and rebuild it, or let DSN/X.25 rebuild it.

WRAP

causes trace entries that overflow the trace record area (greater than *numentries*) to overlay the prior trace entries. If WRAP is omitted, overflow trace entries are discarded, and NOWRAP appears on the trace listing. (This parameter does not affect the EOF marker of the file.)

If WRAP is specified then entries are deposited in a trace record in a circular pattern. For example, with a maximum of 35 trace entries per trace record, trace entries beyond the 35th will overlay the first, second, third (and so on) trace entries in the record. When this happens, the overlaid trace entries will be missing from the listing; a warning message will appear in the listing stating that the records are missing.

*filename*

names the file the user wants the trace information to be written to. If no name is supplied, DSN/X.25 will create a file named DSTRCnnn, where nnn is the right-justified LDEV number of the X.25 device. For example, if the X.25 device LDEV is 51, the trace filename is DSTRC051. If a trace file exists it will be purged, and a new trace file will be created.

## The Trace File

Refer to Section II of the *MPE Intrinsic Reference Manual* for a description of the FOPEN and FCLOSE intrinsic calls. If tracing has been requested, the CS/3000 trace facility issues an FOPEN intrinsic call with the following parameters:

Parameter		Value	Meaning
Formal File Designator		DSTRCnnn	
FOPTIONS	Bits 14, 15	11	Old file
	Bits 13	0	Binary file
	Bits 10,11,12	111	Use actual file designator
	Bits 8,9	11	Variable length records
	Bit 7	0	No carriage control
AOPTIONS	Bits 12 to 15	1111	Write only; purge old contents
	Bit 11	0	No multi-record option
	Bit 10	0	Disallow dynamic locking/unlocking
	Bits 8,9	00	Exclusive access
	Bits 0 to 7	00000000	None
BLOCKFACTOR		1	

If the trace file cannot be opened because it does not exist, then a new file is opened in the system domain. If an error occurs when trying to open the trace file, the particular :DSCONTROL command fails and the trace file printout will be displayed on the console.

When the line is closed, the CS/3000 trace facility issues an FCLOSE intrinsic call with the following parameters:

Parameter	Value	Meaning
DISPOSITION	1	Save
SECCODE	0	Unrestricted access

## Trace Entry Mnemonics

There are six types of trace entries used in DSN/X.25. They are summarized in Table B-1 and described in greater detail on the pages following this table.

**Table B-1. Trace Entry Type Mnemonics**

Mnemonic	Entry Type	Definition
PSTN	Protocol State Transition	Generated each time the driver transfers from one internal state to another. The PSTN entry is for internal HP use and should be ignored by the user.
PRCT	Receive Control Sequence	Generated each time a frame is received from the remote station. The PRCT trace entry shows (in octal or hexadecimal) the exact sequence of bytes that was received. <sup>1</sup>
PSCT	Send Control Sequence	Generated each time the driver sends a frame to the remote station. The PSCT trace entry shows (in octal or hexadecimal) the exact sequence of bytes that was sent. <sup>1</sup>
PRTX	Receive Text	Generated only when the received frame is longer than 32 bytes. The PRTX trace entry shows (in octal or hexadecimal) the exact sequence of bytes received. <sup>2</sup>
PSTX	Send Text	Generated only when the frame sent to the remote station is longer than 32 bytes. The PSTX entry shows (in octal or hexadecimal) the exact sequence of bytes that was sent. <sup>2</sup>
PCMP	User Request Completed	Generated each time a CS driver call is completed. The PCMP trace entry summarizes the line activity, such as the number of frames sent and received and the number of errors that have occurred.

<sup>1</sup> The PRCT or PSCT trace entry omits the Flag and Frame checking sequence (FCS) characters and shows the first 30 bytes of the I field maximum. One byte of the FCS may appear if the frame doesn't end on a word boundary.

<sup>2</sup> PRTX or PSTX entries will be used to display the remainder of the I field that was not displayed in the PRCT or PSCT entry. Trailing Flag and FCS bytes are omitted except when the frame does not end on a word boundary; then one byte of the FCS will appear.

## TERMINATING THE CS/3000 TRACE FACILITY

To terminate the CS/3000 trace facility, include the following parameter in the :DSCONTROL command:

```
;TRACE,OFF
```

The trace facility must be terminated before CSDUMP and DSDUMP can be run.

## FORMATTING A TRACE FILE

There are two trace formatting programs for X.25: CSDUMP and DSDUMP. CSDUMP formats and displays all trace file data in a raw form. DSDUMP allows you to choose a subset of the trace file to be formatted, and will also analyze the chosen data. You need a thorough understanding of the X.25 protocols to interpret information in an X.25 trace file. (See Appendix D for basic information.)

## THE CSDUMP FORMATTING PROGRAM

The CSDUMP program formats the CS trace file to show line activity by displaying all frames being sent and received. CSDUMP will also analyze the X.25 Level 2 LAP-B header as defined in the 1980 X.25 CCITT Recommendation.

### Defining a CS Trace File for CSDUMP

The CSDUMP program expects a trace file named CSTRACE. If your trace file has a different name, such as the default file name DSTRCnnn, you will need to equate the trace file name to CSTRACE. Before starting the CSDUMP program, using the MPE :FILE command this way:

```
:FILE CSTRACE=DSTRCnnn.PUB.SYS
```

### Defining a CSDUMP Listing File

The formal file designator of the trace listing file for CSDUMP is LIST. The file may be defined as a CRT terminal, a line printer, or a disc file. To define the list file, enter an MPE :FILE command prior to initiating the CSDUMP program. Some typical examples are:

```
:FILE LIST;DEV=LP
```

LP is assumed to be the device class name for one or more line printers.

```
:FILE LIST=FILENAME
```

FILENAME is assumed to be the name of an old temporary or permanent disc file.

If a list file does not exist or is not designated by a :FILE command, and PARM of the RUN command is not 1, the CSDUMP program employs the user's session/job output device as the list file. If PARM is set to 1, then the dump program attempts to open the file LIST as an old job or system file. If this fails because LIST does not exist, then LIST is opened as a new file in the system domain. After the CSDUMP program has run, the contents of this file may be accessed via EDIT/3000.



## Initiating the CSDUMP Program

After the CSTRACE and LIST files have been defined, enter the following command:

```
:RUN CSDUMP.PUB.SYS[,OCTAL][;PARM= $\left. \begin{array}{c} 0 \\ 1 \\ 2 \end{array} \right\}$ ]
```

The trace dump program uses the CSTRACE file as input and produces a formatted trace listing on the LIST file. The format of the trace listing is described in the following text. If the secondary entry point OCTAL is specified when CSDUMP is run, the numeric codes for both control characters and data will be printed in octal instead of hexadecimal. If you specify *PARM=0* or 1, all entries will be output by time; however, if you specify *PARM=2* only CS/3000 intrinsics will be output by time.

## Formatted CSDUMP Trace Listing

As you can see from Figure B-1, a CSDUMP trace listing has a specific format. The components of a trace listing are a header message; the beginning-of-trace message; the opening Line Information Display box; one or more consecutively numbered entries; an end-of-trace message; and the closing Line Information Display box. These components are discussed in detail on the pages following Figure B-1. Figure B-1 shows portions of a trace of a line connected to an Intelligent Network Processor (INP).

CS TRACE ANALYZER (A.05.09)                      SUN, APR 24, 1983, 12:46 PM

TRACE FILE IS DSTRC100.PUB.SYS  
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON MON, APR 18, 1983, 4:03 PM

SYSTEM ID=01.00

```
*****
* BEGIN TRACING FOR DEVICE 15 *
*****

*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
*   LINE NUMBER: 3      LOGICAL DEV. NUMBER: 15   *
*   DEV. TYPE: 17      SUBTYPE: 1   VER: A.05.09 *
*           0123456789012345                       *
*   COPTIONS: 0000100101000000                     *
*   AOPTIONS: 0000001100001101                     *
*   DOPTIONS: 0000000000000111                     *
*   NETWORK'ID: 0000000000000000                   *
*   NUMBUFFERS: 242      BUFFSIZE: 66   (WORDS) *
*   INSPEED: 600         OUTSPEED: 600   *
*   MISCARRAY:          RECEIVE TIMEOUT: 20   SECS. *
*                       LOCAL TIMEOUT: 60    SECS. *
*                       CONNECT TIMEOUT: 900  SECS. *
*                       RESPONSE TIMEOUT: 300 HSECS. *
*                       LINE BID TIMEOUT: 60  SECS. *
*                       NO. ERROR RETRIES: 20   *
*                       CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                       DATA-SET-READY DELAY: DISABLED. *
*                       TRANSMISSION MODE: DUPLEX. *
*                       MMSTAT TRACE FACILITY: ENABLED. *
*   DRIVENAME: IOINPO *
*   DOWNLOAD FILE: CSDLAPBO *
*   CTRACEINFO: ENTRIES=16      MASK=011111000 *
*                       TYPE OF TRACE = ALL, NOWRAP *
*   PHONELIST: ENTRIES=0      INDEX=0 *
*   IDLIST: ENTRIES=0      INDEX=0 *
*   ERRORCODE: RECOVERABLE=0   IRRECOVERABLE=0 *
*****
```

Figure B-1. CSDUMP Trace Listing.

Tracing and DSN/X.25 Line Activity

```

* MSGSENT: 0           MSGRCV: 0           *
* RECOVERERRORS: 0     IRRECOVERERRORS: 0   *
*****
0      2.120 PCMP REQUEST ID=%041630(!4398)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=0       #MSG RECV=0       STATE=DISCONNECT
        # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=0

1      2.140 PCMP REQUEST ID=%041233(!429B)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=0       #MSG RECV=0       STATE=DISCONNECT
        # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=0

2      2.680 PSCT REQUEST ID=NONE
        SABM      ADDR=B      P/F=0
        0 1.2 F
        SOH /

3      2.730 PRCT REQUEST ID=NONE
        UA      ADDR=B      P/F=0
        0 1.6 3
        SOH c

4      2.840 PRCT REQUEST ID=NONE
        I-FRAME  ADDR=A      P/F=0  N(R)=0  N(S)=0
        0 3.0 0 1 0.0 0 F B.0 7 F A.0 0
        ETX NUL DLE NUL { BEL z NUL

5      2.840 PCMP REQUEST ID=%042253(!44AB)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=0       #MSG RECV=1       STATE=CONNECTED
        # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=0

6      2.850 PSCT REQUEST ID=NONE
        RR      ADDR=A      P/F=0  N(R)=1
        0 3.2 1
        ETX !

7      2.860 PSCT REQUEST ID=NONE
        I-FRAME  ADDR=B      P/F=0  N(R)=1  N(S)=0
        0 1.2 0 1 0.0 0 F B.0 0 F A.0 0
        SOH      DLE NUL { NUL z NUL

8      2.920 PRCT REQUEST ID=NONE
        RR      ADDR=B      P/F=0  N(R)=1
        0 1.2 1
        SOH !

9      2.920 PCMP REQUEST ID=%042711(!45C9)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=1       #MSG RECV=1       STATE=CONNECTED
        # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=0

```

Figure B-1. CSDUMP Trace Listing (continued).

```

10      51.440 PRCT REQUEST ID=NONE
          I-FRAME  ADDR=A   P/F=0  N(R)=1  N(S)=1
          0 3.2 2 1 0.0 1 0 B.E E 3 1.1 0 4 0.8 0 0 0.5 5
          ETX "   DLE SOH VT  n   1   DLE @   NUL NUL U
          0 0.3 1 1 0.4 0 8 0.0 0 1 0.0 7 0 8.0 1 0 1.0 0
          NUL 1   DLE @   NUL NUL DLE BEL BS  SOH SOH NUL
          2 1.0 5 0 2.0 6 0 8.0 1 2 1.0 0
          !   ENQ STX ACK BS  SOH !   NUL

11      51.440 PRTX REQUEST ID=NONE
          0 0.0 3
          NUL ETX

12      51.440 PCMP REQUEST ID=%042062(!4432)
          ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
          #MSG SENT=1      #MSG RECV=2      STATE=CONNECTED
          # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

13      51.450 PSCT REQUEST ID=NONE
          RR      ADDR=A   P/F=0  N(R)=2
          0 3.4 1
          ETX A

0       51.560 PSCT REQUEST ID=NONE
          I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=1
          0 1.4 2 1 0.0 1 0 F.0 0
          SOH B   DLE SOH SI  NUL

1       51.620 PRCT REQUEST ID=NONE
          RR      ADDR=B   P/F=0  N(R)=2
          0 1.4 1
          SOH A

2       51.620 PCMP REQUEST ID=%041452(!432A)
          ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
          #MSG SENT=2      #MSG RECV=2      STATE=CONNECTED
          # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

3       53.560 PRCT REQUEST ID=NONE
          I-FRAME  ADDR=A   P/F=0  N(R)=2  N(S)=2
          0 3.4 4 1 0.0 1 0 0.0 D
          ETX D   DLE SOH NUL CR

4       53.570 PCMP REQUEST ID=%042314(!44CC)
          ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
          #MSG SENT=2      #MSG RECV=3      STATE=CONNECTED
          # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

5       53.570 PSCT REQUEST ID=NONE
          RR      ADDR=A   P/F=0  N(R)=3
          0 3.6 1
          ETX a

```

Figure B-1. CSDUMP Trace Listing (continued).

Tracing and DSN/X.25 Line Activity

```

6      54.740 PSCT REQUEST ID=NONE
        I-FRAME ADDR=B P/F=0 N(R)=3 N(S)=2
        0 1.6 4 9 0.0 1 2 0.0 2 0 1.0 1 0 2.0 1 0 3.0 2
        SOH d DLE SOH STX SOH SOH STX SOH ETX STX
        0 4.0 0 0 5.0 1 0 6.0 1 0 7.0 1 0 8.0 0 0 9.0 0
        EOT NUL ENQ SOH ACK SOH BEL SOH BS NUL HT NUL
        0 A.0 0 0 C.0 1
        LF NUL FF SOH

7      54.800 PSCT REQUEST ID=NONE
        I-FRAME ADDR=B P/F=0 N(R)=3 N(S)=3
        0 1.6 6 1 0.0 1 2 2.0 D 0 A.0 D 0 A.0 0
        SOH f DLE SOH " CR LF CR LF NUL

8      54.840 PRCT REQUEST ID=NONE
        RR ADDR=B P/F=0 N(R)=3
        0 1.6 1
        SOH a

9      54.840 PCMP REQUEST ID=%042151(!4469)
        ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=3 #MSG RECV=3 STATE=CONNECTED
        # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

10     54.860 PRCT REQUEST ID=NONE
        RR ADDR=B P/F=0 N(R)=4
        0 1.8 1
        SOH SOH

11     54.860 PCMP REQUEST ID=%040200(!4080)
        ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=4 #MSG RECV=3 STATE=CONNECTED
        # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

12     55.220 PRCT REQUEST ID=NONE
        I-FRAME ADDR=A P/F=0 N(R)=4 N(S)=3
        0 3.8 6 1 0.0 1 2 1.5 8
        ETX ACK DLE SOH ! X

13     55.220 PCMP REQUEST ID=%042075(!443D)
        ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=4 #MSG RECV=4 STATE=CONNECTED
        # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

14     55.230 PSCT REQUEST ID=NONE
        RR ADDR=A P/F=0 N(R)=4
        0 3.8 1
        ETX SOH

0      55.260 PSCT REQUEST ID=NONE
        I-FRAME ADDR=B P/F=0 N(R)=4 N(S)=4
        0 1.8 8 1 0.0 1 2 4.3 A
        SOH BS DLE SOH $ :
    
```

Figure B-1. CSDUMP Trace Listing (continued).

```

1      55.270 PRCT REQUEST ID=NONE
        I-FRAME  ADDR=A   P/F=0  N(R)=4  N(S)=4
        0 3.8 8 1 0.0 1 4 1.E E
        ETX BS  DLE SOH A   n

2      55.270 PCMP REQUEST ID=%041307(!42C7)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=4      #MSG RECV=5      STATE=CONNECTED
        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

3      55.280 PSCT REQUEST ID=NONE
        RR      ADDR=A   P/F=0  N(R)=5
        0 3.A 1
        ETX !

4      55.320 PRCT REQUEST ID=NONE
        RR      ADDR=B   P/F=0  N(R)=5
        0 1.A 1
        SOH !

5      55.320 PCMP REQUEST ID=%041172(!427A)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=5      #MSG RECV=5      STATE=CONNECTED
        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

6      55.510 PRCT REQUEST ID=NONE
        I-FRAME  ADDR=A   P/F=0  N(R)=5  N(S)=5
        0 3.A A 1 0.0 1 6 1.5 8
        ETX *  DLE SOH a   X

7      55.510 PCMP REQUEST ID=%042342(!44E2)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=5      #MSG RECV=6      STATE=CONNECTED
        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

8      55.520 PSCT REQUEST ID=NONE
        RR      ADDR=A   P/F=0  N(R)=6
        0 3.C 1
        ETX A

9      58.920 PRCT REQUEST ID=NONE
        I-FRAME  ADDR=A   P/F=0  N(R)=5  N(S)=6
        0 3.A C 1 0.0 1 6 2.6 8 6 5.6 C 6 C.6 F 2 0.6 D
        ETX ,  DLE SOH b   h   e   l   l   o   m
        6 1.6 E 6 1.6 7 6 5.7 2 2 E.7 3 7 9.7 3 0 D.0 2
        a   n   a   g   e   r   .   s   y   s   CR STX

        • (Several entries have been
        • intentionally omitted.)
        •

9      89.920 PSCT REQUEST ID=NONE
        I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=5
        0 1.4 A 1 0.0 1 A 4.4 3 5 0.5 5 3 D.3 2 2 E.2 0
        SOH J  DLE SOH $   C   P   U   =   2   .
    
```

Figure B-1. CSDUMP Trace Listing (continued).

Tracing and DSN/X.25 Line Activity

```

      4 3.4 F 4 E.4 E 4 5.4 3 5 4.3 D 3 1.2 E 2 0.4 D
      C O N N E C T = 1 M
      4 F.4 E 2 C.2 0 4 1.5 0 5 2.2 0
      O N , A P R

10      89.920 PSTX REQUEST ID=NONE
      3 1.3 8 2 C.2 0 3 1.3 9 3 8.3 3 2 C.2 0 2 0.3 4
      1 B , 1 9 8 3 , 4
      3 A.3 0 3 5.2 0 5 0.4 D 0 D.0 A
      : 0 5 P M CR LF

11      90.050 PRCT REQUEST ID=NONE
      RR ADDR=B P/F=0 N(R)=6
      0 1.C 1
      SOH A

12      90.060 PCMP REQUEST ID=%042370(!44F8)
      ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
      #MSG SENT=46 #MSG RECV=50 STATE=CONNECTED
      # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

0      90.340 PSCT REQUEST ID=NONE
      I-FRAME ADDR=B P/F=0 N(R)=2 N(S)=6
      0 1.4 C 1 0.0 1 1 3.0 0 0 0.3 3
      SOH L DLE SOH DC3 NUL NUL 3

1      90.400 PRCT REQUEST ID=NONE
      RR ADDR=B P/F=0 N(R)=7
      0 1.E 1
      SOH a

2      90.400 PCMP REQUEST ID=%042635(!459D)
      ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
      #MSG SENT=47 #MSG RECV=50 STATE=CONNECTED
      # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

3      90.630 PRCT REQUEST ID=NONE
      I-FRAME ADDR=A P/F=0 N(R)=7 N(S)=2
      0 3.E 4 1 0.0 1 1 7.E E 3 1.1 0 4 0.8 0 0 0.5 5
      ETX d DLE SOH ETB n 1 DLE @ NUL NUL U
      0 0.3 1 1 0.4 0 8 0.0 0 1 0.0 7 1 2.0 0 0 0.C 1
      NUL 1 DLE @ NUL NUL DLE BEL DC2 NUL NUL A
      0 4.0 0 0 0.0 0 3 9.C 2 0 8.0 0
      EOT NUL NUL NUL 9 B BS NUL

4      90.630 PRTX REQUEST ID=NONE
      0 0.0 0 0 8.0 0 0 0.0 0 2 E.5 D
      NUL NUL BS NUL NUL NUL . ]

5      90.640 PCMP REQUEST ID=%041465(!4335)
      ERROR CODE=0 LAST RECOVERABLE ERROR CODE= 0
      #MSG SENT=47 #MSG RECV=51 STATE=CONNECTED
      # RECOVERABLE ERR=0 # IRRECOVERABLE ERR=0

```

Figure B-1. CSDUMP Trace Listing (continued).

```

6      90.640 PSCT REQUEST ID=NONE
          RR      ADDR=A    P/F=0  N(R)=3
          0 3.6 1
          ETX a
*****
* END OF TRACE FOR DEVICE 15 *
*****

*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
* LINE NUMBER: 3      LOGICAL DEV. NUMBER: 15 *
* DEV. TYPE: 17      SUBTYPE: 1    VER: A.05.09 *
*      0123456789012345 *
* COPTIONS: 0000100101000000 *
* AOPTIONS: 0000001100001101 *
* DOPTIONS: 0000000000000111 *
* NETWORK ID: 0000000000000000 *
* NUMBUFFERS: 242      BUFFSIZE: 66 (WORDS) *
* INSPEED: 600      OUTSPEED: 600 *
* MISCARRAY: RECEIVE TIMEOUT: 20 SECS. *
* LOCAL TIMEOUT: 60 SECS. *
* CONNECT TIMEOUT: 900 SECS. *
* RESPONSE TIMEOUT: 300 HSECS. *
* LINE BID TIMEOUT: 60 SECS. *
* NO. ERROR RETRIES: 20 *
* CLEAR-TO-SEND DELAY: 00.0 SECS. *
* DATA-SET-READY DELAY: DISABLED. *
* TRANSMISSION MODE: DUPLEX. *
* MMSTAT TRACE FACILITY: ENABLED. *
* DRIVERNAME: IOINPO *
* DOWNLOAD FILE: CSDLAPBO *
* CTRACEINFO: ENTRIES=16      MASK=011111000 *
* TYPE OF TRACE = ALL, NOWRAP *
* PHONELIST: ENTRIES=0      INDEX=0 *
* IDLIST: ENTRIES=0      INDEX=0 *
* ERRORCODE: RECOVERABLE=0      IRRECOVERABLE=0 *
* MSGSENT: 47      MSGRECV: 51 *
* RECOVERERRORS: 0      IRRECOVERERRORS: 0 *
*****

7      122.470 PCMP REQUEST ID=%042574(!457C)
          ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
          #MSG SENT=47      #MSG RECV=51      STATE=CONNECTED
          # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

8      122.490 PCMP REQUEST ID=%041205(!4285)
          ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
          #MSG SENT=47      #MSG RECV=51      STATE=CONNECTED
          # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0

END OF JOB.

```

Figure B-1. CSDUMP Trace Listing (continued).



## CSDUMP Listing Header Message

At the start of the trace listing is a header message (Figure B-2) that tells the date and time of day when the listing was generated by CSDUMP and the fully-qualified name of the trace file. The meanings of the two remaining items in the header message are:

Item	Meaning
LAST OPENED ON ...	This tells you the date and time of day when the trace was executed.
SYSTEM ID=nn.mm	This tells you the version number (nn) and the fix level (mm) of the MPE operating system that was being used when the trace was performed.

CS TRACE ANALYZER (A.05.09)      SUN, APR 24, 1983, 12:46 PM

TRACE FILE IS DSTRC100.PUB.SYS  
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON MON, APR 18, 1983, 4:03 PM

SYSTEM ID=01.00

Figure B-2. Trace Listing Header.

## Begin Tracing and Line Information Messages

The BEGIN TRACING... message appears in the listing when the line to be traced is opened. The message tells you the decimal logical device number of the line (15 in the example in Figure B-3). It indicates the line's activities are now being monitored by the trace facility. It is followed by the Line Information Display describing the state of the line when tracing started.

```
*****
* BEGIN TRACING FOR DEVICE 15 *
*****

*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
* LINE NUMBER: 3          LOGICAL DEV. NUMBER: 15 *
* DEV. TYPE: 17         SUBTYPE: 1   VER: A.05.09 *
*           0123456789012345 *
* COPTIONS: 0000100101000000 *
* AOPTIONS: 0000001100001101 *
* DOPTIONS: 0000000000000111 *
* NETWORK'ID: 0000000000000000 *
* NUMBUFFERS: 242        BUFFSIZE: 66 (WORDS) *
* INSPEED: 600           OUTSPEED: 600 *
* MISCARRAY:           RECEIVE TIMEOUT: 20 SECS. *
*                       LOCAL TIMEOUT: 60 SECS. *
*                       CONNECT TIMEOUT: 900 SECS. *
*                       RESPONSE TIMEOUT: 300 HSECS. *
*                       LINE BID TIMEOUT: 60 SECS. *
*                       NO. ERROR RETRIES: 20 *
*                       CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                       DATA-SET-READY DELAY: DISABLED. *
*                       TRANSMISSION MODE: DUPLEX. *
*                       MMSTAT TRACE FACILITY: ENABLED. *
* DRIVERNAME: IOINPO *
* DOWNLOAD FILE: CSDLAPB0 *
* CTRACEINFO: ENTRIES=16 MASK=011111000 *
*                       TYPE OF TRACE = ALL, NOWRAP *
* PHONELIST: ENTRIES=0 INDEX=0 *
* IDLIST: ENTRIES=0 INDEX=0 *
* ERRORCODE: RECOVERABLE=0 IRRECOVERABLE=0 *
* MSGSENT: 0           MSGRECV: 0 *
* RECOVERERRORS: 0     IRRECOVERERRORS: 0 *
*****
```

Figure B-3. Begin Tracing and Line Information Messages.

## Tracing and DSN/X.25 Line Activity

The opening Line Information Display box contains detailed information on how the line was opened, how the communications controller was configured (transmission speeds, timeout values, logical device number, etc) and trace parameters selected. In the example in Figure B-3, we can determine that:

- the communications controller is an INP (we know this because DEV. TYPE (device type) is 17 and DRIVERNAME is IOINP0),
- it is a synchronous, non-switched line (because it is SUBTYPE 1),
- INSPEED and OUTSPEED (transmission speeds) are 600 characters per second (4800 bps),
- BUFFSIZE is 66 WORDS, or 132 bytes, which provides for a packet size of 128 bytes, plus 3 bytes for the packet header and 1 byte to fill to the word boundary,
- RESPONSE TIMEOUT is 300 HSEC, or 3000 milliseconds, which is the timer T1 (as defined in LAP-B protocol),
- NO. ERROR RETRIES is 20, which is the retry count N2 (as defined in LAP-B protocol),
- DOWNLOAD FILE is CSDLAPB0, which means we are using the LAP-B protocol,
- CTRACEINFO ENTRIES is 16, so *numentries* is 16,
- MASK is 011111000 (=37; for DSN/X.25 ignore the three zeroes on the right),
- ALL events will be traced,
- overflow record entries will be discarded (NOWRAP).

## Trace Entry Format

All entries in a trace listing contain a prefix consisting of four fields:

1. An entry number (0 in the example in Figure B-4).
2. A "time stamp" in seconds and thousandths of seconds (2.120 in Figure B-4).
3. An entry-type mnemonic (PCMP in Figure B-4).
4. A "request ID" that correlates the entry with a particular driver request (%041630 in Figure B-4).

The first entry is numbered zero, and successive entries throughout the rest of this trace record are numbered consecutively in ascending order (1, 2, 3 and so on). The "time stamp" makes it possible for you to determine the elapsed time between one trace entry and another. The mnemonic tells you what type of trace entry you are examining. The body of each trace entry tells you the pertinent information for the particular activity that has happened or is about to happen.

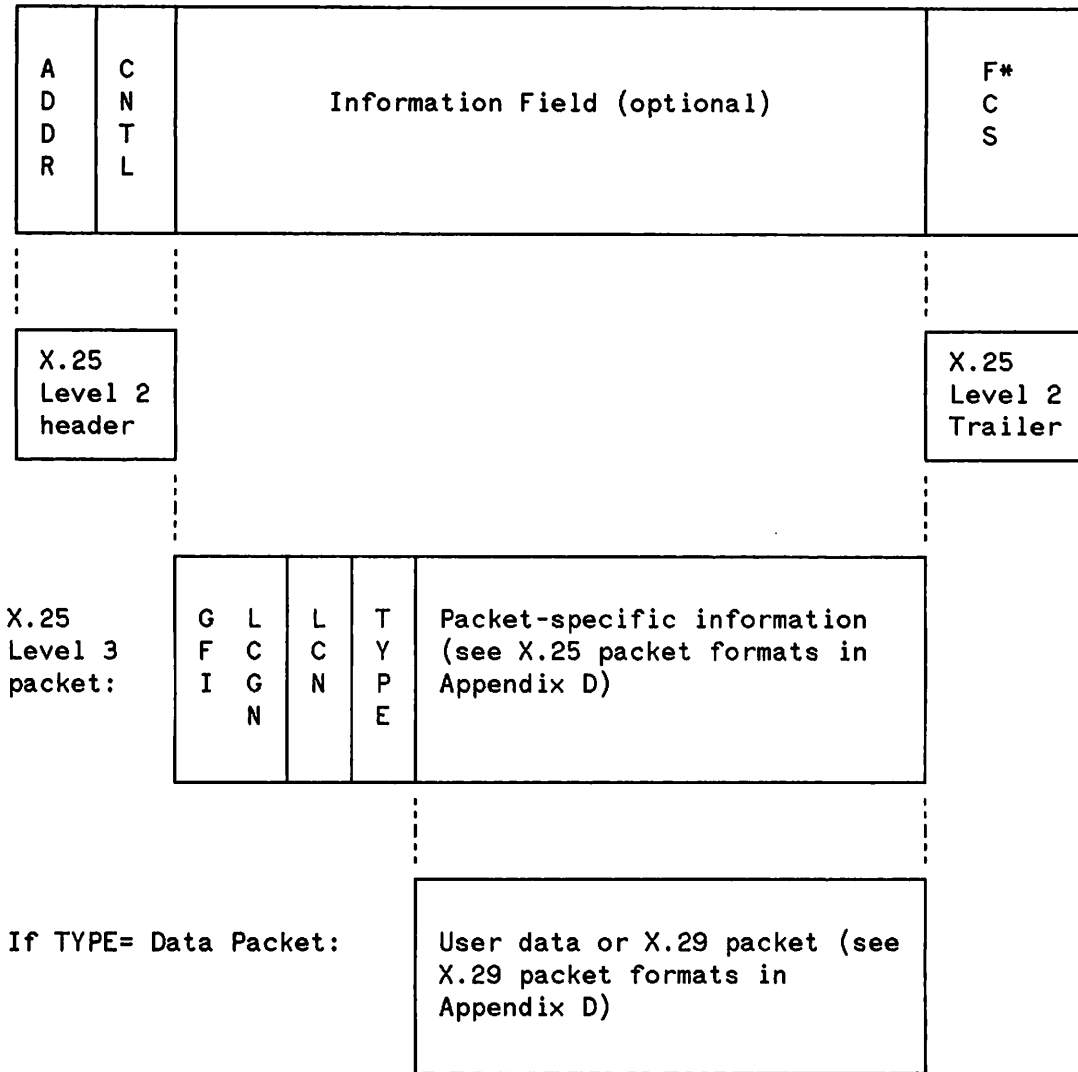
```
0      2.120 PCMP REQUEST ID=%041630(!4398)
      ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
      #MSG SENT=0      #MSG RECV=0      STATE=DISCONNECT
      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0
```

Figure B-4. Sample Trace Entry.

Tracing and DSN/X.25 Line Activity

The following is the data format as defined by X.25 and recorded in the CS trace file for PRCT/PRTX or PSCT/PSTX entries:

Level 2 frame:



\* One FCS byte will appear if the frame ends on an odd-byte boundary.

Figure B-5. The X.25 Data Format.

## Missing Entries Message

If MISSING ENTRIES appears in the listing, it means that the record was not large enough to accommodate all of the trace entries and some entries were lost. If WRAP was not specified (NOWRAP), then the missing entries were at the end just before the PCMP entry; otherwise they are missing from the beginning where they were overlaid by the trace entries that extended past the end of the record. If the missing entries are crucial:

1. Purge the trace file.
2. Invoke trace again, issuing :DSCONTROL with
  - a. a larger *numentries* value
  - b. a mask setting that will produce only those trace entries you are really interested in.

## PRCT Trace Entries

A PRCT trace entry is generated each time a frame is received from the remote station. The body of a PRCT trace entry shows you the exact sequence of bytes received. An example is shown in Figure B-6.

```

9      58.920 PRCT REQUEST ID=NONE
          I-FRAME ADDR=A   P/F=0  N(R)=5  N(S)=6
          0 3.A C 1 0.0 1 6 2.6 8 6 5.6 C 6 C.6 F 2 0.6 D
          ETX , DLE SOH b h e l l o m
          6 1.6 E 6 1.6 7 6 5.7 2 2 E.7 3 7 9.7 3 0 D.0 2
          a n a g e r . s y s CR STX
  
```

Figure B-6. PRCT Trace Entry.

In the example shown in Figure B-6 (see Figure B-5 for the data format) note that the X.25 level 2 header is analyzed by CSDUMP in the line under REQUEST ID.

<pre> 03 =&gt; ADDR=A AC =&gt; CNTL=I frame P/F=0       N(R)=5 N(S)=6 10 =&gt; GFI=1, Q=0 so this packet       contains PAD user data, LCGN=0 01 =&gt; LCN=1 62 =&gt; Data packet, M=0 P(R)=3 P(S)=1       User data = hello manager.sys <b>RETURN</b> 02 =&gt; FCS byte   </pre>	}	<p>as defined in X.25 Level 2 protocol (LAP-B)</p> <p>as defined in X.25 Level 3 protocol (see Appendix D)</p>
---	---	--

Whenever possible, the CSDUMP program converts the hex (or octal) codes to ASCII and displays the character beneath its code.

## PSCT Trace Entries

A PSCT trace entry is generated each time a frame is sent to the remote station. The body of a PSCT trace entry shows you the exact sequence of bytes that was sent to the remote station. An example is shown in Figure B-7.

```

6      54.740 PSCT REQUEST ID=NONE
          I-FRAME ADDR=B P/F=0 N(R)=3 N(S)=2
          0 1.6 4 9 0.0 1 2 0.0 2 0 1.0 1 0 2.0 1 0 3.0 2
          SOH d DLE SOH STX SOH SOH STX SOH ETX STX
          0 4.0 0 0 5.0 1 0 6.0 1 0 7.0 1 0 8.0 0 0 9.0 0
          EOT NUL ENQ SOH ACK SOH BEL SOH BS NUL HT NUL
          0 A.0 0 0 C.0 1
          LF NUL FF SOH
    
```

Figure B-7. PSCT Trace Entry.

In the example shown in Figure B-7 (see Figure B-5 for the data format), note that the X.25 level 2 header is analyzed by CSDUMP in the line under REQUEST ID.

<pre> 01 =&gt; Address=B 64 =&gt; CNTL=I frame P/F=0       N(R)=3 N(S)=2 90 =&gt; GFI=9, Q bit=1, so       data is an X.29 packet LCGN=0 01 =&gt; LCN=1 20 =&gt; packet type=data packet,       M=0 P(R)=1 P(S)=0 02 =&gt; set PAD parameters X.29 packet 01 =&gt; set parameter 1 01 =&gt; value for parameter 1 = 1 02 =&gt; set parameter 2 01 =&gt; value for parameter 2 = 1 03 =&gt; set parameter 3 02 =&gt; value for parameter 3 = 2       .       .       . 0C =&gt; set parameter 12 01 =&gt; value for parameter 12 = 1     </pre>	}	<pre> as defined in X.25 Level 2 protocol (LAP-B)  as defined by X.25 Level 3 packet protocol (see Appendix D)  as defined by X.29 (see Appendix D)     </pre>
--	---	--

Whenever possible, the CSDUMP program converts the hex (or octal) codes to ASCII and displays each character beneath its code.

## PRTX Trace Entries

PRTX trace entries are generated only when the received frame is longer than 32 bytes. In this case, PRTX entries will be used to display the remainder of the data that was not displayed in the PRCT entry. Each PRTX trace entry can show a maximum of 32 bytes. If a frame exceeds this length, as many successive PRTX trace entries are generated as are necessary to display all the data received. An example is shown in Figure B-8.

```

3      90.630 PRCT REQUEST ID=NONE
          I-FRAME ADDR=A   P/F=0 N(R)=7 N(S)=2
          0 3.E 4 1 0.0 1 1 7.E E 3 1.1 0 4 0.8 0 0 0.5 5
          ETX d   DLE SOH ETB n   1   DLE @   NUL NUL U
          0 0.3 1 1 0.4 0 8 0.0 0 1 0.0 7 1 2.0 0 0 0.C 1
          NUL 1   DLE @   NUL NUL DLE BEL DC2 NUL NUL A
          0 4.0 0 0 0.0 0 3 9.C 2 0 8.0 0
          EOT NUL NUL NUL 9   B   BS NUL

4      90.630 PRTX REQUEST ID=NONE
          0 0.0 0 0 8.0 0 0 0.0 0 2 E.5 D
          NUL NUL BS NUL NUL NUL .   ]

```

Figure B-8. PRTX Trace Entry

In the example, we see that the data displayed in the PRTX entry is continued from the preceding PRCT entry. Whenever possible, the CSDUMP program converts the octal or hexadecimal codes to an ASCII character and displays the character beneath its code.

## PSTX Trace Entries

PSTX trace entries are generated only when the sent frame is longer than 32 bytes. In this case, PSTX entries will be used to display the remainder of the data that was not displayed in the PSCT entry. Each PSTX trace entry can show a maximum of 32 bytes. If a frame exceeds this length, as many successive PSTX trace entries are generated as are necessary to display all of the sent data. An example is shown in Figure B-9.



```

9      89.920 PSCT REQUEST ID=NONE
        I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=5
        0 1.4 A 1 0.0 1 A 4.4 3 5 0.5 5 3 D.3 2 2 E.2 0
        SOH J   DLE SOH $   C   P   U   =   2   .
        4 3.4 F 4 E.4 E 4 5.4 3 5 4.3 D 3 1.2 E 2 0.4 D
        C O N N E C T = 1 . M
        4 F.4 E 2 C.2 0 4 1.5 0 5 2.2 0
        O N , A P R

10     89.920 PSTX REQUEST ID=NONE
        3 1.3 8 2 C.2 0 3 1.3 9 3 8.3 3 2 C.2 0 2 0.3 4
        1 8 , 1 9 8 3 , 4
        3 A.3 0 3 5.2 0 5 0.4 D 0 D.0 A
        : 0 5 P M CR LF
    
```

Figure B-9. PSTX Trace Entry

In our example, we see that the data displayed in the PSTX entry is continued from the preceding PSCT entry. In this case, the MPE logoff message is being sent to the remote PAD terminal.

Whenever possible, the CSDUMP program converts the octal or hexadecimal codes to an ASCII character and displays the character beneath its code.

## PCMP Trace Entries

A PCMP trace entry is generated each time a CS driver call is completed. An example is shown in Figure B-10.

```

5      2.840 PCMP REQUEST ID=%042253(!44AB)
        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
        #MSG SENT=0      #MSG RECV=1      STATE=CONNECTED
        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0
    
```

Figure B-10. PCMP Trace Entry.

The meanings of the various items are as follows:

- |                              |  |
|------------------------------|--|
| ERROR CODE:                  | The code of the request's most recent Recoverable Error (see Section I of the <i>HP 3000 Computer Systems Communications Handbook</i> for CS error codes.) |
| LAST RECOVERABLE ERROR CODE: | If a Recoverable Error occurred previously, this identifies its error code.  |
| # MSG SENT:                  | The total number of frames that have so far been sent for this connection. (In the example, 0 frames have been sent.)                                      |

# MSG RECV:

The total number of frames that have been received so far for this connection. (In the example, 1 frames have been received.)

STATE:

The line state after the completion of the user request. In the example it is in the connected state.

# RECOVERABLE ERR:

The total number of Recoverable Errors that have occurred so far for this connection. (In the example, 0 Recoverable Errors have occurred.)

# IRRECOVERABLE ERR:

The total number of Irrecoverable Errors that have occurred so far for this connection. (In the example, 0 Irrecoverable Errors have occurred.)

## End of Trace and Line Information Messages

The END OF TRACE . . . message appears in the listing when the line being traced is closed. The message tells you the decimal logical number of the device (15 in the example in Figure B-11) and indicates that the line's activities are no longer being monitored by the trace facility. It is followed by the Line Information Display, showing the state of the line just before tracing was stopped.

```
*****
* END OF TRACE FOR DEVICE 15 *
*****

*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
* LINE NUMBER: 3          LOGICAL DEV. NUMBER: 15  *
* DEV. TYPE: 17          SUBTYPE: 1   VER: A.05.09 *
*           0123456789012345 *
* COPTIONS: 0000100101000000 *
* AOPTIONS: 0000001100001101 *
* DOPTIONS: 0000000000000111 *
* NETWORK'ID: 0000000000000000 *
* NUMBUFFERS: 242          BUFFSIZE: 66   (WORDS) *
* INSPEED: 4800           OUTSPEED: 4800 *
* MISCARRAY:             RECEIVE TIMEOUT: 20 SECS. *
*                       LOCAL TIMEOUT: 60 SECS. *
*                       CONNECT TIMEOUT: 900 SECS. *
*                       RESPONSE TIMEOUT: 300 HSECS. *
*                       LINE BID TIMEOUT: 60 SECS. *
*                       NO. ERROR RETRIES: 20 *
*                       CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                       DATA-SET-READY DELAY: DISABLED. *
*                       TRANSMISSION MODE: DUPLEX. *
*                       MMSTAT TRACE FACILITY: ENABLED. *
* DRIVERNAME: IOINPO *
* DOWNLOAD FILE: CSDLAPBO *
* CTRACEINFO: ENTRIES=16   MASK=011111000 *
*             TYPE OF TRACE = ALL, NOWRAP *
* PHONELIST: ENTRIES=0     INDEX=0 *
* IDLIST: ENTRIES=0        INDEX=0 *
* ERRORCODE: RECOVERABLE=0 IRRECOVERABLE=0 *
* MSGSENT: 47             MSGRECV: 51 *
* RECOVERERRORS: 0       IRRECOVERERRORS: 0 *
*****
```

Figure B-11. End of Trace and Closing Line Information.

Note the counts of messages sent (47), messages received (51), and recoverable and irrecoverable errors (0 and 0) that have transpired while the trace facility was enabled.

## THE DSDUMP FORMATTING PROGRAM

DSDUMP formats the trace file to allow for easy and quick analysis. DSDUMP can analyze all levels of X.25 protocol headers, if you wish, as defined in the 1980 CCITT X.25 Recommendation such as diagnostic packets, modulo 8 and 128 packet formats, all 18 X.3 parameters, and PAD call requests and call confirmation packets. In general for X.25, DSDUMP allows you to troubleshoot any line problems or software protocol problems more easily than with CSDUMP, which requires you to analyze all protocol headers except for the Level 2 LAP-B header.

### NOTE

DSDUMP segmentation requires a code segment size of 15285K words. This may require your system manager to reconfigure your system table size.

## Defining a Trace File for DSDUMP

DSDUMP allows you to specify the trace file by using a file equation for the formal file designator CSTRACE or DSDUMP will prompt the user (interactive mode only) for the name of the trace file if the CSTRACE file does not exist.

A sample file equation is:

```
FILE CSTRACE=DSTRCnnn.PUB.SYS
```

## Defining a Trace Listing File for DSDUMP

The formal file designator of the trace listing file for DSDUMP is DSLIST. In interactive mode, a file equation for the output file is not permitted. Instead, you will be prompted for the output destination.

## Initiating the DSDUMP Program

### RUNNING DSDUMP INTERACTIVELY

When the DSDUMP program is being run interactively, it is not necessary to specify any file equations. DSDUMP commands can be read from a file, but a file equation for the output file is not permitted. The program will ask you whether you want the output to go to the terminal or to the printer. If you specify a printer, but you do not specify a device, the program defaults to dev class LP. If no priority is specified, the default is 6.

After the FOPEN for the DSLIST file has been performed, you will be prompted for commands. If the output is going to the terminal, then after all messages have been listed, the CSTRACE file is rewound and you will be prompted for additional DSDUMP commands.

## Tracing and DSN/X.25 Line Activity

If the output is going to the printer, you will be prompted for a device, which can be any configured device. If you choose to have your output go to an HP 2680 Laser Printer, you can select an environment. Otherwise, or if you have no environment preference, press **(RETURN)**. You will then be prompted for PRIORITY; press **(RETURN)** for default, or enter a value. All DSDUMP commands will be echoed on your listing.

While in Interactive Mode (that is, not a stream job), and a printer is enabled, pressing **(CONTROL)Y** will make the HP 3000 ask for a new output device, then close the output file, then return you to the command interface. If you are in Interactive Mode without a printer, pressing **(CONTROL)Y** will return control to the user.

### RUNNING DSDUMP IN BATCH MODE

A file equation for the CS trace file is required for batch jobs. However, file equations for the command input file and the output files are optional, since the default designators are \$STDINX and \$STDLIST. The formal designator for the list file is DSLIST. The HELP, NEWDEV, and NEWFILE commands are ignored in batch mode. Any error in the command file will terminate the program. If command input is supplied on \$STDINX, it must be terminated by :EOD if the GO command is not used.

## DSDUMP Commands

The following commands can be used with the DSDUMP program:

CLEAR	Resets all options to their default values.
DATA=	Places a limit on the number of words in the data section to be printed per frame.
DISPLAY	Shows the status of all commands and parameters.
ERRORS	To format only those requests whose completion entry has an error code not equal to zero.
EXIT	Terminates the program. This command may be used any time the user is prompted.
GO	To get out of the Command Interpreter and start the dump.
HELP	For an explanation of the commands. HELP does not accept any parameters. (Only allowed in a session.)
ONES	To include idle (-1) DS messages in the dump. The default is to exclude these messages. This command does not apply to X.25.
NEWDEV	To specify a new output device. (Only allowed in a session.)
NEWFILE	To change CSTRACE files. (Only allowed in a session.)
RANGE	To find the trace times of the first and last entries.
TIMES=	To format only those frames whose trace times are within the specified range.
TYPES=	To format only the specified type of DS messages. This command does not apply to X.25. The parameters for the TYPES= command are:

COMMANDS	Formats the REMOTE command, Remote HELLO, Remote BYE, message, <b>(BREAK)</b> message, RESUME message, ABORT message, KILLJOB message, and First Slave DSOPEN.
PTOP	Formats PREAD, PWRITE, PCONTROL, POPEN, PCLOSE, ACCEPT, and REJECT.
RFA	Formats RFA and IMAGE messages.
RTE	Formats RTE DS messages.
QTOQ	Formats QTOQ (NFT) DS messages.
TERMINAL	Formats PRINT messages, READ and READX messages, and FCONTROLS to the terminal.

**ENABLE  
DISABLE**

ENABLE turns options on, and DISABLE turns options off. Otherwise, the syntax for these commands is identical.

Options can be ENABLED or DISABLED using either = or ,. That is, DISABLE=PLINE and DISABLE,PLINE are identical.

Only one option is permitted for each ENABLE or DISABLE command. Additional options are flagged as errors.

The options for the ENABLE/DISABLE commands are:

PROMPT	Prompt facility that asks the user, at the end of a full screen, whether or not to continue. Type n or N to stop. The program will return to the DSDUMP Command Interpreter. This command applies for interactive mode only.
PLINE	Controls the printing of the line status after calling PRINTLINEINFO.
ASCII	If enabled, ASCII format will be used whenever possible.
OCTAL	As in ASCII, but using octal.
HEX	As in ASCII, but using hexadecimal.

Options to control the level(s) of protocol to be displayed:

DEFAULT Using ENABLE=DEFAULT enables the following settings (explained in more detail below):

LEVEL2 LEVEL3 DS1 USERD PLINE ASCII OCTAL  
L3ALL all settings with an L2 prefix except L2STN

DISABLE=DEFAULT is meaningless, and is ignored.

LEVEL2 The X.25 level 2 display. Use ENABLE to see it, and DISABLE if you do not wish to see it.

## Tracing and DSN/X.25 Line Activity

**LEVEL3**            The X.25 level 3 display. Use **ENABLE** to see it, and **DISABLE** if you do not wish to see it.

**USERD**            Controls printing of the user data. The user data is contained in two areas: the first portion is contained in both the level 2 and level 3 display, while the remaining portion(s) is contained in the **PRTX/PSTX** entry(s). Thus, to see all of the user data, either level 2 or level 3 must be enabled. Otherwise, you would only see the last half of each display. For instance, to display level 3 and the user data, you could type the following:

```
DISABLE=LEVEL2
ENABLE=LEVEL3
DISABLE=L3ALL
ENABLE=L3DATA
GO
```

Or, to get the level 2 and user data display, you could type the following:

```
DISABLE=LEVEL3
DISABLE=L2ALL
ENABLE=L2CTX
ENABLE=LEVEL2
GO
```

Options to control defined subsets of Level 2 or Level 3 to be displayed:

**L2ALL**            Controls the entire level 2 display. Its primary use is when you only wish to see a single command. For example, you may only want to see level 2 **SABM** requests. You would type in the following commands:

```
DISABLE=L2ALL
ENABLE=L2SABM
GO
```

**L3ALL**            As in **L2ALL**, but for level 3.

**L3HIGH**          Controls the printing of the following packet types:

Call	Call Confirm
Clear	Clear Conf
Interrupt	Interr Conf
RNR	Reset
Reset Con	Diagnostic
Reject	

**L2SUP**            Controls level 2 supervisory calls (**RNR**, **RR**, and **REJ**).

Options to control Level 2 entry types to be displayed:

- L2CMP            Controls the display of Level 2 Completion (PCMP) entries.
- L2CTX           Controls the display of Level 2 control text (PRCT and PSCT) entries. The information field of these frames contains the header information and the user data display for Level 3. You should enable this option when you are displaying any Level 3 information.
- L2STN           Controls the display of Level 2 state transition (PSTN) entries. These entries make the trace file very long. HP suggests that you enable this option only upon request from your SE.
- L2TXT           Controls the display of Level 2 PSTX and PRTX entries. Does not affect user data display.

Options to control Level 2 frame types to be displayed:

- L2DISC          Controls the display of Level 2 disconnect (DISC) frames.
- L2DM            Controls the display of Level 2 Disconnect Mode (DM) frames.
- L2FRMR          Controls the display of Level 2 Frame Reject (FRMR) frames.
- L2REJ           Controls the display of Level 2 reject frames.
- L2RNR           Controls the display of Level 2 Receive Not Ready (RNR) frames.
- L2RR            Controls the display of Level 2 receive ready frames.
- L2UA            Controls the display of Level 2 Unnumbered Acknowledge (UA) frames.
- L2SABM          Controls the display of Level 2 Set Asynchronous Balanced Mode (SABM) frames.

Options to control Level 3 packet types to be displayed:

- L3INT           Controls the display of Level 3 interrupt packets.
- L3CALL          Controls the display of Level 3 call request packets.
- L3DATA          Controls the display of Level 3 data packets. These frames contain the header information and some of the user data display for Level 3.
- L3RESET        Controls the display of Level 3 reset packets.



## Tracing and DSN/X.25 Line Activity

Several commands can be combined on one line if they are separated with a semicolon (;). All parameters for a command must be on the same line. When the PINS= command or the TYPES= command is entered several times, it does not cancel the previous command, but instead is added to the previous parameters. The PINS= command checks for duplicate PINS. A new TIMES= or DATA= command, however, does rewrite the previous command. If a colon (:) is typed in the first column of a line, that line is assumed to contain an MPE command. An End-of-File will initiate the dump. COMFILE is the formal designator for the command input file. The default designator is \$STDINX. The command file may be equated to \$NULL if no options are desired.

A sample file equation for the Command Interpreter is:

```
:FILE COMFILE=command file name
```

## Formatted DSDUMP Trace Listing

Sequence of commands used to generate example:

```
:FILE CSTRACE=DSTRC100.PUB.SYS
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO. MON, APR 18, 1983 4:06 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP30131A.00.00
OUTPUT LISTING TO PRINTER OR TERMINAL?P
DEVICE?LP
ENVIRONMENT?RETURN
PRIORITY?RETURN
```

```
>GO
>EXIT
:
```

- or -

```
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO. MON, APR 18, 1983 4:06 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP30131A.00.00
PLEASE ENTER CSTRACE FILE:DSTRC100.PUB.SYS
OUTPUT LISTING TO PRINTER OR TERMINAL?P
DEVICE?LP
ENVIRONMENT?RETURN
PRIORITY?RETURN
```

```
>GO
>EXIT
:
```

### EXAMPLE

```
HEWLETT-PACKARD CO. MON, APR 18, 1983, 4:06 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP30131A.01.00
TRACE FILE IS DSTRC100.PUB.SYS
TRACE DATE IS MON, APR 18, 1983, 4:03 PM
CS LDEV = 15
DOWNLOAD FILE IS CSDLAPB0
```

```
>GO
```

Sent text is on the left, received text on the right

```
*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
* LINE NUMBER: 3 LOGICAL DEV. NUMBER: 15 *
* DEV. TYPE: 17 SUBTYPE: 1 VER: A.05.09 *
* 0123456789012345 *
* COPTIONS: 0000100101000000 *
* AOPTIONS: 0000001100001101 *
* DOPTIONS: 0000000000000111 *
* NETWORK'ID: 0000000000000000 *
* NUMBUFFERS: 242 BUFFSIZE: 66 (WORDS) *
```

Figure B-12. DSDUMP Trace Listing.

Tracing and DSN/X.25 Line Activity

```

* INSPEED: 600          OUTSPEED: 600          *
* MISCARRAY:          RECEIVE TIMEOUT: 20 SECS. *
*                   LOCAL TIMEOUT: 60 SECS.  *
*                   CONNECT TIMEOUT: 900 SECS. *
*                   RESPONSE TIMEOUT: 300 HSECS. *
*                   LINE BID TIMEOUT: 60 SECS. *
*                   NO. ERROR RETRIES: 20      *
*                   CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                   DATA-SET-READY DELAY: DISABLED. *
*                   TRANSMISSION MODE: DUPLEX. *
*                   MMSTAT TRACE FACILITY: ENABLED. *
* DRIVERNAME: IOINPO *
* DOWNLOAD FILE: CSDLAPBO *
* CTRACEINFO: ENTRIES=16 MASK=011111000 *
*                   TYPE OF TRACE = ALL, NOWRAP *
* PHONELIST: ENTRIES=0 INDEX=0 *
* IDLIST: ENTRIES=0 INDEX=0 *
* ERRORCODE: RECOVERABLE=0 IRRECOVERABLE=0 *
* MSGSENT: 0          MSGRCV: 0 *
* RECOVERERRORS: 0    IRRECOVERERRORS: 0 *

```

\*\*\*\*\*

oo

```

o PCMP          STATE=DISCON.  o
o 2.12          LEVEL 2. ID=%041630 !4398o
o Error Code=   0   Last Recov Err=0 o
o # MSG Sent=0   # MSG Rec=0       o
o # Recov Err=0 # Irrec Errs=0     o

```

oo

oo

```

o PCMP          STATE=DISCON.  o
o 2.14          LEVEL 2. ID=%041233 !429Bo
o Error Code=   0   Last Recov Err=0 o
o # MSG Sent=0   # MSG Rec=0       o
o # Recov Err=0 # Irrec Errs=0     o

```

oo

```

+++++
+ PSCT  SABM          P/F=0      +
+ 2.68          LEVEL 2.          DCE +
+++++

```

+++++

```

+ PRCT  UA          P/F=0      +
+ 2.73          LEVEL 2.          DCE +

```

+++++

```

+ PRCT  I Frame N(R)= 0 P=0 N(S)= 0 +
+ 2.84          LEVEL 2.          DTE +

```

```

+ SCT/RCT Control Frame data display +
+ 020.000 373.007 372.000          +
+ DLE.NUL !!! .BEL !!! .NUL          +

```

+++++ LEVEL 3. +++++

```

* Length=8 Packet ID=251 %373 !FB *
* Type=Restart Request & Restart Ind. *
* Log Channel No=0 %000000 !0000 *
* Restart Cause =7 %000007 !0007 *

```

Figure B-12. DSDUMP Trace Listing (continued).

```

* Network Operational *
* Diagnostic Code=250 %000372 !00FA *
* TELENET. Line Stat Chng of down to up*
*****
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 2.84 LEVEL 2. ID=%042253 !44ABo
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=0 # MSG Rec=1 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooo

+++++
+ PSCT RR N(R)= 1 P/F=0 +
+ 2.85 LEVEL 2. DTE +
+++++
+++++
+ PSCT I Frame N(R)= 1 P=0 N(S)= 0 +
+ 2.86 LEVEL 2. DCE +
+ SCT/RCT Control Frame data display +
+ 020.000 373.000 372.000 +
+ DLE.NUL !!! .NUL !!! .NUL +
+++++
* Length=8 Packet ID=251 %373 !FB *
* Type=Restart Request & Restart Ind. *
* Log Channel No=0 %000000 !0000 *
* Restart Cause =0 %000000 !0000 *
* DTE Restart *
* Diagnostic Code=250 %000372 !00FA *
* TELENET. Line Stat Chng of down to up*
*****

+++++
+ PRCT RR N(R)= 1 P/F=0 +
+ 2.92 LEVEL 2. DCE +
+++++
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 2.92 LEVEL 2. ID=%042711 !45C9o
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=1 # MSG Rec=1 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PRCT I Frame N(R)= 1 P=0 N(S)= 1 +
+ 51.44 LEVEL 2. DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 013.356 061.020 100.200 +
+ DLE.SOH VT .!!! 1.DLE @.!!! +
+ 000.125 000.061 020.100 200.000 +
+ NUL. U NUL. 1 DLE. @ !!! .NUL +
+ 020.007 010.001 001.000 041.005 +
+ DLE.BEL BS .SOH SOH.NUL !.ENQ +
+ 002.006 010.001 041.000 +
+ STX.ACK BS .SOH !.NUL +
+++++
LEVEL 3. +++++

```

Figure B-12. DSDUMP Trace Listing (continued).

Tracing and DSN/X.25 Line Activity

```

* Length=32 Packet ID=11 %013 !0B *
* Type=Call Request and Incoming Call *
* Log Channel No=1 %000001 !0001 *
* Calling Address= 31104080005500 *
* Called Address= 31104080001007 *
* Facilities=%000001 *
* Facilities=%000001 *
* Facilities=%000000 *
* Facilities=%000041 *
* Facilities=%000005 *
* Facilities=%000002 *
* Facilities=%000006 *
* Facilities=%000010 *
* Call Request Packet is a PAD Request *
*** WARN: PAD: DS1 Display Suppressed *
* Call User Data *
* 001.041 000. *
* SOH. ! NUL. *
*****
^ PRTX LIMIT=138 Entry Length=2 ^
^ 000.003 ^
^ NUL ETX ^
*****
o PCMP STATE=CONN. o
o 51.44 LEVEL 2. ID=%042062 !4432o
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=1 # MSG Rec=2 o
o # Recov Err=0 # Irrec Errs=0 o
*****
+++++
+ PSCT RR N(R)= 2 P/F=0 +
+ 51.45 LEVEL 2. DTE +
+++++
+ PSCT I Frame N(R)= 2 P=0 N(S)= 1 +
+ 51.56 LEVEL 2. DCE +
+ SCT/RCT Control Frame data display +
+ 020.001 017.000 +
+ DLE.SOH SI .NUL +
+++++ LEVEL 3. ++++++
* Length=6 Packet ID=15 %017 !0F *
* Type=Call Accepted *
* Log Channel No=1 %000001 !0001 *
*****
+++++
+ PRCT RR N(R)= 2 P/F=0 +
+ 51.62 LEVEL 2. DCE +
+++++
o PCMP STATE=CONN. o
o 51.62 LEVEL 2. ID=%041452 !432Ao
o Error Code= 0 Last Recov Err=0 o

```

Figure B-12. DSDUMP Trace Listing (continued).

```

o # MSG Sent=2          # MSG Rec=2          o
o # Recov Err=0        # Irrec Errs=0        o
oooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PRCT      I Frame N(R)= 2 P=0 N(S)= 2 +
+ 53.56          LEVEL 2.                      DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 000.015                               +
+ DLE.SOH  NUL.CR                               +
+++++
* Length=6 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=0 P(S)=0 Q=0 M=0 D=0 *
* User Data Display *
* 015. *
* CR . *
*****
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 53.57          LEVEL 2. ID=%042314 !44CCo
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=2 # MSG Rec=3 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooo

+++++
+ PSCT      RR      N(R)= 3 P/F=0 +
+ 53.57          LEVEL 2.                      DTE +
+++++
+ PSCT      I Frame N(R)= 3 P=0 N(S)= 2 +
+ 54.74          LEVEL 2.                      DCE +
+ SCT/RCT Control Frame data display +
+ 220.001 040.002 001.001 002.001 +
+ !!! .SOH .STX SOH.SOH STX.SOH +
+ 003.002 004.000 005.001 006.001 +
+ ETX.STX EOT.NUL ENQ.SOH ACK.SOH +
+ 007.001 010.000 011.000 012.000 +
+ BEL.SOH BS .NUL HT .NUL LF .NUL +
+ 014.001 +
+ FF .SOH +
+++++
* Length=28 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=1 P(S)=0 Q=1 M=0 D=0 *
* Set PAD Message Code *
* Ref=1 Value=1 Character DLE *
* PAD Recall using a character *
* Ref=2 Value=1 Echo Is Selected *
* Echo Control (Enable or Disable) *
* Ref=3 Value=2 Character CR *
* Selection of Data Forwarding Signal *
* Ref=4 Value=0 Delay in 20Ths/Second*

```

Figure B-12. DSDUMP Trace Listing (continued).

Tracing and DSN/X.25 Line Activity

```

* Idle Timer Delay Selection *
* Ref=5 Value=1 Use of X-ON/X-OFF *
* Ancillary Device Control *
* Ref=6 Value=1 Service Signal to DTE*
* Supression of PAD Service Signals *
* Ref=7 Value=1 Interrupt upon Break *
* Operation of PAD after Break of DTE *
* Ref=8 Value=0 Normal Data Delivery *
* Discard Output. Can Discard or Not *
* Ref=9 Value=0 No Padding after CR *
* Padding After Carriage Return *
* Ref=10 Value=0 No Line Folding *
* Line Folding *
* Ref=12 Value=1 Use of X-ON/OFF is on*
* Flow control PAD by Start-Stop DTE *
*** WARN: PAD: DS1 Display Suppressed *
*****
+++++
+ PSCT I Frame N(R)= 3 P=0 N(S)= 3 +
+ 54.80 LEVEL 2. DCE +
+ SCT/RCT Control Frame data display +
+ 020.001 042.015 012.015 012.000 +
+ DLE.SOH ".CR LF .CR LF .NUL +
+++++ LEVEL 3. ++++++
* Length=10 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=1 P(S)=1 Q=0 M=0 D=0 *
* User Data Display *
* 015.012 015.012 000. *
* CR .LF CR .LF NUL. *
*****

+++++
+ PRCT RR N(R)= 3 P/F=0 +
+ 54.84 LEVEL 2. DCE +
+++++
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 54.84 LEVEL 2. ID=%042151 !4469o
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=3 # MSG Rec=3 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PRCT RR N(R)= 4 P/F=0 +
+ 54.86 LEVEL 2. DCE +
+++++
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 54.86 LEVEL 2. ID=%040200 !4080o
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=4 # MSG Rec=3 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo

```

Figure B-12. DSDUMP Trace Listing (continued).

```

+++++
+ PRCT      I Frame N(R)= 4 P=0 N(S)= 3 +
+ 55.22      LEVEL 2.                      DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 041.130                          +
+ DLE.SOH   !. X                              +
+++++ LEVEL 3. ++++++
* Length=6 Packet ID=1 %001 !01 *
* Type=DTE/DCE Receive Ready (RR) *
* Log Channel No=1 %000001 !0001 *
* P(R)=1 %000001 !1 *
*****
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 55.22 LEVEL 2. ID=%042075 !443Do
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=4 # MSG Rec=4 o
o # Recov Err=0 # Irrec Errs=0 o
oooooooooooooooooooooooooooooooooooooooooooo

+++++
+ PSCT      RR      N(R)= 4 P/F=0          +
+ 55.23      LEVEL 2.                      DTE +
+++++
+++++
+ PSCT      I Frame N(R)= 4 P=0 N(S)= 4 +
+ 55.26      LEVEL 2.                      DCE +
+ SCT/RCT Control Frame data display +
+ 020.001 044.072                          +
+ DLE.SOH   $. :                              +
+++++ LEVEL 3. ++++++
* Length=6 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=1 P(S)=2 Q=0 M=0 D=0 *
* User Data Display *
* 072. *
* :. *
*****

+++++
+ PRCT      I Frame N(R)= 4 P=0 N(S)= 4 +
+ 55.27      LEVEL 2.                      DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 101.356                          +
+ DLE.SOH   A.!!!                              +
+++++ LEVEL 3. ++++++
* Length=6 Packet ID=1 %001 !01 *
* Type=DTE/DCE Receive Ready (RR) *
* Log Channel No=1 %000001 !0001 *
* P(R)=2 %000002 !2 *
*****
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 55.27 LEVEL 2. ID=%041307 !42C7o
o Error Code= 0 Last Recov Err=0 o

```

Figure B-12. DSDUMP Trace Listing (continued).



Tracing and DSN/X.25 Line Activity

```

o # MSG Sent=4      # MSG Rec=5      o
o # Recov Err=0    # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PSCT      RR      N(R)= 5 P/F=0      +
+ 55.28     LEVEL 2.                    DTE +
+++++
+ PRCT      RR      N(R)= 5 P/F=0      +
+ 55.32     LEVEL 2.                    DCE +
+++++
ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
o PCMP                                STATE=CONN.      o
o 55.32     LEVEL 2. ID=%041172 !427Ao
o Error Code= 0      Last Recov Err=0      o
o # MSG Sent=5      # MSG Rec=5      o
o # Recov Err=0    # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PRCT      I Frame N(R)= 5 P=0 N(S)= 5 +
+ 55.51     LEVEL 2.                    DTE +
+ SCT/RCT Control Frame data display +
+ 020.001  141.130
+ DLE.SOH  a. X
+++++ LEVEL 3. ++++++
* Length=6 Packet ID=1 %001 !01 *
* Type=DTE/DCE Receive Ready (RR) *
* Log Channel No=1 %000001 !0001 *
* P(R)=3 %000003 !3 *
*****
ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
o PCMP                                STATE=CONN.      o
o 55.51     LEVEL 2. ID=%042342 !44E2o
o Error Code= 0      Last Recov Err=0      o
o # MSG Sent=5      # MSG Rec=6      o
o # Recov Err=0    # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PSCT      RR      N(R)= 6 P/F=0      +
+ 55.52     LEVEL 2.                    DTE +
+++++
+ PRCT      I Frame N(R)= 5 P=0 N(S)= 6 +
+ 58.92     LEVEL 2.                    DTE +
+ SCT/RCT Control Frame data display +
+ 020.001  142.150  145.154  154.157 +
+ DLE.SOH  b. h     e. l     l. o +
+ 040.155  141.156  141.147  145.162 +
+ . m     a. n     a. g     e. r +
+ 056.163  171.163  015.002
+ .. s     y. s CR .STX
+++++ LEVEL 3. ++++++
* Length=24 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *

```

Figure B-12. DSDUMP Trace Listing (continued).

```
* Log Channel No=1          %000001 !0001 *
* P(R)=3 P(S)=1 Q=0 M=0 D=0 *
* User Data Display *
* 150.145 154.154 157.040 155.141 *
* h. e l. l o. m. a *
* 156.141 147.145 162.056 163.171 *
* n. a g. e r. . s. y *
* 163.015 002. *
* s.CR STX. *
*****
```

- (Several entries have
- been intentionally
- omitted.)

```
+++++
+ PSCT I Frame N(R)= 2 P=0 N(S)= 5 +
+ 89.92 LEVEL 2. DCE +
+ SCT/RCT Control Frame data display +
+ 020.001 244.103 120.125 075.062 +
+ DLE.SOH !!! C P. U =. 2 +
+ 056.040 103.117 116.116 105.103 +
+ .. C. O N. N E. C +
+ 124.075 061.056 040.115 117.116 +
+ T. = 1. . M O. N +
+ 054.040 101.120 122.040 +
+ ,. A. P R. +
```

```
+++++ LEVEL 3. +++++
* Length=32 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=5 P(S)=2 Q=0 M=0 D=0 *
* User Data Display *
* 103.120 125.075 062.056 040.103 *
* C. P U. = 2. . C *
* 117.116 116.105 103.124 075.061 *
* O. N N. E C. T =. 1 *
* 056.040 115.117 116.054 040.101 *
* .. M. O N. , . A *
* 120.122 040. *
* P. R . *
```

```
*****
^ PSTX LIMIT=138 Entry Length=20 ^
^ 061.070 054.040 061.071 070.063 ^
^ 1 8 , 1 9 8 3 ^
^ 054.040 040.064 072.060 065.040 ^
^ , 4 : 0 5 ^
^ 120.115 015.012 ^
^ P M CR LF ^
*****
```

```
+++++
+ PRCT RR N(R)= 6 P/F=0 +
+ 90.05 LEVEL 2. DCE +
+++++
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo
```

Figure B-12. DSDUMP Trace Listing (continued).



```

+ 90.40          LEVEL 2.                DCE +
+++++
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP          STATE=CONN.             o
o 90.40          LEVEL 2. ID=%042635 !459Do
o Error Code=    0   Last Recov Err=0   o
o # MSG Sent=47   # MSG Rec=50         o
o # Recov Err=0   # Irrec Errs=0       o
oooooooooooooooooooooooooooooooooooooooooooo
+++++
+ PRCT          I Frame N(R)= 7 P=0 N(S)= 2 +
+ 90.63          LEVEL 2.                DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 027.356 061.020 100.200 +
+ DLE.SOH ETB.!!! 1.DLE @.!!! +
+ 000.125 000.061 020.100 200.000 +
+ NUL. U NUL. 1 DLE. @ !!! .NUL +
+ 020.007 022.000 000.301 004.000 +
+ DLE.BEL DC2.NUL NUL.!!! EOT.NUL +
+ 000.000 071.302 010.000 +
+ NUL.NUL 9.!!! BS .NUL +
+++++
* Length=32 Packet ID=23 %027 !17 *
* Type=DTE/DCE Clear Confirmation *
* Log Channel No=1 %000001 !0001 *
*****
^ PRTX LIMIT=138 Entry Length=8 ^
^ 000.000 010.000 000.000 056.135 ^
^ NUL NUL BS NUL NUL NUL . ] ^
*****
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP          STATE=CONN.             o
o 90.64          LEVEL 2. ID=%041465 !4335o
o Error Code=    0   Last Recov Err=0   o
o # MSG Sent=47   # MSG Rec=51         o
o # Recov Err=0   # Irrec Errs=0       o
oooooooooooooooooooooooooooooooooooooooooooo

```

```

+++++
+ PSCT          RR          N(R)= 3 P/F=0 +
+ 90.64          LEVEL 2.                DTE +
+++++
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP          STATE=CONN.             o
o 122.47         LEVEL 2. ID=%042574 !457Co
o Error Code=    0   Last Recov Err=0   o
o # MSG Sent=47   # MSG Rec=51         o
o # Recov Err=0   # Irrec Errs=0       o
oooooooooooooooooooooooooooooooooooooooooooo
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP          STATE=CONN.             o
o 122.49         LEVEL 2. ID=%041205 !4285o
o Error Code=    0   Last Recov Err=0   o
o # MSG Sent=47   # MSG Rec=51         o

```

Figure B-12. DSDUMP Trace Listing (continued).

Tracing and DSN/X.25 Line Activity

```
o # Recov Err=0      # Irrec Errs=0      o  
oooooooooooooooooooooooooooooooooooooooooooooooooooooooooooo  
>  
EXIT
```

Figure B-12. DSDUMP Trace Listing (continued).

## DSDUMP Listing Header Message

The output heading provides information about the trace file being analyzed.

```
HEWLETT-PACKARD CO.  MON, APR 18, 1983,  4:06 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP320131A.00.00
TRACE FILE IS DSTRC100.PUB.SYS
TRACE DATE IS MON, APR 18, 1983,  4:03 PM
CS LDEV = 15
  DOWNLOAD FILE IS CSDLAPB0
>GO
```

Figure B-13. Output Heading.

Item	Meaning
MON, APR 18, 1983,  4:06 PM	Date and time of DSDUMP execution.
TRACE FILE IS ...	Provides name of trace file being analyzed. In our case, it is DSTRC100.PUB.SYS.
TRACE DATE IS ...	Date trace file was created. In our case, it is MON, APR 18, 1983,  4:03 PM.
CS LDEV = ...	LDEV of device being traced. In our case, it is 15.
DOWNLOAD FILE IS ...	Defines INP download file being used. In our case, it is CSDLAPB0 (LAP-B).
>GO	DSDUMP command that the user has entered.

## Begin Tracing and Line Information Messages

**Sent text is on the left, received text on the right**

```
*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
*  LINE NUMBER: 3      LOGICAL DEV. NUMBER: 15  *
*  DEV. TYPE: 17      SUBTYPE: 1  VER: A.05.09  *
*                    0123456789012345          *
*  COPTIONS: 0000100101000000                *
*  AOPTIONS: 0000001100001101                *
*  DOPTIONS: 00000000000000111              *
*  NETWORK ID: 0000000000000000              *
*  NUMBUFFERS: 242      BUFFSIZE: 66  (WORDS) *
*  INSPEED: 600         OUTSPEED: 600        *
*  MISCARRAY:          RECEIVE TIMEOUT: 20   SECS. *
*                    LOCAL TIMEOUT: 60     SECS. *
*                    CONNECT TIMEOUT: 900   SECS. *
*                    RESPONSE TIMEOUT: 300  HSECS. *
*                    LINE BID TIMEOUT: 60   SECS. *
*                    NO. ERROR RETRIES: 20   *
*                    CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                    DATA-SET-READY DELAY: DISABLED. *
*                    TRANSMISSION MODE: DUPLEX. *
*                    MMSTAT TRACE FACILITY: ENABLED. *
*  DRIVENAME: IOINPO *
*  DOWNLOAD FILE: CSDLAPBO *
*  CTRACEINFO:  ENTRIES=16      MASK=011111000 *
*                    TYPE OF TRACE = ALL, NOWRAP *
*  PHONELIST:  ENTRIES=0      INDEX=0 *
*  IDLIST:     ENTRIES=0      INDEX=0 *
*  ERRORCODE:  RECOVERABLE=0  IRRECOVERABLE=0 *
*  MSGSENT: 0      MSGRECV: 0 *
*  RECOVERERRORS: 0      IRRECOVERERRORS: 0 *
*****
```

**Figure B-14. Line Information Display.**

Item	Meaning
Sent text is on the left...	Implies PSCT and PSTX entries will appear on the left side of the page, while PRCT and PRTX entries will appear on the right side.

The line information display that follows can be interpreted as in CSDUMP. (See pages B-15 and B-16.)

## DSDUMP Trace Entry Format

The following is the data format as displayed by DSDUMP from the CS trace file for PRCT/PRTX or PSCT/PSTX entries. Refer to Figure B-5 for the data format in the CSTRACE file.

```

+++++
+ PRCT/PSCT                control field values  +
+ time stamp              LEVEL 2.              +
+                          Addr 1              +
+ Information field display                               +
+ (if present)                                           +
+-----+-----+-----+-----+-----+-----+
+-----+-----+-----+-----+-----+-----+
* length 2                Type field value 3          *
*                                                                *
* Type field interpretation                               *
* Logical channel identifier (LCI) 4=value 3          *
* Packet-specific information (see Appendix D)         *
*                                                                *
* If type=Data and not X.29 (Q=0) then USER DATA *
* is displayed with a . between left and right *
* bytes of each word                                   *
*****
^ PRTX/PSTX  DATA limit value  length 2          ^
^                                     (set by user) ^
^                                     ^             ^
^ USER DATA continued                    ^
^-----+-----+-----+-----+-----+-----+

```

optional  
(appears  
only if  
Level 2 is  
an I-frame)

appears only  
if frame is  
longer than  
32 bytes -->

### Footnotes:

<sup>1</sup> Addr A = DTE } as defined  
 Addr B = DCE } by LAP-B

<sup>2</sup> where length = length of trace entry in bytes

<sup>3</sup> where value is given in decimal, %octal, or !hexadecimal

<sup>4</sup> where LCI=  
 0 1 2 3 4 5 6 7 8 9 10 11

L C G N	L C N
---------	-------

Figure B-15. The DSDUMP Data Format.



## PRCT Trace Entries

```

+++++++
+ PRCT      I Frame N(R)= 5 P=0 N(S)= 6 +
+ 58.92      LEVEL 2.                      DTE +
+ SCT/RCT Control Frame data display +
+ 020.001 142.150 145.154 154.157 +
+ DLE.SOH b. h e. l l. o +
+ 040.155 141.156 141.147 145.162 +
+ . m a. n a. g e. r +
+ 056.163 171.163 015.002 +
+ .. s y. s CR .STX +
+++++++ LEVEL 3. ++++++
* Length=24 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=3 P(S)=1 Q=0 M=0 D=0 *
* User Data Display *
* 150.145 154.154 157.040 155.141 *
* h. e l. l o. m. a *
* 156.141 147.145 162.056 163.171 *
* n. a g. e r. . s. y *
* 163.015 002. *
* s.CR STX. *
*****

```

Figure B-16. PRCT Trace Entry.

The X.25 Level 2 header interpretation here tells us that ADDR=DTE (CSDUMP will interpret it as being Address A), and that this is an I frame, so the Information field is present and is displayed.

The X.25 Level 3 header interpretation tells us this is a data packet on logical channel 1 (or virtual circuit 1) and since Q=0 the user data is displayed. In our example, the user is logging on.

Note that one FCS byte does appear after the user's RETURN, with a value of 002 in our example.

## PSCT Trace Entries

```

+++++
+ PSCT      I Frame N(R)= 3 P=0 N(S)= 2 +
+ 54.74      LEVEL 2.          DCE +
+ SCT/RCT Control Frame data display +
+ 220.001  040.002  001.001  002.001 +
+ !!!SOH    .STX  SOH.SOH  STX.SOH  +
+ 003.002  004.000  005.001  006.001 +
+ ETX.STX  EOT.NUL  ENQ.SOH  ACK.SOH  +
+ 007.001  010.000  011.000  012.000 +
+ BEL.SOH  BS .NUL  HT .NUL  LF .NUL  +
+ 014.001                                     +
+ FF .SOH                                       +
+++++ LEVEL 3. +++++
* Length=28  Packet ID=0  %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1  %000001 !0001 *
* P(R)=1  P(S)=0  Q=1  M=0  D=0 *
* Set PAD Message Code *
* Ref=1  Value=1  Character DLE *
* PAD Recall using a character *
* Ref=2  Value=1  Echo Is Selected *
* Echo Control (Enable or Disable) *
* Ref=3  Value=2  Character CR *
* Selection of Data Forwarding Signal *
* Ref=4  Value=0  Delay in 20Ths/Second*
* Idle Timer Delay Selection *
* Ref=5  Value=1  Use of X-ON/X-OFF *
* Ancillary Device Control *
* Ref=6  Value=1  Service Signal to DTE*
* Suppression of PAD Service Signals *
* Ref=7  Value=1  Interrupt upon Break *
* Operation of PAD after Break of DTE *
* Ref=8  Value=0  Normal Data Delivery *
* Discard Output. Can Discard or Not *
* Ref=9  Value=0  No Padding after CR *
* Padding After Carriage Return *
* Ref=10 Value=0  No Line Folding *
* Line Folding *
* Ref=12 Value=1  Use of X-ON/OFF is on*
* Flow control PAD by Start-Stop DTE *
*** WARN: PAD: DS1 Display Suppressed *
*****

```

Figure B-17. PSCT Trace Entry.

The X.25 Level 2 header interpretation here tells us ADDR=DCE (CSDUMP will interpret it as being Address B), and that this is an I frame, so the Information field is present and is displayed.

The X.25 Level 3 header interpretation tells us this is a data packet on logical channel 1, and since Q=1 this is an X.29 packet. The X.29 packet is fully analyzed by DSDUMP. In our example, the HP 3000 is setting the PAD parameters as defined in X.3.

## Tracing and DSN/X.25 Line Activity

The **WARN: PAD: DS1 Display Suppressed** message is displayed after all X.29 packets. See Appendix D for the X.29 packet formats.

## PRTX Trace Entries

In our example, the PAD terminal user never entered any data that was long enough to generate a PRTX entry.

## PSTX Trace Entries

```

+++++++
+ PSCT      I Frame N(R)= 2 P=0 N(S)= 5 +
+ 89.92      LEVEL 2.                      DCE +
+ SCT/RCT Control Frame data display +
+ 020.001 244.103 120.125 075.062 +
+ DLE.SOH !!! . C   P. U   =. 2 +
+ 056.040 103.117 116.116 105.103 +
+ ..      C. O   N. N   E. C +
+ 124.075 061.056 040.115 117.116 +
+ T. =    1. .   . M   O. N +
+ 054.040 101.120 122.040          +
+ ,.      A. P   R.                  +
+++++++ LEVEL 3. ++++++++
* Length=32 Packet ID=0 %000 !00 *
* Type=DTE/DCE Data Packet *
* Log Channel No=1 %000001 !0001 *
* P(R)=5 P(S)=2 Q=0 M=0 D=0 *
* User Data Display *
* 103.120 125.075 062.056 040.103 *
* C. P   U. =    2. .   . C *
* 117.116 116.105 103.124 075.061 *
* O. N   N. E   C. T   =. 1 *
* 056.040 115.117 116.054 040.101 *
* ..      M. O   N. ,   . A *
* 120.122 040.          *
* P. R   .          *
*****
^ PSTX LIMIT=138      Entry Length=20 ^
^ 061.070 054.040 061.071 070.063 ^
^ 1 8 , 1 9 8 3 ^
^ 054.040 040.064 072.060 065.040 ^
^ , 4 : 0 5 ^
^ 120.115 015.012 ^
^ P M CR LF ^
^

```

Figure B-18. PSTX Trace Entry.

The PSTX is just a continuation of the user data display in the PSCT entry. The information within the PSTX entry is the value of LIMIT, which is the number of words of data the user wants displayed (138 words is the default value) and Entry Length, which is the number of bytes in the PSTX entry. In our example, the user data being sent to the terminal is the MPE log off message.

## PCMP Trace Entries

```
ooooooooooooooooooooooooooooooooooooooooooooooooooooo
o PCMP STATE=CONN. o
o 2.84 LEVEL 2. ID=%042253 !44ABo
o Error Code= 0 Last Recov Err=0 o
o # MSG Sent=0 # MSG Rec=1 o
o # Recov Err=0 # Irrec Errs=0 o
ooooooooooooooooooooooooooooooooooooooooooooooooooooo
```

**Figure B-19. PCMP Trace Entry.**

DSDUMP displays all the information in the PCMP entry as recorded by the CS trace facility with no further analysis. See the CSDUMP discussion (page B-22) for explanation of this entry.

## End of Trace and Line Information Messages

```

*****
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****
* LINE NUMBER: 3          LOGICAL DEV. NUMBER: 15 *
* DEV. TYPE: 17         SUBTYPE: 1   VER: A.05.09 *
*           0123456789012345 *
* COPTIONS: 0000100101000000 *
* AOPTIONS: 0000001100001101 *
* DOPTIONS: 0000000000000111 *
* NETWORK'ID: 0000000000000000 *
* NUMBUFFERS: 242        BUFFSIZE: 66 (WORDS) *
* INSPEED: 600          OUTSPEED: 600 *
* MISCARRAY:           RECEIVE TIMEOUT: 20 SECS. *
*                   LOCAL TIMEOUT: 60 SECS. *
*                   CONNECT TIMEOUT: 900 SECS. *
*                   RESPONSE TIMEOUT: 300 HSECS. *
*                   LINE BID TIMEOUT: 60 SECS. *
*                   NO. ERROR RETRIES: 20 *
*                   CLEAR-TO-SEND DELAY: 00.0 SECS. *
*                   DATA-SET-READY DELAY: DISABLED. *
*                   TRANSMISSION MODE: DUPLEX. *
*                   MMSTAT TRACE FACILITY: ENABLED. *
* DRIVERNAME: IOINPO *
* DOWNLOAD FILE: CSDLAPB0 *
* CTRACEINFO: ENTRIES=16      MASK=011111000 *
*                   TYPE OF TRACE = ALL, NOWRAP *
* PHONELIST: ENTRIES=0        INDEX=0 *
* IDLIST: ENTRIES=0          INDEX=0 *
* ERRORCODE: RECOVERABLE=0    IRRECOVERABLE=0 *
* MSGSENT: 47                MSGRCV: 51 *
* RECOVERERRORS: 0          IRRECOVERERRORS: 0 *
*****

```

Figure B-20. End of Trace and Closing Line Information.

The Line Information Display gives the state of the line just before tracing was stopped. Note the counts of messages sent, messages received, and recoverable and irrecoverable errors that have transpired while the trace facility was enabled.



# SAMPLE NETWORK SUBSCRIPTION FORMS

APPENDIX

C

The following pages provide sample subscription forms for the TELENET and TRANSPAC networks. These samples are to give you an idea of the information needed to set up a network.



# RACCORDEMENT DIRECT MODE PAQUET

**CLIENT** n° d'Abonné \_\_\_\_\_ Numéro de feuillet P 001  
 n° de lotto 01/01  
 Nom ou Raison sociale Hewlett Packard Création   
 Correspondant Technique Joël DUBOIS Modification  10215 02 02 00  
 Suppression  n° de contrat  
 Transfert   
 Annuaire  Ancien n° d'Abonné \_\_\_\_\_

**EQUIPEMENT A CONNECTER** Modification   
 Correspondant technique local Joël DUBOIS N° Tel 76258141  
 Raison sociale Hewlett Packard Poste 218  
 Adresse 5 Avenue Raymond Chanas  
 Bât \_\_\_\_\_ Escalier \_\_\_\_\_ Etage \_\_\_\_\_ Pièce \_\_\_\_\_  
 Code postal 38320 Commune EYBENS Uniligne   
 Multiligne   
 Identification de l'équipement HP-1000 Code \_\_\_\_\_ Nombre de lignes \_\_\_\_\_  
 Débit par ligne 9600

**PARAMETRES DE RACCORDEMENT** Modification

<p>REPARTITION DES VOIES LOGIQUES</p> <ul style="list-style-type: none"> <li>• Nombre de voies CVP _____</li> <li>• Nombre de voies CVC : arrivée <u>3</u>, mixte <u>3</u>, départ <u>3</u></li> </ul>	<p>AUTRES FACILITES</p> <ul style="list-style-type: none"> <li>Acceptation taxation au demandé <input checked="" type="checkbox"/></li> <li>Groupe fermé d'Abonnés (GFA) <input type="checkbox"/></li> </ul>	<p>CM _____ MOD _____ N.LIA _____</p> <p>NO.LI _____</p> <p>N° PTT _____</p> <p>FACT Code <u>12</u> Cité <u>01</u></p>																		
<p>PARAMETRES DU NIVEAU TRAME</p> <ul style="list-style-type: none"> <li>• ENVELOPPE                             <ul style="list-style-type: none"> <li>mode HDLC <input checked="" type="checkbox"/></li> <li>mode CARACTERE <input type="checkbox"/></li> <li>type CRC <input type="checkbox"/> 1 <input type="checkbox"/> 2 <input type="checkbox"/></li> </ul> </li> <li>• PROCEDURE                             <ul style="list-style-type: none"> <li>LAP (uniligne) _____</li> <li>Taille de fenêtre (K) <u>7</u></li> <li>Temporisateur (T) <u>1600</u></li> <li>Multiligne _____</li> <li>Taille de fenêtre (F) _____</li> <li>Numéro de Profil _____</li> </ul> </li> </ul>	<p>PARAMETRES DE CONTROLE DE FLUX</p> <ul style="list-style-type: none"> <li>1 - Longueur de paquet <u>128</u></li> <li>2 - Taille de fenêtre niveau paquet <u>2</u></li> <li>3 - Choix des classes de débit par défaut de la liaison pour l'ensemble des CV                             <ul style="list-style-type: none"> <li>• a l'émission n° <u>10</u></li> <li>• a la réception n° <u>10</u></li> </ul> </li> <li>4 - Sélection par l'appelant des classes de débit par communication <input type="checkbox"/></li> <li>5 - Indication des classes de débit au demandé <input type="checkbox"/></li> <li>6 - Sélection des tailles de paquet et fenêtre par CV fonctions choisies LP _____ W _____</li> <li>7 - Choix des classes de débit par CVP (pour chaque CVP dont l'abonné est responsable) <input type="checkbox"/></li> </ul>	<p><b>LISTE DES GFA</b> Modification <input type="checkbox"/></p> <table border="1"> <thead> <tr> <th rowspan="2">Numero absolu de GFA</th> <th rowspan="2">Numero local du GFA</th> <th colspan="2">Acces avec</th> </tr> <tr> <th>demande d'appel</th> <th>appel entrant</th> </tr> </thead> <tbody> <tr> <td>_____</td> <td><u>00</u></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>_____</td> <td>_____</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> <tr> <td>_____</td> <td>_____</td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> </tr> </tbody> </table>	Numero absolu de GFA	Numero local du GFA	Acces avec		demande d'appel	appel entrant	_____	<u>00</u>	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>	_____	_____	<input type="checkbox"/>	<input type="checkbox"/>
Numero absolu de GFA	Numero local du GFA	Acces avec																		
		demande d'appel	appel entrant																	
_____	<u>00</u>	<input type="checkbox"/>	<input type="checkbox"/>																	
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>																	
_____	_____	<input type="checkbox"/>	<input type="checkbox"/>																	

DELAI CONTRACTUEL 25 (Sem) N° DE SEMAINE 146 DATE DE MISE EN SERVICE REELLE \_\_\_\_\_  
 RACCORDEMENT CLEF { OUI  / NON  , DEPEND DE LA MISE EN SERVICE DE P \_\_\_\_\_ OU DE P \_\_\_\_\_

**CIRCUITS VIRTUELS PERMANENTS**

C M S	ABONNE		IDENTIFICATION ABONNE DISTANT				CLASSE de DÉBIT		N° ABSOLU GFA	DATE DDE (Sem)	DATE DE MISE EN SERVICE
	N° VL du CVP	R	N° ABONNE	ou N° CONTRAT	FEUILLET	N° VL du CVP	E	R			
_____	_____	<input type="checkbox"/>	_____	_____	P_____	_____	_____	_____	_____	_____	_____
_____	_____	<input type="checkbox"/>	_____	_____	P_____	_____	_____	_____	_____	_____	_____
_____	_____	<input type="checkbox"/>	_____	_____	P_____	_____	_____	_____	_____	_____	_____

CADRE RESERVE A TRANSPAC

DATE ET PARAPHE CLIENT le <u>21/5/81</u> par <u>GAYRAUD</u>	DATE ET PARAPHE TRANSPAC A. MANKOWSKI <u>22 MAI 1981</u>
--	--



**transpac**

# RACCORDEMENT DIRECT MODE CARACTERE

## CLIENT

n° d'Abonné

Numéro de feuillet C-  
n° de folio

Nom ou Raison sociale

Création

Correspondant Technique

Modification

Suppression

Transfert

Annuaire

n° de contrat

Ancien n° d'Abonné

## EQUIPEMENT A CONNECTER

Modification

Correspondant technique local M.

N° Tél

Raison Sociale

Poste

Adresse

Terminal

Bât. Escalier Etage Pièce

Entrée basse vitesse d'ordinateur (EBVO)

Code postal Commune

Identification de l'équipement (code)

Débit de la ligne Entrées groupées Nombre

## MODEM ABONNE

Modification

- Débit inférieur ou égal à 300 bit/sec : MODEM fourni par l'abonné

Constructeur

Type N° Agrément

Install. N° Admission

- Débit supérieur à 300 bit/sec : MODEM fourni par TRANSPAC  
Mode d'installation : en coffret   
encastrable

CM MOD N.LIA

FACT.

Code Qté

N° PTT

## PARAMETRES DE RACCORDEMENT

Modification

Numéro de profil standard

Accès spécialisé

départ :

arrivée :

Acceptation taxation au demandé

Groupe fermé d'abonnés (GFA)

Ne pas remplir pour les E.B.V.O.

## LISTE DES GFA

Modification

N° ABSOLU de GFA	N° LOCAL GFA	Accès avec	
		demande d'appel	appel entrant
	00	<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>
		<input type="checkbox"/>	<input type="checkbox"/>

DÉLAI CONVENU POUR L'OPÉRATION DATE CONVENU (Sem) DATES DE MISE EN SERVICE RÉELLE

CADRE RÉSERVÉ A TRANSPAC

DATE ET PARAPHE CLIENT

DATE ET PARAPHE TRANSPAC



**transpac**

# GTE Telenet Interface Schedule

CUSTOMER NO. \_\_\_\_\_  
 ORDER NUMBER \_\_\_\_\_ Date April 3, 1981  
 Sales Representative Dennis Moore Tel. 408/255-6450  
 Systems Engineer Justin Simonds (Temp) Tel. 213/450-0606  
 Mktg. Svc. Rep. Nora Sowa Tel. 714/891-4481

Customer Name Hewlett-Packard Code \_\_\_\_\_  
 Mailing Address 19447 Pruneridge Avenue  
Cupertino, California 95014 Attn: Andre Schwager

Station Name Hewlett-Packard  
 Station Address 19447 Pruneridge Avenue  
Cupertino, California 95014

Floor & Room Bldg. 47 lower, DCO computer room (408/725-XXXX)

Customer Contact Bill Gard Tel. 408/725-8111  
 Software Contact Bill Gard Tel. 408/725-8111  
 Operations Contact Bill Gard Tel. 408/725-8111  
 Night Contact NA Tel. \_\_\_\_\_  
 Telco Contact George Alves or Gary Neil Tel. 408/725-8111

Host Computer Type \_\_\_\_\_ Operating System \_\_\_\_\_

Enter requested ID(s) in the section below:

\_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

### SERVICE CHARGES

**Non-Recurring Charges**

Access Facilities at TCO \$ 2245.00  
 TAC, TP1000, TP2200, TP4000 \_\_\_\_\_  
 TAC, TP or PPX Ports \_\_\_\_\_  
 Rotary Feature \_\_\_\_\_  
 Private Network Feature \_\_\_\_\_  
 Separate/ID Billing \_\_\_\_\_  
 Other \$ 200.00 discount on  
 installation of 2nd and 3rd line. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TOTAL \$ 2245.00

**Recurring Monthly Charges**

Access Facilities at TCO 2-9.6 \$ 3000.00  
 TAC, TP1000, TP2200, TP4000 \_\_\_\_\_  
 TAC, TP or PPX Ports \_\_\_\_\_  
 Rotary Feature \_\_\_\_\_  
 Private Network Feature \_\_\_\_\_  
 Detailed/Separate/ID Billing \_\_\_\_\_  
 Account Charge \_\_\_\_\_ 120.00  
 Other Surcharge for \_\_\_\_\_ 300.00  
 alternate TCO \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

TOTAL \$ 3420.00

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> New Installation | <input type="checkbox"/> Change Prior Order                     |
| <input type="checkbox"/> Additional Installation     | <input type="checkbox"/> Cancel Order                           |
| <input type="checkbox"/> Reconfiguration             | <input type="checkbox"/> Remove Service                         |
| <input type="checkbox"/> Other (See Comments)        | <input type="checkbox"/> Move <input type="checkbox"/> In-House |

REQUESTED INSTALLATION DATE June 25, 1981

Will DTE accept *collect* In-WATS connections?  Yes  No

Will DTE accept *collect* connections?  Yes  No

### SERVICE REQUIRED Type of TCO Access Facilities

Dial Port:  Dial-in TCO 2-SFO, 1-Alternate  
 Dial-out  
 Dedicated Access Facility:  2 - 9600 bps  
 Speed 1 - 4800 bps

COMMENTS/SPECIAL REQUIREMENTS \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

All cancellations require 30 days written notice to the authorized GTE Telenet representative.

**ORDERED**

By Authorized Customer Representative:  
 Signature \_\_\_\_\_  
 Name Andre O. Schwager  
 Title Operations Manager  
 Date 4/6/81

**ACCEPTED**

By Authorized Customer Representative:  
 Signature \_\_\_\_\_  
 Name \_\_\_\_\_  
 Title \_\_\_\_\_  
 Date \_\_\_\_\_

Customer Hewlett-Packard

SYNCHRONOUS SERVICE

Network Address \_\_\_\_\_ Framing  HDLC  BSC: Control Characters  
 Direct Dial-in Number \_\_\_\_\_  ASCII  EBCDIC  
 Host Interface Package Hewlett-Packard Link Access Procedure:  LAP  LAPB  
 X.25 Full-duplex, Continuous Carrier Packet Level:  Pure X.25  Telenet Enhanced  
 Other \_\_\_\_\_ ITI:  Pure X.3  Telenet Enhanced  
 Y-Cable Required?  Yes  No Maximum Number of Virtual Circuits? 20

CONFIGURATION FOR  TP 1000/3  TP 1000/7  TP 1000/14  TP 2200  TP 4000  TAC  PPX

	Requested Network Address	Assigned Network Address	Dial-in Standard Emulator	Term. ID or Host ID	No. of Ports*	Speed	Parity	Code Assign.	Direct Dial-in Number
1									
2									
3									
4									
5									

\*On a given host port entry, if the number of ports is greater than one, a rotary is required.

Cabinet Required?  Yes  No Cable Length (between modem and TAC/TP)  15'  30'  50'

ASYNCHRONOUS DEDICATED ACCESS FACILITY OR PRIVATE DIAL PORT

	Requested Network Address	Assigned Network Address	Dial-in Standard Emulator	Term. ID or Host ID	No. of Ports	Speed	Parity	Code Assign.	Direct Dial-in Number
1									

SE Signature and Comments \_\_\_\_\_

11/78

C-5



# PACKET FORMATS

APPENDIX

D

## X.25 PACKET FORMATS

### DATA

Q	D	0	1	L	C	G	N
LCN							
P(R)	M	P(S)	0				
USER DATA							

or

Q	D	1	0	L	C	G	N
LCN							
P(S)				0			
P(R)				M			
USER DATA							

### CALL CONFIRMATION

0	D	S	N	L	C	G	N
LCN							
0 0 0 0 1 1 1 1							
Calling				Called			
Addresses							

← Address Lengths

### RR (Receiver Ready)

0	0	0	1	L	C	G	N
LCN							
P(R) 0 0 0 0 1							

or

0	0	1	0	L	C	G	N
LCN							
0 0 0 0 0 0 0 1							
P(R)				0			

### CLEAR REQUEST

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 0 0 1 1							
Clearing Cause							
Diagnostic Code							

### CLEAR CONFIRMATION

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 0 1 1 1							

### RNR (Receiver Not Ready)

0	0	0	1	L	C	G	N
LCN							
P(R) 0 0 1 0 1							

or

0	0	1	0	L	C	G	N
LCN							
0 0 0 0 0 1 0 1							
P(R)				0			

### RESET REQUEST

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 1 0 1 1							
Resetting Cause							
Diagnostic Code							

### RESET CONFIRMATION

0	0	S	N	L	C	G	N
LCN							
0 0 0 1 1 1 1 1							

### REJ (Reject)

0	0	0	1	L	C	G	N
LCN							
P(R) 0 1 0 0 1							

or

0	0	1	0	L	C	G	N
LCN							
0 0 0 0 1 0 0 1							
P(R)				0			

### RESTART REQUEST

0	0	S	N	0	0	0	0
LCN							
0 0 0 0 0 0 0 0							
1 1 1 1 1 0 1 1							
Restarting Cause							
Diagnostic Code							

### RESTART CONFIRMATION

0	0	S	N	0	0	0	0
LCN							
0 0 0 0 0 0 0 0							
1 1 1 1 1 1 1 1							

### INT. (Interrupt)

0	0	S	N	L	C	G	N
LCN							
0 0 1 0 0 0 1 1							
USER DATA							

### INT. CONF (Interrupt Confirmation)

0	0	S	N	L	C	G	N
LCN							
0 0 1 0 0 1 1 1							

### CALL REQUEST

0	D	S	N	L	C	G	N
LCN							
0 0 0 0 1 0 1 1							
Calling				Called			
Addresses							

← Address Lengths

### INCOMING CALL FROM PAD

0	D	S	N	L	C	G	N
LCN							
0 0 0 0 1 0 1 1							
Calling				Called			
Addresses							
0 0 0 0 0 0 0 0							
0 0 0 0 0 0 0 1							

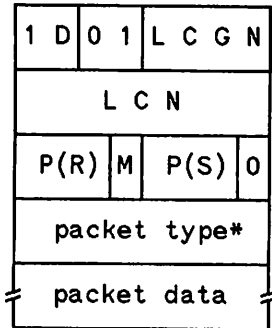
← Address Lengths

## X.29 PACKET FORMATS

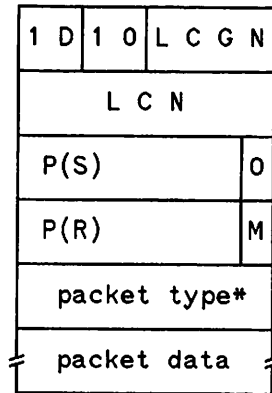
### \*X.29 Packet Types

- |                              |                           |
|------------------------------|---------------------------|
| 0 Parameters indication      | 4 Read parameters         |
| 1 Invitation to clear        | 5 Error                   |
| 2 Set parameter              | 6 Set and read parameters |
| 3 Indication of <b>BREAK</b> |                           |

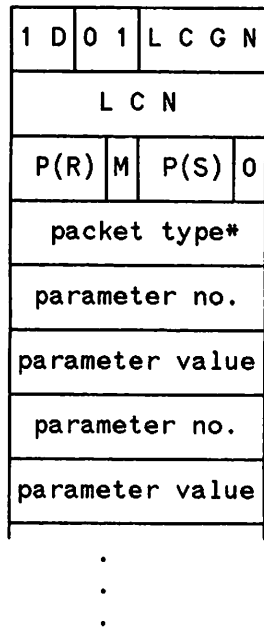
#### Generic MOD 8 X.29 packet



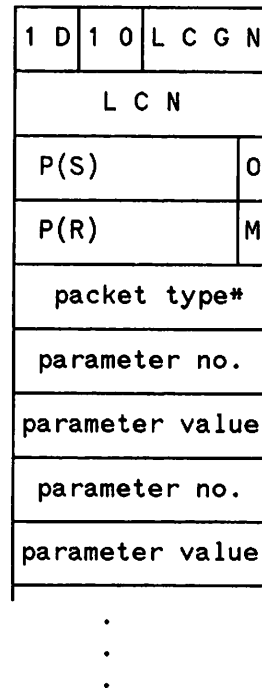
#### Generic MOD128 X.29 packet



#### MOD8 format for X.29 packet type 0,2, and 6



#### MOD128 format for X.29 packet type 0, 2, and 6



MOD8 format for X.29 packet type 1, 3, and 4

1	D	0	1	L	C	G	N
L C N							
P(R)		M	P(S)		0		
packet type*							

MOD128 format for X.29 packet type 1, 3, and 4

1	D	1	0	L	C	G	N
L C N							
P(S)						0	
P(R)						M	
packet type*							

MOD8 format for X.29 packet type 5

1	D	0	1	L	C	G	N
L C N							
P(R)		M	P(S)		0		
0 0 0 0 0 1 0 1							
error value							

MOD128 format for X.29 packet type 5

1	D	1	0	L	C	G	N
L C N							
P(S)						0	
P(R)						M	
0 0 0 0 0 1 0 1							
error value							

Coding and meaning of PAD error values

Meaning	Coding
	Bits 8 7 6 5 4 3 2 1
Received PAD message contained less than 8 bits	0 0 0 0 0 0 0 0
Unrecognized message code in received PAD message	0 0 0 0 0 0 0 1
Parameter field format of received PAD message was incorrect or incompatible with message code	0 0 0 0 0 0 1 0
Received PAD message did not contain an integral number of octets	0 0 0 0 0 0 1 1





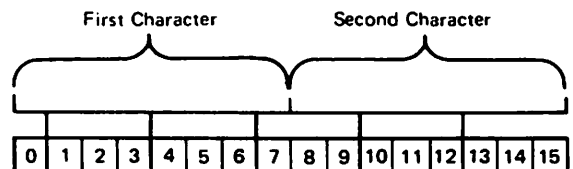
# ASCII CHARACTER SET

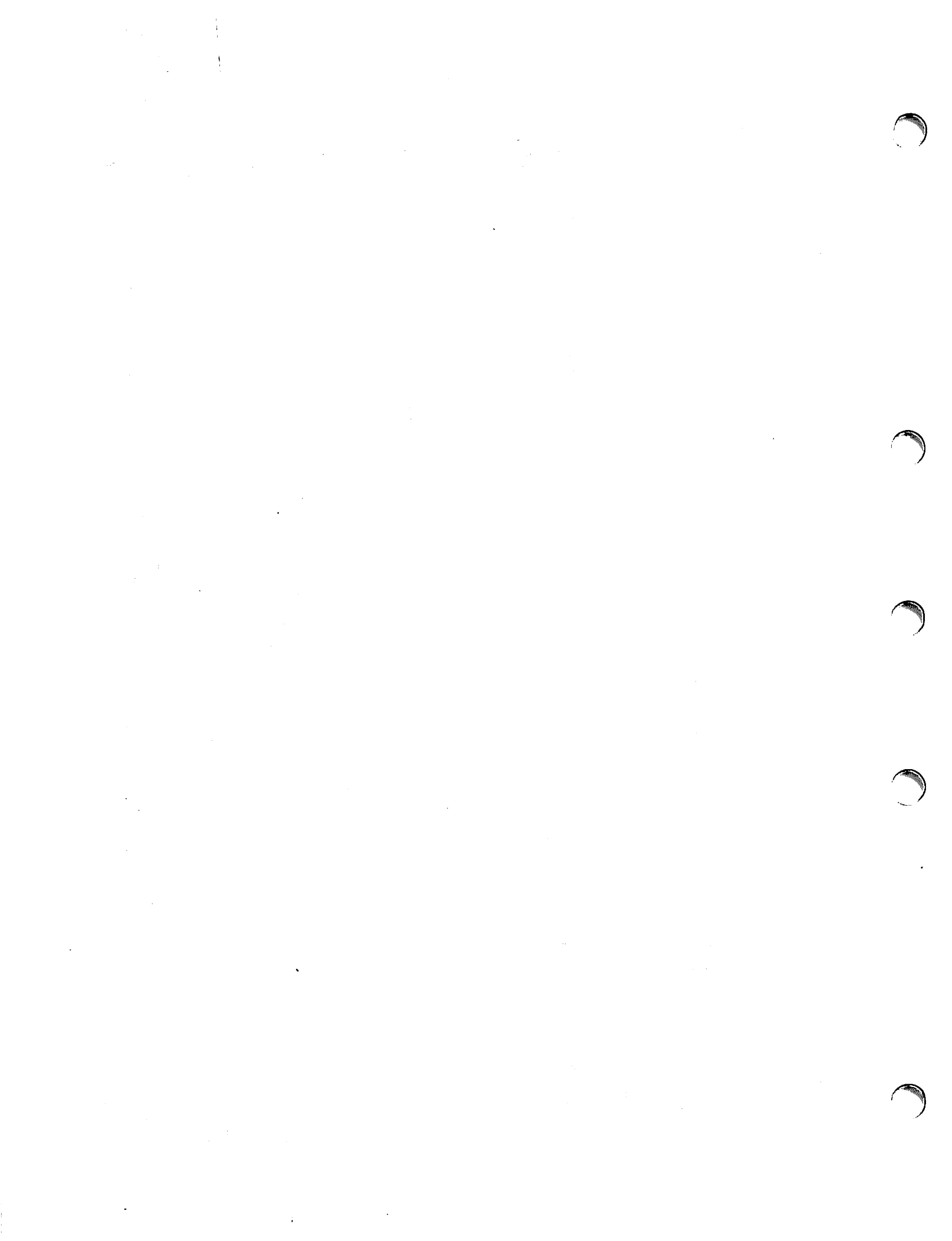
APPENDIX

E

ASCII Character	First Character Octal Equivalent	Second Character Octal Equivalent
A	040400	000101
B	041000	000102
C	041400	000103
D	042000	000104
E	042400	000105
F	043000	000106
G	043400	000107
H	044000	000110
I	044400	000111
J	045000	000112
K	045400	000113
L	046000	000114
M	046400	000115
N	047000	000116
O	047400	000117
P	050000	000120
Q	050400	000121
R	051000	000122
S	051400	000123
T	052000	000124
U	052400	000125
V	053000	000126
W	053400	000127
X	054000	000130
Y	054400	000131
Z	055000	000132
a	060400	000141
b	061000	000142
c	061400	000143
d	062000	000144
e	062400	000145
f	063000	000146
g	063400	000147
h	064000	000150
i	064400	000151
j	065000	000152
k	065400	000153
l	066000	000154
m	066400	000155
n	067000	000156
o	067400	000157
p	070000	000160
q	070400	000161
r	071000	000162
s	071400	000163
t	072000	000164
u	072400	000165
v	073000	000166
w	073400	000167
x	074000	000170
y	074400	000171
z	075000	000172
0	030000	000060
1	030400	000061
2	031000	000062
3	031400	000063
4	032000	000064
5	032400	000065
6	033000	000066
7	033400	000067
8	034000	000070
9	034400	000071
NUL	000000	000000
SOH	000400	000001
STX	001000	000002
ETX	001400	000003
EOT	002000	000004
ENQ	002400	000005

ASCII Character	First Character Octal Equivalent	Second Character Octal Equivalent
ACK	003000	000006
BEL	003400	000007
BS	004000	000010
HT	004400	000011
LF	005000	000012
VT	005400	000013
FF	006000	000014
CR	006400	000015
SO	007000	000016
SI	007400	000017
DLE	010000	000020
DC1	010400	000021
DC2	011000	000022
DC3	011400	000023
DC4	012000	000024
NAK	012400	000025
SYN	013000	000026
ETB	013400	000027
CAN	014000	000030
EM	014400	000031
SUB	015000	000032
ESC	015400	000033
FS	016000	000034
GS	016400	000035
RS	017000	000036
US	017400	000037
SPACE	020000	000040
!	020400	000041
"	021000	000042
#	021400	000043
\$	022000	000044
%	022400	000045
&	023000	000046
'	023400	000047
(	024000	000050
)	024400	000051
*	025000	000052
+	025400	000053
.	026000	000054
-	026400	000055
_	027000	000056
/	027400	000057
:	035000	000072
;	035400	000073
<	036000	000074
=	036400	000075
>	037000	000076
?	037400	000077
@	040000	000100
{	055400	000133
\	056000	000134
}	056400	000135
Δ	057000	000136
-	057400	000137
.	060000	000140
{	075400	000173
	076000	000174
}	076400	000175
~	077000	000176
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