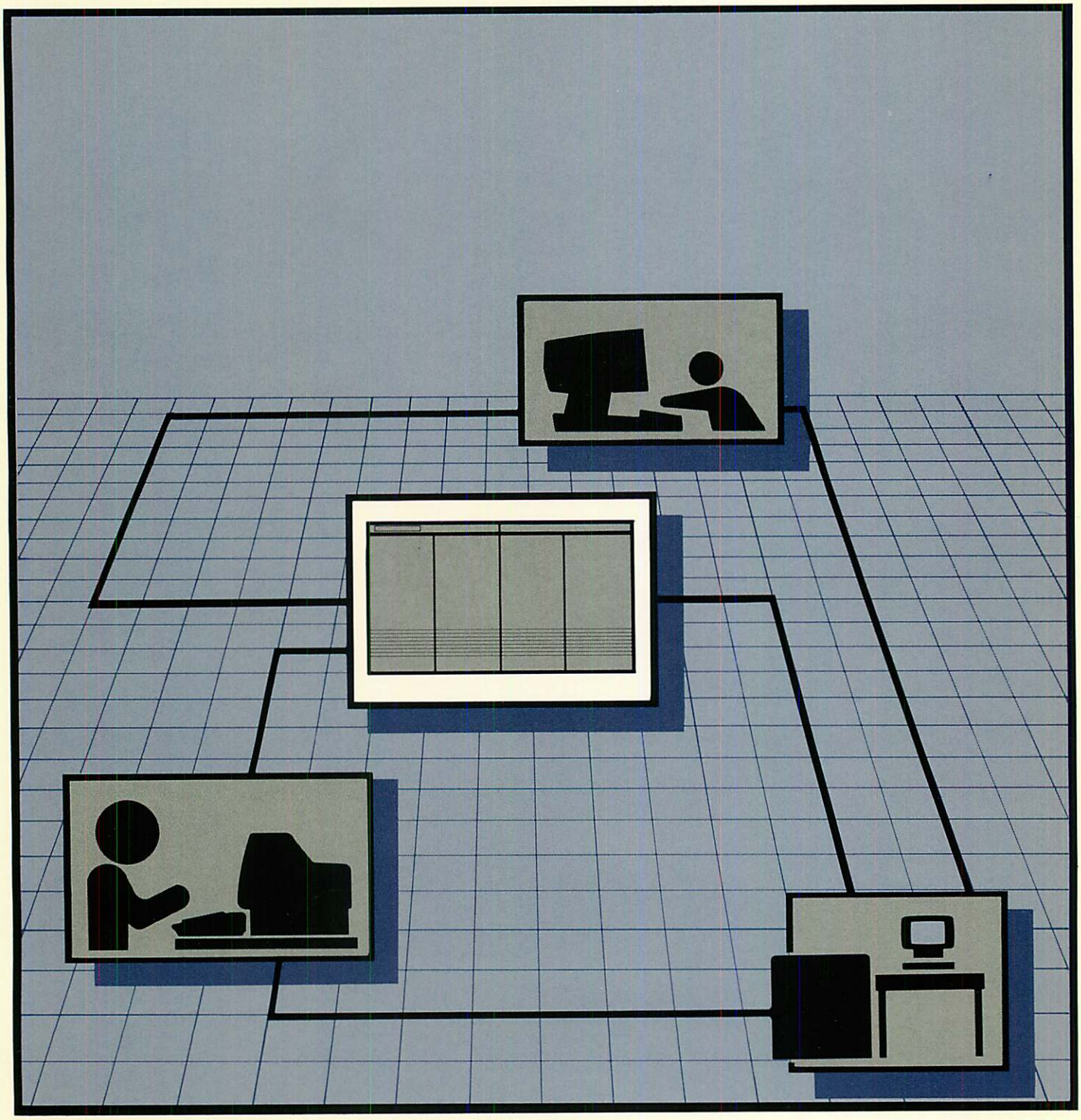
HP AdvanceNet

HEWLETT PACKARD

X.25 Link for the HP 3000

Reference Manual



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X.25 Link for the HP 3000

Reference Manual

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PRINTING HISTORY

New editions are complete revisions of the manual. Update packages, which are issued between editions, contain additional and replacement pages to be merged into the manual by the customer. The dates on the title page change only when a new edition or a new update is published. No information is incorporated into a reprinting unless it appears as a prior update; the edition does not change when an update is incorporated.

The software code printed alongside the date indicates the version level of the software product at the time the manual or update was issued. Many product updates and fixes do not require manual changes and, conversely, manual corrections may be done without accompanying product changes. Therefore, do not expect a one to one correspondence between product updates and manual updates.

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LIST OF EFFECTIVE PAGES

The List of Effective Pages gives the date of the current edition, and lists the dates of all changed pages. Unchanged pages are listed as "ORIGINAL". Within the manual, any page changed since the last edition is indicated by printing the date the changes were made on the bottom of the page. Changes are marked with a vertical bar in the margin. If an update is incorporated when an edition is reprinted, these bars and dates remain. No information is incorporated into a reprinting unless it appears as a prior update.

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ALL	ORIGINAL

PREFACE

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.

X.25 Link 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.

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

For both:

- *TurboIMAGE Reference Manual (32215-90050)*
- *Fundamental Data Communications Handbook (5957-4634)*
- *Data Communications Handbook Section G, X.25 Link (32187-90006)*

If you have DS/3000 software, you should use the following manuals:

- *DS/3000 HP 3000 to HP 3000 User/Programmer Reference Manual (32185-90001)*
- *DS/3000 HP 3000 to HP 3000 Network Administrator Manual (32185-90002)*

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 30244M Intelligent Network Processor (INP) Installation and Service Manual (30244-90002)*
- *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 *DS/3000 User/Programmer Reference Manual*). Other parts are completely new. The *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
nonitalics	Words in syntax statements which are not in italics must be entered exactly as shown. Punctuation characters other than brackets, braces and ellipses must also be entered exactly as shown. For example: `EXIT;`
italics	Words in syntax statements which are in italics denote a parameter which must be replaced by a user-supplied variable. For example: `CLOSE` *filename*
[ ]	An element inside brackets in a syntax statement is optional. Several elements stacked inside brackets means the user may select any one or none of these elements. For example: [A / B] User *may* select A or B or neither.
{ }	When several elements are stacked within braces in a syntax statement, the user must select one of those elements. For example: {A / B / C} User *must* select A or B or C.
...	A horizontal ellipsis in a syntax statement indicates that a previous element may be repeated. For example: [,*itemname*]...;
	In addition, vertical and horizontal ellipses may be used in examples to indicate that portions of the example have been omitted.
,	A shaded delimiter preceding a parameter in a syntax statement indicates that the delimiter **must** be supplied whenever (a) that parameter is included or (b) that parameter is omitted and any **other** parameter which follows is included. For example: *itema*[,*itemb*][,*itemc*] means that the following are allowed: *itema* *itema*,*itemb* *itema*,*itemb*,*itemc* *itema*,,*itemc*

CONVENTIONS (continued)

Δ

When necessary for clarity, the symbol Δ may be used in a syntax statement to indicate a required blank or an exact number of blanks. For example:

```
SET[(modifier)]Δ(variable);
```

underlining

When necessary for clarity in an example, user input may be underlined. For example:

```
NEW NAME? ALPHA
```

Brackets, braces or ellipses appearing in syntax or format statements which must be entered as shown will be underlined. For example:

```
LET var[[subscript]] = value
```

Output and input/output parameters are underlined. A notation in the description of each parameter distinguishes input/output from output parameters. For example:

```
CREATE (parm1,parm2,flags,error)
```

shading

Shading represents inverse video on the terminal's screen. In addition, it is used to emphasize key portions of an example.

The symbol may be used to indicate a key on the terminal's keyboard. For example, RETURN indicates the carriage return key.

CONTROL*char*

Control characters are indicated by CONTROL followed by the character. For example, CONTROL Y means the user presses the control key and the character Y simultaneously.

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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PUBLIC DATA NETWORKS AND X.25

SECTION 1

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.

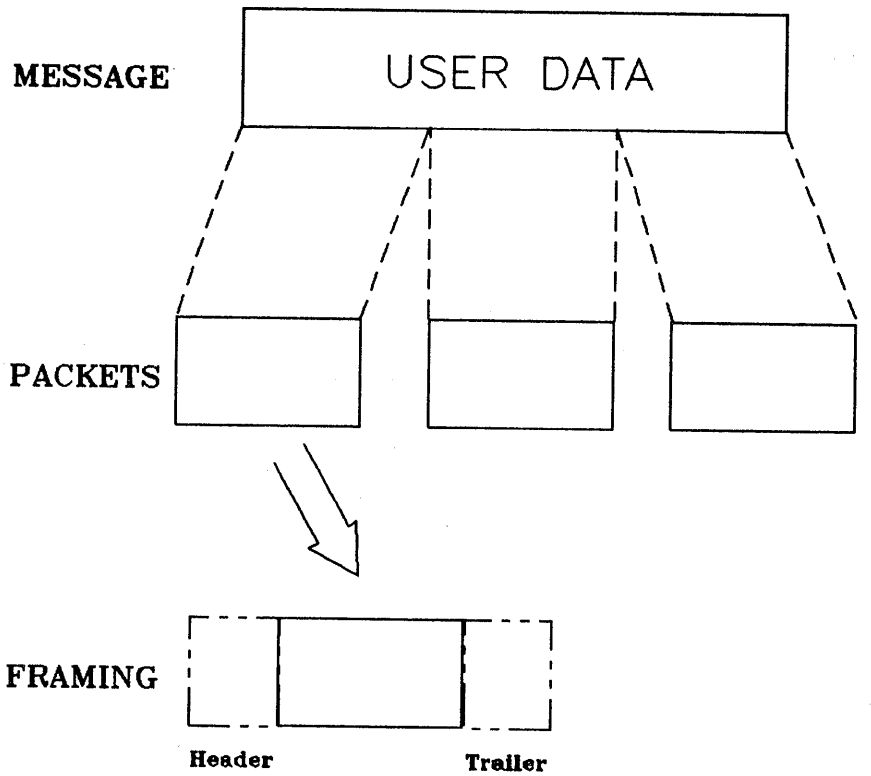


Figure 1-1. Making data into packets.

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

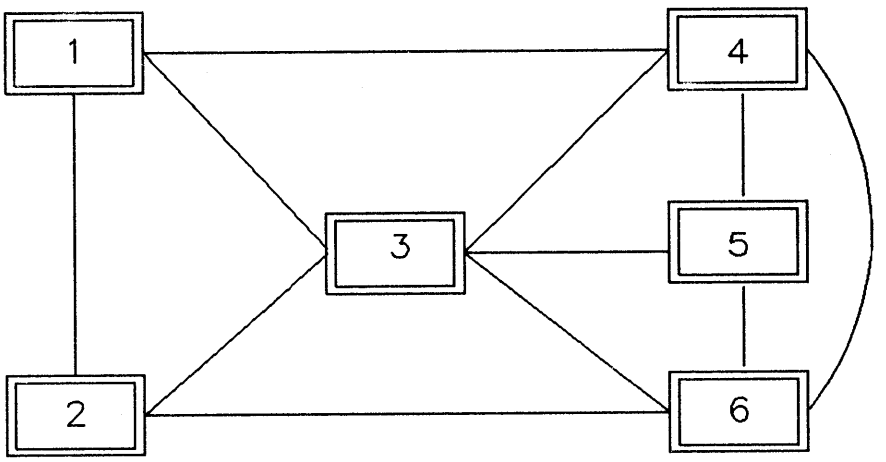


Figure 1-2. Systems without a PDN.

CONNECTING USER SYSTEMS
(with a PDN)

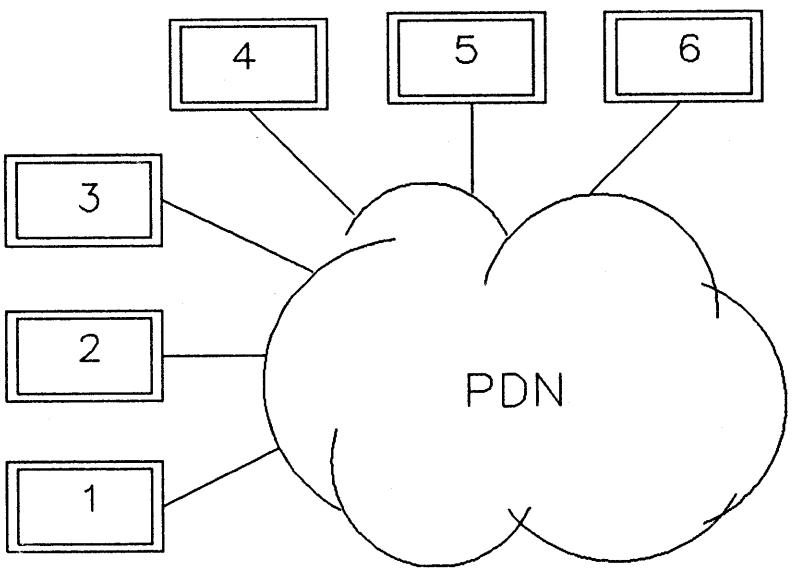


Figure 1-3. Systems with a PDN.

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. X.25 Link 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 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 DS/3000, 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

X.25 Link 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.

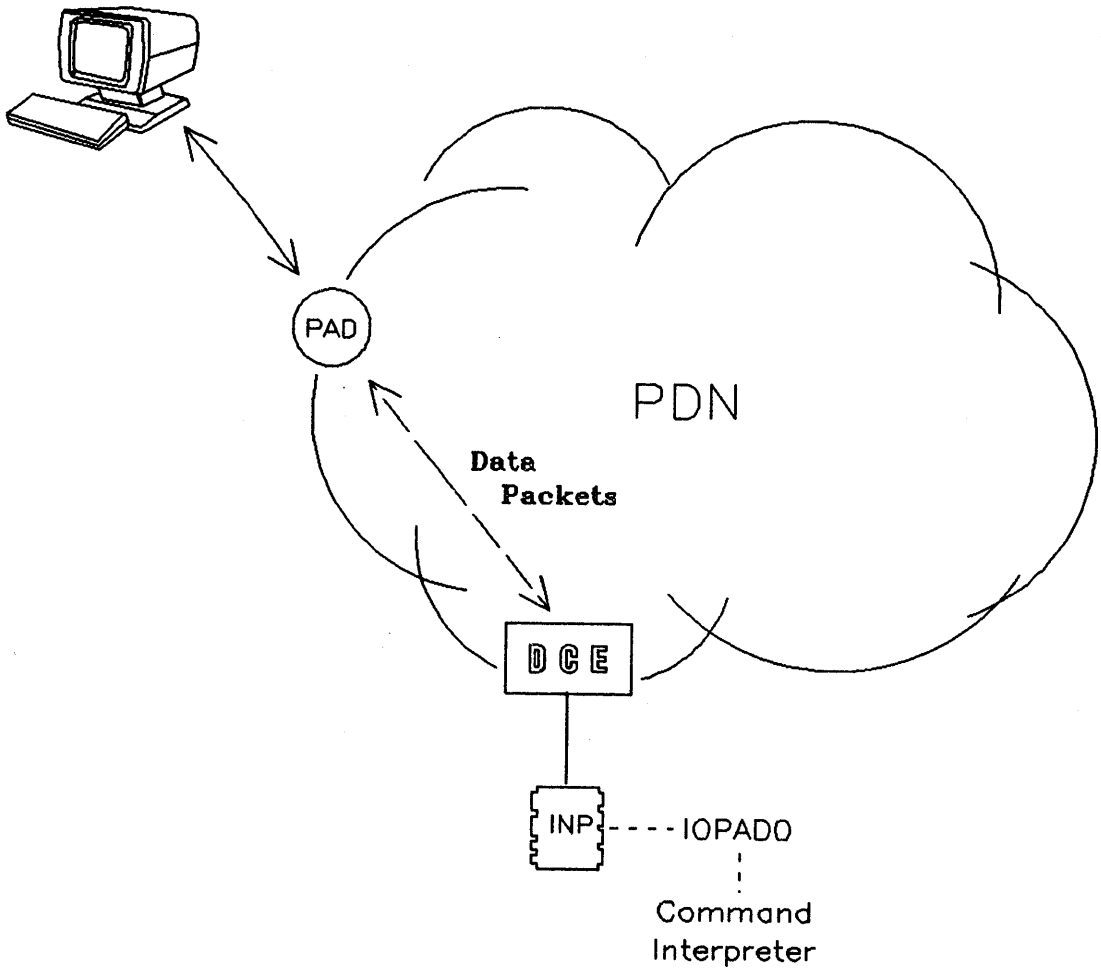


Figure 1-4. The data route between the terminal and the computer.

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.

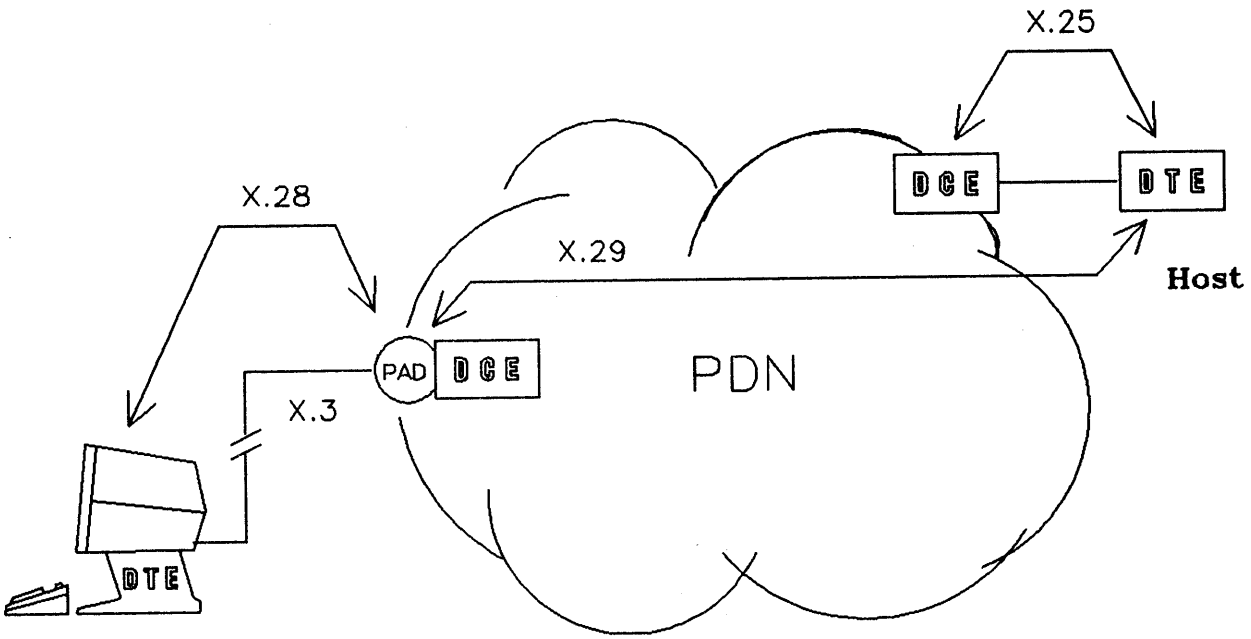


Figure 1-5. CCITT Recommendation map.

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.

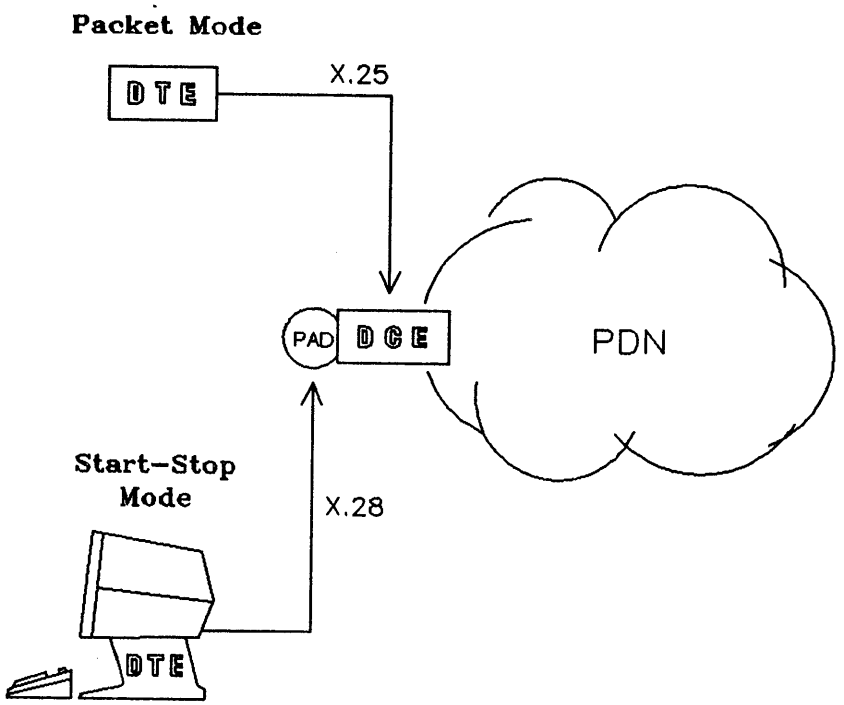


Figure 1-6. X.25 compared with a PAD.

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 has been certified on many networks for use with either character mode or block mode PAD terminals. **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. Please consult your HP representative for a list of the latest networks and those certified for use with character mode or block mode PAD terminals.

CONNECTING TO A PDN

If you are using DS/3000-X.25, connection to a PDN is easy. Simply use the normal DS commands that you'd use on a leased connection. See the *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:

NOTE

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.

USING THE PAD

SECTION 2

CONFIGURING THE TERMINAL

Supported Block Mode Terminals

For an HP terminal or personal computer to use block mode communications over a PAD, it must support block mode. In addition, this terminal or personal computer must support bidirectional XON/XOFF flow control. And it must support automatic keyboard locking when [ENTER] is pressed. The following HP terminals, as well as the HP 150, support these features: HP 2622A, 2623B, and 2624B (with updated ROMs), and HP 2625A, 2627A, 2628A, and 2392A. Other terminals will be added in the future. Contact your HP Sales Representative for more information on equipping your terminals with new ROMs.

Block Mode Configuration and Connection

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.

```
device control   margins/ tabs/col   service keys                    enhance video   define fields                   config keys
```

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 [f6], the `IDENTIFY ROMS` key.

- Press [f6]. 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 (AIDS) 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:

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.

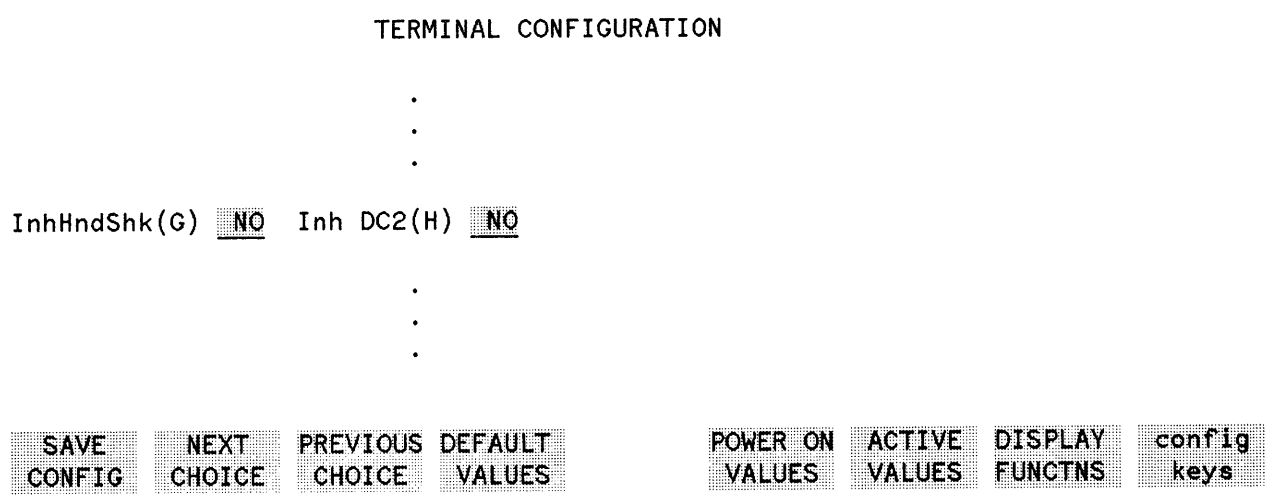


Figure 2-4. Softkeys shown in response to pressing the terminal config key.

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 [f4], the DEFAULT VALUES key, to display the default values.
- [TAB] the cursor to the field labelled InhHndShk(G)
- Press [f2], 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 [f1], the SAVE CONFIG key, to keep this configuration. Your softkeys will change back to those shown in Figure 2-1.

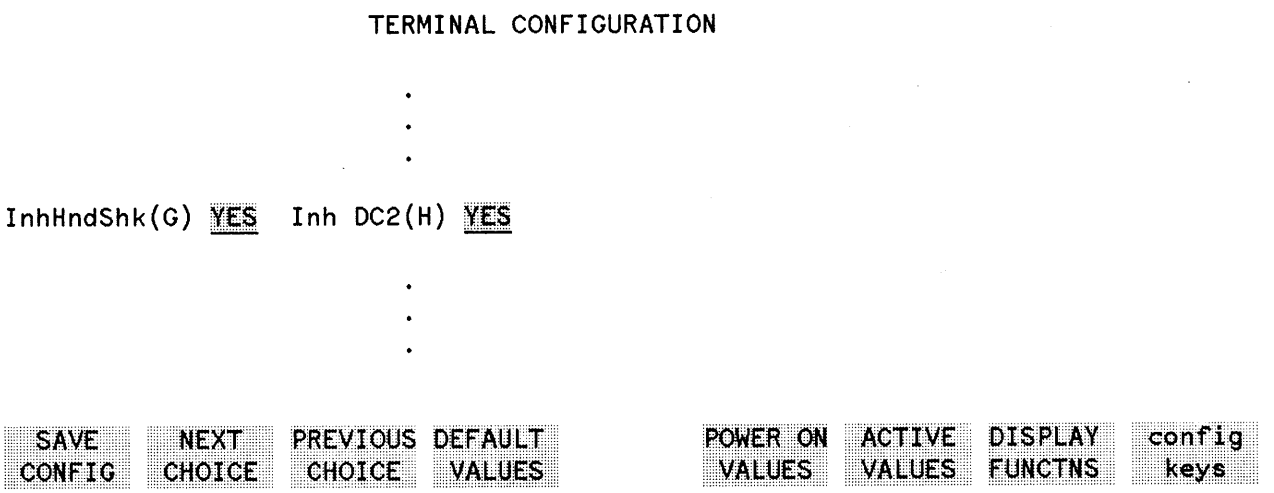


Figure 2-5. The TERMINAL CONFIGURATION screen after making the correct changes.

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.

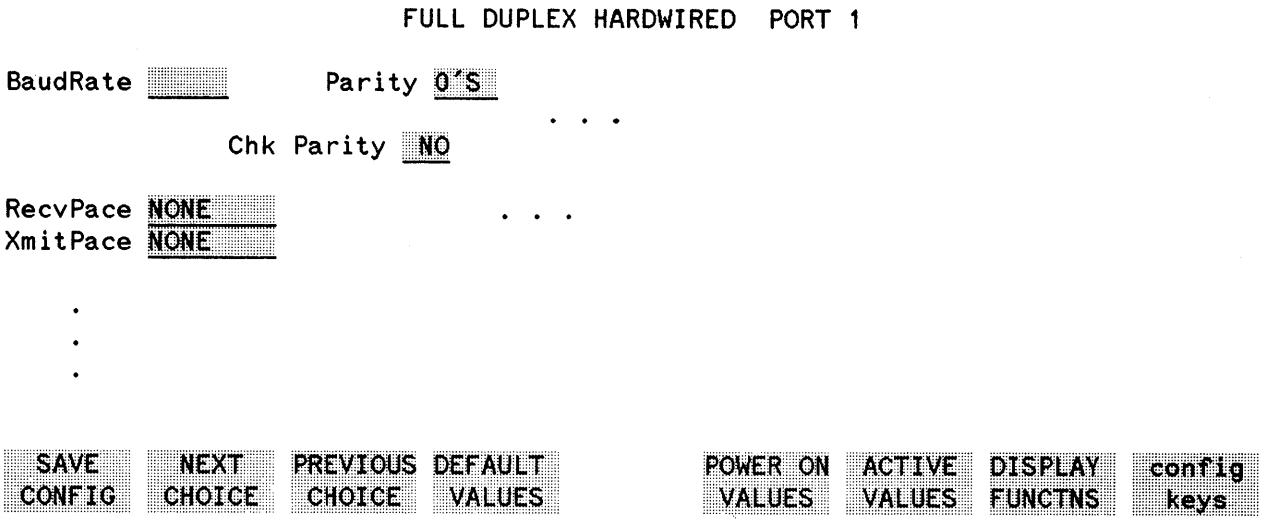


Figure 2-6. Softkeys shown in response to pressing the `port1 config` (or `datacom1 config`) key.

Again, note only the items shown in Figure 2-6.

- Press [f4], the `DEFAULT VALUES` key, to display the default values.
- Press [f2], the `NEXT CHOICE` key, which will change `BaudRate`, until it matches the baud rate of your PAD and modem. (Your network administrator can give you this information.)
- Make sure `Parity` is `0's` and `Chk Parity` is `NO`; if they are not, use the [TAB] key to move the cursor there and change them using the `NEXT CHOICE` key.
- [TAB] to the `RecvPace` field, and press [f2], the `NEXT CHOICE` key, until the value is `Xon/Xoff`.
- [TAB] to the `XmitPace` field, and do the same thing.
- All other fields should have their default values. Your screen should look like the one shown in Figure 2-7.
- Press [f1], the `SAVE CONFIG` key, when you are done.

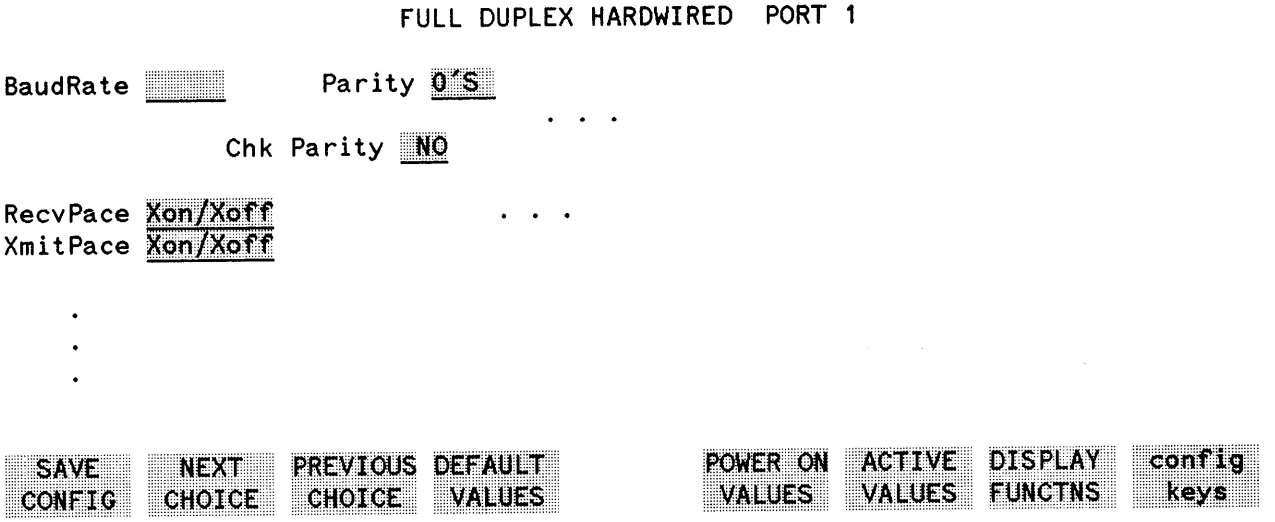


Figure 2-7. The FULL DUPLEX HARDWIRED screen after making the correct changes.

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.

Supported Character Mode Terminals

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

HP 2382A, 2392A

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

HP 2635, 2640B, 2642[1], 2644[1], 2645A[1], 2647[1], 2648[1]

([1] 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 150
HP 9826 (Series 200, Model 26)
HP 9836 (Series 200, Model 36)
HP 9835[2]
HP 9845[2]

([2] These desktop computers should be set to character mode, not line mode)

Character Mode Configuration and Connection

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 Configuration and Connection." 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.)

CONFIGURING THE PRINTER

Remote printers connected to an HP-supplied PAD are supported in both spooled or non-spooled environments. (Spooling allows a non-sharable device, such as a line printer, to appear to be shared by several users.) Sections 4 and 5 of this manual give details on I/O configuration and NETCONF database entries for remote printers attached to an HP 2334A.

Supported Printers

For MPE V/E versions G.01.00 and later, the following printers are supported as either spooled or non-spooled devices connected to the HP2334A:

HP 2601, 2602, 2631
HP 2932, 2933, 2934
HP 2563
HP 2686, 2687 (formatting capabilities not supported)

NOTE

Remote spooled printing is not supported on MPE IV-based systems.

USING THE TERMINAL IN BLOCK MODE

Pure VPLUS/3000 Applications

If you use VPLUS/3000 instrinsics 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

NOTE

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 filenumber when

using FCONTROLs and FREADs, and the $STDLIST filenumber 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            << Yes, block mode PAD terminal >>
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]&s1g1H 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.

NOTE

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.

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

[ESCAPE]&k0K	(disables automatic keyboard locking)
[ESCAPE]b	(unlocks the keyboard)
[ESCAPE]&k0B	(returns to character mode)
[ESCAPE]&s0D	(returns to line mode)
[ESCAPE]&s0g0H	(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*, 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 Intrinsics 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 (FSERR31) 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 BACKSPACE) 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 Intrinsics 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).

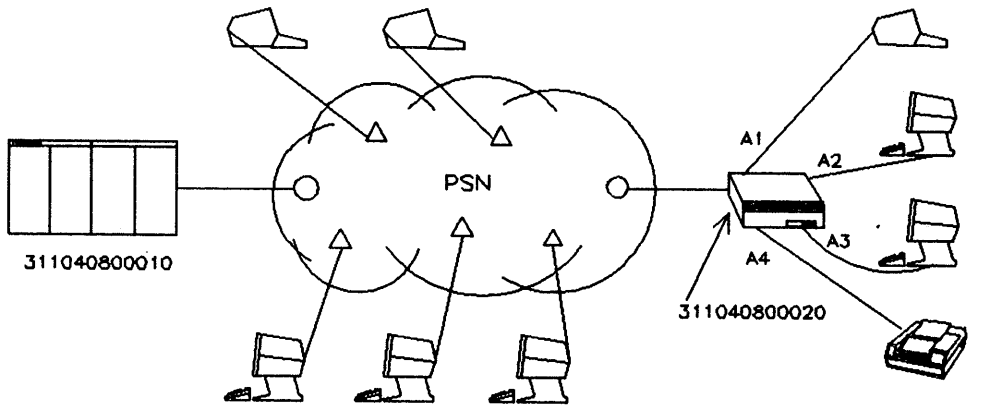
  Your screen will change to the following:

- 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, 2631, 2563, 2932, 2933, 2934, 2686, and 2687 printers are supported in either a spooled or a non-spooled environment. Note, however, that the formatting capabilities of the HP 2686 and 2687 laser printers are not supported.

Accessing a Specific Device



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

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

See pages 5-39 to 5-42 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 appopriate 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:

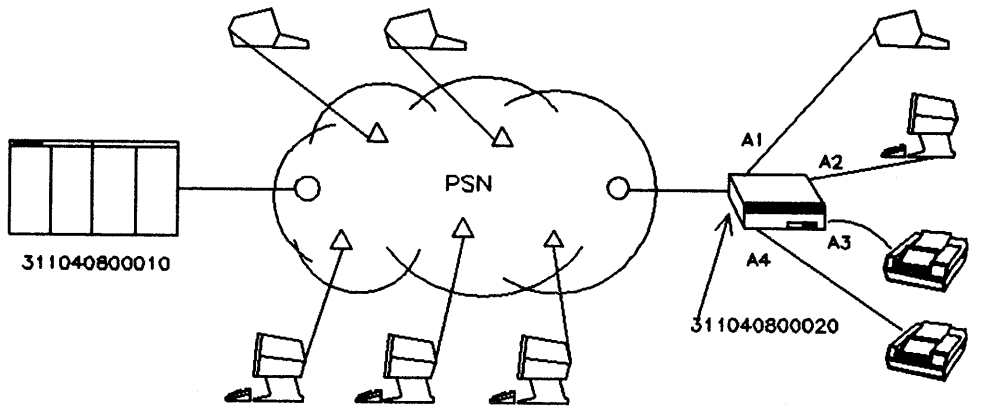
```
byte array device (0:8) := "REMOTEA4 ";
```

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:

O 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 5-43 to 5-46 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,recsize,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

For non-spooled 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 commmand 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 CONTROL X and CONTROL Y, but not CONTROL S, CONTROL Q or CONTROL H) 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 AND X.3

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 RETURN 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*param*:*value*	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.

A list of the parameters and their meanings, according to the X.3 standard, is presented in Tables 3-2 through 3-19. Some PDNs may not follow the standard exactly. The HP 3000 sets parameters 1 through 12 after each call is connected. In the following tables, HP's default selection for a character-mode terminal is indicated by shading. HP's default selections differ for a PAD printer.

Required Parameters

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

Values	Meaning
0	Escape not possible
1	Possible with DLE ((CONTROL)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.

NOTE

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	RETURN
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

Values	Meaning
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

Values	Meaning
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. X.25 Link 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 RETURN to terminal
2	Insert LF after each RETURN from terminal
4	Insert LF after each RETURN 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 (CONTROL H). 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 (CONTROL X). (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

X.25 Link 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/3000 User/Programmer Reference Manual.*

This section explains how to configure the following:

- Intelligent Network Processor (IOINP0)
- X.25 Link Line Monitor (communications driver IODSX)
- X.25 Link PAD Terminals (IOPAD0) -- one for each session that will be allowed on your system from a terminal through a Packet Assembler/Disassembler (PAD).
- X.25 Link PAD printers (IOPAD1) -- one for each HP 2601, HP 2602, HP 2631, or HP 293x 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 MRJE) when it is not being used by X.25 Link. 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 X.25 Link activity, and that a response that is optional for X.25 Link 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 *Data 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.

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? YES
2	SYSTEM ID = HP 32033v.uu.ff? RETURN
3	MEMORY SIZE= xxxx (MIN = yyy, MAX = yyyyy)? RETURN
4	I/O CONFIGURATION CHANGES? YES
5	LIST I/O DEVICES? YES

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.
SUB TYPE	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.

NOTE

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).
LCL TMOUT	Local 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.

7 LIST DEVICE DEFAULTS? (RETURN)

8 HIGHEST DRT=xxx?

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

To change xxx, 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 xxx, enter (RETURN).

9 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 38.

10 DEVICE NAME? (RETURN)

STEP NO.	DIALOGUE
11	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.

12 UNIT #? 0

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

13 SOFTWARE CHANNEL #? 0

14 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)

NOTE

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.

STEP NO. **DIALOGUE**

15 SUB TYPE?

Communications Interface: For an INP, enter 1 or 3, where
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, enter 2 or 14, where
2 = non-spooled PAD printer (MPE IV or MPE V)
14 = spooled PAD printer (MPE V/E G.01.00 or later)

NOTE

If you are configuring a terminal (type 16), the dialogue continues to Step 16. If you are configuring an INP (device type 17), the dialogue skips to Step 18. For all other device types, the dialogue skips to Step 29.

16 For MPE V/E:

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.
Enter 0, 18, 22, or 24, where
0 = Term Type for PAD terminals (IOPAD0 devices)
24 = Term Type for PAD terminals (IOPAD0 devices) using VPLUS (see note)
18 = Term Type for PCL level one printers (Supported only by MPE V/E G.01.00 and later)
22 = Term Type for PCL level two printers (Supported only by MPE V/E G.01.00 and later)

NOTE

If PAD terminals (IOPAD0 devices) are configured as Term Type 24, no TERM= parameter is required in the logon string when using VPLUS. All IOPAD0 devices can be configured as Term Type 24, even though some users/applications will not use VPLUS.

STEP NO. **DIALOGUE**

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.

17 SPEED IN CHARACTERS PER SECOND? 0 (or RETURN)

This question is asked only if Device Type is 16 or 32; then the dialogue skips to Step 29.

18 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.

19 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.

20 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

For CS devices with nonswitched lines connected through a modem (private lines, subtype 1), the dialogue continues with Step 21. If the CS device is a hardwired INP (subtype 3), the dialogue skips to Step 23.

STEP NO.	DIALOGUE

21 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.

22 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 24.

23 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 24).

24 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 23.

25 TRANSMISSION MODE? 0

Mode 0 = Full Duplex

26 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.

27 DRIVER CHANGEABLE? NO

STEP NO.	DIALOGUE
28	DRIVER OPTIONS? 0

NOTE

The dialogue skips to Step 36.

29 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).

30 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.

31 ACCEPT JOBS/SESSIONS?

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

For PAD terminals, enter YES.

32 ACCEPT DATA? NO

33 INTERACTIVE?

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

For PAD terminals, enter YES.

34 DUPLICATIVE?

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

For PAD terminals, enter YES.

35 INITIALLY SPOOLED? NO

36 AUTO REPLY? NO

STEP NO.	DIALOGUE

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

38 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 and IOINP0 entries, either do not enter a device class name, or enter a name which is different from the node names defined in the NETCONF RN Table (see Section 5).

The dialogue now prints the LOGICAL DEVICE #? prompt described in Step 9. If all I/O configuration is complete, press RETURN and the dialogue continues at Step 38. Otherwise, enter a logical device number and repeat the configuration procedure from Step 9.

39 MAX # OF OPEN SPOOLFILES = xxx (MIN=0,MAX=yyy)? RETURN

40 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 5.

41 LIST CS DEVICES? YES

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

NOTE

Step 42 appears only if you are using MPE V/E.

STEP NO.	DIALOGUE
42	TERMINAL TYPE CHANGES?
	Enter NO.
43	CLASS CHANGES? RETURN
44	LIST I/O DEVICES? RETURN

NOTE

The prompt in Step 45 appears only if a CS device is configured or if additional drivers exist (for the CS driver-changeable option in Step 27). If neither case exists, the dialogue skips to Step 47.

45	ADDITIONAL DRIVER CHANGES? NO
46	I/O CONFIGURATION CHANGES? NO
47	SYSTEM TABLE CHANGES? NO
48	MISC CONFIGURATION CHANGES? NO
49	LOGGING CHANGES? NO
50	DISC ALLOCATION CHANGES? NO
51	SCHEDULING CHANGES? NO
52	SEGMENT LIMIT CHANGES? NO
53	SYSTEM PROGRAM CHANGES? NO
54	SYSTEM SL CHANGES? NO

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

STEP NO.	DIALOGUE
55	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).

56 ENTER DUMP FILE SUBSETS?

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

57 LIST FILES DUMPED? YES or NO

58 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.

X.25 NETWORK CONFIGURATOR

SECTION 5

INTRODUCTION

The Network Configurator/Network Data Base is used to configure connections to X.21 or X.25 Public Data Networks.

NOTE

All references to TurboIMAGE in this section apply equally to IMAGE/3000 if you are using either MPE IV or a version of MPE V prior to G.02.00.

One of the features of the Network Configurator/Network Data Base is the ability to define the network configuration once, and then store it away in a TurboIMAGE data base. The network configuration will be referenced automatically each time a user accesses the network. In addition, you can later alter the configuration, if necessary, and store it away for future use.

The data associated with the configuration is stored in a TurboIMAGE 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 DS/3000 and X.25 Link products have read-only access to the data base so that the subsystems can determine the options selected for a particular line, only 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, HP 1000s, or HP 2334s. The NETCON database contains INP and network addresses. These addresses are used when sending a CALL REQUEST packet, which is the result of an FOPEN intrinsic.

ENVIRONMENT

The network configuration information is held in a TurboIMAGE data base in PUB.SYS. The data base consists of the following files:

NETCON (Root File)
NETCON01
NETCON02
NETCON03
NETCON04
NETCON05

Since the configuration information is kept in a data base, it will be necessary, for recovery purposes, periodically to make a backup copy onto magnetic tape. 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 *TurboIMAGE 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 DS/3000 (see the DS/3000 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.

NOTE

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 an HP 2334A, these node names are used when a device is opened by a user or an application on the system. The network administrator must assign a unique class name to each device on the HP 2334A.

`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 DS/3000 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 DS/3000 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).

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, X25. X21 is not available unless you are running DS/3000 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).

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 are 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).

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 TurboIMAGE data base. Refer to the *TurboIMAGE Reference Manual.*

ADD

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, X25.

`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).

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. If you are using TRANSPAC, you must respond with (RETURN).

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).

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:

ARPAC	DATEX-P	PSS
AUSTPAC	DCS	TELENET
BBN	DDX-1	TELEPAC
CTNE	DN1	TRANSPAC
DATANET	EURONET	TYMNET
DATAPAC	IBERPAC	UNINET
DATEX-L	NORDIC	VENUS-P

RETURN = The default PDN name of all blanks is used.

`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 X.25 Link only, this question does not apply, so use the null default by pressing RETURN. If you are using DS and X.25, see the *DS/3000 HP 3000 to HP 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).

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).

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).

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

NOTE

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 `LOW VC NUMBER (1..4095) ?`

Enter one of the following replies:

(RETURN) = The default value of 1 is assigned as the low virtual circuit number.

Virtual Circuit Number = This must be an integer in the range of 1 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.)

NOTE

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

`LOW VC SHOULD BE IN THE RANGE OF 1 TO 4095`

This message appears if your response was not numeric or if it was not in the range of 1 to 4095. You will be prompted again for the Low VC Number (Step 2.6).

STEP NO. **DIALOGUE**

2.7 `HIGH VC NUMBER (1..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 1 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 1 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).

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 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 TurboIMAGE data base. Refer to the *TurboIMAGE Reference Manual.*

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 X.25 Link 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
```

DELETE

THE D[ELETE] 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).

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.

DELETE

STEP NO.	DIALOGUE
1.1	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.

STEP NO.	DIALOGUE
1.2	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.

DELETE

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**

2.1 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.

STEP NO.	DIALOGUE
2.2	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.

EXIT

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 X.25 Link 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**

```
IS IT OK TO EXIT ?
```

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.

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.

LIST

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

NOTE

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.

PRINT

THE P[RINT] 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 X.25 Link, 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).

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 `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 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.

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).

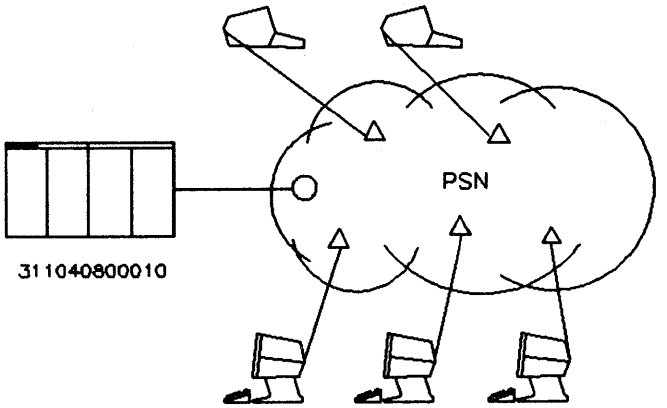
```
NO SUCH ENTRY IN LC TABLE
```

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:

O IS A NETWORK SWITCHING NODE (DCE)

Δ IS A NETWORK-SUPPLIED PAD

I/O CONFIGURATION.

You need to configure an INP and one X.25 communications driver (IODSX) for each physical link to the PDN. In addition, you must configure 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 one 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 #	UNIT	CHAN	TYPE	SUB TYPE	TERMINAL TYPE	TERMINAL 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  -  Mon, Aug 19, 1985, 9:35 AM
Version: A.55.27000  (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	

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

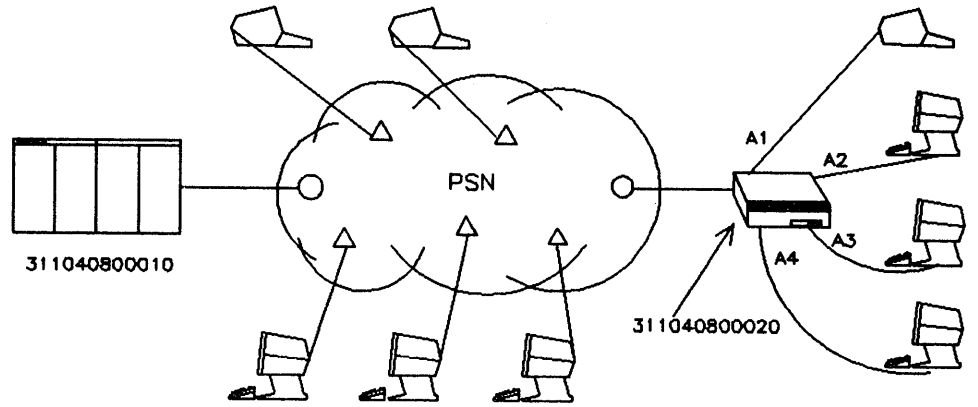
Valid Configuration

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 DRT U  C T SUB              REC   OUTPUT   MODE   DRIVER    DEVICE
DEV  #  N  H Y TYPE  TERMINAL  WIDTH  DEV             NAME      CLASSES
 #      I  A P       TYPE SPEED
        T  N E

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 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.

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

```
Network Configuration Utility  -  Mon, Aug 19, 1985,  9:35 AM
Version: A.55.27000  (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

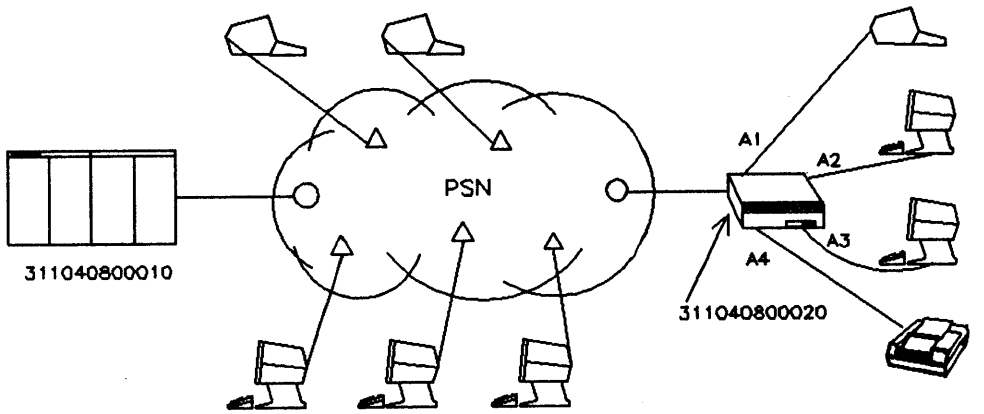
Valid Configuration

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:

O IS A NETWORK SWITCHING NODE (DCE)

Δ IS A NETWORK-SUPPLIED PAD

I/O CONFIGURATION.

In this example, an HP 3000 user or an application is able to FOPEN specifically any one of the devices connected to the HP 2334A. This configuration also allows 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.

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 #	UNIT	CHAN	TYPE	SUB TYPE	TERMINAL TYPE	TERMINAL 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
66	#16	0	0	16	0	??	??	40	66	J ID	IOPAD0	REMOTEA1
67	#16	0	0	16	0	??	??	40	67	J ID	IOPAD0	REMOTEA2
68	#16	0	0	16	0	??	??	40	68	J ID	IOPAD0	REMOTEA3
69	#16	0	0	32	14	18	??	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 01, A2 is 02, A3 is 03, A4 is 04, B1 through B4 are 5-8, C1 through C4 are 9-12, and D1 through D4 are 13-16. 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.

```
Network Configuration Utility  -  Mon, Aug 19, 1985,  9:35 AM
Version: A.55.27000  (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	31104080002001
REMOTEA2	HP2334	67	X25	31104080002002
REMOTEA3	HP2334	68	X25	31104080002003
REMOTEA4	HP2334	69	X25	31104080002004

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

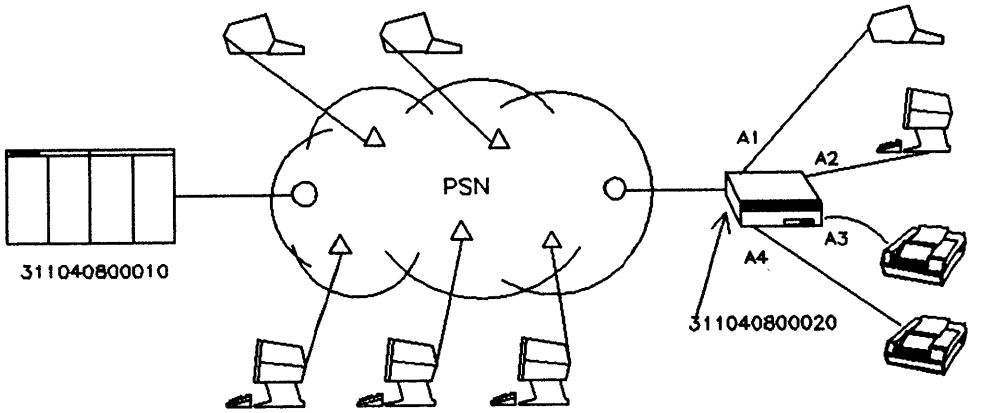
Valid Configuration

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:

O IS A NETWORK SWITCHING NODE (DCE)

Δ 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 supported only for the following printers connected to the HP 2334A: the HP 2601 and HP 2602 (terminal type 18); the HP 2631B and HP 293x family of printers (terminal type 22).

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 #	UNIT	CHAN	TYPE	SUB TYPE	TERMINAL TYPE	TERMINAL 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	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	32	2	??	??	66	0		IOPAD1	REMOTELP
67	#16	0	0	32	2	??	??	66	0		IOPAD1	REMOTELP
68	#16	0	0	32	14	22	??	66	0		IOPAD1	SPOOLRM
69	#16	0	0	32	15	18	??	66	0		IOPAD1	SPOOLRM

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.

```
Network Configuration Utility  -  Mon, Aug 19, 1985,  9:35 AM
Version: A.55.27000  (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	66	X25	311040800020
REMOTEP2	HP2334	67	X25	311040800020
SPOOLRM1	HP2334	68	X25	311040800020
SPOOLRM1	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

NOTE

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 an X.25 communications link, the console operator's :DSCONTROL command must be used to OPEN a line, so that it is available to X.25 Link users. The :DSCONTROL command allows you to enable or disable the X.25 Link 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]]
```

where the parameter *function* has the following options:

```
[;CANCEL]

[ ;OPEN  [,MASTER]  [,[SPEED=]speed ] ]
[ ;SHUT  [,SLAVE ]  [                ] ]

[ ;TRACE {,ON  [,ALL][,mask][,numentries][,WRAP][,filename] } ]
         {,OFF                                               }

[ ;MON  [,DS] ]
[ ;MOFF [,CS] ]

[ ;COMP   ]
[ ;NOCOMP ]

[ ;RETRY={DEFAULT} ]
         {count   }
```

PARAMETERS

x25device
: The logical device number or the device class name of the X.25 Link 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 X.25 Link 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 X.25 Link 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 X.25 Link 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 X.25 Link monitor records. Line must be open for the use of MOFF.

MASTER

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

SLAVE

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

Default: Both MASTER and SLAVE processing are allowed.

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 40 for the INP. The requested value of *numentries* must be a multiple of 8. If an error message is received indicating insufficient memory available on the INP, you should specify the next lower multiple of 8 as the value of *numentries*.

Default: 24.

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 number of the X25 device, IODSX).

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 X.25 Link 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 X.25 Link users. It cannot, however, be shared by users of other communications subsystems supported by your system (for example, MRJE). Thus, you must SHUT the X.25 Link 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 X.25 Link communication driver, IODSX, will be AVAILable if it is currently OPEN for use by X.25 Link 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.

EXAMPLES

To open X.25 line number 55, thereby making it available for use by the X.25 Link 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
```

CSLIST AND DSLIST

SECTION 7

CSLIST and DSLIST are programs that provide information about which versions of communications software are installed on the system. This information must be available for all troubleshooting activities and must accompany each Service Request (SR) submitted to your HP Systems Engineer (SE).

CSLIST

The CSLIST program provides a list of the software version numbers for the CS modules installed on your system. In addition, CSLIST gives information about the HP-standard or user-defined INP download files, including Download Filename, Protocol Type, Board Type, Complile Date, and four version numbers - IC, Protocol, Trace, and RAMCP. The specific CS modules and INP download files reported by CSLIST will vary depending on which Network Service and Network Link products are installed on your system.

The program is executed by entering the following command:

```
:RUN CSLIST.PUB.SYS
```

The program will ask if a complete listing of installed VUFs is desired, if download information is desired, and whether output should be directed to the line printer or $STDLIST. In the version report example below, user input is underscored.

Version Report Example

X.25 Link with DS/3000.

```
:RUN CSLIST.PUB.SYS

HP30131A.55.27 CSLIST/3000  WED, AUG 21, 1985,   4:57 PM
(C) HEWLETT-PACKARD CO. 1980

THIS ROUTINE HAS TWO MAJOR FUNCTIONS - ONE ASSOCIATED WITH
THE CS MODULES AND ONE ASSOCIATED WITH THE DOWNLOAD FILES.
    .
    .
    .
DO YOU WANT A COMPLETE LISTING OF INSTALLED VUFS? y

DO YOU WANT THE DOWNLOAD FILE INFORMATION? y

SHOULD OUTPUT BE DIRECTED TO THE LP? n

COMSYS1  INSTALLED VUF IS  A.55.27
COMSYS2  INSTALLED VUF IS  A.55.27
COMSYS3  INSTALLED VUF IS  A.55.27
COMSYS4  INSTALLED VUF IS  A.55.27
COMSYS5  INSTALLED VUF IS  A.55.27
CSUTILTY INSTALLED VUF IS  A.05.08
```

```
CSDUMMY  INSTALLED VUF IS  A.05.00
CSDUMP   INSTALLED VUF IS  A.55.27
TRACPROG INSTALLED VUF IS  A.55.27
IOINPO   INSTALLED VUF IS  A.55.22
DSM      INSTALLED VUF IS  A.55.26
INPDPAN  INSTALLED VUF IS  A.05.21
NETCONF  INSTALLED VUF IS  A.55.27
CSLIST   INSTALLED VUF IS  A.55.27
IOLANO   INSTALLED VUF IS NOTINSTD
LANDPAN  INSTALLED VUF IS NOTINSTD
LANDIAG  INSTALLED VUF IS NOTINSTD

INFORMATION ON HP-STANDARD DOWNLOAD FILES NOW BEING PRODUCED
OUTPUT GOING TO $STDLIST.

DOWNLOADFILE= CSDBSC0.PUB.SYS              PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 10A   COMPILE DATE= TUE, AUG 24, 1982,  1:02 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.05
   TRACE VERSION = 02.06
   RAMCP VERSION = 05.03

DOWNLOADFILE= CSDBSC1.PUB.SYS              PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 20A   COMPILE DATE= THU, MAY 30, 1985, 11:21 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.14
   TRACE VERSION = 02.08
   RAMCP VERSION = 05.05

DOWNLOADFILE= CSDBSC2.PUB.SYS              PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 20B   COMPILE DATE= WED, MAY 29, 1985,  9:19 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.14
   TRACE VERSION = 02.08
   RAMCP VERSION = 05.05

DOWNLOADFILE= CSDBSCX0.PUB.SYS             PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 10A   COMPILE DATE= FRI, JUL 9, 1982,  1:49 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.04
   TRACE VERSION = 02.06
   RAMCP VERSION = 05.03

DOWNLOADFILE= CSDBSCX1.PUB.SYS             PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 20A   COMPILE DATE= WED, FEB 27, 1985,  7:22 PM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.10
   TRACE VERSION = 02.08
   RAMCP VERSION = 05.05

DOWNLOADFILE= CSDBSCX2.PUB.SYS             PROTOCOL TYPE=  BISYNC (DS,RJE,X.21)
BOARD TYPE=   INP 20B   COMPILE DATE= WED, FEB 27, 1985,  7:27 PM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.10
```

```
   TRACE VERSION = 02.05
   RAMCP VERSION = 05.05

DOWNLOADFILE= CSDLAPB0.PUB.SYS            PROTOCOL TYPE=  X.25
BOARD TYPE=   INP 10A   COMPILE DATE= THU, NOV  4, 1982, 10:39 AM
      IC VERSION = 01.03
PROTOCOL VERSION = 01.01
   TRACE VERSION = 02.06
   RAMCP VERSION = 05.03

DOWNLOADFILE= CSDLAPB1.PUB.SYS             PROTOCOL TYPE=  X.25
BOARD TYPE=   INP 20A   COMPILE DATE= THU, MAR 28, 1985,  9:59 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.11
   TRACE VERSION = 02.08
   RAMCP VERSION = 05.05

DOWNLOADFILE= CSDLAPB2.PUB.SYS             PROTOCOL TYPE=  X.25
BOARD TYPE=   INP 20B   COMPILE DATE= THU, MAR 28, 1985,  10:10 AM
      IC VERSION = 01.02
PROTOCOL VERSION = 01.11
   TRACE VERSION = 02.08
   RAMCP VERSION = 05.05

END OF PROGRAM

:
```

NOTE

The INP download files CSDLAPB0, CSDLAPB1, and CSDLAPB2 are used with X.25 protocol. The 0, 1, and 2 in the file names correspond to INP models 10A, 20A, and 20B, respectively.

The INP download files for DS/3000 using Bisync protocol are CSDBSC0, CSDBSC1, and CSDBSC2, where 0, 1, and 2 correspond to INP models 10A, 20A, and 20B, respectively.

The INP download files for the X.21 protocol are CSDBSCX0, CSDBSCX1, and CSDBSCX2, where 0, 1, and 2 again correspond to INP models 10A, 20A, and 20B, respectively.

DSLIST

The DSLIST program provides a list of the software module version numbers for the X.25 Link modules and CS modules installed on your system. A list of DS/3000 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 X.25 Link 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 B.01.00. If you are using MPE V/E, all your version numbers will begin with B, and cannot be earlier than B.51.00.

Version Report Example

X.25 Link with DS/3000.

```
:RUN DSLIST.PUB.SYS
HEWLETT PACKARD 32185B.52.00 DSLIST/3000 FRI, AUG 2, 1985, 2:22 PM

DS/3000 HP32185B:
   MODULE      VERSION
SL DSSEGS      B.52.00, INTERNAL FIX 001
SL DSRTECALL   B.52.00, INTERNAL FIX 001
   DSMON       B.52.00, INTERNAL FIX 001
   DSTEST      B.52.00, INTERNAL FIX 001
   DS2026      B.52.00, INTERNAL FIX 001
   DS2026CN    B.52.00, INTERNAL FIX 001
   DSCOPY      B.52.00, INTERNAL FIX 001
   IODSO       B.52.00, INTERNAL FIX 001
   IODSTRM0    B.52.00, INTERNAL FIX 001
   IODSTRMX    B.52.00, INTERNAL FIX 001

X.25 HP32187B:
   MODULE      VERSION
   DSMONX      B.52.00, INTERNAL FIX 001
   IODSX       B.52.00, INTERNAL FIX 001
   IOPAD0      B.52.00, INTERNAL FIX 001
   IOPAD1      B.52.00, INTERNAL FIX 001

COMMON MODULES
   MODULE      VERSION
SL DSIOM       B.52.00, INTERNAL FIX 001
   DSDUMP      B.52.00, INTERNAL FIX 001
   DSLIST      B.52.00, INTERNAL FIX 001
```

```
CS SUBSYSTEM HP30131A:
   MODULE      VERSION
SL COMSYS      A.55.27, INTERNAL FIX 000
   NETCONF     A.55.27, INTERNAL FIX 000

END OF PROGRAM
:
```

X.25 Link without DS/3000.

```
:RUN DSLIST.PUB.SYS
HEWLETT PACKARD 32185B.52.00 DSLIST/3000 FRI, AUG 2, 1985, 2:22 PM

DS/3000 HP32185B:
   MODULE      VERSION
*** NOT INSTALLED ***

X.25 HP32187B:
   MODULE      VERSION
   DSMONX      B.52.00, INTERNAL FIX 001
   IODSX       B.52.00, INTERNAL FIX 001
   IOPAD0      B.52.00, INTERNAL FIX 001
   IOPAD1      B.52.00, INTERNAL FIX 001

COMMON MODULES:
   MODULE      VERSION
SL DSIOM       B.52.00, INTERNAL FIX 001
   DSDUMP      B.52.00, INTERNAL FIX 001
   DSLIST      B.52.00, INTERNAL FIX 001

CS SUBSYSTEM HP30131A:
   MODULE      VERSION
SL COMSYS      A.55.27, INTERNAL FIX 000
   NETCONF     A.55.27, INTERNAL FIX 000

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 section refers to the HP X.25 Link subsystem on the HP 3000.

- 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, with 0 being reserved for RESTART and RESTART CONF packets. However, only 255 consecutive VC numbers may be used at any given time on any one physical X.25 line from an 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.

NOTE

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 always set the D-bit to zero in any outgoing packets. If the D-bit is set on an incoming CALL REQUEST packet, we send a CLEAR packet with a diag040. If the D-bit is set on a DATA packet, we send a RESET packet with a diag040.

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.

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 X.25 Link. 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 X.25 Link. 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 DSERROR when trying to send a CALL REQUEST packet (by using the DSLINE command with DS/3000 or FOPENing a device connected to the HP2334A with X.25 Link).

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.

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 A: 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 D.

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

ANNEX E.

The codes in Table 6-1 are generated by X.25 Link. Most of the codes are CCITT standards and are used as such. Some CCITT codes have further qualified meanings on the HP 3000 and are mentioned below. Some codes are special to the HP 3000.

Table 6-1. X.25 Link Diagnostic Codes.

Sent on Packet	Diagnostic Code	Standards Reference	Meaning
Reset	000	CCITT/HP	Invalid P(R)/P(S) (DATEX-P only)
	001	CCITT/HP	CCITT: Invalid P(S) HP: Invalid P(R)/P(S)
	002	CCITT/HP	CCITT: Invalid P(R) HP: Invalid P(R)/P(S)
	003	HP	Invalid P(S) in unanticipated data
	005	HP	Looping detected in reset error recovery
Clear	020	CCITT/HP	Packet type invalid for state p1
	021	CCITT/HP	Packet type invalid for state p2
	022	CCITT/HP	Packet type invalid for state p3
	023	CCITT/HP	Packet type invalid for state p4
	024	CCITT/HP	Packet type invalid for state p5
	026	CCITT/HP	Packet type invalid for state p7
Reset	027	CCITT/HP	Packet type invalid for state d1
	032	CCITT/HP	Outgoing reset request Packet type invalid for state d2
Clear	034	CCITT/HP	Incoming call disabled
	036	CCITT/HP	Packet on unassigned logical channel
	038	CCITT/HP	Invalid packet length on call request CCITT: Packet too short

Table 6-1. X.25 Link Diagnostic Codes (continued).

Sent on Packet	Diagnostic Code	Standards Reference	Meaning
Clear	039	CCITT/HP	Unanticipated data packets too long; facility field too long; Bad user data field; CCITT: Packet too long
	040	CCITT/HP	Invalid GFI HP: D-bit set on CALL
Reset	040	CCITT/HP	Invalid GFI HP: D-bit set on DATA packet
	045	HP	Invalid DS message
Clear	049	CCITT/HP	Timer expired on call request
	050	CCITT/HP	Clear Retry -- timer expired
Restart	052	CCITT/HP	Restart Retry -- timer expired
Clear	064	CCITT/HP	CCITT: Call setup problem HP: Queueing problem or error in opening Netconf database
	065	CCITT/HP	Bad facility field
	068	CCITT/HP	Invalid calling address
	126	HP	Can't expand DS table
Restart	127	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 X.25 Link functional problems. Each group is identified with an explanatory heading, and the messages are listed in numerical sequence within each category for easy reference.

X.25 LINK 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)

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 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, 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)

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 X.25 LINK 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 X.25 Link 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, X.25 Link 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 X.25 Link 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, CSDUMP and DSDUMP, described later in this appendix. Refer to the *Data Communications Handbook*, Section 4, for additional information on the CS/3000 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

%020 = generate POPR and PEDT entries

NOTE

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 X.25 Link, the value may not exceed 40. (If the value requested in this case is greater than 40, a warning message will be printed and the maximum default of 24 will be used.) If *numentries* is set to zero or omitted, there will be a maximum of 24 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 X.25 Link 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 in the trace record are discarded, and NOWRAP appears on the trace listing. (This parameter does not affect the other trace records or 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 16 trace entries per trace record, trace entries beyond the 16th 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 entries are missing.

filename names the file to which the trace information will be written. If no name is supplied, X.25 Link 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 Intrinsics 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

The six types of trace entries used in X.25 Link are summarized in Table B-1 and described in greater detail beginning on page B-20.

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. [1]
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. [1]
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. [2]
PSTX	Send Text	Generated only when the frame sent to the remote station is longer than 32 bytes. The PSTX trace entry shows (in octal or hexadecimal) the exact sequence of bytes that was sent. [2]
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.

[1] 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.

[2] 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 either of the trace formatting programs, CSDUMP or 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. Regardless of which format you choose, you will need a thorough understanding of the X.25 protocols to interpret information in an X.25 trace listing. (See Appendix D for basic information. For a detailed explanation of X.25 fundamentals, refer to *X.25: The PSN Connection.*)

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 one of the online editors.

Initiating the CSDUMP Program

After the CSTRACE and LIST files have been defined, enter the following command:

```
:RUN CSDUMP.PUB.SYS[,OCTAL][;PARM={0}]
                                  {1}
                                  {2}
```

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. If PARM is not specified, the default is PARM=0.

Formatted CSDUMP Trace Listing

Figure B-1 shows portions of a Trace listing for a line connected to an INP (Intelligent Network Processor). As you can see, 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.

```
CS TRACE ANALYZER (A.55.27)        WED, OCT  9, 1985,  9:34 AM

TRACE FILE IS DSTRC131.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON WED, OCT  9, 1985,  9:02 AM

SYSTEM ID=01.03



**********************************
* BEGIN TRACING FOR DEVICE 130   *
**********************************

*************************************************
*-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: 130  *
*  DEV. TYPE: 17        SUBTYPE: 1    VER: A.55.27 *
*              0123456789012345                    *
*    COPTIONS: 0000100110000000                    *
*    AOPTIONS: 0000001100001101                    *
*    DOPTIONS: 0000000000000111                    *
*  NETWORK'ID: 0000000000000000                    *
*  NUMBUFFERS: 242         BUFFSIZE: 66   (WORDS)  *
*  INSPEED: 1200           OUTSPEED: 1200          *
*  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: 10           *
*                CLEAR-TO-SEND DELAY: 00.0  SECS.  *
*               DATA-SET-READY DELAY: DISABLED.    *
*                  TRANSMISSION MODE: DUPLEX.      *
*              MMSTAT TRACE FACILITY: ENABLED.     *
*  DRIVERNAME: IOINP0                              *
*  DOWNLOAD FILE: CSDLAPB1                         *
*  CTRACEINFO:    ENTRIES=24     MASK=011111000    *
*                  TYPE OF TRACE = ALL, NOWRAP     *
*  PHONELIST:    ENTRIES=0         INDEX=0         *
*  IDLIST:       ENTRIES=0         INDEX=0         *
*  ERRORCODE:  RECOVERABLE=0    IRRECOVERABLE=0    *
*  MSGSENT: 1              MSGRECV: 1              *
```

Figure B-1. CSDUMP Trace Listing.

```
*  RECOVERRORS: 1          IRRECOVERRORS: 0        *
*****************************************************

0         6.360 PCMP REQUEST ID=%001050(!0228)
                    ERROR CODE=4      LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=1       #MSG RECV=1       STATE=CONNECTED
                    # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

1         6.390 PCMP REQUEST ID=%001064(!0234)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=1       #MSG RECV=1       STATE=CONNECTED
                    # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

2         7.570 PRCT REQUEST ID=NONE
                     I-FRAME  ADDR=B   P/F=0  N(R)=1  N(S)=1
                    0 1.2 2 1 0.1 0 0 B.2 1 1 1.1 0 0 0.0 1 0 0.0 0
                    SOH "   DLE DLE VT  !   DC1 DLE NUL SOH NUL NUL
                    0 0.2 D
                    NUL -

3         7.570 PCMP REQUEST ID=%000314(!00CC)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=1       #MSG RECV=2       STATE=CONNECTED
                    # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

4         7.570 PSCT REQUEST ID=NONE
                     RR       ADDR=B   P/F=0  N(R)=2
                    0 1.4 1
                    SOH A

5         7.600 PSCT REQUEST ID=NONE
                     I-FRAME  ADDR=A   P/F=0  N(R)=2  N(S)=1
                    0 3.4 2 1 0.1 0 0 F.0 8
                    ETX B   DLE DLE SI  BS

6         7.610 PRCT REQUEST ID=NONE
                     RR       ADDR=A   P/F=0  N(R)=2
                    0 3.4 1
                    ETX A

7         7.620 PCMP REQUEST ID=%001334(!02DC)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=2       #MSG RECV=2       STATE=CONNECTED
                    # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

8         7.670 PRCT REQUEST ID=NONE
                     I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=2
                    0 1.4 4 1 0.1 0 0 1.0 0
                    SOH D   DLE DLE SOH NUL
```

Figure B-1. CSDUMP Trace Listing (continued).

```
9        7.680 PCMP REQUEST ID=%000330(!00D8)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=2       #MSG RECV=3       STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

10       7.680 PSCT REQUEST ID=NONE
                    RR        ADDR=B    P/F=0   N(R)=3
                   0 1.6 1
                   SOH a

11       9.720 PRCT REQUEST ID=NONE
                    I-FRAME   ADDR=B    P/F=0   N(R)=2   N(S)=3
                   0 1.4 6 1 0.1 0 0 0.0 D
                   SOH F    DLE DLE NUL CR

12       9.720 PCMP REQUEST ID=%000344(!00E4)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=2       #MSG RECV=4       STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

13       9.720 PSCT REQUEST ID=NONE
                    RR        ADDR=B    P/F=0   N(R)=4
                   0 1.8 1
                   SOH SOH

14      10.250 PSCT REQUEST ID=NONE
                    I-FRAME   ADDR=A    P/F=0   N(R)=4   N(S)=2
                   0 3.8 4 9 0.1 0 2 0.0 6 0 1.0 1 0 2.0 1 0 3.0 2
                   ETX EOT DLE DLE      ACK 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

15      10.280 PSCT REQUEST ID=NONE
                    I-FRAME   ADDR=A    P/F=0   N(R)=4   N(S)=3
                   0 3.8 6 1 0.1 0 2 2.0 D 0 A.0 D 0 A.B 0
                   ETX ACK DLE DLE "    CR  LF  CR  LF  0

16      10.290 PRCT REQUEST ID=NONE
                    RR        ADDR=A    P/F=0   N(R)=3
                   0 3.6 1
                   ETX a

17      10.290 PCMP REQUEST ID=%001554(!036C)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=3       #MSG RECV=4       STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

18      10.300 PRCT REQUEST ID=NONE
                    I-FRAME   ADDR=B    P/F=0   N(R)=3   N(S)=4
                   0 1.6 8 1 0.1 0 2 1.0 0
                   SOH h    DLE DLE !    NUL
```

Figure B-1. CSDUMP Trace Listing (continued).

```
19      10.300 PCMP REQUEST ID=%000360(!00F0)
               ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=3       #MSG RECV=5       STATE=CONNECTED
               # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

20      10.310 PSCT REQUEST ID=NONE
                RR        ADDR=B    P/F=0   N(R)=5
               0 1.A 1
               SOH !

21      10.320 PRCT REQUEST ID=NONE
                RR        ADDR=A    P/F=0   N(R)=4
               0 3.8 1
               ETX SOH

22      10.330 PCMP REQUEST ID=%001604(!0384)
               ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=4       #MSG RECV=5       STATE=CONNECTED
               # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

23      10.350 PRCT REQUEST ID=NONE
                I-FRAME   ADDR=B    P/F=0   N(R)=4   N(S)=5
               0 1.8 A 9 0.1 0 2 2.0 0 0 1.0 1 0 2.0 1 0 3.0 2
               SOH LF  DLE DLE "   NUL 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

0       10.350 PCMP REQUEST ID=%000374(!00FC)
               ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=4       #MSG RECV=6       STATE=CONNECTED
               # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

1       10.360 PSCT REQUEST ID=NONE
                RR        ADDR=B    P/F=0   N(R)=6
               0 1.C 1
               SOH A

2       10.360 PRCT REQUEST ID=NONE
                I-FRAME   ADDR=B    P/F=0   N(R)=4   N(S)=6
               0 1.8 C 1 0.1 0 4 1.2 1
               SOH FF  DLE DLE A   !

3       10.370 PCMP REQUEST ID=%000410(!0108)
               ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=4       #MSG RECV=7       STATE=CONNECTED
               # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

4       10.370 PSCT REQUEST ID=NONE
                RR        ADDR=B    P/F=0   N(R)=7
               0 1.E 1
               SOH a
```

Figure B-1. CSDUMP Trace Listing (continued).

```
5       10.410 PSCT REQUEST ID=NONE
                I-FRAME  ADDR=A   P/F=0  N(R)=7  N(S)=4
               0 3.E 8 1 0.1 0 4 4.3 A 0 0.0 1
               ETX h   DLE DLE D   :   NUL SOH

6       10.430 PRCT REQUEST ID=NONE
                RR       ADDR=A   P/F=0  N(R)=5
               0 3.A 1
               ETX !

7       10.430 PCMP REQUEST ID=%001744(!03E4)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=5      #MSG RECV=7      STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

8       10.440 PRCT REQUEST ID=NONE
                I-FRAME  ADDR=B   P/F=0  N(R)=5  N(S)=7
               0 1.A E 1 0.1 0 6 1.0 2
               SOH .   DLE DLE a   STX

9       10.440 PCMP REQUEST ID=%000710(!01C8)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=5      #MSG RECV=8      STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

10      10.440 PSCT REQUEST ID=NONE
                RR       ADDR=B   P/F=0  N(R)=0
               0 1.0 1
               SOH SOH

11      13.440 PRCT REQUEST ID=NONE
                I-FRAME  ADDR=B   P/F=0  N(R)=5  N(S)=0
               0 1.A 0 1 0.1 0 6 4.6 8 6 5.6 C 6 C.6 F 2 0.6 D
               SOH     DLE DLE d   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 F
               a   n   a   g   e   r   .   s   y   s   CR  SI

12      13.450 PCMP REQUEST ID=%001350(!02E8)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=5      #MSG RECV=9      STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

13      13.450 PSCT REQUEST ID=NONE
                RR       ADDR=B   P/F=0  N(R)=1
               0 1.2 1
               SOH !

14      14.550 PSCT REQUEST ID=NONE
                I-FRAME  ADDR=A   P/F=0  N(R)=1  N(S)=5
               0 3.2 A 1 0.1 0 6 1.0 1
               ETX *   DLE DLE a   SOH
```

Figure B-1. CSDUMP Trace Listing (continued).

```
15      14.560 PRCT REQUEST ID=NONE
                RR       ADDR=A   P/F=0  N(R)=6
               0 3.C 1
               ETX A

16      14.570 PCMP REQUEST ID=%002120(!0450)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=6      #MSG RECV=9      STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

17      14.740 PSCT REQUEST ID=NONE
                I-FRAME  ADDR=A   P/F=0  N(R)=1  N(S)=6
               0 3.2 C 1 0.1 0 6 6.0 D 0 A.4 8 5 0.3 3 3 0.3 0
               ETX ,   DLE DLE f   CR  LF  H   P   3   0   0
               3 0.2 0 2 F.2 0 4 D.5 0 4 5.2 0 5 6.2 0 2 0.4 7
               0       /       M   P   E       V           G
               2 E.3 0 3 1.2 E 3 0.3 3 2 0.2 8
               .   0   1   .   0   3       (

18      14.740 PSTX REQUEST ID=NONE
               4 2.4 1 5 3.4 5 2 0.4 7 2 E.3 0 3 1.2 E 3 0.3 3
               B   A   S   E       G   .   0   1   .   0   3
               2 9.2 E 2 0.2 0 5 7.4 5 4 4.2 C 2 0.4 F 4 3.5 4
               )   .           W   E   D   ,       O   C   T
               2 0.2 0 3 9.2 C 2 0.3 1 3 9.3 8
                       9   ,       1   9   8

19      14.740 PSTX REQUEST ID=NONE
               3 5.2 C 2 0.2 0 3 9.3 A 3 0.3 2 2 0.4 1 4 D.0 D
               5   ,           9   :   0   2       A   M   CR
               0 A.0 1
               LF  SOH

20      14.820 PRCT REQUEST ID=NONE
                RR       ADDR=A   P/F=0  N(R)=7
               0 3.E 1
               ETX a

21      14.820 PCMP REQUEST ID=%002244(!04A4)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=7      #MSG RECV=9      STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

22      14.830 PRCT REQUEST ID=NONE
                I-FRAME  ADDR=B   P/F=0  N(R)=7  N(S)=1
               0 1.E 2 1 0.1 0 8 1.0 0
               SOH b   DLE DLE SOH NUL

23      14.830 PCMP REQUEST ID=%001364(!02F4)
               ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
               #MSG SENT=7      #MSG RECV=10     STATE=CONNECTED
               # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0
```

Figure B-1. CSDUMP Trace Listing (continued).

```
    • (Several Trace entries
    • have been intentionally
    • omitted.)

12      17.800 PSCT REQUEST ID=NONE
                    RR        ADDR=B    P/F=0   N(R)=4
                   0 1.8 1
                   SOH SOH

13      17.810 PSCT REQUEST ID=NONE
                    I-FRAME   ADDR=A    P/F=0   N(R)=4   N(S)=1
                   0 3.8 2 1 0.1 0 6 C.3 A 0 0.0 1
                   ETX STX DLE DLE 1    :    NUL SOH

14      17.830 PRCT REQUEST ID=NONE
                    RR        ADDR=A    P/F=0   N(R)=2
                   0 3.4 1
                   ETX A

15      17.830 PCMP REQUEST ID=%003154(!066C)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=10      #MSG RECV=12      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

16      17.840 PRCT REQUEST ID=NONE
                    I-FRAME   ADDR=B    P/F=0   N(R)=2   N(S)=4
                   0 1.4 8 1 0.1 0 E 1.6 8
                   SOH H    DLE DLE a    h

17      17.840 PCMP REQUEST ID=%001700(!03C0)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=10      #MSG RECV=13      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

18      17.840 PSCT REQUEST ID=NONE
                    RR        ADDR=B    P/F=0   N(R)=5
                   0 1.A 1
                   SOH !

19      20.000 PRCT REQUEST ID=NONE
                    I-FRAME   ADDR=B    P/F=0   N(R)=2   N(S)=5
                   0 1.4 A 1 0.1 0 E 6.6 2 7 9.6 5 0 D.0 1
                   SOH J    DLE DLE f    b    y    e    CR   SOH

20      20.010 PCMP REQUEST ID=%001714(!03CC)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=10      #MSG RECV=14      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

21      20.010 PSCT REQUEST ID=NONE
                    RR        ADDR=B    P/F=0   N(R)=6
                   0 1.C 1
                   SOH A
```

Figure B-1. CSDUMP Trace Listing (continued).

```
22      20.530 PSCT REQUEST ID=NONE
                    I-FRAME  ADDR=A   P/F=0  N(R)=6  N(S)=2
                   0 3.C 4 1 0.1 0 8 E.0 D 0 A.0 D 0 A.0 1
                   ETX D   DLE DLE SO  CR  LF  CR  LF  SOH

23      20.560 PRCT REQUEST ID=NONE
                    RR       ADDR=A   P/F=0  N(R)=3
                   0 3.6 1
                   ETX a

0       20.560 PCMP REQUEST ID=%003344(!06E4)
                   ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=11     #MSG RECV=14     STATE=CONNECTED
                   # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

1       20.560 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=B   P/F=0  N(R)=3  N(S)=6
                   0 1.6 C 1 0.1 0 0 1.6 8
                   SOH 1   DLE DLE SOH h

2       20.570 PCMP REQUEST ID=%001774(!03FC)
                   ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=11     #MSG RECV=15     STATE=CONNECTED
                   # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

3       20.570 PSCT REQUEST ID=NONE
                    RR       ADDR=B   P/F=0  N(R)=7
                   0 1.E 1
                   SOH a

4       21.120 PSCT REQUEST ID=NONE
                    I-FRAME  ADDR=A   P/F=0  N(R)=7  N(S)=3
                   0 3.E 6 1 0.1 0 8 0.4 3 5 0.5 5 3 D.3 2 2 E.2 0
                   ETX f   DLE DLE NUL 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 0.5 7
                   C   O   N   N   E   C   T   =   1   .       W
                   4 5.4 4 2 C.2 0 4 F.4 3 5 4.2 0
                   E   D   ,       O   C   T

5       21.120 PSTX REQUEST ID=NONE
                   2 0.3 9 2 C.2 0 3 1.3 9 3 8.3 5 2 C.2 0 2 0.3 9
                       9   ,       1   9   8   5   ,           9
                   3 A.3 0 3 2.2 0 4 1.4 D 0 0.0 D 0 A.0 1
                   :   0   2       A   M   NUL CR  LF  SOH

6       21.180 PRCT REQUEST ID=NONE
                    RR       ADDR=A   P/F=0  N(R)=4
                   0 3.8 1
                   ETX SOH
```

Figure B-1. CSDUMP Trace Listing (continued).

```
7       21.180 PCMP REQUEST ID=%003470(!0738)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=12      #MSG RECV=15      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

8       21.190 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=B   P/F=0  N(R)=4  N(S)=7
                   0 1.8 E 1 0.1 0 2 1.6 2
                   SOH SO  DLE DLE !   b

9       21.190 PCMP REQUEST ID=%002040(!0420)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=12      #MSG RECV=16      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

10      21.200 PSCT REQUEST ID=NONE
                    RR       ADDR=B   P/F=0  N(R)=0
                   0 1.0 1
                   SOH SOH

11      21.210 PSCT REQUEST ID=NONE
                    I-FRAME  ADDR=A   P/F=0  N(R)=0  N(S)=4
                   0 3.0 8 1 0.1 0 1 3.0 0 0 0.0 1
                   ETX BS  DLE DLE DC3 NUL NUL SOH

12      21.230 PRCT REQUEST ID=NONE
                    RR       ADDR=A   P/F=0  N(R)=5
                   0 3.A 1
                   ETX !

13      21.230 PCMP REQUEST ID=%003550(!0768)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=13      #MSG RECV=16      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

14      21.240 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=B   P/F=0  N(R)=5  N(S)=0
                   0 1.A 0 1 0.1 0 1 7.6 8
                   SOH      DLE DLE ETB h

15      21.240 PCMP REQUEST ID=%002274(!04BC)
                   ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                   #MSG SENT=13      #MSG RECV=17      STATE=CONNECTED
                   # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0

16      21.240 PSCT REQUEST ID=NONE
                    RR       ADDR=B   P/F=0  N(R)=1
                   0 1.2 1
                   SOH !
```

Figure B-1. CSDUMP Trace Listing (continued).

```
**********************************
* END OF TRACE FOR DEVICE  130   *
**********************************

*****************************************************
*-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: 130  *
*  DEV. TYPE: 17        SUBTYPE: 1   VER: A.55.27 *
*              0123456789012345                   *
*    COPTIONS: 0000100110000000                   *
*    AOPTIONS: 0000001100001101                   *
*    DOPTIONS: 0000000000000111                   *
*  NETWORK'ID: 0000000000000000                   *
*  NUMBUFFERS: 242         BUFFSIZE: 66   (WORDS) *
*  INSPEED: 1200           OUTSPEED: 1200         *
*  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: 10          *
*                CLEAR-TO-SEND DELAY: 00.0  SECS. *
*               DATA-SET-READY DELAY: DISABLED.   *
*                  TRANSMISSION MODE: DUPLEX.     *
*              MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINP0                             *
*  DOWNLOAD FILE: CSDLAPB1                        *
*  CTRACEINFO:    ENTRIES=24     MASK=011111000   *
*                 TYPE OF TRACE = ALL, NOWRAP     *
*  PHONELIST:    ENTRIES=0        INDEX=0         *
*  IDLIST:       ENTRIES=0        INDEX=0         *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0    *
*  MSGSENT: 13             MSGRECV: 17            *
*  RECOVERRORS: 1          IRRECOVERRORS: 0       *
*****************************************************

17       26.990 PCMP REQUEST ID=%002464(!0534)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=13     #MSG RECV=17     STATE=CONNECTED
                    # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

18       27.010 PCMP REQUEST ID=%003710(!07C8)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 4
                    #MSG SENT=13     #MSG RECV=17     STATE=CONNECTED
                    # RECOVERABLE ERR=1      # IRRECOVERABLE ERR=0

END OF JOB.
```

Figure B-1. CSDUMP Trace Listing (continued).

CSDUMP Listing Header Message

NOTE

Items under discussion are shaded for easy identification.

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.55.27)          WED, OCT  9, 1985,  9:34 AM

TRACE FILE IS DSTRC131.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON WED, OCT  9, 1985,  9:02 AM

SYSTEM ID=01.02
```

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 INP (130 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 130   *
**********************************

*************************************************
*-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: 130  *
*  DEV. TYPE: 17        SUBTYPE: 1    VER: A.55.27 *
*              0123456789012345                    *
*    COPTIONS: 0000100110000000                    *
*    AOPTIONS: 0000001100001101                    *
*    DOPTIONS: 0000000000000111                    *
*  NETWORK'ID: 0000000000000000                    *
*  NUMBUFFERS: 242          BUFFSIZE: 66   (WORDS) *
*  INSPEED: 1200            OUTSPEED: 1200         *
*  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: 10           *
*                CLEAR-TO-SEND DELAY: 00.0  SECS. *
*               DATA-SET-READY DELAY: DISABLED.    *
*                  TRANSMISSION MODE: DUPLEX.      *
*              MMSTAT TRACE FACILITY: ENABLED.     *
*  DRIVERNAME: IOINPO                              *
*  DOWNLOAD FILE: CSDLAPB1                         *
*  CTRACEINFO:   ENTRIES=24      MASK=011111000    *
*                  TYPE OF TRACE = ALL, NOWRAP     *
*  PHONELIST:    ENTRIES=0         INDEX=0         *
*  IDLIST:       ENTRIES=0         INDEX=0         *
*  ERRORCODE:  RECOVERABLE=0    IRRECOVERABLE=0    *
*  MSGSENT: 1               MSGRECV: 1             *
*  RECOVERRORS: 1           IRRECOVERRORS: 0       *
*************************************************
```

Figure B-3. Begin Tracing and Line Information Messages.

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 1200 characters per second (9600 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 10, which is the retry count N2 (as defined in LAP-B protocol),
- DOWNLOAD FILE is CSDLAPB1, which means we are using the LAP-B protocol,
- CTRACEINFO ENTRIES is 24, so *numentries* is 24,
- MASK is 011111000 (=%37; for X.25 Link, ignore the three right-most zeroes),
- ALL events will be traced,
- overflow trace 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 (6.360 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 intrinsic call (%001050 in Figure B-4. Note that the % indicates an octal value, and the ! indicates hexadecimal.)

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. When the line is opened, or when the connection has been severed, the time is reset to zero. The entry-type 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. Six types of trace entries are used in X.25 Link. These are summarized in Table B-1 (page B-4) and described in detail beginning on page B-22.

```
0          6.360 PCMP REQUEST ID=%001050(!0228)
                     ERROR CODE=4      LAST RECOVERABLE ERROR CODE= 4
                     #MSG SENT=1       #MSG RECV=1       STATE=CONNECTED
                     # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0
```

Figure B-4. Sample Trace Entry.

Missing Entries Message

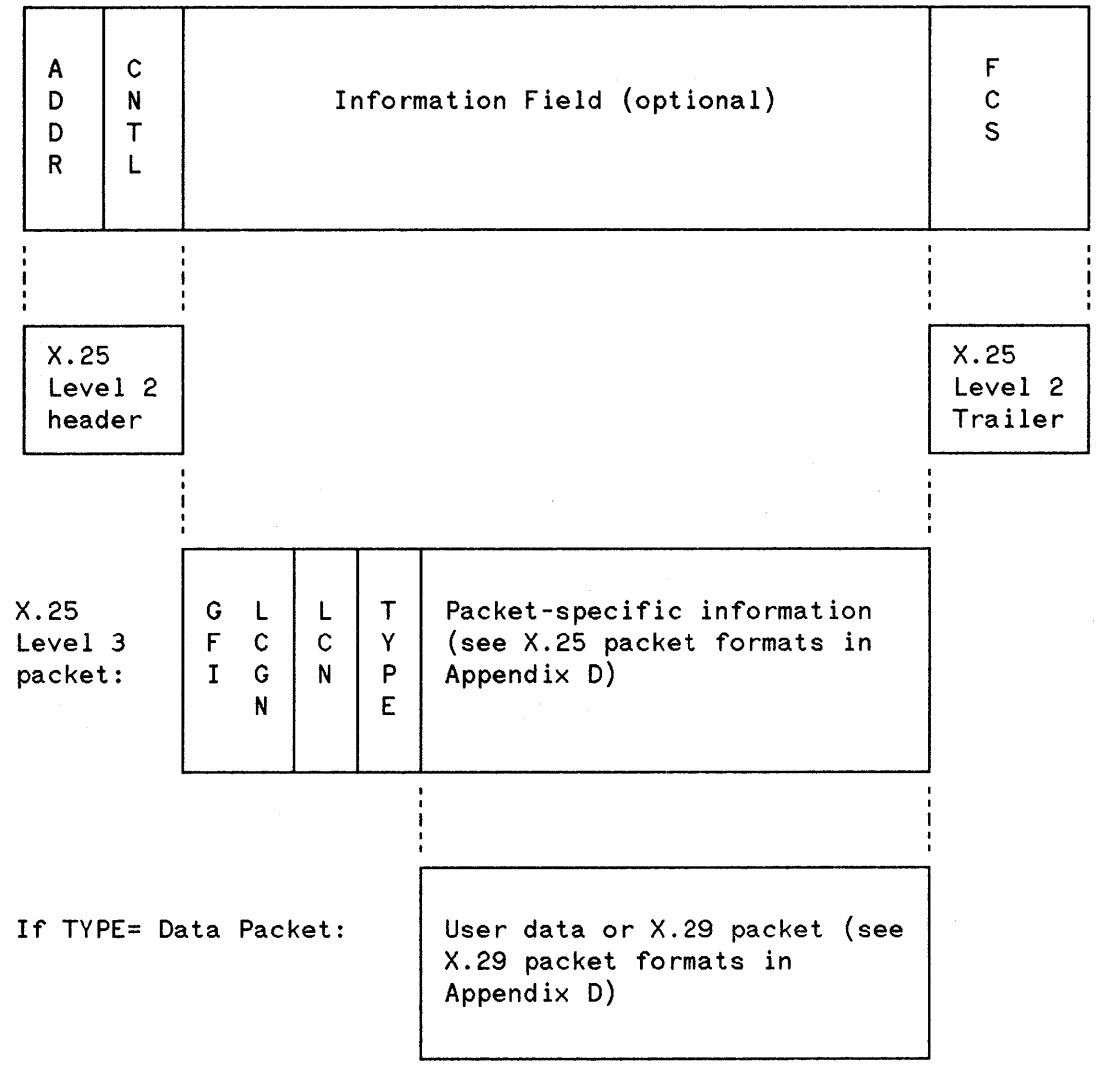
If MISSING ENTRIES appears in the listing, it means that the record was not large enough to accommodate all of the trace entries and some entries were lost. If WRAP was not specified (NOWRAP), then the missing entries were at the end just before the trace record was processed; otherwise they are missing 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/PRTX and PSCT/PSTX Trace Entries

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:



Level 2 field lengths:

```
ADDR = 1 byte
CNTL = 1 byte
 FCS = 1 FCS byte will appear if the frame ends on an odd-byte boundary.
```

Level 3 field lengths:

```
GFI/LCGN = 1 byte
     LCN = 1 byte
    TYPE = 1 byte
```

Figure B-5. The X.25 Data Format (not to scale).

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.

```
11          13.440 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=B   P/F=0  N(R)=5  N(S)=0
                   0 1.A 0 1 0.1 0 6 4.6 8 6 5.6 C 6 C.6 F 2 0.6 D
                   SOH      DLE DLE d   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 F
                   a   n   a   g   e   r   .   s   y   s   CR  SI
```

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.

```
01 => ADDR=B
A0 => CNTL=I frame  P/F=0
      N(R)=5  N(S)=0
10 => GFI=1, Q=0 so this packet
      contains PAD user data, LCGN=0
10 => LCN=16
64 => Data packet, M=0  P(R)=3  P(S)=2
    User data = hello manager.sys (RETURN)
0F => FCS byte
```

as defined in X.25 Level 2 protocol (LAP-B)

as defined in X.25 Level 3 protocol (see Appendix D)

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.

```
14        10.250 PSCT REQUEST ID=NONE
                  I-FRAME  ADDR=A   P/F=0  N(R)=4  N(S)=2
                 0 3.8 4 9 0.1 0 2 0.0 6 0 1.0 1 0 2.0 1 0 3.0 2
                 ETX EOT DLE DLE     ACK 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.

```
03 => Address=A
84 => CNTL=I frame  P/F=0
      N(R)=4  N(S)=2
90 => GFI=9, Q bit=1, so
      data is an X.29 packet  LCGN=0
10 => LCN=16
20 => packet type=data packet,
      M=0  P(R)=1  P(S)=0
06 => set and read PAD parameters X.29 packet
01 => set parameter 1
01 => value for parameter 1 = 1
02 => set parameter 2
01 => value for parameter 2 = 1
03 => set parameter 3
02 => value for parameter 3 = 2
        •
        •
        •
0C => set parameter 12
01 => value for parameter 12 = 1
```

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)

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 such a 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. Whenever possible, the CSDUMP program converts the octal or hexadecimal codes to an ASCII character and displays the character beneath its code.

In our example, the PAD terminal user did not enter any data that was long enough to generate a PRTX entry.

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-8.

```
4        21.120 PSCT REQUEST ID=NONE
                     I-FRAME  ADDR=A   P/F=0  N(R)=7  N(S)=3
                    0 3.E 6 1 0.1 0 8 0.4 3 5 0.5 5 3 D.3 2 2 E.2 0
                    ETX f   DLE DLE NUL 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 0.5 7
                    C   O   N   N   E   C   T   =   1   .       W
                    4 5.4 4 2 C.2 0 4 F.4 3 5 4.2 0
                    E   D   ,       O   C   T

5        21.120 PSTX REQUEST ID=NONE
                    2 0.3 9 2 C.2 0 3 1.3 9 3 8.3 5 2 C.2 0 2 0.3 9
                        9   ,       1   9   8   5   ,           9
                    3 A.3 0 3 2.2 0 4 1.4 D 0 0.0 D 0 A.0 1
                    :   0   2       A   M   NUL CR  LF  SOH
```

Figure B-8. 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 intrinsic call is completed. An example is shown in Figure B-9.

```
7        21.180 PCMP REQUEST ID=%003470(!0738)
                ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 4
                #MSG SENT=12      #MSG RECV=15      STATE=CONNECTED
                # RECOVERABLE ERR=1       # IRRECOVERABLE ERR=0
```

Figure B-9. 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 the *Data Communications Handbook* 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, 12 frames have been sent.)
# MSG RECV:	The total number of frames that have been received so far for this connection. (In the example, 15 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, 1 Recoverable Error has 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 (130 in the example in Figure B-10) 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. Note the counts of messages sent (13), messages received (17), and recoverable and irrecoverable errors (1 and 0) that transpired while the trace facility was enabled.

```
************************************
* END OF TRACE FOR DEVICE  130   *
************************************

*****************************************************
*-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: 130  *
*  DEV. TYPE: 17        SUBTYPE: 1   VER: A.55.27 *
*              0123456789012345                   *
*    COPTIONS: 0000100110000000                   *
*    AOPTIONS: 0000001100001101                   *
*    DOPTIONS: 0000000000000111                   *
*  NETWORK'ID: 0000000000000000                   *
*  NUMBUFFERS: 242         BUFFSIZE: 66   (WORDS) *
*  INSPEED: 1200           OUTSPEED: 1200         *
*  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: 10          *
*                CLEAR-TO-SEND DELAY: 00.0  SECS. *
*               DATA-SET-READY DELAY: DISABLED.   *
*                  TRANSMISSION MODE: DUPLEX.     *
*              MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINP0                             *
*  DOWNLOAD FILE: CSDLAPB1                        *
*  CTRACEINFO:    ENTRIES=24     MASK=011111000   *
*                  TYPE OF TRACE = ALL, NOWRAP    *
*  PHONELIST:    ENTRIES=0        INDEX=0         *
*  IDLIST:       ENTRIES=0        INDEX=0         *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0    *
*  MSGSENT: 13             MSGRECV: 17            *
*  RECOVERRORS: 1          IRRECOVERRORS: 0       *
*****************************************************
```

Figure B-10. End of Trace and Closing Line Information.

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.

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 Link used without DS/3000. The parameters for the TYPES= command are:

COMMANDS	Formats the REMOTE command, Remote HELLO, Remote BYE, message, BREAK message, RESUME mesage, ABORT message, KILLJOB message, and First Slave DSOPEN.

PTOP	Formats PREAD, PWRITE, PCONTROL, POPEN, PCLOSE, ACCEPT, and REJECT.
RFA	Formats RFA, KSAM, 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	If enabled, OCTAL format will be used whenever possible.
HEX	If enabled, HEXADECIMAL format will be used whenever possible.

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.
LEVEL3	The X.25 level 3 display. Use ENABLE to see it, and DISABLE if you do not wish to see it.

DS1 — Controls printing of the formatted DS messages. Does not apply to X.25 Link operation.

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.

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=DSTRC131.PUB.SYS
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO.  WED, OCT  9, 1985,  9:42 AM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
OUTPUT LISTING TO PRINTER OR TERMINAL?P
DEVICE?LP
ENVIRONMENT?RETURN
PRIORITY?RETURN

     X.25 COMMAND SET NOW ENABLED
>GO
>EXIT
:
```

- or -

```
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO.  WED, OCT  9, 1985, 9:43 AM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
PLEASE ENTER CSTRACE FILE:DSTRC131.PUB.SYS
OUTPUT LISTING TO PRINTER OR TERMINAL?P
DEVICE?LP
ENVIRONMENT?RETURN
PRIORITY?RETURN

     X.25 COMMAND SET NOW ENABLED
>GO
>EXIT
:
```

EXAMPLE

```
HEWLETT-PACKARD CO.   WED, OCT  9, 1985,  9:44 AM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
TRACE FILE IS
DSTRC131.PUB.SYS
TRACE DATE IS
WED, OCT  9, 1985,  9:02 AM
CS LDEV = 130
    DOWNLOAD FILE IS CSDLAPB1
>
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: 130  *
*  DEV. TYPE: 17        SUBTYPE: 1   VER: A.55.27 *
*              0123456789012345                   *
*    COPTIONS: 0000100110000000                   *
*    AOPTIONS: 0000001100001101                   *
*    DOPTIONS: 0000000000000111                   *
*  NETWORK'ID: 0000000000000000                   *
*  NUMBUFFERS: 242         BUFFSIZE: 66   (WORDS) *
*  INSPEED: 1200           OUTSPEED: 1200         *
*  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: 10          *
*                CLEAR-TO-SEND DELAY: 00.0  SECS. *
*               DATA-SET-READY DELAY: DISABLED.   *
*                  TRANSMISSION MODE: DUPLEX.     *
*              MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINPO                             *
*  DOWNLOAD FILE: CSDLAPB1                        *
*  CTRACEINFO:    ENTRIES=24     MASK=011111000   *
*                  TYPE OF TRACE = ALL, NOWRAP    *
*  PHONELIST:    ENTRIES=0         INDEX=0        *
*  IDLIST:       ENTRIES=0         INDEX=0        *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0    *
*  MSGSENT: 1               MSGRECV: 1            *
*  RECOVERRORS: 1           IRRECOVERRORS: 0      *
*****************************************************
ooooooooooooooooooooooooooooooooooooo
o PCMP                  STATE=CONN.      o
o 6.36         LEVEL 2. ID=%001050 !0228o
o$Error Code=     4   Last Recov Err=4   o
o$# MSG Sent=1        # MSG Rec=1        o
o$# Recov Err=1       # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooo
```

Figure B-11. DSDUMP Trace Listing.

```
oooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.      o
o 6.39          LEVEL 2. ID=%001064 !0234o
o Error Code=     0    Last Recov Err=4   o
o # MSG Sent=1         # MSG Rec=1         o
o # Recov Err=1        # Irrec Errs=0      o
oooooooooooooooooooooooooooooooooooooooo
                                          ++++++++++++++++++++++++++++++++++++++++
                                          + PRCT      I Frame N(R)= 1 P=0 N(S)= 1 +
                                          + 7.57          LEVEL 2.              DCE +
                                          + SCT/RCT Control Frame data display    +
                                          + 020.020  013.041  021.020  000.001    +
                                          + DLE.DLE  VT .  !  DC1.DLE  NUL.SOH    +
                                          + 000.000  000.055                      +
                                          + NUL.NUL  NUL.  -                      +
                                          ++++++++++++  LEVEL 3.  +++++++++++++++++
                                          * Length=14   Packet ID=11  %013  !0B  *
                                          * Type=Call Request and Incoming  Call *
                                          * Log Channel No=16     %000020 !0010  *
                                          * Calling Address= 1                    *
                                          * Called  Address= 11                   *
                                          * Call Request Packet is a PAD Request *
                                          *** WARN: PAD: DS1 Display Suppressed  *
                                          * Call User Data                        *
                                          * 001.000  000.000  055.                *
                                          * SOH.NUL  NUL.NUL    -.                *
                                          ****************************************
                                          oooooooooooooooooooooooooooooooooooooooo
                                          o PCMP                    STATE=CONN.      o
                                          o 7.57          LEVEL 2. ID=%000314 !00CCo
                                          o Error Code=     0    Last Recov Err=4   o
                                          o # MSG Sent=1         # MSG Rec=2         o
                                          o # Recov Err=1        # Irrec Errs=0      o
                                          oooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR      N(R)= 2 P/F=0        +
+ 7.57          LEVEL 2.              DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 2 P=0 N(S)= 1 +
+ 7.60          LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display    +
+ 020.020  017.010                      +
+ DLE.DLE  SI .BS                       +
++++++++++++  LEVEL 3.  +++++++++++++++++
* Length=6     Packet ID=15  %017  !0F  *
* Type=Call Accepted                    *
* Log Channel No=16     %000020 !0010  *
****************************************
                                          ++++++++++++++++++++++++++++++++++++++++
                                          + PRCT      RR      N(R)= 2 P/F=0        +
                                          + 7.61          LEVEL 2.              DTE +
                                          ++++++++++++++++++++++++++++++++++++++++
```

Figure B-11. DSDUMP Trace Listing (continued).

```
                                    oooooooooooooooooooooooooooooooooooooo
                                    o PCMP                  STATE=CONN.     o
                                    o 7.62        LEVEL 2. ID=%001334 !02DCo
                                    o Error Code=    0   Last Recov Err=4  o
                                    o # MSG Sent=2       # MSG Rec=2       o
                                    o # Recov Err=1      # Irrec Errs=0     o
                                    oooooooooooooooooooooooooooooooooooooo
                                    ++++++++++++++++++++++++++++++++++++++++
                                    + PRCT     I Frame N(R)= 2 P=0 N(S)= 2 +
                                    + 7.67        LEVEL 2.             DCE +
                                    + SCT/RCT Control Frame data display   +
                                    + 020.020  001.000                     +
                                    + DLE.DLE  SOH.NUL                     +
                                    ++++++++++++  LEVEL 3.  +++++++++++++++
                                    * Length=6    Packet ID=1   %001  !01  *
                                    * Type=DTE/DCE Receive Ready (RR)      *
                                    * Log Channel No=16     %000020 !0010  *
                                    * P(R)=0   %000000 !0                  *
                                    ****************************************
                                    oooooooooooooooooooooooooooooooooooooo
                                    o PCMP                  STATE=CONN.     o
                                    o 7.68        LEVEL 2. ID=%000330 !00D8o
                                    o Error Code=    0   Last Recov Err=4  o
                                    o # MSG Sent=2       # MSG Rec=3       o
                                    o # Recov Err=1      # Irrec Errs=0     o
                                    oooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 3 P/F=0       +
+ 7.68        LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
                                    ++++++++++++++++++++++++++++++++++++++++
                                    + PRCT     I Frame N(R)= 2 P=0 N(S)= 3 +
                                    + 9.72        LEVEL 2.             DCE +
                                    + SCT/RCT Control Frame data display   +
                                    + 020.020  000.015                     +
                                    + DLE.DLE  NUL.CR                      +
                                    ++++++++++++  LEVEL 3.  +++++++++++++++
                                    * Length=6    Packet ID=0   %000  !00  *
                                    * Type=DTE/DCE Data Packet             *
                                    * Log Channel No=16     %000020 !0010  *
                                    * P(R)=0   P(S)=0   Q=0   M=0  D=0     *
                                    * User Data Display                    *
                                    * 015.                                 *
                                    * CR .                                 *
                                    ****************************************
                                    oooooooooooooooooooooooooooooooooooooo
                                    o PCMP                  STATE=CONN.     o
                                    o 9.72        LEVEL 2. ID=%000344 !00E4o
                                    o Error Code=    0   Last Recov Err=4  o
                                    o # MSG Sent=2       # MSG Rec=4       o
                                    o # Recov Err=1      # Irrec Errs=0     o
                                    oooooooooooooooooooooooooooooooooooooo
```

Figure B-11. DSDUMP Trace Listing (continued).

```
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 4 P/F=0        +
+ 9.72        LEVEL 2.              DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 4 P=0 N(S)= 2 +
+ 10.25       LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 220.020  040.006  001.001  002.001   +
+ !!!.DLE     .ACK  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=16     %000020 !0010  *
* P(R)=1   P(S)=0   Q=1   M=0  D=0     *
* Set and Read 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*
* 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)= 4 P=0 N(S)= 3 +
+ 10.28       LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  042.015  012.015  012.260   +
+ DLE.DLE    ".CR   LF .CR   LF .!!!   +
++++++++++++  LEVEL 3.  +++++++++++++++
* Length=10   Packet ID=0   %000  !00  *
```

Figure B-11. DSDUMP Trace Listing (continued).

```
* Type=DTE/DCE Data Packet              *
* Log Channel No=16     %000020 !0010  *
* P(R)=1   P(S)=1   Q=0   M=0  D=0      *
* User Data Display                     *
* 015.012  015.012  260.                *
* CR .LF   CR .LF   !!!.                *
*****************************************
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 3 P/F=0       +
                                        + 10.29       LEVEL 2.             DTE +
                                        ++++++++++++++++++++++++++++++++++++++++
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.29       LEVEL 2. ID=%001554 !036Co
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=3       # MSG Rec=4        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooooo
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 3 P=0 N(S)= 4 +
                                        + 10.30       LEVEL 2.             DCE +
                                        + SCT/RCT Control Frame data display   +
                                        + 020.020  041.000                     +
                                        + DLE.DLE    !.NUL                     +
                                        ++++++++++++  LEVEL 3.  +++++++++++++++
                                        * Length=6    Packet ID=1   %001  !01  *
                                        * Type=DTE/DCE Receive Ready (RR)      *
                                        * Log Channel No=16     %000020 !0010  *
                                        * P(R)=1   %000001 !1                  *
                                        ****************************************
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.30       LEVEL 2. ID=%000360 !00F0o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=3       # MSG Rec=5        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 5 P/F=0       +
+ 10.31       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 4 P/F=0       +
                                        + 10.32       LEVEL 2.             DTE +
                                        ++++++++++++++++++++++++++++++++++++++++
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.33       LEVEL 2. ID=%001604 !0384o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=4       # MSG Rec=5        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooooo
```

Figure B-11. DSDUMP Trace Listing (continued).

```
++++++++++++++++++++++++++++++++++++++++
+ PRCT     I Frame N(R)= 4 P=0 N(S)= 5 +
+ 10.35       LEVEL 2.              DCE +
+ SCT/RCT Control Frame data display   +
+ 220.020  042.000  001.001  002.001   +
+ !!!.DLE    ".NUL  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=16     %000020 !0010  *
* P(R)=1   P(S)=1   Q=1   M=0  D=0     *
* Parameter Indication 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*
* 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  *
****************************************
ooooooooooooooooooooooooooooooooooooooo
o PCMP                  STATE=CONN.     o
o 10.35       LEVEL 2. ID=%000374 !00FCo
o Error Code=    0   Last Recov Err=4   o
o # MSG Sent=4       # MSG Rec=6        o
o # Recov Err=1      # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 6 P/F=0       +
+ 10.36       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
```

Figure B-11. DSDUMP Trace Listing (continued).

```
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 4 P=0 N(S)= 6 +
                                        + 10.36       LEVEL 2.             DCE +
                                        + SCT/RCT Control Frame data display   +
                                        + 020.020  101.041                     +
                                        + DLE.DLE    A.  !                     +
                                        ++++++++++++  LEVEL 3.  ++++++++++++++++
                                        * Length=6    Packet ID=1   %001  !01  *
                                        * Type=DTE/DCE Receive Ready (RR)      *
                                        * Log Channel No=16     %000020 !0010  *
                                        * P(R)=2   %000002 !2                  *
                                        ****************************************
                                        oooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.37       LEVEL 2. ID=%000410 !0108o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=4       # MSG Rec=7        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 7 P/F=0        +
+ 10.37       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 7 P=0 N(S)= 4 +
+ 10.41       LEVEL 2.             DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  104.072  000.001            +
+ DLE.DLE    D.  :  NUL.SOH            +
++++++++++++  LEVEL 3.  ++++++++++++++++
* Length=8    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet             *
* Log Channel No=16     %000020 !0010  *
* P(R)=2   P(S)=2   Q=0   M=0  D=0     *
* User Data Display                    *
* 072.000  001.                        *
*   :.NUL  SOH.                        *
****************************************
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 5 P/F=0        +
                                        + 10.43       LEVEL 2.             DTE +
                                        ++++++++++++++++++++++++++++++++++++++++
                                        oooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.43       LEVEL 2. ID=%001744 !03E4o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=5       # MSG Rec=7        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooo
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 5 P=0 N(S)= 7 +
                                        + 10.44       LEVEL 2.             DCE +
                                        + SCT/RCT Control Frame data display   +
```

Figure B-11. DSDUMP Trace Listing (continued).

```
                                        + 020.020  141.002                    +
                                        + DLE.DLE    a.STX                    +
                                        ++++++++++++  LEVEL 3.  +++++++++++++++
                                        * Length=6    Packet ID=1   %001  !01  *
                                        * Type=DTE/DCE Receive Ready (RR)      *
                                        * Log Channel No=16     %000020 !0010  *
                                        * P(R)=3   %000003 !3                  *
                                        ****************************************
                                        ooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 10.44       LEVEL 2. ID=%000710 !01C8o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=5       # MSG Rec=8        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 0 P/F=0       +
+ 10.44       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 5 P=0 N(S)= 0 +
                                        + 13.44       LEVEL 2.             DCE +
                                        + SCT/RCT Control Frame data display   +
                                        + 020.020  144.150  145.154  154.157   +
                                        + DLE.DLE    d.  h    e.  l    l.  o   +
                                        + 040.155  141.156  141.147  145.162   +
                                        +    .  m    a.  n    a.  g    e.  r   +
                                        + 056.163  171.163  015.017            +
                                        +   ..  s    y.  s  CR .SI             +
                                        ++++++++++++  LEVEL 3.  +++++++++++++++
                                        * Length=24   Packet ID=0   %000  !00  *
                                        * Type=DTE/DCE Data Packet             *
                                        * Log Channel No=16     %000020 !0010  *
                                        * P(R)=3   P(S)=2   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  017.                        *
                                        *   s.CR   SI .                        *
                                        ****************************************
                                        ooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 13.45       LEVEL 2. ID=%001350 !02E8o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=5       # MSG Rec=9        o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 1 P/F=0       +
+ 13.45       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
```

Figure B-11. DSDUMP Trace Listing (continued).

```
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 1 P=0 N(S)= 5 +
+ 14.55       LEVEL 2.             DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  141.001                     +
+ DLE.DLE    a.SOH                     +
++++++++++++  LEVEL 3.  +++++++++++++++++
* Length=6    Packet ID=1   %001  !01  *
* Type=DTE/DCE Receive Ready (RR)      *
* Log Channel No=16     %000020 !0010  *
* P(R)=3   %000003 !3                  *
****************************************
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 6 P/F=0       +
                                        + 14.56       LEVEL 2.             DTE +
                                        ++++++++++++++++++++++++++++++++++++++++
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 14.57       LEVEL 2. ID=%002120 !0450o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=6       # MSG Rec=9       o
                                        o # Recov Err=1      # Irrec Errs=0    o
                                        oooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 1 P=0 N(S)= 6 +
+ 14.74       LEVEL 2.             DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  146.015  012.110  120.063   +
+ DLE.DLE    f.CR   LF .  H    P.  3   +
+ 060.060  060.040  057.040  115.120   +
+   0.  0    0.       /.       M.  P   +
+ 105.040  126.040  040.107  056.060   +
+   E.       V.        . G    ..  0   +
+ 061.056  060.063  040.050            +
+   1.  .    0.  3     . (             +
++++++++++++  LEVEL 3.  +++++++++++++++++
* Length=32   Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet             *
* Log Channel No=16     %000020 !0010  *
* P(R)=3   P(S)=3   Q=0   M=0  D=0     *
* User Data Display                    *
* 015.012  110.120  063.060  060.060   *
* CR .LF     H.  P    3.  0    0.  0   *
* 040.057  040.115  120.105  040.126   *
*    . /      . M    P.  E     . V     *
* 040.040  107.056  060.061  056.060   *
*    .       G.  .    0.  1    ..  0   *
* 063.040  050.                        *
*   3.       (.                        *
****************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138     Entry Length=32    ^
^ 102.101  123.105  040.107  056.060    ^
^   B   A    S   E       G    .   0    ^
```

Figure B-11. DSDUMP Trace Listing (continued).

```
^ 061.056  060.063  051.056  040.040   ^
^   1   .    0   3    )   .            ^
^ 127.105  104.054  040.117  103.124   ^
^   W   E    D   ,        0    C   T   ^
^ 040.040  071.054  040.061  071.070   ^
^            9   ,        1    9   8   ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138     Entry Length=14    ^
^ 065.054  040.040  071.072  060.062   ^
^   5   ,             9   :    0   2   ^
^ 040.101  115.015  012.001            ^
^       A    M CR   LF  SOH            ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

```
++++++++++++++++++++++++++++++++++++++++
+ PRCT     RR      N(R)= 7 P/F=0       +
+ 14.82       LEVEL 2.             DTE +
++++++++++++++++++++++++++++++++++++++++
oooooooooooooooooooooooooooooooooooooooo
o PCMP                   STATE=CONN.     o
o 14.82       LEVEL 2. ID=%002244 !04A4o
o Error Code=    0   Last Recov Err=4   o
o # MSG Sent=7       # MSG Rec=9         o
o # Recov Err=1      # Irrec Errs=0      o
oooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PRCT     I Frame N(R)= 7 P=0 N(S)= 1 +
+ 14.83       LEVEL 2.              DCE +
+ SCT/RCT Control Frame data display   +
+ 020.020  201.000                     +
+ DLE.DLE  !!!.NUL                     +
++++++++++++ LEVEL 3. +++++++++++++++++
* Length=6    Packet ID=1   %001  !01   *
* Type=DTE/DCE Receive Ready (RR)      *
* Log Channel No=16     %000020 !0010  *
* P(R)=4   %000004 !4                  *
****************************************
```

- (Several Trace entries
- have been intentionally
- omitted.)

```
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 4 P/F=0       +
+ 17.80       LEVEL 2.             DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 4 P=0 N(S)= 1 +
+ 17.81       LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  154.072  000.001            +
+ DLE.DLE    1.  :  NUL.SOH            +
++++++++++++ LEVEL 3. +++++++++++++++++
* Length=8    Packet ID=0   %000  !00   *
* Type=DTE/DCE Data Packet             *
```

Figure B-11. DSDUMP Trace Listing (continued).

```
* Log Channel No=16      %000020 !0010  *
* P(R)=3    P(S)=6    Q=0    M=0  D=0     *
* User Data Display                      *
* 072.000  001.                         *
*    :.NUL  SOH.                         *
*****************************************
                                        +++++++++++++++++++++++++++++++++++++++++
                                        + PRCT      RR       N(R)= 2 P/F=0       +
                                        + 17.83         LEVEL 2.              DTE +
                                        +++++++++++++++++++++++++++++++++++++++++
                                        ooooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                    STATE=CONN.     o
                                        o 17.83         LEVEL 2. ID=%003154 !066Co
                                        o Error Code=     0    Last Recov Err=4  o
                                        o # MSG Sent=10        # MSG Rec=12       o
                                        o # Recov Err=1        # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooooooo
                                        +++++++++++++++++++++++++++++++++++++++++
                                        + PRCT      I Frame N(R)= 2 P=0 N(S)= 4 +
                                        + 17.84         LEVEL 2.              DCE +
                                        + SCT/RCT Control Frame data display    +
                                        + 020.020  341.150                      +
                                        + DLE.DLE  !!!.  h                      +
                                        ++++++++++++  LEVEL 3.  ++++++++++++++++
                                        * Length=6     Packet ID=1   %001  !01  *
                                        * Type=DTE/DCE Receive Ready (RR)       *
                                        * Log Channel No=16      %000020 !0010  *
                                        * P(R)=7   %000007 !7                   *
                                        *****************************************
                                        ooooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                    STATE=CONN.     o
                                        o 17.84         LEVEL 2. ID=%001700 !03C0o
                                        o Error Code=     0    Last Recov Err=4  o
                                        o # MSG Sent=10        # MSG Rec=13       o
                                        o # Recov Err=1        # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR       N(R)= 5 P/F=0       +
+ 17.84         LEVEL 2.              DCE +
+++++++++++++++++++++++++++++++++++++++++
                                        +++++++++++++++++++++++++++++++++++++++++
                                        + PRCT      I Frame N(R)= 2 P=0 N(S)= 5 +
                                        + 20.00         LEVEL 2.              DCE +
                                        + SCT/RCT Control Frame data display    +
                                        + 020.020  346.142  171.145  015.001    +
                                        + DLE.DLE  !!!.  b    y.  e  CR .SOH    +
                                        ++++++++++++  LEVEL 3.  ++++++++++++++++
                                        * Length=10    Packet ID=0   %000  !00  *
                                        * Type=DTE/DCE Data Packet              *
                                        * Log Channel No=16      %000020 !0010  *
                                        * P(R)=7   P(S)=3   Q=0   M=0  D=0      *
                                        * User Data Display                     *
                                        * 142.171  145.015  001.                *
                                        *   b.  y    e.CR   SOH.                 *
```

Figure B-11. DSDUMP Trace Listing (continued).

```
                                        ****************************************
                                        ooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 20.01       LEVEL 2. ID=%001714 !03CCo
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=10      # MSG Rec=14       o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 6 P/F=0        +
+ 20.01       LEVEL 2.              DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 6 P=0 N(S)= 2 +
+ 20.53       LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  216.015  012.015  012.001   +
+ DLE.DLE  !!!.CR   LF .CR   LF .SOH   +
++++++++++++  LEVEL 3.  +++++++++++++++
* Length=10   Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet             *
* Log Channel No=16     %000020 !0010  *
* P(R)=4   P(S)=7   Q=0   M=0  D=0     *
* User Data Display                    *
* 015.012  015.012  001.               *
* CR .LF   CR .LF   SOH.               *
****************************************

      1 MISSING PROTOCOL ENTRIES(TRUNCATED)


****************************************************
*-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: 130   *
*  DEV. TYPE: 17       SUBTYPE: 1   VER: A.55.27  *
*              0123456789012345                   *
*    COPTIONS: 0000100110000000                   *
*    AOPTIONS: 0000001100001101                   *
*    DOPTIONS: 0000000000000111                   *
*  NETWORK'ID: 0000000000000000                   *
*  NUMBUFFERS: 242         BUFFSIZE: 66   (WORDS) *
*  INSPEED: 1200           OUTSPEED: 1200         *
*  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: 10          *
*                CLEAR-TO-SEND DELAY: 00.0  SECS. *
*               DATA-SET-READY DELAY: DISABLED.   *
*                  TRANSMISSION MODE: DUPLEX.     *
*              MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINPO                             *
```

Figure B-11. DSDUMP Trace Listing (continued).

```
*  DOWNLOAD FILE: CSDLAPB1                          *
*  CTRACEINFO:    ENTRIES=24      MASK=011111000    *
*                 TYPE OF TRACE = ALL, NOWRAP       *
*  PHONELIST:    ENTRIES=0         INDEX=0          *
*  IDLIST:       ENTRIES=0         INDEX=0          *
*  ERRORCODE:  RECOVERABLE=0    IRRECOVERABLE=0     *
*  MSGSENT: 13              MSGRECV: 17             *
*  RECOVERRORS: 1           IRRECOVERRORS: 0        *
****************************************************
ooooooooooooooooooooooooooooooooooooo
o PCMP                   STATE=CONN.      o
o 20.56        LEVEL 2. ID=%003344 !06E4o
o Error Code=     0    Last Recov Err=4   o
o # MSG Sent=11       # MSG Rec=14        o
o # Recov Err=1       # Irrec Errs=0      o
ooooooooooooooooooooooooooooooooooooo
                                         ++++++++++++++++++++++++++++++++++++++++
                                         + PRCT      I Frame N(R)= 3 P=0 N(S)= 6 +
                                         + 20.56        LEVEL 2.              DCE +
                                         + SCT/RCT Control Frame data display   +
                                         + 020.020  001.150                     +
                                         + DLE.DLE  SOH.  h                     +
                                         ++++++++++++  LEVEL 3.  ++++++++++++++++
                                         * Length=6     Packet ID=1   %001  !01  *
                                         * Type=DTE/DCE Receive Ready (RR)      *
                                         * Log Channel No=16      %000020 !0010  *
                                         * P(R)=0   %000000 !0                   *
                                         ****************************************
                                         ooooooooooooooooooooooooooooooooooooo
                                         o PCMP                   STATE=CONN.      o
                                         o 20.57        LEVEL 2. ID=%001774 !03FCo
                                         o Error Code=     0    Last Recov Err=4   o
                                         o # MSG Sent=11       # MSG Rec=15        o
                                         o # Recov Err=1       # Irrec Errs=0      o
                                         ooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR       N(R)= 7 P/F=0       +
+ 20.57         LEVEL 2.              DCE +
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 7 P=0 N(S)= 3 +
+ 21.12         LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  200.103  120.125  075.062   +
+ DLE.DLE  !!!.  C     P.  U     =.  2  +
+ 056.040  103.117  116.116  105.103   +
+    ..       C.  O     N.  N     E.  C  +
+ 124.075  061.056  040.127  105.104   +
+    T.  =     1.  .      .  W     E.  D  +
+ 054.040  117.103  124.040             +
+    ,.       O.  C     T.              +
++++++++++++  LEVEL 3.  ++++++++++++++++
* Length=32    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet              *
```

Figure B-11. DSDUMP Trace Listing (continued).

```
* Log Channel No=16      %000020 !0010  *
* P(R)=4   P(S)=0   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  127.105  104.054  040.117    *
*   ..       W.  E    D.  ,     .  O     *
* 103.124  040.                         *
*   C.  T     .                         *
*****************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138     Entry Length=22    ^
^ 040.071  054.040  061.071  070.065    ^
^       9     ,       1   9    8   5    ^
^ 054.040  040.071  072.060  062.040    ^
^    ,            9    :   0    2      ^
^ 101.115  000.015  012.001             ^
^   A   M  NUL CR   LF  SOH             ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
                                        +++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 4 P/F=0       +
                                        + 21.18       LEVEL 2.             DTE +
                                        +++++++++++++++++++++++++++++++++++++++++
                                        ooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 21.18       LEVEL 2. ID=%003470 !0738o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=12      # MSG Rec=15       o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooo
                                        +++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 4 P=0 N(S)= 7 +
                                        + 21.19       LEVEL 2.             DCE +
                                        + SCT/RCT Control Frame data display   +
                                        + 020.020  041.142                     +
                                        + DLE.DLE    !.  b                     +
                                        ++++++++++++ LEVEL 3. +++++++++++++++++
                                        * Length=6    Packet ID=1   %001  !01  *
                                        * Type=DTE/DCE Receive Ready (RR)      *
                                        * Log Channel No=16     %000020 !0010  *
                                        * P(R)=1   %000001 !1                  *
                                        *****************************************
                                        ooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 21.19       LEVEL 2. ID=%002040 !0420o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=12      # MSG Rec=16       o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        ooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 0 P/F=0       +
+ 21.20       LEVEL 2.             DCE +
```

Figure B-11. DSDUMP Trace Listing (continued).

```
++++++++++++++++++++++++++++++++++++++++
++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 0 P=0 N(S)= 4 +
+ 21.21       LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  023.000  000.001            +
+ DLE.DLE  DC3.NUL  NUL.SOH            +
++++++++++++  LEVEL 3.  +++++++++++++++
* Length=8    Packet ID=19  %023  !13  *
* Type=Clear Request                   *
* Log Channel No=16     %000020 !0010  *
* Cause=0    %000000 !0000             *
* DTE Clearing                        *
****************************************
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     RR      N(R)= 5 P/F=0       +
                                        + 21.23       LEVEL 2.              DTE +
                                        ++++++++++++++++++++++++++++++++++++++++
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 21.23       LEVEL 2. ID=%003550 !0768o
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=13      # MSG Rec=16       o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooooo
                                        ++++++++++++++++++++++++++++++++++++++++
                                        + PRCT     I Frame N(R)= 5 P=0 N(S)= 0 +
                                        + 21.24       LEVEL 2.              DCE +
                                        + SCT/RCT Control Frame data display   +
                                        + 020.020  027.150                     +
                                        + DLE.DLE  ETB.  h                     +
                                        ++++++++++++  LEVEL 3.  +++++++++++++++
                                        * Length=6    Packet ID=23  %027  !17  *
                                        * Type=DTE/DCE Clear Confirmation      *
                                        * Log Channel No=16     %000020 !0010  *
                                        ****************************************
                                        oooooooooooooooooooooooooooooooooooooooo
                                        o PCMP                  STATE=CONN.     o
                                        o 21.24       LEVEL 2. ID=%002274 !04BCo
                                        o Error Code=    0   Last Recov Err=4  o
                                        o # MSG Sent=13      # MSG Rec=17       o
                                        o # Recov Err=1      # Irrec Errs=0     o
                                        oooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++
+ PSCT     RR      N(R)= 1 P/F=0       +
+ 21.24       LEVEL 2.              DCE +
++++++++++++++++++++++++++++++++++++++++
oooooooooooooooooooooooooooooooooooooooo
o PCMP                  STATE=CONN.     o
o 26.99       LEVEL 2. ID=%002464 !0534o
o Error Code=    0   Last Recov Err=4  o
o # MSG Sent=13      # MSG Rec=17       o
o # Recov Err=1      # Irrec Errs=0     o
oooooooooooooooooooooooooooooooooooooooo
```

Figure B-11. DSDUMP Trace Listing (continued).

```
oooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.     o
o 27.01        LEVEL 2. ID=%003710 !07C8o
o Error Code=     0    Last Recov Err=4  o
o # MSG Sent=13       # MSG Rec=17       o
o # Recov Err=1       # Irrec Errs=0     o
oooooooooooooooooooooooooooooooooooooooo
>
EXIT
```

Figure B-11. DSDUMP Trace Listing (continued).

DSDUMP Listing Header Message

The output heading provides information about the trace file being analyzed.

```
HEWLETT-PACKARD CO.    WED, OCT  9, 1985,  9:44 AM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
TRACE FILE IS
DSTRC131.PUB.SYS
TRACE DATE IS
WED, OCT  9, 1985,  9:02 AM
CS LDEV = 130
    DOWNLOAD FILE IS CSDLAPB1
>
GO
```

Figure B-12. Output Heading.

Item	Meaning
WED, OCT 9, 1985, 9:44 AM	Date and time of DSDUMP execution.
TRACE FILE IS ...	Provides name of trace file being analyzed. In our case, it is DSTRC131.PUB.SYS.
TRACE DATE IS ...	Date trace file was created. In our case, it is WED, OCT 9, 1985, 9:02 AM.
CS LDEV = ...	LDEV of device being traced. In our case, it is 130.
DOWNLOAD FILE IS ...	Defines INP download file being used. In our case, it is CSDLAPB1 (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: 130   *
*  DEV. TYPE: 17        SUBTYPE: 1    VER: A.55.27 *
*              0123456789012345                     *
*    COPTIONS: 0000100110000000                     *
*    AOPTIONS: 0000001100001101                     *
*    DOPTIONS: 0000000000000111                     *
*  NETWORK'ID: 0000000000000000                     *
*  NUMBUFFERS: 242          BUFFSIZE: 66    (WORDS) *
*  INSPEED: 1200            OUTSPEED: 1200          *
*  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: 10           *
*                  CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                 DATA-SET-READY DELAY: DISABLED.   *
*                    TRANSMISSION MODE: DUPLEX.     *
*                MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINP0                               *
*  DOWNLOAD FILE: CSDLAPB1                          *
*  CTRACEINFO:    ENTRIES=24      MASK=011111000    *
*                 TYPE OF TRACE = ALL, NOWRAP       *
*  PHONELIST:    ENTRIES=0         INDEX=0          *
*  IDLIST:       ENTRIES=0         INDEX=0          *
*  ERRORCODE:  RECOVERABLE=0    IRRECOVERABLE=0     *
*  MSGSENT: 1                MSGRECV: 1             *
*  RECOVERRORS: 1           IRRECOVERRORS: 0        *
*****************************************************
```

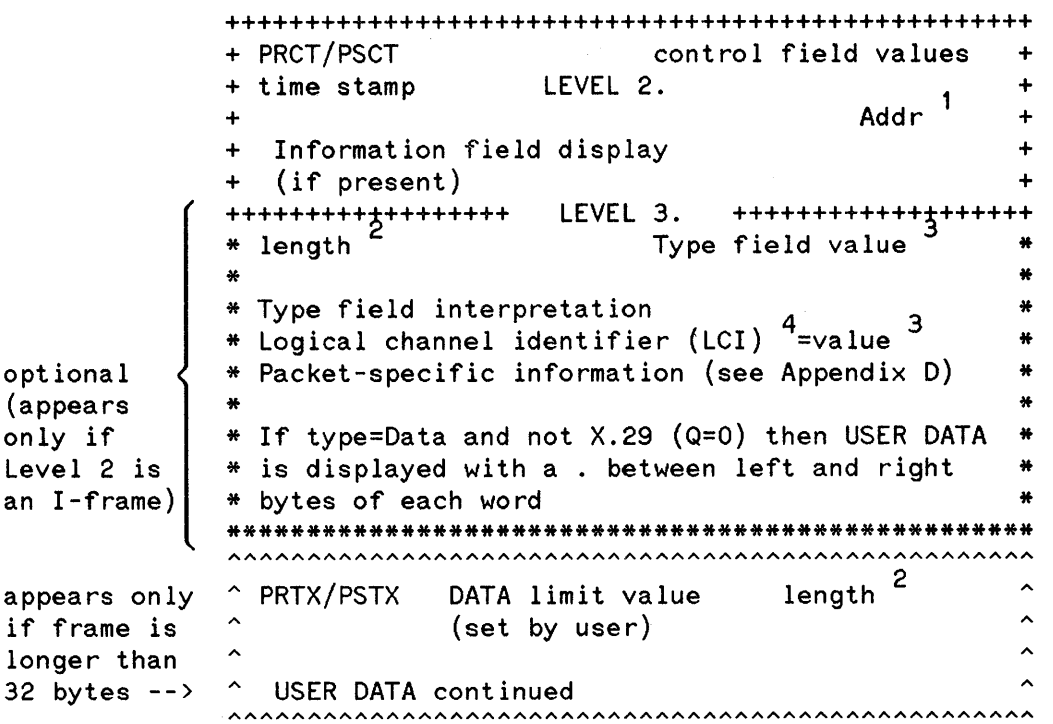
Figure B-13. Line Information Display.

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-19 and B-20).

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.



Footnotes:

1 Addr A = DTE, Addr B = DCE } as defined by LAP-B

2 where length = length of trace entry in bytes

3 where value is given in decimal, %octal, or !hexadecimal

4 where LCI=

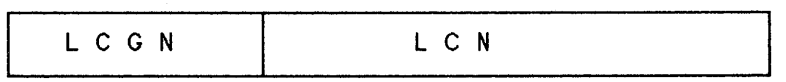


Figure B-14. The DSDUMP Data Format.

PRCT Trace Entries

```
++++++++++++++++++++++++++++++++++++++++
+ PRCT      I Frame N(R)= 5 P=0 N(S)= 0 +
+ 13.44        LEVEL 2.              DCE +
+ SCT/RCT Control Frame data display    +
+ 020.020  144.150  145.154  154.157    +
+ DLE.DLE    d.  h    e.  l    l.  o    +
+ 040.155  141.156  141.147  145.162    +
+     .  m    a.  n    a.  g    e.  r    +
+ 056.163  171.163  015.017             +
+    ..  s    y.  s  CR .SI              +
++++++++++++  LEVEL 3.  +++++++++++++++++
* Length=24    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet              *
* Log Channel No=16      %000020 !0010  *
* P(R)=3   P(S)=2   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  017.                         *
*   s.CR   SI  .                        *
****************************************
```

Figure B-15. PRCT Trace Entry.

The X.25 Level 2 header interpretation here tells us that 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 16 (or virtual circuit 16) 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 017 in our example.

PSCT Trace Entries

```
++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 4 P=0 N(S)= 2 +
+ 10.25        LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display    +
+ 220.020  040.006  001.001  002.001    +
+ !!!.DLE     .ACK  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=16      %000020 !0010  *
* P(R)=1   P(S)=0   Q=1   M=0  D=0      *
* Set and Read 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*
* 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   *
****************************************
```

Figure B-16. PSCT Trace Entry.

The X.25 Level 2 header interpretation here tells us 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 16, 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.

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)= 7 P=0 N(S)= 3 +
+ 21.12        LEVEL 2.              DTE +
+ SCT/RCT Control Frame data display   +
+ 020.020  200.103  120.125  075.062   +
+ DLE.DLE  !!!.  C    P.  U    =.  2   +
+ 056.040  103.117  116.116  105.103   +
+   ..       C.  O    N.  N    E.  C   +
+ 124.075  061.056  040.127  105.104   +
+   T.  =    1.  .     .  W    E.  D   +
+ 054.040  117.103  124.040            +
+   ,.       O.  C    T.                +
++++++++++++  LEVEL 3.  +++++++++++++++
* Length=32   Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet              *
* Log Channel No=16     %000020 !0010  *
* P(R)=4   P(S)=0   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  127.105  104.054  040.117    *
*   ..       W.  E    D.  ,     .  O    *
* 103.124  040.                         *
*   C.  T     .                         *
****************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138     Entry Length=22    ^
^ 040.071  054.040  061.071  070.065    ^
^       9     ,       1   9    8   5    ^
^ 054.040  040.071  072.060  062.040    ^
^   ,            9    :  0    2        ^
^ 101.115  000.015  012.001             ^
^   A   M  NUL CR   LF  SOH             ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Figure B-17. 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

```
ooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.     o
o 21.18        LEVEL 2. ID=%003470 !0738o
o Error Code=     0   Last Recov Err=4  o
o # MSG Sent=12       # MSG Rec=15       o
o # Recov Err=1       # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooo
```

Figure B-18. 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-25) 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: 130   *
*  DEV. TYPE: 17        SUBTYPE: 1    VER: A.55.27 *
*              0123456789012345                     *
*    COPTIONS: 0000100110000000                     *
*    AOPTIONS: 0000001100001101                     *
*    DOPTIONS: 0000000000000111                     *
*  NETWORK'ID: 0000000000000000                     *
*  NUMBUFFERS: 242          BUFFSIZE: 66    (WORDS) *
*  INSPEED: 1200            OUTSPEED: 1200          *
*  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: 10           *
*                CLEAR-TO-SEND DELAY: 00.0  SECS.   *
*               DATA-SET-READY DELAY: DISABLED.     *
*                  TRANSMISSION MODE: DUPLEX.       *
*              MMSTAT TRACE FACILITY: ENABLED.      *
*  DRIVERNAME: IOINP0                               *
*  DOWNLOAD FILE: CSDLAPB1                          *
*  CTRACEINFO:    ENTRIES=24      MASK=011111000    *
*                  TYPE OF TRACE = ALL, NOWRAP      *
*  PHONELIST:    ENTRIES=0         INDEX=0          *
*  IDLIST:       ENTRIES=0         INDEX=0          *
*  ERRORCODE:  RECOVERABLE=0    IRRECOVERABLE=0     *
*  MSGSENT: 13              MSGRECV: 17             *
*  RECOVERRORS: 1           IRRECOVERRORS: 0        *
*****************************************************
```

Figure B-19. 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 (13), messages received (17), and recoverable and irrecoverable errors (1 and 0) that 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 folio 01 / 01

Nom ou Raison sociale Hewlett Packard

Correspondant Technique Joël DUBOIS

Création X
Modification ☐
Suppression ☐
Transfert ☐
Annuaire ☐

10215 02 02/00
n° de contrat

Ancien n° d'Abonné _____

EQUIPEMENT A CONNECTER

Modification ☐

Correspondant technique local Joël DUBOIS
N° Tél 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 ☐

REPARTITION DES VOIES LOGIQUES

- Nombre de voies CVP ____
- Nombre de voie CVC : arrivée 3 ; mixte 3 ; départ 3

AUTRES FACILITES

Acceptation taxation au demande ☒
Groupe fermé d'Abonnés (GFA) ☐

PARAMETRES DE CONTROLE DE FLUX

1 - Longueur de paquet 128
2 - Taille de fenêtre niveau paquet 2
3 - Choix des classes de débit par défaut de la liaison pour l'ensemble des CV
- à l'emission n° 10
- à la reception n° 10

4 - Sélection par l'appelant des classes de débit par communication ☐
5 - Indication des classes de débit au demandé ☐
6 - Sélection des tailles de paquet et fenêtre par CV fonctions choisies LP ___ W ___ ☐
7 - Choix des classes de débit par CVP (pour chaque CVP dont l'abonné est responsable) ☐

PARAMETRES DU NIVEAU TRAME

- ENVELOPPE
  - mode HDLC ☒
  - mode CARACTERE ☐
  - type CRC 1 ☐ 2 ☐
- PROCEDURE
  - LAP (uniligne)
  - Taille de fenêtre (K) 7
  - Temporisateur (T) 1600
  - Multiligne
  - Taille de fenêtre (F) ___
  - Numéro de Profil ___

CM ___ MOD ___ N.LIA ___
NO.LI ___ ___
N° PTT _____
_____
_____
FACT Code 12 Qté 01
___ ___
___ ___

LISTE DES GFA

Modification ☐

Numéro absolu de GFA	Numéro local du GFA	Acces avec demande d'appel	Acces avec appel entrant
_____	00	☐	☐
_____	___	☐	☐
_____	___	☐	☐
_____	___	☐	☐

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

CMS	ABONNE N° VL du CVP	R	IDENTIFICATION ABONNE DISTANT N° ABONNE ou N° CONTRAT	FEUILLET	N° VL du CVP	CLASSE de DEBIT E	R	N° ABSOLU GFA	DATE DDE (Sem)	DATE DE MISE EN SERVICE
___	____	☐	_____	P____	____	___	___	_____	____	____
___	____	☐	_____	P____	____	___	___	_____	____	____
___	____	☐	_____	P____	____	___	___	_____	____	____

CADRE RESERVE A TRANSPAC

DATE ET PARAPHE CLIENT
le contrat de service signé à EYBENS le 6 MAI 1981 par Mr BACHASSON.

DATE ET PARAPHE TRANSPAC
A. MANKOWSKI
22 MAI 1981

21/5/81 MG GAYRAUD

transpac

TPC/CNT/01.02/81

RACCORDEMENT DIRECT MODE CARACTERE

CLIENT

n° d'Abonné

Numéro de feuillet C ____
n° de folio

Nom ou Raison sociale _____

Correspondant Technique _____

Création ☐
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 : ☐

Ne pas remplir pour les E.B.V.O.

Acceptation taxation au demandé ☐
Groupe fermé d'abonnés (GFA) ☐

LISTE DES GFA Modification ☐

N° ABSOLU de GFA	N° LOCAL GFA	Accès avec demande d'appel	Accès avec appel entrant
	00	☐	☐
		☐	☐
		☐	☐
		☐	☐

DÉLAI CONVENU POUR L'OPÉRATION ____ DATE CONVENUE ____ (Sem) DATES DE MISE EN SERVICE RÉELLE _____ ____

CADRE RÉSERVÉ A TRANSPAC	DATE ET PARAPHE CLIENT	DATE ET PARAPHE TRANSPAC

transpac

TPC/CNT/03 - 09/80

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:

_____ _____ _____
_____ _____ _____
_____ _____ _____

[X] New Installation
[ ] Additional Installation
[ ] Reconfiguration
[ ] Other (See Comments)
[ ] Change Prior Order
[ ] Cancel Order
[ ] Remove Service
[ ] Move [ ] In-House

REQUESTED INSTALLATION DATE June 25, 1981

Will DTE accept *collect* In-WATS connections? [ ] Yes [X] No

Will DTE accept *collect* connections? [X] Yes [ ] No

SERVICE REQUIRED
Type of TCO Access Facilities

Dial Port: [ ] Dial-in [ ] Dial-out

TCO 2-SFO, 1-Alternate

Dedicated Access Facility: [X]

Speed 2 - 9600 bps, 1 - 4800 bps

COMMENTS/SPECIAL REQUIREMENTS _____

SERVICE CHARGES

Non-Recurring Charges		Recurring Monthly Charges	
Access Facilities at TCO	$ 2245.00	Access Facilities at TCO 2-9.6 1-4.8	$ 3000.00
TAC, TP1000, TP2200, TP4000		TAC, TP1000, TP2200, TP4000	
TAC, TP or PPX Ports		TAC, TP or PPX Ports	
Rotary Feature		Rotary Feature	
Private Network Feature		Private Network Feature	
Separate/ID Billing		Detailed/Separate/ID Billing	
Other $ 200.00 discount on installation of 2nd and 3rd line.		Account Charge	120.00
		Other Surcharge for alternate TCO	300.00
TOTAL $	2245.00	TOTAL $	3420.00

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

[X] SYNCHRONOUS SERVICE

Network Address _____
Direct Dial-in Number _____
Host Interface Package Hewlett-Packard

[X] X.25 Full-duplex, Continuous Carrier
[ ] Other _____

Framing [X] HDLC [ ] BSC: Control Characters [ ]ASCII [ ]EBCDIC

Link Access Procedure: [ ] LAP [X] LAPB

Packet Level: [X] Pure X.25 [ ] Telenet Enhanced

ITI: [X] 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 _____

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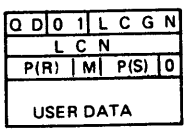
PACKET FORMATS

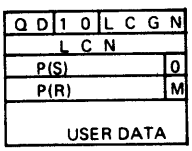
APPENDIX D

X.25 PACKET FORMATS

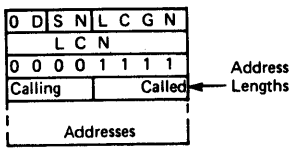
DATA



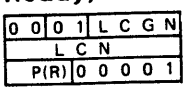
or



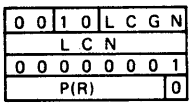
CALL CONFIRMATION



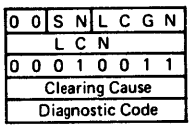
RR (Receiver Ready)



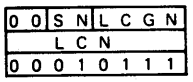
or



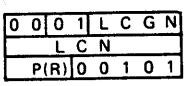
CLEAR REQUEST



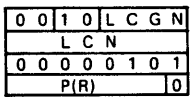
CLEAR CONFIRMATION



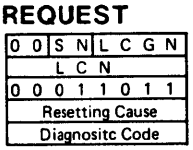
RNR (Receiver Not Ready)



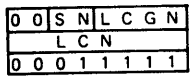
or



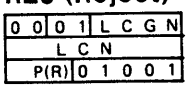
RESET REQUEST



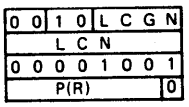
RESET CONFIRMATION



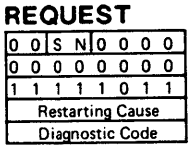
REJ (Reject)



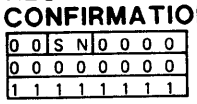
or



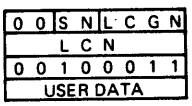
RESTART REQUEST



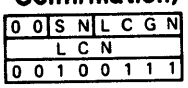
RESTART CONFIRMATION



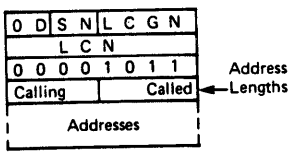
INT. (Interrupt)



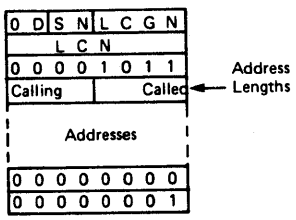
INT. CONF (Interrupt Confirmation)



CALL REQUEST



INCOMING CALL FROM PAD

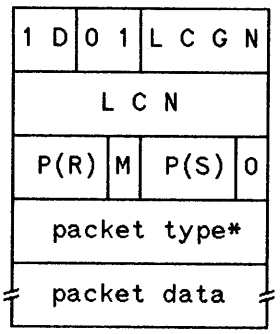


X.29 PACKET FORMATS

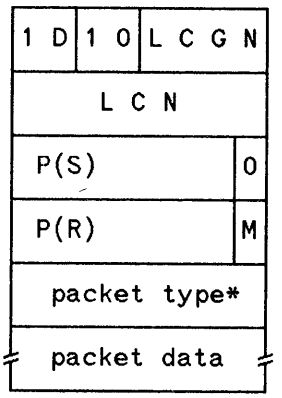
*** Packet Types**

0 Parameters indication
1 Invitation to clear
2 Set parameter
3 Indication of [BREAK]
4 Read parameters
5 Error
6 Set and read parameters

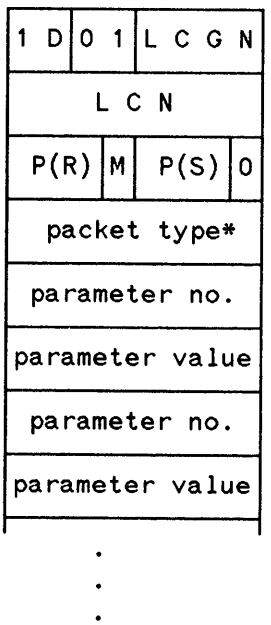
Generic MOD 8 X.29 packet



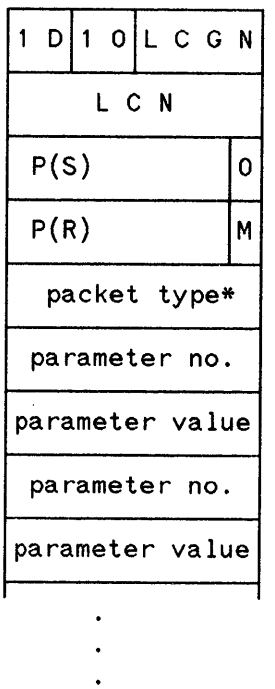
Generic MOD128 X.29 packet



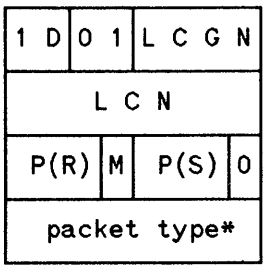
MOD 8 format
X.29 packet type 0, 2, 4, and 6



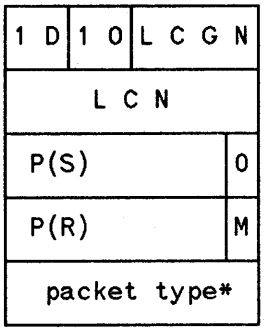
MOD128 format
X.29 packet type 0, 2, 4, and 6



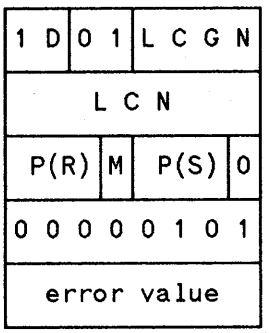
MOD 8 format, X.29 packet type 1 and 3



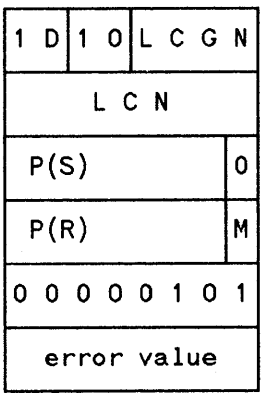
MOD 128 format, X.29 packet type 1 and 3



MOD8 format for X.29 packet type 5



MOD128 format for X.29 packet type 5



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

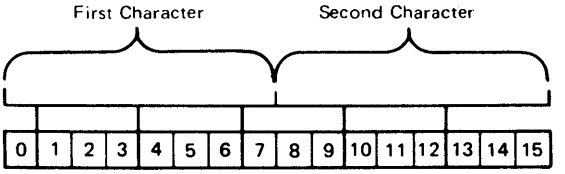
ASCII CHARACTER SET

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
DEL	077400	000177



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SPECIAL CHARACTERS

Part No. 32187-90001
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E1285

HEWLETT PACKARD