

# X.25

## X.25 for the HP 3000

### Section G

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The *Communications Handbook* (obsolete part number 30000-90105) has been restructured to make it more widely available and more readily updated. The various sections of the handbook are now available in two ways:

1. Those sections pertinent to all datacomm products, including controller, modem, CS Trace and troubleshooting guides, are now combined and expanded into a separate handbook, the *Fundamental Data Communications Handbook* (S957-4634). This handbook is included with each new HP 3000 and as such is updated under operating system and software contracts. It can be separately ordered from CSO.
2. The product specific sections are now provided with each product for use as quick references and as such are updated under operating system, software and manual contracts for the products. These sections can also be separately ordered from CSO.

The X.25 section of the *Data Communications Handbook* is intended for use as a quick reference. It is not a set of product specifications. Refer to the appropriate reference manual for complete product, system, and component specifications.

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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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# DSN/X.25 for the HP 3000

SECTION

G

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DSN/X.25

For MPE-IV:

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

For MPE-V:

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

For both:

*IMAGE/3000 Reference Manual (32215-90003)*  
*Data Communications Handbook (30000-90105)*

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

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

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

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

## X.25 DEFINED

X.25 is the standard recommended by CCITT for connecting systems or intelligent terminals to a packet switching network.

The Packet Assembler-Disassembler (PAD) device allows users to interface dumb terminals to a network. The PAD receives asynchronous information from a terminal, converts it to packets, and passes 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 (see figure G-1). Data destined for the terminal is converted from packets to asynchronous characters by the PAD.

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 figure G-2).

- Each PAD terminal session uses its own virtual circuit.
- DSN/X.25 for the HP 3000 supports only switched virtual circuits (SVC).
- Each INP can have up to 255 virtual circuits. In practice, the number of virtual circuits will be limited by the PDN because of the PDN resources required.
- The PAD can be used with dial-up or leased lines with point-to-point terminals only.
- The HP 2334A X.25 Cluster Controller requires a leased line and allows up to 16 terminals and printers to access a network.

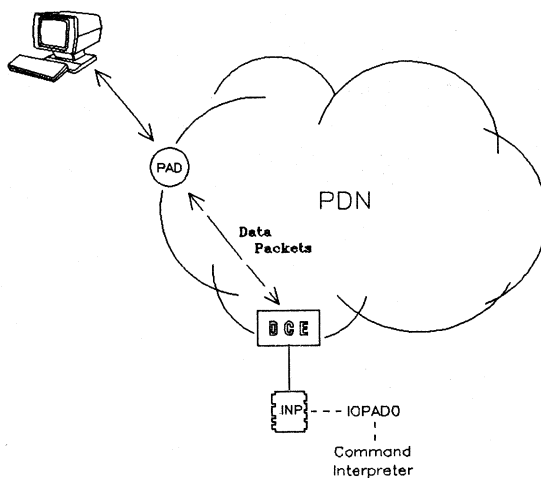


Figure G-1. Connecting the Terminal to the Computer

### Certification

As of this printing, HP's X.25 using character mode over a PAD has been certified on Telenet and Tymnet (United States networks), on Britain's PSS, Germany's Datex-P, France's Transpac, Belgium's DCS, Canada's Datapac, the Netherlands' DN1, and Switzerland's Telepac. Block mode over a PAD is currently certified on Telenet, Datapac, DN1, Tymnet, and Telepac. Certification on other networks should be accomplished soon.

**NOTE**

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

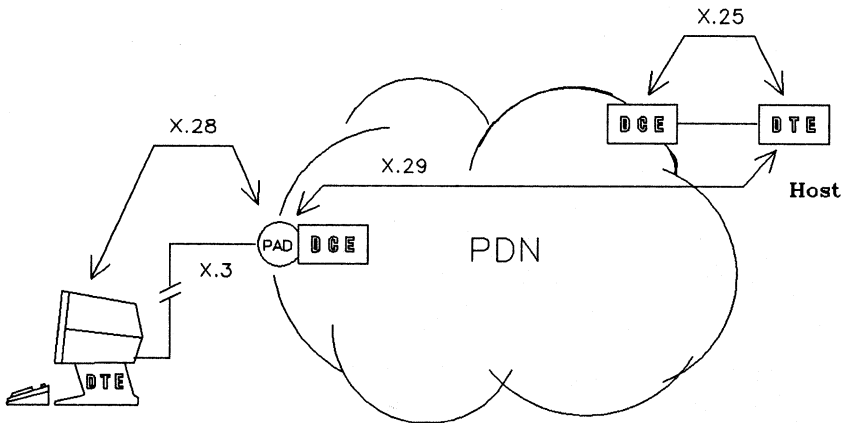


Figure G-2. CCITT Recommendation Map

## X.28 COMMANDS

Table G-1. X.28 Commands

Command	Function
network specific	Sets up the virtual circuit.
PAR? [ <i>n</i> [, ..., <i>n</i> ]]	If <i>n</i> is included, the values of the <i>n</i> X.3 parameters will be printed. If <i>n</i> is not included, the values of all of the X.3 parameters will be printed.
SET[?] <i>parameternumber:desiredvalue</i> [, <i>parameternumber:value</i> [, ..., <i>parameternumber:value</i> ]]	Changes value of <i>parameternumber</i> to <i>desiredvalue</i> . If ? is included, the values of the changed X.3 parameters will be printed.
STAT	Tells whether your virtual circuit is FREE or ENGAGED.
RESET	Sets all protocol sequence numbers to 0.
CLR	Disconnects the virtual circuit.
INT	Sends an interrupt to the remote HP 3000.
PROF [ <i>identifier</i> ]	If <i>identifier</i> is included, sets X.3 parameters according to the profile specified by <i>identifier</i> as defined by the PAD. If <i>identifier</i> is not included, sets X.3 parameters to the default PAD values.

### X.3 PARAMETERS

Table G-2. X.3 Required and Recommended Parameters

Required Parameters	Values	Meaning
1: Escape from Data Transfer	0 1 32-126	Escape not possible. <b>Possible with DLE <u>ESCAPE</u>P</b> Possible with defined character.
2: Echo	0 1	No echo Echo
3: Data Forwarding Signal	0 1 2 4 8 16 32 64	No data forwarding character Alphanumerics <u>RETURN</u> ESC,BEL,ENQ,ACK DEL,CAN,DC2 ETX,EOT HT,LF,VT,FF All characters whose hexadecimal ASCII representation begins with a 0 or 1, plus DEL.  <b>Valid combinations:</b> 0, 2, 6 (2 and 4), 18 (2 and 16), 126 (2,4,8,16,32, and 64) Values of 4,8,16,32, and 64 cannot be used individually.
4: Idle Timer	0 1-255	No time out Increments of 1/20 of a second
5: Ancillary Device Control	0 1	No use of XON and XOFF for flow control Use of XON and XOFF for flow control
6: PAD Service Signals (Refer to Table G-3)	0 1 4	No service signals Service signals other than prompt Prompt service signals  <b>Valid combinations:</b> 0, 1, 4, 5 (1 and 4)
7: Procedure on <u>BREAK</u>	0 1 2 4 8 16	No action Interrupt packet sent Reset packet sent Indication of break PAD message Escape from data transfer Discard output  <b>Valid combinations:</b> 0, 1, 2, 8, 21 (1, 4 and 16)



Table G-2. X.3 Required and Recommended Parameters (cont'd)

Required Parameters	Values	Meaning
8: Discard Output	<b>0</b> 1	<b>Normal data delivery</b> Discard output
9: <b>(RETURN)</b> Padding	<b>0</b> 1-7	<b>No padding</b> Number of padding characters
10: Line Folding	<b>0</b> 1-255	<b>No line folding</b> Characters per line
11: Terminal Speed	0-18	This parameter cannot be changed.
12: PAD Flow Control	<b>0</b> <b>1</b>	<b>No use of XON and XOFF</b> <b>Flow control with XON and XOFF</b>
Recommended Parameters	Value	Meaning
13: Linefeed Insertion	<b>0</b> 1 2 4	No LF insertion Insert LF after each <b>(RETURN)</b> to terminal Insert LF after each <b>(RETURN)</b> from terminal Insert LF after each <b>(RETURN)</b> sent as echo to terminal  <b>Valid combinations: 0, 1, 4, 5 (1 and 4), 6 (2 and 4), 7 (1,2 and 4)</b>
14: Linefeed Padding	<b>0</b> 1 - 7	<b>No LF padding</b> Number of padding characters
15: Editing	<b>0</b> 1	<b>No editing during data transfer</b> Editing during data transfer
16: Character Delete	0 - 127	Character delete character, refer to Table ?-? for a list of ASCII values and their corresponding characters.
17: Line Delete	0 - 127	Line delete character, refer to Table ?-? for a list of ASCII values and their corresponding characters.
18: Line Display	0 - 127	Line display character, refer to Table ?-? for a list of ASCII values and their corresponding characters.

Note: Parameters called out in **bold print** are the values set by the HP 3000.

Table G-3. 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 -- 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 <u>RETURN</u> to get the initial colon (:) prompt from the HP 3000.
ERROR	The PAD did not recognize the command entered. Check the manual and try again.
ENGAGED	Call established (response to STAT command).
FREE	Call not established (response to STAT command).
PAR <i>param:value</i>	Response to SET command.

## BLOCK MODE

For an HP terminal to use block mode communications over a PAD, the terminal must support block mode and bidirectional XON/XOFF flow control. It must also support automatic keyboard locking when **(ENTER)** is pressed. The HP 2624B, HP 2622A, and HP 2623B terminals with updated ROMs, and all HP 2627A terminals support these features (refer to Table G-4). You must have a VPLUS/3000 version of at least B.03.15 to use it over a PAD.

How to connect to the remote HP 3000 so that you may run block mode programs over a PAD:

1. Make sure your terminal has the correct ROMs to support automatic keyboard locking.
2. Set the G and H straps: InhHndShk and Inh DC2 on the Terminal Configuration Screen to YES.
3. Set baud rate and parity as follows:

In the Full Duplex Hardwired Screen, change BaudRate to correspond with the PAD,  
 Set Parity to 0's,  
 Set Chk Parity to NO,  
 Set RecvPace and XmitPace to XON/XOFF.

4. Connect to the PAD. This is network specific. For details contact your PDN representative.
5. Log on to the remote HP 3000 using TERM=24.

**Table G-4. Required ROMs for Supported Terminals**

Supported Terminals	Firmware ROMs
HP 2624B	1818-1701 1818-3139 1818-3140 1818-3141 1818-3142 1818-3143
HP 2622A	1818-3199 1818-3200 1818-3201 1818-3202 (optional - for thermal printer) 1818-3203
HP 2623B	1818-3223 2334 1818-3224 2334 1818-3225 2334 1818-3226 2334 1818-3227 2334 1818-3228 2334
HP 2627A	Included as a standard feature. ROM update not needed.

## Using Intrinsic With Block Mode

### FCONTROLS.

All FCONTROLS work except as noted below:

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

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

2. The following FCONTROLS return CCL. The file error is:

FSERR42 (OPERATION INCONSISTENT WITH DEVICE TYPE)

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

3. The following FCONTROL return CCL. The file error is:

FSERR49 (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 Intrinsic Reference Manual*.)

## Recovering From a Hard Reset

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

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

Your screen will change to the following:

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

- Press **TAB** until you get to Line/Page.
- Press **NEXT CHOICE**, (**F2**), to change **LINE** to **PAGE**. Press **SAVE CONFIG**, (**F1**), to save this configuration.
- Press **MODES**.
- Press **BLOCK MODE**, (**F3**).
- Press **USERKEYS** to get the VPLUS menu again.
- Press **REFRESH**, (**F4**), to get screen 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.

## CHARACTER MODE

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

HP 2382A  
 HP 2621A, 2621B, 2621P, 2622, 2623, 2624A, 2624B, 2626A, 2627  
 HP 2635, 2640B, 2642<sup>1</sup>, 2644<sup>1</sup>, 2645A<sup>1</sup>, 2647<sup>1</sup>, 2648<sup>1</sup>

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

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

HP 85,87,120,125,150  
 HP 9826 (Series 200, Model 26), 9836 (Series 200, Model 36), 9835<sup>2</sup>, 9845<sup>2</sup>

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

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

## Terminal Restrictions on the PAD

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

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

## Using a Microcomputer with a PAD

- All peripherals and terminals that you hook up to a PAD must support XON/XOFF flow control.
- File transfer programs on micros cannot make use of the DC1 "read trigger" used for flow control on a hardwired terminal.
- 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 somewhat differently than a local terminal. These differences are noted below:

- 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 (CONTROLH). Nevertheless, the preceding character will be edited out by the terminal driver when the data reaches the HP 3000.



## USING THE HP 2334A

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

### USING FILE EQUATIONS OR PROGRAMMATIC ACCESS

The DEV=*parm* in a file equation or the *device* parameter in the FOPEN intrinsic may contain either the class name or the LDEV of the IOPAD0 or IOPAD1 driver associated with the terminal or printer connected to the HP 2334A. The specific device to be opened on the HP 2334A is identified in the NETCONF remote node table.

## Possible Error Messages

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

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

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

## SYSTEM I/O CONFIGURATION DIALOGUE

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

This section explains how to configure the following:

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

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*.

**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
```

- |                                  |  |
|----------------------------------|--|
| (1) ANY CHANGES?                 | <u>YES</u>   |
| (2) SYSTEM ID = HP 32002v.uu.ff? | <b>RETURN</b>  |
| (3) MEMORY SIZE= xxx?            | <b>RETURN</b>  |
| (4) I/O CONFIGURATION CHANGES?   | <u>YES</u>   |
| (5) LIST I/O DEVICES?            | <u>YES</u>   |
| (6) LIST CS DEVICES?             | <u>YES</u>   |
| (7) HIGHEST DRT=xx?              | To change xx, enter the new value desired.<br>To maintain the current xx, enter <b>RETURN</b> .                                      |
| (8) LOGICAL DEVICE #?            | Enter the logical device number of the device to be added or deleted.<br>Enter 0 or <b>RETURN</b> ; the dialogue skips to (Step 43). |

- (9) DRT #? To add a device, enter its DRT entry number. For a communications driver, PAD terminal driver, or PAD printer driver, you must assign the logical device number of the associated INP, preceded by a number sign (#).  
To return to Step 8 to remove a device, enter zero.
- (10) UNIT #? 0  
Enter zero for IOINP0, IOPAD0, IOPAD1, or for the DSN/X.25 Communications Driver (IODSX).
- (11) SOFTWARE CHANNEL #? 0
- (12) TYPE? Enter the device type, where:  
16 = PAD Terminal (IOPAD0)  
17 = Intelligent Network Processor (IOINP0)  
41 = Communications Driver (IODSX)  
32 = PAD printer attached to HP 2334A (IOPAD1)
- (13) SUBTYPE? Communications Interface. For an INP, enter 0, 1, or 3, where:  
0 = switched line with modem  
1 = nonswitched line with modem  
3 = hardwired line, synchronous transmission  
  
Communications Driver: For IODSX, enter 0.  
  
PAD Terminal: For IOPAD0, always enter 0.  
  
PAD printer with attached HP 2334A: For IOPAD1, always enter 2.

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

- For MPE V/E: (14) ENTER [TERM TYPE#],[DESCRIPTOR FILENAME]?  
  
This question is asked only if the device type is 16, or if it is 32 with a subtype of 14 or 15. Term Type is always 0 for PAD terminals.
- For MPE IV: (14) TERM TYPE?  
  
0 (or **RETURN**) This question is asked only if device type is 16. Term Type is always 0 for PAD Terminals.
- (15) SPEED IN CHARACTERS PER SECOND? 0 (or **RETURN**) This question is asked only if Type is 16, then the dialogue skips to Step 30.

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

**NOTE**

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

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

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

**NOTE**

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

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

- (20) ANSWER FACILITY? Enter YES if the local modem can answer calls, either manually or automatically. Enter NO if it cannot. A NO response causes the next step to be skipped.

- (21) AUTOMATIC ANSWER? Enter YES if the local modem can automatically answer calls. Enter NO if manual answering is required.

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

- (23) HALF SPEED? Enter YES if the local modem is to operate at half speed. Enter NO if it is to operate at full speed. The dialogue skips to Step 25.

- (24) SPEED CHANGEABLE? For an INP, enter YES if the speed of the line is changeable. Enter NO if the line speed is fixed. You must respond YES if the console operator will be using the speed parameter in the :DSCONTROL command to override the configured transmission speed (see Step 25).
- (25) TRANSMISSION SPEED? For INP (Type 17) devices, enter the transmission speed of the line in characters per second (Bit Rate/8).
- The transmission speed you specify is ignored for modems that provide internal clocking signals. This allows modems of different speeds to be used without reconfiguring the Operating System. The speed specified is used if the modems are eliminated and the controllers are hardwired together.
- The speed you specify becomes the default. The console operator can override the default by including the speed parameter in the :DSCONTROL command, if you answered YES to Step 24.
- (26) TRANSMISSION MODE? Enter the appropriate number for the transmission mode in use. The mode numbers are:  
 0 = Full duplex  
 1 = Half duplex
- Configure the INP to operate in Full Duplex (0) if your facility uses one of the following:
- A leased line with four-wire, point-to-point installation.
  - A dial network with two lines (four-wire equivalent).
  - A dial network with Wide Band Service.
  - Any Direct Connect cable between two INPs.
- Configure the communications interface to operate in Half Duplex (1) if your facility uses the following:
- A dial network with a single-line (two-wire) installation.
- Your response must agree with the characteristics of the communications line.
- (27) PREFERRED BUFFER SIZE? Enter, in words, the desired buffer size, to a maximum of 1024 words for an INP. For X.25, this value is calculated depending on the packet size defined in NETCONF and any value entered here will be overridden by the X.25 software.
- (28) DRIVER CHANGEABLE? NO
- (29) DRIVER OPTIONS? 0  
 The dialogue skips to Step 37.
- (30) RECORD WIDTH? For all PAD Terminals, enter 40.

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

- (31) OUTPUT DEVICE? For the communications driver, or PAD printer attached to HP 2334A enter 0.  
For a PAD terminal, enter the logical device number to be used for the corresponding job/session listing device, usually the LDEV of this device.
- (32) ACCEPT JOBS/SESSIONS? For the communications driver or PAD printer attached to HP 2334A, enter NO.  
For PAD terminals, enter YES.
- (33) ACCEPT DATA? NO
- (34) INTERACTIVE? For the communications driver or PAD printer attached to HP 2334A, enter NO.  
For PAD terminals, enter YES.
- (35) DUPLICATIVE? For the communications driver or PAD printer attached to HP 2334A, enter NO.  
For PAD terminals, enter YES.
- (36) INITIALLY SPOOLED? NO
- (37) DRIVER NAME? Enter the name of the driver for this device as follows:  
  
IOINPO = INP  
IODSX = Communications driver utilizing the X.25 capability.  
IOPADO = PAD terminals utilizing the X.29/X.25 capability.  
IOPAD1 = PAD printer attached to HP 2334A.

**NOTE**

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

- (38) PHONELIST? Enter YES or NO. A NO response causes the next step to be skipped.
- (39) PHONE NUMBER? Enter a string of numbers and hyphens, but not more than 30 characters. This number will be included in the I/O request on the system console when a user OPENS a dial-up (manual call) line. Enter *just* one number if you want it used as the system default.

- (40) LOCAL ID SEQUENCE? This question does not apply to X. 25. Press RETURN.
- (41) REMOTE ID SEQUENCE? This question does not apply to X. 25. Press RETURN.
- (42) DEVICE CLASSES? Enter a list containing a device class name (up to eight alphanumeric characters, beginning with a letter). For IODSX entries, the node names defined in the RN Table cannot be specified as a device class name.
- The dialogue now prints the LOGICAL DEVICE #? prompt described in Step 8. If all I/O configuration is complete, press RETURN and the dialogue continues at Step 43. Otherwise, enter a logical device number and repeat the configuration procedure from Step 8.
- (43) MAX #OF OPENED SPOOLFILES=xxx? RETURN
- (44) LIST OF I/O DEVICES? YES or NO
- (45) LIST CS DEVICES? YES or NO
- For MPE V/E only: (46) TERMINAL TYPE CHANGES? Enter NO.
- (47) CLASS CHANGES? RETURN
- (48) LIST I/O DEVICES? RETURN
- The prompt in Step 49 appears only if a CS device is configured or if additional drivers exist (for the CS driver-changeable option in Step 28). If neither case exists, the dialogue skips to Step 51.
- (49) ADDITIONAL DRIVER CHANGES? NO
- (50) I/O CONFIGURATION CHANGES? NO
- (51) SYSTEM TABLE CHANGES? NO
- (52) MISC CONFIGURATION CHANGES? NO
- (53) LOGGING CHANGES? NO
- (54) DISC ALLOCATION CHANGES? NO
- (55) SCHEDULING CHANGES? NO
- (56) SEGMENT LIMIT CHANGES? NO
- (57) SYSTEM PROGRAM CHANGES? NO
- (58) SYSTEM SL CHANGES? NO The NO response assumes CS/3000 modules are already present on the system.

(59) ENTER DUMP DATE?

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

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

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

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

(60) ENTER DUMP FILE SUBSETS?

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

(61) LIST FILES DUMPED?

YES or No



## NETWORK CONFIGURATOR

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

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

Run NETCONF by entering:

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

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

The **Remote Node (RN)** table is only referenced if you are using an HP 2334A X.25 Cluster Controller, or are using X.25 with DSN/DS (see the *DSN/DS Reference Manual*). 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 **Line Characteristics (LC)** table 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.

Table G-5. NETCONF Commands

Command	Function
A[DD]	Adds a new entry to either the RN or the LC table. Only the creator of the data base can add entries. (Dialogue)
C[HECK]	Checks the relationships between entries in the LC and the RN tables and reports any discrepancies. Three checks: 1) All System Types HP3000 and HP1000 in the RN table have a corresponding entry in the LC table. 2) All primary nodes in the LC table have a corresponding entry in the RN table. 3) The line types of the RN table match those of the LC table.
D[ELETE]	Removes data entries from the RN or the LC table. Only the creator of the data base can delete entries. (Dialogue)
E[XIT]	Executes an automatic call to the CHECK command, then terminates NETCONF unless there are discrepancies in the relationship between the RN and LC tables, in which case, prompts for confirmation before terminating NETCONF. (Dialogue)
H[ELP]	Provides a description of each of the NETCONF commands.
L[IST]	Displays the current content of the network configuration data base.
P[RINT]	Executes the LIST and CHECK commands, with output device the line printer rather than \$STDLIST. Formal designator is NETLIST, default device is LP.
U[PDATE]	Update entries in the RN or LC table. Only the creator can update the data base. (Dialogue)

## Sample Dialogue

There are four NETCONF commands with associated dialogue. The dialogues are similar, so only one is presented here. Specifying the ADD command, the dialogue proceeds as follows:

### STEP NO. DIALOGUE

- 0     REMOTE NODE (RN) OR LINE CHARACTERISTICS (LC) TABLE?  
       RN You will be adding an entry to the Remote Node table. Skip to Step 1.0.  
       LC You will be adding an entry to the Line Characteristics table. Skip to Step 2.0.  
       (RETURN) You are prompted:  
       CONTINUE ADDING (YES OR NO)?
- 1.0    REMOTE NODE NAME?  
       Enter a logical node name (or an HP 2334A class name) of up to eight alphanumeric characters (the first being an alphabetic character).
- 1.1    REMOTE COMPUTER TYPE (HP3000, HP2334, OR HP1000)?  
       (RETURN) = The default Remote Computer type (HP3000).

- 1.2 **LOGICAL DEVICE NUMBER TO BE USED?**  
Enter an LDEV number. This is 1-255 for MPE IV, or 1-999 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.
- 1.3 **LINE TYPE (X25 OR X21)?**  
Press **(RETURN)** for the default value, X.25. X.21 is not available unless you are running DS as well.
- 1.3.1 **REMOTE X25 PDN ADDRESS?**  
**(RETURN)** = The default network address, NULL, will be used.  
Enter 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.
- 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.  
**DATA BASE IS FULL - NEW ENTRY NOT ADDED**  
This message appears when the data base is full. Exit from NETCONF and enlarge the size of the IMAGE data base. Refer to the *IMAGE/3000 Reference Manual*.
- 2.0 **LOGICAL DEVICE NUMBER?**  
Enter an LDEV. This is 1-255 for MPE IV, or 1-999 for MPE V/E, and it must refer to the logical device number of the DS/X.25 line supervisor (IODSX).
- 2.1 **LINE TYPE ( X.25 OR X.21 ) ?**  
This question does not apply to this product. Press **(RETURN)** for the default, X.25.
- 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.
- 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.
- 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 (If you are using TRANSPAC, you must respond with **(RETURN)**.)  
Enter the 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.

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.

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

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

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

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

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

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) ?**

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

Enter the Response Timer; this value must be an integer in the range of 1 to 9999. (For most HP 3000 installations, a value of 3000 is recommended.) (In the case of a PDN connection, this is usually dictated by that PDN.)

2.4 **RETRY COUNT (1..255) ?**

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

Enter a Retry Count; this must be a numeric value in the range of 1 to 255. (In the case of a PDN connection, this is usually dictated by that PDN.)

2.5 **WINDOW SIZE (FRAMES) ?**

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

Enter the Window size; this must be a numeric value in the range of 1 to 7. (In the case of a PDN connection, this is usually dictated by that PDN.) (For optimum performance, the Level 2 window size should be 7.)

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

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

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

- | STEP NO. | DIALOGUE   |
|----------|--|
| 2.6      | <p><b>LOW VC NUMBER (0..4095) ?</b><br/> <b>(RETURN)</b> = The default value of 0 is assigned as the low virtual circuit number.<br/>           Enter a Virtual Circuit Number; this must be an integer in the range of 0 to 4095. It represents the low end of the virtual circuit identification numbers. (In the case of a PDN connection, this is usually dictated by that PDN.) (All virtual circuits are used as 2-way switched virtual circuits on the HP 3000.)</p>  |
| 2.7      | <p><b>HIGH VC NUMBER (0..4095) ?</b><br/> <b>(RETURN)</b> = The default value of the Low Virtual Circuit Number + 255 is assigned as the high virtual circuit number.<br/>           Enter the Virtual Circuit Number; this must be an integer in the range of 0 to 4095. 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.) (All virtual circuits are used as 2-way switched virtual circuits on the HP 3000.)</p> |
| 2.8      | <p><b>PACKET SIZE (32..1024) ?</b><br/> <b>(RETURN)</b> = The default packet size (128 bytes) is used.<br/>           Enter the Packet Size; this must be a numeric value in the range of 32 to 1024. (In the case of a PDN connection, this is usually dictated by that PDN.)</p>   |
| 2.9      | <p><b>MODULO COUNT (8 OR 128) ?</b><br/> <b>(RETURN)</b> = The default of 8 is used.<br/>           Enter the 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.) (The modulo count has no major effect on performance.)</p>   |
| 2.10     | <p><b>WINDOW SIZE (PACKETS) ?</b><br/> <b>(RETURN)</b> = The default value of 2 is used.<br/>           Enter the 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). (In the case of a PDN connection, this is usually dictated by that PDN.) (For optimum performance, the Level 3 window size should be 7 if a modulo count of 8 is being used at Level 3. For a modulo count of 128, any window size greater than 7 has approximately the same performance.)</p>  |
| 2.11     | <p><b>CONTINUE ADDING (YES OR NO) ?</b><br/> <b>YES</b> This will take you back to the ADD prompt (Step 0).<br/> <b>NO</b> (or any input except YES) This will take you out of the ADD command and prompt for another first-level command.</p>   |

## DSCONTROL

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

- Unless :DSCONTROL is issued from the master console, this command requires the user to have CS capability.
- 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.
- Only one DSN/X.25 communications device can be active (OPEN) on an INP at any given time. Once opened (with the :DSCONTROL command), a communications link can be shared by multiple DSN/X.25 users. It cannot, however, be shared by users of other communications subsystems supported by your system (for example, DSN/MRJE). Thus, you must SHUT the DSN/X.25 communications device before the controller can be opened for use by another subsystem.
- Before issuing a :DSCONTROL command, use the :SHOWDEV command to check whether a communications link is already established. The LDEV for the INP port will be UNAVAILable if the communications link is in use by any subsystem; the LDEV for the DSN/X.25 communication driver, IODSX, will be AVAILable if it is currently OPEN for use by DSN/X.25 users.
- If you include more than one function in a :DSCONTROL command, each function (with its subparameter list) must be separated by a semicolon. A function that duplicates or conflicts with a previous function overrides that function. Functions can appear in any order but are executed in the following order:

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

## DSCONTROL

### SYNTAX

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

where the parameter *function* has the following option:

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

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

[ ;MON [ ,DS ] ]
[ ;MONOFF [ ,CS ] ] ]

[ ;COMP ]
[ ;NOCOMP ] ]
```

### PARAMETERS

<i>x25device</i>	The logical device number or the device class name of the DSN/X.25 communications device.
OPEN	Establishes a communications link with the PDN. Makes the line available for remote communication via the DSN/X.25 Subsystem.
SHUT	Initiates line shutdown. All user virtual circuits are cleared and the line is disconnected.
TRACE,ON	Activates the TRACE facility to provide a record of communications activities. The line must have already been opened since the last system start, or the OPEN keyword must also be included.
TRACE,OFF	Deactivates the TRACE facility, so that no records are kept of DSN/X.25 actions, states, and events. Also closes the trace file. The trace file must be closed before any dump formatting can be done.
MON [ ,DS ]	Activates internal communication monitoring activity to give additional information on a subsequent memory dump of the system. The line must be open for the use of MON.
MON	Requests monitoring of all levels of activity.
MON,DS	Requests monitoring at the DSN/X.25 level of internal software operation.
MON,CS	Requests monitoring at the Communication System level of internal software operation.

DSN/X.25

	Default: No monitoring. Used only for system troubleshooting.
MOFF	Deactivates internal DSN/X.25 monitor records. Line must be open for the use of MOFF.
MASTER	Limits DSN/X.25 line activity to outgoing requests only. No incoming PAD sessions are allowed.
SLAVE	Limits DSN/X.25 line activity to incoming PAD sessions only; no outgoing requests are allowed.
<i>linespeed</i>	Default: Both MASTER and SLAVE processing are allowed. Transmission rate in characters per second (Bit Rate/8). Default: System configuration values.
ALL	Generates trace records for all line activity.
<i>mask</i>	Default: Records are written only for transmission errors. An octal number preceded by a percent sign (%nn). Used to select type of trace entries generated. Refer to discussion on initializing CS Trace facilities. Default: %37 (all except PSTN).
<i>numentries</i>	Decimal integer for the maximum number of entries in a trace record, not greater than 24 for the INP. The requested value of <i>numentries</i> must be a multiple of 8. Default: 24.

**NOTE**

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

WRAP	Trace entries that overflow the trace record overlay the prior trace record entries. Default: Overflow entries are discarded.
<i>filename</i>	A name for the trace file. Default: DSTRCxxx.PUB.SYS (where xxx is the LDEV of the X25 device).



## THE CS/3000 TRACE FACILITY

The CS/3000 Trace Facility is used to provide a record of the line actions, states, and events that occur during DSN/X.25 operation. When problems occur during operation, the trace facility provides a means to pinpoint the problem area.

The trace facility is invoked only at the operator's request. Tracing can be invoked for any communication line that DSN/X.25 uses. The trace request is made before or after the :DSCONTROL OPEN command (that is, before or during line activity). Once invoked for a particular communications line, the trace facility continues to record line activity until the operator terminates it. The trace facility keeps track of actions, states and events in the form of trace entries.

The trace entries are grouped into trace records for the CS line driver and are stored in a user-specified trace file. The contents of a trace file can be formatted and printed through the use of trace dump utility programs. For further information on the CS Trace Facility see Section 4 of this Handbook.

### 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

*numentries* is a decimal integer for the maximum number of trace entries in a trace record. It cannot be greater than 248. The value actually used by the trace facility will be the largest integer multiple of eight that is not greater than the number you enter. For an INP running DSN/X.25, the value may not exceed 16. (If the value requested in this case is greater than 16, a warning message will be printed and the maximum default of 16 will be used.) If *numentries* is set to zero or omitted, there will be a maximum of 16 trace entries per trace record. It is not possible to change the value of *numentries* once a trace file has been built. If the value you choose is inadequate, you will have to purge the file and rebuild it, or let DSN/X.25 rebuild it.

*filename* names the file the user wants the trace information to be written to. If no name is supplied, DSN/X.25 will create a file named DSTRCnnn, where nnn is the right-justified LDEV number of the X.25 device. If a trace file exists it will be purged, and a new trace file will be created.

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

See Section 4 of the Data Communications Handbook for definitions of the remaining parameters.

## Terminating the CS/3000 Trace Facility

To terminate the CS/3000 trace facility, include the following parameter in the :DSCONTROL command:

```
;TRACE,OFF
```

The trace facility must be terminated before CSDUMP and DSDUMP can be run.

## Formatting a Trace File

There are two trace formatting programs for X.25: CSDUMP and DSDUMP. CSDUMP formats and displays all trace file data in a raw form. DSDUMP allows you to choose a subset of the trace file to be formatted, and will also analyze the chosen data. You need a thorough understanding of the X.25 protocols to interpret information in an X.25 trace file.

## 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.

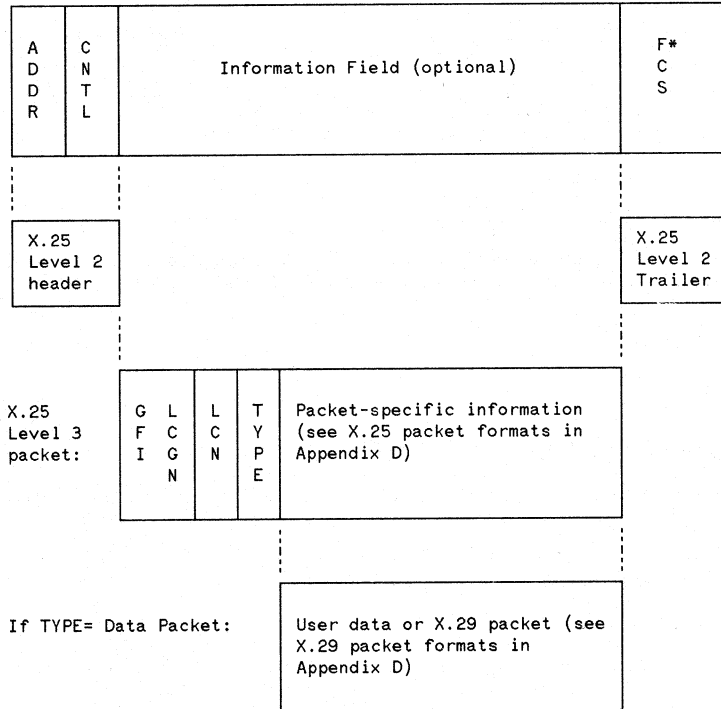
## Defining a CS Trace File for CSDUMP

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
```

The following is the data format as defined by X.25 and recorded in the CS trace file for PRCT/PRTX or PSCT/PSTX entries:

Level 2 frame:



\* One FCS byte will appear if the frame ends on an odd-byte boundary.

Figure G-3. The X.25 Data Format.

## 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.

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

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. The parameters for the TYPES= command are:
COMMANDS	Formats the REMOTE command, Remote HELLO, Remote BYE, <b>CONTROL</b> Y message, <b>BREAK</b> message, RESUME message, ABORT message, KILLJOB message, and First Slave DSOPEN.
PTOP	Formats PREAD, PWRITE, PCONTROL, POPEN, PCLOSE, ACCEPT, and REJECT.
RFA	Formats RFA and IMAGE messages.
RTE	Formats RTE DS messages.
QTOQ	Formats QTOQ (NFT) DS messages.
TERMINAL	Formats PRINT messages, READ and READX messages, and FCONTROLS to the terminal.
ENABLE	ENABLE turns options on, and DISABLE turns options off. Otherwise, the syntax for these
DISABLE	commands is identical.

Options can be ENABLED or DISABLED using either = or . That is, DISABLE=PLINE and DISABLE,PLINE are identical.

Only one option is permitted for each ENABLE or DISABLE command. Additional options are flagged as errors.

The options for the ENABLE/DISABLE commands are:

PROMPT	Prompt facility that asks the user, at the end of a full screen, whether or not to continue. Type n or N to stop. The program will return to the DSDUMP Command Interpreter. This command applies for interactive mode only.
PLINE	Controls the printing of the line status after calling PRINTLINEINFO.
ASCII	If enabled, ASCII format will be used whenever possible.
OCTAL	As in ASCII, but using octal.
HEX	As in ASCII, but using hexadecimal.

Options to control the level(s) of protocol to be displayed:

DEFAULT	Using ENABLE=DEFAULT enables the following settings (explained in more detail below):  LEVEL2 LEVEL3 DS1 USERD PLINE ASCII OCTAL L3ALL all settings with an L2 prefix except L2STN  DISABLE=DEFAULT is meaningless, and is ignored.
LEVEL2	The X.25 level 2 display. Use ENABLE to see it, and DISABLE if you do not wish to see it.
LEVEL3	The X.25 level 3 display. Use ENABLE to see it, and DISABLE if you do not wish to see it.
USERD	Controls printing of the user data. The user data is contained in two areas: the first portion is contained in both the level 2 and level 3 display, while the remaining portion(s) is contained in the PRTX/PSTX entry(s). Thus, to see all of the user data, either level 2 or level 3 must be enabled. Otherwise, you would only see the last half of each display.

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.												
L3ALL	As in L2ALL, but for level 3.												
L3HIGH	Controls the printing of the following packet types:  <table border="0" style="margin-left: 40px;"> <tr> <td>Call</td> <td>Call Confirm</td> </tr> <tr> <td>Clear</td> <td>Clear Conf</td> </tr> <tr> <td>Interrupt</td> <td>Interr Conf</td> </tr> <tr> <td>RNR</td> <td>Reset</td> </tr> <tr> <td>Reset Con</td> <td>Diagnostic</td> </tr> <tr> <td>Reject</td> <td></td> </tr> </table>	Call	Call Confirm	Clear	Clear Conf	Interrupt	Interr Conf	RNR	Reset	Reset Con	Diagnostic	Reject	
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
```

DSN/X.25

## **DSLIS**

The DSLIS program provides a list of the software module version numbers for the DSN/X.25 and CS modules installed on your system. You must have READ access to the DSN/X.25 program files in PUB.SYS.

The run command is:

```
:RUN DSLIS.PUB.SYS
```

The version of this software for MPE IV is B.01.00 or later. For MPE V/E the software version is B.51.00 or later.



## DSN/X.25/3000 Diagnostic Codes

### DSN/X.25/3000 DIAGNOSTIC CODES

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

## DSN/X.25 FUNCTIONAL ERRORS

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  
DS LINE WENT NOT READY. (DSERR 251)

- 252 COMMUNICATIONS INTERFACE ERROR. HARDWARE FAILURE.  
(DSERR 252)
- 253 COMMUNICATIONS INTERFACE ERROR. NEGATIVE RESPONSE TO THE  
DIAL REQUEST BY THE OPERATOR. (DSERR 253)
- 254 COMMUNICATIONS INTERFACE ERROR. INVALID I/O CONFIGURATION.  
(DSERR 254)
- 255 COMMUNICATIONS INTERFACE ERROR. UNANTICIPATED CONDITION.  
(DSERR 255)
- 256 REQUEST QUEUED BEHIND PREVIOUS REQUEST. (DSERR 256)

## DSCONTROL INFORMATORY MESSAGES

These messages convey status information. The ! will be replaced by a numeric value.

- 300 DS DEVICE !: MASTER AND SLAVE ACCESS SHUT.
- 301 DS DEVICE !: SLAVE ACCESS OPENED; MASTER ACCESS SHUT.
- 302 DS DEVICE !: MASTER ACCESS OPENED; SLAVE ACCESS SHUT.
- 303 DS DEVICE !: MASTER AND SLAVE ACCESS OPENED.
- 304 DS DEVICE !: TRACE ACTIVATED USING TRACE FILE !.
- 305 DS DEVICE !: TRACE DEACTIVATED.
- 306 DS DEVICE !: MONITORING ACTIVATED.
- 307 DS DEVICE !: MONITORING DEACTIVATED.
- 308 DS DEVICE !: DEBUG MODE ACTIVATED.
- 309 DS DEVICE !: DEBUG MODE DEACTIVATED.
- 310 DS DEVICE !: SPECIAL DEBUG MODE ACTIVATED.

## DSCONTROL ERROR MESSAGES

These messages point out an error in syntax or warn of the consequences of a request. The ! will be replaced by a numeric value.

- 4100 NUMBER OF PARAMETERS EXCEEDS MAXIMUM OF !. (CIERR 4100)
- 4101 EXPECTED AT LEAST TWO PARAMETERS: A DS DEVICE CLASS/NUMBER AND A FUNCTION  
KEYWORD. (CIERR 4101)

- 4102 EXPECTED A DEVICE CLASS NAME OR LOGICAL DEVICE NUMBER FOR ONE OR MORE DS DEVICES. (CIERR 4102)
- 4103 USER IS NOT ASSOCIATED WITH DS DEVICE !. NO CONTROL FUNCTIONS EXECUTED FOR THIS DEVICE. (CIWARN 4103)
- 4104 USER IS NOT ALLOWED TO USE :DSCONTROL AND IS NOT ASSOCIATED WITH THE DS DEVICE(S). (CIERR 4104)
- 4105 EXPECTED ONE OR MORE OF THE CONTROL FUNCTIONS: OPEN, SHUT, MON, MOFF, COMP, NOCOMP, TRACE, OR DEBUG. (CIERR 4105)
- 4106 INVALID CONTROL FUNCTION. EXPECTED ONE OF: OPEN, SHUT, MON, MOFF, COMP, NOCOMP, TRACE, OR DEBUG. (CIERR 4106)
- 4107 MASTER OVERRIDES PREVIOUS MASTER/SLAVE OPTION. (CIWARN 4107)
- 4108 SLAVE OVERRIDES PREVIOUS MASTER/SLAVE OPTION. (CIWARN 4108)
- 4109 SPEED OPTION OVERRIDES PREVIOUS SPEED OPTION. (CIWARN 4109)
- 4110 OPEN OVERRIDES PREVIOUS OPEN/SHUT FUNCTION. (CIWARN 4110)
- 4111 SHUT OVERRIDES PREVIOUS OPEN/SHUT FUNCTION. (CIWARN 4111)
- 4112 TRACE OVERRIDES PREVIOUS TRACE FUNCTION(S). (CIWARN 4112)
- 4113 DEBUG OVERRIDES PREVIOUS DEBUG FUNCTION(S). (CIWARN 4113)
- 4114 MON OVERRIDES PREVIOUS MON/MOFF FUNCTION. (CIWARN 4114)
- 4115 MOFF OVERRIDES PREVIOUS MON/MOFF FUNCTION. (CIWARN 4115)
- 4118 EXPECTED A ";" , ", " , OR RETURN AS DELIMITER. (CIERR 4118)
- 4119 EXPECTED EITHER A ";" OR RETURN AS DELIMITER. (CIERR 4119)
- 4120 EXPECTED A "=" AS DELIMITER FOR SPEED OPTION. (CIERR 4120)
- 4121 EXPECTED A ", " AS DELIMITER BETWEEN OPTIONS. (CIERR 4121)
- 4122 ILLEGAL OPEN/SHUT OPTION. EXPECTED ONE OF: MASTER, SLAVE, SPEED, OR LINESPEED VALUE. (CIERR 4122)
- 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)



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X.25 FOR THE HP 3000  
Quick Reference

32191-90006 June 1984

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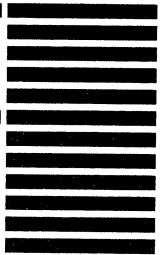
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**B-1200 BRUSSELS**

Tel: (02) 762-32-00

Telex: 23-494 paioen bru

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## MALAYSIA

Hewlett-Packard Sales (Malaysia)

Sdn. Bhd.

1st Floor, Bangunan British

American

**MAYLAISIA (Cont'd)**

Protel Engineering  
P.O. Box 1917  
Lot 6624, Section 64  
23/4 Pending Road  
Kuching, SARAWAK  
Tel: 36299  
Telex: MA 70904 PROMAL  
Cable: PROTELENG  
A.E.M.

**MALTA**

Philip Toledo Ltd.  
Notabile Rd.  
MRIEHEL  
Tel: 447 47, 455 66  
Telex: Media MW 649  
E.P.

**MEXICO**

Hewlett-Packard Mexicana, S.A.  
de C.V.  
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Tepepan, Xochimilco  
16020 MEXICO D.F.  
Tel: 6-76-46-00  
Telex: 17-74-507 HEWPACK MEX  
A,CH,CS,E,MS,P

Hewlett-Packard Mexicana, S.A.  
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Tel: 78 42 41  
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CH

ECISA  
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Telex: 17-72755 ECE ME  
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81 rue Karatchi  
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Telex: 23051, 22822  
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Tel: 272093, 272095  
Telex: 23 739  
P

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Northrop Instruments & Systems Ltd.  
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Tel: 794-091  
Telex: 60605  
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Northrop Instruments & Systems Ltd.  
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CHRISTCHURCH  
Tel: 496-928  
Telex: 4203  
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Northrop Instruments & Systems Ltd.  
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Suhail & Saud Bahwan  
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Mushko & Company Ltd.  
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Telex: 2894 MUSKO PK  
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Electrónica Balboa, S.A.  
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The Online Advanced Systems  
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Legaspi Village, Makati  
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Metro MANILA  
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Telex: 3274 ONLINE  
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M  
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DOHA  
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P  
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Tel: 329 993  
Telex: 4156 EASTEC DH  
Nasser Trading & Contracting  
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Arranged alphabetically by country

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Telex: RS 26283  
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**CAPE PROVINCE 7405**  
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Telex: 57-20006  
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P.O. Box 33345  
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Centre  
Constantia Park  
**PRETORIA**  
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Telex: 321663  
CH,E

Hewlett-Packard So Africa (Pty.) Ltd.  
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Hewlett-Packard Española S.A.  
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Edificio Albia II  
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Hewlett-Packard Española S.A.  
Ctra. de la Coruña, Km. 16, 400  
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Avda. S. Francisco Javier, S/No  
Planta 10, Edificio Sevilla 2,  
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A,CS,MS,P

Hewlett-Packard Española S.A.  
Calle Ramon Gordillo, 1 (Entlo.3)  
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**S-22226 LUND**  
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Hewlett-Packard (Schweiz) AG  
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Case Postale 365  
**CH-1217 MEYRIN 2**  
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Telex: 27333 HPAG CH  
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Hewlett-Packard (Schweiz) AG  
Allmend 2  
**CH-8967 WIDEN**  
Tel: (0041) 57 31 21 11  
Telex: 53933 hpag ch  
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*General Electronic Inc.*  
*Nuri Basha Ahnaf Ebn Kays Street*  
P.O. Box 5781  
**DAMASCUS**  
Tel: 33-24-87  
Telex: 411 215  
Cable: ELECTROBOR DAMASCUS  
E

*Middle East Electronics*  
P.O.Box 2308  
*Adu Rummaneh*  
**DAMASCUS**  
Tel: 33 4 5 92  
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M

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CH,CS,E  
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Telex: 24A39 HEWPACK  
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*Ing Lih Trading Co.*  
3rd Floor, 7 Jen-Ai Road, Sec. 2  
**TAIPEI 100**  
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A

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*Unimesa*  
37 Paipong Ave., Suriwong  
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Telex: 84A39 Simonco TH  
Cable: UNIMESA Bangkok  
A,CH,CS,E,M  
*Bangkok Business Equipment Ltd.*  
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Telex: 87669-BEQUIPT TH  
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## TRINIDAD & TOBAGO

*Caribbean Telecoms Ltd.*  
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Telex: 235,272 HUGCO WG  
CM,E,M,P

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31 Avenue de la Liberté  
**TUNIS**  
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E,P  
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**TUNIS**  
Tel: 253-821  
Telex: 12319 CABAM TN  
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## TURKEY

*Teknim Company Ltd.*  
*Iran Caddesi No. 7*  
*Kavaklıdere, ANKARA*  
Tel: 275800  
Telex: 42155 TKNM TR  
E

*E.M.A.*  
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M

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*Emilac Ltd.*  
P.O. Box 2711  
**ABU DHABI**  
Tel: 82 04 19-20  
Cable: EMITAC ABUDHABI  
*Emilac Ltd.*  
P.O. Box 1641  
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