HP AdvanceNet

HEWLETT PACKARD
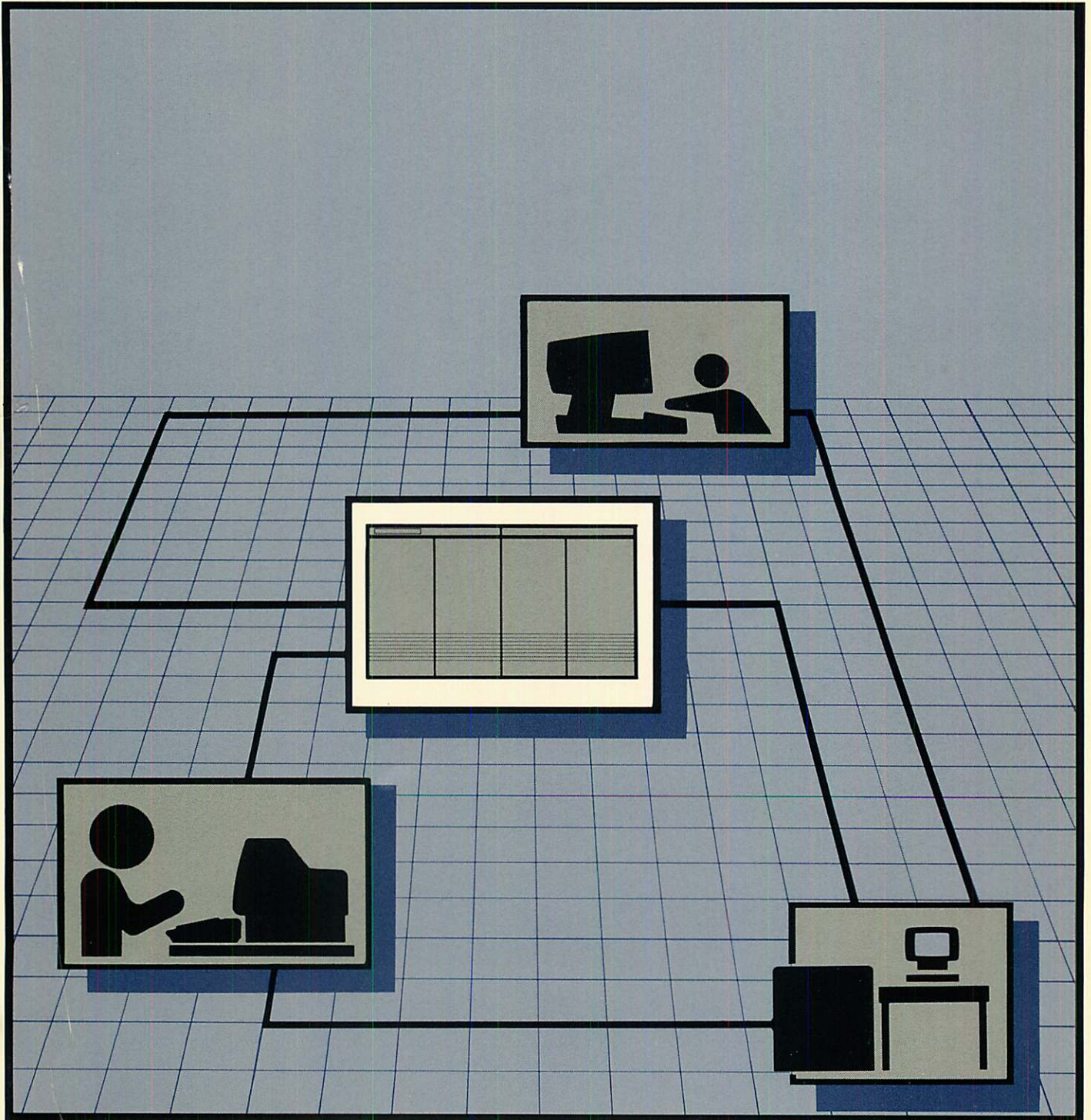
DS/3000 HP 3000 to HP 3000

Network Administrator Manual

HP AdvanceNet

DS/3000

HP 3000 to HP 3000
Network Adminstrator Manual

HEWLETT PACKARD

19420 HOMESTEAD AVENUE, CUPERTINO, CA 95014

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.

First Edition . . . . Dec 1985. . . . . 32185B.52.00 (MPE V/E)

First Edition . . . . Dec 1985. . . . . 32189B.01.00 (MPE IV)

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.

First Edition . . . . December 1985

Effective Pages	Date
ALL	ORIGINAL

HP AdvanceNet is a set of hardware and software data communications products. One of these data communications products, **DS/3000**, is an integrated software package that provides networking capability between HP computer systems.

This manual explains advanced topics, such as system configuration, and using TRACE for debugging. For basic use of DS/3000, see the *DS/3000 HP 3000 to HP 3000 User/Programmer Reference Manual (32185-90001)*.

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 (Versions not earlier than C.B1.A2):

● *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/E (Versions not earlier than G.00.00):

● *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 either MPE-IV or MPE-V/E:

● *Fundamental Data Communications Handbook (5957-4634)*

● *Data Communications Handbook, Section C (32185-90003)*

● *Data Communications Handbook, Section D (32185-90006)*

● *Data Communications Handbook, Section G (32187-90006)*

PREFACE (continued)

For those users who also become involved in the selection and/or connection of the various network components, reference should be made to 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 30055A Synchronous Single-Line Controller (SSLC) Installation and Service Manual (30055-90001).*

- *Hardwired Serial Interface (HSI) Installation and Service Manual (30360-90001).*

For those programmers who use other subsystems in conjunction with DS/3000, the following manuals should be referenced:

- *TurboIMAGE Reference Manual (32215-90050)*

- *BASIC/3000 Interpreter Manual (30000-90026)*

- *COBOL/II Reference Manual (32233-90001)*

- *KSAM/3000 Reference Manual (30000-90079)*

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NOTE
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Within the text of this manual, cross–references are
made to these manuals by title. To obtain the part
number of the referenced manual, refer to these lists
of manuals in the Preface.

In this release, DS/3000 and X.25 Link are two distinct HP products. If you are using
X.25 Link by itself, whether with a Packet Assembler–Disassembler or an HP 2334A
Cluster Controller, you should refer to the *X.25 Link for the HP 3000 Reference Manual
(32187-90001)*. If you are using DS/3000 for computer–to–computer communications,
either with or without X.25, you should use this manual in conjunction with the *DS/3000
HP 3000 to HP 3000 User/Programmer Manual (32185-90001)* for DS information.
Refer to the X.25 Link manual for PAD and HP 2334A information and examples.

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:

> $\begin{bmatrix} A \\ B \end{bmatrix}$ 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:

> $\begin{Bmatrix} A \\ B \\ C \end{Bmatrix}$ 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.

CONTENTS

CONTENTS (continued)

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CONTENTS (continued)

CONTENTS (continued)

Appendix A ERROR CODES AND MESSAGES

DS/3000 operation requires the installation and configuration of one communications interface for each line to a remote computer.

This section explains how to configure the following:

- Intelligent Network Processor (INP)

- Synchronous Single-Line Controller (SSLC)

- Hardwired Serial Interface (HSI)

- DS Line Monitor (communications driver IODS0 or IODSX)

- DS Virtual Terminals (IODSTRM0, IODSTRMX) -- one for each session that will be allowed on your system from a remote system.

The same communications interface (INP, SSLC, or HSI) can be used by another HP 3000 data communications subsystem (such as MRJE) when it is not being used by DS/3000. 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). Keep in mind that the following dialogue applies only when the interface is used for DS/3000 activity, and that a response that is optional for DS/3000 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* and in the *HP 3000 Computer Systems, System Manager/System Supervisor Reference Manual* (*HP 3000 Computer Systems, MPE V System Operation and Resource Management Reference Manual*, if you are using MPE V/E).

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 Account Systems Engineer (SE) has already installed CS/3000.

If you are making any other changes to the MPE I/O system, refer to the *System Manager / System Supervisor Reference Manual* (*HP 3000 Computer Systems, MPE V System Operation and Resource Management Reference Manual*, if you are using MPE V/E).

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 a file reference to a magnetic tape, as follows:

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

The dialogue commences as follows:

STEP NO.   **DIALOGUE**

1   ANY CHANGES? <u>YES</u>

2   SYSTEM ID = HP 32033 v.uu.ff? (RETURN)

3   MEMORY SIZE= xxxx (MIN = yyy,MAX = yyyyy)? (RETURN)

4   I/O CONFIGURATION CHANGES? <u>YES</u>

5   LIST I/O DEVICES? <u>YES</u>

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

LOG DEV	Logical device number.
DRT #	Hardware device address (Device Reference Table number) configured on the interface board.
UNIT	Hardware unit number of device on its controller.
CHAN	Channel number of device on its controller.
TYPE	Device type.
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.

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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? <u>YES</u>

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 and SSLC)
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 or SSLC 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. An HSI has four ports and thus can be configured up to four times with a unique logical device number for each port. In addition, a communications driver (IODS0) with a unique logical device number must be configured for each HSI port configured.

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 50.

10   DEVICE NAME? (RETURN)

STEP NO.   **DIALOGUE**

11   DRT #?

To add a device, enter its DRT entry number. For a communications driver and a virtual terminal, you must assign the logical device number of the associated communications interface (INP, SSLC, or the HSI port), preceded by a number sign (#).

Virtual terminals need to be configured for only one port of any HSI (back referenced to only one logical device number for the HSI). The terminals will be dynamically allocated to the proper port when a user opens it.

To remove a device and return to Step 9, enter zero.

12   UNIT #? <u>0</u>

13   SOFTWARE CHANNEL #? <u>0</u>

14   TYPE?

Enter the device type, where

     16 = Virtual Terminals (IODSTRM0 or IODSTRMX)

     17 = Intelligent Network Processor (INP)

     18 = Synchronous Single-Line Controller (SSLC)

     19 = Hardwired Serial Interface (HSI)

     41 = Communications Driver (IODS0 or IODSX)

NOTE

When configuring device type 16, consider the maximum number of terminals supported by your system. Each virtual terminal configured is added to the total number of terminals already on the system. This information is available from your HP Sales Representative.

STEP NO.   **DIALOGUE**

15   SUB TYPE?

> Communications Interface:
>   For an INP, enter 0, 1, or 3
>   For an SSLC, enter 0 or 1
>   For an HSI, enter 3, where
>   0 = switched line with modem
>   1 = nonswitched line with modem or modem eliminator cable
>   3 = hardwired line, synchronous transmission
>
> Communications Driver:
>   For IODS0 or IODSX, enter 0 or 1, where
>   0 = no data compression
>   1 = data compression
>
> Virtual Terminal:
>   For IODSTRM0 or IODSTRMX, always enter 0.

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NOTE

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> If you are configuring a terminal (type 16), the dialogue
> continues to Step 16. If you are configuring an HSI
> (Type 19), the dialogue skips to Step 18. If you are
> configuring an SSLC (Type 18), the dialogue skips to
> Step 19. If you are configuring an INP (type 17), the
> dialogue skips to Step 22. For all other device types, the
> dialogue skips to Step 36.

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 or 15. Term type is always 0 for DS/3000 Virtual Terminals.

For MPE IV:

TERM TYPE? <u>0</u>

> This question is asked only if Type is 16. Term Type is always zero for
> DS/3000 Virtual Terminals.

17   SPEED IN CHARACTERS PER SECOND? <u>0</u>

> This question is asked only if device Type is 16, then the dialogue skips to Step
> 36.

STEP NO.   **DIALOGUE**

18   PORTMASK?

This question is asked only if device Type is 19 (HSI). The values allowable are shown below and must be entered in decimal. This forms a mask indicating which HSI channel will be used. Only one of the four channels may be designated for each unique logical device number.

Enter 8 for HSI cable connector port 0.

Enter 4 for HSI cable connector port 1.

Enter 2 for HSI cable connector port 2.

Enter 1 for HSI cable connector port 3.

Since only one port on the HSI PCA can be opened at a time, only one block of virtual terminals (entered later in this configuration) are needed for that HSI PCA. This same block is automatically reallocated to each new port opened. One block of virtual terminals serves all ports.

19   PROTOCOL? 1

This response defines Binary Synchronous Communications.

20   LOCAL MODE?

DS/3000 does not use this response. Enter 1.

STEP NO.   **DIALOGUE**

21   TRANSMISSION CODE?

For an HSI, enter 1.

For an SSLC, enter 1, 2, or 3, where
1 = Automatic code sensing of ASCII and EBCDIC if
     initially receiving; ASCII if initially sending;
2 = ASCII transmission.
3 = EBCDIC transmission.

In DS/3000, all transmissions are ASCII. Only in certain other data
communication subsystems can users optionally transfer EBCDIC characters.

22   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.

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

23   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.

24   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 HSI, 100 to 500 is recommended. For an INP or
SSLC, 300 is recommended.

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Steps 25 through 27 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 28. If the CS device is
either an HSI or a hardwired INP (subtype 3), the
dialogue skips to Step 30.

STEP NO.   **DIALOGUE**

25   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.

26   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.

27   AUTOMATIC ANSWER?

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

28   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.

29   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 29.

30   SPEED CHANGEABLE?

For an HSI, enter YES.

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 31).

STEP NO.   **DIALOGUE**

31   TRANSMISSION SPEED?

For INP (Type 17) or SSLC (Type 18) devices, enter the transmission speed of the line in characters per second (Bit Rate/8). For HSI (Type 19) devices, enter 250000 for cable lengths up to 1000 feet, or enter 125000 for cable lengths greater than 1000 feet.

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 30.

STEP NO.　　**DIALOGUE**

32　　　　　TRANSMISSION MODE?

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

0 = Full duplex
1 = Half duplex

INP and SSLC:

Configure the communications interface (INP or SSLC) 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.

- An INP-to-SSLC Direct Connect cable (a "modem eliminator" cable between an INP and an SSLC)

Your response must agree with the remote system's configuration and with the characteristics of the communications line.

HSI:

Always configure an HSI as Full Duplex (0).

STEP NO.	DIALOGUE

33   PREFERRED BUFFER SIZE?

Enter, in words, the desired buffer size, to a maximum of 4095 words for an HSI or SSLC, or up to a maximum of 1024 words for an INP. For a dial-up line, 1024 is generally recommended; for a leased line with an SSLC, the size may be larger than 1024 if the line quality is good. Note that although large buffer sizes increase transmission efficiency, they also use up memory space. Match buffer sizes for sender and receiver whenever possible, since the effective buffer size that can be utilized is the smaller of the two.

34   DRIVER CHANGEABLE? <u>NO</u>

35   DRIVER OPTIONS? <u>0</u>

NOTE

The dialogue skips to Step 44.

36   RECORD WIDTH?

For IODS0 and IODSX, enter 128.

For all Virtual Terminals, enter 40.

37   OUTPUT DEVICE?

For the communications drivers, enter 0.

For a virtual terminal, enter the class name or logical device number to be used for the corresponding job/session listing device.

38   ACCEPT JOBS/SESSIONS?

For the communications drivers, enter NO.

For virtual terminals, enter YES.

39   ACCEPT DATA? <u>NO</u>

STEP NO.   **DIALOGUE**

40   INTERACTIVE?

For the communications drivers, enter NO.

For virtual terminals, enter YES.

41   DUPLICATIVE?

For the communications drivers, enter NO.

For virtual terminals, enter YES.

42   INITIALLY SPOOLED? NO

43   AUTO REPLY? NO

44   DRIVER NAME?

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

IOINP0   = INP

CSSBSC0   = SSLC

CSHBSC0   = HSI

IODS0   = Communications driver, while using the Bisync protocol

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

IODSTRM0 = Virtual terminals, while using the bisync protocol

IODSTRMX = Virtual terminals, while utilizing the X.25 capability

NOTE

Steps 45 through 48 apply to CS devices with switched
(dial-up) lines (types 17 and 18, subtype 0). The
dialogue for all other devices skips to Step 49.

STEP NO.	DIALOGUE

45   PHONELIST?

Enter YES or NO.

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

46   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 line.

The characters that can be used for the phone number are:

0 through 9

/ (separator used for automatic call units that have a second dial tone detect)

E (optional end-of-number indicator)

D (one-second delay. Used for European modems and automatic call units that require built-in delays)

(defined by the local telephone system)

* (defined by the local telephone system)

47   LOCAL ID SEQUENCE?

The default local ID sequence can be specified in ASCII. Enter (RETURN) for a null local ID sequence, or enter an ASCII string in quotes.

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 NOTE 
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Do not enter more than 16 characters for the local or remote ID sequence.

STEP NO.   **DIALOGUE**

48   REMOTE ID SEQUENCE?

              Enter the default remote ID sequence in the same format as the local ID
              sequence (above). This can be repeated until (RETURN) is entered.

49   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.

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│   **NOTE**   │
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              When configuring X.25 devices, the destination logical
              node name cannot be specified as a device class name for
              IODSX or IOINP0 entries.

              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 50. Otherwise, enter a logical device number and repeat the
              configuration procedure from Step 9.

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

51   LIST OF I/O DEVICES? <u>YES</u>

              To print a listing of the new input/output device configuration, enter YES.
              This list appears in the format described in Step 5.

52   LIST CS DEVICES? <u>YES</u>

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

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│   **NOTE**   │
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              Step 53 only appears if you are using MPE V/E.

53   TERMINAL TYPE CHANGES?

              Enter NO.

STEP NO.   **DIALOGUE**

54   CLASS CHANGES? (RETURN)

55   LIST I/O DEVICES? (RETURN)

<div style="text-align:center">

NOTE

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The prompt in Step 56 appears only if a CS device is
configured or if additional drivers exist (for the CS
driver-changeable option in Step 34). If neither case
exists, the dialogue skips to Step 58.

56   ADDITIONAL DRIVER CHANGES? NO

57   I/O CONFIGURATION CHANGES? NO

58   SYSTEM TABLE CHANGES? NO

59   MISC CONFIGURATION CHANGES? NO

60   LOGGING CHANGES? NO

61   DISC ALLOCATION CHANGES? NO

62   SCHEDULING CHANGES? NO

63   SEGMENT LIMIT CHANGES? NO

64   SYSTEM PROGRAM CHANGES? NO

65   SYSTEM SL CHANGES? NO

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

STEP NO. **DIALOGUE**

66   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 accounting, 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 accounting structure,
and any files that were changed on or since the specified date.

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

67   ENTER DUMP FILE SUBSETS?

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

68   LIST FILES DUMPED? YES or NO

69   The console operator must now use the =REPLY command to assign the magnetic tape
drive on which you have arranged for a 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 2-37 through 2-40 for sample configurations.

INTRODUCTION

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

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│    NOTE     │
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```

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 advantages of the Network Configurator/Network Data Base is the need to define the network configuration only 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 Distributed Systems (DS) products have read-only access to the data base so 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 pseudo devices; second, to route calls from the local HP 3000 to remote HP 3000s, HP 1000s, and HP 2334s.

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

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

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

The data base must be RELEASEd using DBUTIL, so that all users may have read access to the data base. Refer to 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 DS/3000 with X.25 Link, or are using an HP 2334A X.25 Cluster Controller (see the *X.25 Link Reference Manual* in this case). This table contains information for all systems or devices connected to the PDN that will be accessed by users or applications on the local system, as well as information on remote systems whose users may want to access the local 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 to a PDN 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 1. For additional clarification of this format, refer to page xi, "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 system will print the following message:

`*** DATA BASE NOW BEING ACCESSED EXCLUSIVELY ***`

| NOTE |

While in ADD mode, no other program on the system (including the X.25 communications software) will be able to access the data base.

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. NETCONF will print:

Data Base reopened for concurrent access

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).

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.

HP2334 = The type of the Logical Node being addressed is a device connected to an HP 2334. See the *X.25 Link for the HP 3000 Reference Manual* for information.

HP1000 = The type of the Logical Node being addressed is an HP 1000.

INPUT MUST BE HP3000 OR HP1000 OR HP2334

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

ADD

STEP NO.   **DIALOGUE**

1.2   LOGICAL DEVICE NUMBER TO BE USED?

Enter the logical device number of the IODSX communications driver
associated with the INP connected to the PDN, or the IODS0 driver associated
with the X.21 network. This can be a numeric value between 1 and 255 for
MPE IV, or between 1 and 999 for MPE V/E.

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)?

(RETURN) = The default (X.25) line type is used.

X25 = You will be prompted for the X.25 Remote Node Address. Skip to
Step 1.3.1.

X21 = You will be prompted for an X.21 Remote Node Address. Skip to Step
1.3.2.

INPUT MUST BE X25 OR X21

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

STEP NO.   **DIALOGUE**

1.3.1   **REMOTE X25 PDN ADDRESS?**

Enter one of the following replies:

(RETURN) = Either an X.25 network address is not necessary because the connection will be across a point-to-point line, rather than a PDN; or the default network address, NULL, will be used if the connection is across a PDN. 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, Swiss TELEPAC, or TRANSPAC, addresses for a different country than the network's country of origin must be preceded 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).

1.3.2   **X21 PDN ADDRESS?**

Enter one of the following replies:

(RETURN) = The default X.21 Address (all blanks) is used.

An X.21 PDN Network Address = This address must be no more than 30 characters long.

X21 ADDRESS SHOULD BE UP TO 30 CHARACTERS

This message appears if the address entered was larger than 30 characters. You will be prompted again for the X.21 PDN address (Step 1.3.2).

ADD

1.4   CONTINUE ADDING (YES OR NO)?

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

    <u>NO</u> or any input except <u>YES</u> = This will take you out of the ADD command. NETCONF will print:

    Data Base reopened for concurrent access,

    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.*

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 be the logical device number of the DS/X.25 communications driver (IODSX) if configuring X.25, or IODS0 for X.21.

`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 )?`

> Enter one of the following replies:

> `RETURN` = The default protocol (X25) is used.

> X25 = X.25 protocol will be used. Skip to Step 2.1.1.

> X21 = X.21 protocol will be used. Skip to Step 2.1.2.

`INPUT MUST BE X25 OR X21`

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

ADD

STEP NO.   **DIALOGUE**

2.1.1   CONNECTION DIRECT OR VIA PDN?

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

(RETURN) = The default connection type (DIRECT) is used. Skip to Step 2.1.3.

DIRECT = The line connection will be via a point-to-point or full duplex link. Skip to Step 2.1.3.

PDN   = The line connection will be via Public Data Network. Skip to Step 2.1.4.

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).

2.1.2   LINE IS LEASED OR SWITCHED?

This prompt is issued only if the connection protocol is X.21.

(RETURN) = The default LEASED is used (Step 2.2).

LEASED   = The line type is LEASED and the connection is point-to-point. Skip to Step 2.2.

SWITCHED = The line type is SWITCHED and the connection is via PDN. Skip to Step 2.1.3.

INPUT MUST BE LEASED OR SWITCHED

This message appears if the response was not one of the above. You will be prompted again for the line type (Step 2.1.2).

STEP NO.   **DIALOGUE**

2.1.3   **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 by the system. 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 by the system. 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 2.1.3).

2.1.4   **LOCAL X25 PDN ADDRESS?**

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

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

Local X25 PDN address = This is the actual local address (from address) assigned by the PDN at subscription time. It should be a numeric address up to 15 digits in length. If you are using Transpac, this field must be all blanks.

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 2.1.4).

ADD

STEP NO.   **DIALOGUE**

2.1.5   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 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 2.1.5).

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

Reply by entering the Remote Node Name to be used as a default. This must correspond to one of the remote node names associated with this line identifier in the RN table. When a :DSLINE command is issued with a line identifier instead of a node name, the node to which the connection will be established is the one identified here.

┌─────────────┐
│   **NOTE**   │
└─────────────┘

DS/X.25 users are encouraged to use a node name in commands such as :DSLINE, DSCOPY, FCOPY, etc. instead of a line identifier.

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
(in milliseconds) the HP 3000 will wait before retransmission of a
frame can be initiated. (In the case of a PDN connection, this is
usually the default provided by that PDN.)

```
|  NOTE  |
```

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

RESPONSE TIMER SHOULD BE IN THE RANGE 1 TO 9999

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

ADD

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 T1 timer. (In the case of a PDN connection, this is usually the default provided by that PDN.)

RETRY COUNT SHOULD BE IN THE RANGE 1 TO 255

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

STEP NO.   **DIALOGUE**

2.5   <u>WINDOW SIZE (FRAMES) ?</u>

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 the default provided by that PDN.)

```
┌──────────────┐
│    NOTE      │
└──────────────┘
```

For optimum performance, the Level 2 window size
should be 7. However, PDN users must specify the
default size provided by the PDN.

WINDOW SIZE SHOULD BE IN THE RANGE 1 TO 7

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

ADD

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

```
┌─────────────────┐
│      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 the default provided
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 the default provided 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 maximum number of data bytes in a data packet that will be used across this connection. (In the case of a PDN connection, this is usually the default provided by that PDN.)

PACKET SIZE SHOULD BE IN THE RANGE 32 TO 1024

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

ADD

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 the default provided 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 the default provided 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)?

> <u>YES</u>   = This will take you back to the ADD prompt (Step 0).
>
> <u>NO</u> or any input except <u>YES</u> = This will take you out of the ADD command. NETCONF will print:
>
> > Data Base reopened for concurrent access,
>
> > 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.*

CHECK

THE C[HECK] COMMAND

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

The first check scans the Remote Node table. For every Line Identifier (LDEV number) that is used with System Type of HP3000 or HP1000, it checks that there is a corresponding entry in the LC table. 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

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

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

THE D[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 system will print the following message:

`*** DATA BASE NOW BEING ACCESSED EXCLUSIVELY ***`

```
┌──────────────┐
│    NOTE      │
└──────────────┘
```

> While in DELETE mode, no other program on the system (including the X.25 communications software) will be able to access the data base.

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. NETCONF will print:

`Data Base reopened for concurrent access,`

and prompts for another first-level command.

`INPUT MUST BE RN OR LC`

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

DELETE

Deleting from the RN Table

The following prompts cover the remote node characteristics.

STEP NO.   **DIALOGUE**

1.0   **REMOTE NODE NAME?**

Enter the remote node name that is presently configured in the RN Table.

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. NETCONF will print:

Data Base reopened for concurrent access,

and 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 NETCONF will print:

Data Base reopened for concurrent access,

and you will be prompted for a first-level command.

STEP NO. **DIALOGUE**

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

1.1   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, NETCONF will print:

      Data Base reopened for concurrent access,

      and 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, NETCONF will print:

      Data Base reopened for concurrent access,

      and you will be prompted for a first-level command.

DELETE

STEP NO.   **DIALOGUE**

ASSOCIATED LC TABLE ENTRY WITH LDEV = nnn

1.2   CONFIRM DELETION (YES OR NO) ?

Enter one of the following replies:

<u>NO</u> or any input except <u>YES</u> (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, NETCONF will print:

Data Base reopened for concurrent access,

and you will be prompted for a first-level command.

<u>YES</u>   = 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,
NETCONF will print:

Data Base reopened for concurrent access,

and you will be prompted for a first-level command.

Deleting from the LC Table

STEP NO.   **DIALOGUE**

2.0   LOGICAL DEVICE NUMBER?

Enter the line identifier (logical device number) that is currently configured in the LC table.

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. NETCONF will print:

Data Base reopened for concurrent access,

and 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.

DELETE

STEP NO.   **DIALOGUE**

LC TABLE ENTRY WITH LOGICAL DEVICE NUMBER = nnn

2.1   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. NETCONF will print:

Data Base reopened for concurrent access,

and 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, NETCONF will print:

Data Base reopened for concurrent access,

and you will be prompted for a first-level command.

STEP NO.   **DIALOGUE**

```
ASSOCIATE RN TABLE ENTRIES USING LDEV = nnn
```

2.2   `CONFIRM DELETION (YES OR NO) ?`

Enter one of the following replies:

<u>NO</u> or any input except <u>YES</u> (including (RETURN)) = The delete is not confirmed, NETCONF will print:

```
Data Base reopened for concurrent access,
```

and you will be prompted for a first-level command.

<u>YES</u>   = All entries in the RN table that use this line identifier (LDEV) are deleted, NETCONF will print:

```
Data Base reopened for concurrent access,
```

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, if NETCONF is being used by the data base creator, a call is automatically made to the CHECK command. Any discrepancies in the relationship between the RN and LC tables are printed.

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

STEP NO.   **DIALOGUE**

1.0   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.

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 system will print the following message:

*** DATA BASE NOW BEING ACCESSED EXCLUSIVELY ***

```
┌─────────────────┐
│      NOTE       │
└─────────────────┘
```

While in UPDATE mode, no other program on the system (including the X.25 communications software) will be able to access the data base.

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. NETCONF will print:

Data Base reopened for concurrent access,

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).

UPDATE

Updating the RN Table

The following prompts cover the remote node characteristics.

STEP NO.   **DIALOGUE**

1.0   `REMOTE NODE NAME?`

> Enter a currently configured remote node name.

`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. NETCONF will print:
>
> `Data Base reopened for concurrent access,`
>
> and 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**

1.1   **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 1.1).

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. NETCONF will print:

Data Base reopened for concurrent access,

and 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.

UPDATE

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 communications driver (IODSX) or IODS0 for X.21.

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. NETCONF will print:

Data Base reopened for concurrent access,

> and 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.

EXAMPLES

DS (Bisync) Only

Case 1: HP32185B

Local node

Remote node
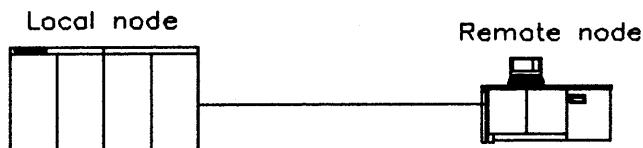
I/O CONFIGURATION

You need to configure an INP and one DS communications driver (IODS0) for each physical link that will use DS/3000. In addition, you must configure one virtual terminal driver (IODSTRM0) for each user who will log on from the remote HP 3000 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 IODSTRM0 devices. The following sample I/O configuration assumes that all remote terminal users may need to log on at the same time. Also, the default mode of operation will be no data compression as IODS0 subtype 0.

LOG DEV #	DRT #	U N I T	C H A N	T Y P E	SUB TYPE	TERMINAL TYPE SPEED		REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	3			0	0		IOINP0	CSINP
60	#16	0	0	41	0			128	0		IODS0	REMOTE
66	#16	0	0	16	0	??	??	40	66	J ID	IODSTRM0	DSTERM
67	#16	0	0	16	0	??	??	40	67	J ID	IODSTRM0	DSTERM
68	#16	0	0	16	0	??	??	40	68	J ID	IODSTRM0	DSTERM
69	#16	0	0	16	0	??	??	40	69	J ID	IODSTRM0	DSTERM
70	#16	0	0	16	0	??	??	40	70	J ID	IODSTRM0	DSTERM

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	7000	0	1024	N	0

NETWORK DATABASE CONFIGURATION

This example only shows a DS configuration for use with the bisync protcol. This means no network database configuration is necessary.

2-37

DS with X.25

Case 2: HP32185B and HP32187B

KEY:
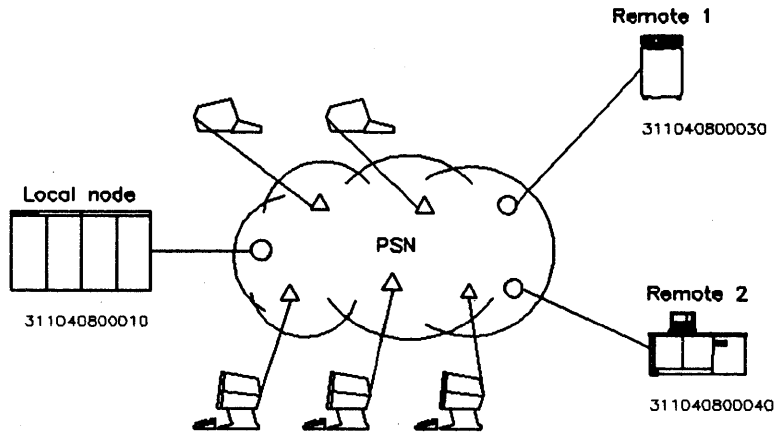
　　O　IS A NETWORK SWITCHING NODE (DCE)

　　△　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
that will use X.25. In addition, you must configure one virtual terminal driver (IODSTRMX) for each
user who will log on from a remote HP 3000 at a given time, and one PAD terminal driver (IOPAD0)
for each user who will log on from a remote PAD terminal at a given time. For example, if there are
10 remote PAD 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
PAD terminal users may need to log on at the same time. The default mode of operation for DS users
will be no data compression as the subtype of IODSX is 0.

LOG DEV #	DRT #	U N I T	C H A N	T Y P E	SUB TYPE	TERMINAL TYPE	SPEED	REC WIDTH	OUTPUT DEV	MODE	DRIVER NAME	DEVICE CLASSES
16	20	0	0	17	1			0	0		IOINP0	CSINP
60	#16	0	0	41	0			128	0		IODSX	
61	#16	0	0	16	0	??	??	40	61	J ID	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	IODSTRMX	DSTERM
67	#16	0	0	16	0	??	??	40	67	J ID	IODSTRMX	DSTERM
68	#16	0	0	16	0	??	??	40	68	J ID	IODSTRMX	DSTERM
69	#16	0	0	16	0	??	??	40	69	J ID	IODSTRMX	DSTERM
70	#16	0	0	16	0	??	??	40	70	J ID	IODSTRMX	DSTERM

```
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

One remote node table entry is required for each remote HP 3000 with which you would like to communicate across the PDN, as well as for those remote nodes that need to communicate with the local system. If the HP 3000 receives an incoming call from a remote HP 3000 with a calling address that has not been specified in the remote node table, the call will be cleared. Remote node names cannot be configured on the system as device class names because DS uses the node name to determine the remote node's PDN address.

You also need to define the X.25 line parameters in the line characteristics table.

The following example (produced by the PRINT command) shows the NETCONF information generated for the I/O configuration shown above.

```
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
REMOTE1	HP3000	60	X25	311040800030
REMOTE2	HP3000	60	X25	311040800040

Line Characteristics Table				
Ldev No	Line Type	Connect Method	DCE/DTE	Remote Primary Node
60	X25	PDNNAME	DTE	REMOTE1

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

For an example with the HP 2334A Cluster Controller, please see pages 5-36 to 5-49 in the *X.25 Link for the HP 3000 Reference Manual.*

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

The internal procedures that DS/3000 uses for controlling the line are called CS intrinsics. Each call to a CS intrinsic generates a series of actions, states and events. An action is something that the CS driver performs, and an event is an external occurence that requires an action from the driver according to the driver's state.

The trace facility is invoked by the operator with a :DSCONTROL command. Tracing can be enabled/disabled when OPENing the line, or before or after the line is opened. Tracing can be invoked for any communication line that DS/3000 uses. Once invoked for a particular communications line, the trace facility continues to record line activity until either the user issues a new :DSCONTROL command with the TRACE, OFF parameter. The trace facility keeps track of actions, states and events in the form of trace entries.

The trace entries are grouped into trace records: one trace record for each CS intrinsic called by DS/3000. The trace records are permanently stored in a system-generated file named DSTRCnnn (where nnn is the LDEV number of the communications driver, IODS0), or in a user-specified trace file. The contents of a CS/3000 trace file can be formatted and printed through the use of trace dump utility programs, CSDUMP and DSDUMP, described later in this section. Refer to the *Data Communications Handbook* for additional information on the CS Trace Facility.

INVOKING 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 intrinsic calls. If ALL is not specified, then trace records are written only when an intrinsic call completes with a transmission error. 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 and INP interconnect entries are generated)

                    %001 = generate PSTX entries

                    %002 = generate PSCT entries

%004 = generate PRTX entries

%010 = generate PRCT entries

%020 = generate POPR and PEDT entries

%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 the value may not exceed 40. (If the value requested for an INP is greater than 40, a warning message will be printed and the maximum default of 40 will be used.) If *numentries* is set to zero or omitted, there will be a maximum of 24 trace entries per trace record for the INP, and 25 for the SSLC. 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 DS/3000 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 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 35 trace entries per trace record, trace entries beyond the 35th will overlay the first, second, third (and so on) trace entries in the record. When this happens, the overlaid trace entries will be missing from the listing; a warning message will appear in the listing stating that the entries are missing.

filename names the file to which the trace information will be written. If no name is supplied, DS/3000 will create a file named DSTRCnnn, where nnn is the right-justified LDEV number of the DS device. For example, if the IODS0 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 call. 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	000	Use actual file designator
	Bits 8,9	11	Variable length records
	Bit 7	0	No carriage control
AOPTIONS	Bits 12 to 15	1111	Write only; purge old contents
	Bit 11	0	No multi-record option
	Bit 10	0	Disallow dynamic locking/unlocking
	Bits 8,9	00	Exclusive access
	Bits 0 to 7	00000000	None
BLOCKFACTOR		1	

If the trace file cannot be opened because it does not exist, then a new file is opened in the system domain. If an error occurs when trying to open the trace file, the particular : DSCONTROL command fails and the trace file printout will be displayed on the console.

When the line is closed, the CS/3000 trace facility issues an FCLOSE intrinsic call with the following parameters:

Parameter	Value	Meaning
DISPOSITION	1	Save
SECCODE	0	Unrestricted access

Trace Entry Mnemonics

There are eight types of trace entries used in DS/3000. They are summarized in Table 3-1 and described in greater detail on the pages following this table.

Table 3-1. Trace Entry Type Mnemonics

Mnemonic	Entry Type	Definition
POPR	Operation	Generated each time the physical driver (a segment of the CS driver) is called upon to perform an operation. The POPR trace entry tells what operation is to be performed.
PSTN	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.
PEDT	Editor	Generated each time a text message or control character sequence is received from the remote station. In the case of a text message, the PEDT trace entry shows the first 14 words of the DS/3000 buffer; BSC control characters, pad characters, and CRC parity sequences are omitted. In the case of a BSC control character sequence, the PEDT trace entry supplies a mnemonic phrase telling what was received.
PRCT	Receive Control Sequence	Generated each time a BSC control character sequence is received from the remote station. The PRCT trace entry shows (in octal or hexadecimal) the exact sequence of bytes that was received.
PSCT	Send Control Sequence	Generated each time the driver sends a BSC control character sequence to the remote station. The PSCT trace entry shows (in octal or hexadecimal) the exact sequence of bytes that was sent.
PRTX	Receive Text	Generated each time a text message is received from the remote station. The PRTX trace entry shows (in octal or hexadecimal) the exact sequence of bytes received.
PSTX	Send Text	Generated each time the driver sends a text message to the remote station. The PSTX trace entry shows (in octal or hexadecimal) the exact sequence of bytes sent.
PCMP	User Request Completed	Generated each time a CS intrinsic 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.

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

The two trace formatting programs for DS/3000 are CSDUMP and DSDUMP. CSDUMP formats the CS trace file to show line activity by displaying all text and Bisync control characters being sent and received. DSDUMP allows you to choose a subset of the trace file for formatting, and will also analyze the selected data. CSDUMP analyzes the data according to the Bisync line protocol, whereas DSDUMP displays only the DS protocol.

Defining a Trace File for CSDUMP

The 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. Use 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:

$$
\texttt{:RUN CSDUMP.PUB.SYS[,OCTAL][;PARM=} \begin{Bmatrix} 0 \\ 1 \\ 2 \end{Bmatrix} \texttt{]}
$$

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 outut by time; however, if you specify PARM=2, only CS/3000 intrinsics will be output by time. When PARM is not specified, the default is PARM=0.

Formatted CSDUMP Trace Listing

Figure 3-1 shows an example of a Trace listing for a line connected to an INP (Intelligent Network Processor) and the series of commands used to generate the example. As you can see from Figure 3-1, a CSDUMP Trace listing has a specific format. The components of a Trace listing are: a header message; the beginning-of-trace message; the opening Line Information Display box; a series of trace records, each consisting of a record header and 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 3-1.

Command sequence used to generate the following example:

```
:DSCONTROL 110;OPEN;TRACE,ON,ALL
:DSCONTROL 110;SHUT;TRACE,OFF
:FILE CSTRACE=DSTRC111.PUB.SYS
:FILE LIST;DEV=LP
:RUN CSDUMP.PUB.SYS
```

EXAMPLE

```
CS TRACE ANALYZER (A.55.25)         TUE, AUG 27, 1985, 11:28 AM

TRACE FILE IS DSTRC111.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON MON, AUG 26, 1985,  5:33 PM

SYSTEM ID=01.02

************************************
* BEGIN TRACING FOR DEVICE 110    *
************************************


*******************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*******************************************************
*   LINE NUMBER: 4       LOGICAL DEV. NUMBER: 110   *
*   DEV. TYPE: 17        SUBTYPE: 3    VER: A.55.25 *
*               0123456789012345                    *
*   COPTIONS: 0000100010000010                      *
*   AOPTIONS: 0000000111001101                      *
*   DOPTIONS: 0000010000000000                      *
*   NETWORK'ID: 0000000000000000                    *
*   NUMBUFFERS: 0           BUFFSIZE: 1024 (WORDS)  *
*   INSPEED: 7000           OUTSPEED: 7000          *
*   MISCARRAY:       RECEIVE TIMEOUT: 20     SECS.  *
*                      LOCAL TIMEOUT: 60     SECS.  *
*                    CONNECT TIMEOUT: 900    SECS.  *
*                   RESPONSE TIMEOUT: 300    HSECS. *
*                   LINE BID TIMEOUT: 29     SECS.  *
*                   NO. ERROR RETRIES: 15           *
*                  CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                DATA-SET-READY DELAY: DISABLED.    *
*                   TRANSMISSION MODE: DUPLEX.      *
*              MMSTAT TRACE FACILITY: ENABLED.      *
*   DRIVERNAME: IOINP0                              *
*   DOWNLOAD FILE: CSDBSC2.PUB.SYS                  *
*   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: 0               MSGRECV: 0             *
```

Figure 3-1. CSDUMP Trace Listing.

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

*****************************************************************
*  CREAD                     TIME=     3.520   REQUEST ID=%005070(!0A38) *
*  CALLER: SEGMENT=PRG %000          ADDRESS=%000342                     *
*  STATE:  LINE STATE=DISCONNECT  COPTIONS=%004202  DOPTIONS=%002000   *
*  INPUT:  IN BUF=%000000 LENGTH=0      SPEC. STATION #=0   COMP #=0   *
*  OUTPUT: TRANSMISSION LOG=0           RESP. STATION #=0   COMP #=0   *
*****************************************************************

0          3.550  POPR  REQUEST ID=%005070(!0A38)
                        WAIT FOR CONNECTION
                        TIMEOUT=   900.000
                        OUT BUFFER= !0000    LENGTH= 0                1
                        IN  BUFFER= !0000    LENGTH= 0                1


1          3.560  POPR  REQUEST ID=%005070(!0A38)
                        INITIAL RECEIVE CONTROL SEQ
                        TIMEOUT=    29.000
                        OUT BUFFER= !0000    LENGTH= 0                1
                        IN  BUFFER= !260F    LENGTH= 16               1



*****************************************************************
*  CSIOWAIT - ERROR          TIME=    32.550   REQUEST ID=%005070(!0A38) *
*  CALLER: SEGMENT=PRG %000          ADDRESS=%000520                     *
*  STATE:  LINE STATE=DISCONNECT   COPTIONS=%004202  DOPTIONS=%002000  *
*  OUTPUT: RECOVERABLE ERRCODE=0   IRRECOVERABLE ERRCODE=217           *
*****************************************************************

2         32.560  POPR  REQUEST ID=%005070(!0A38)
                        DISCONNECT
                        TIMEOUT=     3.000
                        OUT BUFFER= !0000    LENGTH= 0                1
                        IN  BUFFER= !0000    LENGTH= 0                1


3         32.570  PCMP  REQUEST ID=%005070(!0A38)
                        ERROR CODE=217   LAST RECOVERABLE ERROR CODE= 0
                        #MSG SENT=0       #MSG RECV=0        STATE=DISCONNECT
                        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=2


0         32.580  PCMP  REQUEST ID=%002040(!0420)
                        ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                        #MSG SENT=0       #MSG RECV=0        STATE=DISCONNECT
                        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=2



*****************************************************************
*  CREAD                     TIME=    32.590   REQUEST ID=%000410(!0108) *
*  CALLER: SEGMENT=PRG %000          ADDRESS=%000342                     *
*  STATE:  LINE STATE=DISCONNECT   COPTIONS=%004202  DOPTIONS=%002000  *
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
* INPUT:  IN BUF=%000000 LENGTH=0      SPEC. STATION #=0   COMP #=0  *
* OUTPUT: TRANSMISSION LOG=0           RESP. STATION #=0   COMP #=0  *
*******************************************************************

0       32.620 POPR REQUEST ID=%000410(!0108)
                    WAIT FOR CONNECTION
                    TIMEOUT=  900.000
                    OUT BUFFER= !0000   LENGTH= 0              2
                    IN  BUFFER= !0000   LENGTH= 0              2


1       32.620 POPR REQUEST ID=%000410(!0108)
                    INITIAL RECEIVE CONTROL SEQ
                    TIMEOUT=   29.000
                    OUT BUFFER= !0000   LENGTH= 0              2
                    IN  BUFFER= !260F   LENGTH= 16             2



*******************************************************************
* CCONTROL - INTRSC EXEC    TIME=    54.540  REQUEST ID=NONE       *
* CALLER: SEGMENT=PRG %002        ADDRESS=%000027                  *
* STATE:  LINE STATE=DISCONNECT   COPTIONS=%004202 DOPTIONS=%002000 *
* PARAM:  CONTROL CODE=0          PARAMETER=0      (%000000)        *
* OUTPUT: ERROR CODE=0                                             *
*******************************************************************



*******************************************************************
* CCONTROL - DRIVER EXECUTEDTIME=    54.560  REQUEST ID=%004144(!0864) *
* CALLER: SEGMENT=PRG %002        ADDRESS=%000316                  *
* STATE:  LINE STATE=DISCONNECT   COPTIONS=%004202 DOPTIONS=%002000 *
* PARAM:  CONTROL CODE=41         PARAMETER=1      (%000001)        *
* OUTPUT: ERROR CODE=0                                             *
*******************************************************************

2       54.570 POPR REQUEST ID=%000410(!0108)
                    DISCONNECT
                    TIMEOUT=    3.000
                    OUT BUFFER= !0000   LENGTH= 0              2
                    IN  BUFFER= !0000   LENGTH= 0              2


***********************************
* END OF TRACE FOR DEVICE  110  *
***********************************


***************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
***************************************************
*   LINE NUMBER: 4      LOGICAL DEV. NUMBER: 110  *
* DEV. TYPE: 17         SUBTYPE: 3   VER: A.55.25 *
*               0123456789012345                  *
*   COPTIONS: 0000100001000010                    *
*   AOPTIONS: 0000000111001101                    *
*   DOPTIONS: 0000010000000000                    *
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
*   NETWORK'ID: 0000000000000000                        *
*   NUMBUFFERS: 0            BUFFSIZE: 1024 (WORDS) *
*   INSPEED: 7000            OUTSPEED: 7000             *
*   MISCARRAY:          RECEIVE TIMEOUT: 20      SECS. *
*                         LOCAL TIMEOUT: 60      SECS. *
*                       CONNECT TIMEOUT: 900     SECS. *
*                      RESPONSE TIMEOUT: 300     HSECS. *
*                      LINE BID TIMEOUT: 29      SECS. *
*                     NO. ERROR RETRIES: 15            *
*                   CLEAR-TO-SEND DELAY: 00.0    SECS. *
*                   DATA-SET-READY DELAY: DISABLED.    *
*                    TRANSMISSION MODE: DUPLEX.        *
*                 MMSTAT TRACE FACILITY: ENABLED.      *
*   DRIVERNAME: IOINP0                                  *
*   DOWNLOAD FILE: CSDBSC2.PUB.SYS                      *
*   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: 0              MSGRECV: 0                 *
*   RECOVERRORS: 0          IRRECOVERRORS: 3           *

*****************************************************

3       54.580 PCMP REQUEST ID=%000410(!0108)
                    ERROR CODE=201   LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=0       #MSG RECV=0        STATE=DISCONNECT
                    # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=3


*****************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
*****************************************************
*   LINE NUMBER: 4      LOGICAL DEV. NUMBER: 110   *
*   DEV. TYPE: 17         SUBTYPE: 3   VER: A.55.25 *
*              0123456789012345                      *
*   COPTIONS: 0000100001000010                       *
*   AOPTIONS: 0000000111001101                       *
*   DOPTIONS: 0000010000000000                       *
*   NETWORK'ID: 0000000000000000                     *
*   NUMBUFFERS: 0            BUFFSIZE: 1024 (WORDS) *
*   INSPEED: 7000            OUTSPEED: 7000             *
*   MISCARRAY:          RECEIVE TIMEOUT: 20      SECS. *
*                         LOCAL TIMEOUT: 60      SECS. *
*                       CONNECT TIMEOUT: 900     SECS. *
*                      RESPONSE TIMEOUT: 300     HSECS. *
*                      LINE BID TIMEOUT: 29      SECS. *
*                     NO. ERROR RETRIES: 15            *
*                   CLEAR-TO-SEND DELAY: 00.0    SECS. *
*                   DATA-SET-READY DELAY: DISABLED.    *
*                    TRANSMISSION MODE: DUPLEX.        *
*                 MMSTAT TRACE FACILITY: ENABLED.      *
*   DRIVERNAME: IOINP0                                  *
*   DOWNLOAD FILE: CSDBSC2.PUB.SYS                      *
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
*  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: 0                   MSGRECV: 0           *
*  RECOVERRORS: 0              IRRECOVERRORS: 3      *
********************************************************
```

```
*************************************************************************
*  CCONTROL - INTRSC EXEC    TIME=   55.700  REQUEST ID=NONE            *
*  CALLER: SEGMENT=PRG %002         ADDRESS=%001417                     *
*  STATE:  LINE STATE=DISCONNECT  COPTIONS=%004202  DOPTIONS=%002000    *
*  PARAM:  CONTROL CODE=44         PARAMETER=-24829  (%117403)          *
*  OUTPUT: ERROR CODE=0                                                 *
*************************************************************************
```

```
*************************************************************************
*  CCONTROL - INTRSC EXEC    TIME=   55.700  REQUEST ID=NONE            *
*  CALLER: SEGMENT=PRG %000         ADDRESS=%000233                     *
*  STATE:  LINE STATE=DISCONNECT  COPTIONS=%004202  DOPTIONS=%002000    *
*  PARAM:  CONTROL CODE=46         PARAMETER=0       (%000000)          *
*  OUTPUT: ERROR CODE=0                                                 *
*************************************************************************
```

```
*************************************************************************
*  CWRITE                    TIME=   55.700  REQUEST ID=%000060(!0030) *
*  CALLER: SEGMENT=PRG %000         ADDRESS=%001252                     *
*  STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000   *
*  INPUT:  OUT BUF=%170650 LENGTH=8       IN BUF=%172660 LENGTH=1025    *
*          STATION #=0     COMPONENT #=0                                *
*  OUTPUT: TRANSMISSION LOG=8                                           *
*************************************************************************
```

```
0       55.720 POPR REQUEST ID=%000060(!0030)
                    WAIT FOR CONNECTION
                    TIMEOUT= 900.000
                    OUT BUFFER= !0000    LENGTH= 0              3
                    IN  BUFFER= !0000    LENGTH= 0              3


1       55.720 POPR REQUEST ID=%000060(!0030)
                    SEND CONTROL SEQ THEN RECEIVE CONTROL SEQ
                    SEND SEQ=ID ENQ    TIMEOUT=    2.700
                    OUT BUFFER= !0000    LENGTH= 0
                    IN  BUFFER= !260F    LENGTH= 16


2       55.730 PSCT REQUEST ID=%000060(!0030)
                    5 5.1 6 1 6.1 6 1 6.8 5 F F.0 0
                    U   SYN SYN SYN SYN ENQ DEL NUL
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
3          55.780 PRCT REQUEST ID=%000060(!0030)
                        1 6.1 6 1 0.B 0 F F.F F F F.F F F F.F F F F.F F
                        SYN SYN DLE 0   DEL DEL DEL DEL DEL DEL DEL DEL
                        F F.F F F F.F F F F.F F F F.F F F F.F F F F.F F
                        DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                        F F.F F F F.F F F F.F F F F.F F
                        DEL DEL DEL DEL DEL DEL DEL DEL


4          55.780 PEDT REQUEST ID=%000060(!0030)
                        RECV ACK0
                        0 0.0 1
                        NUL SOH


5          55.780 POPR REQUEST ID=%000060(!0030)
                        SEND TEXT THEN RECEIVE TEXT
                        TIMEOUT=    3.000
                        OUT BUFFER= !35E4    LENGTH= 16
                        IN  BUFFER= !2701    LENGTH= 2050


6          55.780 PSTX REQUEST ID=%000060(!0030)
                        5 5.1 6 1 6.1 6 1 6.1 0 0 2.0 8 0 0.0 0 0 2.0 0
                        U   SYN SYN SYN SYN DLE STX BS  NUL NUL STX NUL
                        1 0.1 0 F F.3 F 0 0.0 0 0 0.0 0 7 8.0 0 0 0.0 0
                        DLE DLE DEL ?   NUL NUL NUL NUL x   NUL NUL NUL
                        1 0.8 3 A 7.8 C F F.0 0
                        DLE ETX '   FF  DEL NUL


**************************************************************************
* CCONTROL - DRIVER EXECUTEDTIME=    55.830  REQUEST ID=%002070(!0438) *
* CALLER: SEGMENT=PRG %002       ADDRESS=%001752                       *
* STATE:  LINE STATE=CONNECTED   COPTIONS=%004202  DOPTIONS=%002000    *
* PARAM:  CONTROL CODE=40        PARAMETER=15       (%000017)          *
* OUTPUT: ERROR CODE=0                                                 *
**************************************************************************


7          55.830 PRTX REQUEST ID=%000060(!0030)
                        1 6.1 6 1 0.0 2 0 8.0 0 0 0.0 3 8 0.1 0 1 0.0 0
                        SYN SYN DLE STX BS  NUL NUL ETX NUL DLE DLE NUL
                        3 F.0 0 0 0.0 0 0 0.F 8 0 0.0 0 0 0.1 0 8 3.6 A
                        ?   NUL NUL NUL NUL x   NUL NUL NUL DLE ETX j
                        4 5.F F F F.F F F F.F F F F.F F
                        E   DEL DEL DEL DEL DEL DEL DEL


8          55.830 PEDT REQUEST ID=%000060(!0030)
                        RECV TEXT
                        0 8.0 0 0 0.0 3 8 0.1 0 0 0.3 F 0 0.0 0 0 0.0 0
                        BS  NUL NUL ETX NUL DLE NUL ?   NUL NUL NUL NUL
                        F 8.0 0 0 0.0 0 0 0.0 0
                        x   NUL NUL NUL NUL NUL


9          55.840 PCMP REQUEST ID=%000060(!0030)
                        ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
                     #MSG SENT=1        #MSG RECV=1        STATE=CONNECTED
                     # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=3


0        55.860 PCMP REQUEST ID=%002070(!0438)
                     ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                     #MSG SENT=1        #MSG RECV=1        STATE=CONNECTED
                     # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=3
```

```
****************************************************************************
* CWRITE                      TIME=    55.920   REQUEST ID=%005624(!0B94) *
* CALLER: SEGMENT=PRG %000            ADDRESS=%001225                      *
* STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000       *
* INPUT:  OUT BUF=%170650 LENGTH=2       IN BUF=%172660 LENGTH=1025        *
*         STATION #=0       COMPONENT #=0                                  *
* OUTPUT: TRANSMISSION LOG=2                                              *
****************************************************************************
```

```
0        55.940 POPR REQUEST ID=%005624(!0B94)
                     SEND TEXT THEN RECEIVE TEXT
                     TIMEOUT=    3.000
                     OUT BUFFER= !35EA    LENGTH= 4                    3
                     IN  BUFFER= !2701    LENGTH= 2050                 3


1        55.940 PSTX REQUEST ID=%005624(!0B94)
                     5 5.1 6 1 6.1 6 1 6.1 0 0 2.F F F F.0 0 0 0.1 0
                     U   SYN SYN SYN SYN DLE STX DEL DEL NUL NUL DLE
                     8 3.6 5 A 1.F F
                     ETX e   !   DEL
```

```
****************************************************************************
* CCONTROL - DRIVER EXECUTEDTIME=    55.990   REQUEST ID=%003644(!07A4) *
* CALLER: SEGMENT=PRG %000            ADDRESS=%001504                      *
* STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000       *
* PARAM:  CONTROL CODE=1           PARAMETER=0        (%000000)            *
* OUTPUT: ERROR CODE=0                                                    *
****************************************************************************
```

```
2        55.990 PRTX REQUEST ID=%005624(!0B94)
                     1 6.1 6 1 0.0 2 F F.F F 0 0.0 0 1 0.8 3 6 5.A 1
                     SYN SYN DLE STX DEL DEL NUL NUL DLE ETX e   !
                     F F.F F F F.F F F F.F F F F.F F F F.F F F F.F F
                     DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                     F F.F F F F.F F F F.F F F F.F F
                     DEL DEL DEL DEL DEL DEL DEL DEL


3        55.990 PEDT REQUEST ID=%005624(!0B94)
                     RECV TEXT
                     0 0.0 3 0 0.0 0 F F.F F
                     NUL ETX NUL NUL DEL DEL


4        56.000 PCMP REQUEST ID=%005624(!0B94)
                     ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
                         #MSG SENT=2        #MSG RECV=2        STATE=CONNECTED
                         # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3


0        56.020 POPR REQUEST ID=%003644(!07A4)
                    SEND CONTROL SEQ
                    SEND SEQ=EOT
                    OUT BUFFER= !0000    LENGTH= 0
                    IN  BUFFER= !0000    LENGTH= 0


1        56.020 PSCT REQUEST ID=%003644(!07A4)
                    5 5.1 6  1 6.1 6  1 6.1 6  0 4.F F
                    U   SYN SYN SYN SYN SYN EOT DEL



*****************************************************************************
* CCONTROL - INTRSC EXEC    TIME=   56.030  REQUEST ID=NONE           *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000233                   *
* STATE:  LINE STATE=CONNECTED     COPTIONS=%004202  DOPTIONS=%002000  *
* PARAM:  CONTROL CODE=46           PARAMETER=1         (%000001)      *
* OUTPUT: ERROR CODE=0                                                *
*****************************************************************************


2        56.030 POPR REQUEST ID=%003644(!07A4)
                    RECEIVE CONTROL SEQ
                    OUT BUFFER= !0000    LENGTH= 0
                    IN  BUFFER= !260F    LENGTH= 2


3        56.030 PCMP REQUEST ID=%003644(!07A4)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=2        #MSG RECV=2        STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3



*****************************************************************************
* CREAD                     TIME=   56.040  REQUEST ID=%002244(!04A4) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000426                   *
* STATE:  LINE STATE=CONNECTED     COPTIONS=%004202  DOPTIONS=%002000  *
* INPUT:  IN BUF=%000000 LENGTH=0        SPEC. STATION #=0   COMP #=0  *
* OUTPUT: TRANSMISSION LOG=0              RESP. STATION #=0   COMP #=0  *
*****************************************************************************


0        56.060 POPR REQUEST ID=%002244(!04A4)
                    RECEIVE CONTROL SEQ
                    TIMEOUT=   29.000
                    OUT BUFFER= !0000    LENGTH= 0                3
                    IN  BUFFER= !260F    LENGTH= 2                3



*****************************************************************************
* CCONTROL - INTRSC EXEC    TIME=   70.890  REQUEST ID=NONE           *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000625                   *
* STATE:  LINE STATE=CONNECTED     COPTIONS=%004202  DOPTIONS=%002000  *
* PARAM:  CONTROL CODE=0            PARAMETER=0         (%000000)      *
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
* OUTPUT: ERROR CODE=0                                                          *
*******************************************************************************


*******************************************************************************
* CCONTROL - INTRSC EXEC      TIME=   70.910  REQUEST ID=NONE                   *
* CALLER: SEGMENT=PRG %000            ADDRESS=%000233                           *
* STATE:  LINE STATE=CONNECTED   COPTIONS=%004202  DOPTIONS=%002000             *
* PARAM:  CONTROL CODE=46             PARAMETER=0         (%000000)             *
* OUTPUT: ERROR CODE=0                                                          *
*******************************************************************************


*******************************************************************************
* CWRITE                       TIME=   70.910  REQUEST ID=%002464(!0534)        *
* CALLER: SEGMENT=PRG %000            ADDRESS=%001225                           *
* STATE:  LINE STATE=CONNECTED   COPTIONS=%004202  DOPTIONS=%002000             *
* INPUT:  OUT BUF=%174661 LENGTH=18      IN BUF=%172660 LENGTH=1025             *
*         STATION #=0      COMPONENT #=0                                        *
* OUTPUT: TRANSMISSION LOG=2                                                    *
*******************************************************************************


1        70.910 POPR REQUEST ID=%002244(!04A4)
                      RECEIVE CONTROL SEQ
                      OUT BUFFER= !0000   LENGTH= 0                    3
                      IN  BUFFER= !260F   LENGTH= 2                    3


2        70.910 PCMP REQUEST ID=%002244(!04A4)
                      ERROR CODE=201   LAST RECOVERABLE ERROR CODE= 0
                      #MSG SENT=2       #MSG RECV=2        STATE=CONNECTED
                      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3


0        70.940 POPR REQUEST ID=%002464(!0534)
                      SEND CONTROL SEQ THEN RECEIVE CONTROL SEQ
                      SEND SEQ=ENQ       TIMEOUT=    2.700
                      OUT BUFFER= !0000   LENGTH= 0
                      IN  BUFFER= !260F   LENGTH= 2


1        70.940 PSCT REQUEST ID=%002464(!0534)
                      5 5.1 6 1 6.1 6 1 6.1 6 8 5.F F
                      U   SYN SYN SYN SYN SYN ENQ DEL


2        70.980 PRCT REQUEST ID=%002464(!0534)
                      1 6.1 6 1 0.B 0 F F.F F F F.F F F F.F F F F.F F
                      SYN SYN DLE 0   DEL DEL DEL DEL DEL DEL DEL DEL
                      F F.F F F F.F F F F.F F F F.F F F F.F F F F.F F
                      DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                      F F.F F F F.F F F F.F F F F.F F
                      DEL DEL DEL DEL DEL DEL DEL DEL


3        70.980 PEDT REQUEST ID=%002464(!0534)
                      RECV ACK0
                      0 0.0 1
                      NUL SOH
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
4           70.980 POPR REQUEST ID=%002464(!0534)
                        SEND TEXT THEN RECEIVE TEXT
                        TIMEOUT=    3.000
                        OUT BUFFER= !35DA    LENGTH= 36
                        IN  BUFFER= !2701    LENGTH= 2050


5           70.980 PSTX REQUEST ID=%002464(!0534)
                        5 5.1 6 1 6.1 6 1 6.1 0 0 2.1 1 0 6.0 0 0 0.0 0
                        U   SYN SYN SYN SYN DLE STX DC1 ACK NUL NUL NUL
                        1 0.1 0 0 0.0 0 4 7.0 0 0 0.0 0 0 0.0 2 0 0.1 1
                        DLE DLE NUL NUL G   NUL NUL NUL NUL STX NUL DC1
                        4 8.4 5 4 C.4 C 4 F.2 0 4 D.4 7
                        H   E   L   L   O       M   G


6           70.990 PSTX REQUEST ID=%002464(!0534)
                        5 2.2 E 4 4.5 3 5 5.5 3 4 5.5 2 2 0.0 D 0 0.0 0
                        R   .   D   S   U   S   E   R       CR  NUL NUL
                        1 0.8 3 3 2.8 2 F F.0 0
                        DLE ETX 2   STX DEL NUL


7           71.030 PRTX REQUEST ID=%002464(!0534)
                        1 6.1 6 1 0.0 2 F F.F F 0 0.0 1 1 0.8 3 6 4.3 1
                        SYN SYN DLE STX DEL DEL NUL SOH DLE ETX d   1
                        F F.F F F F.F F F F.F F F F.F F F F.F F F F.F F
                        DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                        F F.F F F F.F F F F.F F F F.F F
                        DEL DEL DEL DEL DEL DEL DEL DEL


8           71.040 PEDT REQUEST ID=%002464(!0534)
                        RECV TEXT
                        0 0.0 3 0 0.0 1 0 0.0 0
                        NUL ETX NUL SOH NUL NUL




*******************************************************************************
* CWRITE - ERROR            TIME=    71.050  REQUEST ID=%002120(!0450) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%001225                    *
* INPUT:  OUT BUF=%000000 LENGTH=0      IN BUF=%000000 LENGTH=0        *
*         STATION #=0       COMPONENT #=0                              *
* OUTPUT: RECOVERABLE ERRCODE=0   IRRECOVERABLE ERRCODE=210            *
*******************************************************************************


9           71.050 PCMP REQUEST ID=%002464(!0534)
                        ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                        #MSG SENT=3      #MSG RECV=3      STATE=CONNECTED
                        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3


0           71.070 POPR REQUEST ID=%002120(!0450)
                        SEND TEXT THEN RECEIVE TEXT
                        TIMEOUT=    3.000
                        OUT BUFFER= !35EA    LENGTH= 4              3
                        IN  BUFFER= !2701    LENGTH= 2050           3
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
1       71.080 PSTX REQUEST ID=%002120(!0450)
                 5 5.1 6  1 6.1 6  1 6.1 0  0 2.F  F F  F F.0 0  0 0.1 0
                 U   SYN SYN SYN SYN DLE STX DEL DEL NUL NUL DLE
                 8 3.6 5 A 1.F F
                 ETX e   !   DEL


2       71.120 PRTX REQUEST ID=%002120(!0450)
                 1 6.1 6  1 6.0 4  F F.F  F F  F F.F  F F  F F.F F
                 SYN SYN SYN EOT DEL DEL DEL DEL DEL DEL DEL DEL
                 F F.F  F F  F F.F  F F  F F.F  F F  F F.F  F F  F F.F F
                 DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                 F F.F  F F  F F.F  F F  F F.F F
                 DEL DEL DEL DEL DEL DEL DEL DEL


3       71.120 PEDT REQUEST ID=%002120(!0450)
                 RECV EOT
                 0 0.0 1
                 NUL SOH


4       71.130 POPR REQUEST ID=%002120(!0450)
                 RECEIVE CONTROL SEQ
                 OUT BUFFER= !0000   LENGTH= 0              3
                 IN  BUFFER= !260F   LENGTH= 2              3


5       71.130 PCMP REQUEST ID=%002120(!0450)
                 ERROR CODE=210   LAST RECOVERABLE ERROR CODE= 0
                 #MSG SENT=3      #MSG RECV=3     STATE=CONNECTED
                 # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=3



********************************************************************
* CCONTROL - INTRSC EXEC     TIME=   71.140  REQUEST ID=NONE       *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000233                *
* STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000 *
* PARAM:  CONTROL CODE=46          PARAMETER=1      (%000001)       *
* OUTPUT: ERROR CODE=0                                             *
********************************************************************



********************************************************************
* CREAD                      TIME=   71.140  REQUEST ID=%003470(!0738) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000426                *
* STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000 *
* INPUT:  IN BUF=%000000 LENGTH=0      SPEC. STATION #=0   COMP #=0 *
* OUTPUT: TRANSMISSION LOG=0           RESP. STATION #=0   COMP #=0 *
********************************************************************


0       71.140 PCMP REQUEST ID=%003770(!07F8)
                 ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                 #MSG SENT=3      #MSG RECV=3     STATE=CONNECTED
                 # RECOVERABLE ERR=0     # IRRECOVERABLE ERR=3


0       71.170 POPR REQUEST ID=%003470(!0738)
                 RECEIVE CONTROL SEQ
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
                    TIMEOUT=    29.000
                    OUT BUFFER= !0000   LENGTH= 0                    3
                    IN  BUFFER= !260F   LENGTH= 2                    3


************************************************************************
* CSIOWAIT                  TIME=    73.330  REQUEST ID=%003470(!0738) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000520                   *
* STATE:  LINE STATE=CONNECTED  COPTIONS=%004202  DOPTIONS=%002000  *
* OUTPUT: TRANSMISSION LOG=0            IN BUF=%000000                *
*         RESPONDING STATION=0                                        *
************************************************************************


1       73.330 PRCT REQUEST ID=%003470(!0738)
                    1 6.1 6 1 6.8 5 F F.F F F F.F F F F F.F F F F.F F
                    SYN SYN SYN ENQ DEL DEL DEL DEL DEL DEL DEL DEL
                    F F.F F F F F.F F F F.F F F F.F F F F F.F F F F.F F
                    DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                    F F.F F F F F.F F F F.F F F F.F F
                    DEL DEL DEL DEL DEL DEL DEL DEL


************************************************************************
* CCONTROL - INTRSC EXEC    TIME=    73.340  REQUEST ID=NONE          *
* CALLER: SEGMENT=PRG %000          ADDRESS=%000233                   *
* STATE:  LINE STATE=CONNECTED  COPTIONS=%004202  DOPTIONS=%002000  *
* PARAM:  CONTROL CODE=46           PARAMETER=0        (%000000)      *
* OUTPUT: ERROR CODE=0                                                *
************************************************************************


************************************************************************
* CREAD                     TIME=    73.340  REQUEST ID=%003204(!0684) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%001355                   *
* STATE:  LINE STATE=CONNECTED  COPTIONS=%004202  DOPTIONS=%002000  *
* INPUT:  IN BUF=%172660 LENGTH=1025   SPEC. STATION #=0   COMP #=0  *
* OUTPUT: TRANSMISSION LOG=12            RESP. STATION #=0   COMP #=0  *
************************************************************************


2       73.340 PEDT REQUEST ID=%003470(!0738)
                    RECV ENQUIRY
                    0 0.0 1
                    NUL SOH


3       73.340 PCMP REQUEST ID=%003470(!0738)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=3      #MSG RECV=3       STATE=CONNECTED
                    # RECOVERABLE ERR=0       # IRRECOVERABLE ERR=3


0       73.360 POPR REQUEST ID=%003204(!0684)
                    SEND CONTROL SEQ THEN RECEIVE TEXT
                    SEND SEQ=ACK0      TIMEOUT=    20.000
                    OUT BUFFER= !0000   LENGTH= 0
                    IN  BUFFER= !2701   LENGTH= 2050
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
1        73.360 PSCT REQUEST ID=%003204(!0684)
                    5 5.1 6 1 6.1 6 1 6.1 0 B 0.F F
                    U   SYN SYN SYN SYN DLE 0   DEL


2        73.380 PRTX REQUEST ID=%003204(!0684)
                    1 6.1 6 1 0.0 2 0 B.0 5 0 0 0.0 0 0 0.1 3 0 0 0.0 0
                    SYN SYN DLE STX VT  ENQ NUL NUL NUL DC3 NUL NUL
                    B 7.4 7 0 0 0.0 0 0 0.0 0 0 0.0 6 0 0.0 1 F F.F E
                    7   G   NUL NUL NUL NUL NUL ACK NUL SOH DEL ~
                    0 0.0 0 0 0.0 1 1 0.8 3 3 3.C 6
                    NUL NUL NUL SOH DLE ETX 3   F


3        73.390 PEDT REQUEST ID=%003204(!0684)
                    RECV TEXT
                    0 B.0 5 0 0 0.0 0 0 0.1 3 0 0 0.0 0 B 7.4 7 0 0 0.0 0
                    VT  ENQ NUL NUL NUL DC3 NUL NUL 7   G   NUL NUL
                    0 0.0 0 0 0.0 6 0 0.0 1 F F.F E 0 0.0 0 0 0.0 1
                    NUL NUL NUL ACK NUL SOH DEL ~   NUL NUL NUL SOH
                    0 0.0 0
                    NUL NUL


4        73.400 PCMP REQUEST ID=%003204(!0684)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=3       #MSG RECV=4       STATE=CONNECTED
                    # RECOVERABLE ERR=0       # IRRECOVERABLE ERR=3



         *********************************************************************
         * CWRITE                    TIME=    73.440  REQUEST ID=%003410(!0708) *
         * CALLER: SEGMENT=PRG %000          ADDRESS=%001225                  *
         * STATE:  LINE STATE=CONNECTED    COPTIONS=%004202 DOPTIONS=%002000  *
         * INPUT:  OUT BUF=%174661 LENGTH=11      IN BUF=%172660 LENGTH=1025  *
         *         STATION #=0     COMPONENT #=0                              *
         * OUTPUT: TRANSMISSION LOG=12                                       *
         *********************************************************************


0        73.450 POPR REQUEST ID=%003410(!0708)
                    SEND TEXT THEN RECEIVE TEXT
                    TIMEOUT=    3.000
                    OUT BUFFER= !35E1   LENGTH= 22                  3
                    IN  BUFFER= !2701   LENGTH= 2050                3


1        73.460 PSTX REQUEST ID=%003410(!0708)
                    5 5.1 6 1 6.1 6 1 6.1 0 0 2.0 A 0 5.0 0 0 0.8 0
                    U   SYN SYN SYN SYN DLE STX LF  ENQ NUL NUL NUL
                    1 3.0 0 0 0.4 7 B 7.0 0 0 0.0 0 0 0.0 0 0 4.0 0
                    DC3 NUL NUL G   7   NUL NUL NUL NUL NUL EOT NUL
                    0 1.0 0 0 0.4 F 0 9.1 0 8 3.7 0
                    SOH NUL NUL 0   HT  DLE ETX p


2        73.460 PSTX REQUEST ID=%003410(!0708)
                    3 E.F F
                    >   DEL
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
3          73.510 PRTX REQUEST ID=%003410(!0708)
                    1 6.1 6  1 0.0 2  0 B.0 5  0 0.0 0  0 0.1 3  0 0.0 0
                    SYN SYN DLE STX  VT  ENQ NUL NUL NUL DC3 NUL NUL
                    B 7.4 7  0 0.0 0  0 0.0 0  0 0.0 6  0 0.0 1  F F.F E
                    7   G   NUL NUL NUL NUL NUL ACK NUL SOH DEL  ~
                    0 0.0 0  5 5.0 A  1 0.8 3  2 4.E 6
                    NUL NUL  U   LF  DLE ETX  $    f


4          73.510 PEDT REQUEST ID=%003410(!0708)
                    RECV TEXT
                    0 B.0 5  0 0.0 0  0 0.1 3  0 0.0 0  B 7.4 7  0 0.0 0
                    VT  ENQ NUL NUL NUL DC3 NUL NUL  7   G   NUL NUL
                    0 0.0 0  0 0.0 6  0 0.0 1  F F.F E  0 0.0 0  5 5.0 A
                    NUL NUL NUL ACK NUL SOH DEL  ~   NUL NUL  U   LF
                    0 0.0 0
                    NUL NUL


5          73.520 PCMP REQUEST ID=%003410(!0708)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=4      #MSG RECV=5      STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3



     ********************************************************************
     * CWRITE                    TIME=   73.550  REQUEST ID=%001114(!024C) *
     * CALLER: SEGMENT=PRG %000          ADDRESS=%001225                  *
     * STATE:  LINE STATE=CONNECTED    COPTIONS=%004202  DOPTIONS=%002000 *
     * INPUT:  OUT BUF=%170650 LENGTH=11      IN BUF=%172660 LENGTH=1025  *
     *         STATION #=0      COMPONENT #=0                             *
     * OUTPUT: TRANSMISSION LOG=2                                         *
     ********************************************************************


0          73.570 POPR REQUEST ID=%001114(!024C)
                    SEND TEXT THEN RECEIVE TEXT
                    TIMEOUT=    3.000
                    OUT BUFFER= !35E1   LENGTH= 22              3
                    IN  BUFFER= !2701   LENGTH= 2050            3


1          73.580 PSTX REQUEST ID=%001114(!024C)
                    5 5.1 6  1 6.1 6  1 6.1 0  0 2.0 A  0 5.0 0  0 0.8 0
                    U   SYN SYN SYN SYN DLE STX  LF  ENQ NUL NUL NUL
                    1 3.0 0  0 0.4 7  B 7.0 0  0 0.0 0  0 0.0 0  0 4.0 0
                    DC3 NUL NUL  G   7   NUL NUL NUL NUL NUL EOT NUL
                    0 1.0 0  0 0.0 0  5 2.1 0  8 3.7 A
                    SOH NUL NUL NUL  R   DLE ETX  z


2          73.580 PSTX REQUEST ID=%001114(!024C)
                    D 9.F F
                    Y   DEL


3          74.100 PRTX REQUEST ID=%001114(!024C)
                    1 6.1 6  1 0.0 2  F F.F F  0 0.0 3  1 0.8 3  6 5.5 1
                    SYN SYN DLE STX DEL DEL NUL ETX DLE ETX  e    Q
                    F F.F F  F F.F F  F F.F F  F F.F F  F F.F F  F F.F F
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
F F.F F F F.F F F F.F F F F.F F
DEL DEL DEL DEL DEL DEL DEL DEL
```

```
**********************************************************************
* CWRITE                     TIME=    74.110  REQUEST ID=%001714(!03CC) *
* CALLER: SEGMENT=PRG %000          ADDRESS=%001225                     *
* STATE:  LINE STATE=CONNECTED   COPTIONS=%004202  DOPTIONS=%002000     *
* INPUT:  OUT BUF=%174661 LENGTH=2      IN BUF=%172660 LENGTH=1025      *
*         STATION #=0     COMPONENT #=0                                 *
* OUTPUT: TRANSMISSION LOG=45                                           *
**********************************************************************
```

```
4       74.110 PEDT REQUEST ID=%001114(!024C)
                    RECV TEXT
                    0 0.0 3 0 0.0 3 0 0.0 3
                    NUL ETX NUL ETX NUL ETX


5       74.120 PCMP REQUEST ID=%001114(!024C)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=5        #MSG RECV=6         STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=3


0       74.140 POPR REQUEST ID=%001714(!03CC)
                    SEND TEXT THEN RECEIVE TEXT
                    TIMEOUT=    3.000
                    OUT BUFFER= !35EA    LENGTH= 4                  3
                    IN  BUFFER= !2701    LENGTH= 2050               3


1       74.140 PSTX REQUEST ID=%001714(!03CC)
                    5 5.1 6 1 6.1 6 1 6.1 0 0 2.F F F F.0 0 0 2.1 0
                    U   SYN SYN SYN SYN DLE STX DEL DEL NUL STX DLE
                    8 3.6 4 C 1.F F
                    ETX d   A   DEL


2       74.190 PRTX REQUEST ID=%001714(!03CC)
                    1 6.1 6 1 0.0 2 0 A.0 5 0 0.0 0 0 0.1 0 1 0.8 0
                    SYN SYN DLE STX LF  ENQ NUL NUL NUL DLE DLE NUL
                    0 0.B 7 4 7.0 0 0 0.0 0 0 0.0 0 4 8.0 0 0 0.0 0
                    NUL 7   G   NUL NUL NUL NUL NUL H   NUL NUL NUL
                    0 0.4 8 5 0.3 3 3 0.3 0 3 0.2 0
                    NUL H   P   3   0   0   0


3       74.190 PRTX REQUEST ID=%001714(!03CC)
                    2 F.2 0 4 D.5 0 4 5.2 0 5 6.2 0 2 0.5 8 2 E.4 3
                    /       M   P   E       V       X   .   C
                    4 2.2 E 4 7.3 2 2 0.2 8 4 2.4 1 5 3.4 5 2 0.5 8
                    B   .   G   2       (   B   A   S   E       X
                    2 E.4 3 4 2.2 E 3 1.3 2 2 9.2 E C 4.1 6
                    .   C   B   .   1   2   )   .   D   SYN


4       74.200 PRTX REQUEST ID=%001714(!03CC)
                    2 0.2 0 4 D.4 F 4 E.2 C 2 0.4 1 5 5.4 7 2 0.3 2
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
                        M    O    N    ,         A    U    G         2
                   3 6.2 C 2 0.3 1 3 9.3 8 3 5.2 C 2 0.2 0 3 5.3 A
                   6   ,     1    9    8    5   ,              5   :
                   3 3.3 3 2 0.5 0 4 D.0 0 1 3.1 0 C 4.1 5
                   3   3       P    M    NUL DC3 DLE D    NAK
```

5   74.200 PRTX REQUEST ID=%001714(!03CC)
```
                   8 3.4 A A F.F  F  F  F.F  F  F  F.F  F  F  F.F  F  F .F.F  F
                   ETX J   /    DEL DEL DEL DEL DEL DEL DEL DEL DEL
                   F F.F  F  F  F.F  F  F  F.F  F  F  F.F  F  F  F.F  F  F  F.F  F
                   DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL DEL
                   F F.F  F  F  F.F  F  F  F.F  F  F  F.F  F
                   DEL DEL DEL DEL DEL DEL DEL DEL
```

6   74.200 PEDT REQUEST ID=%001714(!03CC)
                   RECV TEXT
```
                   0 A.0 5 0 0 0.0 0 0 0.1 0 8 0.0 0 B 7.4 7 0 0.0 0
                   LF   ENQ NUL NUL NUL DLE NUL NUL 7    G    NUL NUL
                   0 0.0 0 0 0.4 8 0 0.0 0 0 0.0 0 4 8.5 0 3 3.3 0
                   NUL NUL NUL H    NUL NUL NUL NUL H    P    3    0
                   3 0.3 0 2 0.2 F 2 0.4 D
                   0   0       /    M
```

7   74.210 PCMP REQUEST ID=%001714(!03CC)
                   ERROR CODE=0   LAST RECOVERABLE ERROR CODE= 0
                   #MSG SENT=6   #MSG RECV=7   STATE=CONNECTED
                   # RECOVERABLE ERR=0   # IRRECOVERABLE ERR=3

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

0   115.810 POPR REQUEST ID=%000170(!0078)
                   SEND CONTROL SEQ THEN DISCONNECT
                   SEND SEQ=EOT   TIMEOUT=   3.000
                   OUT BUFFER= !0000   LENGTH= 0
                   IN BUFFER= !0000   LENGTH= 0

1   115.810 PSCT REQUEST ID=%000170(!0078)
```
                   5 5.1 6 1 6.1 6 1 6.1 6 0 4.F  F
                   U    SYN SYN SYN SYN SYN EOT DEL
```

2   115.820 PCMP REQUEST ID=%000170(!0078)
                   ERROR CODE=0   LAST RECOVERABLE ERROR CODE= 0
                   #MSG SENT=43   #MSG RECV=45   STATE=DISCONNECT
                   # RECOVERABLE ERR=0   # IRRECOVERABLE ERR=3

```
**********************************************************************
* CCLOSE                  TIME=  115.830  REQUEST ID=%000011(!0009) *
* CALLER: SEGMENT=PRG %002          ADDRESS=%000760                 *
* STATE:  LINE STATE=CONNECTED   COPTIONS=%004202 DOPTIONS=%002000  *
**********************************************************************
```

Figure 3-1. CSDUMP Trace Listing (continued).

```
********************************
* END OF TRACE FOR DEVICE  110   *
********************************

***************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
***************************************************
*  LINE NUMBER: 4      LOGICAL DEV. NUMBER: 110  *
*  DEV. TYPE: 17        SUBTYPE: 3   VER: A.55.25 *
*             0123456789012345                    *
*   COPTIONS: 0000100001000010                    *
*   AOPTIONS: 0000000111001101                    *
*   DOPTIONS: 0000010000000000                    *
* NETWORK'ID: 0000000000000000                    *
* NUMBUFFERS: 0          BUFFSIZE: 1024 (WORDS)  *
* INSPEED: 7000          OUTSPEED: 7000           *
* MISCARRAY:      RECEIVE TIMEOUT: 20      SECS.  *
*                  LOCAL TIMEOUT: 60      SECS.   *
*                CONNECT TIMEOUT: 900     SECS.   *
*               RESPONSE TIMEOUT: 300    HSECS.   *
*               LINE BID TIMEOUT: 29      SECS.   *
*               NO. ERROR RETRIES: 15            *
*             CLEAR-TO-SEND DELAY: 00.0  SECS.   *
*             DATA-SET-READY DELAY: DISABLED.     *
*               TRANSMISSION MODE: DUPLEX.        *
*           MMSTAT TRACE FACILITY: ENABLED.       *
* DRIVERNAME: IOINP0                              *
* DOWNLOAD FILE: CSDBSC2.PUB.SYS                  *
* 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: 43            MSGRECV: 45              *
* RECOVERRORS: 0        IRRECOVERRORS: 3         *
***************************************************
```

END OF JOB.

Figure 3-1. 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 3-2) that tells the date and time of day when the listing was printed 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 update level (nn) and the fix level (mm) of the MPE operating system that was being used when the trace was performed.

```
CS TRACE ANALYZER (A.55.25)   TUE, AUG 27, 1985, 11:28 AM

TRACE FILE IS DSTRC111.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON MON, AUG 26, 1985,  5:33 PM

SYSTEM ID=01.02
```

Figure 3-2. Trace Listing Header.

Begin Tracing and Line Information Messages

The BEGIN TRACING.... message appears in the listing when the line to be traced is opened. The message tells you the decimal logical device number of the line (110 in the example in Figure 3-3). 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 110    *
************************************


****************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
****************************************************
*   LINE NUMBER: 4        LOGICAL DEV. NUMBER: 110 *
*   DEV. TYPE: 17         SUBTYPE: 3   VER: A.55.25 *
*                0123456789012345                  *
*   COPTIONS: 0000100010000010                     *
*   AOPTIONS: 0000000111001101                     *
*   DOPTIONS: 0000010000000000                     *
*   NETWORK'ID: 0000000000000000                   *
*   NUMBUFFERS: 0            BUFFSIZE: 1024 (WORDS) *
*   INSPEED: 7000            OUTSPEED: 7000         *
*   MISCARRAY:       RECEIVE TIMEOUT: 20     SECS. *
*                      LOCAL TIMEOUT: 60     SECS. *
*                    CONNECT TIMEOUT: 900    SECS. *
*                   RESPONSE TIMEOUT: 300    HSECS. *
*                   LINE BID TIMEOUT: 29     SECS. *
*                   NO. ERROR RETRIES: 15          *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                 DATA-SET-READY DELAY: DISABLED.   *
*                   TRANSMISSION MODE: DUPLEX.      *
*                MMSTAT TRACE FACILITY: ENABLED.    *
*   DRIVERNAME: IOINP0                             *
*   DOWNLOAD FILE: CSDBSC2.PUB.SYS              *
*   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: 0              MSGRECV: 0             *
*   RECOVERRORS: 0         IRRECOVERRORS: 1        *
****************************************************
```

Figure 3-3. 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 3-3, we know that:

- the communications controller is an INP, because DEV. TYPE (device type) is 17 and DRIVERNAME is IOINPO,

- it is a hardwired synchronous line, because SUBTYPE is 3,

- BUFFSIZE is 1024 WORDS, so the configured line buffer size is 1024,

- INSPEED and OUTSPEED (transmission speeds) are 7000 characters per second, so the synchronous line transmission speed is 56K bps,

- DOWNLOAD FILE for the bisync line protocol is CSDBSC2.PUB.SYS,

- MASK is 011111000 (%37; for DS/3000 ignore the three zeroes on the right),

- ENTRIES=24 is the maximum number of entries in each trace record. (24 is the default.)

- ALL events will be traced

- Overflow trace entries will be discarded (NOWRAP).

Trace Record and Header Message

The trace listing is organized into a series of trace records, each consisting of a series of trace entries. Every trace record pertains to a particular DS/3000 request (intrinsic call).

A trace record is signified by a header message. The header message identifies the CS intrinsic call that generated the trace record. The header (see the example in Figure 3-4) shows the name of the CS instrinsic, where the intrinsic was called from the DS/3000 program, the calling parameters and a REQUEST ID that is the same as the REQUEST ID for the corresponding record entries.

```
********************************************************************************
* CREAD                     TIME=    3.520   REQUEST ID=%005070(!0A38) *
* CALLER: SEGMENT=PRG %000        ADDRESS=%000342                      *
* STATE:  LINE STATE=DISCONNECT   COPTIONS=%004202  DOPTIONS=%002000   *
* INPUT:  IN BUF=%000000 LENGTH=0      SPEC. STATION #=0    COMP #=0   *
* OUTPUT: TRANSMISSION LOG=0           RESP. STATION #=0    COMP #=0   *
********************************************************************************
```

Figure 3-4. Trace Record Header.

Trace Entry Format

All entries in a trace listing contain a prefix consisting of four fields:

1.   An entry number (3 in the example in Figure 3-5).

2.   A "time stamp" in seconds and thousandths of seconds (32.570 in the example).

3.   An entry-type mnemonic (PCMP in the example).

4.   A "request ID" that correlates the entry with a particular intrinsic call (%005070 in Figure 3-5. 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. Eight types of trace entries are used in DS/3000. These are summarized in Table 3-1 (page 3-4) and described in greater detail beginning on page 3-28. The body of each trace entry tells you the pertinent information for the particular activity that has happened or is about to happen.

```
3          32.570 PCMP REQUEST ID=%005070(!0A38)
                        ERROR CODE=217    LAST RECOVERABLE ERROR CODE= 0
                        #MSG SENT=0       #MSG RECV=0        STATE=DISCONNECT
                        # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=2
```

Figure 3-5. 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 are 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, do the following:

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.

POPR Trace Entries

A POPR trace entry is generated each time the physical driver is called upon to perform an operation. An example is shown in Figure 3-6.

```
1        55.720 POPR REQUEST ID=%000060(!0030)
                     SEND CONTROL SEQ THEN RECEIVE CONTROL SEQ
                     SEND SEQ=ID ENQ    TIMEOUT=     2.700
                     OUT BUFFER= !0000    LENGTH= 0
                     IN  BUFFER= !260F    LENGTH= 16
```

Figure 3-6. POPR Trace Entry.

The elements of a POPR trace entry are:

Item	Meaning
SEND CONTROL SEQ....	This item tells you what operation is being performed.
SEND SEQ= ...	This item tells you what BSC control character sequence, if any, is about to be sent to the remote station (ID ENQ in the example).
TIMEOUT	This item tells you the starting value of the applicable timer in seconds. In the example the driver sends a ID ENQ to the remote station and then waits for a character response. TIMEOUT=2.700 specifies that the response timeout timer will be activated and set to 2.7 seconds.
OUT BUFFER= !0000	This item is intended for HP internal use only. It specifies the hexadecimal memory address of the INP internal output buffer.
IN BUFFER= !260F	This item is intended for HP internal use only. It specifies the hexadecimal memory address of the INP internal input buffer.
LENGTH	For output, this specifies the amount of text to be sent (+ indicates words, - bytes). For input, this specifies the maximum amount of text that can be received for this message (+ for words, - for bytes).

PRCT Trace Entries

A PRCT trace entry is generated each time a BSC control character sequence is <u>received</u>. The body of an PRCT trace entry shows you the exact sequence of bytes received. An example is shown in Figure 3-7.

```
2          70.980 PRCT REQUEST ID=%002464(!0534)
                  1 6.1 6 1 0.B 0 F F.5 F
                  SYN SYN DLE 0    DEL _
```

Figure 3-7. PRCT Trace Entry.

Control character sequences are terminated by a trailing pad character (FF hexadecimal). When interpreting the body of an PRCT trace entry, ignore anything following the FF code. In the example, an ACK0 control character sequence was received. The hexadecimal codes are interpreted as follows:

10.B0	ACK0*
FF	PAD character
5F	data to be ignored, since it follows PAD

* This character is read with the parity bit set to odd parity, so it would not resemble an ACK0 if read during a trace.

Whenever possible, the CSDUMP program converts the hex (or octal) codes to an ASCII character and displays the character beneath its code. In the case of bisync control characters, the number shown may not match the ASCII character display because the number may reflect the parity bit. (The parity bit is ignored when CSDUMP converts from octal or hexadecimal to ASCII.) Note that DS/3000 uses odd parity on all control characters, and no parity on text characters.

PSCT Trace Entries

A PSCT trace entry is generated each time the driver <u>sends</u> a BSC control character 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 3-8.

```
1          70.940 PSCT REQUEST ID=%002464(!0534)
                  5 5.1 6 1 6.1 6 1 6.1 6 8 5.F F
                  U   SYN SYN SYN SYN SYN ENQ DEL
```

Figure 3-8. PSCT Trace Entry.

In the above example, an ENQ control character was sent.

Whenever possible, the CSDUMP program converts the hex (or octal) codes to ASCII characters and displays each character beneath its code.

PRTX and PSTX Trace Entries

Figure 3-9 shows the data format for PRTX and PSTX entries as defined by the bisynchronous line protocol and DS/3000 and recorded in the CS Trace file.
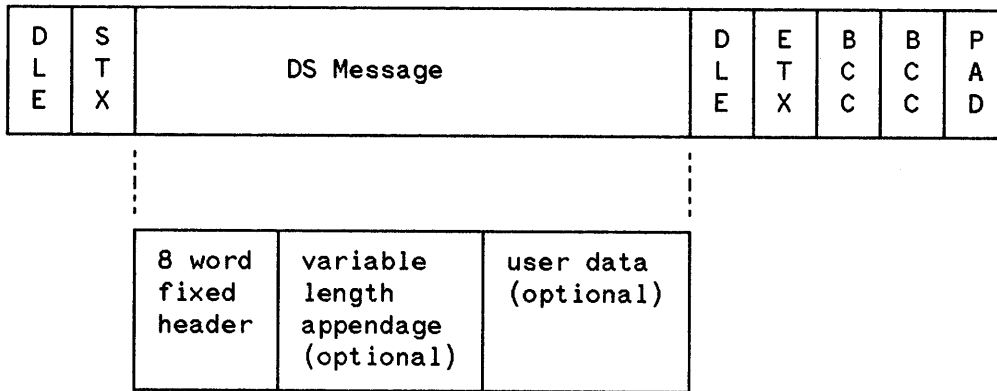
Figure 3-9. Data Format for PRTX or PSTX Entries.

PRTX Trace Entries

PRTX trace entries are generated each time a text message is received from the remote station. The body of a PRTX trace entry shows you the exact sequence of bytes that was received. An example is shown in Figure 3-10.

```
2            74.190 PRTX REQUEST ID=%001714(!03CC)
                1 6.1 6 1 0.0 2 0 A.0 5 0 0 0.0 0 0 0.1 0 1 0.8 0
                SYN SYN DLE STX LF  ENQ NUL NUL NUL DLE DLE NUL
                0 0.B 7 4 7.0 0 0 0.0 0 0 0.0 0 4 8.0 0 0 0.0 0
                NUL 7  G   NUL NUL NUL NUL NUL H   NUL NUL NUL
                0 0.4 8 5 0.3 3 3 0.3 0 3 0.2 0
                NUL H  P   3   0   0   0
```

Figure 3-10. PRTX Trace Entry.

In our example:

10.02	DLE STX
0A.05	word 0 DS fixed header
00 00	" 1 " " "
00.10	" 2 " " "
10	DLE to be ignored (transparent text)
80 00	word 3 DS fixed header
B7 47	" 4 " " "
00 00	" 5 " " "
00 00	" 6 " " "
00 48	" 7 " " "
00 00	word 1 of DS appendage
00 00	" 2 " " "
48	H
50	P
33	3
30	0
30	0
30	0

• user data continued in
• other PRTX entries
• following

See Section 5 for DS/3000 message formats to interpret the fixed header and the DS appendages.

By examining the data in the DS appendage, we see that we are receiving a log on message from the remote system.

Each PRTX trace entry can show a maximum of 32 bytes. If a text message exceeds this length, successive PRTX trace entries are generated as are necessary.

All text messages are terminated by a two-byte Block Check Character sequence (BCC). The BCC is a CRC (cylic redundancy check) sequence. The BCC is followed by a trailing PAD character (FF hex). When interpreting the body of a PRTX trace entry, ignore anything following the FF code. DS always transmits data in transparent mode. Therefore, inserted DLEs in PRTX entries must be ignored.

Whenever possible, the CSDUMP program converts the hex (or octal) codes to an ASCII character and displays the character beneath its code. In the case of bisync control characters, the number shown may not match the ASCII character display because the number may reflect the parity bit. (The parity bit is ignored when CSDUMP converts from octal or hexadecimal to ASCII.) Note that DS uses odd parity on all control characters, and no parity on text characters.

PEDT Trace Entries

PEDT trace entries are generated to identify received text messages and received BSC control character sequences. An example is shown in Figure 3-11.

```
6          74.200 PEDT REQUEST ID=%001714(!03CC)
                  RECV TEXT
                  0 A.0 5 0 0.0 0 0 0.1 0 8 0.0 0 B 7.4 7 0 0.0 0
                  LF   ENQ NUL NUL NUL DLE NUL NUL 7   G     NUL NUL
                  0 0.0 0 0 0.4 8 0 0.0 0 0 0.0 0 4 8.5 0 3 3.3 0
                  NUL NUL NUL H   NUL NUL NUL NUL H   P   3   0
                  3 0.3 0 2 0.2 F 2 0.4 D
                  0   0       /       M
```

Figure 3-11. PEDT Trace Entry.

The PEDT entry in Figure 3-11 shows that a text message was received from the remote station. To interpret the DS message see Section 5 for the DS message formats.

0A.05	word 0 of DS fixed header		
00.00	" 1 " " " "
00.10	" 2 " " " "
80.00	" 3 " " " "
B7.47	" 4 " " " "
00.00	" 5 " " " "
00.00	" 6 " " " "
00.48	" 7 " " " "
00.00	word 1 of DS appendage
00.00	" 2 " " "
48	H
50	P
33	3
30	0
30	0
30	0
20	
2F	/
20	
4D	M

This entry is the edited version of the PRTX entry in Figure 3-10. Note that DLE STX and the inserted DLE for transparent text have been removed.

One PEDT trace entry is generated for each received text message, regardless of how long the text message is. Only the first 14 words of the received message are displayed. Bisync control characters, pad characters, and CRC parity sequences are omitted. XLOG specifies the total number of words or bytes (+ indicates words, - indicates bytes) passed from the communications controller to the DS subsystem.

In the case of a received BSC control character sequence (PRCT), the PEDT trace entry includes a mnemonic phrase telling what control character sequence was received. If the control character sequence was accompanied by an ID sequence, the ID sequence is shown in octal below the mnemonic phrase. XLOG is normally zero, except in the case when an ID sequence was also received. In the latter case, XLOG specifies the length of the ID sequence (+ indicates words, - indicates bytes).

Whenever possible, the CSDUMP program converts the received hexadecimal (or octal) codes to ASCII characters and displays each character beneath its code.

PSTX Trace Entries

PSTX trace entries are generated each time the driver sends a message to the remote station. The body of a PSTX trace entry shows you the exact sequence of bytes that was sent to the remote station. An example is shown in Figure 3-12.

```
5          70.980 PSTX REQUEST ID=%002464(!0534)
                  5 5.1 6 1 6.1 6 1 6.1 0 0 2.1 1 0 6.0 0 0 0.0 0
                  U   SYN SYN SYN SYN DLE STX DC1 ACK NUL NUL NUL
                  1 0.1 0 0 0.0 0 4 7.0 0 0 0.0 0 0 0.0 2 0 0.1 1
                  DLE DLE NUL NUL G   NUL NUL NUL NUL STX NUL DC1
                  4 8.4 5 4 C.4 C 4 F.2 0 4 D.4 7
                  H   E   L   L   O       M   G
```

Figure 3-12. PSTX Trace Entry.

In our example:

```
10 02          DLE STX
11 06          word 0 of DS fixed header
00 00           "   1  "   "     "       "
00 10           "   2  "   "     "       "
10             DLE to be ignored
00 00          word 3 of DS fixed header
47 00           "   4  "   "     "       "
00 00           "   5  "   "     "       "
00 02           "   6  "   "     "       "
00 11           "   7  "   "     "       "
48             H
45             E
4C             L
4C             L
4F             O
20
4D             M
47             G
               • user data continued
               • in following PSTX
               • entries
```

The data format for the PSTX entry is the same as that for the PRTX entry (see Figure 3-9).

See Section 5 for the DS/3000 message formats to interpret the fixed header and DS appendage.

Each PSTX trace entry can show a maximum of 32 bytes. If a text message exceeds this length, as many successive PSTX trace entries are generated as are necessary.

All text messages are terminated by a two-byte Block Check Character sequence (BCC). The BCC is a CRC (cylic redundancy check) sequence. The BCC is followed by a trailing PAD character (FF hex). When interpreting the body of a PRTX trace entry, ignore anything following the FF code. DS always transmits data in transparent mode. Therefore, inserted DLEs in PSTX entries must be ignored.

Whenever possible, the CSDUMP program converts the hex (or octal) 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 3-13.

```
7         74.210 PCMP REQUEST ID=%001714(!03CC)
                 ERROR CODE=0       LAST RECOVERABLE ERROR CODE= 0
                 #MSG SENT=6        #MSG RECV=7        STATE=CONNECTED
                 # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=3
```

Figure 3-13. 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 CS trace section of 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 text messages sent so far for this connection.
# MSG RECV:	The total number of text messages received so far for this connection.
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.
# IRRECOVERABLE ERR:	The total number of Irrecoverable Errors that have occurred so far for this connection.

End of Trace and Line Information Messages

The END OF TRACE.... message appears in the listing when the trace is turned off. The message tells you the decimal logical number of the line (110 in the example in Figure 3-14) 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 (43 in our example), messages received (45 in our example), number of recoverable errors (0 in our example), and number of irrecoverable errors (3 in our example).

```
************************************
* END OF TRACE FOR DEVICE   110   *
************************************


***********************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
***********************************************************
*   LINE NUMBER: 4       LOGICAL DEV. NUMBER: 110  *
*   DEV. TYPE: 17        SUBTYPE: 3   VER: A.55.25 *
*               0123456789012345                   *
*     COPTIONS: 0000100001000010                   *
*     AOPTIONS: 0000000111001101                   *
*     DOPTIONS: 0000010000000000                   *
*   NETWORK'ID: 0000000000000000                   *
*   NUMBUFFERS: 0            BUFFSIZE: 1024 (WORDS) *
*   INSPEED: 7000           OUTSPEED: 7000          *
*   MISCARRAY:      RECEIVE TIMEOUT: 20      SECS. *
*                     LOCAL TIMEOUT: 60      SECS. *
*                   CONNECT TIMEOUT: 900     SECS. *
*                  RESPONSE TIMEOUT: 300     HSECS. *
*                  LINE BID TIMEOUT: 29      SECS. *
*                  NO. ERROR RETRIES: 15          *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                 DATA-SET-READY DELAY: DISABLED.  *
*                   TRANSMISSION MODE: DUPLEX.     *
*               MMSTAT TRACE FACILITY: ENABLED.    *
*   DRIVERNAME: IOINPO                             *
*   DOWNLOAD FILE: CSDBSC2.PUB.SYS                 *
*   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: 43             MSGRECV: 45            *
*   RECOVERRORS: 0          IRRECOVERRORS: 3       *
***********************************************************
```

END OF JOB.

Figure 3-14. End of Trace and Closing Line Information.

THE DSDUMP FORMATTING PROGRAM

The CSDUMP program formats the CS trace file to show all the line activity, including text and bisync control characters being sent and received. This allows the user to troubleshoot protocol or line problems easily, but diagnosing DS or user-level errors requires decoding of DS messages. DSDUMP is designed to decode DS messages and allow the user to choose a subset of the trace file to examine based on time stamps, user process numbers, type of DS messages, or only DS messages that complete with an error code not equal to zero.

Note that 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; 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 DSDUMP Listing File

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 whether you want the output directed to the terminal or the printer. If you select the printer, you must specify a device (either pp or lp). If no priority is specified, the default is 6. After the FOPEN has been performed, you will be prompted for commands. If the output is going to the printer, all DSDUMP commands are echoed. If the output is going to the terminal, then after all messages have been listed, the CSTRACE file is rewound and control goes to the Command Interpreter.

If you are in Interactive Mode (that is, not a stream job), and a printer is enabled, pressing (CONTROL)Y will return control to the command interface, after you respond to a new output device, and will close the output file. 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.

NEWDEV   To specify a new output device. (Only allowed in a session.)

NEWFILE   To change CSTRACE files. (Only allowed in a session.)

PINS=   To format only those frames whose TO or FROM PIN is equal to one of the specified PINs. (Up to ten PINs are permitted.)

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.

(continued)

TYPES=   To format only the specified type of DS messages. The parameters for the TYPES= command are:

COMMANDS   Formats the REMOTE command, Remote HELLO, Remote BYE, (CONTROL)Y 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   ENABLE turns X.25 options on, and DISABLE turns options off. They are only
DISABLE   available if you are using DS/3000 with X.25 Link.

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 replace 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. The default designator is $STDINX. The command file may be equated to $NULL if no options are desired.

The file equation for the Command Interpreter is:

`:FILE COMFILE=command file name`

Formatted DSDUMP Trace Listing

Sequence of commands used to generate the following example on the printer:

```
:FILE CSTRACE=DSTRC111.PUB.SYS
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO.  TUE, AUG 27, 1985, 12:13 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
Output Listing To PRINTER or TERMINAL?P
Device? PP
Environment?  (RETURN)
Priority? 8
>GO
END OF PROGRAM
:
```

            - or -

```
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO.  TUE, AUG 27, 1985, 12:13 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
PLEASE ENTER CSTRACE FILE:DSTRC111.PUB.SYS
Output Listing To PRINTER or TERMINAL?P
Device? LP
Priority? 8
>GO
END OF PROGRAM
:
```

EXAMPLE

```
HEWLETT-PACKARD CO.   TUE, AUG 27, 1985, 12:17 PM
DSDUMP DS/3000-X.25 TRACE DUMP  HP32185B.52.00
TRACE FILE IS DSTRC111.PUB.SYS
TRACE DATE IS  MON.  AUG 26, 1985,  5:33 PM
CS LDEV = 110     DOWNLOAD FILE IS CSDBSC2

>GO

Sent text is on the left, received text on the right
 *** OPR - ID=%000060


******************************************
* Time=55.78                          *
*         INITIALIZATION request      *
* 000002    Software ID=%000002       *
* 000002    Compression Cap.          *
* 177477    Maximum Size=255          *
* 177477    Current Size=63           *
* 074000    Capability Mask=%074000   *
* Header:                             *
* %004000 000002 000020 177477 000000 *
*  000000 074000 000000               *
******************************************
```

Figure 3-15. DSDUMP Trace Listing.

```
************************************************
*  Time=55.83                                  *
*              INITIALIZATION reply            *
*  000003      Software ID=%000003             *
*  000003      Compression Cap.                *
*  000077      Actual Size=63                  *
*  174000      Capability Mask=%174000         *
*  Header:                                     *
*  %004000 000003 100020 000077 000000         *
*    000000 174000 000000                      *
************************************************
```

```
  *** CMP - ID=%000060   ERROR CODE=0
  *** OPR - ID=%002464
*********************************************
*  Time=70.99                               *
*         From PIN=%107 To PIN=%0           *
*           REMOTE HELLO request            *
*  010406      HeadLength (words)=17        *
*  000000      Remote Computer ID=0         *
*  000000      Substream Type=%000000       *
*  000021      DSDataL (bytes)=17           *
*  Header:                                  *
*  %010406 000000 000020 000000 043400      *
*    000000 000002 000021                   *
*  Appendage:                               *
*  044105 046114 047440 046507 051056       *
*  H  E   L  L   O      M   G   R   .        *
*  042123 052523 042522 020015              *
*  D  S   U  S   E  R        .              *
*********************************************
  *** OPR - ID=%003204
```

```
                    ************************************************
                    *  Time=73.38                                  *
                    *         From PIN=%267 To PIN=%107             *
                    *           FCONTROL-TO TERM. request          *
                    *             File Num=1                        *
                    *             Control Code=-2                   *
                    *             Param=0                           *
                    *  005405      HeadLength (words)=11            *
                    *  000000      Remote Computer ID=0             *
                    *  000000      Substream Type=%000000           *
                    *  000006      DSDataL (bytes)=6                *
                    *  Header:                                      *
                    *  %005405 000000 000023 000000 133507          *
                    *    000000 000000 000006                       *
                    *  Appendage:                                   *
                    *  000001 177776 000000                         *
                    *  .  .   .   ~   .  .                          *
                    ************************************************
```

```
  *** CMP - ID=%003204   ERROR CODE=0
  *** OPR - ID=%003410
*********************************************
*  Time=73.46                               *
*         From PIN=%107 To PIN=%267         *
```

Figure 3-15. DSDUMP Trace Listing (continued).

```
*            FCONTROL-TO TERM. reply       *
*              Status Word=%000001         *
*              Status=CCG          .        *
*              Param=0                     *
* 005005      HeadLength (words)=10        *
* 000000      Remote Computer ID=0         *
* 000000      Substream Type=%000000       *
* 000004      DSDataL (bytes)=4            *
* Header:                                  *
* %005005 000000 100023 000000 043667      *
*   000000 000000 000004                   *
* Appendage:                               *
* 000001 000000                            *
* .   .    .   .                           *
*******************************************
                              *******************************************
                              * Time=73.51                               *
                              *       From PIN=%267 To PIN=%107           *
                              *          FCONTROL-TO TERM. request        *
                              *            File Num=1                     *
                              *            Control Code=-2                *
                              *            Param=0                        *
                              * 005405      HeadLength (words)=11         *
                              * 000000      Remote Computer ID=0          *
                              * 000000      Substream Type=%000000        *
                              * 000006      DSDataL (bytes)=6             *
                              * Header:                                   *
                              * %005405 000000 000023 000000 133507       *
                              *   000000 000000 000006                    *
                              * Appendage:                                *
                              * 000001 177776 000000                      *
                              * .   .   .   ~   .   .                     *
                              *******************************************
 *** CMP - ID=%003410   ERROR CODE=0
 *** OPR - ID=%001114
*******************************************
* Time=73.58                               *
*       From PIN=%107 To PIN=%267          *
*          FCONTROL-TO TERM. reply          *
*            Status Word=%000001           *
*            Status=CCG                     *
*            Param=0                        *
* 005005      HeadLength (words)=10        *
* 000000      Remote Computer ID=0         *
* 000000      Substream Type=%000000       *
* 000004      DSDataL (bytes)=4            *
* Header:                                   *
* %005005 000000 100023 000000 043667      *
*   000000 000000 000004                    *
* Appendage:                                *
* 000001 000000                            *
* .   .    .   .                            *
*******************************************
 *** OPR - ID=%001714
```

Figure 3-15. DSDUMP Trace Listing (continued).

```
**************************************************
* Time=74.20                                     *
*        From PIN=%267 To PIN=%107               *
*           PRINT-TO TERMINAL request            *
*             AttachIO Parm1=%000000             *
*             AttachIO Parm2=%000000             *
* 005005     HeadLength (words)=10               *
* 000000     Remote Computer ID=0                *
* 100000     Substream Type=%100000             *
* 000110     DSDataL (bytes)=72                  *
* Header:                                        *
* %005005 000000 000020 100000 133507            *
*  000000 000000 000110                          *
* Appendage:                                     *
* 000000 000000                                  *
* .   .    .   .                                 *
* Data:                                          *
* 044120 031460 030060 020057 020115             *
* H P     3 0    0 0      /      M               *
* 050105 020126 020040 054056 041502             *
* P E     V             X .    C B               *
* 027107 031040 024102 040523 042440             *
* . G     2      ( B    A S    E                 *
* 054056 041502 027061 031051 027040             *
* X .    C B    . 1    2 )    .                  *
* 020115 047516 026040 040525 043440             *
*    M    O N    ,      A U    G                 *
* 031066 026040 030471 034065 026040             *
* 2 6     ,      1 9    8 5    ,                 *
* 020065 035063 031440 050115                    *
*    5   : 3    3      P M                       *
**************************************************
```
*** CMP - ID=%001714 ERROR CODE=0

• (Remainder of DSDUMP
• listing has been
• intentionally deleted)

Figure 3-15. DSDUMP Trace Listing (continued).

DSDUMP Listing Header Message

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

```
HEWLETT-PACKARD CO.    TUE, AUG 27, 1985, 12:17 PM
DSDUMP DS/3000-X.25 TRACE DUMP   HP32185B.52.00
TRACE FILE IS DSTRC111.PUB.SYS
TRACE DATE IS  MON,  AUG 26, 1985,  5:33 PM
CS LDEV = 110    DOWNLOAD FILE IS CSDBSC2

>GO
```

Sent text is on the left, received text on the right

Figure 3-16. DSDUMP Output Heading.

Item	Meaning
TRACE FILE IS ...	Provides name of trace file being analyzed. In our case, it is DSTRC111.PUB.SYS.
TRACE DATE IS ...	Date trace file was created. In our case, it is MON, AUG 26, 1985, 5:33 PM.
CS LDEV = ...	LDEV of device being traced. In our case, it is 110.
DOWNLOAD FILE IS ...	Indicates which INP download file is being used. In our case, it is CSDBSC2, where the D stands for Download to the INP, BSC indicates a bisynchronous point-to-point protocol driver, and the 2 is for an INP/20B.
>GO	DSDUMP command that the user has entered.

Sent text is on the left, received text on the right implies that DS messages sent (PSTX entries) appear on the left side of the page, and DS messages received (PRTX entries) will appear on the right.

DSDUMP Entry Format

PRTX or PSTX entries in a trace file are formatted as follows:

```
********************************************
* time stamp                               *
*      From PIN=%nnn To PIN=%nnn           *
* DS msg/stream class interpretation       *
* Header words    Interpretation of        *
*        "        header words using DS    *
*        "        message formats          *
* Header:                                  *
* raw header data                          *
* Appendage:                               *
* (optional)                               *
* raw data                                 *
* Data:                                    *
* (optional)                               *
* user data                                *
********************************************
```

Item	Meaning
*** OPR - ID=%nnnnn	POPR entry in trace file
*** CMP - ID=%nnnnnn	PCMP entry in trace file
ERROR CODE=n	CS error number from PCMP entry

Figure 3-17. The DSDUMP Data Format.

PRTX Trace Entries

```
******************************************
* Time=74.20                              *
*        From PIN=%267 To PIN=%107        *
*            PRINT-TO TERMINAL request    *
*             AttachIO Parm1=%000000      *
*             AttachIO Parm2=%000000      *
* 005005      HeadLength (words)=10       *
* 000000      Remote Computer ID=0        *
* 100000      Substream Type=%100000      *
* 000110      DSDataL (bytes)=72          *
* Header:                          .     *
* %005005 000000 000020 100000 133507    *
*   000000 000000 000110                  *
* Appendage:                              *
* 000000 000000                           *
* .    .    .  .                          *
* Data:                                   *
* 044120 031460 030060 020057 020115     *
* H  P    3  0    0  0       /        M   *
* 050105 020126 020040 054056 041502     *
* P  E    V          X  .    C  B         *
* 027107 031040 024102 040523 042440     *
* .  G    2       (  B    A  S    E       *
* 054056 041502 027061 031051 027040     *
* X  .    C  B    .  1    2  )    .        *
* 020115 047516 026040 040525 043440     *
*    M    O  N    ,       A  U    G        *
* 031066 026040 030471 034065 026040     *
* 2  6    ,       1  9    8  5    ,       *
* 020065 035063 031440 050115            *
*    5    :  3    3       P  M            *
******************************************
```

Figure 3-18. PRTX Trace Entry.

This DSDUMP entry is an analysis of four CSDUMP PRTX entries (see Figure 3-10 for the first of these four entries as displayed by CSDUMP, or see Figure 3-1, Time=74.190 for all 4 entries). Note in Figure 3-1 that the time stamp reported by DSDUMP matches the time stamp of the last PRTX entry used to record this received message. In this case, we are receiving a logon message from the remote system.

PSTX Trace Entries

```
***********************************
*  Time=70.99                        *
*        From PIN=%107 To PIN=%0      *
*            REMOTE HELLO request     *
*  010406      HeadLength (words)=17  *
*  000000      Remote Computer ID=0   *
*  000000      Substream Type=%000000 *
*  000021      DSDataL (bytes)=17     *
*  Header:                            *
*  %010406 000000 000020 000000 043400 *
*   000000 000002 000021              *
*  Appendage:                         *
*  044105 046114 047440 046507 051056 *
*  H    E    L    L    O       M  G  R  . *
*  042123 052523 042522 020015        *
*  D  S    U  S    E  R       .       *
***********************************
```

Figure 3-19. PSTX Trace Entry.

This DSDUMP entry is an analysis of two CSDUMP PSTX entries (see Figure 3-12 for the first of these two entries as displayed by CSDUMP, or see Figure 3-1, Time=70.980 for both entries). Note in Figure 3-1 that the time stamp reported by DSDUMP matches the time stamp of the last PSTX entry used to record this transmission. Note, also, that the :REMOTE HELLO request message format (see Section 5) indicates that the HELLO command is placed in the appendage field.

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

The internal procedures that DS/3000 and X.25 Link use for controlling the line are called CS intrinsics. Each call to a CS intrinsic generates a series of actions, states and events. 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 by the operator with a :DSCONTROL command. Tracing can be enabled/disabled when OPENing the line, or before or after the line is opened. Tracing can be invoked for any communication line that DS/3000-X.25 uses. Once invoked for a particular communications line, the trace facility continues to record line activity until the user issues a new :DSCONTROL command with the TRACE, OFF parameter.

The trace facility keeps track of actions, states and events in the form of trace entries. The trace entries are grouped into trace records: one trace record for each user request made by DS/3000-X.25. The trace records are permanently stored in a system-generated file named DSTRCnnn (where nnn is the LDEV number of the IODSX device) or in a user-specified trace file. The contents of a CS/3000 trace file can be formatted and printed through the use of trace dump utility programs, CSDUMP and DSDUMP, described later in this section. Refer to the *Data Communications Handbook* for additional information on the CS Trace Facility.

INITIATING THE CS/3000 TRACE FACILITY

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

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

where

ALL   generates trace records for all CS intrinsic calls. If ALL is not specified, then trace records are written only when an intrinsic call completes with a transmission error. 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 and INP interconnect entries are generated)

%001 = generate PSTX entries

%002 = generate PSCT entries

%004 = generate PRTX entries

%010 = generate PRCT entries

%020 = generate POPR and PEDT entries (see NOTE)

%040 = generate PSTN entries

%100 = generate INP interconnect entries

```
┌─────────────────┐
│     NOTE        │
└─────────────────┘
```

POPR and PEDT entries do not apply to X.25

numentries is a decimal integer for the maximum number of trace entries in a trace record. 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 the value may not exceed 40. (If the value requested for an INP 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 for the INP. 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 DS/3000-X.25 rebuild it.

WRAP causes trace entries that overflow the trace record area (greater than *numentries*) to overlay the prior trace entries. If WRAP is omitted, overflow trace entries in the trace record are discarded, and NOWRAP appears in the trace listing. (This parameter does not affect 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, DS/3000-X.25 will create a file named DSTRCnnn, where nnn is the right-justified LDEV number of the DS device. For example, if the IODSX LDEV is 101, the trace filename is DSTRC101. If a trace file having that filename 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 call. 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	000	Use actual file designator
	Bits 8,9	11	Variable length records
	Bit 7	0	No carriage control
AOPTIONS	Bits 12 to 15	1111	Write only; purge old contents
	Bit 11	0	No multi-record option
	Bit 10	0	Disallow dynamic locking/unlocking
	Bits 8,9	00	Exclusive access
	Bits 0 to 7	00000000	None
BLOCKFACTOR		1	

If the trace file cannot be opened because it does not exist, then a new file is opened in the system domain. If an error occurs when trying to open the trace file, the particular :DSCONTROL command fails and the trace file printout will be displayed on the console.

When the line is closed, the CS/3000 trace facility issues an FCLOSE intrinsic call with the following parameters:

Parameter	Value	Meaning
DISPOSITION	1	Save
SECCODE	0	Unrestricted access

Trace Entry Mnemonics

There are six types of trace entries used in DS/3000-X.25. They are summarized in Table 4-1 and described in greater detail on the pages following this table.

Table 4-1. Trace Entry Type Mnemonics

Mnemonic	Entry Type	Definition
PSTN	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 sent.[2]
PCMP	User Request Completed	Generated each time a CS intrinsic 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 characters and Frame checking sequence (FCS) and shows the first 27 bytes maximum of the I field. 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

Two trace formatting programs are available for X.25: CSDUMP and DSDUMP. CSDUMP does some formatting 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 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 header as defined in the 1980 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. Use 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 a one, the CSDUMP program employs the user's session/job output device as the list file. If PARM is set to one, 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:

$$:\text{RUN CSDUMP.PUB.SYS}[,\text{OCTAL}][;\text{PARM}=\begin{Bmatrix}0\\1\\2\end{Bmatrix}]$$

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 outut 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 4-1 shows portions of a Trace listing for a line connected to an INP (Intelligent Network Processor). As you can see from Figure 4-1, a CSDUMP Trace listing has a specific format. The components of a Trace listing are: a header message; the beginning-of-trace message; the opening Line Information Display box; a series of trace records, each consisting of 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 4-1.

```
CS TRACE ANALYZER (A.55.27)        WED, SEP 25, 1985,  4:22 PM

TRACE FILE IS DSTRC059.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON WED, SEP 25, 1985,  4:11 PM

SYSTEM ID=01.02




********************************
* BEGIN TRACING FOR DEVICE 11 *
********************************


************************************************************
*-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: 11    *
*   DEV. TYPE: 17         SUBTYPE: 3   VER: A.55.27 *
*                  0123456789012345                 *
*     COPTIONS: 0000100101000000                    *
*     AOPTIONS: 0000001100001101                    *
*     DOPTIONS: 0000000000000111                    *
*   NETWORK'ID: 0000000000000000                    *
*   NUMBUFFERS: 242       BUFFSIZE: 514   (WORDS)   *
*   INSPEED: 7000         OUTSPEED: 7000            *
*   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: 8            *
*                 CLEAR-TO-SEND DELAY: 00.0   SECS. *
*                 DATA-SET-READY DELAY: DISABLED.   *
*                   TRANSMISSION MODE: DUPLEX.      *
*               MMSTAT TRACE FACILITY: ENABLED.     *
*   DRIVERNAME: IOINPO                              *
*   DOWNLOAD FILE: CSDLAPB2                         *
*   CTRACEINFO:   ENTRIES=16      MASK=011111000    *
*                 TYPE OF TRACE = ALL, NOWRAP       *
*   PHONELIST:    ENTRIES=0        INDEX=0          *
*   IDLIST:       ENTRIES=0        INDEX=0          *
*   ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0     *
```

Figure 4-1. CSDUMP Trace Listing.

4-7

```
*   MSGSENT: 0              MSGRECV: 0                *
*   RECOVERRORS: 0         IRRECOVERRORS: 0           *
*******************************************************
```

```
0          2.300 PCMP REQUEST ID=%044273(!48BB)
                      ERROR CODE=0    LAST RECOVERABLE ERROR CODE= 0
                      #MSG SENT=0     #MSG RECV=0      STATE=DISCONNECT
                      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


1          2.320 PCMP REQUEST ID=%045573(!4B7B)
                      ERROR CODE=0    LAST RECOVERABLE ERROR CODE= 0
                      #MSG SENT=0     #MSG RECV=0      STATE=DISCONNECT
                      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


2          2.650 PSCT REQUEST ID=NONE
                      SABM       ADDR=B    P/F=0
                      0 1.2 F
                      SOH /


3          2.660 PRCT REQUEST ID=NONE
                      UA         ADDR=B    P/F=0
                      0 1.6 3
                      SOH c


4          2.970 PSCT REQUEST ID=NONE
                      I-FRAME   ADDR=B    P/F=0   N(R)=0   N(S)=0
                      0 1.0 0 1 0.0 0 F B.0 0 F A.0 0
                      SOH NUL DLE NUL {    NUL z    NUL


5          2.980 PRCT REQUEST ID=NONE
                      RR         ADDR=B    P/F=0   N(R)=1
                      0 1.2 1
                      SOH !


6          2.980 PCMP REQUEST ID=%044703(!49C3)
                      ERROR CODE=0    LAST RECOVERABLE ERROR CODE= 0
                      #MSG SENT=1     #MSG RECV=0      STATE=CONNECTED
                      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


7          3.020 PRCT REQUEST ID=NONE
                      I-FRAME   ADDR=A    P/F=0   N(R)=1   N(S)=0
                      0 3.2 0 1 0.0 0 F F.5 8
                      ETX       DLE NUL DEL X


8          3.030 PCMP REQUEST ID=%044130(!4858)
                      ERROR CODE=0    LAST RECOVERABLE ERROR CODE= 0
                      #MSG SENT=1      #MSG RECV=1      STATE=CONNECTED
                      # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


9          3.030 PSCT REQUEST ID=NONE
                      RR         ADDR=A    P/F=0   N(R)=1
                      0 3.2 1
                      ETX !
```

Figure 4-1. CSDUMP Trace Listing (continued).

```
10       9.190 PSCT REQUEST ID=NONE
                  I-FRAME  ADDR=B   P/F=0  N(R)=1  N(S)=1
                  0 1.2 2 1 0.1 4 0 B.1 0 8 0.0 0
                  SOH "    DLE DC4 VT  DLE NUL NUL


11       9.200 PRCT REQUEST ID=NONE
                  RR          ADDR=B   P/F=0  N(R)=2
                  0 1.4 1
                  SOH A


12       9.200 PCMP REQUEST ID=%045606(!4B86)
                  ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                  #MSG SENT=2       #MSG RECV=1      STATE=CONNECTED
                  # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


13      12.830 PRCT REQUEST ID=NONE
                  I-FRAME  ADDR=A   P/F=0  N(R)=2  N(S)=1
                  0 3.4 2 1 0.1 4 0 F.3 C
                  ETX B    DLE DC4 SI  <


14      12.830 PCMP REQUEST ID=%044375(!48FD)
                  ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                  #MSG SENT=2       #MSG RECV=2      STATE=CONNECTED
                  # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


15      12.840 PSCT REQUEST ID=NONE
                  RR          ADDR=A   P/F=0  N(R)=2
                  0 3.4 1
                  ETX A


0       21.830 PSCT REQUEST ID=NONE
                  I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=2
                  0 1.4 4 1 0.1 4 0 0.1 0 0 6.0 0 0 1.0 0 1 0.0 0
                  SOH D    DLE DC4 NUL DLE ACK NUL SOH NUL DLE NUL
                  0 0.5 D 0 0 0.0 0 0 0.0 0 0 0.0 0 0 F.4 8 4 5.4 C
                  NUL ]    NUL NUL NUL NUL NUL NUL SI  H   E   L
                  4 C.4 F 2 0.4 D 4 7.5 2 2 E.5 3
                  L O       M   G   R   .   S


1       21.830 PSTX REQUEST ID=NONE
                  4 5.3 3 3 3.3 8 0 D.C E
                  E   3   3   8   CR  N


2       21.850 PRCT REQUEST ID=NONE
                  RR          ADDR=B   P/F=0  N(R)=3
                  0 1.6 1
                  SOH a


3       21.850 PCMP REQUEST ID=%044306(!48C6)
                  ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                  #MSG SENT=3       #MSG RECV=2      STATE=CONNECTED
                  # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0
```

Figure 4-1. CSDUMP Trace Listing (continued).

```
4          22.980 PRCT REQUEST ID=NONE
                       I-FRAME   ADDR=A    P/F=0   N(R)=3   N(S)=2
                       0 3.6 4 1 0.1 4 2 1.5 8
                       ETX d     DLE DC4 !    X


5          22.980 PCMP REQUEST ID=%043403(!4703)
                       ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                       #MSG SENT=3       #MSG RECV=3       STATE=CONNECTED
                       # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


6          22.990 PSCT REQUEST ID=NONE
                       RR        ADDR=A    P/F=0   N(R)=3
                       0 3.6 1
                       ETX a


7          23.830 PRCT REQUEST ID=NONE
                       I-FRAME   ADDR=A    P/F=0   N(R)=3   N(S)=3
                       0 3.6 6 1 0.1 4 2 0.0 B 0 5.0 0 0 0.0 0 1 3.0 0
                       ETX f     DLE DC4       VT  ENQ NUL NUL NUL DC3 NUL
                       0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 0 6.0 0 0 1.F F
                       NUL DC1 ]    NUL NUL NUL NUL NUL ACK NUL SOH DEL
                       F E.0 0 0 0.0 5
                       ~    NUL NUL ENQ


8          23.830 PCMP REQUEST ID=%044334(!48DC)
                       ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                       #MSG SENT=3       #MSG RECV=4       STATE=CONNECTED
                       # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


9          23.840 PSCT REQUEST ID=NONE
                       RR        ADDR=A    P/F=0   N(R)=4
                       0 3.8 1
                       ETX SOH


10         23.980 PSCT REQUEST ID=NONE
                       I-FRAME   ADDR=B    P/F=0   N(R)=4   N(S)=3
                       0 1.8 6 1 0.1 4 2 1.0 0
                       SOH ACK DLE DC4 !     NUL


11         23.990 PRCT REQUEST ID=NONE
                       RR        ADDR=B    P/F=0   N(R)=4
                       0 1.8 1
                       SOH SOH


12         23.990 PCMP REQUEST ID=%043444(!4724)
                       ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                       #MSG SENT=4       #MSG RECV=4       STATE=CONNECTED
                       # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


13         24.540 PSCT REQUEST ID=NONE
                       I-FRAME   ADDR=B    P/F=0   N(R)=4   N(S)=4
                       0 1.8 8 1 0.1 4 2 2.0 A 0 5.0 0 0 1.8 0 1 3.0 0
                       SOH BS    DLE DC4 "    LF  ENQ NUL SOH NUL DC3 NUL
                       0 0.5 D 1 1.0 0 0 0.0 0 0 0.0 0 0 4.0 0 0 1.0 0
```

Figure 4-1. CSDUMP Trace Listing (continued).

```
                    NUL ]    DC1 NUL NUL NUL NUL NUL EOT NUL SOH NUL
                    0 0.0 0
                    NUL NUL


0        24.550 PRCT REQUEST ID=NONE
                    RR          ADDR=B   P/F=0   N(R)=5
                    0 1.A 1
                    SOH !


1        24.560 PCMP REQUEST ID=%043561(!4771)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=5      #MSG RECV=4       STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


2        24.680 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=A   P/F=0   N(R)=5   N(S)=4
                    0 3.A 8 1 0.1 4 4 2.0 B 0 5.0 0 0 0.0 0 1 3.0 0
                    ETX (    DLE DC4 B   VT  ENQ NUL NUL NUL DC3 NUL
                    0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 0 6.0 0 0 1.F F
                    NUL DC1 ]    NUL NUL NUL NUL NUL ACK NUL SOH DEL
                    F E.0 0 0 0.9 B
                    ~    NUL NUL ESC


3        24.690 PCMP REQUEST ID=%045341(!4AE1)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=5      #MSG RECV=5       STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


4        24.690 PSCT REQUEST ID=NONE
                    RR          ADDR=A   P/F=0   N(R)=5
                    0 3.A 1
                    ETX !


5        25.500 PSCT REQUEST ID=NONE
                    I-FRAME  ADDR=B   P/F=0   N(R)=5   N(S)=5
                    0 1.A A 1 0.1 4 4 4.0 A 0 5.0 0 0 1.8 0 1 3.0 0
                    SOH *    DLE DC4 D   LF  ENQ NUL SOH NUL DC3 NUL
                    0 0.5 D 1 1.0 0 0 0.0 0 0 0.0 0 0 4.0 0 0 1.0 0
                    NUL ]    DC1 NUL NUL NUL NUL NUL EOT NUL SOH NUL
                    0 0.0 0
                    NUL NUL


6        25.510 PRCT REQUEST ID=NONE
                    RR          ADDR=B   P/F=0   N(R)=6
                    0 1.C 1
                    SOH A


7        25.520 PCMP REQUEST ID=%044540(!4960)
                    ERROR CODE=0     LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=6      #MSG RECV=5       STATE=CONNECTED
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


8        25.610 PRCT REQUEST ID=NONE
                    I-FRAME  ADDR=A   P/F=0   N(R)=6   N(S)=5
```

Figure 4-1. CSDUMP Trace Listing (continued).

```
                     0 3.C A 1 0.1 4 6 4.0 A 0 5.0 0 0 0.0 0 1 0.A 0
                     ETX J   DLE DC4 d   LF  ENQ NUL NUL NUL DLE
                     0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 4 E.0 0 0 0.0 0
                     NUL DC1 ]   NUL NUL NUL NUL NUL N   NUL NUL NUL
                     0 0.0 A 0 5.0 0 0 0.0 0 1 0.8 0
                     NUL LF  ENQ NUL NUL NUL DLE NUL
```

9   25.610 PRTX REQUEST ID=NONE

```
                     0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 3 9.0 0 0 0.0 0
                     NUL DC1 ]   NUL NUL NUL NUL NUL 9   NUL NUL NUL
                     0 0.4 8 5 0.3 3 3 0.3 0 3 0.2 0 2 F.2 0 4 D.5 0
                     NUL H   P   3   0   0       /       M   P
                     4 5.2 0 4 9.5 6 2 0.4 3 2 E.3 0
                     E       I   V       C   .   0
```

10   25.610 PRTX REQUEST ID=NONE

```
                     3 0.2 E 3 2.3 0 2 E.2 0 2 0.4 D 4 F.4 E 2 C.2 0
                     0   .   2   0   .           M   O   N   ,
                     4 1.5 0 5 2.2 0 3 1.3 8 2 C.2 0 3 1.3 9 3 8.3 3
                     A   P   R       1   8   ,       1   9   8   3
                     2 C.2 0 3 1.3 1 3 A.3 4 3 0.2 0
                     ,       1   1   :   4   0
```

11   25.610 PRTX REQUEST ID=NONE

```
                     4 1.4 D 5 5.0 A
                     A   M   U   LF
```

- (Several entries have
- been omitted.)
-

```
*******************************
* END OF TRACE FOR DEVICE  11  *
*******************************


***********************************************
*-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: 11   *
*   DEV. TYPE: 17        SUBTYPE: 3   VER: A.55.27 *
*               0123456789012345                   *
*   COPTIONS: 0000100101000000                     *
*   AOPTIONS: 0000001100001101                     *
*   DOPTIONS: 0000000000000111                     *
* NETWORK'ID: 0000000000000000                     *
* NUMBUFFERS: 242        BUFFSIZE: 514  (WORDS) *
* INSPEED: 7000          OUTSPEED: 7000            *
* 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: 8            *
*              CLEAR-TO-SEND DELAY: 00.0   SECS. *
```

Figure 4-1. CSDUMP Trace Listing (continued).

```
*                DATA-SET-READY DELAY: DISABLED.    *
*                  TRANSMISSION MODE: DUPLEX.       *
*              MMSTAT TRACE FACILITY: ENABLED.      *
*  DRIVERNAME: IOINP0                               *
*  DOWNLOAD FILE: CSDLAPB2                          *
*  CTRACEINFO:   ENTRIES=16      MASK=011111000     *
*                TYPE OF TRACE = ALL, NOWRAP        *
*  PHONELIST:   ENTRIES=0        INDEX=0            *
*  IDLIST:      ENTRIES=0        INDEX=0            *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=202 *
*  MSGSENT: 54              MSGRECV: 34             *
*  RECOVERRORS: 0           IRRECOVERRORS: 0        *
***************************************************

11      86.180 PCMP REQUEST ID=%043164(!4674)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=54      #MSG RECV=34      STATE=DISCONNECT
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


12      86.220 PCMP REQUEST ID=%044655(!49AD)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=54      #MSG RECV=34      STATE=DISCONNECT
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


0       86.330 PCMP REQUEST ID=%044067(!4837)
                    ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                    #MSG SENT=54      #MSG RECV=34      STATE=DISCONNECT
                    # RECOVERABLE ERR=0      # IRRECOVERABLE ERR=0


END OF JOB.
```

Figure 4-1. 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 4-2) that tells the date and time of day when the listing was printed 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 update level (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, SEP 25, 1983,  4:22 PM

TRACE FILE IS DSTRC059.PUB.SYS
ALL ENTRIES DUMPED BY TIME

LAST OPENED ON WED, SEP 25, 1983,  4:11 PM

SYSTEM ID=01.02
```

Figure 4-2. 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 (11 in the example in Figure 4-3). 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 11 *
**********************************

*****************************************************
*-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: 11   *
*   DEV. TYPE: 17         SUBTYPE: 3    VER: A.55.27 *
*                01234567889012345                  *
*   COPTIONS: 0000100101000000                      *
*   AOPTIONS: 0000001100001101                      *
*   DOPTIONS: 0000000000000111                      *
*   NETWORK'ID: 0000000000000000                    *
*   NUMBUFFERS: 242        BUFFSIZE: 514  (WORDS)  *
*   INSPEED: 7000          OUTSPEED: 7000           *
*   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: 8          *
*                   CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                   DATA-SET-READY DELAY: DISABLED.  *
*                     TRANSMISSION MODE: DUPLEX.    *
*                 MMSTAT TRACE FACILITY: ENABLED.   *
*   DRIVERNAME: IOINP0                              *
*   DOWNLOAD FILE: CSDLAPB2                         *
*   CTRACEINFO:   ENTRIES=16      MASK=011111000    *
*                 TYPE OF TRACE = ALL, NOWRAP       *
*   PHONELIST:   ENTRIES=0        INDEX=0           *
*   IDLIST:      ENTRIES=0        INDEX=0           *
*   ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0     *
*   MSGSENT: 0              MSGRECV: 0              *
*   RECOVERRORS: 0          IRRECOVERRORS: 0        *
*****************************************************
```

Figure 4-3. Begin Tracing and Line Information Messages.

4-15

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 4-3, we know that:

- the communications controller is an INP (we know this because DEV. TYPE (device type) is 17 and DRIVERNAME is IOINPO),

- it is a hardwired line (because it is SUBTYPE 3),

- BUFFSIZE is 514 WORDS, or 1028 bytes, which provides for a packet size of 1024 bytes, plus 3 bytes for the packet header and 1 byte to fill to the word boundary,

- INSPEED and OUTSPEED (transmission speeds) are 7000 characters per second (56000 bps),

- RESPONSE TIMEOUT is 300 HSEC, which is 3000 milliseconds, which is the timer T1 (as defined in LAP-B protocol),

- NO. ERROR RETRIES is 8, which is the retry count N2 (as defined in LAP-B protocol),

- DOWNLOAD FILE is CSDLAPB2, which means we are using the LAP-B protocol,

- CTRACEINFO ENTRIES is 16, so *numentries* is 16,

- MASK is 011111000 (=%37; for DS/3000-X.25, 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 4-4).

2. A "time stamp" in seconds and thousandths of seconds (2.300 in Figure 4-4).

3. An entry-type mnemonic (PCMP in Figure 4-4).

4. A "request ID" that correlates the entry with a particular intrinsic call (%044273 in Figure 4-4. 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. The "time stamp" is reset to zero when the line is first opened or when the connection has been physically severed. The entry-type mnemonic tells you what type of trace entry you are examining. (The six types of trace entries used in DS/3000-X.25 and their respective mnemonics are listed in Table 4-1.) The body of each trace entry tells you the pertinent information for the particular activity that has happened or is about to happen.

```
0          2.300 PCMP REQUEST ID=%044273(!48BB)
                  ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                  #MSG SENT=0       #MSG RECV=0        STATE=DISCONNECT
                  # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=0
```

Figure 4-4. 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 DS/3000-X.25, and recorded in the CS Trace file for PRCT/PRTX or PSCT/PSTX entries:

Level 2 frame:

```
+-----+-----+------------------------------------------+     +-----+
|  A  |  C  |                                          |     |  F  |
|  D  |  N  |      Information Field (optional)         |     |  C  |
|  D  |  T  |                                          |     |  S  |
|  R  |  L  |                                          |     |     |
+-----+-----+------------------------------------------+     +-----+

+-----------+                                           +-----------+
|  X.25     |                                           |  X.25     |
|  Level 2  |                                           |  Level 2  |
|  header   |                                           |  Trailer  |
+-----------+                                           +-----------+

               +-----+-----+-----+------------------------------+
  X.25         |  G  |  L  |  L  |  T  | Packet-specific information|
  Level 3      |  F  |  C  |  C  |  Y  | (see X.25 packet formats in|
  packet:      |  I  |  G  |  N  |  P  | Section 5 )                |
               |     |  N  |     |  E  |                            |
               +-----+-----+-----+-----+----------------------------+

                              +-----------+-----------+-----------+
                              |  8 words  |  variable |  user     |
   If TYPE= Data Packet:      |  DS fixed |  length   |  data     |
                              |  header   |  appendage|  (opt)    |
                              |           |  (optional)|          |
                              +-----------+-----------+-----------+
```
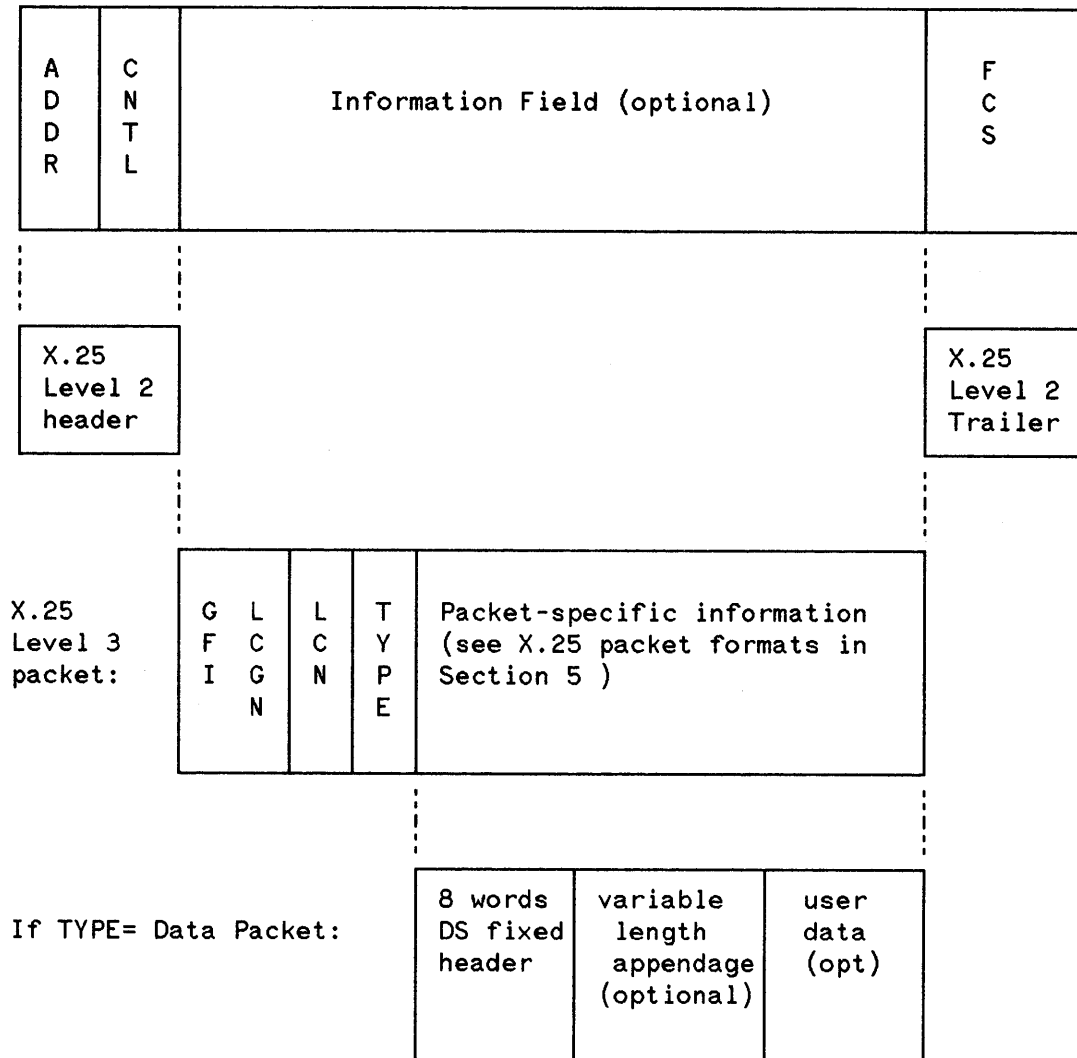
Level 2 field lengths:

```
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 4-5. The X.25 Data Format.

PRCT Trace Entries

A PRCT trace entry is generated each time a frame is received from the remote station. The body of an PRCT trace entry shows you the exact sequence of bytes received. An example is shown in Figure 4-6.

```
8          25.610 PRCT REQUEST ID=NONE
                   I-FRAME  ADDR=A    P/F=0  N(R)=6  N(S)=5
                   0 3.C A 1 0.1 4 6 4.0 A 0 5.0 0 0 0.0 0 1 0.A 0
                   ETX J   DLE DC4 d   LF  ENQ NUL NUL NUL DLE
                   0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 4 E.0 0 0 0.0 0
                   NUL DC1 ]   NUL NUL NUL NUL NUL N   NUL NUL NUL
                   0 0.0 A 0 5.0 0 0 0.0 0 1 0.8 0
                   NUL LF  ENQ NUL NUL NUL DLE NUL
```

Figure 4-6. PRCT Trace Entry.

In the example shown in Figure 4-6 (see Figure 4-5 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
CA => CNTL=I frame   P/F=0
     N(R)=6 N(S)=5   }   as defined by LAP-B
10 => Q=0 so this packet
     does not contain X.29 information,
     modulo 8 is in use, LCGN=0   }   as defined in X.25 level 3 packet
14 => LCN=20   protocol
64 => Data packet M=0 P(R)=3 P(S)=2

```
OA 05          word 0 of DS fixed header
00 00           "   1 "   "    "     "
00 10           "   2 "   "    "     "
AO 00           "   3 "   "    "     "
11 5D           "   4 "   "    "     "
00 00           "   5 "   "    "     "
00 00           "   6 "   "    "     "
00 4E           "   7 "   "    "     "
00 00          word 0 of DS appendage
00 00           "   1 "   "         "
OA ...          user data that continues in a PRTX entry to show MPE logon
                message
```

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 4-7.

```
0          21.830 PSCT REQUEST ID=NONE
                I-FRAME   ADDR=B   P/F=0   N(R)=2   N(S)=2
                0 1.4 4 1 0.1 4 0 0.1 0 0 6.0 0 0 1.0 0 1 0.0 0
                SOH D   DLE DC4 NUL DLE ACK NUL SOH NUL DLE NUL
                0 0.5 D 0 0.0 0 0 0.0 0 0 0.0 0 0 F.4 8 4 5.4 C
                NUL ]   NUL NUL NUL NUL NUL NUL SI  H   E   L
                4 C.4 F 2 0.4 D 4 7.5 2 2 E.5 3
                L   O   M   G   R   .   S
```

<p align="center">Figure 4-7. PSCT Trace Entry.</p>

In the example shown in Figure 4-7 (see Figure 4-5 for the data format), note that the X.25 level 2 header is analyzed by CSDUMP in the line under REQUEST ID.

01 => Address=B	
44 => CNTL=I frame P/F=0 N(R)=2 N(S)=2	as defined by LAP-B

10 => Q bit=0, so
    this packet does not contain X.29 information,
    modulo 8 is in use, and LCGN=0
	as defined by X.25 level 3 packet
	protocol

14 => LCN=20	
00 => packet type=data packet, M=0 P(R)=0 P(S)=0	

```
10 06            word 0 of DS fixed header
00 01             "    1 "   "      "       "
00 10             "    2 "   "      "       "
00 00             "    3 "   "      "       "
5D 00             "    4 "   "      "       "
00 00             "    5 "   "      "       "
00 00             "    6 "   "      "       "
00 0F             "    7 "   "      "       "

DS appendage:

48               H
45               E
4C               L
4C               L
4F               O
•
•                etc.
•
```

continues into PSTX entry to show user's remote MPE log on request.

Whenever possible, the CSDUMP program converts the hex (or octal) codes to ASCII and displays each character beneath its code.

PRTX Trace Entries

PRTX trace entries are generated only when the received frame is longer than 32 bytes. In this case, PRTX entries will be used to display the remainder of the data that was not displayed in the PRCT entry. Each PRTX trace entry can show a maximum of 32 bytes. If a frame exceeds this length, as many successive PRTX trace entries are generated as are necessary to display all the data received. An example is shown in Figure 4-8.

```
8        25.610 PRCT REQUEST ID=NONE
                     I-FRAME  ADDR=A   P/F=0  N(R)=6  N(S)=5
                     0 3.C A 1 0.1 4 6 4.0 A 0 5.0 0 0 0.0 0 1 0.A 0
                     ETX J   DLE DC4 d   LF  ENQ NUL NUL NUL DLE
                     0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 4 E.0 0 0 0.0 0
                     NUL DC1 ]   NUL NUL NUL NUL NUL N   NUL NUL NUL
                     0 0.0 A 0 5.0 0 0 0.0 0 1 0.8 0
                     NUL LF  ENQ NUL NUL NUL DLE NUL


9        25.610 PRTX REQUEST ID=NONE
                     0 0.1 1 5 D.0 0 0 0.0 0 0 0.0 0 3 9.0 0 0 0.0 0
                     NUL DC1 ]   NUL NUL NUL NUL NUL 9   NUL NUL NUL
                     0 0.4 8 5 0.3 3 3 0.3 0 3 0.2 0 2 F.2 0 4 D.5 0
                     NUL H   P   3   0   0   0       /       M   P
                     4 5.2 0 4 9.5 6 2 0.4 3 2 E.3 0
                     E       I   V       C   .   0


10       25.610 PRTX REQUEST ID=NONE
                     3 0.2 E 3 2.3 0 2 E.2 0 2 0.4 D 4 F.4 E 2 C.2 0
                     0   .   2   0   .           M   O   N   ,
                     4 1.5 0 5 2.2 0 3 1.3 8 2 C.2 0 3 1.3 9 3 8.3 3
                     A   P   R   1   8   ,       1   9   8   3
                     2 C.2 0 3 1.3 1 3 A.3 4 3 0.2 0
                     ,       1   1   :   4   0


11       25.610 PRTX REQUEST ID=NONE
                     4 1.4 D 5 5.0 A
                     A   M   U   LF
```

Figure 4-8. PRTX Trace Entry

In the example, we see that the data displayed in the PRTX entry is continued from the preceding PRCT entry. Our example shows an MPE logon message. Whenever possible, the CSDUMP program converts the octal or hexadecimal codes to an ASCII character and displays the character beneath its code.

PSTX Trace Entries

PSTX trace entries are generated only when the sent frame is longer than 32 bytes. In this case, PSTX entries will be used to display the remainder of the data that was not displayed in the PSCT entry. Each PSTX trace entry can show a maximum of 32 bytes. If a frame exceeds this length, as many successive PSTX trace entries are generated as are necessary to display all of the sent data. An example is shown in Figure 4-9.

```
0        21.830 PSCT REQUEST ID=NONE
                 I-FRAME  ADDR=B   P/F=0  N(R)=2  N(S)=2
                 0 1.4 4 1 0.1 4 0 0.1 0 0 6.0 0 0 1.0 0 1 0.0 0
                 SOH D   DLE DC4 NUL DLE ACK NUL SOH NUL DLE NUL
                 0 0.5 D 0 0.0 0 0 0.0 0 0 0.0 0 0 F.4 8 4 5.4 C
                 NUL ]   NUL NUL NUL NUL NUL NUL SI  H   E    L
                 4 C.4 F 2 0.4 D 4 7.5 2 2 E.5 3
                 L   O    M   G   R   .   S


1        21.830 PSTX REQUEST ID=NONE
                 4 5.3 3 3 3.3 8 0 D.C E
                 E   3   3   8   CR  N
```

Figure 4-9. PSTX Trace Entry

In our example, we see that the data displayed in the PSTX entry is continued from the preceding PSCT entry. In this case, the user is logging on to the remote system. Note that the last character is an FCS byte.

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 4-10.

```
12        9.200 PCMP REQUEST ID=%045606(!4B86)
                 ERROR CODE=0      LAST RECOVERABLE ERROR CODE= 0
                 #MSG SENT=2       #MSG RECV=1       STATE=CONNECTED
                 # RECOVERABLE ERR=0        # IRRECOVERABLE ERR=0
```

Figure 4-10. PCMP Trace Entry.

The meanings of the various items are as follows:

ERROR CODE:	The code of the request's most recent Recoverable Error (see the CS trace section of the *Data Communications Handbook* for 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.

MSG RECV: The total number of frames that have been received so far for this connection.

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.

IRRECOVERABLE ERR   The total number of Irrecoverable Errors that have occurred so far for this connection.

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 device number of the INP (11 in the example in Figure 4-11) and indicates that the line's activities are no longer being monitored by the trace facility. It is followed by the Line Information Display, showing the state of the line just before tracing was stopped. Note the counts of messages sent (54), messages received (34), and recoverable and irrecoverable errors (0 and 0) that transpired while the trace facility was enabled.

```
********************************
* END OF TRACE FOR DEVICE  11  *
********************************


*************************************************************
*-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: 11   *
*   DEV. TYPE: 17         SUBTYPE: 3    VER: A.55.27 *
*               0123456789012345                      *
*    COPTIONS: 0000100101000000                       *
*    AOPTIONS: 0000001100001101                       *
*    DOPTIONS: 0000000000000111                       *
* NETWORK'ID: 0000000000000000                        *
* NUMBUFFERS: 242         BUFFSIZE: 514   (WORDS) *
* INSPEED: 7000           OUTSPEED: 7000              *
* 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: 8            *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                 DATA-SET-READY DELAY: DISABLED.    *
*                   TRANSMISSION MODE: DUPLEX.       *
*               MMSTAT TRACE FACILITY: ENABLED.      *
* DRIVERNAME: IOINPO                                  *
* DOWNLOAD FILE: CSDLAPB2                             *
* CTRACEINFO:    ENTRIES=16      MASK=011111000      *
*                TYPE OF TRACE = ALL, NOWRAP         *
* PHONELIST:    ENTRIES=0          INDEX=0           *
* IDLIST:       ENTRIES=0          INDEX=0           *
* ERRORCODE:   RECOVERABLE=0    IRRECOVERABLE=202 *
* MSGSENT:  54                MSGRECV:  34            *
* RECOVERRORS:  0            IRRECOVERRORS:  0        *
*************************************************************
```

Figure 4-11. End of Trace and Closing Line Information.

THE DSDUMP FORMATTING PROGRAM

The CSDUMP program formats the trace file to show all line activity by displaying all messages being sent out and received. CSDUMP will analyze only the level 2 (LAP-B) header. DSDUMP formats the trace file to allow for easy and quick analysis. DSDUMP can analyze all levels of X.25 protocol headers in the data, if you wish, that are defined in the 1980 CCITT standard such as diagnostic packets, modulo 8 and 128 decoding of the packet header, all 18 X.3 parameters, and PAD call requests and call confirmation packets. In general, for DS/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 level 2 LAP-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; 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 do not specify a device, the program defaults to the line printer. If no priority is specified, the default is 6. After the FOPEN has been performed, you will be prompted for commands. If the output is going to the printer, all DSDUMP commands are echoed. If the output is going to the terminal, then after all messages have been listed, the CSTRACE file is rewound and control goes to the Command Interpreter.

If you are in Interactive Mode (that is, not a stream job), and a printer is enabled, pressing (CONTROL)Y will return control to the command interface, after you respond to a new output device, and will close the output file. 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. (Not used by DS/3000-X.25)
NEWDEV	To specify a new output device. (Only allowed in a session.)
NEWFILE	To change CSTRACE files. (Only allowed in a session.)
PINS=	To format only those frames whose TO or FROM PIN is equal to one of the specified PINs. (Up to ten PINs are permitted.)
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. The parameters for the TYPES= command are:

	COMMANDS	Formats the REMOTE command, Remote HELLO, Remote BYE, (CONTROL)Y 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   ENABLE turns options on, and DISABLE turns options off. Otherwise, the syntax for
DISABLE   these commands is identical.

Parameters can be ENABLEd or DISABLEd using either = or ,. That is,
DISABLE=PLINE and DISABLE,PLINE are identical.

Only one parameter is permitted for each command. Additional parameters are
flagged as errors.

The options for the ENABLE/DISABLE commands are:

High Level Command Parameters

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.

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 the printing of formatted DS messages.

USERD   Controls the printing of 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 or
                    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

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.

High Level Command Parameters for Level 2 and Level 3

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 calls:

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).

Level 2-specific Parameters

L2CMP   Controls the display of Level 2 Completion entries.

L2RNR   Controls the display of Level 2 Receive Not Ready frames.

L2TXT   Controls the display of Level 2 STX and RTX entries. Does not affect user data display.

L2UA   Controls the display of Level 2 UA frames.

L2FRMR   Controls the display of Level 2 FRMR frames.

L2DISC   Controls the display of Level 2 DISC frames.

L2SABM   Controls the display of Level 2 SABM frames.

L2REJ   Controls the display of Level 2 reject frames.

L2STN   Controls the display of Level 2 state transition entries. Enabling these entries results in a very long trace file. Typically, up to 80% of the trace file consists of these entries. HP suggests that you enable this option only upon request from your SE.

L2RR   Controls the display of Level 2 receive ready frames.

L2DM   Controls the display of Level 2 DM frames.

L2CTX   Controls the display of Level 2 control text frames. The information field of these frames contains the header information and the user data display for Level 3. You should enable this parameter when you are displaying any Level 3 information.

Level 3-specific Parameters

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 replace 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. The default designator is $STDINX. The command file may be equated to $NULL if no options are desired.

The file equation for the Command Interpreter is:

```
:FILE COMFILE=command file name
```

Formatted DSDUMP Trace Listing

Sequence of commands used to generate the example shown in Figure 4-12:

```
:FILE CSTRACE=DSTRC059.PUB.SYS
:RUN DSDUMP.PUB.SYS
HEWLETT-PACKARD CO.   WED, SEP 25, 1985, 4:13 PM
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, SEP25, 1985, 4:13 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
PLEASE ENTER CSTRACE FILE:DSTRC059.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, SEP 25, 1985,  4:14 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
TRACE FILE IS
DSTRC059.PUB.SYS
TRACE DATE IS
WED, SEP 25, 1985,  4:11 PM
CS LDEV = 11
     DOWNLOAD FILE IS CSDLAPB2
>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: 11   *
*  DEV. TYPE: 17        SUBTYPE: 3   VER: A.55.27 *
*               0123456789012345                  *
*    COPTIONS: 0000100101000000                   *
*    AOPTIONS: 0000001100001101                   *
*    DOPTIONS: 0000000000000111                   *
*  NETWORK'ID: 0000000000000000                   *
*  NUMBUFFERS: 242       BUFFSIZE: 514   (WORDS) *
*  INSPEED: 7000         OUTSPEED: 7000           *
*  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: 8           *
*              CLEAR-TO-SEND DELAY: 00.0   SECS. *
*             DATA-SET-READY DELAY: DISABLED.     *
*                TRANSMISSION MODE: DUPLEX.       *
*           MMSTAT TRACE FACILITY: ENABLED.      *
*  DRIVERNAME: IOINP0                             *
*  DOWNLOAD FILE: CSDLAPB2                        *
*  CTRACEINFO:   ENTRIES=16     MASK=011111000   *
*               TYPE OF TRACE = ALL, NOWRAP       *
*  PHONELIST:   ENTRIES=0       INDEX=0           *
*  IDLIST:      ENTRIES=0       INDEX=0           *
*  ERRORCODE: RECOVERABLE=0   IRRECOVERABLE=0    *
*  MSGSENT: 0           MSGRECV: 0                *
*  RECOVERRORS: 0       IRRECOVERRORS: 0         *
***************************************************
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                STATE=DISCON.    o
o 2.30       LEVEL 2. ID=%044273 !48BBo
o Error Code=    0  Last Recov Err=0  o
o # MSG Sent=0      # MSG Rec=0        o
o # Recov Err=0     # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooooo
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=DISCON.   o
o 2.32          LEVEL 2.  ID=%045573 !4B7Bo
o Error Code=     0   Last Recov Err=0  o
o # MSG Sent=0        # MSG Rec=0        o
o # Recov Err=0       # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++
+ PSCT     SABM              P/F=0      +
+ 2.65          LEVEL 2.            DCE +
+++++++++++++++++++++++++++++++++++++++++
                    +++++++++++++++++++++++++++++++++++++++++
                    + PRCT     UA              P/F=0      +
                    + 2.66          LEVEL 2.            DCE +
                    +++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++
+ PSCT     I Frame N(R)= 0 P=0 N(S)= 0 +
+ 2.97          LEVEL 2.            DCE +
+ SCT/RCT Control Frame data display   +
+ 020.000  373.000  372.000            +
+ DLE.NUL  !!!.NUL  !!!.NUL            +
+++++++++++++  LEVEL 3.  +++++++++++++++++
* Length=8     Packet ID=251 %373  !FB  *
* Type=Restart Request & Restart Ind.   *
* Log Channel No=0      %000000 !0000  *
* Restart Cause =0      %000000 !0000  *
* DTE Restart                          *
* Diagnostic Code=250   %000372 !00FA  *
* TELENET. Line Stat Chng of down to up*
*********************************************
                    +++++++++++++++++++++++++++++++++++++++++
                    + PRCT     RR       N(R)= 1 P/F=0      +
                    + 2.98          LEVEL 2.            DCE +
                    +++++++++++++++++++++++++++++++++++++++++
                    ooooooooooooooooooooooooooooooooooooooooo
                    o PCMP                    STATE=CONN.    o
                    o 2.98          LEVEL 2.  ID=%044703 !49C3o
                    o Error Code=     0   Last Recov Err=0  o
                    o # MSG Sent=1        # MSG Rec=0        o
                    o # Recov Err=0       # Irrec Errs=0     o
                    ooooooooooooooooooooooooooooooooooooooooo
                    +++++++++++++++++++++++++++++++++++++++++
                    + PRCT     I Frame N(R)= 1 P=0 N(S)= 0 +
                    + 3.02          LEVEL 2.            DTE +
                    + SCT/RCT Control Frame data display   +
                    + 020.000  377.130                     +
                    + DLE.NUL  !!!.  X                     +
                    +++++++++++++  LEVEL 3.  +++++++++++++++++
                    * Length=6     Packet ID=255 %377  !FF  *
                    * Type=DTE/DCE Restart Confirmation    *
                    * Log Channel No=0      %000000 !0000  *
                    *********************************************
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
ooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.      o
o 3.03          LEVEL 2. ID=%044130 !4858o
o Error Code=    0   Last Recov Err=0  o
o # MSG Sent=1          # MSG Rec=1        o
o # Recov Err=0         # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooo
```

```
+++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR       N(R)= 1 P/F=0      +
+ 3.03          LEVEL 2.            DTE +
+++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 1 P=0 N(S)= 1 +
+ 9.19          LEVEL 2.            DCE +
+ SCT/RCT Control Frame data display    +
+ 020.024  013.020  200.000             +
+ DLE.DC4  VT .DLE  !!!.NUL             +
+++++++++++++ LEVEL 3. ++++++++++++++++++
* Length=8     Packet ID=11  %013  !0B  *
* Type=Call Request and Incoming  Call *
* Log Channel No=20      %000024 !0014  *
* Called  Address= 8                    *
*****************************************
```

```
+++++++++++++++++++++++++++++++++++++++++
+ PRCT      RR       N(R)= 2 P/F=0      +
+ 9.20          LEVEL 2.            DCE +
+++++++++++++++++++++++++++++++++++++++++
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.      o
o 9.20          LEVEL 2. ID=%045606 !4B86o
o Error Code=    0   Last Recov Err=0  o
o # MSG Sent=2          # MSG Rec=1        o
o # Recov Err=0         # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++
+ PRCT      I Frame N(R)= 2 P=0 N(S)= 1 +
+ 12.83         LEVEL 2.            DTE +
+ SCT/RCT Control Frame data display    +
+ 020.024  017.074                      +
+ DLE.DC4  SI . <                       +
+++++++++++++ LEVEL 3. ++++++++++++++++++
* Length=6     Packet ID=15  %017  !0F  *
* Type=Call Accepted                    *
* Log Channel No=20      %000024 !0014  *
*****************************************
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.      o
o 12.83         LEVEL 2. ID=%044375 !48FDo
o Error Code=    0   Last Recov Err=0  o
o # MSG Sent=2          # MSG Rec=2        o
o # Recov Err=0         # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooo
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR      N(R)= 2 P/F=0      +
+ 12.84          LEVEL 2.         DTE +
+++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 2 P=0 N(S)= 2 +
+ 21.83          LEVEL 2.         DCE +
+ SCT/RCT Control Frame data display   +
+ 020.024  000.020  006.000  001.000  +
+ DLE.DC4  NUL.DLE  ACK.NUL  SOH.NUL   +
+ 020.000  000.135  000.000  000.000  +
+ DLE.NUL  NUL.  ]  NUL.NUL  NUL.NUL   +
+ 000.000  017.110  105.114  114.117   +
+ NUL.NUL  SI . H    E.  L    L.  O    +
+ 040.115  107.122  056.123           +
+    .  M    G.  R    .. S             +
+++++++++++++ LEVEL 3. +++++++++++++++++
* Length=32   Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet             *
* Log Channel No=20     %000024 !0014  *
* P(R)=0   P(S)=0   Q=0   M=0  D=0     *
* User Data Display                    *
* 020.006  000.001  000.020  000.000   *
* DLE.ACK  NUL.SOH  NUL.DLE  NUL.NUL    *
* 135.000  000.000  000.000  000.017   *
*   ].NUL  NUL.NUL  NUL.NUL  NUL.SI    *
* 110.105  114.114  117.040  115.107   *
*   H.  E    L.  L    O.       M.  G    *
* 122.056  123.                        *
*   R.  .    S.                        *
*******************************************
*******************************************
* Time=21.83                           *
*      From PIN=%135 To PIN=%0         *
*         REMOTE HELLO request         *
* 010006     HeadLength (words)=16     *
* 000001     Remote Computer ID=1      *
* 000000     Substream Type=%000000    *
* 000017     DSDataL (bytes)=15        *
* Header:                              *
* %010006 000001 000020 000000 056400  *
*   000000 000000 000017                *
* Appendage:                           *
* 044105 046114 047440 046507 051056   *
* H  E    L  L    O      M  G    R  .   *
* 051440                               *
* S                                    *
* DS MESSAGE IS TRUNCATED              *
*******************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138      Entry Length=6   ^
^ 105.063  063.070  015.316           ^
^   E  3    3  8  CR !!!               ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
++++++++++++++++++++++++++++++++++++++++++++
+ PRCT        RR       N(R)= 3 P/F=0        +
+ 21.85             LEVEL 2.            DCE +
++++++++++++++++++++++++++++++++++++++++++++
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP                     STATE=CONN.      o
o 21.85             LEVEL 2. ID=%044306 !48C6o
o Error Code=      0    Last Recov Err=0    o
o # MSG Sent=3          # MSG Rec=2         o
o # Recov Err=0         # Irrec Errs=0      o
oooooooooooooooooooooooooooooooooooooooooooo
++++++++++++++++++++++++++++++++++++++++++++
+ PRCT        I Frame N(R)= 3 P=0 N(S)= 2 +
+ 22.98             LEVEL 2.            DTE +
+ SCT/RCT Control Frame data display       +
+ 020.024  041.130                         +
+ DLE.DC4    !.  X                          +
++++++++++++ LEVEL 3.  +++++++++++++++++
* Length=6     Packet ID=1    %001   !01   *
* Type=DTE/DCE Receive Ready (RR)          *
* Log Channel No=20       %000024 !0014    *
* P(R)=1    %000001 !1                      *
********************************************
oooooooooooooooooooooooooooooooooooooooooooo
o PCMP                     STATE=CONN.      o
o 22.98             LEVEL 2. ID=%043403 !4703o
o Error Code=      0    Last Recov Err=0    o
o # MSG Sent=3          # MSG Rec=3         o
o # Recov Err=0         # Irrec Errs=0      o
oooooooooooooooooooooooooooooooooooooooooooo
```

```
++++++++++++++++++++++++++++++++++++++++++
+ PSCT        RR       N(R)= 3 P/F=0      +
+ 22.99          LEVEL 2.            DTE +
++++++++++++++++++++++++++++++++++++++++++
```

```
++++++++++++++++++++++++++++++++++++++++++++
+ PRCT        I Frame N(R)= 3 P=0 N(S)= 3 +
+ 23.83             LEVEL 2.            DTE +
+ SCT/RCT Control Frame data display       +
+ 020.024  040.013  005.000  000.000       +
+ DLE.DC4     .VT    ENQ.NUL  NUL.NUL       +
+ 023.000  000.021  135.000  000.000       +
+ DC3.NUL  NUL.DC1   ].NUL   NUL.NUL        +
+ 000.000  006.000  001.377  376.000        +
+ NUL.NUL  ACK.NUL  SOH.!!!  !!!.NUL        +
+ 000.005                                   +
+ NUL.ENQ                                   +
++++++++++++ LEVEL 3.  +++++++++++++++++
* Length=28    Packet ID=0    %000   !00   *
* Type=DTE/DCE Data Packet                 *
* Log Channel No=20       %000024 !0014    *
* P(R)=1    P(S)=0    Q=0    M=0  D=0       *
* User Data Display                        *
* 013.005  000.000  000.023  000.000       *
* VT .ENQ  NUL.NUL  NUL.DC3  NUL.NUL        *
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
* 021.135  000.000  000.000  000.006   *
* DC1.  ]   NUL.NUL  NUL.NUL  NUL.ACK   *
* 000.001  377.376  000.000  005.       *
* NUL.SOH  !!!.!!!   NUL.NUL  ENQ.      *
*****************************************
*****************************************
* Time=23.83                            *
*        From PIN=%21 To PIN=%135       *
*           FCONTROL-TO TERM. request   *
*              File Num=1               *
*              Control Code=-2          *
*              Param=0                  *
* 005405      HeadLength (words)=11     *
* 000000      Remote Computer ID=0      *
* 000000      Substream Type=%000000    *
* 000006      DSDataL (bytes)=6         *
* Header:                               *
* %005405 000000 000023 000000 010535   *
*   000000 000000 000006                *
* Appendage:                            *
* 000001 177776 000000                  *
* .   .   .   ~   .   .                  *
*****************************************
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                   STATE=CONN.    o
o 23.83          LEVEL 2. ID=%044334 !48DCo
o Error Code=    0   Last Recov Err=0  o
o # MSG Sent=3        # MSG Rec=4       o
o # Recov Err=0       # Irrec Errs=0    o
ooooooooooooooooooooooooooooooooooooooooo
```

```
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT      RR       N(R)= 4 P/F=0       +
+ 23.84          LEVEL 2.            DTE +
+++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 4 P=0 N(S)= 3 +
+ 23.98          LEVEL 2.            DCE +
+ SCT/RCT Control Frame data display    +
+ 020.024  041.000                      +
+ DLE.DC4    !.NUL                       +
++++++++++++  LEVEL 3.  ++++++++++++++++++
* Length=6      Packet ID=1   %001  !01 *
* Type=DTE/DCE Receive Ready (RR)       *
* Log Channel No=20      %000024 !0014  *
* P(R)=1    %000001 !1                  *
*****************************************
```

```
+++++++++++++++++++++++++++++++++++++++++++
+ PRCT      RR       N(R)= 4 P/F=0       +
+ 23.99          LEVEL 2.            DCE +
+++++++++++++++++++++++++++++++++++++++++++
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                   STATE=CONN.    o
o 23.99          LEVEL 2. ID=%043444 !4724o
o Error Code=    0   Last Recov Err=0  o
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
                                 o # MSG Sent=4         # MSG Rec=4        o
                                 o # Recov Err=0        # Irrec Errs=0     o
                                 ooooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 4 P=0 N(S)= 4 +
+ 24.54        LEVEL 2.              DCE +
+ SCT/RCT Control Frame data display     +
+ 020.024  042.012  005.000  001.200     +
+ DLE.DC4    ".LF    ENQ.NUL  SOH.!!!     +
+ 023.000  000.135  021.000  000.000     +
+ DC3.NUL   NUL. ]  DC1.NUL  NUL.NUL     +
+ 000.000  004.000  001.000  000.000     +
+ NUL.NUL  EOT.NUL  SOH.NUL  NUL.NUL     +
+++++++++++++  LEVEL 3.  ++++++++++++++++
* Length=26    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet               *
* Log Channel No=20    %000024 !0014     *
* P(R)=1    P(S)=1    Q=0    M=0   D=0    *
* User Data Display                      *
* 012.005  000.001  200.023  000.000     *
* LF .ENQ  NUL.SOH  !!!.DC3  NUL.NUL     *
* 135.021  000.000  000.000  000.004     *
*    ].DC1  NUL.NUL  NUL.NUL  NUL.EOT     *
* 000.001  000.000  000.                 *
* NUL.SOH  NUL.NUL  NUL.                 *
*****************************************
*****************************************
* Time=24.54                             *
*       From PIN=%135 To PIN=%21         *
*         FCONTROL-TO TERM. reply        *
*           Status Word=%000001          *
*           Status=CCG                   *
*           Param=0                      *
* 005005    HeadLength (words)=10        *
* 000001    Remote Computer ID=1         *
* 000000    Substream Type=%000000       *
* 000004    DSDataL (bytes)=4            *
* Header:                                *
* %005005 000001 100023 000000 056421    *
*   000000 000000 000004                 *
* Appendage:                             *
* 000001 000000                          *
* .    .    .   .                        *
*****************************************
                                 +++++++++++++++++++++++++++++++++++++++++++++
                                 + PRCT      RR      N(R)= 5 P/F=0        +
                                 + 24.55        LEVEL 2.              DCE +
                                 +++++++++++++++++++++++++++++++++++++++++++++
                                 ooooooooooooooooooooooooooooooooooooooooooooo
                                 o PCMP                    STATE=CONN.      o
                                 o 24.56        LEVEL 2. ID=%043561 !4771o
                                 o Error Code=     0   Last Recov Err=0  o
                                 o # MSG Sent=5         # MSG Rec=4        o
                                 o # Recov Err=0        # Irrec Errs=0     o
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
ooooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++++
+ PRCT      I Frame N(R)= 5 P=0 N(S)= 4 +
+ 24.68         LEVEL 2.            DTE +
+ SCT/RCT Control Frame data display    +
+ 020.024  102.013  005.000  000.000    +
+ DLE.DC4    B.VT    ENQ.NUL  NUL.NUL    +
+ 023.000  000.021  135.000  000.000    +
+ DC3.NUL  NUL.DC1     ].NUL  NUL.NUL    +
+ 000.000  006.000  001.377  376.000    +
+ NUL.NUL  ACK.NUL  SOH.!!!  !!!.NUL     +
+ 000.233                               +
+ NUL.!!!                               +
+++++++++++   LEVEL 3.  ++++++++++++++++
* Length=28    Packet ID=0    %000   !00  *
* Type=DTE/DCE Data Packet               *
* Log Channel No=20      %000024 !0014   *
* P(R)=2   P(S)=1    Q=0    M=0  D=0      *
* User Data Display                      *
* 013.005  000.000  000.023  000.000     *
* VT .ENQ  NUL.NUL  NUL.DC3  NUL.NUL      *
* 021.135  000.000  000.000  000.006      *
* DC1.  ]   NUL.NUL  NUL.NUL  NUL.ACK     *
* 000.001  377.376  000.000  233.         *
* NUL.SOH  !!!.!!!  NUL.NUL  !!!.          *
*****************************************
*****************************************
* Time=24.68                             *
*       From PIN=%21 To PIN=%135          *
*           FCONTROL-TO TERM. request     *
*             File Num=1                  *
*             Control Code=-2             *
*             Param=0                     *
* 005405     HeadLength (words)=11        *
* 000000     Remote Computer ID=0         *
* 000000     Substream Type=%000000       *
* 000006     DSDataL (bytes)=6            *
* Header:                                 *
* %005405 000000 000023 000000 010535     *
*   000000 000000 000006                  *
* Appendage:                              *
* 000001 177776 000000                    *
* .   .   .   ~   .   .                    *
*****************************************
ooooooooooooooooooooooooooooooooooooooooooo
o PCMP                 STATE=CONN.      o
o 24.69         LEVEL 2. ID=%045341 !4AE1o
o Error Code=    0   Last Recov Err=0  o
o # MSG Sent=5        # MSG Rec=5        o
o # Recov Err=0       # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooooooo
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT       RR       N(R)= 5 P/F=0        +
+ 24.69          LEVEL 2.            DTE +
+++++++++++++++++++++++++++++++++++++++++++
+++++++++++++++++++++++++++++++++++++++++++
+ PSCT       I Frame N(R)= 5 P=0 N(S)= 5 +
+ 25.50          LEVEL 2.            DCE +
+ SCT/RCT Control Frame data display    +
+ 020.024  104.012  005.000  001.200    +
+ DLE.DC4    D.LF    ENQ.NUL  SOH.!!!    +
+ 023.000  000.135  021.000  000.000    +
+ DC3.NUL   NUL.  ]  DC1.NUL  NUL.NUL    +
+ 000.000  004.000  001.000  000.000    +
+ NUL.NUL   EOT.NUL  SOH.NUL  NUL.NUL    +
+++++++++++++ LEVEL 3.  ++++++++++++++++++
* Length=26    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet              *
* Log Channel No=20      %000024 !0014  *
* P(R)=2    P(S)=2   Q=0   M=0   D=0    *
* User Data Display                     *
* 012.005  000.001  200.023  000.000    *
* LF .ENQ   NUL.SOH  !!!.DC3  NUL.NUL    *
* 135.021  000.000  000.000  000.004    *
*   ].DC1   NUL.NUL  NUL.NUL  NUL.EOT    *
* 000.001  000.000  000.                *
* NUL.SOH   NUL.NUL  NUL.                *
*****************************************
*****************************************
* Time=25.50                            *
*        From PIN=%135 To PIN=%21       *
*          FCONTROL-TO TERM. reply      *
*           Status Word=%000001         *
*           Status=CCG                  *
*           Param=0                     *
* 005005      HeadLength (words)=10     *
* 000001      Remote Computer ID=1      *
* 000000      Substream Type=%000000    *
* 000004      DSDataL (bytes)=4         *
* Header:                               *
* %005005 000001 100023 000000 056421   *
*   000000 000000 000004                *
* Appendage:                            *
* 000001 000000                         *
* .  .   .  .                           *
*****************************************
                    +++++++++++++++++++++++++++++++++++++++++++
                    + PRCT       RR       N(R)= 6 P/F=0       +
                    + 25.51          LEVEL 2.           DCE +
                    +++++++++++++++++++++++++++++++++++++++++++
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                    STATE=CONN.     o
o 25.52          LEVEL 2. ID=%044540 !4960o
o Error Code=     0    Last Recov Err=0  o
o # MSG Sent=6         # MSG Rec=5        o
o # Recov Err=0        # Irrec Errs=0     o
ooooooooooooooooooooooooooooooooooooooooo
+++++++++++++++++++++++++++++++++++++++++
+ PRCT       I Frame N(R)= 6 P=0 N(S)= 5 +
+ 25.61          LEVEL 2.            DTE +
+ SCT/RCT Control Frame data display     +
+ 020.024  144.012  005.000  000.000     +
+ DLE.DC4     d.LF   ENQ.NUL  NUL.NUL     +
+ 020.240  000.021  135.000  000.000     +
+ DLE.!!!  NUL.DC1    ].NUL   NUL.NUL     +
+ 000.000  116.000  000.000  000.012     +
+ NUL.NUL    N.NUL   NUL.NUL  NUL.LF      +
+ 005.000  000.000  020.200              +
+ ENQ.NUL  NUL.NUL  DLE.!!!              +
+++++++++++++  LEVEL 3.  ++++++++++++++++
* Length=32    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet               *
* Log Channel No=20      %000024 !0014   *
* P(R)=3   P(S)=2   Q=0   M=0  D=0        *
* User Data Display                      *
* 012.005  000.000  000.020  240.000     *
* LF .ENQ  NUL.NUL  NUL.DLE  !!!.NUL      *
* 021.135  000.000  000.000  000.116     *
* DC1.  ]  NUL.NUL  NUL.NUL  NUL.  N      *
* 000.000  000.000  012.005  000.000      *
* NUL.NUL  NUL.NUL  LF .ENQ  NUL.NUL      *
* 000.020  200.                          *
* NUL.DLE  !!!.                          *
*****************************************
*****************************************
* Time=25.61                             *
*      From PIN=%21 To PIN=%135          *
*         PRINT-TO TERMINAL request      *
*           AttachIO Parm1=%000000       *
*           AttachIO Parm2=%000000       *
* 005005    HeadLength (words)=10        *
* 000000    Remote Computer ID=0         *
* 120000    Substream Type=%120000       *
* 000116    DSDataL (bytes)=78           *
* Header:                                *
* %005005 000000 000020 120000 010535    *
*  000000 000000 000116                  *
* Appendage:                             *
* 000000 000000                          *
* .   .    .   .                         *
* Data:                                  *
* 005005 000000 000020 100040            *
* .    .    .    .    .    .             *
* DS MESSAGE IS TRUNCATED                *
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
*******************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138        Entry Length=32    ^
^ 000.021  135.000  000.000  000.000       ^
^ NUL DC1     ] NUL  NUL NUL  NUL NUL       ^
^ 071.000  000.000  000.110  120.063       ^
^   9 NUL  NUL NUL    NUL  H    P   3       ^
^ 060.060  060.040  057.040  115.120       ^
^   0   0    0           /       M   P      ^
^ 105.040  111.126  040.103  056.060        ^
^   E        I   V       C    .   0         ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138        Entry Length=32    ^
^ 060.056  062.060  056.040  040.115       ^
^   0   .    2   0       .           M      ^
^ 117.116  054.040  101.120  122.040       ^
^   O   N    ,        A    P    R           ^
^ 061.070  054.040  061.071  070.063       ^
^   1   8    ,        1    9    8   3       ^
^ 054.040  061.061  072.064  060.040        ^
^   ,        1   1    :    4    0           ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138        Entry Length=4     ^
^ 101.115  125.012                          ^
^   A   M    U LF                           ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

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

```
*******************************************
*-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: 11   *
*  DEV. TYPE: 17         SUBTYPE: 3  VER: A.55.27  *
*              0123456789012345                    *
*   COPTIONS: 0000100101000000                     *
*   AOPTIONS: 0000001100001101                     *
*   DOPTIONS: 0000000000000111                     *
*  NETWORK'ID: 0000000000000000                    *
*  NUMBUFFERS: 242        BUFFSIZE: 514  (WORDS)   *
*  INSPEED: 7000          OUTSPEED: 7000           *
*  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: 8           *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS. *
*                DATA-SET-READY DELAY: DISABLED.   *
*                   TRANSMISSION MODE: DUPLEX.     *
*               MMSTAT TRACE FACILITY: ENABLED.    *
*  DRIVERNAME: IOINPO                              *
```

Figure 4-12. DSDUMP Trace Listing (continued).

```
*   DOWNLOAD FILE: CSDLAPB2                          *
*   CTRACEINFO:    ENTRIES=16       MASK=011111000   *
*                  TYPE OF TRACE = ALL, NOWRAP       *
*   PHONELIST:    ENTRIES=0          INDEX=0         *
*   IDLIST:       ENTRIES=0          INDEX=0         *
*   ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=202 *
*   MSGSENT: 54               MSGRECV: 34            *
*   RECOVERRORS: 0            IRRECOVERRORS: 0       *
*************************************************
ooooooooooooooooooooooooooooooooooooooooo
o PCMP                  STATE=DISCON.    o
o 86.33        LEVEL 2. ID=%044067 !4837o
o Error Code=     0   Last Recov Err=0  o
o # MSG Sent=54      # MSG Rec=34        o
o # Recov Err=0      # Irrec Errs=0      o
ooooooooooooooooooooooooooooooooooooooooo
>EXIT
```

Figure 4-12. DSDUMP Trace Listing (continued).

DSDUMP Listing Header Message

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

```
HEWLETT-PACKARD CO.    WED, SEP 25, 1985,   4:14 PM
DSDUMP DS/3000-X.25 TRACE DUMP HP32185B.52.00
TRACE FILE IS
DSTRC059.PUB.SYS
TRACE DATE IS
WED, SEP 25, 1985,   4:11 PM
CS LDEV = 11
    DOWNLOAD FILE IS CSDLAPB2
>GO
```

Figure 4-13. Output Heading.

Item	Meaning
WED, SEP 25, 1985, 4:14 PM	Date run
TRACE FILE IS …	Provides name of trace file being analyzed. In our case, it is DSTRC059.PUB.SYS.
TRACE DATE IS …	Date trace file was created. In our case, it is WED, SEP 25, 1985, 4:11 PM.
CS LDEV = …	LDEV of device being traced. In our case, it is 11.
DOWNLOAD FILE IS …	Defines the download file being used. In our case, it is CSDLAPB2; therefore, we are using the LAP-B protocol.
>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: 11    *
*  DEV. TYPE: 17         SUBTYPE: 3    VER: A.55.27 *
*                0123456789012345                   *
*     COPTIONS: 0000100101000000                    *
*     AOPTIONS: 0000001100001101                    *
*     DOPTIONS: 0000000000000111                    *
*  NETWORK'ID: 0000000000000000                     *
*  NUMBUFFERS: 242        BUFFSIZE: 514   (WORDS)   *
*  INSPEED: 7000          OUTSPEED: 7000            *
*  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: 8            *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS.  *
*                 DATA-SET-READY DELAY: DISABLED.   *
*                   TRANSMISSION MODE: DUPLEX.      *
*             MMSTAT TRACE FACILITY: ENABLED.       *
*  DRIVERNAME: IOINP0                               *
*  DOWNLOAD FILE: CSDLAPB2                          *
*  CTRACEINFO:   ENTRIES=16      MASK=011111000     *
*               TYPE OF TRACE = ALL, NOWRAP         *
*  PHONELIST:   ENTRIES=0          INDEX=0          *
*  IDLIST:      ENTRIES=0          INDEX=0          *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=0      *
*  MSGSENT: 0              MSGRECV: 0               *
*  RECOVERRORS: 0         IRRECOVERRORS: 0          *
****************************************************
```

Figure 4-14. Line Information Display.

Item	Meaning
Sent text is on the left ...	Indicates that 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 (page 4-15).

DSDUMP Format for PRCT/PRTX and PSCT/PSTX entries

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 4-5 for the data format in the CSTRACE file.

```
              +++++++++++++++++++++++++++++++++++++++++++++++++++
              + PRCT/PSCT                 control field values    +
              + time stamp          LEVEL 2.                      +
              +                                          Addr 1   +
              +   Information field display                       +
              +   (if present)                                    +
              ++++++++++↑+++++++++      LEVEL 3.     +++++++++++++↑++++++
              * length  2                      Type field value  3   *
              *                                                       *
              * Type field interpretation                            *
appears       * Logical channel identifier (LCI) 4=value 3          *
only if       * Packet-specific information                          *
level 2 is  { *                                                     *
an I-frame    * If type=Data and not X.29 (Q=0) then USER DATA      *
              * is displayed with a . between left and right        *
              * bytes of each word                                  *
              *******************************************************
              *******************************************************
              * time stamp                                          *
              *      From PIN=%nnn To PIN=%nnn                       *
              * DS msg/stream class interpretation                  *
              * Header words    Interpretation of                   *
appears       *      "          header words using DS               *
only if       *      "          message formats                     *
level 3 is  { * Header:                                             *
data          * raw header data                                     *
packet and    * Appendage:                                          *
Q=0           * (optional)                                          *
              * raw data                                            *
              * Data:                                               *
              * (optional)                                          *
              * user data                                           *
              *******************************************************
              ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
appears       ^ PRTX/PSTX    DATA limit value     length 2       ^
only if     { ^                  (set by user)                    ^
frame is      ^                                                   ^
longer than   ^  USER DATA continued                              ^
32 bytes      ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

See footnotes on next page.

Figure 4-15. The DSDUMP Data Format.

Footnotes:

[1]
```
Addr A = DTE ⎫ as defined
Addr B = DCE ⎭ 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=

```
 0   1   2   3   4   5   6   7   8   9  10  11
┌───────────────┬───────────────────────────────┐
│   L C G N     │           L C N               │
└───────────────┴───────────────────────────────┘
```

Figure **4-15**. The DSDUMP Data Format (continued).

PRCT Trace Entries

```
++++++++++++++++++++++++++++++++++++++++++++++
+ PRCT       I Frame N(R)= 6 P=O N(S)= 5 +
+ 25.61          LEVEL 2.                DTE +
+ SCT/RCT Control Frame data display        +
+ 020.024  144.012  005.000  000.000        +
+ DLE.DC4    d.LF    ENQ.NUL  NUL.NUL        +
+ 020.240  000.021  135.000  000.000        +
+ DLE.!!!   NUL.DC1    ].NUL  NUL.NUL        +
+ 000.000  116.000  000.000  000.012        +
+ NUL.NUL     N.NUL  NUL.NUL  NUL.LF         +
+ 005.000  000.000  020.200                 +
+ ENQ.NUL  NUL.NUL  DLE.!!!                  +
++++++++++++   LEVEL 3.   +++++++++++++++++
* Length=32    Packet ID=0   %000  !00   *
* Type=DTE/DCE Data Packet                *
* Log Channel No=20       %000024 !0014   *
* P(R)=3   P(S)=2   Q=0   M=0   D=0        *
* User Data Display                       *
* 012.005  000.000  000.020  240.000      *
* LF .ENQ  NUL.NUL  NUL.DLE  !!!.NUL       *
* 021.135  000.000  000.000  000.116      *
* DC1.  ]  NUL.NUL  NUL.NUL  NUL.  N       *
* 000.000  000.000  012.005  000.000      *
* NUL.NUL  NUL.NUL  LF .ENQ  NUL.NUL       *
* 000.020  200.                           *
* NUL.DLE  !!!.                            *
*********************************************
*********************************************
* Time=25.61                              *
*          From PIN=%21 To PIN=%135       *
*            PRINT-TO TERMINAL request     *
*              AttachIO Parm1=%000000      *
*              AttachIO Parm2=%000000      *
* 005005     HeadLength (words)=10        *
* 000000     Remote Computer ID=0         *
* 120000     Substream Type=%120000       *
* 000116     DSDataL (bytes)=78           *
* Header:                                 *
* %005005 000000 000020 120000 010535     *
*   000000 000000 000116                  *
* Appendage:                              *
* 000000 000000                           *
* .   .   .   .                           *
* Data:                                   *
* 005005 000000 000020 100040             *
* .   .   .   .   .   .   .               *
* DS MESSAGE IS TRUNCATED                 *
*********************************************
```

Figure 4-16. PRCT Trace Entry.

The X.25 Level 2 header interpretation here tells us that ADDR=DTE (it would be interpreted as A by CSDUMP), and 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 20 (or virtual circuit 20) and since Q=0 the user data display shows the beginning of a DS message.

The DS level header interpretation tells us this is a print to terminal request, from PIN %21 on the remote system to PIN %135 on this system.

PSCT Trace Entries

```
++++++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 2 P=0 N(S)= 2 +
+ 21.83        LEVEL 2.              DCE +
+ SCT/RCT Control Frame data display     +
+ 020.024  000.020  006.000  001.000     +
+ DLE.DC4  NUL.DLE  ACK.NUL  SOH.NUL      +
+ 020.000  000.135  000.000  000.000      +
+ DLE.NUL  NUL.  ]  NUL.NUL  NUL.NUL       +
+ 000.000  017.110  105.114  114.117      +
+ NUL.NUL  SI . H    E. L    L. O         +
+ 040.115  107.122  056.123              +
+    . M    G. R    .. S                 +
++++++++++++   LEVEL 3.   ++++++++++++++++
* Length=32    Packet ID=0   %000  !00  *
* Type=DTE/DCE Data Packet              *
* Log Channel No=20     %000024 !0014   *
* P(R)=0   P(S)=0   Q=0   M=0  D=0      *
* User Data Display                     *
* 020.006  000.001  000.020  000.000    *
* DLE.ACK  NUL.SOH  NUL.DLE  NUL.NUL     *
* 135.000  000.000  000.000  000.017    *
*   ].NUL  NUL.NUL  NUL.NUL  NUL.SI      *
* 110.105  114.114  117.040  115.107    *
*   H. E   L. L    O.         M. G      *
* 122.056  123.                         *
*   R. .    S.                          *
*****************************************
*****************************************
* Time=21.83                            *
*       From PIN=%135 To PIN=%0         *
*           REMOTE HELLO request        *
* 010006     HeadLength (words)=16      *
* 000001     Remote Computer ID=1       *
* 000000     Substream Type=%000000     *
* 000017     DSDataL (bytes)=15         *
* Header:                               *
* %010006 000001 000020 000000 056400   *
*   000000 000000 000017               *
* Appendage:                            *
* 044105 046114 047440 046507 051056    *
* H  E   L  L  O     M  G  R  .         *
* 051440                                *
* S                                     *
* DS MESSAGE IS TRUNCATED               *
*****************************************
```

Figure 4-17. PSCT Trace Entry.

The X.25 Level 2 header interpretation here tells us ADDR=DCE (it would be interpreted as B by CSDUMP), and 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 20 (or virtual circuit 20), and since Q=0, the user data display shows the beginning of a DS message.

The DS level header intepretation tells us this is a :REMOTE HELLO request from PIN %135 to the remote system. Examination of the appendage section shows the beginning of the user's logon.

PRTX Trace Entries

```
++++++++++++++++++++++++++++++++++++++++++++
+ PRCT       I Frame N(R)= 6 P=0 N(S)= 5 +
+ 25.61          LEVEL 2.               DTE +
+ SCT/RCT Control Frame data display    +
+ 020.024  144.012  005.000  000.000    +
+ DLE.DC4     d.LF   ENQ.NUL  NUL.NUL    +
+ 020.240  000.021  135.000  000.000    +
+ DLE.!!!   NUL.DC1    ].NUL  NUL.NUL    +
+ 000.000  116.000  000.000  000.012    +
+ NUL.NUL     N.NUL  NUL.NUL  NUL.LF     +
+ 005.000  000.000  020.200             +
+ ENQ.NUL  NUL.NUL  DLE.!!!             +
+++++++++++++  LEVEL 3.  ++++++++++++++++++
* Length=32     Packet ID=0    %000  !00  *
* Type=DTE/DCE Data Packet                *
* Log Channel No=20      %000024 !0014    *
* P(R)=3    P(S)=2    Q=0    M=0   D=0     *
* User Data Display                       *
* 012.005  000.000  000.020  240.000      *
* LF .ENQ  NUL.NUL  NUL.DLE  !!!.NUL       *
* 021.135  000.000  000.000  000.116      *
* DC1.  ]  NUL.NUL  NUL.NUL  NUL.  N       *
* 000.000  000.000  012.005  000.000       *
* NUL.NUL  NUL.NUL  LF .ENQ  NUL.NUL       *
* 000.020  200.                           *
* NUL.DLE  !!!.                            *
*******************************************
*******************************************
* Time=25.61                              *
*       From PIN=%21 To PIN=%135          *
*           PRINT-TO TERMINAL request     *
*           AttachIO Parm1=%000000        *
*           AttachIO Parm2=%000000        *
* 005005    HeadLength (words)=10         *
* 000000    Remote Computer ID=0          *
* 120000    Substream Type=%120000        *
* 000116    DSDataL (bytes)=78            *
* Header:                                 *
* %005005 000000 000020 120000 010535     *
*   000000 000000 000116                  *
* Appendage:                              *
* 000000 000000                           *
* .   .    .   .                          *
* Data:                                   *
* 005005 000000 000020 100040             *
* .   .   .    .   .   .                   *
* DS MESSAGE IS TRUNCATED                  *
*******************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138        Entry Length=32  ^
^ 000.021  135.000  000.000  000.000     ^
^ NUL DC1     ] NUL  NUL NUL  NUL NUL     ^
```

Figure 4-18. PRTX Trace Entry.

```
^ 071.000  000.000  000.110  120.063  ^
^   9 NUL   NUL NUL  NUL   H    P    3 ^
^ 060.060  060.040  057.040  115.120  ^
^   0   0    0         /         M    P ^
^ 105.040  111.126  040.103  056.060  ^
^   E     I    V       C     .    O   ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138      Entry Length=32  ^
^ 060.056  062.060  056.040  040.115  ^
^   0   .     2   0      .         M   ^
^ 117.116  054.040  101.120  122.040  ^
^   O   N    ,       A    P    R      ^
^ 061.070  054.040  061.071  070.063  ^
^   1   8    ,         1   9    8    3 ^
^ 054.040  061.061  072.064  060.040  ^
^   ,         1   1    :    4    0    ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PRTX LIMIT=138      Entry Length=4   ^
^ 101.115  125.012                     ^
^   A   M   U LF                        ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

Figure 4-18. PRTX Trace Entry (continued).

The PRTX entries here, when appended to the user data display at level 3, form a complete DS message. The MPE logon message from the remote system is being printed on user PIN %135's terminal.

PSTX Trace Entries

```
++++++++++++++++++++++++++++++++++++++++++
+ PSCT      I Frame N(R)= 2 P=0 N(S)= 2 +
+ 21.83          LEVEL 2.             DCE +
+ SCT/RCT Control Frame data display    +
+ 020.024  000.020  006.000  001.000    +
+ DLE.DC4  NUL.DLE  ACK.NUL  SOH.NUL     +
+ 020.000  000.135  000.000  000.000     +
+ DLE.NUL  NUL. ]   NUL.NUL  NUL.NUL     +
+ 000.000  017.110  105.114  114.117     +
+ NUL.NUL  SI . H    E. L     L. O       +
+ 040.115  107.122  056.123              +
+   . M     G. R     .. S                +
++++++++++++  LEVEL 3.  ++++++++++++++++++
* Length=32    Packet ID=0    %000  !00  *
* Type=DTE/DCE Data Packet                *
* Log Channel No=20     %000024 !0014    *
* P(R)=0    P(S)=0    Q=0   M=0   D=0     *
* User Data Display                       *
* 020.006  000.001  000.020  000.000     *
* DLE.ACK  NUL.SOH  NUL.DLE  NUL.NUL      *
* 135.000  000.000  000.000  000.017     *
*   ].NUL  NUL.NUL  NUL.NUL  NUL.SI       *
* 110.105  114.114  117.040  115.107     *
*  H. E     L. L     O.       M. G        *
* 122.056  123.                          *
*  R.  .    S.                            *
******************************************
******************************************
* Time=21.83                              *
*       From PIN=%135 To PIN=%0           *
*          REMOTE HELLO request           *
* 010006     HeadLength (words)=16        *
* 000001     Remote Computer ID=1         *
* 000000     Substream Type=%000000       *
* 000017     DSDataL (bytes)=15           *
* Header:                                 *
* %010006 000001 000020 000000 056400     *
*   000000 000000 000017                  *
* Appendage:                              *
* 044105 046114 047440 046507 051056      *
* H  E    L  L    O       M  G    R   .    *
* 051440                                  *
* S                                       *
* DS MESSAGE IS TRUNCATED                  *
******************************************
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
^ PSTX LIMIT=138      Entry Length=6     ^
^ 105.063  063.070  015.316             ^
^  E  3    3   8   CR  !!!               ^
^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
```

This PSTX entry, when appended to the user data display at level 3, forms a complete DS message. The user (PIN %135) is logging on to the remote system.

PCMP Trace Entries

```
OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
o  PCMP                    STATE=CONN.      o
o 9.20            LEVEL 2. ID=%045606 !4B86o
o Error Code=     0    Last Recov Err=0  o
o # MSG Sent=2         # MSG Rec=1        o
o # Recov Err=0        # Irrec Errs=0     o
OOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOOO
```

Figure 4-20. 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 4-22) for explanation of this entry.

End of Trace and Line Information Messages

```
******************************************************
*-L-I-N-E---I-N-F-O-R-M-A-T-I-O-N---D-I-S-P-L-A-Y*
******************************************************
*  LINE NUMBER: 3        LOGICAL DEV. NUMBER: 11   *
*  DEV. TYPE: 17          SUBTYPE: 3    VER: A.55.27 *
*                0123456789012345                   *
*    COPTIONS: 0000100101000000                     *
*    AOPTIONS: 0000001100001101                     *
*    DOPTIONS: 0000000000000111                     *
*  NETWORK'ID: 0000000000000000                     *
*  NUMBUFFERS: 242        BUFFSIZE: 514   (WORDS)   *
*  INSPEED: 7000          OUTSPEED: 7000            *
*  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: 8           *
*                 CLEAR-TO-SEND DELAY: 00.0  SECS.  *
*                 DATA-SET-READY DELAY: DISABLED.   *
*                    TRANSMISSION MODE: DUPLEX.     *
*               MMSTAT TRACE FACILITY: ENABLED.     *
*  DRIVERNAME: IOINP0                               *
*  DOWNLOAD FILE: CSDLAPB2                          *
*  CTRACEINFO:   ENTRIES=16      MASK=011111000     *
*               TYPE OF TRACE = ALL, NOWRAP         *
*  PHONELIST:   ENTRIES=0        INDEX=0            *
*  IDLIST:      ENTRIES=0        INDEX=0            *
*  ERRORCODE:  RECOVERABLE=0   IRRECOVERABLE=202 *
*  MSGSENT: 54             MSGRECV: 34              *
*  RECOVERRORS: 0          IRRECOVERRORS: 0         *
******************************************************
```

Figure 4-21. End of Trace and Closing Line Information.

The Line Information Display gives us the state of the line just before tracing was stopped. Note the counts of messages sent (54), messages received (34), and recoverable and irrecoverable errors (0 and 0) that have transpired while the trace facility was enabled.

DS MESSAGE FORMATS

HOW TO USE THIS SECTION

This section is intended to aid in the debugging of DS application programs. It is assumed that you are analyzing a CSDUMP trace listing, or output from a line monitor.

DS messages are uniquely identified according to Message Class and Stream Type. Specific Stream Types within each Message Class are summarized in Table 5-1.

This section presents only the format of each message and shows what the individual parts of the message represent. For details on the values and meanings of a particular message, you must refer to the appropriate reference manual. Table 5-2 correlates reference manuals to DS message intrinsics.

Table 5-1. DS Message Summary

MESSAGE CLASS	STREAM TYPE	FS INTRINSIC or IMAGE INDEX	MESSAGE NAME
0	%20(!10,16) %21(!11,17)		Initialization Request/Reply Termination Request/Reply
3	%20(!10,16)		REMOTE COMMAND (Exclusive of HELLO and BYE)
4	%22(!12,18) %23(!13,19) %24(!14,20) %26(!16,22) %27(!17,23)		PREAD Request PWRITE Request PCONTROL Request PREAD, PWRITE, or PCONTROL Reply Accept PREAD, PWRITE, or PCONTROL Reply Reject
5	%20(!10,16) %21(!11,17) %23(!13,19) %24(!14,20)		Print to $STDLIST Read from $STDIN FCONTROL for $STDIN/$STDLIST Abort Read Request

6	%20(!10,16)
	%21(!11,17)
	
	%22(!12,18)
	%23(!13,19)
	%24(!14,20)
	%25(!15,21)
	%27(!17,23)
	%31(!19,25)
	%32(!1A,26)
			Remote HELLO
			Remote BYE
			CONTROL MESSAGE:
			    - Request Break
			    - Request Abort
			    - Request Resume
			    - Request Control-Y
			    - Request Kill Job
			PTOP Flow Message
			PTOP Flow Resume Message

Table 5-1 (continued). DS Message Summary

MESSAGE CLASS	STREAM TYPE	FS INTRINSIC or IMAGE INDEX	MESSAGE NAME
7	%20(!10,16)	1	FOPEN
		2	FCLOSE
		3	FREAD (Not Multirecord)
		4	FREADDIR (Not Multirecord)
		5	FREADSEEK
		6	FWRITE (Not Multirecord)
		7	FWRITEDIR (Not Multirecord)
		%10(!8,8)	FREADLABEL
		%11(!9,9)	FWRITELABEL
		%12(!A,10)	FUPDATE (Not Multirecord)
		%13(!B,11)	FSPACE
		%14(!C,12)	FPOINT
		%15(!D,13)	FGETINFO
		%16(!E,14)	FCHECK
		%17(!F,15)	FCONTROL
		%20(!10,16)	FSETMODE
		%21(!11,17)	FRENAME
		%22(!12,18)	FRELATE
		%23(!13,19)	FLOCK
		%24(!14,20)	FUNLOCK
		%30(!18,24)	FREAD (Multirecord)
		%31(!19,25)	FREADDIR (Multirecord)
		%32(!1A,26)	FWRITE (Multirecord)
		%33(!1B,27)	FWRITEDIR (Multirecord)
		%34(!1C,28)	FUPDATE (Multirecord)
		%44(!24,36)	DBOPEN
		%45(!25,37)	DBINFO
		%46(!26,38)	DBCLOSE
		%47(!27,39)	DBFIND
		%50(!28,40)	DBGET
		%51(!29,41)	DBUPDATE
		%52(!2A,42)	DBPUT
		%53(!2B,43)	DBDELETE
		%54(!2C,44)	DBLOCK
		%55(!2D,45)	DBUNLOCK
		%56(!2E,46)	DBCONTROL
		%57(!2F,47)	DBBEGIN
		%60(!30,48)	DBEND
		%61(!31,49)	DBMEMO
		%63(!33,51)	FDELETE
		%64(!34,52)	FFILEINFO
		%65(!35,53)	FDEVICECONTROL
	%21(!11,17)	%25(!15,21)	POPEN Request
		%26(!16,22)	PCLOSE
	%22(!12,18)		RFA Request (Remote Hello on Slave - Initial DSOPEN)

Table 5-1 (continued). DS Message Summary

MESSAGE CLASS	STREAM TYPE	FS INTRINSIC or IMAGE INDEX	MESSAGE NAME
7	%23(!13,19)	%35(!1D,29)	KSAM FFINDN
		%36(!1E,30)	KSAM FFINDBYKEY
		%37(!1F,31)	KSAM FGETKEYINFO
		%40(!20,32)	KSAM FREADBYKEY
		%41(!21,33)	KSAM FREADC
		%42(!22,34)	KSAM FREMOVE
		%43(!23,35)	KSAM KSPACE
	%26(!16,22)	%25(!15,21)	POPEN Reply Accept
	%27(!17,23)	%25(!15,21)	POPEN Reply Reject
%11	%21(!11,17)		QOPEN (Master to Slave) Request
	%22(!12,18)		QOPEN (Master to Slave) Accept Reply or QWRITEREAD (Master to Slave or Slave to Master)
	%23(!13,19)		QOPEN (Master to Slave) Reject Reply or QCLOSE (Master to Slave or Slave to Master)

Table 5-2. Manuals to use with message formats.

| Messages and starting letter:	Refer to the:
System Intrinsics (Print, Read) File System Intrinsics (start with F)	MPE Intrinsics Reference Manual
DSCOPY Intrinsics (start with Q) PTOP Intrinsics (start with P)	DS/3000 User/Programmer Reference Manual
KSAM Intrinsics (start with K)	KSAM/3000 Reference Manual
Database Intrinsics (start with DB)	TurboIMAGE Reference Manual

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

For DS messages used in HP 3000 to HP 1000
connections, refer to the *DS/1000-IV Network
Manager's Manual.*

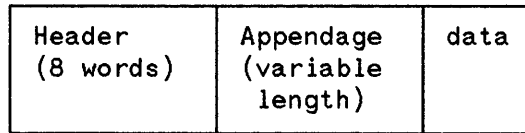## BASIC MESSAGE FORMATS

The Bisync and X.25 protocols each add various headers and trailers to the DS messages. (See Figure
5-1.) These headers and trailers are not HP-specific, and so will not be discussed here. We will discuss
only the DS message formats. The Bisync and X.25 headers and trailers are discussed in sections 3 and
4, respectively.

bisync or X.25 headers	DS message	bisync or X.25 trailers
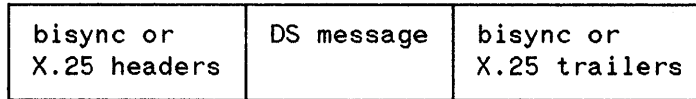
Figure 5-1. DS message with bisync and X.25 headers and trailers.
(not to scale)

The basic DS message formats for X.25 and Bisync are as follows:

Header (8 words)	Appendage (variable length)	data

Figure 5-2. Basic DS message format (X.25).
(not to scale)

Header (8 words)	Appendage	Data	

sequence numbers ──┘
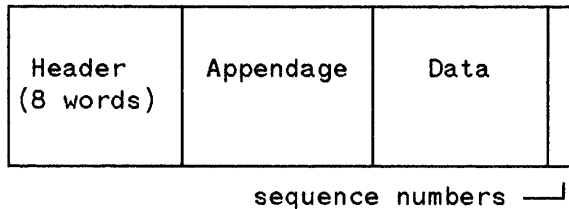
Figure 5-3. Basic DS message format (Bisync)
(not to scale)

The DS header (also known as the DS fixed header) is always 8 words long. The appendage is of
variable length; the 8th word of the DS header contains the combined lengths of the appendage and
the data, in bytes. Data can include such items as information that has been read or is to be written,
and so on.

For Bisync, the basic DS message format has one additional word following the data section (see Figure 5-3). This word contains the text block sequence numbers, where the format is as follows:
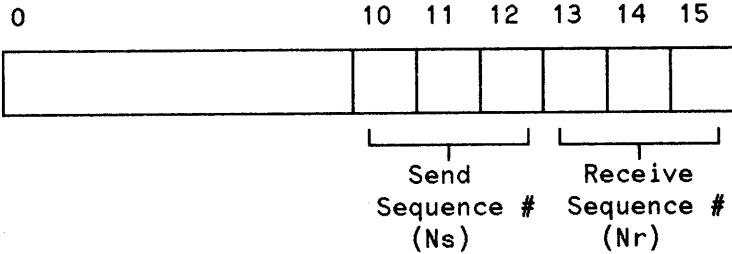
Figure 5-4. Sequence Numbers for Bisync DS messages.
(not to scale)

| NOTE |

For HP 3000 to HP 1000 connections, sequence numbers are not supported.

HEADER FORMATS

General Header Format

This section will explain the standard DS header. This header, 8 words long, will be present as shown for all messages except for those of Class 0 (Initialization and Termination Request and Reply). Those messages are explained following this section.

```
       0  1  2  3  4  5  6  7  8  9 10 11 12 13 14 15

  0 | Length of header and    | Message Class          |
    | appendage in words      |                        |

  1 | VC number (X.25) or 0 (bisync)                    |

  2 |RP|RJ|CN|BR|CM|NB|       | Stream type            |

  3 |CL| 0|PX|          0                          | PR|

  4 | C.I. from process       | C.I. to process        |

  5 |            RTE sequence number                    |

  6 |          0              | Version                |

  7 | Length (in bytes) of appendage and data           |
```

Word 0   (0:8)   is the length of the header and appendage in words. The length of the fixed header is 8 words. Therefore, the length of appendage is Word 0(0:8)-8 in words.

(8:8)   is the message class, which can be 0, 3, 4, 5, 6, 7, or %11.

Word 1   Virtual circuit number for X.25. For bisync, this is 0.

Word 2   (0:1) RP -- Reply bit. On if the message is a reply.

(1:1) RJ -- Reject bit. On if the message received has been rejected by the remote system.

(2:1) CN -- Continue bit. On if a continuation message is to follow.

(3:1) BR -- Break bit. On if the user's session is in break mode.

(4:1) CM -- Compression bit. On if the message has been compressed.

(5:1) NB -- Non-PTOP break bit. On if a break for non-PTOP activity has been detected.

(8:8) Stream type -- the message stream types are currently %20 (!10, 16) to %32 (!1A, 26).

Word 3 (0:1) CL -- On implies clear break mode for the terminal.

      (2:1) PX -- On implies print for the terminal, over an X.25 line.

      (14:2) PR -- Pre-emptive bits.
          0 -- not a pre-emptive message
          1 -- soft pre-emptive message
          2 -- hard pre-emptive message

Word 4 (0:8) -- Command Interpreter main From process identification number (PIN). For an HP1000, this is an LU number, or 0. For MPE V/E this is a virtual pin.

      (8:8) -- Command Interpreter main To process identification number (PIN). For an HP1000, this is an LU number, or 0. For MPE V/E this is a virtual pin.

Word 5 RTE sequence number for HP 1000. If talking to an HP 3000, it is 0. DS/3000 just sends back the same sequence number received from the HP 1000. DS/1000-IV increments this with each message and uses it as a "timestamp."

Word 6 (8:8) -- If the message is a REMOTE HELLO Request or Reply, this field is set to a non-zero value for MPE V/E. If the message is not REMOTE HELLO, or if a version prior to MPE V/E is being used, then this field is zero.

Word 7 Length in bytes of the appendage and data. Thus, the length of data in bytes is Word 7 - ((Word 0(0:8)-8) * 2).

MESSAGE FORMATS

Message Class 0

(This message class applies to DS using the bisync protocol only.)

Initialization Request/Reply

Message Class = 0
Stream Type =%20(!10,16)

Initialization Request

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0			8_{16}									0				
1					0										MC	0
2						10_{16}										
3	Max buffer size								Current buffer size							
4						0										
5						0										
6	0		S	E		C		M				0				
7						0										

Initialization Reply

	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
0			8_{16}									0				
1					0										MC	SC
2	1					10_{16}										
3			0						Actual buffer size							
4						0										
5						0										
6	R		S	E		C		M				0				
7						0										

Word 0   (0:8) is the length in words of the header and appendage.

Word 1   (14:1) MC=1 if the master can compress data (for request only).
                (14:1) MC=0 for reply.
                (15:1) SC=0 for request.
                (15:1) SC=1 if the slave can compress data (for reply only).

Word 2   (0:1) Bit 0 is the reply bit. The stream type is %20 (!10, 16).

                (0:1) Bit 0=1 implies that this is a reply.

Word 3   All buffer sizes are ((actual size)$_{10}$/16) −1 in words.
                Max size = 0 => exclusive mode requested (request only).
                Actual size = 0 => exclusive mode rejected.

Word 6   R is the mask reply bit -- on only if the mask is transmitted in an
                  Initialization Reply.
                S is the sequence bit -- on only if Sequence Numbers are supported
                E is the exclusive bit -- on only if DS supports exclusive mode without
                  exclusive mode protocol.
                C is the continuation bit -- on only if DS supports low level continuation
                  records.
                M is the buffer size bit -- denotes that the buffer size being sent is
                  the maximum that can be handled.

                Potential expansion can take place in the capability mask for future enhanced
                capabilities.

Termination Request/Reply

Message Class = 0
Stream Type = %21(!11, 17)

Termination Request

	0 1 2 3 4 5 6 7	8 9 10 11 12 13 14 15
0	8_{16}	0
1	0	
2	11_{16}	
3	0	
4	0	
5	0	
6	0	
7	0	

Termination Reply

	0 1 2 3 4 5 6 7	8 9 10 11 12 13 14 15
0	8_{16}	0
1	0	
2	RP RJ 11_{16}	
3	0	
4	0	
5	0	
6	0	
7	0	

Word 2   (0:1)   RP -- Reply bit. Set if and only if termination request is accepted.
(reply only)

(1:1)   RJ -- Reject bit. Set if and only if the termination request is rejected.

Message Class 3

REMOTE COMMAND
(Exclusive of HELLO and BYE)

Message Class = 3
Stream Type = %20 (!10, 16)

REQUEST

$$\left(\frac{17 + AL_{1\emptyset}}{2}\right)_{\!\!1\emptyset} \quad 3$$

$1\emptyset_{16}$

$AL_8 + \emptyset$

Head Section

command

Appendage Section

REPLY

$8_{16} \quad 3$

$1 \quad 1\emptyset_{16}$

$\emptyset + \emptyset$

Head Section
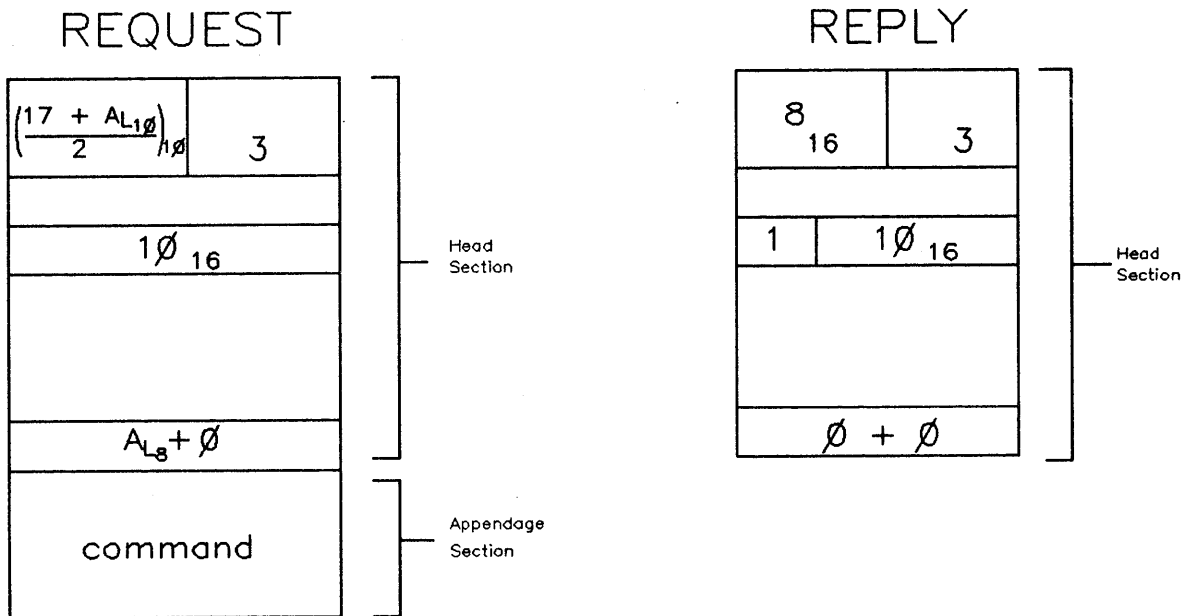
Message Class 4

PREAD

Message Class = 4
Stream Type   = %22 (!12, 18) Request
       = %26 (!16, 22) Reply Accept
       = %27 (!17, 23) Reply Reject

REQUEST

21_{16}	4
$*12_{16}$	
$n = 32_{16} + \emptyset$	

Head Section

0	/////////
1	tcount
2	PROG ID#
3	I/O CLASS
4	TERM #
5	
	TAG FIELD
	14_{16} WORDS

Appendage Section

*After First PREAD,
Continuation
Stream = $1E_{16}$

REPLY

FIRST RECORD

21_{16}	4
X**	
$32_{16} + D_L$	

Head Section

0	ERROR CODE
1	tcount'
2	PROG ID#
3	I/O CLASS
4	TERM #
5	
	TAG FIELD
	14_{16} WORDS

Appendage Section

	DATA
	(ACCEPT ONLY)

Data Section

CONTINUATION RECORD
(ACCEPT ONLY)

D_{16}	4
X*	
$A_{16} + D_L$	

Head Section

0	/////////
1	tcount'
2	PROG ID#
3	I/O CLASS
4	TERM #

Appendage Section

	DATA

Data Section
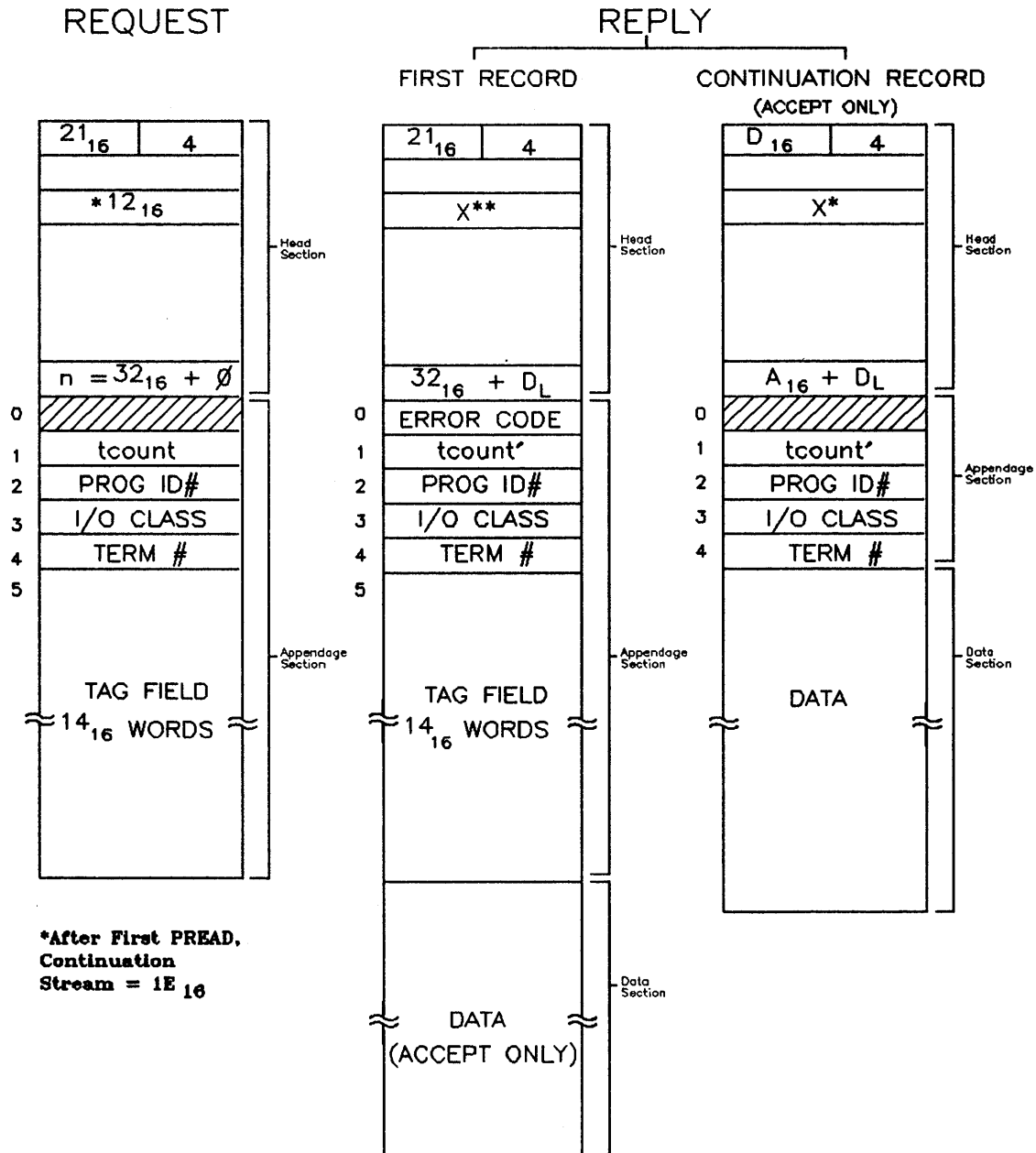
PWRITE

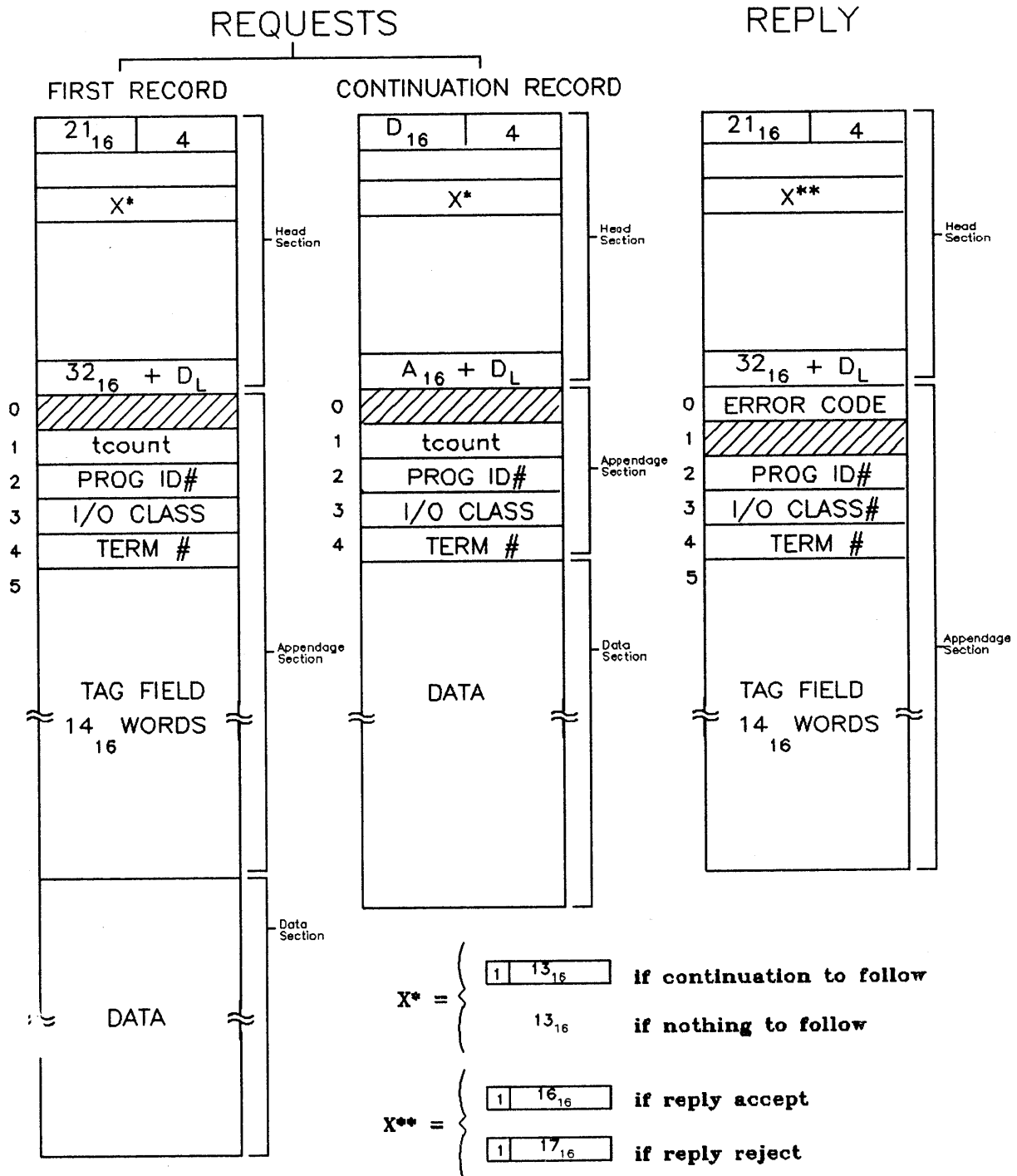Message Class = 4
Stream Type   = %23 (!13, 19) Request
                        = %26 (!16, 22) Reply Accept
                        = %27 (!17, 23) Reply Reject

PCONTROL

Message Class = 4
Stream Type   = %24 (!14, 20)   Request
                 = %26 (!16, 22)   Reply Accept
                 = %27 (!17, 23)   Reply Reject

REQUEST

21_{16}	4
14_{16}	Head Section
32_{16}	

0	////////
1	////////
2	PROG ID#
3	I/O CLASS ID#
4	TERM#
5	
≈	TAG FIELD 14_{16} WORDS

Appendage Section

REPLY

21_{16}	4
X*	Head Section
$32_{16} + \emptyset$	

0	cc ERROR CODE
1	////////
2	PROG ID#
3	I/O CLASS ID#
4	TERM#
5	
≈	TAG FIELD 14_{16} WORDS

Appendage Section
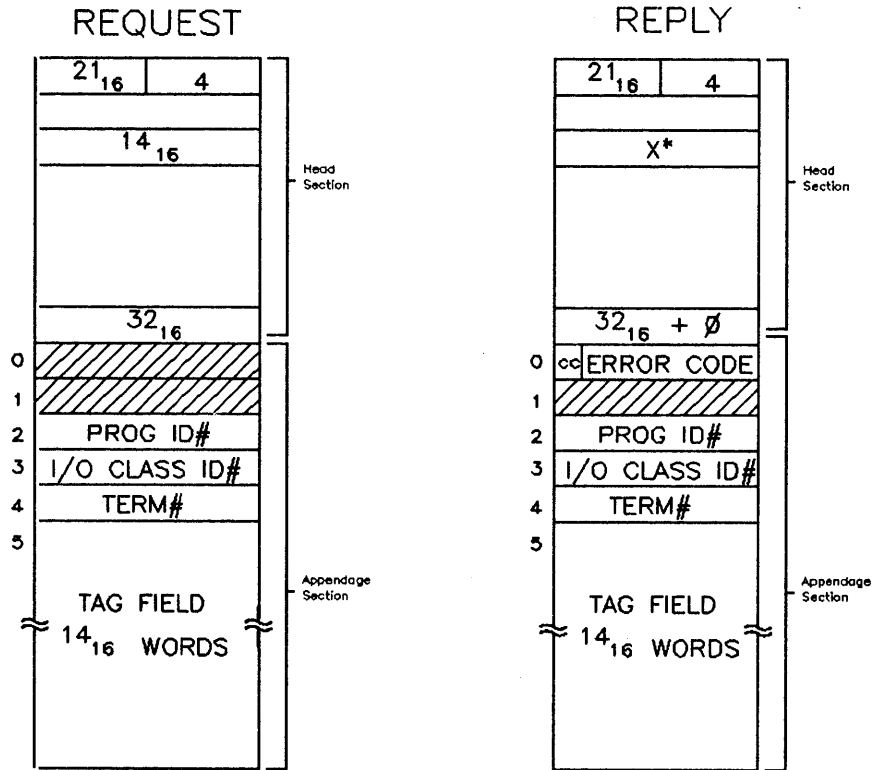
$$X^* = \begin{cases} \boxed{1 \quad 16_{16}} & \text{if reply accept} \\ \boxed{1 \quad 17_{16}} & \text{if reply reject} \end{cases}$$

Message Class 5

Print to $STDLIST

Message Class = 5
Stream Type = %20 (!10, 16)

REQUEST

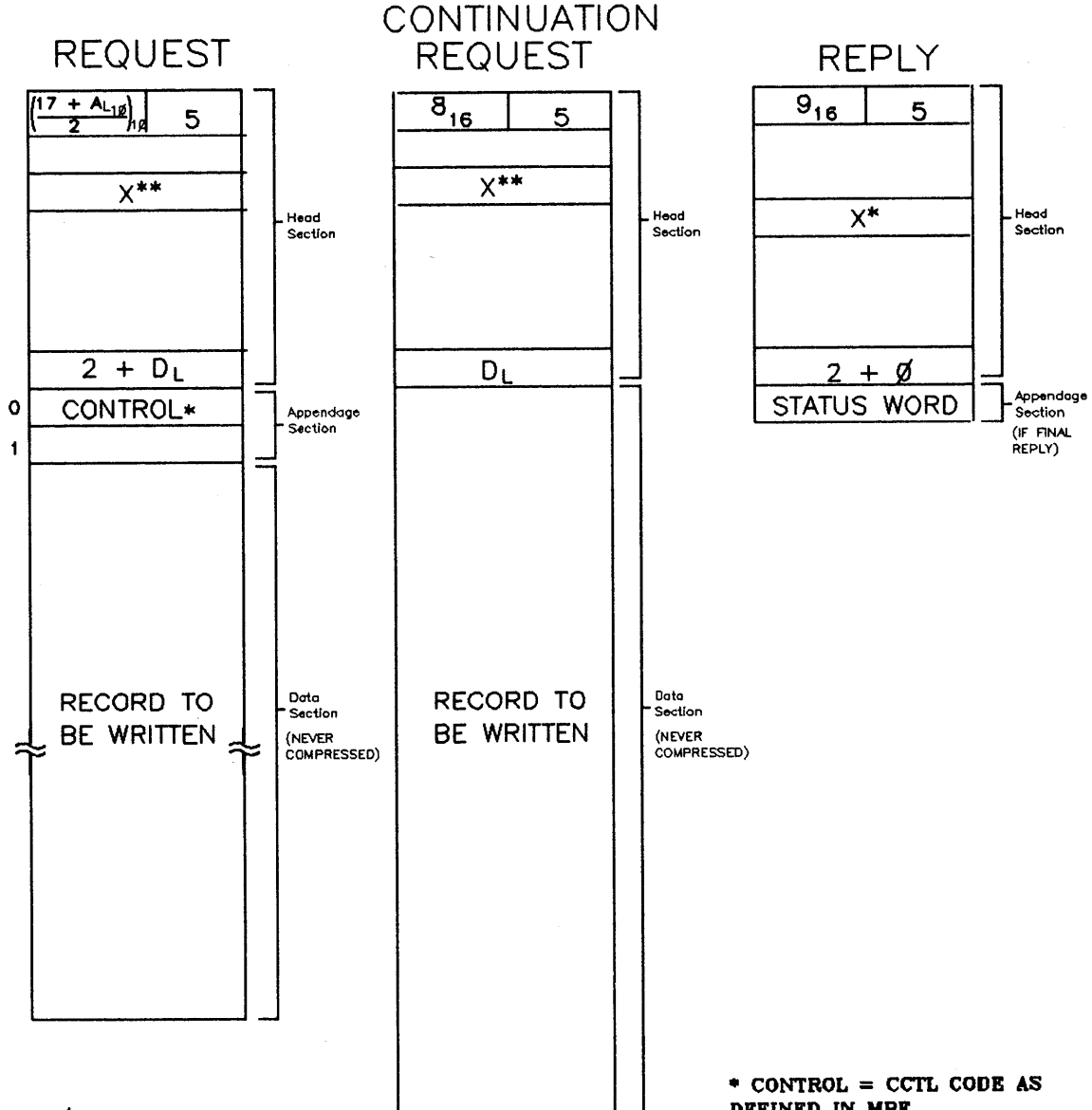| $\left(\frac{17 + A_{L10}}{2}\right)_{10}$ | 5 |
X**	
	Head Section
2 + D_L	
0 CONTROL*	Appendage Section
1	
RECORD TO BE WRITTEN	Data Section (NEVER COMPRESSED)

CONTINUATION REQUEST

8_{16}	5
X**	
	Head Section
D_L	
RECORD TO BE WRITTEN	Data Section (NEVER COMPRESSED)

REPLY

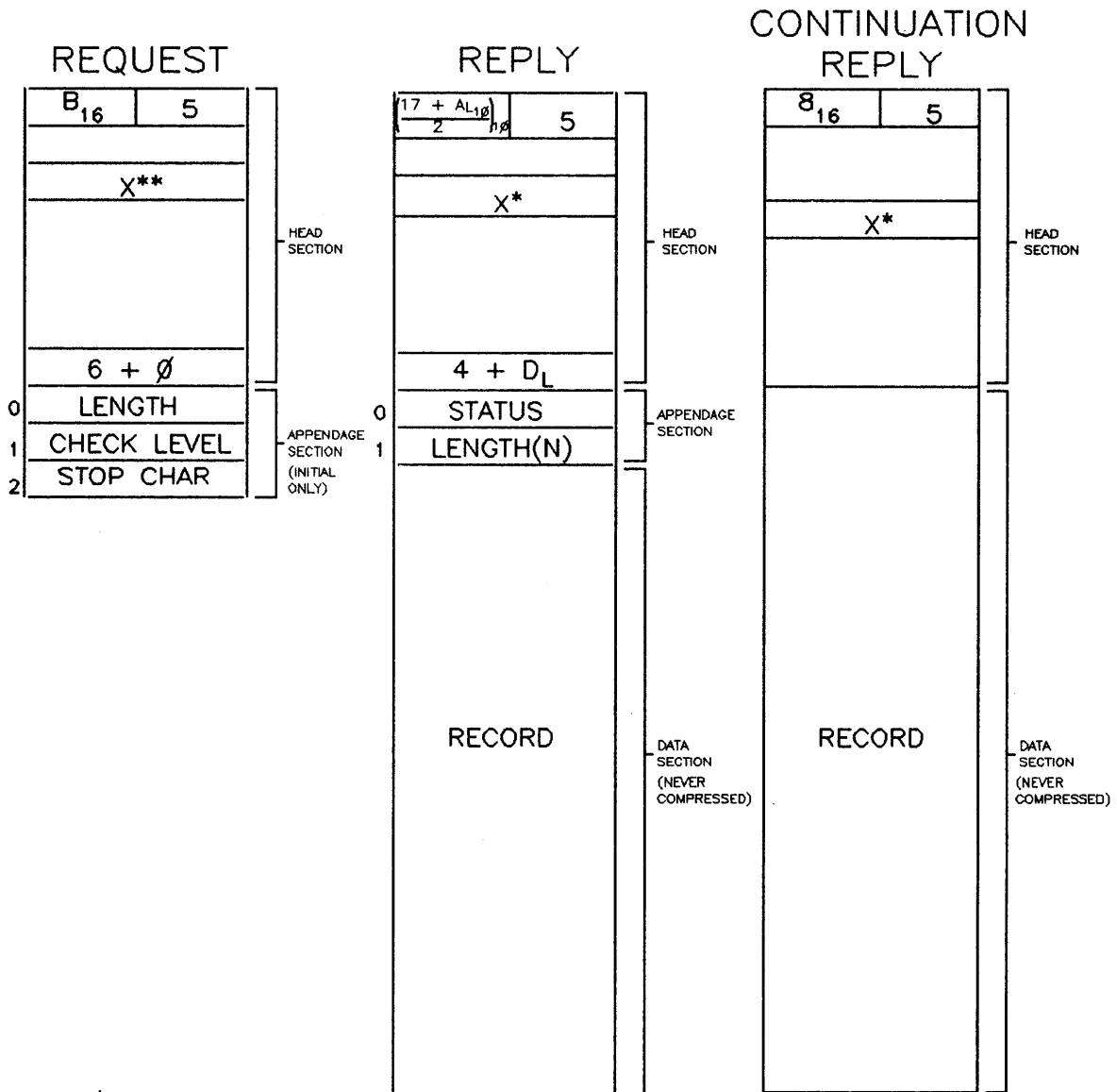| 9_{16} | 5 |
X*	
	Head Section
2 + Ø	
STATUS WORD	Appendage Section (IF FINAL REPLY)

$X* = \begin{cases} \boxed{1\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation reply} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if final reply} \end{cases}$

$X** = \begin{cases} \boxed{\emptyset\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

* CONTROL = CCTL CODE AS DEFINED IN MPE

Read from $STDIN

Message Class = 5
Stream Type = %21 (!11, 17)

REQUEST

| B$_{16}$ | 5 |

X**

6 + Ø

0	LENGTH
1	CHECK LEVEL
2	STOP CHAR

HEAD SECTION

APPENDAGE SECTION (INITIAL ONLY)

REPLY

| $\frac{17 + AL_{1\emptyset}}{2}$ hø | 5 |

X*

4 + D$_L$

| 0 | STATUS |
| 1 | LENGTH(N) |

RECORD

HEAD SECTION

APPENDAGE SECTION

DATA SECTION (NEVER COMPRESSED)

CONTINUATION REPLY

| 8$_{16}$ | 5 |

X*

RECORD

HEAD SECTION

DATA SECTION (NEVER COMPRESSED)

X* =
| 1Ø1 | 11$_{16}$ | if continuation to follow
| 1 | 11$_{16}$ | if nothing to follow

X** =
| ØØ1 | 1Ø$_{16}$ | if continuation request
1Ø$_{16}$ if initial request

FCONTROL for $STDIN/$STDLIST

Message Class = 5
Stream Type = %23 (!13, 19)

REQUEST

B_{16}	5
13_{16}	
$6 + \emptyset$	
filenum	
control code	
param	

Head Section

Appendage Section

REPLY

A_{16}	5
1	13_{16}
$4 + \emptyset$	
status	
param	

Head Section

Appendage Section
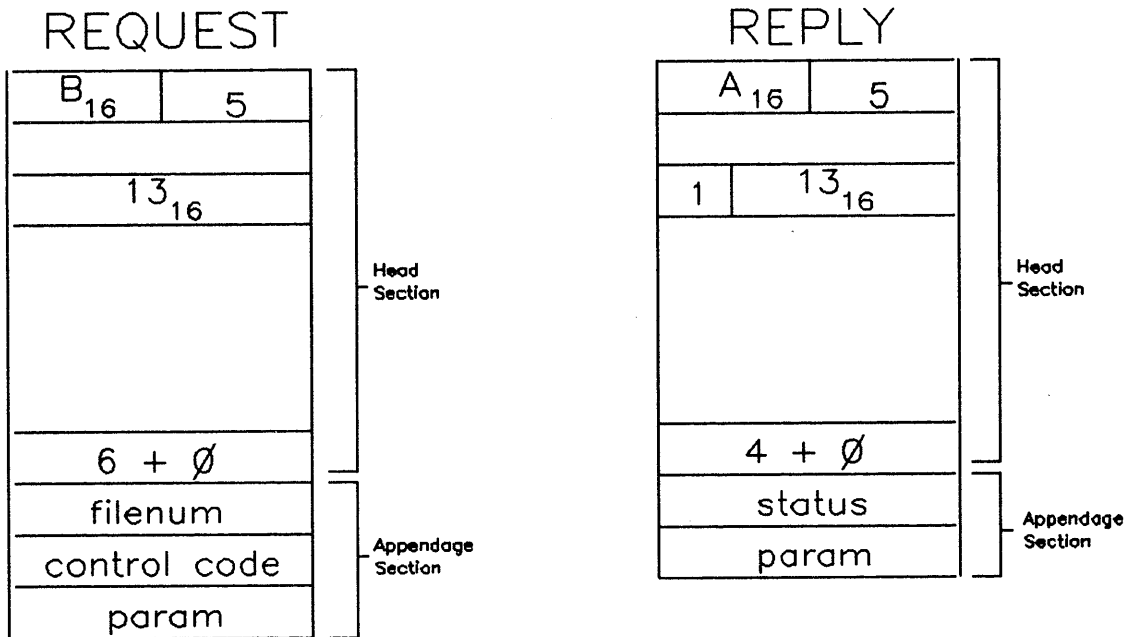
Negative FCONTROL codes are used to cause ATTACHIOs on the real terminal with a request code equal to the absolute value of the FCONTROL code.
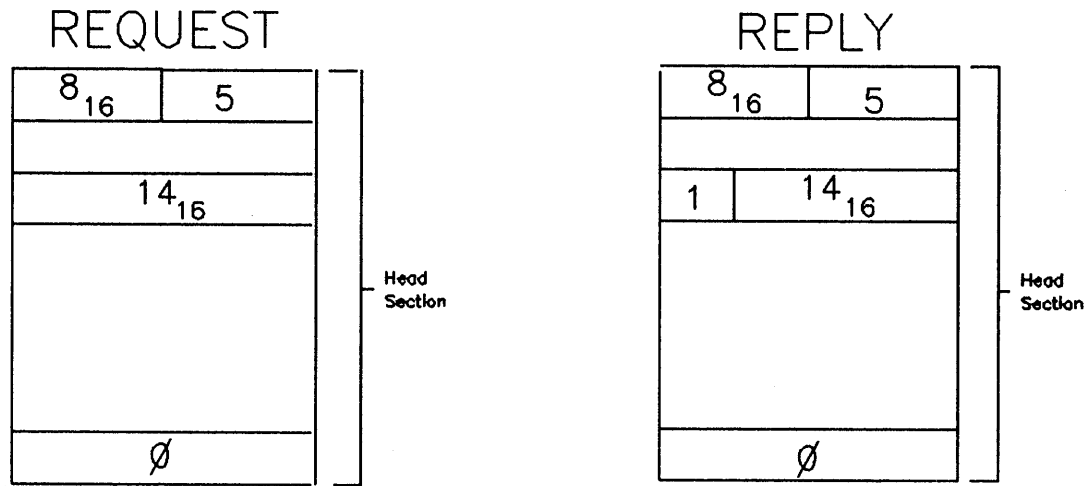
Exception: A control code of −28 is a request to expand the print buffer on the master side. The appendage is as follows:

filenum
−28
required word size/ actual word granted in reply

Abort Read Request

Message Class = 5
Stream Type = %24 (!14, 20)

REQUEST

8_{16}	5
14_{16}	
$\emptyset$	

— Head Section

REPLY

8_{16}	5
1	14_{16}
$\emptyset$	

— Head Section

Message Class 6

Remote HELLO

Message Class = 6
Stream Type = %20 (!10, 16)

REQUEST

$\left(\frac{17 + AL_{10}}{2}\right)_{10}$	6

10_{16}

Head Section

$A_L + 0$

3000
COMMAND
HELLO

Appendage Section

REPLY

8_{16}	6

| 1 | 10_{16} |

Head Section

$0 + 0$
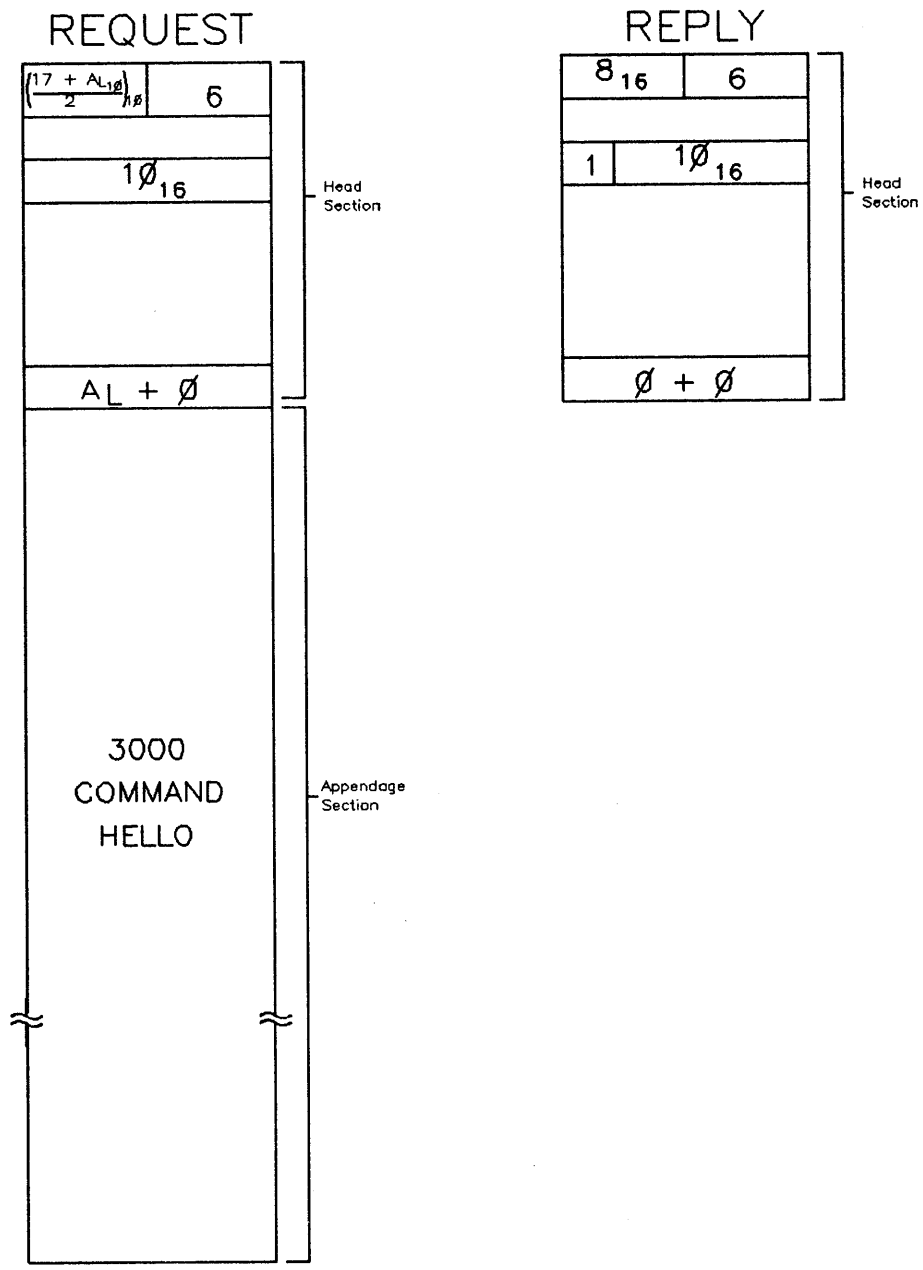
Remote BYE

Message Class = 6
Stream Type = %21 (!11, 17)

REQUEST

```
┌─────────────────┬─────────┐ ┐
│ (17 + A_L₁∅)    │         │ │
│ ──────────── ∣₁∅│    6    │ │
│      2          │         │ │
├─────────────────┴─────────┤ │
│                           │ ├ Head
│          11₁₆             │ │  Section
├───────────────────────────┤ │
│                           │ │
│                           │ │
│                           │ │
├───────────────────────────┤ ┘
│        A_L + ∅            │ ┐
├───────────────────────────┤ │
│                           │ │
│                           │ │
│                           │ │
│         3000              │ │
│        COMMAND            │ ├ Appendage
│          BYE              │ │  Section
│                           │ │
│                           │ │
│     ≈           ≈         │ │
│                           │ │
└───────────────────────────┘ ┘
```

$$\left(\frac{17 + A_{L1\emptyset}}{2}\right)\bigg|_{1\emptyset} \quad 6$$

$$11_{16}$$

$$A_L + \emptyset$$

3000
COMMAND
BYE

REPLY

```
┌─────────┬─────────┐ ┐
│  8₁₆    │    6    │ │
├───┬─────┴─────────┤ │
│ 1 │    11₁₆       │ ├ Head
├───┴──────────────┤ │  Section
│                  │ │
├──────────────────┤ ┘
│     ∅ + ∅       │
└──────────────────┘
```

$$8_{16} \quad 6$$

$$1 \quad 11_{16}$$

$$\emptyset + \emptyset$$
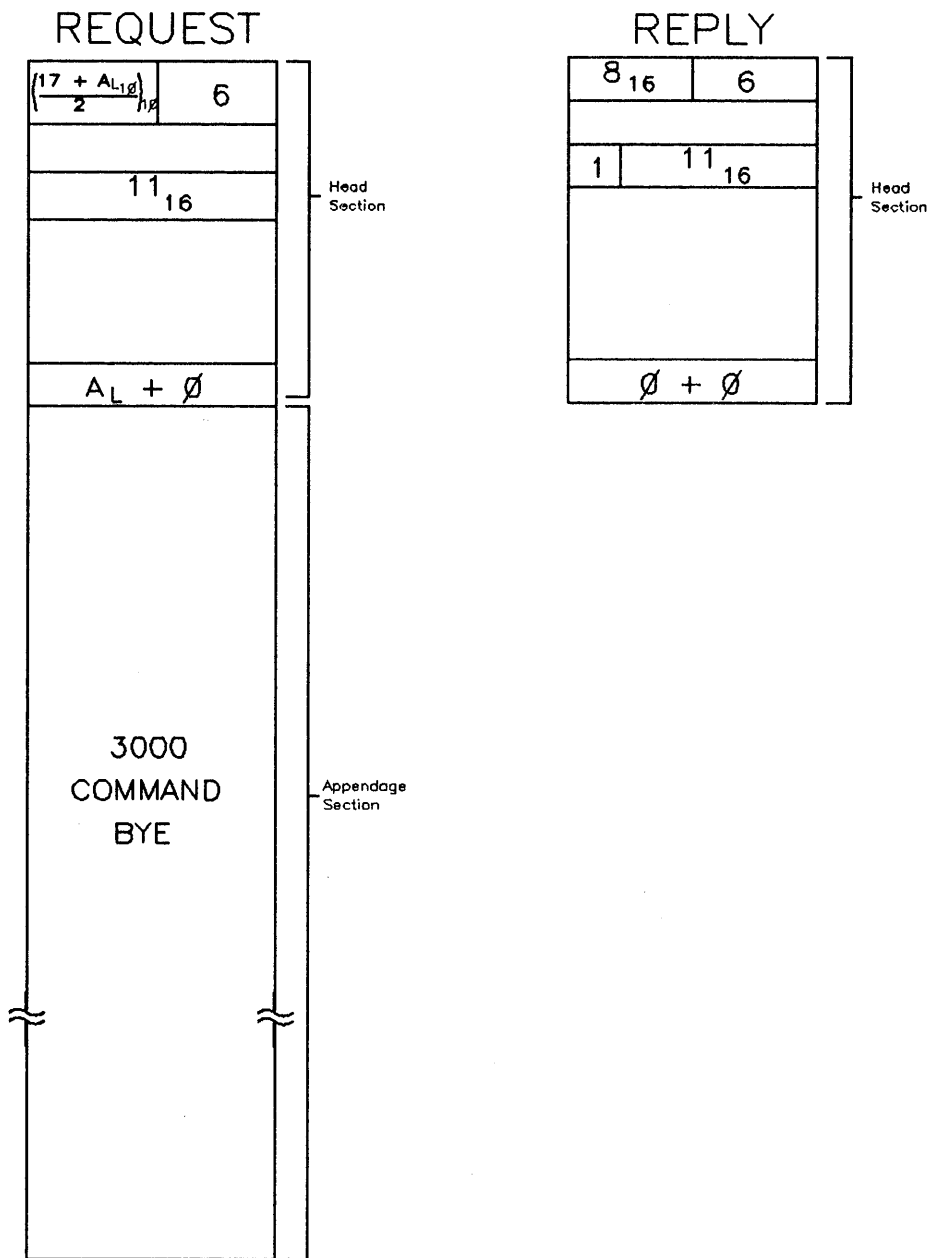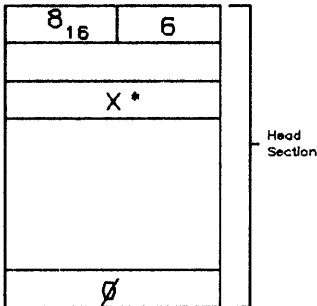
CONTROL MESSAGE

Message Class = 6
Stream Type = %22 (!12, 18) Request Break
        = %23 (!13, 19) Request Abort
        = %24 (!14, 20) Request Resume
        = %25 (!15, 21) Request Control-Y
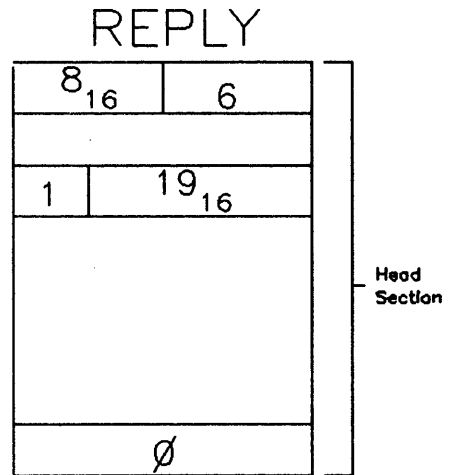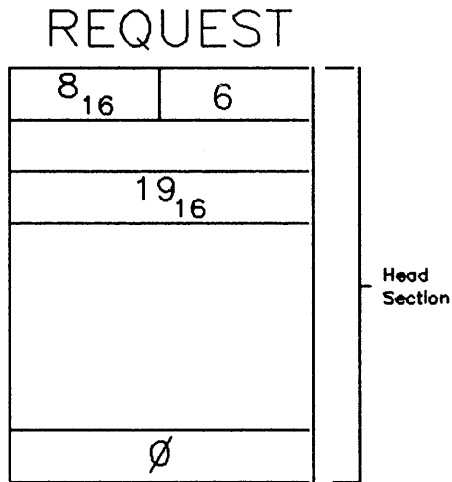   = %27 (!17, 23) Request Kill Job

REQUEST/REPLY

8_{16}	6
X *	
Ø	

Head Section

$X^* =$

Ø	12_{16}	request break message
Ø	13_{16}	request abort message
Ø	14_{16}	request resume message
Ø	15_{16}	request control-y message
Ø	17_{16}	request kill job message
1	12_{16}	reply break message
1	13_{16}	reply abort message
1	14_{16}	reply resume message
1	15_{16}	reply control-y message
1	17_{16}	reply kill job message

PTOP Flow Message

Message Class = 6
Stream Type = %31(!19, 25)

REQUEST

8_{16}	6
19_{16}	
$\emptyset$	

Head Section

REPLY

8_{16}	6
1	19_{16}
$\emptyset$	

Head Section

PTOP Flow Resume Message

Message Class = 6
Stream Type = %32 (!1A, 26)

REQUEST

8_{16}	6
$1A_{16}$	
$\emptyset$	

Head Section

REPLY

8_{16}	6
1	$1A_{16}$
$\emptyset$	

Head Section
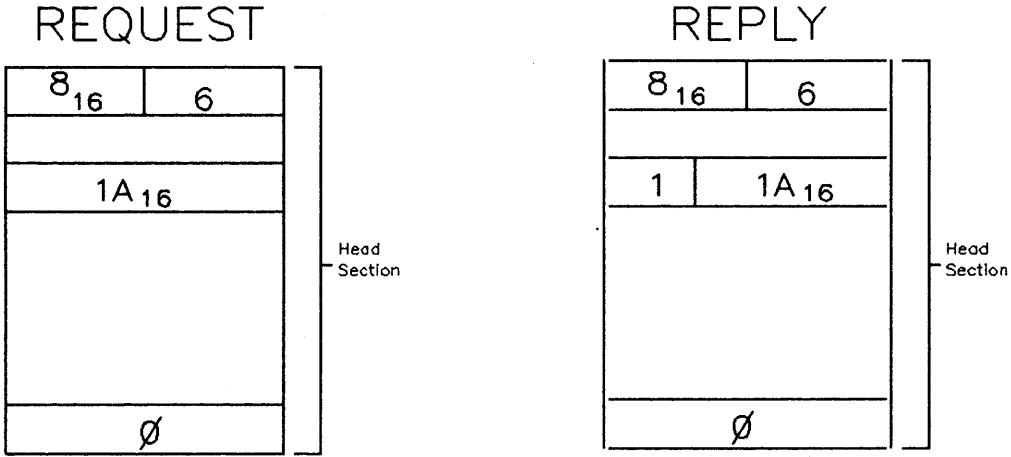
Message Class 7

FOPEN

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 1

REQUEST

$\left(\frac{17 + AL_{16}}{2}\right)_{16}$	7

10_{16}

— Head Section

$A_L + 0$

	"R"	"F"
0	"R"	"F"
1	"A"	" "
2	1	
3	@file name	
4	foptions	
5	aoptions	
6	recsize	
7	@device name	
8	@ formmsg	
9	userlabels	
10	blockfactor	
11	numbuffers'	
12	filesize	
13		
14	numextents	
15	initalloc	
16	filecode	
17	mask	

— Appendage Section

file name

device name

formmsg

REPLY

A_{16}	7

1	10_{16}

— Head Section

$4 + 0$

status word

mask

— Appendage Section

O ABC = byte pointer (relative to beginning of appendage) to area ABC.

STATUS REGISTER

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
M	I	T	R	O	C	CC			FILENUM						

When set:
M   Mode User Privileged
I   Ext Interrupts Enabled
T   User Traps Enabled
R   Right Stack Op Pending
O   Overflow
C   Carry
CC Condition Code
      CCL = 1
      CCE = 2
      CCG = 0

6–7	Condition
0	> G
1	< L
2	= E
3	Undefined

no buffer

FCLOSE

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 2

REQUEST

E_{16}	7
10_{16}	
$C_{16} + 0$	

0	"R"	"F"
1	"A"	" "
2	2	
3	filenum	
4	disposition	
5	seccode	

Head Section — applies to upper rows

Appendage Section — applies to rows 0–5

REPLY

9_{16}	7	
1	10_{16}	
2 + 0		
status word		

Head Section

Appendage Section

Status Word — See FOPEN
(Status Word filenum = 0)

no buffer

FREAD
(Not Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 3

REQUEST

D_{16}	7
X^{**}	

Head Section

	$A_{16} + \emptyset$	
0	"R"	"F"
1	"A"	" "
2	ERR #	3
3	filenum	
4	tcount	

Appendage Section

REPLIES

FIRST RECORD

A_{16}	7
X^{*}	

Head Section

$4 + D_L$	
status word	
tcount'	

Appendage Section

DATA

Data Section

CONTINUATION RECORD

8_{16}	7
X^{*}	

Head Section

$\emptyset + D_L$	

DATA

Data Section

---

tcount — Amount to be read
tcount' — Amount read
    Status Word — See FOPEN

ERR # — used when local system finds an error in a file. Err # passed to remote system is to be included in FCHECK returned by remote system.
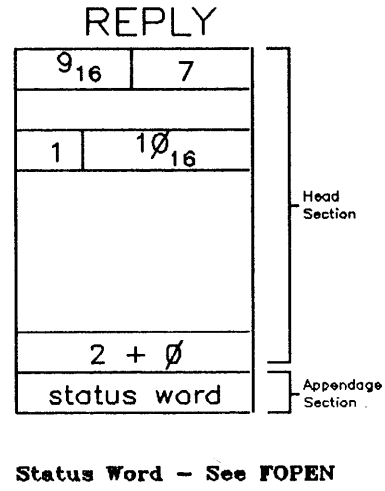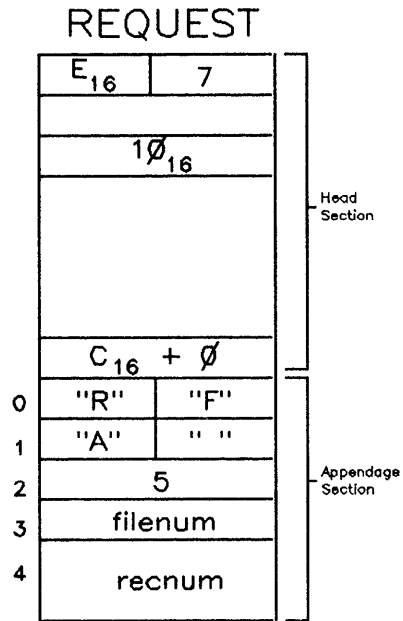
$X^{*} =$
| 1Ø1 | 1Ø$_{16}$ | if continuation to follow

| 1 | 1Ø$_{16}$ | if nothing to follow

$X^{**} =$
| ØØ1 | 1Ø$_{16}$ | if continuation to follow

1Ø$_{16}$ if nothing to follow

FREADDIR
(Not Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 4

REQUEST

F_{16}	7
X**	

Head Section

E_{16} + $\emptyset$	
0	"R"	"F"
1	"A"	" "
2	ERR #	19_{16}
3	filenum	
4	tcount	
5	recnum	

Appendage Section

REPLIES

FIRST RECORD

A_{16}	7
X*	

Head Section

4 + D_L	
0	status word
1	tcount´

Appendage Section

DATA

Data Section

CONTINUATION RECORD

8_{16}	7
X*	

Head Section

$\emptyset$ + D_L	
0	

DATA

Data Section

tcount – Amount to be read
tcount´ – Amount read

Status Word – See FOPEN

Err # – used when local system
finds an error in a file.
ERR # passed to remote
system is to be included
in FCHECK returned by
remote system.

$X* = \begin{cases} \boxed{1\emptyset1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$

$X** = \begin{cases} \boxed{\emptyset\emptyset1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

FREADSEEK

Message Class = 7
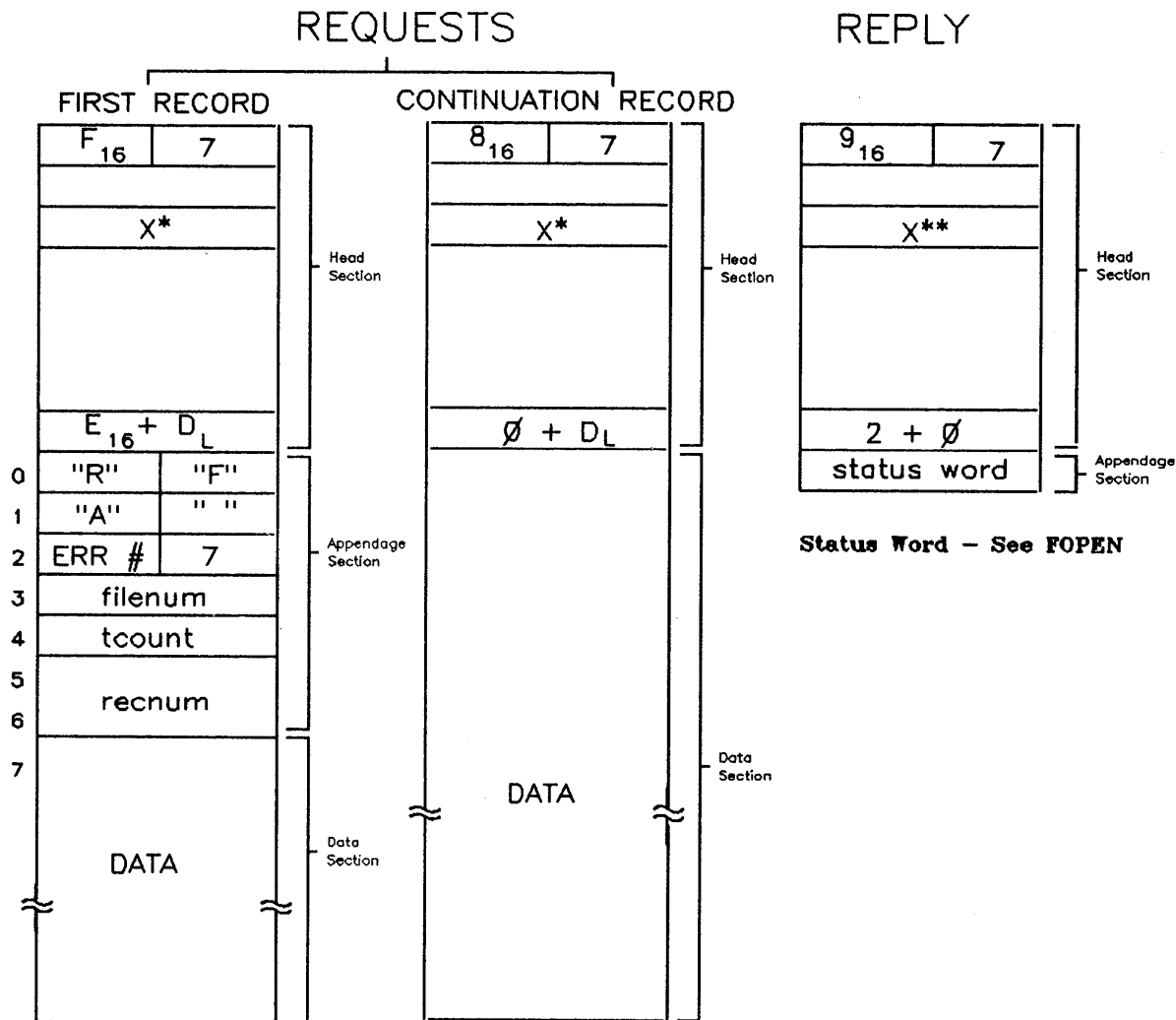Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 5

REQUEST

	E_{16}	7
	10_{16}	
	$C_{16} + \emptyset$	
0	"R"	"F"
1	"A"	" "
2	5	
3	filenum	
4	recnum	

Head Section
Appendage Section

REPLY

9_{16}	7	
1	10_{16}	
2 + $\emptyset$		
status word		

Head Section
Appendage Section

Status Word — See FOPEN

FWRITE
(Not Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 6

REQUESTS

FIRST RECORD

E_{16}	7

X^*

Head Section

$C_{16} + D_L$

0	"R"	"F"
1	"A"	" "
2	ERR #	6
3	filenum	
4	tcount	
5	control	
6		

Appendage Section

DATA

Data Section

CONTINUATION RECORD

8_{16}	7

X^*

Head Section

$\emptyset + D_L$

DATA

Data Section

REPLY

9_{16}	7

X^{**}

Head Section

| 2 + $\emptyset$ |
| status word |

Appendage Section

Status Word — See FOPEN

ERR # — used when local system finds an error in a file. Err # passed to remote system is to be included in FCHECK returned by remote system.

$X^* = \begin{cases} \boxed{\emptyset\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$
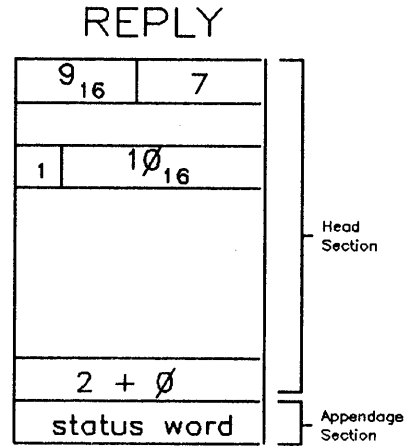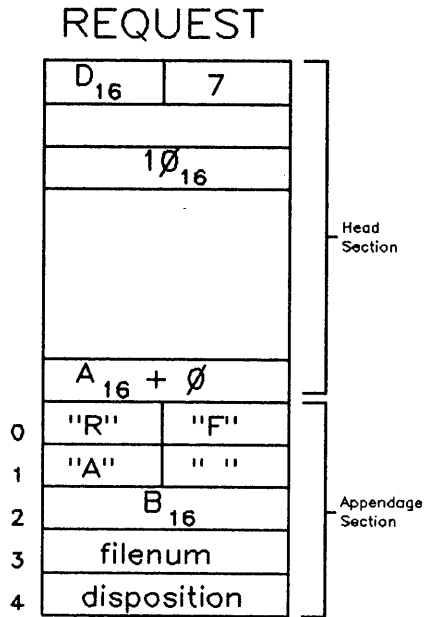
$X^{**} = \begin{cases} \boxed{1\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

FWRITEDIR
(Not Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = 7

REQUESTS   REPLY

FIRST RECORD   CONTINUATION RECORD

F_{16}	7	Head Section
X*		
$E_{16} + D_L$		

0	"R"	"F"
1	"A"	" "
2	ERR #	7
3	filenum
4	tcount
5	recnum
6	
7	DATA

Appendage Section

Data Section

CONTINUATION RECORD

8_{16}	7
X*	
$\emptyset + D_L$	

DATA

Head Section

Data Section

REPLY

9_{16}	7
X**	
$2 + \emptyset$	
status word	

Head Section

Appendage Section

Status Word — See FOPEN

ERR # — used when local system finds an error in a file. Err # passed to remote system is to be included in FCHECK into returned by remote system.

$X* = \begin{cases} \boxed{1\emptyset1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$

$X** = \begin{cases} \boxed{\emptyset\emptyset1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

FREADLABEL

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %10 (!8, 8)

REQUEST

F_{16}	7
10_{16}	
	(Head Section)
$E_{16} + 0$	

0	"R"	"F"
1	"A"	" "
2	8_{16}	
3	filenum	
4	tcount	
5	labelid	
6	mask	

Head Section

Appendage Section

REPLY

89_{16}	7
1	10_{16}
	(Head Section)
(label length *2)+2	

0	status word
1	
	LABEL
128	

Head Section

Appendage Section

(label returned only if CCE)

Status Word — See FOPEN

5-31
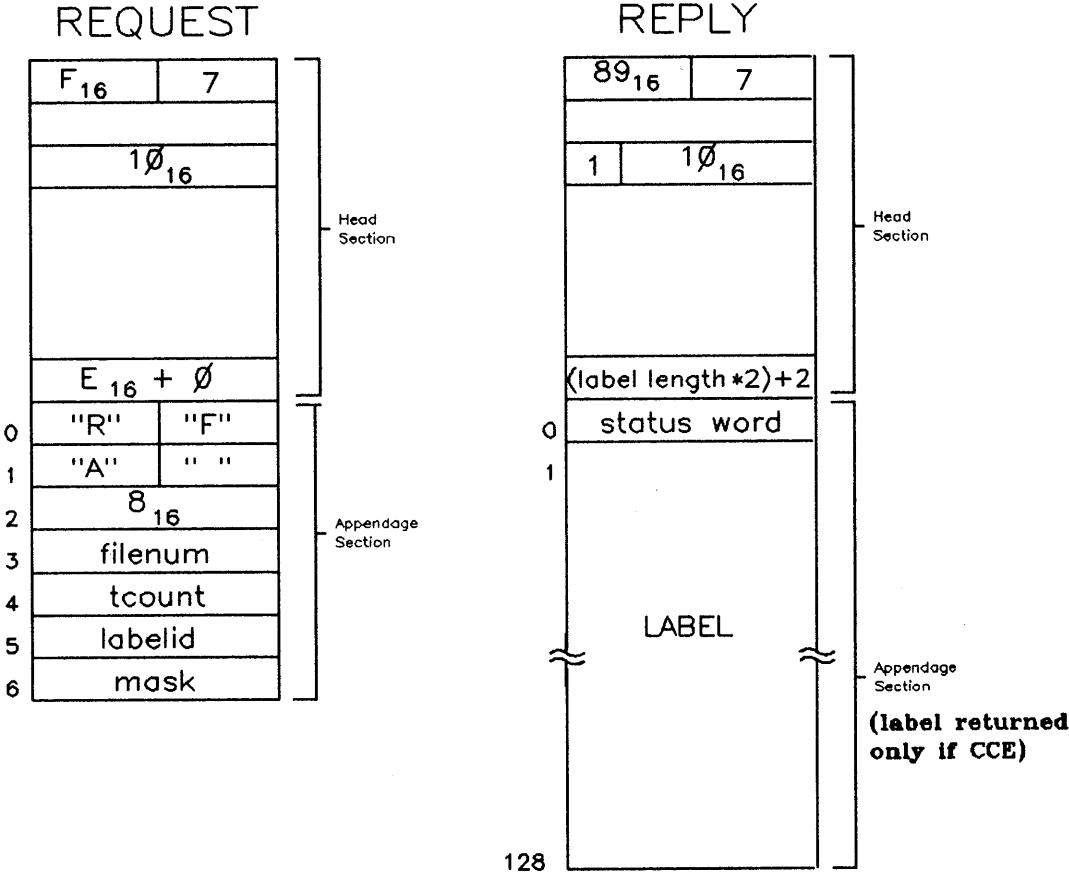
FWRITELABEL

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %11 (!9, 9)
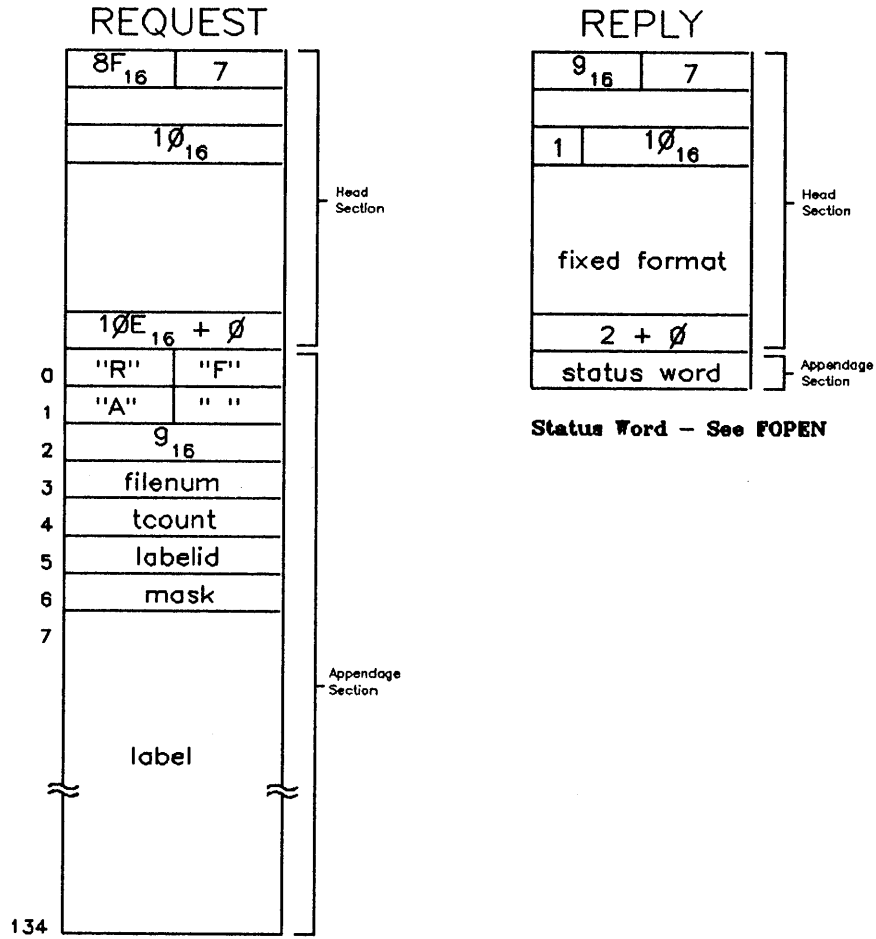
REQUEST

$8F_{16}$	7		Head Section
10_{16}			
$10E_{16} + 0$			

0	"R"	"F"	
1	"A"	" "	
2	9_{16}		
3	filenum		
4	tcount		
5	labelid		
6	mask		
7			Appendage Section
	label		
134			

REPLY

9_{16}	7		Head Section
1	10_{16}		
fixed format			
$2 + 0$			
status word			Appendage Section

Status Word — See FOPEN

FUPDATE
(Not Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %12 (!A, 10)

REQUESTS

FIRST RECORD

D_{16}	7
X*	

Head Section

$A_{16} + D_L$	

0	"R"	"F"
1	"A"	" "
2	A_{16}	
3	filenum	
4	tcount	

Appendage Section

DATA

Data Section

CONTINUATION RECORD

8_{16}	7
X*	

Head Section

$\emptyset + D_L$	

DATA

Data Section

REPLY

9_{16}	7
X**	

Head Section

2 + ∅	
status word	

Appendage Section

Status Word = See FOPEN

X* =
- $\boxed{\emptyset\emptyset 1 \mid 1\emptyset_{16}}$ if continuation to follow
- $\boxed{1 \mid 1\emptyset_{16}}$ if nothing to follow

X** =
- $\boxed{1\emptyset 1 \mid 1\emptyset_{16}}$ if continuation to follow
- $1\emptyset_{16}$ if nothing to follow

FSPACE

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %13 (!B, 11)

REQUEST

	D_{16}	7
	$1\emptyset_{16}$	
	$A_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	B_{16}	
3	filenum	
4	disposition	

Appendage Section

REPLY

9_{16}		7
1	$1\emptyset_{16}$	
$2 + \emptyset$		

Head Section

status word

Appendage Section
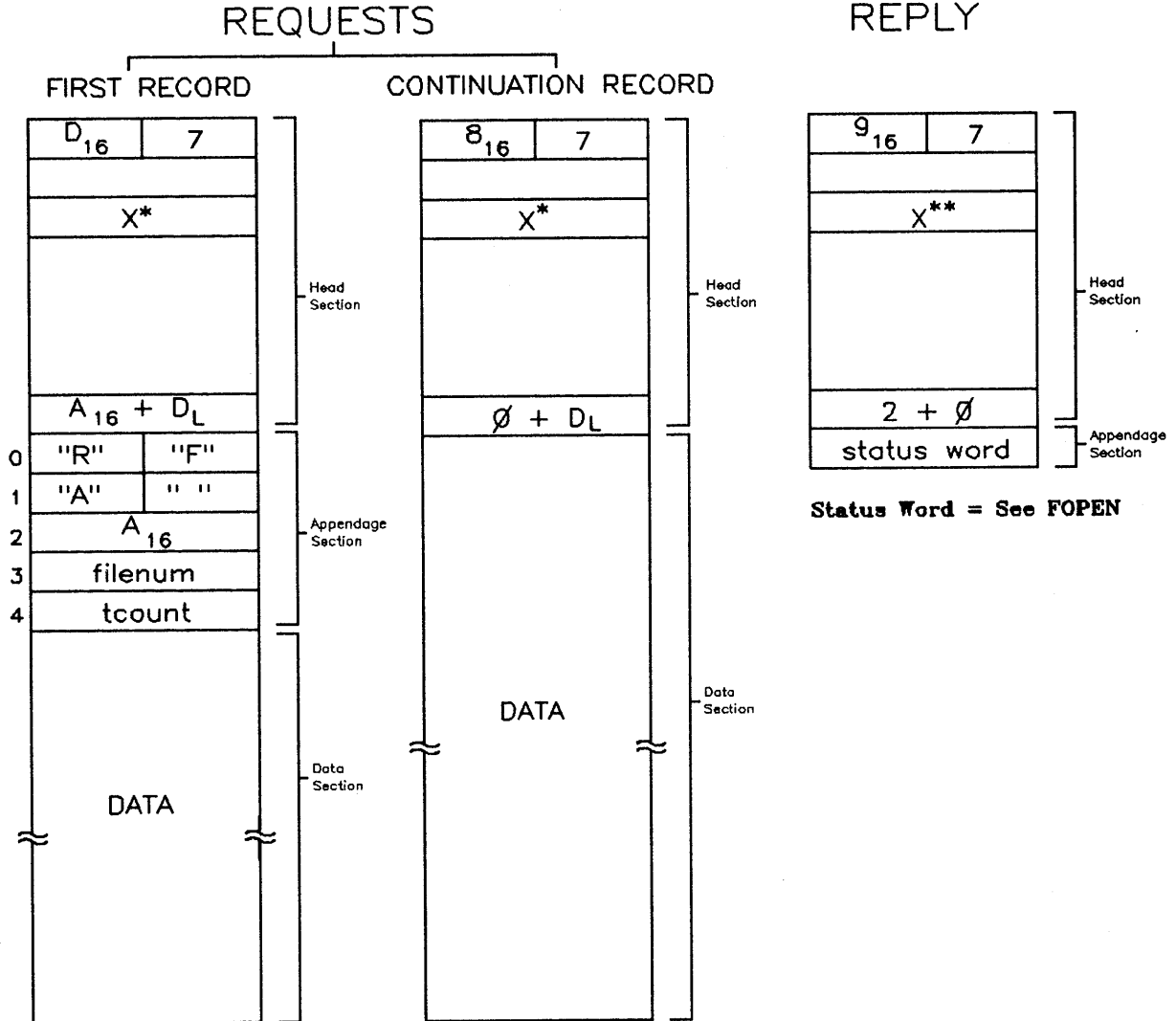
Status Word = See FOPEN

FPOINT

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %14 (!C, 12)

REQUEST

	E_{16}	7
	10_{16}	
	$C_{16} + 0$	
0	"R"	"F"
1	"A"	" "
2	C_{16}	
3	filenum	
4	recnum	

Head Section (rows 1–5)
Appendage Section (rows 6–10)

REPLY

9_{16}	7	
1	10_{16}	
2 + 0		
status word		

Head Section
Appendage Section
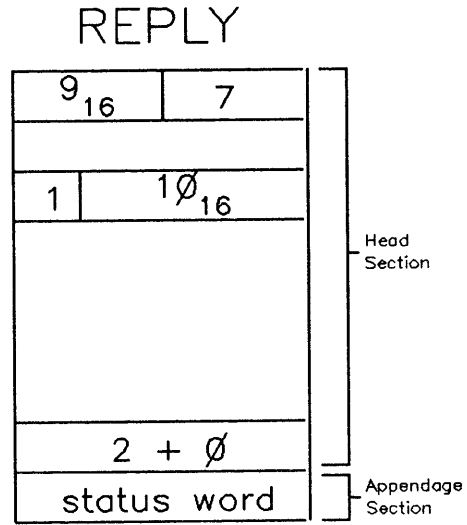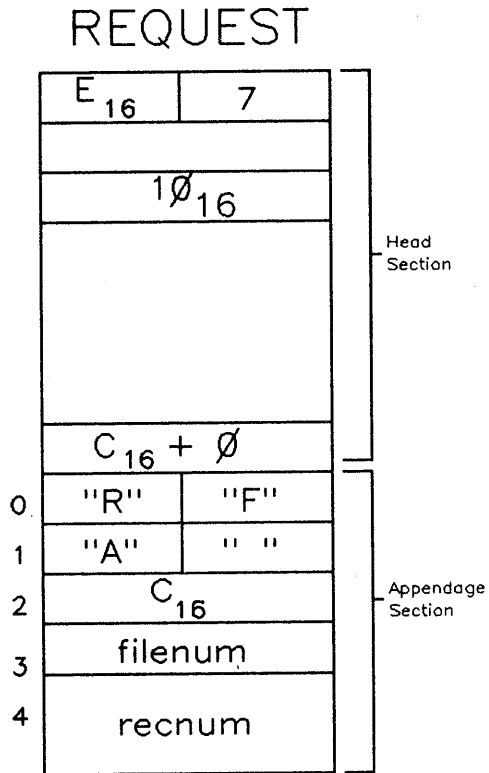
Status Word — See FOPEN

FGETINFO

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic = %15 (!D, 13)

REQUEST

E_{16}	7
$1\emptyset_{16}$	
C_{16}	

Head Section

0	"R"	"F"
1	"A"	" "
2	D_{16}	
3	filenum	
4	mask	

Appendage Section

REPLY

34_{16}	7
1	$1\emptyset_{16}$
$58_{16} + \emptyset$	

Head Section

0	status word
1	
	file name
2	
15	faption
16	aoption
17	recsize
18	devtype
19	ldnum
20	hdaddr
21	filecode
22	recpt
24	eof
26	flimit
28	logcount
30	physcount
32	blksize
33	extsize
34	numextents
35	userlabels
36	creator ID
40	labaddr
42	mask

Status Word
= See FOPEN

Appendage Section

FCHECK

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %16 (!E, 14)

REQUEST

D_{16}	7

10_{16}

$A_{16} + \emptyset$

Head Section

	"R"	"F"
0	"A"	" "
1	E_{16}	
2	filenum	
3	mask	
4		

Appendage Section

REPLY

F_{16}		7

1	10_{16}

$E_{16} + \emptyset$

Head Section

0	status word
1	errorcode
2	tlog
3	blknum
5	numrec
6	mask

**Status Word
— See FOPEN**

Appendage Section

FCONTROL

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %17 (!F, 15)

REQUEST

E_{16}	7
$1\emptyset_{16}$	
$C_{16} + \emptyset$	

Head Section

	"R"	"F"
0	"R"	"F"
1	"A"	" "
2	F_{16}	
3	filenum	
4	control code	
5	param	

Appendage Section

REPLY

A_{16}	7	
1	$1\emptyset_{16}$	
4 + $\emptyset$		

Head Section

0	status word
1	param

Appendage Section

Status Word — See FOPEN
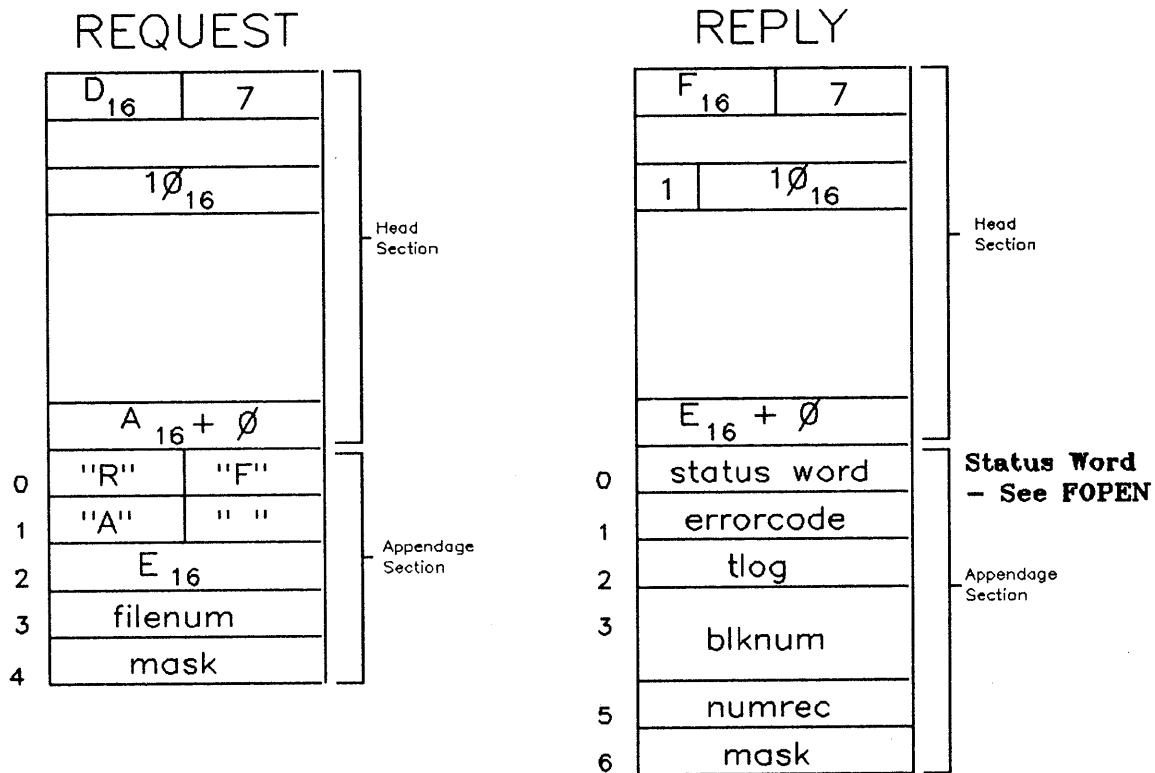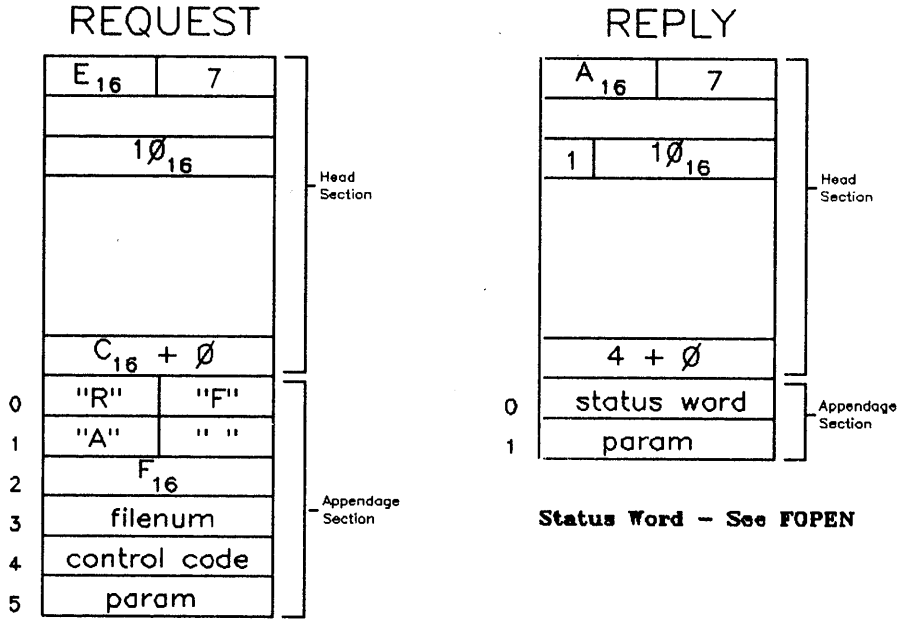
FSETMODE

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic = %20 (!10, 16)

REQUEST

D_{16}	7
$1\emptyset_{16}$	
$A_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	$1\emptyset_{16}$	
3	filenum	
4	mode flags	

Appendage Section

REPLY

9_{16}	7
1	$1\emptyset_{16}$
$2 + \emptyset$	
status word	

Head Section

Appendage Section

Status Word — See FOPEN
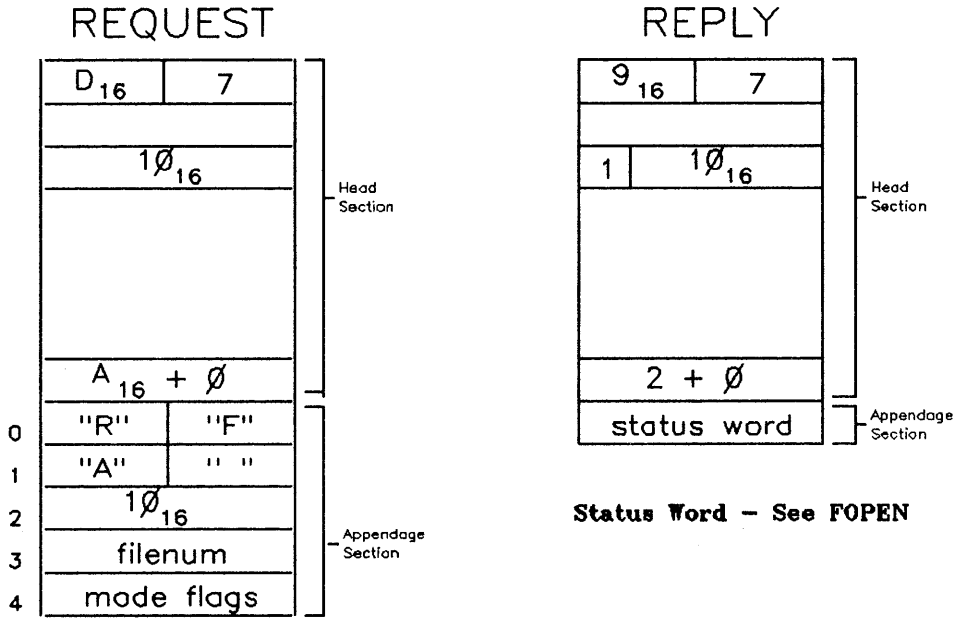
FRENAME

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %21 (!11, 17)

REQUEST

$1A_{16}$	7
10_{16}	(Head Section)
$24_{16} + 0$	

0	"R"	"F"
1	"A"	" "
2	11_{16}	
3	filenum	
4	new file name	(Appendage Section)

REPLY

9_{16}	7
1	10_{16}	(Head Section)
$2 + 0$	
status word	(Appendage Section)

Status Word — See FOPEN
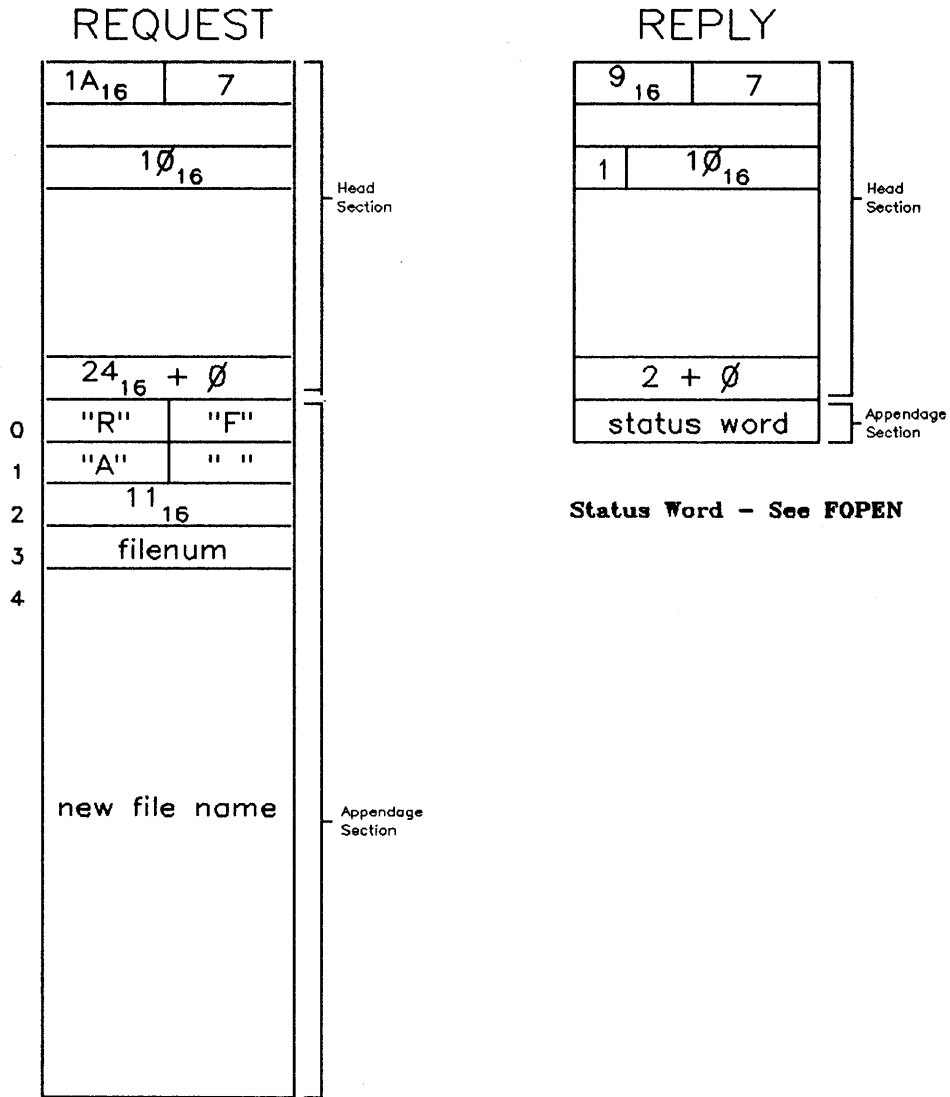
FRELATE

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %22 (!12, 18)

REQUEST

D_{16}	7	⎤
$1\emptyset_{16}$		Head Section
$A_{16} + \emptyset$		⎦

0	"R"	"F"	⎤
1	"A"	" "	
2	12_{16}		Appendage Section
3	infilnum		
4	listfilnum		⎦

REPLY

A_{16}	7	⎤
1	$1\emptyset_{16}$	Head Section
$4 + \emptyset$		⎦

0	status word	⎤ Appendage Section
1	reply	⎦
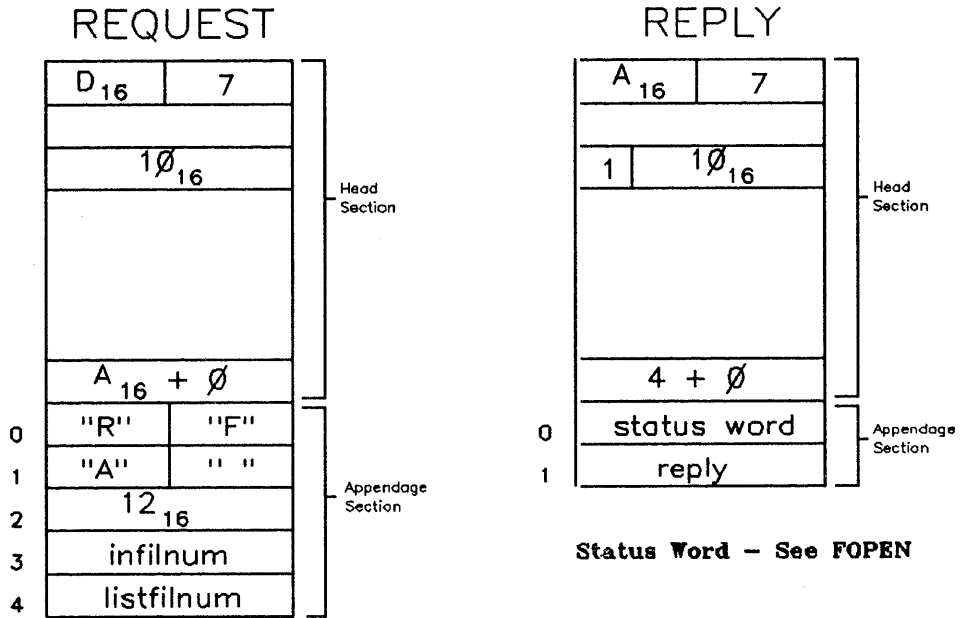
Status Word — See FOPEN

FLOCK

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %23 (!13, 19)

REQUEST

F_{16}	7	Head Section
10_{16}		
$E_{16} + \emptyset$		
0	"R"	"F"	Appendage Section
1	"A"	" "	
2	13_{16}		
3	filenum		
4	lockcond		
5	Q-7		
6	Q-6		

REPLY

B_{16}	7	Head Section
1	10_{16}	
$6 + \emptyset$		
0	status word	Appendage Section
1	Q-7	
2	Q-6	
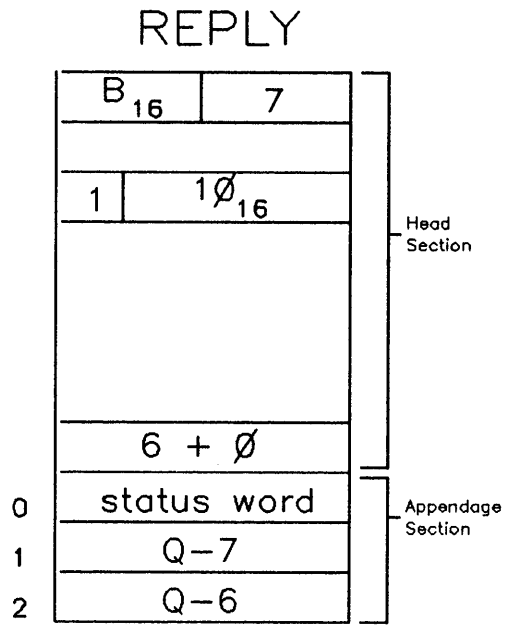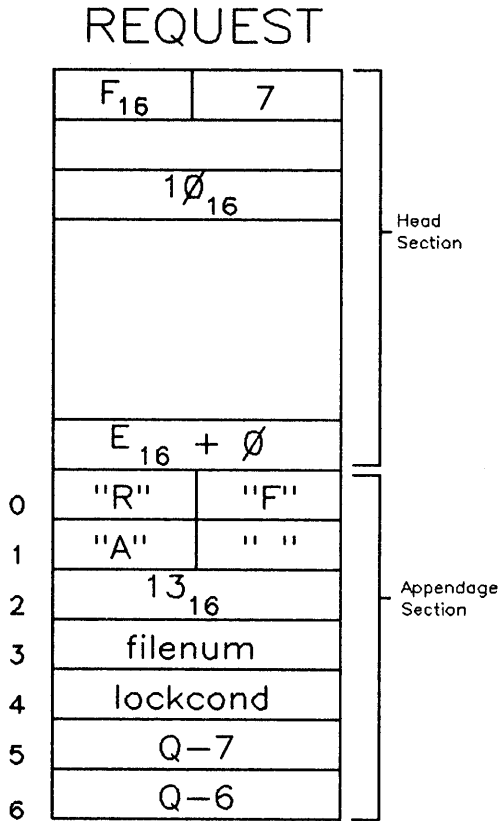
Status Word — See FOPEN

FUNLOCK

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %24 (!14, 20)

REQUEST

E_{16}	7
10_{16}	
$C_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	14_{16}	
3	filenum	
4	Q−7	
5	Q−6	

Appendage Section

REPLY

9_{16}	7
1	10_{16}
2 + $\emptyset$	
status word	

Head Section

Appendage Section

Status Word — See FOPEN
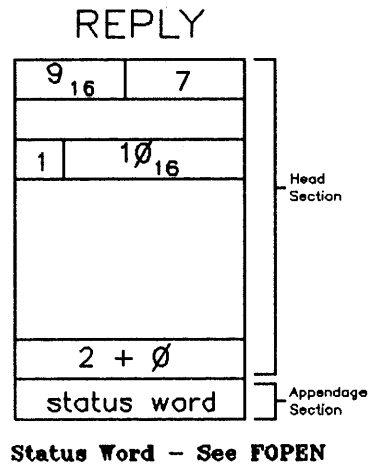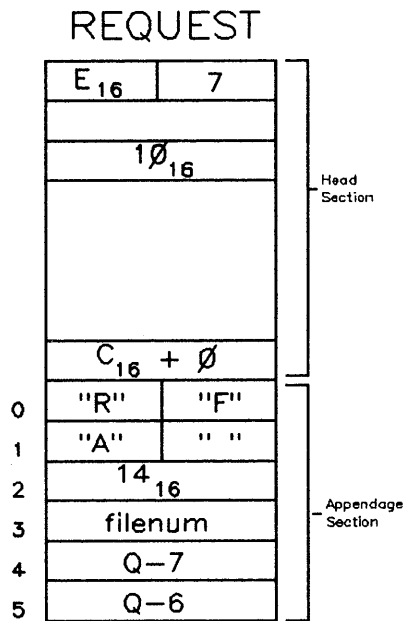
FREAD
(Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %30 (!18, 24)
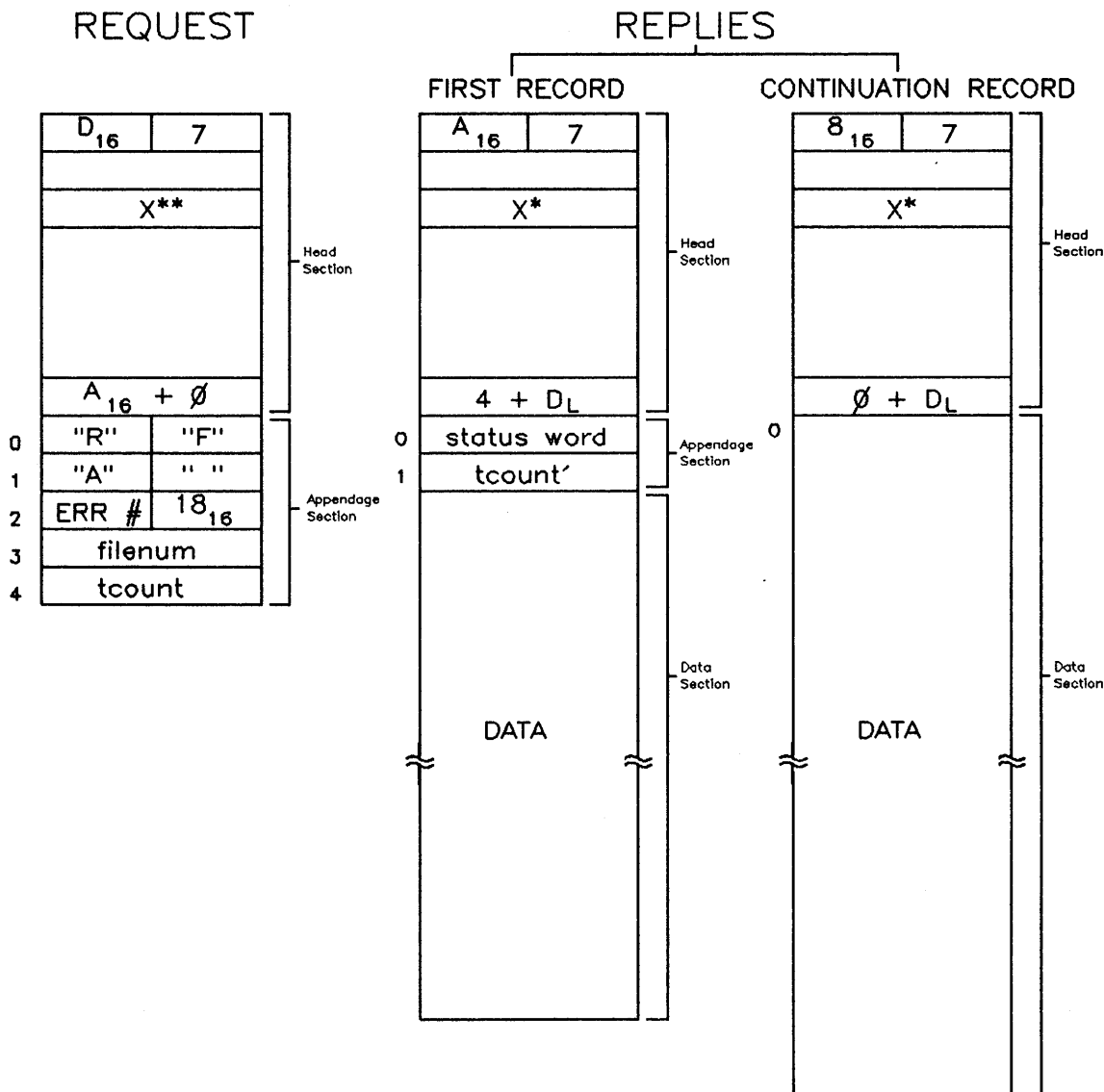
REQUEST

```
┌─────────┬─────┐
│ D₁₆     │  7  │
├─────────┴─────┤
│               │
│     X**       │          ┐
│               │          │ Head
│               │          │ Section
│               │          │
├───────────────┤          │
│  A₁₆  +  ∅    │          ┘
├───────┬───────┤
│0 "R"  │ "F"   │          ┐
│1 "A"  │ " "   │          │ Appendage
│2 ERR# │ 18₁₆  │          │ Section
│3  filenum     │          │
│4  tcount      │          ┘
└───────────────┘
```

REPLIES

FIRST RECORD

```
┌─────────┬─────┐
│ A₁₆     │  7  │
├─────────┴─────┤
│               │
│     X*        │          ┐
│               │          │ Head
│               │          │ Section
├───────────────┤          ┘
│   4 + D_L     │
├───────────────┤
│0 status word  │          ┐ Appendage
│1 tcount'      │          ┘ Section
├───────────────┤
│               │          ┐
│               │          │ Data
│               │          │ Section
│    DATA       │
│               │
│  ≈         ≈  │
│               │
└───────────────┘
```

CONTINUATION RECORD

```
┌─────────┬─────┐
│ 8₁₆     │  7  │
├─────────┴─────┤
│               │
│     X*        │          ┐
│               │          │ Head
│               │          │ Section
├───────────────┤          ┘
│   ∅ + D_L     │
├───────────────┤
│0              │          ┐
│               │          │ Data
│    DATA       │          │ Section
│               │
│  ≈         ≈  │
│               │
└───────────────┘
```

tcount — Amount to be read
tcount' — Amount read

Status Word — See FOPEN

Err # — used when local system finds an error in a file. ERR # passed to remote system is to be included in FCHECK returned by remote system.

$$X^* = \begin{cases} \boxed{1\emptyset1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \mid 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$$

$$X^{**} = \begin{cases} \boxed{\emptyset\emptyset1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$$

FREADDIR
(Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %31 (!19, 25)
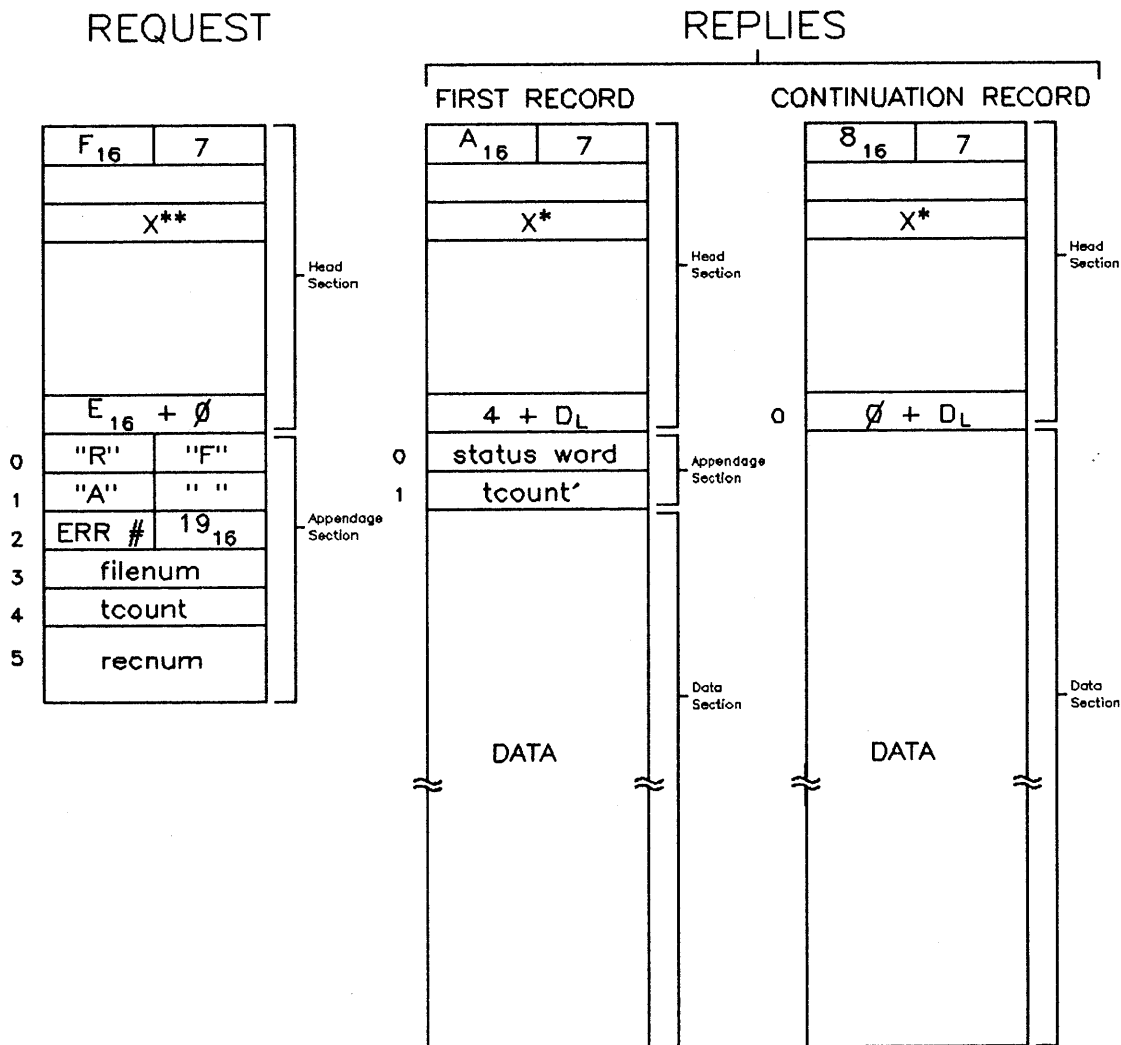
REQUEST

F_{16}	7
$X**$	
$E_{16} + \emptyset$	

0	"R"	"F"
1	"A"	" "
2	ERR #	19_{16}
3	filenum	
4	tcount	
5	recnum	

Head Section

Appendage Section

REPLIES

FIRST RECORD

A_{16}	7
$X*$	
$4 + D_L$	

0	status word
1	tcount'

DATA

Head Section

Appendage Section

Data Section

CONTINUATION RECORD

8_{16}	7
$X*$	
$\emptyset + D_L$	

0

DATA

Head Section

Data Section

---

tcount — Amount to be read
tcount' — Amount read

Status Word — See FOPEN

Err # — used when local system
finds an error in a file.
ERR # passed to remote
system is to be included
in FCHECK returned by
remote system.

$X* = \begin{cases} \boxed{1\emptyset 1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \mid 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$

$X** = \begin{cases} \boxed{\emptyset\emptyset 1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

FWRITE
(Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %32 (!1A, 26)

REQUEST   REPLY

FIRST RECORD   CONTINUATION RECORD

E_{16}	7
X*	

Head Section

$C_{16} + \cancel{0}$	
"R"	"F"
"A"	" "
ERR #	$1A_{16}$
filenum	
tcount	
control	

Appendage Section

8_{16}	7
X*	

Head Section

$\cancel{0} + D_L$	

DATA	

Data Section

9_{16}	7
X**	

Head Section

$2 + \cancel{0}$	
status word	

Appendage Section

Status Word — See FOPEN

Err # — used when local system finds an error in a file. ERR # passed to remote system is to be included in FCHECK returned by remote systems.

$X^* = \begin{cases} \boxed{\cancel{0}\cancel{0}1 \mid 1\cancel{0}_{16}} & \text{if continuation to follow} \\ \boxed{1 \mid 1\cancel{0}_{16}} & \text{if nothing to follow} \end{cases}$

$X^{**} = \begin{cases} \boxed{1\cancel{0}1 \mid 1\cancel{0}_{16}} & \text{if continuation to follow} \\ 1\cancel{0}_{16} & \text{if nothing to follow} \end{cases}$

FWRITEDIR
(Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %33 (!1B, 27)

REQUEST

FIRST RECORD

F_{16}	7

X*

Head Section

$E_{16} + \cancel{0}$

"R"	"F"
"A"	" "
ERR #	$1B_{16}$

filenum

tcount

recnum

Appendage Section

CONTINUATION RECORD

8_{16}	7

X*

Head Section

$\cancel{0} + D_L$

Data Section

DATA

REPLY

9_{16}	7

X**

Head Section

$2 + \cancel{0}$

status word

Appendage Section

Status Word — See FOPEN

Err # — used when local system finds an error in a file. ERR # passed to remote system is to be included in FCHECK returned by remote systems.

$X* = \begin{cases} \boxed{\cancel{0}\cancel{0}1 \quad 1\cancel{0}_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\cancel{0}_{16}} & \text{if nothing to follow} \end{cases}$

$X** = \begin{cases} \boxed{1\cancel{0}1 \quad 1\cancel{0}_{16}} & \text{if continuation to follow} \\ 1\cancel{0}_{16} & \text{if nothing to follow} \end{cases}$

FUPDATE
(Multirecord)

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %34 (!1C, 28)

REQUESTS

FIRST RECORD

| D_{16} | 7 |

X^*

Head Section

$A_{16} + D_L$

0	"R"	"F"
1	"A"	" "
2	A_{16}	
3	filenum	
4	tcount	

Appendage Section

DATA

Data Section

CONTINUATION RECORD

| 8_{16} | 7 |

X^*

Head Section

$\emptyset + D_L$

DATA

Data Section

REPLY

| 9_{16} | 7 |

X^{**}

Head Section

$2 + \emptyset$

status word

Appendage Section

Status Word = See FOPEN

$$X^* = \begin{cases} \boxed{\emptyset\emptyset 1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \mid 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$$

$$X^{**} = \begin{cases} \boxed{1\emptyset 1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$$
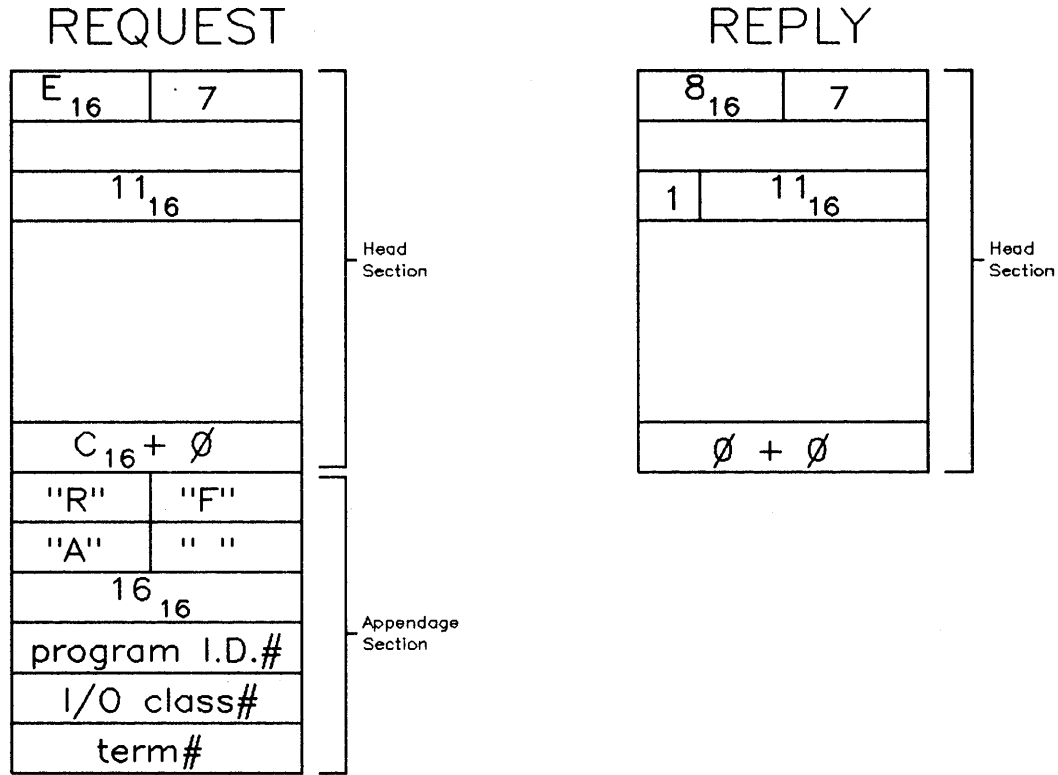
5-49

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DBOPEN

Message Class = 7
Stream Type = %20 (!10, 16)
Image Index = %44 (!24, 36)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{h\emptyset}$	7

Head Section

10_{16}

$A_L + D_L$

	"R"	"F"
0	"R"	"F"
1	"A"	" "
2	image index #24_{16}	
3	mode	
4		
5	password	
6		
7		
8	length of base (words)	
9	XDS #	

base
(4 to 40 bytes)

Appendage Section

REPLY

14_{16}	7

X*

Head Section

$A_L + D_L$

status word (CCL)

status 10 words

Appendage Section

XDS #

# of data items

data item table

# of data sets

data set table

Data Section
MAXIMUM OF
3641 WORDS

(For TurboIMAGE
MAX = 13842 WORDS)

X* = {
| 101 | 10_{16} | **if continuation to follow**

| 1 | 10_{16} | **if nothing to follow**

DBOPEN
(Detail of Data Section)


```
┌─────────────────────┐
│ # data items        │
├─────────────────────┤
│ first data          │
│ item entry          │          ┌──────────────────────┐  ┐
├─────────────────────┤          │                      │  │
│ second data         │          │    data item         │  │
│ item entry          │          │      name            │  │
├─────────────────────┤          │                      │  ├ one
│                      │          │  ⎛16 characters⎞      │  │ 10 word
≈│ all other           │≈        │  ⎝blank padded⎠      │  │ entry per
│   data              │          │                      │  │ data item
├─────────────────────┤          ├──────────────────────┤  │
│ last date           │          │    data item #       │  │
│ item entry          │          ├──────────────────────┤  │
├─────────────────────┤          │  length (words)      │  ┘
│ # data sets         │          └──────────────────────┘
├─────────────────────┤
│ first data          │          ┌──────────────────────┐  ┐
│ set entry           │          │                      │  │
├─────────────────────┤          │    Data Set          │  │
│ second data         │          │      name            │  │
│ set entry           │          │                      │  ├ one
├─────────────────────┤          │  ⎛16 characters⎞      │  │ 11 word
│ all other           │          │  ⎝blank padded⎠      │  │ entry per
≈│ data set           │≈        ├──────────────────────┤  │ data set
│ entries             │          │    data set #        │  │
├─────────────────────┤          ├──────────────────────┤  │
│ last data           │          │  length (words)      │  │
│ set entry           │          ├──────────────────────┤  │
└─────────────────────┘          │  primary key         │  │
                                 │ length (words)*      │  ┘
                                 └──────────────────────┘
```

*Master data sets only. Detail
data set entries contain a ∅ in
this position.

DBINFO

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %45(!25, 37)

REQUEST

0	"R"	"F"
1	"A"	" "
2	image index #25_{16}	
3	mode	
4	qualifier	
5		
6	unused	
7		
8	length of base (words)	
9	base (4 to 4Ø bytes)	

Head Section:
- $\left(\frac{17 + A_{L1\emptyset}}{2}\right)_{16}$ 7
- $1\emptyset_{16}$
- $A_L + D_L$

Appendage Section

INBUF LEN:

MODE				
MODE	0	- 0	WORD(S)	
MODE	101	- 1	WORD(S)	
MODE	102	- 13	WORD(S)	
MODE	103	- 2-256	WORD(S)	(DET. LOCALLY +)
MODE	104	- 2-256	WORD(S)	(DET. LOCALLY)
MODE	201	- 1	WORD(S)	(DET. LOCALLY)
MODE	202	- 17	WORD(S)	(DET. LOCALLY)
MODE	203	- 2-100	WORD(S)	(DET. LOCALLY)
MODE	204	- 2-100	WORD(S)	(DET. LOCALLY)
MODE	301	- 4-49	WORD(S)	(DET. LOCALLY)
MODE	302	- 2	WORD(S)	(DET. LOCALLY)

+ DET.= DETERMINED

NOTE: Local DBINFO will convert qualifier to numeric form if necessary.

REPLY

Head Section:
- 13_{16} 7
- X*
- $A_L + D_L$

Ø	status word	
1		
2	buffer length	
	status (1Ø words)	

Appendage Section

buffer (inbuf)

Data Section
MIN = 0 Words
MAX = 256 Words

For Turbo Image
MAX = 1024 Words

(Depends on mode and the information returned.)

$X^* = \begin{cases} \boxed{1\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$

DBINFO
(Detail of Reply – Mode 0)

REPLY

13_{16}	7
1	10_{16}

Head Section

$A_L + D_L$

Ø DB version number
1
2 Ø

Appendage Section

status
(1Ø words)
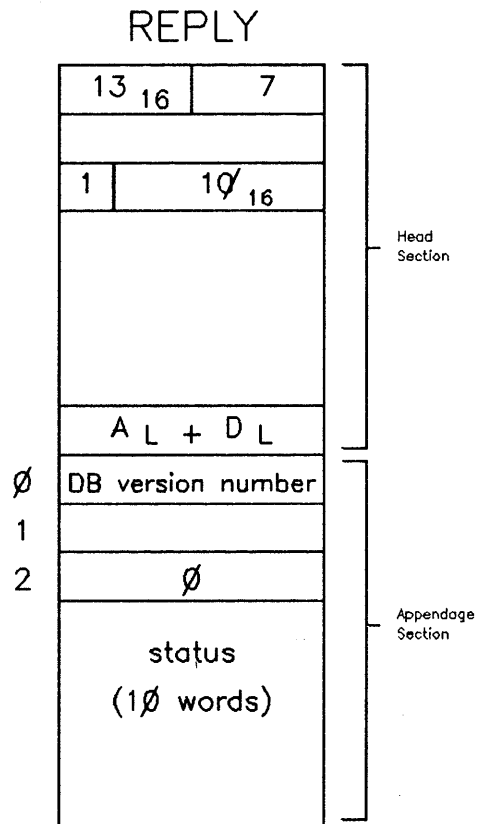
No Buffer

DBCLOSE

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %46(!26, 38)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7
10_{16}		Head Section
$A_L + D_L$	
"R"	"F"
"A"	" "
image index $\#26_{16}$
mode
DSET
unused
length of base (words)
base (4 to 40 bytes)

Head Section

Appendage Section

REPLY

13_{16}	7
10_{16}		Head Section
16_{16}	
status word
status (10 words)	Appendage Section
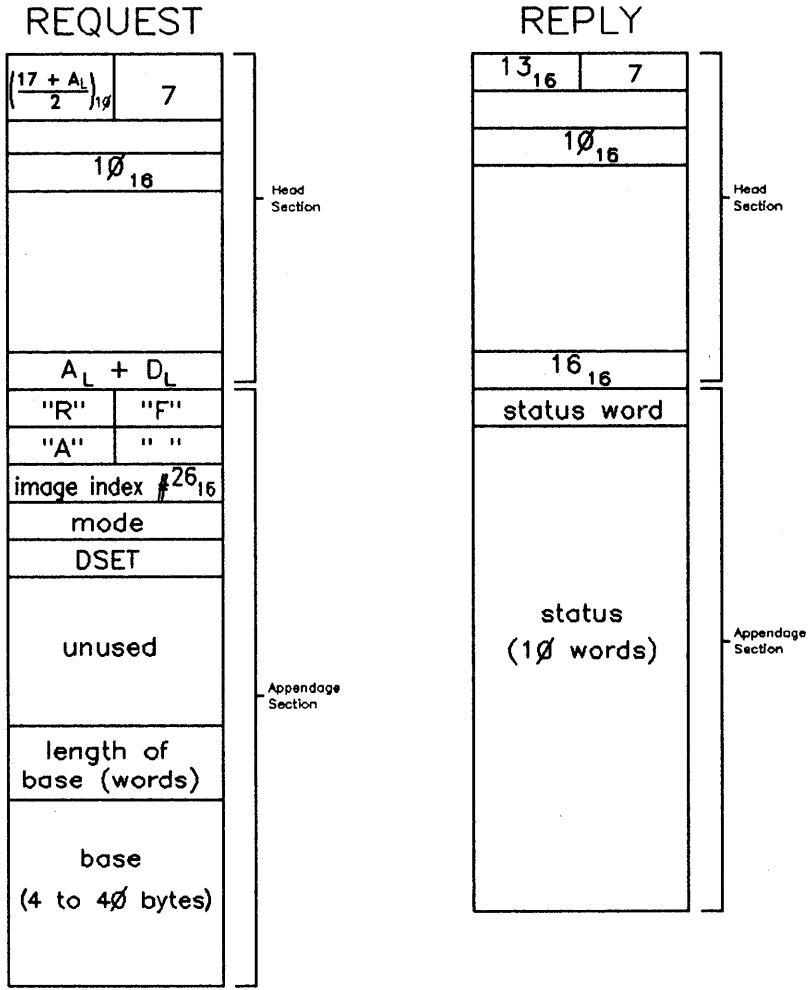
NOTE: Local DBCLOSE will convert DSET to numeric form if necessary.

DBFIND

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %47(!27, 39)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7
X**	
$A_L + D_L$	

0	"R"	"F"
1	"A"	" "
2	image index#27_{16}	
3	mode	
4	DSET	
5	item	
6	— unused —	
7		
8	length of	
9	base (words)	
10		
11	base	
12	(4 to 4$\emptyset$ bytes)	
13		

Head Section

Appendage Section

REPLY

13_{16}	7
$1\emptyset_{16}$	
16_{16}	
status word	
status ($1\emptyset$ words)	

Head Section

Appendage Section

$X^{**} = \begin{cases} \boxed{\emptyset\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

OUTBUF

argument
$\left(\begin{array}{c} 1 \text{ to } 2\emptyset 47 \\ \text{words} \end{array}\right)$

Data Section

Size determined from local extra data segment. (Size of item from item list.)

NOTE: Local DBFIND will convert DSET and item to numeric form if necessary.

DBGET

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %50(!28, 40)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$ | 7

10_{16}

Head Section

$A_L + D_L$

0	"R"	"F"
1	"A"	" "
2	image index #28_{16}
3	mode
4	DSET
5	inbuf length (words)
6	unused
7	
8	length of base (words)
9	

base (4 to 40 bytes)

Appendage Section

OUTBUF

length of list (in words)

LIST (1 to 128 words)

argument $\left(\begin{array}{c}1 \text{ to } 2047 \\ \text{words}\end{array}\right)$

Data Section

NOTE: Local DBGET will convert DSET and LIST to numeric form if necessary.

REPLY

$\left(\frac{17 + A_L}{2}\right)_{10}$ | 7

X*

Head Section

$A_L + D_L$

status word

status (10 words)

Appendage Section

buffer (inbuf) $\left(\begin{array}{c}1 \text{ to } 2047 \\ \text{words}\end{array}\right)$

BUFSIZE will be determined from local extra data segment. (Sum of sizes of items in D.S.)

Data Section

X* =
| 101 | 10_{18} | if continuation to follow
| 1 | 10_{16} | if nothing to follow

DBUPDATE

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %51(!29, 41)

REQUEST

$\left(\dfrac{17 + A_L}{2}\right)_{10}$	7
X**	(Head Section)
$A_L + D_L$	

"R"	"F"
"A"	" "
image index#29_{16}	
mode	
DSET	
unused	
length of base (words)	
base (4 to 4Ø bytes)	

Head Section
Appendage Section

REPLY

13_{16}	7
%20	(Head Section)
16_{16}	

status word
status (1Ø words)

Head Section
Appendage Section

$$X** = \begin{cases} \boxed{ØØ1 \mid 1Ø_{16}} & \text{if continuation to follow} \\ 1Ø_{16} & \text{if nothing to follow} \end{cases}$$

OUTBUF

length of list (in words)
LIST (1 to 128 words)
buffer $\left(\begin{array}{c}1 \text{ to } 2Ø47 \\ \text{words}\end{array}\right)$

Data Section

⟵ Size pre-determined from local XDS
(Sum of sizes of items in D.S entry)

NOTE: Local DBUPDATE will convert DSET and
LIST to numeric form if necessary.

DBPUT

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %52(!2A, 42)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7

X**

$A_L + D_L$

Head Section

"R"	"F"
"A"	" "

image index #$2A_{16}$

mode

DSET

unused

length of
base (words)

base
(4 to 4Ø bytes)

Appendage Section

REPLY

13_{16}	7

$1\emptyset_{16}$

Head Section

16_{16}

status word

status
(1Ø words)

Appendage Section

$X** = \begin{cases} \boxed{\emptyset\emptyset 1 \mid 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$

OUTBUF

length of list
(in words)

LIST
(1 to 128 words)

buffer
$\left(\begin{matrix} 1 \text{ to } 2\emptyset47 \\ \text{words} \end{matrix}\right)$

Data Section

← Size pre-determined from local XDS
(Sum of items in data set entry)

NOTE: Local DBPUT will convert DSET and
LIST to numeric form if necessary.

DBDELETE

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %53(!2B, 43)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7
10_{16}	
$A_L + D_L$	
"R"	"F"
"A"	" "
image index# $1B_{16}$	
mode	
DSET	
unused	
length of base (words)	
base (4 to 40 bytes)	

Head Section

Appendage Section

REPLY

13_{16}	7
10_{16}	
16_{16}	
status word	
status (10 words)	

Head Section

Appendage Section

NOTE: Local DBDELTE will convert DSET to numeric form if necessary.

DBLOCK

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %54(!2C, 44)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{1\emptyset}$	7
X**	
$A_L + D_L$	

0	"R"	"F"
1	"A"	" "
2	image index#	$1C_{16}$
3	mode	
4	DSET	
5		
6	unused	
7		
8	length of base (words)	
9		
	base (4 to 4$\emptyset$ bytes)	

Head Section / Appendage Section

REPLY

13_{16}	7
$1\emptyset_{16}$	
16_{16}	
status word	
status (1$\emptyset$ words)	

Head Section / Appendage Section

1 to 2$\emptyset$48 words

Data Section
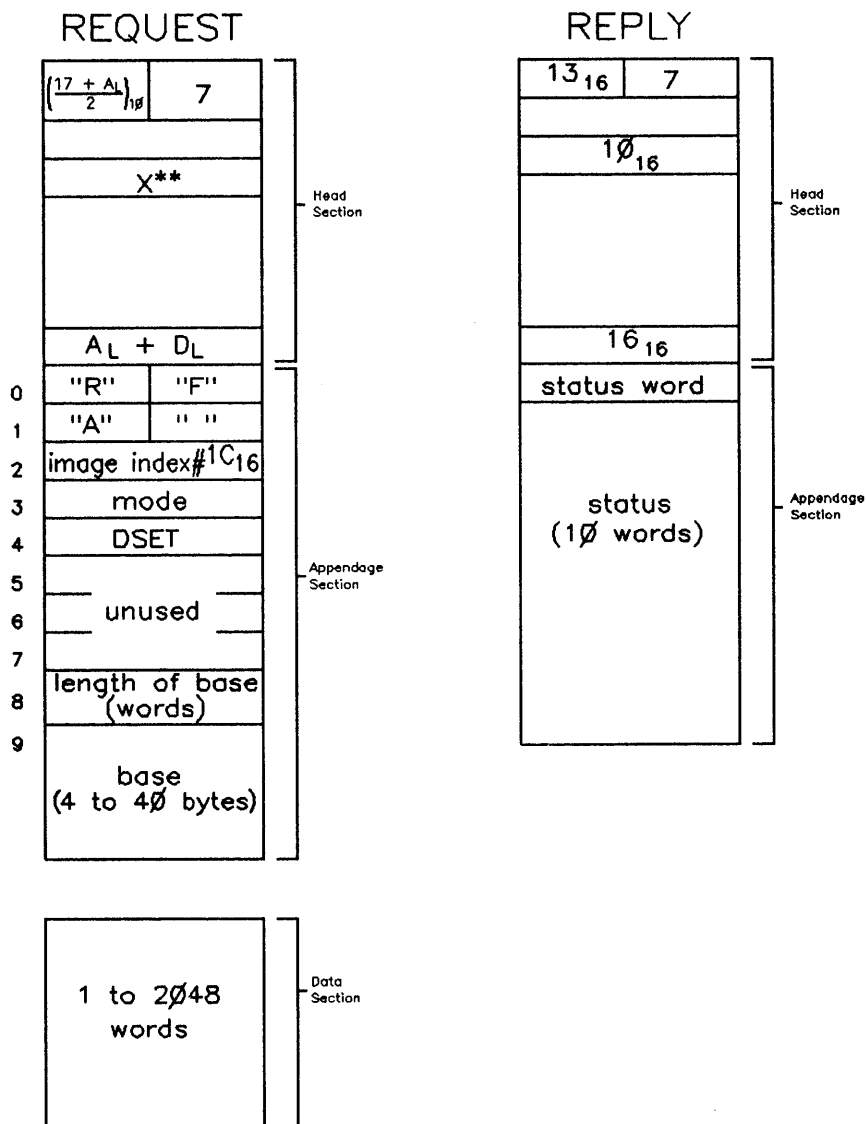
$$X** = \begin{cases} \boxed{\emptyset\emptyset 1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ 1\emptyset_{16} & \text{if nothing to follow} \end{cases}$$

DBUNLOCK

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %55(!2D, 45)
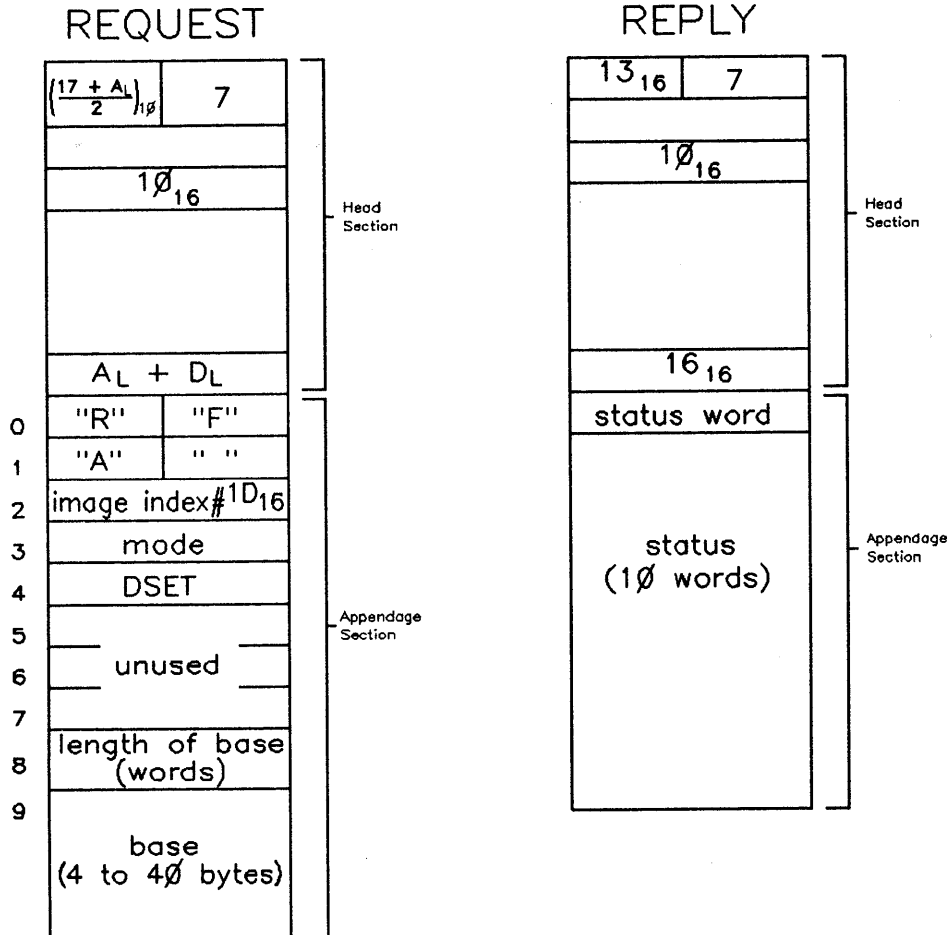
REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7

| 10_{16} | |

| $A_L + D_L$ | |

0	"R"	"F"
1	"A"	" "
2	image index # $1D_{16}$	
3	mode	
4	DSET	
5		
6	unused	
7		
8	length of base (words)	
9	base (4 to 40 bytes)	

Head Section

Appendage Section

REPLY

13_{16}	7

| 10_{16} | |

| 16_{16} | |

status word
status (10 words)

Head Section

Appendage Section

DBCONTROL

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %56(!2E, 46)

REQUEST

$\left(\frac{17 + A_L}{2}\right)_{10}$	7

X**

$A_L + D_L$

Head Section

0	"R"	"F"
1	"A"	" "
2	image index#$1E_{16}$	
3	mode	
4	DSET	
5	unused	
6		
7		
8	length of base (words)	
9		

base
(4 to 40 bytes)

Appendage Section

1 to 2048 words

Data Section

REPLY

13_{16}	7

10_{16}

Head Section

16_{16}

status word

status
(10 words)

Appendage Section
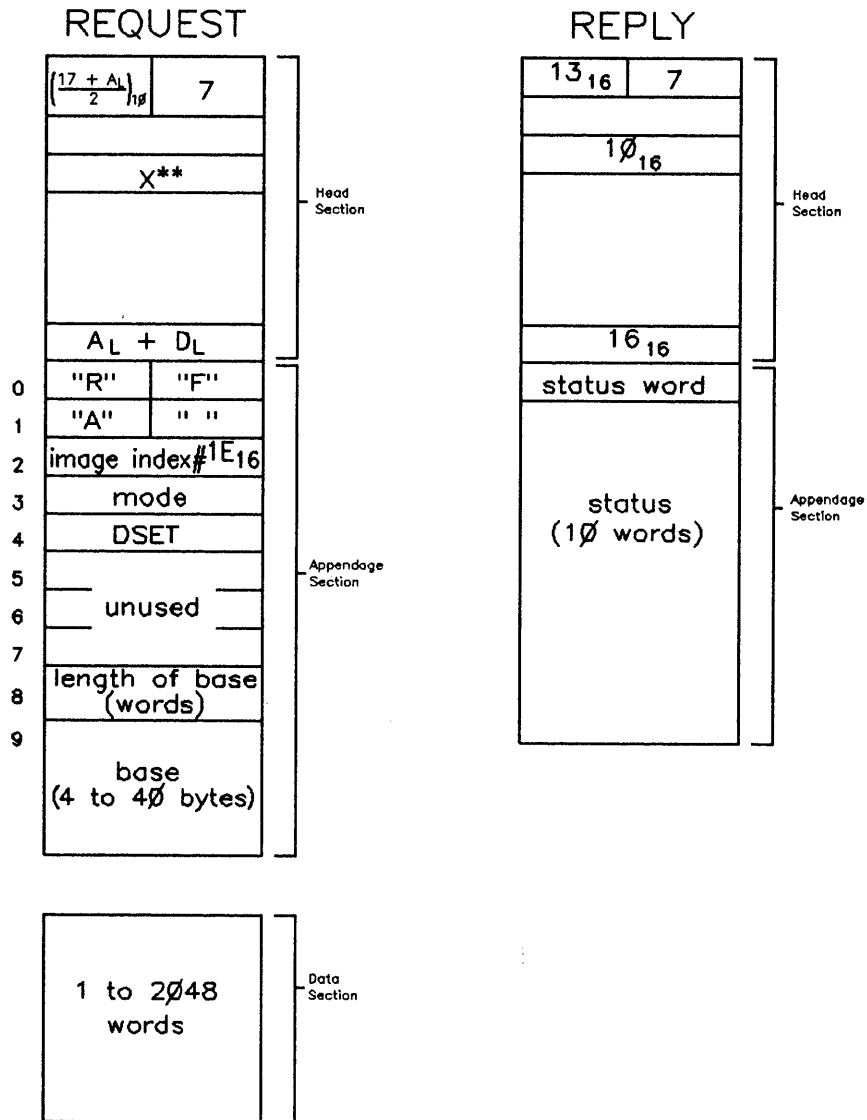
$$X** = \begin{cases} \boxed{001 \quad 10_{16}} & \text{if continuation to follow} \\ 10_{16} & \text{if nothing to follow} \end{cases}$$

DBBEGIN

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %57(!2F, 47)
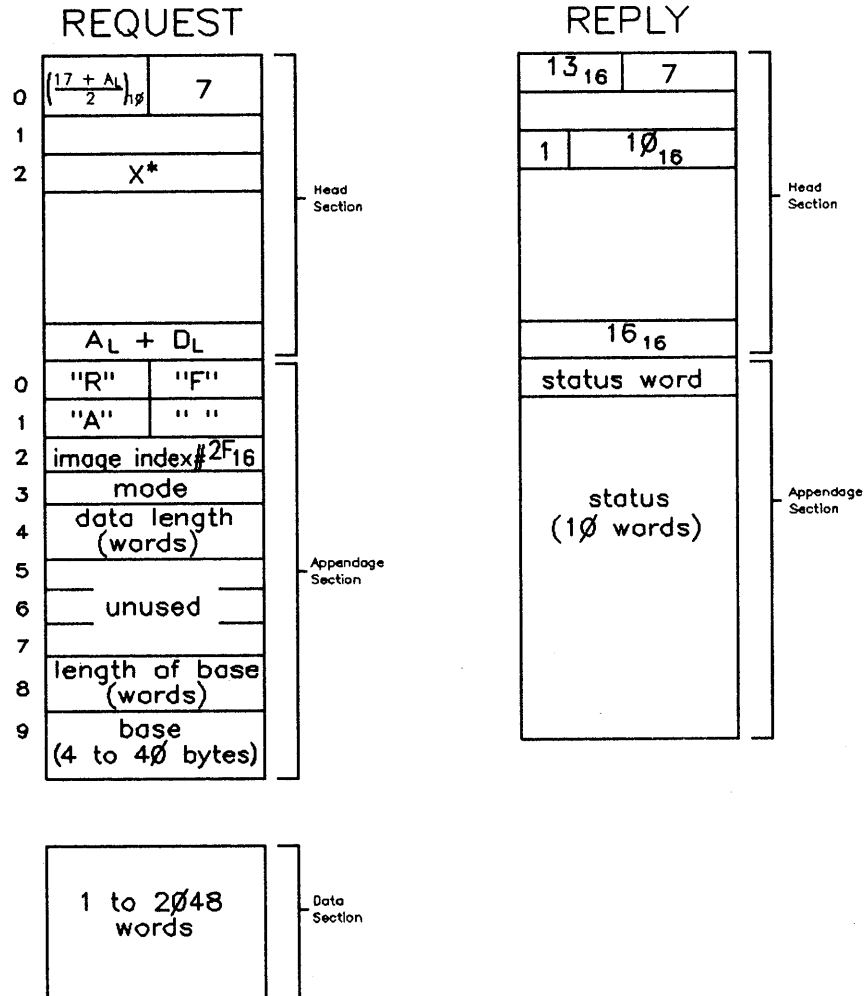
REQUEST

0	$\left(\frac{17 + A_L}{2}\right)_{h\emptyset}$	7
1		
2	X*	
	$A_L + D_L$	

Head Section

0	"R"	"F"
1	"A"	" "
2	image index# $2F_{16}$	
3	mode	
4	data length (words)	
5		
6	unused	
7		
8	length of base (words)	
9	base (4 to 4$\emptyset$ bytes)	

Appendage Section

1 to 2$\emptyset$48 words

Data Section

REPLY

13_{16}	7
1	$1\emptyset_{16}$
16_{16}	

Head Section

status word
status (1$\emptyset$ words)

Appendage Section

$$X^* = \begin{cases} \boxed{1\emptyset1 \quad 1\emptyset_{16}} & \text{if continuation to follow} \\ \boxed{1 \quad 1\emptyset_{16}} & \text{if nothing to follow} \end{cases}$$

DBEND

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %60(!30, 48)

REQUEST

0	$\left(\frac{17 + A_L}{2}\right)_{10}$	7
1		
2	X*	
	$A_L + D_L$	

Head Section

0	"R"	"F"
1	"A"	" "
2	image index#30_{16}	
3	mode	
4	data length (words)	
5		
6	unused	
7		
8	length of base (words)	
9	base (4 to 4Ø bytes)	

Appendage Section

1 to 2Ø48 words

Data Section

REPLY

13_{16}	7
1	$1Ø_{16}$
16_{16}	

Head Section

status word
status (1Ø words)

Appendage Section
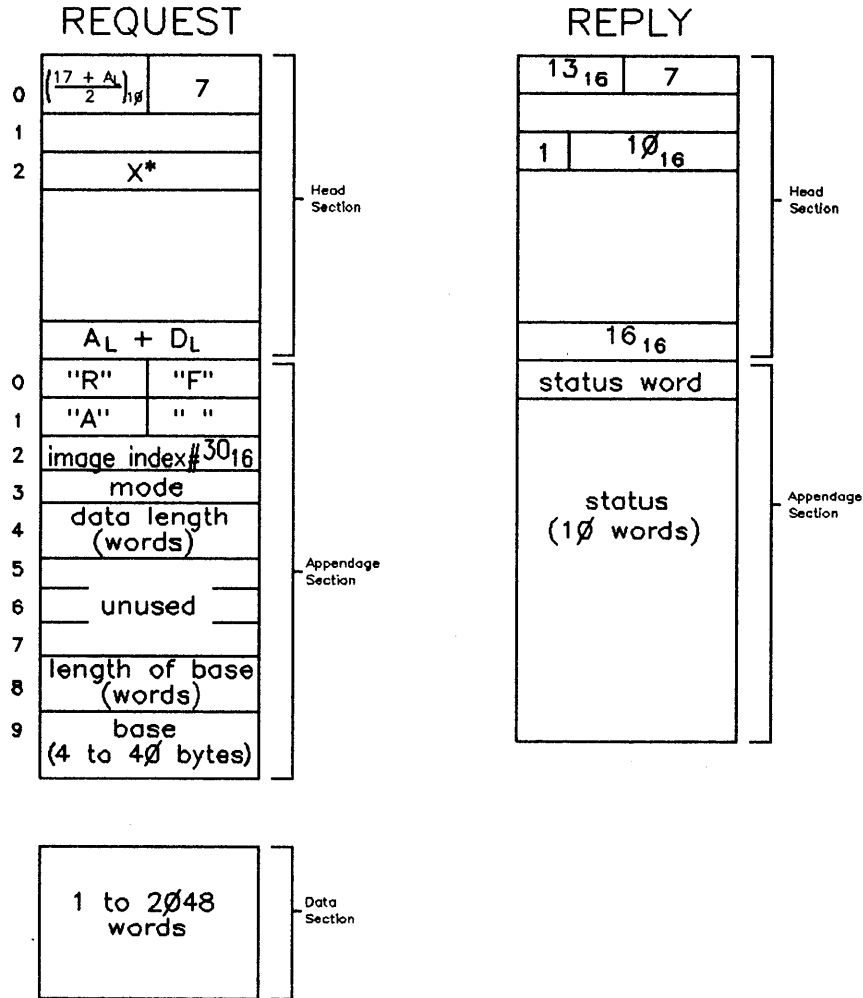
$$X^{**} = \begin{cases} \boxed{ØØ1 \quad 1Ø_{16}} & \text{if continuation to follow} \\ 1Ø_{16} & \text{if nothing to follow} \end{cases}$$

DBMEMO

Message Class = 7
Stream Type = %20(!10, 16)
Image Index = %61(!31, 49)
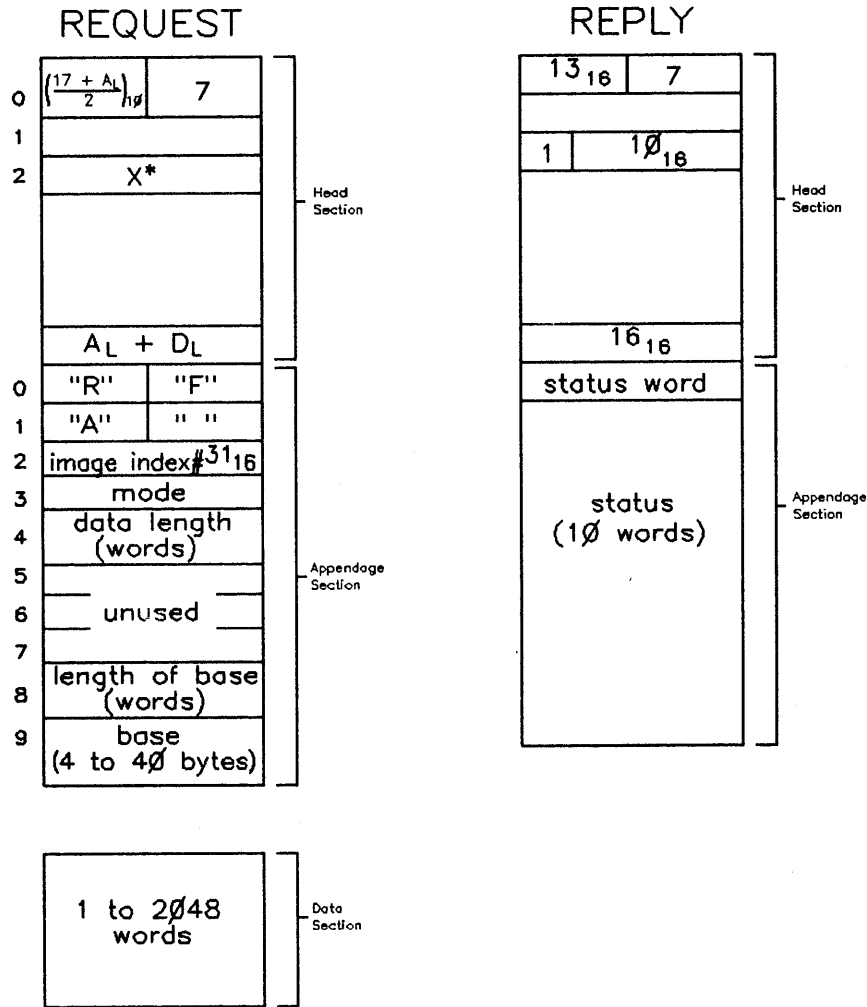
REQUEST

0	$\left(\frac{17 + A_L}{2}\right)_{10}$	7
1		
2	X*	
	$A_L + D_L$	

0	"R"	"F"
1	"A"	" "
2	image index #31_{16}	
3	mode	
4	data length (words)	
5		
6	unused	
7		
8	length of base (words)	
9	base (4 to 40 bytes)	

Head Section

Appendage Section

1 to 2048 words

Data Section

REPLY

	13_{16}	7
	1	10_{16}
	16_{16}	

status word
status (10 words)

Head Section

Appendage Section

$$X^* = \begin{cases} \boxed{001 \quad 10_{16}} & \text{if continuation to follow} \\ 10_{16} & \text{if nothing to follow} \end{cases}$$

FDELETE

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %63 (!33, 51)

REQUEST

	F_{16}	7
	$1\emptyset_{16}$	
	$E_{16} + \emptyset$	

0	"R"	"F"
1	"A"	" "
2	33_{16}	
3	filenum	
4	recnum	
5		
6	mask	

Head Section

Apendage Section

REPLY

	9_{16}	7
1		$1\emptyset_{16}$
	$2 + \emptyset$	

0	status word

Head Section

Appendage Section
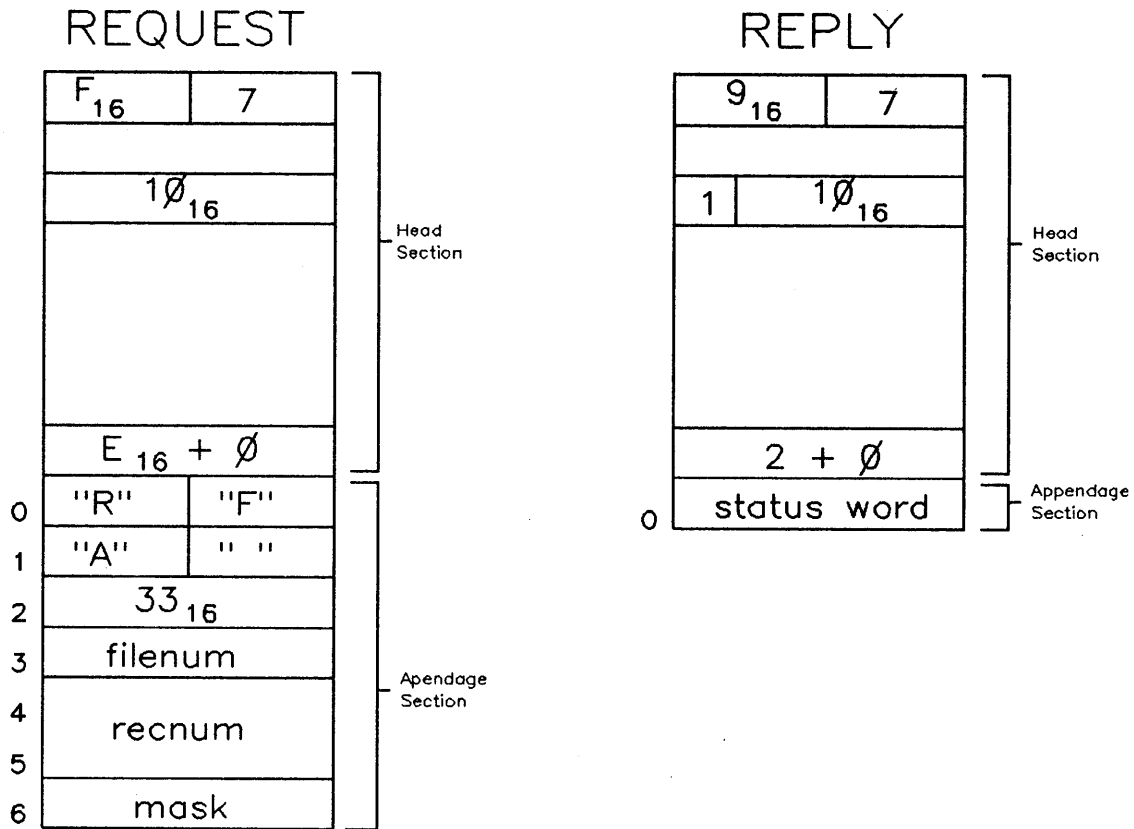
FFILEINFO

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %64 (!34, 52)

REQUEST

	17_{16}	7
	$1\emptyset_{16}$	
	$1E_{16} + \emptyset$	
0	"R"	"F"
1	"A"	" "
2	34_{16}	
3	filenum	
4	itemnum1	
5	itemvalue1	
6	itemnum2	
7	itemvalue2	
8	itemnum3	
9	itemvalue3	
10	itemnum4	
11	itemvalue4	
12	itemnum5	
13	itemvalue5	
14	mask	

Head Section (rows through $1E_{16} + \emptyset$)
Appendage Section (rows 0–14)

REPLY

	9_{16}	7
	1	$1\emptyset_{16}$
	$2 + D_L$	
0	status word	
1	value 1	
	value 2	
	value 3	
	value 4	
	value 5	

Head Section
Appendage Section (status word)
Data Section (value 1 – value 5)

FDEVICECONTROL

Message Class = 7
Stream Type = %20 (!10, 16)
F.S. Intrinsic Number = %65 (!35, 53)

REQUEST

FIRST RECORD

10_{16}	7
X*	
$10_{16} + 0$	
"R"	"F"
"A"	" "
ERR#	35_{16}
filenum	
tcount	
control code	
parm1	
parm2	

Head Section
Appendage Section

CONTINUATION

8_{16}	7
X*	
$0 + D_L$	
target	

Head Section
Data Section

REPLY

A_{16}	7
1	10_{16}
$4 + 0$	
status word	
errnum	

Head Section
Appendage Section
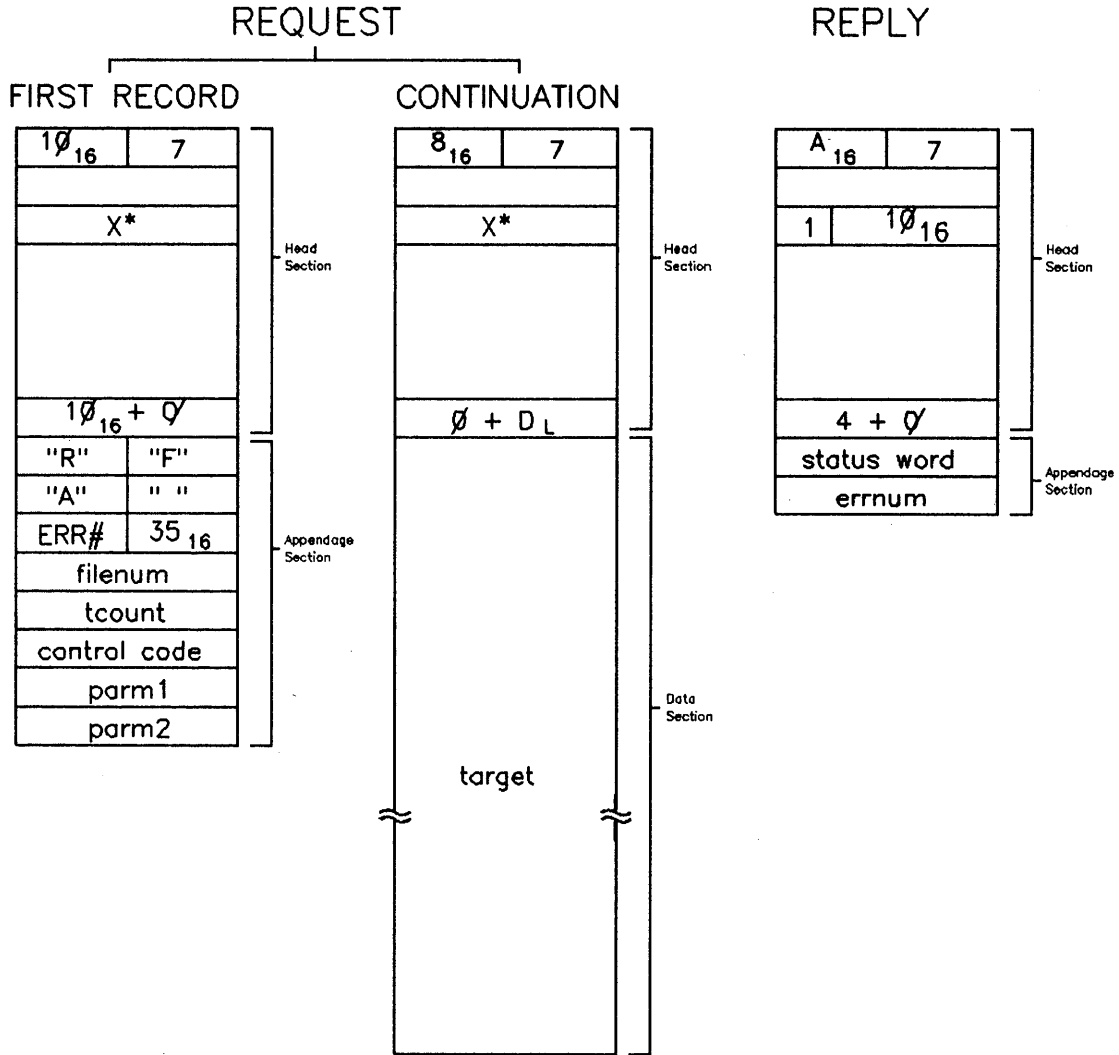
ERR# – used when local system finds an
error in a file.   ERR# passed to
remote system to be placed in ACB
so FCHECK will return correct error.

$$X^* = \begin{cases} \boxed{001 \mid 10_{16}} & \text{if continuation to follow} \\ \\ 10_{16} & \text{if nothing to follow} \end{cases}$$

POPEN

Message Class = 7
Stream Type = %21 (!11, 17) Request
= %26 (!16, 22) Reply Accept
= %27 (!17, 23) Reply Reject
F.S. Intrinsic Number = %25 (!15, 21)

REQUEST

38_{16}	7
11_{16}	
$6\emptyset_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	15_{16}	
3	PROG NAME E_{16} WORDS	
17	ENTRY POINT 4 WORDS	
21	TAG FIELD 14_{16} WORDS	
41	param	
42	flags	
43	stacksize	
44	dlsize	
45	maxdata	
46	bufsize	
47	mask	

Appendage Section

REPLY

22_{16}	7
X*	
$34_{16} + \emptyset$	

Head Section

0	cc	error code
1	/////////	
2	prog ID#	
3	I/O class#	
4	term#	
5		
	TAG FIELD 14_{16} WORDS	
25	mask	

Appendage Section

X* =
| 1 | 16_{16} | **if reply accept**
| 1 | 17_{16} | **if reply reject**

5-69
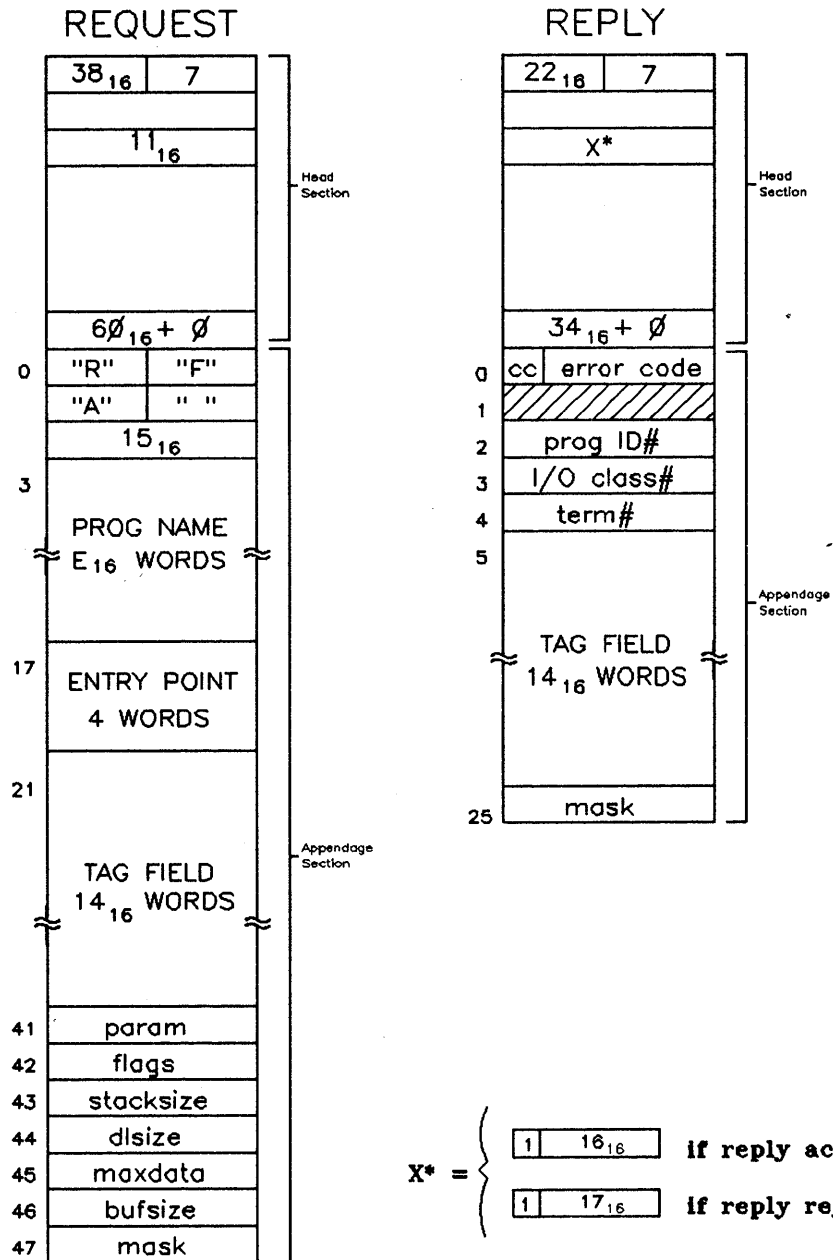
PCLOSE

Message Class = 7
Stream Type = %21 (!11, 17)
F.S. Intrinsic Number = %26 (!16, 22)

REQUEST

E_{16}	· 7
11_{16}	
$C_{16}+ \emptyset$	

Head Section

"R"	"F"
"A"	" "
16_{16}	
program I.D.#	
I/O class#	
term#	

Appendage Section

REPLY

8_{16}	7
1	11_{16}
$\emptyset + \emptyset$	

Head Section

RFA Request
(Remote Hello on Slave)
(Initial DSOPEN)

Message Class = 7
Stream Type = %22 (!12, 18)

REQUEST

C_{16}	7

12_{16}	

Head Section

8_{16}	

"R"	"F"
"A"	" "
*	17_{16}
process #	

Appendage Section

REPLY

8_{16}	7

1	12_{16}

Head Section

$\emptyset + \emptyset'$
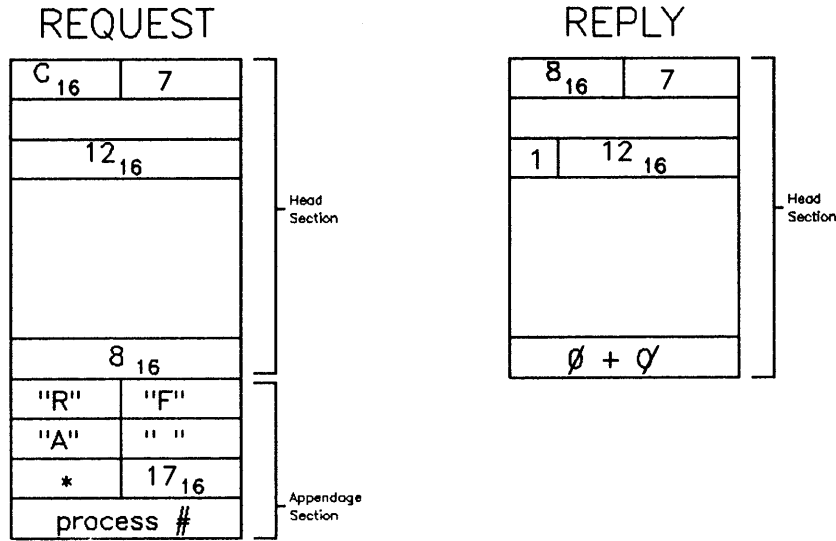
NOTE: Performs a DSOPEN.

* $\emptyset'$ = Master is not compressing on this line, slave will not compress either.

  1 = Master is compressing on this line and knows that the slave can compress also, so slave will compress.

KSAM FFINDN

Message Class = 7
Stream Class = %23 (!13, 19)
F.S. Intrinsic Number = %35 (!1D, 29)

REQUEST

F_{16}	7
13_{16}	
$E_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	$1D_{16}$	
3	filenum	
4	number	
6	keyloc	

Appendage Section

REPLY

9_{16}	7
1	13_{16}
$2 + \emptyset$	

Head Section

status word

Appendage Section
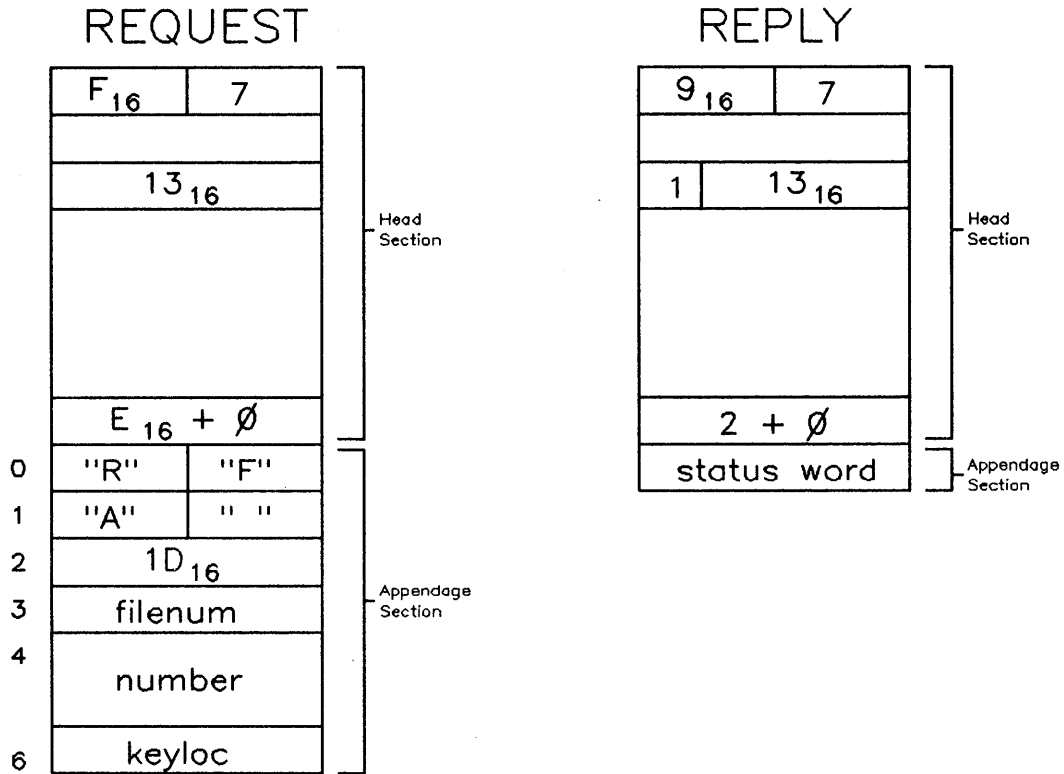
KSAM FFINDBYKEY

Message Class = 7
Stream Class = %23 (!13, 19)
F.S. Intrinsic Number = %36 (!1E, 30)

REQUEST

F_{16}	7	Head Section
13_{16}		
$E_{16} + D_L$		
0	"R"	"F"
1	"A"	" "
2	$1E_{16}$	
3	filenum	
4	keyloc	
5	keylength	
6	relop	
7		
	KEY	
	128 WORDS	

Head Section

Appendage Section

REPLY

9_{16}	7	Head Section
1	13_{16}	
$2 + \emptyset$		
status word		Appendage Section
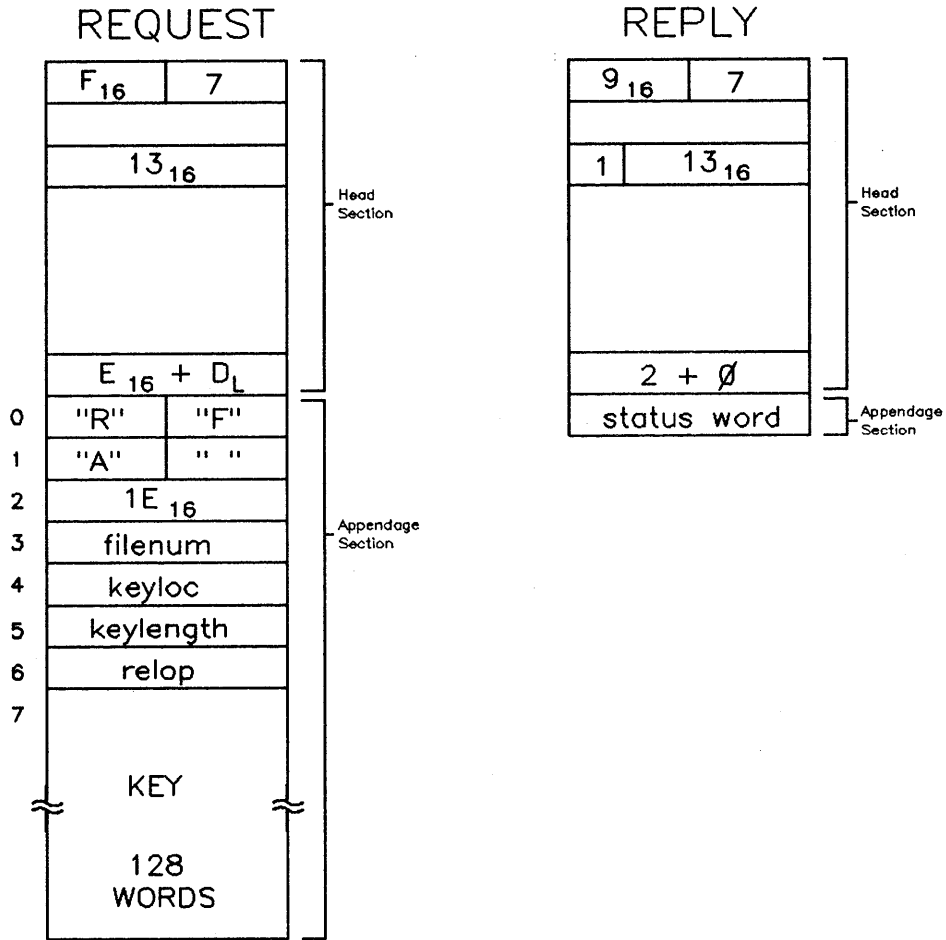
KSAM FGETKEYINFO

Message Class = 7
Stream Type = %23 (!13, 19)
F.S. Intrinsic Number = %37 (!1F, 31)

REQUEST

C_{16}	7
13_{16}	
$8_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	$1F_{16}$	
3	filenum	

Appendage Section

REPLY

89_{16}	7
1	13_{16}
$1\emptyset2_{16} + D_L$	

Head Section

0 status word
1
KSAM CONTROL 128 WORDS

Appendage Section

KSAM PARAM
UP TO 128 WORDS

Data Section

5-74
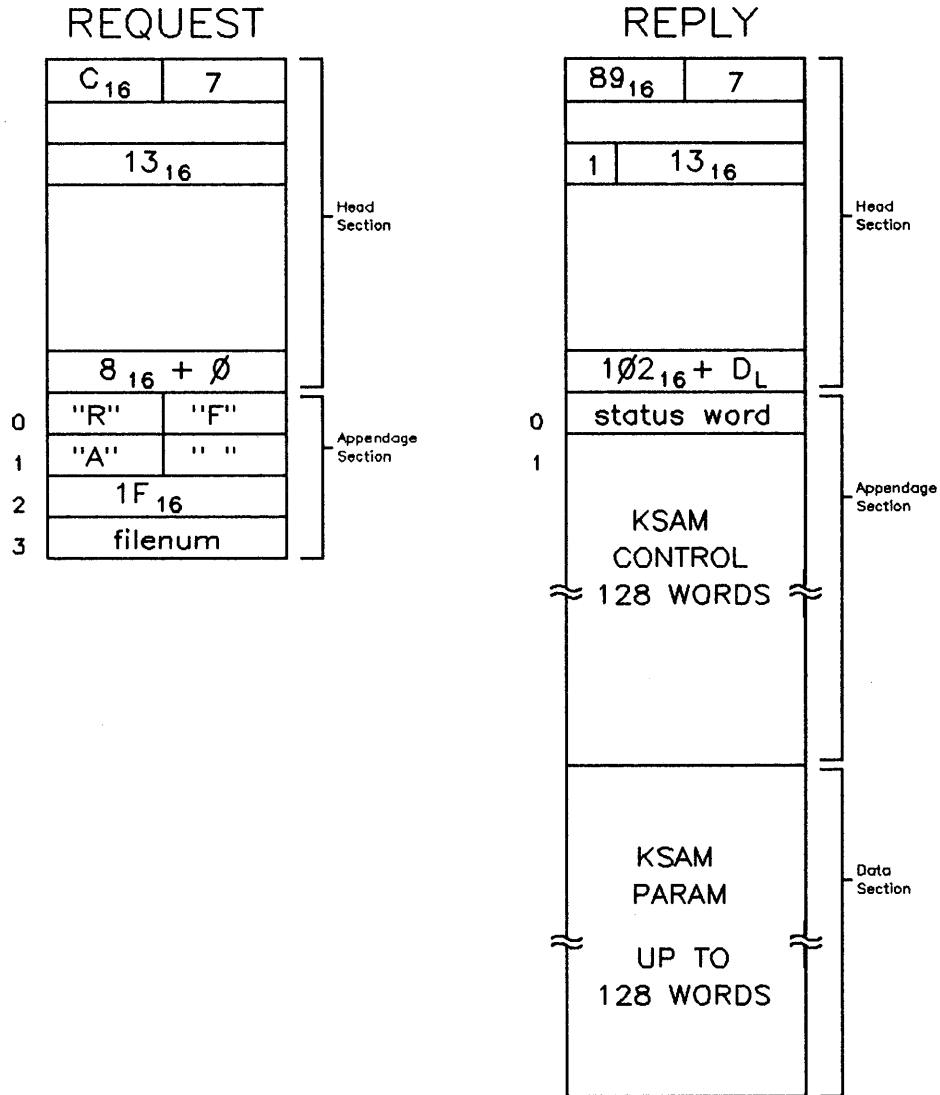
KSAM FREADBYKEY

Message Class = 7
Stream Type = %23 (!13, 19)
F.S. Intrinsic Number = %40 (!20, 32)

REQUEST

E_{16}	7
13_{16}	
$C_{16} + \emptyset$	

0	"R"	"F"
1	"A"	" "
2	20_{16}	
3	filenum	
4	tcount	
5	keyloc	

KEY

128

WORDS

Head Section

Appendage Section

REPLY

A_{16}	7
1	13_{16}
$4 + D_L$	

0	status word
1	length

TARGET

Head Section

Appendage Section

Data Section
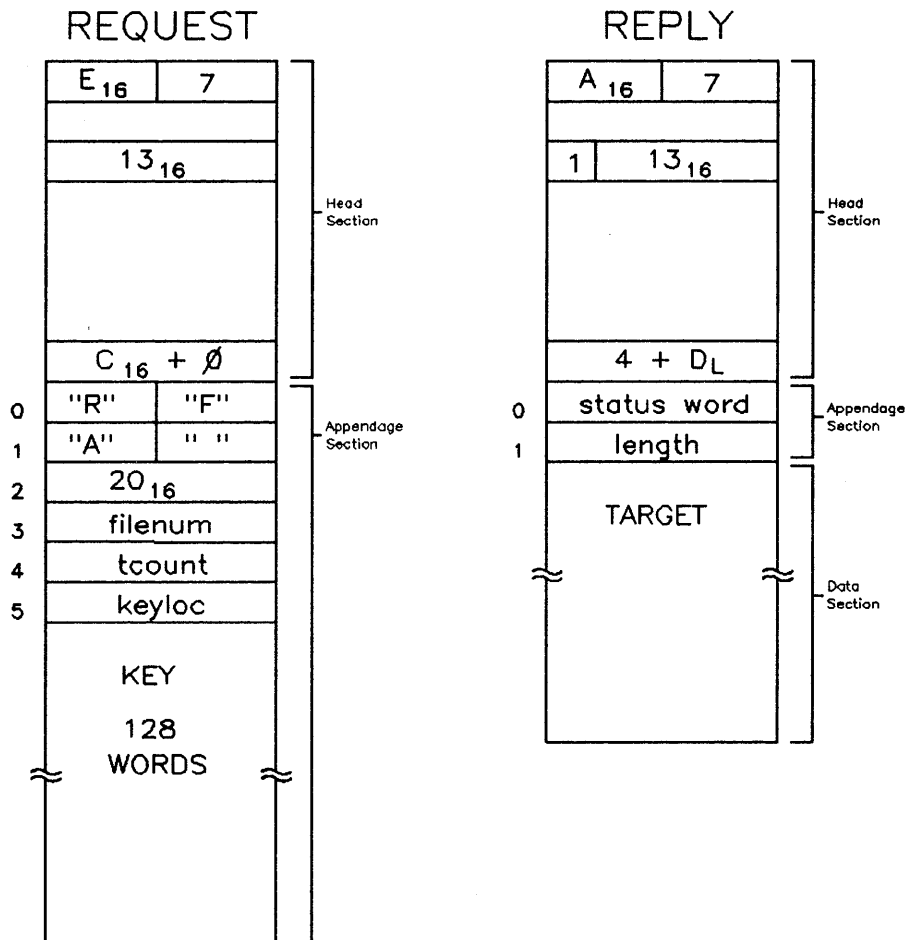
KSAM FREADC

Message Class = 7
Stream Type = %23 (!13, 19)
F.S. Intrinsic Number = %41 (!21, 33)

REQUEST

D_{16}	7
13_{16}	
$A_{16} + \emptyset$	

0	"R"	"F"
1	"A"	" "
2	21_{16}	
3	filenum	
4	tcount	

Head Section

Appendage Section

REPLY

A_{16}	7
1	13_{16}
$4 + D_L$	

0	status word
1	length
	TARGET

Head Section

Appendage Section

Data Section
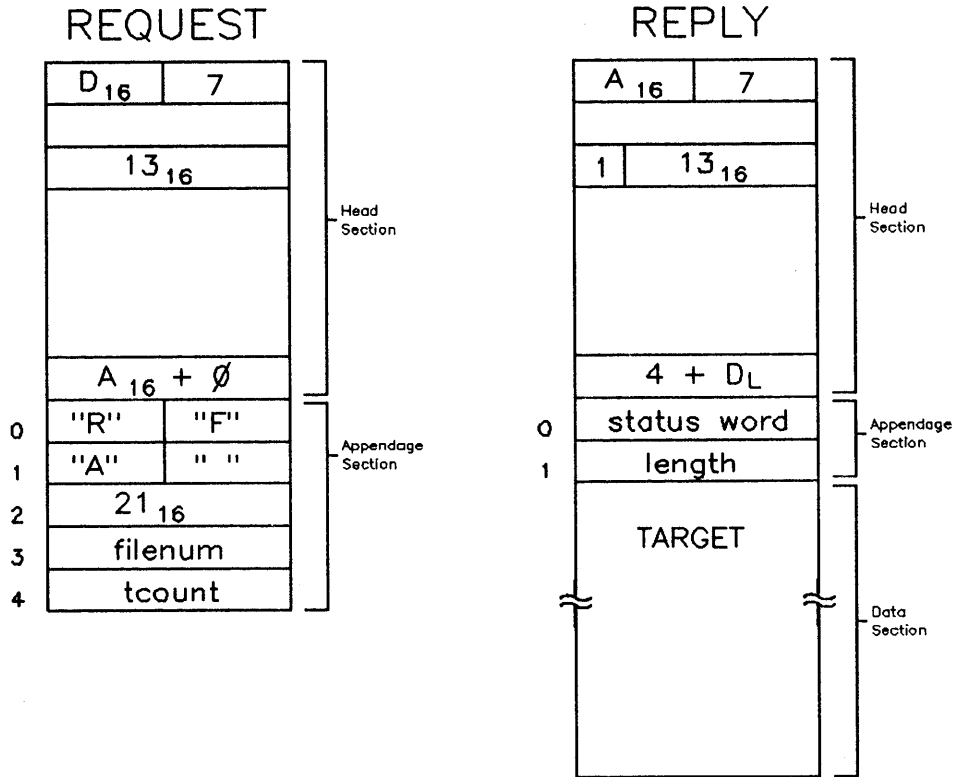
KSAM FREMOVE

Message Class = 7
Stream Type = %23 (!13, 19)
F.S. Intrinsic Number = %42 (!22, 34)

REQUEST

C_{16}	7
13_{16}	
$8_{16} + \emptyset$	

Head Section

0	"R"	"F"
1	"A"	" "
2	22_{16}	
3	filenum	

Appendage Section

REPLY

9_{16}	7
1	13_{16}
$2 + \emptyset$	

Head Section

status word

Appendage Section
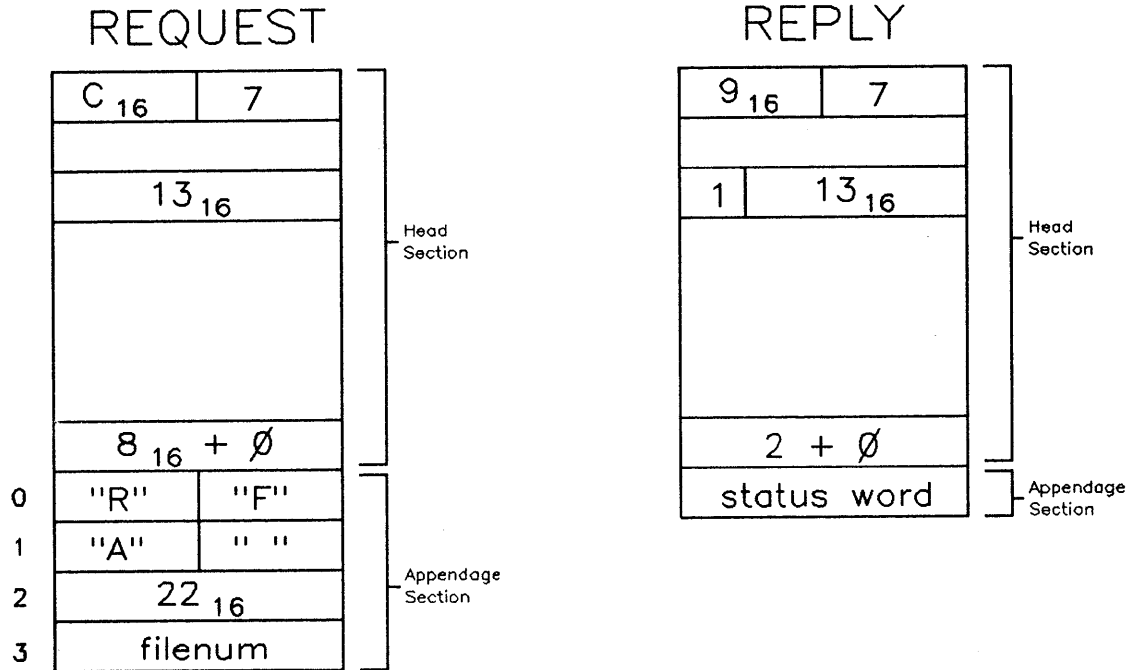
KSAM KSPACE

Message Class = 7
Stream Type = %23 (!13, 19)
F.S. Intrinsic Number = %43 (!23, 35)

REQUEST

	D_{16}	7
	13_{16}	
	$A_{16} + \emptyset$	
0	"R"	"F"
1	"A"	" "
2	23_{16}	
3	filenum	
4	displacement	

Head Section

Appendage Section

REPLY

9_{16}		7
1	13_{16}	
	$2 + \emptyset$	
	status word	

Head Section

Appendage Section
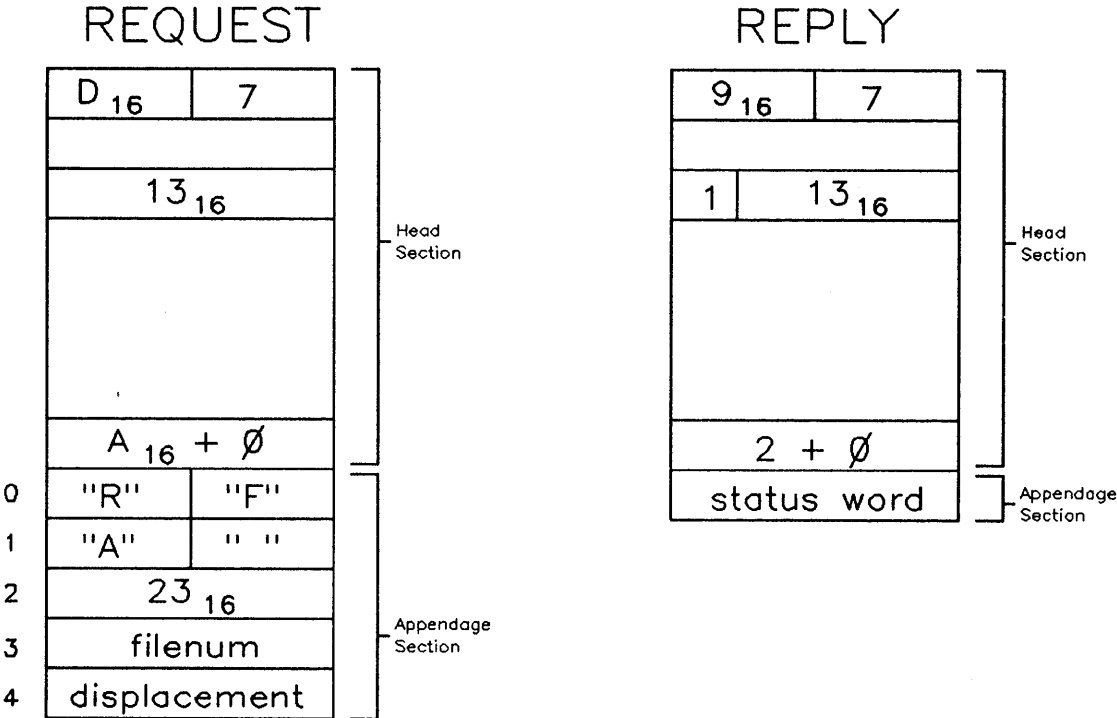
Message Class %11

QOPEN
(Master to Slave)

Message Class = %11 (!9, 9)
Stream Type = %21 (!11, 17) Request
         = %22 (!12, 18) Accept Reply -- QWRITEREAD
         = %23 (!13, 19) Reject Reply -- QCLOSE

REQUEST
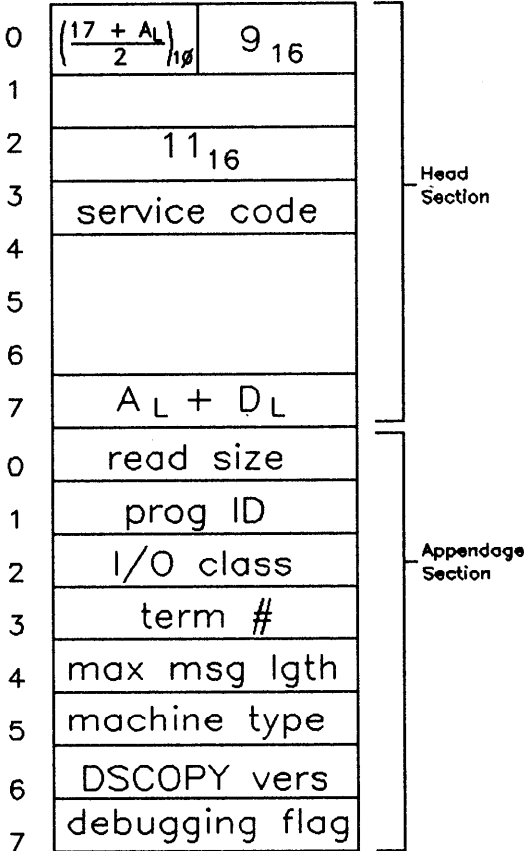
0	$\left(\dfrac{17 + A_L}{2}\right)_{10}$	9_{16}
1		
2	11_{16}	
3	service code	
4		
5		
6		
7	$A_L + D_L$	

Head Section

0	read size
1	prog ID
2	I/O class
3	term #
4	max msg lgth
5	machine type
6	DSCOPY vers
7	debugging flag

Appendage Section

QWRITEREAD
(Master to Slave or Slave to Master)

Message Class = %11 (!9, 9)
Stream Class = %22 (!12, 18)

REQUEST

0	C_{16}	9_{16}
1		
2	R*	12_{16}
3	service code	
4		
5		
6		
7	$8 + D_L$	

Head Section

0	read size
1	prog ID
2	I/O class
3	term #

Appendage Section

Data Section
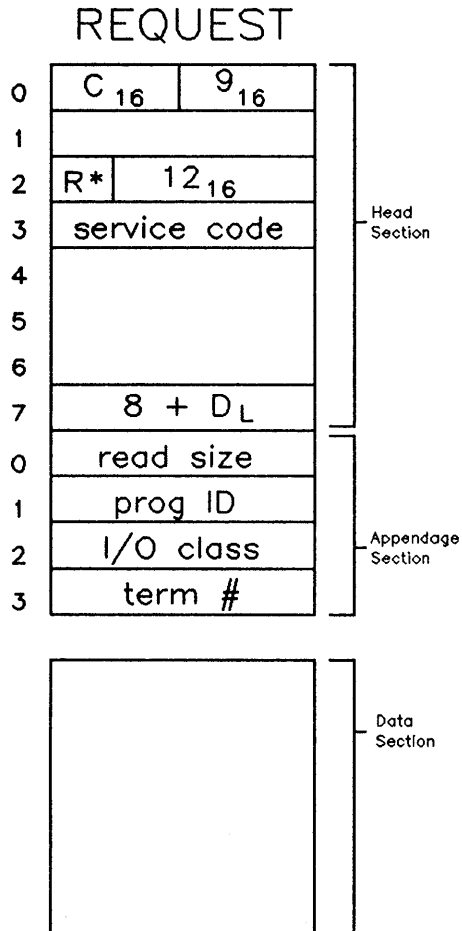
R *

R = ∅   Master to Slave

R = 1   Slave to Master

Expected reply is
QWRITEREAD OR QCLOSE

QCLOSE
(Master to Slave or Slave to Master)

Message Class = %11 (!9, 9)
Stream Class = %23 (!13, 19)

REQUEST

0	C_{16}	9_{16}
1		
2	R*	13_{16}
3	service code	
4		
5		
6		
7	$8 + D_L$	

Head Section

0	read size**
1	prog ID
2	I/O class
3	term #

Appendage Section

Data Section
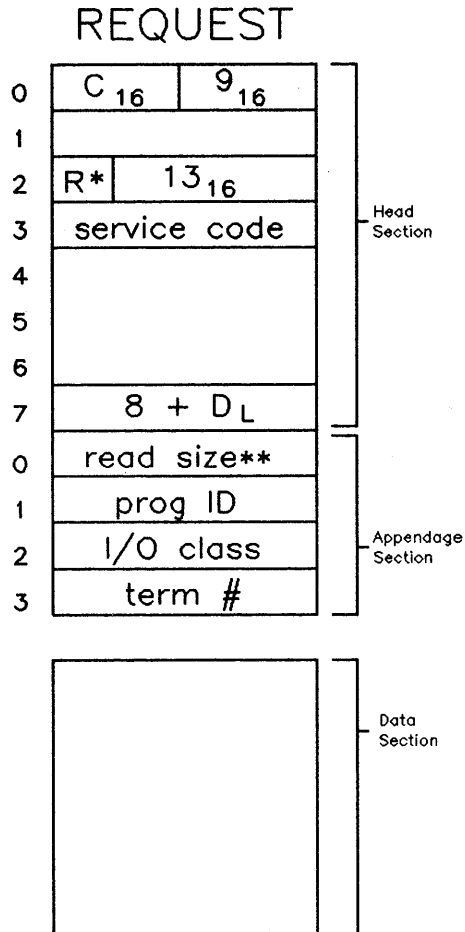
R *

R = ∅   Master to Slave
          Expected reply is
          QCLOSE.

R = 1   Slave to Master
          No reply is expected.

** read size = −1

5-81

X.25 PACKET FORMATS

PACKET LEVEL PROTOCOL

Packet Formats

DATA

```
Q D 0 1 L C G N
    L C N
P(R) | M | P(S) | 0      or
   USER DATA
```

```
Q D 1 0 L C G N
    L C N
P(S)              0
P(R)              M
   USER DATA
```

CALL CONFIRMATION

```
0 D S N L C G N
    L C N
0 0 0 0 1 1 1 1        Address
Calling      Called ◄— Lengths
      Addresses
```

RR (Receiver Ready)

```
0 0 0 1 L C G N
    L C N
P(R) 0 0 0 0 1        or
```

```
0 0 1 0 L C G N
    L C N
0 0 0 0 0 0 0 1
    P(R)        0
```

CLEAR REQUEST

```
0 0 S N L C G N
    L C N
0 0 0 1 0 0 1 1
   Clearing Cause
   Diagnostic Code
```

CLEAR CONFIRMATION

```
0 0 S N L C G N
    L C N
0 0 0 1 0 1 1 1
```

RNR (Receiver Not Ready)

```
0 0 0 1 L C G N
    L C N
P(R) 0 0 1 0 1        or
```

```
0 0 1 0 L C G N
    L C N
0 0 0 0 0 1 0 1
    P(R)        0
```

RESET REQUEST

```
0 0 S N L C G N
    L C N
0 0 0 1 1 0 1 1
   Resetting Cause
   Diagnositc Code
```

RESET CONFIRMATION

```
0 0 S N L C G N
    L C N
0 0 0 1 1 1 1 1
```

REJ (Reject)

```
0 0 0 1 L C G N
    L C N
P(R) 0 1 0 0 1        or
```

```
0 0 1 0 L C G N
    L C N
0 0 0 0 1 0 0 1
    P(R)        0
```

RESTART REQUEST

```
0 0 S N 0 0 0 0
0 0 0 0 0 0 0 0
1 1 1 1 1 0 1 1
   Restarting Cause
   Diagnostic Code
```

RESTART CONFIRMATION

```
0 0 S N 0 0 0 0
0 0 0 0 0 0 0 0
1 1 1 1 1 1 1 1
```

INT. (Interrupt)

```
0 0 S N L C G N
    L C N
0 0 1 0 0 0 1 1
   USER DATA
```

INT. CONF (Interrupt Confirmation)

```
0 0 S N L C G N
    L C N
0 0 1 0 0 1 1 1
```

CALL REQUEST

```
0 D S N L C G N
    L C N
0 0 0 0 1 0 1 1        Address
Calling      Called ◄— Lengths
      Addresses
```

INCOMING CALL FROM PAD

```
0 D S N L C G N
    L C N
0 0 0 0 1 0 1 1        Address
Calling      Called ◄— Lengths
      Addresses
0 0 0 0 0 0 0 0
0 0 0 0 0 0 0 1
```

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

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

Preliminary notes:

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

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

DS/3000 WITH X.25 LINK

```
: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 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 correspond to INP models 10A, 20A, and 20B, respectively.

Downloads CSDLAPB0, CSDLAPB1, and CSDLAPB2 are used with X.25 protocol. Again, the 0, 1, and 2 correspond to INP models 10A, 20A, and 20B, respectively.

DSLIST

The DSLIST program provides a list of the software module version numbers for the DS/3000, X.25 Link, and CS modules installed on your 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 DS/3000 program files in PUB.SYS. The command syntax is:

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

Version Report Examples

DS/3000 WITH X.25 LINK

```
: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
   IODSTRMO     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
   IOPADO       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
:

DS/3000 WITHOUT X.25 LINK

: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
   IODSTRMO     B.52.00, INTERNAL FIX 001
   IODSTRMX     B.52.00, INTERNAL FIX 001
```

X.25 HP32187B:
   NOT INSTALLED

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
:

DSTEST

DSTEST checks your DS line by transmitting and receiving data. You can specify how many times to check your line, and other parameters, by running DSTEST in Diagnostic Mode. Or, you can simply run DSTEST, and it will use default values. Before running DSTEST, you must have opened the DS line using the :DSLINE command, and established a remote session.

Normal Mode

Normal mode is often run by users when problems are suspected. When calling for HP Support, the results of running Normal Mode should be included.

To run the normal mode, perform the following steps:

1. Enter the following line to initiate DSTEST:

   :<u>RUN DSTEST.PUB.SYS</u>

   In the normal mode, you are not required to select options; the default values are automatically used.

2. Answer the following question:

   :DSLINE?

   Enter the device class or logical device number for IODS0, or node name for an X.25 configuration.

<div style="text-align:center">

┌─────────────┐
│   NOTE   │
└─────────────┘

</div>

The normal mode default is a 512-word program-to-program transfer with all words containing %177777.

Diagnostic Mode

To run the diagnostic mode, perform the following steps:

1. If you are testing RFA, a :FILE command is required before initiating DSTEST to direct the data to the desired file to and DS line. (This file does not have to exist.) The file equation is:

   :FILE REMOTE;DEV=dsdevice#DISC

   Enter the following line to initiate the line test:

   :RUN DSTEST.PUB.SYS,DIAG

2. Answer the following questions:

   .RFA or PTOP?

   Enter RFA for Remote File Access or enter PTOP for Program-to-Program testing.

   .REMOTE COMPUTER?   (This question is only asked for RFA.)

   Enter 3000 or 1000.

   .DSLINE?   (This question is not asked for RFA if Step 1 was followed.)

   Enter the device class or logical device number for IODS0, or node name for an X.25 configuration.

.NUMBER OF PASSES?

   Enter the number of actual transmissions desired, up to a maximum of 32767 (decimal). Entering 0 or (RETURN) causes the test pattern to be transmitted once. A pass is one transmit and one receive transaction pair.

.PATTERN?

   Enter an octal word to be transferred (the % sign must be entered).

```
┌─────────────┐
│    NOTE     │
└─────────────┘
```

Illegal input causes the message

INPUT ERROR

to be printed. Enter a correct value, or enter (RETURN) to specify the default value %177777.

.BLOCKSIZE?

Enter the desired blocksize of the transfer (<4096). If a value equal to or greater than 4096 is entered, an error message will be printed.

`.CONTINUE (Y/N)?`

Enter Y̲ to return to the beginning of the option selection phase if you wish to repeat the cycle, or enter N̲ to terminate the test.

DSTEST,CONFIG

DSTEST has an alternate entry point, CONFIG, that provides a list of the DS devices configured through SYSDUMP. The program also provides a rudimentary check of the configuration, looking for obvious errors. It does not recognize the PAD terminal drivers IOPAD0 or IOPAD1. DSTEST,CONFIG is especially useful for picking out the DS devices from a large configuration.

A sample run of DSTEST,CONFIG follows.

```
:RUN DSTEST.PUB.SYS,CONFIG
```

LDEV	DEVICE	DEVICE TYPE	LINK	SUBTYP	MODE		WIDTH	DRIVER
13	CS	INP		3			0	IOINP0
15	CS	INP		3			0	IOINP0
16	CS	INP		3			0	IOINP0
17	CS	INP		3			0	IOINP0
18	CS	INP		3			0	IOINP0
19	CS	INP		3			0	IOINP0
120	DS	CONTROLLER	17	0			128	IODS0
121	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
122	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
123	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
124	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
125	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
126	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
127	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
128	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
129	DS	PSEUDOTERM	120	0	J	ID	40	IODSTRM0
140	DS	CONTROLLER	15	0			128	IODSX
141	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
142	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
143	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
144	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
145	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
146	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
147	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
148	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
149	DS	PSEUDOTERM	140	0	J	ID	40	IODSTRMX
150	DS	CONTROLLER	16	0			128	IODS0
151	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
152	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
153	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
154	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
155	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
156	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
157	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
158	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
159	DS	PSEUDOTERM	150	0	J	ID	40	IODSTRM0
160	DS	CONTROLLER	18	0			128	IODS0
161	DS	PSEUDOTERM	160	0	J	ID	40	IODSTRM0
162	DS	PSEUDOTERM	160	0	J	ID	40	IODSTRM0
163	DS	PSEUDOTERM	160	0	J	ID	40	IODSTRM0
164	DS	PSEUDOTERM	160	0	J	ID	40	IODSTRM0

165	DS	PSEUDOTERM	160	0	J ID	40	IODSTRM0
166	DS	PSEUDOTERM	160	0	J ID	40	IODSTRM0
167	DS	PSEUDOTERM	160	0	J ID	40	IODSTRM0
168	DS	PSEUDOTERM	160	0	J ID	40	IODSTRM0
171	DS	CONTROLLER	19	0		128	IODS0
172	DS	PSEUDOTERM	171	0	J ID	40	IODSTRM0
173	DS	PSEUDOTERM	171	0	J ID	40	IODSTRM0
174	DS	PSEUDOTERM	171	0	J ID	40	IODSTRM0
175	DS	CONTROLLER	13	0		128	IODS0
176	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
177	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
178	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
179	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
180	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
181	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
182	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0
183	DS	PSEUDOTERM	175	8	J ID	40	IODSTRM0

```
END OF PROGRAM
:
```

If the person configuring the system had answered any of the SYSDUMP questions incorrectly, an error message (such as LDEV nnn: Device mode may be erroneous.) would be printed.

ERROR CODES AND MESSAGES

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 :DSLINE syntax problems, while the second group contains the messages that report a DS/3000 functional problem. Each group is identified with an explanatory heading, and the messages are listed in numerical sequence within each category for easy reference.

:DSLINE SYNTAX ERRORS

These messages are sent to the terminal user to point out an error in syntax or to warn of the consequences of a request.

1300 REMOTE JOBS ARE NOT ALLOWED !. (CIERR 1300)

1301 DSLINE CANNOT CONTAIN BOTH OPEN AND CLOSE. (CIERR 1301)

1302 DSLINE REQUIRES AT LEAST ONE PARAMETER. (CIERR 1302)

1303 DSNUMBER SPECIFICATION MUST BE A NUMBER FROM 1 THRU 255.
     (CIERR 1303)

1304 DSLINE #1! DOES NOT IDENTIFY AN OPEN DS LINE. (CIERR 1304)

1305 EXPECTED LINEBUF, PHNUM, IOCID, REMID, OPEN, CLOSE,
     QUIET, COMP, NOCOMP, OR EXCLUSIVE. (CIERR 1305)

1306 MULTIPLE USE OF ! IS NOT ALLOWED. (CIERR 1306)

1307 THE SYNTAX FOR ! REQUIRES AN = SIGN FOLLOWED BY DATA.
     (CIERR 1307)

1308 PHNUM IS 1 TO 20 DIGITS AND DASHES. (CIERR 1308)

1309 ! LIST CAN CONTAIN ONLY ONE ELEMENT. (CIERR 1309)

1310 THE SPECIFIED LOGICAL DEVICE IS NOT OPEN. (CIERR 1310)

1311 THE FIRST CHARACTER OF AN ID SEQUENCE MUST BE A " OR A (
     (CIERR 1311)

1312 THE ID SEQUENCE MUST TERMINATE WITH A). (CIERR 1312)

1313 THE ID SEQUENCE MUST TERMINATE WITH A ". (CIERR 1313)

1314 A NUMERIC ID SEQUENCE ELEMENT MUST BE 1 THRU 255 (OR
     %377). (CIERR 1314)

1315 LINEBUF MUST BE A NUMERIC VALUE FROM 304 THRU 4096.
     (CIERR 1315)

1316 UNABLE TO COMPLETE THE REMOTE COMMAND. (CIERR 1316)

1317 NOT A CURRENTLY AVAILABLE DSLINE. (CIERR 1317)

1318 USE OF EXCLUSIVE REQUIRES BOTH NS AND CS CAPABILITY.
     (CIERR 1318)

1319 THE DS LINE #L! IS IN USE BY A PROGRAM OR SUBSYSTEM AND
     CANNOT BE CLOSED. (CIERR 1319)

1320 EXPECTED A RESPONSE OF YES, Y, NO, OR N. (CIERR 1320)

1321 UNABLE TO OPEN THE DS LINE ON DEVICE !. (CIERR 1321)

1322 @ IS INVALID IN THIS CONTEXT. (CIERR 1322)

1323 A DSLINE OPEN REQUIRES A VALID DS DEVICE NAME AS THE
     FIRST PARAMETER. (CIERR 1323)

1324 FROM ADDRESS MUST BE BETWEEN 1 AND 14 CHARACTERS INCLUSIVE.
     (CIERR 1324)

1325 TO ADDRESS MUST BE BETWEEN 1 AND 14 CHARACTERS INCLUSIVE.
     (CIERR 1325)

1326 FROM AND TO ADDRESS MUST BE A DECIMAL NUMBER. (CIERR 1326)

1389 INVALID OR MISSING DELIMETER FOR SELECTION SIGNAL SEQUENCE.
     (CIERR 1389)

1390 SELECTION SIGNAL SEQUENCE MUST BE FROM 1 TO 30 CHARACTERS.
     (CIERR 1390)

1391 BOTH QUEUE AND NOQUEUE SPECIFIED; NOQUEUE USED. (CIWARN 1391)

1392 ONLY ! WORDS WERE ALLOCATED FOR THE LINE BUFFER.
     (CIWARN 1392)

1393 COMPRESSION REQUEST NOT HONORED. REMOTE DOES NOT SUPPORT
     THIS FEATURE. (CIWARN 1393)

1394 COMPRESSION PARAMETER RESPECIFIES AND OVERRIDES PREVIOUS
     COMPRESSION PARAMETER. (CIWARN 1394)

1395 OPEN PARAMETERS ENTERED ON A CLOSE REQUEST ARE IGNORED
     (CIERR 1395)

1396 AN ID LIST MUST CONTAIN 255 OR LESS ELEMENTS.
     (CIWARN 1396)

1397 AN UNNECESSARY DELIMITER IS IGNORED. (CIWARN 1397)

1398 THERE ARE NO DS LINES OPEN. (CIWARN 1398)

1399 MULTIPLE USE OF ! IS REDUNDANT AND IGNORED. (CIWARN 1399)

DS/3000 FUNCTIONAL ERRORS

These messages report a functional problem within the system.

201 REMOTE DID NOT RESPOND WITH THE CORRECT REMOTE ID.
    (DSERR 201)

202 SPECIFIED PHONE NUMBER IS INVALID. (DSERR 202)

203 REMOTE ABORT/RESUME NOT VALID WHEN DOING PROGRAM-TO-
    PROGRAM COMMUNICATION. USE LOCAL ABORT/RESUME.
    (DSWARN 203)

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

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

206 SLAVE PTOP FUNCTION ISSUED FROM A MASTER PROGRAM.
    (DSERR 206)

207 SLAVE PTOP FUNCTION OUT OF SEQUENCE. (DSERR 207)

208 MASTER PTOP FUNCTION ISSUED BY A SLAVE PROGRAM.
    (DSERR 208)

209 SLAVE PROGRAM DOES NOT EXIST OR IS NOT PROGRAM FILE.
    (DSERR 209)
        Creation of Slave Program failed, possibly because of invalid stack size.

210 WARNING -- INVALID MAXDATA OR DLSIZE FOR A SLAVE PROGRAM.
    SYSTEM DEFAULTS ARE IN EFFECT. (DSWARN 210)

211 SLAVE ISSUED A REJECT TO A MASTER PTOP OPERATION.
    (DSWARN 211)

212 FILE NUMBER FROM IOWAIT NOT A DS LINE NUMBER. (DSWARN 212)

213 EXCLUSIVE USE OF A DS LINE REQUIRES BOTH ND AND CS
    CAPABILITY. (DSERR 213)

214 THE REQUESTED DS LINE HAS NOT BEEN OPEN WITH A USER :DSLINE
    COMMAND OR A REQUIRED :REMOTE HELLO HAS NOT BEEN DONE.
    (DSERR 214)

215 DSLINE CANNOT BE ISSUED BACK TO THE MASTER COMPUTER.
(DSERR 215)

216 MESSAGE REJECTED BY THE REMOTE COMPUTER. (DSERR 216)

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

218 INVALID PTOP FUNCTION REQUESTED. (DSERR 218)

219 MULTIPLE POPEN. ONLY ONE MASTER PTOP OPERATION CAN BE
ACTIVE ON A DS LINE. (DSERR 219)

220 PROGRAM EXECUTING GET WAS NOT CREATED BY POPEN. (DSERR 220)

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

222 MASTER PTOP FUNCTION ISSUED PRIOR TO A POPEN. (DSERR 222)

223 REQUEST TO SEND MORE DATA THAN SPECIFIED IN POPEN.
(DSERR 223)

224 FILE EQUATIONS FOR A REMOTE FILE CONSTITUTE A LOOP.
(DSERR 224)

225 CANNOT ISSUE POPEN TO A SLAVE SESSION IN BREAK MODE.
(DSERR 225)

226 SLAVE PROGRAM HAS TERMINATED BEFORE EXECUTING "GET".
(DSERR 226)

227 REMOTE HELLO MUST BE DONE TO INITIATE REMOTE SESSION.
(DSERR 227)

228 EXCEEDED MAXIMUM NUMBER OF VIRTUAL CHANNELS PER JOB.
(DSERR 228)

231 INVALID FACILITY IN CONNECTION REQUEST. (DSERR 231)

232 THE REMOTE COMPUTER IS NOT OBTAINABLE. (DSERR 232)

233 VIRTUAL CIRCUIT IS NOT AVAILABLE. (DSERR 233)

234 QUEUEING IS REQUIRED TO COMPLETE THE REQUEST. (DSERR 234)

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)

241 DS LINE IN USE EXCLUSIVELY OR BY ANOTHER SUBSYSTEM.
    (DSERR 241)

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)

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)

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.

: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.

311 DS DEVICE !: DEFAULT MODE IS NO COMPRESSION.

312 DS DEVICE !: DEFAULT MODE IS COMPRESSION.

313 DS DEVICE !: RETRY COUNT NOW EQUALS !.

314 DS DEVICE !: CALL REQUEST CANCELLED.

315 DS DEVICE !: TRACE ACTIVATION PENDING, MESSAGE SENT TO SYSTEM CONSOLE.

: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)

4116 COMP OVERRIDES PREVIOUS COMP/NOCOMP FUNCTION. (CIWARN 4116)

4117 NOCOMP OVERRIDES PREVIOUS COMP/NOCOMP FUNCTION.
     (CIWARN 4117)

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)

4129 COMP/NOCOMP FUNCTIONS HAVE NO OPTIONS.   (CIERR 4129)

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)

4134 PROGRAM FILE "DSMON.PUB.SYS" MISSING.   (CIERR 4134)

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)

4143 DS DEVICE !: COMP/NOCOMP NOT EXECUTED DUE TO ABOVE.
     (CIWARN 4143)

4144 DS DEVICE !: DEBUG NOT EXECUTED DUE TO ABOVE.   (CIWARN 4144)

4145 NO DS DEVICES REMAINING TO BE CONTROLLED.   (CIWARN 4145)

4146 RETRY OVERRIDES PREVIOUS RETRY FUNCTION.   (CIWARN 4146)

4147 EXPECTED AN "=" AS DELIMITER FOR RETRY FUNCTION.
(CIERR 4147)

4148 INVALID RETRY COUNT, MUST SPECIFY "DEFAULT" OR A NUMBER
BETWEEN O AND 255 INCLUSIVE.   (CIERR 4148)

4149 DS DEVICE !: RETRY NOT EXECUTED DUE TO ABOVE.   (CIWARN 4149)

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)

4155 PROMPT OVERRIDES PREVIOUS PROMPT FUNCTION(S).   (CIERR 4155)

4180 REDUNDANT SPECIFICATION OF CANCEL OPTION IGNORED.   (CIWARN 4180)

4181 CANCEL OPTION HAS NO PARAMETERS.   (CIERR 4181)

4182 DS DEVICE ! IS NOT AN X.21 DEVICE; CANCEL NOT EXECUTED. (CIWARN 4182)

4183 NO CALL REQUEST FOR DS DEVICE !.   (CIWARN 4183)

:DSCOPY GENERAL ERROR MESSAGES

0   SUCCEEDED.

1   SUCCESSFULLY INITIATED.

4   UNABLE TO OPEN TRANSACTION FILE.   (NFTERR 4)

5   UNABLE TO OPEN LIST FILE (DSCOPYI).   (NFTERR 5)

6   IC ERROR ON TRANSACTION FILE.   (NFTERR 6)

7   TRANSACTION RECORD > 200 CHARS LONG.   (NFTERR 7)

9   TEMPORARY TRANSACTION FILE FULL.   (NFTERR 9)

10   PARAMETERS IMPLY CONFLICTING MODES.   (NFTERR 10)

11   CAN'T "RUN" COPY PROCESS IN THIS MODE.   (NFTERR 11)

13   UNRECOGNIZED PARAMETER.   (NFTERR 13)

14 CONFLICTING OPTIONS HAVE BEEN SPECIFIED. (NFTERR 14)

16 UNIMPLEMENTED FEATURE. (NFTERR 16)

17 CANNOT CONTACT REMOTE NODE. (NFTERR 17)

18 FILE SYSTEM ERROR ON SOURCE FILE. (NFTERR 18)

19 FILE SYSTEM ERROR ON TARGET FILE. (NFTERR 19)

21 ILLEGAL DSLINE NAME. (NFTERR 21)

24 UNSUPPORTED STANDARD DEVICE TYPE. (NFTERR 24)

25 CAN'T FIND OR OPEN THE SOURCE FILE. (NFTERR 25)

26 CAN'T CREATE OR OPEN THE TARGET FILE. (NFTERR 26)

27 CANNOT CONTACT REMOTE SYSTEM. (NFTERR 27)

28 SOURCE AND TARGET FILES CANNOT BE ACCESSED THROUGH REMOTE
    FILE ACCESS. (NFTERR 28)

29 COMMUNICATION IO ERROR. (NFTERR 29)

30 INSUFFICIENT CAPABILITIES. (NFTERR 30)

33 NO SOURCE FILE WAS SPECIFIED. (NFTERR 33)

36 DS/3000 HAS NOT BEEN INSTALLED ON THIS SYSTEM. (NFTERR 36)

37 REMOTE SYSTEM UNABLE TO USE TRANSPARENT MODE. (NFTERR 37)

38 CAN'T FIND THE EXTRA DATA SEGMENT, USE THE DSCOPY INTRINSIC
    TO INVOKE NFT. (NFTERR 38)

39 INVALID EXTRA DATA SEGMENT CONTENTS, USE THE DSCOPY INTRINSIC
    TO INVOKE NFT. (NFTERR 39)

40 NEGOTIATIONS FAILED, NO COPY CAN BE PERFORMED. (NFTERR 40)

41 FILE TRANSFER ABORTED. (NFTERR 41)

42 COPY CANCELLED BY USER. (NFTERR 42)

:DSCOPY INTRINSIC ERROR RETURNS

80 BOUNDS VIOLATION. (NFTERR 80)

81 SPLITSTACK MODE CALLS NOT ALLOWED. (NFTERR 81)

82 FIRST PARAMETER VALUE IS OUT OF RANGE (-1:6). (NFTERR 82)

83 SECOND PARAMETER TOO SHORT TO CONTAIN VERSION STRING.
    (NFTERR 83)

84 NFT PROCESS IS BUSY, CAN'T START NEW TRANSACTION.
    (NFTERR 84)

85 NFT PROCESS IS NOT RUNNING. (NFTERR 85)

86 ILLEGAL BASIC CALLING SEQUENCE. (NFTERR 86)

:DSCOPY INTERNAL ERRORS

101 INTERNAL ERROR ON REMOTE SYSTEM. (NFTERR 101)

102 REMOTE SYSTEM NFT VERSION IS INCOMPATIBLE. (NFTERR 102)

103 INTERNAL - STRING STORAGE OVERFLOW. (NFTERR 103)

104 UNABLE TO CREATE TEMPORARY TRANSACTION FILE. (NFTERR 104)

105 AN UNEXPECTED MESSAGE WAS RECEIVED. (NFTERR 105)

106 AN ILLEGAL VALUE WAS RECEIVED IN A MESSAGE. (NFTERR 106)

107 A MESSAGE RECEIVED IN INVALID FORMAT. (NFTERR 107)

108 A REQUIRED ELEMENT WAS MISSING FROM A RECEIVED MESSAGE.
    (NFTERR 108)

109 NFT PROCESS CREATE FAILED. (NFTERR 109)

110 ATTEMPT TO GET EXTRA DATA SEGMENT FAILED. (NFTERR 110)

X.21 MESSAGES

Set 1: Call Progress Signals

1 ! LDEV !/CPS 001   TERMINAL CALLED

2 ! LDEV !/CPS 002   REDIRECTED CALL

3 ! LDEV !/CPS 003   CONNECT WHEN FREE

20! LDEV !/CPS 020   NO CONNECTION

21! LDEV !/CPS 021   NUMBER BUSY

22! LDEV !/CPS 022   SELECTION SIGNALS PROCEDURE ERROR

23! LDEV !/CPS 023   SELECTION SIGNAL TRANSMISSION ERROR

41! LDEV !/CPS 041   ACCESS BARRED

42! LDEV !/CPS 042   CHANGED NUMBER

43! LDEV !/CPS 043   NOT OBTAINABLE

44! LDEV !/CPS 044   OUT OF ORDER

45! LDEV !/CPS 045   CONTROLLED NOT READY

46! LDEV !/CPS 046   UNCONTROLLED NOT READY

47! LDEV !/CPS 047   DCE POWER OFF

48! LDEV !/CPS 048   INVALID FACILITY REQUEST

49! LDEV !/CPS 049   NETWORK FAULT IN LOCAL LOOP

61! LDEV !/CPS 061   NETWORK CONGESTION

71! LDEV !/CPS 071   LONG TERM NETWORK CONGESTION

81! LDEV !/CPS 081   REGISTRATION/CANCELLATION CONFIRMED

82! LDEV !/CPS 082   REDIRECTION ACTIVATED

83! LDEV !/CPS 083   REDIRECTION DEACTIVATED

Set 2: DCE Provided Information

1 ! LDEV !/NPI 001   CHARGE ADVICE - MONETARY CHARGES !

2 ! LDEV !/NPI 002   CHARGE ADVICE - DURATION (SECONDS) !

```
3 ! LDEV !/NPI 003   CHARGE ADVICE - UNITS !

10! LDEV !/NPI 010   LINE IDENTIFICATION !

20! LDEV !/NPI 020   SIGNAL FORMATTING ERROR !
```

SYSTEM FAILURE LIST

The following system failures are applicable to DS/3000 operation. For a more detailed explanation of the cause and what action to take in response to a specific failure, refer to Section 9 of the *System Operation and Resource Management Reference Manual.*

Failure #	Module	Description
911	DSSEGS	MANAGEWRITECONV (Invalid message class or stream type.)
912	DSSEGS	MANAGEWRITECONV, CXRFA (RFA buffer size less than zero.)
913	IODSO	Line unopened.
913	IODSO	DSW and DSWR counts don't agree.
913	IODSX	Message lengths don't agree.
914	IODSO,IODSTRMO	DS use count is less than zero.
915	DSMON	Bad data and DEBUGON, 3.
916	DSMON	DEBUGON, 3 and DS error.
916	DSMONX	UC number out of bounds.
917		JOB'DSCLB (Unable to locate DS line control block.)
918	DSSEGS	MANAGEWRITECONV (No virtual pin assignment on FROMPROCESS or improper compression buffer pointer.)
919	DSSEGS	No real pin found.
923	IODSTRMX	UCNO = zero in GETQ.
926	IODSX	UCNUM greater than 255 or less than zero.
980	DSIOM	DSCOMPLETE (IOQ index = zero.)
981	DSIOM	DSCOMPLETE (IOQ index exceeds bounds of IOQ DST.)

Failure #	Module	Description
982		Bad read length from $STDIN.

When submitting an SR (Service Request) relating to one of the above system failures, you should also supply the following material:

- MPE Version, DSLIST, and CSLIST

- SYSDUMP I/O Configuration

- SYSDUMP CS Configuration

- NETCONF Listing (for X.25 related failure)

- DUMPARCHed tape of memory dump on the machine that failed.

- Pscreen of console after bringing the system back up.

HSI, 1-1, 1-4, 1-5, 1-6, 1-7, 1-8, 1-9, 1-11, 1-13
  adding, 1-5

I

I/O configuration
  example of, 2-37, 2-38
I/O devices, 1-2
IBERPAC, 2-12
Initialization Request/Reply, 5-8
Initiating CSDUMP, 3-6, 4-6
Initiating DSDUMP, 3-37, 4-25
  in batch mode, 3-38, 4-26
  interactively, 3-37, 4-25
INP, 1-1, 1-3, 1-5, 1-6, 1-9, 1-13
  adding, 1-5
INP-to-SSLC Direct Connect cable, 1-11
Intelligent Network Processor, 1-1, 1-3, 1-5, 1-6, 1-9, 1-13
  adding, 1-5
Interfaces, and use with other subsystems, 1-1
Invoking tracing, 3-1, 4-1
IODS0, 1-1, 1-6, 1-13
IODSTRM0, 1-1, 1-6, 1-13
IODSTRMX, 1-1, 1-6, 1-13
IODSX, 1-1, 1-6, 1-13, 2-28, 2-32
IOINP0, 1-13

K

KSAM FFINDBYKEY, 5-73
KSAM FFINDN, 5-72
KSAM FGETKEYINFO, 5-74
KSAM FREADBYKEY, 5-75
KSAM FREADC, 5-76
KSAM FREMOVE, 5-77
KSAM KSPACE, 5-78

L

LC table, 2-2, 2-31
  adding to, 2-9
  checking, 2-20
  deleting from, 2-25
  differences from RN table, 2-2
  updating, 2-36
LDEV, 1-3, 2-2, 2-6
LDN, 1-3, 2-2, 2-6
Leased line, 1-11
Leaving NETCONF, 2-3
Leaving Network Configurator, 2-3
Leaving SYSDUMP, 1-4, 1-15

Q

R

S

T

for CSDUMP, 3-5, 4-5
Trace file for DSDUMP, 3-37, 4-25
Trace Record and Header message, 3-26
Tracing, invoking, 3-1
Tracing DS Bisync Line Activity, 3-1
Tracing DS/3000-X.25 line activity, 4-1
TRANSPAC, 2-12
TYMNET, 2-12
Type, 1-5
Type 16, 1-6
Type 19, 1-7
Type 32, 1-6
TYPES, 3-39, 4-26

U

UNINET, 2-12
UPDATE, 2-3, 2-33
Updating LC table, 2-36
Updating Line Characteristics table, 2-36
Updating Remote Node table, 2-34
Updating RN table, 2-34

V

VENUS-P, 2-12
Virtual terminal, 1-6, 1-13
  adding, 1-5
  with X.25, 1-13
Virtual terminals, 1-1

W

Wide Band Service, 1-11

X

X.21, 2-6, 2-7, 2-9
X.21 messages, A-12
  call process signals, A-12
  DCE provided information, A-12
X.25, 1-13, 2-6, 2-9
  Diagnostic Codes, 6-9
  HP compared to CCITT, 6-1
  Packet Formats, 5-82
  with DS/3000, 2-2
X.25 and DS, configuration example of, 2-38
X.25 Link, with DS/3000, 2-2

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