

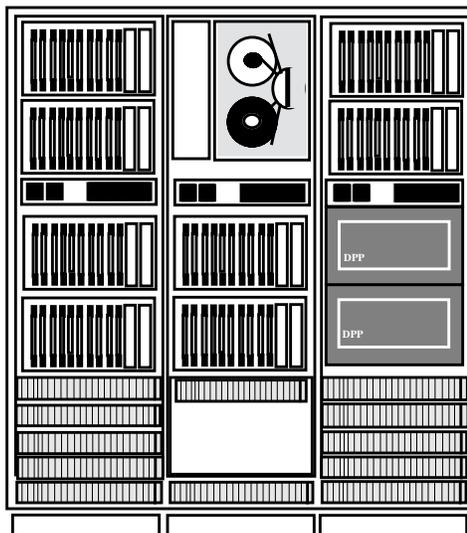
297-1001-331

DMS-100 Family

# Distributed Processing Peripheral Administration Guide

DPP001 and up Standard 02.01 April 1997

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DMS-100 Family

# **Distributed Processing Peripheral (DPP)**

## **Administration Guide**

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- First standard issue.

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- Information related to the 3 1/2" disk drives is added to related sections.
- Modified for changes in related documentation.
- Modified for changes in template.
- Modified to address technical inaccuracies.

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# About this document

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## When to use this document

This document describes how to perform the administrative tasks associated with the Distributed Processing Peripheral (DPP). Its audience is those who administrate the DPP.

## How to check the version and issue of this document

The version and issue of the document are indicated by numbers, for example, 01.01.

The first two digits indicate the version. The version number increases each time the document is updated to support a new feature release. For example, the first release of the document is 01.01. In the *next* feature release cycle, the first release of the same document is 02.01.

The second two digits indicate the issue. The issue number increases each time the document is revised but rereleased in the *same* feature release cycle. For example, the second release of the document in the same feature release cycle is 01.02.

This document is written for all DMS-100 Family offices. More than one version of this document may exist. To determine whether you have the latest version of this document and how documentation for your product is organized, check the release information in *North American DMS-100 Northern Telecom Publications Cancellation Index*, 297-1001-001.

## References in this document

The following documents are referred to in this document:

- *Distributed Processing Peripheral (DPP) Product Guide*, 297-1001-019.
- *Common Customer Data Schema*, 297-1001-451.
- *Distributed Processing Peripheral (DPP) Commands and Messages Guide*, 297-1001-545.
- *Distributed Processing Peripheral (DPP) Maintenance Procedures Guide*, 297-1001-547.
- *Device Independent Recording Package (DIRP) Routine Maintenance Procedures*, 297-1001-572.
- *Device Independent Recording Package (DIRP) Recovery Procedures*, 297-1001-574.
- *Automatic Message Accounting Teleprocessing System (AMATPS) Generic Requirements*, TR-TSY-000385, Issue 1, Revision 1, February 1990.

## What precautionary messages mean

The types of precautionary messages used in NT documents include warning and caution messages. Warning and caution messages indicate possible risks.

Example of the precautionary messages follow.

WARNING                      Possibility of equipment damage

	<p><b>WARNING</b> <b>Damage to the backplane connector pins</b> Align the card before seating it, to avoid bending the backplane connector pins. Use light thumb pressure to align the card with the connectors. Next, use the levers on the card to seat the card into the connectors.</p>
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**CAUTION**

Possibility of service interruption or degradation.

**CAUTION****Possible loss of service**

Before continuing, confirm that you are removing the card from the inactive unit of the peripheral module. Subscriber service will be lost if you remove a card from the active unit.

## How commands, parameters, and responses are represented

Commands, parameters, and responses in this document conform to the following conventions.

### Input prompt (>)

An input prompt (>) indicates that the information that follows is a command:

**>BSY**

### Commands and fixed parameters

Commands and fixed parameters that are entered at a MAP terminal are shown in uppercase letters:

**>BSY CTRL**

### Variables

Variables are shown in lowercase letters:

BSY CTRL ctrl\_no

The letters or numbers that the variable represents must be entered. Each variable is explained in a list that follows the command string.



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# General

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This document describes how to perform the administrative tasks associated with a Distributed Processing Peripheral (DPP). These tasks include:

- accepting a newly installed DPP.
- maintaining the DPP load file.
- maintaining the DPP spare parts stock.
- setting the DPP clock.
- changing the DPP security passwords.
- planning DPP emergency procedures.

Chapters are also included that describe the various DPP components, provide a brief system description, and outline DPP to Host Office Collector (HOC) communications.

The administrative tasks described here make extensive use of the DPP and DMS-100 Device Independent Recording Package (DIRP), Man-Machine Interface (MMI). You must be familiar with DPP and DIRP MMIs to use this information. This document describes the application of various DMS-100 and DPP commands in performing the DPP administrative tasks. The commands themselves are described in the *DPP Commands and Messages Guide*.

## User/DPP dialog

Because of the extensive use of MMI, a special convention is used to describe the MMI command input and response exchange between the DPP user and the DMS-100/DPP system when performing certain tasks. Throughout this document you will be communicating with the DPP via the Maintenance and Administration Position (MAP). This is how the dialog is shown:

**>THIS IS USER INPUT, SIGNIFIED BY THE">" SIGN BEFORE THE TEXT**

This is how the DPP's response is shown.

All commands beginning with a **CP** are valid only for Turbo units.



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# System operation

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## Overview

The DPP acquires, stores, formats, and forwards data from the DMS-100. The DPP accepts billing data from the DMS-100, temporarily stores the collected data on hard disk, and when requested, retrieves, reformats, and sends the stored data to the HOC. Data collected by the DPP includes call records for billing purposes, statistical data, and maintenance reports. The various types of data are stored in different files on disk drives for ease of retrieval. The retrieval of the stored data is under control of the HOC located at the central collection point, as shown in Figure 2-1. Figures 2-2 through 2-4 provide block diagrams of the DPP and the systems interconnected to it on an information flow level.

## Collecting and storing data

Magnetic Tape Drive (MTD) and storage type output signals from the DMS-100 are routed from the active DMS-100 MTD Port, through the interface box, to the DPP Data Stream Interface (DSI) Printed Circuit Assemblies (PCAs). The DSI PCAs have their own microprocessor and software program to emulate MTD functions, which requires two-way communication between the DPP and the DMS-100. The DSI software receives commands that are normally sent to the MTDs, and responds with the status and strobe signals normally sent back to the DMS-100. The DSI receives call record data blocks, processes them and forwards them to the active processing unit.

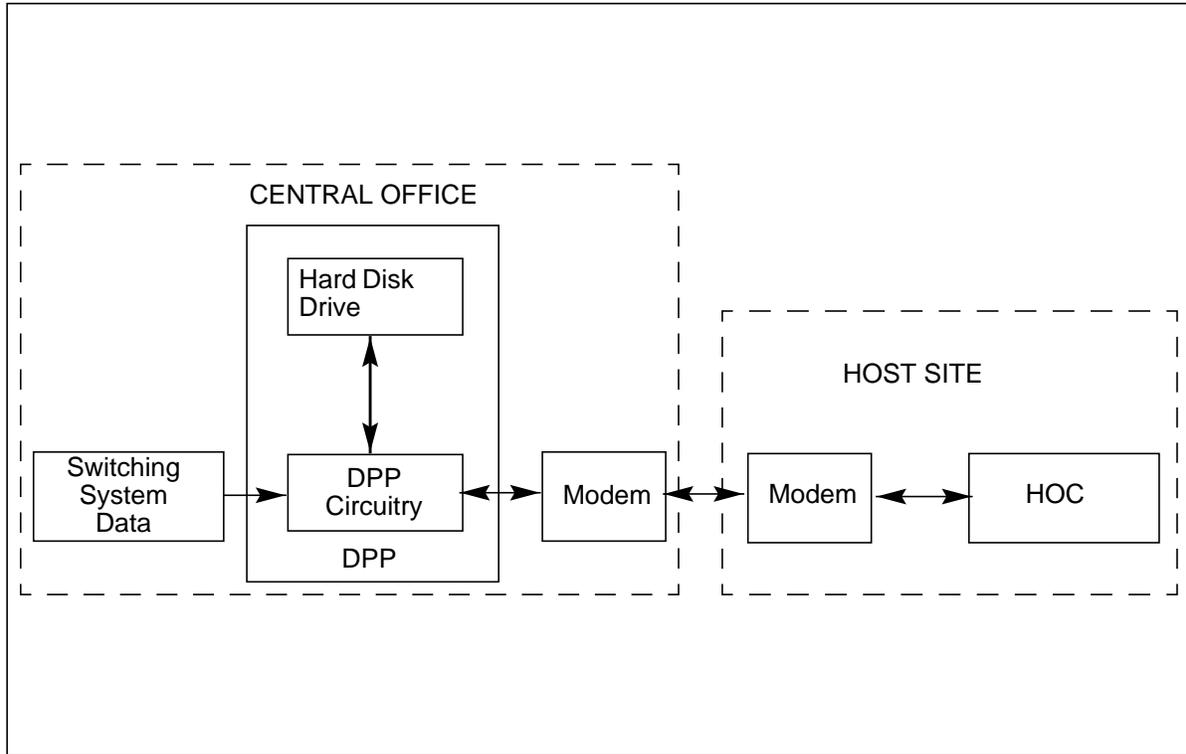
When data blocks are received from the DMS-100, a signal is sent to the active processing unit to take the data block. Under processor (DMA) control, the data block is transferred through the data bus and assigned to a buffer. The buffer used depends upon whether the block contains test or call record data. Test data blocks may be read back to the DMS-100, but not to disk. The DPP software program stores test blocks on the DSI PCA. There is a six block buffer in the main CPU to hold call records where validation occurs.

During the validation checks, all criteria relative to validation, thresholds, and alarms are used in examining the data block. If a call record, a group of call records, or the entire block does not meet the validation requirements, an

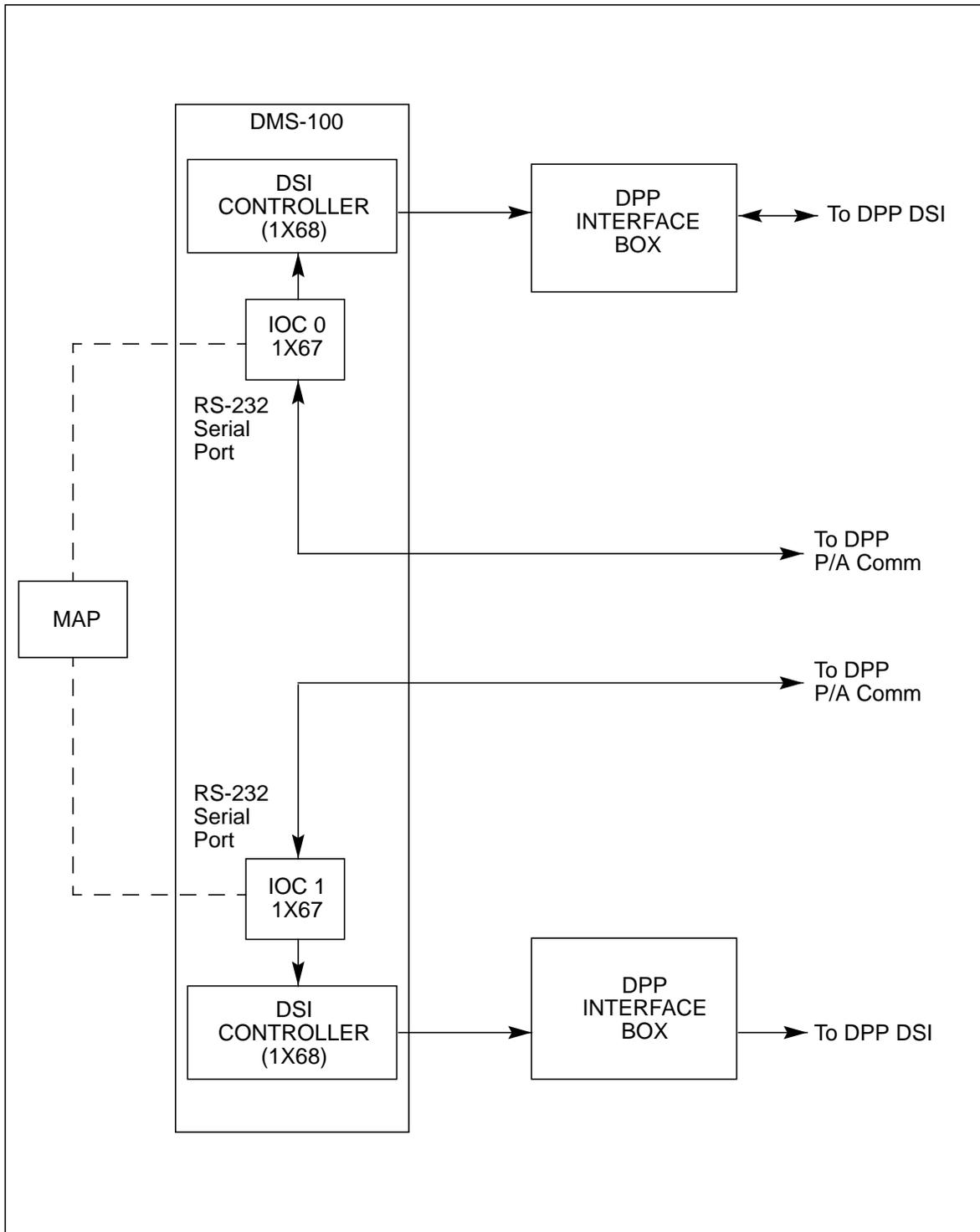
exception report is printed out as a log message. In extreme cases, a processor alarm is generated.

Validated call records are loaded into a disk buffer on the Disk Interface PCA, used for AMA call records. When a buffer is full, its contents are written to disk, while another buffer is made available to receive call records.

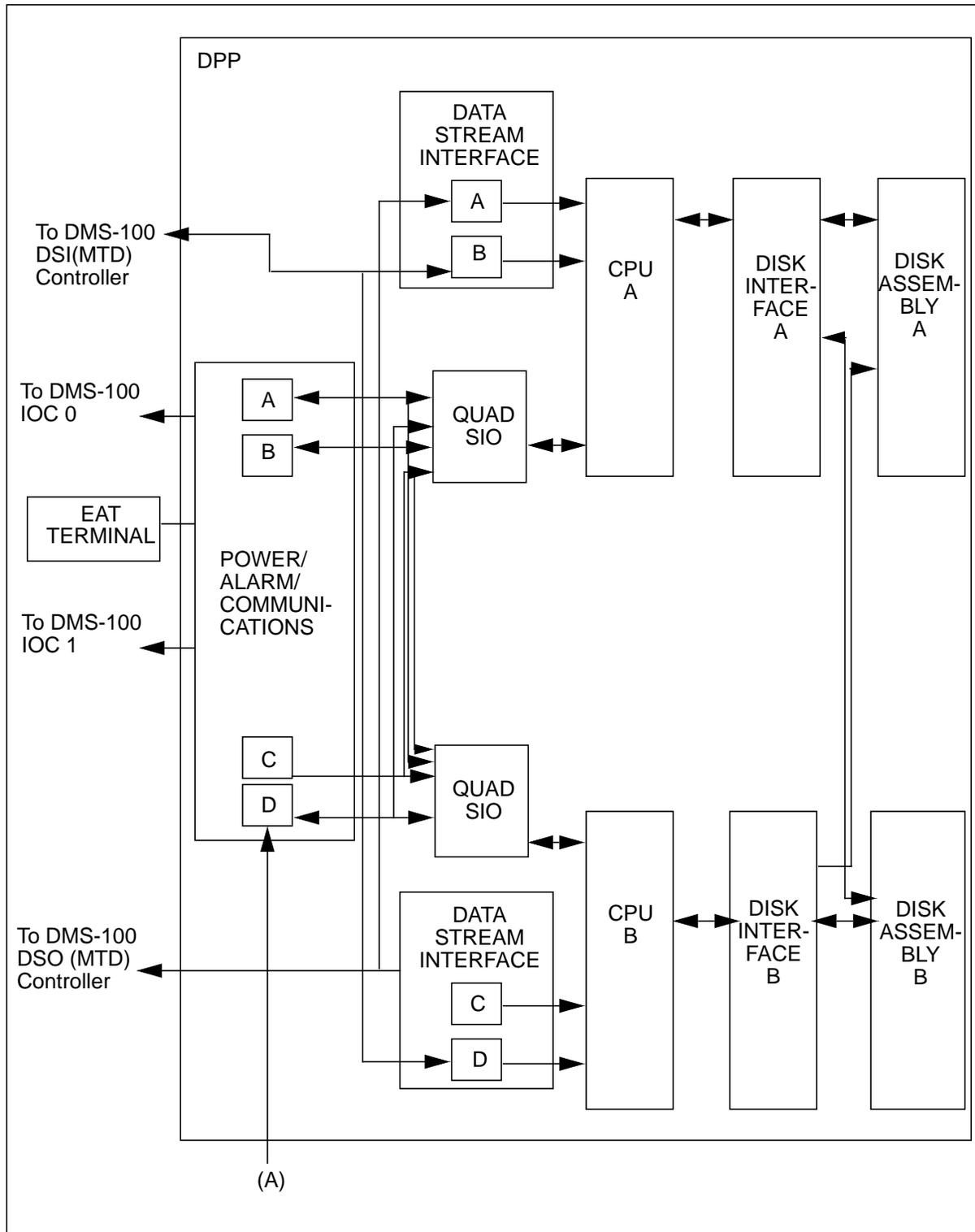
**Figure 2-1**  
**Simplified block diagram of DPP operation**



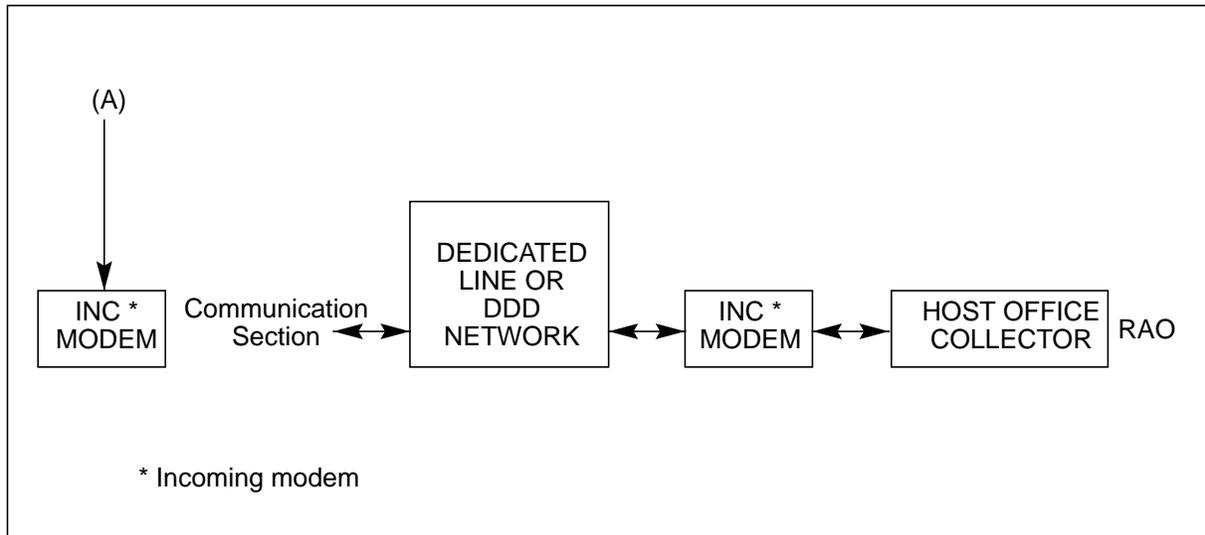
**Figure 2-2**  
**DPP data paths (sheet 1 of 3)**



**Figure 2-3**  
**DPP data paths (sheet 2 of 3)**



**Figure 2-4**  
**DPP data paths (sheet 3 of 3)**



Ribbon cables are used to send data and write commands from the Disk Interface PCA to the Disk Crossover PCA and both disk drives. Identical data is written to the primary disk, then to the secondary disk, providing redundancy to enhance the integrity of the billing data.

## Data storage

The disks provide an intelligent data storage system by recording different types of information in separate files. Files for record storage are divided as follows:

- MAINF - informational files used by the HOC containing a summary of polling sessions.
- PRIMARY- primary AMACRD files. Contains unpolled AMACRD files.
- SECONDARY - secondary AMACRD files. Contains polled AMACRD files.
- EXCCRD - exception file. Contains corrupted blocks of data.
- LOG - contains DPP-generated maintenance messages.
- SITE DATA - contains site data entered at start-up.
- REPORT STATISTICS - contains statistical data on DPP operation.
- PROGRAM FILES - contains the DPP program files.

These files are standard on the DPP, whether or not they are used. Data received from the DMS-100 is recorded in the appropriate file on the disk.

To guard against data loss in the event of a loss of power, data from the DMS-100 is written to disk from a buffer every two minutes (under low or normal traffic conditions) or when a buffer is full (high traffic conditions). If a power fault causes a system outage, billing data can be retrieved from the disk. The restored buffer, partially loaded, continues to receive call records until full, at which time it is permanently transferred to disk.

**Note:** The statistics file is not updated by the storage of call records on disk. That is, if a statistical report is requested, call records held in temporary storage on disk are not included in the printout. File statistics are updated only when those call records are permanently on disk.

### Disk file system

The disk drives provide an off-line medium for data storage that is not affected by power outage. Data remains on disk, as secondary AMA data, even after polling by the HOC. Due to the large storage capacity of disks, several days of records are accommodated on the disk, available as backup records to retrieve at a later time, if necessary. When certain threshold values are reached, or if additional storage space is required, files are removed from disk. Sufficient disk capacity allows several days storage while polling problems are resolved, so that no data is lost.

The DPP uses a redundant disk configuration which is capable of operating in either a prime or only mode. In the **prime** mode, data is written to both disks; first to the prime disk, then the standby disk. In the **only** mode, data is written to the prime disk. The prime mode is the normal operating mode for the disk system. The only mode is used when either disk drive is unavailable due to a fault, or some maintenance condition.

The DPP disk system consists of multiple files. The maximum number of files is 383 (511 for DPP systems with 760-Mbyte, 1- or 2-Gigabyte disk drives). These files can be displayed by use of the LSTDIR ALL command. For more information concerning the LSTDIR command, consult the *DPP Commands and Messages Guide*.

There are two categories of files: dynamic and static. **Dynamic** files are usually large, while most static files are small. Most dynamic files are data files consisting of AMA, exception (EXC), and log files. Each of these files has an index file associated with it. **Static** files are stand-alone files, primarily various index files that are used for the management of data, statistics, site data, program, boot, and other files.

Due to DPR buffer limitations, a maximum of 14 files can be open (reading from or writing to) at one time. This is further divided into seven dynamic and seven static files. Normal operating systems have AMACRD, EXCCRD, LOGCRD, and TDYSTS files open using LSTACT. You can open other required files during program loading or polling. The data files may have a

maximum of 255 versions, after which it rolls back to restart the count at version 1, with the previous version 1 deleted.

**Note:** File versions containing primary data are not deleted.

The maximum number of AMA blocks that can be contained in any one file version is disk size dependent, as follows:

- 72- and 140-Mbyte disk drives                    945 blocks/version
- 380-Mbyte (Non-Turbo)                            3836 blocks/version
- 380- and 760-Mbyte (Turbo)                    4780 blocks/version
- 1 or 2 gigabytes                                    100,000 blocks/version

The index file is used to keep track of the data file versions. It may contain a maximum number of versions of either 56 (72-, 140-, and 380-Mbyte disk drives) or 200 (380-Mbyte [Turbo], 760-Mbyte, 1 and 2 gigabytes drives). Each version of the index file consists of 9 bytes which is described by the following:

<b>Table 2-1 Byte structure of index files</b>	
<b>Byte</b>	<b>Description</b>
1	Version number
2-3	Total number of blocks
4-5	Number of blocks to be polled
6, 7, 8	Starting sequence number
9	Days to delete

The total number of bytes in an index file is:

- 504 if there are 56 versions per index file; 9 bytes times 56 versions.
- 1800 if there are 200 versions per index file; 9 bytes times 200 versions.

The other static files (statistics, site data, program) are accumulated in 512 byte increments and put on disk.

Each DPP disk file has a number associated with it which represents the number of days left before the file is deleted. This number is used for the message journal files and secondary (polled) call record data files. The number is entered into the file upon creation of the file on the disk. After the

file has been polled, the number is decremented by one at 1 a.m. of each day. The file is deleted when one of the following occurs:

- the (down) count reaches zero.
- when it is the oldest file on disk with AMA storage exceeding 90% (70% with DPP software version DPPA9A), or with AMA file versions exceeding the maximum (56 or 200).

### **Disk storage capacity recovery**

When a disk full condition exists, the DPP does not write over stored primary data. Instead, it switches to an only disk mode and continues writing data to the other disk. When this disk becomes full, an End of Tape (EOT) signal is sent to the DMS-100. The DMS-100 attempts to access the second interface. The second interface also returns an EOT to the DMS-100 and generates a critical alarm.

**Note 1:** To determine what percentage of the disk has been used, refer to the information on the DISK USAGE command in the *DPP Commands and Messages Guide*.

**Note 2:** The total disk capacity for the DPP is 95 percent of total disk space available. When total disk capacity (AMA data=100 percent disk usage) is referred to throughout this section in relation to AMA files, it refers to 95 percent of the actual DPP disk capacity.

Tables 2-2 and 2-3 list the ERRMAP entries and log messages associated with the specified disk usage levels. Table 2-2 lists the entries and messages that are specific to Non-Turbo DPP systems. Table 2-3 lists the entries and messages that are specific to all Turbo DPP systems. Refer to the *DPP Commands and Messages Guide* for more information regarding these entries and messages.

<b>Table 2-2 ERRMAP and log messages for Non-Turbo DPP systems</b>		
<b>Disk usage</b>	<b>ERRMAP entry</b>	<b>Corresponding log message</b>
90% *	SECND FILES DEL	SECONDARY FILES DELETED NO SECONDARY FILE TO DELETE
90%	LOG FILES DEL	LOG FILES DELETED
99%	RESERV DSK FULL	OFF-LINE DISK HAS UNPOLLED DATA
Both Disks Full	BOTH DISKS FULL	BOTH DISKS FULL

\* 70% usage with units running DPP software version DPPA9A

<b>Table 2-3 ERRMAP and log messages for Turbo DPP systems</b>		
<b>Disk usage</b>	<b>ERRMAP entry</b>	<b>Corresponding log message</b>
70%	DSK 70 FULL	DISK USE > 70% PRIMARY DATA
90%	DSK 90 FULL	DISK USE > 90% PRIMARY USE
99%	RESERV DSK FULL	OFF-LINE DISK HAS UNPOLLED DATA
Both Disks Full	DSK STORE LIMIT	BOTH DISKS FULL

In extreme conditions, for instance, if it becomes impossible to conduct a polling session at the appointed time, the DPP uses a specific set of recovery activities that are designed to serve the integrity of the primary AMA data in compliance with the Bellcore recommendations set forth in the *Automatic Message Accounting Teleprocessing System (AMATPS) Generic Requirements* document. These actions are discussed in the following paragraphs.

### **70% disk occupancy**

#### **Without disk capacity enhancement**

When disk occupancy reaches 70% of maximum disk storage, the oldest secondary (previously polled) AMA files are deleted so that this occupancy is reduced to the 70% threshold. As new primary files are added to storage, the oldest secondary files continue to be deleted. If all secondary files are deleted and disk occupancy remains at 70% or above, a minor alarm is raised.

### **With Disk Capacity Enhancement**

When the amount of primary data on the disks reaches 70% of total storage capacity, a minor alarm is raised. No secondary data is deleted from storage at this point.

### **90% disk occupancy**

#### **Without disk capacity enhancement**

When the 90% disk occupancy threshold level is reached, all message journal (LOG) files are deleted to provide additional space for AMA records. If primary data occupancy then continues to exceed the 90% threshold, a major alarm is generated.

#### **With disk capacity enhancement**

When occupancy reaches 90% of maximum disk capacity, the oldest secondary file is deleted so that occupancy is reduced to below the 90% threshold. As new primary files are added to the disk, and the oldest secondary files removed, the message journal files are deleted. If primary data occupancy continues to exceed the 90% threshold, a major alarm is generated.

### **100% disk occupancy**

When occupancy reaches 100%, the DPP disk mode drops to a non-redundant or ONLY mode. The active disk stops writing data and the standby disk is cleared to accept new primary AMA data. This cleared standby disk then becomes the active disk. Each hour, a major alarm and log message are generated to notify personnel that the DPP is in the ONLY mode.

In the extreme case that the second disk should be 100% full, an EOT status is generated by the DPP. This causes the DMS-100 to switch to the other DSI. The DPP responds with another EOT status, forcing the DMS-100 to continue writing to an optional parallel file. At this point, the DPP alarm is raised to critical status. In compliance with Bellcore requirements that primary data not be overwritten, no new data can be written to the DPP disk at this point.

Collecting data from a DPP in the non-redundant mode requires extraordinary polling procedures, which are described in the *DPP Maintenance Procedures Guide*.

In order to poll the AMA data in sequence, the DPP disk mode must be manually changed back to the original full disk. The polling session then takes the oldest primary AMA data from the first full disk. At this time, any incoming AMA data from the DMS-100 is written to a special reserved area of the disk from which AMA data is being polled. The polling session ends when all primary AMA data has been read from the first full disk. In order to poll the second disk, a manual disk mode change to the second disk must be

performed, and another polling session initiated. Any AMA data is written on a special reserved area of the second disk.

If AMA data is being written at a consistent rate, several disk mode changes and polling sessions may be required to poll all of the primary data. Once all of the primary AMA data has been polled from the second disk, the following manual actions have to be performed in order to return the DPP to its normal operation:

- 1 Change disk mode to first disk.
- 2 Change DPP disk operation to prime mode.
- 3 Clear all alarms.



---

## Accepting a newly-installed DPP

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This section provides guidelines for verifying that a newly installed DPP unit is operating properly. Although initial testing of the DPP is performed during installation, you should also test after installation to verify that there are no problems with the DPP when it is placed on-line. Accepting a DPP unit involves:

- verifying MAP communication with the DPP.
- testing the DPP unit itself.
- checking the DPP site data.
- verifying that the correct DPP download file is stored on both the DMS-100 and DPP disks.

The following paragraphs describe the procedure for performing each of these tasks.

After installing the DPP, perform the initial tests outlined here to verify that it is operating properly. At this point, the DPP should be powered up and running as a parallel AMA recording device. From the DMS-100 MAP, verify that the MAP can communicate with the DPP:

```
>MAPCI;MTC;IOD;DPP AMA (cr)
```

The DPP MAP menu and display should appear. If the IOD menu is displayed with an associated error message, an error in DMS-100 datafill for DPP most likely exists. Contact the DMS maintenance group to investigate the problem.

### Procedure for communicating with the DPP

After entering the DPP MAP menu query the clock in the active DPP processor once for each of the two links:

```
>CLK ACT (cr)  
>CLK ACT (cr)
```

```
Command sent to DPP  
= day yy dd/mm hh:mm:ss a COMPUTER
```

### 3-2 Accepting a newly-installed DPP

---

If the DMS-100 MMI links are functioning properly, you will see the command input and response sequence shown above. The following responses indicate a problem with DPP/DMS-100 MMI links:

DPP UNABLE TO SERVICE REQUEST. TRY LATER

INTERNAL ERROR CHECK LOGS FOR DETAILS IF THEY EXIST

MAINTENANCE LINK UNAVAILABLE CHECK PORT STATUS

NO RESPONSE FROM MAINTENANCE INTERFACE SYSTEM MAY BE SLOW DO YOU WISH TO CONTINUE? (YES OR NO)

PROBLEMS DURING TRANSMISSION COMMAND RECEPTION NOT ACKNOWLEDGED BY DPP

If you receive any of these responses, contact the maintenance group to clear the problem.

### Testing the DPP

After testing MAP-DPP communications, use DPP TEST commands from the DPP MAP menu to exercise the DPP unit:

**>TEST ACT (cr)**

**>CP TEST ACT (cr)**

Command sent to DPP

Command sent to DPP

Certain tests may take several minutes to execute. Please wait for the responses from all tests.

**Note 1:** The results for the DPR and DSK tests are not displayed when the TEST ACT command is entered during a polling session.

**Note 2:** The list of responses that follows is provided as an example. The DPP test responses will not necessarily be displayed in the order shown below. The tests are dependent upon system resources and may not be completed in the same order each time the command is entered.

DPR TEST PASSED

CP ROM Checksum Test Passed

DSK TEST PASSED

CP PRG Checksum Test Passed

CLK TEST PASSED

CP RAM Test Passed

CTC TEST PASSED

CP DMA Test Passed

SIO TEST PASSED

CP SCC Loopback Test Passed on Channel A

PIO TEST PASSED

CP SCC Loopback Test Passed on Channel B

```
ERR TEST PASSED
B0 DSI TEST PASSED
B2 DSI TEST PASSED
DMA TEST PASSED
RAM TEST PASSED
ROM TEST PASSED
PRG TEST PASSED
```

The message, xxx TEST FAILED, indicates a failure in the DPP. Contact the maintenance group to clear the fault.

To test the standby DPP processor:

```
>TEST STDBY (cr)      >CP TEST STDBY (cr)
```

```
Command sent to DPP  Command sent to DPP
```

Certain tests may take several minutes to execute, please wait for the responses from all tests.

**Note 3:** The results for the DPR test are not displayed when the TEST STDBY command is entered during a polling session.

**Note 4:** The list of responses that follows is provided as an example. The DPP test responses will not necessarily be displayed in the order shown below. The tests are dependent upon system resources and may not be completed in the same order each time the command is entered.

```
DPR TEST PASSED      CP ROM Checksum Test Passed
CLK TEST PASSED      CP PRG Checksum Test Passed
CTC TEST PASSED      CP RAM Test Passed
SIO TEST PASSED      CP DMA Test Passed
PIO TEST PASSED      CP SCC Loopback Test Passed on Channel A
ERR TEST PASSED      CP SCC Loopback Test Passed on Channel B
B0 DSI TEST PASSED
B2 DSI TEST PASSED
RAM TEST PASSED
```

DMA TEST PASSED  
ROM TEST PASSED  
PRG TEST PASSED

**Note 5:** The disk test is not run on the standby processor.

If any test fails, contact the maintenance group to have the failure cleared.

### Verifying DPP site data

After testing the DPP unit, check the DPP site data to verify that it is correct. The following information is stored on DPP disk as site data information:

- AMA Transmitter (AMAT) password
- HOC password
- billing validation information
- hour block entry
- ERRMAP data
- BAUD rate data
- Bellcore X.25 (BX.25) polling data.

Check with the engineering group to determine the correct values for the DPP site data. If this information is not in the office records, add it for future reference.

If you make any changes to the site data file while performing the following procedures, perform a SITDAT WRITE after each change to save it, and make it permanent.

**Note 1:** To save changes made to AMATPSW and COLLPSW on a DPP Turbo system, the SITDAT WRITE, CP BOOT ACT, CP BOOT STDBY commands must be executed.

**Note 2:** Do not make any changes within one minute of either side of an hour (:59 to :01); they will not be accepted and the DPP will revert to its existing data.

After each change:

**>SITDAT WRITE (cr)**

```
*****WARNING*****  
THIS COMMAND WILL AFFECT SITE DATA IN MEMORY OR ON DISK  
Do you wish to continue?  
Please confirm ('YES' or 'NO'):
```

**>YES (cr)**

Command sent to DPP  
SITDAT FILE DISK JOB COMPLETE

To begin, verify that the AMAT password is correct using the command:

**>AMATPS (cr)**

Command sent to DPP  
AMAT PASSWORD = nnnn nnnnnn

If the current AMAT password is incorrect, enter the correct AMAT password:

**>AMATPSW xxxxxx (sen type) xxxxxx (sen id) (cr)**

\*\*\*\*\*WARNING\*\*\*\*\*  
CHANGING PASSWORD MAY INHIBIT POLLING  
Password entered: Type = nnnn Id = nnnnnn  
Do you wish to continue?  
Please confirm ('YES' or 'NO')

**>YES (cr)**

Verify that the HOC passwords are correct. To display the current HOC passwords:

**>COLLPSW (cr)**

Command sent to DPP  
HOST-COLLECTOR PASSWORD  
PASS #1 = nnnn nnnnnn  
PASS #2 = nnnn nnnnnn

If the current HOC passwords are incorrect, enter the correct passwords:

**>COLLPSW list no off type off id (cr)**

\*\*\*\*\*WARNING\*\*\*\*\*  
CHANGING PASSWORD MAY INHIBIT POLLING  
Password n entered: List No. = nn Type = nnnn Id = nnnnnn  
Do you wish to continue?  
Please confirm ('YES' or 'NO')

**>YES (cr)**

Command sent to DPP  
HOST-COLLECTOR PASSWORD  
PASS #1 = nnnn nnnnnn  
PASS #2 = nnnn nnnnnn

To display the current value of the number of data blocks required to automatically close the AMACRD file:

**>VALPARM BLOCKS (cr)**

Command sent to DPP  
BLOCKS TO CLOSE FILE = number

The default value for this command is 200 blocks. To modify the value:

**>VALPARM BLOCKS number (cr)**

```
*****WARNING*****  
A CHANGE TO PARAMETERS MAY AFFECT BILLING VALIDATION  
Do you wish to continue?  
Please confirm ('YES' or 'NO')
```

**>YES (cr)**

Command sent to DPP  
BLOCKS TO CLOSE FILE = number

To verify that the billing validation information is correct:

**>VALPARM INVALID value (cr)**

```
*****WARNING*****  
A CHANGE TO PARAMETERS MAY AFFECT BILLING VALIDATION  
Do you wish to continue?  
Please confirm ('YES' or 'NO')
```

**>YES (cr)**

Command sent to DPP  
AMA INVALID ALARM THRESHOLD = nnnnn

To verify that the current hour block entry is correct:

**>AMAHRS (cr)**

Command sent to DPP  
BLOCK CHECK START xx END yy HOURS

If the values are incorrect, enter the correct values:

**>AMAHRS start stop interval (cr)**

Command sent to DPP  
BLOCK CHECK START xx END yy HOURS

To verify that the error map is correct:

**>ERRMAP ACT (cr)**

Command sent to DPP  
CURRENT ALARM ASSIGNMENTS ARE:

A current ERRMAP list is output; refer to the *DPP Commands and Messages Guide* for information regarding ERRMAP entries and corresponding log messages.

\* INDICATES CURRENTLY ACTIVE ALARM(S)

**Note:** For each event number, the alarm name, type, and level. If any must be changed, make the change using the command:

**>ERRMAP ACT event alarm type level (cr)**

```
*****WARNING*****
THIS COMMAND MAY CAUSE LOSS OF BILLING DATA
Do you wish to continue?
Please confirm ('YES' or 'NO')
```

**>YES (cr)**

Command sent to DPP  
CURRENT ALARM ASSIGNMENTS ARE:

A current ERRMAP list is output, including changes.

\* INDICATES CURRENTLY ACTIVE ALARM(S)

Check the error map entries in the standby DPP processor in the same manner as in the active processor, except, use the STDBY option of the ERRMAP command of the ACT option.

To verify that the polling link baud rate is correct:

**>BAUD (cr)**

Command sent to DPP  
FOR LINK #n, BAUD RATE = xxxx, T1 = yy, and N2 = zz

If the current rate is incorrect, to enter the correct value:

**>BAUD link rate (cr)**

```
*****WARNING*****
USE OF THIS COMMAND MAY AFFECT POLLING THROUGHPUT
Do you wish to continue?
Please confirm ('YES' or 'NO')
```

**>YES**

### 3-8 Accepting a newly-installed DPP

---

Command sent to DPP  
FOR LINK aa, BAUD RATE = xxxx, T1 = yy, and N2 = zz

To verify that the current BX.25 parameters are correct:

**>BX25PARAM R20 (cr)**

Command sent to DPP  
R20 = nnn

**>BX25PARAM R22 (cr)**

Command sent to DPP  
R22 = nnn

**>BX25PARAM T20 (cr)**

Command sent to DPP  
T20 = nnn

**>BX25PARAM T22 (cr)**

Command sent to DPP  
T22 = nnn

**>BX25PARAM T24 (cr)**

Command sent to DPP  
T24 = nnn

To change any of the above parameters:

**>BX25PARAM parameter value (cr)**

```
*****WARNING*****  
A CHANGE TO BX25 PARAMETERS MAY AFFECT POLLING  
Do you wish to continue?  
Please confirm ('YES' or 'NO')
```

**>YES (cr)**

Command sent to DPP  
parameter value

The following BX25PARAM parameter is valid in DPP systems that have 3 1/2" disk drives or software loads of at least DPP008 (Non-Turbo) or DPT029 (Turbo) for systems with 5 1/4" disk drives.

*Note:* This command must be entered in the Direct mode. You must either enter the SMODE command to enter the Direct mode and then

enter the BX25PARM command string or you can type a '\$' before the BX25PARM command string.

To verify that the system is using the correct AMATPS setting:

**>BX25PARM PRIHDR (cr)**

PRIHDRn

To change the AMATPS setting:

**>BX25PARM PRIHDRn (cr)**

PRIHDRn

The DPP site data in the has now been verified. If you made any changes, to make them permanent:

**>SITDAT WRITE (cr)**

```
*****WARNING*****
THIS COMMAND WILL AFFECT SITE DATA IN MEMORY OR ON DISK
Do you wish to continue?
Please confirm ('YES' or 'NO'):
```

**>YES (cr)**

```
Command sent to DPP
SITDAT FILE DISK JOB COMPLETE
```

## Setting up DPP as parallel AMA collector

After completing a sufficient AMA record collection by the primary device and the DPP as parallel device, notify the HOC to poll the DPP. The AMA data to be used for billing will still be transferred to the HOC using the existing method. Regular polling of the DPP for primary AMA has not begun yet. The AMA test data transmitted to the HOC from the DPP is compared to the primary AMA sent by the regular means. If the two data files are identical, the DSI links and the DPP - HOC communications links are validated as ready for service.

If the data in both files match, consider the DPP to be operating properly and ready to place on-line. If the data does not match, there may be a problem in the DPP or in the AMA data stream between the DMS-100 and DPP, or the DPP and HOC. Contact the maintenance support group to isolate and clear the problem. Do not place the DPP on-line at this time. Repeat the DPP parallel recording test when the problem has been cleared. Do not place the DPP on-line until the parallel recording tests passes.



**CAUTION**

**AMA Test Records**

You must inform the HOC that the data being recovered is duplicate information for DPP testing and unit acceptance only, and not for regular billing.

### Setting the DPP up as a parallel device

Here is an example of procedures that can be followed in setting up the DPP as a parallel AMA device. Create three tuples in Table DIRPOOL be used in collecting billing information:

- one tuple for regular recording of AMA to disk.
- one tuple for regular recording of AMA to tape or DPP.
- one tuple for setting up parallel AMA recording.

See Table 3-1. These three tuples are used:

- when setting up the DPP as a parallel AMA recording device for verification tests.
- when changing the DPP from parallel AMA collector to primary AMA recording device.
- when setting up backup parallel devices to the DPP.

Set up the DPP as the primary AMA recording device, and a backup parallel AMA device using either disk or tape. If these three tuples do not exist, add them in Table DIRPPPOOL. Consult the *Common Customer Data Schema* document for datafill parameters, and the *DIRP Routine Maintenance Procedures* document, for sample sessions working with the DIRP related tables, DIRPSSYS, and DIRPOOL.

<b>Table 3-1 Example of Table DIRPOOL</b>									
POOLNO	POOLNAME	POOLTYPE	DEVTYPE	VOLUME0	VOLUME1	VOLUME2	VOLUME3	VOLUME4	VOLUME5
0	AMAPOL	REGULAR	DPP	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
0	AMAPOL	REGULAR	DPP	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
3	AMADISK	REGULAR	DISK	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
62	AMAPARL	PARALLEL	DISK	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$
\$	\$	\$	\$	\$	\$	\$	\$	\$	\$

## DSI preparation

The DSI links connect the DPP to the Magnetic Tape Controllers (MTCs) housed in the DMS IOCs. In the procedure below, n corresponds to a MTD number. Prepare the two DSI links to be used by DIRP by entering the following command sequence for each one.

### 1 >ERASTAPE n (cr)

where: n is the DSI to be mounted.

```
** WARNING, THIS TAPE WILL BE ERASED.**
Please confirm ("YES" or "NO")
```

>YES

Tape has been successfully formatted.

### 2 >MOUNT n FORMAT DPP AMA (cr)

```
Volume = 'BLANK'
Formatting tape as 'DPPAMA'
OK
```

3 >DEMOUNT Tn (cr)

OK

### Procedure for replacing existing parallel AMA device with DPP

Use this procedure when replacing an existing parallel AMA recording device with the DPP:

- 1 At the DIRP MAP level identify and DMNT any parallel AMA device(s).  
Enter:

> QUERY AMA (cr)

```
SSNAME    SSNO SEQNO ROTATES POOLNO PARPOOL EMERGENCY
AMA        0   1   35         3   62     NO
REGULAR
FILE(S)   STATE VOLUME RECCOUNT BLOCK E V V_B VLID FNUM FRN#
ACTIVE    AVAIL  D000AMA1 1         0  0 23 NO 280A 0008 60EC
STANDBY1  AVAIL  D010AMA0 0         0  0 22 NO 282A 0008 E016

PARALLEL
FILE              STATE VOLUME BLOCK E V V_B VLID FNUM FRN#
B920120173039  AMA AVAIL  T0  1     0  0 YES2400 0001 4014
```

- 2 To DMNT the Parallel AMA, enter:

>DMNT AMA <device> PARALEL (cr)

where: <device> is a disk volume or a tape (T0 in example above)

```
*** WARNING- THIS UPDATE MAY AFFECT THE CURRENTLY
RECORDING PARALLEL FILE***
Updating volume information for T0:  Volume 0 in Parallel
Pool 62,AMAPARL
```

Please confirm ('YES' or 'NO')

>YES (cr)

Parallel Volume T0 will be taken out of DIRP as soon as possible. Total parallel retention for subsystem AMA may be reduced.

- 3 Identify the DPP as a tape when the DPP is used for parallel AMA collection. In Table DIRPPOOL, position on the number corresponding to the AMAPARL tuple and change the device type to TAPE.
- 4 At the DIRP MAP level, enter:

**>MNT AMA T# PARALEL (cr)**

where: # is MTD number of one DPP DSI

Updating volume information for  
T#: Volume 1 in Parallel Pool 62, AMAPARL  
Please confirm ("YES" "NO")

**>YES (cr)**

Parallel volume T# allocated.

Repeat this step for the other DSI.

- 5 In a working office, normal traffic generates call records used to verify DPP. In a non-in-service office, use the MAKEAMA command to generate call records. For example, enter:

**>MAKE AMA <call code> <quantity of calls> (cr)**

where: call is code for a Bellcore AMA billing record and quantity equals a number between 1 and 100. The valid call codes for this office are in Table BCCODES under the Tuple ID "TOLL"

**Example:** MAKEAMA 6 100

- 6 To verify that calls are being sent to the DPP, use the IDXMAINT commands from the DPP MAP. Enter:

**>IDXMAINT DIR OPEN AMA (cr)**

- 7 After collecting a sufficient quantity of call records, contact the HOC and request that the DPP be polled. Be sure to advise the HOC that the files being polled are duplicate call records being used in a verification procedure. Compare the accuracy of the records collected from the DPP with those from the active AMA collection device.
- 8 At the DPP level, enter the command: REPORT AMA TDAY a number of times, and ensure that the number of blocks received is incrementing. If so, AMA data is being received; if not, contact the DMS maintenance support group to troubleshoot.

**DPP as the primary device**

After completion of DPP verification procedures and telephone company acceptance of the DPP installation, assign the DPP as the primary AMA collection device. Do this by demounting the current device(s) and mounting the DPP as the primary AMA collector. Before starting this procedure, establish the exact configuration to be used. Normally the device previously used as the primary device becomes the parallel or back up device, and the

DPP becomes the primary unit. This procedure involves configuring the DPP and the parallel device in DIRP. After successfully mounting both units, verify that the DPP is receiving AMA data from the DMS. Then, notify the HOC that the DPP installation has been completed so regular polling may begin. Polling should proceed on a regular, predetermined schedule.

In order to bring the DPP on-line as the primary AMA collector, you must first demount the current primary device(s). Before doing this, verify whether or not the field MINFILES in Table DIRPSSYS for AMA is set to 0. See Table 3-2 for an example of AMA tuple in Table DIRPSSYS. If the field MINFILES is not set to 0, change it, using the following procedure before demounting the current parallel AMA devices. Normally this is impossible, since DMS rejects any attempt to reduce the number of AMA volumes below the number in field MINFILES of Table DIRPSSYS, and Table DIRPSSYS rejects any attempt to enter a zero in field MINFILES.

Table 3-2 Example of Table DIRPSSYS										
Table DIRPSSYS										
SSYSNAME	READRITE	NUMFILES	MINFILES	POOLNAME	FILENAME	ALARM0	ALARM1			
ALARM2	ALARM3	RETPD	CRETDP	PARLPOOL	PARCONC	MANPALM	FILEDATE			
SHEDDAYS	SHEDBASE	SHEDINCR	ROTACLOS	AUTOXFER	SPACROTE	MAXDFSIZ	PRIOTIO			
AMA	Y	2	1	AMAPOL		\$	CR	NA		
NA	NA	30	30	AMAPARL	N	NA	OPENED	YYYYYYY		
14	X12	NONE	NONE		N		64	Y		

To set field MINFILES to zero in Table DIRPSSYS, set the office parameter DIRKILL IN EFFECT to Y. (This parameter is normally set to N to prevent the demounting of all AMA volumes.)

### Changing AMA minfiles to 0 in Table DIRPSSYS

Here is an outline of the procedure used to change the DIRPKILL IN EFFECT tuple from N to Y. You must do this to allow the MINFILES field in the AMA tuple in Table DIRPSSYS to be changed to 0. After changing the DIRPKILL IN EFFECT from N to Y, go to Table DIRPSSYS and set field MINFILES in the AMA tuple to zero.

**Note:** If either RWOK or DIRPKILL IN EFFECT are not loaded in your switch, a patch from ETAS or ITAS is necessary to set field MINFILES to zero in Table DIRPSSYS.

- 1 Identify the table location of the DIRPKILL IN EFFECT office parameter by entering:

>Table OKPARMS; Position DIRPKILL\_IN\_EFFECT (cr)

```
DIRPKILL IN EFFECT STD      N
```

- 2 The DIRPKILL IN EFFECT tuple is in Table OFCSTD and its is disabled. Table OFCSTD is a write protected table. Before entering Table OFCSTD and attempting to change the boolean in the tuple DIRPKILL IN EFFECT from N to Y, turn on RWOK (Read/Write enable). At the CI level of the MAP, Set Read/Write to On by entering:

**>RWOK ON (cr)**

Write access enabled for restricted data.

- 3 Access the Table OFCSTD and set the parameter DIRPKILL IN EFFECT to Y, by performing the following:

**>Table OFCSTD; pos DIRPKILL IN EFFECT (cr)**

Table OFCSTD  
DIRPKILL IN EFFECTN

**>CHA (cr)**

PARMVAL: N

**>Y (cr)**

Tuple to be changed  
DIRPKILL IN EFFECTY  
ENTER Y TO CONFIRM, N TO REJECT, E TO EDIT

**>Y (cr)**

TUPLE CHANGED

- 4 Access Table DIRPSSYS, position on AMA and change the field MIN-FILES to 0 by entering:

**>Table DIRPSSYS; pos AMA (cr)**

Table DIRPSSYS

AMA	Y	2	1	AMAPOL	\$	CR	NA
NA	NA	30	AMAPARL	NA	OPENED	YYYYYY	
14		X12	NONE	NONE	N	64	Y

**>CHA 4 0 (cr)**

Tuple to be changed:

AMA	Y	2	0	AMAPOL	\$	CR	NA
NA	NA	30	AMAPARL	NA	OPENED	YYYY	
14	X12	NONE	NONE		N	64	Y

>CHA 4 0 (cr)

ENTER Y TO CONFIRM, N TO REJECT, E TO EDIT

>Y (cr)

TUPLE CHANGED

## Setting up DPP as primary AMA collection device

*Note 1:* PRIVERAS is a non-resident program used to clear priority files such as AMA records off DMS disks that will be used for parallel recording.

*Note 2:* When clearing DPP disk be careful to update index file. When completed, you should only see three index files: AMA, LOG, and EXC.



### CAUTION

#### Parallel AMA Volume

Note that even after the DPP has been configured as the primary device, and even if an extended period of error free data collection is completed, a secondary or backup collection system should be continued to protect the integrity of the AMA data.

To change DPP from parallel to primary collector of AMA:

- 1 Take DPP out as a parallel device. At DIRP MAP level enter:

>DMNT AMA T# PARALEL (# is the tape's unit number) (cr)

>DMNT AMA T# PARALEL (cr)

- 2 MNT another parallel device if available, or take one primary AMA device out of DIRP and put it up as a parallel collector. If using a disk volume, verify that any DIRP files have been processed, and then erase them, and any DIRPFILE SEGS using the non-res command PRIVERAS if necessary. If using magnetic tapes, you may need to use the ERASTAPE command. Format the tape using the MOUNT command and then DEMOUNT it. In Table DIRPPPOOL, position on the tuple used for AMA parallel devices and change the device type to show disk or tape. For example, at the DIRP level, enter:

>MNT AMA D010AMA PARALEL (cr)

where: D010AMA identifies a disk volume

\*\*\*WARNING- Volume - Volume needs preformatting for parallel recording.

Parallel recording is not currently active for AMA.  
Recording may begin immediately on this parallel volume.

Updating volume information for  
D000AMA volume in Parallel Pool 62, AMAPARL  
Please confirm ("YES" or "NO"):

**>YES (cr)**

Parallel volume D000AMA allocated.

DIRP can execute the DIRPFFMT command on a disk volume. This procedure, whether done by DIRP or entered as a command, is CPU intensive and should be done in a low traffic period.

- 3 Clean test data from DPP disks, by performing the following (before doing this, ensure that all records on the DPP are in fact test calls and can be deleted. Obtain telephone company permission to delete these files:

**>MAPCI;MTC;IOD;DPP AMA (cr)**

**>LSTACT (cr)**

**>02nnnn1531 (the file 02 where size is 1531) (cr)**

**>03nnnn85 (cr)**

**>04nnnn2062 (cr)**

**>06nnnn256 (cr)**

**>CLSACT2 (cr)**

**>DELFILE AMACRD 1 255 (cr)**

**>DELFILE AMAIDX 1 255 (cr)**

*Note:* You may receive an error code 04 which tells you that you can not close the active file. Ignore this warning as this file is empty.

**>IDXMAINT CREATE FILE AMA (cr)**

- 4 Prepare each DSI by entering the following:

**>ERASTAPE n (cr)**

where: n is MTD number

\*\*\* WARNING, THIS TAPE WILL BE ERASED.\*\*\*

Please confirm ('YES' or 'NO'):

**>YES (cr)**

Tape has been successfully formatted.

**>MOUNT n FORMAT DPPAMA (cr)**

Volume = 'BLANK'  
Formatting tape as 'DPPAMA'  
OK

**>DEMOUNT Tn (cr)**

OK

Repeat steps b and c for other DSI.

- 5 In Table DIRPSSYS, position on AMA tuple and change field MINFILES to 0. You may have to set DIRPKILL IN EFFECT in Table OFCSTD to Y using procedure shown below:

**>CHA (cr)**  
**>AUTOXFER (cr)**  
**>NONE (cr)**

**>CHA (cr)**  
**>ROTACLOS (cr)**  
**>NONE (cr)**

- 6 Prepare a DPP tuple in Table DIRPPOOL. The recommended device type in AMAPOOL tuple is DPP. This alerts personnel to the presence of the DPP. Change field 27 (volume 22) to T2 and field 28 (volume 23) to T3, where 2 or 23 in T# identify the DSIs. Enter:

**>QUIT ALL (cr)**

TABLE DIRPSYS AMA TUPLE, see AMA under SYSNAME POSITION

- 7 From the CI level enter:

**>MAPCI NODISP;MTC;IOD;DIRP (cr)**  
**>QUERY AMA (cr)**

Enter Table DIRPSSYS, and position on the AMA tuple. DMNT all remaining primary AMA devices.

**>DMNT AMA D000AMA (cr)**

Change the POOLNAME to AMAPOOL:

---

**>CHA POOLNAME AMAPOOL (cr)**

This puts the two DSIs (one primary and one standby) on line as primary AMA collectors. One parallel device is now in place.

- 8 Verify that other values in the AMA tuple in Table DIRPSSYS are set correctly. Set MINFILES to 1, ROTACLOS to none, and set up a rotation schedule avoiding a rotation between the hours of 2 a.m. and 4 a.m.
- 9 Verify that DIRP has mounded all devices correctly. At DIRP level, enter:

**>QUERY AMA ALL (cr)**

**>QUIT ALL (cr)**

## Polling test data from the DPP

AMA data stored on the DPP disk is polled by the HOC. During a polling session, the HOC requests a polling session from the DPP over the polling link. After security is established, it sends a file poll command requesting an AMA data file, beginning with a particular sequence number and containing 100 blocks.

The DPP then confirms the message and begins sending the AMA data requested. It inserts the actual number of blocks in the AMA file in the message header of the first block sent. The DPP continues sending blocks of AMA data (in 100 block increments) until either the all primary AMA data has been sent, or 100 blocks of AMA data have been sent. If the AMA data file is exhausted before sending 100 blocks, the DPP inserts an end of file indicator in the message header of the last block sent.

The HOC then checks the number of blocks sent as one file, checks the file sequence number, and then sends a file confirm message after verifying that the file size is correct. The DPP responds with a file confirm message, then changes the status of the polled AMA data from primary to secondary. The HOC checks for more data in the DPP file. If more exists, the HOC sends another file poll command requesting AMA data starting at the next sequence number from the last block sent. If no more exists, the HOC sends a session disconnect message to the DPP, which terminates the polling session.

To poll test AMA data from the DPP disk, contact HOC personnel to arrange an unscheduled polling session. To poll the required data, the HOC needs to know the starting sequence number of the test data. To determine this perform the following:

- 1 To access the DPP MAP menu and display:

**>MAPCI;MTC;IOD;DPP AMA (cr)**

- 2 Display the closed AMA files on the DPP disk:

**>IDXMAINT DIR CLOSED AMA ver (cr)**

where: ver - maximum file versions: 56 (Non-Turbo DPPs) or 200 (Turbo DPPs)

Command sent to DPP

VS vvv: bbb BLKS, ddd PRIMARY AMA SEQ# nnnnnn

VS vvv: bbb BLKS, ddd PRIMARY AMA SEQ# nnnnnn

VS vvv: bbb BLKS, ddd PRIMARY AMA SEQ# nnnnnn

VS vvv: bbb BLKS, ddd PRIMARY AMA SEQ# nnnnnn

- 3 Look at the SEQ #nnnnnn portion on the first line of the response. 'nnnnnn' is the starting sequence number. The HOC needs this number. Record it if necessary.

Contact HOC personnel and explain that a test file needs to be polled from the DPP.



**CAUTION**

Make sure the HOC is aware that the data to be polled is a test file and not 'live' AMA data and is not to be sent to the AMA data processor.

Arrange a polling session with the HOC. If the polling session can be done immediately, monitor the DPP MAP display as the polling session occurs. A SES CON message appears at the DPP at the start of the polling session, and a SES DIS message at the end of the session. If the polling session cannot be scheduled immediately, return to the DPP MAP menu when polling is to take place, and watch for the SES CON and SES DIS messages from the DPP to be printed in the LOGUTIL. After receiving this message sequence, consider the polling session successful.

**Performing match and compare of DPP test data**

After the HOC receives the test file, ask the RAO to compare the data on the active DIRP files recorded during the test period with the AMA data in the DPP test file. The data in both files should match.

If the data in both files matches, consider the DPP to be operating properly and ready to place on-line. If the data does not match, there may be a problem in the DPP or in the AMA data stream between the DMS-100 and DPP, or the DPP and the HOC. Contact the maintenance support group to isolate and clear the problem. Do not place the DPP on-line at this time. Repeat the DPP parallel recording test when the problem has been cleared. Do not place the DPP on-line until the parallel recording test passes.

---

## Maintaining the DPP load file

---

The DPP load file contains a backup copy of the DPP software for DPP software reloading purposes. This file exists in both DMS-100 storage and on the DPP disk. Maintenance of the DPP load file involves verifying that a copy of the DPP load file exists in both DMS-100 storage, and on the DPP disk, and replacing the load file with an updated version, when necessary. These procedures are described next.

### Verifying DPP load file storage

The DPP load file is stored on both the DMS-100 disk and the DPP disk. On the DMS-100 disk, the DPP load file is typically stored with DMS-100 peripheral module loads. The disk volume name under which these load files are stored varies locally; however, the volume name should be recorded in the office records.

DPP load files follow a strict naming convention that is shown in Figure 4-1. To verify that the DPP load file is stored on the DMS-100 disk:

- 1 Check the office records to determine the current DPP load file name.
- 2 Check the office records to determine the disk volume name that contains the DMS-100 Peripheral Module (PM) load files.  
*Note:* There may be more than one volume containing the PM load files.
- 3 Display the contents of the disk volume containing the PM load files:

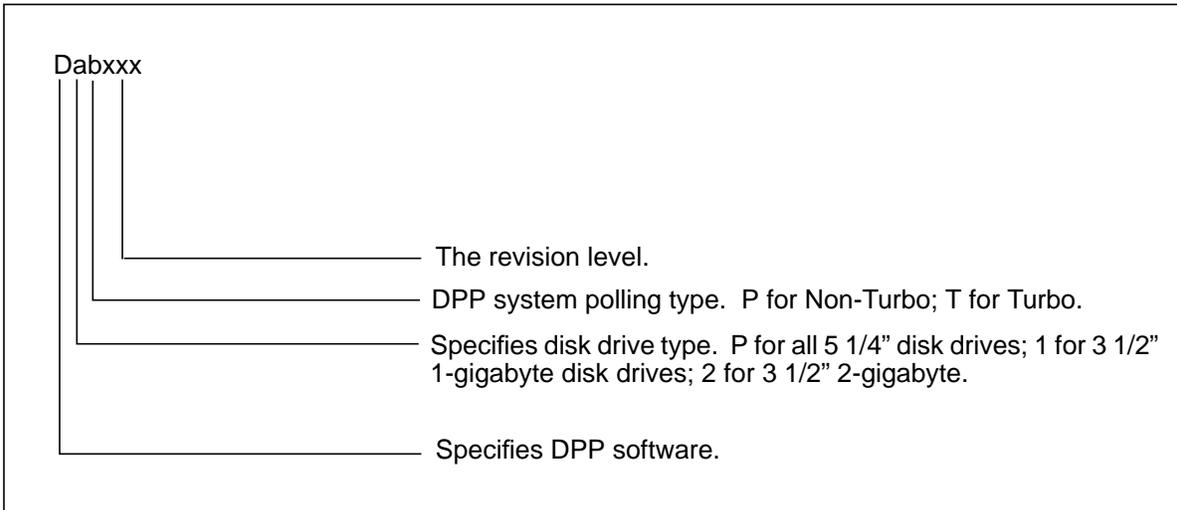
```
>DSKUT (cr)
```

```
DSKUT
```

```
>LISTVOL disk vol name ALL(cr)
```

```
<files in PM load volume displayed>  
Dabxxx
```

**Figure 4-1**  
**DPP load file naming convention**



- 4 Look through the file names for the DPP load file. If the DPP load file name is there, the file is properly stored in DMS-100 disk storage. If the DPP load file is not there, and there is more than one disk volume containing PM load files, repeat step 3 above for the other volumes.

If the DPP load file is not in DMS-100 disk storage, add the DPP load file to the DMS-100 disk storage:

- a. The DPP load file is delivered on tape with the DPP unit, which should be at the site. Locate the DPP load tape. If you can not find it, contact the maintenance support group.
- b. Once you have the DPP load tape, find an available MTD and load the DPP load tape on it.
- c. Mount the MTD containing the DPP load tape:

**>MOUNT n (cr)**

where: n is the number of the MTD on which the DPP load file tape is mounted.

- d. List the files on the DPP load tape:

**>LIST Tn (cr)**

where: n is the number of the MTD on which the DPP load file tape is mounted

- 
- e. If you have more than one PM load disk volume, select one to store the DPP load file.
  - f. Copy the DPP load file from the DPP load tape to the PM disk volume:

**>COPY Dabxxx disk vol name (cr)**

where: Dabxxx = DPP load file name  
disk vol name = PM load disk volume name

- g. Verify that the DPP load file was successfully copied to the PM load file disk volume, and to the DMS-100 disk:

**>LISTVOL disk vol name ALL (cr)**

If the DPP load file is not in DMS-100 disk storage, return to step d. If the DPP load file cannot be copied into DMS-100 disk storage, contact the maintenance support group for assistance.

- h. Exit DSKUT:

**>QUIT (cr)**

- i. Demount the MTD containing the DPP load tape. To demount the MTD on which the DPP load tape is mounted:

**>DEMOUNT Tn (cr)**

where: n is the number of the MTD on which the DPP load file tape is mounted

- j. Store the DPP load tape per local procedures.

After verifying that the DPP load file is in DMS-100 disk storage, verify the DPP load file is on DPP disk:

- 1 List the files on the DPP disk:

**>MAPCI;MTC;IOD;DPP AMA (cr)**

**>LSTDIR ALL (cr)**

<files on DPP disk are displayed>

Look for the DPP load file name. If the DPP load file is on the DPP disk, the DPP load file is properly stored in DPP disk storage. If the DPP load file is not on the DPP disk:

**>LOADDPP FG FILENAME (cr)**

DOWNLOADING USING FILE file name  
DPP DOWNLOADING COMPLETE

to download the DPP software in the background mode from DMS-100 disk storage. Verify that the DPP's disk lights are flashing, indicating that the load is being accepted.

- 2 The DPP load file is now in both DMS-100 and DPP disk storage. To return to the MAP CI level:

**>QUIT ALL (cr)**

### Downloading the DPP with a new load file

When updates to DPP software are required, a new DPP load file is released, and the updated load file is provided on tape. When a new DPP load file is received:

- 1 Copy the new DPP load file to DMS-100 disk storage as outlined in *Verifying DPP Load File Storage* section.
- 2 Change the DPP load file name in Table DPP to the new load file name:

**>TABLE DPP (cr)**

TABLE: DPP

**>POS AMA (cr)**

<tuple displayed>

**>CHA DPPDNLD Dabxxx (cr)**

TUPLE TO BE CHANGED:  
<changed tuple displayed>  
ENTER Y TO CONFIRM, N TO REJECT OR E TO EDIT

**>Y (cr)**

TUPLE CHANGED

**>QUIT (cr)**

- 3 Download the new DPP load file to the DPP:

**>MAPCI;MTC;IOD;DPP AMA (cr)**

**>LOADDPP FG (cr)**

```
DOWNLOADING USING FILE file name DPP
DOWNLOADING COMPLETE
```

**Note:** The following steps involve making the new load active in the DPP. At the completion of the procedure, you may want to leave the old version of the software on disk until after the new software has been verified. After the verification, use the DELFILE command to delete the old software version(s).

The new software is now loaded onto the DPP disks. If the existing software is active, the new released Main Processor (MP) and/or Communication Processor (CP) software must be substituted into the respective boot\_files. Once that is completed, reboot the active and standby processors as follows:

- a. For Non-Turbo DPP systems, locate the new DPP load file on the DPP disk, delete the old bootfile (this is Dabxxx version), and add the new bootfile to the BOOTLIST:

```
>BOOT LIST (cr)
>BOOT DELETE (cr)
>BOOT ADD (cr)
```

```
FILE>file name version
```

Use the BOOT STDBY command to reboot the standby with the new load. (You can also power down the standby DPP processor, wait thirty seconds, then power it back up.) For a Non-Turbo unit, loading should take about one minute, a Turbo unit will take a little longer.

Verify that the standby processor has the new software. To do this, enter:

```
>VS STDBY (cr)
```

and see the new load filename.

Perform a processor switch (SWACT command), and use the BOOT STDBY command again. For Turbo DPP systems, you must delete the old for the MP and the CP. Locate the new DPP load files on the DPP disk, delete the old boot files (DPGxxx.version; CP-SAxx version, and add the new bootfile(s) to the DPGxxx BOOTLIST and CP BOOTLIST:

- b. xxx\_version; CPSAxx.version, and add the new bootfile(s) to the MP BOOTLIST and CP BOOTLIST:

```
>BOOT LIST (cr)
>BOOT DELETE (cr)
>BOOT ADD (cr)
>FILENAME VERSION (cr)
```

```
DOWNLOADING USING FILE file name DPP
DOWNLOADING COMPLETE
```

**Note:** The following steps involve making the new load active in the DPP. At the completion of the procedure, you may want to leave the old version of the software on disk until after the new software has been verified. After the verification, use the DELFILE command to delete the old software version(s).

The new software is now loaded onto the DPP disks. If the existing software is active, the new released MP and/or CP software must be substituted into the respective boot files. Once that is completed, reboot the active and standby processors as follows:

```
>BOOT LIST (cr)
>BOOT DELETE (cr)
>BOOT ADD (cr)
```

```
FILE>file name version
```

```
>CP BOOT LIST (cr)
>CP BOOT DELETE (cr)
>CP BOOT ADD (cr)
```

```
FILE>file name version
```

Power down the standby DPP processor, wait thirty seconds, then power it back up. This reboots the standby with the new load. (You can also use the BOOT STDBY command.)

Verify that the standby processor has the new software. To do this:

```
>VS STDBY (cr)
```

and see the new load filename.

Perform a processor switch (SWACT command), and power down the now standby processor, and use the BOOT STDBY command again.

---

## Maintaining the DPP spares parts stock

---

Spare parts for the DPP are essential for proper DPP maintenance. Use of the DPP unit can be lost for extended periods if replacement parts must be ordered because they are not on hand. To prevent this, maintain the DPP spare parts stock. Here are guidelines for maintaining the DPP.

### Replaceable assemblies

Many of the assemblies of the DPP unit are replaceable. Keep spare assemblies on hand at all times to assure expedient repair of the DPP in case of a fault. The types of assemblies that are replaceable in the DPP are as follows:

- PCAs
- disk drives
- panel lamps
- power supplies
- fan units
- power supply fuse(s)
- fan filters.

Each assembly of the DPP is assigned a Product Engineering Code (PEC). Each assembly is identified by its PEC. The PEC for each replaceable assembly is listed in the *DPP Product Guide*.

### **Recommended spare assembly stock**

The DPP spare parts stock should consist of the following:

<b>Assembly</b>	<b>Quantity</b>
PCAs	two each
power supplies	one each
power supply fuse(s)	five each
disk drives	one each
fan units	one each
fan filters	four each
panel lamps	one each

Use the quantities suggested as a guide. If experience shows that more or less of any item is needed, adjust supplies accordingly. Check the spare stock frequently to ensure that enough spare assemblies are always on hand.

---

## Setting the DPP clock

---

The DPP has a clock, governed by an internal crystal oscillator, that is used for time-stamping messages and for performing certain maintenance functions. To check the current DPP time:

```
>MAPCI;MTC;IOD;DPP AMA (cr)
>CLK ACT (cr)
```

Command sent to DPP

```
(a) day yy mm/dd hh:mm:ss a COMPUTER
```

where:

- a = responding computer
- day = weekday (MON, TUE, WED, THU, FRI, SAT, or SUN)
- yy = year (00 - 99)
- dd = day of month (1 - 31)
- mm = month (1 - 12)
- hh = hour (0 - 23)
- mm = minute (0 - 60)
- ss = the second (0 - 60)
- a = active processor (A or B)

To change the DPP clock:

```
>SETCLK year month date hour min sec day (cr)
```

where:

- year = 00 - 99
- month = 01 - 12
- date = 01 - 31
- hour = 00 - 23
- min = 00 - 59
- sec = 00 - 59
- day = MON, TUE, WED, THU, FRI, SAT, or SUN



---

## Changing the DPP security passwords

---

Certain situations may dictate that you change the AMAT and HOC passwords. These passwords are exchanged at the initiation of each polling session as part of the AMA data security system. These passwords are stored in the DPP site data file. To view the AMAT and HOC passwords:

```
>MAPCI;MTC;IOD;DPP AMA (cr)
>AMATPSW (cr)
```

```
Command sent to DPP
AMAT PASSWORD = sen type sen id
```

```
>COLLPSW (cr)
```

```
Command sent to DPP
HOST-COLLECTOR PASSWORD
PASS #1 - off type off id
PASS #2 - off type off id
```

```
where:  sen type  is the AMAT sensor type (nnnn)
        sen id    is the AMAT sensor identification (nnnnnn)
        off type  is the HOC office type (nnnn)
        off id    is the HOC office identification (nnnnnn)
```

To change the passwords:

```
>AMATPSW sen type sen id (cr)
```

```
Command sent to DPP
AMAT PASSWORD = sen type sen id
```

```
>COLLPSW list (1 or 2) off type off id (cr)
```

```
Command sent to DPP
HOST-COLLECTOR PASSWORD
PASS #1 = off type off id
PASS #2 = off type off id
```

## 7-2 Changing the DPP security passwords

---

where:    sen type = sensor type  
          sen id    = sensor identification  
          list no   = password list number (1 or 2)  
          off type = HOC office type  
          off id    = HOC office identification

After changing password(s), write any changes to the DPP disk:

**>SITDAT WRITE (cr)**

```
*****WARNING*****  
THIS COMMAND WILL AFFECT SITE DATA IN MEMORY OR ON DISK  
Do you wish to continue?  
Please Confirm ('YES' or 'NO'):
```

**>YES (cr)**

```
Command sent to DPP  
SITDAT FILE DISK JOB COMPLETE
```

---

## DPP emergency procedures

---

The DPP is a completely redundant, highly reliable unit. However, if you allow the DPP to operate in a non-redundant mode for an extended period of time, or allow the DPP disks to become full of AMA data, it may not be able to record AMA data.

To protect valuable AMA data in the unlikely event that DPP is unable to record, establish a contingency plan. This section provides some guidelines for a DPP emergency recovery plan as well as some general rules for reducing the possibility of a DPP emergency occurring.

### Determining when the DPP is not operating

The DPP provides an extensive set of trouble indicators, including audible and visual alarms. Like the DMS-100, the degree of alarm in the DPP is determined by the severity of the fault.

Critical faults in the DPP generate critical alarms, major faults, major alarms, and minor faults, minor alarms. Generally, critical DPP alarms indicate a problem that can adversely affect AMA data recording.

If the DPP experiences a critical fault while in the non-redundant mode, or if both DPP disks are full, a critical alarm is generated. The alarm is displayed at the DMS-100 MAPCI continuous system status display under the IOD header (unless a higher priority IOD alarm exists), the DPP MAP display to the right of the DPP unit header, and at the DPP unit system Switch and Status panel.

The key indicator that the DPP has stopped recording is the DIRP NO AMA alarm. If this occurs, in addition to the previously mentioned critical DPP alarms, the DIRP NO AMA alarm is displayed in place of the critical DPP alarm under the IOD header of the MAPCI continuous system status display. The DPP MAP display appears as shown in Figure 8-1.

**Note:** It is also possible that recording has stopped because of a DMS problem, in which case the DPP will not show any alarms.

**Figure 8-1**  
**DPP MAP display indicating DPP not recording**

```

CM      MS      IOD      Net      PM      CCS      Lns      Trks      Ext      APPL
.       .       NO AMA      .       .       .       .       .       .       .

      DPP
0  Quit      *C*
2  CP_      IOD:
3  LSTDIR_  IOC   0   1   2   3   4   5   6   7   8   9
4  LSTACT_  STAT  .   .   .   .   .   .   .   .   .
5  REPORT_
6  TEST_    DIRP: .  XFER: .  SLM : .  NOP : .  NX25: .
7          MLP : .  DPPP: .  DPPU:AMA CRIT SCAI: .
8
9  IDXMAINT
10 DSIMAIN
11 ERRMAP_
12 RSERR_
13 CLK_
14 VS_
15 LINKTEST
16 LoadDPP_
17 QueryDPP
18 RESETIO_
      userid

TIME   hh:mm  MAP>

```

**Responding to a DPP emergency**

When a DPP emergency arises, maintenance personnel should ensure that AMA is being collected on a parallel volume using the QUERY AMA command. If the response to the QUERY AMA command indicates that a parallel volume is mounted, AMA data is still being collected and maintenance personnel can diagnose the problems with the DPP. If the response to the QUERY AMA command indicates that a parallel volume is not mounted, determine whether it would be quicker to fix the DPP or mount a parallel volume. Refer to the *DIRP Routine Maintenance Procedures* document for more information on how to mount a parallel volume.

The parallel volume can be a MTD or the DMS-100 disk. Transferring recording to tape is the fastest means of re-establishing AMA recording. A blank tape is mounted on a spare MTD and the MTD is mounted in the DIRP system. If the DMS-100 disk must be used, contact the maintenance support group, and change the DIRP datafill before resuming recording. To resume recording on the DPP after it is repaired, again contact the maintenance support group, stop AMA recording, and change the DIRP datafill.

To prevent a long delay in re-establishing AMA recording, make sure that at least one spare MTD is available at all times. This is normal practice for most operating companies.

Refer to the *DPP Commands and Message Guide* to begin diagnosis of the DPP problem. Follow the corrective action steps recommended in the descriptions of the error messages found in this manual.

## Recovering AMA data from the parallel volume

If AMA data is lost because of a DPP or DIRP fault, the data can be recovered from the AMA parallel file if one was mounted prior to the fault. The procedure for recovering AMA data from the parallel file is in the *DIRP Recovery Procedures* document.

## Avoiding DPP emergencies

The possibility of a DPP emergency occurring and the impact that such an emergency can have on AMA recording can be significantly reduced by adhering to the following guidelines:

- Investigate all DPP alarms promptly.
- Keep the AMA system parallel file mounted at all times.
- Ensure that at least one spare MTD is available at all times.
- Keep the *DPP Command and Messages Guide* available and up to date at all times.

## DPP restoration after restarts

**Note:** If the DIRP device type is datafiled as DPP, you may ignore the information in this section.

The situation may arise that the DPP tape ports may be demounted after a cold and reload restart. This is due to the fact that the DPP emulates tape drives and reacts to restarts as a tape drive would react. Thus, it is essential that DPP recording be re-established after a restart. Use the following procedure to restore AMA recording to the DPP.

For this example, the DPP is represented as MTD Tape Port T0 and T1; actual tape port assignment is determined in table MTD and is site dependent. After the DMS-100 has recovered from the restart, proceed as follows:

```
>MAPCI:MTC:IOD:DIRP:QUERY AMA (cr) (to query AMA status; should
observe that both T0 and T1 are
unavailable)
>MOUNT 0 FORMAT <VOLUME ID> (cr) (to format DPP tape ports)
>DEMOUNT T0 (cr)
>MOUNT 1 FORMAT <VOLUME ID> (cr)
>DEMOUNT T1 (cr)
```

Re-establish AMA recording by using one of two methods:

- Via DIRP and table DIRPOOL.
- From the DIRP MAP level.

### **Method 1 - table DIRPOOL**

**>TABLE DIRPOOL:POS <# OF POOL USED> (cr)**

REFER TO TABLE DIRPSSYS TO IDENTIFY POOLNAME

**>CHA <VOLUME 0 - VOLUME 23> \$ (cr)**

VERIFY THAT ALL VOLUMES CONTAIN \$.

**>CHA <VOLUME0> T0 (cr)**

**>CHA <VOLUME0> T1 (cr)**

After entering Y to confirm the changes, the system responds with T0/T1 ALLOCATED. Proceed to the DIRP level and perform a QUERY AMA to confirm that AMA ACTIVE and AMA STDBY1 are available.

### **Method 2 - DIRP level**

**> TABLE DIRPOOL:POS <# OF POOL USED> (cr)**

REFER TO TABLE DIRPSSYS TO IDENTIFY POOLNAME

**>CHA <VOLUME 0 - VOLUME 23> \$ (cr)**

VERIFY THAT ALL VOLUMES CONTAIN \$.

**>MNT AMA T0 (cr)**

**>MNT AMA T1 (cr)**

After entering Y to confirm, the system responds with T0/T1 ALLOCATED. QUERY AMA to confirm that AMA ACTIVE and AMA STDBY1 are available. After verifying the reactivation of AMA recording on the Active/Standby1 volumes, re-establish AMA recording to the parallel volume as well.

---

# DPP-to-HOC communication

---

## Overview

The HOC, located at a central collection point, uses a prearranged polling schedule for contacting the DPP and requesting transmission of data. Polling schedules are a function of the expected traffic at the various DPP sites. Data retrieval is accomplished in accordance with BX.25 level 3 protocol specifications.

## Establishing a polling link

The process by which a HOC polls call record blocks from a DPP requires a series of communication signals to pass between the two devices. The first step in establishing a link is to set up machine/ machine security parameters and consists of assigning a specific identity to the DPP and the device(s) authorized to access it. After establishing security data, the DPP can be accessed only by an authorized device.

The first level of security is an exchange of security passwords between DPP and HOC. The HOC initiates this by sending DPP a unique ten-digit numeric sequence known as the HOC password, which identifies the outside device to the DPP. The default password supplied the HOC is 0320 215801. When DPP receives this password, it responds by sending a unique ten-digit numeric password, revealing its identity to the outside device and establishing the set of conditions necessary for information transmission. The default password for DPP is 0380 312967.

## Call record transfer (polling)

After establishing security, call record transfer occurs via the following process:

- 1 The HOC sends a file poll command requesting a billing data file beginning with a particular sequence number. The DPP sends 100 blocks of primary data to the HOC. The active AMACRD file is automatically closed upon receipt of a polling request when the number of blocks of data in the active file is greater than or equal to the threshold set using the VALPARM BLOCKS command (default value is 200 blocks). If the active AMACRD file contains less than the threshold set using the VALPARM BLOCKS command, the active file must be closed manually. Once the active AMACRD file is closed, polling continues.

- 2 DPP sends a message confirm and checks the file poll command. If the starting block sequence number is that of the next primary block, the DPP sends the data requested. If the starting block sequence number is unavailable or a mismatch, the DPP sends the message FILE REJECT with the reason: file unavailable but another file is available to be transmitted.
- 3 The HOC sends a message confirmation for every five messages, with each message containing one billing block.
- 4 The DPP sends billing blocks until it either exhausts the number for which it was asked or runs out of blocks. Unless there are less than one hundred blocks on disk, one hundred primary blocks are sent. The session message header of the message containing the last block has an end of file indication. The file header preceding the first block contains the actual size of the file.
- 5 The HOC checks the number of blocks sent as one complete file, and the file sequence number, and sends a file confirm message after verifying that the file size is correct.
- 6 The DPP sends a message confirm after receiving the file confirm message. Subsequently, all blocks in the transmitted file are marked secondary.
- 7 The HOC checks for space in its input buffer and more data in the DPP disk file. If the HOC continues polling, revert to Step 4, and repeat the procedure. If the HOC buffer is full, it opens another input buffer, reverts to Step 1, and repeats the procedure. If no other input buffers are available, the HOC sends a session disconnect message to the DPP, terminating the session.
- 8 The DPP waits for the next file poll command. The process then reverts to Step 2, and begins again.
- 9 If the DPP has no more data to send, the HOC sends a session disconnect message to the DPP.
- 10 When the session disconnect message is received, the DPP returns its own session disconnect message to the HOC.
- 11 The HOC releases the dialed connection.

### Polling link adjustment

The DPP contains a feature that enables you to perform maintenance-related functions on the data polling link. For actual maintenance conditions to be performed in response to a failed data link, refer to the *DPP Commands and Messages Guide*. This feature is activated by a system command, detailed as follows:

- enter LINIT to initialize a specified data link.
- enter LNKDSC to disconnect a specified data link.

**Note:** For more detail on polling link adjustment commands and their resultant system messages, refer to the *DPP Commands and Messages Guide*.

---

# Protocol

---

The DPP single entry AMA data is transferred to the HOC using a File Transfer Procedure (FTP) built on the BX.25 Issue 3 protocol.

Attachment 1 (Appendices A, B, and C) of the *AMATPS Generic Requirements* document defines the BX.25 level 1, 2, and 3 features required to support the AMA FTP. All features of level 1 and level 2 as well as the level 3 Permanent Virtual Circuit (PVC) features are required.

## Requirements

The AMA FTP file and session layers perform call procedures such as Session Connect, Accept, and Disconnect. Level 1 of BX.25 provides a standard electrical and physical interface. Level 2 provides basic functions including link setup and disconnection. As currently defined, this interface requires a subset of level 3 BX.25 features. In particular, a DPP requires only a communication path, which is predefined as a level 3 PVC, to establish a connection to its HOC. Each PCV has a single data stream for the transmission of large sequential data files.

The following is a summary of the AMA FTP BX.25 protocol requirements:

- The HOC/DPP interface consists of a single logical channel PVC. Each PVC has a single data stream.
- The HOC/DPP BX.25 physical interface is implemented as an EIA RS-232C.
- The HOC/DPP interface is implemented with all of the BX.25 level 2 link layer logical interface including dial-up and first I frame password operations as listed in attachment 1 (Appendices A, B, and C) of the *AMATPS Generic Requirements* document.
- The following parts of BX.25 level 3 packet layer logical interface are implemented for the HOC/DPP interface:
  - Data packets
  - Flow control and reset
    - Receive ready

- Receive not ready
  - Reset request
  - Reset indication
  - Reset confirmation
- Restart
  - Restart request
  - Restart indication
  - Restart confirmation
- For each AMA data transmission session, one physical data channel is established through an automatic dial-out/dial back arrangement.
- Data transmission failure recovery is provided by BX.25 level 2 link layer re-transmission and the AMA FTP session and file layers.
- Typical BX.25 level 2 protocol parameters are in Table 10-1.
- Typical BX.25 level 3 protocol parameters are in Table 10-2.
- Manual and automatic data channel testing is supported.
- Protocol parameters can be modified without reprogramming. A protocol parameter change does not require a shutdown of the DPP or result in a billing data loss.
- Protocol performance counts to measure data transfer efficiency and data link occupancy.
- The HOC to DPP interface does not support virtual call and packet switch network.
- The following parts of BX.25 level 3 packet layer logical interface are not implemented for the HOC to DPP interface:
  - Call setup and clearing
    - Call capabilities are not required. Dial-up operations are implemented at the BX.25 level 2 interface, the session layer provides call procedures.
  - Data and interrupt
    - Delivery confirmation (D) and qualifier (Q) bits are always zero and ignored.
  - Flow control
    - The reject command is not implemented.
  - Optional facilities
    - Packet re-transmission is not implemented (R1 counter is zero). No other optional facilities are implemented.

<b>Table 10-1 BX.25 level 2 parameters</b>		
<b>Parameter</b>	<b>HOC</b>	<b>DPP</b>
Retransmission time (Sec) - T1	2.5	10
Checkpoint time (Sec) - T2	12	12
Maximum I-field size (bytes) - N1	259	540
Maximum transmission count - N2	10	6
Maximum outstanding frame count - K	3	3

<b>Table 10-2 BX.25 level 3 parameters</b>		
<b>Parameter</b>	<b>HOC</b>	<b>DPP</b>
Maximum data field size (bytes)	537	537
Window size (packets) - W	3	3
Reset time (sec) - Td	10	10
Window update time (sec) - Tf	20	20
Restart time (sec) - Ts	10	10
Maximum reset requests count - Rd	3	3
Maximum data transmission count - R1	0	0
Maximum restart requests count - Rs	3	3

## Application (file) layer protocol

The following paragraphs provide a description of the messages and files used in the application layer of the FTP. The application layer provides file transfer capability and ensures data integrity. The types of files passed between DPP and HOC include:

- Billing (AMA) data
- Billing data repolls
- Tracer records
- Maintenance (data) files
- Test file.

**File header**

The file header is located at the start of every file transferred between the DPP and the HOC. The file header length varies with the file type. The first eight bytes of each file header contains the same data. The data contents of these eight bytes are:

**Byte 1** - file header, item, and file header length.

**Byte 2** - file send sequence number (0-255), incremented by +1 for each file sent during a session, wraps around to 0 after maximum count is reached.

**Byte 3** - file type; not used, filled with zeros.

**Bytes 4 thru 6** - file length; provides the number of bytes in the file; does not include the number of bytes in the file header

**Byte 7** - extended file item code

**Byte 8** - file item length; provides the number of subsequent file header bytes that contain the file name.

In addition to the six fields described in above, each file header provides the file name. Table 10-3 provides a list of all files and file names. All file headers are provided in Table 10-4. Data in the file header is coded in binary; all unused fields are filled with zeroes.

<b>Table 10-3 DPP File Names</b>	
<b>Description</b>	<b>File Name</b>
From DPP to HOC	
Primary billing file	1 + Block sequence number
Secondary billing file	2 + Block sequence number
Maintenance file	3
Repoll tracer record file	5
Time change file	6
Test file	7
Sheet 1 of 2	

<b>Table 10-3 DPP File Names</b>	
<b>Description</b>	<b>File Name</b>
From HOC to DPP	
Test file	64
Time file	67
Time verify file	68
<p><b>Note 1:</b> The file name (1 through 8 and 64 through 68) is placed in byte 9 of the file header.</p> <p><b>Note 2:</b> The block sequence number of the first block in the file, when used, goes in bytes 10 through 13 of the file header.</p>	
<b>Sheet 2 of 2</b>	

<b>Table 10-4 DPP File Headers</b>				
<b>Byte</b>	<b>Heading</b>	<b>Item</b>	<b>Heading</b>	<b>Length</b>
Primary Billing File (note 1)				
1	00	00	00	00
2	File Send Sequence Number (0-255)			
3	File Type (not used; note 2)			
4-6	File Length in Bytes; Excluding File Header			
Extended File Item Code				
7	11	00	00	01
Length of File Name in Bytes				
8	00	00	01	01
File Type				
9	00	00	00	01
10-13	Remainder of File Name			
<b>Sheet 1 of 3</b>				

<b>Table 10-4 DPP File Headers</b>				
<b>Byte</b>	<b>Heading</b>	<b>Item</b>	<b>Heading</b>	<b>Length</b>
	Extended File Item Code			
14	11	00	10	10
15	File Item Length			
16-19	Number of Blocks Remaining in Primary File			
	End of Heading Item			
20	10	00	00	00
	Secondary Billing File (note 1)			
1	00	01	01	01
2	File Send Sequence Number (0-255)			
3	File Type (not used; note 2)			
4-6	File Length in Bytes; Excluding File Header			
	Extended File Item Code			
7	11	00	00	01
	Length of File Name in Bytes			
8	00	00	00	01
	File Type			
9	00	00	00	1-0
10-13	Remainder of Tile Name			
	End of Heading			
14	10	00	00	00
	Non-Billing File (note 1)			
1	00	01	01	01
2	File Send Sequence Number (0 - 255)			
3	File Type (not used; note 2)			
<b>Sheet 2 of 3</b>				

<b>Table 10-4 DPP File Headers</b>				
<b>Byte</b>	<b>Heading</b>	<b>Item</b>	<b>Heading</b>	<b>Length</b>
4-6	File Length in Bytes; Excluding File Header			
	Extended File Item Code			
7	11	00	00	01
	File Item Length			
8	00	00	00	01
9	File Type			
10	10	00	00	00
<i>Note 1:</i> Data is coded in binary				
<i>Note 2:</i> Unused fields are zeroes.				
Sheet 3 of 3				

### **File Poll message**

The File Poll message is sent from the HOC to the DPP to initiate file transmission. The message identifies type of file, and the name of the file to be transferred from the DPP to the HOC. The message specifies the number of blocks to be sent as one file

*Note:* The File Poll message for billing data files is different from the File Poll message for other type files.

### **File Repoll message**

The File Repoll message is sent from the HOC to the DPP to request billing data that was previously sent and successfully received by the HOC.

The File Repoll message is also used to retrieve the secondary tracer record file.

### **File Confirm message**

A File Confirm message is sent by either the DPP or the HOC to indicate successful reception of a file. This is the last message sent following a successful file transfer operation.

For billing data files, a File Confirm message from the HOC results in the DPP setting the appropriate block header bit to indicate that all call records in those blocks are now secondary records.

**File Reject message**

A File Reject message is sent by the DPP or HOC to indicate that a file transfer cannot occur. The File Reject message is sent when:

- the file is not the next one available.
- the incoming file length is greater than the file length permissible.
- the file already exists at the HOC.
- the file size is not the same as that in the header.

A File Reject message, along with a file reject reason, is sent if the HOC polls for billing data and there is no more billing to be sent.

If a File Reject message is sent because of a block sequence mismatch, the File Reject message contains an item extender field, a field to identify the next available block sequence number, and the password of the last HOC to poll that DPP. Refer to Table 10-5 for a list of file reject reasons.

File Reject Reason	Data Field (Byte)						
	7	6	5	4	3	2	1
Incoming file length exceeds maximum file length permitted by receiving data terminal equipment.	0	0	0	0	0	0	0
File already exists and it cannot be changed.	0	0	0	0	0	0	1
File is not available to be transmitted.	0	0	0	0	0	1	0
File size does not agree with header.	0	0	0	0	0	1	1
File is not available to be transmitted, but another file is ready to be transmitted.	0	0	0	0	1	0	0
Invalid data.	0	0	0	0	1	0	1
Invalid file type.	0	0	0	0	1	0	1

**File Re-synchronization message**

If the HOC asks for a file that has already been sent, or is not available to be sent, a File Reject message is returned to the HOC. This message provides the identifier of the next available file and the password of the first HOC to poll that DPP.

The HOC responds to the File Reject message with a File Re-synchronization message. The File Re-synchronization message contains a request for the

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DPP to send the file identified (taken from the file reject message) as the next available file for transmission.

The HOC also sends a message indicating the block sequence mismatch. The HOC operator resolves the problem and, when required, initiates terminal requests for any blocks for billing data not sent.

### **File layer responses to file transfer procedure error conditions**

At the application layer, a number of error conditions can occur. These errors can take the form of an incorrect file header, an incorrect block header, incorrect file size, or incorrect sequence number. Each of these conditions results in a File Reject message being sent by the receiving system. For each of these conditions, the system that receives the File Reject message sends a Session Disconnect message with ABORT as the reason.

*Note:* When one of the above conditions occurs, one action the HOC may elect to take is to output a terminal message and remove the DPP from the port polling queue.

### **Incorrect block sequence number**

When the HOC sends a File Poll message for a billing file beginning with the incorrect block sequence number, the DPP sends a File Reject message to the HOC with reason given as File Unavailable. The File Reject message includes a field for insertion of the block sequence number of the next block in the primary billing record file.

The HOC does not send a Session Disconnect message in this case. A terminal message is printed out and a file poll message for the block indicated in the file reject message received from the DPP is sent to the HOC.

The DPP maintains a counter to determine whether the HOC sends two consecutive file poll requests with the incorrect block sequence numbers. A depiction of the file timer is provided in Table 10-6. If two consecutive incorrect block numbers appear at the DPP, a Session Disconnect message is returned to the HOC from the DPP to abort the session. Refer to Table 10-7.

*Note:* The HOC can output a terminal message to indicate the trouble, and reschedule that DPP at the bottom of the port polling queue.

### **Mixing more than one file type in session**

The HOC can only receive certain types of files in any one session. For example, primary and secondary billing record files must be sent in separate sessions. If the HOC requests the transmission of files not normally transmitted in the same session, the DPP responds by transmitting the appropriate files, if available. This type of response permits the HOC to

handle multiple file types in the same session without changing DPP software.

**Unsupported file transfers**

Program files, operational data files, translation dump files, and dump files transfers are not supported. If the HOC attempts to poll for, or transmit these files to a DPP, a File Reject message with the file reject reason, invalid file request is returned to the HOC. The HOC terminates the session upon receipt of this file reject message.

<b>Table 10-6 File Timer</b>				
<b>Timer</b>	<b>Time-Limit Value (Sec.)</b>	<b>Started When</b>	<b>Normally Terminated When</b>	<b>Action When Timer Expires</b>
FT2	120	Program issues a File Re-synchronization message	Program receives the appropriate file header	Retransmit, until FA1, then terminate

<b>Table 10-7 File Attempt Counter</b>				
<b>Counter</b>	<b>Value</b>	<b>Started When</b>	<b>Normally Terminated When</b>	<b>Action When Counter is Exhausted</b>
FA1	2	Program issues a File Re-synchronization message	Program receives the requested file header	Termination

**Session layer protocol**

The following paragraphs summarize the session layer protocol level used in the FTP. As part of the data transfer procedure, AMA data files are sent as sequential messages. The session layer protocol provides message transfer and ensures data integrity.

*Note:* Session re-synchronization, session re-accept, and session re-connect are not supported.

**Session layer message header**

The Session Layer Message Header is placed at the beginning of each application message sent during the session. The header contains a message send sequence number (0 to 255) and a message length indicator. When data message are received by either the DPP or the HOC, the session layer verifies the message sequence number and length indicator and passes the message to the application (file) layer. A message confirm message is then sent to the HOC.

**Session Connect message**

The Session Connect message is the first message from the HOC to the DPP. The Session Connect message contains the password to be verified by the DPP. The password identifies the recording office type plus the recording office identifier. The DPP accepts two HOC passwords from its normal and backup HOC, and saves the password of the last HOC to poll it.

**Session Accept message**

The Session Accept message is the DPP response to a Session Connect (message) request from the HOC. The DPP sends a Session Accept message if it is ready for file transfers and if the HOC sent the correct password. The session accept message also contains the DPP password, which the HOC must verify.

**Session Message Confirm message**

When messages are sent from the DPP or the HOC, a copy of the message is retained in the memory of the sender until the far-end unit responds with a confirmation message. The confirm message is sent as a response to session layer messages between DPP and HOC.

The Message Confirm message is sent for every message received except those messages containing billing (AMA) data. If the message contains billing data, the Message Confirm message is returned for every five messages received.

A window of 10 (ten) messages exists, and messages continue to be sent until the window size is met or the output buffer queue is emptied. The message confirmation message is not an indication that messages have been transferred correctly, only an indication that each message has been transferred to the other system. If a confirmation message is received for a message, any previous messages with lower sequential number are assumed to be included in the confirmation.

**Session Reject message**

The Session Reject message is sent to the DPP in response to a Session Connect message from the HOC to indicate that it is not prepared to transfer files, the HOC password is invalid, or the HOC session message is invalid or incorrect. Refer to Table 10-8 for a list of valid Session Reject (message) reasons.

**Session Disconnect message**

The Session Disconnect message is sent from the HOC to the DPP after the requested files have been received at the HOC. The HOC releases the dialed connection upon return of the Session Disconnect message from the DPP. Refer to Table 10-9 for a list of valid Session Disconnect (message) reasons.

**Session layer response to file transfer procedure error conditions**

The following paragraphs provide a description of error conditions that may occur within the session layer and the responses required from the HOC and DPP.

Some trouble conditions can occur during session establishment. These include an invalid session layer 2 password or an incorrect or invalid Session Connect message. For each of these conditions, the DPP sends the HOC a Session Reject message indicating the applicable reason.

*Note:* The HOC retries the session attempt twice to establish the session and, if still unsuccessful, may output a terminal message indicating the trouble, and remove the DPP from the port polling queue.

**No response from DPP when session requested**

The hardware at the HOC must establish a connection to the DPP through dial-up, or dedicated, facilities, and the hardware at the DPP (dial back-up unit or automatic calling unit) must return the call. This procedure is necessary to establish a secure two-way communications path.

<b>Table 10-8 Valid session reject reasons</b>						
<b>Reject reason</b>	<b>Description</b>	<b>Data</b>				
Called port unavailable	DPP unavailable to transfer files	00	00	00	00	
Higher level failure	A failure occurred at the packet link layer of the BX.25 protocol	11	10	00	00	
Unrecognized message		11	00	01	00	
Time expired	Threshold value of session timer has been exceeded	10	10	00	00	
Invalid session connect		00	10	00	00	

<b>Table 10-9</b>								
<b>Valid session disconnect reasons</b>								
<b>Disconnect reason</b>	<b>Description</b>							
	<b>7</b>	<b>6</b>	<b>5</b>	<b>4</b>	<b>3</b>	<b>2</b>	<b>1</b>	<b>0</b>
Normal disconnect	0	0	0	0	0	0	0	0
Abort disconnect - no additional information	0	0	0	0	0	0	0	1
Abort disconnect - timer expired or attempt count reached	1	0	1	0	0	0	0	1
Abort disconnect - procedure error - unrecognized message	1	1	0	0	0	0	1	1
Abort disconnect - procedure error - message not allowed	1	1	0	0	0	1	0	1
Abort disconnect - procedure error - data not allowed	1	1	0	0	0	1	1	1
Abort disconnect - procedure error - message out of sequence	1	1	0	0	1	0	1	1
Abort disconnect - higher level request - higher level failure	1	1	1	0	0	0	1	1
Abort disconnect - higher level request - higher level error	1	1	1	0	0	1	0	1

If the DPP does not respond to a HOC session request within three minutes, the HOC terminates the session attempt. Refer to Table 10-10 for a description of session timers. Refer to Table 10-11 for a description of the session attempt counters.

**Note:** The HOC performs two retries; if communication cannot be established, a message may be printed to the terminal at the HOC, and the DPP is removed from the port polling queue. The DPP is polled again at the next scheduled time or whenever a manual request is initiated at the HOC terminal. This procedure is followed for demand polls as well as scheduled polls.

### **Invalid/incorrect session layer message**

After secure communications are established for a session, the HOC, or the DPP may receive an invalid or incorrect session layer message. The receiving system sends a Session Disconnect message with an accompanying reason for the disconnect.

**Note:** The HOC outputs a terminal message and the DPP can be removed from the port polling queue.

**Link timer time-out**

To avoid long periods of inactivity on the DPP-to-HOC link once a call is established, the DPP has a 1-minute timer, and the HOC has a 55-second timer at the session at the session layer, for receipt of messages. If either timer expires, the system with the expired timer sends a Session Disconnect request and the reason for the disconnect (timer expired) to the other system. The HOC may send a message to the terminal and place that DPP at the bottom of the port polling queue.

*Note:* No timer of this type is necessary at the application layer.

<b>Table 10-10 Session timer</b>				
<b>Timer source</b>	<b>Time-limit value (sec.)</b>	<b>Started when</b>	<b>Normally terminated when</b>	<b>Action when timer expires</b>
ST2 HOC	180	Calling HOC issues a Session Connect message	Calling HOC receives a: a. Session Accept message b. Session Reject message	Terminate
ST3 DPP	30 (note 1)	DPP sends application data	DPP receives an acknowledgment for application data	Re-transmit until A1, then recover (note 3) or terminate
ST4 HOC	120	HOC issues a Resynchronization message (note 2)	HOC receives the appropriate message	Re-transmit until A2, then recover (note 3) or terminate
ST5 HOC	300	Called DPP is notified that the virtual call has been cleared	Called DPP receives a Session Reconnect message	Terminate
ST6 HOC	300	Called HOC issues a Session Reconnect message	Calling HOC receives a: a. Session Accept message b. Session Reject message	Re-transmit until A3, then terminate
<p><b>Note 1:</b> The value of this timer is dependent on the message length and parameter settings of the next lower level such as packet size, window size, and the value of the data packet re-transmission timer.</p> <p><b>Note 2:</b> This action occurs if the session re-synchronization option is in effect. (The re-synchronization option is not used in this application.)</p> <p><b>Note 3:</b> This action occurs if the session recovery option is in effect.</p>				

**Table 10-11****Session attempt counters**

Counter source	Value	Started when	Normally terminated when	Action when counter is exhausted
A1 HOC	1	ST3 expires	HOC receives the appropriate acknowledgment	Recover (note 2) or terminate
A2 DPP	2	DPP issues a Session Re-synchronization message (note 1)	DPP receives the appropriate message	Recover (note 2) or terminate
A3 HOC	3	Calling HOC issues a Session Reconnect message (note 2)		Terminate
<p><b>Note 1:</b> The value of this timer is dependent on the message length and parameter settings of the next lower level such as packet size, window size, and the value of the data packet re-transmission timer.</p> <p><b>Note 2:</b> This action occurs if the session re-synchronization option is in effect. (The re-synchronization option is not used in this application.)</p>				

## Packet layer protocol

The primary data record type transferred between the DPP and the HOC are AMA call records, or billing data. The call records vary in length, depending on call type. Billing data call records are assembled by the DPP into blocks of 1531 bytes.

Every billing block contains a 14 byte header, stand-alone format call records, excluding sensor type, sensor I.D., recording office type, and recording office ID. Filler, FF(hex) is used to pad the billing data block if there are not enough call records to fill all 1531 bytes. The blocks are assembled into files with each file containing from one to one hundred blocks. Most billing files contain one hundred blocks. If the DPP does not have one hundred blocks of call record data remaining to be sent, the billing record file size is less than one hundred blocks. The first block in all primary billing files is preceded by a 20 byte header.

**Note:** Call records must not extend across block boundaries. If there are more call records than one block can hold, another block is created, beginning with a complete call record. No sharing of call records across boundaries is permissible.

Each file is transferred from the application layer to the session layer of the protocol. The session layer is responsible for ensuring that the files are assembled properly to form messages. A message may contain an entire file if the file is small, but a message never contains data from more than one

billing block or file. Maximum message size is 537 bytes. This is segmented as 512 bytes of data, 20 bytes for the file header (first block of a file only), and a 5 byte session header.

Messages are sent to the BX.25 packet layer, where they are formed into packets. All packets, excluding the 3 byte packet header, are a maximum of 537 bytes of user data. The packets are sent to the link layer of the protocol. The link layer adds a 1 byte flag, a 2 byte frame header to the front of the packet, a 2 byte Cyclic Redundancy Check (CRC), and a 1 byte flag to the end of the packet, creating a frame. The frames are then transmitted over the link.

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# List of terms

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## AMA

Automatic Message Accounting

An automatic recording system that documents all of the necessary billing data of subscriber-dialed long distance.

## AMAT

AMA Transmitter

## AMATPS

AMA Teleprocessing System

An AMA data management system in the DMS-100 designed for use with BELLCORE AMA data. AMATPS consists of the DMS-100 Device Independent Recording Package (DIRP), the DPP, and a remote data collection center. The DMS-100 DIRP manages the flow of AMA data from the DMS-100 to the DPP. The DPP functions as the AMA data formatter and collector, and as the AMA transmitter. The remote polling center acts as the AMA data polling system.

## BELLCORE

Bell Communications Research

A group responsible for coordinating Bell Operating Company projects and setting industry standards.

## BX.25

Bellcore X.25

A BELLCORE-defined version of the X.25 communications protocol.

## CP

Communication Processor

**CPU**

Central Processing Unit

**CRC**

Cyclic Redundancy Check

**DIRP**

Device Independent Recording Package

Software that automatically directs data from the various administrative and maintenance facilities to the appropriate recording devices.

**DMA**

Direct Memory Access

The use of special hardware for transferring data to and from memory to reduce the number of interrupts required for program data transfers.

**DPP**

Distributed Processing Peripheral

A peripheral device of the DMS-100 that functions as an AMA data collector and an AMA transmitter in the AMATPS of the DMS-100. The DPP collects AMA data from the DIRP, formats the data, stores the data on its own internal disk and transmits the data to a data collection center when polled by the collection center. The DPP performs the AMA Transmitter (AMAT) functions independently of the DMS-100, thereby off-loading the AMAT functions from the DMS-100 Central Control Complex (CC)

**DRAM**

Dynamic Random Access Memory

A Random Access Memory system that employs transistor capacitor storage cells. The logic state is stored in the capacitor and buffered by the transistor. The capacitive charge is only held for a short duration and must be refreshed at a periodic rate to maintain its programmed state.

**DSI**

Data Stream Interface

A circuit of the DPP that accepts AMA data from the DMS-100 Magnetic Tape Drive (MTD) Ports. The DSI emulates an MTD on DMS-100 MTD Ports, duplicating all of the communications signals normally exchanged between the DMS-100 and an MTD.

**EAT**

Emergency Administration Terminal

A maintenance terminal connected directly to the DPP that is used for performing various maintenance functions on the DPP. The EAT connects to the DPP Emergency Administrative Interface.

**EIA**

Electronic Industries Association

**EOT**

End of Tape

A signal sent from an MTD to its host indicating that no more data should be recorded on the currently loaded tape.

**FTP**

File Transfer Protocol

**HOC**

Host Office Collector

An AMA data collection center that polls COs in its region on a prescheduled basis and compiles the collected data onto a magnetic tape. The tape is used by the Revenue Account Office for computing customer billing.

**IOC**

Input/Output Controller

An equipment shelf that provides an interface between up to 36 Input/Output Devices and the Central Message Controller. The IOC contains a peripheral processor that independently performs local tasks, thus relieving the load on the CPU.

**IOD**

Input/Output Device

**MAP**

Maintenance and Administrative Position

A group of components that provide a human-machine interface between OTC personnel and the DMS-100 Family. A MAP consists of Visual Display Unit, voice communications module, testing facilities and MAP furniture.

**MMI**

Man-Machine Interface

**MP**

Main Processor

**MTC**

Magnetic Tape Controller

**MTD**

Magnetic Tape Drive

**PCA**

Printed Circuit Assembly

**PEC**

Product Equipment Code

**PM**

Peripheral Module

**PVC**

Permanent Virtual Circuit

**RAO**

Regional Accounting Office

**SIO**

Serial Input/Output

Circuitry in the DPP that passes data from the DPP to external devices. The DPP employs four such circuits in its Quad SIO PCA that provides communications paths between the DPP and DMS-100/DPP maintenance interface, the DPP Emergency Administrative Terminal (EAT), and the remote polling center link.



DMS-100 Family  
**Distributed Processing  
Peripheral**  
Administration Guide

Information Services  
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PO Box 13010  
Research Triangle Park, North Carolina 27709

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