

UCD - XL

INSTALLATION GUIDE

NEC America, Inc.

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Chapter 1 Introduction

General Description of UCD-XL

UCD-XL is an Open Applications Interface (OAI) application that expands the capabilities of Uniform Call Distribution (UCD) in the NEAX2400 PBX. Although the PBX is limited to 60 extensions in a UCD group, this application can route a call to any extension in a group of any size (subject to a practical limit of 150 voice mail ports). Multiple UCD groups are supported. The application also monitors the calls and maintains cumulative statistics which can be reported.

UCD-XL has the ability to distribute calls to groups based upon the automatic number identification (ANI) of the call. Separate statistics are maintained for ANI patterns.

UCD-XL, which resides on the User Application Processor (UAP), may communicate with a voice mail system (VMS) via the standard Message Center Interface (MCI) link, as shown in Figure 1-1. When an incoming call is connected to a voice port, a message is sent to the VMS, identifying the originator and the port. The VMS, in turn, sends a message to the UAP controlling a message waiting lamp (MWL). UCD-XL passes this MCI message unaltered to the PBX.



Figure 1-1 UCD-XL Environment with a VMS

UCD-XL is able to receive calls across a CCIS network of PBXs. However, all extensions comprising the managed groups must reside on the PBX connected to the User Application Processor. Office codes are supported, and may be omitted or truncated in MCI messages.

If UCD-XL detects a failure of the OAI link with the PBX, the application will switch to passive mode. In this passive mode, UCD-XL passes MCI messages between the PBX and the VMS. Once the OAI link is reestablished, UCD-XL will restore full functionality.

Installation Overview

This guide describes the procedures to follow and specific information to use during the installation and configuration of UCD-XL.

Components	There are a minimum of four component applications to UCD-XL.			
	• Monitor	Provides call processing functions; specifically, Monitor intercepts calls and routes them to a port of an appropriate UCD group.		
	• Mediator	Receives and transmits MCI messages between the PBX and the VMS.		
	• Messenger	Connects calls to ports, and checks port status. UCD-XL may have more than one Messenger.		
	• Administrator	Generates statistics of UCD call activity, and provides the capability to dynamically trace UCD call activity.		
	During installation, component is requir groups. After instal described on page 3	components are configured sequentially. The Mediator red only if a Voice Mail System will be used for one of the UCD lation, each can be configured separately using the APM, as 31.		
Installation Steps	Briefly, the installation and set up of UCD-XL involves the following sequence of steps. These steps are described in detail in the chapters of this guide.			
	• Software Installation - First load the UCD-XL software from the release media. Log in to the APM Platform Management Menu, select the Installation of Applications/Packages option, and follow the instructions provided in the APM Installation Manual to complete this part of the installation. Refer to page 11 for more information.			
	• Application Configuration - UCD-XL is internally supported by the APM, and must be configured in the APM environment. UCD-XL is comprised of (at least) four internal components, of which three must be configured. Either respond to the prompts during installation, or use the instructions provided in the APM Operations Manual to make the entries contained in this section. Refer to page 31 for more information.			
	• Database Requision constructed through begins with the databases. Use the make the entries information.	irements - UCD-XL requires two databases which are ough the APM Database Administration option. This process creation of master definition files and their related master he instructions provided in the APM Operations Manual to a contained in this section. Refer to page 41 for more		
	• MAT Assignments - There are data settings which must be assigned at the NEAX Maintenance Administration Terminal (MAT) before UCD-XL will function. Use the instructions provided in the NEAX2400 IMS System Manuals to make the entries contained in this section. Refer to page 47 for more information.			

	• Initialization/Termination - All UCD-XL components must be initialized and terminated through the APM Operations Menu. These actions and their sequencing among the components are discussed on page 49. Use the instructions provided in the APM Operations Manual. Refer to page 49 for more information.
	• Backups - It is recommended that a backup of the "oai" filesystem be made on diskettes (device name "/dev/rfd0") or cartridge tape ("/dev/rct0") immediately after completing the installation and configuration of UCD-XL and its databases. Refer to the SCO UNIX System Administrators Guide for instructions.
Additional Documentation	In addition to this guide, use instructions in the following manuals to aid with this installation:
	• Applications Manager (APM) Installation Manual - Contains step-by-step instructions for installing the software from the release media.
	• NEAX2400 System Manuals - Give very detailed explanations about the assignments that need to be made through the Maintenance Administration Terminal (MAT) commands on the NEAX2400.
	• Applications Manager (APM) Operations Manual - Explains how applications like UCD-XL are configured in the APM environment, and how its

Manual Organization

This guide contains the following chapters:

Chapter 1:	Introduction	A brief explanation of
		UCD-XL.
Chapter 2:	Installation	How to install UCD-XL.
Chapter 3:	Configuration	How to configure UCD-XL.
Chapter 4:	Database Requirements	A description of database re-
		quirements.
Chapter 5:	MAT Assignments	How to make data settings for
		the MAT.
Chapter 6:	Initialization/Termination	How to initialize and terminate
		UCD-XL.
Appendix A:	Error Messages	UCD-XL error messages.
Appendix B:	Utilities	UCD-XL Utilities.
Appendix C:	Environment/Hardware	A description of the physical
		environment and hardware
		needed to support UCD-XL.

databases are created, using the entries and values provided in this chapter.

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Chapter 2 Installation

This chapter provides instructions for installing the UCD-XL software. In addition to the information in this chapter, you can refer to the *Applications Manager* (*APM*) *Installation Manual* for more information on installing software from release media.

Installing UCD-XL

Begin the installation of UCD-XL by loading the UCD-XL software from the release media. Log in to the APM Platform Management Menu, select the Installation of Applications/Packages option, and follow the instructions provided in the APM Installation Manual to complete this part of the installation.

When the software has been loaded, the installation software displays the message

UCD-XL Installation Procedure for SCO UNIX

The installation software issues the following prompts, one at a time.¹

```
Do you want to configure UCD-XL Monitor at this time (y or n)?
Do you want to configure UCD-XL Mediator at this time (y or n)?
Do you want to configure one or more Messengers at this time (y or n)?
Do you want to configure UCD-XL Administrator at this time (y or n)?
```

If you type **n** and press **Enter** after any of the above prompts, the installation software issues the next prompt in the sequence.

If you type **y** and press **Enter** after any of the above prompts, the installation software immediately begins the configuration of that component, before issuing the next prompt in the above sequence. Once the configuration of a component begins, see the appropriate section:

- UCD-XL Monitor on page 12.
- UCD-XL Mediator on page 18.
- UCD-XL Messenger on page 23.
- UCD-XL Administrator on page 26.

After one or more components have been successfully configured, the installation software performs some set-up tasks that require you to enter the root password. That procedure is described in Miscellaneous Set Up on page 29.

If, at any time, you quit the installation of UCD-XL, the installation software displays the following message and prompt:

```
Installation aborted.
Press Enter key to return to the APM Platform menu.
```

^{1.} The default for all UCD-XL "yes or no" prompts is "no."

This usually means that the configuration data for the current component has been lost. After pressing the **Enter** key, you may repeat the installation procedure from the beginning (re-loading the UCD-XL software), or you may manually configure the components as described on page 31.

UCD-XL Monitor The primary function of the UCD-XL Monitor is to intercept calls and route them to an available port of an appropriate UCD group. The Monitor is a required component of UCD-XL.

To configure the UCD-XL Monitor, perform the following steps.

1. The installation software displays the message

The recommended name for the component is UCDXL_Monitor.

The installation software issues the prompt

Is this acceptable? (y or n)

2. If you want UCD-XL_Monitor to be the name of the Monitor component, type **y** and press **Enter**. Go to step 4.

If you want to assign a different name, type **n** and press **Enter**. The installation software issues the prompt

Enter the desired name for the Monitor -->

3. Type the new name for the UCD-XL Monitor and press **Enter**. Any embedded blanks in the name will be converted to underscores. The installation software displays the message

The Monitor component shall be named <*Monitor name*>

where *<Monitor name>* is the name assigned to the UCD-XL Monitor.

4. The installation software issues the command

Select the source and destination links from the following list:

[1]	source: OAI1TCP	dest:	PBX1TCP	(TCP/IP protocol)
[2]	source: OAI1X25	dest:	PBX1X25	(X.25 protocol)
[9]	other (specify)			
[q]	quit installation			

The installation software issues the prompt

Enter bracketed value -->

5. Type the number corresponding to your source and destination links, and press **Enter**. If you choose [1] or [2], the installation continues with step 8. If you choose [9], the installation software issues the prompt

Invalid option. Specify source link -->

6. Type in the source link and press **Enter**. The installation software issues the prompt

Specify destination link -->

7. Type in the destination link and press Enter.

The source and destination links are names that identify sets of OAI communication characteristics between the UAP (source) and the PBX (destination). These names are defined under the System Configuration Menu of APM System Administration. Refer to the APM Operations Manual for further information.

8. After entering the selection (or entering the names of the source and destination links), the installation software displays the following message:

```
Source will be \langle source \ link \ name \rangle. Destination will be \langle destination \ link \ name \rangle.
```

where *<source link name>* and *<destination link name>* are the names of the source and destination links, respectively. (The names are automatically converted to uppercase.)

9. The installation software issues the prompt

```
Will you distribute calls based upon ANI data, requiring use of the ANI Pattern Database? (y or n) % \left( \left( {{{\mathbf{x}}_{i}}} \right) \right)
```

Type **y** for yes or **n** for no, and press **Enter**.

If you answer yes, you must provide records for the ANI Pattern Database after the installation is complete. (See page 44.) The following message displays:

The ANI Pattern Database will be used.

If you answer no, the following message displays:

ANI-based distribution will not occur.

10. The installation software issues the prompt

```
Specify the default frequency of port inspections in minutes (default is 30). NOTE: This value may be overridden for individual groups in the Group Database.
```

- 11. Type the frequency of port inspections, and press **Enter**. If you do not want the Monitor to verify the statuses of the ports of a group, specify 0 here and in the appropriate record of the Group Identification Database.
- **Note:** *Keep in mind that if the Monitor mistakenly thinks a port is busy, it will not connect any calls to that port, even though the port is really free. An inspection will rectify such errors.*

The installation software displays the message

Inspections will occur every <inspection frequency> minutes.

where *<inspection frequency>* is the inspection frequency you entered, or 30 if you did not enter a value.

12. The installation software issues the command

```
Select the type of statistics from the following list:

[1] all statistics (major and minor)

[2] major statistics only

[3] none

[q] quit installation

The installation
```

The installation software issues the prompt

```
Enter bracketed value -->
```

13. Type the number corresponding to the statistics you want, and press Enter.

Major statistics cover call activity per group, and include incoming call count, abandoned call count, queued call count, and average and maximum durations of queued calls. Minor statistics apply to each port within a group, and include connected call count and average and maximum durations of connected calls. The installation software displays the following message:

<statistics type> will be provided.

where *<statistics type>* is the statistics type you selected.

14. If you selected option [3] above, the installation continues with step 16. Otherwise, the installation software displays the following prompt:

```
Select the statistics collection period from the following list:

[1] hourly

[2] daily

[q] quit installation

Enter bracketed value -->
```

15. Type the number corresponding to the statistics collection period you want, and press **Enter**.

The first option, "hourly", means that statistics are computed and recorded at the top of every hour. The second option, "daily", means statistics are computed and recorded at midnight of every day. The installation software displays the following message:

Statistics will be collected <statistics collection period>.

where *<statistics* collection period*>* is the statistics collection period you selected.

16. The installation software issues the following message and prompt:

```
The Monitor communicates with one of more Messengers by means of

'request bins' in shared memory. The quantity of request bins needed

is based upon call traffic volumes. Select from the following list:

[1] specify quantity

[2] 20 bins (1-2999 calls/hour)

[3] 30 bins (3000-4999 calls/hour)

[4] 40 bins (5000+ calls/hour)

[4] quit installation

Enter bracketed value -->
```

17. Type the number corresponding to the number of request bins you want, and press **Enter**. If you choose option [2], [3], or [4], go to step 19. If you choose [1], the installation software issues the prompt

Invalid option. How many request bins? -->

- 18. Type in the number of request bins you want and press Enter.
- 19. The installation software displays the following message:

<request bins> request bins will be allocated.

where < request bins> is the number of request bins you selected.

20. The installation software issues the prompt:

Are you using UCD-XL to distribute calls to a VMS? (y or n)

21. Type **y** or **n** to indicate whether or not you will use UCD-XL for voice mail access, and press **Enter**.

If you respond with an **n**, the installation software displays the following message:

The Mediator component will not be configured.

and installation of the UCD-XL Monitor continues with step 25. If you respond with a **y**, the installation software displays the following message:

UCD-XL Mediator is necessary to manage the MCI link. The recommended name for the component is ${\tt UCDXL_Mediator}.$

The installation software issues the prompt

Is this acceptable? (y or n)

22. If you want UCD-XL Mediator to be the name for the Mediator component, type **y** and press **Enter**. The installation continues with the message displayed in step 23. If you want to assign a different name, type **n** and press **Enter**. The installation software displays the following message:

Enter the desired name for the Mediator.

23. Type in the new name for the Mediator and press **Enter**. The installation software displays the following message:

The Mediator component shall be named <*Mediator name*>.

where <Mediator name> is the name assigned to the UCD-XL Mediator.

- **Note:** After the Monitor has been configured, the configuration of the Mediator begins immediately with step 3 on page 18.
- 24. The installation software issues the prompt

```
What is the source of the mailbox number that will be placed
in the MCI message for a direct call to the VMS?
[1] actual line of the call
[2] my line (physical extension)
[q] quit installation
Enter bracketed value -->
```

Type the desired number and press **Enter**. Option #1 applies in most cases. Option #2 applies when a caller wants to retrieve his voice mail from a virtual line on his phone. (This option does not apply to calls originating from a remote PBX across CCIS.)

Depending upon your answer, the installation software displays one of the following messages:

Actual line will be the source for the mailbox number.

or

```
My line will be the source for the mailbox number.
```

25. The installation software issues the prompt

Is this configuration of the Monitor acceptable? (y or n)

If you are satisfied with this configuration, type **y** and press **Enter**. This ends the installation of UCD-XL Monitor.

If you made a mistake during this configuration, type **n** and press **Enter**; installation of the UCD-XL Monitor starts over at step 1 on page 12.

26. The installation software displays the following messages (if installing for the first time):

/oai/utils/autocfg running...
/oai/utils/autocfg: <Monitor name> application configured.
/oai/utils/autocfg terminated normally.

UCD-XL Monitor configuration completed.

If you are upgrading UCD-XL, you will see the following messages:

/oai/utils/autocfg running...

/oai/utils/autocfg: <Monitor name> is already configured.

/oai/utils/autocfg: Reconfigure (y/n)?

Answer \mathbf{y} to change the configuration, and \mathbf{n} to keep the original setting.

End of procedure.

UCD-XL Mediator The UCD-XL Mediator receives and transmits MCI messages between the PBX and the VMS. If you are not using a Voice Mail System, you do not need to configure the UCD-XL Mediator.

If you have just finished configuring the UCD-XL Monitor, go to step 3 below to configure the UCD-XL Mediator; otherwise, begin configuration of the UCD-XL Mediator with step 1.

1. The installation software displays the following message

```
The recommended name for the application is UCDXL_Mediator.
```

The installation software issues the prompt

```
Is this acceptable? (y or n)
```

If UCDXL_Mediator is the name you want to use for the Mediator component, type **y** and press **Enter**. Mediator installation continues with step 3. If you want to assign a different name, type **n** and press **Enter**. The installation software issues the prompt

Enter the desired name for the Mediator $\cdot - >$

2. Type the desired name for the Mediator and press **Enter**. Any embedded blanks in the name will be converted to underscores. The following message displays:

The Mediator component shall be named < Mediator name>

where <*Mediator name*> is the name assigned to the UCD-XL Mediator.

3. The installation software issues the command

Select the MCI message set to use from the following list:

```
[1] standard MCI (described in ETI-121 specification)
[2] expanded MCI (must set ASYD: sys 1, index 246, bit 3)
[q] quit installation
```

Note: Your VMS must support the desired message set.

The installation software issues the prompt

Enter bracketed value -->

4. Type the number corresponding to the MCI message set you want, and press **Enter**.

For either MCI option, you must also configure the PBX to enable the MCI. See MAT Assignments, on page 47.

The installation software displays the following message:

MCI message set will be <*MCI message set*>.

where *<MCI* message set > is the MCI message set you selected.

5. The installation software issues the prompt

Specify device name of the MCI port to the PBX ('q' to quit) -->

To quit the installation, type **q** and press **Enter**.

6. Type the UNIX device name of the MCI port to the PBX, and press **Enter**. If you have installed a Digiboard for serial communications, the device names range from "ttyi1a" to "ttyi1p".¹

If the specified device does not exist or corresponds to the virtual terminal you are using, the installation software displays an appropriate message and prompts you for the device name again. Type another UNIX device name of the MCI port to the PBX, and press **Enter**.

7. The installation software issues the command

Select the baud rate for the PBX's MCI port from the following list:

```
[1] 1200
[2] 2400
[3] 4800
[4] 9600
[5] 19200
[q] quit installation
```

The installation software issues the prompt

Enter bracketed value -->

8. Type the number corresponding to the baud rate you want, and press **Enter**. The baud rate must match the configuration on the PBX side. See MAT Assignments, on page 47.

^{1.} If you want to see a list of device names, log in at another virtual terminal and enter the UNIX command ls /dev/tty* | more

9. The installation software issues the command

Select the parity of the PBX's MCI port from following list: [0] none [1] odd [2] even [q] quit installation The installation

The installation software issues the prompt

```
Enter bracketed value -->
```

- 10. Type the number corresponding to the parity you want, and press **Enter**. The parity must match the configuration on the PBX side. See MAT Assignments, on page 47.
- 11. The installation software issues the command

```
Select the quantities of data and stop bits from following list:
   [1] 7 data, 1 stop
   [2] 7 data, 2 stop
   [3] 8 data, 1 stop
   [4] 8 data, 2 stop
   [q] quit installation
```

The installation software issues the prompt

Enter bracketed value -->

12. Type the number corresponding to the data and stop bits you want, and press **Enter**.

The quantities must match the configuration on the PBX side. See MAT Assignments, on page 47.

The installation software displays the following message

```
PBX's MCI port is /dev/<MCI PBX port device name>: <baud rate> baud, <parity> parity, <data bits> bits, <stop bits> stop.
```

where:

<*MCI PBX port device name*> is the device name you entered for the MCI port to the PBX;

<baud rate> is the baud rate you selected for the port;

<parity> is the parity you selected for the port;

<*data bits*> and *<stop bits*> are the number of data bits and stop bits you selected for the port.

13. The installation software issues the prompt

Specify device name of the MCI port to the VMS ('q' to quit) -->

To quit the installation, type **q** and press **Enter**.

- 14. Type the UNIX device name (must be different from the device name for the port to the PBX) of the MCI port to the VMS, and press Enter.If the specified device does not exist, is the same as the device name for the PBX port, or corresponds to the virtual terminal you are using, the installation software displays an appropriate message and prompts you for the device name. Type another UNIX device name for the MCI port to the VMS, and press Enter.
- 15. The installation software displays the following message

```
VMS's MCI port is /dev/<MCI VMS port device name>: <baud rate> baud, <parity> parity, <data bits> bits, <stop bits> stop.
```

where:

<*MCI VMS port device name*> is the device name you entered for the MCI port to the VMS;

s the baud rate you selected for the PBX port;

<parity> is the parity you selected for the PBX port;

<data bits> and <stop bits> are the number of data bits and stop bits you selected for the PBX port.

- **Note:** It is assumed that the communication characteristics for the VMS are the same as for the PBX. If this is not the case, you may modify Mediator's configuration through the APM. See page 38.
- 16. If you have not configured the Monitor during this session, the installation software issues the following prompt

Enter the application name of the Monitor as known to the APM (default is UCDXL_Monitor). -->

17. Type the name which was assigned to the Monitor and press **Enter**, or press **Enter** to accept the default of UCDXL_Monitor. The installation software issues the message

Monitor's name is <Monitor name>.

18. The installation software issues the prompt:

```
Do you want UCD-XL to omit office codes from MCI messages? (y or n)
```

- 19. If your PBX network uses office codes but you do not want them conveyed to the VMS, type **y** and press **Enter**. The installation of Mediator continues with step 20. If you do not use office codes or you want them included in MCI messages, type **n** and press **Enter**. The installation continues with step 22.
- 20. If you responded with y, the installation software issues the prompt:

Specify the length of an office code (maximum 4 digits). -->

- 21. Enter the number of digits (from 1 to 4) comprising an office code. UCD-XL will use this value to truncate or erase any office code that precedes an extension number identifying a calling, called, or intermediate party. If you specify 0 (the default), office codes will be included in MCI messages to the VMS.
- 22. The installation software displays one of the following messages, depending upon your responses:

Office codes of $\langle \textit{offcode length} \rangle$ digits will be omitted.

or:

Office codes, if given, will be put in MCI messages.

23. The installation software issues the prompt

Is this configuration of the Mediator acceptable? (y or n)

If you made a mistake during this configuration, type **n** and press **Enter**; installation of the UCD-XL Mediator starts over at step 1 or step 3, as appropriate.

If you are satisfied with this configuration, type **y** and press **Enter**.

24. The installation software displays the following messages:

/oai/utils/autocfg running...

/oai/utils/autocfg: <Mediator name> application configured.

/oai/utils/autocfg terminated normally.

UCD-XL Mediator configuration completed.

End of procedure.

UCD-XL Messenger	UCD-XL uses Messengers to check the statuses of the ports of its UCD groups, and to connect calls to the ports. At least one Messenger is required; a total of three Messengers may be needed as call traffic increases.				
	To configure the UCD-XL Messenger(s), perform the following steps.				
	1. The installation software issues the command				
	The quantity of Messengers is roughly based upon call traffic volumes. Select from following list:				
	 [1] 1 Messenger (1-3499 calls/hour) [2] 2 Messengers (3500–5999 calls/hour) [3] 3 Messengers (6000+ calls/hour) [q] quit installation The installation software issues the prompt 				
	Enter bracketed value>				
	2. Type the number corresponding to the number of Messengers you need (as determined by the estimated traffic), and press Enter . Then repeat steps 3 through 7 until all Messengers have been named.				
	3. For each Messenger you request, the installation software displays the follow- ing message				
	The recommended name for Messenger $\# \mathbf{n}$ is UCDXL_Messenger \mathbf{n}				
	where n is a value between 1 and the number of Messengers you requested (maximum of 3).				
	4. The installation software issues the prompt				
	Is this acceptable? (y or n)				
	 5. For each Messenger, if the recommended name is acceptable, type y and press Enter. Installation of the Messenger(s) continues with step 7. For each Messenger, if the recommended name is not acceptable, type n and press Enter. The installation software issues the prompt 				
	Enter the desired name for Messenger $\# \mathbf{n}$ >				
	where n is the number of a specific Messenger (maximum of 3).				
	6. Type the desired name for this Messenger, and press Enter . Any embedded blanks in the name will be converted to underscores.				

7. The installation software displays the following message for each Messenger

Messenger #**n** shall be named <*Messenger* #**n** name>

where n is the number of a specific Messenger (maximum of 3), and <*Messenger* #**n** *name*> is the name assigned to that Messenger.

8. If you have just configured the UCD-XL Monitor, the installation continues with step 15. Otherwise, the installation software issues the command

```
Select the source and destination links from the following list:
   [1] source: OAIITCP dest: PBX1TCP (TCP/IP protocol)
   [2] source: OAIIX25 dest: PBX1X25 (X.25 protocol)
   [9] other (specify)
   [q] quit installation
```

The installation software issues the prompt

Enter bracketed value -->

Type the number corresponding to your source and destination links, and press Enter. After any entry but [9], installation continues with step 12.
 If you choose [9], the installation software issues the prompt

```
Invalid option. Specify source link -->
```

10. Type in the source link and press **Enter**. The installation software issues the prompt

Specify destination link -->

- 11. Type in the destination link and press **Enter**.
- 12. After entering the selection (or entering the names of the source and destination links), the installation software displays the following message:

```
Source will be <source link name>. Destination will be <destination link name>.
```

where *<source link name>* and *<destination link name>* are the names of the source and destination links, respectively. (The names are automatically converted to uppercase letters.) For further information about these names, see the APM Operations Manual.

13. The installation software issues the prompt

```
Enter the name of the Monitor as known to the APM. (default is UCDXL_Monitor).-->
```

14. Type the name which was assigned to the Monitor and press Enter, or press Enter to accept the default of UCDXL_Monitor. The installation software issues the message

Monitor's name is <Monitor name>.

15. The installation software issues the prompt

Is this configuration of the Messenger(s) acceptable? (y or n)

If you need to change something in this configuration, type **n** and press **Enter**. Installation of the UCD-XL Messenger(s) starts over at step 1. If you are satisfied with this configuration, type **y** and press **Enter**.

16. The installation software displays the following message:

/oai/utils/autocfg running...

For each Messenger, the following message displays:

/oai/utils/autocfg: </br/>Messenger $\#\mathbf{n}$ name> application configured.

where < Messenger #n name > is the name assigned to that Messenger. The installation software displays the following messages

/oai/utils/autocfg terminated normally.

UCD-XL Messenger configuration(s) completed.

End of procedure.

UCD-XL Administrator	The UCD-XL Administrator generates statistics and traces call activity within UCD-XL. The UCD-XL Administrator is required only if statistics will be maintained.
	To configure the UCD-XL Administrator, perform the following steps.
	1. The installation software displays the message
	The recommended name for the component is UCDXL_Admin.
	The installation software issues the prompt
	Is this acceptable? (y or n)
	 If UCDXL_Admin is the name you want to use for the Administrator component, type y and press Enter. Installation continues with step 4. If you want to assign a different name, type n and press Enter. The installation software issues the prompt
	Enter the desired name for the Administrator>
	3. Type the desired name for the Administrator and press Enter . Any embedded blanks in the name will be converted to underscores.
	4. The installation software displays the message
	The Administrator application shall be named < <i>Administrator name</i> >.
	where < Administrator name> is the name assigned to the Administrator.
	5. The installation software issues the prompt
	Specify the device name of the terminal to be used by the
	UCD-XL Administrator (e.g. tty12). ('q' to quit)>
	To quit the installation, type q and press Enter .
	6. Type the UNIX device name of the Administrator's terminal, and press Enter . The names for virtual terminals range from "tty01" to "tty12". If you have installed a Digiboard for serial communications, device names range from "tty11a" to "tty11p". The current terminal is not a valid entry, and will not be accepted. ¹
	If the specified device does not exist or corresponds to the virtual terminal you are using, the installation software displays an appropriate message and prompts you for the device name. Type another UNIX device name for the Administrator's terminal, and press Enter .

^{1.} If you want to see a list of device names, log in at another virtual terminal and enter the UNIX command ls /dev/tty* | more

7. The installation software displays the message

The terminal device will be /dev/<terminal device name>.

where *<terminal device name>* is the device name assigned to the Administrator's terminal.

8. The installation software issues the command

Select the terminal type from following list: [1] ansi_a [2] vt100 [9] other (specify) [q] quit installation The installation software issues the prompt

Enter bracketed value -->

9. Type the number corresponding to the Administrator's terminal type, and press Enter. Use "ansi_a" for virtual terminals, "vt100" for dumb terminals. After any entry but [9], installation continues with step 12.
If you choose [9], the installation software issues the prompt

Invalid option. Specify terminal type -->

- 10. Type the Administrator's terminal type and press Enter.
- 11. The installation software displays the following message:

The terminal type will be <Administrator terminal type>.

where *Administrator* terminal type is the Administrator terminal type you selected.

12. The installation software issues the prompt

Enter the Administrator's password (default is "adm") -->

Press Enter to accept the default of adm.

13. Type the password for the UCD-XL Administrator, and press **Enter**. Embedded blanks in the password are converted to underscores. Do not specify more than 10 characters. The installation software issues the prompt

The password will be < Administrator's password>. Is this correct? (y or n)

where *<Administrator's password>* is the password selected for the UCD-XL Administrator.

14. If the password is correct, type **y** and press **Enter**.

If the password is not correct, type **n** and press **Enter**. Installation of the UCD-XL Administrator will repeat from step 12.

15. The installation software issues the prompt

Specify the number of lines per page in a report (default is 60). -->

16. Type the desired number of lines comprising a page in a statistics report. The minimum quantity is 10 lines. If no value is specified, 60 lines are used. If the value is valid, the installation software displays the message

A report will have <#> lines per page.

17. If the Monitor is configured, the installation continues with step 20. Otherwise, the installation software issues the prompt

Enter the name of the Monitor as known to the APM. (default is UCDXL_Monitor).-->

18. Type the name which was assigned to the Monitor and press Enter, or press Enter to accept the default of UCDXL_Monitor. The installation software issues the message

Monitor's name is <Monitor name>.

19. The installation software issues the prompt

```
Will you distribute calls based upon ANI data, requiring use of the ANI Pattern Database? (y or n)
```

Type **y** for yes or **n** for no, and press **Enter**. If you answer yes, you must provide records for the ANI Pattern Database after the installation is complete. (See page 44.) Depending on your answer, the installation software displays one of the following messages:

The ANI Pattern Database will be used.

or

ANI-based distribution will not occur.

20. The installation software issues the prompt

Is this configuration of the Administrator acceptable? (y or n)

- 21. If you made a mistake during this configuration, type **n** and press **Enter**; installation of the UCD-XL Administrator starts over at step 1.
- 22. If you are satisfied with this configuration, type **y** and press **Enter**.
- 23.UCD-XL displays the following messages:

/oai/utils/autocfg running...

/oai/utils/autocfg: <Administrator name> application configured.

/oai/utils/autocfg terminated normally.

UCD-XL Administrator configuration completed.

End of procedure.

Miscellaneous Set Up	1.	At this point, the configurations of one or more UCD-XL components have been saved, but the terminals and ports have not yet been set up to work with UCD-XL. The installation software issues the prompt
		You must be the UNIX System Administrator (root) to set up the Administrator terminal and/or MCI ports. If you know the root password and wish to continue, enter 'y'; otherwise, enter 'n'or 'q' to abort the installation:
	2.	To abort the installation of UCD-XL, type n or q and press Enter . If you wish to continue, type y and press Enter . The installation software issues the prompt
		Please Enter The su/root Password:
	3.	Type the root password and press Enter . Some informational messages will appear as each terminal and port device is disabled by UNIX.
	4.	Upon conclusion, the installation software displays the following message and prompt:
		Installation of UCD-XL is complete.
		Press Enter key to return to the APM Platform Menu:
	5.	Press Enter to go to the APM Platform Management Menu and the APM.
		End of procedure.
	No	te: If you have installed and configured the UCD-XL components successfully, you are now ready to build the databases that UCD-XL requires. Follow the instructions in Database Requirements on page 41.

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Chapter 3 Configuring UCD-XL

This chapter provides instructions for configuring UCD-XL. You can refer to the *Applications Manager (APM) Operations Manual* for more information about configuring the software.

Application Characteristics

UCD-XL is configured into the APM system using the Add function of the Application Configuration option on the APM System Administration menu.

- **Note:** This chapter describes an alternate method for configuring the components of UCD-XL when the installation procedure on page 11 is not performed.
- 1. Enter the APM option from the APM Platform Management menu.
- 2. Enter the System Administrator password at the APM password screen.
- 3. Enter the Application Configuration option from the System Administration menu.

This section contains the information that should be entered to the configuration file for UCD-XL. The Monitor, Messenger, and Administrator components must be configured; the Mediator component is optional.

- Monitor: Provides call processing functions; specifically, Monitor intercepts calls and routes them to a port of an appropriate UCD group.
- Mediator: Receives and transmits MCI messages between the PBX and the VMS. This is required only when UCD-XL will be used for voice mail access.
- Messenger: Connects calls to ports, and checks port status. UCD-XL may have more than one Messenger.
- Administrator: Generates statistics of UCD call activity, and provides the capability to dynamically trace UCD call activity.

For specific instructions on how to enter the following information, see the APM Operations Manual.

When adding UCD-XL to the APM Application Configuration file, characterize each of its components as follows:

Parameter	Monitor	Mediator	Each Messenger	Administrator
OAI Application	Y	Ν	Y	Ν
CRT Application	Ν	Ν	Ν	Ν
Communication Queue	Ν	Y	Ν	Y

Table 3-1 UCD-XL Component Characteristics

Parameter definitions:

•	OAI Application	Indicates whether or not (Yes or No) this com- ponent communicates with the NEAX2400 using OAI processes.
•	CRT Application	Indicates whether or not (Yes or No) this com- ponent runs on the same screen as the APM, rendering the APM temporarily inaccessible.
•	Communication Queue	Indicates whether or not (Yes or No) this non- OAI component needs an IPC queue to com- municate with other processes.

Primary Configuration Parameters

On the APM's Application Configuration Entry screen, make the entries shown below to the parameters indicated for each component.

The component names shown below are examples only. Queue key values may be changed if they conflict with another application.

Parameter	Monitor	Mediator	Each Messenger	Administrator
Application Name	UCDXL_Monitor	UCDXL_Mediator	UCDXL_Messenger \mathbf{n} ($\mathbf{n} = 1, 2, 3$)	UCDXL_Admin
Executable Filename	/oai/app/ucdxl/ucdmon	/oai/app/ucdxl/ucdmci	/oai/app/ucdxl/ucdmsgr	/oai/app/ucdxl/ucdadm
Group	UCDXL	UCDXL		UCDXL
Response Mode	N(otify)	N(otify)	I(gnore)	N(otify)
Initialization Batch	N(o) or Y(es)	N(o) or Y(es)	N(o) or Y(es)	N(o) or Y(es)
Termination Mode	T(ermination Signal)	M(essage)	T(ermination Signal)	M(essage)
Standard Output	/dev/null	/dev/null	/dev/null	/dev/null
Number Of Restarts	*	*	*	0
Queue Key	(Not applicable)	385	(Not applicable)	380

 Table 3-2
 Primary Configuration Parameters

Parameter definitions:

Application Name	Specifies the name to be displayed in the APM
	menus and identifies the component. This name is
	displayed as entered. Lower case letters and punc-
	tuation are acceptable; spaces are not permitted.

Names the group to which the component is asso-

• Executable Filename Specifies the path name of the program.

minate.

Group

٠

ciated.Response ModeIndicates the action that the APM is to take with
the component should a member of the group ter-

•	Initialization Batch	Indicates whether or not (Yes or No) the compo- nent is to be initialized automatically when the OAI system is initialized.
•	Termination Mode	Indicates how the APM is to notify the compo- nent to terminate.
•	Standard Output	Designates the file into which component output is redirected.
•	Number of Restarts	Indicates how many times the APM may restart the component after it terminates erroneously.
•	Queue Key	Indicates the unique number of the queue that is to be assigned to the component.

Facilities

According to instructions in the APM Operations Manual, designate the following NEAX2400 facilities for UCD-XL Monitor and all UCD-XL Messengers, using the Facilities command on the APM Configuration Entry screen.

Table 3	3-3 Fa	acilities
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Monitor	Messenger(s)
SMFN - Status Notification Facility	SCF - Switch Control Facility
SMFR - Status Request Facility	SMFR - Status Request Facility

OAI Configuration

Using the OAI-Conf command on the Application Configuration Entry screen, select the entry shown for each of the following parameters required by the Monitor component. Use the instructions provided for this option in the APM Operations Manual.

Note: *Italicized entries may be changed.*

Parameter	Entry	Description
Database Name #1	/oai/db/cur/ucdgrps	Filename of the UCD-XL Group Identification Database.
Database Name #2	/oai/db/cur/ucdports	Filename of the UCD-XL Port Assignment Database.
Timeout Value #1	30	Default frequency of port inspection, in minutes. This may be overridden by the value given for a group in the Group Identification Database (see page 42). If the group's value is 0 and the default value is 0, inspections of that group will not occur.
Timeout Value #2	0	Unused by Monitor.
Tenant Number	0	Specifies the number of the tenant that UCD-XL Monitor serves. (0 means all ports and tenants)
Source Link Name	OAIITCP	Identifies the port on the source side of the communication link; entry should correspond to a link name in the APM system configuration file.
Destination Link Name	PBX1TCP	Identifies the port on the destination side of the communication link; entry should correspond to a link name in the APM system configuration file.
Association Recovery	15	Interval, in seconds, UCD-XL Monitor waits before attempting to re-establish an OAI association.
Using the OAI-Conf command on the Application Configuration Entry screen, make the entry shown for each of the following parameters required by *each* Messenger component; each Messenger has the same values for its parameters. Use the instructions provided for this option in the APM Operations Manual.

Note: *Italicized entries may be changed.*

Parameter	Entry	Description
Database Name #1		Unused by Messenger.
Database Name #2		Unused by Messenger.
Timeout Value #1	0	Unused by Messenger.
Timeout Value #2	0	Unused by Messenger.
Tenant Number	0	Specifies the number of the tenant that UCD-XL Messenger serves. (0 means all ports and tenants)
Source Link Name	OAIITCP	Identifies the port on the source side of the communication link; entry should correspond to a link name in the APM system configuration file.
Destination Link Name	PBX1TCP	Identifies the port on the destination side of the communication link; entry should correspond to a link name in the APM system configuration file.
Association Recovery	0	Unused by Messenger.

Table 3-5	Messenger	Parameters
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User-Defined Parameters

Make the entries shown for each of the following user-defined parameters (UDPs) by using the UserDefined command on the APM's Configuration Entry screen (for the Mediator and Administrator components), or on the OAI Configuration screen (for the Monitor and Messenger components).

Note: *Italicized entries may be changed. The format X(xxxx) indicates that only the first letter is significant.*

Monitor Userdefined Parameters

Make the following entries on the OAI Configuration screen. Italicized entries can be changed.

User Defined	Entry	Definition		
#1	/oai/db/cur/ucdani	Pathname of the ANI Pattern Database. This is required only if you desire the distribution of calls based upon their ANI data. Otherwise, leave this parameter blank.		
#2	(blank)	This paramet	er is no longer being used.	
		Type of statistics collected. Select one of the followin entries:		
		A(ll stats):	All call activity, per group and per port.	
#3	A(ll stats)	M(ajor):	Call activity per group, including incoming call count, abandoned call count, queued call count, and average and maximum durations of queued calls.	
		N(one):	Do not collect statistics.	
			Statistics collection frequency. Select one of the following entries:	
#4	H(ourb)	H(ourly):	Statistics are collected at the top of the hour, each hour.	
	#4 <i>H(Ourly)</i>	D(aily): If no statistic irrelevant.	Statistics are collected at midnight, each day. s will be collected, this parameter is	
#5	/oai/app/data/ucdxl	Directory of the statistics file, trace file, and report file.		
#6	/oai/app/ucdxl/ucdrptr	Filename of the Reporter process, which stores the statistics and trace data in the statistics directory.		
#7	20	Number of request bins. The Monitor communicates with one of more Messengers by means of "request bins" in shared memory. The quantity of request bins needed is based upon call traffic volumes. Must be greater than zero. Suggested values: 20 (1 - 2999 calls/hour) 30 (3000 - 4999 calls/hour) 40 (5000+ calls/hour)		
#8	125	Shared memory key. Can be changed if it conflicts with another application.		
#9	165	Semaphore set key. Can be changed if it conflicts with another application.		

Table 3-6	Monitor	User-defined	Parameters
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User Defined	Entry	Definition	
#10	UCDXL_Mediator	Name assigned to the Mediator component. Must be as given in the Primary Configuration Parameters on page 32.	
		Source for the mailbox number in a MCI message for a direct call to voice mail. Select one of the following entries:	
	#11 <i>A(ctual)</i>	A(ctual): The actual line of the call.	
#11		P(hysical): The physical extension of the phone.	
		M(yLine): Same as Physical.	
		If there are no voice mail groups, this parameter is irrelevant.	

Table 3-6	Monitor	User-defined	Parameters
-----------	---------	---------------------	------------

Messenger User-	Make the following entries on the OAI Configuration screen. Italicized entries can
defined	be changed.
Parameters	

Table 3-7	Messenger	User-defined	Parameters
-----------	-----------	---------------------	------------

User Defined	Entry	Definition
#1	UCDXL_Monitor	Name assigned to the Monitor component. Must be the same as in the Primary Configuration Parameters on page 32.
#2	125	Shared memory key. Can be changed if it conflicts with another application, but must be the same as in the Monitor's configuration.
#3	165	Semaphore set key. Can be changed if it conflicts with another application, but must be the same as in the Monitor's configuration.

Mediator Userdefined Parameters

Make the following entries on the APM Configuration Entry screen. Italicized entries can be changed.

User Defined	Entry	Definition	
#1	UCDXL_Mediator	Name assigned to the Mediator component. Must be as listed in the Primary Configuration Parameters on page 32.	
		MCI message s entries:	set to use. Select one of the following
		S(tandard):	Standard MCI (described in ETI-121 specification).
#2	S(tandard)	X(panded):	Expanded MCI. See MAT Assignments, page 47, for establishing MCI in the PBX.
		Expanded MCI functionality as call party fields from 6 to 8 cha The VMS must	I message set provides the same s the standard MCI message set, but the s in each message have been expanded tracters to support CCIS. t support the desired set.
#3	ttyi1e 19200 none 8 2	MCI port to the PBX: device name, baud rate, parity, data bits, stop bits. There must be a blank between each field.	
		Device name:	The names for virtual terminals range from "tty01" to "tty12". If you have installed a Digiboard for serial communications, device names range from "ttyi1a" to "ttyi1p".
		Baud rate:	Must be one of these values: 1200, 2400, 4800, 9600, 19200.
		Parity:	Must be one of these values: none, odd, even.
		Data bits:	Number of data bits per packet. Must be either 7 or 8.
		Stop bits:	Number of stop bits per packet. Must be either 1 or 2.

Table 3-8 Mediator User-defined Parameters

User Defined	Entry	Definition	
		MCI port to the VMS: device name, baud rate, par data bits, stop bits.	
		Device name:	The names for virtual terminals range from "tty01" to "tty12". If you have installed a Digiboard for serial communications, device names range from "ttyi1a" to "ttyi1p".
#4	ttyi1f 19200 none 8 2	Baud rate:	Must be one of these values: 1200, 2400, 4800, 9600, 19200.
		Parity:	Must be one of these values: none, odd, even.
		Data bits:	Number of data bits per packet. Must be either 7 or 8.
		Stop bits:	Number of stop bits per packet. Must be either 1 or 2.
#5	/oai/app/ucdxl/reader	Filename of the Reader process, which receives MCI messages from the PBX and VMS ports.	
#6	UCDXL_Monitor	Name assigned to Monitor component. Must be as given in the Primary Configuration Parameters on page 32.	
#7	4	Number of digits, 4 maximum, comprising an office code. Specify a value other than 0 only if your PBX network uses office codes and you do not want them in the MCI messages that UCD-XL will send to a VMS.	
#8	not used	N/A	
#9	not used	N/A	
#10	not used	N/A	
#11	not used	N/A	
#12	not used	N/A	
#13	not used	N/A	
#14	t (trace)	Establishes a trace of MCI messages being received from and transmitted to the VMS and PBX by the Mediator. MCI messages will be displayed in ASCII form, with spaces replaced by underscores, in the APM log and in the APM Status Window. This feature should only be used to validate MCI communication among the PBX, UCD-XL, and VMS. Be sure to turn off the trace, by terminating the Mediator and clearing UDP #14 (or setting it to "no trace"), before establishing the normal operation of UCD-XL.	

Table 3-8	Mediator	User-defined	Parameters
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Administrator User-defined Parameters

Make the following entries on the APM Configuration Entry screen. Italicized entries can be changed.

User Defined	<u>Entry</u>	Definition
#1	UCDXL_Admin	Name assigned to the Administrator component. Must be as given in the Primary Configuration Parameters on page 32.
#2	tty12	 Device name of Administrator's terminal. Cannot be the device name of the current terminal. The names for virtual terminals range from "tty01" to "tty12". If you have installed a Digiboard for serial communications, device names range from "ttyi1a" to "ttyi1p". Note: Communication characteristics for the Administrator's terminal are fixed at 9600 baud, no parity, 8 data bits, and 1 stop bit.
#3	ansi_a	Type of Administrator's terminal. Select one of the following entries:ansi_a:use this for virtual terminals.vt100:use this for dumb terminals.
#4	adm	Administrator's password, not more than 10 characters. Do not use blanks.
#5	UCDXL_Monitor	Name assigned to the Monitor component. Must be as listed in the Primary Configuration Parameters on page 32.
#6	/oai/app/data/ucdxl	Path to the statistics file, trace file, and report file.
#7	/oai/db/cur/ucdgrps	Filename of the UCD-XL Group Identification Database.
#8	lp	Print command. Can be a UNIX script. When printing, UCD-XL appends the appropriate filename to the end of the command. Ip -o nobanner suppresses the printing of a banner page before each report.
#9	60	Lines per page in a report. Minimum is 10; default is 60.
#10	/oai/db/cur/ucdani	Pathname of the ANI Pattern Database. This is required only if you desire the distribution of calls based upon their ANI data. Otherwise, leave this parameter blank.

Table 3-9 Administrator Us	ser-defined Parameters
----------------------------	------------------------

Chapter 4 Database Requirements

UCD-XL requires two databases that are constructed through the APM: the Group Identification Database, and the Port Assignment Database. A third database is optional--the ANI Pattern Database. Database creation involves the following 5-step process for each required database:

- 1. **Create Master Definition File** This step involves creating the master definition file that defines the fields in the master database file.
- **Note:** If you have installed UCD-XL as described on page 11, this step has been done for you.
- 2. **Build Master Database File** This step involves entering data into the master database fields that were just defined in the master definition files in Step 1. This creates the records of the master database file.
- 3. **Create Application Definition File** In this step, a definition file is created for each of the UCD-XL databases. This file defines the formats by which data from the corresponding master file are to be converted to meet the needs of UCD-XL.
- **Note:** If you have installed UCD-XL as described on page 11, this step has been done for you.
- 4. **Process Application Database** In this step, the records of the Application Database file are created. Data is drawn from the master database and converted to the formats specified in the corresponding application definition file.
- Install Application Database In this step, the UCD-XL components (if running) are notified so that they can read the appropriate application database.
 Normally, the Master Definition file and the Application Definition file are provided when the UCD-XL software is installed. In this case, only steps 2, 4, and 5 above are necessary.

Instructions

The information required for all of the UCD-XL databases is provided in table form on the following pages. Using this information plus the procedural instructions provided in the APM Operations Manual, enter the Database Administration option on the APM System Administration Menu. Then build the UCD-XL databases, one at a time. Any messages displayed during these steps are addressed in the Process and Error Messages chapter of the APM Operations Manual.

Remember to complete step 4 - Process Application Database, and step 5 - Install Application Database, for each database after the following information is entered.

Group	The Group Identification Database identifies the groups that the application will
Identification	manage. The name of the Group Identification master definition file must be
Database	<i>ucdgrps_m</i> , and the name of the application definition file must be <i>ucdgrps</i> .

Note: The order of the fields in the application definition file differs from that in the master definition file. The "pos" column in the following table indicates the correct positions of the fields in the application definition file.

Field		Master Def	inition File	Application Definition File		Master Database	
tion	Туре	Size	Min. Value	Max. Value	Pos	Data Type	Typical Entry
Group ID	Ν	3	1	999	1	short int	1
Group Name	А	24			3	ASCII	Executive
Pilot Number	Ν	5	0	99999	4	long int	59432
Tenant Number	Ν	3	1	255	2	short int	1
Announce ment Message Number	Ν	3	0	58	5	short int	0
Voice Mail? (Y or N)	А	1	Ν		9	ASCII	Y
Check ANI? (Y or N)	А	1	Ν		10	ASCII	Ν
Call Distribution Method	А	10	Round Robin		8	ASCII	Round Robin
Port Inspection Period	Ν	2	0	60	7	int	15
Announce ment Period	Ν	2	0	60	6	short int	20

Table 4-1 Group Identification Database

Field Definitions:

- **Group ID** A number that identifies the UCD group. The Group ID must be unique. Records are ordered by group ID.
- **Group Name** An alphanumeric string that identifies the UCD group in reports.
- **Pilot Number** The monitored number which a caller must dial in order to access one of the ports in the group, or to be routed based upon ANI data (if the "Check ANI" flag is set). It must be assigned in the PBX using the AMNO command (see page 47). A non-zero pilot number must be unique among all groups.
- **Note:** This value may be 0 if the group is only used as the destination of ANI-distributed calls as specified in the ANI Pattern Database.
 - **Tenant Number** A number that identifies the tenant to which all ports in the group belong.
 - Announcement Message Number A number that identifies the announcement a caller will hear if all ports are busy. This applies only when an announcement package is used to handle call overflow. More than one group may be assigned the same announcement message number. If this value is 0, then calls to the applicable group will <u>not</u> be connected to an announcement message upon overflow. (The caller hears ringback tone while queued.) This announcement message number must be assigned in the PBX using the AADT command (see page 47).
 - Voice Mail? (Y or N) Is the group intended for use with a voice mail system? Answer "Y" for yes or "N" for no. (Default is "N".) If the answer is "Y", then the Mediator component is required.
 - Check ANI? (Y or N) Shall calls to the pilot number of this group be distributed to the proper group (not necessarily this one) based upon their ANI data? Answer "Y" for yes or "N" for no. (Default is "N".) If the answer is "Y", then the ANI Pattern Database is required and it is not necessary for this group to have any ports assigned to it.
 - **Call Distribution Method** The method by which a call will be distributed to a port within the group. Select one of the following entries (only the first letter is necessary):

RoundRobin - Calls are connected to the next idle port in a group that follows the previous port used.

TopDown - Calls are connected to the lowest-numbered idle port in a group.

For example, if a call comes into the PBX in which ports 1 and 4 are idle, ports 2 and 3 are busy, and the last call was connected to port 3, round-robin distribution would connect the incoming call to port 4; top-down distribution would connect the incoming call to port 1.

Field Definitions (Continued):

- **Port Inspection Period** Frequency of inspection of the group's ports, in minutes. If this value is 0, the default frequency configured for the Monitor component is used. If that value is 0 also, no inspection is performed.
 - Announcement Period The number of seconds to wait between attempts at connecting a queued call to an announcement message. If this value is 0, only one attempt is made. This value is irrelevant if the announcement message number (above) is 0.

Port AssignmentThe ports of each group are identified in the Port Assignment Database. The name
of the Port Assignment master definition file must be *ucdports_m*, and the name of
the application definition file must be *ucdports*.

Field Description	Master Definition File				Application Definition File	Master Data- base
	Туре	Size	Min. Value	Max. Value	Data Type	Typical Entry
Port Exten- sion	N	5	100	99999	long int	3600
Group ID	N	3	1	999	short int	1

Table 4-2 Port Assignment Database

Field Definitions:

- **Port Extension** A unique numeric value assigned to exactly one group. The extension must be defined in the PBX. All extensions must belong to the same tenant. The records are ordered by extension.
- **Group ID** A number that identifies the UCD group. This group must be defined in the Group Identification Database.

Warning: A port extension should <u>not</u> be a UCD pilot number in the PBX. When UCD-XL connects a call to such an extension, the PBX will send its own MCI message, which may conflict with the one that UCD-XL generates, causing a VMS to respond to the call incorrectly.

ANI Pattern Database The destination of calls being distributed based upon their ANI data is determined by means of the ANI Pattern Database. This database is only required when UCD-XL has been configured to provide ANI-based distribution (see the description of Monitor's User-defined Parameters on page 36) and at least one group in the Group Identification Database requires a check of a call's ANI data (see page 43). The name of the ANI Pattern Database master definition file must be *ucdani_m*, and the name of the application definition file must be ucdani.

Field Description		Master Def	Application Definition File	Master Data- base		
	Туре	Size	Min. Value	Max. Value	Data Type	Typical Entry
ANI Pattern	А	16	default		ASCII	214*
Primary Group	Ν	3	1	999	short int	16
Overflow Group	Ν	3	0	999	short int	1

Table 4-3 ANI Pattern Database

Field Definitions:

ANI Pattern - A string of characters that represents a specific ANI number or a set of ANI numbers. A pattern may consist of a combination of digits and/or asterisks, or it may be a special word (see below). An asterisk is a "wild card" character, representing any digit or set of digits. For example, "214*" matches any call originating in the 214 area code; "*" matches any call with ANI. If an asterisk is in the middle of a pattern (e.g. 21455*0000), it matches a single digit only.

There are three special patterns, identified by a single word (upper or lower case):

DEFAULT - This represents any call that does not have ANI data or whose ANI does not match any other pattern in the database. There must be a record in the ANI Pattern Database that specifies the *DE*-*FAULT* pattern.

FOREIGN - This represents any call originating from outside the North American Numbering Plan; i.e. ANI greater than 10 digits.

INTERNAL - This represents any call originating within the PBX network; for example, an extension.

- **Note:** The format of an ANI number is assumed to be a 3-digit area code followed by a 3-digit exchange and a 4-digit extension, as defined by the North American Numbering Plan. The field is larger to accommodate international calls in the future.
 - **Primary Group** ID of the group to which a call will be usually directed if its ANI number matches the specified pattern. This value must correspond to a record in the Group Identification Database.
- **Note:** This group does not have to be the one whose pilot number was called, nor does it have to be one that has its "Check ANI" flag set.
 - **Overflow Group** ID of the group to which a call will be directed if its ANI number matches the specified pattern and there are no ports available in the primary group. A non-zero value must correspond to a record in the Group Identification Database. If this value is zero or the overflow group has no available ports, the call will be handled in a manner dictated by the

overflow method for the primary group (i.e. connected to an announcement message or simply queued).

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Chapter 5 MAT Assignments

This guide assumes that data settings which affect the operation of all OAI software on a system-wide basis have already been assigned on the NEAX Maintenance Administration Terminal (MAT). Such settings include, for instance, system index values and assignment of Interface I/O Port Data in the Interface Processor (IP).

For more information about these system data settings, and for instructions in making the following UCD-XL settings, consult the OAI System Manual for the NEAX2400 IMS.

AADT Command (Assignment of Announcement/Dictation Trunk):

This MAT command sets up the announcement message number, and is relevant only when a group is assigned an announcement message number (see page 36).

AMNO Command (Assignment of Monitored Numbers):

Whenever a call comes into a monitored number, UCD-XL is informed. Use this MAT command to assign the monitored numbers that represent the pilot numbers for the groups in the Group Identification Database (see page 42).

ARNP2 Command (Assignment of Reverse Numbering Plan 2):

To set an office code, set RT to 0 and set ACC to the desired office code, maximum of 4 digits. To delete an office code, set RT to 0 and respond \mathbf{Y} at the prompt.

ASHU Command (Assignment of Station Hunting - UCD):

This MAT command defines the UCD group to which a monitored number degrades. This should be a subset of a group defined in UCD-XL.

Note: The pilot number should <u>not</u> be a member of the Port Assignment Database.

ASYD Command (Assignment of System Data):

Assign SYS (1), INDEX 246, BIT 3 the value of 1 for MCI expansion service. This is relevant only if using Expanded MCI.

Assign SYS (1), INDEX 28, BIT 5 to provide MWL control, and SYS (1), IN-DEX 29, BITS 0 - 5 to specify the MCI port for either standard or expanded MCI service.

Assign SYS(1), INDEX 240, BIT 5 the value of 1 to provide across CCIS (and hence to UCD-XL) the physical extension (my line) of a call from a remote PBX. If this value is 0, the actual extension (such as a virtual line) of the call is provided.

This completes the necessary MAT assignments. Go to the next chapter for instructions on how to initialize UCD-XL.

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Chapter 6 Initialization and Termination

Initialization

UCD-XL must be initialized through the APM Operations Menu according to instructions provided in the APM Operations Manual. Although each of the configured components is initialized individually, the Monitor must be initialized prior to or in conjunction with any one or more Messengers. Although the Messenger(s) cannot function unless the Monitor is already running, the Administrator and Mediator function independently of the Monitor. When the Monitor is initialized, it will wait in STANDBY mode for at least one Messenger to start up before being capable of processing calls.

Initializing the Administrator brings up the logon screen on the Administrator's terminal.

The Mediator must be initialized to provide MCI communication with the VMS.

As an alternative, some or all of the UCD-XL components may be configured (by using the "initialization batch" field) to start automatically when the APM initializes the OAI system. See page 32.

Termination

Termination of any or all of the components of UCD-XL may be performed at any time according to instructions provided in the APM Operations Manual. If the Monitor is terminated, all Messenger components terminate automatically. If Mediator is terminated, MCI communication with the VMS ceases.

If the last Messenger is terminated, Monitor goes into STANDBY mode, and cannot process calls.

When Monitor is terminated, UCD-XL call processing ceases; Mediator and Administrator can still be running, but the Administrator is unable to provide a trace of call activity.

Pressing **Esc** at the logon prompt for UCD-XL Administrator will terminate the Administrator. This is the preferred method. However, if you need to terminate the component from the APM Operations Menu, please be sure that the Administration screen is not viewing a trace prior to termination.

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Appendix A Error Messages

Error Messages from UCD-XL Monitor

The following are the error messages from UCD-XL Monitor which you might encounter in the APM log and/or on the APM screen. Immediately following each error message is a brief explanation and a possible solution to the problem.

Note 1: *The error code <errno> originates from UNIX.*

Note 2: *"UDP" means User-defined Parameter.*

1. Invalid option: <input string>

The given input is not an acceptable option for one of UDP #3, #4 or #11. Refer to the Monitor Configuration section on page 36 for a list of valid options for each of these parameters.

2. Shared memory or semaphore key is not specified.

UDP #8 and UDP #9 each must contain a positive number. The recommended value for the shared memory key (UDP #8) is 125. The recommended value for the semaphore key (UDP #9) is 165. These values must be unique in the UNIX environment. (Use the UNIX command **ipcs** to get lists of shared memory and semaphore keys.)

3. Quantity of request bins is not specified.

UDP #7 must specify at least 1 request bin. The recommended quantity is roughly based upon the expected volume of call traffic: 20 bins for 1-2999 calls/hour, 30 bins for 3000-4999 calls/hour, 40 bins for 5000 or more calls/ hour.

4. Error getting info about <appl_name>

The Monitor was unable to acquire configuration information about the named application. Verify that <appl_name> exists in the list of applications displayed when the "Application Status Summary" option or "Application Communication Summary" option is selected under the APM's System Status Reports Menu. If so, verify that <appl_name> has a queue key or is an OAI application. Try running <appl_name> before initializing the Monitor.

5. Cannot acquire shared memory (errno = <errno>)

The Monitor was unable to obtain shared memory due to a UNIX system error (errno). Contact your NEC distributor or an NEC representative.

6. Cannot acquire semaphore (errno = <errno>)

The Monitor was unable to obtain a semaphore due to a UNIX system error (errno). Contact your NEC distributor or an NEC representative.

7. Cannot release semaphore (errno = <errno>)

The Monitor was unable to release a semaphore due to a UNIX system error (errno). Contact your NEC distributor or an NEC representative.

8. NOT USED

9. Cannot open Group Identification Database file. (errno = <errno>)

Verify that the Group Identification Database named *ucdgrps_m* exists by selecting the "Build Master Database" option under the APM's Database Administration Menu. If it does exist, use the "Process Application Database" and "Install Application Database" options in order to process and install the database. If not, create *ucdgrps_m* by following the instructions in the Database Requirements section on page 41.

10. No groups in database.

At least one group must be identified in the Group Identification Database. Follow the instructions in the Database Requirements section on page 41 to create one or more records in the database.

11. Cannot open Port Assignment Database file. (errno = <errno>)

Verify that the Port Assignment Database named *ucdports_m* exists by selecting the "Build Master Database" option under the APM's Database Administration Menu. If it does exist, use the "Process Application Database" and "Install Application Database" options in order to process and install the database. If not, create *ucdports_m* by following the instructions in the Database Requirements section on page 41.

12. No ports in database.

At least one port must be assigned in the Port Assignment Database. Follow the instructions in the Database Requirements section on page 41 to create one or more records in the database.

13. Unable to monitor tenant <tno> number <extn>

The PBX could not satisfy the Monitor's request to be informed of call activity involving the specified pilot number or port. Verify that the specified number is either an extension in the PBX or a monitored number defined through the AMNO command on the MAT. Once that has been done, terminate and restart the Monitor. If the error applies to a pilot number that has been defined as a monitored number, use the AMNO command to change its NMI index to be a different unique number, then restart the Monitor. If the problem persists, contact your NEC distributor or an NEC representative.

14. Unable to halt monitoring of tenant <tno> number <extn>

The PBX could not satisfy the Monitor's request to cease the monitoring of the specified pilot number or port. Usually, this error occurs during termination due to the prior occurrence of error #13 (unable to monitor) above, so it can be ignored.

15. No available memory.

The UNIX system was unable to allocate sufficient memory to satisfy the application's requirements. Additional RAM may be needed. Contact your NEC distributor or an NEC representative.

16. Cannot open a pipe to Reporter.

The UNIX system was unable to create a pipe between two processes. Terminate all APM applications and reinitialize the Monitor. If this error occurs again, terminate OAI and exit the APM. As user "apmadm", halt the APM system, then restart it. Log onto the APM and reinitialize OAI and the Monitor. If the problem persists, contact your NEC distributor or an NEC representative.

17. Cannot spawn Reporter process.

The UNIX system was unable to execute the Reporter process. Verify that UDP #6 gives the pathname of the Reporter as */oai/app/ucdxl/ucdrptr*. If so, contact your NEC distributor or an NEC representative.

18. Cannot write to pipe.

The Monitor was unable to send a message to the Reporter, perhaps because the Reporter terminated. Terminate and restart the Monitor. If the problem persists, contact your NEC distributor or an NEC representative.

19. WARNING! Some ports in unexpected states. New statuses noted.

This message appears only on the bottom of the APM screen during an inspection of all ports. It warns that the Monitor detected a difference between what it thought was a port's status and what was the actual status. The Monitor automatically updates its knowledge and proceeds. More detailed messages (see below) are kept in the APM log file.

20. Port actually busy: <extension>

This message appears only in the APM log file during an inspection of all ports. It indicates that the Monitor incorrectly thought that the specified port was free, when in fact it is busy. If this message frequently specifies the same port, it is possible that someone is dialing that extension directly (instead of calling a pilot number given in the Group Identification Database). Another possibility is that the VMS is not releasing the port properly.

21. Port actually free: <extension>

This message appears only in the APM log file during an inspection of all ports. It indicates that the Monitor incorrectly thought that the specified port was busy, when in fact it is free. Frequent occurrences of this message during every inspection may imply that the PBX is not properly notifying the Monitor of port releases. In that case, the UCD-XL Administrator should observe call activity by performing a trace and verify that a "release" event occurs for every call. If these events are missing in the trace file, contact your NEC distributor or an NEC representative.

22. Connection pending for port <extension>

Upon concluding an inspection of all ports, the Monitor determined that the specified port is in a state of flux. The Monitor had requested the connection of a call to that port but had not received a response from the PBX yet. Usually the port will become busy shortly after this message appears. If this message occurs for the same port during every inspection, examine a trace of call activity via UCD-XL Administrator. Are calls being connected to the extension and released from it? If not, try to place a call directly to the extension, then release the extension. If necessary, restart the Monitor component via the APM to establish an initial inspection.

23. Unable to set OAI timer for port inspection -- error <apmerr>

The Monitor could not set a timer to trigger the next occurrence of the inspection of ports due to an APM error (apmerr). Contact your NEC distributor or an NEC representative.

24. Unable to set OAI timer for statistics collection -- error <apmerr>

The Monitor could not set a timer to trigger the next occurrence of the collection of statistics due to an APM error (apmerr). Contact your NEC distributor or an NEC representative.

25. Cannot notify MCI Mediator about call -- error <apmerr> (errno <errno>)

The Monitor was unable to send a message to the Mediator. Verify that the Mediator is an active application under the APM. If not, initialize the Mediator or erase the Mediator's name from UDP #10 in Monitor's configuration. If the problem persists, contact your NEC distributor or an NEC representative.

Note: The first error code originates from the APM, the second from UNIX.

26. WARNING: Reporter died unexpectedly. Restarting.

Something abnormal happened that caused the Reporter process to terminate abruptly. The Monitor automatically tries 3 times to restart the Reporter.

27. WARNING: Reporter died unexpectedly. No more stats or trace.

Something abnormal happened that caused the Reporter process to terminate abruptly 3 times, despite attempts by Monitor to restart it. Without the Reporter process, statistics and a trace cannot be maintained. Terminate the Monitor and reinitialize it. If the Reporter continues to terminate, contact your NEC distributor or an NEC representative.

28. Group not defined for port <extension>

The specified port belongs to a group that is not defined in the Group Identification Database (*ucdgrps_m*). Via the APM's Database Administration Menu, verify that the port record in the Port Assignment Database (*ucdports_m*) contains a group ID that corresponds to a record in *ucdgrps_m*. If either database was modified recently, make certain that it has been processed and installed.

or

Group not defined for ANI pattern <pattern>

The specified ANI pattern is associated with a group (primary or overflow) that is not defined in the Group Identification Database (*ucdgrps_m*). Via the APM's Database Administration Menu, verify that the record in the ANI Pattern Database (*ucdani_m*) contains group IDs that correspond to records in *ucdgrps_m*. If either database was modified recently, make certain that it has been processed and installed.

29. WARNING: A UCD group requires MCI, but Mediator is not known.

Although a group in the Group Identification Database has been defined for use with a VMS, either the UCD-XL Mediator component has not been configured in the APM or Mediator has not been named as a user-defined parameter for UCD-XL Monitor. No MCI messages will be generated.

30. Unable to set OAI timer for announcement -- error <apmerr>

The Monitor could not set a timer to trigger the next attempt at connecting a queued call to an announcement message due to an APM error (apmerr). Contact your NEC distributor or an NEC representative.

31. Port is locked out: <extension>

This message appears only in the APM log file during an inspection of all ports. It indicates that the Monitor was informed by the PBX that the specified port has been locked out, a condition in which the port is off-hook but not occupied with a call nor in the process of making a call. If this message specifies the same port in consecutive inspections, the extension should be investigated.

32. Final destination of call is an unknown port: <extension>

The PBX routed a call to an extension that is not known to UCD-XL. This may occur if the Monitor tried to connect the call to a port that was also the pilot number of a UCD group in the PBX. Since the specified extension is a member of that UCD group, it should be added to the list of ports in UCD-XL's Port Assignment Database. (Alternatively, the pilot number may be removed from the PADB.)

33. Release pending for port <extension>

Upon concluding an inspection of all ports, the Monitor determined that the specified port is in a state of flux. The Monitor had received notice of abandonment by a caller, but had not received notice that the port had indeed released. Usually the port will become idle shortly after this message appears. If this message occurs for the same port during every inspection, examine a trace of call activity via UCD-XL Administrator. Is the port being released soon after a call is abandoned? If not, try to place a call directly to the extension, then release the extension. If necessary, restart the Monitor component via the APM to establish an initial inspection.

34. Did not inspect port <extension>

The specified port could not be monitored, therefore it is not being used or inspected by UCD-XL. Most likely, the extension does not exist in the PBX or is not defined as a station. You may prefer to delete (or replace) the extension from the Port Assignment Database, then process and install the database again.

35. Invalid distribution method (default is Round-robin) for group <group ID>

In the Group Identification Database record for the specified group, the distribution method field contains an invalid value. The first letter of the value (uppercase or lowercase) must be either "R" for round-robin or "T" for top-down distribution. The Monitor proceeds to use round-robin distribution for the group. Via the APM's Database Administration Menu, examine the record, modify it appropriately, then process and install the database again.

36. Cannot open ANI Database file. (errno=<errno>)

Verify that the ANI Pattern Database named *ucdani_m* exists by selecting the "Build Master Database" option under the APM's Database Administration Menu. If it does exist, use the "Process Application Database" and "Install Application Database" options in order to process and install the database. If not, create *ucdani_m* by following the instructions in the Database Requirements section on page 41. Also verify that UCD-XL Monitor's UDP #1 is correct via the APM's Application Configuration Menu (see page 36).

Note: *The error code <errno> originates from UNIX.*

37. No default ANI record provided.

There is no record in the ANI Pattern Database for the special pattern "DE-FAULT". Via the APM's Database Administration Menu, build that record in *ucdani_m*, then process and install the database again.

38. Duplicate pilot number for group <group ID>

Every group in the Group Identification Database must be assigned a unique pilot number, unless that value is 0. Via the APM's Database Administration Menu, modify the specified record in *ucdgrps_m* so that its pilot number is either unique or 0. (A non-zero pilot number also must be a monitored number defined in the PBX via MAT command AMNO.) Then process and install the database again.

39. WARNING! Some calls queued for more than 60 minutes.

This error message may appear during an inspection of a group's ports to indicate that some incoming calls have been waiting an excessively long time. Via UCD-XL Administrator, a trace of the group should be initiated in order to analyze the traffic for that group. Also, the actual statuses of the ports in the PBX should be investigated.

40. Some groups are ANI-based, but ANIDB is not specified.

During the loading of the Group Identification Database, the Monitor determined that some groups would require the use of the ANI Pattern Database. However, the name of the ANI Database is not specified in the Monitor's configuration. Verify that Monitor **UDP #1** contains the correct pathname (see page 36), or alter the appropriate GIDB records so that the **Check ANI** field is set to **N** (see page 42).

Error Messages from UCD-XL Messenger

The following are the error messages from the UCD-XL Messenger which you might encounter in the APM log and/or on the APM screen. Immediately following each error message is a brief explanation and a possible solution to the problem.

Note: "UDP" is short for "User-defined Parameter".

1. Monitor is not specified.

UDP #1 in the Messenger's configuration must specify the name of the UCD-XL Monitor application known to the APM. See page 37 for more information.

2. Shared memory or semaphore key is not specified.

UDP #2 and UDP #3 each must contain a positive number. The recommended value for the shared memory key (UDP #2) is 125. The recommended value for the semaphore key (UDP #3) is 165. These values must correspond to the ones specified for the Monitor.

3. There is no info about <mon_name>

The Messenger was unable to acquire configuration information about the Monitor. Verify that <mon_name> exists in the list of applications displayed when the "Application Status Summary" option is selected under the APM's System Status Reports Menu. If so, verify that <mon_name> is defined as an OAI application (under "Application Configuration Summary").

4. Cannot acquire shared memory (errno = <errno>)

The Messenger was unable to obtain shared memory due to a UNIX system error (errno). Contact your NEC distributor or an NEC representative.

5. Cannot acquire semaphore (errno = <errno>)

The Messenger was unable to obtain a semaphore due to a UNIX system error (errno). Try to start the Monitor first. If that fails, contact your NEC distributor or an NEC representative.

6. Cannot release semaphore (errno = <errno>)

The Messenger was unable to release a semaphore due to a UNIX system error (errno). Try to start the Monitor first. If that fails, contact your NEC distributor or an NEC representative.

7. Unable to send message <msgno> -- apmsend error <apmerr> (errno = <errno>)

The Messenger was unable to send a message to the Monitor. Verify that the Monitor is an active application under the APM. Terminate the Messenger and restart. If necessary, also terminate the Monitor and restart both. If the problem persists, contact your NEC distributor or an NEC representative.

NOTE: *«msgno» identifies a UCD-XL specific message; «apmerr» is an error code that originates from the APM; and «errno» originates from UNIX.*

8. Too many Messengers! Terminating.

During an attempt to start a Messenger, the absolute limit of 10 running Messenger applications was exceeded. This Messenger is terminated, but the others are not affected.

9. Unable to check tenant <tno> number <extn>

The Messenger was unable to check the status of the specified extension in the PBX. Possible reasons include: (1) the port is not defined in the PBX; (2) the PBX is slow or unable to respond via OAI.

10. Failed to connect to announcement message <ancmsg>

The Messenger was unable to connect a call to the announcement package associated with the specified announcement message number. Possible reasons include: (1) maximum of 8 callers are already connected (limitation of the PBX); (2) the announcement message is being played for other callers; (3) the caller has released. This error message does not identify the caller.

11. Failed to connect to extension <extn>

The Messenger was unable to connect a call to the specified extension in the PBX. Possible reasons include: (1) the port is not idle; (2) the caller has released. This error message does not identify the caller.

Error Messages from UCD-XL Mediator

The following are the error messages from the UCD-XL Mediator which you might encounter in the APM log and/or on the APM screen. Immediately following each error message is a brief explanation and a possible solution to the problem.

Note: *"UDP" means User-defined Parameter.*

1. Invalid option: <input string>

The given input is not an acceptable option for UDP #2 -- MCI message set. Refer to the Mediator User-defined Parameters section on *page 38* for a list of valid options for this parameter.

2. Incomplete characteristics for port <devname>

UDPs #3 and #4 must define 5 characteristics of the PBX and VMS ports -- device name, baud rate, parity, data bits, and stop bits -- each separated by a space. If any of these values are missing, this error message is displayed. Refer to the Mediator User-defined Parameters section on *page 38* for further information.

3. Device unknown or inaccessible: /dev/<devname>

The specified device name does not exist in the UNIX system or cannot be accessed by the Mediator. Check the list of UNIX devices under /dev and modify UDP #3 or #4 accordingly. Also, as superuser, check the ownership and permissions of the desired device file. It should either be owned by "apm" or have "rw" permission for the world (other).

4. Invalid baud rate: <baudrate>

The specified baud rate (bits per second) in UDP #3 or #4 is wrong. Acceptable values for baud rate are 1200, 2400, 4800, 9600, and 19200.

5. Invalid parity: <paritype>

The specified parity type in UDP #3 or #4 is wrong. Acceptable values for parity type are "none", "even", and "odd".

6. Invalid # of data/stop bits: <dbits>/<sbits>

The specified quantity of data bits or stop bits in UDP #3 or #4 is wrong. Acceptable values for data bits are 7 and 8. Acceptable values for stop bits are 1 and 2.

7. Error while opening device /dev/<devname>: <errno> (open) Error while opening device /dev/<devname>: <errno> (ioctl)

The Mediator could not open or set characteristics of the specified device due to a UNIX system error (errno) or device driver error. As superuser, check the ownership and permissions of the desired device file. It should either be owned by "apm" or have "rw" permission for the world (other). Terminate the Mediator and restart. If the problem persists, contact your NEC distributor or an NEC representative.

8. Unable to spawn Reader for PBX Unable to spawn Reader for VMS

The Mediator could not start a Reader program (child process) for reading MCI messages from the specified source (PBX or VMS). Verify that UDP #5 contains the correct filename of the Reader as described in the Mediator User-defined Parameters section on *page 38*. Terminate the Mediator and restart. If the problem persists, contact your NEC distributor or an NEC representative.

9. Detected death of Reader for PBX (errno <errno>) Detected death of Reader for PBX (signal <signum>) Detected death of Reader for VMS (errno <errno>) Detected death of Reader for VMS (signal <signum>) One of the two Reader processes terminated unexpectedly due to a UNIX system error (errno) or the receipt of a UNIX signal (signum). Terminate the Me-

tem error (errno) or the receipt of a UNIX signal (signum). Terminate the Mediator and restart. If the problem persists, contact your NEC distributor or an NEC representative.

10. Unable to send message <msgno> -- apmsend error <apmerr> (errno = <errno>)

The Mediator could not send a message to the Monitor. Verify that the Monitor is an active application under the APM and is specified in UDP #6. Terminate the Mediator and restart. If necessary, also terminate the Monitor and restart both. If the problem persists, contact your NEC distributor or an NEC representative.

Note: <*msgno> identifies a UCD-XL specific message; <apmerr> is an error code that originates from the APM; and <errno> originates from UNIX.*

11. Error while writing MCI port for PBX: <errno>

The Mediator could not send an MCI message to the PBX due to a UNIX system error (errno). As superuser, check the ownership and permissions of the device file for the MCI port for the PBX. It should either be owned by "apm" or have "rw" permission for the world (other). Terminate the Mediator and restart. If the problem persists, contact your NEC distributor or an NEC representative.

12. Error while writing MCI port for VMS: <errno>

The Mediator could not send an MCI message to the VMS due to a UNIX system error (errno). As superuser, check the ownership and permissions of the device file for the MCI port for the VMS. It should either be owned by "apm" or have "rw" permission for the world (other). Terminate the Mediator and restart. If the problem persists, contact your NEC distributor or an NEC representative. organizing

13. Invalid office code length. Maximum size is 4.

UDP #7, if not blank, must specify a value from 0 to 4 that represents the length of an office code assigned to the PBX.

Error Messages from UCD-XL Administrator

The following are the error messages from the UCD-XL Administrator which you might encounter in the APM log and/or on the APM screen. Immediately following each error message is a brief explanation and a possible solution to the problem.

Note 1: *<errno> is the UNIX error code.*

Note 2: "UDP" means User-defined Parameter.

1. Unable to access terminal <devname> (errno <errno>).

The specified device name does not exist in the UNIX system or cannot be accessed by the Administrator. Check the list of UNIX devices under /dev and modify UDP #2. Also, as superuser, check the ownership and permissions of the device file. It should either be owned by "apm" or have "rw" permission for the world (other).

2. Unable to receive a message - error <apmerr> (errno <errno>).

The Administrator could not receive a message due to an APM or UNIX system error. Contact your NEC distributor or an NEC representative.

3. No memory available.

The UNIX system was unable to allocate sufficient memory to satisfy the application's requirements. Additional RAM may be needed. Contact your NEC distributor or an NEC representative.

4. Cannot open Group Identification Database. (errno <errno>)

Verify that the Group Identification Database named *ucdgrps_m* exists by selecting the "Build Master Database" option under the APM's Database Administration Menu. If it does exist, use the "Process Application Database" and "Install Application Database" options in order to process and install the database. If not, create *ucdgrps_m* by following the instructions in the Database Requirements section on page 41. Also verify that UCD-XL Administrator's UDP #7 is correct via the APM's Application Configuration Menu (see page 40).

5. Cannot open ANI Pattern Database. (errno <errno>)

Verify that the ANI Pattern Database named *ucdani_m* exists by selecting the "Build Master Database" option under the APM's Database Administration Menu. If it does exist, use the "Process Application Database" and "Install Application Database" options in order to process and install the database. If not, create *ucdani_m* by following the instructions in the Database Requirements section on page 41. Also verify that UCD-XL Administrator's UDP #10 is correct via the APM's Application Configuration Menu (see page 40).

Informational Messages from UCD-XL

The following are the informational messages you might encounter when running UCD-XL. Immediately following each message is a brief explanation.

Note: *"UDP" means User-defined Parameter.*

<count> calls are currently queued.

This message from the Monitor may appear after an inspection of all ports in a group. It specifies the quantity of incoming calls waiting to be connected to a port as the inspection concludes.

Caller has abandoned. Freeing port <extn>.

This message from the Monitor is displayed to explain certain SCF errors that may occur during an attempt to connect a call to the specified port. (Also see Messenger error #11 on page A-6.) In this case, the caller has apparently abandoned before the connection could be completed. As a result, the specified port is considered free again.

Caught termination signal.

This message indicates that the Monitor did receive the signal to terminate from the APM.

Communicating with Mediator again.

This message from the Monitor indicates that Monitor has re-established communication with the Mediator, allowing it to again provide information about connected calls so that the Mediator can inform the VMS via MCI.

DANGER! All request bins utilized. Need more shared memory.

This message from the Monitor is a warning that the UCD-XL system is overloaded. More request bins are needed in order to satisfy the influx of UCD calls. Without available bins, the Monitor and Messengers cannot promptly connect calls to the ports or inspect those ports. If this message appears, it is strongly recommended that the number of request bins (UDP #7) be increased by 10 or more in Monitor's configuration. The application must be terminated first.

DANGER! Disk is full. Unable to save statistics for <group>.

The Reporter issues this message when there is no more space available in the /oai filesystem for the growth of the statistics file. The statistics from the concluding collection period for the specified group are not saved. You should erase obsolete statistics via UCD-XL Administrator immediately.

DANGER! Disk is nearly full. Will not save statistics for <group>.

The Reporter issues this message when there is 2% or less space available in the / oai filesystem for the growth of the statistics file. The statistics from the concluding collection period for the specified group are not saved. You should erase obsolete statistics via UCD-XL Administrator immediately.

Database update completed.

This message from the Monitor concludes an update (reloading) of one of UCD-XL's databases. Such an update occurs when the APM Administrator installs the database while the Monitor is running.

Group <group ID>(<group name>):<portcnt>ports.

Once the Group Identification Database and Port Assignment Database are loaded, this message from the Monitor displays to show the quantity of ports associated with each group.

Halting Messengers.

Prior to termination, the Monitor displays this message when it tells the APM to terminate all Messengers.

Initialization failed - terminating.

A significant error has occurred during initialization, preventing the Monitor from proceeding. The APM logfile contains a specific message about the error. See "Error Messages from UCD-XL Monitor" on page 51.

Keeping original ANI Database.

This message from the Monitor will appear if, during a reloading of the ANI Pattern Database, there is an error in the data of one of the records. The original set of database records is restored as the application abruptly concludes the update procedure.

Keeping original Group Database.

This message from the Monitor will appear if, during a reloading of the Group Identification Database, there is an error in the data of one of the records. The original set of database records is restored as the application abruptly concludes the update procedure.

Keeping original Port Database.

This message from the Monitor will appear if, during a reloading of the Port Assignment Database, there is an error in the data of one of the records. The original set of database records is restored as the application abruptly concludes the update procedure.

Loading ANI patterns ...

This message from the Monitor indicates that, during initialization, the Monitor is loading the ANI Pattern Database into memory. There may be a noticeable delay while this action occurs.

Loading groups and ports...

This message from the Monitor indicates that, during initialization, the Monitor is loading the Group Identification Database and Port Assignment Database into memory. There may be a noticeable delay while this action occurs.

Logged stats for <group>.

The Reporter issues this message after saving on disk the statistics from the concluding collection period for the specified group.

Lost OAI communication. Now PASSIVE.

This message from the Monitor indicates that the Monitor has entered the passive state because it cannot communicate with the PBX any more. In this state, no calls can be processed, but the Monitor repeatedly attempts to re-establish the OAI link in order to become active again. The application may be terminated if desired.

Port <extn1> busy. Connecting caller to <extn2>. Port <extn1> busy. Putting caller on a queue.

The Monitor issues one of these two messages if the Monitor has failed to connect a call to the specified port (extn1) because it was unexpectedly busy. The first message indicates that the call is being redirected to another available port (extn2). The second message indicates that no other ports are free so the call is being held in a queue (perhaps hearing an announcement message). These messages do not identify the caller.

Port <extn1> locked out. Connecting caller to <extn2>. Port <extn1> locked out. Putting caller on a queue.

The Monitor issues one of these two messages if the Monitor has failed to connect a call to the specified port (extn1) because it was unexpectedly locked out. The first message indicates that the call is being redirected to another available port (extn2). The second message indicates that no other ports are free so the call is being held in a queue (perhaps hearing an announcement message). These messages do not identify the caller.

Port inspection aborted for group <group ID>.

This message from the Monitor indicates that the Monitor has aborted an inspection of the specified group due to an OAI error. It has scheduled another inspection for that group, however, according to the interval stated in the corresponding record of the Group Identification Database.

Port inspection begins for group <group ID>.

This message from the Monitor indicates that the Monitor has started an inspection of the specified group's ports, as assigned in the Port Assignment Databse.

Port inspection ends for group <group ID>.

This message from the Monitor indicates that the Monitor has concluded an inspection of the specified group's ports.

Processing error. Freeing port <extn>.

This message from the Monitor is displayed to explain certain SCF errors that may occur during an attempt to connect a call to the specified port. (Also see Messenger error #11 on page 59.) In this case, UCD-XL has provided the PBX with incorrect data to identify the call. As a result, the caller (hearing ringing) remains attached to the monitored number indefinitely, while the specified port is considered free again. If this error occurs repeatedly, contact your NEC distributor or an NEC representative.

Ready for MCI communication.

This message from the Mediator indicates that the Mediator is ready to receive MCI messages from the PBX or VMS and pass them to the other system. It will also convert information about incoming calls from the Monitor into MCI messages ("J" records) and send them to the VMS.

Ready for requests.

This message from the Messenger indicates that the Messenger is ready to process requests from the Monitor for performing OAI functions, specifically the connection of a call to a VMS port and the determination of the status of a port. These requests are read from request bins in shared memory.

Ready to log statistics and/or trace.

This message indicates that the Reporter process, spawned by the Monitor, is alive and ready to perform its duties. The Reporter is needed for the preservation of statistics and trace data on the hard disk.

Reloading the ANI Database.

If the APM Administrator has processed and installed the ANI Pattern Database while the Monitor is running, the application displays this message. There may be a noticeable delay while the Monitor loads the database into memory. During this time, no calls can be processed.

Reloading the Group Database.

If the APM Administrator has processed and installed the Group Identification Database while the Monitor is running, the application displays this message. There may be a noticeable delay while the Monitor loads the database into memory. During this time, no calls can be processed.

Reloading the Port Database.

If the APM Administrator has processed and installed the Port Assignment Database while the Monitor is running, the application displays this message. There may be a noticeable delay while the Monitor loads the database into memory. During this time, no calls can be processed.

Request bins are at normal level of usage.

This message indicates that the burst of call traffic has subsided sufficiently to reduce Monitor's usage of request bins to below 75%. If this message does not occur soon after a "75% used" warning (see below), it is recommended that the number of request bins (UDP #7) be increased by 5 or more in Monitor's configuration. The application must be terminated first.

SHUTDOWN in progress.

This message from the Monitor indicates that the Monitor has entered the shutdown state because the APM has signaled termination or all Messengers have terminated. The Monitor will wait for running Messengers to complete call connections to ports, but no new calls will be processed since the application stops monitoring all pilot numbers. No further port inspections will occur, either.

Statistics collection begins.

This message from the Monitor indicates that the Monitor, in conjunction with the Reporter process, has begun to compile statistics about the call activity that has occurred during the current collection period (an hour or a day). It appends the data to a file on disk (named /oai/app/data/ucdxl/ucdstats) so that the Administrator may generate reports. During collection, the Monitor is unable to process any calls.

Statistics collection ends.

This message from the Monitor indicates that the Monitor has concluded the task of compiling call statistics. (The Reporter may still be updating the statistics file, though.) A new collection period commences.

Stopped monitoring groups.

This message indicates that the Monitor has informed the PBX to cease monitoring of the pilot numbers for every group in the Group Identification Database.

Stopped monitoring ports.

This message indicates that the Monitor has informed the PBX to cease monitoring of every extension in the Port Assignment Database.

UCD processing commences. ACTIVE.

This message from the Monitor indicates that the Monitor has entered the active state. It is able to process any calls placed to the pilot numbers of UCD-XL groups. Port inspections and statistics collections are also performed periodically, based upon the Monitor's configuration.

Waiting for a Messenger. STAND-BY.

This message from the Monitor indicates that the Monitor has entered the stand-by state. It waits either for a Messenger to initialize or for the APM to signal termination. No incoming calls are processed, and no port inspections are performed.

Waiting for completion of outstanding requests.

During shutdown, this message from the Monitor appears if the Monitor needs to wait for one or more Messengers to complete their tasks -- connecting a call to a port or determining the status of a port. If a problem has occurred, the Monitor may remain in this state until the APM recognizes it as a hung application and terminates it. If this situation occurs repeatedly, contact your NEC distributor or an NEC representative.

Waiting for Monitor...

This message from the Messenger indicates that the Messenger is waiting for the Monitor to establish an OAI association after being initialized by the APM. The Messenger cannot perform any tasks while in this state.

WARNING! 75% of request bins are used.

This message from the Monitor indicates that a burst of call traffic has caused the Monitor to use 75% or more of the request bins in shared memory. If this message occurs frequently, it is recommended that the number of request bins (UDP #7) be increased by 5 or more in Monitor's configuration. The application must be terminated first.

WARNING! 90% of request bins are used.

This message from the Monitor indicates that a burst of call traffic has caused the Monitor to use 90% or more of the request bins in shared memory. If this message occurs, it is recommended that the number of request bins (UDP #7) be increased by 5 or more in Monitor's configuration. The application must be terminated first.

WARNING! Disk is 75% full. Please erase old statistics.

The Reporter issues this message when there is 25% or less space available in the /oai filesystem for the growth of the statistics file. Although the statistics from the concluding collection period for the specified group are saved, it is recommended that you erase obsolete statistics via UCD-XL Administrator immediately.

Appendix B UCD-XL Utilities

There are four utility programs that enable the UNIX system administrator to access the shared memory and semaphore set utilized by the components of UCD-XL. These programs are located in directory /oai/app/ucdxl and may be run from the UNIX command line.

Note: Upon initialization, the Monitor clears shared memory and the semaphore set, creating them if necessary.

chkbins <shrmem key> [<interval>]

<shrmem key=""></shrmem>	Shared memory key (same as given in Monitor's UDP #8, page 36).
<interval></interval>	Number of seconds between checks. If 0 or not given, program does one check and exits. Otherwise, it runs continuously until the interrupt key (Ctrl + c) is pressed.

This utility checks the statuses of the request bins in shared memory on a periodic basis. Information includes:

- list of active Messengers with process IDs
- quantity of bins in use
- ID of next empty bin (first is 0)
- ID of bin containing next outstanding request (first is 0)
- bin counts according to status:
 - empty available for an OAI request from the Monitor
 - outstanding Monitor's request not read by a Messenger yet
 - pending Monitor's request being processed by a Messenger
 - response contains result of Monitor's request

chksem <sem key> [<interval>]

<sem key=""></sem>	Semaphore set key (same as given in Monitor's UDP #9, page 36).
<interval></interval>	Number of seconds between checks. If 0 or not given, program does one check and exits. Otherwise, it runs continuously until the interrupt key $(Ctrl+c)$ is pressed.

This utility checks the set of two semaphores utilized by UCD-XL on a periodic basis. The first semaphore is a flag that prevents more than one UCD-XL component from modifying shared memory simultaneously: 1 = unlocked, 0 = locked. The second semaphore is equivalent to a count of outstanding requests. Every Messenger waits for this semaphore to become non-zero, then takes its turn reading the next outstanding request in shared memory. Each request is processed by exactly one Messenger.

clrbin <shrmem key> <bin>

<shrmem key=""></shrmem>	Shared memory key (same as given in Monitor's UDP #8, page 36).
<bin></bin>	Bin ID, starting with 0; -1 means all bins are cleared.

This utility clears a specific request bin or all request bins in shared memory, regardless of their statuses. It should only be used when a software problem prevents a Messenger from processing the bin(s) or when garbage data appears in the bin(s). Since this utility changes the contents of shared memory indiscriminately, it may affect the performance of UCD-XL.

dispbin <shrmem key> <bin>

<shrmem key> - Shared memory key (same as given in Monitor's UDP #8, page 36).

bin> - Bin ID, starting with 0.

This utility displays the contents of a specific request bin in shared memory. Information includes:

- Status: empty, outstanding, pending, response
- Facility/function: SCF 4 (connect call), SCF 5 (announce call) or SMFR 3 (status check)
- Response: busy, make busy, lockout, idle, success, failure, clear (no response)
- time of response
- Transaction: incoming call, queued call, announcement, inspection, failed connection
- Calling party terminal ID (an OAI data structure) of the caller
- Announcement message number (for announcement transaction)
- Destination extension to which call is connected
- Group index record ID of group associated with the call
- Port index record ID of port associated with the call
- Pattern index record ID of the ANI pattern, if any, associated with the call
- Office code PBX office code, if any, associated with the call
Appendix C UCD-XL Environment and Hardware

This appendix describes the physical environment and hardware needed to support UCD-XL.

- A Digiboard DigiCHANNEL, NEC Multi-8/16, or similar serial communications board is required in the UAP to supply sufficient ports for the MCI links among the PBX, the VMS, and UAP (UCD-XL). RS232 cables comprise the links. Connectors may be DB-25 (25 pins) or RJ-45 (8 pins) standard. Special adaptors may also be necessary.
- Two A/B boxes (or an AaBb box) are recommended to provide an alternative path for MCI messages between PBX and VMS if UCD-XL (specifically, the Mediator component) is unavailable. One box is placed along the link between the PBX and UAP; the other is placed along the link between the VMS and UAP. The A output of each box is routed to the UAP; the B outputs are connected together directly using a RS232 cable. A diagram of the layout is shown below. If the UCD-XL Mediator application is terminated for any reason,



- the two boxes should be manually switched from A to B, enabling MCI traffic to bypass the UAP and ensuring that users continue to have access to their voice mailboxes.
- The PBX's MCI port is wired as a DCE device. Therefore, the VMS's MCI port must be a DTE device, or converted to one using a null modem adapter, in order for communication to occur.

The NEC Multi-8 and Multi-16 Boards are DTE devices that use RJ-45 connectors. The signals are laid out on a Multi-8/16 RJ-45 connector as follows:
 Table C-1 RJ-45 Pin Assignments for NEC Multi-8/16 Board

Signal	Description	Plug Pin #	Socket Pin #
TXD	Transmit Data	1	2
DTR	Data Terminal Ready	2	3
RTS	Request to Send	3	4
SGND	Signal Ground	4	5
CGND	Chassis Ground	5	6
RXD	Receive Data	6	7
CTS	Clear to Send	7	8
DCD	Data Carrier Detect	8	9

• The MCI link between A/B box #1 (the PBX side) and the NEC Multi-8/16 Board on the UAP requires an adapter that connects DTE (Multi-8/16) to DCE (PBX). This wiring configuration is as follows:

 Table C-2
 Adapter for Multi-8/16 to PBX

Multi-8/16 Side			PBX Side	
Signal	RJ-45 Pin		Signal	DB-25 Pin
TXD	2	<>	TXD	2
DTR	3	<>	DTR	20
RTS	4	<>	RTS	4
SGND	5	<>	SGND	7
CGND	6	<>	CGND	1
RXD	7	<>	RXD	3
CTS	8	<>	CTS	5
DCD	9	<>	DCD	8

• The MCI link between A/B box #2 (the VMS side) and the NEC Multi-8/16 Board on the UAP requires an adapter that connects DTE (Multi-8/16) to DTE (VMS). This wiring configuration is as follows:

Multi-8/16 Side			VMS Side	
Signal	RJ-45 Pin		Signal	DB-25 Pin
TXD	2	<>	RXD	3
DTR	3	<>	DCD	8
RTS	4	<>	CTS	5
SGND	5	<>	SGND	7
CGND	6	<>	CGND	1
RXD	7	<>	TXD	2
CTS	8	<>	RTS	4
DCD	9	<>	DTR	20

Table C-3 Adapter for Multi-8/16 to VMS

• The Digiboard DigiCHANNEL serial communications board is a DTE device that uses either RJ-45 or DB-25 connectors. The pin assignments for both types are given below:

Signal	Description	RJ-45 Pin	DB-25 Pin
RI	Ring Indicator	g Indicator 1	
DSR	Data Set Ready	2	6
RTS	Request to Send	3	4
CGND	Chassis Ground	4	1
TXD	Transmit Data	5	2
RXD	Receive Data	6	3
SGND	Signal Ground	7	7
CTS	Clear to Send	8	5
DTR	Data Terminal Ready	9	20
DCD	Data Carrier Detect	10	8

Table C-4 RJ-45 and DB-25 Pin Assignments for DigiCHANNEL

• For the connection between A/B box #1 (PBX side) and the DigiCHANNEL on the UAP, there is no special wiring unless an RJ-45/DB-25 adapter is needed. In that case, the signals are maintained by wiring together the RJ-45 and DB-25 pins for each signal as listed in Table C-4.

• For the connection between A/B box #2 (VMS side) and the DigiCHANNEL on the UAP, the following wiring configuration is needed to form a DTE-DTE connection:

DigiCHANNEL Side			VMS Side		
Signal	RJ-45 Pin	DB-25 Pin		Signal	DB-25 Pin
TXD	5	2	<>	RXD	3
RXD	6	3	<>	TXD	2
RTS	3	4	<>	CTS	5
CTS	8	5	<>	RTS	4
DSR	2	6	<>	DTR	20
SGND	7	7	<>	SGND	7
DCD	10	8	<>	DTR	20
DTR	9	20	<>	DSR&DCD	6&8

 Table C-5
 Adapter for DigiCHANNEL to VMS

[•] The previous information was extracted from the *BusinessMate 386/25 Multi-8/Multi-16 Reference Guide*, copyright 1990 by NEC Corporation, and the *DigiCHANNEL PC/8i and DigiCHANNEL PC/4i Installation Guide/Reference Manual*, copyright 1989 by DigiBoard Incorporated. The information is subject to change without notice.

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