Lucent Technologies
Bell Labs Innovations

I-2000 Controller for DACS II Release 3.3.8

Applications, Planning, and Ordering Guide

365-353-903
Issue 1
November 1997

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Identification No.: 365-353-903 Issue No.: 1 Date: November 1997

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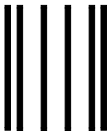

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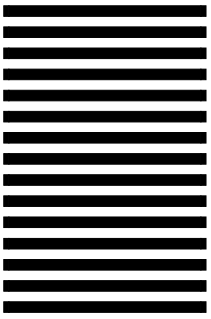

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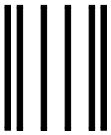

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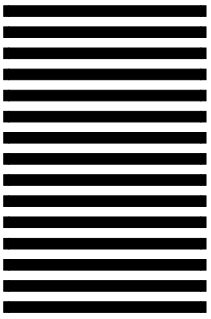

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About This Guide

Purpose

The Applications, Planning, and Ordering Guide (APOG) describes the I-2000 Controller for DACS II and tells you how you can use the I-2000 to improve the ease and efficiency of managing a network of Digital Access and Cross-connect Switch (DACS) frames. Information is provided that will help you select the appropriate I-2000 System configuration for your particular application. Ordering information is also provided for the various components that make up the I-2000 System.

Scope

The I-2000 normally operates as a stand-alone controller, but it can also perform as an element management server when it is connected to Lucent Technologies' DACScan®-2000/C Controller (Circuit Module). This guide describes only the stand-alone mode of operation for Lucent Technologies' DACS II and DACS II ISX Digital Access and Cross-connect Systems. For more information about DACScan, contact your Lucent Technologies representative.

Intended Audiences

This guide is for those personnel who are responsible for I-2000 System applications, planning, or ordering. It is also for anyone who wants to know more about the I-2000 Controller for DACS II and who wants to learn how to deploy the I-2000 to manage a network of DACS frames. This guide provides all the necessary information for choosing an I-2000 System for a particular application and for determining which items must be ordered to provide that configuration.

How to Use This Guide

It is recommended that you read Chapter 1 of this guide to gain a general understanding of the I-2000 Controller for DACS II. Anyone requiring a more detailed understanding of the I-2000 System features and system operation should proceed to Chapters 2 and 3. If you are planning a configuration for a specific application of I-2000, read Chapter 4. Chapter 5 provides ordering information for I-2000 hardware and software. A Glossary defines the terms associated with the I-2000 Controller for DACS II and identifies abbreviations and acronyms associated with the I-2000. An Index lists keywords and page numbers for easy reference.

Related I-2000 Documentation

The following I-2000 documents provide important information about operating and installing the I-2000 Controller for DACS II.

I-2000 Documentation

Title	Description
I-2000 Controller for DACS II User's Guide	Provides instructions for using the various I-2000 features.
I-2000 Controller for DACS II Installation Manual	Provides instructions for installing the hardware and software for an I-2000 System and explains how to connect the required communication links.
I-2000 Controller for DACS II Software Release Description, Release 3.3.8	Provides a description of features and software fixes that accompany the specific software release for the I-2000 System.

Additional Documentation

The following DACS II-related and ISX-related documents may be of help in using the I-2000 with DACS II. Some documents are not specifically relevant to I-2000 features but will be useful, for example, to an expert user in Passthrough mode.

DACS II Documentation

DACS II Product Description

DACS II Release PDS Operation and Maintenance Manual

DACS II Release PDS Command and Message Manual

DACS II Release PDS Quick Reference Guide

DACS II Release MML Operation and Maintenance Manual

DACS II Release MML Command and Message Manual

DACS II Release MML Quick Reference Guide

DACS II Release PDS 2.048-Mb/s Interface Operation and Maintenance Manual

DACS II Release PDS 2.048-Mb/s Interface Command and Message Manual

DACS II Release PDS 2.048-Mb/s Interface Quick Reference Guide

DACS II Release MML 2.048-Mb/s Interface Operation and Maintenance Manual

DACS II Release MML 2.048-Mb/s Interface Command and Message Manual

DACS II Release MML 2.048-Mb/s Interface Quick Reference Guide

DACS II ISX Documentation

DACS II ISX Product Description

DACS II ISX PDS Operation and Maintenance Manual

DACS II ISX PDS Command and Message Manual

DACS II ISX PDS Quick Reference Guide

DACS II ISX MML Operation and Maintenance Manual

DACS II ISX MML Command and Message Manual

DACS II ISX MML Quick Reference Guide

DACS II ISX PDS 2.048-Mb/s Interface Operation and Maintenance Manual

DACS II ISX PDS 2.048-Mb/s Interface Command and Message Manual

DACS II ISX PDS 2.048-Mb/s Interface Quick Reference Guide

DACS II ISX Documentation —*Continued*

DACS II ISX MML 2.048-Mb/s Interface Operation and Maintenance Manual

DACS II ISX MML 2.048-Mb/s Interface Command and Message Manual

DACS II ISX MML 2.048-Mb/s Interface Quick Reference Guide

Document Ordering

To order copies of this guide or any of the related documents, refer to the following ordering information:

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  The Lucent CIC also maintains a website that can be used for obtaining delivery of Lucent customer information products. The website address for the Lucent CIC follows:

  /http://www.cic.lucent.com/

  Once you access the Lucent CIC website, clicking on the "Documents" selection will take you to the area through which numerous types of customer information products can be located, ordered, and/or downloaded.

Training

Hands-on training for operating and maintaining an I-2000 System is available through the Lucent Product Training Center in Dublin, Ohio. Contact the Training Center directly at 1-888-LUCENT8 (1-888-582-3688). Refer to course TR3721, *I-2000 Controller Operation*.

System Overview

1

Contents

System Overview

1

This chapter provides an overview of the I-2000 Controller for DACS II and describes a typical I-2000 System configuration.

What is the I-2000 Controller for DACS II?

The I-2000 Controller for DACS II, also referred to in this document as the I-2000 or as the I-2000 System, is an element-level management system for Digital Access and Cross-connect Switch (DACS) frames. It provides a user-friendly interface that is both menu-driven and forms-based and lets a single operator perform provisioning and maintenance operations on multiple DACS frames from one location. The I-2000 is implemented as a software application that runs in conjunction with a commercial database program under the UNIX® Operating System on a computer workstation.

The I-2000 is currently deployed in many different environments around the world. It is used to manage DACS frames in applications that include a world-wide government communication network, a large private data communications network for a major U.S. retail business, a cellular service provider's distribution network in a major U.S. city, and in many different applications within telephone companies in a number of different countries. It is especially well suited for applications in networks that experience a lot of restructure and/or high growth rates.

How is the I-2000 Connected to a Network?

A typical application of the I-2000 is shown in Figure 1-1.

The I-2000 workstation computer should be installed at a location that allows you convenient access for performing I-2000 administrative and maintenance functions. The I-2000 workstation console (keyboard and video monitor) lets you access all network management and administrative features of the I-2000 System.

Remote I-2000 user terminals ("dumb" ASCII terminals) can be located at other sites to provide additional access for network management staff. These terminals can be connected through direct cables, dial-up modems and the switched telephone network, or through a Wide Area Network (WAN) such as DataKit® VCS.

All I-2000 features are available through the remote terminals except for

- Database Backup and Restore and
- Software Upgrades,

both of which require physical access to the I-2000 workstation.

The I-2000 workstation is connected to the DACS frames that it controls through either

- Asynchronous Snider (RS-232C) communication links or through
- Synchronous X.25 links.

Asynchronous Snider connections can be implemented with direct cable runs, modems and leased telephone lines, or a WAN. If the workstation is connected through synchronous X.25 links, both the I-2000 workstation and the DACS frame(s) must be connected through synchronous links to access ports of an X.25 Packet Data Network (PDN). An X.25 PDN is the preferred choice, if one is available, because it requires fewer connections and ports on the I-2000 and because the I-2000 provides automatic switching to a backup DACS link when synchronous X.25 links are used.

The I-2000 can also be connected to the DACS frames through direct X.25 links. Direct X.25 links are not recommended, because this configuration requires a dedicated synchronous port for each DACS frame. If, however, your application requires direct X.25 links, these links are documented in the *I-2000 Controller for DACS II Installation Manual*.

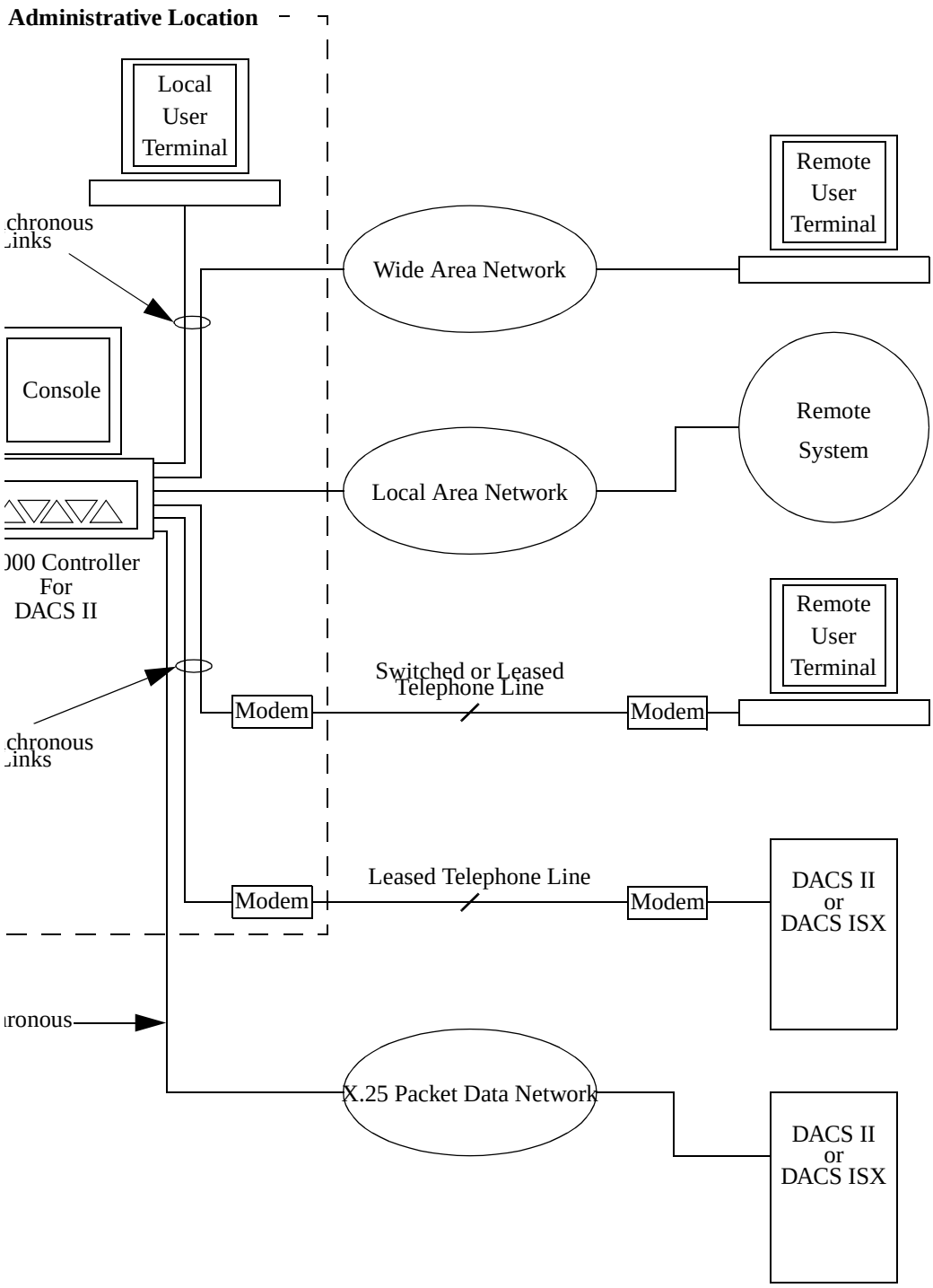
Administrative Location
Local User Terminal
chronous Links
Wide Area Network
Remote User Terminal
Console
Remote System
Local Area Network
000 Controller For DACS II
Remote User Terminal
Switched or Leased Telephone Line
chronous Links
Modem
Modem
Leased Telephone Line
Modem
Modem
DACS II or DACS ISX
ronous
X.25 Packet Data Network
DACS II or DACS ISX

Figure 1-1. I-2000 Controller for DACS II Typical Configuration

What are the I-2000's Features?

The I-2000 provides features in each of the classic element management categories listed below. These features are provided at a single user interface for controlling up to 30 DACS frames.

Configuration Management Features

- Centralized configuration management for up to 30 DACS frames. Supported NPCs can be calculated from the following equation,

  $$\text{max\_units} \times \text{max\_npcs} \times 30 = \text{total npcs} \qquad \text{(EQ 1)}$$

  where, *max_units* is the maximum number of units supported in a specific DACS frame type, *max_npcs* are the maximum number of NPCs supported in a unit, and *30* is the maximum number of DACS frames supported, ex., Non-CEF, CEPT DACS II.

  $$4 \times 128 \times 30 = 15360 \qquad \text{(EQ 2)}$$

- Menu/Form Interface for implementing cross-connections
- Menu/Form Interface for setting port parameters
- Named Identifiers for cross-connections and ports (Bellcore CLLI, CLCI compliant)
- Temporary reconfiguration and quick normalization of any cross-connect
- Rapid reconfiguration of multiple cross-connects using predefined plans
- Time Scheduled configuration operations
- Flexible Reports of configuration data

Fault Management Features

- Centralized Fault Management for up to 30 DACS frames
- Audible and Visible Alarm reporting to console and terminals
- Quick Access to a log of all DACS alarm messages
- Tracking of facility (port) alarms
- Flexible Reports of alarm log data
- Rapid reconfiguration of multiple cross-connects using predefined plans
- Automatic execution of reconfiguration plans upon occurrence of alarm(s)
- Rapid rebuilding of DACS port and connection database if the database becomes corrupted

Performance Management Features

- Centralized performance management for up to 30 DACS frames
- Menu/Form Interface for setting port performance monitoring alarm thresholds
- Menu/Form Interface for reading port performance monitoring counts

Security Management Features

- Login/Password security for user access
- User classes for restricting access to administrative functions
- Reduced need for unsecured craft terminals connected to DACS frames

System Integrity Features

- Tape and floppy disk backup/restore of I-2000 and DACS configuration data
- Monitoring of integrity of DACS links and alarming of failures
- Automatic transfer to backup DACS link for X.25 link failures
- Automatic tracking of any direct (craft link) activity on each DACS frame
- Audit and Synch between I-2000 and DACS frames to maintain database integrity

Friendly User Interface

The I-2000 user interface provides text-based menus that let you make easy option selections, and it provides forms that let you enter data. To enhance the presentation of information, I-2000 uses the color provided by the system console. Alarm and status information appear in dedicated zones on the screen, even when menus or forms are displayed. Default values and lists of available options are presented when you enter data in forms, and context-sensitive help is available to you with a single keystroke.

Flexible Integration With Other Management Systems

You can easily integrate the I-2000 System with other network management, surveillance, or operation support systems. All alarm messages that an I-2000 receives from the DACS frames that it controls can be sent to another management system through an RS-232C serial port. These messages can be in MML format, formatted exactly as they are received from the DACS frames, or in G2 format, which is the format required by the Lucent Technologies TransVu-2000 System.

All I-2000 features can be made available to an operator of another management system if that system can provide a “virtual terminal” capability. Such a virtual terminal would connect to an I-2000 just like a real remote terminal, and the operator would then see the same menus and forms that appear on an actual I-2000 terminal screen.

What are the Benefits of Using the I-2000?

The I-2000 enhances the day-to-day operations of a DACS network in a number of ways. Some of these advantages are listed below.

Reduced Operating Expenses

- Fewer staff are required for configuration and maintenance operations
- Quick, accurate access is available to network configuration data
- More efficient use can be made of network resources

Reduced Outage Time

- Fast, centralized detection and isolation of facility faults
- Quick network reconfiguration to restore service around facility faults
- Secondary backup of DACS databases

New Revenue Opportunities

- Rapid, automated reconfiguration capability
- Potential for “on demand” offerings

What New I-2000 Features are on the Way?

The following new features are being actively considered for I-2000:

- New product evolution to the **DACS Network Director** (DND) with:
  - Configurations for managing as many as several hundred DACS frames
  - A Graphical User Interface
  - Faster and more automated restoration capabilities
  - Mirrored workstation operation for increased fault tolerance
  - Specification of an Application Programming Interface that allows customer development of interfaces to higher level management systems

Lucent Technologies is very interested in hearing about any customer's specific needs or desires for the evolution of the I-2000 System and will work with customers to satisfy those needs. Please contact your Lucent Technologies representative for more information.

Feature Descriptions

2

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Feature Descriptions

2

This chapter provides a description of each of the major features of the I-2000 Controller for DACS II. For more details, or for information about how the operator actually uses these features, refer to the *I-2000 Controller for DACS II User's Guide*.

Alarm Monitoring and Reporting

The I-2000 Alarm Monitoring and Reporting feature provides a convenient way to track the alarm activity on each DACS frame that is connected to an I-2000 System.

Whenever an alarm message is received from a DACS, the name of that DACS appears in an Alarm Line that is always visible at the top of the I-2000 terminal screen. Multiple DACS names can appear on this line, and each DACS name will remain there until you acknowledge the alarm by viewing the alarm log for that particular DACS. Blink and underline or color attributes for the DACS name in the Alarm Line are used to indicate the highest severity unacknowledged alarm for that DACS.

Whenever you press Control-A on the I-2000 keyboard and select a DACS from the list that appears, you will see a display of the Alarm log for that DACS. This display shows the following information for each alarm message in the alarm log:

- Date and Time that the alarm occurred
- Severity of the alarm (Critical, Major, Minor)
- Type of alarm (CGA, PBA, LOS, PARAM, PERF, etc.)
- Other appropriate information for some alarm types

The alarm log is presented with the most recent alarm messages listed first. You can use the function keys to page through the entire log (either forward or backward). You can also use a function key to print the currently displayed portion of the log. The entire alarm log can be printed using the Reports feature that is described later in this chapter.

The I-2000 System reports and logs all DACS facility alarms (CGA, PBA, LOS types), performance alarms (PARAM, PERF types), unit equipment and NPC alarms (OOS types for FTMI, FTU, etc.), and common equipment alarms (Power Fail, OOS types for Synch/CI/Link, etc.). The I-2000 reports alarms when they occur as well as when they go away (Idle).

Another I-2000 feature that helps track the alarm status of each DACS is the Alarm Query Report. This feature is available as a menu option from the Reports Menu, and it sends a query to the DACS to receive an up-to-date picture of all alarms that are active at the current time. This information is presented in a report that shows details for each alarm and statistical summaries of all current alarms by type and severity. It covers all facility alarms, unit equipment alarms, and frame common equipment alarms.

An Alarm Reporting Port is also provided. This port is an RS-232C serial port to which an I-2000 will send a copy of each alarm message that it receives from any of the DACS frames that the I-2000 System manages. The format of the messages that are sent to this port can be selected to be MML format, formatted exactly as they are received from the DACS frames, or in G2 format, which is the format required by the Lucent Technologies TransVu-2000 System. The baud rate for this port can be set by the I-2000 operator, and it can be used to drive a printer or to connect to another management system.

Equipment Provisioning

The I-2000 Equipment Provisioning feature provides you with a convenient forms-based interface that lets you provision port parameters and control or read-out the state of the facility terminating ports in a DACS frame. This feature supports all line-terminating port types that the current software releases support, except for SLC types. For DACS II, Release 6.0 is the current software release. For ISX, Release 1.0 is the current release.

Some of the line-terminating port types that the Equipment Provisioning feature supports are listed below:

- Channelized T1 and/or E1 facilities
- Nonchannelized (clear) T1 or E1 facilities (available only in optional Feature Package G)
- Channelized or nonchannelized DS1 signals within a DS3 facility
- PA, DA, or TA ports (these are the newest “enhanced” port types)

The Equipment Provisioning feature also supports Digital Multipoint Bridge (DMB) NPC types, but it does not currently support the following equipment:

- DS3-level multiplexing equipment (for example, MXR) for a DACS II DS3 shelf
- Shelf or frame common equipment for a DACS II or ISX

Although Equipment Provisioning is not provided for the above equipment, the I-2000 monitors and reports the associated alarms for these equipment types. You can provision this equipment, however, if you invoke through the I-2000 user interface the Passthrough feature that is described later in this chapter.

The I-2000 Equipment Provisioning Form contains the following fields:

- NPC Type
- Insertion Word
- Performance Monitoring thresholds and alarm levels (not currently available for DA or TA types)
- Alarm aging setting
- Text identifier for the port
- Text entry to identify the location of the far end of the facility connected to the port

In addition to the fields listed above, the following fields are also provided for CEPT (30 channel) ports:

- Time-Slot 0 transmit bits
- Time-Slot 0 monitor bits
- Nonframe word setting

You can enter data into these fields to **Create** a new port or to **Modify** the settings for an existing port. The current settings for an existing port will appear in the form as soon as you enter a port number. A Browse feature lets you retrieve the settings for any ports that match a partial port name specification.The I-2000 tracks this data and uses it to assemble the appropriate command(s) that it sends to the DACS whenever you request a **Create**, **Delete, Modify, Remove, or Restore** action.

The I-2000 Equipment Provisioning Form also provides read-only fields to indicate the current service state and alarm state of a port. A **Query** action lets you request a display of updated information from the DACS for performance monitoring counts of the port.

Circuit Provisioning

The I-2000 Circuit Provisioning feature lets you set up cross-connections between channels within a particular DACS. Circuit Provisioning supports the following types of cross-connections:

- One-way, two-way, and one-way virtual broadcast
- Single channel, wide-band (Nx64 Kb/s, contiguous or alternating sequence), Clear E1, or Clear T1 Circuits
- CEPT to NAS (Gateway), with or without A-law to Mu-law conversion
- CEPT Time-Slot 0 to Time-Slot 0
- CEPT Time-Slot 0 to Non-Time-Slot 0
- Clear DS1
- Clear E1
- Single-Channel DMB Symmetric Voice and Polling Data Types

The I-2000 Circuit Provisioning Form provides fields for all data that relates to a particular cross-connection. Some of these fields are listed below:

- To and From port and channel numbers
- Circuit type (one-way, two-way, virtual multipoint)
- Circuit bandwidth (number of channels)
- Trunk conditioning
- Insertion word
- Other options (such as AIS or NAM)

In addition to the fields listed above, the following fields are provided for CEPT circuits:

- Signaling conversion
- Time-Slot 0 framing word

This data is used by the I-2000 to assemble the appropriate command(s) to send to the DACS whenever the user requests an **Activate, Deactivate, Pending, Delete,** or **Modify** action.

The following text fields are also provided on the I-2000 Circuit Provisioning Form:

- Circuit identifier
- Customer name
- Location identifiers (for the two ends of the circuit)

- A section for General remarks
- Service date
- Circuit priority

Data is stored within the I-2000 System and is available on various forms and reports. A Browse feature lets you retrieve the settings for any circuits that match a partial circuit identifier specification.

Circuit Alternate Routing

The I-2000 Circuit Alternate Routing feature lets you specify a temporary change in the channels that are assigned to a specific cross-connection. This change in channels allows you to move a circuit to a temporary location at a different facility in order to accommodate failures or rearrangements at the original facility.

Either the From or the To channel assignments, or both, can be changed. The alternate channels can be unused or currently in use by another cross-connection. If these channels are currently in use, the I-2000 notifies the user of the circuit that is using them. If the user agrees, the channels will be preempted for use in the alternate route. The preempted circuit will be temporarily disconnected.

After a circuit has been alternate routed, you can return it to its original configuration by executing a **Normalize** action on it. If the alternate route preempted any other circuits, these circuits will be automatically returned to their original configurations.

The I-2000 tracks the original circuit, the alternate route, and any preempted circuits. Circuit Alternate Routing and preemption information are included in the status information that is displayed for each circuit listed on the Circuit Provisioning Form. This information is also included in various reports.

NPC Roll

The I-2000 NPC Roll feature lets you permanently change all cross-connections on a particular port by reassigning cross-connections that are currently assigned to a particular port to a different port. This reassignment allows you to move all circuits that use a particular facility to another facility in order to accommodate failures or rearrangements in the network.

Reconfiguration Plans

The I-2000 lets you create Reconfiguration Plans. These plans are lists of the following circuit provisioning commands:

- Activate
- Deactivate
- Altroute

These commands are stored in the I-2000 database under a unique plan name. Whenever you **Execute** a Reconfiguration Plan**,** each of the commands listed in that plan will be implemented.

You can also **Idle** a Reconfiguration Plan. Each step in the plan will be undone in reverse order:

- **Activates** will be deactivated
- **Deactivates** will be activated
- **Altroutes** will be normalized

You can **Create** new plans, **Destroy** existing plans, **Insert/Remove/Change** steps in a plan, **Check** the steps in a plan for invalid circuit references, and **Clean** out any steps in a plan that refer to invalid circuits. You can also **Abort** any in-progress Reconfiguration Plan execution or idling.

A Reconfiguration Plan is associated with a single DACS. The commands in the plan can only act upon circuits in that particular DACS. You can **Execute** or **Idle** a Restoration Plan directly, or you can schedule an **Execute** or **Idle** using the Task Administration feature described later in this chapter.

A special **Boot** action is also available from the Reconfiguration Plan Menu. Whenever you **Boot**, commands are sent to the DACS to establish all channel connections that are present in the I-2000 database. When it is used together with the Synchronize NPC feature, **Boot** provides a convenient way to initialize a DACS when it is first installed or to restore a DACS that has lost its database.

Automatic Reconfiguration Plans

An Automatic Reconfiguration Plan is a plan that contains a list of Reconfiguration Plans. Whenever you **Execute** an Automatic Reconfiguration Plan, each of the Reconfiguration Plans in that list is executed in sequence. Similarly, an **Idle** action for an Automatic Reconfiguration Plan will idle each of the Reconfiguration Plans in that list in reverse order.

The **Create**, **Destroy**, **Insert/Remove/Change**, **Check**, **Clean**, and **Abort** actions for Automatic Reconfiguration Plans work similarly to the way they do for Reconfiguration Plans.

Each of the Reconfiguration Plans listed in an Automatic Reconfiguration Plan can be associated with a different DACS. The Automatic Reconfiguration Plan list can also include the name or number of one or more NPCs whose alarm state is to be associated with the plan.

Automatic Reconfiguration Plans can be executed directly by an I-2000 operator or by scheduling a task. In addition, these plans will be executed automatically whenever any one of the NPCs listed in the plan goes into a **Critical** or **Major** alarm state. You can **Idle** an Automatic Reconfiguration Plan directly, or you can **Idle** it using the Task Administration feature described later in this chapter.

The I-2000 Automatic Reconfiguration Plans thus provide you with the basis for a powerful service restoration capability.

Test Port Provisioning

The I-2000 Test Port Provisioning feature lets you **Create** or **Delete** a test port digroup within a DACS. It also lets you **Create** or **Delete** a test port on any existing test port digroup. To perform these actions, you fill out the Test Port Provisioning Form. These actions are necessary to support the **Test Access** feature described below.

Test Access

The I-2000 Test Access feature lets you connect a channel of any port into a test access configuration. A configuration can be a **Monitor**, **Split,** or **Hub** state in either **Terminate** or **Unterminate** modes.

A **Loop** state, which loops the test port back on itself, and a **Release** state, which disconnects the channel from the test port, are also supported. You can change the configuration among the **Monitor**, **Split,** and **Release** states or from the **Loop** or **Hub** state to the **Release** state.

This feature supports test access for single-channel one-way, two-way, and virtual broadcast types of NAS, CEPT, or Gateway circuits. It does not currently support wide-band (Nx64Kb/s) circuits or Clear T1 or Clear E1 circuits.

Passthrough

The I-2000 Passthrough feature lets you bypass the I-2000 controller and directly access a DACS craft interface. This feature can be useful when you have to provision or monitor common equipment in the DACS or perform any other DACS function that the I-2000 does not directly support. Two modes of Passthrough operation exist: Multiplexed Passthrough and Full-Screen Passthrough. Each mode has advantages under different circumstances.

- Multiplexed Passthrough lets you type commands and then sends those commands to the DACS. You can edit a command line as you enter it, since it is not sent to the DACS until you request this action.

  The I-2000 terminal screen displays two separate windows. One window shows the last command sent, and the other window shows the DACS responses to that command. You can select an option to have the screen display only DACS responses to the commands sent, responses and alarm messages, or all output from the DACS. A window of 14 response lines is visible that you can scroll within a buffer of the last 120 lines of output. Multiplexed Passthrough to any connected DACS is available to all users of an I-2000 System.

- The Full-Screen Passthrough feature lets you see what appears to be a terminal screen that is connected to a DACS. This feature works just like a real terminal: each character that you type is sent to the DACS, and whatever the DACS sends back is shown on the screen.

  Full-Screen Passthrough works better for dialog interactions with a DACS, such as the DACS II frame configuration command or interactive help menus. This feature is only available to one user per DACS at a time, however, and it uses up an entire link to the DACS.

  If the DACS is connected by a single asynchronous link and a user is connected to that DACS through Full-Screen Passthrough, no other users can perform any I-2000 provisioning operations. When the connection to the DACS is through an X.25 link, however, I-2000 uses a separate virtual circuit for the Passthrough connection, and I-2000 provisioning operations can occur simultaneously.

Task Administration

Whenever you request the I-2000 to execute an action, you are offered a choice of execution time. You can either execute the action immediately, or you can schedule the action to take place at a later time.

You can schedule an execution to occur only once at a future date and time, to occur at a fixed interval for a specified number of executions starting at a future date and time, or to occur repeatedly at a fixed interval starting at a future date and time until you cancel the execution schedule. The number of repeated executions can be up to 99 (or forever), and the interval between executions can be in units of minutes, hours, or days. The Task Administration feature thus provides you with a powerful method of scheduling periodic maintenance activities or implementing network rearrangements based on time of day or day of week.

Once you have scheduled specific tasks, the I-2000 Task Administration feature lets you manage them. The currently scheduled tasks can be listed by DACS name and/or user id along with a brief description of each task and its next execution time. You can also delete any task, which will cancel further executions.

User Administration

System operators access the I-2000 System by logging in through the system console or through a remote terminal.

The login process requires operators to type a user id (a one-word name) at the **login:** prompt and to type a password at the **Password:** prompt. The I-2000 software is shipped with a user id called **dacsadm** already installed, and the first time that an operator logs in with that user id, the system requests a new password. The **dacsadm** user id has full administrative privileges and can be used to set up other user ids for other operators.

Up to 63 additional user ids can be defined, each with its own unique password. Each user id is assigned a user class when it is created of either OPERATOR or ADMIN.

ADMIN class user ids are permitted to execute all possible actions within the I-2000 System.

OPERATOR class user ids are permitted to execute all Provisioning, Reconfiguration Plan, Alarm Management, Passthrough, Report, and Test Access actions as well as certain User Administration and Task Administration actions that pertain to their own user id. OPERATOR class user ids are not permitted to execute Port/Link/Frame Administration, System Shutdown, Database Audit/ Synch/Backup/Restore, Printer Administration, or Date and Time actions or to create or delete user ids or to change user ids other than their own.

Two user options are available for each user id. These options control the way login sessions will operate for that user.

- An Alarms Audible option can be set to ON or OFF to control whether or not an audible beep occurs when an alarm is first reported.
- A UI Idle Option can be set to ON to automatically log the user off whenever there has not been any user input for more than 60 minutes, or it can be set to OFF to allow login sessions to continue indefinitely.

The I-2000 also maintains data fields for the Name, Phone Number, Address, and City associated with each user id as a reference for other users. Users can change their own passwords, user options, or data fields at any time. ADMIN class users can change these fields as well as the user class for their own user id, or for any other user id at will.

System Administration

The I-2000 System Administration feature covers a number of activities that are necessary to set up and configure an I-2000 System. It lets system administrators control the following I-2000 configurations and activities:

- Login ports
- Links for communication with DACS frames or a DACScan 2000 C-Module
- Local Printer
- Set the Date and Time clock in the I-2000 and in the DACS frames

The System Administration feature provides several forms that a system administrator completes in order to invoke specific administrative tasks. Each of these forms provides fields that relate to a specific function of that administrative task.

The Login Port Administration Form lets an administrator configure asynchronous ports in order to provide login access, and it lets an administrator set the port data rates to 1200, 2400, 4800, or 9600 b/s. This form also provides a Status field that indicates how a port is currently being used.

The X.25 Link Administration Form lets an administrator configure synchronous ports for direct connection or Packet Data Network (PDN) operation. This form also provides a Status field that indicates how the port is currently being used.

The Frame Administration Form lets an operator tell the I-2000 about each DACS that will be connected to the I-2000 System. These entries include the following:

- I-2000 port to be used for communication
- Communication protocol (Snider, X.25 direct, or X.25 PDN)
- Language, addressing scheme, and software generic used by the DACS

Data entries for a Site Name (that the I-2000 uses to identify the DACS) and Location name are also included, as well as options for Alarm Synch and Echoed Response Processing (ERP). For an explanation of ERP, see the section called "Echoed Response Processing." For an explanation of Alarm Synch, see the section called "DACS Link Monitoring."

When a frame is **Created** or **Deleted**, the I-2000 database for the ports and cross-connections in that frame is created or deleted. Once a frame has been created, actions are available that will activate or deactivate the frame's communication link (and backup link, if one is used) or change any data associated with that frame.

The I-2000 System supports a local printer that can be used to print hard-copy reports and any I-2000 screen images. It can also be used to log all output from the DACS frames or to log alarm messages only.

The printer is managed by the standard UNIX Operating System print spooling mechanism that queues all requests for printing and then sends these requests to the printer in the sequence that they were received. The spooler operates in the background so that users can continue with other tasks while print requests are processed.

The Printer Administration Form lets an I-2000 administrator start or stop the print spooler, list and/or cancel pending print jobs, and select logging of all DACS output, alarms only, or nothing. Operators without ADMIN privileges can list and cancel their own print jobs through the Task Administration Form.

The Date and Time Administration Form lets an I-2000 operator quickly set the date and time of the I-2000 internal clock. An option is also provided to set the time-of-day clock in a DACS frame to match the I-2000 clock within 1 second.

Finally, a System Shutdown feature is provided that lets an administrator close all files and prepare the operating system so that power can be shut off to the I-2000 without losing any data.

Database Administration

The I-2000 Database Administration feature provides several capabilities that are necessary to maintain the integrity of an I-2000 System database. It allows an operator to perform the following activities:

- Back up and restore data to floppy disks or to tape
- Compare data in the I-2000 with data in the DACS frames
- Force agreement between the data in I-2000 and the data in a DACS frame

The data stored in an I-2000 is divided into individual databases. There is one database called COMMON that contains all administrative data for the system. There is also one database for each DACS frame that the I-2000 controls.

A Database Backup/Restore feature is provided that lets an operator back up to or restore from floppy disk(s) or tape(s). A single tape backup operation can include any number of databases and will usually fit onto a single tape. An option is provided to format floppy disks, but no separate formatting step is required for tapes. Database backups provide a way to recover from hardware failures, and they also provide a way to move data from one I-2000 machine to another.

A Database Audit feature lets an administrator compare the database in a particular DACS frame with the corresponding data in the I-2000 database. Audits can be performed for port provisioning or for channel connection data. The scope of the audit can be anything from one channel or port up to all possible ports in the frame. A report is automatically prepared that lists any inconsistencies discovered by the audit.

If the I-2000 and DACS databases do not agree, an administrator can invoke a Database Synch feature that will force the databases to match. The DACS can be chosen as the Master for the Synch and the I-2000 will be changed to agree with it, or the I-2000 can be chosen as the Master and the DACS will be changed to agree.

As with audits, synchs can be invoked for port provisioning or for channel connection data, and the scope can be from one channel or port up to all possible ports in the frame. It is also possible to synch just the alarm status of ports.

A single-step **Upload** action is provided to synch all ports and connections with the DACS as Master to quickly bring an I-2000 into synch with a DACS (such as when the I-2000 is first installed).

Reports

The I-2000 Reports feature provides a flexible and convenient way for users to access the data stored in the I-2000 System.

Tabular report formats can be defined by specifying which data elements are to appear in which columns, what width to use for each column, and what headings to put on the columns. A set of standard report formats is provided, and new formats can be defined by I-2000 users.

A report is generated by choosing the desired format and then specifying what search criteria to use for extracting data from the system. Search criteria may be given for any data field in the report and can include pattern matching or numeric specifications. The actual generation of a report, which may take some time for large databases, is executed as a background task to allow the user to continue with other activities. When the generation of a report is complete, the user is notified by the I-2000 System, and the report can be viewed on the screen or printed out on the I-2000 printer.

Reports are available for many categories of configuration data, including:

- Circuits
- Equipment
- Channels
- Frames/Links
- Reconfiguration Plans

Other report formats provide the results of the following operations:

- Reconfiguration Plan
- Audit/Synch
- NPC Roll
- Task Schedule

The following autonomous activity reports are also provided:

- DACS Alarms
- DACS Alarm Query
- DACS History
- Echoed Response Processing

Echoed Response Processing

The I-2000 Echoed Response Processing feature tracks all messages coming from a DACS frame, and it reacts to any messages that indicate configuration activity (cross-connection or port configuration) that are not requested by the I-2000 itself. Such activity could be the result of commands entered on direct craft links to the DACS. Whenever the I-2000 sees such commands, it records the changes in its database, notifies all users that a change has been made, and logs the details of the change to a file. This keeps the I-2000 configuration database up to date at all times. Any circuit or port records in the I-2000 database that are the result of Echoed Response Processing are given identifiers with a specific characteristic pattern so that they can be easily identified in I-2000 database searches and reports.

If any DACS messages indicate changes that the I-2000 cannot resolve, the users are notified and the changes are logged to a file, but the I-2000 database is not updated. In such cases, a user would have to manually intervene with the help of the I-2000 Audit and Synch features in order to resolve the situation.

DACS Link Monitoring

The I-2000 DACS Link Monitoring feature constantly monitors the integrity of the communication links that connect the I-2000 to the DACS frames that it controls. Whenever one of these links fails, all I-2000 users are notified with an audible and visible indication. If the failed link is an X.25 PDN link and if there is a backup link configured for that DACS, the I-2000 will automatically try to establish a connection over the backup link.

The I-2000 provides an option for each DACS to specify whether or not it will perform an automatic synchronization of port alarm states with the DACS whenever a failed link becomes restored. A minimum interval between such synchronizations can also be set to prevent unnecessary activity if links experience frequent brief outages.

Operating an I-2000 System

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Operating an I-2000 System

3

This chapter describes the normal operation of an I-2000 System.

User Operations

Typical I-2000 user activities fall into the two distinct categories described below.

- Configuration management: Provisioning ports and cross-connections on DACS frames and generating reports about their configuration and status.
- Fault management: Monitoring the alarm status of the DACS frames and, when failures occur in the network, using the I-2000 to reconfigure the network in order to restore service.

Managers can assign all the tasks mentioned above to the same work group, or they can assign the configuration tasks to one work group and the fault management to another. Configuration activity may require periodic access to the I-2000 System and can be done on a dial-up basis. However, alarm monitoring for fault management requires full-time access.

System Administration

Routine system administration for the I-2000 consists of the following activities:

- Provisioning the I-2000 communication links and user login accounts
- Periodically backing up the databases
- Periodically checking the synchronization of the I-2000 and DACS databases

Other occasional activities include:

- Installing software updates
- Initializing the I-2000 database when a DACS is first connected
- Troubleshooting communication link problems

If the user is familiar with small computers and minicomputer systems, the UNIX operating system, and/or data communications, this knowledge will help to perform these tasks.

Backing Up the I-2000 Database

To back up the I-2000 database, you make menu selections and insert and remove floppy disks or tapes.You must perform these actions from the system console, however. You cannot schedule a backup for automatic execution, because physical access to the machine is required.

A backup operation takes from 5 to 50 minutes, depending on the size of the database. Good data backup practice suggests that you establish a regular backup schedule, such as once per week, and that you retain the five most recent backups in a secure place.

The I-2000 System is fully functional and available to all users during database backups, but performance may be reduced. You may, therefore, wish to schedule backup activity to take place during late night or early morning hours.

Monitoring the Synchronization of the I-2000 and DACS Databases

To monitor the synchronization of the I-2000 and DACS databases, you must run a periodic database audit for each DACS. Running an audit on a complete DACS requires executing one command and takes somewhere between a half-hour and two hours, depending on the size of the database involved.

Audits can be scheduled for automatic execution by the I-2000 and should be performed on a regular basis to ensure database integrity. The administrator's responsibility is to review the audit reports for any synchronization problems that may be listed, and to take actions to correct these problems.

Maintenance and Repair

The I-2000 System requires no periodic software or hardware maintenance. It is intended to run continuously and is designed so that all files are automatically limited to a maximum size.

When powered up, the I-2000 System boots automatically to the login prompt with all I-2000 communication links operational. The I-2000 can usually survive a power interruption with no loss of data. In cases where extreme power conditions exist, however, you are advised to provide power conditioning with an uninterruptable power supply. This precaution will help you avoid loss of data and/or hardware damage. A UPS with a capacity of 500 watts should be sufficient for one I-2000 System and a printer.

If any hardware component of an I-2000 System fails, you must repair or replace it. All I-2000 hardware conforms to standards for small computer systems, and repairs and replacements are readily available through Lucent Technologies. A I-2000 System is out of service during repair, however, and a repair may take several days. If system availability is important, you may want to maintain a backup computer to allow fast recovery. You could then replace a failed machine by moving its communication links over to the backup machine and restoring the failed machine's most recent database backup onto the backup machine. This procedure typically takes less than one hour. Good data backup practices will ensure the ability to recover from a hardware failure.

No failure mode of an I-2000 System can in any way affect the quality of transmission maintained within the DACS frames that it controls. The only thing that can happen is that control over the DACS frames via the I-2000 can be lost. You are therefore advised to maintain a separate method of direct communication, such as dial-up modem lines, with the DACS frames from the operations location as a backup against possible I-2000 System outages.

System Performance

The performance of an I-2000 System depends upon many factors, including the number, type and size of the DACS frames that it controls, and the number of users active on the system.

System performance also depends on the level of autonomous alarm messages coming from the frames and the time that it takes the frames to execute the commands that the I-2000 sends them. Under typical conditions (two active users, 20 frames with 500 ports each, no more than 6 alarm messages per minute from any frame, no database backup or audit or synch activity), keyboard response is immediate, alarms are reported within 1 or 2 seconds, and provisioning activities that require single DACS commands take less than 5 seconds to complete.

Report generation can take as long as several minutes for large databases and complex searches, however. Provisioning operations that require multiple DACS commands (such as alternating range connections) can take 10 seconds or more. Reconfiguration plans take from 2 to 5 seconds per plan step to execute.

Performance may be slower when any of the following conditions are present: when more users are active, when database backup or audit or synch operations are executing, or when large numbers of DACS alarm messages are being received. Also, a DACS can take much longer to respond to I-2000 requests when it is experiencing a large number of alarm conditions. This situation can degrade I-2000 System performance even further.

System Capacity

The I-2000 System can handle up to 30 DACS frames. The total number of T1 or E1 ports is a sum of the maximum number of Units multiplied by the maximum number of NPCs (ports) per Unit multiplied by maximum number of DACS frames (30). Alarm logs can hold approximately 4000 alarm messages for each DACS, and DACS message logs can hold approximately 1000 messages.

The I-2000 database has enough capacity to hold configuration data, restoration plan data, and report data consistent with heavy usage of all of the I-2000 features across all channels on all ports.

The I-2000 System can store Reconfiguration Plans (one for each port of each DACS) with as many as 307,200 total steps in all plans (one step for each of 30 channels on each port).

Similarly, the I-2000 System can store as many as 5,120 Automatic Reconfiguration Plans (one for each possible pair of ports), each of which may list up to 20 Restoration Plans and up to 56 ports to be monitored.

Planning an I-2000 System Installation

4

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Planning an I-2000 System Installation

4

This chapter provides information that will help you plan an I-2000 System installation for a particular application.

Choosing a Location

Location is an important factor when you install an I-2000 System. You must consider access to the system, the space necessary to accommodate the system, and environmental conditions.

The location must allow convenient access to the I-2000 System for the staff who will perform the administrative operations (see “System Administration” section in Chapter 3).

A single I-2000 workstation requires a moderate sized desk or table to accommodate the system’s cpu, monitor, keyboard, mouse, external 4mm tape drive and two serial expansion boards (4 port synchronous, 16 port asynchronous). There is also a need to support two protocol converters, however, they do not need to reside next to the I-2000 system unit. If a printer is required, the desktop or tabletop should be large enough to accommodate it, too. Additional space will be required to store the documentation and system software, as well as printer supplies (paper and ribbons), tapes, and floppy disks. You may want to provide lockup security for these storage needs.

An I-2000 System installation location should be environmentally controlled to have an ambient temperature between 60 and 90^{o} F with 20- to 80-percent relative humidity. There should be adequate and reliable AC power available (600 watts per system), easy access to voice telephone facilities, and reasonable access to the communication links that will be connected to user terminals and DACS frames.

User Terminal Links

Each I-2000 remote user terminal requires one asynchronous port on the scsiTerminal Server™ board of the I-2000 workstation computer. An I-2000 System provides up to sixteen asynchronous serial ports for either remote terminals or DACS snider links. In addition, the workstation has a built-in console (keyboard and monitor) for system access.

As shown in Figure 4-1, remote terminal connections (links) are standard RS-232C circuits at up to 9600 b/s. Remote terminals can be connected directly to the I-2000 System by cable over distances of up to about 50 feet. For those remote terminals that require longer connections, standard RS-232C asynchronous modems can be used over private/leased lines or over the switched telephone network. A Wide Area Network (WAN) such as DataKit VCS® can also be used to connect remote terminals to the I-2000 System. Modem connections over the switched telephone network or WAN connections can be either dedicated (full time) connections or dial-up.

Direct connections to a terminal can be made using an RJ-45 cable and a Terminal/Printer Adapter. Connections to a modem or a WAN require an RJ-45 cable and a Modem/ACU Adapter.

See the *I-2000 Controller for DACS II Installation Manual* for more details about connection options.

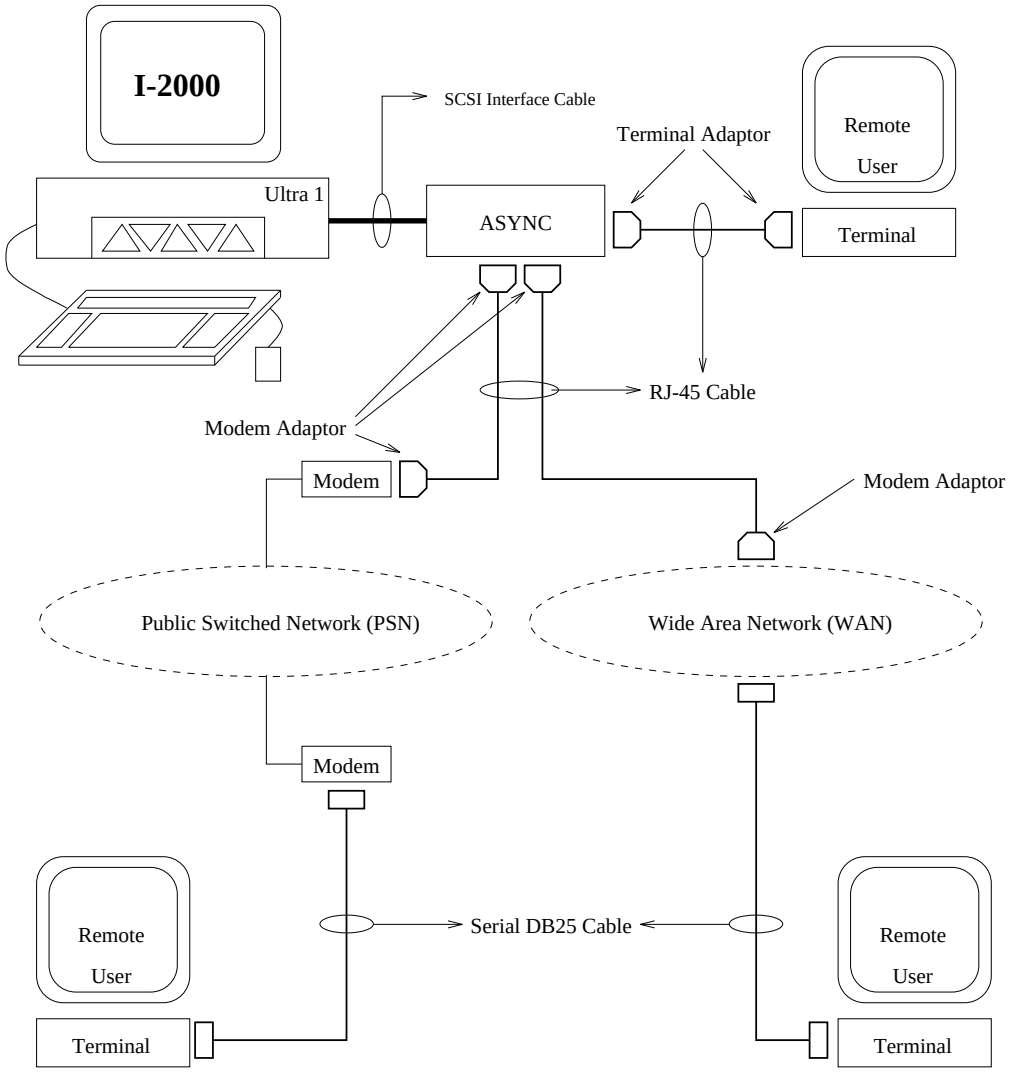

Figure 4-1. Remote Terminal Links

DACS Links

The I-2000 workstation can be connected to the DACS frames that it controls through either asynchronous Snider (RS-232C) communication links or through synchronous links into an X.25 Packet Data Network (PDN). X.25 PDN is the more reliable and flexible option if access is available at the I-2000 location and at the locations of the DACS frames.

The I-2000 System provides for automatic switching to a backup DACS connection when X.25 links are used. Each asynchronous Snider connection requires a separate dedicated port on both the I-2000 and the DACS frame, but one X.25 PDN port can accommodate up to 61 virtual connections at the same time. Therefore, X.25 PDN connections can reduce the number of ports and cable connections required on the I-2000, and thus decrease cost.

X.25 PDN connections can also share X.25 links on the DACS frames with other applications, since each of those links can accommodate up to 16 virtual circuits.

Like remote terminal connections, each asynchronous Snider link requires one asynchronous port on the scsiTerminal Server™ board. Remote DACS frames can be connected to an I-2000 System at up to 9600 b/s with direct cable runs of up to about 50 feet. For those DACS frames that require longer connections, standard RS-232C asynchronous modems can be used over private/leased lines or over the switched telephone network. A WAN such as DataKit VCS can also be used to connect DACS frames to the I-2000.

Modem connections over the switched telephone network or WAN connections require both an RJ-45 cable and Modem/ACU Adapter. Direct connections to a DACS II (or ISX) can be made with an RJ-45 cable and a Modem/ACU Adapter if the DACS II port uses a Group 2 adapter. An RJ-45 cable and a Terminal/Printer Adapter are necessary if the DACS II port uses a Group 1 adapter.

Figure 4-2 shows asynchronous Snider DACS links. The RJ-45 (10 wire) cables and the adapters required for scsiTerminal Server™ connections are not commonly available items, but you can order them from Lucent Technologies.

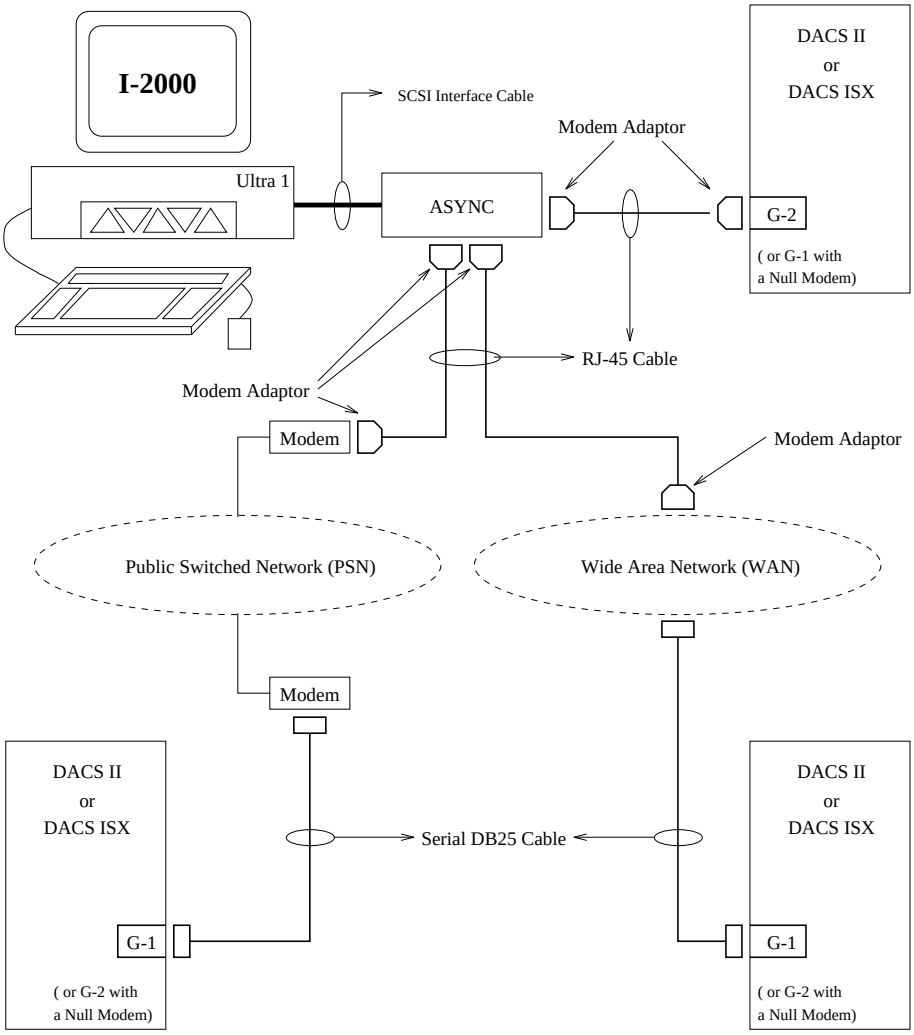

Figure 4-2. Asynchronous SNIDER DACS Links

X.25 PDN connections require that one (or more) synchronous port(s) on the I-2000 System be connected to access port(s) of the X.25 PDN, as shown in Figure 4-3. These connections can be implemented using standard 25-wire cables (male DB25 connectors on both ends) for distances of up to 50 feet. For longer distances, synchronous modems are required. Synchronous modems can be connected to the I-2000 System with standard 25-wire cable.

See the *I-2000 Controller for DACS II Installation Manual* for more details about connecting either Snider or X.25 PDN links.

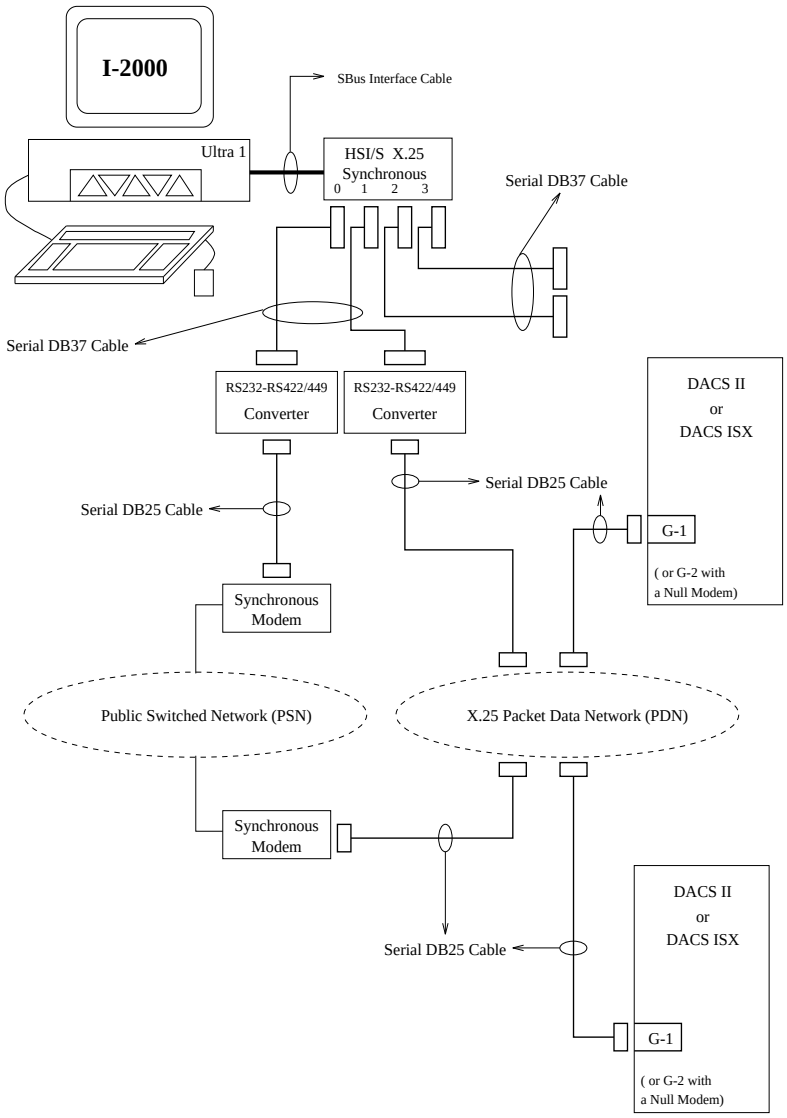

Figure 4-3. Synchronous (X.25 PDN) DACS Links

The number of synchronous ports required for X.25 PDN links depends on the number of DACS frames that are connected to the I-2000 System and the degree of backup desired.

One SunLink HSI/S board provides four ports with a maximum of 128 virtual circuits across its ports. This is enough to handle primary links for 30 DACS frames with no backup links, or primary and backup links for 30 DACS frames.

One SunLink HSI/S board is recommended, with two ports connected to a PDN access device, to provide the greatest reliability. The RS-232 (25 wire) cables used for synchronous connections are standard data cables and can be obtained locally.

See the *I-2000 Controller for DACS II Installation Manual* for more details.

While it is possible for you to install an I-2000 System with a limited number of I/O boards and then add more boards later as your needs grow, adding boards is a fairly complex and time consuming process and does require downtime.

You have to remove the I-2000 System from service for several hours, remove existing driver software, install new hardware, load new drivers, and run utilities in order to update the I-2000 database. If you make a mistake at any step in this process, you risk having to reinstall the I-2000 System.

The maximum I/O configuration is therefore recommended initially as a precaution against possible problems.

Printer

The optional printer connects to the I-2000 System through a standard IBM PC-Compatible parallel printer cable (male DB25 to male Centronics 36). A 10-foot cable is available from Lucent Technologies. Longer cables (up to about 25 feet) can be obtained locally. For distances longer than 25 feet, commercial products are available from computer and data processing sources which can extend this distance.

Alarm Port

The I-2000 Alarm Port requires a standard RS-232C circuit at up to 9600 b/s. It can be connected to the I-2000 System with direct cable runs of up to about 50 feet. For Alarm Ports that require longer connections, standard RS-232C asynchronous modems can be used over private/leased lines or over the switched telephone network. A WAN such as Datakit VCS can also be used to connect (link) Alarm Ports to the I-2000 System. Figure 4-4 shows Alarm Port connections to the I-2000 System.

Connections require a standard “Serial” cable (male DB25 to male DB25). This cable is a standard item that you can obtain locally.

See the *I-2000 Controller for DACS II Installation Manual* for more details about connection options.

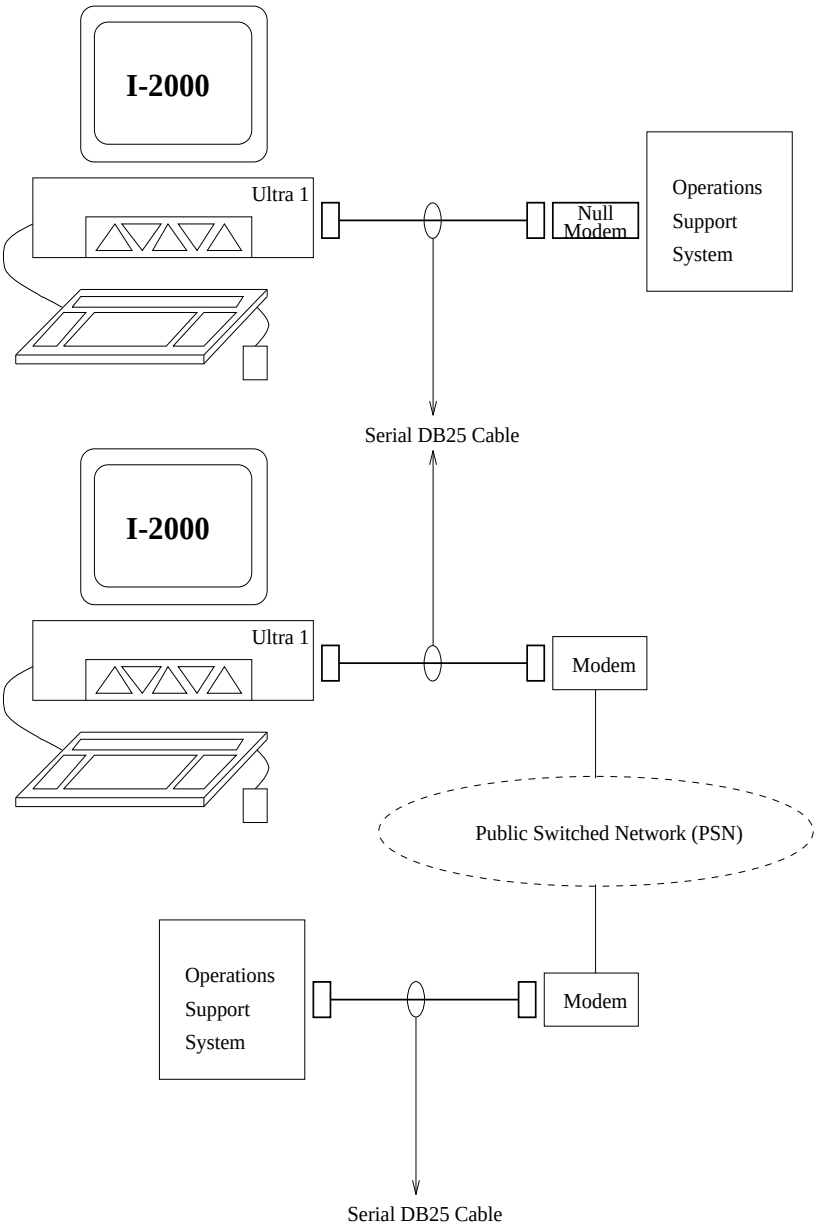

Figure 4-4. Alarm Port Connections

Summary

The actions listed below summarize the steps required for planning a successful I-2000 System installation.

- Determine the number and type of DACS frames that you want the I-2000 to control.
- Decide how many remote user terminals are required and where you will locate them.
- Choose the location for the I-2000 workstation based on the requirements discussed in this chapter.
- Determine the types and number of communication links required for connections to remote user terminals, DACS frames, and the Alarm Port. You may want to consult a data communication specialist. It is also a good idea to sketch out each connection so that all components are readily identifiable and you have a record for later reference.
- Add up the number of asynchronous ports required for remote user terminals and the number required for DACS connections. Use the total to determine the number of scsiTerminal Server boards to order with the I-2000 System (one board for 16 ports; two boards for 32 ports).
- Determine the number of SunLink HSI/S boards (if any) to order with the I-2000 System based upon the number and type of X.25 connections that are required. One board accommodates 20 links with no backup or 10 links with backup, and two boards accommodate 20 links with backup.
- Determine the number of RJ-45 cables and the number of each type of adapter to order with the I-2000 System for connections to the scsiTerminal Server boards.
- Decide whether or not to order an optional printer and printer cable.
- Place your order for the I-2000 hardware and software. (Read Chapter 5 for ordering information; use the Ordering Worksheets included there.)
- Arrange for the design, installation, and testing of all communication links, modems, WAN connections, and/or X.25 access ports. Be sure to include the connections required at DACS locations.
- Order all the necessary cables and/or supplies that you can obtain from local sources.

When you have installed and tested all communications links and you have received all I-2000 hardware and software, you can then install the I-2000 System.

See the *I-2000 Controller for DACS II Installation Manual* for details of this process.

Ordering an I-2000 System

5

Contents

Ordering an I-2000 System

5

This chapter provides ordering information for the I-2000 Controller for DACS II.

Hardware and System Software

The information in this section can be used as a guide for filling out the Hardware Ordering Form included at the end of the section. If more than one I-2000 system is being ordered, copy the form and fill out one copy of it for each system, then total up the quantity for each item and fill out one "aggregate" form to be used to place an order.

The I-2000 application software runs on a Sun Microsystems® UltraSPARC™-based processor workstation platform. The computing power and I/O port capacity of this platform are appropriate for I-2000 applications which support up to 16 simultaneous users and up to 30 DACS frames, with Snider asynchronous links or X.25 PDN connections or a mixture of both. The basic computer comes equipped with an Ultra 173Mhz processor, a 2.1 Gbyte hard disk drive, 128 Mbytes of random access memory (RAM), an internal 3.5-inch floppy disk drive, an internal CD-ROM drive, and a keyboard with mouse. A Sun Creator video adapter, a 20 inch color monitor, an external 4mm tape drive and a copy of the Solaris/SunOS Unix Operating System are also required for each I-2000 machine. Two serial (RS-232C) communication ports (one of which can be used for an Alarm Reporting Port) and one parallel printer port are included in this basic configuration. Both the computer and the monitor operate on either 110 Volts or 220 Volts, 50 or 60 Hz. power. They come equipped with power cords for North American 110V connections.

A dot matrix printer is offered as an option. It provides fast (300 cps) draft quality printing on standard 9 inch fan-fold tractor-feed computer paper. Two different models are available - one which operates on 110 volts and one which operates on 220 volts. A power cord is provided for North American 110V connections. A six foot long parallel interface cable is also available for connecting the printer to the I-2000.

An asynchronous character-based monochrome terminal is available for use as a remote I-2000 user interface. Order as many terminals as you need.

The previous chapter explained how to determine the number of each type of I/O ports your system will require. Order one scsiTerminal Server board to provide 16 asynchronous ports. For each scsiTerminal Server port which will connect directly to a user terminal, order a cable and a Terminal/Printer adapter. For each port which will connect to a modem or to a wide area network, order a cable and a Modem/ACU Adapter. You may wish to review the many possible asynchronous port connection options discussed in the previous chapter and in the *I-2000 Controller for DACS II Installation Manual* before deciding which cables and adapters to order.

To provide up to two synchronous (X.25) communication ports with up to 128 virtual circuits, order one SunLink HSI/S board, two DB37 or equivalent cables and two RS-232 - RS422/449 converters.

Other items which may be needed for your I-2000 installation are readily available from computer supply sources, so they are not included on the Hardware Ordering Form. These items should be obtained from local suppliers. They include:

- Asynchronous or synchronous DB25 extension cables (see the *I-2000 Controller for DACS II Installation Manual*)
- 9-inch-wide, fan-fold, tractor-feed computer printer paper
- 3-1/2 inch high density 1.44 Mbyte floppy disks
- 4mm DAT tapes
- An uninterruptable computer AC power supply (500 watts or more)
- Power cords for work station, monitor, printer and/or terminals if connections will NOT be North American 110V standard (equipment end is “standard HP” type female connector)

I-2000 Application Software

The I-2000 application software itself and the required Informix Database software are ordered from Lucent Technologies, Inc., Merrimack Valley Works, as per the J9C004 drawing as outlined below. Note that different drawing numbers are used for United States (J9C004B-3) and non-United States (J9C004A-4) applications. The list structure is the same for both drawings, however. The information presented here applies to initial installations of Release 3.2 I-2000 software only. For upgrades to existing installations, or for releases newer than 3.2, consult your Lucent Technologies representative for updated information.

Each I-2000 system will require ordering one J9C004B-3 (or one J9C004A-4), List 1, equipped with the following list items:

- 1 x List A1 (the software 4mm tapes and the *I-2000 Controller for DACS II Software Release Description* document)
- 1 x List M1B (the core software Right to Use)
- 1 x List B2 (the Informix database software for an 80486 machine)
- 1 x List C1 (one copy of the *I-2000 Controller for DACS II User's Guide*)
- 1 x List C2 (one copy of the *I-2000 Controller for DACS II Installation Manual*)

Additional quantities of Lists C1 and/or C2 can be ordered if more copies of the manuals are desired.

For each DACSII ISX which will be controlled by the I-2000, add the following:

- 1 x List M1G (required RTU for an ISX)
- 1 x List F2G (**optional** - order only if you want Feature Package D)

For each non-CEF DACSII frame which will be controlled by the I-2000, add the following:

- 1 x List M1R (required RTU for a non-CEF DACSII)
- 1 x List F2R (**optional** - order only if you want Feature Package D)
- 1 x List F5R (**optional** - order only if you want Feature Package G)

For each CEF DACSII frame which will be controlled by the I-2000, add the following:

- 1 x List M1T (required RTU for a CEF DACSII)
- 1 x List F2T (**optional** - order only if you want Feature Package D)
- 1 x List F5T (**optional** - order only if you want Feature Package G)

Feature Package D provides for an interface from the I-2000 to the DACScan-2000 C-Module network controller and is not required for the types of applications discussed in this guide. Feature package G is required to provide I-2000 provisioning functionality for DS3 and Clear T1/E1 circuit types on DACS II frames, if that is desired. The ISX does not support DS3 terminations, so there is no Feature Package G option for ISXs.

The list items for Feature Package G are independent options for each DACS. For instance, if you will be controlling four CEFs but only two will be equipped for DS3 operation, you can include Feature Package G for two of them and not for the other two.

The I-2000 Software Order Form included at the end of this section provides a convenient means to calculate the total quantity of each list that will be required for a particular installation.

I-2000 Application Hardware

The I-2000 Hardware is ordered as a complete package. Those items with quantities defined as “1 per system”, in the Hardware Ordering Worksheet, are considered the Core Hardware. All other equipment is considered peripheral and can be ordered in various quantities up to the amount defined in the “quantities” column.

To better serve our customers, the following guidelines have been developed.

In the case of specific I-2000 sales oriented or configuration questions, please contact the DACS II Product Manager, Tom Adams, at (732) 949-8916.

In the case of I-2000 hardware configurations, that is, Sun, Central Data, Black Box, etc., call Unique Computer Services, Inc. at (732) 786-0111.

In the case of customer orders, submit a Request For Proposal (RFP) to Unique Computer Services, via facsimile at (908) 786-0097 with a follow-up via voice at (908) 786-0111.

I-2000 Hardware Ordering Worksheet

Order Qty.	Comcode	Description	Req'd Qty.
___ x	407747120	Sun UltraSPARC 1 Creator, Model 170E w/ 128Mb of RAM, 2.1 Gb Hard Drive, Internal 3.5" Floppy Drive, Internal CD-ROM	1 per system
		2.1 Gb Internal Hard Drive	1 per system
		20" Color Monitor	1 per system
		External 4mm Tape Drive	1 per system
		Sun Type 5 PC Country Kit	1 per system
		Central Data 16 port Serial Expansion Unit	1 per system
		Narrow to Wide SCSI Interface Cable	1 per system
___ x		50 Ft. 8 Wire RJ-45 Cables	As Needed
___ x		RJ-45/DB25M Terminal/Printer Adapter	As Needed
___ x		RJ-45/DB25MACU/Modem Adapter	As Needed
		SunLink HSI/SBus X.25 Interface Card	1 per system
___ x		Black Box RS232 - RS422/449 Converter	2,3,4
___ x		10 Ft. M37 or Equivalent Serial Cable	2,3,4
___ x		Asynch. ASCII Monochrome Terminal	As Needed
___ x		9 Pin Dot Matrix Printer - 110V	0 or 1
___ x		9 Pin Dot Matrix Printer - 220V	0 or 1
___ x		Parallel Printer Cable, 6 ft.	0 or 1

I-2000 Software Ordering Worksheet

____1 x J9C004B-3, List 1 (for United States applications)

____1 x J9C004A-4, List 1 (for non United States applications)
Equipped with:

Order Qty.	List	Description	Requirement
1 x	**List A1**	R3.3.8 Application Software R3.3.8 Configuration Software Software Release Description Document	One Per System
1 x	**List M1B**	Basic Right to Use	One Per System
1 x	**List B2**	Informix Database Software for Solaris 2.5.1 Operating System	One Per System
___ x	**List C1**	User's Guide Document	As Required
___ x	**List C2**	Installation Manual	As Required
___ x	**List M1G**	Basic RTU for one ISX	One for each ISX to be controlled
___ x	**List F2G**	Feature Package D for one ISX	One for each ISX, for DACScan-2000 Interface
___ x	**List M1R**	Basic RTU for one non-CEF DACS II	One for each non-CEF DACS II to be controlled
___ x	**List F2R**	Feature Package D for one non-CEF DACS II	One for each non-CEF DACS II, to add DACScan-2000 Interface
___ x	**List F5R**	Feature Package G for one non-CEF DACS II	One for each non-CEF DACS II, to add DS3 and Clear T1/E1
___ x	**List M1T**	Basic RTU for one CEF DACS II	One for each CEF DACS II to be controlled
___ x	**List F2T**	Feature Package D for one CEF DACS II	One for each CEF DACS II, to add DACScan-2000 Interface
___ x	**List F5T**	Feature Package G for one CEF DACS II	One for each CEF DACS II, to add DS3 and Clear T1/E1

Glossary

A

AC
Alternating current.

Action
An operation specified to the I-2000 by entry of a predefined value into the **Action** field of many I-2000 forms. The **Action** value is the command verb of the I-2000 user interface. It may generate one or more command verbs to the frame, or it may designate an operation that is strictly local to the I-2000 computer.

Activate
Place in service as a transmission-carrying circuit.

adm, ADMIN
Administrat -or, -ive.

AIS
Alarm Indication Signal.

Alarm
A message sent by a DACS indicating that transmission is impaired or equipment has failed. Alarms are classified by cause as Circuit Pack Failure, Carrier Failure (see CGA), and Facility Performance. They are also classified by severity for purposes of response notification.

A-law
A set of companding rules used for CEPT transmission. See also Compander, Gateway.

Altroute -ed -ing
Alternate routing of transmission paths.

ANSI
American National Standards Institute, a U.S. standards-setting body.

ARP
See Automatic Reconfiguration Plan.

ASCII
American Standard Code for Information Interchange.

Asynchronous
Operating at a speed determined by the circuit functions rather than by timing signals. Not synchronous.

Audit
An I-2000 function under Database Administration by which differences between the I-2000 database and a DACS database are tracked and logged.

Automatic Reconfiguration Plan (ARP)
A file containing a sequence of references to Reconfiguration Plans to be executed when the ARP is executed. See also Reconfiguration Plan.

B

Backbone Leg (BBL)
In a Broadcast Circuit, the transmission source. The one-way circuit from the From side to the virtual branch point.

Bandwidth
The number of channels used for a high-rate circuit.

BBL
See Backbone Leg.

Boot
In general, to load and start the operating system of a computer. In the I-2000, **Boot** means to load an I-2000 database with data reflecting the provisioning present in a specified DACS, or to provision the DACS so that it matches provisioning data stated in the I-2000 database.

bps
Bits per second.

Branch Legs
In a virtual broadcast circuit, the one-way circuits from the virtual branch point to the broadcast points.

Broadcast Circuit or Cross-connection
A virtual multipoint circuit, connecting a channel on one side with multiple channels on the other. The cross-connection is one-way and can be high-rate. Connection is through a virtual node, which is a logical, or software, entity that performs the signal switching. The circuit on the From side is the Backbone Leg, and the circuits on the To side are the Branch Legs.

C

Carrier Group Alarm (CGA)
Also called a Carrier Failure Alarm. One of several types of DACS II alarms (see Alarm).

CCN
Cross-connect Network.

CEF
Capacity Expansion Frame.

CEPT
See Conference European Postale et Telephonique.

CGA
See Carrier-Group Alarm.

Channel
A DS0-level signal that can be cross-connected in a circuit. Channels are provided by NPCs. An NPC makes available two directions per channel.

Channelized
A DS1 time division multiplexed into a number of lower capacity channels such as DS1 channelized into 24 DS0 channels.

Circuit
A cross-connection between channels. A two-point circuit connects two channels; a multipoint circuit connects more than two. A circuit may be a one-way circuit where one transmission direction is used for each channel, or a circuit may be a two-way circuit where both transmission directions are used for each channel. Thus, the same channel can be in two active one-way circuits.

Clear DS1 Signal
A nonchannelized, 193-bit DS1 signal on an NAS NPC. The 24 8-bit DS0 channels and one framing bit are cross-connected as one DS1 signal, 193 bits wide.

Clear E1 Signal
A nonchannelized, 256-bit DS1 signal on a CEPT NPC. The 32 8-bit DS0 channels are cross-connected as one DS1 signal, 256 bits wide.

COMCODE
Component code.

Command
A DACS command generated by an I-2000 action. It can also be an I-2000 **Action**, whether it generates one or more DACS commands, or no commands, to a frame.

Compander
Compressor-expander, a device used to protect low-level voice volumes from noise by increasing them for transmission; that is, compressing the range of volumes and expanding the range again at the other end of the transmission. See also A-law and Mu-law.

Conference European Postale et Telephonique.
The European standard-setting body who defines E1 transmission standards.

Contiguous Cross-connections
Multiple cross-connections such that the channels on the From side and the To side are each consecutively numbered channels in a single NPC.

Create
An I-2000 **Action** used in a number of forms to register an object in the I-2000 database. Some objects that can be created are a frame and NPC.

Cross-connect -ion -ing
A circuit between two or more channels. The frame interchanges to connect channels from a time slot in one NPC to another time slot in the same or in a different NPC, as designated by the I-2000.

D

DACS
Digital Access and Cross-connect System.

DACScan-2000 Controller C-Module
A multi-DACS control network that can utilize the I-2000 as a controller via machine-to-machine communication.

DACS Database
The I-2000 database that is named with a DACS Site Name and stores I-2000 information concerning that DACS. This database is distinct from the DACS's own database, here termed the *remote* or *facility* database, which is installed on the DACS itself.

DACS I, DACS II
An Lucent Technologies product that terminates DS1-level multiplexed signals and has the capability of separating them into DS0 signals for purposes of cross-connecting them. The I-2000 provides a user-friendly interface to generate the commands that instruct the DACS to perform the appropriate cross-connections.

Database
A collection of logically united data. Here, the term does not imply any specific structure of code or organization of data on disk or in memory. The data might be tracked in various ways and be stored at disparate locations. A screen, for example, is not necessarily a record in a file, as it would be in COBOL or PL-1.

DB
Database.

DC
Direct current.

DCE
Data Communications Equipment.

Deactivate
Place out of service as a transmission-carrying circuit.

Delete
An I-2000 **Action** used in a number of forms to delete an object from the I-2000 database. Some objects that can be deleted are a frame and an NPC.

Digroup
For NAS transmission, a digroup is 24 (two groups of 12) DS0-level signals. It is a specific kind of NPC provided by a DDC.

DMB
Digital Multipoint Bridge.

Domestic
A term used in earlier DACS and I-2000 documentation to mean North American Standard (NAS). Strictly speaking, however, this term only applies to within the U.S.

DPC
Dual primary card.

DSX
Digital Signal Cross-connect.

DS0
Digital signal level 0. A level in the NAS TDM transmission hierarchy providing a single channel with a 64-Kbps data rate.

DS1
Digital signal level 1. A level in the NAS TDM transmission hierarchy providing 24 DS0 channels at a transmission rate is 1.544 Mbps.

DS3
Digital signal level 3. A level in the NAS TDM transmission hierarchy providing 672 DS0 channels at a transmission rate of 44.736 Mbps.

DTE
Data Terminal Equipment.

E

Echoed Response Processing (ERP)
An Echoed Response Message is a message from a frame to the I-2000 that is not in response to an I-2000 process waiting for it. Echoed Response Messages often indicate that provisioning has been performed in the frame but is not matched by provisioning in the I-2000. Echoed Response Processing is I-2000-only NPC or circuit provisioning that is automatically performed for the purpose of making the I-2000 provisioning match the frame provisioning indicated by the message.

EFT
External Facility Termination.

EIA
Electronic Industries Association.

ERP
See Echoed Response Processing.

Equipment Provisioning
Prior to the I-2000 Release 3.2, the term used for NPC provisioning in I-2000 forms.

Execute
In general, to invoke an **Action**.

E1
A level in the CEPT TDM hierarchy providing 32 channels at a transmission rate of 2.048 Mbps.

F

Facility
In the telephone vocabulary, a device for transmitting telephone signals. With reference to a DACS, “facility” is typically used to mean NPC.

Far End
With regard to a cross-connection, the far end is the NPC at the other end of a line terminating in one of the sides of the circuit. Thus, a two-point, single-channel cross-connection has two far ends.

Field
A named and delineated space on the screen for data entry or display; also, the logical entity associated with the name.

Form, Screen
A terminal display showing field names into which you enter data.

Frame
In this guide, a frame refers to a DACS machine.

From Channel Assignment
One side in a cross-connection. The name derives from the fact that the DACS II command that establishes the cross-connection identifies the channel number of this point with a From qualifier.

G

Gateway
A cross-connection between a channel in an NAS NPC and a channel in a CEPT NPC. For transmission of digitized voice signals, the difference in companding rules must be taken into consideration; that is, an A- to Mu-Law Conversion may be necessary. This conversion is not necessarily for transmission of data signals.

Generate a Report
To instruct the I-2000 to create a report in an electronic file. Printing or displaying the file is a separate step.

Generic
Formerly the release number of the software and, therefore, the “type” of software. One generic is not necessarily compatible with another. Currently, the use of generic has been dropped, and the term “release” is used instead.

GPSC
General Purpose Synchronous Controller.

H

HDU
Hard Disk Unit.

High-rate Circuit
A single circuit defined to be multiple one-way or two-way two-point cross-connections. The number of cross-connections, which is the same as the number of channels on a side, is the bandwidth. Bandwidth is allocated on channels that are numbered contiguously or alternately.

History File
A file storing I-2000/DACS communications just as they were generated or received, in circumstances for which a history file has been defined.

Hub Test Configuration
A test circuit configuration in which any number of signals to be tested are brought from remote DACS frames to a Hub DACS where they are then routed to test equipment.

HuMan-Machine Language (MML)
A software command language that is used in the interface to the DACS frame.

I

Idle
A concept that is based on the Idle **Action** of Reconfiguration Plan Provisioning. To idle a plan means to restore all circuits acted upon by actions in the plan to their previous status.

In Service (IS)
A value displayed in a Status field, indicating that the object referenced by the form is fully operable. For example, if the object is an NPC, an NPC that is “IS” has been created and restored. Only in-service NPCs can provide transmission.

IPC
Intelligent Ports Card.

IS
See In Service.

ISX
Integral Shelf Cross-connect.

IW
Insertion Word.

I-2000 Controller for DACS II
A controller that offers a user-friendly interface between operators at terminals and multiple frames stationed on a Packet Data Network (PDN) or in a point-to-point configuration.

K

Kb
Kilo-bits.

Kbps
Kilo-bits per second.

Keystroke
The signal resulting from pressing a key once.

L

Line
A connection between a computer and a peripheral, such as a terminal. In general, however, a line can be any stream of transmission or facility carrying it.

Link
A connection to a network.

Log
A file containing records of events resulting from various circumstances. Some logs are automatically generated by the I-2000; others can be manually kept by the user in the I-2000.

M

Master
In database audit/synchronization, the database designated as the standard to which other databases must conform.

Mb
Megabits.

Mbps
Megabits per second.

Menu
A list of selections on the screen.

MML
See Man-Machine Language.

Modem
Modulator-demodulator, a device that converts signals from data processing into signals suitable for transmission over telephone lines (modulation) and vice versa (demodulation). A modem is required to transmit the synchronous signals to and from the PDN.

Multiplexing
Multiplexing is the combining of a number of signals into one transmission stream. Demultiplexing is the separation of a multiplexed stream into consistent signals. (see Time Division Multiplexing.)

Multipoint Circuit
A cross-connection in which a signal can be sent from a single source to a number of destinations. A DACS multipoint is a two-way circuit and features a DMB channel as a branch point. See also Broadcast Circuit.

Mu-Law
A set of companding rules used for NAS transmission. See also Compander, Gateway.

N

NAM
No A- to Mu-Law Conversion.

NAS
See North American Standard.

NAS Facility
An NPC terminating DS1 signals that were multiplexed according to the Time-Division Multiplexing (TDM) hierarchy in use in the North American Standard (NAS).

Network
A set of communication pathways. Networks consist of nodes connected by links.

Normalize
Return an Altrouted circuit to its original path or a Preempted circuit to Active state.

North American Standard (NAS)
A standard or transmission in use in the United States and elsewhere. Within the U.S., it is termed domestic.

NPC
Network Processing Circuit.

NPC Roll
The transfer of all the circuits connected to an NPC to another NPC. Only certain kinds of NPC can be rolled.

NPC Type
The kind of NPC where “type” gets its significance from the **Type** field of the NPC Provisioning Form. Different types of NPC are provided by different hardware modules.

NULL Status
A value returned to a status field, after you press ENTER, when no record of the object described by the form exists in the I-2000 database. An example of an object that can have a NULL status is a login port.

O

O&M
Operation and Maintenance.

One-way Cross-connect or Circuit
A cross-connect that utilizes only one transmission direction.

OOS
See Out of Service.

Operator
As used in the I-2000, a person who has logged on with a login and password assigned by the system administrator. An operator does not have access to the selections listed on the System Administration Menu.

Out of Service (OOS)
A value displayed in a status field indicating that the object referenced by the form exists in the database but is not yet operable. For example, an NPC that is OOS is equipped but is not placed in active service. An out-of-service NPC cannot be expected to transmit data.

P

Packet Data Network (PDN)
A network on which data is transmitted by breaking it up into packets. Commonly, the X.25 protocol is used in a PDN. Connection to a customer X.25 PDN by the I-2000 is through the X.25 interface Board. See also Switched Virtual Circuit.

Passthrough
A special mode of the I-2000 that allows an operator at an I-2000 terminal to communicate directly to a frame as though the I-2000 were a frame terminal.

PCM
See Pulse Code Modulation.

PDN
See Packet Data Network.

PDS
Product Documentation Standard.

Pending
Said of circuits that exist in the I-2000 only and are marked with a Pending **Ckt Status**. They are waiting to be activated.

Port
A physical and logical connection to a computing system. The I-2000 provides asynchronous RS-232C ports for its operator terminals and synchronous X.25 ports for connecting to other equipment. These ports are provided by the IPC-900 and IPC-1600 Boards. Synchronous ports, for connection to the PDN, are provided by GPSC-AT/E Boards.

Provisioning
The process of making available various communications resources. In the I-2000, the resources are mainly NPCs and circuits.

Pulse Code Modulation (PCM)
Digital transmission of an analog voice signal by converting it into a digital signal.

R

RAM
Random Access Memory.

Reconfiguration
In the I-2000, the alteration of a circuit in any way, whether by changing its **Ckt Status** or its terminations.

Reconfiguration Plan (RP)
A defined collection of circuit provisioning actions.

Remove
As used in the I-2000, to take an object out of service. Some objects that can be removed are an asynchronous port, a synchronous link, a frame, and an NPC.

Restore
As used in the I-2000, to place an object in service. Some objects that can be restored are an asynchronous port, a synchronous link, a frame, and an NPC. The term is also applied to retrieving a database from backup.

Root
The highest level directory of any UNIX System. In the I-2000 System, root is the initial login of the system and also grants full access to it. The root password is the password associated with root.

RP
See Reconfiguration Plan.

Rx
Receive.

S

Schedule
In the I-2000, to place an **Action** on queue, to be executed at the time and frequency specified in the scheduling insert.

Screen, Form
A terminal display showing named fields into which you enter data.

SCSI
See Small Computer Systems Interface.

Search Criteria
In the I-2000, a field value or range of values, specified on a Search Criteria Form, that restrict the scope of the report data to be found by keying in on that field.

Side
One of the two duplicate NPCs with the same address provided by a DMB circuit pack. They are identified as Side 0 and Side 1.

Small Computer Systems Interface (SCSI)
An interface established to support mass storage for microcomputers and minicomputers. Published in ANSI Standard X3.131, it defines a standard for attaching intelligent peripherals to computers.

Snider
The Asynchronous Data Link Protocol, an EIA RS-449 based Lucent Technologies handshaking routine used to handle input transactions to a frame and output messages from it.

Speed
The baud rate over an asynchronous line. The I-2000 offers baud rates of 1200, 2400, 4800, or 9600.

Stand-alone
Hardware or software that functions without the assistance of other hardware or software. A DACS can be used as a stand-alone device, without either the I-2000 or the DACScan-2000 Controller C-Module.

Status
In the I-2000, one of a number of fields not accessible to the user, which display the current predefined mode of activity of an object. Some of the objects that have a status are a login port, a synchronous link, an NPC, and a circuit. Sometimes “state” is used as a synonym. Some of the major status values are IS (In service) OOS (Out of Service), UEQPD (Unequipped), and NULL.

SVC
See Switched Virtual Circuit.

Switched Virtual Circuit (SVC)
A virtual circuit set up for the duration of a call on an X.25 Packet Data Network (PDN). An X.25 card provides 20 SVCs. Each installed DACS reserves one for its primary link and possibly another for backup.

Synchronization
To make predefined logical objects contain the same or similar data in parallel. An example of parallel objects are the time and date in both the I-2000 and a frame. Synchronization is also an I-2000 **Action** under Database Administration by which differences between the I-2000 database and the DACS database for a given DACS are reconciled, subject to certain restrictions. This is termed "manual" synchronization. Echoed Response Processing also performs some automatic synchronization. Synchronization of alarm information can be turned on or off in I-2000 Circuit Provisioning.

Synchronous
In step or in phase, as applied to two or more circuits.

T

Task
As used in the I-2000, a set of commands or an I-2000-only operation that has been initiated on the I-200 System with the EXECUTE key. It may or may not be identical with one or more UNIX tasks. An I-2000 task may be executed in the background or foreground, or may be placed on queue for scheduled execution.

TDM
See Time Division Multiplexing.

TDM Hierarchy
A set of digital levels determining the number of channels that will be sampled during one time frame in Pulse Code Modulation transmission. (See Time Division Multiplexing.)

Test Access
Cross-connecting test ports in test circuits.

Test Port
Two contiguous channels that have been designated as a test port through Test Port Provisioning. They must be located in an NPC that has been designated as a Test Port Group.

Test Port Group
An equipped NPC that has been further designated as a collection of test ports through Test Port Provisioning.

Threshold
An error rate below which no alarm is generated for a Facility Performance Parameter. A DACS II stores sets of Facility Performance Parameter Thresholds for each performance parameter.

Time Division Multiplexing (TDM)
The multiplexing of a number of channels for transmission purposes by taking samples of the signal on each channel at time intervals.

Time Slot
A timed position in a formatted stream of 8-bit words resulting from TDM.

To Channel Assignment
One side in a two-point cross-connection. Its name is derived from the fact that the frame command that establishes the cross-connection identifies the channel number of this point with a To qualifier.

Trunk Conditioning
A code associated with cross-connected channels or a provisioned test port. The code tells the frame which signals to place on each channel if the facility fails. It indicates signaling bits to be sent in each direction on the circuit for the first 2.5 seconds after transmission is lost and another set to be sent thereafter.

Two-way Cross-connection
A two-point cross-connection that connects the channels in both transmission directions.

TSI
Time Slot Interchanger.

Tx
Transmit.

T1
A transmission system that transmits data at the DS1 rate.

U

UEQD
Unequipped

UI
User interface.

Upload
An I-2000 **Action** under Database Administration by which the I-2000 database is synchronized to the current provisioning of a frame.

UPS
Uninterruptable Power Supply.

User
The person performing an **Action** on an I-2000 System.

V

VGA
Video Graphics Adapter.

Virtual Multipoint Circuit
A Broadcast Circuit, called virtual because the connection is not provided by a DMB, as it is in a true multipoint circuit. Instead, it is a software emulation.

X

X.25

An Lucent Technologies implementation of CCITT Recommendation X.25, a packet-switching protocol defining standards of communication between DTE and DCE; that is, the DTE/DCE interface. The recommendation defines the physical, data link, and network layers of the Reference Model for Open Systems interconnection, an international convention for data communication.

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