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TELRAD DIGITAL Family Product Description

DIGITAL

Business Telecommunication System

PRODUCT DESCRIPTION

Cat. No. 76-110-01000G ■ Issue 1

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Business Telecommunication System

PRODUCT DESCRIPTION

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This document describes Telrad's Release 7 of the **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems, Release 2 of the **SynopSys** systems, and Release 7.00 of **ImaGEN**, as of August 1999.

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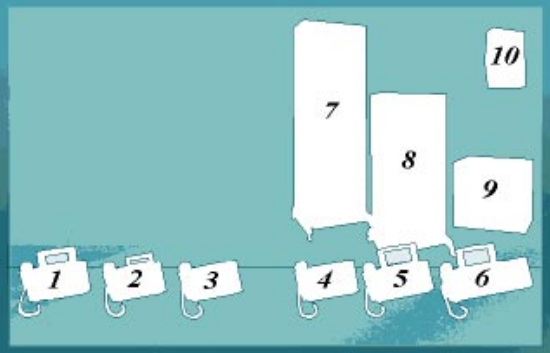
CONTENTS

The Telrad DIGITAL Family

1) Avanti Display set
2) Avanti Speakerphone Display set
3) Avanti Monitor set
4) Avanti 15-Button set
5) Avanti Executive set
6) Avanti Attendant station with 36-Button Add-On unit
7) DIGITAL 1000
8) DIGITAL 400
9) DIGITAL KEY BX
10) SynopSys



The DIGITAL family of telephone systems

1 INTRODUCTION

This document describes the Telrad **DIGITAL** family of integrated telephone systems, including the **DIGITAL 1000** medium- and large-business system, **DIGITAL 400** and **DIGITAL KEY BX** small- and medium-business systems and the **SynopSys** small-business system. These telecommunications systems provide a clear migration path from the smallest 13 ports, supporting four outside lines and nine telephones, to the largest 1024 ports, supporting up to 255 outside lines and up to 925 telephones.

All systems in the Telrad **DIGITAL** family provide the latest in computer telephony integration (CTI) including support for TSAPI- and basic or expanded TAPI-compliant off-the-shelf, Telrad-developed, and other applications. Each of these systems brings your office into the era of full integration and simultaneous transmission of voice and data. Combining advanced technology with simplicity of operation, the **DIGITAL** systems are capable of meeting your evolving communication requirements for years to come. They provide modularity and ease of expandability, with a smooth migration path from the smallest system to the largest.

Telrad **DIGITAL** family of systems was in the forefront of integrating ISDN into the private exchange. Each of these systems supports ISDN telephones and terminals and both Primary and Basic Rate Interface ISDN outside lines.

Telrad is introducing a new line of seven Avanti telephones for the **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems, including one model with a 128 x 240 pixel graphic display. All telephones with displays include softkeys that actively change there function in accordance with call progress. Some of these telephones can be expanded with DSS add-on units and the addition of feature cards, like the data cards or the voice recognition dialing card.

The SynopSys system uses the seven Telrad DIGITAL telephone sets and the 36 button Add-on units. If you upgrade from a SynopSys system to one of the larger Telrad **DIGITAL** systems you can keep using the same telephones for cost savings as you migrate to a larger system.

DIGITAL KEY BX, DIGITAL 400, AND DIGITAL 1000 SYSTEMS

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems provide optional ISDN Primary Rate Interface (PRI) and Basic Rate Interface (BRI) cards to connect to outside and network lines. With ISDN, your **DIGITAL** systems will be part of the current communication revolution. ISDN (Integrated Services Digital Network) access brings you to the era of full end-to-end digital communications, providing economical, enhanced services. The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems are compatible with Nortel, AT&T, and ETSI ISDN standards.

The systems also provide Basic Rate Interface for ISDN terminals for Internet access and video conferencing. With a cost effective start-up configuration of four outside lines and 16 stations provided by just two printed circuit cards, the **DIGITAL KEY BX** system can grow to 96 extensions and 48 outside lines (a maximum of 128 ports combined). The **DIGITAL 400** system can grow to 254 extensions and 144 outside lines (a maximum of 384 ports combined),

DIGITAL 1000 system can grow to 925 extensions and 255 outside lines (a maximum of 1024 ports combined).

The same peripheral equipment and stations are supported on the **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems. This protects your investment and ensures easy expansion of your telephone system up to the largest configuration in the family.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems incorporate many exciting standard and optional features, such as DPNSS (Digital Private Network Signaling System 1) and QSIG intersystem networking, Electronic Business Card, speed dial phonebook, PC attendant answering, calling and call registry package, voice activated speed dialing, integrated Caller Identification (caller ID) with automatic or intelligent call routing, Direct Inward Dialing (DID), editable text messaging, visual message selection, flexible programming of personal and system speed dial directories, advanced networking, flexible call cost monitoring, PBX operation (multiple station appearance), directory number (DN) buttons, automatic redial and auto dialer (scanner) and ISDN supplementary applications, such as, Calling Line Identification Presentation, Calling Line Identification Restriction, Direct Inward Dialing, Call-By-Call Integrated Service Access, Equal access and point-to-multipoint connection.

In addition, the **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems provide optional software packages that support ACD (Automatic Call Distribution), which routes and distributes incoming calls, as well as, its companion ACD I.Q. (ACD Information Query) management information and reporting software.

The **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems can be connected in networks in a variety of configuration to accommodate virtually any application. By integrating the call forwarding, call back, voice messages, and paging features with the private-networking features, the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems assure you a very powerful private network.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems' expanded private network feature facilitates internal dialing to all extensions in the network, access to all trunks in the network, and external call forwarding, call back on busy, messaging, and paging to extensions throughout the network.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems are compatible with the latest in telecommunication networking via ISDN lines, including DPNSS and QSIG intersystem corporate networking. DPNSS and QSIG enable multi-signal global communication. The speed, versatility, and security offered by DPNSS including its basic call and supplementary services and by the QSIG basic call services enable the integration of your Telrad **DIGITAL** switch with other **DIGITAL** switches or with switches of other vendors. DPNSS supplementary services include centralized voice mail, message, call forward, callback busy, callback no answer, and Calling Line Identification Presentation.

The system configuration is contained in a replaceable software memory cartridge attached to the Main Processor card (MPD). The **DIGITAL 1000** system has redundancy capabilities that enable the installation of a backup main processor on a second MPD.

Software updates and the addition of optional software applications are accomplished by simply changing the memory cartridge.

The system is programmed through a menu-driven, user-friendly application running on a personal computer (PC). The PC is connected to the system either locally,

or from a remote site via a modem. Programming can be performed online for immediate implementation, (without disrupting system operation), or offline, for downloading at a later time.

The **DIGITAL** systems are provided with a family of voice/data Avanti telephone sets characterized by an attractive man-machine interface, for simple operation. The Avanti sets range from an economical electronic telephone set, the Avanti 3000, to the sophisticated Avanti 3025 set that features graphic display with icons, softkey operation, dual color LED indicators, full duplex communication, electronic volume and contrast control, offhook voice announce with handsfree answerback, and many other features.

A Direct Station Select (DSS) unit, attachable to the Avanti sets, provides one-touch dialing as well as a visual Busy Lamp Field (BLF) indication for up to 120 extensions. The DSS unit may also be used for speed dial or feature activation.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems also support industry standard 500 (pulse) and 2500 (tone) type single line telephones (SLTs). When upgrading from previous Telrad systems, the family of **DIGITAL** stations and the Telrad analog stations manufactured after August 1987 may be retained and used with your new **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems.

Telrad's Integrated Multi-Application Generator - ImaGEN - provides a range of sophisticated, high-voice-quality automated attendant and voice mail features. Based on DSP (Digital Signal Processing) technology, the ImaGEN totally integrates with the **DIGITAL** system's software and user interface. Visual messaging lets you view a detailed list of all messages in your mailbox on the displays of the Avanti 3025, Avanti 3020F, Avanti 3020H sets. At the touch of a station button, you may access messages, record conversations, and forward, copy, or distribute messages to user groups. The unified messaging feature sends your ImaGEN messages to your MS-Exchange or MS-Outlook E-mail inbox, where you can select them and activate ImaGEN message features like play, record, playback, copy, and send directly from your PC screen.

An optional application generator is available with the ImaGEN system. The application generator provides a tool to design and build completely customized ImaGEN voice mail menus, messages, announcements, and interview questions to satisfy virtually any application.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems utilize ISDN-type technology (2B+D), using both B channels for internal communication.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems support Computer Telephone Integration (CTI) that gives your telephone system access to a wide range of computer-based applications.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems support Extended TAPI (Telephony Application Programming Interface) and TSAPI (Telephony Services Application Programming Interface). This enables you to build wide-ranging, functional applications that benefit your business. TAPI and TSAPI provide a set of software routines that enable the control of the **DIGITAL** systems from within a software application.

TAPI enables you to integrate your desktop PC and telephone, using custom or shrink-wrapped TAPI-compliant software. TAPI is a component of Windows 95/98 and Windows NT.

TSAPI provides a system level computer telephony interface between the **DIGITAL** system and a computer network server running on an NT network. TSAPI provides third-party, call-control functionality.

TAPI and TSAPI provide for very cost-efficient computer telephony integration.

PC applications supported by the DATA*Lync* data card include TAPI applications and custom written applications, using the TelradLINK protocol.

The APP*Lync* data card supports TSAPI and ACD I.Q. applications.

The APP*Lync* and DATA*Lync* data cards, when installed in Avanti telephone sets, provide an interface with a PC via a snap-in RS-232 configured port.

Other CTI applications allow PC users to place, control, and monitor telephone calls from a PC. For example, the TelradLINK protocol, used in conjunction with an individual developer's software, gives your organization the ability to talk to customers or prospects while reviewing all contacts, sales or other information on a PC screen. The TelradLINK protocol allows third-party companies to write customized CTI software applications that interface with and provide additional features for your **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems. Access to all features of the Avanti station can be done through a window on your contact management or database software right on your PC screen. Extended TAPI and TSAPI enables you to interface with developer software or off-the-shelf TAPI and TSAPI compatible applications. User productivity is improved through shorter dialing time, reduced call set-up time, and the ability to tailor scripts or presentations to customer requirements, such as PC screen pops linking customer records to incoming or outgoing calls.

Caller ID (called ANI on T1 digital lines and CLIP on PRI or BRI digital lines), the most widely used CTI application, displays the telephone number of the calling party on Avanti sets with displays. When linked to a PC, CTI applications can check a database and provide screen pops with customer information or files on the PC screen as the call is received.

The Computer Telephony applications are described in detail in Section 4, *DIGITAL KEY BX, DIGITAL 400 and DIGITAL 1000 Computer Telephony Integration.*

Direct Inward Dialing (called Direct Number Identification Services on digital lines) enables the routing of incoming calls directly to a specific individual station.

Avanti sets with display will show a 16 character alphanumeric DNIS. The DID/DNIS information can be used in CTI applications for call routing, screen pops, and application launches.

The **DIGITAL** systems offer you the best in voice and data communications today and, with their state-of-the-art data technology, provide the platform from which to plan sophisticated data communication applications for tomorrow.

Telrad has been successfully designing and manufacturing telecommunications systems for almost half a century. The **DIGITAL** systems have been designed and built based on the experience gained by Telrad over the years.

Telrad's development and manufacturing facilities meet the highest standards of the industry and have been awarded ISO 9001 and ISO 9000.3 certification, as well as the highest national award for quality.

The **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems are described in Sections 2

through 11, with the technical specification appearing in section 13.

THE SYNOPSYS SYSTEM

The **SynopSys** small business system provides a wide range of telephone features plus an array of options while remaining truly affordable. With its foundation of advanced Digital Signal Processing (DSP), you get pristine sound quality. Its modular design lets you quickly and easily expand your **SynopSys** system as your telephone needs grow.

The **SynopSys** system is compact yet powerful. It interfaces with both ISDN and analog outside lines and its internal communication can support ISDN terminals, Telrad DIGITAL telephones, and analog single line telephones. The **SynopSys** system has an optional multi-feature, digital voice mail system that runs on a card inside the **SynopSys** cabinet, or Telrad's powerful ImaGEN voice mail system can be connected to the **SynopSys** system.

Its DIGITAL telephone sets provide your **SynopSys** system with a modern family of voice/data telephone sets characterized by an attractive human-machine interface, for simple operation. The seven Telrad DIGITAL sets range from an economical electronic single line telephone, to the sophisticated Executive set, which features an expanded display, softkey operation, dual color LED indicators, electronic volume and contrast control, offhook voice announce with handsfree answerback, and many other features.

An Add-on unit, attachable to the DIGITAL sets, provides one-touch dialing, Direct Station Selection, for 25 extensions.

The **SynopSys** systems also support industry standard SLTs.

The **DIGITAL** family allows smooth migration, when you outgrow **SynopSys** and move into one of the larger **DIGITAL** systems. All of the terminals are still usable in the larger **DIGITAL** systems, thus protecting your investment.

The SynopSys system is described in detail in Section 12.

TERMINAL UNITS

2

TELEPHONE INSTRUMENTS

Avanti telephone set features

Telrad is introducing the new digital family of seven telephones: ***Avanti.***

These sets have been designed to provide the user with an easy-to-use yet extremely versatile telephone.

Buttons: The design and spacing of the buttons has been developed to enable the user to easily dial or perform other telephone features.

All of the stations have nine fixed buttons, including HOLD, REDIAL, CONFERENCE/TRANSFER and FEATURE, and from four to 29 programmable buttons. The dual color LEDs (light emitting diodes) on the programmable buttons enable you to know the status of the outside line, telephone, or feature supported by that button. The stations with displays also have from three to 16 softkeys.

- ***Softkeys:*** The Avanti 3025 set has 16 softkeys which dynamically change their status in accordance with call progress. Five of these buttons operate as worktable softkeys, as described below. The function of each softkey is indicated on the display with clear text or easily understood icons next to the buttons. The Avanti 3020F and Avanti 3020H sets have three menu softkeys on the left side of the display plus three worktable softkeys, as described below. The Avanti 3015DF and Avanti 3015DH sets have three menu softkeys below the display.

To operate the displayed feature, simply press the corresponding softkey. These softkeys display all the currently legal options, You never need to scan the station faceplate for function buttons or memorize feature access codes. With the valid softkey functions displayed, it is easier to select the desired function.

- ***ImaGEN display prompts:*** adjacent to the menu softkeys show you the options currently open to you in ImaGEN. Instead of listening to the recorded menus and dialing the required digit, you can press the appropriate softkey at any time.

- ***Worktable softkeys:*** On the Avanti 3025 set, five worktable softkeys, on the right side of the display, follow the progress of calls, calls placed on hold, and calls recalling to the station. You can retrieve these calls by pressing the appropriate worktable softkey. The Avanti 3020F and Avanti 3020H sets have three worktable softkeys on the right side of the display.

Figure 1 The Avanti buttons and dialpad

- ***Programmable Buttons:*** For easiness of use, features may be programmed on any of the station's programmable buttons. Then, a press of a button activates the feature.

- The function of each of the Avanti telephones' programmable buttons can be defined through system programming. To help you customize each individual telephone set precisely for the needs of the extension user, 57 programmable button maps are available in the **DIGITAL KEY BX** system, 73 programmable button maps are available in the **DIGITAL 400** system, and 143 programmable button maps are available in the **DIGITAL 1000** system.

- ***Cursor-movement button:*** The Avanti 3025 set has a four directional, cursor-movement button enabling you to easily move the cursor among the softkeys and icons on the telephone's graphic display.

- ***Enter button:*** With the Avanti 3025 set, once you have highlighted a softkey or icon, you may activate the feature by pressing the enter button.
- ***Dual color LEDs:*** The stations' programmable buttons all have dual color LEDs, which indicate the status of a line or facility (generally, green indicates accessibility to the station user; red indicates inaccessibility).

- **Display:** The Liquid Crystal Displays (LCD) on the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, and Avanti 3015DH sets are adjustable to provide easy viewing from different angles and lighting conditions. The telephone display modules include softkeys with functions that respond to the status of the telephone or function being used. The wide displays on the Avanti 3025, Avanti 3020F, and Avanti 3020H sets provide more call data and messaging information at a glance. The softkeys function as both menu and worktable keys. Icons appear next to six of the menu softkeys on the graphic display of the Avanti 3025 set.

Figure 2 The Avanti set display can be tilted to the desired angle

	Avanti 3025 set	*Avanti* 3020F and *Avanti* 3020H sets	*Avanti* 3015DF and *Avanti* 3015DH sets	*Avanti* Attendant
Display size	128x240 graphic	4x24	2x20	128x240 graphic
Cursor movement button	Y	-	-	Y
Enter button	Y	-	-	Y
Icon on display	Y	-	-	Y
Soft buttons	16	6	3	16
Call Id message list	Y	Y	Y	Y
Display contrast button controlled	Y	Y	Y	Y

Base: Each telephone comes with a base that allows you to adjust the telephone to either of two positions for the comfort of the user. The base can also be used to easily mount the telephone on the wall.

Communication: Models of the Avanti family of telephone sets are available with full duplex and half duplex communication. Full duplex enables both parties to speak and be heard simultaneously. The Avanti 3025 at the top of the range is full duplex. The Avanti 3015H and Avanti 3000, the sets without displays, are half duplex. The other sets are available in full-duplex or half-duplex models.

Operation: Basic telephone operation is consistent throughout the line of Avanti telephones. However, each telephone can be programmed to support specific features and to operate in either Key or PBX mode.

- ***Hot dialpad:*** Dial without lifting the handset or pressing a speaker/intercom button. The station speaker is automatically activated when any button on the dialpad is pressed, for internal dialing, when pressing an outside line button to initiate external dialing, or for operating system features.

Figure 3 Avanti DSS unit

- ***Distinctive station ringing:*** By selecting any one of the available distinctive ring tones for a station, users can easily recognize when their station rings.

Figure 4 Avanti 3015DF and 3015DH display sets

Figure 5 Avanti 3015H - 15-button set

- ***Handsfree Answerback (HFAB):*** Answer a voice call received through the station speaker handsfree, via the station microphone, without having to lift the handset or press the SPEAKER button.

Figure 6 Avanti 3020F and 3020H display sets

In addition, on Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H stations:

Handsfree: Initiate calls and talk handsfree, through the high-quality built-in speakerphone, on internal, local, long-distance, and international calls.

Voice activated speed dialing: A Voice Recognition card is available for dialing based on an oral (voice) command. From stations having this card, you can perform voice activated speed dial. The telephone will recognize your voice given instructions and dial the number you request. For each station having a Voice Recognition card, the user can record dialing instructions and program up to 56 numbers to be dialed.

Figure 7 Avanti 3025 graphic display set

DSS Add-on unit: Attach up to four DSS Add-on units (figure 2) to a station, to enable easy access to a total of 120 extensions and speed dial numbers and to provide extension Busy Lamp Field (BLF) indications. Each DSS Add-on module has four map buttons and 30 programmable buttons for speed dial numbers and BLF indication, so four sets of 30 speed dial numbers can be programmed. With the **DIGITAL KEY BX** system, up to eight button maps may be programmed. With the **DIGITAL 400** and **DIGITAL 1000** systems, up to 12 and 48 maps, respectively, may be programmed. The each of these systems a maximum of four maps may be assigned to each DSS.

Data interface: The optional Telrad APP*Lync* data card or the optional Telrad DATA*Lync* data card come in a unit that snap on to the bottom of the stations for use as a computer-telephony interface (see Data interface cards, later in this section). With either of these data cards, a PC may be connected to the telephones.

Figure 8 Avanti 3000

Software upgrades: When Telrad develops upgraded software for the telephones, the new software can be downloaded to the telephones from a remote sight or from a PC connected to the MPD card in the system cabinet, without touching the individual telephones.

The Avanti family includes seven stations:

- Avanti 3025 with graphic display, full duplex (Figure 7)
- Avanti 3020F with 4 line by 24 character display, full duplex (Figure 6)
- Avanti 3020H with 4 line by 24 character display (Figure 6)
- Avanti 3015DF with 2 line by 20 character display, full duplex (Figure 4)
- Avanti 3015DH with 2 line by 20 character display (Figure 4)
- Avanti 3015H 15 buttons with no display (Figure 5)
- Avanti 3000 four buttons with no display (Figure 8)

The Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H sets support as add-on units these options:

- DSS console,
- APP*Lync* data card,
- DATA*Lync* data card,
- Voice recognition dialing card.

Up to four DSS consoles or one card can be connected to an Avanti set.

On the Avanti 3020F and Avanti 3020H sets, one line of the display is dynamic, and the other lines are for menu items. On the Avanti 3015DF and Avanti 3015DH sets, one line of the display is dynamic, and the other is for menu items, which appear above the softkeys at the bottom of the display module.

OTHER TELEPHONES

The **DIGITAL 1000**, **DIGITAL 400**, **DIGITAL KEY BX**, and **SynopSys** systems support:

- The seven telephones of the Telrad DIGITAL family of stations (see Section 12 *SynopSys - the Small Business System)*
- Pulse/Tone SLTs (including telephones with message waiting lamp).

The **DIGITAL 1000**, **DIGITAL 400**, and **DIGITAL KEY BX** systems also support:

- Three PC-telephone products that operate by connecting a PC directly to a telephone set port:
  - PC phone (see *PC phone*, below)
  - PC attendant (see *Attendant and PC attenda*nt, below)
  - PC ACD (see Section 3)
- Telrad analog stations (manufactured after August 1987).

DATA INTERFACE CARDS

The **DIGITAL** family of systems comes with a variety of data cards that can be installed in the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H telephone sets. Each of the data cards provides a data channel with data links:

- ACD I.Q. (see Section 3, below);
- TAPI link (see Section 4, below);
- TSAPI link (see Section 4, below).

These links use the following application programming interfaces (API):

- TAPI;
- TSAPI;

The data cards come in special telephone set base modules that snap into the bottom of the Avanti telephone sets.

By connecting a Avanti telephone with the DATA*Lync* data card to a PC running a commercially available dialer software package, you may operate call processing features (dial, answer, and hang up) from the PC, using the PC keyboard or mouse.

The DATA*Lync* data card also supports interface for CTI using TAPI and provides an interface to customer written applications using the TelradLINK protocol.

The APP*Lync* data card supports interface for CTI using TSAPI and API via an advanced link protocol developed by Telrad and allows integration of third party software with ACD I.Q.

PC PHONE

The PC phone connects to a port on a ULD card like an Avanti telephone set. The PC phone can provide all of the features of the Avanti 3025 telephone with the added advantage and versatility of a PC.

ATTENDANT AND PC ATTENDANT

The **DIGITAL** family of systems provide two options for the attendant console. The attendant console may be operated using an Avanti 3025 set (see Figure 9) or via the PC attendant (see Figure 10). Either option provides many features of attendant call supervision:

- Speed in call processing
- Call status information

Figure 9 Avanti attendant console with DSS add-on unit

The PC attendant provides the attendant with:

- Additional speed in call processing
- Busy Lamp Field with icons indicating extension status and speed dial numbers
- Call register
- Caller ID data available with customized ringing and a picture of the caller
- Expanded speed dialing capabilities
- Expanded display with call status information
- Improved response time
- Integration with Telrad's ImaGEN voice mail system
- Integration with the Phone Book database
- Report generating capabilities
- TAPI driver for CTI interface and screen pops.

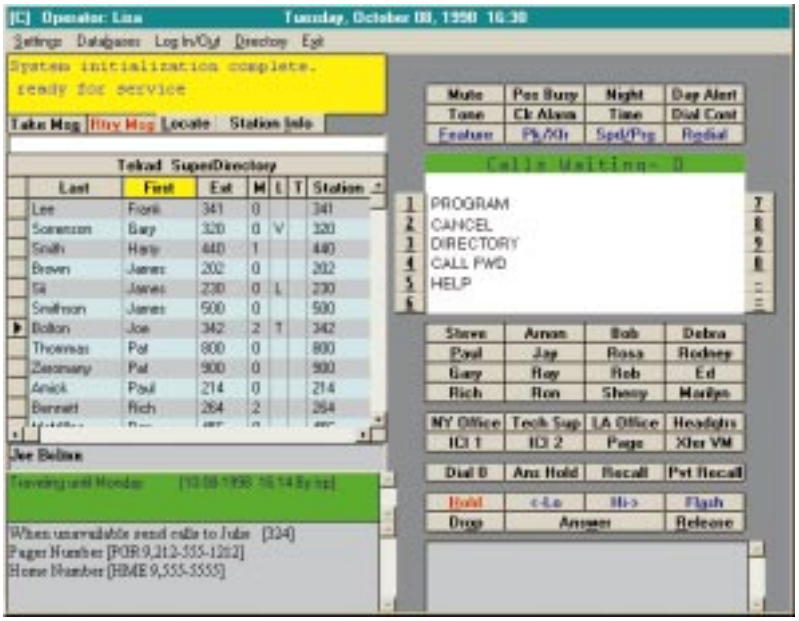


Figure 10 PC attendant call processing window

The personal computer-based attendant position for the **DIGITAL** system, provides the features of the telephone set attendant console with the added convenience, greater flexibility, and ease of use found in a PC-Windows environment (see Figure 10). In addition to the call processing features, the PC attendant provides integration with a phone book, voice mail, and a drive for TAPI.

The Avanti attendant telephone set (see Figure 8) has the capability and sophistication of a PBX console. With the aid of programmed logical queues, softkey operation, an expanded display with graphic capabilities, and DSS Add-on unit, the attendant can cope quickly and easily with greater volumes of call traffic.

An answering position can be configured in the system, in place of, or in addition to, an attendant console. Recalls and calls dialed to the attendant ring at the answering position.

CALL QUEUES

The **DIGITAL** systems can be divided into up to four logical tenant groups. Each group has 12 First-In-First-Out (FIFO) call queues, controlled by the attendant, for selective handling and equal sharing of call traffic.

All callers reaching the attendant hear ringback tone or Music on Hold, and enter a Main Call queue. In addition, incoming calls on privileged CO lines or internal extensions, can enter one of eight Incoming Call Identifier (ICI) queues. Interposition calls, recalls, and personal recalls also enter special queues.

Each queue has a button appearance at the attendant console. To answer a call from a queue, the attendant simply presses the queue button. With the PC attendant calls in a queue can be answered with a click of the mouse.

On the display, the attendant sees the source of calls ringing at the console and is able to answer calls according to priorities.

DISPLAY

The attendant's task is greatly facilitated by softkeys and icons, which change their function according to the console's state, and prompt the attendant as to the valid options open for further call processing.

The button functions at any particular moment are indicated on the display.

2

PC ATTENDANT FEATURES

The PC attendant runs on a PC running Windows 95, 98, NT, or 2000, using a telephone port in the **DIGITAL** system. A handset, headset, or optional Sound Blaster card can be used for audio.

An attendant has clear, easy-to-use screens and a custom-built, color-coded keyboard for fast and efficient call processing.

The following describes the PC attendant features.

Busy Lamp Field

Any of the extensions in the **DIGITAL** system can be placed on the Busy Lamp Field (BLF) to provide an icon with a visual indication of the status of extensions and to enable dialing of extensions with a click of the mouse. Busy Lamp Field icons can be created for the speed dial numbers so they can be dialed with a mouse click. Different folders can be set up for groups of speed dial and extension icons (for example, extensions in each department). The icons within any group can be selected individually.

Call Register

Calls to the PC attendant are recorded on a chronological log showing the date and time of the call, duration of ringing, duration of call, number or name of called or calling party. The Call Register options enable display of any of all of the following call categories: incoming or outgoing, internal or external, answered or unanswered. The Call Register accesses the Phone Book database to initiate callback. Call Register data can be printed or the database can be exported, for example, to Microsoft Excel for preparing a spreadsheet.

Caller ID box and picture

If the caller ID of a call ringing the PC attendant matches a Phone Book entry, the Phone Book entry details appear on the PC attendant screen. These details can also include a picture of the caller. To help identify the caller, ring styles can be customized for each Phone Book entry and can be stored as a *.wav* file.

Report printing

A report printing feature enables the attendant to print call data reports or export to the database for processing and printing (see *Call Register*).

TAPI driver for CTI

A TAPI driver is included with the PC attendant, to enable screen-popping from customer/client databases and other efficient benefits that CTI offers, if the PC is running TAPI-compliant software.

Voice mail integration

The PC attendant integrates with the ImaGEN voice mail system, giving the attendant the ability to route callers to the voice mail, even if the station is not call forwarded to the voice mail.

Access to ImaGEN can be achieved on-screen. Just click the mouse on one of the frequently-used ImaGEN features (Play, Record, Skip, Fast Forward, Pause, or Rewind) or on one of up to six additional user-definable ImaGEN feature buttons.

MAINTENANCE

The attendant plays a crucial role in maintaining smooth system operation. The attendant is informed, via the display, of alarm messages generated by the **DIGITAL** system diagnostics. In addition, the attendant can test ports and trunks to see if they are noisy or busy. The attendant can also cancel all system messages.

With the PC attendant, when the **DIGITAL** system sends an alarm, a Console Alarm Notification dialog box is displayed, giving the alarm number and a description of the alarm condition.

	Avanti 3025 set	Avanti 3020F set	Avanti 3020H set	Avanti 3015DF set	Avanti 3015DH set	Avanti 3015H set	Avanti 3000 set	Avanti Attendant
Display size	128x240 graphic	4x24	4x24	2x20	2X20	-	-	128x240 graphic
Cursor movement button	Y	-	-	-	-	-	-	Y
Enter button	Y	-	-	-	-	-	-	Y
Fixed buttons	9	9	9	9	9	9	9	22
Programable buttons	29	24	24	19	19	19	4	15
Soft buttons	16	6	6	3	3	-	-	16
Icons on display	Y	-	-	-	-	-	-	Y
Dual-color LED buttons	29	24	24	19	19	19	4	29
Handsfree answerback intercom	Y	Y	Y	Y	Y	Y	-	-
High quality speakerphone	Y	Y	Y	Y	Y	Y	-	-
Offhook voice announce with handsfree answerback	Y	Y	Y	Y	Y	-	-	-
Onhook dialing	Y	Y	Y	Y	Y	Y	Y	-
Distinctive ringing	Y	Y	Y	Y	Y	Y	Y	Y
Button control of speaker, handset, and ring volume and display contrast	Y	Y	Y	Y	Y	Y*	Y*	Y*
Support for the following options:								
Full duplex communication	Y	Y	-	Y	-	-	-	-
APP*Lync* data card	Y	Y	Y	Y	Y	Y	-	Y
DATA*Lync* data card	Y	Y	Y	Y	Y	Y	-	Y
Voice recognition card	Y	Y	Y	Y	Y	Y	-	Y
DSS Add-on units	Y	Y	Y	Y	Y	Y	-	Y

* Volume control only.

AUTOMATIC CALL DISTRIBUTION (ACD) APPLICATION OPTIONS

Figure 11 Telephone display of ACD statistics

Figure 12 Telephone display of a list of ACD agents

APPLICATIONS

Telrad's Automatic Call Distribution (ACD) system provides two optional software packages that support the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems.

The two Telrad ACD options are:

- The ACD enhanced call processing and distribution system;
- The ACD I.Q. management information system.

The ACD system has been designed for the service oriented office with a high volume of incoming call traffic that must be processed quickly and efficiently. ACD is uniquely suited for organizations that have to quickly process calls from numerous customers, such as customer care or customer service departments.

The ACD system provides the means to distribute calls among user groups and gives supervisors basic call processing statistics about their agents. Figure 11 shows ACD statistics, and figure 12 shows a list of ACD agents as it might appear on the Avanti 3025 telephone display.

The ACD I.Q. reporting package has been designed to provide advanced management information with graphical and statistical reports. ACD and ACD I.Q. streamline utilization of telephone and personnel resources and optimize the efficiency of your call center.

ACD SYSTEM

Telrad's Automatic Call Distribution (ACD) system provides an easy-to-use, advanced system for the routing and distribution of incoming calls to various office units, and also provides viewing of basic ACD statistics on the telephone display at the supervisor's station. The ACD system has been refined to include the ability to create ACD groups and to customize on-hold announcements for each group.

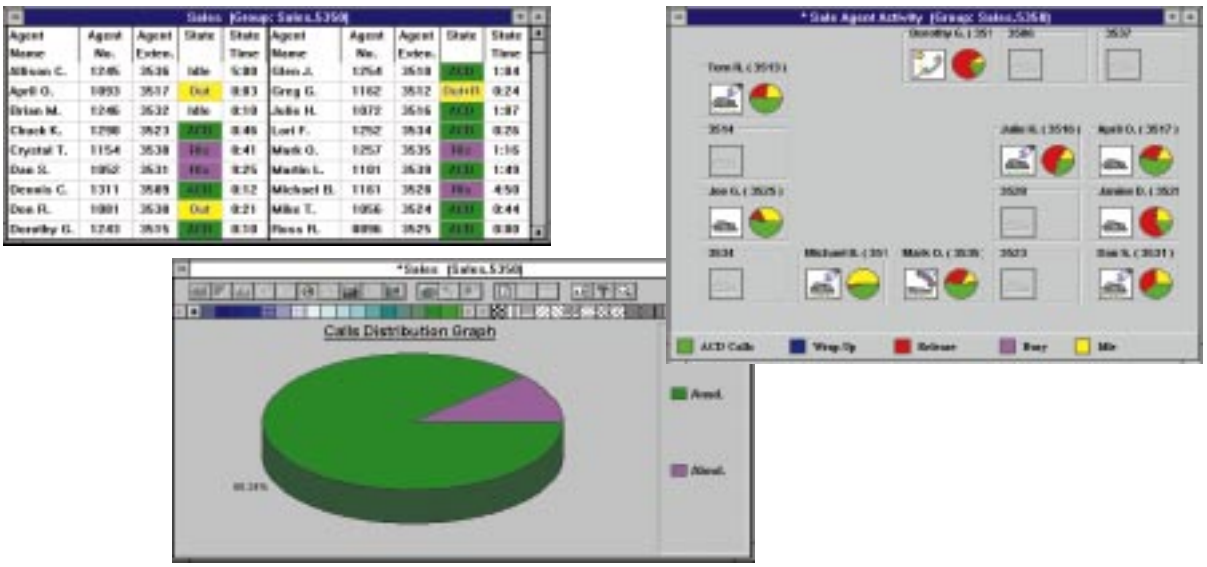


Figure 13 ACD I.Q sample agent status and call distribution windows

With ACD, calls directed to a central service facility are routed to the appropriate call queues.

Calls entering each of the queues are directed to the first available agent. Based on parameters programmed when configuring your system, the ACD system determines which agent is able to process the call first, thus enabling your organization to reduce the time callers must wait. The calls are processed according to the priority that you set for the ACD plan. Calls to an ACD plan may be interflowed to any station, attendant console, attendant position, trunk, trunk group, hunt group, MDN, ACD plan, speed dial number, or an ImaGEN or voice-store-and-forward mailbox. ACD provides a very flexible system for determining call distribution and routing to the agents. Calls can ring or be automatically connected to the agent. Agents can be given wrap-up time to handle activities, such as entering an order, before the next call is received.

PC ACD: The PC ACD provides a PC-based ACD agent console that enables the ACD agent to perform all of the agent functions from a PC. The PC ACD uses the same port on a line card as the ACD agent telephone would use and provides a CTI link to allow integration of third party applications.

ACD I.Q. SYSTEM

The ACD I.Q. is a sophisticated, Windows-based, online automatic call distribution management information system and reporting package that runs on a PC connected to a APP*Lync* data card installed in a Avanti telephone set. The ACD I.Q. computer receives data concerning the call processing activities of each ACD agent and of all of the ACD groups and queues in the system.

ACD I.Q. can generate online reports that provide real-time ACD call-processing data, or offline reports that provide a historical perspective of ACD call processing. The station that is connected to the ACD computer is not dedicated to that function, but can continue to perform all other functions.

ACD I.Q. allows you to request various types of reports and specify the time frames for the reports. In addition,

to viewing the ACD statistics on the telephone screen, multicolored statistical reports and histograms may be viewed on the computer screen or sent to a printer. Reports may be viewed immediately or stored for later retrieval and processing. The supervisor may program the system to generate specific reports at designated times: monthly, weekly, daily, or at the end of a shift or other time interval. Reports may be generated for agents, groups, super-groups, supervisors, trunks, trunk groups, call classifications, or clients.

Customized reports can be generated to suit each application. You can control the report range and modify the headers, colors, and fonts used. Report statistics can be programmed to appear in different colors when values reach certain thresholds. Up to three colors may be used for this purpose. The layout of online reports may also be customized to suit the user.

Offline reports: provide raw data on system usage (e.g. numbers of calls and agents), statistical analysis including averages and weighted averages (e.g. talk time or wait time), maximums (e.g. waiting time), and percentages (e.g. abandoned calls).

Current status reports: These reports show:

- Busy or idle status of every trunk in the **DIGITAL** system;
- Busy, hold, or idle status of every Agent extension in the **DIGITAL** system;
- Ring status of non-ACD calls;
- Status changes of every call currently in the ACD queue.

The ACD I.Q. supervisor has a great deal of flexibility in defining the statistical breakdown of the desired reports and in designating the format in which the data appears. Supervisors may view statistics on a number of groups or may view details of one particular group's agents. By means of user-friendly, pull-down menus and screens, the supervisor can quickly and easily modify the configuration of the ACD I.Q. data, and define the parameters of the database used for a report. Several supervisory positions can operate simultaneously, with each display providing real-time call processing information. At the same time, other

DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 COMPUTER TELEPHONY INTEGRATION

4

Computer Telephony Integration (CTI) provides for the mutual exchange of information between a computer system and a telephone system thereby increasing the value and versatility of each system. CTI provides businesses with a tool to improve customer service, increase employee efficiency and productivity, save time, and reduce operating cost.

The Telrad **DIGITAL** family of systems supports the following Computer Telephony Integration (CTI) links and Service Provider Interfaces (SPI):

- TAPI (Telephony Application Programming Interface) using the DATA*Lync* data card and the Telrad TAPI SPI;
- TSAPI (Telephony Services Application Programming Interface) using the APP*Lync* data card and the Telrad TSAPI SPI;
- ACD Link - using the APP*Lync* data card, for ACD I.Q. applications (see Section 3, *Automatic Call Distribution Application Options;*
- OAL (Open Architecture Link) - using the OAL module, for external voice mail applications (see *Telrad's OAL,* below).

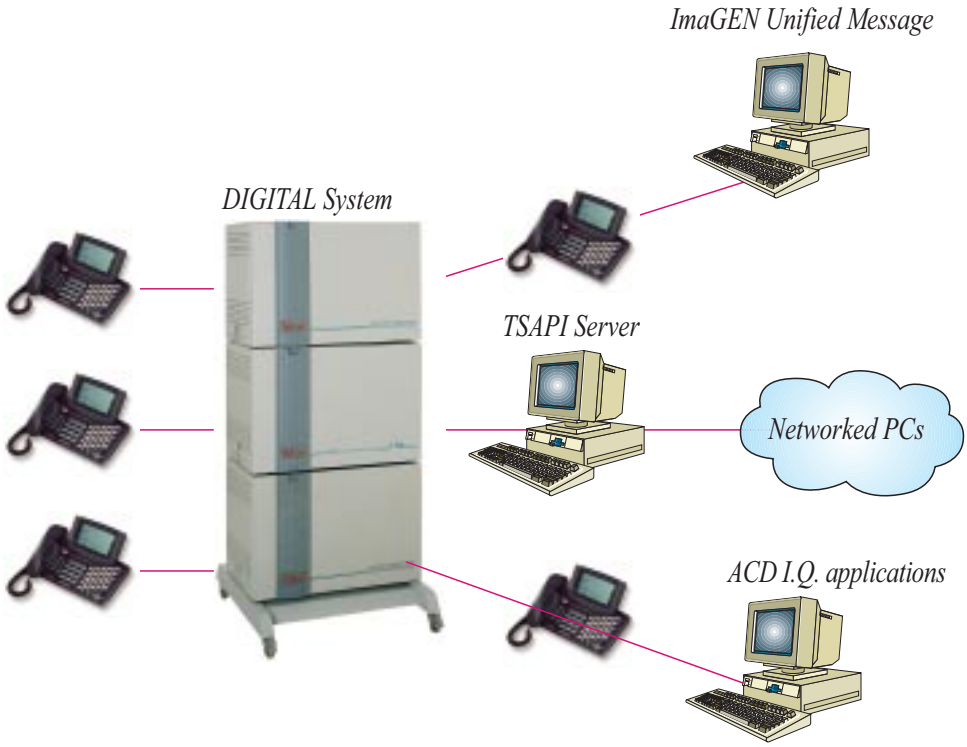


Figure 14 Data capabilities

4

TAPI

The Telrad **DIGITAL** family of systems supports TAPI, Telephony Application Programming Interface. TAPI provides a programming interface for the development of telephony control applications. TAPI enables the integration of shrink-wrapped software applications with the **DIGITAL** family of systems.

Telrad's TAPI product is implemented in the **DIGITAL KEY BX**, **DIGITAL 400**, and **DIGITAL 1000** systems via the DATA*Lync* data card, the TelradLINK protocol, and the Telrad TAPI Service Provider Interface (SPI). The SPI is installed in the personal computer and translates the TAPI protocol to a Telrad protocol. TAPI is supported in the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H telephone sets. TAPI is also supported by the **SynopSys** system with an **DIGITAL** Executive or Speakerphone telephone set with a TelradLINK Data Card.

TAPI allows a PC user to control telephone calls from a PC running Windows 95, 98, or from a Windows NT workstation, without having to touch the buttons on the telephone set. With TAPI, you can use commonly available Windows-based programs to perform a wide range of telephone functions directly from the PC, including dial, transfer, conference, disconnect, and Caller ID screen pops. This is extremely convenient for workers who require simultaneous use of the telephone and the PC (see Figure 16).

Figure 15 Telephony Application Programming Interface (TAPI)

TSAPI

TSAPI provides a two-way exchange of information, between the computer network and the telephone system, that supports information coordination and call routing services required for callers and recipients.

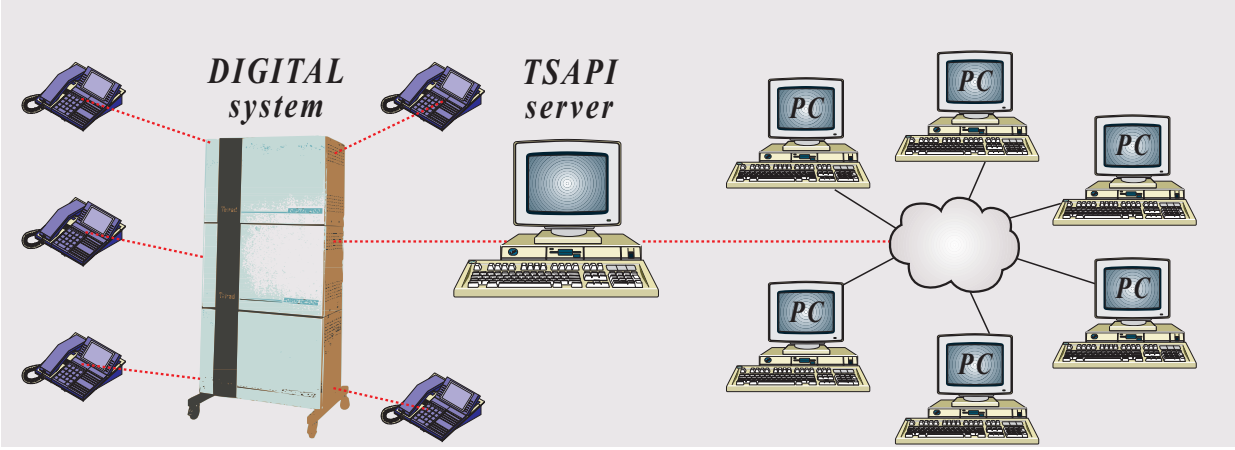


Figure 16 Telephone Services Application Programming Interface (TSAPI)

TSAPI is implemented via Telrad's APP*Lync* data card and Telrad's TSAPI SPI.

TSAPI provides a cost-effective CTI solution by eliminating the requirement for desktop CTI integration, and replacing it with system/network level integration (see Figure 16).

TELRAD'S OAL

Telrad's Open Architecture Link is used to connect the following Vendor Processing Equipment (VPE) to your **DIGITAL KEY BX, DIGITAL 400**, or **DIGITAL 1000** system:

- Third-party voice mail;
- Interactive Voice Response (IVR);
- CT (Computer Telephony) server;
- Any other VPE (Voice Processing Equipment).

5 IMAGEN VOICE MAIL AND AUTOMATED ATTENDANT FEATURES

Telrad's Integrated Multi-Application Generator - ImaGEN - uses a dedicated personal computer to provide advanced automated attendant and voice mail facilities, plus an application generator and other optional applications that are totally integrated with the **DIGITAL** systems' switch. ImaGEN serves both outside callers on tone telephones and internal Avanti telephone users. Messages can be retrieved internally or from remote locations. Calls can be forwarded to and from ImaGEN, and ImaGEN options can be operated via the station display and programmable buttons. The advanced automated attendant and voice mail features are described in this section, and the application generator and other optional features are described in Section 6, *ImaGEN Application Generator and Other Optional Features,* below.

The **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems' DPNSS networking capa--bilities provide the following centralized ImaGEN voice mail features across networked switches:

- Message LED indicator
- Voice memo
- Call forwarding to mailbox
- Call retrieval from mailbox
- Call record
- ImaGEN screen access

ImaGEN uses Digital Signal Processing (DSP) technology with 64kb/s Pulse Code Modulation (PCM) for crystal clear voice quality. ImaGEN provides 1,000 mailboxes, and is available with 70 hours of non-compressed message recording time. Additional message storage time is available should your application require it. However, compressed recording and playback can be selected for a lower sampling rate that increases the total recording time to more than 70 hours.

To take advantage of ImaGEN's crystal clear voice quality and also increase total recording time, you can program the ImaGEN system to select one voice quality for one type of message and a different quality for another type of message. For example, the external messages can be played in high quality, while the playback of internal messages stored in the mailboxes can be compressed, to allow more message storage.

ImaGEN can be configured with up to 12 voice mail ports in the **DIGITAL KEY BX** system, and up to 16 voice mail ports in the **DIGITAL 400** and **DIGITAL 1000** systems. From one to four ImaGEN voice mail cards, each supporting four ImaGEN voice mail ports, can be installed in the ImaGEN personal computer. A two-port ImaGEN voice mail card is also available for systems where 2, 6, 10 or 14 ImaGEN voice mail ports are required. The ImaGEN PC audio connects to the **DIGITAL** system via one to four Multiple Interface Modules (MIM) mounted on one or two Option (OCD) cards. The ImaGEN voice mail application does not use SLT lines.

For users of Avanti 3025, Avanti 3020F, or Avanti 3020H stations, ImaGEN provides a list of voice mail messages on the station display.

Separate lists appear for New and Urgent, Old, Certified, and Future Delivery messages. These lists can be accessed through the ImaGEN menus on the telephone display. The display shows the date, time, sender (Caller ID), and duration of the message. You can page through the list, or play any message on the list, by pressing the adjacent softkey.

With a networked personal computer, you can access your telephone messages from your E-mail inbox using the unified message feature. See *Unified message* under *ImaGEN mailbox user features*, below. In addition, you can see a display of message statistics showing how many New, Urgent, Old, Certified, and Future Delivery messages you have (see Figure 17)

With the ImaGEN interview feature, nine sets of interview questions - each with up to eight questions and one closing message - may be programmed. Separate sets of interview questions can be programmed for each of the four tenants.

Nine ImaGEN announcer messages may be programmed to serve the voice mail application.

In addition, 50 different announcer messages may be programmed to serve the Automatic Call Distribution application option in the **DIGITAL** system.

Configuration and administration of ImaGEN is simplified through easy-to-understand, menu-driven software. With the Avanti 3025 set, ImaGEN menu choices can be accessed through the softkeys adjacent to each selection and via the icons at the bottom of the display.With the Avanti 3020F and Avanti 3020H sets, ImaGEN menu choices can be accessed through the softkeys adjacent to each selection.

The Application generator provides a powerful and versatile tool for defining and modifying ImaGEN menus and operations, as described in Section 6, *ImaGEN Application Generator and Other Optional Features,* below.

AUTOMATED ATTENDANT

When answered by the Automated Attendant, outside callers hear recorded instructions which explain how to dial the extension or department of their choice, or how to access directory assistance. This affords the convenience of direct inward dialing on outside lines, and, since these calls are not transferred via an attendant, the attendant is free to perform other tasks.

With the Automated Attendant Dial-By-Name feature, both outside callers and extension users reaching the automated attendant may dial the name of the person that they are trying to reach rather than waiting to find out the extension number. Up to 1,500 names can be entered in the Automated Attendant Dial-By-Name file.

Alternately, the Automated Attendant Directory assistance feature can provide a list of numbered choices from which callers may select. See *Directory assistance*, under the *ImaGEN Incoming Caller Features*, below.

Figure 17 Display of message statistics

Figure 18 IMAGEN message classification choices on the Avanti 3025 set display

Callers answered by the Automated Attendant can also opt to wait on hold for a busy station by choosing the appropriate option when they receive a busy greeting. Certain automated attendant parameters can be programmed from your telephone, for example, the type of calls serviced by the automated attendant (internal/external) and the call forward options. The Automated Attendant can also double as an after hours attendant by providing the caller with information or by directing them through the voice mail system.

VOICE MAIL

The Voice Mail is a sophisticated, reliable, and confidential solution to the problem of unanswered or busy calls and also enables you to send voice memos internally to any station (see *Voice Memo,* below).

When a caller reaches a busy station or receives no answer at an extension, he or she is connected to ImaGEN, and hears one of the mailbox owner's pre-recorded personal greetings. Different greetings may be recorded, by the mailbox user, for busy and no answer situations. In addition, a temporary message may be recorded for special situations, for example when you are out at a convention or on vacation. The caller can then record and edit a voice message of any length in the user's mailbox, or call another extension.

For stations with displays, the number of voice messages recorded in your mailbox appears on your station display (see Figure 19). For Avanti 3025, Avanti 3020F, and Avanti 3020H sets, a list of the voice messages in your mailbox can be seen on the display, enabling you to select a specific message for playback.

Mailbox owners may review messages in their mailbox and select options such as replay, save, erase the message, or send or copy the message to other mailboxes.

Advanced functions include call screening on incoming calls, recording a call in progress, voice memo, tagging messages with date and time information or urgent or private classifications, future message delivery, forwarding message reminders to internal or outside numbers (including pager systems), and message restoration, which gives the users a 15-minute window o restore messages they have deleted, even if they have already hung up the telephone.

ImaGEN provides you with a variety of ways to access your messages even when you are not at your telephone:

- Listen to the messages sequentially by pressing the lit telephone message button
- Select the message that you want to hear, from the message list appearing on the display of the Avanti 3025, Avanti 3020F, and Avanti 3020H telephone sets
- Locate indexed messages quickly by requesting the message by its index number

- Access the messages in your mailbox from a telephone in a networked system
- Choose the message you want from your E-mail inbox using your PC

All access to mailboxes and message modification is controlled by private codes to ensure totally confidential communications.

Figure 19 Avanti 3015DF display showing the number of voice mail messages

Figure 20 Visual list of messages

ImaGEN-DIGITAL SYSTEM INTEGRATION

Direct communication is established between the processor of the ImaGEN PC and the DIGITAL system Central Pro--cessing Unit (CPU). ImaGEN leaves messages on the station display, and you can access ImaGEN through the regular procedures for answering messages, without having to first access ImaGEN.

You can even access ImaGEN with the Avanti telephone set's programmable buttons.

Calls can be forwarded from your station to ImaGEN or from ImaGEN to your station. You can access ImaGEN from a networked PC, and select messages from your E-mail inbox, then play them, or activate other ImaGEN features.

ImaGEN knows how to distinguish between incoming internal and external calls, and handles the calls appropriately.

On your Avanti telephone, you can have dedicated buttons that provide you access to ImaGEN call recording and call screening features. These dedicated buttons are programmed at system setup.

Using the ImaGEN application generator, you can customize the messages heard by the voice mail and automated attendant users to suit your exact requirements.

IMAGEN INCOMING CALLER FEATURES

Each of the ImaGen incoming caller features is described below.

Attendant assistance
At any stage in call processing, the caller may dial the attendant for personal assistance.

Automated Attendant Dial-By-Name (DBN)
Callers reaching the automated attendant may dial the name of the person that they would like to reach, rather than waiting to learn the extension number. See *Automated attendant* at the beginning of this section. Also see *Directory assistance*, below.

Automated interview
ImaGEN can serve as an automated interviewer for callers on pre-defined incoming outside lines, or the interview feature can be accessed from the automated attendant by dialing the interview digit.

Callers are asked a series of up to eight pre-recorded questions. The answers are recorded through the ImaGEN and stored in a separate file, in a dedicated mailbox, where they can be reviewed, collated, and summarized at a later time. The automated interview process concludes with a ninth recorded message that can be used as a sign-off message, or to provide the caller with further instructions. Up to nine separate interviews can be programmed to run concurrently in the ImaGEN, so that nine distinct interviews can be conducted simultaneously.

Camp on
Incoming callers answered by the automated attendant can camp themselves on (choose to wait for) the busy extension.

Camp on recall
If an extension, where a call is camped on, remains busy for more than a pre-defined time, the caller is returned to the automated attendant. When this occurs, the caller hears the personal opening greeting of the called party.

Directory assistance (secondary assistance option)
The Directory assistance feature of the Automated Attendant provides callers with a list of numbered choices from which to make their selection. For example, the initial message might state: "Press 5 for the Order Department, 6 for Customer Service, 7 for Shipping..." If you press "5" this can be followed by a second message: "Press 1 to place a new order, 2 to change an order, 3 for emergency shipments..." or you may receive a secondary message: "This is the Order Department; press 1 for Ellen Boller, 2 for Mark Frost, 3 for Mary Lauder, 4 for John Stone..."

Fax-tone recognition and routing
Incoming fax transmissions routed through the automated attendant are recognized and automatically forwarded to the single line circuit of the fax machine. A dedicated fax line is not required.

Messages
After leaving a message in a user's mailbox, the following options are provided:

Erase: After playback, erase the message.

Extend: Extend the time allotted for message recording.

Playback: Playback the message you recorded.

Re-record: Erase the recorded message and record another message.

Save: Save a recorded message.

Save options: Save a recorded message and assign one of the following special handling classifica--tions to it: Urgent, Private, Certified (confirmation of receipt), or Future Delivery.

Private messages
After recording a message, the caller can designate the message as private. This prevents automatic copying of the message to other mailboxes.

Record time-out warning
While recording a message, the ImaGEN voice mail system sends a "beep" to warn you that the time allotted for a message is running out. The ImaGEN voice mail system then explains how to extend the message time, if desired.

Single digit dialing
With the default programming, up to four destinations may be defined for single digit dialing. Each of these extensions can be reached by dialing a single digit from the main automated attendant menu.

Tenant greetings
You may record separate greetings for each of up to four tenants. Incoming callers hear the appropriate greeting for the tenant they are calling. Different greetings can be recorded for different time periods. With the ImaGEN option, you have a great deal of flexibility in programming tenant greetings. For each tenant you can program up to 32 different day, night, vacation, or other messages. Also, with the ImaGEN option, you can have different answer modes and greetings for different time periods, holidays, and vacations.

Urgent message designation
When leaving a message in a mailbox, ImaGEN gives you the option to designate it as an urgent message. Urgent messages are placed at the head of the new message queue, and voice-tagged as urgent. Mailbox owners can choose to automatically copy urgent messages only or can activate automatically copy for all messages.

IMAGEN MAILBOX USER FEATURES

ImaGEN mailbox user features include:

Automated attendant
The user can program certain automated attendant parameters from their telephone, including the type of calls serviced by the automated attendant (internal/external) and the call forward options.

Automatic message copy
To prevent important messages from being left unheard, mailboxes can be programmed to automatically copy new messages to another mailbox if they have not been listened to within a programmable period. You can also designate the automatic message copy feature to copy only urgent messages, or not to copy private messages. This programming can also be done by the system administrator for each mailbox.

Carbon copy
You can copy a message that is in your mailbox and send it to a number of mailboxes that you select on the spot. The original message is retained in your mailbox.

Carbon send
You can record a message and send it to a number of mailboxes that you select on the spot.

Call record
Users of stations programmed with a CALL RECORD button can record a telephone call and store it in their mailbox. They also have the option of sending copies of the recording to other mailboxes. The system can be programmed to sound a warning tone when a call is being recorded.

Call routing (external callers off premise forwarding)
Call forwarding can be programmed to automatically route external callers through the ImaGEN automated attendant directly to an external telephone without the need for a dedicated extension in the **DIGITAL** system. External callers can also be routed to an extension in the **DIGITAL** system and, if that extension is busy, or if there is no answer, be forwarded to an external telephone.

Call screen
Users of stations programmed with a CALL SCREEN button can screen incoming calls to their extension by listening to the caller's response to the automated attendant, and answering only the calls they wish to accept. Unanswered calls are automatically directed to the user's mailbox.

Confirmation-certification
When sending a message to a mailbox or a group of mailboxes, you can request confirmation that the message was heard by each person to whom it was sent. As soon as the message is listened to, the sender receives a message in their mailbox certifying receipt of the message. If you sent the message to a mailbox group, you receive a separate confirmation message as your message is heard by each member of the group.

Caller ID list
Where available from the central office, the **DIGITAL** system stores the Caller Line Identification Number of the incoming calls. You can view a list of these calls and reply to calls by pressing the appropriate softkeys. The caller ID list shows the ID of the caller and the time of the call. For every directory number, the system can store 100 caller ID messages.

Continuous listening
You can define your mailbox to allow you to hear your messages one after the other without selecting the messages individually. This feature can be defined to apply all the time, only when you call the mailbox from outside, or not to apply at all.

Day and time tag (header)
All calls recorded in your mailbox may be prefixed with the date and time they arrived. Messages left by other users in the **DIGITAL** system are also tagged with the extension number or the name of the sender.

Display prompts
On Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti Attendant stations, the ImaGEN menu options appear next to the softkeys on the station. You may progress through the ImaGEN menus by pressing the appropriate softkey instead of dialing digits on the dial pad. With the Avanti 3025 set, some of the ImaGEN menu options appear as icons at the lower edge of the display. These options can be selected by pressing the key below the icon.

ImaGEN softkey and icon operation allows you to see all options currently available and activate them without waiting for the audio prompts.

Forwarding messages
Individual mailboxes can be programmed to forward messages to the user at another destination. Users can decide to send only urgent messages, urgent and external messages, or all new messages.

Future delivery
Messages can be programmed for delivery to a mailbox or group of mailboxes at a future date and time.

Mailbox name announcement
You can assign names to mailboxes or mailbox groups. Before sending or copying a message to a mailbox or a mailbox group, you hear a message with the mailbox name (if recorded). Also when recording a direct group message, the mailbox group's name (if recorded) is played.

Mailbox name updating
The ImaGEN updates the mailbox names daily to match any changes made in the DIGITAL system's directory number (DN) names.

Mailbox password
A password is required to access any mailbox. The password is normally assigned to each user by the system administrator during initial programming of ImaGEN. Passwords can be up to 12 digits long. Mailbox users may change their password at any time.

Message annotation
Additional comments (annotations) can be inserted at the beginning of a single message when transferring a message to another mailbox, or a single annotation can be made to a message sent to a mailbox group.

Message confirmation
When you send or copy a message, or when you save a message with properties (urgent, private, future delivery, or confirmed-certified), a message confirming the operation is played.

Message restore (for deleted messages)
If you erroneously delete a message, you can recover the message. Any message deleted from a mailbox can be restored within the first 15 minutes after it has been deleted, even if you have already exited the ImaGEN.

Message sorting
ImaGEN separates your new (unheard messages) and old (already heard) messages so that you can request playback of either.

Message waiting indication
All Avanti telephone sets provide visual indication of waiting messages via the message button light. The number of voice messages in your mailbox appears on the telephone set display. A list of the voice messages in your mailbox is shown on the displays of the Avanti 3025, Avanti 3020F, and Avanti 3020H telephone sets.

Message
When reviewing messages in your mailbox, the following options are available:

Carbon copy: Copy a message to a number of mailboxes. For each message that you carbon copy, you define which mailboxes will receive the message. The message remains in your mailbox.

Carbon send: Send a message to a number of mailboxes. For each message that you carbon send, you define which mailboxes will receive the message. The message is transferred from your mailbox to the mailboxes that you selected.

Copy: Copy a message to another mailbox. The message remains in your mailbox.

Copy to group: Copy a message to a defined group of mailboxes. The message remains in your mailbox.

Erase: After playback, erase the message.

Fast forward: During playback, skip forward a few seconds.

Pause/resume: During playback, pause and resume playback.

Playback: Playback messages recorded in your mailbox.

Repeat: After playback, listen to the message you have just heard again.

Reply: After playback, record a reply to the sender whose message you reviewed.

Rewind: During playback, rewind the recording a few seconds.

Send: Send a message to another mailbox. The message is transferred from your mailbox to another mailbox.

Send to group: Send a message to a defined group of mailbox owners. The message is transferred from your mailbox to a group of mailboxes.

Message monitoring and intercepting
Users can monitor messages, while they are being left in their mailbox, and intercept them to take the call, if desired. The message monitor and intercept feature must be enabled to access this function.

Numbering messages - indexing
You may assign index numbers to messages that you want to listen to again. You can then use the number to easily identify and access the message, when you want to hear it again.

Password update by user
You may update your own mailbox password from your station, using the Mailbox Options menu.

Personal greeting (busy and no answer)
Callers dialing your extension hear different personal messages when you are on another call or when you are out of your office.

Private distribution list
You can create your own private distribution list, of up to eight mailboxes or mailbox groups, which can be used for recording, copying, or sending messages. The system administrator can also program private distribution lists for each mailbox user.

Programming from the station
You can program your mailbox's automated attendant, automatic message copy, and private distribution list features from your telephone.

Remote follow me
The ImaGEN periodically calls a user-programmed number, which may be an internal extension, an outside number, or a pager facility, to alert you to new messages deposited in your mailbox.

Revert to new status
You can have a message that you already listened to revert to new status. The message will continue to appear in your list of new messages and the message light on your telephone will remain lit.

Send / copy with properties
You can designate any message that you send or copy to a mailbox or group of mailboxes as: Urgent, Private, for Future delivery, or requiring Confirmation-certification (see each classification).

Speed control (on message playback)
When listening to a message, you can increase or decrease the speed of the playback at the press of a button.

Temporary personal greeting
Each mailbox owner may record an alternative opening message for temporary use. This greeting may then be used, when desired, instead of the busy or no answer personal greeting. Once the temporary greeting is erased, the mailbox owner's original busy and no answer greetings are heard.

Unified Messaging
With an ImaGEN system connected to a network and a networked personal computer at your desk, your voice mail messages can be sent to your MS Exchange or MS-Outlook E-mail inbox. You can select the messages that you want to hear from your inbox and hear them over the speaker or headset of your telephone. You can use the PC to activate ImaGEN features such

as record, playback, fast forward, copy, send, volume adjustment, etc. (see Figure 21).

Urgent message designation
See *Urgent message* designation under *ImaGEN Incoming Caller Features,* above.

Visual message selection
Users of the Avanti 3025, Avanti 3020F, and Avanti 3020H sets can view a list of the messages in their mailbox, and page up and down the list on their display. To select the specific message that you want to hear, simply press the corresponding softkey. You can call up this list from the voice mail menu, and then, at the press of a button, toggle between the list and the voice mail menu. For each message, the date and time of receipt, the sender's name, DN or CALLER ID, and the length of the message are displayed.

Voice memo
You may leave a voice message memo at an extension by dialing the extension number and then pressing the voice memo softkey or the programmable button to directly access the extension's mailbox. This can be done when the extension is busy or while it is ringing.

Volume adjustment
When playing a message, you can increase or decrease the volume at the press of a button.

IMAGEN SYSTEM FEATURES

The ImaGEN system features include:

Ambiguous name reconciliation
When programming ImaGEN, you can access a list of up to 15 ambiguous name pairs. For ease of reconciliation of these names, you can toggle between this list and the ImaGEN screens used to program the name corrections.

Announcement messages (9 messages) - administrative
Announcement messages may be recorded and programmed to automatically play on a daily, weekly, or monthly basis to any DN or page zone. Multiple messages may be programmed to play at the same DN or page zone. Use these messages to remind your staff of deadlines, meetings, etc. For example, "The marketing department's monthly strategy meeting will start at 9:30 this morning" may be programmed to play over a page zone. Up to nine different announcement messages may be programmed.

Announcement messages (50 messages) - ACD/hunt group
The system can be programmed so that certain messages are played at a pre-defined time after an incoming call reaches the extensions or trunks connected to the ImaGEN. For example, an incoming call that reaches the system hears Music on Hold for a preset time and then hear an announcement message such as "We are presently busy; we will be able to assist you shortly." The system can be configured so that the announcement messages work in conjunction with the Automatic Call Distribution (ACD) feature on the **DIGITAL** system. Up to 50 announcement messages may be programmed.

Automated attendant
The ImaGEN automated attendant answers incoming calls and, through a series of recorded menus and telephone directories, helps incoming callers reach the desired extension.
When answered by the automated attendant, outside callers follow recorded instructions that explain how to dial directly to the extension of their choice by extension number or by using the Dial-By-Name feature, or how to access directory assistance to learn the desired extension number. This affords the convenience of direct inward dialing on outside lines, and, since these calls are not transferred via an attendant, it reduces the workload on the receptionist. ImaGEN can also double

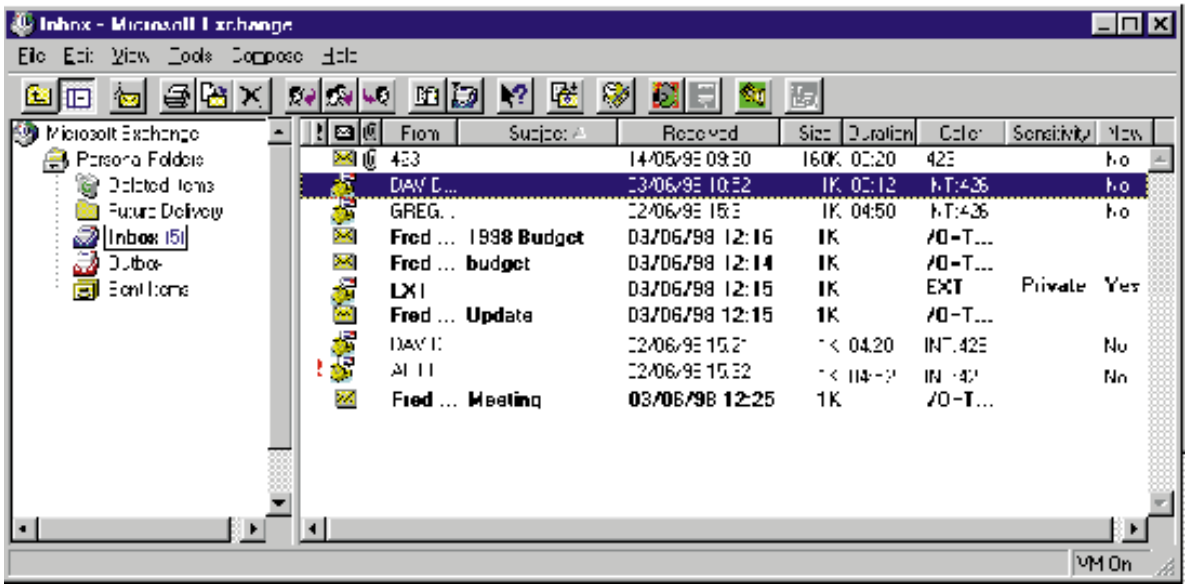


Figure 21 Unified messaging -Use E-mail to select your telephone message

Automated attendant and voice mail tenant service
Using the tenant feature, each of up to four tenants sharing the **DIGITAL** system and the ImaGEN can optionally have their own automated attendant, opening greetings, special service messages for day and night service, and special messages for holiday and vacation periods.

Automated Attendant Dial-By-Name
Up to 1,500 names may be stored in the Automated Attendant Dial-By-Name file. The length of each name dialed can be up to six letters. The Automated Attendant, can access any name.

Automatic backup to tape (option)
Messages left on the ImaGEN voice mail can be automatically backed up to a tape.

Automatic clock update
The ImaGEN software checks the time and date on the **DIGITAL** system clock when the ImaGEN software starts up, and then once each day. This information is used to perform a daily update of the time and date on the ImaGEN PC to ensure synchronization between the two systems.

Automatic day / night modes
Different patterns of responses may be played to callers during working and nonworking hours. This is coordinated with the day/night service of your **DIGITAL** system, so that the system automatically switches between day and night modes, and the appropriate day or night messages are always played.

Automatic disk maintenance
You can program ImaGEN to periodically (daily or weekly) activate the disk-maintenance utilities of your PC to calibrate the ImaGEN-PC hard disk. These utilities strengthen the magnetic information, find and repair disk sectors whose reliability is borderline, perform minimum pattern testing, and reorganize the physical layout of all files and directories. Running these utilities reduces disk fragmentation, decreases average disk access time, and helps to maintain the reliability of the hard disk.The Windows ScanDisk utility will be activated for disk maintenance.

Automatic purge
Messages that have been left for longer than a pre-programmed number of weeks can be purged from the ImaGEN database to avoid wasting disk space. The system can be programmed to provide a warning message to the system administrator prior to purging the voice mail messages. The purge can be programmed to delete only specific types of messages, for example, only old messages.

Automatic route to hunt / MDN mailbox
Calls transferred to a busy MDN or hunt group, and forwarded to the ImaGEN voice mail are automati--cally sent to the mailbox for that MDN or Hunt group.

Caller ID routing of calls
Incoming calls to the voice mail system can be automatically routed to specific telephones in your **DIGITAL** system, based on the incoming caller identification number received from the public exchange. This enables you to route calls coming from a particular number, office, or area to a specific telephone in the **DIGITAL** system, eliminating the need to transfer the calls. For example, calls can be routed directly to the sales or service person who is responsible for the area from which the call is received, or calls from a particular customer can be routed to the person handling that account or file. You can program up to 1,000 Caller ID entries through the automated attendant in the ImaGEN system.

Caller ID routing of messages
When an outside caller leaves a message, the Caller ID data is stored and can be displayed in the Visual message list on Avanti 3025, Avanti 3020F, and Avanti 3020H telephones (see *Visual message selection* in *ImaGEN mailbox user feature*s, above).

Delayed voice mail answer when a free station exists
When a trunk is routed to more than one station, and one of the stations is busy and programmed with Call Forward Busy to the ImaGEN voice mail, the free stations are given a chance to answer before the call is forwarded to the voice mail.

Delete message confirmation
Once a message is deleted, the ImaGEN confirms the deletion.

Dial ahead
Experienced users can dial ahead through the ImaGEN without listening to the recorded instructions. ImaGEN continues at the message pertinent to the point reached in the system.

Direct group message
You may record a message and send it directly to a mailbox group.

Directory services
You may set up different directories that may be accessed by incoming callers. The directories include:

> ***Automated attendant dial-by-name:*** To enable external callers to reach extensions by dialing the party's name.
>
> ***Directory assistance:*** To allow a caller to determine the extension number of each employee.
>
> ***Help:*** To provide instructions about which code, extension, or department to contact for a certain service (e.g. "Dial 8 to place an order").
>
> ***Products:*** To provide a list of your company's products.
>
> ***Single digit routing:*** To provide a list of people or departments that can be dialed by pressing a single button.

Disk space reporting
The amount of recording time left on the disk is easily determined, and, if there is not enough free space, messages can be purged (see *Automatic purge*, above).

Dynamic mailbox groups
Mailbox groups can be created so that messages can be forwarded to a specific group of mailbox users. Up to 80 mailbox groups can be created, with a total of up to 1,200 mailbox numbers in the groups. Each group can include up to 198 mailboxes or individual mailbox groups.

Electronic Business Card option
See Electronic Business Card option in Section 6, *ImaGEN Application Generator and Other Optional Features,* below.

Flash signaling
The automated attendant and voice mail can flash signal to CENTREX or to a PBX to access CENTREX or PBX features.

Global trace and call disconnect trace
ImaGEN can trace all active directory numbers and store and print data concerning the causes for session disconnection.

Greeting (day and night/internal and external)
Record separate messages to be played during office hours and after office hours. Separate day and night messages can be played for each tenant, when more than one company is sharing the ImaGEN system. In addition, separate messages can be recorded for internal and external callers.

Integrated Station Message Detail Recording (ISMDR) option
See *Integrated Station Message Detail Recording (ISMDR) option* in Section 9, *ImaGEN Application Generator and Other Optional Features*, below.

Multilingual option
You can program the system to operate in up to ten different languages, according to your needs. This is especially useful for organizations that work with a multilingual population or for international companies. ImaGEN can be programmed to operate in one language, or to let the caller select the language in which the system menus and messages are played.

New mailbox users' help menu
New users of the ImaGEN are provided with audio instructions on how to set up their mailbox.

Programmable message order
On a system-wide basis, your administrator may program the order in which the messages stored in your mailbox are played back, so that you hear either the most recently received or the oldest message first.

Remote follow me number verification
The system verifies the follow me number entered, by repeating the digits that you dialed.

Routing calls for specific trunks, trunk groups, or DID numbers to a specific mailbox
The administrator may determine that, whenever the voice mail answers any incoming trunk, trunk group, or DID number, the call is inserted directly into an associated mailbox.

IMAGEN APPLICATION GENERATOR AND OTHER OPTIONAL FEATURES

6

The ImaGEN system can provide your **DIGITAL** system with other optional applications including:

- ***Application generator***
- ***Electronic Business Card***
- ***Integrated Station Message Detail Recording (ISMDR)***

APPLICATION GENERATOR

The Application generator option of ImaGEN provides a powerful and versatile interactive, Windows-based application and development environment that enables you to define, view, and modify ImaGEN menus and operations. The menu data can be saved as ImaGEN program files for subsequent downloading to the ImaGEN system.

Figure 22 shows the Application generator Menu list and Operation list windows.

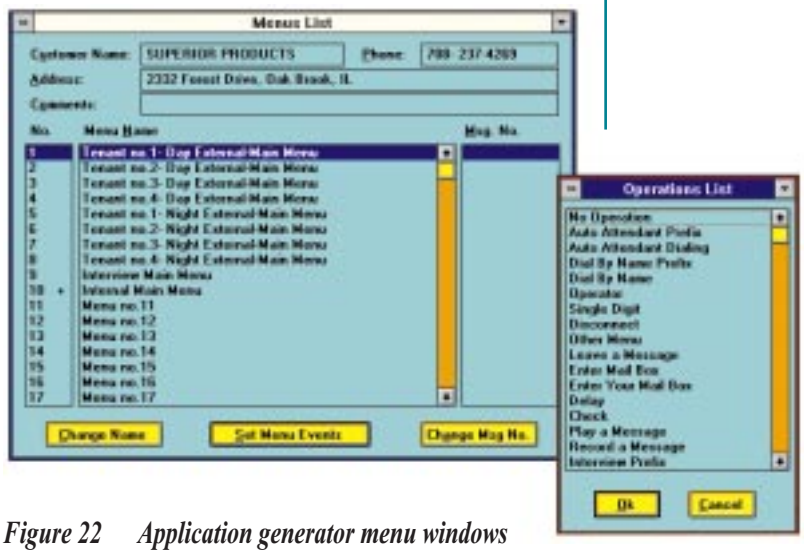


Figure 22 Application generator menu windows

The Application generator enables custom tailoring of ImaGEN internal and external call processing to meet your specific needs. ImaGEN menus and operations can be tailored to service your needs, so that those who call you hear recorded menu selections that you have developed to suit the specific requirements of your organization. As your voice mail needs change, you can modify existing ImaGEN menus, or additional ones can be created so your voice mail system keeps pace with the dynamics of your changing needs. You can develop ImaGEN program files with up to 32 menus. Each menu can have up to 14 selections. Menu options are heard through the handset or speaker and appear on the displays of the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, and Avanti 3015DH telephone sets. Separate application definitions can be developed and stored for internal and external calls. For every tenant, separate day mode and night mode of operations can be defined. With the interview feature, you can define up to nine sets of interview questions. Each interview can consist of up to eight questions and a closing message. A directory assistance (secondary assistance) menu can also be defined.

The user can define unique messages to play before each operation, and the user can record a separate menu message for each application that is defined.

The flexibility of the ImaGEN Application generator enables the defining of chained operations for more in-depth customization.

ELECTRONIC BUSINESS CARD OPTION

With the Electronic Business Card feature, up to 10 different directories can be created with up to 1,000 entries, in total. These directories, and the entries that comprise them, can be used to establish files of electronic business cards that can be viewed on the telephone display (see Figure 23).

By selecting the name of the party you are seeking using the buttons on the telephone display, you can view all of the information that you would see on a printed business card on the telephone display.

The Electronic Business Card can be easily tailored to the specific needs of each organization and can be easily programmed and modified to include whatever information the user needs. For example, the company name, account number, and several telephone and fax numbers can be entered for an individual card.

Figure 23 Electronic Business Card

Any of the numbers entered in the Electronic Business Card may be automatically dialed by simply pressing the softkey next to the entry.

The Electronic Business Card directories can be programmed at a remote location and downloaded to your ImaGEN system.

An Electronic Business Card directory can be programmed as a help directory, to provide you with help messages on the graphic display of the Avanti 3025 telephone. Figure 24 shows an example of such help data.

Figure 24 Help display

In addition, the Electronic Business Card System Dial-By-Name (SDBN) feature provides callers with the ability to reach extensions or outside lines by dialing the name (up to six letters) of the party being called. A caller can dial the desired party without knowing or having to look up the person's number.

Figure 25 shows an Electronic Business Card Dial-By-Name list as it appears on the telephone display.

Figure 25 Dial-By-Name telephone display

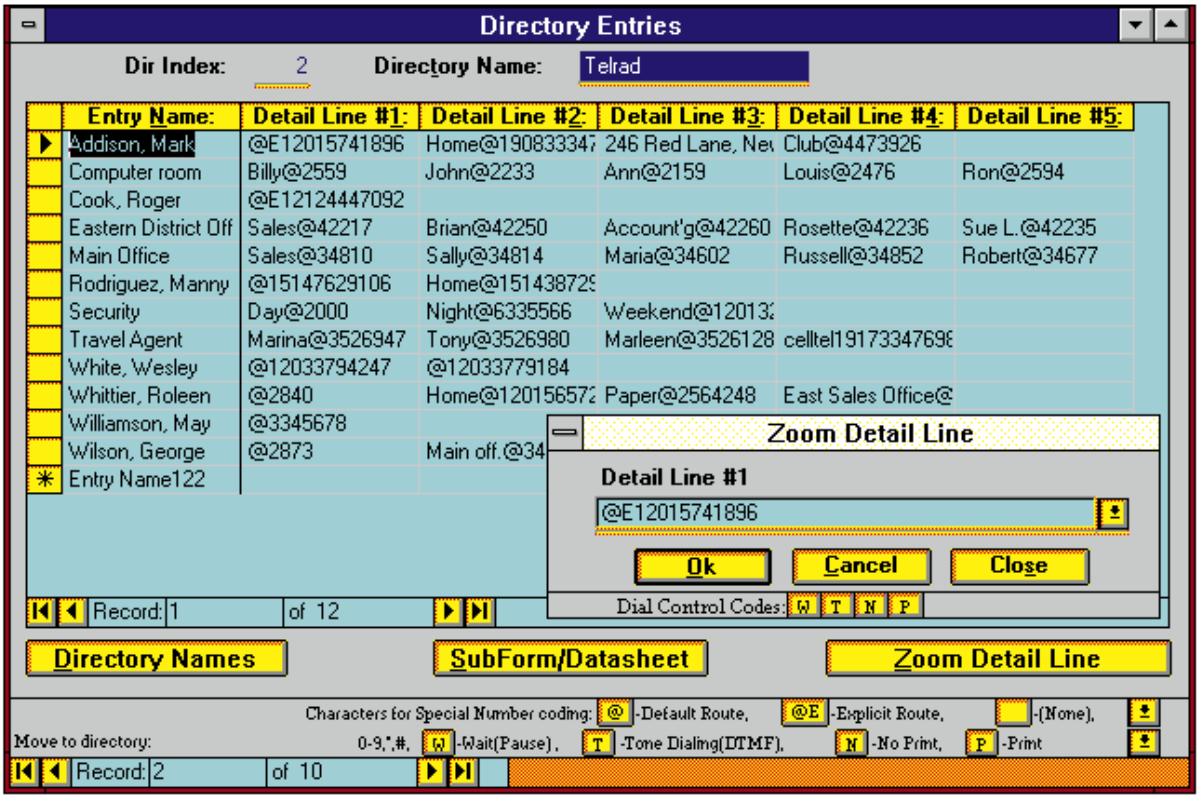


Figure 26 Dial-By-Name programming screen

Figure 26 shows the Electronic Business Card Dial-By-Name programming window with the details of a record.

INTEGRATED STATION MESSAGE DETAIL RECORDING (ISMDR) OPTION

Integrated Station Message Detail Recording (ISMDR) is a call accounting application that provides a powerful tool for reviewing and controlling the utilization and costs of the telephones in use in your organization.

ISMDR provides detailed reports of the outbound traffic from all extensions. The ISMDR reports provide data to help businesses monitor outbound call traffic and provide a method for billing calls to clients. Figure 27 shows an example of an ISMDR call cost report.

Incoming caller identification data is automatically transferred to the ISMDR database and appears on ISMDR reports.

ISMDR allows you to program and receive reports of calls and their costs, as well as a breakdown by:

- Extension number
- Outside line
- Dialed number
- Destination prefix and area code or local office
- Call duration
- Account number

When calls are transferred, ISMDR will record the cost separately for each party involved in the transferred call. ISMDR's versatility allows you to customize reports according to your needs. You may specify the periods of time in which you are interested, and select

other call parameters on which you want the reports to focus. Reports can then be viewed on your ImaGEN-PC screen or printed via a printer connected to your system.

ImaGEN can be programmed to start printing each section of ISMDR reports (for example, data about each extension, outside line, prefix, or account code) on a new page. You may carry out all ISMDR programming tasks from the ImaGEN PC without interrupting real-time operation of the ImaGEN voice mail system.

Also, your ImaGEN-PC screen can provide an online, real-time monitor of basic call activity and cost parameters for each call, as it is completed. This enables you to track call usage immediately in real time.

Cost multiplier (surcharge)

The ISMDR cost multiplier feature allows you to program ISMDR to add a fixed value surcharge to calls that are made. This is useful for billing a client or hotel guest a service charge above the actual cost of the telephone call.

Call cost display

The system may be programmed to show the cost of each call on the telephone display as soon as the call is completed.

Recording cost or pulses

See *Recording cost or pulses* under *System Features* in Section 11, *DIGITAL Family Features*, below.

Recording call transfers

See *Recording call transfers* under *System Features* in Section 11, *DIGITAL Family Features*, below.

EXT	ECO	DATE	TIME	DURATION	T	ACCOUNT NO.	CALLED-NUMBER	COST ($).
223	804	MAY-19	09:13a	00:43	L			
236	810	MAY-19	09:34a	05:36	L		8952000	
231	801	MAY-19	10:24a	02:17	L		9082531783	
242	804	MAY-19	10:56a	08:47	L		6792469	
236	803	MAY-19	11:38a	12:32	L		2123346700	
218	808	MAY-19	11:49a	15:24	L		7182394358	
222	810	MAY-19	12:07p	05:38	L		8942639	
XFER	802	MAY-19	12:27p	24:19	L		7084257483	
215	803	MAY-19	12:45p	03:25	L		8953740	
231	804	MAY-19	01:24p	05:49	L		8033627498	
223	803	MAY-19	01:28p	11:36	L		5145365353	
223	802	MAY-19	01:39p	01:24	L		201563000	
218	805	MAY-19	01:54p	04:53	L		7134585599	
236	807	MAY-19	02:26p	17:33	L		7368240	
218	801	MAY-19	02:58p	04:27	L		6176487246	
218	804	MAY-19	03:15p	08:13	L		4628471	
242	802	MAY-19	03:42p	16:04	V		3647392	
245	804	MAY-19	03:51p	02:44	L		4156638427	
231	802	MAY-19	o4:23p	13:35	L		8032264892	
241	809	MAY-20	09:04a	07:16	L		2076412211	
218	803	MAY-20	09:17a	12:52	L		702729048	
215	810	MAY-20	09:32a	08:16	L		9163690027	

STRIKE ANY KEY TO CONTINUE!!!

Figure 27 ISMDR call cost report displayed and printed

DIGITAL FAMILY FEATURES

7

SYSTEM FEATURES

The main features of the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems are listed below. Section 12 lists the features that apply to the **SynopSys** system. The features described here may have different characteristics in the **SynopSys** system.

Those features marked with an asterisk (*) require the ImaGEN option.

Access restriction
Individual extensions may be restricted from accessing specific outside lines or groups of lines. Different access restrictions can be programmed for day and night service.

ACD (Automatic Call Distribution) option
Using a sophisticated software program, the ACD program routes and distributes incoming calls among agents and ACD groups and provides supervisors with statistical reports (on the telephone display) of incoming call traffic and call processing. See Section 3, *Automatic Call Distribution (ACD) Applications*, for a detailed description of ACD.

ACD I.Q. option
Using the data collected from the ACD program, ACD I.Q. (Automatic Call Distribution - Information Query) provides sophisticated statistical reports, histograms, and graphs that can be viewed on a personal computer screen, printed, stored, and retrieved. ACD I.Q. enables you to easily define the exact parameters desired for each report. See Section 3, *Automatic Call Distribu--tion (ACD) Applications*, for a detailed description of the ACD I.Q. option.

Alphanumeric display of names - upper and lower case
Names can be assigned to extensions, page zones, trunks, trunk groups, hunt groups, and MDN groups so that when features are accessed or calls are placed, the name of the feature, source, or destination, rather than the facility's Directory Number or access code, is displayed. Names may have up to 16 letters and numbers, e.g. "Purchasing Linel" or "Sally Lane SALES". names can be entered in the system program in upper or lower case, and they appear on the telephone display as they were programmed (for example, BROWN or Brown).

Analog outside line volume control
The system audio signal amplification on individual analog outside lines can be programmed to suit the physical distance from the central office. Three amplification levels are possible.

Analog station support
Telrad analog key telephones (manufactured after August 1987) are supported by the **DIGITAL** family of systems.

ANI (Automated Number Identification)
The **DIGITAL** system receives the Caller ID information for calls coming in on T1 circuits (see *Caller ID option*, below).

Announcement messages (9 messages) - administrative*
See *ImaGEN System Features* in Section 8, *ImaGEN Voice Mail and Automated Attendant Features*, above.

* Requires the ImaGEN option

7

Announcement messages (50 messages) - ACD/hunt group*

See *ImaGEN System Features* in Section 8, *ImaGEN Voice Mail and Automated Attendant Features*, above.

Announcer (SLT)

An external announcer, for playing pre-recorded messages, can be configured to answer outside calls to a Uniform Call Distribution (UCD) group.

Answering position

An answering position to which calls, recalls, and dial attendant calls may be routed, can be configured in the system. The position may be used by a department secretary to answer the telephones in the department and to take calls that were left on hold, or the answering position may be used in addition to, or in place of, an attendant position.

For flexibility in processing incoming calls, calls to the answering position can be routed to up to eight Incoming Call Identifier (ICI) queues that arrive at different buttons on the answering position. This allows you to answer calls on each queue with a different greeting. When calls recall to the answering position, the recalling extension's name/number is displayed.

Application generator*

See Section 6, *ImaGEN Application Generator and Other Optional Features*.

Attendant console

Up to four attendant consoles may be connected to your **DIGITAL KEY BX** or **DIGITAL 400** system, and up to 24 attendant consoles may be connected to your **DIGITAL 1000** system. An attendant console position can be configures integrating up to four attendant consoles in the **DIGITAL KEY BX** or **DIGITAL 400** systems and up to eight attendant consoles in the **DIGITAL 1000** system (see *Attendant Console Features*, below).

Automated attendant*

See *ImaGEN System Features* in Section 8, *ImaGEN Voice Mail and Automated Attendant Features*, above.

Automatic out-dial on system alarm

On detection of any alarm that affects system operation, **DIGITAL** systems can automatically dial the Service Center, via the modem, and transmit the details of the alarm.

Automatic real-time self diagnostics and alarms

Through built-in diagnostics, the system continuously checks for faults in system operation. When faults are detected, alarms are sent instantly to the attendant console. The alarms are also stored in the system memory for analysis.

Background music

System users have access to background music facilities that channels music to the station speaker while the station is idle. Up to four different background music sources can be connected to the **DIGITAL KEY BX** system, up to eight to the **DIGITAL 400** system, and up to 12 to the **DIGITAL 1000** system.

Battery backup (memory)

During a power failure the system configuration data is maintained in battery-backed memory located in the memory module. The memory module can store configuration data for up to three years after being disconnected from the AC power source.

Battery backup (system-wide)

To ensure continued system operation during power outage, the **DIGITAL** systems can be backed up by external batteries or by an Uninterruptible Power Supply (UPS).

* Requires the ImaGEN option.

Behind PBX/CENTREX lines
Individual outside lines may be defined as extensions of a larger exchange. Special parameters, such as flash time, may be programmed to match the requirements of the larger exchange.

Branch routing (networking digital systems)
Calls can be routed among different systems, branches, or departments of an organization at different locations with the press of a button. This feature takes advantage of the sophisticated networking capabilities of the **DIGITAL** family of systems, including DPNSS and QSIG corporate-wide networking (See *DPNSS networking* and *QSIG networking* under *Private networking features*, below).

BRI (ISDN Basic Rate Interface)
The **DIGITAL** system supports ISDN Basic Rate Interface to both outside lines and internal lines. On internal BRI lines, each S-bus supports two TEIs (terminal equipment identifiers), and the **DIGITAL** system tracks calls to the appropriate TEI. This enables two incoming or outgoing calls to be handled simultaneously at the same DN.

> ***Outside lines:*** The **DIGITAL** systems support ISDN Primary Rate Interface (PRI) outside lines, using the ETSI (Euro-ISDN), NT-DMS100, AT&T-4ESS or AT&T-5ESS standards, and Basic Rate Interface (BRI) outside lines, using the ETSI, NI1-DMS100, or NI1-5ESS standards, depending on public network support. The **DIGITAL** systems also support PRI and BRI ISDN supplementary services such as Call-By-Call Integrated Service Access (PRI only), Caller Line Presentation (CLIP), Caller Line Restriction (CLIR), and Direct Inward Dialing (DID), where supported by the public network. See *ISDN Features*, below.

> ***Terminal lines:*** The **DIGITAL** system supports Basic Rate Interface for ISDN terminals, using the ETSI (Euro-ISDN) or AT&T standards. This facilitates connection to the Internet, video conferencing, and communications with other ISDN terminals external to the **DIGITAL** system. It is possible to use both B channels on the BRI line individually or simultaneously for placing or receiving two internal or external calls on the same or on separate directory numbers (DNs). In addition to supporting the BRI bearer services, the following ISDN supplementary services are supported on the terminal lines: calling party identification presentation and restriction (CLIP and CLIR) and ETSI multiple subscriber number (MSN).

Call Accounting Supervision
A call accounting supervision station can be designated. From this station, you can monitor cost recording data and change whether cost data is recorded for individual stations.

Caller ID option
A variety of Caller ID functions are available on incoming and outgoing calls on analog, ISDN, and T1 trunks. Where available from the local central office, for analog loop- and ground-start trunks, when a display station receives an incoming call, a message appears on the display, indicating the source of the incoming call. This requires a Caller ID interface box. Where supported by the central office and programmed in the **DIGITAL** system, for calls coming in on T1 and ISDN lines, the telephone number of the incoming caller appears on the telephone display.

For T1 carriers caller identification is done via the Automated Number Identification (ANI) protocol. For ISDN carriers, this is done via the Caller Line

Identification Presentation (CLIP) protocol. For ISDN carriers the system supports both CLIP and Caller Line Identification Restriction (CLIR) that can be programmed to operate on a call-by-call basis (see *ISDN Features*, below). The ANI caller identification feature for T1 can be programmed to show the calling party ID number on a trunk-by-trunk basis, where supported by the outside lines.

You can program the **DIGITAL** system to display either the incoming caller ID name or number (See Figure 28).

Figure 28 Caller ID list display

In addition to sending the Caller ID number to the station display, the Caller ID interfaces with ImaGEN, ISMDR, and TelradLINK. A major advantage is call routing based on the incoming Caller ID number. ImaGEN can use the Caller ID data to route incoming calls to a specific extension. This enables you to route a call directly to the person who should be processing it. Up to 1,000 Caller ID entries can be defined (see *Caller ID* under *ImaGEN System Features*, in Section 5, *ImaGEN Voice Mail and Automatic Attendant Features*, above).

The Caller ID number data is forwarded to the ISMDR database. The Caller ID number data is also processed for calls made or received via the proprietary interface TelradLINK, TSAPI, and TAPI applications. With these applications based on the caller ID/ANI information, customer records can be sent as screen pops on your PC. You see the calling party's file while you receive the call, letting you review the file before speaking to the customer.

Chaining digits under a private speed dial button

You may program a group or series of digits in a speed dial button string in order to invoke several actions, such as the activation of features or dialing, by pressing a single button. This enables direct one-button access to ImaGEN voice mail functions, such as:

- Transfer to mailbox button
- Password
- Immediate answer to voice message.

Class Of Service (COS)

Extensions are assigned a Class of Service, through which access and restriction profiles to various system features and outside lines are programmed. The Class of Service may be different for Day and Night operation. Also, the **DIGITAL** systems may be programmed to provide five global (system-wide) COSs that may be accessed by any user with the appropriate password. Users with the appropriate password may also use their Class of Service at another station (see *Traveling Class of Service in the User Features*, below).

Configuration backup and restore

From either a local or remote location, a customer's configuration data can be uploaded from the system to a PC, for backing up onto disk, or restored (downloaded) from the PC to the system, to update a system configuration.

CTI (Computer Telephone Integration) applications
CTI applications, including Telephone Application Programming Interface (TAPI), Telephone Services Application Programming Interface (TSAPI), and the proprietary interface TelradLINK, enable integration of your **DIGITAL** systems and your personal computer (see Section 7, *DIGITAL KEY BX, DIGITAL 400 and DIGITAL 1000 Computer Telephony Integration,* above.)

Day and night service
For day and night modes, various call handling parameters for features (such as incoming ring routing and Class Of Service assignment) may be programmed. Day or night service mode is normally activated from the attendant position.

Dial-By-Name (Automated Attendant DBN)*
See *ImaGEN System Features* in Section 5, *ImaGEN Voice Mail and Automated Attendant Features*, above.

DID analysis
The **DIGITAL** systems' Direct Inward Dialing (DID) analysis system allows the handling of DID numbers, received from the public exchange or the private network, which contain more than four digits. DID analysis also allows the processing of incoming DID calls directed to specific trunk groups, where supported by the public exchange.

Digital stations
The **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems supports all seven models of Telrad *Avanti* family of digital telephone sets.

Direct In Lines (DIL)
Incoming calls on lines in the **DIGITAL** systems can be programmed to terminate directly at an extension, without being transferred from an attendant position.

* Requires the ImaGEN option

Direct Inward Dialing (DID)
Since the **DIGITAL** systems have the ability to translate incoming dialed digits, they support Direct Inward Dialing from a Central Office. This enables outside callers to dial directly to a particular extension within the system, without the intervention of an attendant. With the **DIGITAL KEY BX** system, you can store 200 number translations, with the **DIGITAL 400** system, 400 numbers, and with the **DIGITAL 1000** system 1500 numbers.

Direct Inward System Access (DISA)
An outside caller may dial into the system, access system features and, after dialing a security password, may even dial out of the system on the lines of the **DIGITAL** system. A DID number can be routed to DISA. To prevent unauthorized calls, DISA may be deactivated during night service.

Direct Outward Dialing (DOD)
Outside calls, including long-distance and international calls, can be placed from any extension, depending on system programming, without the intervention of an attendant.

Directory assistance*
See *ImaGEN Incoming Caller Features* in Section 8, *ImaGEN Voice Mail and Automated Attendant Features*, above.

Door Unit interface
An attendant and up to four designated stations can be alerted to a person at the front door by an audio warning, an indication on the station's display, and a programmed station DOOR UNIT button. They may then converse with the person, and release the door lock. The door unit has a distinctive ring so that it can be easily distinguished. Door units can be ring routed to different locations in day and night mode.

7

DSS Add-on unit
The Direct Station Select (DSS) Add-on unit provides one-touch dialing of up to 120 Directory Numbers and speed dial numbers and a visual Busy Lamp Field (BLF) indication for up to 120 extensions. Up to four units may be chained together and attached to any Avanti Attendant, Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, or Avanti 3015H set. Alternatively you can shift between the four button maps on a single DSS Add-on unit. With the **DIGITAL 400** and **DIGITAL 1000** systems, up to eight button maps may be programmed with a maximum of four assigned to each DSS Add-on unit. The **DIGITAL 1000** system supports up to 48 DSS Add-on units, while the **DIGITAL 400** and **DIGITAL KEY BX** support 16 and eight DSS units, respectively.

DTMF signaling to SLT ports
The **DIGITAL** systems provide DTMF signaling to SLT ports to enable operation of external equipment such as standalone Voice-Store-and-Forward machines, facsimile machines, etc.

Elapsed time starter
For each trunk or trunk group, you can define the delay after dial completion before the system starts timing the call.

Electronic Business Card*
See *Electronic Business Card* in Section 6, *ImaGEN Application Generator and Other Optional Features,* above.

Equal access support
You may choose a particular carrier for a call. If dialing via Least Cost Routing (LCR), the system selects the most economical carrier automatically. Different restriction routines can be defined for calls on different carriers.

Error message history file
Records of system errors, which generate system alarms and diagnostic messages, are stored in the Error Handling Unit (EHU) history file. This enables maintenance technicians to see, at a glance, the source and history of system malfunctions.

External bell interface
Incoming calls arriving in a noisy environment or at distant extensions can be programmed to ring at external bells. This ensures that all calls can be heard. Different ringing patterns can be programmed for day and night service. Up to four external bells may be configured in the **DIGITAL KEY BX** system, up to eight in the **DIGTAL 400** system, and up to 48 in the **DIGITAL 1000** system.

Flash type
You can define the default flash type for the system as either flash or signal. For individual calls you can override the default flash type. The preferred default depends on how your **DIGITAL** system is configured.

Flexible Numbering Plan (FNP)
The code assigned to each extension, trunk, trunk group, or feature is flexible. The customer can select the code (up to four digits long) to be dialed when accessing each facility in the system.

Half Private Trunk Groups (HPTG)
Half private trunks are regular private trunks that, for outgoing calls only, are grouped under a single Flexible Numbering Plan (FNP). In other words, they can be called directly from the outside but share one trunk group access code for placing outside calls. This allows stations with many buttons to receive the trunk appearance and users of more simple stations to select outgoing trunks by using a single code.

Hearing aid compatible
All of the telephones available with the **DIGITAL** family of systems are hearing aid compatible.

* Requires the ImaGEN option

Hunt groups
Groups of extensions, such as those within a company department, can be assigned a single Directory Number (DN). Calls placed or routed to that DN ring at all extensions within the group, in sequence, according to a pre-defined algorithm.

Hybrid key/PBX configuration
The **DIGITAL** systems can function as either key, PBX, or hybrid key/PBX systems, to suit any customer application requirements.

Incoming call routing
Incoming calls can be routed, per trunk or trunk group, to specific extensions or groups of extensions. Up to 16 extensions may be programmed to ring for an incoming call.

Intercom restriction
Four hierarchical intercom groups can be defined in which extensions belonging to a specific group can dial other extensions in the same, or in a lower intercom group, but are restricted from dialing extensions belonging to intercom groups higher in the hierarchy.

Internal page zones
Up to eight internal page zones may be defined in the **DIGITAL KEY BX** and **DIGITAL 400** systems, and up to 16 internal page zones may be defined in the **DIGITAL 1000** system. Each extension may be granted or denied access to each page zone. Announcements to internal page zones may be routed simultaneously to a public address system.

ISDN (Integrated Services Digital Network)
ISDN Primary Rate Interface to outside lines following ETSI (Euro-ISDN), NT-DMS100, and AT&T-4ESS and 5ESS standards is supported. Each ISDN Primary Rate Interface PRI24 card provides a 23B+D channel interface to the ISDN-based public switch network and the ability to access ISDN supplementary services (where supported by the public network).

Each ISDN Primary Rate Interface PRI30 card provides a 30B+D channel interface to the ISDN-based public switch network and the ability to access ISDN supplementary services (where supported by the public network). These services include Calling Line Identification Presentation, Calling Line Identification Restriction, Direct Inward Dialing, and Call-By-Call Integrated Service Access (see *ISDN Features*, below).

The **DIGITAL** system can generate busy, ring, and dial tones for ISDN PRI lines when these tones are not supplied by the CO. ISDN Basic Rate Interface to outside lines following ETSI, NI1-DMS100, or NI1-5ESS standards is supported. The BRT card provides four 2B+D channels for Basic Rate Interface to the ISDN-based public switch network and the ability to access ISDN supplementary services (where supported by the public network).

Basic Rate Interface is also provided for ISDN stations and terminals where ETSI (Euro) or AT&T ISDN protocol is supported. Each Basic Rate Interface station/terminal card provides four 2B+D channels.

Least Cost Routing (LCR)
For each hour of the day and each day of the week, the system can select the least expensive available route and carrier for a given call, to maximize cost savings on long distance calls. Every installation can implement LCR in a unique way to meet its specific needs.

Letter code feature access
The feature access codes programmed in the system reflect the feature name. For example, Background Music is operated by dialing [FEATURE] [B] [M] or [7] [2] [6] on the dialpad. You can access features without committing the feature code to memory, simply

7

Manager/secretary
A manager with a private secretary or several managers sharing one secretary can program all calls on their regular line to ring at the secretary's telephone when the secretary is at her desk and can program calls to ring directly at each manager's desk when the secretary is out of the office. The secretary's telephone can have a separate DN button for each manager so that she knows exactly whose call she is answering. Each manager can have selected internal and external callers reach her directly, by using a private DN (See *Multiple station appearance,* below).

Memory cartridge
To enable simple configuration changes and system upgrades to the **DIGITAL** family of systems, all system programming is contained in a removable memory cartridge, which is attached to the main processor card.

Modem (internal and external)
Online administration and maintenance procedures can be carried out from a remote site through a modem internal to the **DIGITAL** system or from a user supplied (external) modem. From the remote site, configurations can be backed up, restored, or changed, and the error message history file can be accessed. The internal modem is a module that snaps onto the Option card.

Multiple appearance of DNs (MDN groups)
A call directed to a group of extensions (MDN groups), represented by a single Directory Number (DN), may ring at up to 16 extensions, and flash at an unlimited number of extensions, simultaneously. A call can ring at certain stations, and then after a programmed delay, ring at additional stations. Any extension where the call rings or has an appearance may answer the call by pressing the programmed MDN button. There can be multiple appearances of the same DN in an MDN group. With the **DIGITAL KEY BX** system, up to 250 MDN groups can be created, with the **DIGITAL 400** system up to 400 groups can be created, and with the **DIGITAL 1000** system up to 997 groups can be created.

Multiple attendant positions
Up to four attendant positions may be configured in a **DIGITAL KEY BX** or **DIGITAL 400** system to provide a high attendant to user ratio, efficient call traffic management, or up to four operative tenant exchanges. With the **DIGITAL 1000** system, up to 24 attendant positions may be configured.

Multiple station appearance (MSA)
MSA configuration (PBX) mode provides a second mode of operation to suit a variety of applications. Incoming calls for any extension can ring and flash, or just flash at a number of different extensions or, a call can ring at one station and have a delayed ring at another station. For example, if the secretary does not answer the call, it then rings the manager. You can program stations so that you may only place a call from a station when a DN button is available.

Therefore, you may assign the DNs of other stations to a telephone in an MSA group so that any station in the group can answer incoming calls being transferred to the group, or can make outgoing calls using another station's DN. You can have multiple appearances of the same DN in one MDN group and multiple DN hunting on the same station.

You can also assign a station a virtual DN to allow you to access an additional line. Each incoming or outgoing call is assigned to a button. Depending on which extension the call is for, a different LED lights so that the person answering the call knows exactly which extension is being called. This makes it easy to program the system so that a secretary can screen calls for one or more managers (see Manager/secretary, above) or for a group of employees, e.g. the members of a sales

and forwarded, either to the specific person who should handle the call, or to the first available person from the group.

You can assign a DID line to one DN at each telephone (programmed with MSA) so that callers can be given a direct line to reach the person handling their business, while other calls can be sent to the same telephone using the other DNs appearing on it.

Call forwarding of internal or external calls can be programmed separately for each DN assigned to a station, or all the DNs can be forwarded to the same destination.

All of the features described under *Call Forwarding* in the *User Features*, below, can be used with MSA. In addition, the system can be programmed so that call forwarding for a DN can be done from any telephone on which the DN appears.

Music on hold
Outside callers placed on hold can be connected to external music sources. Up to four different Music On Hold sources can be connected to the **DIGITAL KEY BX** system, up to eight can be connected to the **DIGITAL 400** system, and up to 12 can be connected to the **DIGITAL 1000** system.

North American Numbering Plan
Each system in the **DIGITAL** family is compatible with the North American Numbering Plan.

Off-premises extension (OPX) support
Through the SHD - single line extension card, the **DIGITAL** systems can connect to other telephone systems in the same organization, thereby enabling Direct Dialing from the local **DIGITAL** systems to any extension in the remote systems. The SHD interface can also be used to connect distant SLT extensions (OPXs) to the system.

Option modules
Three option modules may be attached to each OCD to provide an internal modem; additional DTMF receivers; four ImaGEN voice mail ports, or external page zones and door units (MIM module); Telrad's OAL link; the meet-me-conference option (Source1 module); or to enable the MPD redundancy feature in **DIGITAL 1000** systems (Source 2 module).

Page interface (external)
Up to eight external page or public address systems may be connected to the **DIGITAL KEY BX** and **DIGITAL 400** systems, and up to 24 external page or public address systems may be connected to the **DIGITAL 1000** system.

PC attendant (option)
A detailed description of the PC attendant is provided, above, in Section 2, *Terminal Units*, under both *Attendant and PC attendant* and *PC attendant features*.

Preferred connection
A station may be programmed to receive a pre-defined trunk or trunk group immediately when going offhook. This feature facilitates "Behind CENTREX" applications.

PRI (ISDN Primary Rate Interface)
The **DIGITAL** system supports ISDN Primary Rate Interface outside lines and PRI ISDN supplementary services such as Call-By-Call Integrated Service Access, Caller Line Presentation (CLIP), Caller Line Restriction (CLIR), and Direct Inward Dialing (DID), where supported by the public network. The ETSI (Euro-ISDN), AT&T-4 ESS, AT&T-5ESS or NT1-DMS100 standards for Primary Rate Interfaces may be used, depending on public network support. The ISDN Primary Rate Interface can also be used to connect **DIGITAL** systems in a network. See *ISDN Features*, below.

7

Programming and Administration from a PC
The system can be programmed in two ways***:***

> ***Offline:*** A system configuration can be prepared offline on an administration PC and stored on hard or floppy disk, without the PC being connected to the **DIGITAL** system.
>
> ***Online:*** When the administration PC is connected online to a **DIGITAL** system, either locally, or remotely via modem, a complete configuration may be downloaded from the PC or backed up to the PC, modifications may be made to the system configuration and all maintenance procedures may be accessed.

Recording cost or pulses
You can program the **DIGITAL** system to have the call cost displayed at the station and recorded for ISMDR and CDR (Call Detail Recording) reports in actual monetary cost or in the number of pulses metered (message units). Calculations are done for stations, private trunks, trunk groups, or hunt groups. For Multiple DN groups, the call cost can appear on the telephone display. You have the flexibility to decide for each DN whether or not to record the cost data.

Recording call transfers
When calls are transferred, cost accounting data can be recorded separately for the time each party was involved in the conversation.

Redundancy
The **DIGITAL 1000** system has a system redundancy -- backup -- option to enable continued operation when there is a failure of the central processing unit (the MPD card). Also, in multiple-cabinet systems, if the power fails in the cabinet housing the MPD card, the system can provide back-up power to the MPD card.

> ***Central Processing Unit (CPU) backup:*** A second MPD card and a Source 2 module can be installed to provide the system with a backup main processor.
>
> ***MPD card power backup:*** If the power supply in the cabinet with the MPD (main processor) card fails, in a multiple-cabinet system, the power supply on the lower cabinet will provide power for the MPD card, keeping the system running.

Remote reset
The system can be reset from a remote Service Center so that malfunctions requiring a reset can be dealt with quickly and effectively, without the need for a technician to visit the customer site.

RS232 interface
The system features RJ45 ports that provide RS232 interface to peripheral equipment via the MPD, OCD, COL, CHL, COG, and RS232 cards and via the RS232 daughterboard that connects to the ONS and HONS cards. The MPD cards in the **DIGITAL 400** and **DIGITAL 1000** systems also have a 9-pin RS232 interface for connecting an external modem.

Selective outside line ringing
Calls on outside lines ring at specified extensions, for specified periods of time.

Different ringing programs can be configured for day and night service.

Single Line Telephone (SLT) support
On- and off-premise DTMF or rotary Single Line Telephones (Type 500 and 2500) are supported. The SLT ports can also be used to connect fax machines, announcers and Voice-Store-and-Forward devices to any of the **DIGITAL** systems.

Software upgrades

When Telrad develops new software for the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H telephone sets, the software can be downloaded to the telephones from a remote sight or from a PC connected to the MPD card in the system cabinet. The technician can specify that the download be done to these telephones system-wide, to all of a specific model of Avanti telephone, or to one specific telephone. This upgrade of the telephone software is quick and does not disrupt the whole operation of your office, since it is done without touching the telephones.

Station Message Detail Recording (SMDR)*

Details of all incoming or outgoing calls can be directed by the system to a printer or call accounting system. Both parameters of calls to be recorded (such as number of dialed digits or call duration) and transmission parameters of the SMDR device (such as baud rate and parity) can be programmed (see also *Integrated Station Message Detail Recording*, in Section 6, *ImaGEN Application Generator and Other Optional Features*, above).

Station self-test

Automatic station maintenance tests check the operation of the buttons on the telephone set and the telephone set hardware.

System speed dial

Each class of service can access up to ten system speed dial groups. Each group can have up to 100 numbers. The **DIGITAL KEY BX** and **DIGITAL 400** systems support two speed dial arrays, each with up to 10 system speed dial groups and 1700 (**DIGITAL KEY BX**) or 2700 (**DIGITAL 400**) system and personal speed dial numbers. The **DIGITAL 1000** system support four speed dial arrays, each with up to 10 system speed dial groups and 2700 system and personal speed dial numbers.

SYSTEM TIMERS

Different times may be set for the following time parameters:

Attendant interflow timeout
Attendant overflow timeout
Attendant recall
Automatic EHU printout
Automatic test start
Barge-in tone
Call forward no answer
Call record warning tone
CENTREX flash
CO signal flash
Conference loop force connect
Day recall
Delayed ringing
Dialing pulses per second
DTMF dial-off duration
DTMF dial-on duration
First digit timeout
Forced onhook
Handsfree
Hold
Hunt no answer
ISDN 302
Make/break ratio
Maximum interdigit dialing
Night recall
Open loop
Page
Patch
Pause
PBX feature flash
Preferred connection
Reset after swap (DIGITAL 1000 only)
SLT interdigit
SLT maximum flash
SLT near end disconnect
Transfer recall

* Requires the ImaGEN option

Traveling Class of Service
Trunk attendant ring
Trunk interdigit
Trunk seizure
Wait for next character
Waiting tone timeout

TAPI (Telephone Application Programming Interface)
See Section 7, *DIGITAL KEY BX, DIGITAL 400 and DIGITAL 1000 Computer Telephony Integration,* above.

Tenant service
A number of features of the **DIGITAL** family of systems, such as call queues, call routing, access restriction, intercom restriction, etc., provide the system with tenant service capabilities. Four independent tenant groups may be configured, each with its own attendant position, extensions, and outside lines.

T1/E1 carrier support
The digital trunk card provides the interface to a T1 carrier, the equivalent of 24 PCM trunks, or to an E1 carrier, the equivalent of 30 PCM trunks. Each one of the 24 T1 channels can be utilized as either a digital loop-start, ground-start, DID (Direct Inward Dialing), or tie line trunk. The system supports E1 protocols R2 or R2-MFC. Each one of the 30 E1 channels can be utilized as either a digital DID, DOD (Direct Outward Dialing), or tie line trunk. Multiple carriers may also be accommodated.

Tie lines
The **DIGITAL** systems provide E&M signaling for tie lines. In conjunction with the **DIGITAL** systems' networking software, this allows private networking of **DIGITAL** systems, or interface to PBX tie lines. A network of **DIGITAL** systems can also be established using T1/E1 or ISDN PRI lines.

Time setting station
One station in each system is defined to set the system time and date, as it appears on the station display and in the system.

Toll restriction (TLR)
To control costs by restricting unauthorized use of office telephone facilities, calls initiated from certain extensions and dialed on certain outside lines or outside line groups may be restricted. The restrictions are based on 32 allow or deny toll restriction tables, in which specific dialed numbers (up to 31 digits long) are permitted or denied. For example, on a station-by-station basis, you may restrict access to all long distance and international calls, or allow calls only locally and to specific long distance or international numbers (for example, customers or your organization's branch offices).

Tone and pulse telephones
SLT extensions may be either impulse dial (type 500) or DTMF (type 2500). Dialing from pulse SLTs can be converted for outside dialing on DTMF trunks.

TSAPI (Telephone Services Application Programming Interface)
See Section 7, *DIGITAL KEY BX, DIGITAL 400 and DIGITAL 1000 Computer Telephony Integration,* above.

Trunk groups
Trunks defined in a group can be accessed by a single code or dedicated button on the Avanti telephone set. Up to ten trunk groups can be defined in the **DIGITAL KEY BX** system, up to 32 in the **DIGITAL 400** system, and up to 64 in the **DIGITAL 1000** system.

Trunk signal amplification
See *Analog outside line volume control,* above.

Trunks
The following trunk related parameters apply to the system.

Ground start: The **DIGITAL** system interfaces with ground-start outside lines via a COG or T1 card.

Loop start: The **DIGITAL** system interfaces with loop-start outside lines via a COL, CHL, COG, or T1/E1 card; in addition, in the **DIGITAL KEY BX** system, four ports are included on the MPD card.

ISDN Primary Rate Interface: The **DIGITAL** system interfaces with the public network ISDN Primary Rate Interface channels via a PRI24 and PRI30 cards, where supported by the public network (see *ISDN Features*, below).

ISDN Basic Rate Interface: The **DIGITAL** system interfaces with the public network ISDN Basic Rate Interface channels via BRT and BHT cards, where supported by the public network (see *ISDN Features*, below).

DPNSS interface: The **DIGITAL** system interfaces with DPNSS lines for networking **DIGITAL** switches, even with other vendor switches.

QSIG interface: The **DIGITAL** system interfaces with QSIG lines to network a large number of switches supplied by different vendors.

Tie line interface: The **DIGITAL** system interfaces with tie lines via an EMD card or a T1/ E1 card.

Direct Inward Dial (DID): The **DIGITAL** system translates incoming dialed digits to enable direct inward dialing to specific extensions.

Open loop detection: If supported by the central office, the **DIGITAL** system recognizes an open loop state when a call has been placed, and it disconnects the line.
Pulse or DTMF: Each trunk in the **DIGITAL** system can be programmed as a pulse or DTMF trunk.

Pulse to DTMF conversion: When required by certain types of calls over a number of carriers, the **DIGITAL** system can dial (via LCR) both pulse and DTMF for a single subscriber number. Pulse-to-DTMF conversion of an outside line can also be included in all types of automatic dialing; that is, speed dial, redial, save/repeat, and automatic redial.

Tone detection: To enable automatic redial, auto dialer (scanner), and speed dial chaining, the **DIGITAL** system has call progress tone detectors that can recognize dial tone, busy tone, reorder tone, and ringback tone.

Battery reverse detection: When connected to an inter-office trunk, the **DIGITAL** system can detect reverse polarity caused by a closed loop.

Uniform call distribution (UCD)
The volume of call traffic can be divided equally and fairly among system users to ensure uniform distribution of the call traffic load and quicker response for incoming callers.

Voice mail*
See *Voice mail* in Section 8*, ImaGEN Voice Mail and Automated Attendant Features,* above.

Wall mounting station
To free desk space and for ease of operation, all Avanti stations are wall-mountable.

* Requires the ImaGEN option

7

ISDN FEATURES

The main **DIGITAL** systems' ISDN features are described below.

Call-By-Call Integrated Service Access

On a call-by-call basis, based on the number dialed, the system, after connecting to an ISDN channel, can request PRI ISDN services such as Outward Wide Area Telephone Service (OUTWATS), foreign exchange (FX), or tie lines from the public network. With call-by-call integrated service access, you have a great amount of flexibility. For each call, any ISDN channel can provide you with any of the services supported by the public switch. Therefore, you do not need the expense and trouble of a dedicated line for each service that you want to use.

Caller Line Identification Presentation (CLIP)

The Avanti telephones with displays show the number of the calling party if the call is received over an ISDN line and the calling party has not blocked the display of the number. On outgoing calls on ISDN lines, your number can be displayed to the called party (if they have a caller identification facility). If your **DIGITAL** system is programmed to restrict caller line identification, you can override this restriction on a call-by-call basis, by entering a feature code. Also see the related feature *Calling Line Identification Restriction,* below.

Caller Line Identification Restriction (CLIR)

On outgoing calls on ISDN lines, you can prevent the display of your number to the called party. If your **DIGITAL** system is programmed to present caller line identification, you can block this presentation on a call-by-call basis, by entering a feature code. Also see the related feature *Calling Line Identification Presentation*, above.

Direct Inward Dialing (DID)

The **DIGITAL** systems have the ability to translate dialed digits coming in on an ISDN line. They support Direct Inward Dialing from an exchange via ISDN lines. This enables outside callers, using the advantages of ISDN, to dial directly to a particular extension in the **DIGITAL** system without the intervention of an attendant.

Equal access

Where AT&T or Nortel ISDN standards are supported by the public network, the **DIGITAL** system will provide equal access for BRI outside lines and terminals.

Multiple subscriber numbers

Where ETSI ISDN is supported by the public network, BRI station lines can be assigned multiple subscriber numbers for identifying the terminal for call charging and caller ID purposes.

Video conferencing

Video conferences via ISDN lines can be established with an appropriately configured personal computer, receiving or calling out using two B channels of the BRS card.

PRIVATE NETWORK FEATURES

The main **DIGITAL** systems' private networking features are described below.

Alternate routing

Networked **DIGITAL** systems provide alternate routes for internal and external calls to make the best use of all available tie, ISDN, DPNSS, QSIG, T1/E1, DID, and outside lines connected to the network.

Calls to destinations within the network can be routed along various tie routes throughout the branches of the private network or, if the tie lines are not available, along ISDN, DPNSS, QSIG, T1/E1, DID, or exchange outside lines. Calls to outside numbers are routed along

the most efficient and economical route. For example, calls may be routed via the private network to the branch closest to the destination or routed directly to the public exchange, whichever is more practical.

Back-to-back operation
To double the system capacity, two **DIGITAL** systems can be connected by customer-owned tie lines. With back-to-back operation, all of the outside lines in both systems are available to any of the extensions in either system.

Call back on busy
When an extension is busy, the **DIGITAL** system automatically calls back the sender of a message left at your extension, even if the sender is in another **DIGITAL** system that is connected to your system via a network.

Call back no answer
When there is no answer at an extension, the **DIGITAL** system automatically calls back the sender of a message left at your extension, even if the sender is in another **DIGITAL** system that is connected to your system via a network.

Central ImaGEN
One ImaGEN system can support ImaGEN features for any extension in networked **DIGITAL** systems. With DPNSS, ImaGEN can also support voice mail features to networked switches of other vendors (see *DPNSS networking*, below).

Conferencing
All networked systems may participate in a regular or meet-me conference, with up to eight parties in each **DIGITAL** system participating. The parties in each system can be local extensions, outside lines, or networked extensions.

DPNSS networking
With DPNSS, you can build a network of **DIGITAL** systems or establish a network between one or more **DIGITAL** systems and other switches. With DPNSS you have improved network-wide services, even between switches of different vendors. The **DIGITAL KEY BX, DIGITAL 400,** and **DIGITAL 1000** systems support DPNSS basic call features including hold, transfer, conference, and interworking for basic call services, as well as, the following DPNSS supplementary features:

Call forward (call diversion)
Callback on busy
Callback no answer
Caller Line Presentation (CLIP)
Indefinite loop avoidance

In addition, the following proprietary services are accepted on a DPNSS network:

Message
Page
Centralized voice mail - message LED
Centralized voice mail - voice memo
Centralized voice mail - voice mail screens
Centralized voice mail - call forward to mailbox
Centralized voice mail - message retrieval from mailbox
Centralized voice mail - call record
Conference add-on
Transit capability
Trunk optimization

Some of these DPNSS features have been customized for the **DIGITAL** system.

External call forward
Calls may be forwarded to a telephone external to your **DIGITAL** system. See *Call forwarding* and *External call forward* under *User Features*, below.

7

Message
System messages can be sent to or received from any extension in a network of **DIGITAL** systems. The message LED on the receiving station will light, and the display will show the DN of the sending station.

Multiple branch connection
More than two **DIGITAL** systems can be connected to each other via public exchange tie lines, and each system can be connected by outside lines to the public exchange. All of the branch **DIGITAL** systems can reach extensions in any other branch by simply dialing an internal number, and each branch can use any of the others' services.

When you dial a number, the **DIGITAL** system finds the most efficient and economical route to the called party, either sending the call via the private network to the public exchange or directly to the public exchange. The call processing is transparent to the user. Dialing and routing applications can be custom tailored to suit your individual application.

Page
Both internal and external paging can be done to extensions in networked **DIGITAL** systems, so you may easily page from one networked **DIGITAL** system to another.

QSIG networking
QSIG provides a secure and confidential way of connecting a large number of switches supplied by different vendors. With QSIG networking, you can build a network of **DIGITAL** systems or establish a network between one or more **DIGITAL** system and other switches. The **DIGITAL** systems support the following features on a QSIG network:

Basic call
Hold
Transfer
Conference
Indefinite loop avoidance
Interworking for basic call services
Caller Line Presentation (CLIP)

Recall
Both unscreened and patch recall can be performed across T1/E1 or tie lines in networked systems.

Reply via ImaGEN
You can record and send a reply to any ImaGEN message received from any extension in networked **DIGITAL** systems.

Satellite operation
A **DIGITAL** system can reach the public exchange through another **DIGITAL** system.

Tandem operation
Two **DIGITAL** systems can each be connected by ISDN, DPNSS, QSIG, T1/E1, or tie lines to a third **DIGITAL** system without the first two systems being connected to each other. The system in the middle can transfer calls between all three **DIGITAL** systems and can provide a path for all three systems to share services.

Transfer
Calls on outside lines or on private network ISDN, DPNSS, QSIG, T1/E1, or tie lines can be transferred to another extension in the network, using screened, unscreened, or confirmed transfer.

Uniform numbering
Each extension in the network is given a unique extension number. This simplifies intra-network routing. Calls between any extensions in the network can be routed without seizing an outside line.

USER FEATURES

The following describes the **DIGITAL** systems' main user features.
Those features marked with an asterisk (*) require the ImaGEN option.

Account code
Enter account codes for each outside call placed or received, to record the account number as part of the call record. Entry of account codes may be programmed per extension as either optional (Reminder), or compulsory (Forced).

> ***Reminder:*** On selecting an outside line and during incoming and outgoing calls, a tone is heard as a reminder to enter an account code. Dialing is not conditional on the code being entered.
>
> ***Forced:*** Before seizing an outside line, an account code must be entered.

Alarm clock
Set the telephone alarm to ring at a specified time.

Automatic answer
Answer an incoming call by going offhook without pressing the incoming line button.

Automatic hold
When on an outside line, pressing a DSS button or activating certain features automatically places the outside call on hold.

Automatic redial (ARD)
Automatically redial a busy number a pre-programmed number of times, at pre-defined intervals, until the ringback tone is reached, or a succession of outside numbers can be automatically dialed in turn by the system, until each number is reached. Automatic redial can be canceled and reactivated at the touch of a button.

Barge in
When trying to call a busy extension, privileged users may barge into an existing call, if permitted by system programming.

Callback (automatic)
After receiving a busy tone from another extension, callback can be activated to request the system to ring back as soon as the other extension becomes idle.

Call cost display*
See *Integrated Station Message Detail Recording (ISMDR)* in Section 6, *ImaGEN Application Generator and Other Optional Features*, above.

Call forward all
Any extension user can have calls temporarily routed to another extension or hunt group. Internal and external calls can be routed to different locations. The Call Forward All destinations can be directed to MDN groups, hunt station, hunt groups, extensions, an ACD plan, or an attendant within the local **DIGITAL** system, in a networked **DIGITAL** system, or to an external location.

Call forward - five steps
Calls may be forwarded in several ways to individual extensions, to groups, or to the voice mail. Call forwarding can be selective so that internal and external calls are processed differently, and call forwarding of no answer and busy calls can be processed differently. The telephone display shown in Figure 29, below, lets you easily program your customized call forward options.

Calls can be forwarded to any location in networked systems. In addition, calls can be forwarded to extensions outside the network, as explained below, under *External call forward*. You may forward calls

* Requires the ImaGEN option.

Figure 29 Programming call forwarding options from the Avanti 3025 telephone set

via private trunks, trunk groups, LCR, ISDN, DPNSS, T1/E1, or tie lines. Call forwarding can be performed to up to five steps (i.e., the location to which you forward the call can forward it to another location until the call has been forwarded to up to five different locations (see Figure 30, below).

The **DIGITAL** systems' flexible call forwarding feature gives you these call forwarding options:

Forwarding all calls (unconditional): Select an extension or outside number to which all internal, external, or both internal and external calls are forwarded temporarily while you are away from your telephone. All calls can be forwarded to a single destination, or internal calls can be forwarded to one destination and external calls to another destination. Calls are directed to the call forward extension without attempting to ring the regular extension DN.

Forwarding busy calls: While your telephone is in use, forward internal, external, or all calls for your extension to a programmed busy forward extension, to an outside number or to the voice mail. All calls can be forwarded to a single destination or internal calls can be forwarded to one destination and external calls to another destination.

Forwarding no answer calls: Forward internal, external, or all calls for your extension that are unanswered, to a programmed no answer forward extension, to an outside number, or to the voice mail. All calls can be forwarded to a single destination, or internal calls can be forwarded to one destination and external calls to another destination.

Forwarding calls from a DND extension: Forward calls to a programmed extension by activating the DND feature. All calls can be forwarded to a single destination, or internal calls can be forwarded to one destination and external calls to another destination.

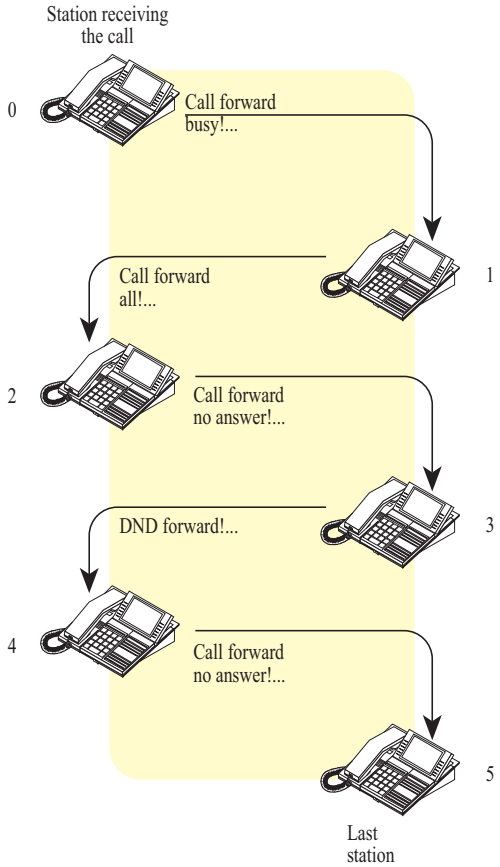


Figure 30 Five step call forwarding example

Call pickup
Calls to individual extensions may be retrieved by other system users in several ways.

Direct: Retrieve a call ringing at a specific extension.

Group: Retrieve any call ringing within your retrieval group, from your telephone, without having to know which extension or outside line the call is on.

On hold: Retrieve a call on hold at another extension in the system.

One touch: With the press of one button, any station can pick up incoming calls to any other extension in the system.

Page: Retrieve a call announced through a page.

Call transfer
Calls may be transferred in several different ways, depending on personal convenience and the location of the call recipient.

Confirmed: Ensure the successful completion of a transfer by remaining on the line to check that the parties are connected.

Handsfree: Transfer an outside call to another station using the handsfree audio path as a voice call.

Page: Transfer an outside call using the paging feature. The call can be retrieved by call pickup page or meet-me page.

Screened: Ask the intended recipients of calls if they wish to accept them, before completing the transfer.

Unscreened: Transfer a call to another extension and go onhook before the called extension answers. The transferred call then rings or camps on to the destination extension.

Camp on
Transfer a call to a busy extension. The system automatically camps the call onto the called extension.

Camp on tone
Set the system to sound a tone at an extension where a call has been camped on.

Conference
The **DIGITAL** systems support three types of conferences: conference, conference loop and meet-me conference. At any time there can be total of up to 30 conference participant system wide.

Conference - eight parties: Set up a conference call with up to seven other internal or outside parties by dialing each party and adding them to the conference. All eight parties can participate in the conversation.

Conference loop - 30 parties: Set up the conference loop call with up to 30 pre-defined internal parties. At the press of a single button, the **DIGITAL** system will dial all of the conference parties. The **DIGITAL** system supports up to ten loop conferences held simultaneously, with a maximum of 30 participants system-wide.

The system can be programmed for two-way conference loop, so that all of the parties can listen and speak, or for one-way conference loop, where the mediator of the conference can speak and can designate up to five other parties to speak. The remaining parties are listening to the conversation. By the press of a button, any listening parties can alert the conference mediator of their desire to

speak. The one-way conference mediator can provide a party with speaking rights, as long as, at any one time there are not more than six parties with speaking rights. The conference loop is useful for making an announcement to a large number of people at once, with the press of a button.

Meet-me conference (option) - 8 parties:
Up to eight internal or outside parties can hold a meet-me conference by calling a meet-me-conference DN. All eight parties can participate fully in the conference. This conference is useful for a group of people that have arranged a meeting at a designated time. Up to five meet-me-conference DNs can be defined in the system, and five meet-me conferences can be held simultaneously with a total of up to 30 conference participants.

Caller ID list*
Where caller ID is available on the incoming trunk and at the station, you can view a list of the calls coming in to your telephone, and dial out to selected Caller IDs.

Consultation (split call)
Leave a call temporarily to place another call, and then return to the original caller.

Contrast adjustment (electronic)
Adjust the display contrast on any Avanti station while the station is in idle state by using the volume LOW-HIGH button on the station.

Delayed ring
In PBX mode, you can program incoming calls to ring at certain extensions immediately, and at other extensions the call will ring only after a delay. Then the delayed ring station will only answer calls that are not answered by the first extensions. For example, a call will only ring at a group manager's extension after it has not been answered by anyone from the group.

Destination status display
The calling party's station displays the status of the called internal party, for example, BUSY, DND (do not disturb), CONF (conference), CFWD (call forward all), CONV (conversation).

Dial-By-Name (System DBN)*
You may dial any extension or outside line by dialing the name of the called subscriber (up to six letters) or, on an Avanti 3025 set, by selecting the name from one of the system Dial-By-Name (SDBN) directories using a softkey. You can leave, send, or copy messages to a mailbox or mailbox group by dialing its name.

Direct line termination
Program an outside line to terminate directly at a specific button on the Avanti telephone set.

Direct station selection - DSS button
Press a DSS button to dial an extension. When used to transfer outside calls, DSS buttons activate automatic hold. The DSS button is programmed by the station user. The DSS buttons also provide Busy Lamp Field (BLF) indications for extensions.

Direct trunk or trunk group select
Select a specific trunk or trunk group, by dialing its access code or pressing a trunk or trunk group button on the Avanti station.

Directory assistance (secondary assistance)*
See *ImaGEN Incoming Caller Features* in Section 5, *ImaGEN Voice Mail and Automated Attendant Feature*s.

Display
On Avanti stations that have Liquid Crystal Displays (LCD), time, date, and call status information is provided. The display contrast is adjustable as is the

* Requires the ImaGEN option.

display panel incline. The Avanti Attendant and Avanti 3025 sets have a graphic display with some softkey functions displayed as icons. On Avanti Attendant, Avanti 3025, Avanti 3020F, and Avanti 3020H sets, the LCD also provides softkey operation, worktable features, and full length message display. In addition, on the Avanti 3025, Avanti 3020F, and Avanti 3020H sets, you can see a list of voice mail messages and lists of caller ID data. On the Avanti 3025 sets all entries on the Electronic Business Card option can also be viewed.

Distinctive rings and tones
The type and status of a call (e.g. internal, external, recall) can be identified by the cadence of the ring or tone generated by the system.

Distinctive station ringing
The Avanti stations can be programmed with a ring tone that is distinctive for all calls to that station. Using the station dialpad, you may easily select from nine different ring tones. Where there are several stations in close proximity, the distinctive tones make it easier to identify which station is ringing.

Do not disturb (DND)
If you do not want to be disturbed, at the press of a button, you can block all internal and external calls to your extension and prevent it from ringing.

Door unit operation
If a door unit is connected to the system, you can speak with the person at the door and unlock the door using a button on the telephone set.

Dual color LED indication
The flash rate and color of the dual-color (red and green) LEDs on the Avanti telephones indicate the status of the programmed extension, trunk, or feature represented by the button.

Dual color LED indication
The flash rate and color of the dual-color (red and green) LEDs on the Avanti telephones indicate the status of the programmed extension, trunk, or feature represented by the button.

Elapsed time display
During an external call, Avanti stations display the time elapsed since the trunk was seized.

Executive Credit Codes (ECC)
A secret code, the Executive Credit Code, can be used to access the Global Class Of Service and Telephone lock features. With an Executive Credit Code and the proper Class Of Service, a privileged user may dial into the system on an outside line and dial out of the system on the lines of the **DIGITAL** system.

Executive intercom (manager-secretary hot line)
Calls placed from a defined manager station to a defined secretary station override all intercom restrictions and the DND status of the secretary station.

Executive suite
An attendant console or display set may process incoming calls for a number of organizations in an efficient manner. For each incoming call, an appropriate name or message appears on the telephone display, indicating for which organization the arriving call is intended. You may also program the telephone for MSA mode and program a different button LED to flash on incoming calls for each organization (See *Multiple station appearance* under *System Features*, above).

External call forward
The user can forward either internal calls, or external calls, or all calls to telephone(s) outside the **DIGITAL** system. Calls may be forwarded outside the system for either busy conditions, or no answer conditions, or both. Furthermore, calls may be forwarded via

private trunks, trunk groups, LCR, ISDN, DPNSS, T1/E1, or tie lines (see *Call forwarding*, above). With the ImaGEN option, the automated attendant or System Dial-By-Name features can be used to forward an external caller to a telephone external to the **DIGITAL** system.

Feature button
Access features by pressing the FEATURE button and dialing the feature access code.

Letter codes relating to the feature name are used as a memory aid. All feature codes reflect the feature name, for example, to access Background Music dial [FEATURE] [B] [M] (i.e. [7] [2] [6]).

Flash disconnect
The user can disconnect a call (using the FLASH button) but still retain the connection (internal or external) in order to dial again.

Flash signaling
On a trunk configured behind PBX or CENTREX service, the flash signal enables you to signal the PBX or CENTREX switch. This signaling is often required to access special features. Flash signaling can be included in automatic dialing sequences.

Flip Flop
Users of SLTs and Avanti stations lacking appearance buttons for outside lines can swap between two outside calls - one in conversation and one on hold - without disconnecting either party.

Floating loop buttons
A button that can be assigned temporarily to any outside line that does not have a dedicated button on the station. This button enables the extension user to take a call on an outside line when the extension does not have a button for that outside line. The user can also transfer a call from an outside line group to a floating loop button so the user can dial out on the outside line.

Handsfree calling
Place a voice call to another station through the station speaker (without ringing). The called party can answer handsfree, through their station microphone.

Handsfree answerback (HFAB)
Answer voice calls handsfree (without lifting the handset or pressing the SPEAKER button), just by responding via the microphone. All of the Avanti stations have this feature.

Headset
The Avanti sets may be operated with a headset, in place of a handset, for your convenience. To use the headset, a programmable HEADSET button is required. The LOW-HIGH button controls the headset volume as well as the volume for the speaker and handset.

Hold - exclusive or inclusive (system hold)
A choice of two types of hold is offered:

> ***Exclusive hold:*** Places the call on hold at the your station only.

Inclusive hold: Places the call on system hold at all stations with access to the trunk.

When configuring the system, the default mode (i.e., whether a call is placed on exclusive or inclusive hold by default) may be set as desired for each station.

Hot dial pad
Pressing any button on the dialpad automatically activates the Avanti station speaker. Dialing is initiated, even while the station is onhook and idle, without having to lift the handset or press the SPEAKER button.

Last number redial
The user can redial the last outside number dialed, at the press of a button.

Meet-me page
A paged party can call a page initiator during a page call without knowing the page initiator's extension number.

Memory buttons
Memory buttons are used to dial extensions at the press of a single button. The memory buttons can also be used to provide single-button access to features.

Messages
The **DIGITAL** systems have several methods of sending
messages between extensions:

Callback: Automatically call back the sender of a message left at your extension.

Waiting: When messages are waiting at a station, the message LED flashes. If the station has a display, messages sent to the station appear on the display. If more than one message has been sent to a station with a display, the number of messages waiting appears on the display. A list of all the messages can be viewed on the Avanti 3025, Avanti 3020F, and Avanti 3020H sets.

DND: A message appears on the display of any display station that calls a station that is in DND mode.

Confirmed: When you send a message to a busy display station, the busy station user can send you confirmation of receipt of the message without interrupting the current call.

Stored: A full length text message can be selected from a store of 30 messages. These messages may be edited and sent to no answer and busy stations. The message is displayed on the station display and stored in the memory buffer for later retrieval. Messages can be sent to an extension within the local **DIGITAL** system or in a networked system.

Retrieve: Users of Avanti Attendant, Avanti 3025, Avanti 3020F, and Avanti 3020H sets can review all the messages received at the station, and reply to the messages in any order.

Mute handset microphone
The user can mute the handset microphone to prevent the calling party from hearing surrounding noise or a conversation in the vicinity of the station.

Mute station microphone
The user can mute the station microphone, before or during a conversation, to prevent a caller or called party from hearing what is being said in the vicinity of the station.

Notepad
During a conversation, users of Avanti, DIGITAL, or analog telephones, may insert and save a telephone number that can be dialed at a later time. The notepad is very useful when the calling or called party gives you a telephone number that you want to call after you complete the current conversation. Numbers entered in the notepad are stored in a personal speed dial bin or under an available speed dial button.

Offhook ring
Telephones or multiple directory numbers in PBX mode can receive a ring even when they are busy. When the second call arrives, you will hear a tone over the station speaker or handset, and the DN LED will flash. On the Avanti 3025 sets, a softkey will appear for answering the second call.

Offhook voice announce with handsfree answerback (option)
While conducting a call via the handset of an Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, or Avanti 3015DH station, an internal caller may call your station via your speaker, and you may answer via the station microphone, without disrupting the call currently in progress via the handset.

Onhook dialing and monitoring
All operations may be performed without having to lift the handset.

Onhook voice announce with handsfree answerback
While stations are idle, a voice call may be received through the station speaker, and the recipient may reply through the station microphone, without having to lift the handset or press the SPEAKER button.

Page zones
Page calls can be placed to internal or external page zones or public address systems to make announcements and to transfer calls.

Pause time
Users may insert a pause time during dialing, or in a speed dial number, which momentarily suspend dialing. When the number is automatically dialed again (via redial, speed dial, or save/ repeat), the pause is included.

Phone book
Users of extension with displays can access their personal speed dial numbers from a phone book listing. So that they can easily dial their personal speed dial numbers, including other extensions, by name or, with the Avanti attendant, Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, and Avanti 3015DH model telephones, select the name from a list on the telephone display (See Figure 31).

Figure 31 Phone book listing and phone book details on the Avanti 3025 display

Preferred connection
You can program a preferred connection, so that when you go offhook your station automatically connects to a trunk or trunk group and, if programmed, dials an internal or outside number. A timer can be set to delay this dialing so that you have time to override the preferred connection and dial another number.

Private outside lines
A private outside line can be routed to ring at an extension. Calls arriving at that extension may be optionally routed to recall at an attendant position.

Programmable buttons
During system configuration, programmable buttons are assigned functions on station maps such as Call Forwarding, Memory, Floating, Background Music, Least Cost Routing (LCR), Trunk, Trunk Group, Multiple Directory Number (MDN), etc.

Recall
Outside calls left on hold, or ringing, automatically recall the same or other extensions, to prevent calls from being dropped. The recall type can be identified by the distinctive ring rate.

Save/repeat dialing
Save a dialed number under the save button for subsequent one-touch dialing with save/repeat. The number is stored until it is replaced by another number. This feature is useful for storing a number that will be redialed several times on a specific day but is not dialed on a regular basis.

Softkeys
On the Avanti Attendant, Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, and Avanti 3015DH sets, softkeys greatly simplify station operation. The softkeys dynamically change their function in the course of operation, offering a visual presentation of all the possibilities currently open to the user (see *Avanti Telephone Features* in Section 2, *Terminal Units*, above).

Speakerphone/Handsfree
Conversations on Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, and Avanti 3015DH sets can be conducted handsfree via the high-quality, built-in speakerphone.

Speaker monitor
You may listen to a conversation via the station's speaker while continuing to speak through the handset (i.e., the station's microphone remains inoperative).

Speed dial
Various methods of speed dialing, using buttons and codes, can be accessed to abbreviate and simplify dialing.

Chaining: at the press of one button, the system performs a series of operations including activating features, pausing, and dialing. For example, the series of operations programmed on the speed dial button could include: selecting an outside line, pausing to identify receipt of outside line dial tone, and dialing an outside number. In this way, a speed dial button may be set to act as a feature button.
Buttons: You may program speed dial buttons with internal or external numbers for one button speed dialing of features or outside numbers.

Personal: Up to 89 speed dial numbers per station are programmable for personal use.

System: Users may be granted access to up to ten system speed dial directories containing up to 1,000 speed dial codes. One station is assigned as the system speed dial programming station for each directory. Each extension can access one of two speed dial arrays in the **DIGITAL KEY BX** and **DIGITAL 400** systems or one of four arrays in the **DIGITAL 1000** system (see *System speed dial* in *System Features*, above).

Voice activated: With the Voice Recognition card option in your telephone, you can dial up to 56 numbers based on an oral command.

Station-to-station call
Intercom calls between specific extensions in the system can be totally restricted, or unrestricted, conditional on the status of the called extension.

System pickup (one touch)
With the press of a single button, any station can pickup incoming calls to any other extension in the system to which it has authorized access.

Telephone lock
Any extension can be barred from placing outside calls, if it is assigned a Class of Service (COS) that is restricted from dialing on outside lines. The telephone lock feature lets you switch your telephone to a restricted COS (lock) at the push of a button. You may then unlock the telephone by pressing a button and entering a password.

Tone button
Place tone (ringing) calls to internal extensions by pressing the TONE button prior to dialing the extension number. When transferring outside calls, pressing the TONE button automatically places the call on hold.

Traveling Class of Service (COS)
The COS of a station may be temporarily changed to a traveling COS. This feature allows you to "take" your COS with you, and use it at any other station in the system by entering the directory number and COS password. In addition to station COSs, five global (system-wide) COSs may be defined. This enables any user who knows the password of a global COS to have any station temporarily assume the characteristics defined by that COS (i.e., a more restricted global COS when out of the office or a special call abroad capability). The temporary COS assignment is discontinued after a pre-programmed timeout.

Trunk-to-trunk patch
Set up a conference with two other outside parties; then exit the call, and patch the two outside parties together. The patch initiator may retrieve the patch call at any stage.

Trunk queue
When a private trunk or all trunks in a trunk group are busy, you may activate a trunk queue. When the private trunk, or any trunk from the trunk group becomes available, the system calls you.

Voice memo*
Refer to *Voice memo* in Section 8, *ImaGEN Voice Mail and Automated Attendant Feature*s, above.

Voice activated speed dial (option)
By recording your oral instructions and programming the number to call, Avanti 3025 sets with the Voice Recognition card option can recognize your voice given instructions and dial. You tell the telephone to whom you want to call, and the call is dialed. For example, to dial Jane Baker in the Marketing department, you press an activation button and say, "Jane" and the number will be dialed.

Volume adjustment (electronic)
Adjust the speaker, handset, or headset volume on Avanti stations individually for handsfree answerback, ringing, paging, and speakerphone operations using the volume (LOW-HIGH) button on the station.

ATTENDANT FEATURES

In addition to the features available to a regular extension user, the attendant is provided with the features described below.

Those features marked with an asterisk (*) require the PC attendant option.

Alarm indication in display
Alarm messages generated by the **DIGITAL** systems' online diagnostics are displayed on the attendant console display and may be cleared from the display by pressing the CLEAR ALARM button.

Answer (first call waiting)
Press the ANSWER button to answer the call waiting longest in the attendant Main Call queue.

Automatic hold
Calls to the attendant are automatically placed on hold when the attendant begins dialing any extension in the system.

Busy verification
The attendant may check which extension is using a particular busy trunk line. The Attendant may connect to the line to confirm that a conversation is actually taking place.

* Requires the ImaGEN option.

Busy Lamp Field
See *Avanti telephone set features* and *PC Attendant Features* in Section 2, *Terminal Units*, above.

Call Register*
See *PC Attendant Features* in Section 2, *Terminal Units*, above.

Call transfer
The attendant can transfer calls:

- ***Screened***
- ***Unscreened***
- ***Handsfree***
- ***Confirmed***
- ***Page***
- ***Camp on***

Call ID box and picture*
See *PC Attendant Features* in Section 2, *Terminal Units*, above.

Cancel all messages (system)
Each attendant may cancel all system messages stored at extensions assigned to that attendant position.

Class of Service reassignment
The attendant console can reprogram the day and night Class of Service of any extension.

Clear alarm
The attendant may clear any system diagnostic alarms from the attendant display at the press of a button.

* Requires the PC Attendant option.

Conference
An attendant can set up a conference of up to eight parties, and then speak exclusively with one party in the conference. The parties can be extensions or outside lines.

Day alert
An attendant experiencing an unusual amount of call traffic, or wishing to leave the attendant position temporarily, may flexibly assign another station, the day alert station, to receive attendant calls. Calls ring the attendant and the day alert station simultaneously.

Dial continuation
Dial continuation overrides automatic hold and enables the attendant to operate certain features such as dialing to a Voice-Store-and-Forward (VSF) machine.

Direct station select
The attendant can access a station by pressing its direct station select (DSS) button on the Attendant console or on the DSS unit.

Distinctive recall
You can program each DID number to recall to a specific attendant. The *Avanti* Attendant console display shows the number of the DID line so that the attendant knows which DID line is recalling.

Distinctive ring at attendant*
See *Caller ID box and picture* under *PC Attendant Features* in Section 4, *Terminal Units*, above.

Display (attendant console)
The *Avanti* Attendant console is equipped with a graphic display that provides Ten softkeys, time and date information, and calling and called status display. Six buttons on the display module indicate the status of calls placed on private hold.

Drop
Cancel a current feature or disconnect a current call and return to the previous state by using the DROP button.

Executive suite
When an attendant or receptionist handles calls for a number of organizations, the Executive suite feature enables the attendant/receptionist to process the calls efficiently. For each incoming call, an appropriate name or message appears on the display, indicating for which organization the arriving call is intended. With this information, the attendant can answer the call as a representative of the appropriate organization.

Flash over trunk
Press the FLASH softkey to disconnect the current call while retaining the line for dialing.

Flash signal
Press the FLASH-SIGNAL softkey to signal a PBX or CENTREX exchange when accessing features or services on the PBX or CENTREX exchange.

Headset
The attendant position can be operated with a headset.

Heavy load on main queue indication
When more than a pre-defined number of calls are waiting in a queue, or when a call has been left on hold for longer than a pre-defined time, an indication of the heavy call load on the main queue appears on the Avanti Attendant display (see *Overflow*, below).

Idle state
When idle, the Avanti Attendant does not hear dial tone.

Incoming Call Identifier (ICI)
See *Queues*, below.

Interflow
When pre-programmed heavy call traffic conditions are met, a defined interflow from the attendant console or attendant position is automatically activated. Until the interflow condition disappears, all calls to the attendant console or attendant position are sent to the interflow destination. This destination may be any station, attendant console, attendant position, trunk, trunk group, hunt group, MDN, ACD plan, ImaGEN or voice-store-and-forward mailbox, or speed dial number. Besides destinations internal to the **DIGITAL** system, the speed dial number can target a networked system, a least cost route (LCR), the ImaGEN network, or the public network.

Interposition call
One attendant can call directly or transfer calls to another attendant position.

Mute ring
When a new call arrives in an empty call queue, and when calls are left unprocessed in queues, the **DIGITAL** systems sound a tone. These tones can be muted and reactivated by toggling the MUTE RING button.

Overflow
When pre-programmed heavy call traffic conditions are met, a defined overflow station is automatically activated. Until the overflow condition disappears, all calls ringing the attendant console or attendant position ring simultaneously at the overflow station (see *Heavy load on main queue indication*, above).

Passing dial tone
The attendant can pass a trunk to an extension not normally entitled to access that trunk.

Position busy
When an attendant console is placed in the position busy state, the console is inactive until returned to normal operation.

Private hold
Six PRIVATE HOLD buttons, situated on the right of the display panel, enable the attendant to retain outside calls on private hold at the console, without returning the calls to the common hold queue. This feature facilitates efficient call monitoring and handling.

Queues
All calls directed to an attendant enter a Main Call queue and may enter other sub-queues as well, depending on system programming. The system can handle over 40 (First In-First Out) call queues (with a possible four Main Call queues). Call queues simplify, delegate, and prioritize call handling.

Recall: A transferred call, or a call left on hold recalls the attendant position's Recall queue.

Private recall queue: Certain calls, which an attendant wishes to deal with personally, may recall to the attendant that last dealt with the call, rather than recalling the main attendant position.

Dial attendant: Internal calls directed to the attendant position are routed to a special attendant queue.

Hold: Incoming calls may be placed on hold in a common Hold queue. Calls may be retrieved from the Hold queue by any attendant at the attendant position.

Incoming Call Identifier (ICI): The Main Call queue can be subdivided into up to eight Incoming Call Identifier (ICI) queues to which trunks and extensions are assigned for selective answer at the attendant console.

Release
Terminate a call or complete a process (for example, transfer) by pressing the RELEASE button.

Selective answer
Answer calls according to priority, from any of the call queues active at the console.

Serial calls
An outside caller may request to be transferred to a number of extensions in succession. The serial function returns the caller to the attendant after the completion of each call transfer, to enable further transfers to other extensions.

Softkeys
Softkeys, on both sides and at the bottom of the display, change their function dynamically during the course of operation. The current function of each softkey is indicated on the display (see *Avanti Telephone Features* in Section 2, *Terminal Units*, above).

TAPI driver for CTI*
See *PC Attendant Features* in Section 2, *Terminal Units*, above.

Trunk test
The attendant may access any trunk individually, even if it belongs to a trunk group, to check if it is operative.

Voice mail integration*
See *PC Attendant Features* in Section 2, *Terminal Units*, above.

* Requires the PC Attendant option.

8 DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 SYSTEM DESCRIPTION

The **DIGITAL** systems' modular hardware and flexible software enable every installation to be tailored precisely to meet the customer's needs. The system is extremely versatile: it can be configured as a PBX, as a hybrid PBX/key telephone system (KTS), or as a squared KTS.

TECHNOLOGY

The **DIGITAL** systems use Space and Time Division Multiplexing (S/TDM) and Pulse Code Modulation (PCM). Distributed control is achieved through the microcontrollers located on each peripheral card. System cards are built for sophistication and economy using Surface Mount Technology (SMT).

The incorporation of the ISDN (physical layer) passive bus (2B+D S-interface) into the **DIGITAL** systems' architecture enables the running of data and additional applications as described in Section 4, and the flexible assignment of one or two stations on a bus. Using Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, or Avanti 3015DF sets, offhook voice announce with handsfree answerback can be configured for all of the extensions in the system, with no reduction in system capacity or performance.

SYSTEM EQUIPMENT

DIGITAL KEY BX and DIGITAL 400

The **DIGITAL KEY BX** and **DIGITAL 400** systems' equipment consists of up to three modular cabinets with a power supply in each cabinet. The system power supply unit(s) can be supported by an external Battery Backup Unit (BBU) or Uninterruptible Power Supply (UPS), to provide service during power outages.

DIGITAL 1000

The **DIGITAL 1000** systemís equipment consists of up to four modular card cabinets. The direct current is provided by individual power rectifiers in each cabinet (SREC) or the cabinets can be connected to an external 48 Vdc power source.

Each card cabinet requires a Switching Power Converter (SPC), which switches the 48 dc voltage output of the rectifiers or of the external 48 Vdc power source to the various voltages required by the **DIGITAL 1000** system.

An external Battery Backup Unit (BBU) or Uninterruptible Power Supply (UPS) can provide service during power outages.

In addition, in multiple-cabinet systems, the **DIGITAL 1000** system has a Driver (DRV) card in each card cabinet, for communication among the cabinets.

Peripheral equipment includes Telrad's new digital Avanti sets, the Avanti DSS Add-on module, Telrad's APP*Lync* and DATA*Lync* data cards, the Voice Recognition Card option, the PC attendant, Telrad's **DIGITAL** sets, industry standard SLTs, Telrad Analog sets, announcers, and ImaGEN - Telrad's Integrated Multi-application Generator with voice mail/automated attendant as well as other optional applications.

SYSTEM CABINETS

Each **DIGITAL KEY BX** system cabinet (see Figure 32) can be wall-mounted and contains up to six printed circuit card slots as well as its own power supply unit. The Main Processor card (MPD) must be inserted into the first slot of the first cabinet. All other cards may

Figure 32 DIGITAL KEY BX and DIGITAL 400 system cabinets

The **DIGITAL 400** system (see Figure 32) can be wall-mounted or installed on a rolling base. Each cabinet contains up to 15 printed circuit card slots and its own power supply unit. The Main Processor card (MPD) must be inserted into the first slot of the main cabinet. All other cards may be allocated to any slot in any cabinet.

The **DIGITAL 1000** system consists of from one to four card cabinets that are installed on a wheel-base. Each **DIGITAL 1000** card cabinet contains up to 15 printed circuit card slots for peripheral equipment cards, a slot for the Driver card, a slot for an SPC module, and a slot for a power rectifier unit (SREC).

The Main Processor card (MPD) of the **DIGITAL 1000** system must be inserted into slot number one of the main cabinet. If a second MPD card is used it must be situated adjacent to the first MPD card. A DRV (Driver) card is required in slot zero of every cabinet of a multiple-cabinet configuration. All other cards may be allocated to any slot in any cabinet.

POWER SUPPLY

A power supply unit slides into each cabinet. There is a separate power supply for use in the six slot **DIGITAL KEY BX** system, the 15 slot **DIGITAL 400** system, and the 15 slot **DIGITAL 1000** system.

In the **DIGITAL KEY BX** system, the power supply is located above the system cards.

In the **DIGITAL 400** and **DIGITAL 1000** systems, the power supply is located to the right of the system cards.

When configuring a **DIGITAL 1000** system using some **DIGITAL 400** cabinets, the **DIGITAL 1000** cabinets use the **DIGITAL 1000** power supply, and the **DIGITAL 400** cabinets use the **DIGITAL 400** power supply.

SYSTEM CARDS

All of the extension and outside line cards and the option card, may be used in the **DIGITAL KEY BX, DIGITAL 400**, or **DIGITAL 1000** systems. There are three MPD cards, one that supports up to 128 ports, one that supports 384 ports and one for the **DIGITAL 1000** cabinet. The MPD card that supports 128 ports may be used in either the **DIGITAL KEY BX** or in a single **DIGITAL 400** cabinet, while the MPD card that supports 384 ports may only be installed in the **DIGITAL 400** cabinet. The MPD for the **DIGITAL 1000** system can only be installed in the **DIGITAL 1000** cabinet. Each of these MPD cards requires either a standard memory cartridge or an optional enhanced memory cartridge with ACD capabilities.

Figure 33 DIGITAL KEY BX, DIGITAL 400, and DIGITAL 1000 modular growth

SYSTEM GROWTH

Both the **DIGITAL KEY BX** system and the **DIGITAL 400** system can be expanded by the addition of one or two modular card cabinets. The **DIGITAL 1000** system can be expanded by the addition of from one to three modular, card cabinets. Figure 33 shows the **DIGITAL** systems at their various expansion levels.

The expansion cabinets attach simply and unobtrusively to the original cabinet. For the **DIGITAL KEY BX** system, a three-cabinet wall-mounting kit may be used at initial installation to simplify the installation of expansion cabinets later. To expand the **DIGITAL 400** and **DIGITAL 1000** systems, the expansion cabinet(s) can be mounted on the original cabinet and wheel assembly.

For those small, medium, and larger size businesses that expect to grow significantly, the **DIGITAL** family of systems offers an ideal means of migration and protection of your investment through upward compatibility to larger systems. This is accomplished by using software that is compatible at all levels of system growth and by supporting the same peripheral equipment, system cards, and stations in the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems. The **DIGITAL 1000** system can even be configured using some cabinets from a **DIGITAL 400** system.

SYSTEM CONFIGURATION

The **SynopSys** system comes in a single cabinet. There are one, two, and three cabinet configurations of both the **DIGITAL KEY BX** and **DIGITAL 400** systems. There are one, two, three, and four cabinet configurations of the **DIGITAL 1000** system. It is also possible to configure a **DIGITAL 1000** system using both **DIGITAL 1000** and **DIGITAL 400** cabinets in one tower.

Figure 34 shows the number of possible extensions (stations, ISDN terminals, or SLTs) and trunks (loop-start, ground-start, ISDN Primary Rate Interface [PRI], ISDN Basic Rate Interface [BRI], DPNSS or QSIG network, DID, E&M tie, or T1/E1) in each cabinet configurations of the **SynopSys, DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems (**SynopSys** only supports loop-start and BRI trunks).

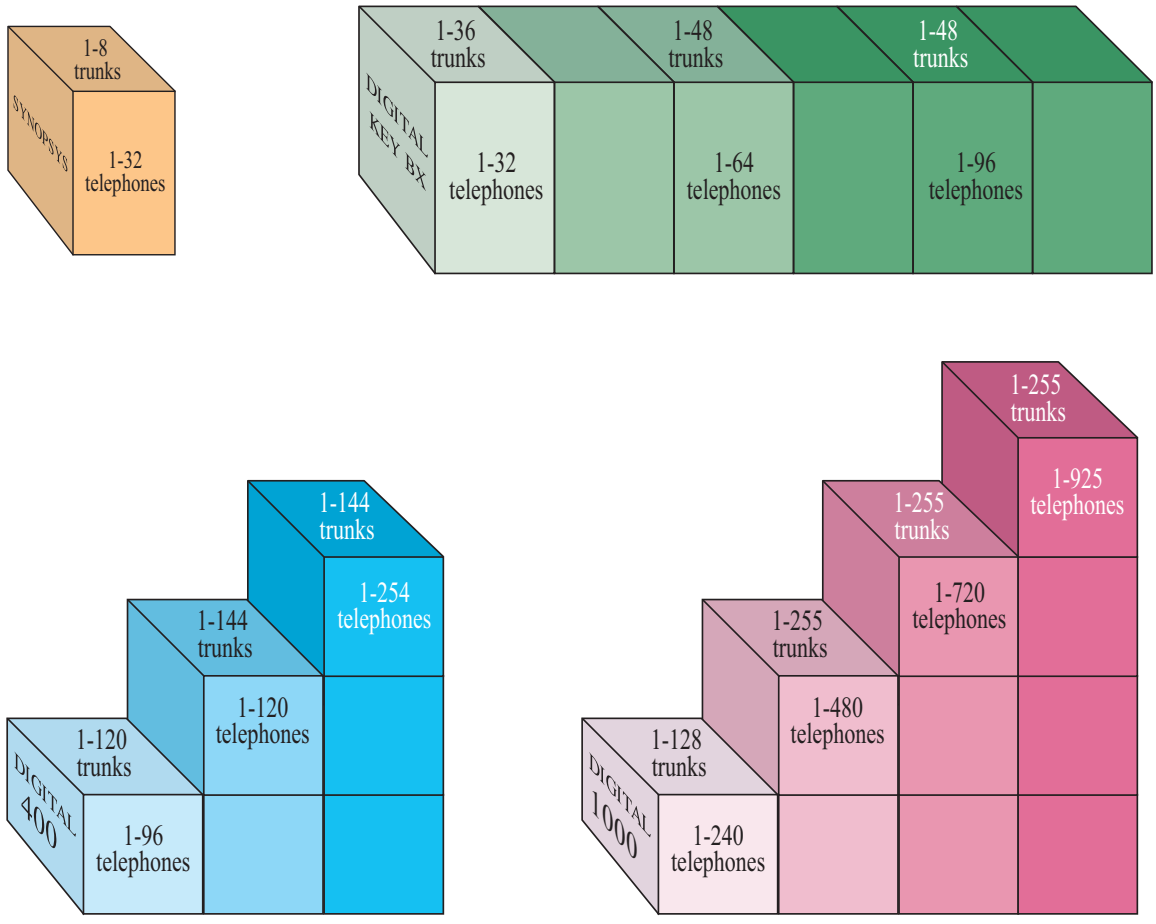


Figure 34 DIGITAL Family configuration capabilities

9 DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 CONFIGURATION CAPABILITIES

In the **DIGITAL KEY BX** system, four loop start CO circuits are provided on the MPD card. The minimum configuration of 4/16 (four outside lines and 16 stations) requires only two cards - the MPD and one ELD. In the **DIGITAL 40**0 system, the minimum configuration requires an MPD card, an ELD card, and a trunk card for an 8/16 configuration (eight outside lines and 16 stations). Both systems are expanded by the addition of modular cabinets, peripheral cards, terminal equipment, and external options. The table below lists the peripheral cards and shows the capacity of each card.

Card*	Number of ports	Function	Maximum # of cards DIGITAL KEY BX*	Maximum # of cards DIGITAL 400*	Maximum # of cards DIGITAL 1000*
COL	8	Loop-start outside lines	6	18	32
CHL	4	Loop-start outside lines	12	36	58
COG	8	Ground-start or loop-start outside lines	6	18	32
DID	8	Direct Inward Dialing circuits	6	18	32
EMD	4 ***	E&M tie line trunks	12	36	58
PRI24	23	ISDN 24 (23B+D) Primary Rate Interface for outside lines (23 ISDN outside lines on one PRI carrier)	2 (not more than 1 per cabinet)	6 (not more than 4 per cabinet)	12 (not more than 10 per cabinet)
PRI30	30	ISDN 30 (23B+D) Primary Rate Interface for outside lines (30 ISDN outside lines on one PRI carrier)	2 (not more than 1 per cabinet)	5 (not more than 4 per cabinet)	9 (not more than 8 per cabinet)
N24	23	ISDN 24 (23B+D) DPNSS or QSIG Networking Interface	2 (not more than 1 per cabinet)	6 (not more than 4 per cabinet)	12 (not more than 10 per cabinet)
N12	12	ISDN 12 (12B+D) DPNSS or QSIG Networking Interface	4 (not more than 2 per cabinet)	12 (not more than 10 per cabinet)	22
N30	30	ISDN 30 (30B+D) DPNSS or QSIG Networking Interface	2 (not more than 1 per cabinet)	5 (not more than 4 per cabinet)	9 (not more than 8 per cabinet)
N20	20	ISDN 20 (20B+D) DPNSS or QSIG Networking Interface	3 (not more than 1 per cabinet)	8 (not more than 6 per cabinet)	13 (not more than 12 per cabinet)
N10	10	ISDN 10 (10B+D) DPNSS or QSIG Networking Interface	5 (not more than 2 per cabinet)	15 (not more than 12 per cabinet)	26
BRT	4	ISDN2 (2B+D) ISDN Basic Rate Interface for outside lines	6	18	32
BHT	2	ISDN2 (2B+D) ISDN Basic Rate Interface for outside lines	12	36	58
T1	24	T1 carrier (equivalent to 24 PCM trunks on one T1 carrier)	2	6	11
E1	30	E1 carrier protocol R2 (equivalent to 30 PCM trunks on one E1 carrier)	2	5	9
E1MFC-R2	30	E1 carrier protocol MFC-R2 (equivalent to 30 PCM trunks on one E1 carrier)	2	5	9

* Not all cards are available in every country.
** These maximums are based on defining and activating all ports on each card.
*** Two EMD TIE ports if four-wire audio is used.

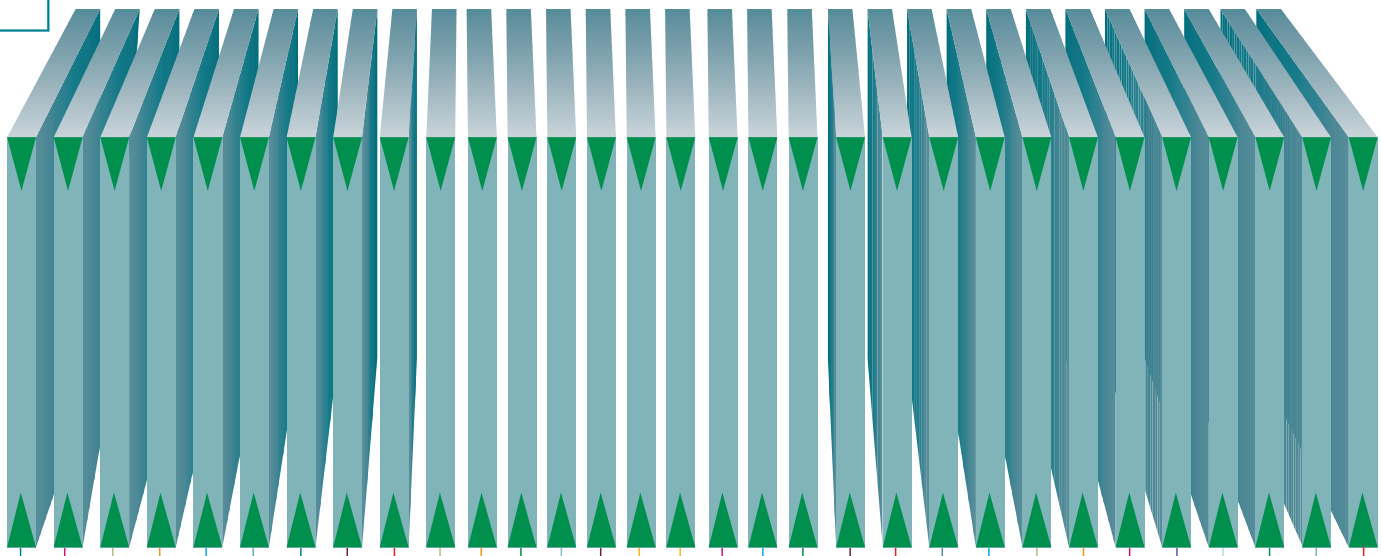
Card*	Number of ports	Function	Maximum # of cards DIGITAL KEY BX*	Maximum # of cards DIGITAL 400*	Maximum # of cards DIGITAL 1000*
ULD	16	Interface for Avanti sets or attendant	6	16	58
UHD	8	Interface for Avanti sets or attendant	12	32	58
ELD	16	Interface for DIGITAL sets or attendant	6	16	58
EHD	8	Interface for DIGITAL sets or attendant	12	32	58
ELA	8	Interface for Telrad Analog telephone sets	12	15 (not more than 5 per cabinet)	20
BRS	8	ISDN (2B+D) ISDN Basic Rate Interface for internal lines	12	32	58
SHD	4	Interface for Pulse or Tone dial SLT OPX	17	43	58
ONS	16	Interface for Pulse or Tone dial ONS SLT extensions	6	16	58
HONS	8	Interface for Pulse or Tone dial ONS SLT extensions	12	32	58
OCD	3	Option modules	3	10	10

* Not all cards are available in every country.
** These maximums are based on defining and activating all ports on each card.
*** Two EMD TIE ports if four-wire audio is used.

9

EXPANSION INCREMENTS

Additional expansion is achieved using the cards shown in Figure 35:



MPD 1 DTMF receiver, MOH and BGM audio channels (for the DIGITAL KEY BX system, the MPD card includes 4 loop-start CO lines, audio channels, and relays)
OCD 3 option modules
RS232 RS232 (extra RS232 port)
DRV DIGITAL 1000 Driver card*
ULD 16 U - interfaces for 16 *Avanti* digital stations or attendants
UHD 8 U - interfaces for 8 *Avanti* digital stations or attendants
ELD 8 S-interfaces for 16 DIGITAL stations
EHD 4 S-interfaces for 8 DIGITAL stations
ELA 8 analog stations
SHD 4 single line telephones (pulse dial or DTMF)
ONS 16 on premises single line telephones (pulse dial or DTMF)
HONS 8 on premises single line telephones (pulse dial or DTMF)
BRS 4 ISDN 2B channel + 1D channel (ISDN2) Basic Rate Interfaces for internal lines (terminal)
PRI24 1 ISDN 23B channel + 1D channel (ISDN24) Primary Rate Interface to the public exchange
PRI30 1 ISDN 30B channel + 1D channel (ISDN30) Primary Rate Interface to the public exchange

BRT 4 ISDN 2B channel + 1D channel (ISDN 2) Basic Rate Interface to the public exchange
BHT 2 ISDN 2B channel + 1D channel (ISDN 2) Basic Rate Interface to the public exchange
COL 8 loop-start CO lines
CHL 4 loop-start CO lines
COG 8 ground or loop-start CO lines
DID 8 Direct Inward Dialing trunks
N24 1 ISDN 23B channel + 1D channel (ISDN 24) DPNSS or QSIG Networking Interface**
N12 1 ISDN 12B channel + 1D channel (ISDN 12) DPNSS or QSIG Networking Interface**
N30 1 ISDN 30B channel + 1D channel (ISDN 30) DPNSS or QSIG Networking Interface**
N20 1 ISDN 20B channel + 1D channel (ISDN 20) DPNSS or QSIG Networking Interface**
N10 1 ISDN 10B channel + 1D channel (ISDN 10) DPNSS or QSIG Networking Interface**
EMD 4 E&M TIE lines (4 two-wire)
EMD 2 E&M TIE lines (2 four-wire)
El 1 El carrier R2 protocol (equivalent to 30 analog/digital trunks)
E1-MFC/R2 1 E1 carrier MFC and R2 protocols (eqivalent to 30 analog/digital trunks)
T1 1 T1 carrier (equivalent to 24 analog/digital trunks)

* *For the DIGITAL 1000 system only.*
** *These cards can be ordered with either QSIG or DPNSS protocol.*

Figure 35 DIGITAL family cards

OPTION CARD

Each of the option cards (OCD) can support up to three option modules (see Figure 36). The six available options are:

- Multiple Interface Module (MIM) to interface with:
  - Four ImaGEN voice mail ports
  - External equipment such as background music, external bells, public address systems, and door units.

- Source 1 module provides:
  - The meet-me conference option (see *Conference* in *User features* in Section 7)
  - Interface for four ImaGEN voice mail ports
  - Interface for external equipment such as background music, external bells, public address systems, and door units.

- Source 2 module provides:
  - Access to the MPD redundancy feature (**DIGITAL 1000** system only)

- DTMF receiver module:
  Each DTMF module provides the **DIGITAL** system with four independent DTMF receivers, each of which will recognize 16 different tone pairs. Altogether, up to 17 DTMF receivers can be installed in the **DIGITAL KEY BX** system and, using ONS/HONS cards, up to 37 DTMF receivers can be installed on the **DIGITAL 400** system. The **DIGITAL 1000** system supports 45 DTMF receivers. In the **DIGITAL KEY BX** and **DIGITAL 400** systems, up to 16 of the DTMF receivers are provided by using the DTMF modules. In the **DIGITAL 1000** system, up to 24 of the DTMF receivers are provided by using the DTMF modules.

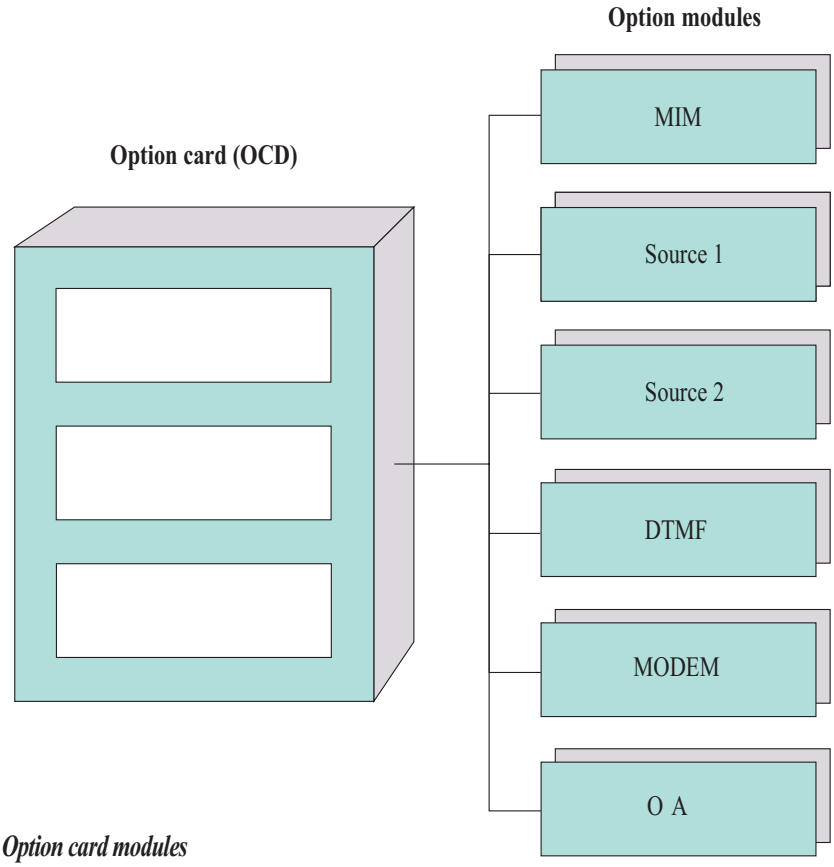


Figure 36 Option card modules

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- Modem module:
  The **DIGITAL** family of systems supports one internal modem dedicated for remote administration and maintenance.

- Open Architecture Link (OAL) module to interface with:
  - Third-party voice mail, Interactive Voice Response (IVR), or any other Voice Processing Equipment (VPE).
  - External equipment such as background music, external bells, public address systems, and door units.

INTERFACES, PERIPHERAL EQUIPMENT AND APPLICATIONS

The system is designed with the following interfaces, peripheral equipment and application configuration capabilities (see Figure 37, below).

INTERFACES

- ACD I.Q.
- Asynchronous printer for Station Message Detail Recording (SMDR)
- Circuit Switched Data capabilities
- Station lines:
  - Telrad Avanti digital sets
  - Telrad DIGITAL sets
  - Telrad Analog sets
  - Analog single line telephones
  - ISDN terminals
- Outside lines:
  - Direct Inward Dialing (DID)
  - Loop-start
  - Ground-start
  - ISDN Primary Rate Interface (PRI)
  - ISDN Primary Rate Network Interface (PRI)
  - ISDN Basic Rate Interface (BRI)
  - DPNSS network interface
  - QSIG network interface
  - T1
  - El (R2 and MFC-R2)
  - Tie E&M
- CTI-TelradLINK proprietary interface
- Data cards for TAPI, TSAPI, and ACD I.Q - Computer Telephone Interface (CTI)
- ImaGEN IVM (Integrated Voice Mail) link
- Multiple music source for music on hold
- Multiple music sources for background music
- PC applications
- PC attendant
- RS232 ports on system cards and the RS232 daughterboard
- TAPI (Telephony Application Programming Interface)
- TSAPI (Telephony Services Application Programming Interface)
- Voice activated speed dial
- Voice mail

The following table shows the maximum configuration for **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems.

MAXIMUM CONFIGURATION	DIGITAL KEY BX	DIGITAL	DIGITAL 1000
Maximum number of ports	128	384	1024
Maximum number of stations, ISDN terminals or SLTs	96	254	925
Maximum number of loop-start, ground-start, Direct Inward Dialing trunks, E&M tie lines or PRI ISDN, BRI ISDN, DPNSS,QSIG or T1/E1* channels	48	144	255
DSS Add-on units connected to Avanti sets and Avanti Attendant consoles	8	16	48
Proprietary Voice Mail/Automated Attendant system - ImaGEN ports	12	16	16
Avanti Attendant positions	4	4	24

* E1/T1 may not be available in all countries.

PERIPHERAL EQUIPMENT

- New family of Telrad Avanti digital telephone sets
- Telrad DIGITAL family of telephone sets
- Telrad analog telephone sets
- Pulse or DTMF (tone) 500/2500 type single line telephones including support of SLT message lamp indication and off premise extensions
- Announcers - external page/public address systems
- Attendant consoles or PC attendant
- Automated attendant
- Analog voice mail
- Door units
- External bells
- Modem for remote system administration and maintenance
- PC-based remote administration and maintenance

9

APPLICATIONS

The applications listed here are described in detail in previous sections of this document.

- Automatic Call Distribution (ACD/ACD I.Q.) with call distribution/management and reporting package
- Caller Identification
  - Caller ID for loop-start analog trunks
  - Calling Line Identification Presentation (CLIP) and Calling Line Identification Restriction (CLIR) for ISDN lines
  - Automatic Number Identification (ANI) for T1 lines
  - ImaGEN and CTI routing of calls by Caller ID
- Electronic Business Card
  - Dial-By-Name
  - Directories
  - Help
- Integrated Station Message Detail Recording (ISMDR) and call accounting software package
- ImaGEN - Integrated Multi-Application Generator
  - High quality voice mail
  - Visual messaging
  - Automated attendant
  - Automated interview - nine different interviews supported simultaneously
  - Unified messaging (Interface between the **DIGITAL** systems and MS-Exchange or MS-Outlook)
  - Applications platform
- Meet-me conference
- Screen pops based on Caller ID, ANI, and CLIP
- TelradLINK interface, providing operation of the **DIGITAL** systems' telephone features from a PC screen
- TAPI
- TSAPI
- Voice activated speed dial

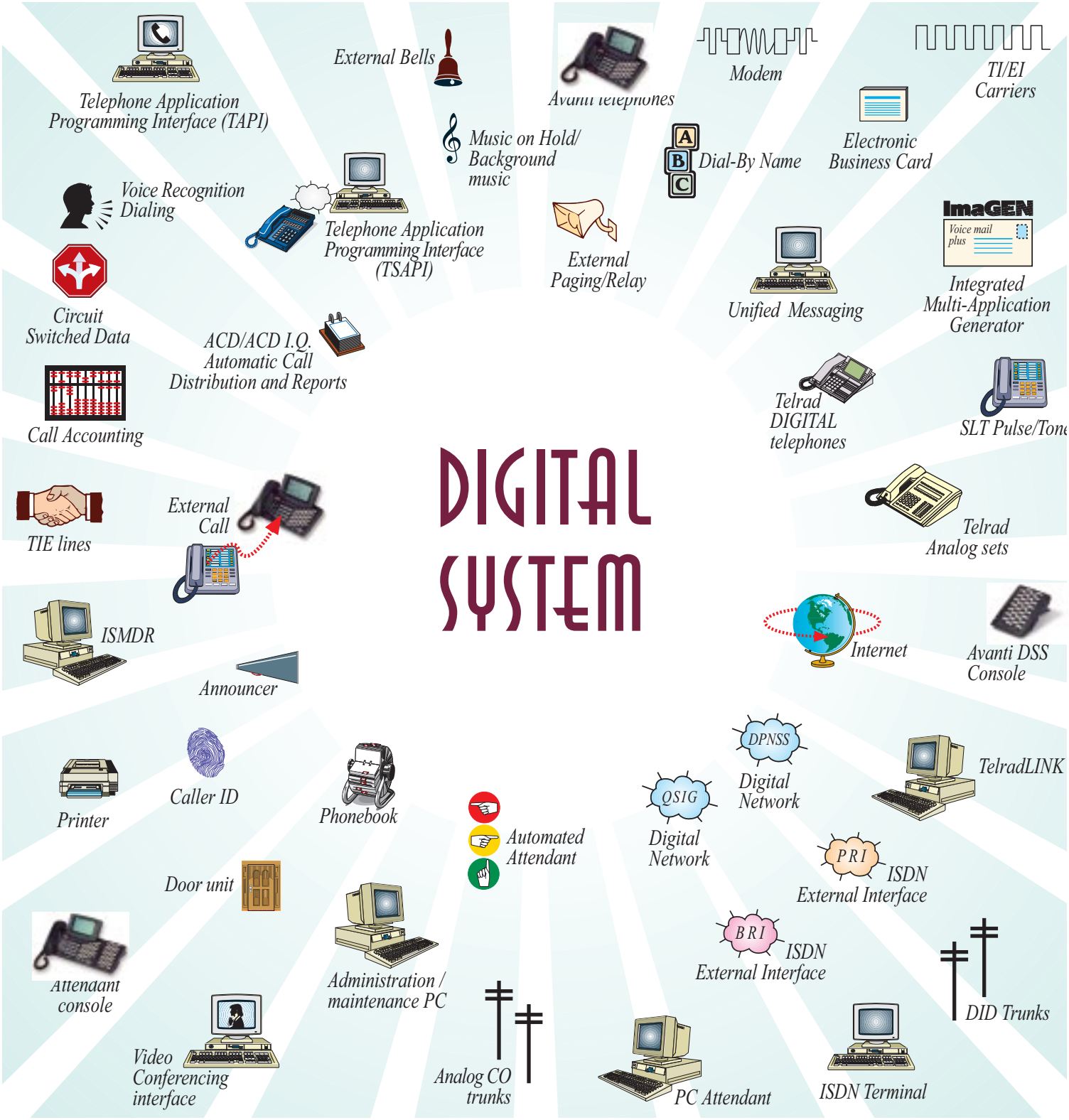

Figure 37 Peripheral and external equipment configuration options

10 DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 FUNCTIONAL DESCRIPTION

The functioning of the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems can best be understood by dividing each of them into four major subsystems - control, switching, signaling, and peripherals (see Figure 38).

CONTROL

The control subsystem is concentrated in the MPD card and includes one 32-bit microprocessor for applications and control, and a communications microcontroller. The microprocessor is responsible for decision making in call processing functions, for message translation, for system configuration, and for running diagnostic routines. The microcontroller is responsible for communication between the control subsystem and the peripheral subsystem via the signaling subsystem.

SWITCHING

All data and audio switching in the system uses digital signaling. In the Avanti stations, the speech and call processing tones are converted from analog to digital signals before being sent toward the system. Digital signal coming to the Avanti stations are converted to analog signals in the station.

The digitized audio is circuit switched via the switching matrix on the MPD card, along the PCM/ TDM highways. Circuit switched data is also sent via the switching matrix on the MPD card, along the PCM/TDM highways.

SIGNALING

Call process signaling such as dialed digits, indications of onhook and offhook conditions, station status information, etc. is transmitted from the control subsystem to the peripheral subsystem via the internal network.

PERIPHERALS

The peripheral subsystem consists of microcontrollers on each of the peripheral cards. The interface between the peripheral units and the main processor on the MPD card is done via the internal LAN. The tasks of this subsystem include: conversion of events detected by card hardware to logical events to be sent to the MPD and vice versa, and transmission of commands from the microprocessor on the MPD to the peripheral cards and stations.

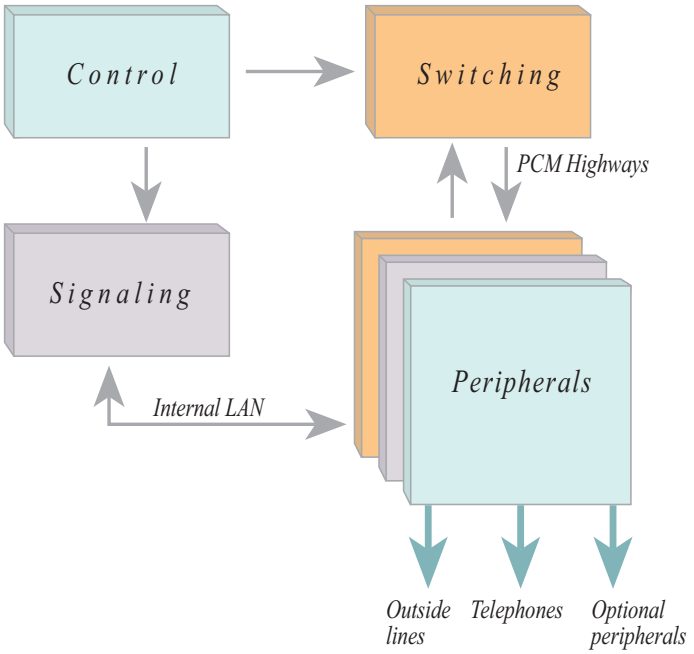

Figure 38 Functional block diagram

SynopSys

The **SynopSys** system combines the control, switching, signaling and peripheral subsystems into the Basic card, enabling a **SynopSys** system to operate with just one card.

All data and audio switching in the system uses digital signaling. The speech and call processing tones are converted from analog to digital signals and from digital to audio signals in the DIGITAL stations.

Additional telephones and outside lines can be added using expansion cards and options can be added using the various option cards.

The expansion cards connect directly to ports on the Basic card. A flat cable from the Basic card to the expansion cards provides a power connection and carries data and audio signals.

11 DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 ADMINISTRATION, INSTALLATION & MAINTENANCE

ADMINISTRATION

The **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems' configuration is stored on a memory cartridge attached to the Main Processing Card (MPD). Software updates can be implemented simply and easily by removing the current cartridge and replacing it with an updated one.

In the **SynopSys** system, the software is stored on a chip on the Basic card. The **SynopSys** system is a plug-and-play system that comes with a basic configuration already programmed. You can operate **SynopSys** with the basic configuration, or you can easily modify it using a designated telephone set or a PC.

Each **DIGITAL** installation and each extension within a system, can be uniquely configured. The flexibility of the configuration ensures that every customer always receives the maximum benefit from the telephone system.

The **DIGITAL** systems are configured via a PC using programming screens that provide online help. As you move from field to field, you are given the valid values for the field. On many screens additional help screens have been provided and are accessed by pressing a function key. To aid in configuring the system, the program has been developed to enable you to move easily between related screens. After configuring the system, the configuration data is easily downloaded to the **DIGITAL** system.

The system can be configured either from a PC situated at the customer location, or via modem, from a remote Service Center. When working via modem, new configurations or changes to the current configuration can be prepared off site, and downloaded to the customer system, without a technician having to visit the customer site.

Most of these procedures cause no interruption to system operation.

Detailed administration instructions for the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems can be found in the **DIGITAL** Administration manual and the **DIGITAL 1000** addendum for the **DIGITAL** family of systems and, for **SynopSys**, the **SynopSys** Administration manual.

INSTALLATION

The **DIGITAL** systems can be installed in any office. They are quiet and operate in most normal office environments. They can be located almost anywhere within the customer's premises. The **SynopSys** cabinet is easily mounted on the wall with three screws. The **DIGITAL KEY BX** system is mounted on the wall. A mounting kit is available to simplify installation and facilitate future expansion of the system. A wheel assembly is available for use with a one- two- or three-cabinet **DIGITAL 400** system. A kit is also available for mounting a single **DIGITAL 400** cabinet on the wall. The one- two- three- or four-cabinet **DIGITAL 1000** system mounts on a wheel assembly. It comes with individual power rectifiers in each cabinet, or each cabinet can be connected to an external 48 Vdc power source.

The Avanti telephones are installed with the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems to provide the users with advanced, versatile telephone sets. Up to four DSS Add-on units can be connected to one Avanti set.

The **SynopSys** system uses the seven telephone models of the DIGITAL family of telephone sets. The DIGITAL telephone sets support 36 button Add-on units, which provide DSS one-touch dialing and Busy Lamp Field indication.

Considerations for planning station location and comprehensive installation instructions and procedures for the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems are provided in the **DIGITAL** Installation manual and the **DIGITAL 1000** addendum. For the **SynopSys** system, theses instructions are in the **SynopSys** Installation manual.

MAINTENANCE

Corrective maintenance consists of fault detection and isolation, and replacement of the faulty equipment (Avanti station, card, power supply, etc.). Fault detection equipment is built-in, and replacement of faulty parts is performed, in most cases, without disruption to system operation. No preventative maintenance is required. When a fault is detected, the system generates a warning which is categorized either as a major alarm, a minor alarm, or a diagnostic message, depending on the severity of the fault. All alarms and messages are stored in the system error message history file to be examined at any time by maintenance personnel. The warnings may also be sent to the printer used for Station Message Detail Recording, or to a maintenance terminal or PC. In addition, all major and minor alarms are displayed at the attendant console. The alarm message alone often provides the necessary information to isolate the faulty unit.

If a fault capable of disrupting system operation is detected, the system may be programmed to automatically dial the Service Center, via the modem, and transmit the most recently generated alarms. From the Service Center, the system's history file can be viewed and certain maintenance functions, such as system reset, can be performed. Sometimes the fault can be corrected without a technician visiting the customer site.

Software upgrades: When upgrades of the Avanti telephone software are developed, the software of the Avanti 3025, Avanti 3020F, Avanti 3020H, Avanti 3015DF, Avanti 3015DH, and Avanti 3015H telephones can be upgraded from a remote site via a modem or locally using a PC connected to the MPD card (see *Software upgrades* under *System Features* in Section 7 *DIGITAL Family Features*).

Redundancy: The **DIGITAL 1000** system has the options of installing redundant hardware to enable continued operation of the system when hardware fails (see *Redundancy* under *System Features* in Section 7 *DIGITAL Family Features*).

MAINTENANCE INFORMATION

The **DIGITAL** systems are equipped with a Maintenance Information utility that enables display of the technical details (such as directory number, port number, port type, bus number, terminal number on the bus, and status) of each port in the system or each card in the system cabinet.

MAINTENANCE TESTING

The **DIGITAL 400** and **DIGITAL 1000** maintenance testing utility provides versatile testing of system resources.

The following types of interactive and daily tests can be run:

- Interactive testing of a specific card port or resource
- Interactive testing of all lines or resources on a card
- Daily system testing: Every day at a preset time, a series of tests is performed.

12 SYNOPSYS - THE SMALL BUSINESS SYSTEM

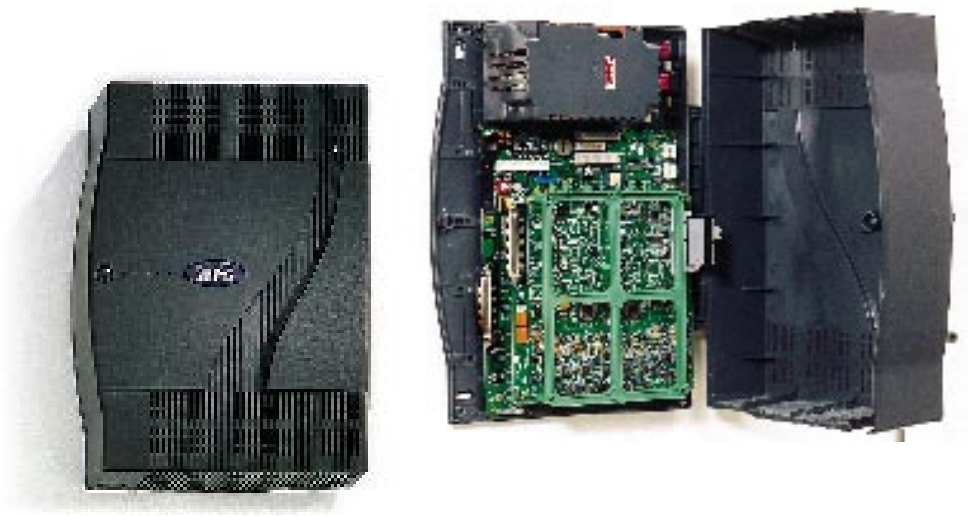

Figure 39 SynopSys cabinet

INTRODUCTION

With the **SynopSys**, Telrad provides a small business telephone system that is rich in the most advanced telecommunication features, yet very affordable. **SynopSys** provides small-sized companies with a high-power telephone system with the most sophisticated modern telephone features, including ISDN capabilities and a variety of voice mail options, and a platform ready to move forward to the future advancements in telecommunications.

The flexible **SynopSys** was developed to easily grow with your business and to quickly adapt to new telecommunication features. The **SynopSys** system is geared for the future. With its obsolescence-proof platform **SynopSys** is ready to adapt to the enhancements and technological developments of the fast changing telecommunications world.

The **SynopSys** cabinet is shown, open and closed, in Figure 39.

TECHNOLOGY

SynopSys was built on a foundation of Digital Signal Processing, providing exceptional performance and high-quality sound.

Plug-and-Play installation

The plug-and-play technology of **SynopSys** provides a user-friendly, easy-to-install, and simple-to-operate telephone system, with a basic configuration already programmed.

With plug-and-play you can add cards to your system or switch the telephones connected to the system and the system automatically updates the configuration software.

System Backup

In case of power failure:

- The configuration data for **SynopSys** is maintained by a back-up battery on the main card.

- Telephone operation can be maintained with a power failure unit routing Single Line Telephones to the analog trunks.

If your **SynopSys** system is configured with an optional Uninterruptible Power Supply (UPS), during a power outage, the **SynopSys** system can be kept operating for up to one hour and 40 minutes with a configuration having 16 DIGITAL telephones or for up to three hours for other configurations.

CONFIGURATION OPTIONS

Hardware

SynopSys comes in a single-compact, wall-mounted cabinet, the size of an attaché case, that houses from one to three modular system cards and one or two power supply modules. The cabinet comes with the Basic card and Basic power supply already installed.

With a single card, the **SynopSys** Basic system provides up to four outside lines, up to eight Single Audio Port DIGITAL telephone sets (or up to four Dual Audio Port DIGITAL telephone sets), and a single line telephone (In some countries, outside the United States, the Basic system includes a second card providing eight additional single line telephones).

To expand the system, you snap one or two expansion cards in front of the Basic card, and insert the Expansion power supply on the Basic power supply. The fully expanded **SynopSys** system contains three cards and two power supply modules. It provides a maximum of 33 ports (37 outside the USA).

The expansion cards provide additional ports for DIGITAL telephone sets, single line telephones, ISDN terminals, ISDN outside lines, or analog outside lines.

The **SynopSys** system also supports 36 button Add-on units on any DIGITAL telephones connected to the Basic card.

Programming

The **SynopSys** system automatically recognizes which of the seven available Telrad DIGITAL telephone sets is plugged into each port.

Two methods of configuration programming are possible:

- Programming from a telephone;
- Programming from a PC.

When programming from a telephone, customization of telephone outside line and system programming is easily carried out using one of the following Telrad DIGITAL telephone set with a display:

- Executive station with expanded display;
- Executive station with display;
- Display speakerphone.

The fields being programmed are visible on the telephone display.

Programming of the hardware configuration and the whole range of features can be carried out easily using a PC with the **SynopSys** configuration program. This program includes programming screens that provide online help that shows you the valid values for each field you enter. Additional help screens are available on many screens at the press of a function key.

The system can be configured and the data downloaded to **SynopSys** either from a PC situated at the customer location, or via modem, from a remote Service Center.

Figure 40 DIGITAL family of telephone sets

When working via modem, new configurations or changes to the current configuration can be prepared off site, and downloaded to the customer system without a technician having to visit the customer site. Most of these procedures cause no interruption to system operation.

TERMINAL UNITS

The **SynopSys** system supports the seven telephone sets of the DIGITAL family (Figure 40):

- Executive station with 8x24 expanded display
- Executive station with 2x24 display
- Executive station without display
- Display Speakerphone set with 2x16 display
- Speakerphone set
- 16 Button set
- Four Button set

The DIGITAL telephones are also compatible with Telrad's larger **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** systems, so that when your business is ready for a larger telephone system, you can use the same telephones and preserve the bulk of your investment.

With the **SynopSys** system, one of the DIGITAL telephone sets can be used as an answer position.

DIGITAL STATIONS

The family of seven DIGITAL stations utilizes an ISDN passive bus (S-interface) for simultaneous voice and data transmission.

All DIGITAL stations share the same 12-button dialpad and surrounding fixed function buttons, including REDIAL, HOLD, and a FEATURE button that standardizes the operation of all features from all telephones.

The **SynopSys** system provides customization of stations through 15 button maps.

The DIGITAL sets offer, as standard, a wide variety of advanced features. For example:

- **Hot dialpad**
- **Distinctive station ringing**
- **Handsfree answerback (HFAB)**
- **Dual color LEDs:**
- **Programmable buttons**

In addition, the three Executive models and the two Speakerphone models support:

- **Handsfree operation**
- **36 button Add-on units**
- **Data interface**

Executive stations also provide:

- **Additional buttons**

Executive stations with displays also provide:

- **A wider display**
- **A raise-and-lock display module with four convenient viewing positions**

Furthermore, Executive sets with expanded display provide:

- **Six menu softkeys**
- **Six workable softkeys**
- **Voice activated speed dialing interface**

Add-on unit: The **SynopSys** system also supports Telrad DIGITAL 36 button Add-on units connected to the Executive and Speakerphone DIGITAL telephone sets that are connected to the Basic card.

Basic TAPI: A DIGTAL Executive or Speakerphone telephone set with a Universal Data Card inserted supports Telrad's Basic TAPI product. This Basic TAPI product provides basic telephone functions including dial, answer, and terminate.

These DIGITAL telephones appear in Figure 40, above.

ANALOG TELEPHONES

The **SynopSys** system also supports on-site single line telephones.

TECHNICAL SPECIFICATIONS

Configuration options

The table below shows the various **SynopSys** configuration options.

SYNOPSYS CONFIGURATION OPTIONS

The **DIGITAL** telephone sets may be configured for single audio path (SAP) or dual audio path (DAP) operation. With a SAP configuration, two telephones can be configured on one bus, with each telephone utilizing one of the audio paths of the bus. Each telephone in a DAP configuration utilizes both audio paths of the bus enabling the user to converse with one party through the handset and another party through the microphone and speaker.

12

Outside lines	*DIGITAL Telephones (SAP or DAP)*	*Single Line Telephones*	*Total ports*
4	8 SAP or 4 DAP	1	13
4	8 SAP or 4 DAP	5	17
4	8 SAP or 4 DAP	9	21
4	16 SAP or 8 DAP	1	21
8	8 SAP or 4 DAP	9	25
8	16 SAP or 8 DAP	1	25
8	8 SAP or 4 DAP	17	33
8	16 SAP or 8 DAP	9	33
8	24 SAP or 12 DAP	1	33
12**	8 SAP or 4 DAP	17	37**
12**	16 SAP or 8 DAP	9	37**
12**	24 SAP or 12 DAP	1	37**

* In these configurations any of the four S buses can be configured for ISDN Basic Rate Interface terminals or for DIGITAL telephone sets, or two of the S buses can be configured as ISDN Basic Rate Interface outside lines and the other two S buses can be used for either ISDN Basic Rate Interface terminals or for DIGITAL telephone sets.

** This configuration is not available in the United States.

In the United States the following maximum configuration options are available:

- 8 outside lines, 8 single audio path (or 4 dual audio path) DIGITAL telephone sets, 17 single line telephones
- 8 outside lines, 16 single audio path (or 8 dual audio path) DIGITAL telephone sets, 9 single line telephones or
- 8 outside lines, 12 dual audio path DIGITAL telephone sets, 1 single line telephone.

In other countries up to 12 outside lines are available in the maximum configurations with the same telephone configurations as listed above, or a maximum configuration option of 12 outside lines, 24 single audio path DIGITAL telephone sets, 1 single line telephone is available.

On the expansion card with four S buses, any of the four S buses can be configured for ISDN Basic Rate Interface terminals or for DIGITAL telephone sets, or two of the S buses can be configured as ISDN Basic Rate Interface outside lines and the other two S buses can be used for either ISDN Basic Rate Interface terminals or for DIGITAL telephone sets.

Operating environment

Maximum operation: 32^0 F to 104^0 F (0^0 C to 40^0 C); 20% to 80% humidity without condensation

Optimal operation: 50^0 F to 95^0 F (10^0 C to 35^0 C); 25% to 65% humidity without condensation

Cabinet size

Height x Width x Depth
16.92" x 12.92" x 6.04"

Power requirements

85 to 264 Vac, 50 or 60 Hz
Maximum power consumption: 100 W

SYSTEM AND USER FEATURES

The main **SynopSys** system and user features are listed below. For an explanation of the features appearing in this list, see the **DIGITAL KEY BX, DIGITAL 400**, and **DIGITAL 1000** features in Section 7.

SYSTEM FEATURES

Access restriction
Alphanumeric display of names - upper and lower case
Analog outside line volume control
Announcement messages (9 messages) - administrative**
Announcement messages (50 messages) - hunt group**
Announcer (SLT)
Answering position
Application generator**
Automated attendant*
Automatic alarms
Automatic out-dial on system alarm
Background music
Battery backup (memory)
Battery backup (system-wide)
Behind PBX/CENTREX lines feature operation
BRI (ISDN Basic Rate Interface) outside lines and terminal lines
Call Accounting Supervision
Call Detail Recording (CDR)
Caller ID option
Chaining digits under a private speed dial button
Class Of Service (COS)
Configuration backup and restore
CTI (Computer Telephone Integration) applications
Day and night service
Dial-By-Name (Automated Attendant DBN)**
DIGITAL stations
Direct In Lines (DIL)
Direct Inward System Access (DISA)
Direct Outward Dialing (DOD)

* A Telrad voice mail option is required.

** ImaGEN option is required.

Directory assistance**
Door Unit interface (option)
DTMF signaling to SLT ports
Elapsed time starter
Electronic Business Card**
Equal access support
Error message history file
External bell interface
Flash type
Flexible Numbering Plan (FNP)
Half Private Trunk Groups (HPTG)
Hearing aid compatible
Hunt groups
ImaGEN**
Incoming call routing
Intercom restriction
Internal page zones
ISDN (Integrated Services Digital Network) Basic Rate Interface
- outside lines
- terminals
Least Cost Routing (LCR)
Letter code feature access
Manager/secretary
Modem (external)
Multiple appearance of DNs (MDN groups)
Music on hold
North American Numbering Plan support
Page interface (external)
Power failure transfer capabilities
Preferred connection
Programming and administration from a
- PC - Offline and Online
- Telephone set
Recording call transfers
Recording cost or pulses
Remote reset
RS232 interface
Selective outside line ringing
Single Line Telephone (SLT) support
Station Message Detail Recording (SMDR)**

12

Station self-test
SynopSys MailMate Integrated Voice Mail option*
System speed dial

System timers:
- Attendant recall
- Automatic EHU printout
- Automatic test start
- Barge-in tone
- Call forward no answer
- Call record warning tone
- CENTREX flash
- CO signal flash
- Day recall
- Delayed ringing
- Dialing pulses per second
- DTMF dial-off duration
- DTMF dial-on duration
- First digit timeout
- Forced onhook
- Handsfree
- Hold
- Hot line
- Hunt no answer
- Make/break ratio
- Maximum interdigit dialing
- Night recall
- Open loop
- Overflow timeout
- Page
- Patch
- Pause
- PBX feature flash
- SLT interdigit
- SLT maximum flash
- SLT near end disconnect
- Transfer recall
- Traveling Class of Service
- Trunk attendant ring
- Trunk interdigit

TAPI (Telephone Application Programming Interface)
Tenant service
Time setting station
Toll restriction (TLR)
Tone and pulse telephones
Trunk groups - half private
Trunk signal amplification
Trunks
- Battery reverse detection
- ISDN Basic Rate Interface
- Loop start
- Open loop detection
- Pulse or DTMF
- Pulse to DTMF conversion
- Tone detection

TSAPI (Telephone Services Application Programming Interface)
Uniform call distribution (UCD)
Voice mail (external or internal)*
Wall mounting station
36 button Add-on unit

ISDN FEATURES

Call-By-Call Integrated Service Access
Caller Line Identification Presentation (CLIP)
Direct Inward Dialing (DID)
Equal access
Multiple subscriber numbers

USER FEATURES

Account code
Alarm clock
Automatic answer
Automatic hold
Automatic redial (ARD)
Barge in
Call cost display**
Call forward - five steps

* A Telrad voice mail option is required.
** ImaGEN option is required.

Call forward all
Call pickup
Call transfer
Caller ID list option
Camp on
Camp on tone
Conference - eight parties
- Meet-me-conference
- Standard conference
Consultation (split call)
Contrast adjustment (electronic)
Delayed ring
Destination status display
Dial-By-Name (System DBN)**
Direct line termination
Direct station selection - DSS button
Direct trunk and trunk group selection
Display
Distinctive rings and tones
Distinctive station ringing
Do Not Disturb (DND)
Door unit operation (option)
Dual color LED indication
Elapsed time display
Executive Credit Codes (ECC)
Executive intercom (manager-secretary hot line)
Executive suite
External call forward
Feature button
Flash disconnect
Flash signaling
Flip Flop (brokerage)
Floating loop buttons
Handsfree answerback (HFAB)
Handsfree calling
Headset
Hold - exclusive or inclusive (system hold)
Hot dial pad
ISDN Basic Rate Interface to outside lines and to terminals
Last number redial
Manager/Secretary
Meet-me page
Memory buttons
Messages
Mute handset microphone
Mute station microphone
Notepad
Offhook ring
Offhook voice announce with handsfree answerback (option)
Onhook dialing and monitoring
Onhook voice announce with handsfree answerback
Page zones
Pause time
Preferred connection
Private outside lines
Programmable buttons
Recall
Save/repeat dialing
Softkeys
Speaker monitor
Speakerphone or Handsfree operation
Speed dial
Station-to-station call
System pickup (one touch)
Telephone lock
Tone button
Traveling Class of Service (COS)
Trunk queue
Voice activated speed dial
Voice memo**
Volume adjustment (electronic)

* Future option.
** ImaGEN option is required.

12

VOICE MAIL

The **SynopSys** system can support three Telrad supplied voice mail options:

- ***ImaGEN:*** A multifaceted application generator with voice mail, automated attendant, and other features (see Section 5 *ImaGEN Voice Mail and Automated Attendant Features* and Section 6 *ImaGEN Application Generator and Other Optional Features*).

- ***SynopSys MailMate:*** A plug-and-play, digital, integrated voice mail system developed specifically for the **SynopSys** system. It contains a powerful package of voice mail features at an economical price. **SynopSys** MailMate is available either with two ports and one hour of voice message storage or with four ports and six hours of voice message storage.

- ***SynopSys Mail:*** An analog plug-and-play system using a single line port (see the description below).

SYNOPSYS MAILMATE

Just plug the **SynopSys** MailMate card into the port on the **SynopSys** system main card and your **SynopSys** MailMate advanced voice mail and automated attendant system is ready for use. Both the two- and four-port versions of **SynopSys** MailMate provide you with 50 mailboxes and storage of up to 2,000 messages. **SynopSys** MailMate provides you with the following features:

SYSTEM FEATURES

After hours answering
Automated attendant
Broadcast capability
Custom call distribution
Day and night mode operation
Directories (two)*
Fax tone detection and transferring
Follow me*
Multiple menus (nine)*
Offline and online programming option
Personal greeting messages
Rotary telephone access
Single personal greeting for each mail box
System greeting messages for day and night

USER FEATURES

Access to attendant
Automatic reply to message
Busy notification
Call recording
Call screening
Copy messages to group mailboxes*
Distribution lists
Help keys
Interruptible voice prompts
Message waiting lamp
Password protection
Play menu operation
    Play
    Repeat
    Next
    Erase
    Copy
Record menu operation
    Record
    Playback
    Save
    Erase
    Add
Skip message capability
Time and date stamping of messages

* Future option

AUTOMATED ATTENDANT OUTSIDE CALLER FEATURES

Attendant access
Automated attendant mailbox access
Camp on
Direct dial to extensions
Leave voice message
Single digit dialing

SYNOPSYS MAIL

Just plug **SynopSys** Mail into the **SynopSys** system single line port for plug-and-play operation of a very powerful voice mail application that integrates smoothly with your **SynopSys** system.

SynopSys Mail includes an Automated Attendant with pre-recorded greetings that can be used as is, or can be easily customized. Two additional greetings are available for use as work-hour and after-hour greetings. **SynopSys** Mail provides a mailbox for each extension and 13 guest mailboxes, plus an extension reserved for fax connection.

SynopSys Mail comes in two configurations:

- Two ports, providing four hours of message storage
- Four ports, providing eight hours of message storage.

You can easily upgrade the two-port **SynopSys** Mail to a four-port configurations.

The **SynopSys** Mail voice mail option provides your **SynopSys** system with many useful features including:

AUTOMATED ATTENDANT FEATURES

Announce only mailboxes
Answer schedules - 20
Call routing mailboxes - 3
Call transfer
Dial action tables - 3
Dial-By-Name
Direct message to mailbox
Fax tone detection
Single digit routing

MESSAGE FEATURES

Back up a few seconds
Back up to beginning
Erase message
Exit listen mode
Forward message
Go forward a few seconds
Guest mailboxes
Listen to messages
Listen to next message
Pause and resume listening
Record a reply
Reverse listening order
Save message
Time-date-sender stamp
Volume adjustment

USER FEATURES

Broadcast messages
Exit mailbox
Hear time and date
Message notification to pager
Record future delivery message
Record mailbox greeting
Record name
Set mailbox password

SYSTEM FEATURES

Answer-schedule override
Apply subscriber mailbox names
Check system software version
DTMF programming
Erase all messages
Record announcement messages
Record instruction messages
Record system greetings
Set system date
Set system time

13 DIGITAL KEY BX, DIGITAL 400 & DIGITAL 1000 SYSTEMS TECHNICAL SPECIFICATIONS

(See also Section 12, *SynopSys- The Small Business System Technical Specifications*).

SIZE

MAXIMUM CAPACITY

	DIGITAL KEY BX	DIGITAL 400	DIGITAL 1000
Outside lines	48	144	255
Extensions	96	254	925
Attendant consoles	4	4	24
DSS Add-on units	8	16	48
Voice mail ports	12	16	16 (28 future)

EXPANSION INCREMENTS

Outside lines	
Analog central office lines	8 per full capacity card (COL, COG, DID) 4 per half capacity card (CHL)
Tie lines	4 per card, using 2-wire audio (EMD) 2 per card, using 4-wire audio (EMD)
T1 carriers	24 trunks per card
E1 carriers	30 trunks per El card for R2 and E&M protocols 30 trunks per El MFC-R2 card for MFC-R2 and R2 protocols
ISDN PRI carriers	23 PRI ISDN trunks per PRI24 (23B+D) card 30 PRI ISDN trunks per PRI30 (30B+D) card 20 PRI ISDN trunks per PRI20 (20B+D) card 10 PRI ISDN trunks per PRI10 (10B+D) card
ISDN BRI carriers	4 BRI ISDN trunks per BRT (2B+D) card 2 BRI ISDN trunks per BHT (2B+D) card
DPNSS or QSIG carrier	23 DPNSS or QSIG network trunks per N24 card 12 DPNSS or QSIG network trunks per N12 card 30 DPNSS or QSIG network trunks per N30 card 20 DPNSS or QSIG network trunks per N20 card 10 DPNSS or QSIG network trunks per N10 card

(Not all cards are available in every country.)

Extensions	
Avanti stations	16 Avanti telephone sets per full card (ULD) 8 Avanti telephone sets per half card (UHD)
DIGITAL stations	16 (8 for offhook voice announce with HFAB) per full card (ELD) 8 (4 for offhook voice announce with HFAB) per half card (EHD)
Telrad analogy key stations	8 per ELA card
Single line Telephones (SLTs)	4 per SHD 4-port OPX (off premises extension) card 16 per ONS on-site extension card 8 per HONS on-site extension card
ISDN terminal devices	8 per BRS card (4 S buses, each bus is 2B+D)

Other interfaces	
RS232 configured ports	1 per RS232 card or RS232 daughterboard 1 per OCD, COG, COL, or CHL card 2 per (128 port) MPD card (1 for future use) 3 per model S400 MPD card (2 for future use) 3 per model S1000 MPD card (2 for future use)
Option card	3 option modules per OCD card

PHYSICAL DIMENSIONS

	DIGITAL KEY BX	DIGITAL 400	DIGITAL 1000
Key Switching Unit (single cabinet) HxWxD:	21.1"x7.5x14.6" (53.5cm x 19cm x 37cm)	16.5" x 24.4" x 15.0" (42cm x 62cm x 38cm)	16.5" x 24.4" x 15.0" (42cm x 62cm x 38cm)
Weight (fully loaded):	40.5lb (18kg)	59.4lb (27kg)	66lb (30kg)
Power supply HxWxD:	5.5" x 5.7" x 12" (14cm x 14.4cm x 30.5cm)	12.4" x 5.7" x 9.7" (31.4cm x 14.4cm x 24.5cm)	SREC (optional) and SPC units 12.8" x 6" x 10.4" (32cm x 15cm x 26cm)
Weight:	10.8lb (4.9kg)	8.8lb (4.0kg)	SREC and SPC units 13.2 lb (6kg)

TECHNOLOGY

System control
Based on Intel microprocessor and microcontroller 80xxx families.

Communications (internal LAN)
Ethernet style Carrier Sense Multiple Access/Collision Detection (CSMA/CD) mechanism

Switching
Pulse Code Modulation, Space/Time Division Multiplexing (TDM)

ISDN
Systems marketed in the United States meet AT&T-4ESS and 5ESS and NT-DMS100 ISDN Primary Rate Interface standards, and NI1-5ESS and NI1-DMS100 ISDN Basic Rate Interface standards. Systems marketed elsewhere meet ETSI ISDN standards for both Primary Rate Interface and Basic Rate Interface.

Dialing

Out dialing	DTMF or pulse dialing
Pulse dialing	
Interdigit time	800-1200 msec
Make/break ratio	36-42 msec break/ 58-64 msec make

Traffic

Traffic capacity

DIGITAL KEY BX	Totally non-blocking
DIGITAL 400	Totally non-blocking
DIGITAL 1000	Essentially non-blocking

POWER SPECIFICATIONS

	DIGITAL KEY BX	DIGITAL 400	DIGITAL 1000
Input	110 Vac/60 Hz or 230 Vac/50 Hz	115 Vac/60 Hz or 230 Vac/50 Hz	115 Vac/60 Hz or 230 Vac/50 Hz, or -48 Vdc
Consumption	150 VA per cabinet	500 VA per cabinet	920 VA per cabinet
Output	-48A Vdc/1.8A +5 Vdc/4 A -5 Vdc/0.3 A	Main output -48A Vdc/5.5A +5 Vdc/8 A -5Vdc/1.3A Auxiliary output -48B Vdc/0.3 A -24 Vdc/0.15A	Main output -48 Vdc/12A +5 Vdc/15 A -5Vdc/2.5A -105 Vdc/1.4A 80 Vac/0.4A Auxiliary output -48B Vdc/0.3 A -24 Vdc/0.3A

Station wiring	
Avanti telephone sets and attendant console	1-pair modular twisted cable, 24 AWG wire
DIGITAL telephone sets) and attendant console	2-pair modular twisted cable, 24 AWG wire
Telrad analogy key telephone sets wire	2-pair and 3-pair modular twisted cable, 24 AWG wire

Maximum cabling runs from cabinet (24 AWG)	
Avanti telephone sets and attendant console	6000 feet (1800 meters)
DIGITAL telephone sets) and attendant console	3000 feet (900 meters)
Telrad analogy key telephone sets wire	2400 feet (800 meters)
Single Line Telephones (SLTS)	3.7 miles (6 km)
PC or printers (connected to RS 232 configured ports)	50 feet (15 meters)

OPERATING CONDITIONS

Maximum operation:
32° F to 104° F (0° C to 40° C)
20% to 80% humidity without condensation

Optimal operation **DIGITAL KEY BX:**
50° F to 95° F (10° C to 35° C);
25% to 65% humidity without condensation

Optimal operation **DIGITAL 400** and **DIGITAL 1000:**
50° F to 104° F (10° C to 40° C);
25% to 65% humidity without condensation

Storage:
-14° F to 151° F (-10° C to 66° C);
20% to 90% humidity without condensation

MISCELLANEOUS

Certification
Telrad development and production facilities have received ISO 9001 and ISO 9000.3 certification from the International Standards Organization.

FCC registration Numbers:

Key Telephone system ARAISR-18430-KF-E

Hybrid Key/PBX system ARAISR-18427-MF-E

UL approved.

Canadian Standard Connecting Arrangement Code: CA21A (for loop-start, ground-start, and DID trunks and for off-premises extensions).