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AUDIX®

System Description

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Acknowledgment

This document was prepared by the AT&T Product Documentation Development Department, Denver, CO 80234-2703.

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About This Document

This document provides an overview and technical description of the Audio Information Exchange (AUDIX) Voice Messaging system. This document and its companion volume, *AUDIX Feature Descriptions* (585-305-203), replace the *AUDIX Reference* manual (585-300-201).

PURPOSE

AUDIX System Description is designed to answer basic questions about the AUDIX system and its switching and peripheral equipment. It gives a technical description of the current AUDIX models and AUDIX software capabilities and features through Release 1 Version 8 (R1V8) software.

INTENDED AUDIENCES

This document may be useful to the following groups of people:

- AUDIX system customers, telecommunications managers, and system administrators are the targeted audience for this document.
- AT&T sales and marketing personnel who need to understand the features and functions of an AUDIX system on a general and technical level. These people include the Software Associates and Specialists (SAs and SSs), Design Specialists (DSs) [formerly Systems Consultants (SCs)], project managers, and personnel at the Sales and Technical Response Center (STRC) or Technical Marketing Center (TMC).
- Telephone company employees may use this material as a reference, including Local Exchange Carrier (LEC) personnel. The term *LEC* includes all telephone companies and their personnel, such as those at a Regional Bell Operating Company (RBOC).
- Services support staff may also need this reference material, especially when working on or supporting more than one type of system. This may include the following personnel:
  - AUDIX Upgrade Control Center (AUCC)
  - GBCS Design Center [formerly the National Engineering Center (NEC)]
  - Electronic Switching Assistance Center (ESAC)
  - Field Services Administration Center (FSAC)
  - Field Support Organizations (FSOs)
  - International Technical Assistance Center (ITAC)
  - Technical Service Center (TSC) [formerly the National Customer Support Center (NCSC)]

HOW THIS DOCUMENT IS ORGANIZED

This document covers general and end-user information as well as technical and hardware-oriented information. The information is organized as follows:

- Chapter 1, *An Introduction to AUDIX*, gives a brief overview of AUDIX systems and software features through R1V8.
- Chapter 2, *AUDIX Hardware*, covers the major physical components of the one- and two-cabinet AUDIX systems. Topics include descriptions of the cabinets, circuit packs, disk drives, controller, temperature-control system, and power equipment.
- Chapter 3, *AUDIX Software*, contains basic information needed for understanding and performing AUDIX system administration and maintenance. Topics include filesystem naming conventions, mount points, types, disk space thresholds, filesystem distribution, and audits.
- Chapter 4, *System Interfaces*, focuses on the voice, data, maintenance, administration, and alarm links between an AUDIX system and various AT&T switches, and the equipment needed to provide the proper connections.
- Chapter 5, *Subsystem Interfaces*, details the administration and maintenance interfaces, including an overview on the Text Service Interface (TSI) and the AUDIX Administration and Data Acquisition Package (ADAP). It also discusses modem pooling and the use of MERLIN II with the AUDIX Networking feature.
- Chapter 6, *AUDIX Networking*, provides information about various configurations for standard, advanced, AMIS analog and Distributed Communications System (DCS) networks.
- Chapter 7, *Site Preparation*, discusses the requirements for an AUDIX system setup and includes an installation summary. Environmental, equipment room, and power needs are listed.
- Chapter 8, *Sizing an AUDIX System*, gives an overview of user and system requirements to be considered when installing or upgrading an AUDIX system.
- Appendix A, *Ordering Codes*, summarizes required and optional AUDIX system components, and provides ordering codes for switch hardware and peripheral equipment including cables, terminals, personal computers, work group stations, and circuit packs.
- Appendix B, *AUDIX-L Hardware*, discusses the major physical components of the AUDIX-L system. Topics include descriptions of the cabinets, carriers, circuit packs, disk drives, controllers, temperature-control system, and power equipment.
- Appendix C, *Non-AT&T Switch Integrations*, describes the AUDIX interface to a DMS-100, SL-1, SL-100, or other non-AT&T switch.

This document also includes a list of abbreviations, a glossary, and a cross-referenced index.

NOTE

The terms ‘‘DEFINITY Generic 3i’’ and ‘‘DEFINITY Generic 3s’’ in this document refer to the latest version of switch software based on DEFINITY Generic 1 features. The term ‘‘DEFINITY Generic 3r’’ refers to the latest version of switch software based on DEFINITY Generic 2 features. The term ‘‘DEFINITY Generic 3’’ is used to refer to *all* DEFINITY Generic 3 systems (Generic 3i, Generic 3s, and Generic 3r).

CHANGES FROM THE PREVIOUS ISSUE

Changes from the previous issue of this document include:

- Chapter 1 has been updated to reflect the new AUDIX R1V8 features.
- Chapter 2 and Chapter 8 contain information on the new 3.5-inch disk drives.
- Chapter 3 contains information on the new R1V8 announcement filesystems (standard and traditional).
- Chapter 5 includes information on new modems.
- Chapter 6 has been updated to show the 7400C HSL replacement for the MPDM/M1*. Also, the Generic 3r information has been updated to indicate its support of dual I-channel capability on the DCP ports for AUDIX networking.
- Appendix A, *Ordering Codes*, has been updated.

TRADEMARKS AND SERVICE MARKS

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RELATED RESOURCES

This document is designed to supplement, *not replace*, other volumes in the AUDIX document library. Always refer to the appropriate document for specific information on installing, administering, or maintaining an AUDIX system.

Documents that cover different aspects of the AUDIX system are listed in the following table. A full description of each AUDIX document appears in *AUDIX Feature Descriptions* (585-305-203) and the *AUDIX Documentation Guide* (585-300-010). Refer to the *Global Business Communications Systems Publication Catalog* (555-000-010) for a more complete list of documents related to switching systems and peripheral equipment that can be integrated with AUDIX systems.

Title	Document Number
AUDIX Administration	585-305-501
AUDIX Administration and Data Acquisition Package	585-302-502
AUDIX Call Detail Recording Package	585-305-506
AUDIX Feature Descriptions	585-305-203
AUDIX Installation	585-305-105
AUDIX Maintenance for Tier I	585-305-106
AUDIX Networking	585-300-903
AMIS Analog Networking	585-300-512
AUDIX Release 1 Version 8 Forms Reference	585-305-209
AUDIX Upgrade Instructions	585-302-108
GBCS Products Security Handbook	555-025-600
Switch Administration for AUDIX Voice Messaging	585-305-505

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1. An Introduction to AUDIX

This chapter gives a brief overview of the AUDIX system and summarizes its basic features.

OVERVIEW

An AT&T AUDIX message-handling system gives people the means to record and exchange voice messages over the phone when direct communication is inconvenient or unnecessary. It contains stored voice prompts that guide users to create, send, retrieve, answer, save, or forward spoken messages. It also answers calls for personnel who are busy or unavailable.

Because an AUDIX system captures the tone and inflection of a spoken message, it provides the personal interaction that written messages lack. Security is preserved through login codes and passwords, preventing unauthorized access to the system. AUDIX systems are highly reliable and is flexible enough to accommodate special customer requirements and growth when needed.

AUDIX FEATURES

AUDIX offers a full range of standard and optional features, which are detailed in the *AUDIX Feature Descriptions* manual (585-305-203). Table 1-1 lists these features and their basic functions.

Table 1-1. AUDIX Features *(Part 1 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Addressing • By list • By name • By number	Sender (Routing)	 *L *A *A	 R1V1 R1V1 R1V1	Allows messages to be addressed to any subscriber according to name, extension number, or list. Addressing modes can be changed any time.
AMIS Analog Networking	Sys Admin (Message)		R1V6	Allows worldwide interchange of voice mail messages between AUDIX systems and non-AT&T voice mail systems.
AUDIX Administration and Data Acquisition Package (ADAP)	Sys Admin (Reports)		R1V2	Provides traffic and usage reports through a PC interface.
Automated Attendant • Basic (transfer to telephone) • Enhanced (transfer into mailbox) • Nesting of attendants • Transfers by name addressing	Sys Admin (Routing)		 R1V3 R1V5 R1V3 R1V8	Offers callers a voiced menu of options, then routes calls according to the touch-tone keys the caller presses.

(Continued)

TABLE 1-1. AUDIX Features *(Part 2 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Automatic Message Scan	Recipient (Playback)		R1V5	Allows subscribers to scan all *new* message headers and/or messages at the touch of a button.
Broadcast Messages • Broadcast voice message • Log-in announcement	Sender (Message)		 R1V5 R1V5	Enables users to create special messages to all local subscribers of an AUDIX system. It creates a special message announcement or header.
Bulletin Board	Sys Admin (Message)		R1V1	Allows the system administrator to set up a special number that plays a recorded message to the caller. It is often used with the Automated Attendant feature.
Call Answering	Sys Admin (Admin)		R1V1	The basic function of AUDIX intercepting calls for a subscriber.
Call Detail Recording • Voice Session, Outgoing Voice Call, System Activity • Network Session	Sys Admin (Records)		 R1V5 R1V5	Provides detailed information on AUDIX activity, including sessions, outgoing messages, and network transmissions.
Class of Service	Sys Admin (Admin)		R1V1	Permits the system administrator to assign up to 12 classes of service, or sets of options, within the subscriber community.
DCS Network Operation	Switch (Admin)		R1V2	Allows one or more AUDIX adjuncts to be set up in a Distributed Communications System network.
Delivery Scheduling	Sender (Delivery)		R1V1	Allows scheduled delivery of messages for specific days and times.
Dial-by-Name	Sender (Routing)	*T	R1V2	Allows dialing of another subscriber by name rather than number.
Directory	Sender (Database)	**N	R1V2	Provides a system directory so subscribers can access other names and numbers quickly.
End-of-Message Warning	Sender (Warning)		R1V6	Causes the recording of a message to be interrupted at a predefined amount of time before the maximum recording time is reached.

(Continued)

TABLE 1-1. AUDIX Features *(Part 3 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Escape to Attendant • From Call Answer session • From Voice Mail session • Call transfers follow coverage	Caller (Routing)	 0 *0	 R1V2 R1V2 R1V7	Allows AUDIX subscribers to have a personal attendant or operator designated to answer incoming calls if the caller wants to speak with a live attendant.
Exit (AUDIX disconnects)	Sender (Routing)	**X	R1V3	Causes AUDIX to hang up without disconnecting. Useful if the caller is on a toll phone and wishes to make another call.
File Redundancy	Sys Adm (Maintenance)		R1V4	Stores an independent, duplicate filesystem so that there are two copies of system data or messages. This ensures service without interruption.
Form Filler	Sys Adm (Message)		R1V3	Captures voiced responses to prerecorded voice prompts and stores them in a voice mailbox where they can later be transcribed to data records on a PC or on hard copy.
Full Mailbox Answer	Sender (Message)		R1V5	Provides a caller with options for when the recipient's mailbox is full and a message cannot be left.
Guest Password	Sender (Message)		R1V2	Allows people who are not AUDIX subscribers to access AUDIX and leave messages for subscribers.
Help (On line)	All (System)	*H	R1V1	Plays a help menu listing all available options at that point.
Hold Message in Category	Sender (Message)	**H	R1V4	Saves an incoming message in its current category (such as new or unopened).
Leave Word Calling	Sender (Message)		R1V1	Allows a local caller to leave a standard-format message, usually by the touch of a button, requesting that the called party return the call.
Mailing List • Address messages or build other lists • Contain maximum of 250 addresses • Private or public	Sender (Routing)	*L	 R1V1 R1V1 R1V1	Allows subscribers to create and name lists for delivering messages.
Maintenance • Internal background testing • Alarm origination and resolution	Sys Admin (Maintenance)		 R1V1 R1V1	Allows full maintenance of AUDIX.

(Continued)

TABLE 1-1. AUDIX Features *(Part 4 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Message Delivery	Sys Admin (Message)		R1V6	Allows AUDIX subscribers to send voice mail messages to any touch-tone phone anywhere in the world.
Message Waiting Indicator • Control link message • Dial feature access code	Recipient (Notification)		 R1V1 R1V4	Informs subscribers of new messages in their voice mailboxes. Can be either a message-waiting lamp or stutter dial tone.
Name Record by Subscriber	Subscriber (Recording)		R1V5	Gives subscribers the option of recording their own names to be voiced during a system greeting.
Networking • AUDIX digital via DCP switch • AUDIX digital via non-DCP switch • AUDIX digital via RS-232 ports • Remote connection turn-around • Loop-around testing	Sys Admin (Networking)		 R1V3 R1V5 R1V5 R1V7 R1V7	Permits the sending and receiving of voice mail messages and forwarded Call Answer messages between subscribers on different AUDIX machines.
Outcalling • For new messages • For new priority messages	Recipient (Notification)		 R1V4 R1V5	Calls users at a specified number to notify them of new messages. Can be activated for specific time periods.
Password Security • Variable length • Administrable minimum/ maximum length • Enhanced (default less than minimum)	Subscriber (Access)		 R1V1 R1V4 R1V5	Allows restricted access to protect messages.
Personal Directory	Sender (Database)		R1V5	Permits each subscriber to create a private list of customized names. These *aliases* correspond to other subscribers. The directory can be queried by name, or used for addressing messages, transferring calls, and creating mailing lists.
Playback and Recording Control • Manually • Automatically • By category (New/unopened/old) • Increase/decrease volume • Increase/decrease speed • Incremental rewind/advance • Start/stop playback • Administer rewind/advance increments	Sender Recipient (Playback/) (Recording)	 4/7 9/8 5/6 3/3	 R1V1 R1V5 R1V1 R1V1 R1V1 R1V1 R1V1 R1V7	Allows subscribers to listen to their call answer and voice mail messages, then replay the entire message or step backwards or forwards in four-second intervals. Also allows callers to leave a call-answer message for a subscriber, then replay the message and edit it as necessary.

(Continued)

TABLE 1-1. AUDIX Features *(Part 5 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Priority Message	Sender (Message)		R1V5	Allows some subscribers to send priority messages that will be specially marked and preferentially presented to recipients.
Private Message • For voice mail messages (Option) • For call answer messages (Option)	Sender (Routing)	 **B/**P *M **B/**P *M	 R1V4 R1V5 R1V4 R1V5	Allows one to designate a message as *private*, which prevents the message from being forwarded.
Relogin for new user session	Subscriber (Access)	**R	R1V2	Allows two or more AUDIX subscribers to log on to AUDIX sequentially without needing to place a new call.
Respond loop for message reply	Subscriber (Message)		R1V8	Allows subscribers to return to getting messages if they cannot reply to an incoming message.
Restart • Call answer - login • Voice mail - go to activity menu	Subscriber (Message)	 *R *R	 R1V1 R1V1	Allows subscribers to access their own mailboxes. Especially useful for long-distance calls or for AUDIX Standalone users wishing to access AUDIX when all voice mail ports are busy.
Sending Restrictions	Sys Admin (Routing)		R1V5	Allows the system administrator to restrict or modify the routing of messages to avoid abuse or misuse of Voice Mail. It can be administered by subscriber or class of service, and can be overridden by using the Call Answer feature.
Service Enhancements • Field updates for software • Control link trace • Remote execution of tests	Service (Maintenance)		 R1V5 R1V5 R1V7	Allows Services and field-support engineers to readily monitor and repair any problems that might occur with AUDIX and associated switches.
Switch Integrations • DCIU/SCI (AT&T PBXs) • Standalone (not integrated) • AT&T 1A ESS (SMSI) • AT&T 5ESS (API via SCA)	Sys Admin (Administration)		 R1V1 R1V3 R1V4 R1V4	Allows AUDIX to be integrated with various AT&T and non-AT&T switches. Non-AT&T switch integrations are covered in Appendix C.
System Clock	Sys Admin (Administration)		R1V3	Provides a clock with backup power for maintaining accurate time records for calls.

(Continued)

TABLE 1-1. AUDIX Features *(Part 6 of 6)*

Feature	User/ (Function)	Key(s) Pressed	Release	Summary
Text Service Interface	Sender (Networking)		R1V4	Enables subscribers to transmit, via PC, voice mail headers to electronic mail machines.
Traffic Reports	Sys Admin (Reports)		R1V1	Allows the system administrator to generates statistics about the number and timing of calls that go through AUDIX.
Transfer Call • Basic (switch-hook flash) • Enhanced (via control link) • Dial by name • Default activation of Enhanced Call Transfer	Caller (Routing)	 *T *T *T	 R1V2 R1V2 R1V2 R1V7	Allows an attendant to transfer a call that has been sent to coverage, or otherwise redirected, into the AUDIX system, enabling the caller to record a message for the subscriber he/she was trying to reach. Also allows any caller who has called or been redirected to AUDIX through the Call Answer feature to leave the AUDIX system and transfer to any extension in the switch's dial plan.
Untouched Message	Recipient (Notification)	**H	R1V4	Allows secretaries or any subscriber to scan messages or headers in the incoming section of the voice mailbox without changing the status from *new* to *old*, or from *unopened* to *old*.
Voice Mail	Sender (Message)		R1V1	The "verbal letter" sent to one or more subscribers on the AUDIX system.
Voice Mailbox • Have AUDIX pause (Wait) • Delete name or message • Undelete (restore) message	Sender/ Recipient (Message)	 *W *D **U	 R1V1 R1V1 R1V7	The storage area on disk where voice mail messages are created, stored, received, and accessed.

2. AUDIX Hardware

This chapter describes the major physical components of AUDIX one- and two-cabinet systems. It covers the cabinets, circuit packs, disk drives, power equipment, and temperature-control systems.

AUDIX CABINETS

An AUDIX system can have one or two cabinets. The one-cabinet AUDIX system (formerly called AUDIX-S) is the base system. If additional ports are needed, an expansion cabinet is added to form a two-cabinet system. Main components in each cabinet are detailed in the following sections.

AUDIX Base Cabinet (J58886U-1)

The one-cabinet AUDIX consists of a single half-height cabinet that can hold from 2 to 16 ports. Figure 2-1, *Early One-Cabinet AUDIX System (Front View)*, shows the 5.25-inch disk drives and 20-Mbyte RCD used in early AUDIX systems. Figure 2-2, *Current One-Cabinet AUDIX System (Front View)*, shows the 3.5-inch disk drives and 50-Mbyte RCD used in later AUDIX systems.

The one-cabinet AUDIX hardware includes:

- *Circuit Pack Carrier:* AUDIX uses a single circuit-pack carrier that is built into the cabinet. The circuit packs installed in the cabinet are listed in Table 2-2, *One-Cabinet AUDIX Carrier Layout*.
- *Connectors:* The connectors for external cabling are on the back of the cabinet. These connectors support one or two voice port links (eight ports per link), an alarms link, a data link (used for integrated systems only), the administration terminal or PC, and the local or remote maintenance terminal or PC. Additional connectors support AUDIX Networking (if used) and display monitors that allow service personnel to troubleshoot various problems. Table 2-1, *AUDIX Connectors*, lists each connector and its use.
- *Disk Drives:* An AUDIX system always requires one Removable Cartridge Drive (RCD) and at least one Hard Disk Drive (HDD). A 20- or 50-Mbyte cartridge-type RCD is used for routine backups of system and customer data, and may also be used to update system software.

  Up to three HDDs of varying size may be installed in the cabinet to provide system and customer information storage. Early AUDIX systems contain only 5.25-inch drives. Later AUDIX systems typically contain 3.5-inch drives that are equivalent in storage capacity to the 5.25-inch drives. Current disks are sized by hours instead of megabytes. See the *Disk Drives* section for details.
- *Documentation Slot:* A shelf for holding service manuals is located at the top front of the cabinet. An updated set of manuals should be kept with the machine at all times.

- *Power Equipment:* The power equipment is always located at the lower rear of each cabinet. An AC/DC power supply and battery reserve may be installed; this assembly uses 120 VAC from a commercial AC power source for normal operation and 48 VDC power from an internal battery reserve during brief power outages. A DC power option is also available (refer to the *Power Equipment* section).
- *Temperature-Control System:* A fan assembly, air filter, thermal sensors, and air plenums regulate the cabinet's temperature (refer to the *Temperature Control* section).
- *Wiring:* All wiring for internal power and carrier connections is factory installed. Refer to the *Backplane Circuit Boards* section for more information.

The AUDIX cabinet (J58886U-1) measures 27 inches (70 cm) in width and 22 inches (55 cm) in depth. The cabinet is about 22.5 inches (57 cm) in height, plus another 2 inches (5 cm) for the floor-mount cabinet feet which come standard with the system. If desired, 7/8-inch (2.2-cm) desk-mount or stackable-module (cabinet-mount) feet may be ordered instead.

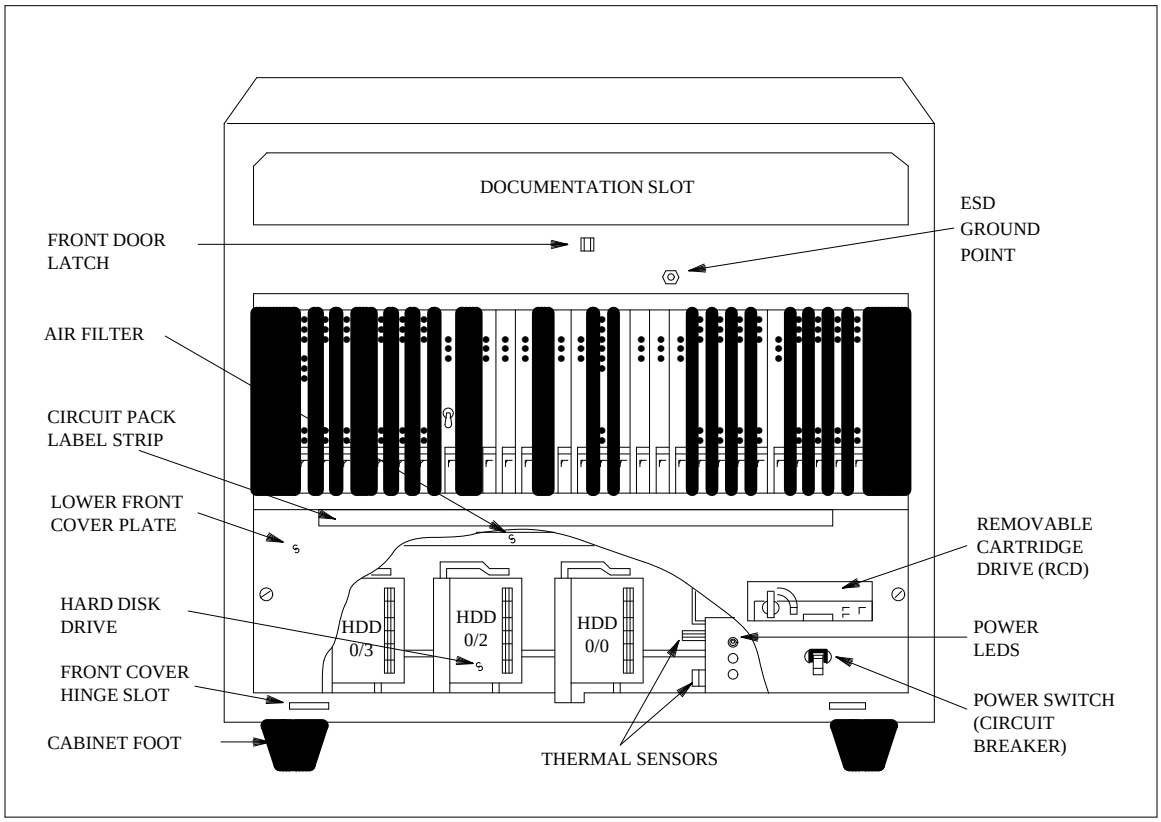


Figure 2-1. Early One-Cabinet AUDIX System (Front View)

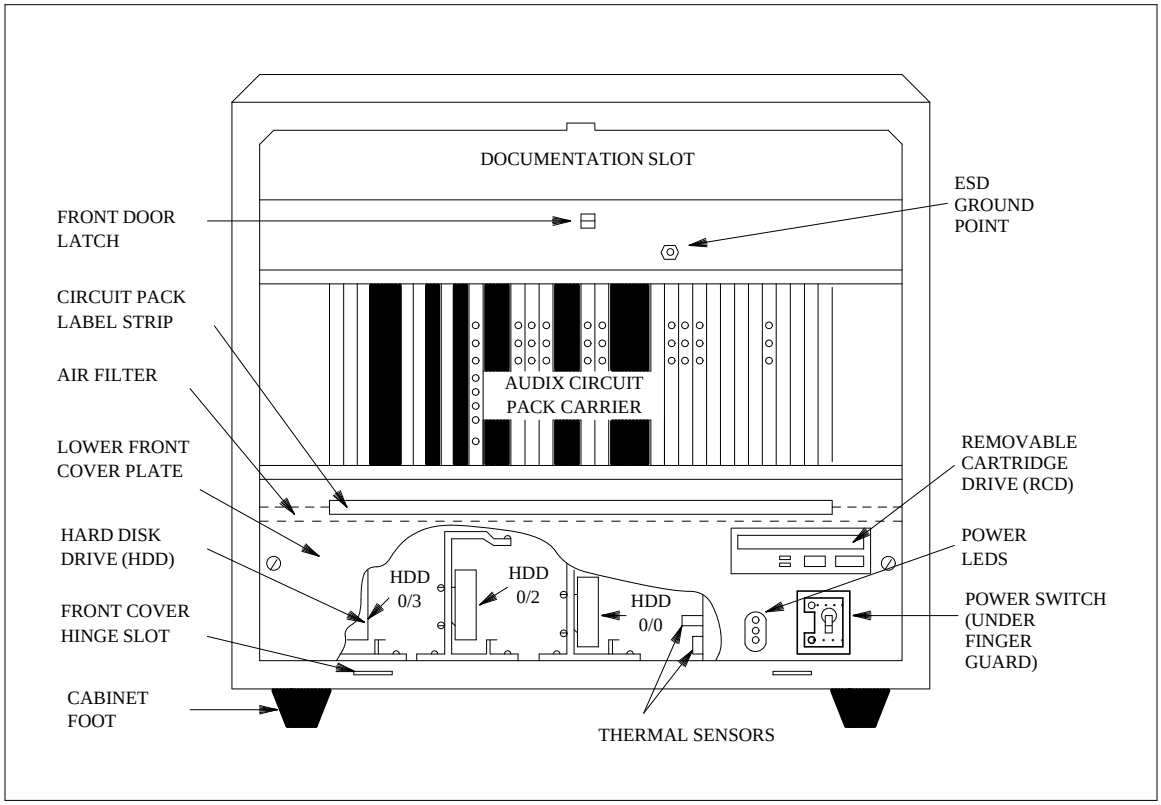


Figure 2-2. Current One-Cabinet AUDIX System (Front View)

AUDIX Expansion Cabinet

A one-cabinet AUDIX system can have an expansion cabinet installed on top of it as part of the same system. An AUDIX base cabinet with an expansion cabinet is known as a two-cabinet AUDIX configuration. A two-cabinet AUDIX system is *not* a networked machine. It is a single system that has both cabinets cabled directly together.

Figure 2-3, *Two-Cabinet AUDIX System (Front View)*, shows the AUDIX system with the early 5.25-inch drives and 20-Mbyte RCD. Newer two-cabinet systems may ship with the 3.5-inch drives and 50-Mbyte RCD shown in Figure 2-2. Figure 2-4, *Early Two-Cabinet AUDIX System (Rear View)*, and Figure 2-5, *Current Two-Cabinet AUDIX System (Rear View)*, show minor differences in hardware between older and newer systems.

An AUDIX two-cabinet system uses the same base cabinet hardware as that listed in the previous section. The expansion cabinet contains the following additional equipment:

- *Cabinet Connection:* A spring clip at the front and a cabinet plate at the rear normally fasten the two cabinets together. The front clip and rear plate also provide grounding between the cabinets. The rear cabinet plate is coated with a conductive paint, and should be installed paint-side in.
- *Carrier Layout:* The AUDIX expansion cabinet has the same carrier layout as the basic one-cabinet AUDIX system. A few circuit pack changes must be made in the base cabinet if an existing one-cabinet AUDIX system is upgraded to a two-cabinet configuration; new systems ship with all required boards in place.
- *Connectors:* The expansion cabinet has connectors for two additional voice links (eight ports per link) and a display monitor to troubleshoot the additional processor. Refer to Table 2-1, *AUDIX Connectors*.
- *Front Plate:* A front cabinet plate may be ordered instead of the spring clip to provide the extra structural support needed for earthquake protection. It is a duplicate of the rear cabinet plate (refer to Figures 2-4 or 2-5) and should be installed paint-side out. Current AUDIX J58886U-1 cabinets have four holes drilled along the top and bottom front to allow this optional front plate to be bolted on if needed.
- *HDDs:* Up to three 5.25-inch and/or 3.5-inch hard disks may be installed in the upper (expansion) cabinet. This allows up to six disk drives plus an RCD to be installed in a two-cabinet AUDIX system.

NOTE

Only one RCD is installed per AUDIX system, and is located in the lower (base) cabinet. Refer to Figure 2-3, *Two-Cabinet AUDIX System (Front View)*.

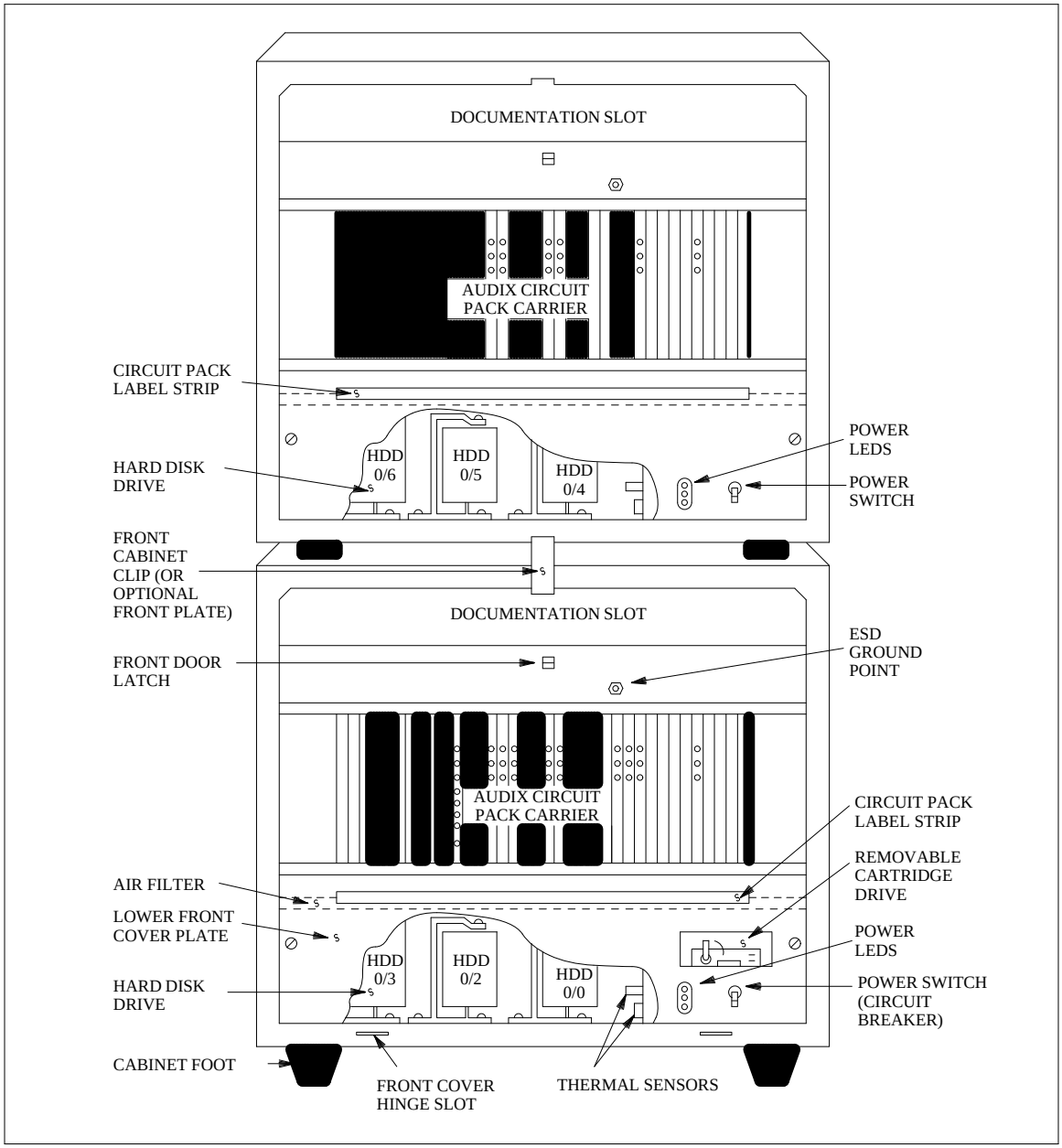


Figure 2-3. Two-Cabinet AUDIX System (Front View)

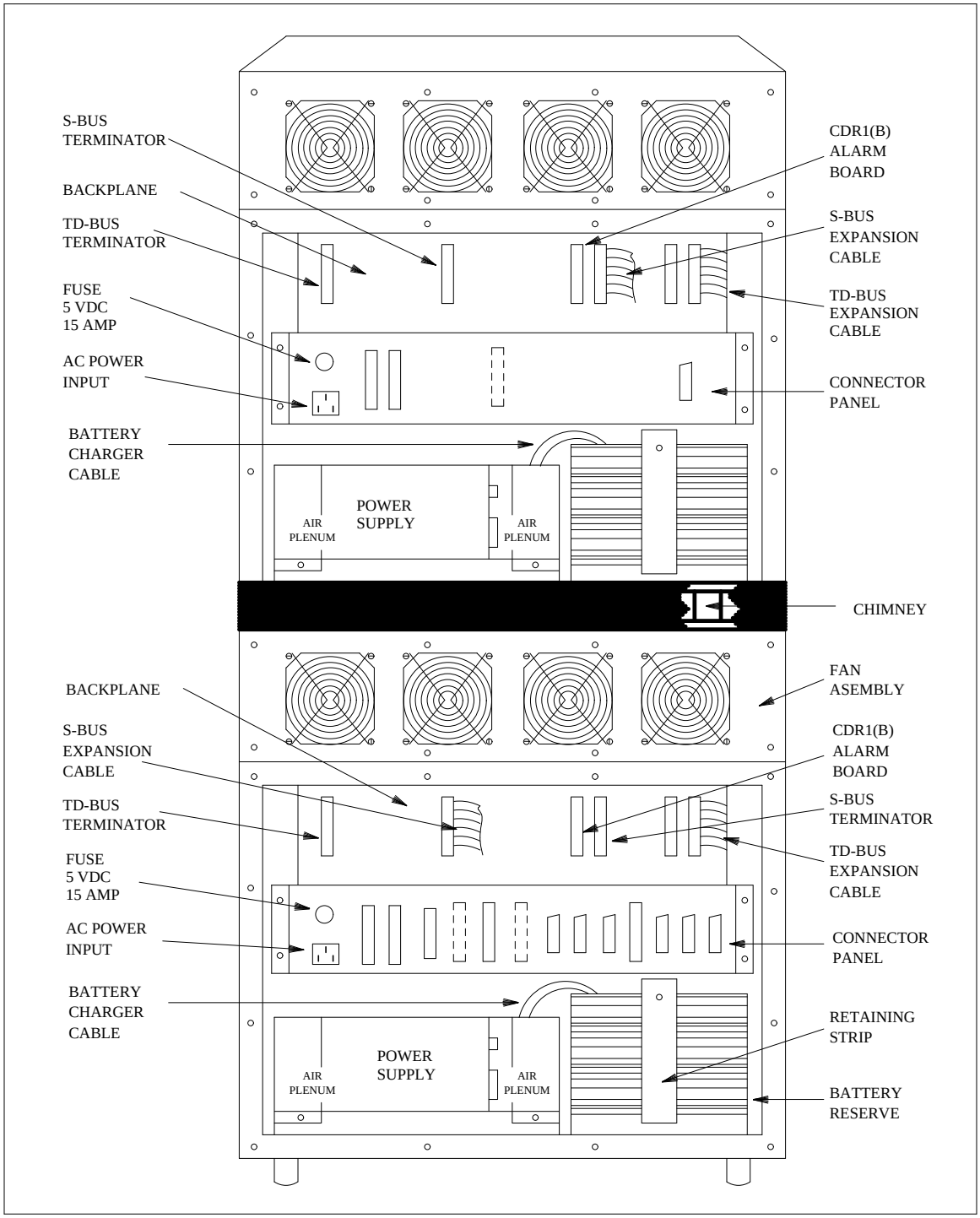


Figure 2-4. Early Two-Cabinet AUDIX System (Rear View)

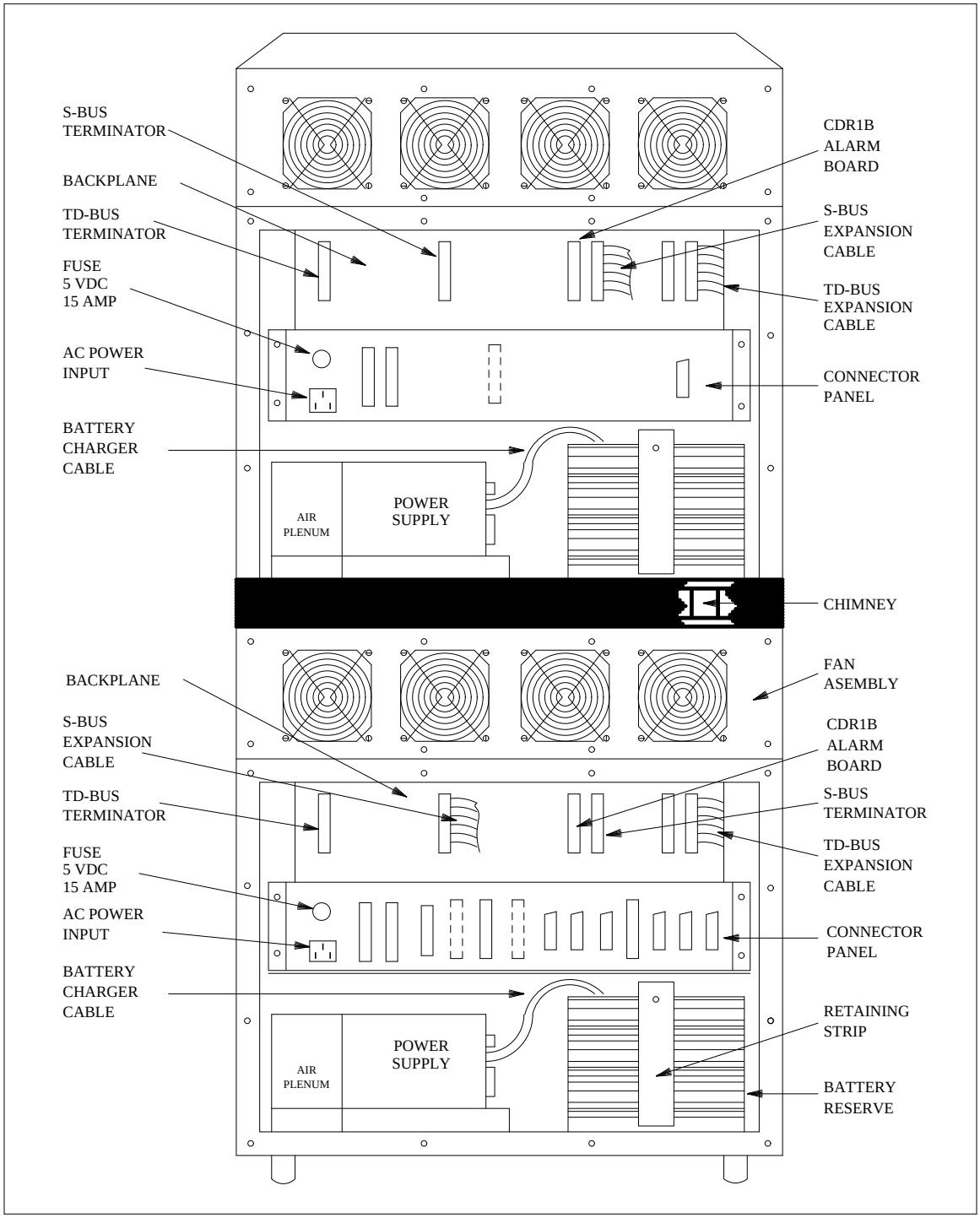


Figure 2-5. Current Two-Cabinet AUDIX System (Rear View)

AUDIX Connectors

Refer to Figure 2-6, *AUDIX Rear Connector Panels*, for the position of connectors on the AUDIX rear panels. Table 2-1, *AUDIX Connectors*, lists the types and functions of these connectors.

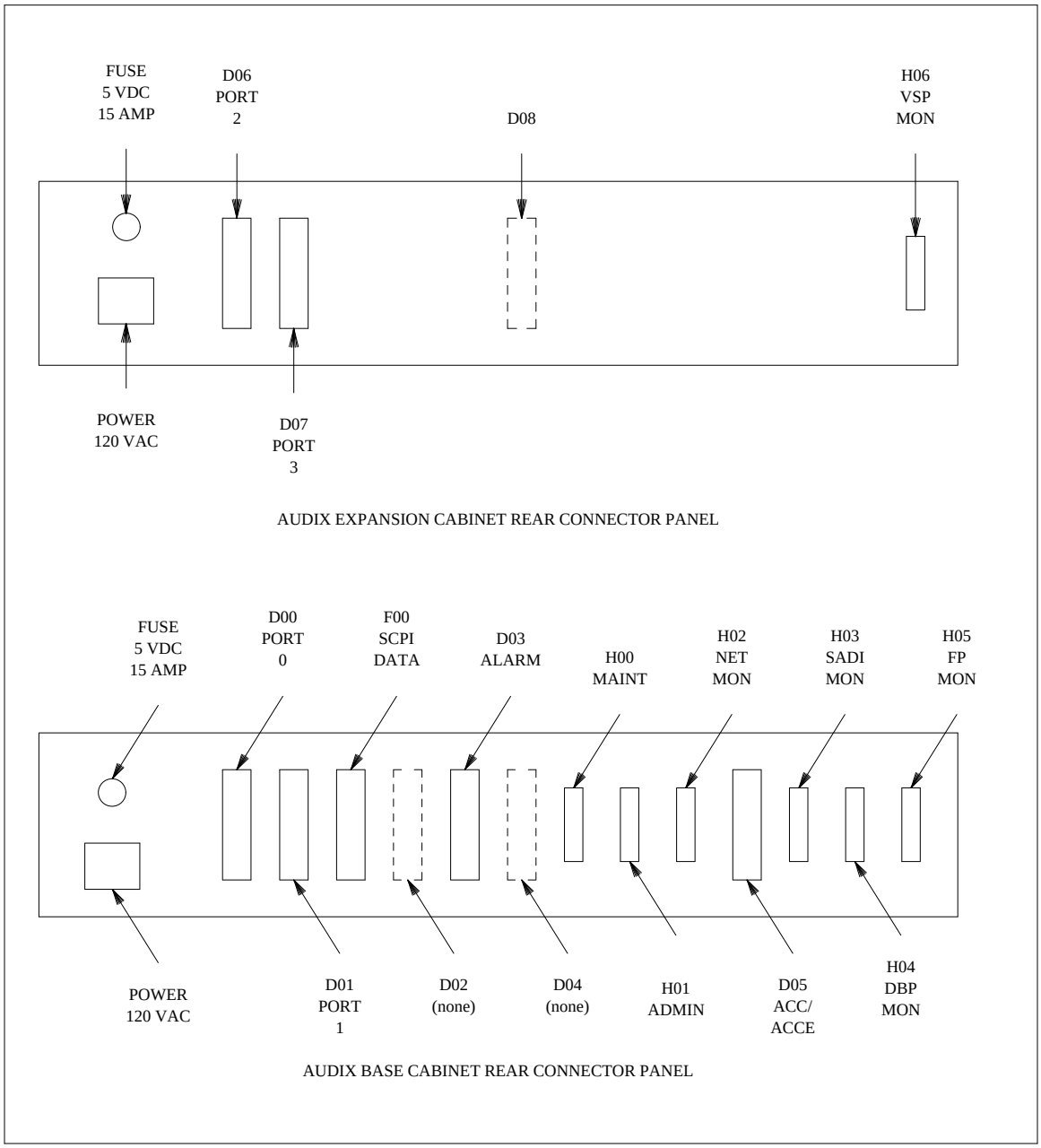


Figure 2-6. AUDIX Rear Connector Panels

Table 2-1. AUDIX Connectors

AUDIX Base Cabinet Connectors			
Function	**Description**	**Labels**	
Power Input	Male 3-prong 60-Hz AC power input (*not used for DC-powered systems*)	POWER	120 VAC
Voice Ports	Female 25-pair Amphenol (1 to 8 ports) Female 25-pair Amphenol (1 to 8 ports)	PORT 0 PORT 1	D00 D01
Data Link	Male 37-pin RS-449 connector	SCPI DATA	F00
(for extra VPT on SL-1)	Female 25-pair Amphenol	*none*	D02
Remote Alarms Link *	Female 25-pair Amphenol (1 pair)	ALARM	D03
(Spare)	Female 25-pair Amphenol	*none*	D04
Maintenance Terminal *	Female 25-pin RS-232C	MAINT	H00
Administration Terminal	Female 25-pin RS-232C	ADMIN	H01
ACC(E) Monitor *	Female 25-pin RS-232C	NET MON	H02
Networking Link †	Female 25-pair Amphenol (2 to 6 ports)	ACC/ACCE	D05
SADI Monitor *	Female 25-pin RS-232C	SADI MON	H03
DBP Monitor *	Female 25-pin RS-232C	DBP MON	H04
FP Monitor *	Female 25-pin RS-232C	FP MON	H05
AUDIX Expansion Cabinet Connectors			
Power Input	Male 3-prong 60-Hz AC power input (*not used for DC-powered systems*)	POWER	120 VAC
Voice Ports	Female 25-pair Amphenol (1 to 8 ports) Female 25-pair Amphenol (1 to 8 ports)	PORT 2 PORT 3	D06 D07
(Spare)	Female 25-pair Amphenol	*none*	D08
VSP Monitor *	Female 25-pin RS-232C	VSP MON	H06

* For Services use only.

† Used only on networked systems.

CARRIERS AND CIRCUIT PACKS

A single built-in AUDIX carrier contains all required and some optional circuit packs. All loose wiring and cabling from the backplane to the connectors is included in the carrier assembly. Other cables are connectorized for easy assembly. The circuit pack carrier layout, individual circuit pack descriptions, and paddle boards on the backplane are covered in this section.

One-Cabinet AUDIX Carrier

The one-cabinet AUDIX carrier is located in the center of the J58886U-1 cabinet. Card guides and slots are built into the cabinet. Figure 2-7, *One-Cabinet AUDIX Carrier and Circuit Packs*, shows the required and optional AUDIX carrier circuit packs and their slot locations. The circuit packs in slots 03 and 21 through 28 are optional.

The main AUDIX carrier contains all circuit packs, including the Feature Processor (FP) and Database Processor (DBP) Central Processing Units (CPUs). Both processors work together to control all one-cabinet AUDIX operations. If AUDIX Networking is installed, the AUDIX Communications Controller (ACC) works with the other processors to send messages from the main system (controlled by the FP) and the disk subsystem (controlled by the DBP) to other remote AUDIX machines, and to receive remote network transmissions. Port circuit packs including the TN747B Voice Port (VPT) and TN501B Voice Processor Computer (VPC) provide the voice interface to the switch for up to 16 ports.

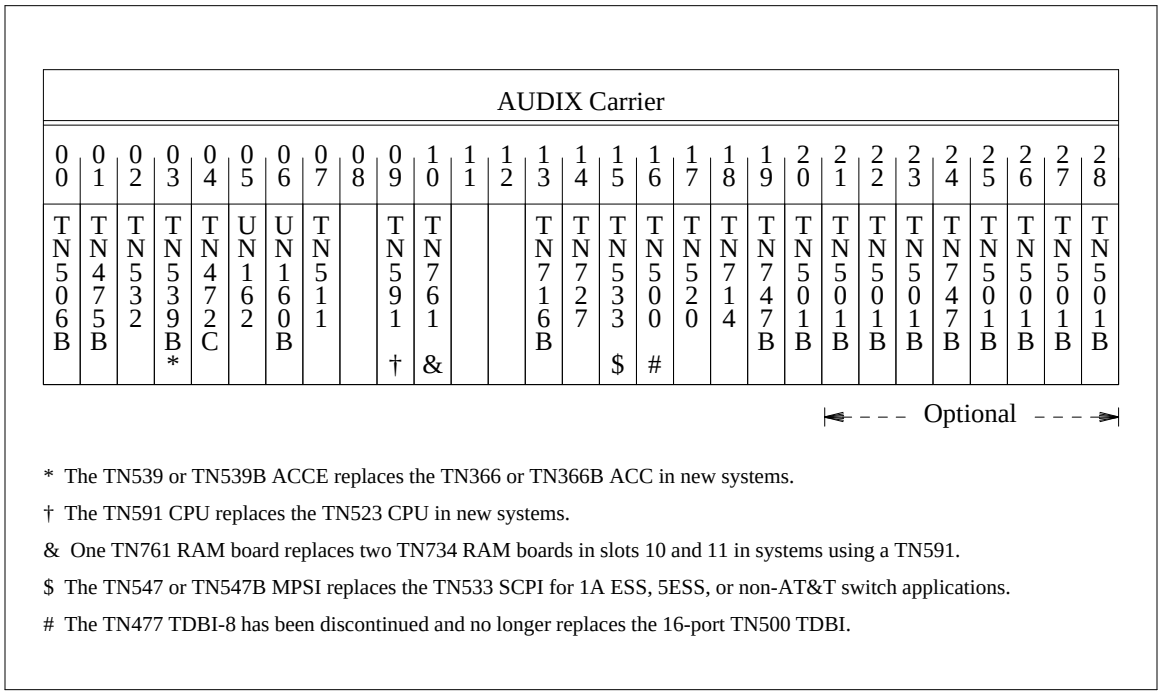


Figure 2-7. One-Cabinet AUDIX Carrier and Circuit Packs

One-Cabinet AUDIX Circuit Packs

Table 2-2, *One-Cabinet AUDIX Carrier Layout*, lists the circuit packs used in a one-cabinet AUDIX system and the slots in which they appear.

Table 2-2. One-Cabinet AUDIX Carrier Layout

Circuit Slot	Circuit Pack Code	Description and Names	When Installed
00	TN506B	Bus Controller (BC)	Standard
01	TN475B	SCSI-to-AUDIX Disk Interface (SADI)	Standard
02	TN532 *or* TN540	Data Base Processor Random Access Memory (DBP-RAM, DBP-MEM, or DVRAM)	Standard
03	TN366(B) *or* TN539(B)	AUDIX Communications Controller (ACC) or ACC Enhanced (ACCE)	Networking Networking
04	TN472C	DBP Central Processing Unit (DBP-CPU or DFC)	Standard
05	UN162	Voice Store and Forward Interface (VSFI)	Standard
06	UN160B	Data Base Processor Interface (DBPI)	Standard
07	TN511	Maintenance Interface (MI)	Standard
08	TN535	Processor Monitor (FP-MON or MON)	Testing *
09	TN591 *or* TN523	Feature Processor Central Processing Unit (FP-CPU, FP-PE, or PE 0) CPU in early systems with < 24 ports; requires TN734 RAM boards	Standard
10	TN761 *or* TN734	FP Random Access Memory board 1 (FP-RAM 0) (One TN761 replaces two TN734s)	Standard
11	TN734	FP Random Access Memory board 2 (FP-RAM 1) (Empty if slot 10 has a TN761 installed)	Standard
12	–	Spare	–
13	TN716B	FP Bus Interface (FP-BI or Interface 1)	Standard
14	TN727	Network Control (NC or NETCON)	Standard
15	TN533 *or* TN547B	Switch Communications Processor Interface (SCPI), or Multiprotocol Switch Interface (MPSI)	Required †
16	TN500 *or* TN477	Time Division Bus Interface – 16 ports (TDBI), or (TDBI-8 in early systems with ≤ 8 ports)	Standard
17	TN520	Voice Buffer (VB)	Standard
18	TN714	Tone and Clock (TC)	Standard
19	TN747B	Voice Port 1 (VPT)	Standard
20	TN501B	Voice Processor 1 (VPC)	Required †
21	TN501B	Voice Processor 2 (VPC)	Optional ‡
22 to 23	TN501B	Voice Processors 3 and 4 (VPC)	Optional
24	TN747B	Voice Port 2 (VPT)	Optional
25 to 28	TN501B	Voice Processors 5 to 8 (VPC)	Optional

* Reserved for Services use only.

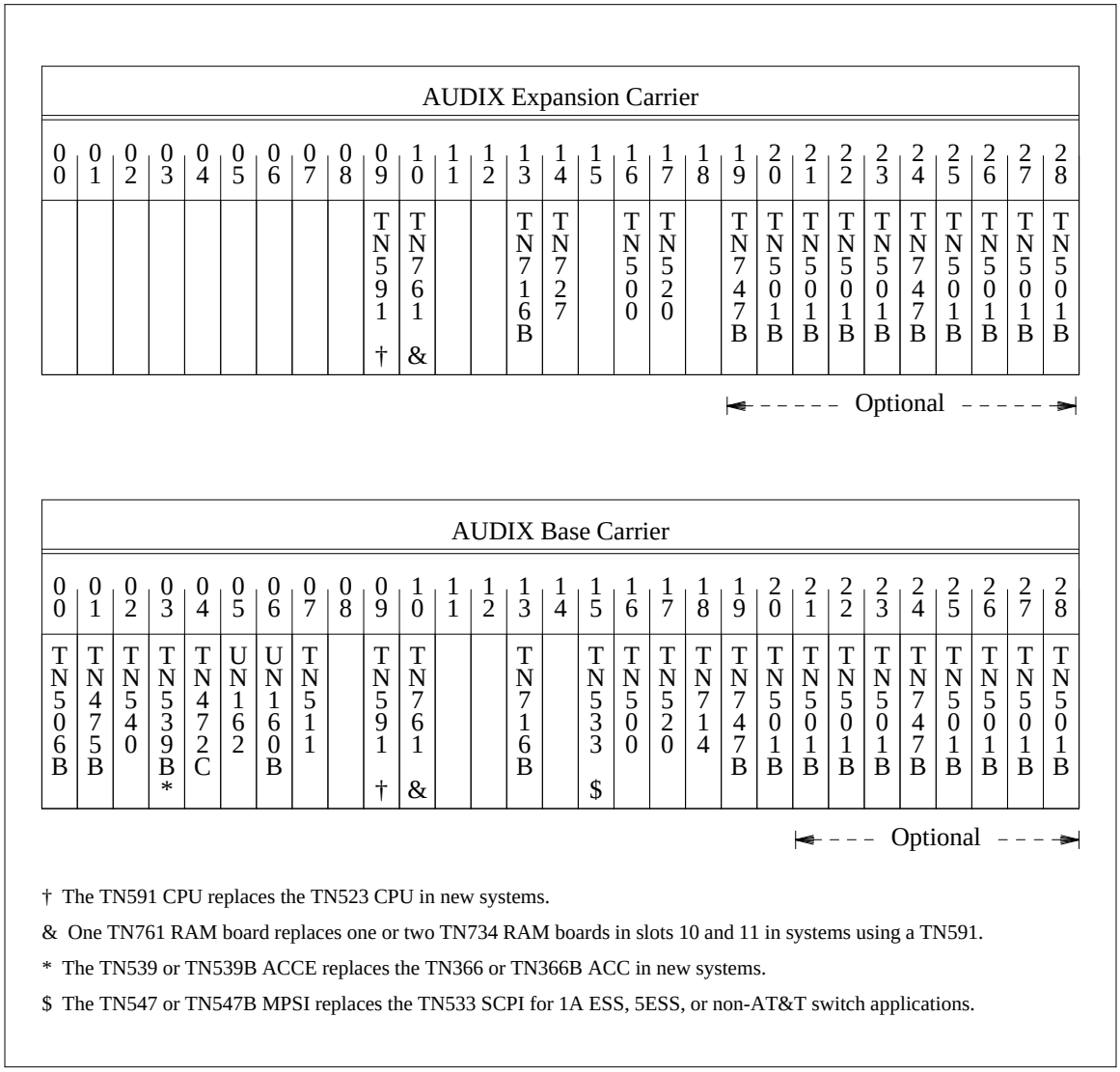
† Required, but must be ordered separately prior to R1V7.

‡ For SL-1 applications, this may be a TN747B or TN762B (VPT 3 or 5).

Two-Cabinet AUDIX Carriers

The two-cabinet AUDIX uses the one-cabinet model as the base cabinet. Like the one-cabinet AUDIX, the two-cabinet base carrier contains the FP and DBP, CPUs, the data link and AUDIX Networking links (if used), and circuit packs for the first 16 ports.

The upper (expansion) cabinet contains the Voice Session Processor (VSP) subsystem, the second TDBI/VB pair, and any additional voice ports. Figure 2-8, *Two-Cabinet AUDIX Carriers and Circuit Packs*, shows the required and optional two-cabinet AUDIX circuit packs and their slot locations.



† The TN591 CPU replaces the TN523 CPU in new systems.

& One TN761 RAM board replaces one or two TN734 RAM boards in slots 10 and 11 in systems using a TN591.

* The TN539 or TN539B ACCE replaces the TN366 or TN366B ACC in new systems.

$ The TN547 or TN547B MPSI replaces the TN533 SCPI for 1A ESS, 5ESS, or non-AT&T switch applications.

Figure 2-8. Two-Cabinet AUDIX Carriers and Circuit Packs

Two-Cabinet AUDIX Circuit Packs

The two-cabinet AUDIX circuit packs are identical to those listed for the one-cabinet AUDIX in Table 2-2, *One-Cabinet AUDIX Carrier Layout*, with the following changes:

- *DBP Memory Board:* A 4-Mbyte TN540 DBP-RAM board is installed in the base cabinet instead of the 2-Mbyte TN532 DBP-RAM used for a one-cabinet AUDIX (the 2-Mbyte TN532 board does not work with the two-cabinet AUDIX).
- *Disk Controller:* The TN475B SADI in the base cabinet controls up to three additional disks in the upper cabinet (up to seven disk devices per two-cabinet system).
- *NC Board:* The TN727 NC board is moved from slot 14 of the base cabinet to slot 14 of the upper (expansion) cabinet.
- *TDBI Board:* A 16-port TN500 TDBI must be installed in the base cabinet instead of the optional TN477 TDBI-8 (the 8-port TN477 is not supported in a two-cabinet system).
- *TD-Bus Boards:* An additional TN500 TDBI and TN520 VB are installed in the upper cabinet. Additional TN747B and TN501B boards support an additional 16 ports (for 18 to 32 ports per two-cabinet system).
- *VSP Subsystem:* A TN591 (or TN523) VSP-CPU, TN716B VSP-BI, and one TN761 (or TN734) VSP-RAM board are always required in the upper cabinet.

AUDIX Circuit Pack Descriptions

Individual AUDIX circuit packs are described for each main subsystem. Minimum vintages are shown for each board (the `maintenance : system : vintage` form displays the boards and vintages currently installed in a system). Later vintages and board codes (such as those with a B or C suffix) replace older boards without affecting system operation.

DBP Subsystem Packs

Circuit packs for the DBP subsystem are described in numerical order.

- *TN366 or TN366B — ACC:* The TN366 or TN366B AUDIX Communications Controller (ACC) board appears in some early AUDIX systems. It has been replaced by the TN539B ACCE.
- *TN472C — DBP-CPU:* The DBP-CPU circuit pack contains a Motorola 68000 CPU chip with 64K of Read Only Memory (ROM) and 512K of RAM. DBP-CPU memory is used for system tables and stacks, kernel text, and utility task-running areas. The DBP-CPU controls the disk subsystem. It is responsible for database access and filesystem management, and initializes some boards on the DBP/Versa-Module European Bus (VME) bus. Early systems may use the TN472 or TN472B, but the TN472C is required for networking and the TN540 DBP-RAM board.
- *TN475 or TN475B — SADI:* The TN475B SADI board is the disk controller for AUDIX. The SADI is the interface between the TN472C DBP-CPU and the mass-storage units (disks) in the DBP subsystem. The SADI faceplate has several Light Emitting Diodes (LEDs) to show which disk drives are connected and accessible to the system (refer to the *SADI LEDs* section).

A Motorola 68000 CPU executes SADI firmware stored in two 64K Electrically Programmable Read Only Memories (EPROMs) and 16K of static RAM. Two Direct Memory Access Controllers (DMACs) transfer disk read/write data between the DBP/VME bus and the SCSI interface to the disks. The SADI has 512K available to buffer disk data. SADI features include disk defect management, error checking and recovery, maintenance and diagnostics, and removable-media management.

NOTE

A TN475 does not support 58- or 88-hour drives (a TN475B Vintage 2 or later board is required for the larger disk sizes). A TN475B Vintage 5 (or later) is required for two-cabinet systems.

- *TN506 or TN506B — BC:* (Also called DBP BC/Terminator, BUS CTRL, or VME BC/Terminator.) The TN506B BC board resides at one end of the DBP (VME) bus used by the DBP subsystem. It combines the function of BC and bus terminator. An AHF102 board on the backplane provides the bus terminator function for AUDIX. A TN506 vintage BC may be installed in early AUDIX systems, although a TN506 Vintage 3 BC *or* a TN506B (Vintage 2 or later) board is required for AUDIX Networking. The circuit pack provides the following functions and information:

  — DBP/VME bus master bus clocks, reset signals, and data flow control

  — Electrical bus termination

  — Return data acknowledgement (DTACK) on board ID and vintage read

- *TN532 — DBP-RAM:* The DBP-RAM (Vintage 4 or later) circuit pack contains 2 Mbytes of error-corrected memory using 256K dynamic RAM chips. The DBP-RAM circuit pack, used on one-cabinet AUDIX systems, supports asynchronous data transfer on the DBP's VME bus by buffering voice data channels between the TN520 VB and the disk drives. The board uses a subset of the full VME specification. Error detection, correction, and maintenance features are provided.

- *TN539 or TN539B — ACCE:* The TN539B AUDIX Communications Controller Enhanced (ACCE) board replaces the TN366 or TN366B ACC board in all new systems. The ACCE board supports the AUDIX Call Detail Recording (CDR) feature as well as AUDIX digital networking. Major networking features include multiple-stage dialing needed for modem pooling with Merlin II, RS-232 ports for direct modem connectivity to other AUDIX machines, Digital Communications Protocol (DCP) Mode 1 connectivity with ACCUNET Switched 56 Service, and connectivity with non-DCP switches through an AT&T digital switch (AUDIX Standalone Networking).

  The ACCE board has a Motorola 68000 CPU which uses 128 kilobytes (K) of RAM and 256K of ROM to handle communications protocols. Another 512K of shared RAM is used to buffer messages between AUDIX machines (over the network interface) and to communicate with the FP, DBP, and DBPI processors.

  The network interface consists of two physical DCP links to a digital port board on the switch; this DCP Link Interface (DLI) is handled by three Intel 8274 High Level Data Link Control (HDLC) devices which can control S (signaling) and I (information) channels (two I channels per port; four per board). The ACCE board also provides two RS-232 channels for network connections, timers, and a monitor (RS-232C terminal) interface. The TN539B version of the ACCE provides increased throughput on systems with heavy network traffic, provided a TN539B board is present in both the sending and receiving systems.

- *TN540 — DBP-RAM:* The DBP-RAM (Vintage 2 or later) circuit pack is required for AUDIX two-cabinet systems (replacing the TN532). It contains 4 Mbytes of error-corrected memory using 1-megabit dynamic RAM chips. The TN540 supports all the features of the 2-Mbyte TN532 DBP-RAM circuit pack including error detection, correction, and maintenance features, and supports asynchronous

data transfer on the DBP's VME bus. A TN472C (or later) DBP-CPU board is required to support the TN540.

- *UN162 — VSFI:* The VSFI (Vintage 3 or later) circuit pack is the gateway for all DBP subsystem interaction with the FP subsystem. The UN162 VSFI connects to the S bus through the UN160B DBPI board. The VSFI enables voice data transfer between the TN532 DBP-RAM and TN520 VB voice buffer. This board is initialized by the UN160B DBPI.

FP and VSP Subsystem Packs

Circuit packs for the FP or VSP subsystem are described in numerical order. VSP packs include the TN591 VSP-CPU, TN716B VSP-BI, and TN734 VSP-RAM; the TN500 TDBI, TN501B VPC, TN520 VB, TN714 TC, TN727 NC, and TN747B packs may be part of the FP or VSP subsystem in two-cabinet systems.

- *TN477 — TDBI-8:* The TDBI-8 (Vintage 1 or later) circuit pack is the data-exchange interface between the TN520 VB and TN501B VPC boards for early AUDIX systems with eight or fewer ports. The TN477 TDBI-8 can connect up to eight ports (four VPC boards) to the TN520 VB board through the TD bus. It functions the same as the TN500 TDBI except it uses fewer channels; it was offered as an economy option for very small systems. The TN477 has been discontinued for new systems; it is replaced with the TN500 TDBI.
- *TN500 — TDBI:* The TDBI (Vintage 7 or later) circuit pack is the data-exchange interface between the TN520 VB and TN501B VPC boards. One TN500 TDBI can connect up to 16 ports (8 VPC boards) to the TN520 VB board through the TD bus. The TN500 TDBI board is partly initialized by the TN520 VB and partly by the TN727 NC. It contains three Intel 8051 processors, RAM, and ROM.
- *TN501B — VPC:* (Also called Voice Processor Computer.) The VPC (Vintage 6 or later) circuit pack contains two ports that connect to the TD bus. Each port has two channels: one channel communicates to the TN747B VPT board, and the other communicates to the disk drives through the TDBI. The VPC circuit pack encodes and compresses messages to reduce disk storage requirements. The VPC does the following:
  - — Automatic gain control on recording
  - — Bandwidth and silent interval encoding and decoding
  - — Speed and volume control on playback
  - — Speech compression and expansion
  - — Touch-tone signal detection
- *TN511 — MI:* The MI (Vintage 3 or later) circuit pack is connected to the FP-PE through the M-bus. It can reset (reboot), restart, or shut down the FP through software control or firmware thresholds. The MI has an alarm panel with LEDs and a shutdown/reinitialize toggle switch. It receives and can act on alarms from the CDR1 or CDR1B alarm board. The MI contains an Intel 8088 processor and provides:
  - — Administration terminal access (RS-232C compatible ADMIN connector)
  - — Local and remote maintenance access (RS-232C compatible MAINT connector)
  - — Environmental (thermal) monitoring and control
  - — Sanity timer monitoring
  - — System shutdown after AC power failure or low-battery voltage

- *TN520 — VB:* The Voice Buffer (VB) circuit pack provides memory and control functions to handle voice data flow to and from the DBP subsystem and VPC ports. Data passes from the TN520 over the S bus to the UN160B leading to the DBP. The TN520 VB can handle up to 16 active VPC ports simultaneously through the TDBI. The VB supports an announcement channel and play/record channel for each port (32 channels per board). The VB also converts the block voice-data flow to a stream-oriented flow for the TDBI and vice versa. The VB board contains an Intel 8086 processor with 128K of RAM and 64K of ROM. A vintage 15 or later VB is required when a TN500 TDBI is installed.
- *TN523 — FP-CPU or VSP-CPU:* The TN523 CPU appears in some early AUDIX systems; it has been replaced with the TN591 CPU board. See Appendix B, *AUDIX-L Hardware*, for a description of this board. The TN523 CPU *must* be used with TN734 RAM boards; it does not work with the newer TN761 boards.
- *TN533 — SCPI:* The SCPI (Vintage 6 or later) circuit pack supports the AUDIX serial data link to a PBX. The SCPI provides an unbalanced RS-449/RS-232 synchronous BX.25-compatible data link that runs at a maximum of 9600 bps. The data devices in the link provide electrical isolation for signals and act as null-modems in directly cabled applications, since both the AUDIX SCPI and switch's Data Communications Interface Unit (DCIU), Processor Interface (PI), or Switch Communications Interface (SCI) data link boards are Data Terminal Equipment (DTE) devices.

  The SCPI circuit pack contains an Intel 80186 processor with 512K of RAM and 64K of ROM. It connects to the S bus and transmits data to and from FP memory over the data link. An Intel 8273 HDLC device drives the single synchronous data link, provides framing, and checks for errors. SCPI hardware supports up to level 2 of the BX.25 protocol; SCPI firmware and FP software support the higher levels of this protocol.
- *TN535 — Processor Monitor (MON):* The MON board is used for testing and circuit pack monitoring by qualified personnel. When this board is in place, it connects to the M bus. This slot normally remains vacant in the field.
- *TN547 or TN547B — MPSI:* The MPSI circuit pack (Vintage 2 or later) supports the asynchronous Simplified Message Service Interface (SMSI) data link to an integrated 1A ESS Switch, 5ESS Switch, or a non-AT&T switch (see Appendix C). The MPSI contains an Intel 80186 processor with 512K of dynamic RAM and 64K of EPROM. It connects to the S bus and transmits data to and from FP memory over the data link. An Intel 8274 Multiple Protocol Serial Controller (MPSC) is a synchronous-asynchronous, error-checking chip that drives the data link.

  The MPSI board is used instead of the TN533 SCPI board for 1A ESS Switch or 5ESS Switch connections (the SCPI is used only for PBX data links). The MPSI can operate in terminal or computer mode for SMSI connections; terminal mode is always recommended so the switch can detect problems and message acknowledgements in the data link. An Applications Processor Interface (API) connection (possible on 5ESS Switches only) uses computer mode (no acknowledgements sent to MPSI) because of the switch communications adapter (SCA) in the link. The SMSI setup uses an asynchronous, RS-232C, ASCII interface that runs at 1200 bps in full duplex. The API link is similar to the SMSI link, except it supports up to 9600 bps operation and Leave Word Calling (LWC) messages left on the AUDIX system.
- *TN591 — FP-CPU or VSP-CPU:* [Also called the Processor Element (PE) board (FP-PE or VSP-PE); sometimes called the Central Processing Unit/Memory Management (CPU/MM) board.] The TN591 CPU, TN761 RAM, and TN716B BI boards make up the PE which is the heart of the FP subsystem on all AUDIX systems (the FP-PE or PE 0). A second set of CPU, RAM, and BI boards make up the VSP-PE (or PE 1) which is used in AUDIX two-cabinet systems. The TN591 CPU board is called the FP-CPU or VSP-CPU, depending on the subsystem with which it is used.

The TN591 FP-CPU or VSP-CPU circuit pack contains an Intel 8086 processor and is responsible for overall operation of the PE. It executes programs loaded from disk to RAM. Firmware runs low-level functions, while software loaded into the TN761 (or TN734) RAM boards runs the primary AUDIX programs. On one-cabinet systems, the FP-CPU board performs all of the following functions. On two-cabinet systems, the CPU boards share the AUDIX work load as noted in the list:

— 24-bit address space and associated memory management

— Initialization and maintenance interface (FP-CPU)

— Interrupt handling

— Multimode operation with associated protection

— Support of BX.25 protocol (FP-CPU)

— Voice buffer/voice port interface (VSP-CPU)

The TN591 replaces the TN523 and is recommended (but not required) for all systems with 24 or more voice ports. It can work with either TN761 or TN734 RAM boards.

- *TN714 — TC:* The TC circuit pack provides the master reference clock for the TD bus and performs digital generation of the standard call progress tones. Clock signals generated include the system clock (2.048-MHz) and frame clock (8-kHz) used by all boards on the TD bus.
- *TN716 or TN716B — FP-BI:* (Also called the Interface 1 board.) The FP-BI works with the FP-CPU and FP-RAM boards to form the PE for the FP subsystem. The FP-BI circuit pack provides a bidirectional path for data transfer from the FP-PE on the M bus. The FP-BI also provides interrupt and clock functions for control of and communication with processor components on the S bus. A TN716 BI may be installed in early AUDIX systems; a TN716B vintage pack is required for two-cabinet systems.
- *TN727 — NC:* (Also called NETCON.) The NC circuit pack is a bidirectional path for transferring status and control information between the FP-PE or VSP-PE on the M bus and devices on the TD bus. The NC continuously scans the TD bus for messages and hardware problems. An Intel 8051 microprocessor on the NC is the master of the TD bus, passing messages between it and the FP.

  The NC also has a real-time clock (RTC) used in R1V3 or later software. The time may be set on the AUDIX system or synchronized with the switch. The clock normally receives power from the backplane. In case of a power outage, an on-board battery keeps the clock running until regular power is restored (the clock does not have to be reset after power-up). This lithium battery is soldered to the board and has about a 4-year lifespan. The battery does not begin to discharge unless the NC board is plugged into the backplane.
- *TN734 — RAM:* [Also called 2M (2-Mbyte) Random Access Memory (RAM) board.] The TN734 RAM board appears in some early AUDIX systems; it has been replaced with the TN761 RAM board. See Appendix B, *AUDIX-L Hardware*, for a description of this board. Only TN734 RAM boards can be used with the early TN523 CPU.
- *TN747 or TN747B — VPT:* [Also called the Central Office (CO) Trunk board.] The VPT circuit pack has eight voice-port circuits (loop-start signaling for DCIU, ground-start for all non-DCIU and Standalone systems) for analog connections to a call-distribution group or hunt group on the switch. It performs signaling and analog/digital conversions for each port. One VPT board provides analog interfaces for up to four VPC boards (eight ports) over the TD bus. Early AUDIX systems may have a TN747 vintage VPT installed. In new systems, a Vintage 5 *or* Vintage 8 (or later) TN747B VPT must be installed.

- *TN761 — FP-RAM:* [Also called FP Memory (MEM) or 4M (4-Mbyte) Random Access Memory (RAM) board.] The TN591 FP-CPU, TN716B FP-BI, and a TN761 FP-RAM board make up the PE for the FP subsystem. Another set of TN591, TN716B, and a TN761 boards make up the PE for the VSP subsystem in two-cabinet systems. The TN761 board provides dynamic memory control and error detection/correction functions for the FP-CPU. Background RAM tests on the board run slowly but continuously. The TN761 replaces the 2-Mbyte TN734 RAM board when the TN591 CPU is used (only TN734 RAM boards can be used with the early TN523 CPU).
- *UN160 or UN160B — DBPI:* The DBPI circuit pack connects the FP subsystem with the DBP subsystem over the S bus. It works with the UN162 VSFI to allow AUDIX system communication with the DBP subsystem and disk storage. This board also allows communication between the FP and ACC on AUDIX Networking systems. A UN160 Vintage 8 DBPI may be installed in early nonnetworking AUDIX systems, although the UN160B (Vintage 2 or later) circuit pack is required for AUDIX Networking.

Backplane Circuit Boards

Small circuit boards (called *paddle* boards) are attached to the AUDIX backplane (PWJ58886U-1) as listed in Table 2-3, *One-Cabinet AUDIX Backplane Boards (PWJ58886U-1)*, and Table 2-4, *Two-Cabinet AUDIX Backplane Boards (PWJ58886U-1)*. These boards are held in place by their backplane connector. The backplane and paddle boards can be removed and replaced if needed. New systems ship with card guides to facilitate proper insertion.

One-Cabinet Backplane Boards

In the one-cabinet AUDIX model, only two paddle boards have any cables attached:

- *AHF104:* This board has a 50-pin data cable connector for the disk drives. The ED-1E434-11 Group 183 data cable that plugs into this connector is a single cable that links all base-cabinet disk drives serially in the chain, plus a 60-pin monitor cable to H02, H03, H04, and H05.
- *CDR1 or CDR1B:* This alarm board has several connectors linking many devices in the system. See the *Alarm Board (CDR1B)* section for a list of these connections.

NOTE

Early AUDIX one-cabinet systems have a PWJ58886U-1 List 1 (L1) backplane. List 2 (L2) and List 4 (L4) backplanes support AUDIX Networking and the expansion cabinet. List 4 backplanes were designed with longer pins for easier board insertion. *For AUDIX Networking, it is necessary to upgrade existing List 1 and List 3 backplanes with D-Kit 181965.*

Table 2-3. One-Cabinet AUDIX Backplane Boards (PWJ58886U-1)

Backplane Code	Circuit Pack Code	Circuit Pack Comcode	Carrier Position	Description
AB0	AHF104	105 190 839	01 (rear)	Disk interface board
AB1	AHF102	105 167 233	05 (rear)	DBP/VME-bus terminator board
AB2	ZAHF8 *or*	103 963 336	06 (rear)	Early S-bus terminator board *
	AHF108	105 408 728	06 (rear)	Current S-bus terminator board *
AB3	CDR1 *or*	105 266 498	07 (rear)	Alarm board (AC power only)
	CDR1B	105 711 238	07 (rear)	Alarm board (AC or DC power)
AB4	ZAHF8 *or*	103 963 336	17 (rear)	Early S-bus terminator board *
	AHF108	105 408 728	17 (rear)	Current S-bus terminator board *
AB5 (L1)	WP-91602 †	405 522 780	18 (rear)	TD-bus terminator board ‡
AB5 (L2+)	WP-91602 †	405 522 780	00 (rear)	TD-bus terminator board ‡
AB6	WP-91602 †	405 522 780	28 (rear)	TD-bus terminator board ‡

* Both S-bus terminator boards must match (either ZAHF8s or AHF108s).

† AHF1 boards (103810586) may be used in early systems instead of the WP-91602 List 1.

‡ List 1 boards fit in carrier positions 18 and 28. List 2 or later boards are used in carrier positions 00 and 28.

Two-Cabinet Backplane Boards

The position of the boards in the lower cabinet depends on whether the base cabinet has a List 1 or later backplane (shown by an L1, L2, or L4 printed at the center top of the backplane). A one-cabinet AUDIX upgrade might have an L1 backplane in the base cabinet. The upper (expansion) cabinet always has a List 2 or later backplane.

In two-cabinet systems, an AHF107 (extender) and AHF108 (terminator) board replace the two S-bus terminator boards used in a one-cabinet AUDIX. An AHF109 TD-bus extender board replaces one of the AHF1 boards on the lower (base) cabinet's backplane.

Table 2-4. Two-Cabinet AUDIX Backplane Boards (PWJ58886U-1)

Upper (Expansion) Cabinet				
Backplane Code	**Circuit Pack Code**	**Circuit Pack Comcode**	**Carrier Position**	**Description**
AB5	AHF109	105 465 603	00 (rear)	TD-bus extender board
AB0	AHF104	105 190 839	01 (rear)	Disk interface board
AB2	AHF107	105 408 710	06 (rear)	S-bus extender board
AB3	CDR1 *or*	105 266 498	07 (rear)	Alarm board (AC power only)
	CDR1B	105 711 238	07 (rear)	Alarm board (AC or DC power)
AB4	AHF108	105 408 728	17 (rear)	S-bus terminator board
AB6	WP-91602 *	405 522 780	28 (rear)	TD-bus terminator board
Lower (Base) Cabinet				
AB0	AHF104	105 190 839	01 (rear)	Disk interface board
AB1	AHF102	105 167 233	05 (rear)	DBP/VME-bus terminator board
AB2	AHF108	105 408 728	06 (rear)	S-bus terminator board
AB3	CDR1 *or*	105 266 498	07 (rear)	Alarm board (AC power only)
	CDR1B	105 711 238	07 (rear)	Alarm board (AC or DC power)
AB4	AHF107	105 408 710	17 (rear)	S-bus extender board
AB5/AB6	WP-91602 *	405 522 780	18/28 (rear)	TD-bus terminator board †
AB6/AB5	AHF109	105 465 603	28/00 (rear)	TD-bus extender board †

* AHF1 boards (103810586) may be used in early systems instead of the WP-91602 List 1.

† List 1 boards fit in carrier positions 18 and 28. List 2 or later boards are used in carrier positions 00 and 28.

Intercabinet Cables

Intercabinet cables run through a cabinet chimney (refer to Figures 2-4 and 2-5) near the rear of the two-cabinet system. These cables are listed in Table 2-5, *Intercabinet Cables*. They pass signals between the two cabinets and provide common grounding. The intercabinet cables connect to the backplane paddle boards as shown in Figure 2-9, *Two-Cabinet AUDIX List 2 or 4 Backplane Boards*.

Table 2-5. Intercabinet Cables

Cable *	Conductors	Connects	#
CDR1 or CDR1B/Alarms (ED-1E434-11 Group 185)	14 (F-to-F)	Upper and lower cabinet alarm boards via the J5 connector on each board.	1
SADI–I/O (SCSI) (ED-1E434-11 Group 186)	50 (4F, 1M)	AHF104 in lower cabinet to all disks in the system, daisy chain through upper cabinet and back to SADI cable in lower cabinet.	1
TD-Bus Expansion (ED-67086-10 Group 4 or ED-1E434-11 Group 187)	40 (F-to-F)	AHF109 to AHF109, extending the TD-bus to the upper cabinet (the Group 187 cable is for upgrades only).	1
S-Bus Expansion (ED-1E434-11 Group 328)	60 per cable (F-to-F)	AHF107 to AHF107, extending the S-bus to the upper cabinet; cables are notched.	2
S-Bus Signal Ground (H-600-140 Group 403)	#10 wire	AHF107 to AHF107 ground lugs of the two cabinets; a 5-foot (150 cm) black cable.	1
S-Bus Bus-Bar Ground (H-600-140 Group 404)	#10 wire	AHF107 ground lug to lower cabinet bus bar ground; an 8-inch (20 cm) wire (upgrades only).	1

* Most cables have female (F) connectors and may not be physically keyed.

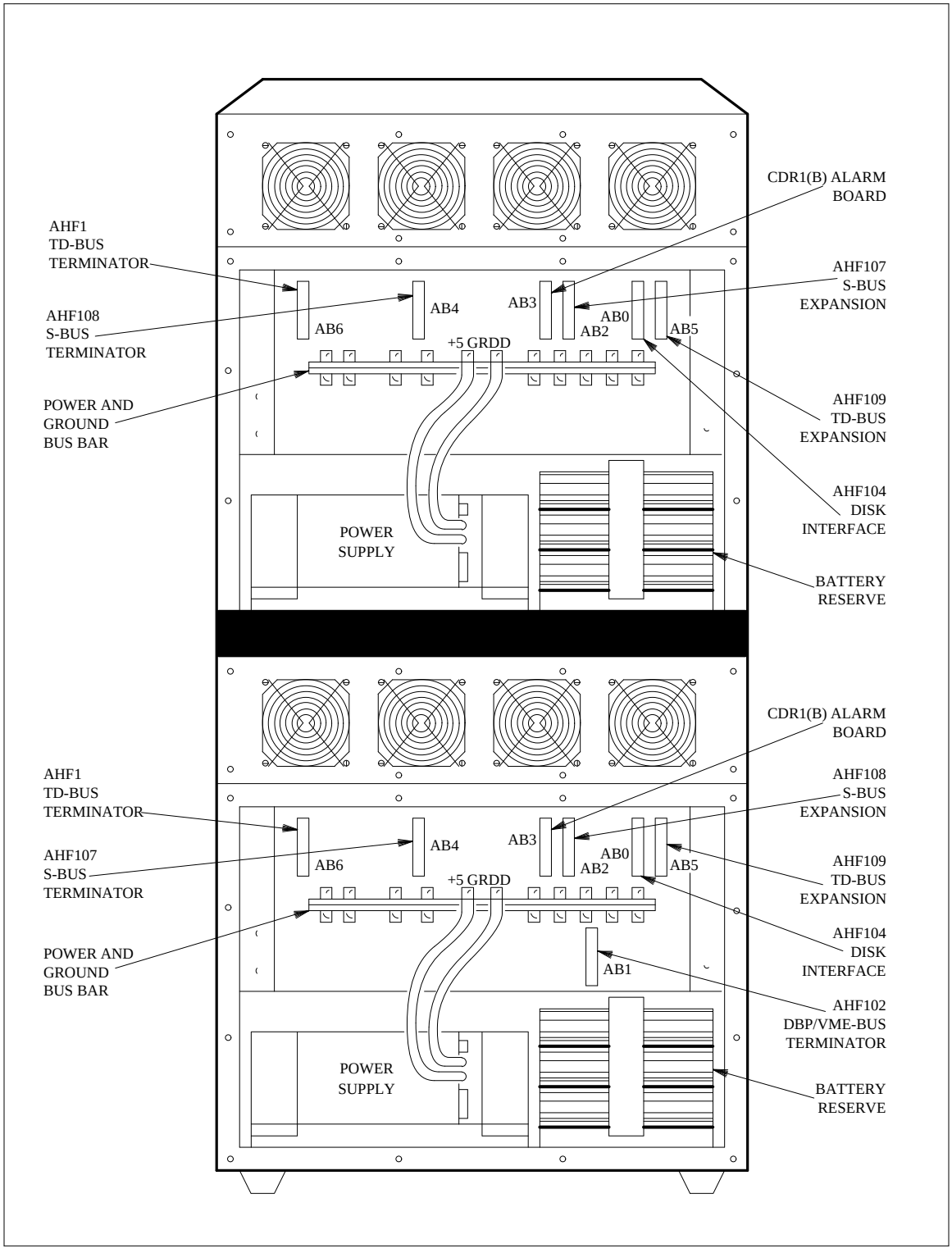


Figure 2-9. Two-Cabinet AUDIX List 2 or 4 Backplane Boards

DISK DRIVES

Two types of disk drives are installed on an AUDIX system: a required 20- or 50-Megabyte Removable Cartridge Drive (RCD), and up to three Hard Disk Drives (HDDs) of varying sizes per cabinet. Either 5.25-inch or 3.5-inch hard disks may be installed. AUDIX disk drive positions, functions, models, and power are covered in this section.

Order of Disk Drives in the Cabinet

The order in which disk drives are installed in the one- or two-cabinet AUDIX is shown in Figure 2-10, *Order of Disk Drives in AUDIX Cabinet*. Each drive is identified to software by its jumper settings (set by service technicians or the factory) that mark its position. Only one RCD is installed per system; this required drive is always located in the one-cabinet (or base) AUDIX system.

One-cabinet AUDIX disk drives fill positions 0 to 3, while expansion cabinet drives (if installed) fill positions 4 to 6. Because the SADI disk controller is always number 0 (the only controller in the system), disk drive positions are often shown as 0/0 to 0/6. Disk drives are given names (labels) through software that follow this naming convention (such as disk00 or disk03). The `list : volume names` form shows the label for each disk drive or cartridge.

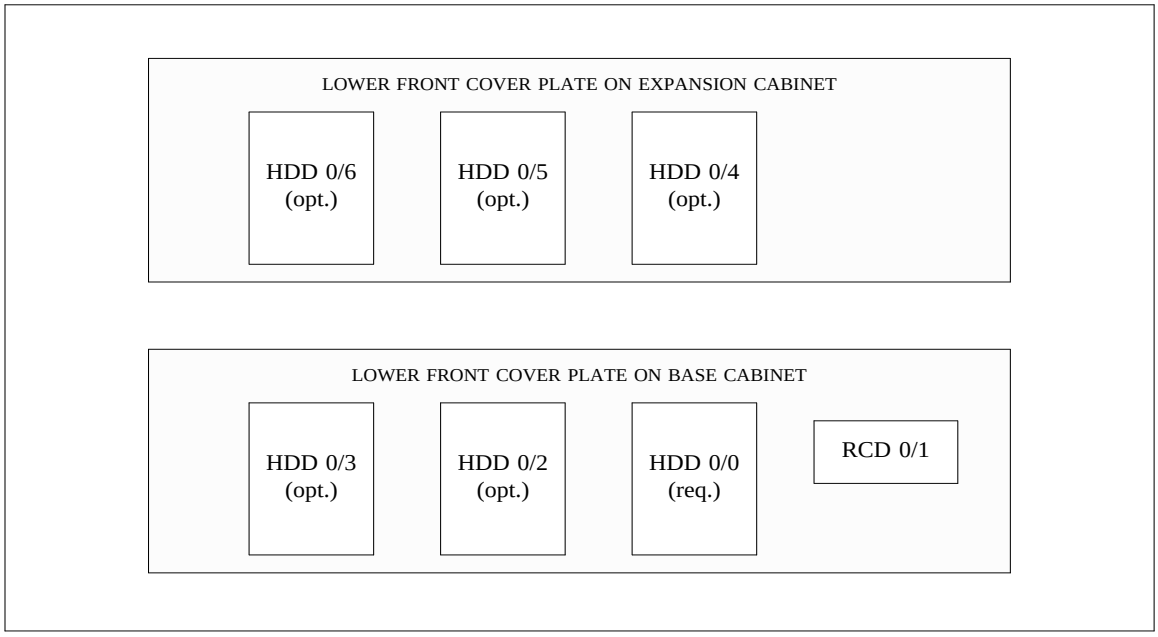


Figure 2-10. Order of Disk Drives in AUDIX Cabinet

SADI LEDs

LEDs on the TN475 or TN475B SADI circuit pack's faceplate show the number of drives installed and whether or not they are working. One yellow LED should be lit on the SADI for each installed disk drive as shown in Table 2-6, *SADI LEDS and Disk Drive Position*.

The TN475B SADI is already set up to handle the maximum number of hard disks that can fit in the AUDIX system. If fewer than six HDDs are installed, additional drives can be ordered. The new drives may be installed by on-site service personnel, and should ship with instructions for setting the options for the correct drive position and operating parameters needed by an AUDIX system. See the following *HDDs* section for details.

Table 2-6. SADI LEDs and Disk Drive Position

SADI LED	Disk Drive and Position	Label	Required	AUDIX Cabinet
16	HDD 0/6	disk06	Optional	Expansion
15	HDD 0/5	disk05	Optional	Expansion
14	HDD 0/4	disk04	Optional	Expansion
13	HDD 0/3	disk03	Optional	Base
12	HDD 0/2	disk02	Optional	Base
11	RCD 0/1	Varies *	Yes	Base
10	HDD 0/0	disk00	Yes	Base

* Removable cartridges are named by the system administrator according to their contents (for example, `backup` or `back01`).

HDDs

An AUDIX Hard Disk Drive (HDD) is a permanent mass-storage device (fixed disk). One HDD is required per system, but up to three can be installed in a one-cabinet system, and three more can be installed in the expansion cabinet. HDDs include various types (such as early 5.25-inch drives or the newer 3.5-inch drives) and sizes (current systems offer HDDs by hours of storage, while early systems offered a choice of disk sizes by megabytes). The same type and size of drives or any combination of HDDs may be installed on a single system.

The megabyte capacity of the drives reflects their size *before* formatting (done prior to shipment). The formatting program uses a small percentage of disk space for the organization needed to write and access data; the majority of space is free for program and subscriber use. Typically HDD 0/0 holds less customer information than the other disks due to the amount of space needed for program storage, special features such as CDR and multiple personal greetings, and system overhead.

For example, if a single 3.5-inch disk drive is installed in a 200-subscriber system, HDD 0/0 (also called *disk00*) would use the equivalent of eight hours of storage for system programs and overhead. However, if a new system is ordered with more than one HDD, the system filesystems are distributed across the available hard disks to improve system performance, dividing the overhead among all the disks in the system configuration.

Although AUDIX systems ship with the software already on disk, copies (backups) of important software or data should be kept on another HDD (if space is available) or on an RCD cartridge (as discussed in the next section). Chapter 3, *AUDIX Software*, covers recommended filesystem distribution. The HDDs:

- Contain software programs used for standard system operation
- Store subscriber messages, lists, headers, and personal greetings
- Update software and record data continuously as the system is used
- Provide sufficient storage for large filesystems and multiple voice text (`vtext`) filesystems
- Provide on-line copies of system software (such as a current `boot_e` copy of the `disk00.boot_f` filesystem), voiced-in names in the `ndat` filesystem, and announcements in the `adat` filesystem

All AUDIX disk drives use SCSI technology, a standard interface with a logical, command-based protocol. The drives can transmit data at 1.5 megabytes per second, with an average access time of 18 to 25 milliseconds (ms). Each drive requires about 20 to 40 watts for normal (steady-state) operation, or from 40 to 65 watts during surge (spin-up) conditions.

HDD Option Settings

Because an AUDIX system uses more than one vendor for its disk drives, documentation showing drive jumper settings is shipped with every new drive. Service technicians use this information to correctly identify the disk drive's position in the cabinet. The drives should also be set up for parity checking, delayed motor start, and *no* terminating resistors (only the RCD uses these resistors).

Types of HDDs

Either 5.25-inch, 3.5-inch, or both types of hard disks may be installed on a single system. The 3.5-inch disks are used in later systems for the 14-, 20-, 33- and 58-hour disk sizes (the 88-hour drive is still a 5.25-

inch drive). For the larger disks (those that offer at least 33 hours of storage or 380 Mbytes), a TN475B SADI Vintage 2 (or later) board must be installed in one-cabinet systems, or a TN475B SADI Vintage 5 (or later) board must be installed in two-cabinet systems.

Sizes of HDDs

The following disk drives are currently available. All of these are 3.5-inch disks except for the 88-hour drive (this is a 5.25-inch drive).

- 14-hour
- 20-hour
- 33-hour
- 58-hour
- 88-hour — typically used with the File Redundancy (filesystem mirroring) feature

Either the same-sized drives or a combination of HDDs may be installed on a single system. All the drives currently offered require the equivalent of about eight hours of voice storage for system programs and overhead.

The following 5.25-inch disks are no longer available (they are listed here for reference). Each of these drives required the equivalent of approximately six hours of storage for system overhead:

- 120-Mbyte HDD (about 11 hours each)
- 170-Mbyte HDD (about 18 hours each)
- 380-Mbyte HDD (about 40 hours each)
- 760-Mbyte HDD (about 80 hours each, renamed 88-hour drive)

RCD

The Removable Cartridge Drive (RCD) is part of the RCD assembly (ED-1E523-70) located at the bottom front of the cabinet. The RCD allows a portable, mass-storage disk cartridge to be inserted or removed. This removable media allows new software to be loaded or copies (backups) of filesystem data to be made. One RCD is always required per AUDIX system. The RCD allows:

- New or updated software to be loaded
- Generic system software to be copied to hard disk in case the system filesystems on a hard disk are lost or damaged
- Nightly backups of the system data (`sdat`) filesystem to be made automatically to restore critical customer data in the event of a hard disk failure
- Weekly backups of the names data (`ndat`) filesystem if this system has only one HDD
- Periodic backups of important filesystems which have been updated through system operation or administrator activities

Cartridge Types and Uses

The AUDIX RCD uses blank, null, and program cartridges as described in this section. All RCD cartridges require careful handling and a regulated environment to work properly.

Blank Cartridges. At least two blank RCD cartridges (J58889UB-1, List 1) are recommended for each AUDIX system (one is always required). All blank cartridges must be ordered separately. One of these blank cartridges should always be installed in the RCD so routine backups of subscriber data (the `sdat` filesystem) can automatically be made each night. The second blank cartridge may be used for backups of other filesystems in case the customer wants to keep traffic reports, `sst` files or names backup. All cartridges should be clearly labeled with descriptive names. Once a cartridge is equipped, labels may be displayed on the `list : volume names` form.

Null Cartridge. A new RCD should always be shipped with a null (dummy) cartridge in place to protect the drive heads from contamination. Normally this null cartridge is removed during installation and replaced with the `sdat` backup cartridge so the nightly audit can be made. If the backup cartridge is removed, however, do *not* leave the RCD empty. Reinsert the null cartridge until another active cartridge is ready to be equipped.

Program Cartridges. A set of generic-program cartridges is required for every AUDIX system. The generic-cartridge set consists of two 20-Mbyte cartridges (or three cartridges if verbose announcements are ordered), or one 50-Mbyte cartridge that contains all essential filesystems, additional software, and services utilities and tools. The AUDIX program-cartridge set is used to update software of the same release, for upgrading one software release to another, or is saved as a backup for the software shipped on disk00 (HDD 0/0). All program cartridges should be filed in a cool, dry, safe place in case the system programs on the hard disk are ever damaged or lost.

Different program-cartridges are required for each version of AUDIX software and for each AUDIX model. For example, a different set of program cartridges must be ordered to upgrade a one-cabinet AUDIX to a two-cabinet system, even if the two-cabinet AUDIX is to run the same software release.

RICOH Drive and Faceplate

Two types of 5.25-inch RCDs are in current use:

- Early AUDIX systems use a 20-Mbyte RICOH drive. This drive is identified by its flip-down lid and lid latch. See Figure 2-11, *RICOH 20-Mbyte RCD Faceplate*.
- Newer systems use a 50-Mbyte RICOH drive. This drive has a button to push for simpler cartridge handling. See Figure 2-12, *RICOH 50-Mbyte RCD Faceplate*.

A 20-Mbyte RCD may be upgraded to a 50-Mbyte drive using D-Kit 182482. On either drive, the start/stop button is disabled during a software request to spin the drive up or down. This prevents an accidental interruption or reversal of the automatic spin-up/spin-down cycle.

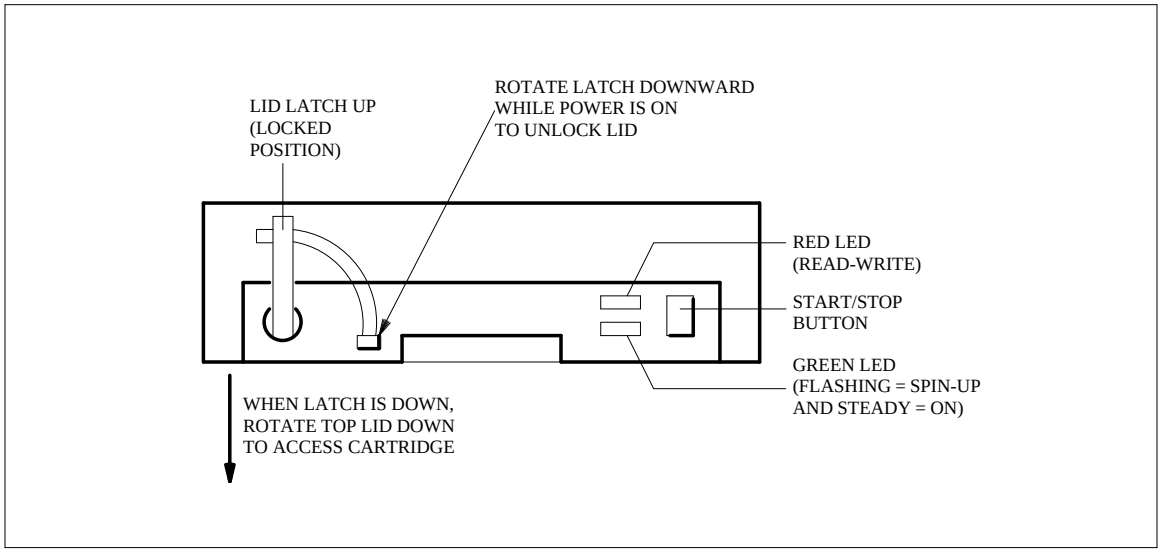


Figure 2-11. RICOH 20-Mbyte RCD Faceplate

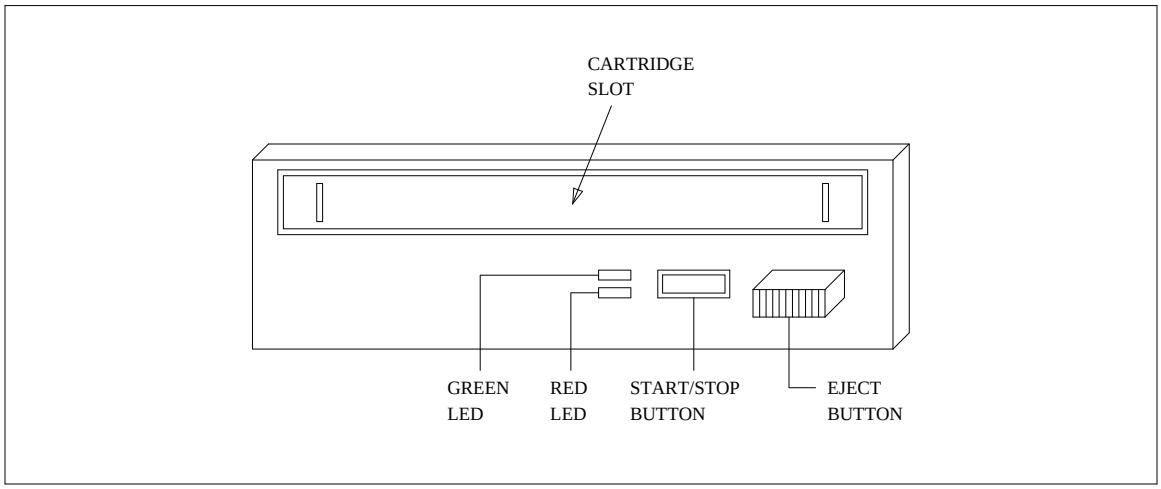


Figure 2-12. RICOH 50-Mbyte RCD Faceplate

Disk Drive Power

Disk drives receive power from the main AUDIX internal wiring harness (LCJ58886U-1A). Each drive requires from 25 to 40 watts for normal (steady-state) operation, or from 40 to 65 watts during surge (spin-up) conditions. Each power connector supplies the following voltages to the drives:

Pin	Voltage
1	+12 VDC
2	12 return
3	5 return
4	+5 VDC

The 5 VDC fuse shown in Figure 2-13, *Disk Drive Power Cabling*, is a 10-amp fuse in early AUDIX systems (as marked on the rear connector panel). In later AUDIX systems, this fuse has been replaced with a standard 15-amp Automatic Gain Control (AGC) 5V fuse to support 33-hour (380-Mbyte) and larger drives. All early AUDIX systems should be upgraded to the 15-amp fuse using D-Kit 182229 (comcode 105727952).

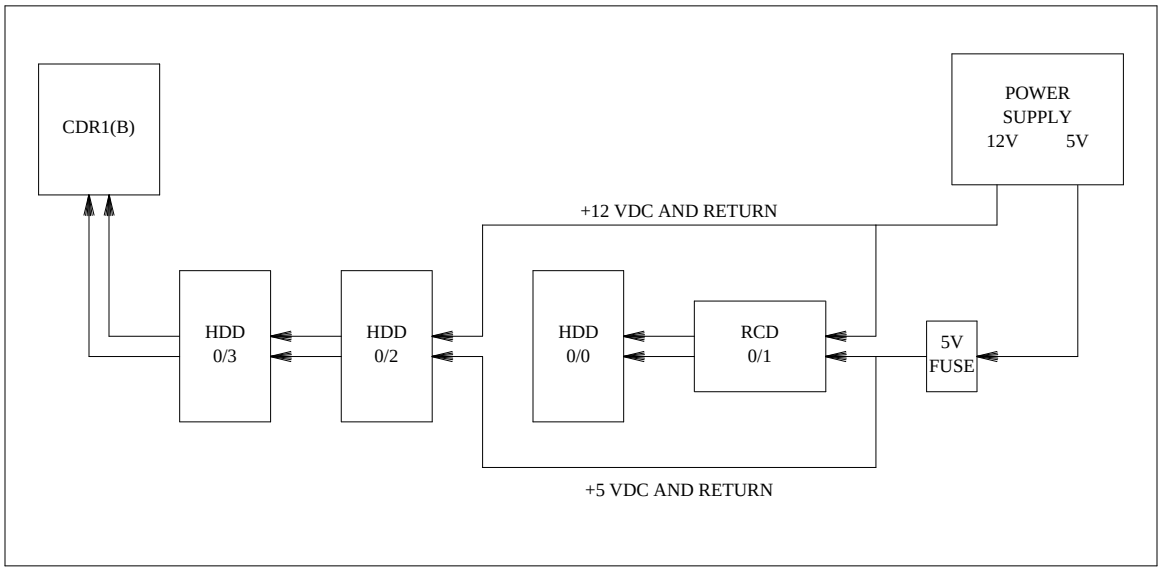


Figure 2-13. Disk Drive Power Cabling

POWER EQUIPMENT

An AC/DC power supply and battery reserve are located at the base of most AUDIX cabinets. The power supply uses 120 VAC from a standard wall outlet for normal operation and 48 VDC power from an internal battery reserve during brief power outages. The battery charger is part of the power supply.

Systems which run from a battery plant or other DC source may have a DC/DC converter installed in each cabinet. An AUDIX system will shut down a DC-powered system gracefully if the battery-plant output drops to approximately 42 VDC. DC equipment is covered at the end of this section.

Power Supply (ED-1E524-70)

The power supply (ED-1E524-70) is located at the lower left side of the AUDIX cabinet. Early AUDIX systems have air plenums on either side to divert air to cool the power supply [refer to Figure 2-4, *Early Two-Cabinet AUDIX System (Rear View)*]. Newer systems may not have the air plenum on the right side installed (see Figure 2-5).

The internal wiring harness (LCJ58886U-1A) connects the power supply to all internal components, including the disk drives, CDR1 or CDR1B alarm board, and POWER switch (circuit breaker) on the lower front panel. An ED-1E524-70 Group 1 (early) or Group 2 (connectorized) harness is used for AC-powered systems; an ED-1E524-70 Group 3 harness is used for DC-powered systems.

Table 2-7, *AUDIX Power Supply Input and Output Voltages*, lists the regulated input and output voltages required of all AC and DC power supplies used in an AUDIX system. AC power supplies must meet the following specifications:

- *AC transient input protection:* Provides built-in transient protection from the AC line so an AC protector cabinet is not needed. Specifications require that the power supply withstand the following tests and remain functional:
  - — Peak inrush current of 75 A (typical) during power-up
  - — 1000 V peak transient applied to AC line, 1 nanosecond rise time, pulse width 1 microsecond
  - — 1000 V peak transient applied to AC line, unidirectional wave shape 1.2×50 microseconds of Institute of Electrical and Electronic Engineers (IEEE) Standard 587 – 1980
- *Battery charger:* Contains internal circuitry for charging the 48 VDC battery reserve.
- *Input:* Accepts 120 VAC, 60-Hz, single-phase (nominal) from a standard wall outlet.
- *Remote battery-disconnect feature:* Allows the MI to disconnect the battery if low-battery voltage is indicated or when shutdown is complete.

All qualified power supplies (AC or DC) meet the following specifications:

- *Alarms:* Report power or battery problems to the system through the alarm board. A CDR1 board was used in early AC-powered systems. A CDR1B vintage alarm board is used for later systems and is required for all DC-powered systems.
- *Physical design:* Fit the cabinet dimensions (up to 5 by 8 by 13.5 inches, or 13 by 20 by 34 cm.) and contain an internal DC-powered fan. The supply must be able to connect to the internal wiring harness (LCJ58886U-1A).

- *Safety:* Meet Underwriter Laboratories (UL) and Canadian Standards Association (CSA) approval. AUDIX systems are listed with Underwriters Laboratories Inc. as UL number 538E.

Table 2-7. AUDIX Power Supply Input and Output Voltages

AC Input Voltage:	**For:**	
90 to 132 VAC	Nominal 120 VAC	
180 to 264 VAC	Nominal 220 VAC (Reserved for future use)	
47 to 63 Hz	Frequency variation	
DC Input Voltage:	**For:**	
40 to 63 VDC	Nominal –48 VDC	
Output Voltage:	**Range:**	**Amperes:**
+5 VDC	+4.85 to +5.15	100 A
–5 VDC	–4.85 to –5.15	2 A
+12 VDC	+11 to +13	15 A
–48 VDC	–44 to –52.5	0.5 A

Battery Charger and Reserve

The AUDIX battery reserve (or holdover unit) is used in AC-powered systems only. It allows AUDIX to continue service and save memory during short-term commercial power outages and glitches. A battery charger built-in to the power supply keeps the batteries in the holdover unit fully charged through an attached cable. If the cable is detached, an alarm is raised.

The battery reserve is located at the lower rear of the AUDIX cabinet. Its 24 sealed lead-acid battery cells together provide 48 VDC holdover voltage for the system. The total current is 10 to 18 amps nominal. The batteries are rated at five amp-hours.

The battery reserve allows the system to continue working for about 30 seconds after an AC power failure before beginning an orderly shutdown. Depending on the size of the system, the batteries could supply power for three to eight minutes. However, software requests AUDIX to shut down quickly to ensure that data and equipment are protected. This early shutdown allows AUDIX to save data repeatedly through several power outages.

The battery reserve has a remote battery-disconnect feature. This allows the MI to disconnect the battery if low-battery voltage is indicated, or after a system shutdown is complete. If AC power resumes during a shutdown procedure, the power supply immediately returns to normal AC operation and begins recharging the batteries.

In case of a commercial AC power failure, the battery reserve acts as follows:

1. The battery output connects to the 48 VDC inputs on the power supply to provide system-wide power, and an alarm is given.
2. For 30 seconds, service continues for existing calls, but the AUDIX system denies further access.
3. If the power outage continues, the AUDIX system shuts down gracefully in 20 to 30 seconds by transferring vital information from RAM to disk memory and ceasing service.
4. The MI sends a battery-disconnect command to the power supply. All power is shut off and the system goes dark (no LEDs are lit).

   NOTE

   If a low-battery voltage is indicated (for example, if several repeated power outages occur), the MI disconnects the battery reserve to prevent damage to the batteries. All power is then shut off until AC power resumes.

5. When commercial power resumes, the batteries immediately begin to recharge at 0.125 amps. The batteries take up to 16 hours to fully charge after being completely discharged. If the batteries do not charge in 24 hours, an alarm is raised.

DC Power Equipment

A one- or two-cabinet AUDIX model can be ordered with an internal DC-to-DC converter to run from a battery plant or other –48 VDC source. An AC-powered system can also be upgraded to support DC power input using D-Kit 182236 as shown in Figure 2-14, *AUDIX DC Cable Hookup (D-Kit 182236)*, shows the installed AUDIX DC cable hookup.

A DC-powered AUDIX system requires the following changes to the standard power equipment:

- The power supply assembly must be an ED-1E524-70 Group 3. Acceptable DC/DC converters are shown on List 2 of the WP-91569 specification.
- The battery reserve is not installed. Instead, a DC filter and terminal mounting strip are installed behind a modified lower rear cover plate. The new cover plate allows two 6 to 10 AWG DC cables (in conduit, if necessary) to be attached directly to the terminal strip.
- The internal wiring harness (LCJ58886U-1A) must be changed to a Group 3. Internal wiring assemblies for the power supply, fuse, and disk drives must be added.
- The alarm board must be a CDR1B board (or later).
- The circuit breaker (POWER switch), part of the RCD assembly (ED-1E523-70), must be changed to a 20-amp internal breaker for DC power. This requires an ED-1E523-70 Group 5 RCD assembly in the base cabinet, and an ED-1E523-70 Group 6 assembly (no RCD) in the expansion cabinet.
- The AC outlet at the rear of the cabinet is replaced with a cover plate and connection for gutter-tap ground or green-wire ground (GWG) using D-Kit 181895.

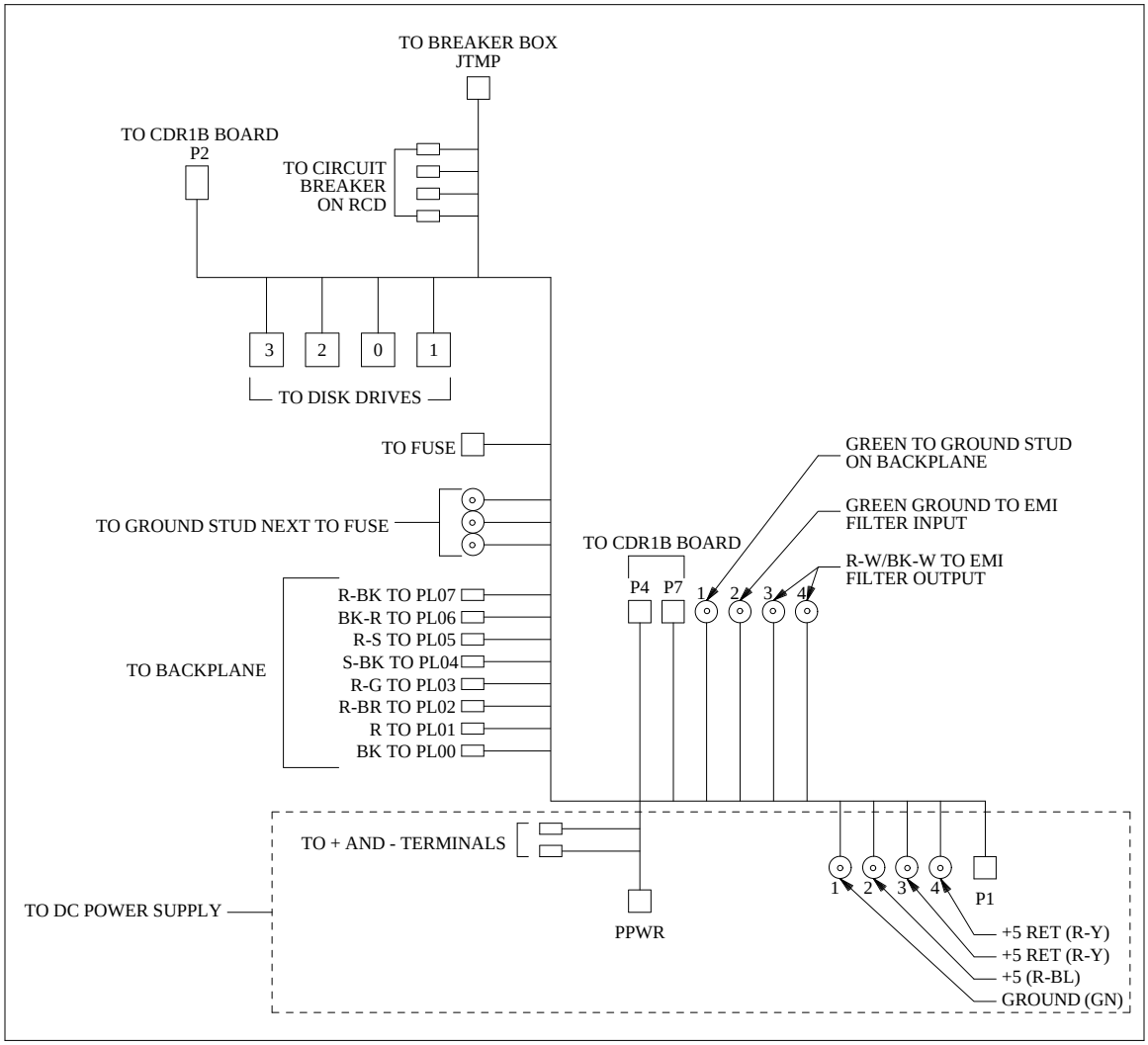


Figure 2-14. AUDIX DC Cable Hookup (D-Kit 182236)

TEMPERATURE CONTROL

Temperature control in an AUDIX system is maintained by an air filter, air plenum(s), disk drive fans, a cabinet fan assembly, and thermal sensors which regulate the cabinet's temperature. An alarm board mounted on the backplane monitors the environment and passes alarms to the MI board if needed. A duplicate set of this equipment is installed in the expansion cabinet in two-cabinet systems.

Alarm Board (CDR1B)

The CDR1 or CDR1B alarm board transmits signals to and from the MI board. As shown in Figure 2-15, *CDR1(B) Alarm Board and Cable Connections*, it monitors most of the major components and connectors in the system, including power, cabinet air flow, fan speed, rear-panel connectors, front panel components, and environment. The board is located on the backplane. Early AC-powered systems used a CDR1 board; the CDR1B vintage board (or later) is required for later AC/DC systems and all DC-powered AUDIX systems.

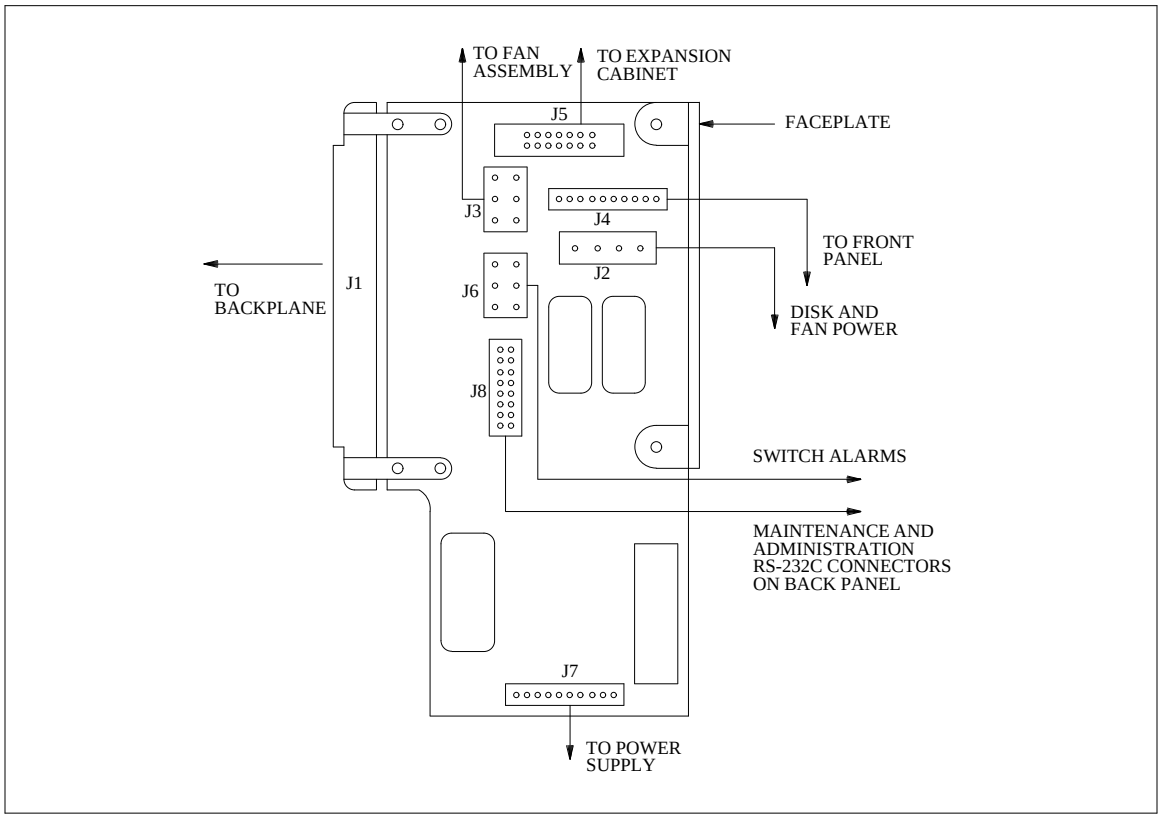


Figure 2-15. CDR1(B) Alarm Board and Cable Connections

The CDR1(B) collects alarm signals from various system components through the following connectors:

- *J1: (Backplane)* This major connector attaches the CDR1(B) securely to the backplane (PWJ58886U-1). Most environmental alarms are sent to the MI over this connection.
- *J2: (Disk Power)* This 4-pin connector carries 5 and 12 VDC and GRD from the disk drives to the fan assembly.
- *J3: (Fan Assembly)* Monitors fans and temperature
- *J4: (Front Panel)* Connects to the three power LEDs, POWER switch (circuit breaker), and thermal sensors on the lower front panel
- *J5: (Expansion Cabinet)* Used to connect the two alarm boards in a two-cabinet AUDIX system
- *J6: (Switch Alarms)* Allows the AUDIX system to report major alarms to the remote site through the ALARM (D03) connector on the rear panel
- *J7: (Power Supply)* Monitors all power supply and battery reserve signals
- *J8: (RS-232C Connectors)* Connects the local or remote maintenance and administration terminals on the rear panel (MAINT H00 and ADMIN H01))

The topmost CDR1(B) connector (J5) is used in two-cabinet AUDIX systems to connect the alarm board in the base cabinet with the alarm board in the expansion cabinet. The ED-1E434-11 Group 185 cable that links the two CDR1(B) boards provides an *or* condition, meaning that a power or environmental alarm (such as a low battery warning) could be in either the base or expansion cabinet. Services personnel must rely on visual inspection or take other steps when troubleshooting an AUDIX power or environment problem to determine which cabinet is actually having the problem.

Air Filter

The air filter is located just below the circuit pack carrier and above the disk drives. It should be routinely cleaned or replaced to help keep the cabinet clean and cool.

Air Plenums

The AUDIX cabinet is designed to allow air to flow in from the bottom of the unit, up through the air filter, past the circuit packs, and out the top rear of the cabinet. The fan assembly at the upper rear of the cabinet pushes hot air out of the cabinet, while air diverters or *plenums* ensure that the air being pulled into the bottom of the cabinet flows correctly past the power supply and disk drives. The fans at the rear of the cabinet must have sufficient room to allow the heated air to exit freely.

Fan Assembly (ED-1E522-70)

The fan assembly (ED-1E522-70) is located at the top rear of the AUDIX cabinet. It requires 12 VDC power to operate, which it obtains through the CDR1(B) alarm board. The fan assembly contains four fans and a thermal assembly unit (ED-1E430-70, Group 5) which includes a thermistor and two thermostats to monitor heat output.

The thermal assembly unit allows the fans to maintain an interior cabinet temperature within acceptable operating limits. The fans are designed to run continuously at low speed. If the thermostats record a temperature above 150°F (65.5°C), or if the thermistors at the top and bottom of the cabinet measure a difference in temperature greater than 30°F (16.6°C), the system sets the fans to run on high speed until the problem is corrected. The fans also run on high speed if one fan stops working so the system can run without overheating until the fan is repaired or replaced.

Thermal Sensors

An AUDIX system has two sets of thermal sensors to monitor cabinet temperature. One set of sensors, the thermal assembly unit (ED-1E430-70, Group 5), is located in the fan assembly at the upper rear of the cabinet. A second set of sensors is located in the RCD assembly (ED-1E523-70) at the bottom front of the cabinet.

Each thermal sensor assembly contains a thermistor, two thermostats, and associated wiring. The thermistors at the top and bottom of the cabinet work together to compare the incoming air temperature (at the RCD assembly) to the exit-air temperature (at the fan assembly). If the temperature difference between the two thermistors is 30°F (16.6°C) or more, the fans are set to run at high speed.

Two thermostats (thermal switches) are located on each side of the fan assembly, and at the bottom left of the RCD bracket. The thermostats send an alarm if any of them records a temperature greater than 150°F (65.5°C). External or mechanical factors (such as blocked air filter or fans, or a breakdown of normal air-conditioning facilities) can cause the thermal sensors to record a high temperature.

3. AUDIX Software

This chapter describes the organization, handling, and maintenance of AUDIX software.

NAMING CONVENTIONS

A *volume* is any of the HDDs or program cartridges described in the previous chapter that is used to store programs and customer data. Table 3-1, *Disk Drive Volume Names*, lists the volumes used in a one- or two-cabinet AUDIX system.

The system *controller*, a TN475B Small Computer Systems Interface-to-AUDIX Disk Interface (SADI) board, writes to and reads from any of the volumes. Because only one SADI is installed for each one- or two-cabinet system, it is called *controller 0*.

Hard Disks

Hard (or fixed) disk volumes [HDDs or Fixed Storage Drives (FSDs)] are assigned 1- to 7-character alphanumeric names. These are based on the disk drive's position in the AUDIX cabinet and the controller with which it is associated. For example, the second hard disk run by controller 0 would be called *disk02*.

Removable Backup Cartridges

Most removable backup cartridges use names that AUDIX system administrators or service personnel assign. Removable-cartridge backups are periodic copies of the information stored and updated on a hard disk during normal system operation. The copies can be used to restore system information in the event of a hardware failure or other problem that damages data.

The removable cartridge's volume name should clearly indicate either the cartridge's content (such as `adat1` for a voiced-name backup), its function (such as `backup1` or `backup2`), or the date (such as `b103093`). Any logical naming convention may be used, as long as the name is 1- to 7-alphanumeric characters in length.

Table 3-1. Disk Drive Volume Names

Volume Name *	Device Type	Controller Number	Device Number	Disk Designation
All Models:				
backup name varies †	RCD (20 or 50 Mbytes)	0	1	RCD 0/1
disk00	HDD 0 (varying sizes)	0	0	HDD 0/0
disk02	HDD 2	0	2	HDD 0/2
disk03	HDD 3	0	3	HDD 0/3
Two-Cabinet System Only:				
disk04	HDD 4	0	4	HDD 0/4
disk05	HDD 5	0	5	HDD 0/5
disk06	HDD 6	0	6	HDD 0/6

* Volume names reflect the device's controller number (0 or 1) and its device number, or physical position in the cabinet (0 to 6).

† Removable program-cartridge volume names are based on software release, such as 7:2 for R1V7. Removable backup cartridges use descriptive names assigned by the system administrator (such as back01 or back02).

Removable Program Cartridges

Removable program or *generic* cartridges shipped from the factory are marked with volume names that indicate the software issue. For example, the first program cartridge shipped for a system could be named `7:1` for Version 7, Issue 1. The next update for changes or corrections would be named `7:2` for Issue 7.2. The next major software release with added features would increase the version number to, for example, Version 8 (`8:1`).

FILESYSTEM DESCRIPTION

Filesystems are collections of organized files which contain similar types of system and user information. A filesystem functions like a *directory* in an operating system.

Filesystem Names

Filesystem names consist of two parts: a 1- to 7-character *volume* name indicating the physical device where the filesystem resides (see the previous *Naming Conventions* section), a 1- to 10-character *filesystem* name, and the type of files in that filesystem.

Because all AUDIX systems must have a hard disk in position 0/0, AUDIX software looks for the boot filesystem `disk00.boot_f` automatically. The boot filesystem always contains the configuration file `dbpa` which lists the locations of other filesystems AUDIX needs.

AUDIX system software accesses filesystems through *mount points*. A mount point logically identifies a filesystem independent of its physical location. The `filesystem : list` form shows the mount points for all filesystems on a specific disk as shown in Figure 3-1, *Sample List of Filesystems and Data*.

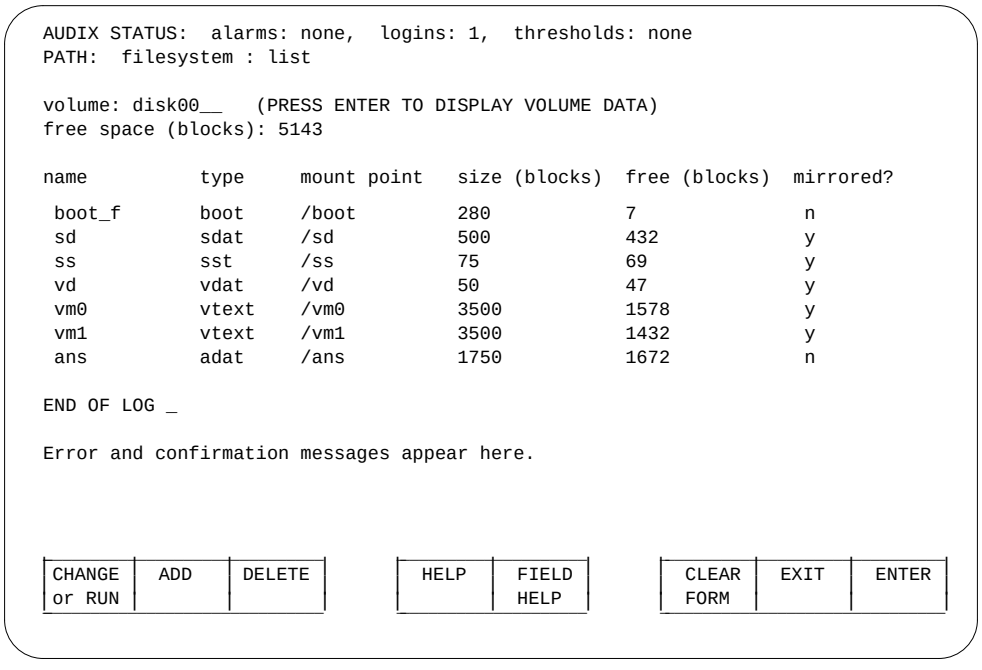


Figure 3-1. Sample List of Filesystems and Data

The `system : filesystems` form displays the *active* filesystems. AUDIX announcements and names are listed on the `system : announcement : filesystems` form. The `filesystem : list` form lists all the filesystems located on a specific volume (physical device) whether or not they are active. Refer to the forms reference manual for your software release to see examples of these screen forms.

Filesystem Types and Files

The filesystem *type* must be specified on various administration or maintenance forms when a filesystem is created or displayed. The type tells the system what kind of data and files a filesystem contains.

Usually only one filesystem of each type is active at a time. However, up to 10 `vtext` (Voice Mail message) filesystems may be active at once. Continuously updated copies of filesystems can be made using the File Redundancy feature; the updated copy can automatically become active if the original filesystem experiences problems (see the *Filesystem Redundancy* section for details). Table 3-2, *Filesystem Names, Mount Points, and Types*, summarizes AUDIX filesystem information.

Announcement Filesystem

The announcement filesystem is a large-block (16K) filesystem containing two sets of files with the same format. The announcement filesystems contain only system announcements; subscriber names are in the names filesystem. The type is `adat`, and the mount points are `/anp` (for the active version) and `/ans` (for the administration version). These mount points switch if the active announcement filesystem is swapped (exchanged) with the administrative version. Files include:

- `/anp/sam`: Active system announcements
- `/anp/sat`: Active announcement translations
- `/ans/sam`: Administrative version of system announcements
- `/ans/sat`: Administrative version of system announcement translations

Two versions of AUDIX system announcements are available in R1V8: a standard version (`anc.adat`) and a traditional abbreviated version (`ana.adat`). Prior to R1V8, the abbreviated (short) version `ana.adat` was the default, although a verbose version with longer prompts (`anp.adat`) could be ordered and installed if desired. Refer to *AUDIX Administration* (585-305-501) for more information on announcement sets.

Although the default names are used as examples in this section, customers are free to name their announcement filesystems anything they wish. For example, a customer with customized announcements might name the announcement filesystem `custana.adat`. In addition, the upgrade utility preserves the name of the announcement filesystem if customers upgrade their system from an earlier version of software to a newer one. For example, if a customer with verbose announcements upgrades to R1V8, the announcement filesystem would still be named `anp.adat`.

Table 3-2. Filesystem Names, Mount Points, and Types

Filesystem Name *	Mount Point	Type	Type Description
Activated by the `system : announcement : filesystems` form:			
disk02.ana *or* disk02.anc *or* disk02.anp	/anp	adat	Active announcement data (adat) version †
disk00.ans	/ans	adat	Administrative (working) announcement version
Activated by the `system : filesystems` form:			
disk00.boot_f	/boot	boot	Boot (startup) filesystem &
disk02.nm	/nm	ndat	Names data filesystem
disk00.sd	/sd	sdat	System data filesystem
disk02.ss	/ss	sst	System status filesystem
disk00.vd	/vd	vdat	Voice data filesystem
disk00.vm0	/vm0	vtext	First voice text filesystem
disk00.vm1	/vm1	vtext	Second voice text filesystem $
disk02.vm2	/vm2	vtext	Third voice text filesystem $
. . .			
disk06.vm9	/vm9	vtext	Tenth voice text filesystem $

* The disk drive names (such as disk00 and disk02) in this table are used as examples only. Refer to the *Distributing Filesystems* section in this chapter for information on recommended filesystem distribution based on the number of disks installed.

† The mount points for the active and administrative announcement filesystems reverse if the versions are swapped (exchanged).

& AUDIX software always attempts to boot from the disk00.boot_f filesystem at system startup, so this name should always be used for the main boot filesystem. If disk00.boot_f does not exist, software looks for another boot filesystem. A boot_e backup should be on another disk if possible (such as disk02.boot_e).

$ The volume part of a vtext name reflects the physical device on which the filesystem is located. In this example, the third vtext filesystem (vm2) is on the second disk drive (disk02). The tenth vtext filesystem (vm9) is on the sixth hard disk (disk06).

Boot Filesystem

The boot filesystem is a large-block (16K) filesystem which contains AUDIX software for the main processors: the Feature Processor (FP) and Database Processor (DBP) on all systems, and the Voice Session Processor (VSP) on two-cabinet AUDIX systems. The filesystem type is `boot` and the mount point is `/boot`. This filesystem contains all software and control programs, administration and maintenance forms, help files, and the system configuration file.

Normally the boot filesystem used to run the system is named `disk00.boot_f` and its backup is named `disk02.boot_e`. Other boot filesystems that reside on the generic-program cartridge include `boot_c` and `boot_i`. These filesystems are used only by services personnel and should be saved on the cartridge unaltered. Boot files include:

- `/boot/.more`: This is a work file allocated by the DBP after booting. It provides overflow buffering for data between the DBP and FP (or VSP) processor.
- `/boot/HW_ATTR_FILE`: DBP Hardware Attribute File. This indexed-sequential file contains a description of all hardware components configured in the DBP subsystem.
- `/boot/HW_CONF_FILE`: DBP Hardware Configuration File. This indexed-sequential file contains information about the DBP hardware equipage.
- `diskboot`: Disk Bootstrap Image (one block located at block zero of the boot filesystem). This bootstrap program is not treated as a regular stream file in the boot filesystem.
- `/boot/dbp`: DBP Image (DBP generic load). This program must be the second stream file created and populated in the boot filesystem. It contains the DBP software.
- `/boot/dbpa`: AUDIX Filesystem Configuration File. This indexed-sequential file contains information about AUDIX permanent filesystems and their respective mount points. In R1V4 and later software, it also contains the announcement and redundant filesystem mount points.
- `/boot/fctl`: AUDIX Terminal Form Control File. This indexed-sequential file contains the control information for the data fields on the forms.
- `/boot/fporyx`: AUDIX/FP Image (AUDIX/FP generic load). This stream file contains the Oryx/Pecos operating system and the AUDIX application programs that are loaded and run in the Feature Processor (FP). For single-processor systems, this file also contains the equivalent VSP applications.
- `/boot/fpregs`: AUDIX/FP Register Map. This stream file defines the initial values of FP registers and is used by the AUDIX/FP Image to initialize FP registers.
- `/boot/ftext`: AUDIX Terminal Form Text File. This indexed-sequential file contains the actual words which appear on each form.
- `/boot/help`: AUDIX help files (screen forms and text).
- `/boot/imb`: Intermediate Boot Image. This program must be the first stream file created and populated in the boot filesystem. It is used to boot the DBP Image file.
- `/boot/op_boot`: AUDIX Intermediate Boot Image. This stream-file boot program is used to boot the AUDIX Image (AUDIX Generic).
- `/boot/time`: Time (month, hour, and minutes) from the real-time clock (RTC), plus the year.
- `/boot/vsporyx`: (*2-cabinet AUDIX only*) AUDIX/VSP Image (AUDIX/VSP generic load). This stream file contains the Oryx/Pecos operating system and the AUDIX application program that are to be loaded and run in the Voice Session Processor (VSP).
- `/boot/vspregs`: (*2-cabinet AUDIX only*) AUDIX/VSP Register Map. This stream file defines the initial values of VSP registers and is used by AUDIX/VSP Image to initialize VSP registers.

Names Filesystem

The names filesystem is a medium-block (4K) filesystem that was introduced in AUDIX R1V3 software. It contains the subscriber and machine names voiced in by the system administrator or by the subscribers themselves. The type is `ndat` and the mount point is `/nm`. Files include:

- `/nm/sam`: Subscriber and machine names
- `/nm/sat`: Name translations

System Data Filesystem

The system data filesystem is a small-block (2K) filesystem with many indexed-sequential files. The filesystem type is `sdat` and the mount point is `/sd`. Files include subscriber and system information.

- `/sd/attend`: Automated Attendant Profile File
- `/sd/attend_ext`: Automated Attendant Extension File
- `/sd/cls`: Class of Service File
- `/sd/extr`: Extension Translation File
- `/sd/mh`: Message Header File
- `/sd/netname`: Global Network Machine Names File
- `/sd/netprof`: Network Profiles File
- `/sd/nettr`: Network Subscriber Translations File
- `/sd/nmtr`: Name Translation File
- `/sd/oc_serve`: Outcalling Service File (queue of outcalls to be made at the appropriate time)
- `/sd/pdir`: (*Introduced in R1V5*) Subscriber Personal Directory File
- `/sd/ranges`: Network Address Range Translations File
- `/sd/rmail`: Network Remote Mail Identifiers File
- `/sd/rmatrix`: (*Introduced in R1V5*) Sending Restrictions Matrix File
- `/sd/sav`: System Announcement Version File (a stream file)
- `/sd/sdl`: Subscriber Distribution List File
- `/sd/subtf`: Subscriber Traffic Data File
- `/sd/sup`: Subscriber Profile File
- `/sd/svd_amw`: Service Dispatcher Automatic Message-Waiting (AMW) Status File
- `/sd/svd_trans`: Service Dispatcher Translation File
- `/sd/syp`: System Profile File
- `/sd/ttnm`: Touch-Tone Name Translation File
- `/sd/upddlta`: Remote Subscriber Delta Update File (record of local changes to be sent to a remote machine)

- /sd/usrd: User Directory File
- /sd/vhconfig: VSP Hardware Configuration Translation File
- /sd/vip_trans: VIP Translation File
- /sd/vnq: Remote Subscriber Voice Names File (temporary file of subscriber names needed locally from a remote machine)

System Status Filesystem

The system status filesystem is a small-block (2K) filesystem containing several indexed-sequential files. The filesystem type is sst and the mount point is /ss. System status files include traffic data (subscriber and system measurements), logs, schedulers, and threshold records.

- /ss/a_index: (*Introduced in R1V4, removed in R1V7; may not be present*) Keys to the Activity Log Entries
- /ss/activity: (*Introduced in R1V4; may not be present*) Activity Log Entries
- /ss/al: Administrative Error Log
- /ss/ala: Active Alarm Log
- /ss/alptr: (*Introduced in R1V5; may not be present*) Administrative Log Companion File
- /ss/alr: Resolved Alarm Log
- /ss/cdr0 to /ss/cdr32: (*Introduced in R1V5; may not be present*) CDR Record Files
- /ss/crdump: PE 0 Core Dump (*for service technicians; may not be present*)
- /ss/dcmty: (*Introduced in R1V5*) Daily Community Traffic File
- /ss/dfeature: Daily System Feature Traffic File (31 previous plus current day)
- /ss/dload: Daily System Load Traffic File (31 previous plus current day)
- /ss/dnetload: Daily Network Load Traffic File (31 previous plus current day)
- /ss/drmcur: Daily Remote Messages Current Traffic File
- /ss/drmsun to /drmsat: Daily Remote Messages Traffic Files for each day of the week (Sunday through Saturday). Other weekday filenames are /drmmon (Monday), /drmtue (Tuesday), /drmwed (Wednesday), /drmthu (Thursday), and /drmfri (Friday).
- /ss/dstd: Daily Special Features Traffic File
- /ss/dsubcur: Daily Subscriber Current Traffic File
- /ss/dsubsun to /dsubsat: Daily Subscriber Traffic Files for each day of the week (Sunday through Saturday). Other weekday filenames are /dsubmon (Monday), /dsubtue (Tuesday), /dsubwed (Wednesday), /dsubthu (Thursday), and /dsubfri (Friday).
- /ss/el: Error Log
- /ss/fsch: FP Scheduler
- /ss/hcmty: (*Introduced in R1V5*) Hourly Community Traffic File
- /ss/hfeature: Hourly System Feature Traffic File

- `/ss/hload`: Hourly System Load Traffic File
- `/ss/hnetload`: Hourly Network Load Traffic File
- `/ss/hstd`: Hourly Special Features Traffic File
- `/ss/link`: (*Introduced in R1V5; may not be present*) Maintenance Link Log
- `/ss/mrmcur`: Monthly Remote Messages Current Traffic File
- `/ss/mrmjan` to `/mrmdec`: Monthly Remote Message Traffic Files for each month (January through December). Other monthly filenames are `/mrmfeb` (February), `/mrmmar` (March), `/mrmapr` (April), `/mrmmay` (May), `/mrmjun` (June). `/mrmjul` (July), `/mrmaug` (August), `/mrmsep` (September), `/mrmoct` (October), and `/mrmnov` (November).
- `/ss/msubcur`: Monthly Subscriber Current Traffic File
- `/ss/msubjan` to `/msubdec`: Monthly Subscriber Traffic Files for each month (January through December). Other monthly filenames are `/msubfeb` (February), `/msubmar` (March), `/msubapr` (April), `/msubmay` (May), `/msubjun` (June). `/msubjul` (July), `/msubaug` (August), `/msubsep` (September), `/msuboct` (October), and `/msubnov` (November).
- `/ss/tr_conf`: (*Introduced in R1V4; may not be present*) Activity Log Translation Configuration
- `/ss/updtmp`: Temporary Update File 1 to 4 (constructs messages to be sent to remote machines)
- `/ss/vsch`: VSP Scheduler

Utility Filesystem

The utility filesystem is a large-block (16K) filesystem containing DBP stand-alone utilities and hardware-diagnostic programs. The programs can be loaded on the DBP without relying on the FP (or VSP in two-cabinet AUDIX systems); only the DBP subsystem needs to be operational. The programs are loaded and run through the DBP monitor interface.

The utility filesystem normally is located on removable cartridges used by service personnel. It does not have a file type because it is not used in any forms. The mount point is `/util`. The filesystem contains tools which should only be used under remote services supervision.

Voice Data Filesystem

The voice data filesystem is a small-block (2K) filesystem with indexed-sequential files. The filesystem type is `vdat` and the mount point is `/vd.` Files include:

- `/vd/dr`: Delivery Request File
- `/vd/mb`: Mailbox File (contains pointers for subscribers' incoming and outgoing mailboxes to messages stored in the `vtext` filesystems)
- `/vd/net_tmp`: Network Temporary File
- `/vd/xmq`: Network Transmission Queue

Voice Message Filesystem

The voice message filesystem (also called voice text) is a large-block (16K) filesystem which contains voice stream files for spoken messages created during normal Voice Mail sessions, including recordings of personal greetings. Up to 10 voice message (vtext) filesystems may be set up for storing these voice-stream files.

The filesystem type is `vtext` and the 10 filesystem mount points are `/vm0`, `/vm1`, `/vm2`, `/vm3`, `/vm4`, `/vm5`, `/vm6`, `/vm7`, `/vm8`, and `/vm9`. More than one filesystem of the same type can be active and mounted at one time.

FILESYSTEM HANDLING

Filesystems can be activated in the following ways:

- *Automatic:* The main filesystems are automatically activated when the AUDIX system is booted. The boot filesystem always contains the mount points of all AUDIX filesystems that appear on the `system : filesystems` form. The announcement filesystems are also automatically activated when the system boots up.
- *System : filesystems Form:* Manually changing the active filesystem in response to a problem or because a filesystem no longer fits on the current volume requires:
  1. Creating and mounting a new filesystem using the `filesystem : detail` and `filesystem : mount` forms.
  2. Displaying the `system : filesystems` form. To activate a new filesystem, the filesystem name (including the volume name) is typed into the space provided on the form, and the CHANGE function key is pressed. This procedure identifies the filesystem and its physical location to the system, so that software can access it.
  3. If this is a permanent change, the `filesystem : update configuration` form is used to copy the new data to the backup boot filesystem.
- *System : announcement : filesystems Form:* The filesystem name (including the volume name) for the active system announcement set (`adat`), the names filesystem (`ndat`), and the weekly names backup filesystem are entered. If custom announcements are used at the site, the name of the administrative announcement set is also typed.

Screen Forms

The forms used in AUDIX systems display both read-only information and information fields which an administrator is allowed to add or change.

Status

The read-only STATUS line at the top of each form supplies the following information:

- `alarms`: `w` (Warning); `M` (Major); `m` (Minor); `A` (Administrative)
- `logins`: `1` (one terminal); `2` (two terminals)
- `thresholds`:
  - `lower`: Indicates that the lower preset space threshold across all voice text filesystems has been exceeded, for example, 50% (default 75%)
  - `middle`: Indicates that the middle preset space threshold across all voice text filesystems has been exceeded, for example, 60% (default 85%)
  - `upper`: Indicates that the upper preset space threshold across all voice text filesystems has been exceeded, for example, 70% (default 95%)
  - `filesystem`: Indicates that more than 85% of the space within at least one filesystem has been used. The `system : thresholds` form is displayed to determine which filesystem thresholds have been exceeded.

Paths

Forms are displayed when a user enters a correct path name on the `PATH` line. Path names are divided into *segments* (similar to subdirectories) to identify the form. This arrangement is called a *parse tree*, where the different segments are ‘‘branches’’ of the tree. For example, `system` and `filesystems` make up the correct path name `system : filesystems`.

The complete path names do not have to be typed, only enough characters to uniquely identify the path. For example, typing **`f l`** contains the minimum number of characters required to identify the `filesystem : list` form.

Screen-Labeled Keys

The eight reverse-video boxes at the bottom of the screen are the AUDIX function keys. They are called *screen-labeled* keys because the AUDIX software programs these keys when a person logs on to the system using a compatible terminal. In some cases, these keys may need to be manually programmed. The eight screen-labeled keys are:

- F1 `CHANGE or RUN` — This key executes a form or processes new data after changes have been made or a test requested.
- F2 `ADD` — This key adds a subscriber, filesystem, or other entity to the system.
- F3 `DELETE` — This key removes a subscriber, filesystem, or other entity from the system.
- F4 `HELP` — This key displays online information about the form currently on the screen, including its display-only fields. On the `PATH` line, it shows the next possible entries from the current position. It is equivalent to the HELP key on the keyboard (if present) or the CTRL-key commands.
- F5 `FIELD HELP` — This key displays online information about a specific data-entry (modifiable) field on a currently displayed form. The cursor marks the field to be described.
- F6 `CLEAR FORM` — This key allows the system administrator (or service technician) to erase all enterable fields on the form with a single keystroke.
- F7 `EXIT` — This key is used to leave a form or back up on the `PATH` line. It is equivalent to the physical EXIT key on the keyboard (if present) or the CTRL-x command.
- F8 `ENTER` — This key is used to display information on a form. It is equivalent to the ENTER key on the keyboard (if present) or the CTRL-key commands.

Terminal Operation

Some general rules for terminal operation are listed in Table 3-3, *Terminal Operating Commands for AUDIX Forms*. The user document for a specific terminal should always be referred to for complete operating information and a list of available keys.

AUDIX software has a built-in time-out for idle terminal sessions. If no characters are entered for one hour, the session is automatically logged off. Any key can be pressed to extend the session.

Table 3-3. Terminal Operating Commands for AUDIX Forms

Function	Terminal Operation
Accessing a form	Each segment name (or a unique abbreviation) must be entered individually on the PATH line. On most systems, segment abbreviations are separated by spaces, and then entered by pressing ENTER or the carriage return. (The return key works the same as the ENTER key on the PATH line, but not in the form.) Colons (:) are automatically inserted.
Displaying the next possible segment(s)	Either HELP, CTRL-?, or CTRL-_ is pressed.
Moving to the next segment	Enough characters are typed to uniquely identify the segment; then ENTER or RETURN is pressed.
Moving around in a form	NEXT, PREV, TAB, or SHIFT-TAB are pressed. Various keyboard-labeled or arrow keys are used to add or change information.
Executing the form	The CHANGE or RUN, ADD, DELETE, and ENTER screen-labeled keys are used to perform various functions as described in the forms reference manual for your software release.
Backing up one segment	EXIT or CTRL-x is pressed.
Clearing the entire path line and exiting the form	SHIFT-EXIT or CTRL-z is pressed.
Logging off	CTRL-d is pressed.

Distributing Filesystems

Customers who have more than one hard (or fixed) disk in their AUDIX systems can improve their response time by placing the busiest filesystems on separate hard disks.

Activity of Filesystems

The most frequently accessed AUDIX filesystems are:

- sdat
- sst (especially if the Activity Log is turned on)
- vdat

The next most active filesystems are:

- adat
- ndat

System response time will improve to the extent that these filesystems can be separated. General guidelines include:

1. The three busiest filesystems (sdat, sst, and vdat) should be placed on separate disks whenever possible.
2. The next busiest filesystems (adat and ndat) should separated from sdat, sst, and vdat if possible.
3. The vtext filesystems should be spread as evenly as possible among disks.

Table 3-4, *Recommended Filesystem Distribution*, shows how filesystems should be distributed, based on the number of disks in the system, to result in optimum performance.

File Redundancy

The File Redundancy feature is offered in Release 1 Version 4 (R1V4) and later software for one- and two-cabinet AUDIX systems. This feature allows the system to make a continuously updated (*redundant*) copy of an active filesystem. The duplicate filesystem is automatically made active if the original filesystem has problems, or if the disk on which it resides fails. Because of this, the redundant (or *mirrored*) filesystem must be kept on a different disk from the original filesystem.

Table 3-5, *Recommended Filesystem Distribution with File Redundancy*, shows the recommended filesystem distribution if full mirroring is used (all filesystems are duplicated and continuously updated). Customers who are using the File Redundancy feature to duplicate only some of their filesystems should combine the recommendations from Tables 3-4 and 3-5 as appropriate.

Table 3-4. Recommended Filesystem Distribution

Number of Hard Drives	disk00	disk02	disk03	disk04	disk05	disk06
1 HDD	boot_f boot_e sdat vdat sst adat ndat all vtext					
2 HDDs	boot_f sdat vdat 50% vtext	boot_e sst adat ndat 50% vtext				
3 HDDs	boot_f sdat ndat 30% vtext	boot_e vdat adat 30% vtext	sst 40% vtext			
4 HDDs	boot_f sdat 25% vtext	boot_e vdat 25% vtext	sst 25% vtext	adat ndat 25% vtext		
5 HDDs	boot_f sdat 20% vtext	boot_e vdat 20% vtext	sst 20% vtext	adat 20% vtext	ndat 20% vtext	
6 HDDs	boot_f sdat 15% vtext	boot_e vdat 15% vtext	sst 15% vtext	adat 15% vtext	ndat 15% vtext	 25% vtext

In the following table, duplicated (*mirrored*) filesystems are indicated with an `m` prefix. For more information on the File Redundancy feature, see the previous *File Redundancy* section.

Table 3-5. Recommended Filesystem Distribution with File Redundancy

# of Drives	disk00	disk02	disk03	disk04	disk05	disk06

2 HDDs	boot_f
	sdat
	vdat
	50% vtext
	`msst`
	`madat`
	`mndat`
	`50% mvtext`
		boot_e
		sst
		adat
		ndat
		50% vtext
		`msdat`
		`mvdat`
		`50% mvtext`				

3 HDDs	boot_f
	sdat
	ndat
	33% vtext
	`mvdat`
	`33% mvtext`
		boot_e
		vdat
		adat
		33% vtext
		`msst`
		`33% mvtext`
			sst
			34% vtext
			`msdat`
			`madat`
			`mndat`
			`34% mvtext`			

4 HDDs	boot_f
	sdat
	25% vtext
	`mvdat`
	`25% mvtext`
		boot_e
		vdat
		25% vtext
		`msdat`
		`25% mvtext`
			sst
			25% vtext
			`madat`
			`mndat`
			`25% mvtext`
				adat
				ndat
				25% vtext
				`msst`
				`25% mvtext`		

5 HDDs	boot_f
	sdat
	20% vtext
	`mvdat`
	`20% mvtext`
		boot_e
		vdat
		20% vtext
		`mndat`
		`20% mvtext`
			sst
			20% vtext
			`madat`
			`20% mvtext`
				adat
				20% vtext
				`msst`
				`20% mvtext`
					ndat
					20% vtext
					`msdat`
					`20% mvtext`	

6 HDDs	boot_f
	sdat
	16% vtext
	`16% mvtext`
		boot_e
		vdat
		16% vtext
		`16% mvtext`
			sst
			16% vtext
			`16% mvtext`
				adat
				16% vtext
				`mvdat`
				`16% mvtext`
					ndat
					16% vtext
					`msdat`
					`16% mvtext`
						20% vtext
						`msst`
						`madat`
						`mndat`
						`20% mvtext`

Increasing Filesystem Size

The AUDIX system administrator should monitor filesystem space and increase size when needed. On a weekly basis, the system administrator should:

1. Check for filesystem threshold violations on the STATUS line.
2. Use the `system : limits` form to calculate space for the `ndat`, `sdat`, `sst`, and `vdat` filesystems. `Vtext` filesystems vary in size according to the size of the disk installed.

   Refer to the forms reference manual for your software release for more information on using this form.
3. For filesystems listed on the `system : filesystems` form, shut down the system.
4. Increase the filesystem size using the `filesystem : detail` form, then restart the system.

Mounting and Copying Filesystems

There may be an occasion to mount an inactive filesystem to copy data to it or from it. This procedure is used for two basic reasons:

- The need to make a copy of the files in an active filesystem for backup purposes while the system is still running. (Normally, backups of complete filesystems can be made only if the system is shut down.)

  NOTE

  The active boot filesystem is the only filesystem that cannot be copied while the system is active. However, the backup boot filesystem can be updated from the active one using the `filesystem : update configuration` form.

- The need to make a copy of a file or filesystem because it was damaged or *corrupted*. Usually this diagnostic procedure is done by service personnel. A faulty file or filesystem is copied to a blank cartridge and returned to the factory for analysis.

The following steps are used to copy a file or filesystem:

1. First, a new filesystem or part of the generic cartridges are created, usually on an equipped blank cartridge, using the `filesystem : detail` form.
2. The new filesystem is opened using the `filesystem : mount` form. The */mountpoint/filename* format is used to create a mount point and logical file name for the file to be copied.

   NOTE

   Individual file names cannot be listed on any form. The `filesystem : list` form shows mount points up to several characters in length.

3. The `filesystem : copy` form is used to copy each filesystem from/to the new mount point. For single files, the `filesystem : file copy` form is used to copy each file to/from the active filesystem to the new mount point. The */mountpoint/filename* format is used for both filesystems on this form.
4. On the removable-cartridge drive, the mount point is unmounted using the `filesystem : unmount` form. If the new filesystem is not unmounted, software will not allow the cartridge drive to be unequipped (although filesystems can be forced to unmount by physically removing the cartridge or shutting the system down).
5. The cartridge is unequipped and removed from the drive. The backup copy is filed, or the cartridge is shipped to the factory (if this is a service request).

NOTE

An inactive or unmounted filesystem still takes up disk space until it is deleted with the `filesystem : detail` form.

Updating AUDIX Software

AUDIX software is updated periodically using standard system administration forms. Updates involve copying filesystems to and from removable cartridges. Updates are usually done when:

- Corrections to AUDIX software must be incorporated into the system.
- A customer purchases software enhancements which must be added to the system.

Software updates fall into two basic categories: new announcement-set versions and new boot filesystems. If the program cartridge received from the factory contains both types of filesystems, the announcement sets should be updated first.

For system updates, four identical boot filesystems are shipped on one program (or generic) cartridge. Two copies of the boot filesystem software should be on a system: `disk02.boot_e` (a backup version, preferably on the second hard disk, if installed) and `disk00.boot_f` (the active copy on the first hard disk which normally runs the system). While `disk00.boot_f` continues to run the system, the `disk02.boot_e` backup is used to customize the new boot software on the generic-program cartridge (an active boot filesystem cannot be copied or altered).

The `filesystem : update configuration` form is used to update the new software. This allows an installation's unique configuration data to be copied from the old boot filesystem to the new boot filesystems on the removable cartridge. The two files which are copied are:

- `/bootdbpa` — Contains the filesystem information
- `/boot/HW_CONF_FILE` — Contains unique information about hardware configuration

Refer to the forms reference manual for your software release for more information on using this form.

AUDITS

Audits are special software programs designed to recognize and resolve problems within filesystems. Most audits run automatically each night to update the filesystems internally and synchronize them with each other.

For example, one nightly audit removes references to a deleted subscriber from other subscribers' mailing lists. If another audit detects a subscriber in the `sdat` filesystem without an entry in the `vdat` filesystem, it resolves the conflict by automatically creating the required entry.

If a problem occurs and an alarm is raised, audits may have to be run immediately to restore as much lost information as possible. This procedure is designed to bring the system back to its former level of performance as closely and quickly as possible. Trained service personnel should run audits needed to recover from a system fault.

Operation

Automatic audits run nightly or weekly according to a preset schedule. *Immediate* audits are run manually after a filesystem recovery or as part of alarm resolution. Audits are run:

- Manually using the `maintenance : audits : fp` or `maintenance : audits : vsp` forms
- Automatically each night (including the `sdat` filesystem backup)
- Automatically each week (for long audits and, in R1V3 or later releases, the `ndat` filesystem backup on Sunday)
- Automatically when faults are logged and alarmed by software

Audits are associated with the FP or the VSP. The AUDIX administration and maintenance manuals describe each audit, and the maintenance manual provides detailed steps on running audits following filesystem recovery.

On most AUDIX systems, audits begin at 7 p.m. each night (R1V2 systems start audits at 10 p.m.). The system terminates any audits that may still be running at 6 a.m. so the audits don't compete with call processing. The audits then resume the next evening.

Audits, Networking, and Large Systems

If a small number of subscribers are administered on an AUDIX system (500 or so), the audits complete in a couple of hours. On large systems (up to 4,000 local subscribers) or networked AUDIX systems (with up to 28,000 administered remote subscribers), each system may need to keep track of up to 32,000 subscribers and their related files.

Some audits, such as Voice Files and Voice Data Rebuild, may not be able to run in a single night because of the large number of records used in a Networking setup. Audits are therefore begun according to a nightly or weekly schedule. If the audits scheduled for a particular day of the week do not complete in one night, they are continued the following night.

Audits always run in a certain order to ensure that the most crucial ones are done nightly. For example, the `sdat` backup, service dispatcher, alarm log, and announcement structure audits always run first, followed by the weekly audits and other, lower-priority audits. The final automatic audits run that night if there is time, or are completed on subsequent nights on a rotating basis. The entire audit cycle completes every three to seven days.

Immediate Audits

Immediate audits should be run manually as soon as possible after a system problem occurs or when a filesystem has been restored from a backup volume. These audits match the information in the older restored filesystem to the newer information in the filesystems on the disk. The update restores the system as closely as possible to its previous performance level.

All immediate audits listed for a filesystem should be manually run after a filesystem restoration. General steps for restoring an AUDIX filesystem are listed below.

1. If a filesystem or disk suffers a problem, an alarm message appears on the terminal screen. The alarm log should be checked for a fault code that identifies the problem filesystem (see the appropriate AUDIX maintenance manual for codes).
2. If a filesystem is damaged, it must be unmounted and deleted using the `filesystem : unmount` and `filesystem : detail` forms.
3. The system must be shut down and the most recent backup cartridge installed using the `shutdown` and `maintenance : dbp : equip` forms).
4. The equivalent filesystem from the backup cartridge is copied in place of the deleted filesystem using the `filesystem : copy` form. If a volume is physically damaged, the backup filesystem should be copied to a different volume.
5. The new filesystem is activated and the system is started using the `system : filesystems` and `startup` forms).
6. Appropriate audit(s) are run to update the older restored filesystem with the newer filesystem information existing elsewhere on the disk. For this, the `maintenance : audits : fp` or `maintenance : audits : vsp` forms are used.

4. System Interfaces

This chapter focuses on the hardware interfaces between AUDIX systems and various AT&T and non-AT&T communications systems.

OVERVIEW OF LINKS

An AUDIX system uses up to five different hardware links, three of which can be connected to a PBX or Central Office (CO) switch. These links are described below.

Voice Links

Voice links connect callers from a compatible switch port to an AUDIX voice port. Internal or external callers are directed through the switch to a call-distribution group or hunt group of analog ports associated with the AUDIX system. These ports then connect the callers to the appropriate extension on the AUDIX voice ports.

An AUDIX system may have from 2 to 32 voice ports. These ports are connected to an equivalent number of analog ports on the switch and administered as a call-distribution group or hunt group. See Figure 4-1, *Basic AUDIX Voice Link*. All AUDIX models (including Standalone) use the same basic voice-link interface; the only difference is the number of ports connected.

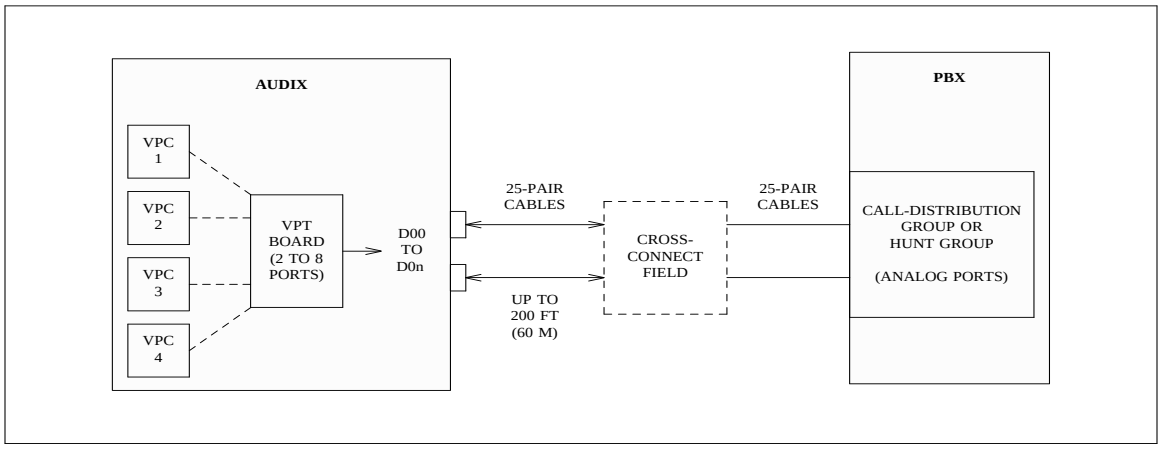


Figure 4-1. Basic AUDIX Voice Link

AUDIX Voice Boards

The AUDIX voice link depends on several circuit packs which include a variable number of Voice Processor (VPC) and Voice Port (VPT) boards.

The *Voice Processor (VPC)* TN501B boards contain processors for two voice ports each. One VPC board is always installed, and additional boards may be added as needed. One *Voice Port (VPT)* TN747B board is required for every four VPC boards. Each VPT board supports eight ports.

Each AUDIX system supports various numbers of voice ports as follows:

- One-cabinet system: Up to eight 2-port TN501B VPC boards (16 ports) and two 8-port TN747B VPT boards may be installed.
- Two-cabinet system: Eight additional 2-port TN501B VPC boards and two more 8-port TN747B VPT boards may be installed for a total of 32 ports.

Cable Connections

Female 25-pair connectors are on the back of the AUDIX cabinet for attaching cables to each VPT board. The connectors are labeled as follows:

- One-cabinet system: PORT 0 (D00) and PORT 1 (D01)
- Two-cabinet system: PORT 2 (D06) and PORT 3 (D07)

The 25-pair cables are usually connected to the cross-connect field and then to the switch. Cables may be up to 200 feet (60 m) long. The total distance between the switch ports and AUDIX voice ports varies depending on the type of switch board used.

If a switch and an AUDIX system are colocated, the 25-pair cables may be attached directly to connectors on the switch port board if the pinouts are compatible (the AUDIX system uses the first wire pair for the first analog port, skips two pairs, uses the fourth pair, skips two pairs, and so on). However, direct connection also dedicates the entire switch pack to the AUDIX system, which may reduce reliability or increase ring blocking. See the following *Response and Reliability* section for details.

Call-Distribution Groups

The switch must be administered so its analog ports are correctly associated with the voice ports on the AUDIX system. For an integrated AUDIX system, the switch port boards must be set up as one or more call-distribution or hunt groups to route incoming calls to idle ports on the AUDIX system. These groups are:

- System 75 and System 75 XE (R1V3 and later), DEFINITY Generic 1, and Generic 3: Uniform Call Distribution (UCD)
- System 85 (R2V3 and later), DEFINITY Generic 2, and Generic 3: Automatic Call Distribution (ACD)
- System 85 R2V2 and DIMENSION PBX: Enhanced Uniform Call Distribution (EUCD)

NOTE

If you assign AUDIX as a Uniform Call Distribution (UCD) hunt group on a Generic 3 system, we recommend you do *not* set the ACD field on the form to yes. This field allows the Call Management System (CMS) to measure the usage of the AUDIX hunt group (for example, how long calls remain in queue). However, unless you specifically need this information, setting the ACD flag to yes fills the CMS with records because the AUDIX system has such high usage.

Response and Reliability

When the call-distribution or hunt group is set up, a good strategy is to spread out the switch ports in the group over as many port carriers as possible. This reduces the size of failure groups when they occur, and distributes ring blocking over a larger area. For example:

- DEFINITY Generic 2 traditional modules, DIMENSION PBX, and System 85 ring four ports per 1/4 carrier. By physically spreading port boards over more carriers or parts of carriers, more than four ports can ring at one time.
- System 75, System 75 XE, Generic 2 universal modules, and Generic 3 can ring 4 ports per board on an 8-port TN742 board. The 16-port TN746B board can ring 4 ports out of each set of 8 (4 ports can simultaneously ring on ports 1 through 8 and 4 ports can simultaneously ring on ports 9 through 16). AUDIX ports should be distributed among different boards to minimize ring blocking.

Since the switch distributes calls to the split one at a time, it is unlikely that four calls will continue to ring before one is answered. However, spreading out the AUDIX ports is still recommended to help increase response time and reliability.

Data Link

In fully integrated AUDIX systems, the switch and AUDIX exchange nonvoice control information over a BX.25 data link. This is the same interface used by other switch adjuncts such as PBX Applications Processors (APs), nodes in a Distributed Communications Systems (DCS) network, data applications such as the Call Management System (CMS), or the AT&T 3B2 Message Server Adjunct (MSA) or 3B5 computers. The data link connection varies depending on the type of AUDIX system used and the type of switch to which it is connected. The data link can be any of the following:

- The Data Communications Interface Unit (DCIU) on System 85, DEFINITY Generic 2, or DIMENSION PBX
- The Packet Gateway (PGATE) board for a DEFINITY Generic 3r
- The Processor Interface (PI) board (or PIB) on System 75, System 75 XE, DEFINITY Generic 1, Generic 3i, and Generic 3s
- The Switch Communications Interface (SCI) or the AP/CMS/DCS interface on early models of the System 75
- The Simplified Message Service Interface (SMSI) on the 1A ESS Switch and certain configurations of the 5ESS Switch
- The Basic Rate Interface—Applications Processor Interface (BRI-API) on the 5ESS Switch

NOTE

AUDIX Standalone systems do *not* use a data link.

Some examples of data exchanged between the switch and an AUDIX system are:

- Call-distribution group extension availability on the switch to route calls to idle ports
- Calling and called party identification
- Connect/disconnect messages for beginning or ending a call to an AUDIX system
- Integrated Message Notification (IMN) and Unified Messaging (UM)
- Leave Word Calling (LWC) messages generated by switch users
- Automatic message-waiting (AMW) lamp status to indicate new messages
- Time synchronization so the AUDIX system can tell what time messages were sent or received and adjust for different time zones

The data link is a synchronous interface and should always run at 9600 bps. Both the AUDIX system and the switch data link are Data Terminal Equipment (DTE) devices. The correct options may need to be set on a data-link device (such as a DSU or MPDM) or through switch software. Refer to *AUDIX Installation* (585-305-105) for details on setting up the data link.

An AUDIX system uses one circuit pack for its PBX data link. A Switch Communications Processor Interface (SCPI) TN533 board or Multiprotocol Switch Interface (MPSI) TN547B board transfers switch messages from the Feature Process (FP) directly to the external data connector. The 37-pin RS-449 SCPI

DATA connector (F00) is located at the rear of the AUDIX cabinet. This data connector is the only male connector on the AUDIX cabinet, designed to mirror the male connectors used on the switch data links so compatible cables can be used.

AUDIX Alarm Link

The alarm link automatically reports AUDIX problems (major or minor alarms) through the switch's normal alarm-reporting procedures. Remote services personnel can then dial in through the AUDIX maintenance link to determine the nature of the problem and the steps needed to correct it.

Each AUDIX system contains an internal alarm board that monitors many of the major components in the system (such as power, air flow, and fan speed). The alarm board for the one- or two-cabinet AUDIX system is the CDR1 or CDR1B. These boards collect and process alarms or errors, monitor equipment, and report problems to the Maintenance Interface (MI) circuit pack. When the MI board detects a major (system-wide) or minor (subsystem) alarm, it sends a signal back to the alarm board. The board then sends a signal out to the female 25-pair ALARM connector on the rear of the AUDIX cabinet to the switch's alarm-reporting facilities.

NOTE

If remote maintenance is not provided for a system, the AUDIX alarm link cannot signal possible problems to remote personnel. If the entire AUDIX system fails, however, the switch will probably report data link errors through its own alarm facilities.

AUDIX Maintenance Link

The AUDIX maintenance link provides:

- Continuous automatic testing and monitoring of hardware and software through background self-tests run on individual processors
- Automatic detection and diagnostics of service problems
  - — Stores errors logged by software in the error log
  - — Flags administrative errors in system log
  - — Enters a fault in the alarm log if an error threshold is exceeded
  - — Detects and recovers from faults if possible
  - — Reports resolved alarms
- Alerts to local and remote service personnel to run tests and status reports using the maintenance display terminal
- Continued service if possible by removing defective units from service and reconfiguring the system
- Updated disk databases by running audits and background maintenance on a preset schedule

Local and remote maintenance links are required for an AUDIX system. These links share the same RS-232C MAINT connector. The remote link is usually connected at all times, *except* when the local link is

being used by on-site service personnel. For more information about the various maintenance link setups, see the *Maintenance Interface* section in Chapter 5, *Subsystem Interfaces*.

Administration Switched Access (Optional)

Administration is usually done by the customer at the AUDIX site. Configurations include extended-local access (hard-wired through the building wiring), dial-up access (through the switch), and local and remote setups like those used for the maintenance terminal (see the *Administration Interface* section in Chapter 5, *Subsystem Interfaces*).

System Administrator Tasks

The system administrator performs the following tasks to maintain the AUDIX system and subscriber database:

- Checks the administration log
- Evaluates system space
- Keeps records of files and changes to software and hardware
- Makes regular filesystem backups
- Reports and tracks problems
- Schedules maintenance
- Studies traffic reports
- Updates boot software and announcement versions

AUDIX Data Exchange — Standalone Option

The AUDIX Data Exchange–Standalone product is a PC-based software program that allows a system administrator to administer both a switch and the AUDIX system and transfer data between them.

AUDIX Data Exchange–Standalone is designed for switches with 800 or fewer lines. It is called *standalone* because it is just one of the Generic 3 (G3) Management Applications (G3-MA). AUDIX Data Exchange–Standalone works with System 75 R1V3 PBXs and with DEFINITY Communication Systems Generic 1 and Generic 3.

For more information on this administration option, refer to the *AUDIX Data Exchange–Standalone* document (585-229-205).

SYSTEM 75/75 XE/GENERIC 1/GENERIC 3 INTERFACE

The AUDIX links used with System 75, System 75 XE, and DEFINITY Communications Systems Generic 1 and Generic 3 switches are described in this section.

Voice Links

System 75, System 75 XE, Generic 1, Generic 2 universal modules, and Generic 3 can use the following types of analog line circuit boards for AUDIX VPT connections. The TN742 or TN746B may be used (see Figure 4-2, *System 75 VPT Cabling*).

- *TN742*: A common 8-port circuit board for analog station connections and for connecting off-premises analog stations. Signals may travel from 13,000 feet on 26-gauge wire to 20,000 feet on 24-gauge wire using this board.
- *TN746B*: A common 16-port circuit board for analog station connections. Signals may travel from 2000 feet on 26-gauge wire to 3100 feet on 24-gauge wire using this board. The TN746B board rings 4 ports out of each set of 8 ports (4 ports can simultaneously ring on ports 1 through 8 and on ports 9 through 16); it is recommended that AUDIX connections be spread among TN746B ports and packs to allow the most ports to ring at one time as possible.

CAUTION

Only the TN746B vintage board is compatible with AUDIX. The TN746 board will **not** *work with AUDIX systems.*

- *TN769*: The same as TN742, but also supports neon MWLs.

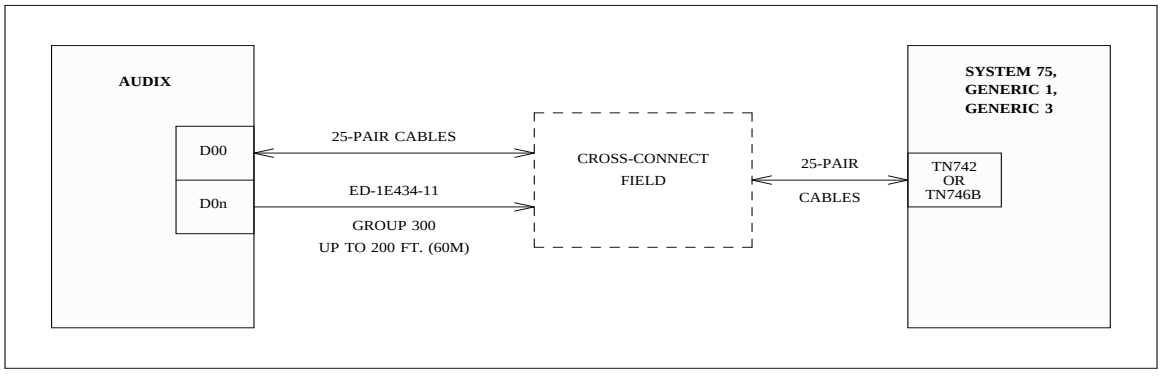


Figure 4-2. System 75 VPT Cabling

Data Links

The data links that may be used with the System 75, System 75 XE, Generic 1, and Generic 3 interfaces include:

- *TN577 PGATE:* The TN577 Packet Gateway (PGATE) circuit pack on a DEFINITY Generic 3r provides X.25 connectivity to support external adjuncts such as AUDIX and DCS nodes.
- *TN765 PI:* The TN765 Processor Interface (PI) board (or PIB) on System 75, System 75 XE, DEFINITY Generic 1, Generic 3i, or Generic 3s provides up to four data link connections. Its RS-232C EIA port allows direct access to one of its four data links and, if available, is the recommended interface for the AUDIX system.
- *TN754 SCI:* The Switch Communications Interface (SCI) is the AUDIX/AP/CMS/DCS interface on System 75. A Generic 1 or Generic 3 switch can also connect to the AUDIX system through a TN754 board. Both of these setups require an MPDM connection.

EIA Port Considerations

The TN765 Processor Interface (PI) circuit pack has one Electronics Industries Association (EIA) port which allows direct access to one of its four data links. The EIA port is the recommended interface for the AUDIX system.

Depending upon the type of cabinet involved, an EIA port may not be available for direct connection to an AUDIX system. If not, the data link must be made using an MPDM. Use the following guidelines to help determine EIA port availability:

- On Generic 1 or Generic 3i systems *without* duplicate common control, an EIA port may be available
- On Generic 1 or Generic 3i systems *with* duplicate common control, an EIA port is not available
- On Generic 1 or Generic 3i systems with DC power, the EIA port cannot be used
- On System 75, an EIA port will probably not be available
- On System 75 (Models 2 and 3), there are no EIA ports, although Models 2A and 2B may have an SCI
- On System 75 XE, the EIA port may be available for AUDIX connectivity

IDI Link (Local Connection)

The Isolating Data Interface (IDI) is a small, synchronous DCE device needed for ground isolation between the two systems. It has two female RS-449 connectors and is powered from leads on the electrical interface. The IDI communicates in RS-423 protocol at speeds from 300 to 19,200 Kbps. The baud rate should be set through the switch to 9600 bps.

In an IDI connection, the AUDIX TN533 SCPI board's male F00 connector should be attached to a 4.5-foot (1.4-m) RS-449 cable leading to an IDI. In a TN765 PI setup, an RS-449 to RS-232C H600-210 cable from 10 feet (9 m) up to 400 feet (120 m) in length connects the IDI directly to the TN765 EIA port. See Figure 4-3, *PI Data Link (Using IDI) to an AUDIX System*, for a diagram.

If the IDI connection is to a TN577 PGATE board, an H600-347 Group 1 cable is required to connect the H600-210 cable to one of the four RS-232C connectors on the TN577 board. See Figure 4-4, *PGATE Data Link (Using IDI) to an AUDIX System*, for an illustration.

NOTE

The right IDI PI connection must be used in System 75. J588908G is the correct backplane. The IDI will not work with backplane J588908H-1.

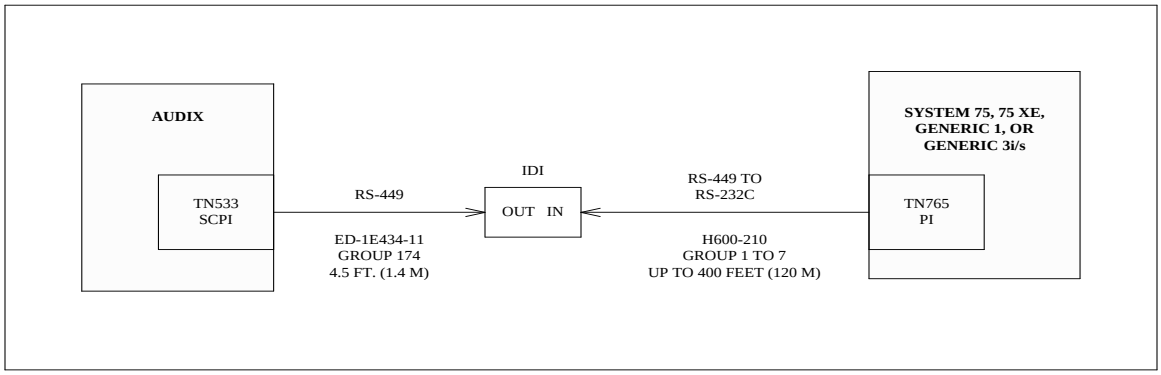


Figure 4-3. PI Data Link (Using IDI) to an AUDIX System

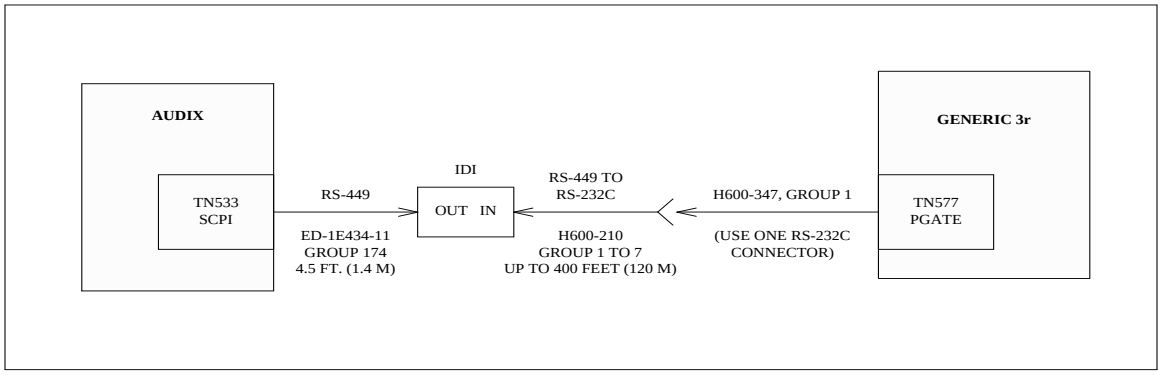


Figure 4-4. PGATE Data Link (Using IDI) to an AUDIX System

DSU Link (Extended-Local Connection)

If the AUDIX system is farther than 400 feet (122 m) from the switch (as in a remote installation), a pair of DATAPHONE II 2500 Data Service Units (DSUs) may be used. The 2600 or 2700 series may also be used; these are more expensive DSU options and support diagnostic testing and the DATAPHONE II Service network connections.

The 2596A DSUs are synchronous Data Communications Equipment (DCE) devices that support 2400, 4800, and 9600 bps connections. They can extend the 9.6 Kbps AUDIX data-link connection up to 5.6 miles (9 km) using 26-gauge wiring, or 7.3 miles (11.7 km) using 24-gauge building wiring. In all AUDIX data setups, wiring must be run in a protected environment, either within a building, or between buildings. The DSUs are connected back-to-back over standard building wiring. Because they are equipped with modular D8W-87 cords, the transmit pair of one DSU must be connected to the receive pair of the other DSU (and vice versa) at the cross-connect field. The transmit and receive signals are on pairs 2 and 4 for DSUs.

Figure 4-5, *PI Data Link (Using DSU) to an AUDIX System*, and Figure 4-6, *PGATE Data Link (Using DSU) to an AUDIX System*, show the cables required to connect the DSUs to the AUDIX system and to the switch. Note that AUDIX requires an RS-232C to RS-449 cables, while the switch requires a straight RS-232C connection.

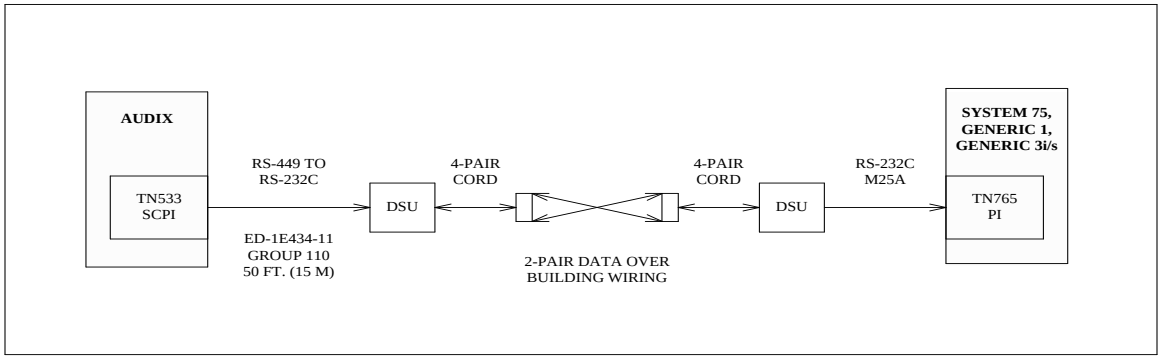


Figure 4-5. PI Data Link (Using DSU) to an AUDIX System

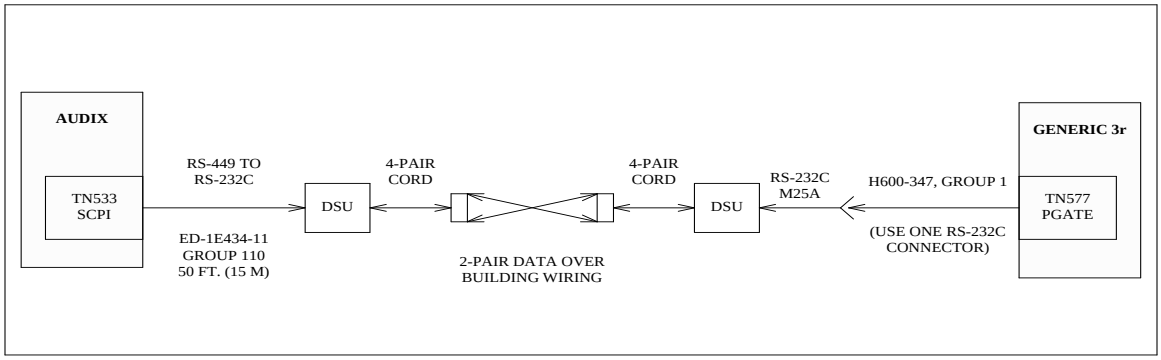


Figure 4-6. PGATE Data Link (Using DSU) to an AUDIX System

MPDM Data Link

A System 75, Generic 1, or Generic 3 switch can connect to an AUDIX system by using a Modular Processor Data Module (MPDM) connected to a digital TN754 board on the switch. A System 75, Generic 1, or Generic 3i/s connects to an AUDIX system as shown in Figure 4-7, *TN754 Data Link (Using MPDM) to an AUDIX System*. A Generic 3r switch connects to an AUDIX system as shown in Figure 4-8, *PGATE Data Link (Using MPDM) to an AUDIX System*.

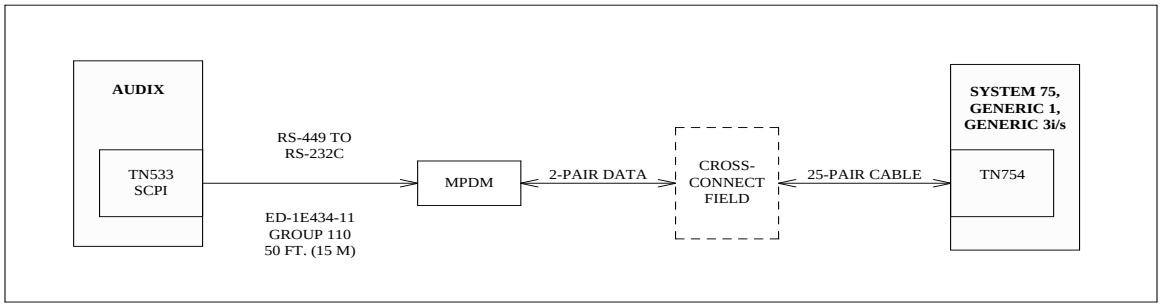


Figure 4-7. TN754 Data Link (Using MPDM) to an AUDIX System

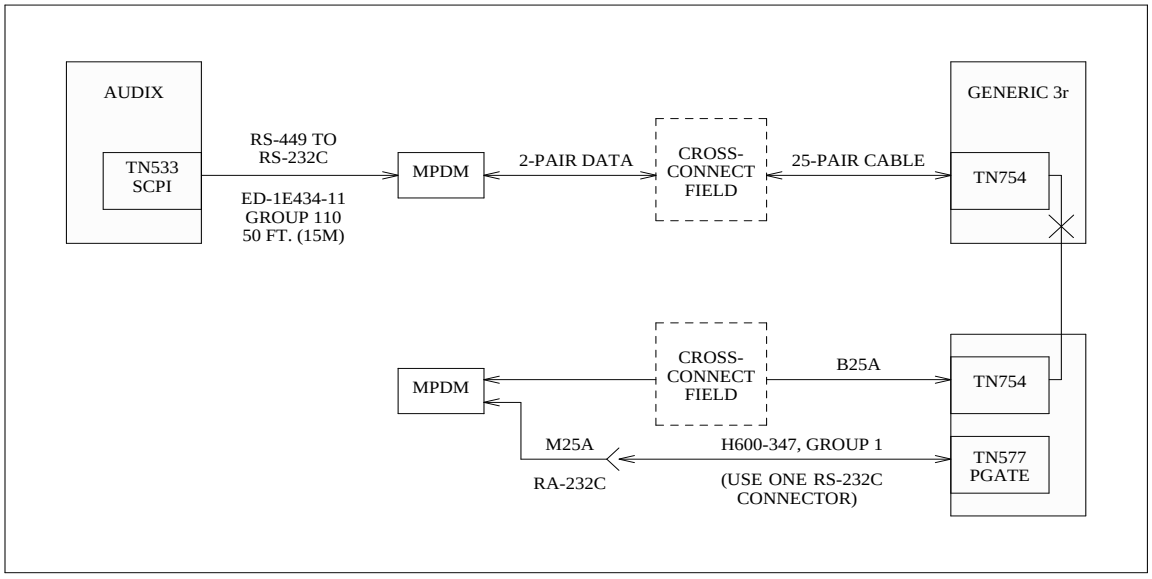


Figure 4-8. PGATE Data Link (Using MPDM) to an AUDIX System

The MPDM transmits Digital Communications Protocol (DCP) data through a modular connector (DCP uses one pair to transmit and one pair to receive data). The D8W-87 modular cord or solid-gauge cabling is then cut down at the cross-connect field. MPDM signals can be transmitted over standard building wiring from 4000 feet (1220 m) on 26-gauge wire to 5000 feet (1524 m) on 24-gauge wire. The connection may terminate on the modular System 75 cross-connect field or on a 110-type hardware wall field. A 25-pair Amphenol cable extends from the cross-connect field to a TN754 Digital Line board in switch cabinet.

The MPDM should be ordered with an RS-232C interface card; it connects to the AUDIX system with an RS-449 to RS-232C cable. The RS-232C end of the cable plugs into the 25-pin RS-232C connector on the MPDM's interface card, and the RS-449 end connects to the AUDIX SCPI DATA connector (F00). Because RS-232C signaling is used in the cable, the MPDM should be located within the EIA recommended limit of 50 feet (15 m) from the system. A standalone or rack-mount MPDM may be used, depending on the space and equipment available on-site.

The TN754 Digital Line board's 25-pair connector allows eight possible DCP connections, although an AUDIX system only uses one port. In a System 75, the Digital Line board connects to the Switch Communications Interface (SCI) internally. The SCI is made up of the following boards:

- *Interface 1 (INT1) TN716B:* This board provides the bus interface between the System 75 Switch Processing Element (SPE) and the Switch Communications Processor (SCP).
- *Interface 2 (INT2) TN738:* The SCP TN738 board processes DCS signaling or BX.25 protocol. The TN738 board provides four data links (the system may use one).
- *Interface 3 (INT3) TN719:* The Synchronous/Asynchronous Interface (SAI) TN719 board is the interface between the SCP links and the Time Division Multiplex (TDM) bus.

NOTE

The SCI boards can be replaced with the single TN765 PI board. The TN765 plugs into the Interface 3 slot.

SYSTEM 85/GENERIC 2/DIMENSION INTERFACE

An AUDIX system can be fully integrated with System 85, DEFINITY Generic 2, and DIMENSION PBXs using voice, data, alarm, remote maintenance, and optional administration switched access links as described in this section.

Voice Links

For System 85 and DEFINITY Generic 2, one of the following analog port boards is needed per 25-pair cable connection to an AUDIX system. Each board has eight voice ports.

- *SN222 or SN222B (Discontinued)*: Analog Line interface for on-premise or out-of-building voice terminals. Signals may travel up to 3500 feet (1067 m) over building wiring. The SN222 series boards were discontinued by the System 85 R2V2 release.
- *SN228B*: This board provides a switch interface for analog equipment located farther from the switch than SN222 or SN229 boards can reach. Signals may travel from 9000 feet (2743 m) on 26-gauge wire to 20,000 feet (6100 m) on 24-gauge wire over building wiring.
- *SN229*: The same as the SN222, except it uses light-emitting diode (LED)-type message-waiting lamp (MWL) signaling and is *not* compatible with the Outcalling feature.

NOTE

The SN222, SN222B, or SN228B boards *must* be used for Outcalling on System 85 and DEFINITY Generic 2 traditional modules. Other port boards do not disconnect properly and could hang up a port. See Appendix A, *Ordering Codes*, for analog board ordering codes.

DIMENSION PBX LC circuit packs each have four voice ports; two LC boards are therefore required to connect one 25-pair cable connection from an AUDIX system if all eight ports are used. Signals may travel from 13,000 feet (3962 m) on 26-gauge wire to 20,000 feet (6100 m) on 24-gauge wire, depending on -48 VDC ringing voltage. LC boards include:

- *LC02*: Standard analog circuit pack used on DIMENSION PBX.
- *LCO3*: The same as the LC02, except it can also support a station with a MWL (useful for subscriber voice terminals on integrated AUDIX systems). This board requires the LC41B signal distribution circuit for power.

Data Link

On System 85, DEFINITY Generic 2, and DIMENSION PBX systems, the AUDIX system is hard-wired to the switch's Data Communications Interface Unit (DCIU). The type of data device used in the link varies depending on the distance to the switch.

IDI Link (Local Connection)

The Isolating Data Interface (IDI) shown in Figure 4-9, *DCIU Data Link (Using IDI) to an AUDIX System*, is the recommended setup for AUDIX connections that are less than 400 feet (122 m) from the switch.

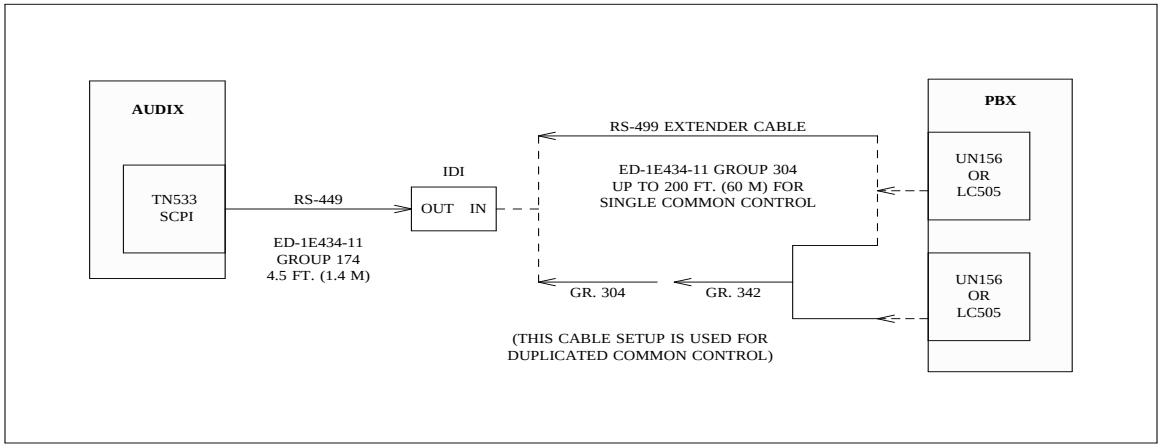


Figure 4-9. DCIU Data Link (Using IDI) to an AUDIX System

In this setup, the AUDIX TN533 SCPI board's male F00 connector should be attached to a 4.5-foot (1.4-m) RS-449 cable leading to an IDI. The IDI is a small, synchronous device needed for ground isolation between the two systems. It has two female RS-449 connectors and is powered from leads on the electrical interface.

The IDI communicates in RS-423 protocol at speeds from 300 to 19,200 Kbps. The baud rate should be set through the DCIU to 9600 bps.

An RS-449 extender cable from 25 feet (7.6 m) up to 400 feet (122 m) in length connects the IDI directly to the DCIU port. If the switch has duplicated common control, a Group 342 Y cable must be attached to the DCIU.

DSU Link (Extended-Local Connection)

If the AUDIX system is farther than 400 feet (122 m) from the switch (as in a remote installation), a pair of DATAPHONE II 2500 Data Service Units (DSUs) may be used, as shown in Figure 4-10, *DCIU Data Link (Using DSU) to an AUDIX System*. The 2600 or 2700 series may also be used; these are more expensive DSU options and support diagnostic testing and the DATAPHONE II Service network connections.

The 2596A DSUs are synchronous Data Communications Equipment (DCE) devices that support 2400, 4800, and 9600 bps connections. They can extend the 9.6 Kbps AUDIX data-link connection up to 5.6 miles (9 km) using 26-gauge wiring, or 7.3 miles (11.7 km) using 24-gauge building wiring. In all AUDIX data setups, wiring must be run in a protected environment, either within a building, or between buildings.

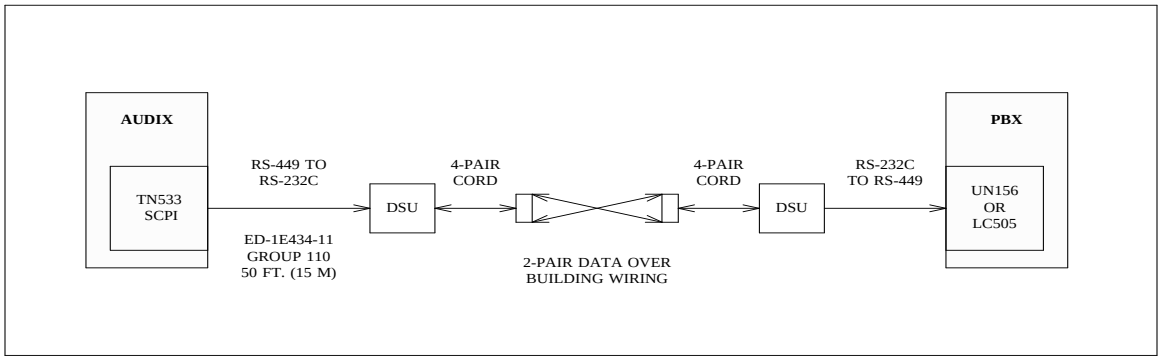


Figure 4-10. DCIU Data Link (Using DSU) to an AUDIX System

RS-232C to RS-449 cables connect one DSU to the AUDIX SCPI DATA port, and the other DSU to the DCIU port. (If the switch has duplicated common control, a Group 342 Y cable is needed at the DCIU connector.)

The DSUs are connected back-to-back over standard building wiring. Because they are equipped with modular D8W-87 cords, the transmit pair of one DSU must be connected to the receive pair of the other DSU (and vice versa) at the cross-connect field. The transmit and receive signals are on pairs 2 and 4 for DSUs.

1A ESS SWITCH INTERFACE

AUDIX R1V4 and later software supports fully-integrated applications with a 1A ESS CO switch, as shown in Figure 4-11, *AUDIX Integration with a 1A ESS Switch*.

Feature Support

Specific services and equipment are required from a 1A ESS CO to support a fully integrated AUDIX system. It is the customer's responsibility to request and obtain the following:

- The 1AE7 Generic software load, or a later version.
  - — Generic 7 does not provide Message Waiting Indication (MWI) until the 1AE7A.08 load, when audible MWI was made available. The AUDIX Outcalling feature can be used on early Generic 7 switches to notify subscribers of new AUDIX messages. However, most 1A ESS Switches have been updated to 1AE8.
  - — Generic 8 provides audible MWI only (stutter dial tone) in Generic 1AE8.02, 1AE8A, and later generics.
  - — Generic 9 introduces Message Service System (MSS) and 10-digit dialing. It also provides audible and visual MWI in Generic 1AE9.03 and later. Users can deactivate MWI in 1AE9.

    See the *1A ESS Switch Simplified Message Service Feature Document* (231-390-176) for a description of the 1A ESS Switch Simplified Message Service Interface (SMSI) and MSS features. A list of additional 1A ESS Switch documentation is included in the document.
- SMSI feature, also called Simplified Message Desk Interface (SMDI). The message service should provide visual or audible MWI if possible. Early systems use only computer mode; 1AE9 or later generics may use terminal mode for a more robust interface.

  NOTE

  Centrex users who subscribe to AUDIX features should be equipped with message service and the Call Forwarding feature.

- A full duplex channel on the Input/Output Processor (IOP), also called *IOP Frame*. Early IOP Frames may provide half duplex channels; an AUDIX system does *not* support half duplex at this time. The IOP Frame must have a 4-wire 3002 analog voice Private Line (PL) data circuit that supports the SMSI feature. This circuit connects to an 829 Channel Interface Unit or equivalent, such as an OMNI port, located on the customer premises.

  The SMSI link must be an RS-232C, full duplex, asynchronous, ASCII operation interface with a transmission rate of 1200 bps.

  The 829 Channel Interface Unit (or equivalent) should be installed on the customer premises and cabled down to a standard 4-pin modular phone jack. This jack is the demarcation point and the end of the CO responsibility.

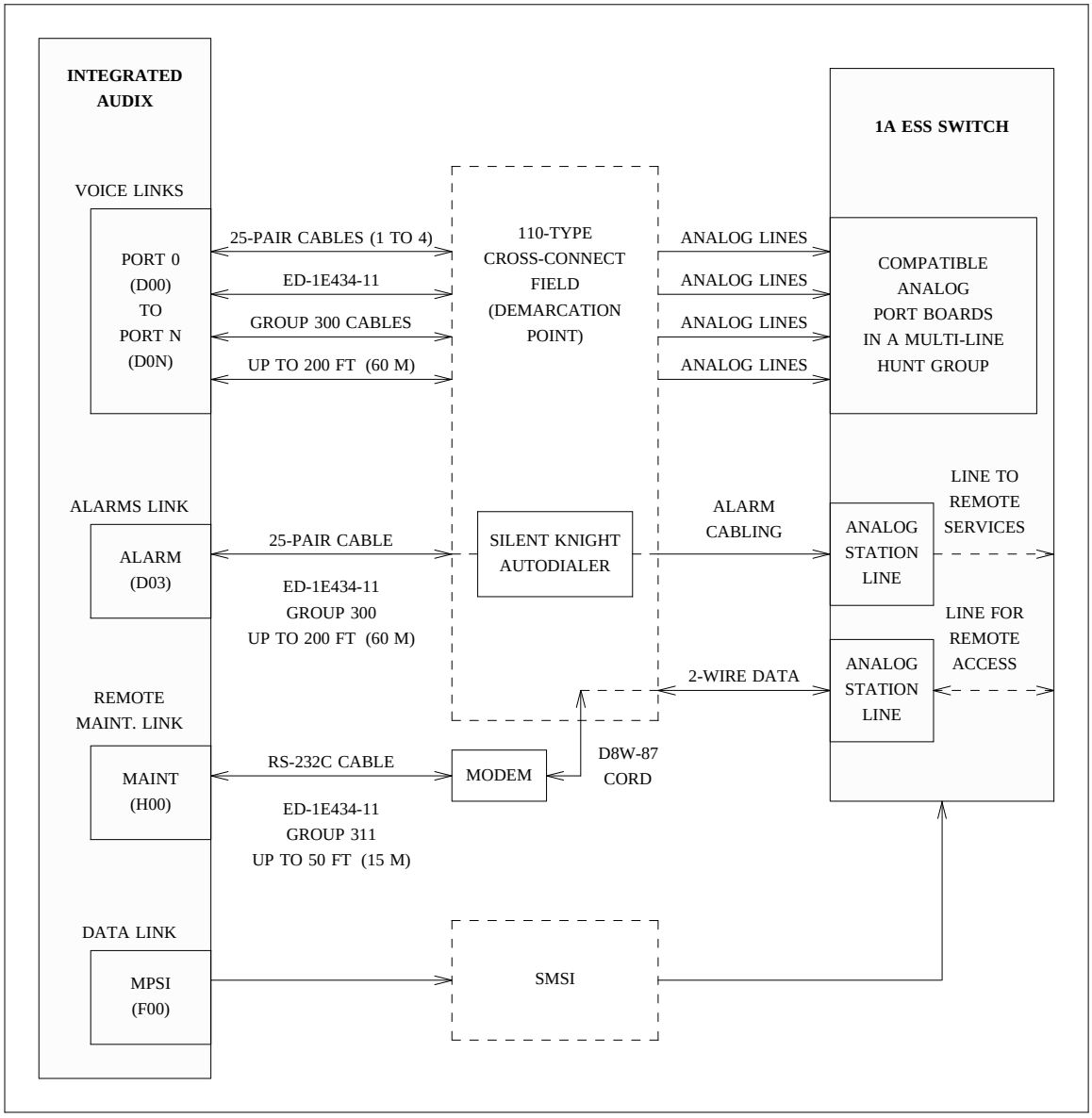


Figure 4-11. AUDIX Integration with a 1A ESS Switch

- Up to 32 two-way, ground-start, Centrex analog voice lines in a Multi-Line Hunt Group (MLHG). The number of queue slots in the group should be based on traffic. The number of analog lines should match the number of AUDIX voice ports. These analog lines must be installed up to the customer's cross-connect field (the demarcation point).
  - — The AUDIX voice ports must be allowed to originate calls (needed for the Outcalling feature to call out on the main MLHG).
  - — Queuing (including optional music or recorded announcements) may be assigned to the hunt group if desired (UCD queuing ability may vary on different 1A ESS Switches).

  - The MLHG number *must* be obtained from the CO; it is used as the first part of the AUDIX voice port numbers assigned on the `system : translation : voice port` form.
  - *Optional:* Some AUDIX ports may be assigned to a separate hunt group on the switch to support the AUDIX Automated Attendant feature (for example, if heavy Automated Attendant use is expected). Outside callers can then be directed to the Automated Attendant MLHG, while AUDIX subscribers can dial directly into the main MLHG.

    If desired, other AUDIX ports may be set aside to support the Outcalling feature (for example, on a 1A ESS Switch Generic 7). This ensures that the AUDIX system has more ports available to notify subscribers through Outcalling that they have new messages on the system. The Outcalling feature always uses the highest numbered ports on the system first (such as 29 to 32); these ports should be translated as individual station lines on the switch.

    Any ports that are set aside for specific Automated Attendant or Outcalling use are subtracted from the total number of ports available in the main AUDIX hunt group. For example, if a 32-port system has six ports in a MLHG for Automated Attendant calls and 4-station lines set aside for Outcalling, 22 ports are available in the main AUDIX MLHG for direct Voice Mailbox calls and redirected Call Answer calls.

- One two-way analog station line for reporting AUDIX alarms to a remote services site, if necessary.
- One two-way analog station line that allows remote services personnel to dial into an AUDIX system to do remote maintenance, if necessary.
- Lines for the AUDIX stations (subscriber telephones) meeting the following criteria:
  - Call Forwarding with optional forwarding to the AUDIX MLHG (needed for the AUDIX Call Answer feature). The 1A ESS Switch bases internal call forwarding on the Centrex group).
  - MWI feature, either visual (MWL in 1AE9.03 or later) or audible (stutter dial tone in 1AE7A.08 or later).
  - User deactivation of MWI (optional in 1AE9 only).

AUDIX Translations

The AUDIX installer needs some information from the CO so that AUDIX translations will match the CO translations. The customer is responsible for finding out and passing on the following information:

- The CO exchange number or prefix (NXX) of the Centrex users
- The MLHG or Message Desk Center (MDC) number; this number is used as the first part of the AUDIX voice port numbers assigned on the `system : translation : voice port` form
- All Line Equipment Numbers (LENs) to be used

Data Link Requirements

The following Customer Premises Equipment (CPE) is required on the customer site to support an integrated AUDIX system behind a 1A ESS Switch as shown in Figure 4-12, *AUDIX Data Link to 1A ESS Switch*:

- AUDIX R1V4 or later software
- The TN547(B) Multiprotocol Switch Interface (MPSI) circuit pack (AUDIX-L upgrades require D-Kit 182095 to use the MPSI)
- A 202T PL modem, including a Standalone mounting kit if needed and an M8K modular cord
- One of the following RS-232C to RS-449 cabling alternatives between the 202T modem and the AUDIX system:
  - — An ED-1E434-11 Group 13 cable, 36 inches (91 cm), RS-232C to RS-449
  - — An ED-1E434-11 Group 110 cable, 50 feet (15 m), RS-232C to RS-449
  - — An M25A RS-232C extender cable, 5 to 50 feet (1.5 to 15 m), *plus* an ED-1E434-11 Group 13 RS-232C to RS-449 cable

The local service technician cables the AUDIX system to the demarcation point as soon as the 1A ESS Switch has been translated. See the appropriate *AUDIX Installation* manual for procedures for installing AUDIX cables and peripheral equipment, including option settings for the 202T modem.

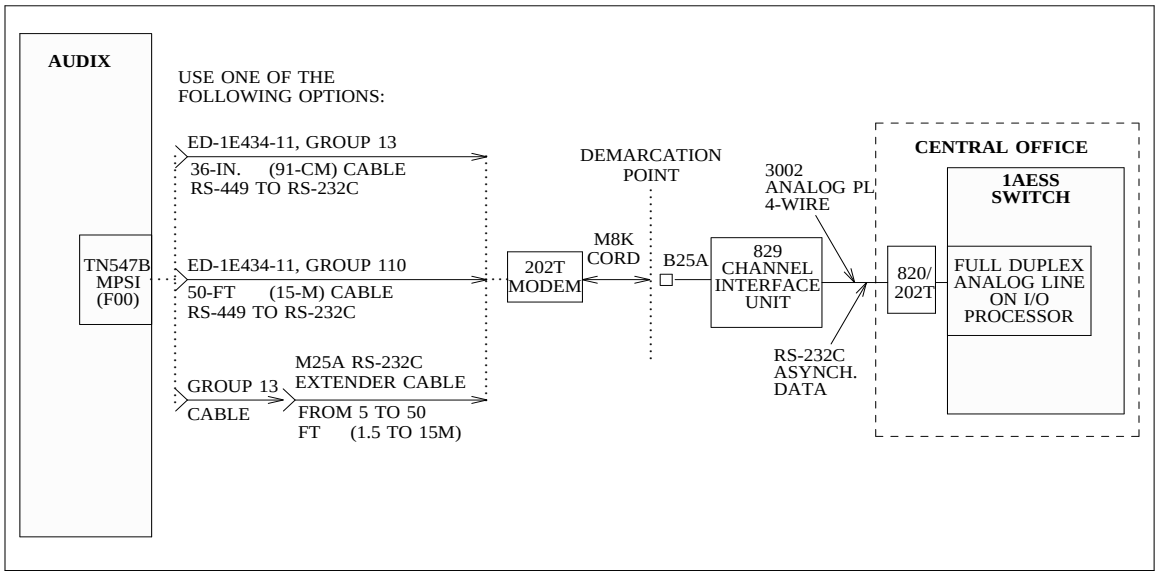


Figure 4-12. AUDIX Data Link to 1A ESS Switch

CO Provided Equipment

The modular jack for the 202T modem is the demarcation point for the AUDIX data link (everything beyond the jack is CO responsibility). However, the following equipment is also needed on the customer premises to support an AUDIX connection:

- An 829 Channel Interface Unit or equivalent, such as an OMNI port (this is supplied by the CO).
- An appropriate cable (such as a B25A) between the 829 Channel Interface Unit and the 202T modem leading to the AUDIX system (a second 202T modem or equivalent is required in the CO).
- The wires between the modem and the 829 are usually punched down to a standard 110-type cross-connect field (the demarcation point).

5ESS SWITCH INTERFACE

As with the 1A ESS, an AUDIX system will integrate with a 5ESS CO Switch. The customer has the CO provide specific equipment and services, and orders equipment for their premises.

The 5ESS Switch supports the API protocol. Data must be converted by the AUDIX TN547(B) MPSI board from SMSI to API protocol before it reaches the Integrated Services Digital Network (ISDN) Switching Module (SM) on the 5ESS Switch. The customer can translate API to SMSI protocol using:

- A Switch Communications Adapter (SCA), or
- The Advanced Communications Package (ACP)

These two setups are discussed in this section.

NOTE

Depending on local tariffing, the customer may have to use an alternative SMSI translator instead of an SCA. One alternative is the Network Systems 3A SMSI Translator, an API-to-SMSI converter sold by Network Systems that supports an interface that conforms exactly to the Bell Communications Research (BELLCORE) Specification. It supports that same protocol conversion as the SCA, but does *not* support LWC or AUDIX data link diagnostics. See *3A SMSI Translator User's Guide* (533-605-206) for details on the Network Systems protocol converter.

5ESS Switch Requirements

CO requirements for an SCA or ACP link to an integrated AUDIX system are basically the same; the customer ensures that the CO provides the following hardware and software:

- 5E4(2) generic software load (Version 4.2 or later)
- ACP on a 5ESS Switch Applications Processor (needed only for setups where the AP, not the SCA, does the API-to-SMSI conversion)
- Basic Rate Interface (BRI) line for the API link (an AUDIX system requires a 4-wire BRI/API data link)
- Business and Residence Custom Services (BRCS) feature package I, II, or III [needed for SCA setups only; see *BRCS Modular Features* guide (5D5-190-101) for details]
- ISDN feature package I
- An ISDN SM, Optical Remote Module (ORM), or Remote Switching Module (RSM) to support the BRI/API link
- The ISDN Message Service, also called Deluxe MSS
- Up to 32 analog station lines in a MLHG, one two-way Centrex line for each AUDIX port. The number of queue slots in the group should be based on traffic. The number of analog lines should match the number of AUDIX voice ports.
- One two-way analog station line for reporting AUDIX alarms to a remote services site, if necessary

- One two-way analog station line that allows remote services personnel to dial into an AUDIX system to do remote maintenance, if necessary

5ESS Switch Administration

The following switch translations are required on the 5ESS Switch:

- The two to 32 AUDIX station lines must be assigned to a Message Service Center (MSC) MLHG. The hunt group must use UCD and be associated with a Deluxe MSS group.
  - — The voice ports must be allowed to originate calls (needed for the AUDIX Outcalling feature to call out on the main MLHG).
  - — Queuing (including optional music or recorded announcements) may be assigned to the hunt group if desired.
  - — The MLHG number *must* be obtained from the CO; it is used as the first part of the AUDIX voice port numbers assigned on the `system : translation : voice port` form.
  - — *Optional:* Some AUDIX ports may be assigned to a separate hunt group on the switch to support the AUDIX Automated Attendant feature (for example, if heavy Automated Attendant use is expected). Outside callers can then be directed to the Automated Attendant MLHG, while AUDIX subscribers can dial directly into the main MLHG.

    If desired, other AUDIX ports may be set aside to support the Outcalling feature. Outcalling always uses the highest numbered ports on the system first (such as 29 to 32); these ports should be translated as individual station lines on the switch.

    Any ports that are set aside for specific Automated Attendant or Outcalling use are subtracted from the total number of ports available in the main AUDIX hunt group. For example, if a 32-port system has six ports in a MLHG for Automated Attendant calls and four station lines set aside for Outcalling, 22 ports are available in the main AUDIX MLHG for direct Voice Mailbox calls and redirected Call Answer calls.
- An AUDIX data link through an SCA or ACP requires a BRI line set up in Office Dependent Data (ODD) as an API; this BRI/API link should be a 0B+D link (data only) with D-channel packet switching.
- The following line assignments are needed for all AUDIX station (user telephone) lines, depending on customer requirements:
  - — Business Customer Group ID (shows the message group to which AUDIX subscribers belong). One AUDIX system can support more than one company, for example, if each company has a different customer group ID. The Business Customer Group ID does not affect AUDIX operation at this time.
  - — Call Forwarding in ODD, with optional forwarding to the AUDIX MLHG (called the MSC MLHG on the switch). The 5ESS Switch bases internal call forwarding on the terminal group.
  - — Deluxe MSS feature with:
    - Attendant Coverage (required; set to `yes`)
    - LWC (available only on 5ESS Switch links through an SCA), either Incoming and Outgoing (LWC-IO) or Outgoing Only (LWC-O)

- MWI; may be visual MWL, audible (stutter dial tone), or both
- User deactivation of MWI (optional; allows subscribers to cancel MWI without retrieving their messages)

If a call goes over one or more hops, all hops must support the Deluxe MSS feature or the call-history information is lost. See the *BRCS Assignment Guide* (5D5-200-100) for more information on setting up MSS features.

- The following optional translations may also be requested if the customer uses an SMSI link to an AUDIX system through an AP. These and other AP/ACP interactions should be discussed with the Account Team to determine which features might be available to the customer:
  - — If the AP/ACP supports a Customer Message Service System (CMSS), the customer may wish to route internal calls to the AUDIX system, and outside calls to the message center so callers reach a live agent.
  - — One adjunct behind an AP (such as an AUDIX system) can support MWI through the AP. Customers should determine if they want the AUDIX system to use this MWI ability.

AUDIX Translations

The AUDIX installer needs some information from the CO in order to correctly translate the AUDIX system. The customer is responsible for finding out and passing on the following information:

- The CO exchange number(s) or prefix(es) of the Centrex users (NNX or NXX)
- The MLHG number; this number is used as the first part of the AUDIX voice port numbers assigned on the `system : translation : voice port` form
- The Business Customer ID (five digits)
- The Line Card Equipment Number (LCEN), also called the LEN or Office Equipment (OE) number. This 8-digit number identifies the data link slot on the CO switch; for BRI/API connections, it is set on the SCA dip switches. The number should be broken down as follows:
  - — Switch Module Number (three digits, 000-192)
  - — Line Unit Number (one digit, 0-7)
  - — Line Group Controller (two digits, 00-15)
  - — Line Card Number (two digits, 00-31)

5ESS Switch Link Using an SCA

The SCA is a protocol converter. It converts the API protocol used by the 5ESS Switch or its switching module to the SMSI format used by the AUDIX TN547(B) MPSI board, as shown in Figure 4-13, *AUDIX BRI/API Data Link (Using SCA) to a 5ESS Switch*.

The SCA allows an AUDIX system to receive LWC messages from subscribers on the switch, and it also supports data link diagnostics that allow services personnel to rapidly identify the source of any problems in the AUDIX data link to the switch.

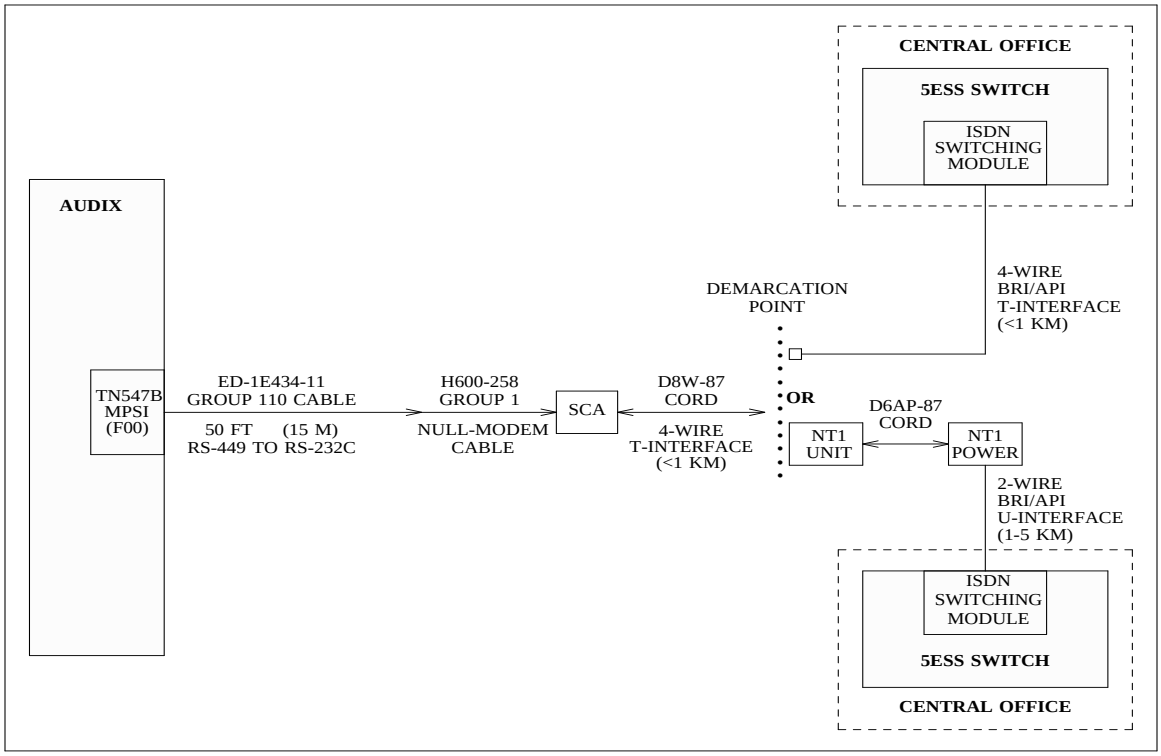


Figure 4-13. AUDIX BRI/API Data Link (Using SCA) to a 5ESS Switch

CO Requirements

An AUDIX data link with an SCA requires a BRI line set up in ODD as an API; this BRI/API link should be a 0B+D link (data only) with D-channel packet switching. The CO may provide this service as follows:

- A BRI/API 4-wire T-interface. The T-interface can extend up to one km (.6 miles) before reaching the SCA leading to the AUDIX system. A 5ESS Switch module may provide an Integrated Services Line Unit – T card (ISLU-T) connection if the customer site is located near the CO. If the SCA is farther than one km away, a Network Termination 1 (NT1) unit is required.
- A 2-wire BRI/API U-interface. The U-interface allows the SCA to be located up to about 10 km (6.25 miles) from the switch (if 19-gauge wire is used); a U-interface often uses 25-gauge wire, allowing the connection to extend up to 3.6 km (2.25 miles). However, the AUDIX SCA can only connect to 4-wire T-interface cabling. An NT1 unit is required to convert the 2-wire BRI/API U-interface from the switch to the 4-wire T-interface wiring needed by the SCA.

  The CO may provide the NT1 unit, or the customer may be required to obtain it, depending on the local operating company procedures. See the *5ESS Switching System Installation Procedures Handbook 555*, Section 487, for details.

Customer Site Requirements

The following CPE is required on the customer site when using an SCA:

- AUDIX R1V4 or later software
- The TN547(B) MPSI circuit pack (AUDIX-L upgrades require D-Kit 182095 to use the MPSI)
- A SCA API-to-SMSI protocol converter
- An ED-1E434-11 Group 110 cable, with a fixed length of 50 feet (15 m); the RS-449 end of the cable connects to the AUDIX MPSI board, and the RS-232C end of the cable connects to AUDIX null-modem cable
- An H600-258 Group 1 null-modem cable that connects to the SCA (early AUDIX systems may use an ED-1E434-11 Group 350 null-modem cable)
- A D8W-87 8-pin modular cord (RJ45 to RJ45) leading to a 4-wire, T-interface jack. The modular jack is usually the demarcation point; the CO is responsible for any equipment beyond this point.

Physical requirements for SCA site preparation include:

- A 120 VAC, 60-Hz, 3-wire power outlet located within 6 feet (1.8 m) of the SCA, which is *not* controlled by a wall switch. If a dedicated circuit (not required) is used, connect the SCA to the same power source as the dedicated equipment.
- The SCA and its external power supply have the following dimensions:
  - *SCA:* 3.5 inches (9 cm) in height, 12.5 inches (32 cm) in width, 8.5 inches (22 cm) in depth, and weighs 5.6 pounds (2.5 kg).
  - *Power Supply:* 2.5 inches (6 cm) in height, 3 inches (8 cm) in width, 5 inches (13 cm) in depth, and weighs 2.4 pounds (1 kg).

The SCA and its power supply may be placed on top of the AUDIX cabinet(s). Provide space at the rear of the unit for cables and connectors.

CO Provided Equipment

The modular jack for the SCA is usually the demarcation point for the AUDIX data link (everything beyond the jack is CO responsibility). However, the following additional equipment may also be needed on the customer premises to support an AUDIX connection:

- If the AUDIX SCA is located within one km (.6 miles) of the switch, it may be connected to a 5ESS Switch module ISLU-T.
- If the SCA is located more than one km (.6 miles) from the switch, an NT1 setup is required.
  - NT1 Unit
  - NT1 Power Supply
  - Appropriate D8W-87 8-pin (RJ45 to RJ45) and D6AP-87 6-pin modular cords for a Standalone NT1 and power supply
  - Brite cards on the 5ESS Switch, required if the NT1 unit is more than five km (three miles) away [see *AT&T Practice (365-170-502)*]

NOTE

Depending on the Local Exchange Carrier (LEC), the customer may be responsible for obtaining the NT1 unit and its connecting cables.

The local service technician cables the AUDIX system to the demarcation point as soon as the 5ESS Switch has been translated. See the appropriate *AUDIX Installation* manual for procedures for installing AUDIX cables and peripheral equipment, including option settings for the SCA.

5ESS Switch Link Using an ACP

An AUDIX system may connect to a 5ESS Switch through a 3B2 applications processor to take advantage of the messaging features available in the Advanced Communications Package (ACP) software. As shown in Figure 4-14, *AUDIX Data Link to a 5ESS Switch with a Local or Remote ACP* an AUDIX connection to an AP uses an SMSI link; the ACP then connects to the 5ESS Switch using a BRI/API link. LWC and data link diagnostics are not available through an AUDIX system in an ACP setup.

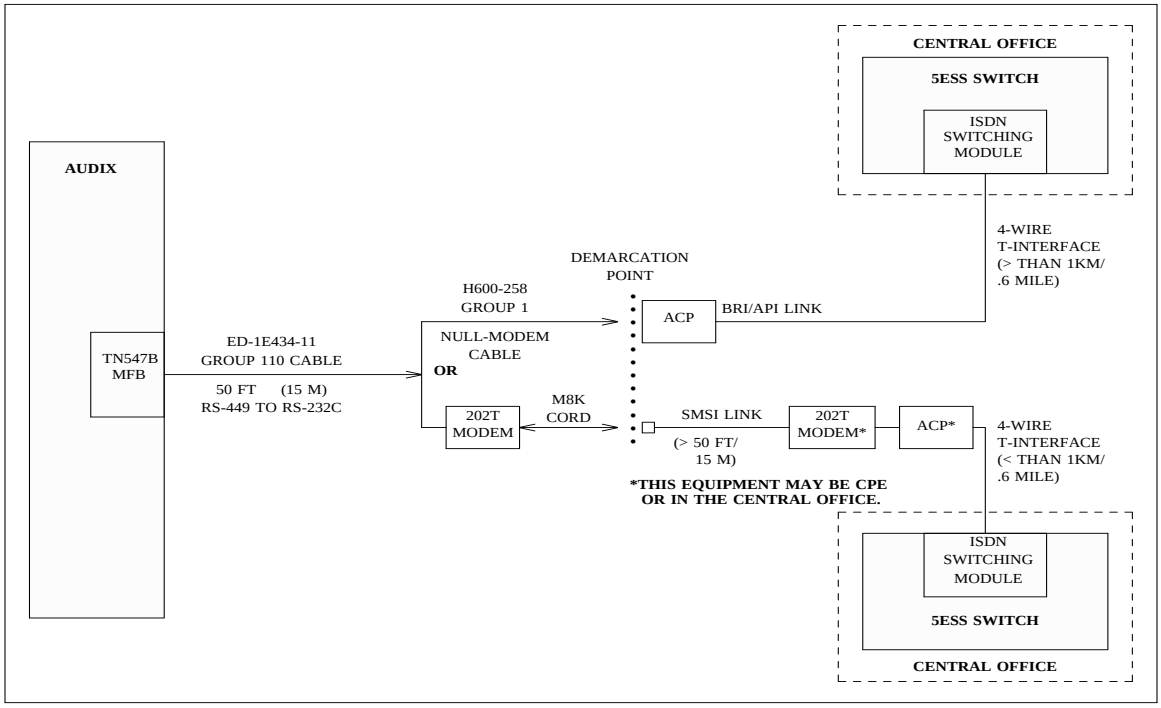


Figure 4-14. AUDIX Data Link to a 5ESS Switch with a Local or Remote ACP

CO Requirements

CO requirements for using an ACP are nearly the same as those required for SCA setups. The ACP is often located on the customer premises, but can be at the CO. The SMSI link between the ACP and the AUDIX system must be an asynchronous, 1200 bps, full duplex connection. Because it is an RS-232C link, the SMSI link between the ACP and the system should be less than 50 feet (15 m). Greater distances require a pair of 202T modems.

Customer Site Requirements

The following CPE is required on the customer site when using an ACP:

- AUDIX R1V4 or later software
- The TN547(B) MPSI circuit pack (AUDIX-L upgrades require D-Kit 182095 to use the MPSI)

  An ED-1E434-11 Group 110 cable, with a fixed length of 50 feet (15 m); the RS-449 end of the cable connects to the AUDIX MPSI board, and the RS-232C end of the cable connects to AUDIX null-modem cable
- An H600-258 Group 1 null-modem cable that connects to the ACP (early AUDIX systems may use an ED-1E434-11 Group 350 null-modem cable)

The ACP is considered the demarcation point. The BRI/API link between the ACP and the CO is the CO responsibility.

5ESS Switch Link with Remote ACP

If the link between the ACP and the AUDIX system is greater than 50 feet (15 m), the customer must order a pair of 202T modems and appropriate cabling to extend the SMSI link. The second modem and the ACP may be located on the customer premises or in the CO in this arrangement. Customer site requirements include:

- AUDIX R1V4 or later software
- The TN547(B) MPSI circuit pack (AUDIX-L upgrades require D-Kit 182095 to use the MPSI)
- A 202T PL modem, including a standalone mounting kit if needed and an M8K modular cord
- One of the following RS-232C to RS-449 cabling alternatives between the 202T modem and the AUDIX system. The RS-449 connector attaches to the AUDIX MPSI board, and the RS-232C connector attaches to the modem:
  - — An ED-1E434-11 Group 13 cable, 36 inches (91 cm), RS-232C to RS-449
  - — An ED-1E434-11 Group 110 cable, 50 feet (15 m), RS-232C to RS-449
  - — An M25A RS-232C extender cable, five to 50 feet (1.5 to 15 m), *plus* an ED-1E434-11 Group 13 RS-232C to RS-449 cable

The modular jack for the 202T modem is the demarcation point for the AUDIX data link (everything beyond the jack is CO responsibility). If the modem connection leaves the customer premises, the CO is responsible for providing the second 202T modem and the ACP in the CO.

STANDALONE AUDIX

A Standalone AUDIX system does not have a data link by definition. However, it is partially integrated with the switch because subscribers and nonsubscribers can access the AUDIX system through the voice ports. Figure 4-15, *Sample AUDIX Standalone Configuration*, shows a sample AUDIX Standalone system.

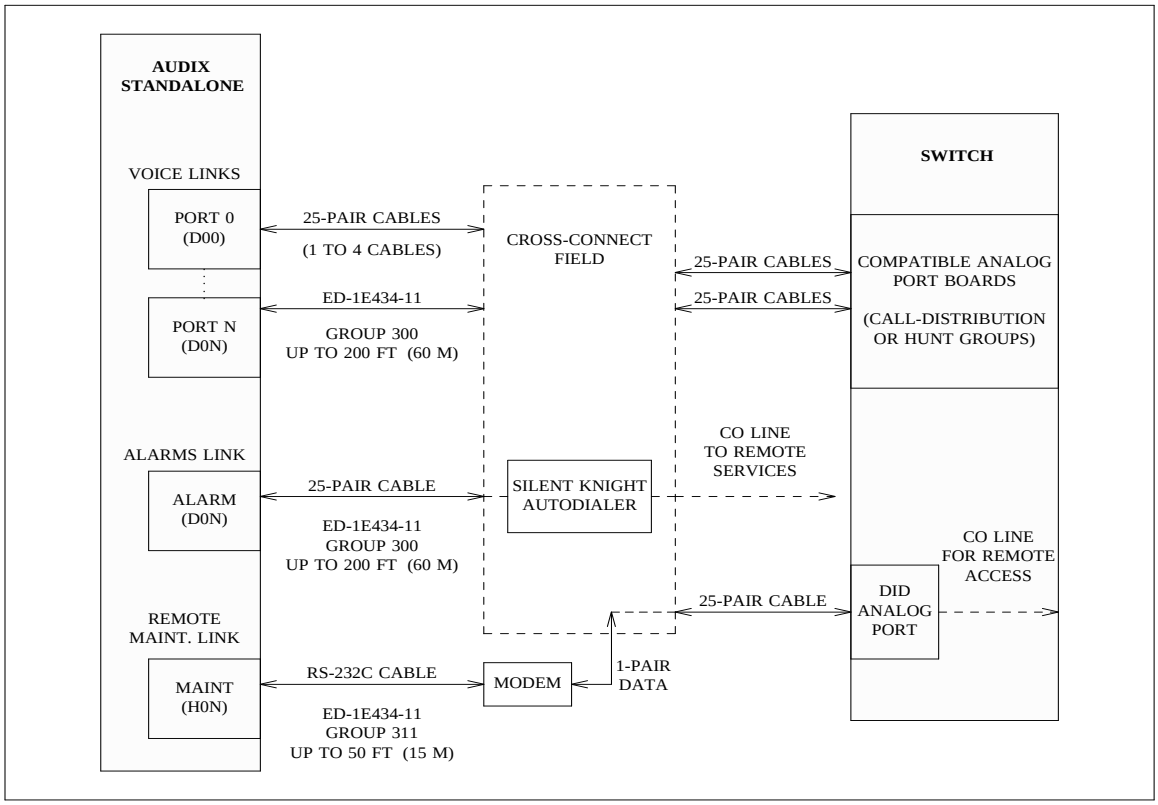


Figure 4-15. Sample AUDIX Standalone Configuration

An AUDIX Standalone will work with the following AT&T switches:

- Any DIMENSION PBX that does *not* run the Feature Package 8, Issue 3, Lab 7 or Issue 3.8 software release (such as a DIMENSION 400 PBX)
- System 75 Model 1A or 1B, or any System 75 or 75 XE that does *not* run System 75 R1V3 or later software
- Any System 85 that does *not* run a compatible software load (R2V2 or later)
- System 25
- Any AT&T switch that may have a compatible software load, but does *not* have any data links available for the AUDIX system

An AUDIX system originally configured as a Standalone AUDIX may later be integrated with a compatible switch to run in data-link mode.

Configuration

An AUDIX Standalone has the same basic configuration requirements as an integrated AUDIX system. The only differences are:

- Data-link connecting hardware does *not* have to be ordered. No switch data link is needed.
- One to three sets of call-distribution ports (or hunt groups) may be set up on the switch depending on the desired features and system operation (an integrated AUDIX system uses only one call-distribution group).
  - — Automated Attendant (optional): If used, it requires its own call-distribution group connected to dedicated *a-type* ports on the AUDIX system. Up to three main attendants can be accessed directly. Any number of subattendants are available.
  - — Call Answer (required): Most systems use Call Answer *c-type* ports to handle all calls. In this case, callers always receive a Call Answer prompt to enter the extension of the person they are trying to reach. Callers then enter a second extension, or press [*] [R] to access their Voice Mailbox.
  - — Voice Mailbox (optional): If desired, a separate call-distribution group can be set up for the *v-type* Voice Mailbox ports. This allows AUDIX subscribers to dial a different extension number (*not* the Call Answer number) to immediately hear the AUDIX Voice Mailbox prompt telling them to log on (they do not have to press [*] [R]).
  - — Message Notification: AUDIX R1V5 and later Standalone systems can assign up to five Message Notification *m-type* ports, which are administered like regular telephone lines on the switch. A system uses these ports to send a message-waiting access code (such as [*] [5] [3]) to PBX Standalone users who have new messages. The code may activate either an audible stutter dial tone or visual MWI.

Physical Setup

AUDIX Standalone uses the same voice-port links and terminal setups for maintenance and administration as other AUDIX systems. However, the other connections may differ as listed below.

- *Data Link:* No data link hardware or cabling needs to be ordered or installed for an AUDIX Standalone system. However, the TN533 SCPI data link board is still shipped in place. The SCPI board runs in a quiescent state, and may be used later if the system is integrated with a compatible switch.
- *Remote Maintenance Link:* AUDIX Standalone is usually connected to a remote service site to allow AT&T technicians to access and diagnose the AUDIX system.

- *Voice Link:* If AUDIX Standalone is connected to an AT&T switch, it is installed as described earlier in this chapter. If another vendor's switch is used, the voice-port boards must first be qualified. This qualification process will initially be handled on a case-by-case basis to make sure the vendor's hardware works with the AUDIX system. For example, the voice-port board must generate 48 VDC voltage to ring the AUDIX VPT board, or the system will not answer.

Operational Differences

Because AUDIX Standalone has no data link, it does not automatically receive information on:

- The calling or called extension
- The type of call (Call Answer, Automated Attendant, or Voice Mail)
- The origination of the call (internal to the switch or outside)

The following changes are therefore needed in AUDIX Standalone software setup and operation to provide this information.

- Connect/disconnect messages cannot be sent over the data link (as in an integrated AUDIX system). Instead, calls are set up or torn down through the voice-link interface.
- Calls are recognized as direct or redirected depending on which type of port they use to access the system (Automated Attendant, Call Answer, or Voice Mail). Most switches are therefore set up with two or three sets of call-distribution ports (hunt groups) to process these calls (an integrated AUDIX system uses one call-distribution group for all calls).

NOTE

Because an AUDIX system only dials out on message-notification (*m-type*) ports in R1V4, the ports should not be set up as a hunt group on the switch.

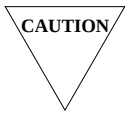
- An AUDIX system maintains the correct time-of-day (once set) through a Real-Time Clock (RTC) located on the TN727 Network Controller (NC) board. System administrators on integrated AUDIX systems have the option of setting the RTC or synchronizing it with the switch time over the data link. On AUDIX Standalone systems, the clock *must* be set through the administrative interface.
- On any AUDIX Standalone, Outcalling may be set up; this allows the system to call subscribers when they receive new messages.
- MWI access codes may be administered. This allows an AUDIX Standalone to light MWLs or send a stutter dial tone to notify subscribers who have new messages.
- A different maintenance busy-out and test-call procedure must be used for the voice-port boards.

NOTE

An AUDIX Standalone *can* support AUDIX Networking if a System 75, System 85, Merlin II or DEFINITY Communications System is used as a data switch.

AUDIX Standalone with Other Vendor Switches

An AUDIX Standalone may be connected to some non-AT&T switches *if* the vendor has a voice-port board that is compatible with AUDIX hardware and meets the other specifications summarized in this section.



Because of the variety of switches, AUDIX technical personnel must qualify non-AT&T vendor switches on a **case-by-case** *basis. Once qualified, an AUDIX Standalone may be connected to that vendor's switch without going through a special process.*

General Guidelines

Some general administration guidelines for Standalone systems connected to non-AT&T vendors are listed below. Not all these features may be administrable on all switches; others not listed may also be required.

- Every AUDIX port should be administered on the switch as if it were a 2500-type analog set with touch-tone and dial-out capability.
- Call transfer capability must be enabled for *T (Transfer). The PBX must recognize a 600 millisecond (ms) open-loop flash, deliver dial tone, accept touch-tone addressing within five seconds, and connect the call within three seconds (otherwise the AUDIX system disconnects and the transfer fails).
- Disconnect timing must be as short as possible: four seconds (preferred) to 15 seconds (maximum). The PBX should idle the station loop and be ready to accept the next call within two seconds. Disconnect and loop supervision are required for all AUDIX voice ports.
- When the caller disconnects, the switch must give a ''Drop 400D'' to the AUDIX system greater than 100 ms open on the loop, with loop current dropping below 20 milliamps (ma).
- The switch should be able to hunt to any line within a group of 32 and have all 32 lines active simultaneously. Individual extensions (currently three to 10 digits in length) must be assigned to each member of a hunt group (service technicians need to dial each line directly to make system test calls).
- Interdigit time-out for dial tone and outpulsed digits must be at least 10 seconds.
- Provide touch-tones with a minimum 100-milliseconds duration.

Qualified Switches

The following switches have been tested and qualified for use with AUDIX Standalone:

- NEC (NEAX 2400): The voice port disconnect timing should be set to 100 milliseconds on the AUDIX system for a NEAX switch. The 16LCQ analog port board is the only circuit pack that currently works for AUDIX VPT connections.

- Rolm 8000: The Rolm 8000 switch requires off-premises port circuit packs in order to work with the AUDIX system (the Rolm switch does not offer loop supervision to detect calling-party disconnects). Rolm setups also require a special load of AUDIX R1V3 or later software to disable the automatic dial tone test on the AUDIX system (this maintenance test does not work with a Rolm system). Orders must be processed through the Custom Work Group in order to get the correct load.

NOTE

If a technician or system administrator runs the AUDIX dial-tone detection test manually on a Rolm/Standalone setup, the AUDIX system will busy-out its port boards. The boards must be unequipped and re-equipped in order to clear the alarm.

The trunks in the main AUDIX hunt group must be administered as one-way incoming trunks on the system. Because these trunks are administered for incoming calls only, any ports that are to be used for Outcalling must *not* be included in the main AUDIX hunt group. The Outcalling feature always uses the highest numbered ports on the system first (such as 32, then 31, and so on). To allow the AUDIX system to notify subscribers of new messages through Outcalling, the highest numbered AUDIX ports are translated as individual station lines on the switch. However, reserving some ports for Outcalling may lead to increased blocking on the main MLHG used for Voice Mailbox and Call Answer calls (fewer ports are available in each MLHG to handle any type of call). Customers should decide on the importance of the Outcalling feature before setting up the switch in this way.

NOTE

Starting in R1V5, the Transfer Out of AUDIX feature works on a Rolm/Standalone system. Dialing [*] [7] activates the call transfer.

Required Specifications

Every PBX that is to be used with AUDIX Standalone must conform to all mandatory standards required for interfaces as described in the *EIA Engineering Committee TR-41 publication SP1378*. Relevant SP1378 sections are 4.5 (Station Interfaces), 4.6.2 (DTMF Signaling), 4.7.4.1.1. (Dial Tone Removal), 4.7.5 (Electrical Standards for Call Progress Signals), and 4.8 (Transmission Parameters).

In addition, the following advisory requirements are necessary for proper operation. The Technical Marketing Center (TMC) may have details on these specifications.

- In Section 4.5.3 for on-premise lines, ringing must have a minimum energy burst of 600 ms minimum duration and must *not* be single polarity.
- The PBX must register DTMF address signaling at the station-line interface, and its equipment for station-to-AUDIX calls should use DTMF signaling.
- The PBX disconnect signal to the station (AUDIX system) must be at least 600 ms open loop. (The AUDIX default 400 ms should work for most switches.) During disconnect and idle state, current leakage over the loop must not exceed 2 mA.
- The AUDIX dial-tone test requires the correct frequency of Call Progress dial tone as specified in Section 4.7 (or the port boards will be alarmed).

Differences Visible to Subscribers

Most AUDIX features and functions are available on a Standalone system. However, because AUDIX Standalone is not fully integrated, some operational differences exist. Changes that affect AUDIX Standalone subscribers are listed below:

- *Voice Mailbox Calls:* AUDIX subscribers must always enter their entire extension number when calling into the AUDIX system (they cannot simply press # when they are at their own phones). Also, because the calling-party number is not provided for Call Answer messages, subscribers scanning their incoming mail cannot automatically return a call or reply to the sender. However, these options are still available for incoming Voice Mail messages.

  NOTE

  On most AUDIX Standalone systems, a separate Voice Mailbox number is *not* assigned. Subscribers access their mailboxes by dialing the Call Answer number, followed by * R (Restart). They are then welcomed into the system and may log on.

- *Call Answer Calls:* Callers who reach the AUDIX system through Call Answer must manually enter the extension of the subscriber they are attempting to call. Because calling-party information is not provided automatically, subscribers scanning their incoming Call Answer messages cannot learn the name or extension of the caller from the header. The call is handled like an external call, even though it may have originated on the same switch.

  Call Answer may also be set up with a general Voice Mailbox to handle calls from outside callers who do not have a touch-tone phone.

- *Different Extensions:* Some AUDIX subscribers must call a Voice Mailbox extension number to access their AUDIX mailboxes. The Call Answer features uses a different extension number (it can be reached through Call Forwarding or by calling the Call Answer number directly). Callers on two-extension systems who reach the AUDIX system through Call Answer may log on to their AUDIX mailbox through the restart command before or after leaving a message. They do *not* have to disconnect and dial the Voice Mailbox number.

- *MWIs:* Depending on the switch and AUDIX software load, AUDIX Standalone subscribers may not have new MWIs such as stutter dial tone or MWLs. However, all AUDIX subscribers can use the Outcalling feature to have the system call them directly when new messages are received.

  In AUDIX R1V4 and later software, the system allows MWI access codes to be administered. This allows a Standalone AUDIX to light MWLs or send a stutter dial tone to notify subscribers who have new messages.

- *Automated Attendant:* Only one main or *first-level* Automated Attendant extension is allowed per Standalone system using a type ''a'' port. However, one or more of the main menu choices can lead callers to another (nested) Automated Attendant. The feature always uses the Basic Call Transfer switchhook flash to transfer calls.

The following features are *not* available on most AUDIX Standalone systems:

- *LWC Messages:* LWC messages are a feature of the AT&T switch and are transmitted over the data link. As such, they cannot be sent to an AUDIX Standalone system, which uses an incompatible switch with no data link.
- *No MWLs (R1V3):* Because message-waiting indication is normally controlled through a switch data link, Standalone AUDIX subscribers on R1V3 systems cannot visually check for new messages. Instead, they can either dial in to the system periodically, or use the Outcalling feature. In AUDIX R1V4 or later software, the system can use MWI access codes to light MWLs or send a stutter dial tone to subscribers who have new messages.
- *No Unified-Message Notification:* Without a data link, the system does not know about other messaging services such as Message Center or Electronic Document Communications (EDC). AUDIX subscribers calling into their mailboxes will therefore hear only about their AUDIX messages.

5. Subsystem Interfaces

This chapter covers the administration, data acquisition, maintenance, text service, modem pool, and MERLIN II interfaces as they apply to an AUDIX system.

ADMINISTRATION INTERFACE

Because an AUDIX system uses screen-based software (forms) when administrative operations are performed, a display terminal or a personal computer (PC) running terminal emulation is always needed. Local and certain remote setups, however, are not commonly used for AUDIX system administration.

Figure 5-1, *Common Administration Interface Setups*, shows the most common administration setups used with an AUDIX system.

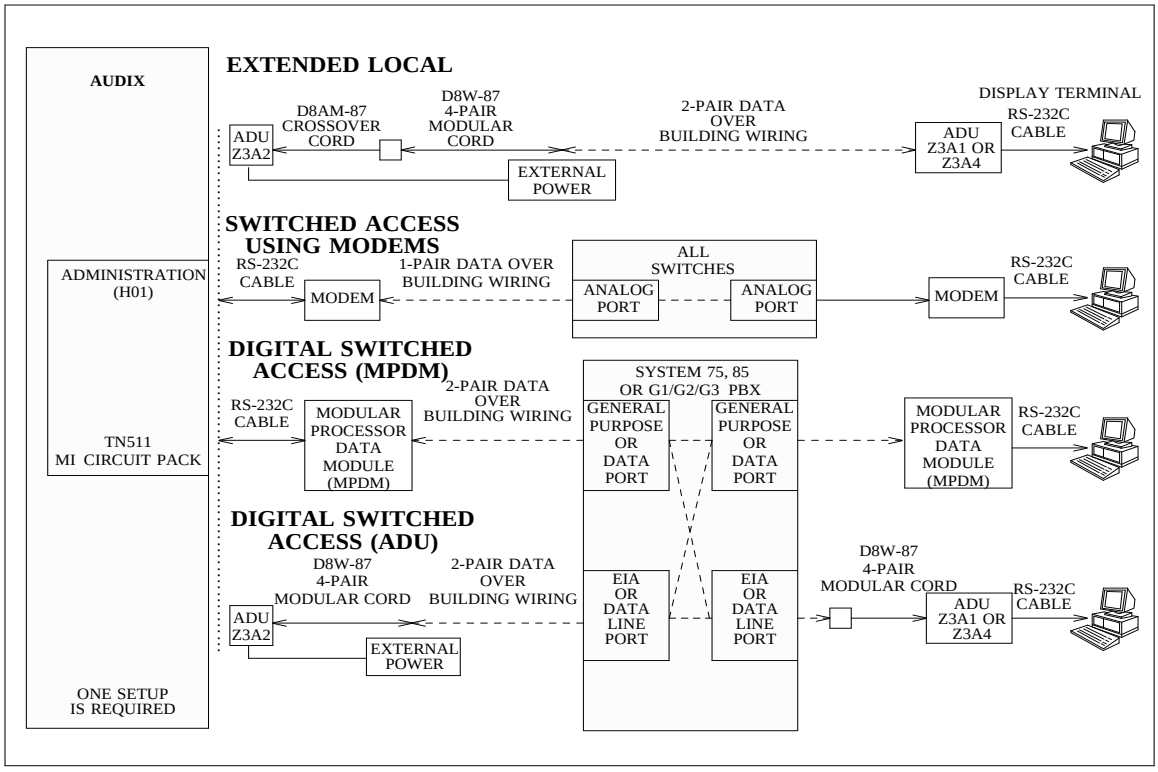


Figure 5-1. Common Administration Interface Setups

A local setup in the equipment room is usually avoided. Because the administering of many AUDIX features requires a quiet area — for instance, the making of good voice recordings — the system administrator will most often work in a separate room.

If several sites are administered from one central location, a remote administration area can be set up. However, analog connections made through a modem normally run at only 1200 bps. Because 4800 bps provides a better user interface, digital connections are most often preferred.

Extended-Local Installation

To exceed the directly connected maximum cable length of 50 feet (15 m) of a local hookup without going through the switch, Z3A Asynchronous Data Units (ADUs) can be attached directly to the terminal and the AUDIX ports.

Over 4-pair building wiring, ADUs can extend the distance up to 16,000 feet (4875 m) on 26-gauge wire, or 20,000 feet (6100 m) on 24-gauge wire at 1200 bps. At 4800 bps, the distance can be extended up to 6000 feet (1827 m) on 26-gauge wire, or 7000 feet (2134 m) on 24-gauge wire.

The ADU uses two pairs of wires for data transmission—one pair to receive and the other to transmit. When only 2-pair building wiring is available, a local power transformer can be set up to power the ADU attached to the AUDIX machine. Equipment required for an ADU setup includes:

- A Z3A2 ADU (male RS-232C connector, no cable) to attach back-to-back to the AUDIX port
- A D8AM-87 crossover cord (required for back-to-back connections)
- One D8W-87 4-pair modular cord to attach the ADU to the wall jack (or to a local external-power adapter)
- External power (a 2012D transformer and adapter are needed for an ADU connected to an AUDIX system; local and remote power setups are available)
- 103A modular wall jack (or equivalent) leading to the building wiring

NOTE

On DIMENSION PBXs, adapters may need to be ordered to convert 4-pair modular wall cords to a 2-pair wiring scheme.

- A second D8W-87 4-pair modular cord at the other end of the building wiring
- Z3A1 (male cable-mounted RS-232C connector) or Z3A4 (female cable-mounted connector) ADU to attach to the terminal, PC, or Work Group Station (WGS)

NOTE

Two Data Service Units (DSUs) can optionally be used for extended-local connections. However, DSUs are designed for synchronous communication.

For additional Z3A configurations and applications, see *Z3A Asynchronous Data Unit Product Manual* (555-401-708).

Switched Access Using Modems

A switched-access (dial-up) connection allows more flexible use of the terminal than a dedicated (hard-wired) connection. More applications can be accessed. The setup involves attaching a terminal to a modem and then to an analog port on the switch. Another modem at the other end of the switch transmits the signals to the AUDIX system at 1200 bps.

Modems use a standard RS-232C interface and should be located within 50 feet of the AUDIX cabinet or terminal. Modems transmit analog signals which require only 1-pair wiring, so they can be used on any switch. Equipment needed for an analog switched-access setup includes:

- Terminal, PC, or WGS, and printer with connecting cable
- Two Optima 2400, DM224, 2224-CEO, or equivalent Hayes-compatible modems, one at each end of the connection
- An RS-232C compatible cable to connect each modem to the RS-232C port
- Two D8W-87 4-pair modular cords to attach the modems to the building wiring (or other appropriate modular cords as required)

NOTE

On DIMENSION PBXs, adapters may need to be ordered to convert 4-pair modular wall cords to a 2-pair wiring scheme.

- An analog switch port at each end of the connection

Switched Access Using Digital Equipment

A switched-access (dial-up) connection can be made over digital AT&T PBXs (System 75, System 75 XE, System 85, and DEFINITY Communications System) using digital data devices such as Modular Processor Data Module (MPDMs) or Z3A ADUs. AT&T 715 Business Communications System (BCS) terminals, 615 Multi-Tasking Terminals (MTs), or 515 Business Communications Terminals (BCTs) can be used with these digital devices. Setups can be mixed. For example, an ADU-to-Electronic Industries Association (EIA) port board connection can be used on one end of the switch and a General Purpose Port (GPP)-to-MPDM arrangement can be used on the other.

MPDM Setup

MPDMs allow transmissions to be extended through standard 2- or 4-pair building wiring for up to 4000 feet (1220 m) on 26-gauge wire, or 5000 feet (1524 m) on 24-gauge wire. The MPDMs use a standard RS-232C interface and should be located within 50 cable feet of the terminal and AUDIX ports. The equipment needed for this setup includes:

- Two MPDMs (one near the terminal and one near the AUDIX cabinet) with RS-232C interface cards installed

- Two RS-232C cables
- *For stand-alone MPDMs:* A D8W-87 4-pair modular cord to connect each MPDM to the building wiring
- Switch port boards:
  - — On System 75, System 75 XE, Generic 1, Generic 2 universal module, or Generic 3, a TN754 Digital Line port to connect each MPDM to the switch
  - — On System 85 or Generic 2 traditional module, an SN270B GPP board port to connect each MPDM to the switch

For complete MPDM installation procedures, see *Modular Processor Data Module User's Guide* (999-700-300 IS).

Z3A ADU Setup

A Z3A ADU can be attached to a terminal or to an AUDIX port to increase the distance between the ADU and the switch over 4-pair building wiring.

A 1200 bps transmission between the ADU and a compatible switch board (either an SN238 EIA or a TN726 Data Line board) can be extended up to 16,000 feet (4875 m) on 26-gauge wire, or up to 20,000 feet (6100 m) on 24-gauge wire. At 4800 bps, the extension may be up to 6000 feet (1827 m) on 26-gauge wire, or up to 7000 feet (2134 m) on 24-gauge wire.

NOTE

An ADU-to-EIA port board connection can be used on one end of the switch and a GPP-to-MPDM arrangement can be used on the other.

The ADU uses two pairs of wires for data transmission; the external power needed for the AUDIX system uses another wire pair. For 2-pair building wiring, a local power transformer can be used instead of a remote one. The equipment required for an ADU switched-access setup includes:

- Z3A1 (male cable-mounted RS-232C connector) or Z3A4 (female cable-mounted connector) ADU to attach to the 515 BCT
- One D8W-87 4-pair modular cord to attach the ADU to the building wiring
- Switch port boards:
  - — On System 75, System 75 XE, Generic 1, Generic 2 universal module, or Generic 3, a TN726 Data Line port connects each ADU to the switch. This board is also called a Digital Line Circuit (DLC) or EIA Interface.
  - — On System 85 or Generic 2 traditional module, an SN238 EIA port connects each ADU to the switch
- External power (a 2012D transformer and adapter are needed for an ADU connected to the AUDIX system; local and remote power setups are available)
- A second D8W-87 4-pair modular cord at the other end of the switch to attach the second ADU to the building wiring

- A Z3A2 ADU (male RS-232C connector, no cable) to attach directly to the AUDIX port

NOTE

Some terminals have problems displaying screens or disconnecting in a dial-up ADU setup. They may need an Originate/Disconnect switch to generate a 2-second break signal (see Appendix A for ordering codes). See *Z3A Asynchronous Data Unit Product Manual* (555-401-708) for additional information.

7400 DSU

The 7400 Data Service Unit (DSU) may be used with a PC using 513 emulation to administer remote AUDIX systems through a System 75, System 85, Generic 1, or Generic 3 switch.

The equipment needed for this setup includes:

- A 7400A DSU between each AUDIX cabinet and the switch
- One D8W cord connected to 355 adapters between the AUDIX cabinet and the DSU; another D8W cord from the DSU through a 103A adapter to the switch
- A 7400B DSU between the terminal and the switch
- One D8W cord connected to 355 Adapters between the terminal and the DSU; another D8W cord from the DSU through a 103A adapter to the switch

Display Terminals

The following display terminals can be used for AUDIX administration (and maintenance). Other terminals, if used, may require more complicated keyboard commands or other customization.

- AT&T 715 Business Communications System (BCS)
- AT&T 615 Multi-Tasking Terminal (MT)
- AT&T 510, 513, 515, or 610 Business Communications Terminals (BCTs)
- AT&T Information Systems 4415 or 4425 terminals
- AT&T TELETYPE Corporation 5420 or 5425 terminals

Voice Terminals

The AUDIX administrator requires a touch-tone telephone (or voice terminal) for adding new subscribers' names to the system, and for recording messages, Automated Attendant menus, and announcements. Some service procedures also require a telephone so the technicians can do testing. Each telephone needs a standard switch connection.

Printers

A printer may be attached to the administration display terminal to provide hard-copy printouts of AUDIX reports and other system information. Printers may also be attached to terminals, PCs, or WGSs used for maintenance.

Printers may use either a parallel or an RS-232C serial interface. Printers in current use include:

- The 593, 595, or 6417 parallel printers (parallel printers are recommended over serial printers because they allow the serial port on the terminal to be used for another RS-232C connection, such as to the AUDIX system)
- The 570-series AT&T printers (a 570 parallel printer may replace the earlier AT&T 473 printer, and the 572 serial printer may replace the 475)

ADMINISTRATION AND DATA ACQUISITION PACKAGE

The AUDIX Administration and Data Acquisition Package (ADAP) is a software package shipped with all AUDIX systems. It allows an AUDIX system administrator to transfer AUDIX subscriber, maintenance, and/or traffic data over the administration port to a compatible administration PC or WGS.

Applications

The assigned PC or WGS can double as the administration terminal for the AUDIX system. The system administrator dials into the ADMIN port using the ADAP automatic or manual logins, or the sample program login procedure. AUDIX data is transferred to the PC or WGS and stored in a format compatible with dBASE III PLUS software.

The ADAP package includes a nontechnical menu-driven program, PC2AUDIX, that generates commonly used reports. Programs can be tailored for each customer to bill subscribers, analyze traffic data, monitor disk and port use, create directory listings, or produce easily read reports. The customer's data-processing department or a third-party vendor can modify the programs in dBASE III PLUS software. Customized programs are *not* supported by AT&T.

ADAP also speeds up subscriber administration by allowing the system administrator to add, remove, or modify subscriber profiles. If AUDIX subscribers are to be moved from one machine to another, the system administrator can transfer subscriber profiles to the PC or WGS using ADAP, then upload the subscriber profiles to the new AUDIX machine. After minor editing and voicing-in, the new subscriber administration is complete.

AUDIX Administration and Data Acquisition Package (585-302-502) is shipped with every AUDIX system. This document describes the format in which data is stored in the PC database, and gives procedures for accessing and using the data. Installation instructions for sample programs included with this software package are also in the document. The ADAP software is shipped on both 3.5- and 5.25-inch diskettes.

ADAP Requirements

The following hardware and software are required to run ADAP:

- An AT&T 6386 WGS, 6286 WGS, PC 6300, PC 6300 Plus, PC 6310, or PC 6312 WGS that can run the MS-DOS 3.1 or later operating system. The PC or WGS must have at least 640 Kbytes of memory before loading ADAP and at least a 20-Mbyte hard disk. The PC or WGS can be cabled from either COM1 or COM2 directly to the AUDIX ADMIN port, or set up to dial into the system at 1200 or 4800 bps.
- A 513 Terminal Emulation package (needed to access the AUDIX screen forms and to troubleshoot the AUDIX connection).
- The dBASE III PLUS software package (version 1.1 or later). ADAP software does *not* work with dBASE IV software at this time.
- A compatible AT&T printer (see the *Printers* section)

NOTE

The *Stella Business Graphics Package 1*, which has been used optionally to automatically generate various types of charts and graphs for the usable sample programs provided with ADAP, is no longer orderable.

MAINTENANCE INTERFACES

A local and remote maintenance terminal setup is required for every AUDIX system, as shown in Figure 5-2, *Local and Remote Maintenance Terminal Cabling*.

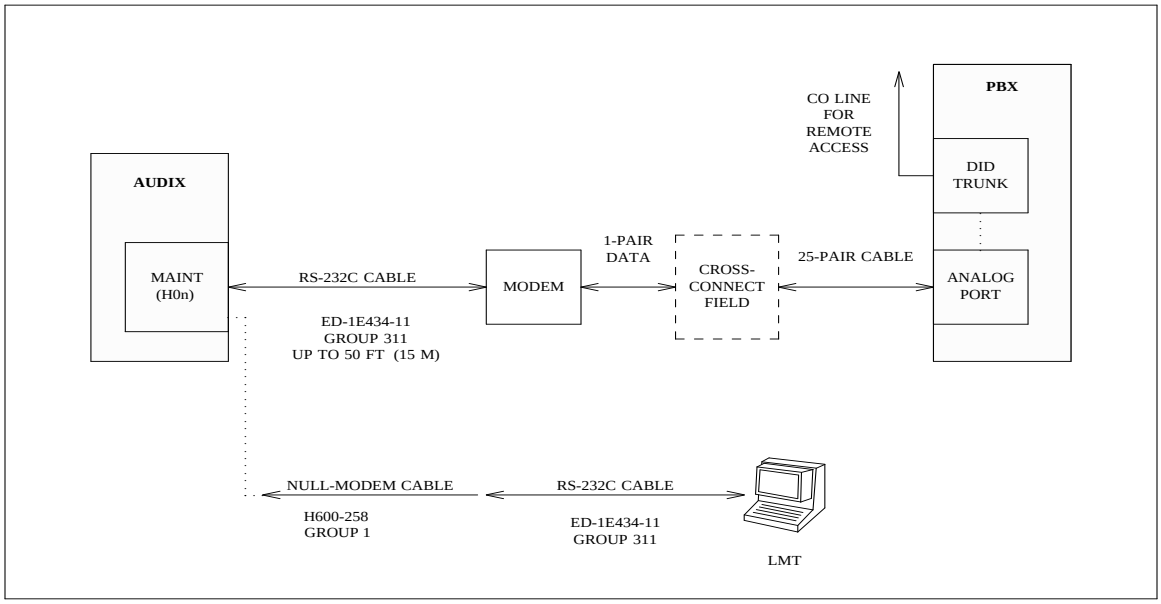


Figure 5-2. Local and Remote Maintenance Terminal Cabling

Local Installation

A Local Maintenance Terminal (LMT) is attached temporarily when a service technician visits the AUDIX site for troubleshooting, upgrade, or repair procedures. It is cabled directly (hard-wired) to the AUDIX maintenance port. The total cable length from port to port should be less than 50 feet (15 m).

The terminal must be positioned so the technician can see the Light Emitting Diodes (LEDs) on the front of the AUDIX system. The technician should always reattach the remote maintenance connector before leaving the site. The local connection should run at 4800 bps.

A local terminal installation requires the following equipment:

- AT&T 715 BCS or equivalent terminal
- 103-key keyboard and monitor
- RS-232C compatible cable (Group 311) to connect the terminal to the AUDIX system
- Null-modem cable to connect the RS-232C cable to the AUDIX maintenance port. Early AUDIX systems used an ED-1E434-11 Group 350 cable; new systems use an H600-258 Group 1 null-modem cable. The Group 350 cable does *not* work with the newer terminals (the 615 MT or 715 BCS).

The ED-1E434-11 Group 311 (RS-232C) and AUDIX null-modem cables are shipped with the basic AUDIX system.

Remote Installation

A remote installation connects the AUDIX maintenance port to a remote maintenance site, allowing off-site service personnel to dial into the MAINT port for routine maintenance or alarm diagnosis.

Usually an analog (modem) setup is used, although a digital (modem pooling) dial-up configuration can be used if desired. Maintenance personnel toggle the baud rate to 1200 bps by using the BREAK key at login.

Analog Setup

A modem (or data set) normally transmits signals to the AUDIX RS-232C connector at 1200 bps. Because the modem uses an RS-232C interface, it should be located within the recommended limit of 50 cable feet (15 m) from the AUDIX port. Modems require only 1-pair wiring, so they can be used on any switching system.

A remote analog configuration requires the following equipment in the AUDIX equipment room. Another modem and the remote maintenance terminal are attached at the far end of the connection.

- One Optima 2400, DM224, or equivalent Hayes-compatible modem
- RS-232C compatible cable to connect the modem to the AUDIX maintenance port (an ED-1E434-11 Group 311 cable is shipped with the basic AUDIX system)
- *For a stand-alone modem:* A modular cord to the cross-connect field
- An analog port to attach the modem to the switch

NOTE

The modem must have one option adjusted before it can be attached to AUDIX. On the terminal, the `Data Transparency` option is set to `y` (yes) before the modem is connected to the AUDIX maintenance port.

If the switch does not support Direct Inward Dialing (DID) or if the switch must be bypassed because of a switch problem, the modem should be connected to a central office (CO) line. A direct CO-line connection requires one dedicated trunk line from the CO. However, it is unlikely the AUDIX system will continue to operate if the switch fails.

Digital Setup

A remote digital dial-up setup can be used if desired. The remote terminal operator dials into the switch through a modem pool using MPDM or Z3A digital devices connected to the AUDIX system. Because this setup usually does not run faster than 1200 bps, it is not a recommended maintenance setup. However, a modem-pool setup might be used for remote administration applications, where the connection would not be used continually. The digital facilities can then be used locally as needed at 4800 bps.

MI Circuit Pack

The Maintenance Interface (MI) circuit pack is the interface between the maintenance software running in the Feature Processor (FP) and the maintenance (and administration) display terminals. Although it is possible for the FP to run the AUDIX features without the MI, the MI is needed to control the system modes, start up or shut down the software, and monitor alarms.

Control Mode and Normal Mode

The MI software controls the mode or state in which an AUDIX system operates. When the system is first powered on, the system enters *control mode* (the MI firmware is in control). During software initialization, the system enters *normal mode*, the usual state of AUDIX operation.

The screen forms can only be accessed in normal mode (when software is running). In normal mode, the MI activates both connectors, allowing administration or maintenance forms to be accessed by terminals connected to either port.

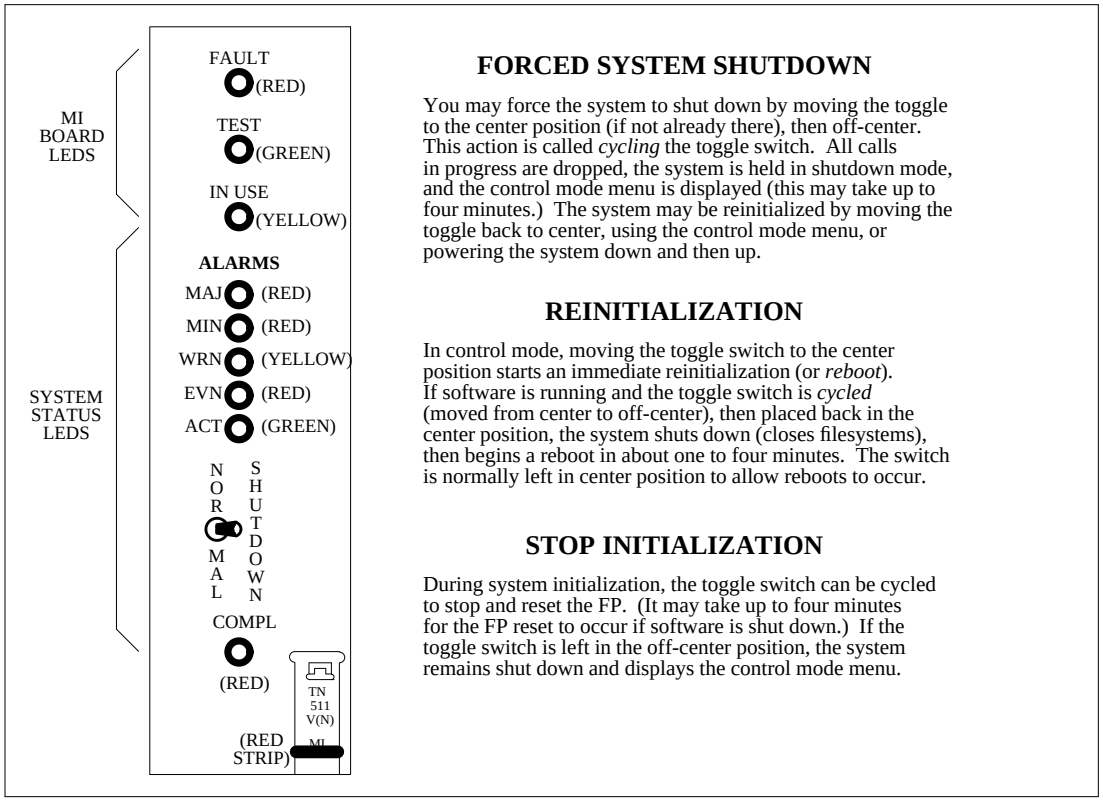
In control mode, only the MI's maintenance connector is active, so the maintenance terminal must be attached to the MAINT connector to do any commands.

MI Alarm Panel

An alarm panel on the front of the MI circuit pack shows MI and AUDIX system status (see Figure 5-3, *MI Circuit Pack Faceplate and Operation*). The LEDs indicate the following:

- *MI Status:* Three LEDs show MI circuit pack status: red (FAULT), green (TEST), and yellow [IN USE; this means an Local Maintenance Terminal (LMT) is connected or an Remote Maintenance Terminal (RMT) is logged in].
- *System Status:* Four LEDs show AUDIX system status and possible alarms: red (major alarm), red (minor alarm), yellow (alarm warning), and red (environmental alarm). The MI also reports alarms to the remote site through the alarm link, and to the terminal's `STATUS` line if a display terminal is logged on.
- *Shutdown Status:* Two LEDs located above and below the MI toggle switch show shutdown status: green (shutdown activated) and red (shutdown complete). The system may be shut down with the MI toggle switch (local only) or the `shutdown` form (local or remote). The TN523 FP-Central Processing Unit's (CPU's) red LED is always lit when the system is shut down.

The MI board's toggle switch may be used to shut down or reinitialize (*reboot*) the system depending on its position. Normally it is left off-center for local maintenance procedures and centered for normal operation. The switch's position does *not* affect normal AUDIX power-up or standard initialization procedures.



FORCED SYSTEM SHUTDOWN

You may force the system to shut down by moving the toggle to the center position (if not already there), then off-center. This action is called *cycling* the toggle switch. All calls in progress are dropped, the system is held in shutdown mode, and the control mode menu is displayed (this may take up to four minutes.) The system may be reinitialized by moving the toggle back to center, using the control mode menu, or powering the system down and then up.

REINITIALIZATION

In control mode, moving the toggle switch to the center position starts an immediate reinitialization (or *reboot*). If software is running and the toggle switch is *cycled* (moved from center to off-center), then placed back in the center position, the system shuts down (closes filesystems), then begins a reboot in about one to four minutes. The switch is normally left in center position to allow reboots to occur.

STOP INITIALIZATION

During system initialization, the toggle switch can be cycled to stop and reset the FP. (It may take up to four minutes for the FP reset to occur if software is shut down.) If the toggle switch is left in the off-center position, the system remains shut down and displays the control mode menu.

Figure 5-3. MI Circuit Pack Faceplate and Operation

TEXT SERVICE INTERFACE

The AUDIX Text Service Interface (TSI) allows users on a separate host computer system to receive timely notification of AUDIX messages. The feature will support the following electronic mail services:

- The IBM Professional Office System (PROFS) text service. The TSI package is shipped with customized software diskettes and hardware specifically designed for this interface.
- Other third-party interfaces. For other (non-PROFS) electronic text services, customers must write their own application programs using the software shipped with the TSI.

Information Sent

The following information is printed on the electronic text service user's PC or WGS screen:

- Message sender's name and extension (if available)
- Name of the originating AUDIX machine (local or remote if networked)
- Recipient's extension number and text service user ID
- Message delivery date and time (on the AUDIX system)
- Message length (in minutes and seconds)
- Message type [such as Call Answer, Leave Word Calling (LWC), or Voice Mail]
- Message status (new, unopened, old, or deleted)
- Data link status (integrated system or AUDIX Standalone)

PC Administration

If the customer purchases an AT&T PC or WGS for the TSI package, AT&T service technicians can install, administer, and support the PC, the interface and communications boards, and the software. If the customer purchases an AT&T PC independently (for example, from a Value Added Reseller) or plans to use a non-AT&T PC (*not recommended or supported*), a trained customer representative must then install the PC hardware and software. Complete steps for PC administration can be found in *AUDIX Text Service Interface* (585-304-503).

PBX Administration

As shown in Figure 5-4, *TSI Required Equipment*, the TSI runs on AT&T digital PBXs (System 75, System 75 XE, System 85, or DEFINITY Communications Systems). Local or remote services personnel typically administer the switch.

Two connections for TSI should be set up:

- A digital connection through either the AUDIX TN366 or TN366B AUDIX Communications Controller (ACC), or the TN539 or TN539B AUDIX Communications Controller Enhanced (ACCE).

  The digital port on the ACC or ACCE must connect to a digital port on the switch. Suitable circuit packs include:

  — A TN754 Digital Line board on a System 75, Generic 1, or Generic 3

  — An SN270 GPP board on a System 85 or Generic 2

  If AUDIX Networking is in place, a Digital Communications Protocol (DCP) link is already set up and ready for TSI use.

- The PC/PBX connection. Switch administration for this feature is described in *PC/PBX Connection Installation and Reference Manual* (555-016-201).

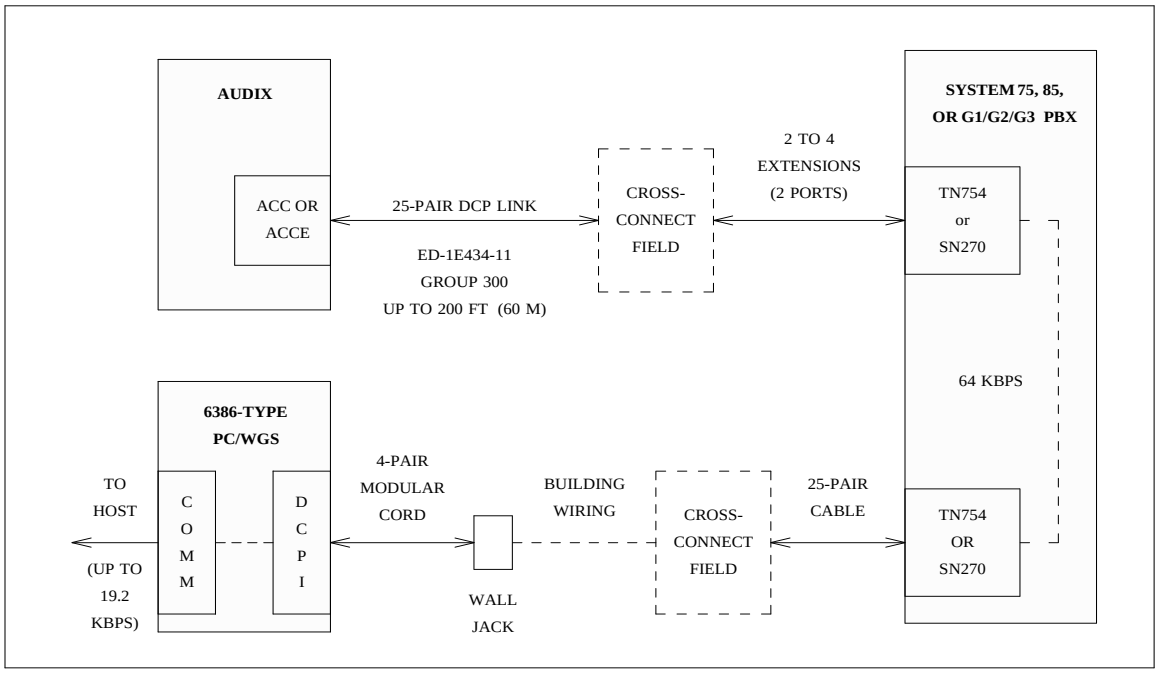


Figure 5-4. TSI Required Equipment

PBX Administration on a Non-DCP Switch

If TSI is used with a non-DCP switch (any non-AT&T switch), a MERLIN II communications system is required to provide DCP connectivity. See the *MERLIN II* section to see how this connectivity is provided.

Text Service Host Administration

A trained customer or vendor representative must administer the host text service machine (such as an IBM mainframe) to work with the TSI. The electronic text host machine should be set up to:

- Recognize the link to the communications board installed in the PC
- Receive AUDIX message headers and diagnostic headers from the PC
- Allow subscribers access to the electronic mail service (for example, PROFS users need special administration on the host)

Basic Package

The AUDIX TSI package always includes the following hardware and software:

- *Hardware (required for all applications):*
  - — A PC/PBX Digital Communications Protocol Interface (DCPI) expansion card for the 63xx PC or WGS
  - — D8W-87 4-pair modular wall cord to connect the board to a System 75, System 75 XE, System 85, or DEFINITY Communications System
- *AUDIX Text Service Interface* (585-304-503): This document describes installation, administration, and diagnostic procedures.
- *Software (required as follows):* Several diskettes are included inside the jacket of the TSI document. These include:
  - — *For IBM PROFS applications only:* Diskettes containing the TSI software for IBM PROFS, including DCPI driver software Version 3.00D. One 3.5- and one 5.25-inch floppy disk are shipped to accommodate either drive size.
  - — *For all other third-party interface applications:* Floppy diskettes containing the TSI software, including the DCPI driver software Version 3.00D. These applications must be coded by the customer using the software listed in the following section. Both 3.5- and 5.25-inch floppy disks are shipped to accommodate either size of disk drive.
- *Hardware (used for IBM PROFS applications only):*
  - — A 2780/3780 communications (COMM) interface board
  - — An RS-442 to RS-232C converter cable
  - — An RS-442 diagnostic loop-around plug
  - — One 5.25-inch and one 3.5-inch floppy diskette containing the 2780/3780 communications interface board (the ICP188X) software and diagnostics

Additional Requirements

The following hardware and software is *also* required to support the AUDIX TSI:

- AUDIX R1V4 or later software
- TN366 or TN366B AUDIX Communications Controller (ACC), or TN539 or TN539B AUDIX Communications Controller Enhanced (ACCE)

NOTE

Networked systems already have an AUDIX ACC or ACCE board and the required switch cabling installed.

- A 25-pair DCP cable to a System 75, System 75 XE, System 85, or DEFINITY Communications System
- An AT&T 6386 WGS or equivalent PC is supported (such as a 6312 WGS). The PC or WGS requires a keyboard, at least one Mbyte of Random Access Memory (RAM), and the following:
  - — AT&T PC DOS Version 3.20 Rev. 2.02 (for 5.25-inch drives) or Version 3.3a Rev. 1.01 (for 3.5-inch drives)
  - — Monochrome or color monitor
  - — A compatible AT&T parallel printer (see the *Printers* section)
  - — One floppy disk drive (1.2-Mbyte minimum capacity). Either 3.5-inch or 5.25-inch disk drives may be used (the software is shipped on both sizes of diskette)
  - — One hard disk drive (20-Mbyte minimum capacity)

NOTE

The PC or WGS used for the TSI *cannot* be shared with other applications.

PROFS Applications

PROFS applications also require the following hardware and software *in addition* to the equipment shipped with the basic TSI package:

- IBM Remote Spooling Communications Subsystem (RSCS) software
- A 2780 emulation package on the host
- A front-end processor (FEP)
- An IDM line set (a specialized RS-232C extender cable from a synchronous modem to the IBM FEP)

Third-Party Interface Applications

The following hardware and software is also required *in addition* to the equipment shipped with the basic package when the Text Service Interface is to be used with non-IBM PROFS, third-party interface applications.

- A communications board for the PC
- Cabling from the PC to the host computer where the electronic text mail service resides
- The following PC software (required for developing the applications software that runs on this communications board):
  - — Aspen Scientific Curses Library Version 4.0
  - — Microsoft C Compiler Version 5.0
  - — Microsoft Library Manager Version 3.08
  - — Microsoft Make File Utility
  - — Microsoft Overlay Linker Version 3.61
  - — Software and diagnostics for the communications board

Remote Setups

Any setup where the PC is located more than 50 feet (15 m) from the electronic text mail service host may require a pair of synchronous modems between the PC and the host. The modems may transmit data over twisted-pair cabling, leased line, private line, T1 carrier, or other facilities.

An Optima 2400, DM224, or equivalent Hayes-compatible modem may be used in this setup. Consult the *AT&T Sales Manual* for possible products, their transmission specifications, and the physical connection requirements. Figure 5-5, *TSI Remote Synchronous Setup*, shows a sample synchronous modem setup.

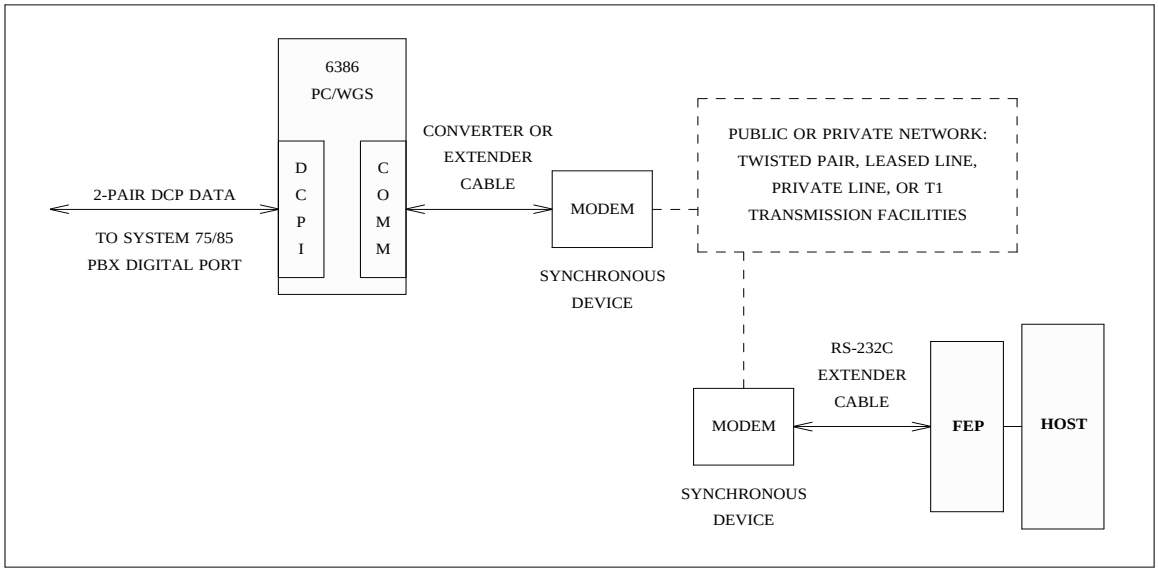


Figure 5-5. TSI Remote Synchronous Setup

Extended-Local Setup

A Z3B1 Synchronous Data Unit (SDU) setup (see Figure 5-6, *TSI Extended-Local Setup Using SDUs*) has been tested for a extended-local TSI configurations. The SDU is a bit-oriented, DCE device that can be used for SDLC, Bisync, or X.25 protocols. With SDUs, the distance between the PC and a host computer can be extended up to 16,500 feet (5 km) over standard, 24-gauge, twisted-pair wire at speeds of 1.2 to 9.6 Kbps, or up to 10,000 cable feet (3 km) at 19.2 Kbps.

The following equipment is required for a back-to-back SDU connection. See *Z3B1 Synchronous Data Unit Product Manual* (555-401-703) for details on SDU setups:

- RS-232C cable from the communications (COMM) board to the SDU

NOTE

For the PROFS application, an RS-442 to RS-232C converter cable is provided with the TSI package. For other applications, the customer or vendor must supply this cable.

- Two Z3B1 SDUs
- Twisted-pair building wiring between the SDUs
- A D8AM-87 crossover cord at one of the SDUs

NOTE

A 356A adapter may be needed in some equipment room applications to convert a 25-pair cable connector to eight modular jacks.

- An additional RS-232C extender cable may be needed between the second SDU and the electronic text service host (see the ordering codes in Appendix A)

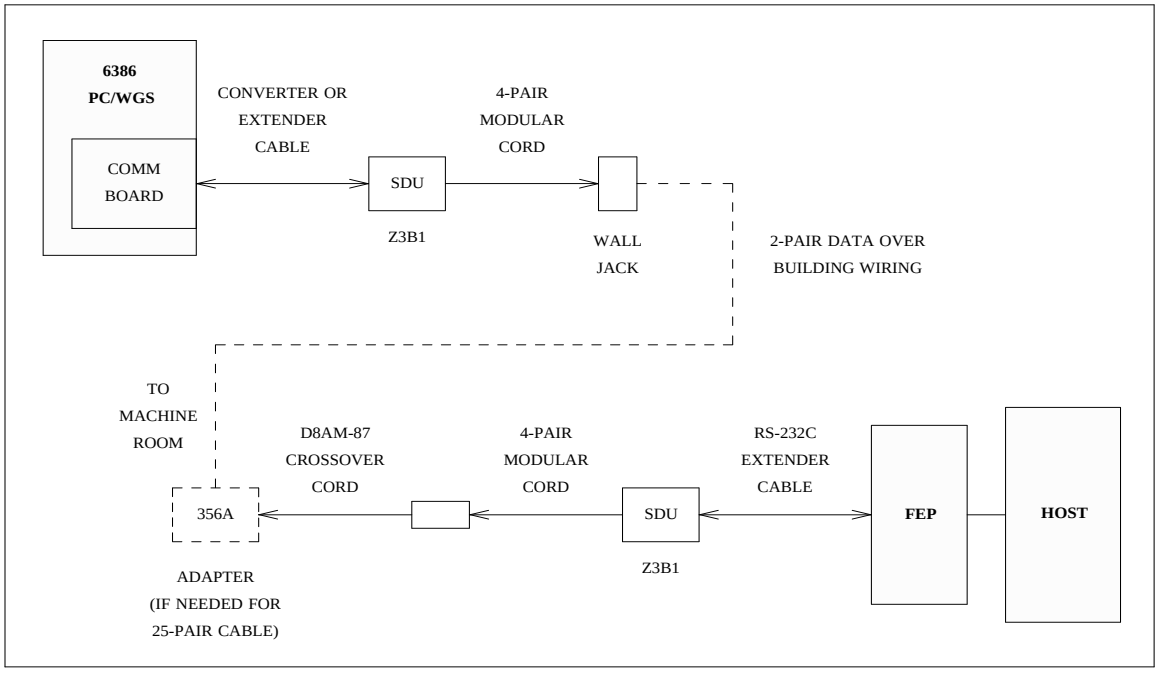


Figure 5-6. TSI Extended-Local Setup Using SDUs

Configuration for Text Service

To figure out how many TSIs are needed in a network environment, the following subscriber characteristics must be considered and configured. The information in Table 5-1, *Subscriber Characteristics*, is taken from the Delivery Operations Support System (DOSS) Configurator.

Table 5-1. Subscriber Characteristics

Category	Msgs/Day	Msgs/Hour @ 14% *	Number/Subscribers †
Light	1.6	0.224	6700
Medium	2.5	0.350	4280
Heavy	3.3	0.462	3250
Very Heavy	4.6	0.644	2330
Extremely Heavy	5.5	0.770	1950

* Busy-hour messages are computed by multiplying the busy-hour fraction by the number of messages/day (the default busy hour equals 14%).

† The maximum capacity of a link is 1500 messages per hour.

The best link utilization is obtained with a single AUDIX system. With multiple systems, some link capacity will be wasted because collisions of data can occur.

NETWORK MODEM POOLS

Modem pools use modems and data sets to convert RS-232 analog signals into DCP, and vice versa. They can operate as standalone models or as multiple units in a rack. In an AUDIX/PBX network, a modem pool can connect:

- The DCP and RS-232 ACCE networking ports between AUDIX machines
- The DCP and RS-232 ports on a switch
- The DCP and RS-232 ports between an AUDIX system and a switch

Refer to *AUDIX Networking* (585-300-903) for needed connections, option settings, and switch translations for the following equipment.

Standalone Modem Pools

A standalone modem pool can be created by connecting a 7400A Data Service Unit (DSU) with a viable modem such as the AT&T 2296A, Comsphere 3820, Paradyne DM424, and the MICROCOM QX 3296/C. A male-to-male M25B RS-232 cable connects the modem and DSU to each other. The 4-wire telephone cable from the modem, and a D8W cable from the DSU are each connected to a 104A connecting block. From the connecting block, the modem connects to the analog port, and the DSU connects to the digital port on a switch, between AUDIX systems, or between an AUDIX system and a switch.

Multiple-Mount Modem Pools

For greater data and port usage, DSU/modem pairs can be installed in multiple-mount carriers. For example, 2296A modems fit into a 105A rack which is fastened into the upper portion of the carrier. The 7400A DSUs fit into a 77A rack which slides into the bottom portion of the carrier. Each modem and its associated DSU is vertically aligned in the carrier.

The carrier has its own power supply. Each DSU and modem is plugged into the supply individually. The power cables are keyed.

Refer to Figure 5-7, *Multiple-Mount Modem Pool Connections*, to see how multiple-mounted DSUs and modems are connected.

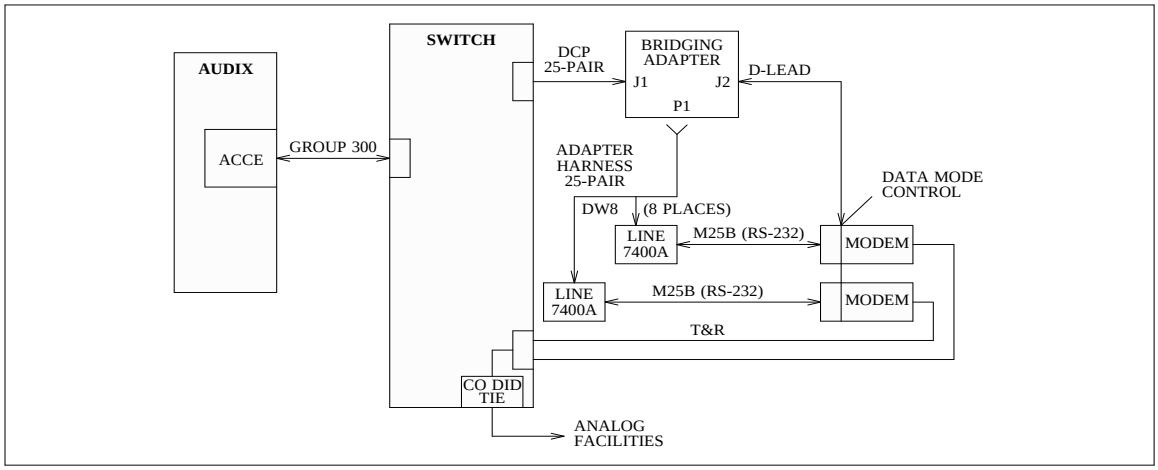


Figure 5-7. Multiple-Mount Modem Pool Connections

An adapter and cable kit is needed which includes the DW8 adapter harness, bridging adapter, and a D-lead modem-control cable. The D-lead cable connects the DATA MODE CONTROL connector on the 105A rack to the MODEM CONTROL connector on the 77A rack. Separate RS-232C (M25B) cables run between each modem/DSU pair.

NOTE

If a small modem pool is dedicated to an AUDIX system, the periodic testing done on the switch should be turned *off* to prevent contention problems over the available ports. At least two modems are recommended to give an AUDIX system a better ability to transmit and receive data as scheduled.

MERLIN II

The MERLIN II, an AT&T digital hybrid key communications system, can be used as a networking controller for an AUDIX system's information data channels, as shown in Figure 5-8, *AUDIX Interface with MERLIN II*.

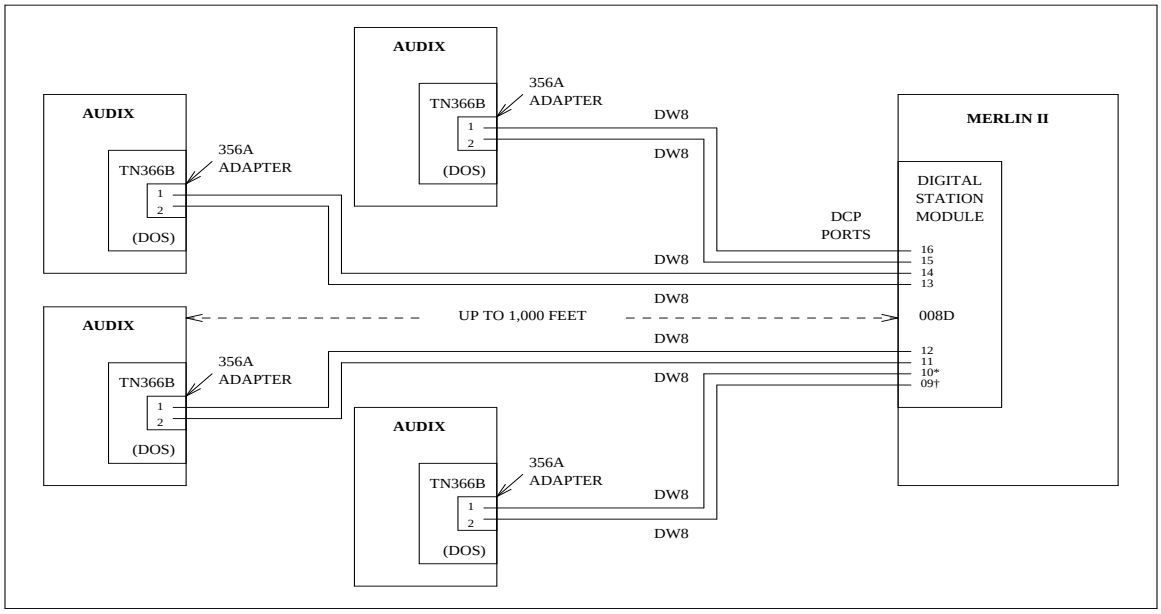


Figure 5-8. AUDIX Interface with MERLIN II

Each AUDIX system has a slot for a single AUDIX Communications Controller (ACC) or ACC Enhanced (ACCE) board. Either of these modified boards can handle four information (I) channels on two DCP data links. Because MERLIN II supports the I2 data channels only, the ACC or ACCE uses these two I channels for data transfer. Only the jacks numbered 1 and 2 on the ACC or ACCE are connected. By default, 1 is incoming and 2 is outgoing.

A single digital station module (008D) in a MERLIN II will port up to eight channels, using *DCP Mode 3* at 64 Kbps per channel. Up to eight modules can be installed into a MERLIN II using *Feature Module II* or *Feature Module III*, supplying 64 data ports to 32 AUDIX cabinets.

Equipment Needed

The following equipment is needed for a single AUDIX/MERLIN II configuration.

- TN366 or TN366B AUDIX Communications Controller (ACC) or TN539 or TN539B AUDIX Communications Controller Enhanced (ACCE) board in each AUDIX system
- MERLIN II control unit which includes the base, a power module, and a processor module
- Feature Module II which allows a maximum of 56 CO lines, 72 stations, and 64 data terminals
- Feature Module III which has added features over FM II, including Automated Attendant, Incoming Line Identification, and Tie Line Support
- 8-port digital station module (one per four AUDIX systems)
- 356A Adapter (25 pair to eight modular 8-pin jacks)
- DW8-87 8-conductor telephone cord (two per AUDIX system, each 25 feet long)
- One of the following display sets, *if* administration is to be performed:
  - — MERLIN II display console
  - — MERLIN II attendant console
  - — MERLIN II 34D console

As shown in Table 5-2, *Network Connectivity with MERLIN II*, MERLIN II can be used to provide the following types of connectivity between an AUDIX system and a host switch. Refer to Chapter 6, *AUDIX Networking*, for drawings of the MERLIN II in use.

Table 5-2. Network Connectivity with MERLIN II

Switch Type	Local Networks High Speed *	Remote Networks Low Speed †
DCP	DCP Mode 3	Modem Pool or Direct RS-232
Non-DCP	DCP Mode 3 or Direct RS-232	Modem Pool or Direct RS-232

* High speeds include 56000 and 64000 bps.

† Low speeds include 1200, 2400, 4800, 9600, and 19200 bps.

MERLIN II Modem Pool

A MERLIN II can be set up with its own modem pool to allow DCP communication from one AUDIX system to another's RS-232 networking ports using multistage dialing.

Multistage dialing occurs when an AUDIX system dials the modem pool and then waits for the modem to answer. After the modem answers, the system dials the telephone number of the modem connected to the RS-232 port on the other AUDIX system.

The RS-232 AUDIX system also uses multistage dialing when it calls the DCP port on the other AUDIX system.

A modem pool can also be set up on a MERLIN II to dial directly to a modem pool on a System 75, System 85, or DEFINITY Communications System switch, or to a modem across an AT&T voice-grade network. Besides the basic equipment needed for a MERLIN II, this setup requires a ring generator and a 012 basic telephone set module.

6. AUDIX Networking

The AUDIX Networking feature allows versatile configurations and flexible data connections to be made between AUDIX systems and one or more switches. Through scheduled automatic delivery, Voice Mail, and Call Answer, messages can be sent locally to subscribers or remotely to as many as 100 other AUDIX systems. The AUDIX system administrator controls transmission schedule, remote subscriber administration, addressing codes, and name voiceback.

NOTE

All AUDIX network configurations must be designed and approved by the Global Business Communications Systems (GBCS) Design Center.

Networking from an AUDIX system is provided through the TN539 or TN539B AUDIX Communications Controller Enhanced (ACCE) circuit pack; this board replaces the TN366 and TN366B AUDIX Communications Controller (ACC) circuit packs used in earlier AUDIX systems.

The ACCE, when used with AUDIX R1V5 or later software, allows the system to handle Digital Communications Protocol (DCP) Mode 1 (56 Kbps), Mode 2 (modem pooling), or Mode 3 (64 Kbps) and RS-232 connections which may be synchronous, asynchronous, or converted to DCP using a conversion module. (The ACC board is limited to DCP Modes 2 and 3; an ACCE is required for DCP Mode 1 setups.) A breakout cable that plugs into the ACCE receptacle allows four DCP connections and two RS-232 connections.

This chapter briefly covers some sample AUDIX networking setups. For complete information on the AUDIX Networking feature, refer to *AUDIX Networking* (585-300-903).

NOTE

The AMIS Analog Networking feature was introduced in AUDIX R1V6 software. The Audio Messaging Interchange Specification (AMIS) is an intervendor standard for analog networking between systems. AMIS allows AUDIX subscribers to exchange voice mail messages with any AT&T or non-AT&T voice mail system that also has AMIS analog networking capabilities.

AMIS Analog Networking is *not* the same as the AUDIX Networking feature described in this chapter. AMIS does not require an ACCE board; instead, the feature is administered locally on the AUDIX system using R1V6 or later software to send analog messages over the AUDIX voice ports. For more information on AMIS, refer to *AMIS Analog Networking* (585-300-512).

LOCAL NETWORKING

In a local network setup, one or more AUDIX systems can be integrated with a single switch. All AUDIX subscribers can be assigned the same (or no) prefixes and separate extension numbers, or different prefixes to distinguish between local systems.

A one-cabinet 16-port AUDIX system can provide services to up to 2000 local subscribers; a two-cabinet 32-port system handles twice as many. When AUDIX systems are integrated into a local network, they take on the appearance of one large AUDIX system for most features (for example, the Return Call to Sender feature may only work for Voice Mail messages when networked messages are received in a local setup).

The AUDIX system(s) can reside together in the same equipment room with the switch, or set in a remote location according to the type of connections made. See Chapter 4, *System Interfaces*, for a discussion of basic AUDIX connectivity.

Any number of AUDIX systems can be locally networked depending on the digital and/or analog circuit-pack capacity and the overall traffic capacity of the switch being used as the network controller. Supported options for network controllers include the following AT&T digital PBXs: MERLIN II, System 75, System 85, and DEFINITY Generic 1, Generic 2, or Generic 3.

Local DCP/RS-232 Connectivity

Figure 6-1, *Local RS-232-DCP Connectivity*, shows a local connection to a MERLIN II, System 75, Generic 1, and some Generic 3 systems. Because these switches support only two of the ACCE's four DCP channels, conversion devices may be attached to the RS-232 connectors on the back of the AUDIX cabinet to convert these ports to DCP, allowing the ACCE board to provide four DCP channels.

Currently a 7400C High-Speed Link (HSL) and an RS-232/V.35 converter are used to convert the RS-232 ports to DCP. An H600-413 Group 1 cable must be used to connect each RS-232 port on the AUDIX ACCE board to the RS-232/V.35 converter (a standard RS-232 cable will not work). This setup can operate at data rates of either 56 Kbps (Mode 1) or 64 Kbps (Mode 3). Because the conversion devices cannot do high-speed dialing, networking calls can only be received by the AUDIX system; the AUDIX system cannot dial out over this configuration.

Previously, a Modular Processor Data Module, Model M1* (MPDM/M1*), was used to make this conversion; the MPDM/M1* is no longer available. To communicate in DCP Mode 1 or 3, the MPDMs had to be equipped with ACCUNET capabilities using D-Kit (D-181509).

NOTE

All Generic 3r Version 2 software and Generic 3r Version 1 load 8.0 or later software supports dual I-channel capability on the DCP ports. This capability allows four (not two) AUDIX extensions to be assigned (two for each port).

Because the ACCE RS-232 ports can only be used as incoming channels using this setup, 7400A or 7400B Data Service Units (DSUs) can be used instead to allow the two RS-232 ports to be incoming *and* outgoing. With DSUs, incoming and outgoing calls can be sent at speeds up to 19.2 Kbps, as long as the public facilities can support these speeds.

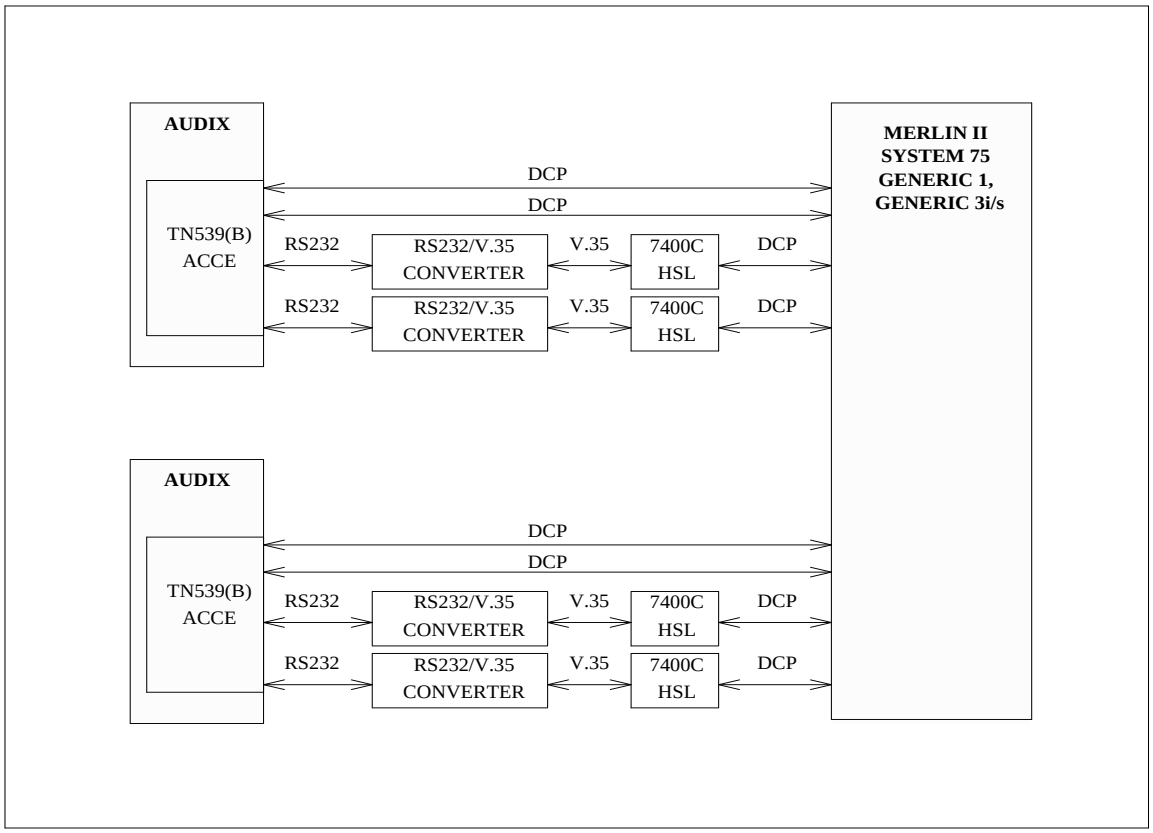


Figure 6-1. Local RS-232/DCP Connectivity

Local Dedicated EIA Connectivity

A common approach to local networking is to connect up to three AUDIX systems together through the two RS-232 ports on the ACCE, eliminating the need to use additional analog or digital ports on the switch for networking. Figure 6-2, *Local RS-232 Connectivity*, shows three AUDIX systems connected in this way.

This dedicated arrangement requires that the RS-232 M25A cables from each system be connected together with a null modem cable or adapter. This configuration requires R1V5 or later software, and can operate at speeds up to 64 Kbps if the cables used no more than 20 feet in length; see the *AUDIX Networking* document (585-300-903) for details.

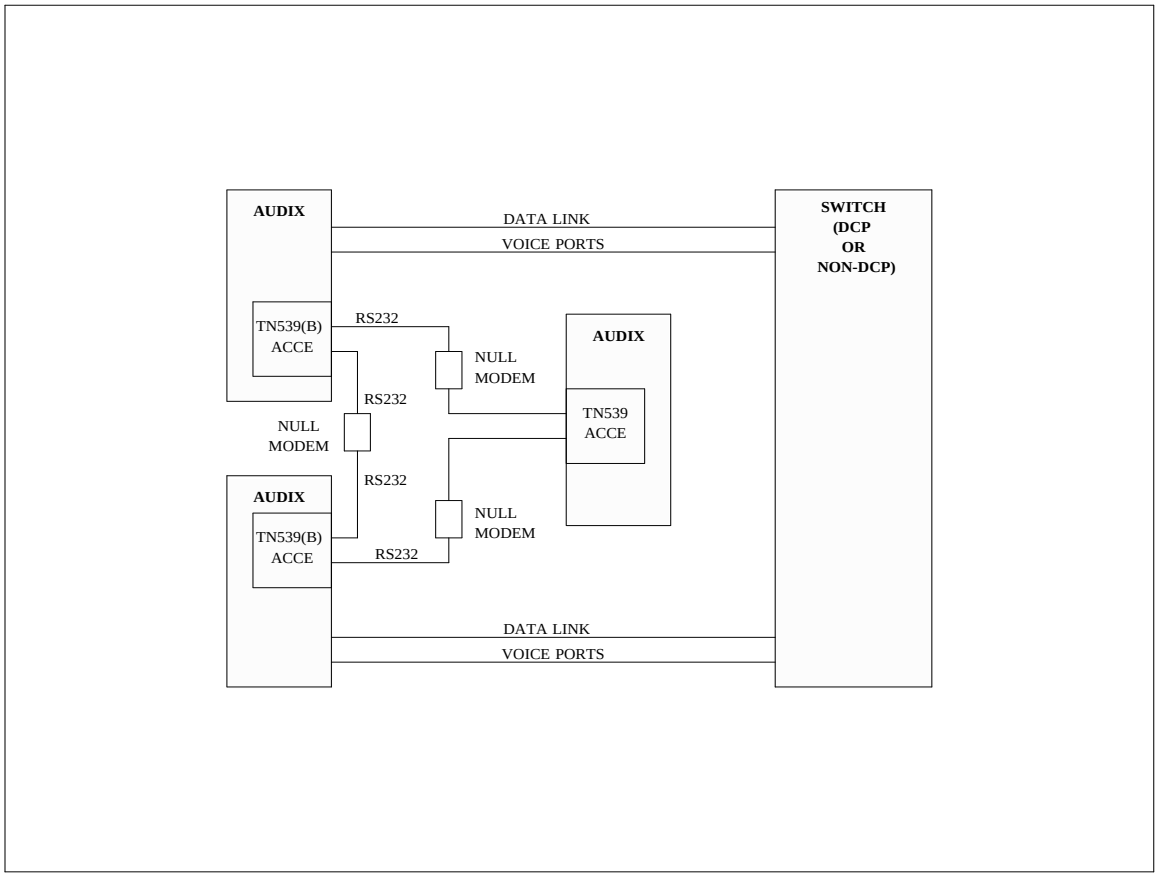


Figure 6-2. Local RS-232 Connectivity

Local Switched EIA Connectivity

Figure 6-3, *Switched Connectivity to a Local Switch*, shows an RS-232 connection to a switch using a modem. This arrangement can be used when DCP is not available on a host switch. It is also used to increase the number of ACCE ports to MERLIN II, System 75, Generic 1, and Generic 3 host switches.

Modems are supported to transmit at fixed-rates of 9600 bps or 19.2 Kbps. Viable modems include the AT&T 2296, Comsphere 3820, Paradyne DM424, and the MICROCOM QX 3296/C. Many brands of modems can be mixed in network connections; refer to the compatibility matrix in the *AUDIX Networking* document (585-300-903) for supported combinations.

M25A RS-232 cables connect the ACCE ports to the modems if the modems are placed farther than four feet from the back of the AUDIX cabinet; otherwise, the ACCE breakout cord can be connected to the modem. Analog phone lines connect the modems to the switch.

Since each ACCE has two RS-232 ports, the telephone numbers of these ports could be administered in a hunt-group arrangement on the host switch if the GBCS Design Center determines traffic warrants this. This is because only one of the telephone numbers can be administered on the calling AUDIX system.

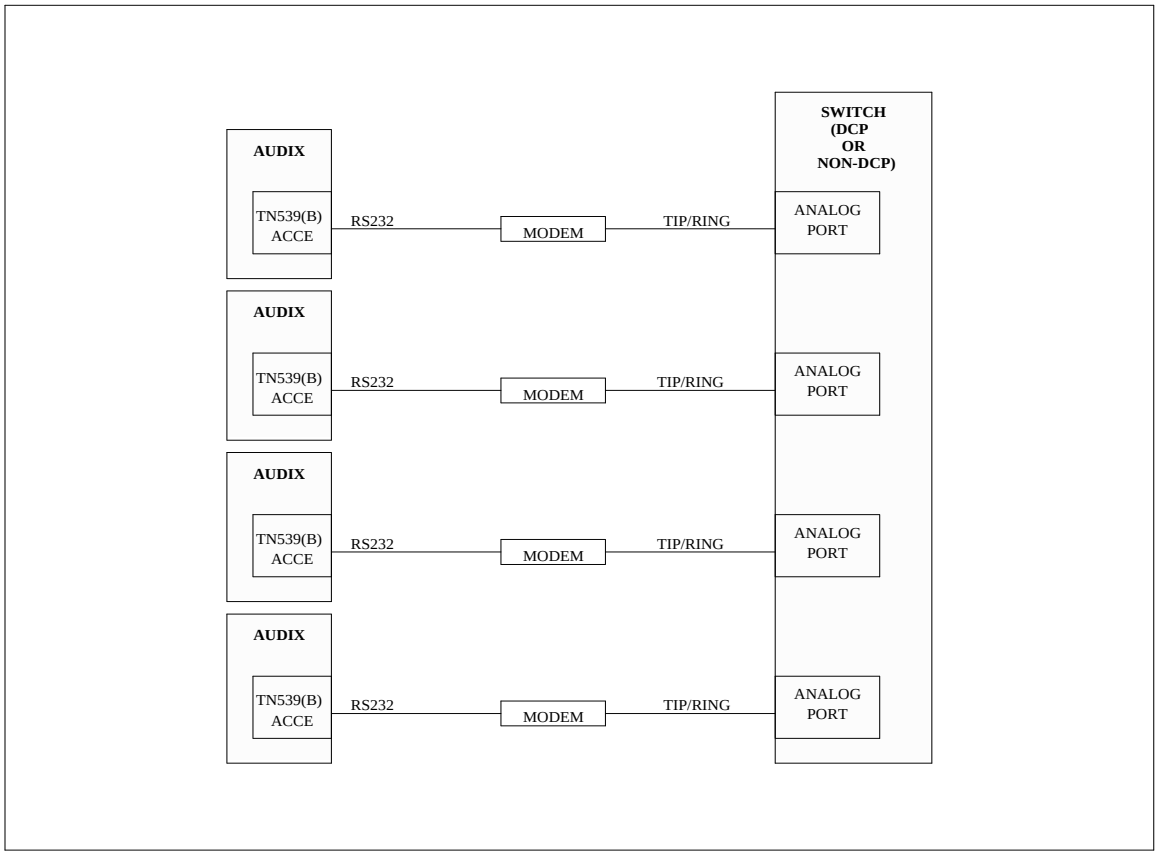


Figure 6-3. Switched Connectivity to a Local Switch

STANDALONE AUDIX NETWORKING

Even though there is no data link connection to the local switch, AUDIX Standalone systems attached to a nondigital or other generic switch can be networked if data connections to an AT&T digital switch (including System 75, System 75 XE, System 85, DEFINITY Communications System, or MERLIN II) are available. The MERLIN II setup is preferable.

The ACC or ACCE Networking board in the AUDIX Standalone requires two DCP links on a compatible AT&T digital PBX. Figure 6-4, *Sample AUDIX Standalone Network with MERLIN II or Digital PBX*, shows a sample setup with a MERLIN II or AT&T PBX being used as a data switch.

NOTE

Any of these switches can have more adjuncts if the AUDIX systems are installed as Standalone systems. Additional AUDIX systems, however, do *not* lend redundancy. A remote system cannot pick up the load for another system that may be having problems.

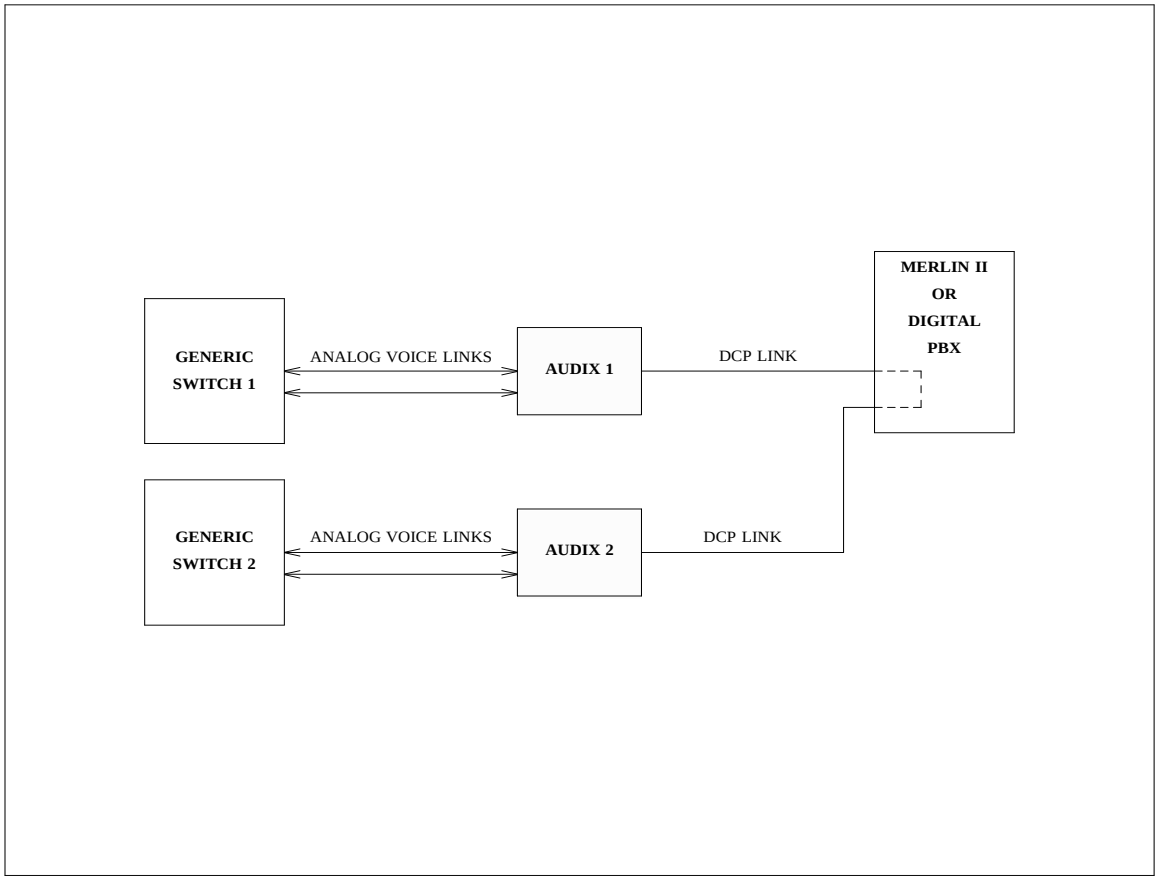


Figure 6-4. Sample AUDIX Standalone Network with MERLIN II or Digital PBX

REMOTE NETWORKING

In a remote network, an AUDIX system can be integrated with any of various switches and can be connected with up to 100 other AUDIX adjuncts. Remote systems may be geographically distant, have different dial plans, and use different connections (as long as pairs of AUDIX systems have compatible transmission facilities between them). Connection facilities may be:

- Digital Service (DS1) facilities between switches
- Voice-grade (analog) facilities between switches

AUDIX subscribers not administered on a local system are considered remote, although they may be at the same physical location. Remote subscribers, however, can be administered on a local system to allow name voice-back and name addressing.

Addresses for remote subscribers consist of an optional location prefix and required extension number. The networking prefix specifies the AUDIX *home* system on which a remote subscriber has a Voice Mailbox. It may be an abbreviation of a location or system, but must not conflict with the local (host) switch's numbering plan. The total length of the address must be less than 24 characters.

Any remote network can be mixed with a local network as shown in Figure 6-5, *Sample Mixed AUDIX Network*. Switches can use any public or private switched networking facility, or be a part of a Digital Communications System (DCS) network (described later in this chapter).

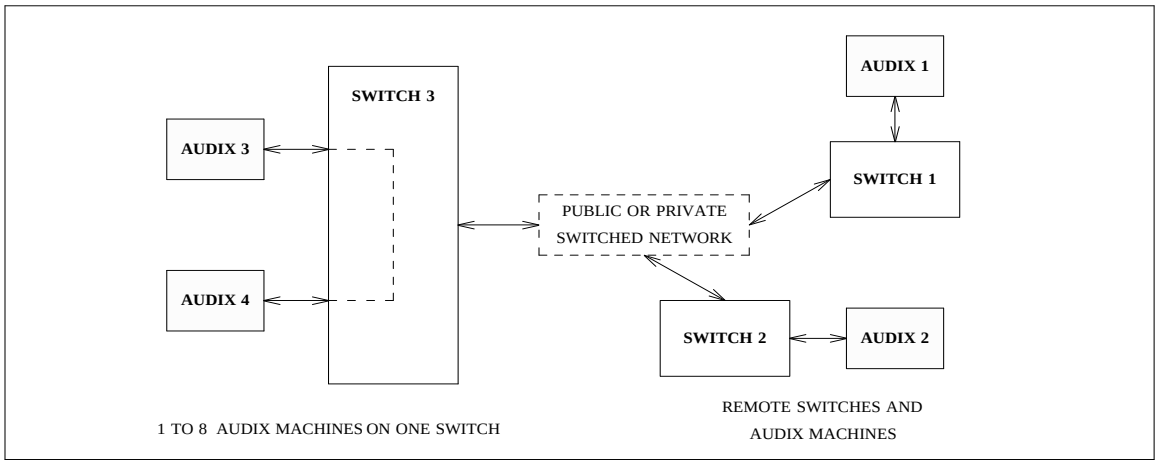


Figure 6-5. Sample Mixed AUDIX Network

Remote Digital Network Using DS1 Facilities

Figure 6-6, *Remote Digital Networking Using DS1 Facilities*, shows a sample AUDIX network with a System 75, System 85, or DEFINITY Communications System using end-to-end DS1 facilities.

The DS1 tie trunks between the two switches can be a T1 or other carrier. The DS1 link should be set up for Alternate Voice/Data (AVD) to allow the AUDIX system to use one of the 23 clear channels for 64 Kbps digital transmission. It is also possible to use the B-channels of an Integrated Services Digital Network (ISDN) span to make the remote connection.

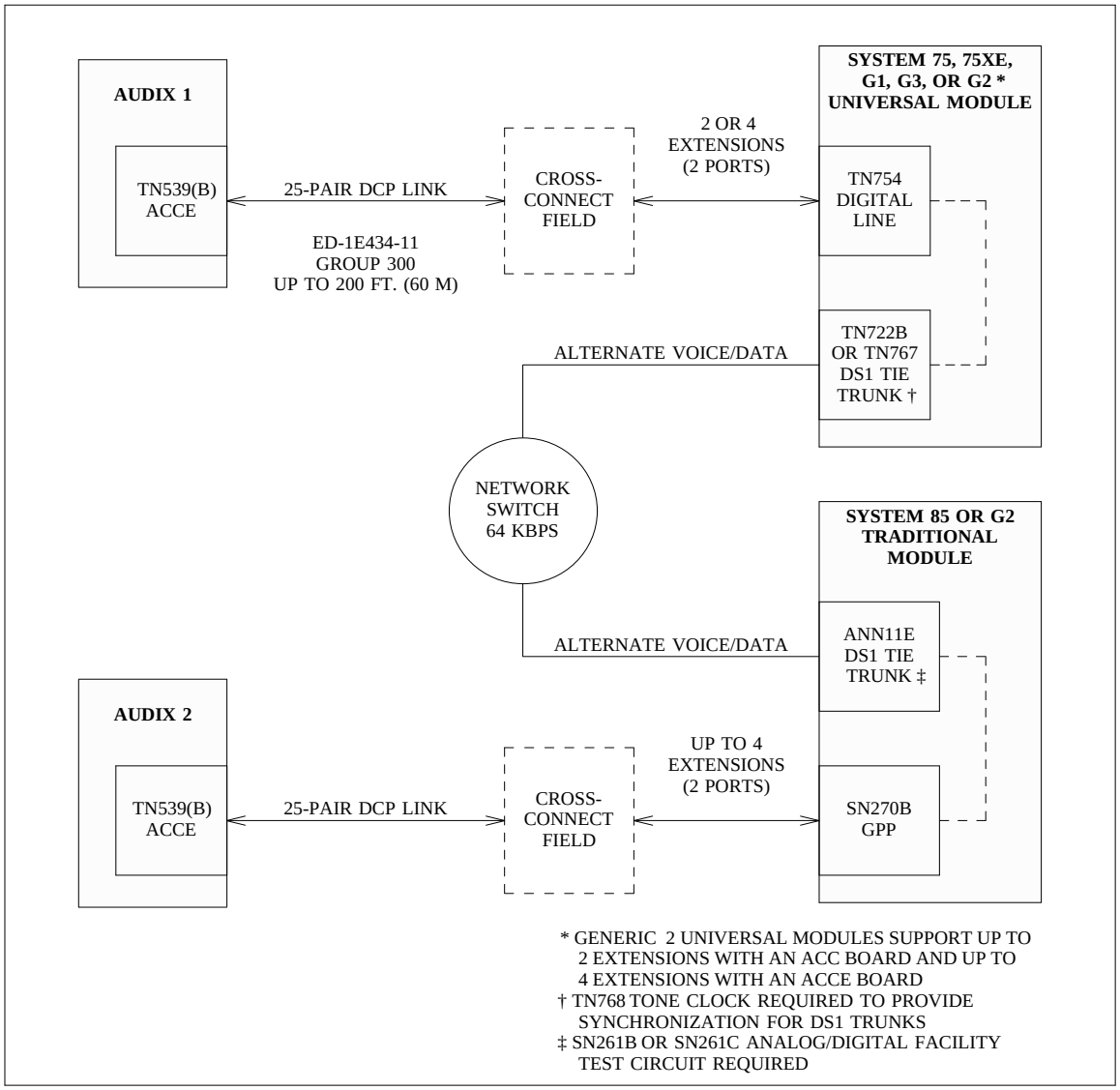


Figure 6-6. Remote Digital Networking Using DS1 Facilities

Remote Digital Network Using ACCUNET Switches 56 Services

Figure 6-7, *Remote Digital Networking Using ACCUNET 56 Services*, shows a remote network connected to ACCUNET Switches 56 Services. The facilities between the DCP switch and the network switch must be T1.

The AUDIX system must have R1V5 or later software and an ACCE to provide DCP Mode 1 (high-speed 56 Kbps) connectivity. AUDIX R1V7 software and a TN539B ACCE board are recommended because of the enhanced networking features and built-in loop-around testing capabilities they provide.

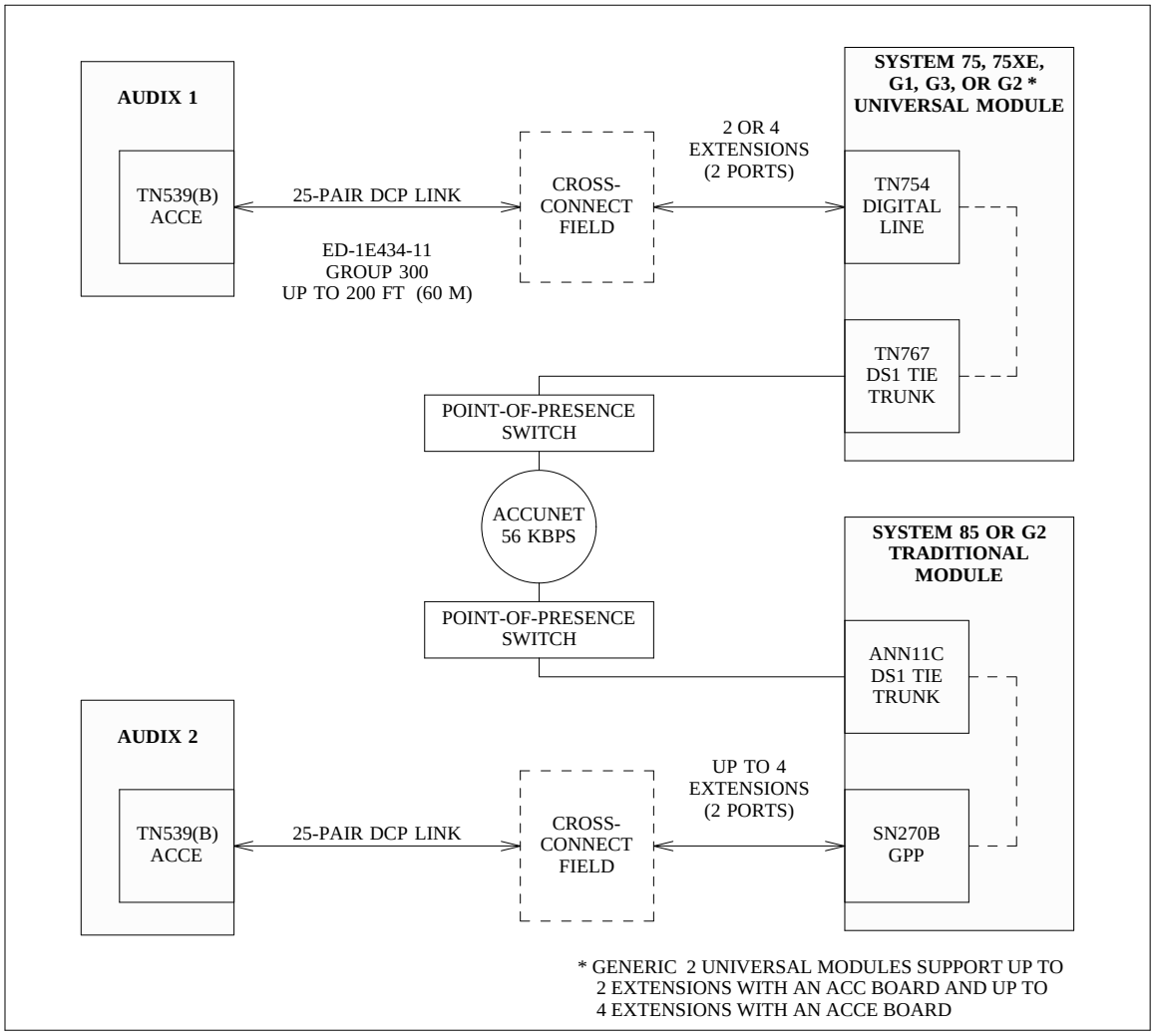


Figure 6-7. Remote Digital Networking Using ACCUNET 56 Services

Remote Analog Network

Whenever end-to-end digital facilities are not available, the AUDIX system can send messages for a remote site through a modem pool instead of RS-232 analog. Using analog data facilities, the system can transmit no faster than 9600 bps. Figure 6-8, *Remote AUDIX Networking with Voice-Grade DS1 and Modem Pools*, shows a sample AUDIX network with a System 75, Generic 1, or Generic 3 switch connected to a System 85 or Generic 2 switch through a modem pool using voice-grade (bit-robbed) DS1 facilities.

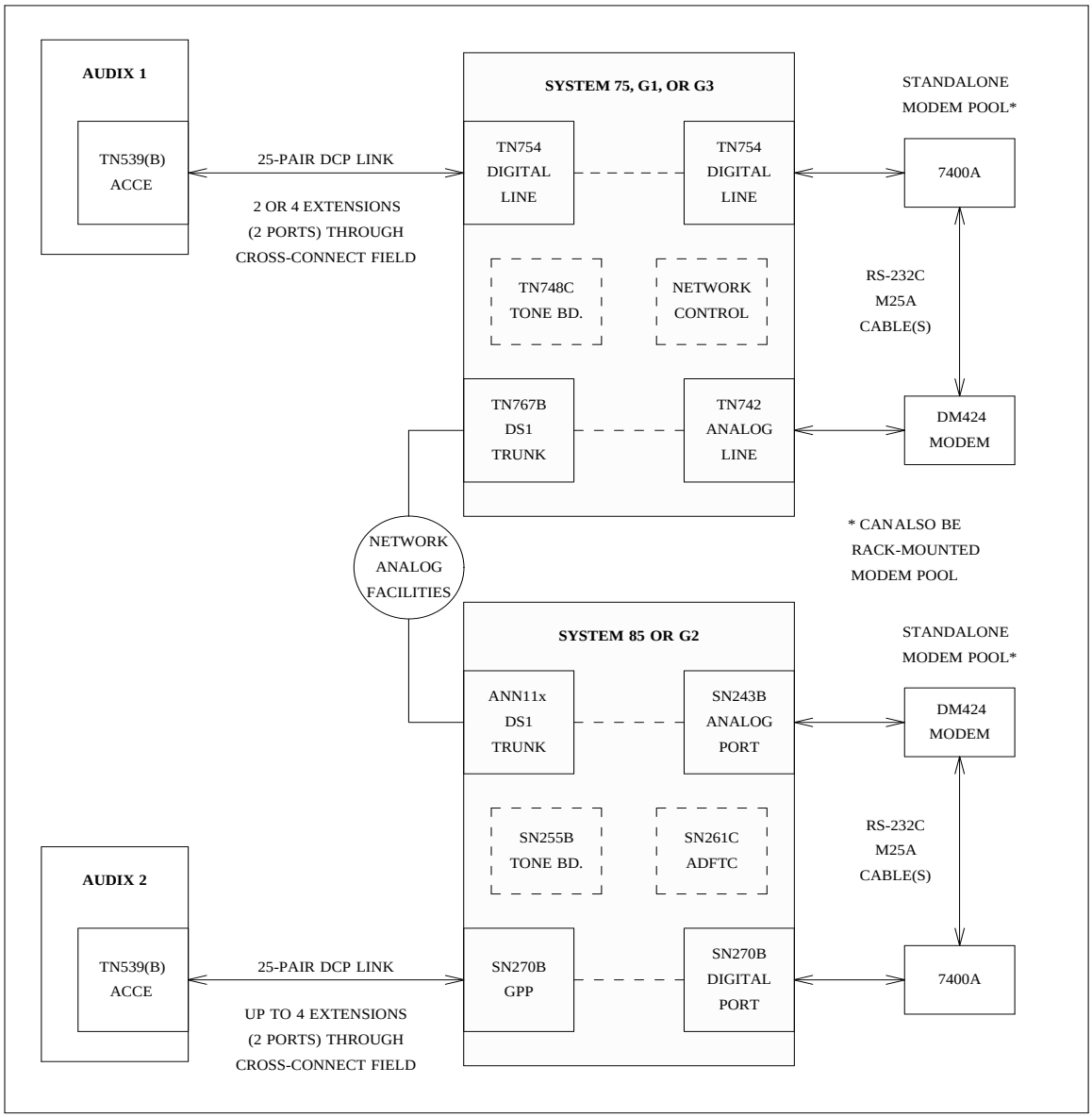


Figure 6-8. Remote AUDIX Networking with Voice-Grade DS1 and Modem Pools

System 75, System 75 XE, DEFINITY Generic 1, Generic 2 (universal modules), and Generic 3 switches require the following boards for analog networking:

- *TN727:* One four-channel TN727 Network Control (NC) circuit pack is required on every System 75 or System 75 XE PBX when 7400As and modem pools are used.
- *TN742 or TN746B:* One port on an eight-port TN742 or 16-port TN746B Analog Line board is required for every modem connection to a System 75-type switch.
- *TN748C:* The TN748C Tone-Detector board is required on System 75 and DEFINITY-type switches to detect 2100 Hz answer tone. A TN748C Vintage 1 *or* Vintage 3 (or later) board allows switches to detect the tone. A DEFINITY Generic 1 or Generic 2 requires a Vintage 3 (or later) board in the universal module. The number of TN748Cs needed depends on traffic (often one board and one spare are sufficient).
- *TN754:* One eight-port TN754 Digital Line board is required for each of two connections:
  - AUDIX ACC (TN366 or TN366B) or ACCE (TN539 or TN539B) board: Two ports on one TN754 are needed. Because System 75, Generic 1, and early Generic 3 software releases support only one I (information) channel, a maximum of two AUDIX extensions are available (one for each port). These circuits are assigned as *lines* on the data-module form, `type = pdm`.

    NOTE

    All Generic 3r Version 2 software and Generic 3r Version 1 load 8.0 or later software supports dual I-channel capability on the DCP ports. To allow two AUDIX extensions to be assigned for each port (for a total of four extensions), use the data-module screen as above. Assign the first channel on the first physical port as `secondary data module = n`, then assign the second channel on that same physical port as `secondary data module = y`.

  - 7400A: One port on a different TN754 is needed for every 7400A connection to the modem pool. These circuits are assigned to *combined modem pools*.
- *TN777:* One four-channel TN777 NC circuit pack on DEFINITY Generic 1 systems replaces the TN727 NC board used on System 75 systems. The TN777 NC is required on every system when 7400As and modem pools are used.
- Various analog-trunk interface boards may be used, including:
  - *TN747B:* CO Analog Trunk board (eight ports)
  - *TN753:* DID Analog Trunk board (eight ports)
  - *TN760B:* Analog tie-trunk interface to the CO (four ports)

System 85 and DEFINITY Generic 2 (traditional modules) require the following boards for analog Networking:

- *SN243B:* One port on a four-port SN243B Analog Data Port board is required for every modem connection to the switch.
- *SN255B:* The SN255B Tone-Detector board (Vintage 3) is required on System 85 PBXs or on DEFINITY Generic 2 systems that use a traditional module. The SN255B board allows the switch to detect 2100 Hz answer tone. The number of SN255Bs needed depends on traffic.
- *SN261C:* One SN261C (or SN261B) Analog/Digital Facilities Test Circuit (ADFTC) board is required *per system* for installation troubleshooting and running the modem-pool sanity test.

- *SN270B:* The four-port SN270B General Purpose Port (GPP) board is needed for two connections:
  - AUDIX ACC (TN366 or TN366B) or ACCE (TN539 or TN539B) board: Two ports on one GPP are needed. Because System 85 R2 and DEFINITY Generic 2 software allows an AUDIX system to use both I (information) channels (I1 and I2) of the port, the two ports support four AUDIX extensions.
  - 7400A: One port on a GPP is needed for every 7400A connection to the modem pool.
- Various analog-trunk interface boards may be used, including:
  - *SN230B:* Central Office (CO) Analog Trunk board (four trunks)
  - *SN232B:* Direct Inward Dialing (DID) Analog Trunk board (four trunks)
  - *SN233C:* Analog tie-trunk interface to the CO (four trunks)

Remote Networking to a CO

A 1A ESS Switch or 5ESS Switch in a CO can use AUDIX Networking to increase the number of available ports. The 25-pair cable connected to an AT&T digital PBX such as a System 75, System 75 XE, System 85, DEFINITY Communications System, or a MERLIN II, is called the AUDIX Network Controller (ANC). A MERLIN II is the preferred switch for this type of setup as shown in Figure 6-9, *AUDIX Networking in a CO*. However, an AUDIX with an ACCE board can also use the RS-232 ports for networking connections as shown in Figure 6-3, *Switched Connectivity to a Local Switch*.

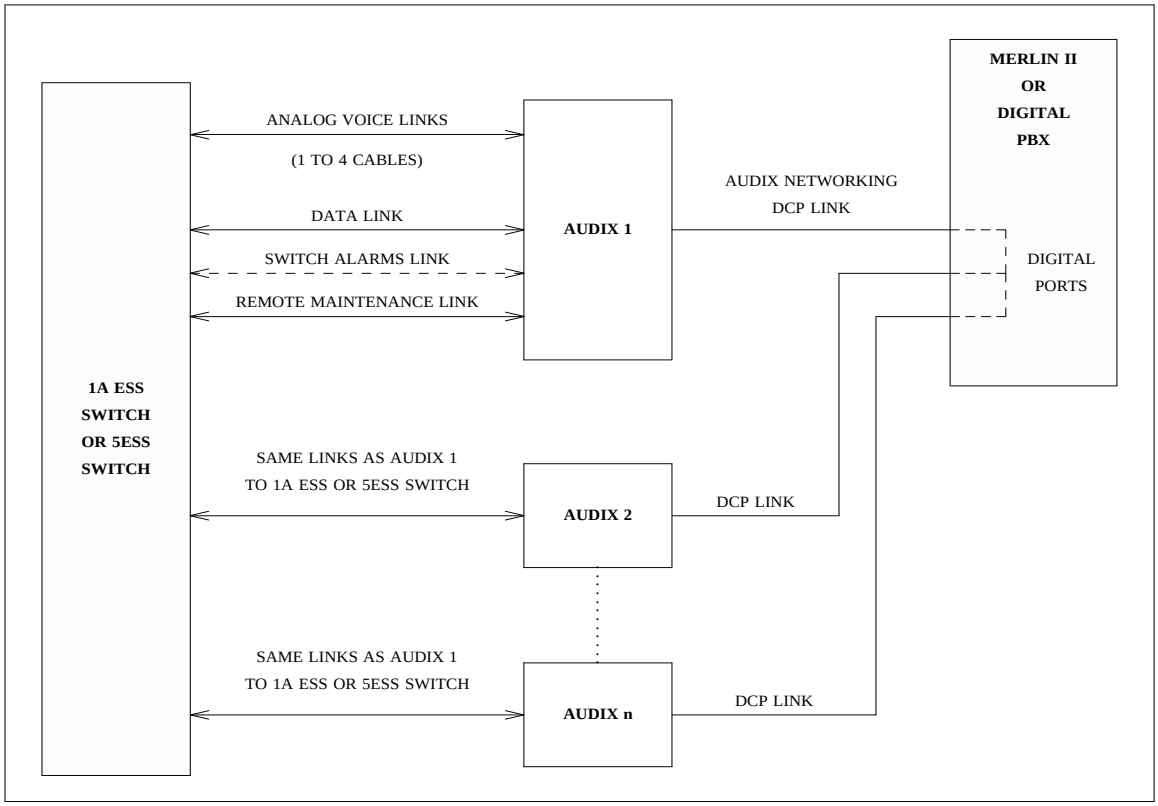


Figure 6-9. AUDIX Networking in a CO

DCS NETWORKS

Distributed Communications System (DCS) networking is a *switch* feature that allows feature transparency between two or more PBX switching systems. For the PBXs to work together, each switch (called a DCS *node*) must be connected to the other nodes in the DCS network (or *cluster*) with logical (channel) links.

A single AUDIX system can provide service for multiple switches in a DCS network. This is known as AUDIX transparency in a DCS network. DCS networks and AUDIX networking are two separate features. DCS and AUDIX networking can be done separately, or they can overlap as shown in Figure 6-10, *Sample DCS Network with an AUDIX System*.

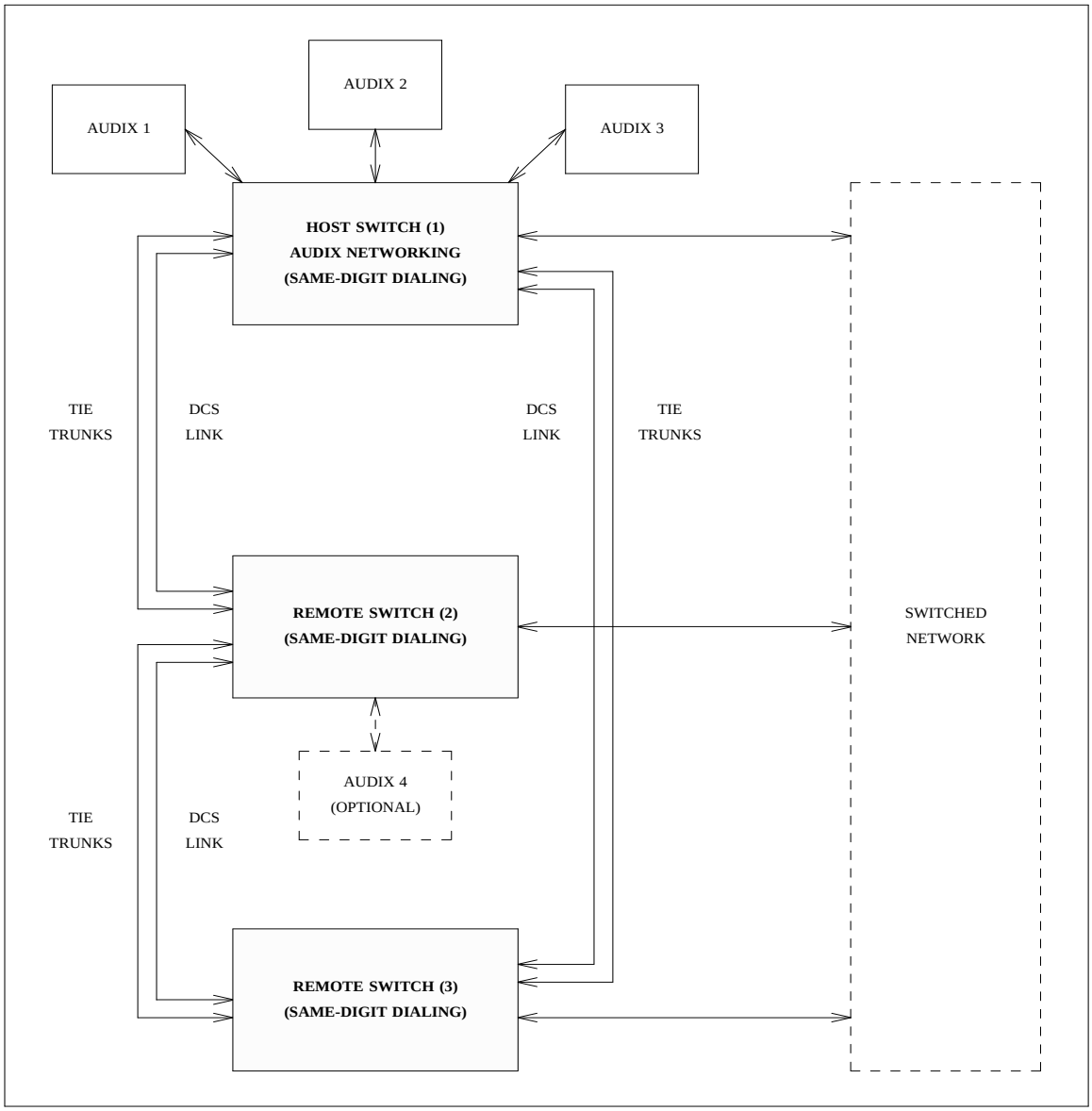


Figure 6-10. Sample DCS Network with an AUDIX System

Local and Remote Switch Feature Transparency

An AUDIX system can serve up to 20 switches in a DCS network. When more than one system is needed, different ones can be directly connected to the *host* or local switch, or to a remote switch. Adjunct AUDIX systems are usually administered to appear as one large system to subscribers. Full AUDIX feature transparency is always available for users on the host switch.

The degree of feature transparency between an AUDIX system and a remote switch varies according to the type of switch and the release of software used. For example, call coverage does *not* work from a remote DIMENSION PBX to an AUDIX adjunct on another switch, while System 85 R2V4 provides the necessary feature transparency for remote switches in a DCS network. The number of data links and AUDIX systems that each switch can support is listed below:

- *System 75, System 75 XE, and DEFINITY Generic 1, Generic 3i, and Generic 3s:* Only one AUDIX system can be directly connected to one of these switches through a data link. System 75, Generic 1, and Generic 3i/s support an AUDIX system as follows:
  - — *All:* The TN765 Processor Interface (PI) board offers four data links [including the Electronic Industry Association (EIA) port which allows direct access to *one* of its data links]. A fully integrated AUDIX system may use one link.
  - — *System 75 Only:* The Switch Communications Interface (SCI) provides four data links. A fully integrated AUDIX system may use one link.

NOTE

System 75, Generic 1, and Generic 3i/s switches can support *one* directly connected AUDIX systems or *one* remote system. However, multiple switches can share a system. For example, AUDIX 1 may be directly connected to Switch 1, and AUDIX 2 can be directly connected to Switch 2. In a multiswitch DCS network, subscribers for AUDIX 1 or AUDIX 2 can be located on Switch 1, 2, 3, etc.

- *System 85 R2V2 or R2V3 and DIMENSION PBX:* Up to four AUDIX systems can be fully integrated over a data link per switch.
  - — *System 85 R2V2 and R2V3:* The Data Communications Interface Unit (DCIU) is limited by software to four AUDIX systems.
  - — *DIMENSION PBX:* Two LC505 boards must be installed to provide four data links for adjuncts or DCS nodes.

NOTE

A System 85, DEFINITY Generic 2, or DIMENSION PBX can support up to 20 AUDIX systems (1 local, 19 remote) in a DCS network, depending on system engineering.

- *System 85 R2V4, Generic 2, and Generic 3r:* Up to eight AUDIX systems can be fully integrated over a data link per switch (the DCIU and PGATE boards each support eight data links).

System 75, Generic 1, and Generic 3i/s Considerations

System 75 R1V3 has been enhanced starting in Issue 1.4 to support centralized AUDIX service in a DCS network. One AUDIX system can support users on *all* switches in the DCS cluster; that adjunct can answer calls from any DCS node that supports an AUDIX system. One local system and one remote system can be in the network; these can support subscribers on any of the switches. A DCS network could be divided so that different AUDIX systems support one or more switches independently, but every System 75, Generic 1, or Generic 3i/s switch in the network can access only a single system (the system on the host switch, or a centralized system in the DCS network).

System 85, Generic 2, and Generic 3 Considerations

System 85 R2V3, R2V4, Generic 2, and Generic 3 fully support a centralized AUDIX system in a DCS network. In addition, these switches (except for System 85 R2V3) support additional AUDIX features such as Call Transfer Into AUDIX and Enhanced Call Transfer Out of AUDIX.

System 85 R2V4, Generic 2, and Generic 3 switches also support Enhanced Services (ES) signaling. With an end-to-end ES connection, AUDIX information can piggy-back on the DCS channel with other data (hop channels are *not* needed on the host for AUDIX systems in a DCS network that uses ES signaling).

In some cases, if a mixed-system DCS network includes feature-transparent switches, the AUDIX adjunct can be placed on a *non*transparent switch. For example, if the DCS cluster contains both System 85 R2V2 and R2V3 switches, the AUDIX system can be placed on the System 85 R2V2 switch. Most AUDIX features can then work transparently from the remote R2V3 to the AUDIX system on the host R2V2.

Tie Trunk Impact

A critical consideration when configuring an AUDIX system in a DCS network is the potential traffic increase from the remote switch(es) to the host switch that serves the AUDIX system. Tie trunk use should be carefully evaluated to make sure that access blocking is minimized. The overall traffic patterns of the DCS network may also change because of AUDIX use.

NOTE

A DCS application needs engineering support to properly size the AUDIX system, determine the optimum number of tie trunks, and perform processor occupancy configurations on the systems involved. The GBCS Design Center should estimate the impact of an AUDIX system on a DCS network.

7. Site Preparation

Suitable environmental, equipment room, and electrical facilities must be considered before an AUDIX system can be installed. This chapter provides information to use when planning a new installation, and gives a general review of the installation process.

ENVIRONMENTAL CONSIDERATIONS

Because of its disk drives and removable cartridge, each AUDIX system requires a space that meets or exceeds the environmental conditions needed for a switch. Not only must the equipment room environment be evaluated, but suitable storage conditions must also be met prior to installation. Table 7-1, *AUDIX Environmental Requirements*, lists environmental requirements necessary for an AUDIX system to function normally.

Table 7-1. AUDIX Environmental Requirements

Environment	Limits
Altitude	200 feet (60 m) below sea level 10,000 feet (3050 m) above sea level
Temperature	–40 to 150°F storage temperature 65 to 85°F (18 to 29°C) operating temperature * †
Humidity	10 to 80 percent (noncondensing) * 79°F (26°C) maximum wet-bulb temperature
Air Quality	No cigarette smoke, corrosive gasses such as sulfur and chlorine, or excessive dust, lint, carbon particles, paper fiber and metallic particles (these contaminants are produced by copiers and FAX machines)
Sound Level	Should not exceed 90 decibels

* AUDIX equipment can operate at temperatures or humidity outside of the recommended range for no more than 72 hours or a total of 15 days in one year.

† While under operation, AUDIX equipment should not be exposed to a gradient temperature of more than 20°C (68°F) per hour.

NOTE

Conditions that do not meet these limits may reduce system life or impede system operation. The Account Team must be consulted if the normal limits cannot be met.

Based on local code, earthquake protection may be required for cabinets over four feet (1.2 m) in height. For two-cabinet AUDIX systems or one- to two-cabinet upgrades, earthquake-protection parts are ordered and installed as follows:

- *One-cabinet AUDIX system:* Only two floor bolts are needed for adequate earthquake protection.
- *Two-cabinet AUDIX system:* A front cabinet plate must be installed or ordered instead of the front cabinet (AUDIX drawing J58886U-1 List H).
  - — On some two-cabinet AUDIX upgrades, four holes must be drilled over the documentation slot in the base cabinet to attach the front cabinet plate. Two additional holes may also need to be drilled under the power supply of the top cabinet.
  - — No more than *two* AUDIX cabinets can be stacked and still provide earthquake protection. A one-cabinet system can be stacked with a System 75 XE if the XE's front cabinet plate is used to connect the cabinets; metal washers may be required under the AUDIX cabinet screws.
  - — Earthquake protection hardware must be installed and the base cabinet bolted in place *before* the expansion cabinet is added. Two cabinets, once they are attached, should never be moved.
- *Concrete Floors:* All four corners of the AUDIX base cabinet must be anchored to a concrete floor using the bolts and floor-anchor hardware contained in ED-1E496-70 Group 5 (AUDIX drawing J58886U-1 List G). Four 3/8-16 by 2 3/4-inch (7-cm) long bolts fasten the cabinet to the floor; one or more disk drives may need to be removed to access the holes in front, and the power supply must be shifted to access the two holes in the rear.
- *Raised Floors:* Earthquake protection may be possible on a *conditional* basis (subject to local code) if all four corners of the base cabinet are anchored to a concrete subfloor using the hardware in ED-1E496-70 Group 4 (AUDIX drawing J58886U-1 List M). This group includes four 24-inch (60-cm) threaded rods, which must be cut to size. The mounting arrangement should be certified locally.

CAUTION

Any exposed components on the AUDIX system must be protected with a plastic sheet during the drilling process. All metal filings and drilling debris must be removed prior to powering up the system, otherwise the disk drives or other equipment could be damaged. For one-cabinet AUDIX upgrades, some vendors require the system to be removed from the equipment room prior to drilling cabinet holes. Warranty conditions should be checked with the customer.

Figure 7-1, *Earthquake Zones in the Continental United States*, shows earthquake zones in the United States according to severity. Equipment in zones 0 and 1 typically never requires earthquake protection.

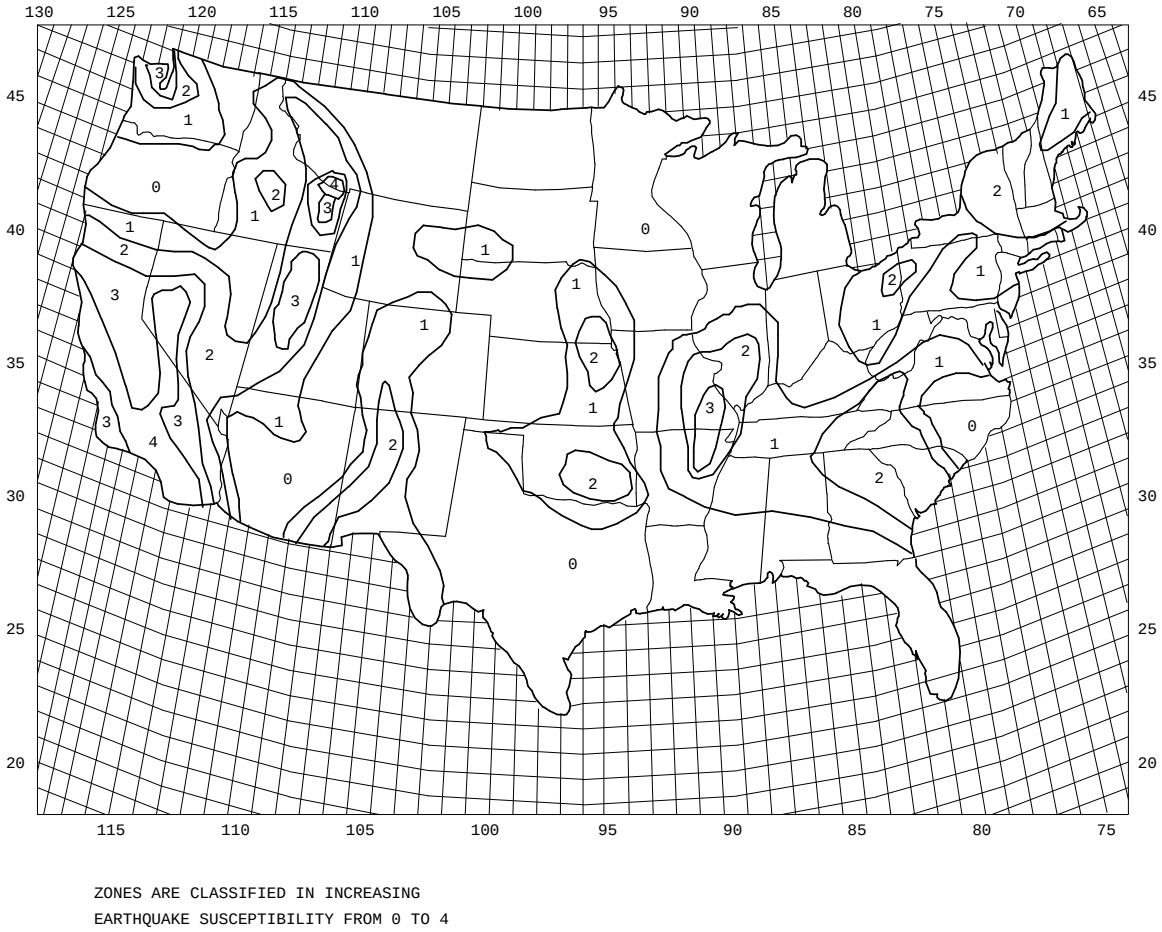


Figure 7-1. Earthquake Zones in the Continental United States

EQUIPMENT ROOM PREREQUISITES

An AUDIX system must be set up in a clean environment that is moisture proof and as near dust free as possible. The equipment must not be located in or near:

- Radio transmitters with a field strength in excess of 0.05v per meter, measured at the proposed equipment location
- Commutator motors rated at more than 1/4 horsepower (187 watts), industrial RF heating equipment and welders

NOTE

Small tools with universal motors, motors without commutators, whether synchronous or asynchronous, are not included.

- Locations susceptible to flooding
- Areas where equipment might be subjected to excessive vibrations or struck by moving equipment such as hand trucks or transporters
- Areas with an explosive or flammable atmosphere
- Photocopiers or FAX machines

Cabinet Dimensions

The AUDIX cabinets have the following dimensions. These measurements should be considered when designing a floor plan.

- *One-cabinet AUDIX system:* This cabinet measures 27 inches (69 cm) in width and 22 inches (56 cm) in depth. The cabinet is about 22.5 inches (57 cm) in height, plus another two inches (five cm) for the floor-mount cabinet feet (default). If desired, 7/8-inch (2.2-cm) desk-mount or stackable-module (cabinet-mount) feet can be ordered instead.
- *Two-cabinet AUDIX system:* The footprint of the two-cabinet system is the same as that of the one-cabinet system. The total two-cabinet height is about 49 inches (125 cm).

NOTE

The 7/8-inch (2.2-cm) desk-mount cabinet feet are *always* installed on the expansion cabinet. On a new two-cabinet system, the 2-inch (5-cm) floor-mount cabinet feet are always shipped with the base cabinet.

The one- and two-cabinet system front covers lift straight up. No extra room is needed for the covers to swing open. Service personnel, however, must have room to work in front and in back of the cabinets.

Cables and Ductwork

The following guidelines should be considered for cable connections and ductwork:

- *AUDIX one- or two-cabinet* connectors are shipped ready for cables to run downward under a raised floor, over a regular floor, or through cable-slack managers (if already installed on a System 75 or System 75 XE).
- If overhead ductwork is used, the AUDIX D-type (25-pair Amphenol) connectors can be reversed so the cables can dress upward (the connectors snap in and out).
- A one- or two-cabinet system requires no overhead cable-support racks or ductwork; a tall ceiling therefore is not required. However, AUDIX cables may be run through installed overhead ductwork if desired to conform to the rest of an equipment room setup.
- In most setups, an AUDIX cabinet is best placed at the end of the line-up. The cables are then dressed upwards next to the last tall cabinet.
- Ductwork is *not* required for System 75, System 75 XE, Generic 1, or Generic 3 switch installations with a one- or two-cabinet system.
- Additional ductwork is needed if an AUDIX cabinet is placed near a wall or if the cabling must cross an aisle to another line-up.
- Endcaps must be ordered for an out-of-line-up or remote setup that uses ductwork.
- Ductwork can be ordered with 120 VAC power outlets if utility receptacles are needed for service personnel.

Floor Loading and Terminal Placement

An architectural engineer should certify that a floor can safely support the cabinet(s). This is especially critical for side-by-side cabinet arrangements on System 75 XE or Generic 3s, where an AUDIX cabinet weighs more than the switch cabinet. Additional aisle space may be needed to meet floor load requirements.

- *One-cabinet AUDIX system:* The floor load is 48 pounds (22 kg) per square foot (psf) for the cabinet footprint. A fully equipped cabinet weighs about 200 pounds (91 kg). Each foot of the cabinet exerts a pressure of about 50 pounds (23 kg) per square inch (psi).
- *Two-cabinet AUDIX system:* A fully equipped two-cabinet system weighs about 385 pounds (175 kg). The two-cabinet system floor load is 90 pounds (40 kg) psf for the cabinet footprint. Each foot of the lower (base) cabinet exerts a pressure of about 90 pounds (40 kg) psi.
- *Terminal:* The Local Maintenance Terminal (LMT), Personal Computer (PC), or Work Group Station (WGS) must be placed within sight of the AUDIX circuit packs and Light Emitting Diodes (LEDs), usually on a nearby table or cart.
  - — The maximum cable length allowed from a terminal directly cabled to the AUDIX maintenance port is 50 feet (15 m).
  - — If a one- or two-cabinet system is located on a low table or the floor, the LMT may be placed on top of it instead of on a separate facing table as long as the terminal can be easily used.

Distance Limitations

Table 7-2, *AUDIX System and Switch Component Distance Limitations*, lists different AUDIX, switch, and peripheral components and their distance limitations.

Table 7-2. AUDIX System and Switch Component Distance Limitations

Component	PBX	Distance Limitation
Switch:		
Alarm Link	All	4900 total cable feet (1493 m) to alarm facilities
Analog Port Boards TN742, TN769	System 75, XE, Generic 1 & 3	Ranges from 13,000 feet (3962 m) on 26-gauge wire to 20,000 feet (6100 m) on 24-gauge wire
TN746B	System 75, XE, Generic 1 & 3	Ranges from 2000 feet (610 m) on 26-gauge wire to 3100 feet (945 m) on 24-gauge wire
SN222, SN222B, and SN229	System 85, Generic 2	3500 feet (1067 m) on 24- or 26-gauge wire
SN228, SN228B	System 85	Ranges from 9000 feet (2743 m) on 26-gauge wire Generic 2
LC02, LC03	DIMENSION PBX	Ranges from 13,000 feet (3962 m) on 26-gauge wire to 20,000 feet (6100 m) on 24-gauge wire for one 2500-type phone; limited by –48 V ringing voltage
Data Devices:		
Z3A ADU	All (hard-wired) or	1200 bps: 16,000 feet (4875 m) on 26-gauge wire or 20,000 feet (6100 m) on 24-gauge wire
	System 75/85 (switched access)	4800 bps: 6000 feet (1827 m) on 26-gauge wire or 7000 feet (2134 m) on 24-gauge wire
DSU	All (hard-wired)	Varies; at 9600 bps, 5.6 miles (9 km) on 26-gauge wire, or 7.3 miles (11.7 km) on 24-gauge wire
MPDM, MTDM	All	4000 feet (1220 m) on 26-gauge wire, or 5000 feet (1524 m) on 24-gauge wire
Cables:		
25-Pair Cable	All	Maximum orderable length is 200 feet (60 m)
DCP Links (Networking)	All	4000 feet (1220 m) on 26-gauge wire, or 5000 feet (1524 m) on 24-gauge wire
IDI Cable	System 75, XE, Generic 1, 2, & 3 System 85, DIMENSION	RS-449 to RS-232C extender cable may be up to 400 feet (120 m) from the AUDIX port to the switch port, depending on cable group (see Appendix A)
RS-232C Cable	All	EIA specification recommends 50-foot (15 m) limit

POWER AND GROUND REQUIREMENTS

Power requirements for an AUDIX system depends on its internal configuration, the power supply efficiency, and external factors such as the resistance of the wire that feeds the AUDIX cabinet(s). Table 7-3, *AC and DC Power Requirements*, shows the allowable power ranges for an AUDIX system.

Table 7-3. AC and DC Power Requirements

Power Supply	Minimum Value	Typical Value	Maximum Value	Worst Case Variables
VAC	104	117	129	– 10 %
VDC	42.0	52.0	52.5	– 20 %
Power Factor (pf) (AC input only)	.60	.65	.95	– 8 %
AC and DC Efficiency (varies per vendor)	.65	.70	.85	– 7 %

Table 7-4, *AUDIX Sample Steady-State AC/DC Input and BTU Measurements*, shows sample steady-state input values and British Thermal Unit (BTU) measurements for AC- and DC-powered AUDIX systems. These figures should be used as a guide for:

- Ordering air conditioning equipment
- Determining the power outlets needed in the equipment room
- Sizing the backup power requirements for either AC- or DC-powered systems

Some cooling considerations include:

- Air should not be blown directly at the AUDIX cabinet(s); this may interfere with the normal cabinet air-flow pattern.
- Personnel and external equipment (such as terminals and other cabinets) also affect air cooling planned for an AUDIX system and should be considered.

Table 7-4. AUDIX Sample Steady-State AC/DC Input and BTU Measurements

AUDIX System	Number of Drives	Number of Ports	Base/Expansion Watts *	AC [DC] Base/Expansion Amps	Total BTUs per Hour †
One Cabinet					
min. config.	2	4	475	6.2 [9.1]	1621
2 HDDs, 8 ports	3	8	554	7.2 [10.7]	1891
plus 4 ports	3	12	606	7.8 [11.7]	2067
max. config.	4	16	685	8.9 [13.2]	2337
Two Cabinet					
cab. only	4	16	673/138 ‡	8.7/1.8 [12.9/2.7]	2767
plus 8 ports	4	24	673/237	8.7/3.2 [12.9/4.6]	3107
plus HDD 0/4	5	24	673/268	8.7/3.6 [12.9/5.2]	3211
plus HDD 0/5	6	24	673/349	8.7/4.7 [12.9/5.7]	3489
max. config.	7	32	673/428	8.7/5.7 [12.9/8.2]	3757

Notes:

* These input values are based on an AC power supply power factor of .65. Numbers were calculated using the formula power = volts × amps × pf, Where *power* = watts and *pf* = power factor (.65).

A DC power supply always has a power factor (pf) of *1*, so the input values were calculated using the formula power (watts) = volts x amps.

† Heat dissipation is measured in BTUs. BTUs required per hour (Btuh) can be calculated once the steady-state watt value is known using the formula: Btuh = (steady-state watts) × 3.412.

To find the *maximum* BTUs per hour, add 30 percent to the typical figures shown (a more than 30 percent increase is highly unlikely). For example, a maximum configuration would not generate more than 4884 BTUs per hour.

‡ The two-cabinet model lists AC/DC watts and amperes for each cabinet separately. The power in the one-cabinet model changes when some of its circuit boards are moved to the expansion cabinet.

To find the *worst case* figures for AC power, add 26 percent to these numbers For example, up to 863 watts and 11.2 amps for a one-cabinet system. For DC power, add 30 percent to these numbers For example, up to 17.1 amps for a one-cabinet, 16.8 amps for a base two-cabinet, and 10.7 amps for an expansion cabinet. See Table 7-3, *AC and DC Power Requirements*, for worst-case variables (such as low battery-plant output).

AC Power Requirements

An AUDIX system using AC power requires the following:

- Each cabinet requires 120V (+10/–15 percent), single-phase, 60-Hz (±3-Hz), 15- or 20-amp service from an AC load center.

  NOTE

  The AUDIX internal AC breaker was a 10-amp breaker; current systems use an internal 15-amp breaker, and early systems are required to upgrade to the 15-amp fuse per QPPCN 363DR. When the 15-amp fuse is installed, only 20-amp AC service can be used.

- In a two-cabinet AUDIX system, each power cord must be plugged into a separate 15- or 20-amp branch circuit terminating in a standard 120 VAC, single-phase, 60-Hz wall outlet.
- If 20-amp branches are used, both cabinets may be connected to the same branch using standard wall outlets. However, no other equipment (such as the LMT) should be plugged into one of these shared outlets.
- Chassis and logic grounds are tied together to a single point at the load center. An AC protector ground on the AUDIX cabinet is optional for most AC-powered AUDIX systems.
- The AC load center and nonfusible disconnect switch should be located in the same room as the AUDIX cabinet if possible to minimize power cable lengths.
- For AUDIX cabinets installed in systems with a DC/AC inverter from a battery plant, the AC-powered AUDIX system is treated as a normal AC installation. The AC ground(s) must use the same single-point ground and approved ground as the switch and battery plant. AC- and DC-powered cabinets may not be hooked up in the same line-up.
- As shown in Figure 7-2, *Sample AC Hookup to Two-Cabinet AUDIX System*, all AC-powered AUDIX systems may be installed behind an AT&T Uninterruptible Power Supply (UPS). The UPS provides continued service through brief AC power interruptions. An AT&T 1-KVA UPS can support a one-cabinet AUDIX system with two hard disks and 10 voice ports. Any larger one-cabinet AUDIX configurations and all two-cabinet AUDIX configurations use the 3 KVA model, which supports up to 25-amp loads.

  For further information about AT&T Uninterruptible Power Systems, see *Standby Power Systems Product Manual* (555-035-301).

Additional outlets needed for peripheral equipment must meet the following requirements:

- Outlets must not be controlled by a switch or shared with other equipment. They should be located outside of the cross-connect field area.
- Service personnel often require additional 120 VAC, 60-Hz power outlets for test equipment. Outlets may be installed under a raised floor or in the overhead ductwork if needed.
- Peripheral equipment may require additional outlets (for example, data link devices and AUDIX terminals. Equipment requirements must be checked).

CAUTION

Data equipment and signals must be isolated in AC-powered setups. No direct copper connections may be made outside of the cabinet to other equipment. Outside devices such as the Isolating Data Interface (IDI) or Data Service Unit (DSU) provide needed isolation.

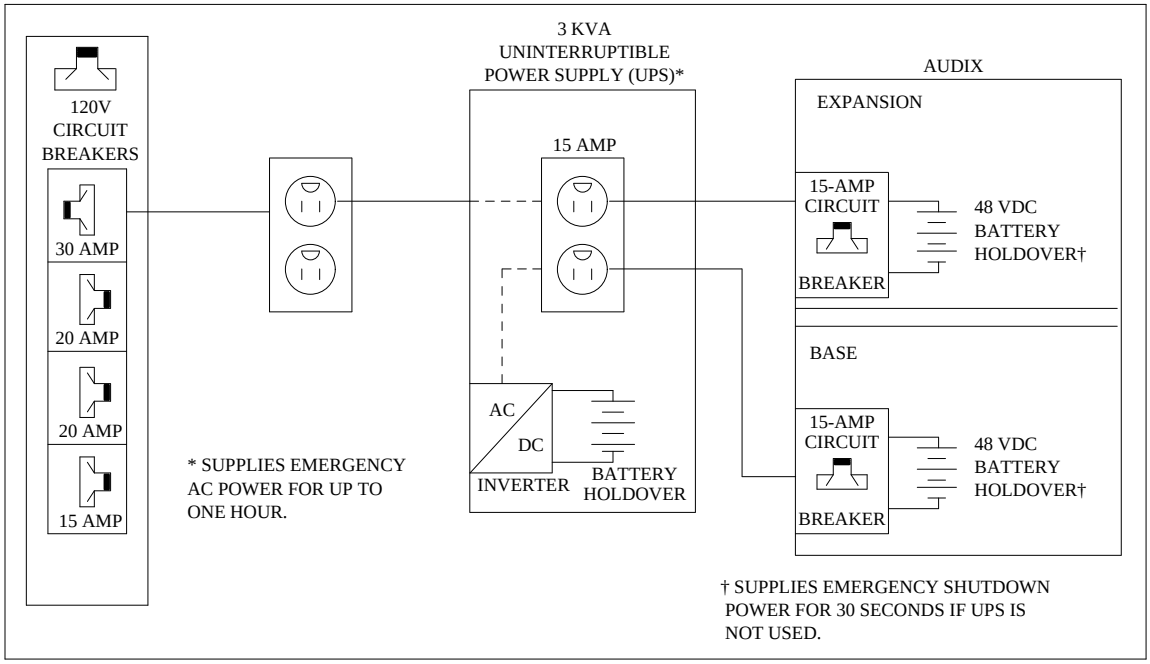


Figure 7-2. Sample AC Hookup to Two-Cabinet AUDIX System

DC Power Requirements

A one- or two-cabinet AUDIX system can be ordered with or upgraded to use -48 VDC. As shown in Figure 7-3, *AUDIX DC Power and Ground Connections*, this DC power is usually provided by a battery plant installed for a switch. The battery must have sufficient capacity to also support the AUDIX system. Its size should be based on the AUDIX system typical steady-state DC power draw and the desired holdover time.

Each AUDIX cabinet requires:

- One 30-amp –48V single-pole dedicated circuit.
- Either the AC protector cabinet (if installed) or AC load center ground which has a single-point ground connected to an approved ground. The ground discharge bar in the battery plant must be connected to this single-point ground. Two connections must be made:
  - — The AUDIX -48 VDC return must connect to the ground discharge bar on the battery plant.

— The AUDIX gutter tap must connect to the same single-point ground and approved ground as the battery plant.

- Power cables that should be locally engineered for less than 4 percent (2.08 VDC) voltage drop at 30 amps for each cabinet.
- Two 6-American Wire Gauge (AWG) cables, recommended for each cabinet (this is the largest size that will connect to the AUDIX terminal block). However, cables as small as 10 AWG can be used if the AUDIX cabinet is close to the battery plant.
- Typically, the gutter-tap cable is never smaller than the input cables (for example, 6 AWG).
- The main GWG cable is usually 2 AWG.

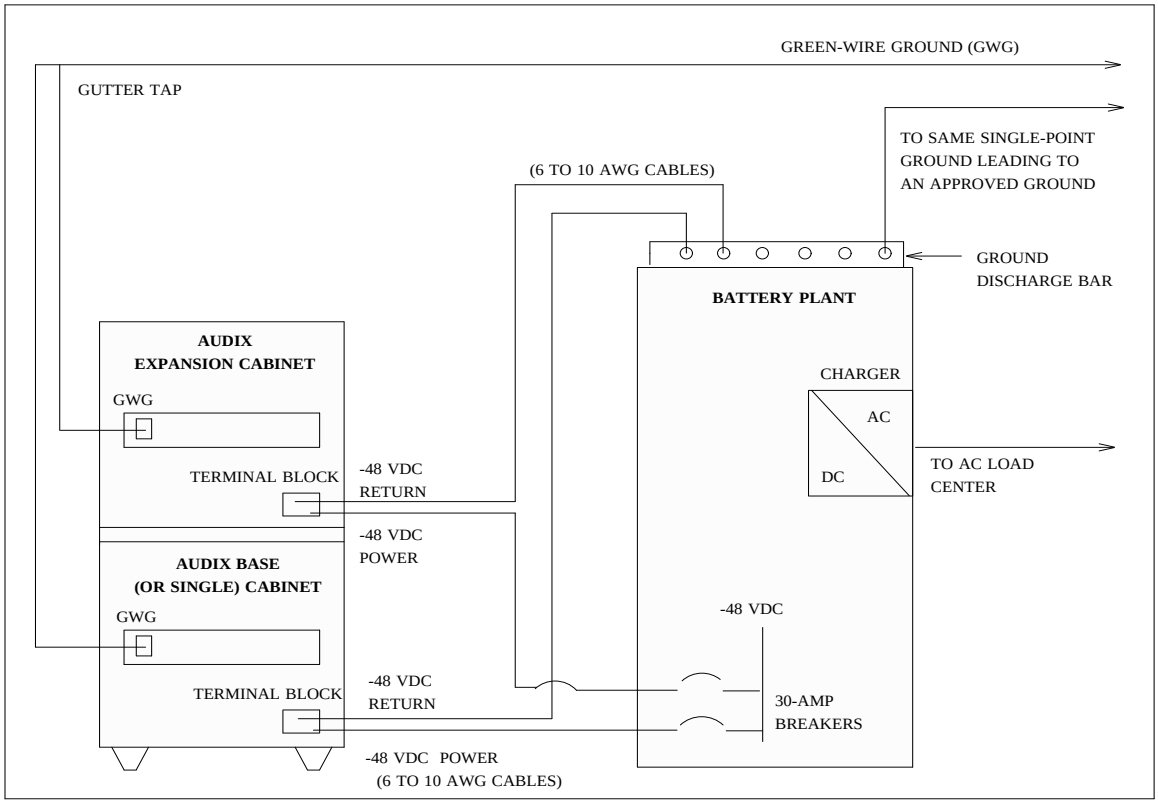


Figure 7-3. AUDIX DC Power and Ground Connections

AUDIX FLOOR PLANS

The following section discusses various local and remote floor plans.

Local Floor Plans

A local (or colocated) installation usually means that the AUDIX cabinet is placed in the same room as the switch. A local installation must meet the following criteria:

- An AUDIX system shares the cross-connect (wall) fields used by the switch
- An AUDIX system shares a suitable environment
- An AUDIX system shares the AC or DC power source equipment already available for the switch
- An AUDIX system is part of a switch cabinet line-up or in a near-by line-up where the ductwork connects to other System 85-type ductwork

NOTE

The one- or two-cabinet AUDIX models do not need ductwork and can be placed in any convenient spot in a switch room or closet. An AUDIX system installed in a nearby or adjoining room may be considered local if it shares the switch's cross-connect fields and power.

If an AUDIX system does not meet any of the above criteria, it is treated as a remote installation. Thus, a room air conditioner may need to be ordered if the AUDIX cabinet is in an adjoining but separate room.

System 75, Generic 1, and Generic 3i/s Floor Plan

Figure 7-4, *Floor Plan for Local AUDIX System, System 75, Generic 1, or Generic 3i/s*, shows a sample floor plan for an AUDIX system installed with a System 75, System 75 XE, or DEFINITY Generic 1, Generic 3i, or Generic 3s switch. This type of setup usually follows System 75 Release 1 equipment room requirements.

Preferably, a System 75 XE or Generic 3s and a one-cabinet AUDIX system should not be stacked. Because each uses different grounding schemes, the cabinets should be separated to provide maximum noise immunity margins for the disk drives.

If the cabinets *must be* stacked, these guidelines should be followed:

- The AUDIX cabinet can be physically placed below or on top of a modular System 75 (System 75 XE) or Generic 3s.
- The 7/8-inch (2.2-cm) desk-mount cabinet feet *must* be used. These feet are optional on a one-cabinet AUDIX system, but the default cabinet-foot size is *always* the 2-inch (5-cm) floor-mount cabinet feet. For stacked applications, the small-cabinet feet must be specially ordered.
- Cabinets should never be stacked more than three high (i.e., two modular System 75 cabinets and one AUDIX cabinet).

CAUTION

Cabinets should **never** *be stacked more than two high in an earthquake-prone area (e.g., a one-cabinet AUDIX system and a switch cabinet, or one two-cabinet AUDIX system). See the* **Environmental Considerations** *section for more information on earthquake zones and installation procedures.*

- Both the switch cabinet and the AUDIX system *must* be serviced from the same AC load center.
- An IDI is always needed for isolation in the switch data link.

NOTE

If an AUDIX system is located on a low table or the floor, the LMT may be placed on top of it instead of on a separate facing table as shown in Figures 7-4 through 7-7.

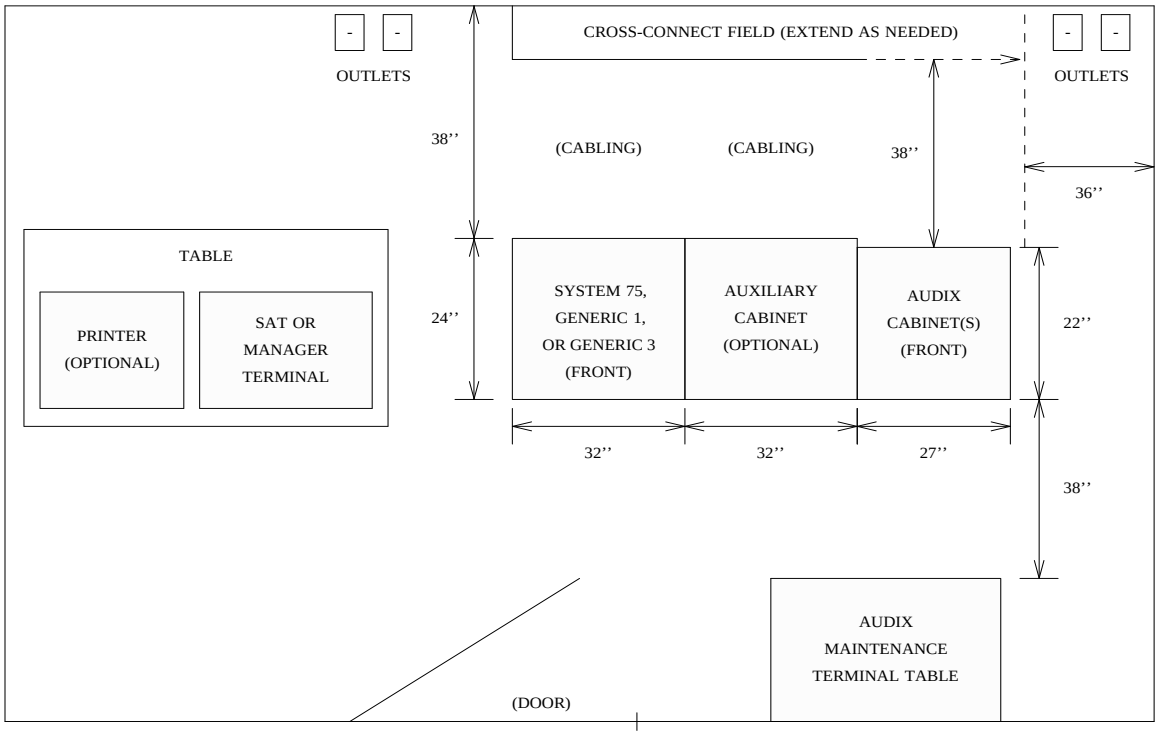


Figure 7-4. Floor Plan for Local AUDIX System, System 75, Generic 1, or Generic 3i/s

Generic 2 (Universal Modules) or Generic 3r Floor Plan

Figure 7-5, *Floor Plan for Local AUDIX System and Generic 2 or Generic 3r*, shows a sample floor plan for a local one- or two-cabinet AUDIX system installed with a DEFINITY Generic 2 that uses universal modules or a Generic 3r. On a Generic 2 system, the universal modules are contained in a single cabinet, eliminating the need for port cabinets. The Applications Processor (AP) and Time Multiplexed Switch (TMS) cabinets are also not used for DEFINITY Generic 2 systems.

The I/O cross-aisle ductwork can be ordered in two sizes, leaving about 38 inches (97 cm) or 48 inches (122 cm) of aisle space between cabinets. The total space from the front of one row to the front of the next would therefore be 62 inches (157 cm) or 72 inches (183 cm). An I/O duct to the wall requires 43 inches (109 cm) of space; if ladder racks are used, they can be sized as needed.

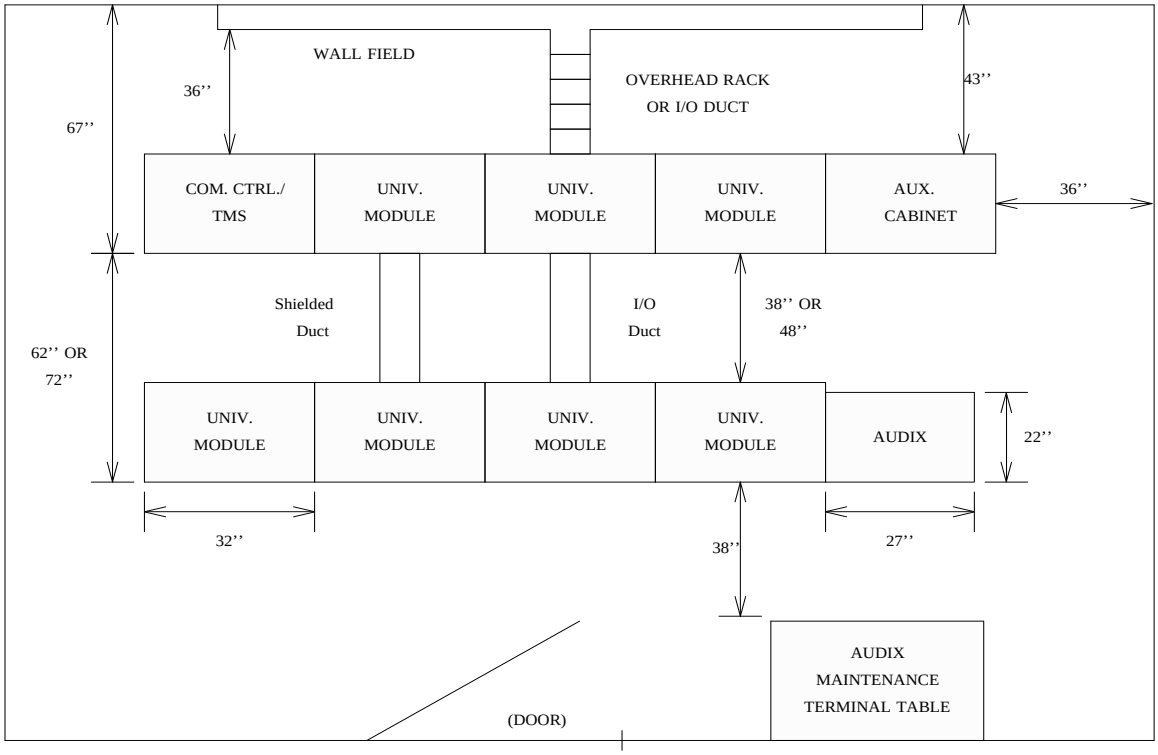


Figure 7-5. Floor Plan for Local AUDIX System and Generic 2 or Generic 3r

System 85 or Generic 2 (Traditional Modules) Floor Plan

Figure 7-6, *Floor Plan for Local AUDIX System and System 85*, shows a sample floor plan for a one- or two-cabinet AUDIX system installed in the same room with a System 85 or a DEFINITY Generic 2 with traditional modules. This setup generally follows System 85 Release 2 equipment room requirements.

Because the one- and two-cabinet AUDIX systems are smaller than the switch and need no overhead ductwork, the AUDIX cabinets should be placed at the end of the line-up. The cables can then be run up the side of the adjacent cabinet and use the overhead ductwork. Ductwork can be ordered for System 85s that have been upgraded from an R1 to R2.

NOTE

An AUDIX system cannot be in a line-up with a DIMENSION PBX because each uses a different single-point ground. The cabinets must be placed five feet from each other.

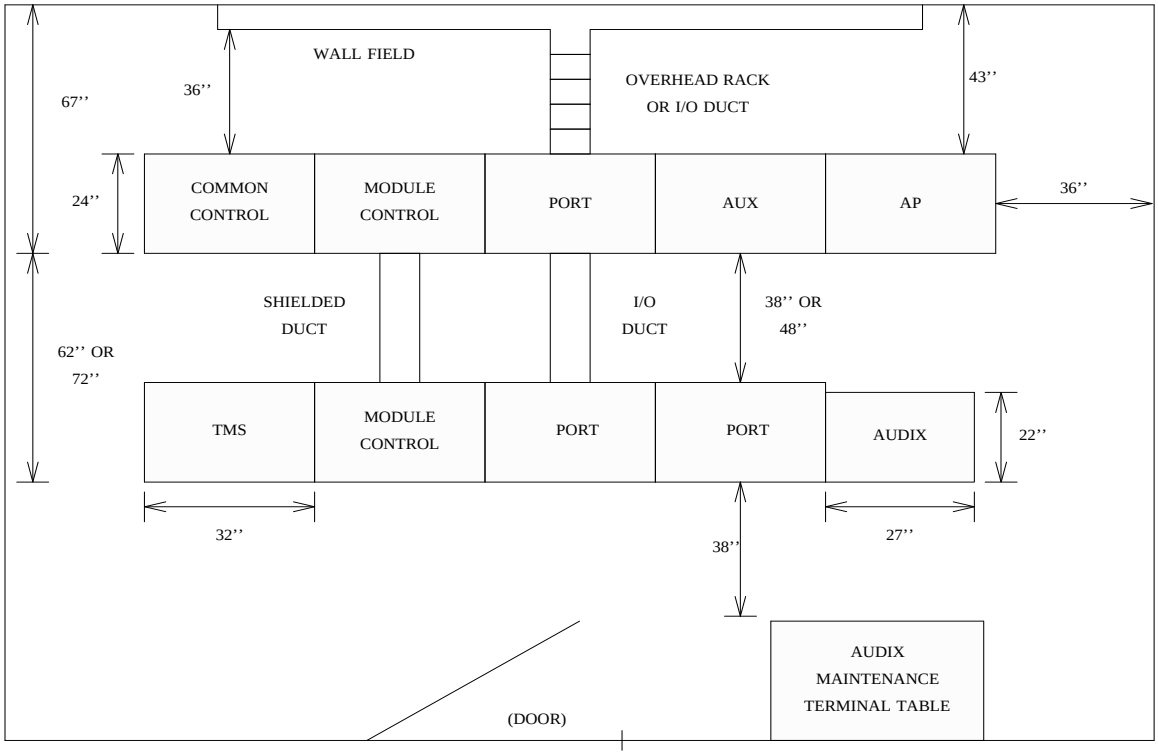


Figure 7-6. Floor Plan for Local AUDIX System and System 85

Remote Floor Plan

A remote installation usually refers to an AUDIX cabinet installed in a separate room some distance from the switch. All remote installations must meet the conditions described earlier in this chapter. Figure 7-7, *Sample Floor Plan for a Remote AUDIX System*, shows a sample floor plan for a remote one- or two-cabinet AUDIX system.

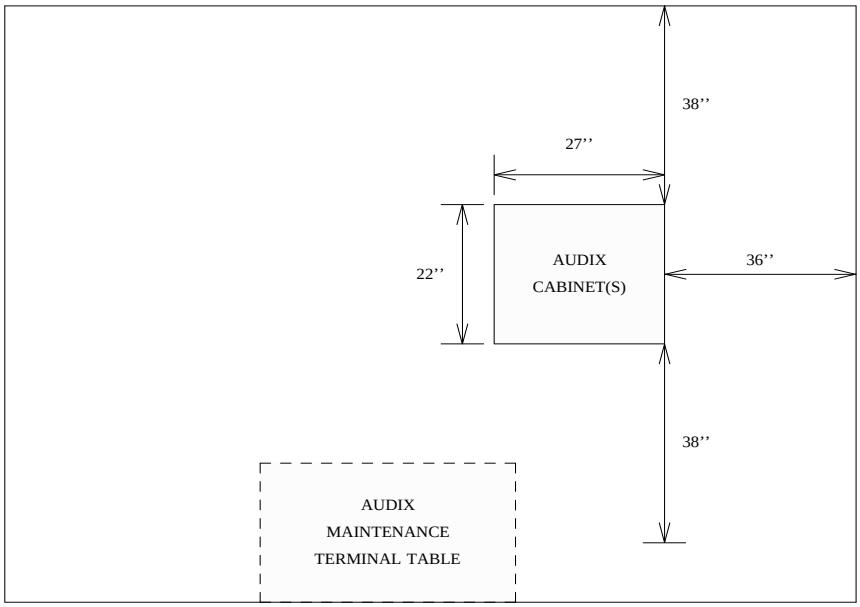


Figure 7-7. Sample Floor Plan for a Remote AUDIX System

Special considerations include:

- The remote equipment room *must* be located in the same building as the switch (with the exception of a 1A ESS, 5ESS, or non-AT&T switch). Use the previous *Distance Limitations* section to find the limiting distance factor for a remote AUDIX system.
- If an AUDIX cabinet is located on a low table or the floor, the LMT may be placed on top of it instead of on a separate facing table.
- Cross-connect field attachments must be provided.
- Building wiring connects the AUDIX wall field with the switch wall field. Some switches may need adapters to convert AUDIX 4-pair modular cords to 2-pair wiring.

  If desired, the number of cables can be reduced to conserve wiring (a full AUDIX configuration requires about 40 pairs, or two 25-pair cables).

8. Sizing an AUDIX System

Before ordering or configuring an AUDIX system, the Account Team must have a good idea of the size and type of system the customer needs and whether or not multiple adjuncts are required. The AUDIX size and model depends on the usage patterns of the subscriber population, their service requirements, and the eventual capacity that will be needed. This chapter describes user population factors and equipment requirements.

ESTIMATING AUDIX DEMAND

The user demand for AUDIX facilities can only be estimated when configuring a first-time AUDIX installation. The actual use can be calculated more precisely after a system is installed through the reporting features discussed in this section. For a new AUDIX installation, the Account Team must get a general feel for the type of user population prevalent at the customer's facility and their service demands *before* an AUDIX system is ordered. To help determine the type of user population dominant at the facility, the following factors must be considered to come up with a general estimate.

- How many people will be AUDIX subscribers? (This is the number of Voice Mailboxes needed.)
- How many people are light, medium, or heavy phone users? How many hours per day do people actually spend on the phone? (This affects the number of ports and disks needed.)
- How long would messages need to be kept on disk for reference? (This affects the amount of disk space needed.)
- How many phone messages are currently generated on paper? What is the length of most messages? (This affects the amount of disk space needed.)
- How many messages are lost or never taken because the caller's desired contact was busy or out of the office? (The Call Answer feature may be needed.)
- If the Call Answer feature is needed, how many subscribers would use it? How many internal and external callers would use it? (This affects the number of ports and disks needed.)
- Would the organization use an announcement or bulletin board service? (The Bulletin Board feature may be needed.)
- Will the Automated Attendant or Outcalling features be used? (This affects the number of ports needed.)
- Is there a need to send out regular notifications or reports on standard distribution lists? How many different lists would be used? How long are the reports? (This affects the Voice Mailbox and disk space requirements.)

DEFINING THE USER POPULATION

AUDIX subscribers are divided into three groups for configuration calculation purposes: light, medium, and heavy. These designations indicate how long users are typically connected to one of the AUDIX voice ports and how much disk space they require. Because a subscriber may frequently use AUDIX ports but may not have many messages on disk, the user requirements for ports and disks should be calculated separately as described in the following sections.

Light, Medium, and Heavy Port Users

The general types of AUDIX port users are shown in Table 8-1, *AUDIX Port User Types*. Port users are grouped according to the length of time they are connected to an AUDIX system (actually using one of the voice ports). Table 8-1 reflects the assumption that Voice Mail holding times are about 100 seconds each, while Call Answer messages are about 26 seconds each.

Table 8-1. AUDIX Port User Types

Port Use	Minutes per Day Connected to an AUDIX Voice Port	Messages Retrieved	Message Retrieval Time
Light	1.38 minutes (average)	Once every other day	100 seconds
Medium	7.87 minutes (average)	Twice a day	160 seconds (320 per day)
Heavy	12.63 minutes (average)	Three times a day	160 seconds (480 per day)

NOTE

Subscribers who use pagers and have the Outcalling feature should be considered heavy port users. Outcalls may take up to two minutes.

Light, Medium, and Heavy Disk Users

The general types of AUDIX disk users are shown in Table 8-2, *AUDIX Disk User Types*. Users are grouped according to the number of messages they typically store and the frequency at which new messages are received (the number of messages in storage includes new messages just received that have not yet been listened to and deleted). The numbers in Table 8-2 assume that subscribers delete messages one day after they have been created.

Table 8-2. AUDIX Disk User Types

Disk Use	New Voice Mail and Call Answer Messages per Day	Messages in Storage (One-day lifetime)
Light	1.2	1.2
Medium	3	3
Heavy	5	5

User Populations

Most installations have a mixture of AUDIX user types, with the majority being light users. It is important to determine the true size of the light-user subset, because concentrating on the requirements of the medium or heavy users can lead to an overconfigured (and therefore more expensive) system.

To aid in system configuration, different mixtures of user types are defined as an AUDIX *population.* Each population consists of the various percentages of user types shown in Table 8-3, *AUDIX User Populations*.

Table 8-3. AUDIX User Populations

Population	Light Users	Medium Users	Heavy Users	Average Port Use per Subscriber
Light	90%	5%	5%	2.3 minutes
Medium	70%	15%	15%	4.0 minutes
Heavy	50%	25%	25%	5.8 minutes
Very Heavy	20%	40%	40%	8.48 minutes
Extremely Heavy	0%	50%	50%	10.25 minutes

DETERMINING PORT REQUIREMENTS

Table 8-4, *Sample Port Requirements Based on User Population*, presents a summarized list of the number of ports required to support different numbers of subscribers based on the GOS and type of population. This table should be used only as a general guide for estimating port requirements. AT&T can assist with detailed port calculations.

Table 8-4. Sample Port Requirements Based on User Population

Subscriber Population	# of Ports	# of Subscribers at 0.02 GOS *	# of Subscribers at 0.03 GOS *	# of Subscribers at 0.05 GOS *
Light-user population	2	45	55	73
	8	690	744	815
	16	1858	1945	2065
	24	3152	3260	3423
	32	4000	4000	4000
Medium-user population	2	25	31	41
	8	387	417	457
	16	1042	1091	1158
	24	1768	1829	1920
	32	2515	2591	2698
Heavy-user population	2	17	21	28
	8	269	290	317
	16	724	758	805
	24	1228	1271	1334
	32	1747	1800	1875
Very heavy user population	2	12	14	19
	8	184	199	218
	16	497	521	553
	24	844	873	917
	32	1200	1237	1288
Extremely heavy user population	2	9	12	16
	8	152	164	180
	16	411	430	457
	24	697	722	758
	32	992	1022	1064

* GOS reflects the percentage of calls that are delayed more than 10 seconds before accessing an AUDIX system. Typically 0.03 is an acceptable GOS, which means that 3 percent of all calls are delayed during the busy hour.

NOTE

Voice port requirements are based on the amount of time subscribers are connected to an AUDIX system and the total number of users (internal and external) who need to access. The grade of service (GOS) desired should be specified prior to the final AUDIX design. The GOS indicates the percentage of incoming calls which are delayed is expected to be rapid, a larger model may need to be initially installed. The AUDIX modular approach, however, allows customers to upgrade a one-cabinet to a two-cabinet model at any time.

Port-Related Equipment

All AUDIX systems require additional equipment as the number of ports increases:

- *Voice Processor (VPC) Boards:* One TN501B VPC board contains two VPC circuits. Ports must therefore be added in increments of two.
- *Voice Port (VPT) Boards:* Each TN747B VPT board contains eight VPT connections. One VPT board is therefore required for every four VPC boards (that is, one VPT must be added at 9 to 10 ports, 17 to 18 ports, and 25 to 26 ports).

Automated Attendant Considerations

If the Automated Attendant feature is to be implemented on an AUDIX R1V3 or later system, additional voice ports may be needed. The number of extra ports to be installed depends on the number of calls made during prime time, the number of people expected to use the feature, and the length of calls (including menu playback and option selection).

For example, each call to an Automated Attendant may last about 10 seconds for all the options to play. Afterwards, the caller selects an option. If the option leads to another Automated Attendant, another 10-second menu plays, and so on. If the caller transfers to another extension or times-out, another 15 to 20 seconds may need to be added.

Outcalling and AMIS Analog Networking Considerations

If the Outcalling feature is used on AUDIX R1V3 or later systems, additional voice ports may be needed depending on the number of calls made during prime time, the number of people expected to use the feature, the length of calls, and the frequency of notification attempts. For example, a successful (answered) outcall plus message retrieval time may take 20 seconds, while an unsuccessful outcall may take one or two minutes for the AUDIX system to hang up.

AMIS Analog Networking and Message Delivery also use the outcalling ports. Refer to *AMIS Analog Networking* (585-300-512) for more information.

DETERMINING DISK REQUIREMENTS

Disk storage requirements are based on the number and length of messages received, the length of time messages and headers are stored, the size of subscribers' mailboxes, and the total number of subscribers.

Any combination of hard disk types and sizes may be installed in a one- or two-cabinet AUDIX system. Because vendors vary, the number of subscribers a particular AUDIX disk can support may vary ±5 percent. The Account Team has access to more detailed disk calculations, including those needed for the File Redundancy feature and a mixture of disk drive types.

AUDIX software for a 200-subscriber system typically requires the equivalent of eight hours of storage for system overhead, which is automatically calculated during system configuration. Software and overhead is placed on the first disk drive (disk00 or HDD 0/0) if only one HDD is installed, or it is divided among disks if a system is ordered with more than one disk drive; spreading system software among hard disks improves system performance and reliability.

NOTE

Assigning *guaranteed* (reserved) space is *not* recommended. Reserved space, which may require more disks, is seldom used efficiently. Often, subscribers may never need or use the space reserved for them.

Table 8-5, *AUDIX Disk Drive Storage Ratings*, compares current disk drive storage ratings to earlier disk drives. With the exception of the 760-Mbyte drive (renamed as the 88-hour drive), the pre-R1V7 5.25-inch disk drives (sized by megabytes) are no longer available; they are included here for comparison and reference.

Table 8-5. AUDIX Disk Drive Storage Ratings

Disk Drive	Hours of Storage if Disk in First (disk00) Position	Hours of Storage if Disk is in any Other Position
Current Disk Drives		
14-hour	6	14
20-hour	12	20
33-hour	25	33
58-hour	50	58
88-hour	80	88
Pre-R1V7 Disk Drives		
120-Mbyte	5	11
170-Mbyte	12	18
380-Mbyte	34	40
760-Mbyte	74	80

Hardware considerations for disk drives include:

- Different sizes of disk drives may fill the subsequent slots. The mix of disk drive sizes is manually calculated based on expected growth, estimated subscriber population requirements, and cost. Features such as File Redundancy are also taken into account.
- The large 88-hour drives can easily accommodate most user populations; they are typically used to provide extra storage for the File Redundancy feature.
- For four or more hard disks, a two-cabinet AUDIX system is required. A one-cabinet system may be upgraded to a two-cabinet model by adding an expansion cabinet.
- A TN475 does not support 33-hour (380-Mbyte) or larger disk drives; a TN475B Vintage 2 or later is required for the larger disks. A TN475B Vintage 5 (or later) is required for two-cabinet systems.

DETERMINING SYSTEM REQUIREMENTS

Once the requirements of the AUDIX user population are known, the type and size of AUDIX system that best suits the customer's needs can be selected. Each AUDIX system can grow slowly as the user population grows, or another AUDIX adjunct can be added to increase AUDIX capacity.

The AUDIX modular upgrade approach allows customers with smaller configuration needs to initially install a one-cabinet system with a minimal configuration. Later, as their needs grow, customers can add an expansion cabinet. New customers who already require a large-capacity system may initially order a new two-cabinet AUDIX configuration.

Capacity Criteria

The number of subscribers an AUDIX system can handle depends upon the hardware installed and user requirements for ports and disk space. AUDIX capacity is therefore based on a combination of factors, including the following:

- *Data Links:* Each fully integrated AUDIX adjunct requires one port (or link) on a switch data link board. These links may also be used by Applications Processors (APs), nodes in a Distributed Communications System (DCS) network, or applications such as the Call Management System (CMS). The number of data links available on the switch may limit the number of AUDIX adjuncts possible (see the following *AUDIX Adjunct Considerations* section for details):
  - — The System 75 and System 75 XE Processor Interface (PI) or Switch Communications Interface (SCI) has four links, but software limits the number of AUDIX adjuncts to one.
  - — The DEFINITY Generic 1, Generic 3i, and Generic 3s Processor Interface (PI) has four links, but software limits the number of AUDIX adjuncts to one.
  - — A DEFINITY Generic 3r Packet Gateway (PGATE) board supports up to eight AUDIX adjuncts.
  - — A System 85 or DEFINITY Generic 2 Data Communications Interface Unit (DCIU) has eight links. R2V2 and R2V3 software limits the number of AUDIX adjuncts to four, while R2V4 and DEFINITY Generic 2 software supports all eight links as AUDIX adjuncts.

  - A DIMENSION PBX DCIU has four links (two links per LC505 board).
  - A 1A ESS Switch can support up to 72 message services over Simplified Message Service Interface (SMSI) links.
  - A 5ESS Switch can support up to 96 message services with SMSI links; up to 65 can be supported off a 5ESS Switch Advanced Communications Package (ACP).

- *Networking:* Networks can increase the number of subscribers supported as follows:
  - *AUDIX Network:* Up to 32,000 administered subscribers may be in an AUDIX network, with up to 4000 of them local and 28,000 remote (a one-cabinet system can support only 2000 local subscribers). Each system can schedule automatic delivery of voice mail messages to up to 100 other systems.
  - *DCS Network:* Subscribers on one AUDIX system may be located at up to 20 different sites (nodes) in a DCS network.

AUDIX Adjunct Considerations

If the expected AUDIX user requirements exceed 32 voice ports or six hard disks, another adjunct can be added to increase capacity. The following factors should be considered when planning additional AUDIX adjuncts:

- Sufficient data links must be available on the switch to install a fully integrated adjunct. Up to four AUDIX adjuncts may be attached to most AT&T PBXs (see the previous list for details).
- Subscribers may be assigned to only one AUDIX adjunct.
- Subscribers on one adjunct cannot send voice messages to subscribers on other AUDIX adjuncts unless AUDIX Networking is used in AUDIX R1V3 or later software.
- Switch-related features such as Call Answer and Leave Word Calling (LWC) work transparently in a multiple-adjunct AUDIX arrangement on the host switch.

AUDIX Model Selection

Once the user population and hardware requirements for an AUDIX system are determined, the size and type of system that best suits the customer's needs can be selected.

A one-cabinet AUDIX system is selected if:

- Fewer than 2000 light-usage populations, 1000 medium-usage populations, or 750 heavy-usage populations are to be administered on one system (including expected growth)
- Fewer than 16 ports are (or will be) required
- The physical space available for an AUDIX system is very limited

A two-cabinet AUDIX configuration is selected if:

- More than 2000 subscribers are to be administered on one system
- More than 16 ports are (or soon will be) required

OBTAINING PERIPHERAL EQUIPMENT

Voice terminals, data equipment, printers, display terminals, and Personal Computers (PCs) or Work Group Stations (WGSs) are used to communicate with an AUDIX system and the switch. This peripheral equipment is a necessary part of the AUDIX configuration and must be obtained prior to an installation.

Equipment setups fall into two basic categories: local and remote. Local (directly cabled) setups are useful if ready access to the AUDIX machine is needed (for example, by service technicians). Remote setups are useful for centralized system administration, access from an office located off-site, or centralized remote maintenance. Both administration and maintenance setups are discussed in Chapter 5, *Subsystem Interfaces*.

NOTE

Because peripheral equipment is periodically replaced with updated or substitute devices, Account Teams should check the AT&T *Sales Manual* for new Price Element Codes (PECs) and recommended terminal, PC, or WGS equipment.

The switch and cross-connect field must have sufficient connections for the voice terminals used by AUDIX subscribers, the system administrator, and service personnel. All voice terminals require touch-tone capability and use a port on a switch circuit pack.

Suitable switch port boards for voice terminals are listed below.

System 75, System 75 XE, DEFINITY Generic 1, Generic 2 (Universal Modules), and Generic 3:

Compatible voice-terminal boards include:

- *Analog:* TN742 (8 ports), TN769 (8 ports), and TN746 or TN746B (16 ports)

NOTE

The TN746 board does not work with AUDIX TN747B VPT boards; however, it may be used for AUDIX voice terminals.

- *Hybrid:* TN735 Multifunction Electronic Terminal (MFET) line (4 ports) and TN762B (8 ports)
- *Digital:* TN754 (8 ports)

System 85 and DEFINITY Generic 2 (Traditional Modules):

Compatible voice-terminal boards include:

- *Analog:* SN228B and SN229 (8 ports each)

  (System 85 Only): SN222, SN222B, and SN228 (8 ports each); discontinued
- *Hybrid:* ANN17B Multifunction Analog Terminal (MFAT) (8 ports) or SN224B MFET (4 ports)
- *Digital:* SN270B General Purpose Port (GPP) (4 ports)

DIMENSION PBX:

Compatible voice-terminal boards include:

- *Analog:* LC02 or LC03 (4 ports each); the LC03 supports MWLs
- *Hybrid:* LC55 and LC02 (MET set)
- *Digital:* none

A. Ordering Codes

This appendix contains AUDIX ordering tables for AUDIX system components, cables, circuit packs, switch equipment, and peripheral devices. Each Price Element Code (PEC) may be used for initial system orders or for upgrades and additions. Some PEC descriptions include 9-digit comcodes, which are used by Services personnel.

Network Systems personnel currently order AUDIX Customer Premises Equipment (CPE) equipment through Delivery Operations Support System (DOSS) using the PECs. For all Network Systems installations, customers and Account Teams should see *ISDN Customer Premises Planning Guide* (533-700-100) for a complete list of CPE comcodes and hardware.

AUDIX BASIC EQUIPMENT

Table A-1, *AUDIX System Ordering Codes*, covers required and optional AUDIX one- or two-cabinet software and equipment. Software releases prior to R1V7 may no longer be available.

NOTE

AUDIX system PECs were restructured during the AUDIX R1V6 release. In addition, many additional PECs were changed due to AT&T reorganization. Always refer to the AT&T sales manual or the DOSS configurator for the latest PECs.

Note on terminology:

In the following tables, an *A* following a PEC indicates the item is being added to an existing AUDIX system. A *P* following a PEC indicates the item is being included when the AUDIX system is packaged with a switch purchase.

Table A-1. AUDIX System Ordering Codes *(Part 1 of 9)*

Software	PEC	Notes
Basic AUDIX System with Existing PBX	7021-VMA	PEC used to order all common equipment when a one-cabinet AUDIX is installed with an existing PBX. The VMA model includes 4 ports (2 TN501B VPCs and 1 TN747B VPT). Specify:
	ASWnn	Attribute for associated switch: ASW02=DIMENSION, ASW04=S85 R2, ASW09=S75 R1V3, ASW16=1A ESS, ASW17=5ESS, ASW18=SL-1, ASW19=DMS-100, ASW20=SL-100, ASW22=G1, ASW23=G2, ASW28=G3i, ASW29=G3r, ASW30=G3s
	EPS10	For AC-powered cabinet
	EPS13	For DC-powered cabinet
	EQK01	Without earthquake protection
	EQK03	For earthquake protection on concrete floors
	EQK04	For earthquake protection on raised floors
	LNGnn	Group 300 cable length; see Table A-2
	MTG33	For 2-inch cabinet feet
	MTG01	For 7/8-inch cabinet feet
	SML01	Attribute for new one-cabinet system
	SML02	Attribute for new two-cabinet system
Basic AUDIX System with Existing PBX	7021-VMB	PEC used to order all common equipment when a two-cabinet AUDIX is installed with an existing PBX. The VMA model is the same as the VMA model except it includes 18 ports (9 TN501B VPCs and 3 TN747B VPTs) and the expansion cabinet.
Basic AUDIX System with New DEFINITY	7021-VMS	PEC used to order all common equipment when a one-cabinet AUDIX is installed with a new DEFINITY Communications System. Otherwise the VMS model is the same as the VMA model with 4 ports (2 TN501B VPCs and 1 TN747B VPT).
Basic AUDIX System with New DEFINITY	7021-VMT	PEC used to order all common equipment when a two-cabinet AUDIX is installed with a new DEFINITY Communications System. The VMT model is the same as the VMA model except it includes 18 ports (9 TN501B VPCs and 3 TN747B VPTs) and the expansion cabinet.

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 2 of 9)*

Software	PEC	Notes
Basic AUDIX System with System 75 Upgrade	7021-VM7	PEC used to order all common equipment when a one-cabinet AUDIX is packaged with a System 75 upgrade to a Generic 1 or 3 (a G1.1 upgrade may also require PEC 63511P). Otherwise the VM7 model is the same as the VMA model with 4 ports (2 TN501B VPCs and 1 TN747B VPT).
Basic AUDIX System with System 75 Upgrade	7021-VM8	PEC used to order all common equipment when a two-cabinet AUDIX is packaged with a System 75 upgrade to a Generic 1 or 3 (a G1.1 upgrade may also require PEC 63511P). The VM8 model is the same as the VMA model except it includes 18 ports (9 TN501B VPCs and 3 TN747B VPTs) and the expansion cabinet.
Basic AUDIX System with AVP Upgrade	7021-VM9	PEC used to order all common equipment when a one-cabinet AUDIX is packaged with an AUDIX Voice Power migration to AUDIX. The VM9 model is similar to the VMA model except it accommodates up to 8 ports (4 TN501B VPCs and 1 TN747B VPT).
Basic AUDIX System with AVP Upgrade	7021-VM0	PEC used to order all common equipment when a two-cabinet AUDIX is packaged with an AUDIX Voice Power migration to AUDIX. The VM0 model is similar to the VMA model except it accommodates up to 12 ports (6 TN501B VPCs and 2 TN747B VPTs) and includes the expansion cabinet.

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 3 of 9)*

Software	PEC	Notes
AUDIX Expansion Cabinet (new or upgrades)	70310/A/P * †	Includes expansion cabinet, basic circuit packs (VSP-PE and TDBI/VB), power for carrier and disk drives, and intercabinet cables. Specify:
	EXP01	For a new two-cabinet system (default)
	EXP02	For a one-cabinet (or AUDIX-S) upgrade
		Specify other appropriate attributes listed in PEC 7021-VMA
Misc.:	X600-ASC	Ship AUDIX system complete
	0505-VST	AUDIX service visit
	1400-000	AUDIX system training
Misc. Features:		
AMIS	1253-AAN	AMIS analog networking activation charge (AMIS RTU); includes document
	1253-AA7	R1V7 AMIS activation charge (RTU)
Call Detail Recording (CDR)		PC package, used in addition to AUDIX Administration and Data Acquisition Package (ADAP); includes document
–	1253-CDR	CDR activation charge (CDR RTU)
–	70161/A *	CDR Version 8 PC software
–	70197/A	CDR Version 7 PC software
–	70195/A	CDR Version 6 PC software
–	70254/A	CDR Version 5 PC software

* An *A* following a PEC indicates an item added to an existing AUDIX system

† A *P* following a PEC indicates an item included when AUDIX is packaged with a switch

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 4 of 9)*

Software	PEC	Notes
Misc. Features (cont.):		
AUDIX Networking		
(New Systems)	70293/A *	Includes TN539B ACCE, the *AUDIX Networking* (585-300-903) document, and the following cables:
– H600-330 null modems		Required for AUDIX RS-232 back-to-back direct connections; two null-modem cable adapters are included, one for each RS-232 port
– H600-331 breakout cable		A single cable that connects the ACCE with the DCP and RS-232 ports. Select the group: Group 1: A male 50-pin connector splits into two 8-pin modular connectors for the DCP ports and two male RS-232 connectors Group 2: A male 50-pin connector splits into one female 50-pin connector for the DCP ports and two male RS-232 connectors
(Upgrades)	70312	Upgrades TN366(B) ACC or TN539 ACCE to TN539B ACCE; use KIT14 attrib. for one- and two-cabinet systems, use KIT15 for AUDIX-L; includes networking document and cables.
SL-1	70373	SL-1 Integration Package
	70374	SL-1 Upgrade Integration Package
	X600-AAO	Number of Automated Attendant/Outcalling ports (TN747B boards) for SL-1
	X600-VMC	Number of Voice Mail/Call Answer ports (TN762B boards) for SL-1
TSI	70366	Optional package for IBM PROFS or other e-mail service in R1V4 or later software; includes PC/PBX DBPI expansion card and 4-pair modular cord (comcode 527855142), documentation with 3.5- and 5.25-inch diskettes (doc. # 585-304-503); and for IBM PROFS a 2780/3780 communications interface (ICP188X) card, software diskette, and cabling (comcode 405766478).

* An *A* following a PEC indicates an item added to an existing AUDIX system

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 5 of 9)*

Software	PEC	Notes
R1V8:		
one-cabinet	1253-183 1253-V83	Upgrade one-cabinet software to R1V8 Right-to-use R1V8 software on a new one-cabinet system
two-cabinet	1253-184 1253-V84 1253-E84	Upgrade two-cabinet software to R1V8 Right-to-use R1V8 software on a new two-cabinet system Upgrade a one-cabinet system to a two-cabinet R1V8
standard announcement set	70162/A * 70164A CAB01 CAB02	for 50-Mbyte RCD for 20-Mbyte RCD (existing systems only) one-cabinet system two-cabinet system
traditional announcement set	70163/A 70165A CAB01 CAB02	for 50-Mbyte RCD for 20-Mbyte RCD (existing systems only) one-cabinet system two-cabinet system
document set	70732 70733	customer document set (traditional) customer document set (standard)
R1V7:		
one-cabinet	1253-173 1253-V73	Upgrade one-cabinet software to R1V7 Right-to-use R1V7 software on a new one-cabinet system
two-cabinet	1253-174 1253-V74 1253-E74	Upgrade two-cabinet software to R1V7 Right-to-use R1V7 software on a new two-cabinet system Upgrade a one-cabinet system to a two-cabinet R1V7
50-Mbyte RCD 50-Mbyte RCD	70198 70198A *	(for a new one-cabinet system) (to upgrade a one-cabinet to R1V7)
20-Mbyte RCD 20-Mbyte RCD	70199A 70190A VER07	(to upgrade a two-cabinet to R1V7) R1V7 verbose announcements (the 50-Mbyte cartridge includes verbose announcements)
documents	70718	R1V7 customer document set

* An *A* following a PEC indicates an item added to an existing AUDIX system

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 6 of 9)*

Software	PEC	Notes
R1V6:		
one-cabinet	1253-163	Upgrade from one-cabinet R1V2/V3/V4/V5
	1253-V63	Right-to-use R1V6 software (new one-cabinet)
50-Mbyte RCD	70193 CAB01	(new one-cabinet system)
50-Mbyte RCD	70193A CAB01	(upgrade one-cabinet to R1V6)
20-Mbyte RCD	70383A *	Required spare 20-Mbyte program cartridge (J58889UB-1-L16-S10E, PG-3E613-01)
two-cabinet	1253-164	Upgrade from two-cabinet R1V2/V3/V4/V5
20-Mbyte RCD	70191A CAB02	(upgrade two-cabinet to R1V6)
50-Mbyte RCD	70193 CAB02	(new two-cabinet system)
50-Mbyte RCD	70193A CAB02	(upgrade two-cabinet to R1V6)
	1253-V64	Right-to-use R1V6 software (new two-cabinet)
	1253-E64	Right-to-use R1V6 software on one- to two-cabinet upgrade
20-Mbyte RCD	70384A	One spare program cartridge required (J58889UB-1-L17-S10E, PG-3E611-01)
verbose announcements	70190A VER06	for R1V2/V3/V4/V5 upgrades on systems with a 20-Mbyte RCD (J58889UB-1-L25-S10E, PG-3E615-01); systems with 50-Mbyte RCDs have verbose announcements included in program cartridge
R1V5:		
one-cabinet	1253-153	Upgrade to R1V5
	1253-V53	Right-to-use R1V5 software
	70399	50-Mbyte program cartridge (attrib. CAB01)
two-cabinet	1253-154	Upgrade from two-cabinet R1V3/V4 to two-cabinet R1V5
	1253-E54	Right-to-use R1V5 software from a one-cabinet R1V2/V3/V4 to a two-cabinet R1V5
	1253-V54	Right-to-use R1V5 software on a new two-cabinet R1V5
	70399	50-Mbyte program cartridge (attrib. CAB02)

* An *A* following a PEC indicates an item added to an existing AUDIX system

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 7 of 9)*

Basic Hardware	PEC	Notes
R1V4:		
one-cabinet	1253-143	Upgrade to R1V4
	1253-V43	Right-to-use R1V4 software
	70360	Program cartridge — required as a spare
two-cabinet	1253-144	Upgrade from two-cabinet R1V3 to two-cabinet R1V4
	1253-E44	Right-to-use R1V4 software from a one-cabinet R1V2, R1V3, or R1V4 to a two-cabinet R1V4
	1253-V44	Right-to-use R1V4 software on a new two-cabinet R1V4
	70361	Program cartridge — required as a spare
AUDIX Base Cabinet (pre-R1V7)	7021-VM4	Includes cabinet, carrier, basic circuit packs, power for carriers and up to four disk drives and cables. Specify:
	CAB01	Cabinet type
	ASW02	For DIMENSION systems
	ASW04	For System 85 or DEFINITY Generic 2 systems
	ASW09	For System 75 or DEFINITY Generic 1 systems
	EPS10	For AC-powered cabinet
	EPS13	For DC-powered cabinet
	SML01	Attribute for new one-cabinet system
	SML02	Attribute for new two-cabinet system
	MTG33	For 2-inch cabinet feet
	MTG01	For 7/8-inch cabinet feet
	EQK01	Without earthquake protection
	EQK03	For earthquake protection on concrete floors
	EQK04	For earthquake protection on raised floors
		One TN747B VPT (PEC 70231/P†) and (R1V4 to R1V6 systems) one 170-Mbyte disk (PEC 70247/A/P*†) are included.
	7021-VM3	Identical to PEC 7021-VM4 except *no* 170-Mbyte disk is included.

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 8 of 9)*

Basic Hardware	PEC	Notes
Circuit Packs:		
VPC (TN501B)	70230/A/P * †	Order 1 board for every 2 ports; maximum is 16 for 32 ports
VPT (TN747B)	70231/A/P	One required for every 8 ports (4 VPC boards); maximum is 4 for 32 ports
TDBI and VB (TN500, TN520)	70232	Order 1 for every 16 ports (maximum is 2)
TN500 TDBI	70300/A	Order 1 to replace TN477 TDBI-8
Memory (FP-RAM) Board (TN734)	70302	Two additional Mbytes of FP-CPU memory if needed for systems with TN523 CPU
TN472C DBP-CPU	70307/A	Order 1 to replace TN472
TN533 SCPI	70363/A	AUDIX data link board to an AT&T PBX (System 75, System 85, DIMENSION PBX, or DEFINITY Communications System; part of basic PEC prior to R1V4 release); order *instead of* PEC 70364)
TN547(B) MPSI	70364	AUDIX data link to a 1A ESS Switch or 5ESS Switch; order *instead of* PEC 70363)
TN539B ACCE	70293/A or 70312	Order new or for networking upgrade; see AUDIX Networking under *Misc. Features*
TN475B SADI	70369	Required to upgrade TN475 SADI
DC Power (New Systems)	70375	DC power equipment for a *new* 1- or 2-cabinet AUDIX system; order one DC converter for each cabinet (use attribute EPS13 in basic or expansion PEC)
DC Power (Upgrades)	70376	DC power equipment for upgrading an existing AUDIX from AC to DC power; includes D-Kit 182236 and DC power cable (PEC 24243)

* An *A* following a PEC indicates an item added to an existing AUDIX system

† A *P* following a PEC indicates an item included when AUDIX is packaged with a switch

(Continued)

TABLE A-1. AUDIX System Ordering Codes *(Part 9 of 9)*

Basic Hardware	PEC	Notes
Disks (current):		A combination of sizes may be used.
14-hour HDD	70385	For low-end users, typically only drive in a one-cabinet system.
20-hour HDD	70386	Order up to three (for a one-cabinet system) or six (for a two-cabinet system) disk drives.
33-hour HDD	70387	Order up to three (for a one-cabinet system) or six (for a two-cabinet system) disk drives.
58-hour HDD	70388	Order up to three (for a one-cabinet system) or six (for a two-cabinet system) disk drives.
88-hour HDD	70389	Order up to three (for a one-cabinet system) or six (for a two-cabinet system) disk drives. Typically used for File Redundancy.
RTU AUDIX Disk Storage	1253-H14	RTU 14-hour disk
	1253-H20	RTU 20-hour disk
	1253-H33	RTU 33-hour disk
	1253-H58	RTU 58-hour disk
	1253-H88	RTU 88-hour disk
Blank Cartridge		One is always required for backups; order as many as needed (at least 2 are recommended):
	70249	Blank (spare) 20-Mbyte cartridge
	70420	Blank (spare) 50-Mbyte cartridge
20- to 50-Mbyte RCD Upgrade	70194A *	Upgrade a 20-Mbyte RCD to a 50-Mbyte drive on R1V5 or later systems
Disks (early):		*The following disks are no longer available.*
120-Mbyte HDD	70196/A/P	11-hour drive for one-cabinet system. Replaced with 14-hour HDD.
170-Mbyte HDD	70247/A/P	18-hour drive in main machine model in R1V4 to R1V6 (WP-91507 List 1). Replaced with 20-hour HDD.
380-Mbyte HDD	70305/A/P	40-hour drive (WP-91507 List 2). Replaced with 58-hour HDD.
760-Mbyte HDD	70370/A/P	80-hour drive (WP-91507 List 3). Renamed the 88-hour HDD.

* An *A* following a PEC indicates an item added to an existing AUDIX system

Table A-2, *ED Cable Codes and Descriptions*, lists AUDIX cable and circuit-pack codes. Service technicians can order fixed-length cables by ED-code and group number, and variable-length cables by comcode. Circuit packs and other parts may also be ordered by comcode (most customers must order parts by PEC).

Table A-2. ED Cable Codes and Descriptions *(Part 1 of 3)*

ED-1E434-11 Cable	Connector Type and Gender *	Associated PEC †	Use	Description
Group 13	M RS-232C to F RS-449	65254/A attr. CCT01	As needed	36-inch for Aux. cabinet or for SMSI link; PEC includes Groups 304, 342
Group 30	M-to-F RS-232C	–	As needed	36-inch extender for cabinet-mount
Group 110	M RS-232C to F RS-449	65259/A attr. CCT01	As needed	Straight-through cable from an RS-232C device to an RS-449 connector; order by PEC (50 ft only) or by comcode (601085087 = 20 ft, 601085095 = 30 ft, 601085103 = 40 ft, 601085111 = 50 ft)
Group 113	M-to-M cable	70234	AUDIX-L	Disk cabinet battery alarms for second AC power supply
Group 152	M-to-M cable	70234	AUDIX-L	Second 309A/310A supply alarms
Group 156	M-to-M cable	7021-	AUDIX-L VM1	Disk cabinet converter/DC breaker alarms cable
Group 174	F-to-M RS-449	65399 attr. CNN07	As needed	4.5-ft cable between the AUDIX and IDI (leads to switch DCIU) ‡
Group 183	Five F connectors	Basic	AUDIX	50-pin AUDIX disk-data cable
Group 185	Two F connectors	Basic	AUDIX	14-pin AUDIX CDR1 extender cable
Group 186	4-F, 1-M connector	Basic	AUDIX	50-pin AUDIX disk-data cable
Group 187	F to F connector	70310	AUDIX two-cab.	Extends TD-bus to upper cabinet for AUDIX two-cabinet upgrades

* M = Male connector (plug). F = Female connector (receptacle).

† Included in the basic system PEC for a one- or two-cabinet AUDIX.

‡ Only System 85, DEFINITY Generic 2, and DIMENSION PBXs use a DCIU link.

(Continued)

TABLE A-2. AUDIX Cable Codes and Descriptions *(Part 2 of 3)*

ED-1E434-11 Cable	Connector Type and Gender	Associated PEC	Use	Description
Group 300	M-to-M shielded Amphenol	Basic attr. LNG11 to 17 65258/A LNG10 to 32	2 to 6 As needed	AUDIX 25-pair cable to wall field; order lengths as in PEC 65258/A Extra 25-pair cable(s) to wall field; LNG10 = 35 ft (601000904) LNG11 = 50 ft (601000938) LNG12 = 75 ft (601000979) LNG13 = 100 ft (600046338) LNG14 = 125 ft (601004625) LNG15 = 150 ft (601085301) LNG16 = 175 ft (601085319) LNG17 = 200 ft (601001399) LNG20 = 15 ft (601000854) LNG21 = 25 ft (601000888) LNG25 = 20 ft (601000862) LNG27 = 30 ft (601000896) LNG28 = 40 ft (601000912) LNG30 = 60 ft (601000953) LNG32 = 80 ft (601000987)
Group 304	M-to-F RS-449	65399 attr. LNG10 to 49	As needed	Extender cable from IDI to DCIU; LNG21 = 25 ft (601089535) LNG10 = 35 ft (601089543) LNG11 = 50 ft (601003585) LNG12 = 75 ft (601089550) LNG13 = 100 ft (601085426) LNG15 = 150 ft (601089568) LNG16 = 175 ft (601089576) LNG17 = 200 ft (601085434) LNG47 = 250 ft (601089584) LNG48 = 300 ft (601085442) LNG49 = 400 ft (601089592)
Group 309	M-to-F RS-232C		As needed	Extender cable, same as 50-foot M25A except for lengths (5, 12, 25, or 50 feet)
Group 311	M-to-M RS-232C	Basic	2	50-ft RS-232C extender cable 601087075 = 5 ft 601087083 = 10 ft 601087091 = 20 ft 601087109 = 30 ft 601087117 = 40 ft 601001365 = 50 ft

(Continued)

TABLE A-2. AUDIX Cable Codes and Descriptions *(Part 3 of 3)*

ED-1E434-11 Cable	Connector Type and Gender	Associated PEC	Use	Description
Group 317	M-to-pigtail Amphenol	2726-04n	2 to 6	25-pair cable to 66-type wall field on DIMENSION; specify length n, where T = 30 ft (601087828), V = 50 ft (601087836), X = 200 ft (601087851), Z = 100 ft (601087844)
Group 329	Two F connectors	70310	AUDIX two-cab.	60-pin S-bus extender cable for two-cabinet AUDIX
Group 340	F RS-449 to two M RS-449s	–	As needed	Y cable for duplicated common control on switch alarms TN492C
Group 342	M RS-449 to two F RS-449s	65259, 65399 attr. CCT02	As needed	Y cable for duplicated common control on switch UN156 DCIU
Group 350 *	M-to-F RS-232C	Basic attr. LNF05 to 28	2	Up to 50-ft AUDIX null-modem cable; order 601 088 008 = 1 ft, LNF05 = 5 ft (601 089 733), LNF50 = 10 ft (601 088 016), LNF25 = 20 ft (601 089 741), LNF27 = 30 ft (601 089 758), LNF28 = 40 ft (601 089 766), LNF11 = 50 ft (601 088 032)
Group 355	M-to-M cables	7021-VM1	AUDIX-L	18-inch disk power converter
Group 362	F-to-F cables	7021-VM1	AUDIX-L	18-inch disk control (daisy-chain)
Group 363	F-to-F cables	7021-VM1	AUDIX-L	12-ft disk control (ribbon)
Group 364	F-to-F cables	7021-VM1	AUDIX-L	12-ft disk data (ribbon)
Group 372	F-to-F cable	7021-VM1	AUDIX-L	Cable from ZAEH5B Vintage 3 board to 312A battery reserve
Group 373	F-to-F cable	70270	AUDIX-L	Networking cable to ACC(E) panel

* The H600-258 Group 1 cable replaces the Group 350 cable in AUDIX R1V4 and later systems.

The following circuit packs are used in the AUDIX carriers and backplanes. Only services personnel order parts by comcode. Customers should use the PECs listed in the previous tables.

Table A-3. AUDIX Circuit Pack Codes *(Part 1 of 2)*

Circuit Pack	Comcode	AUDIX Model	Description
494HA	103803599	AUDIX-L	DC/DC Converter ±12 VDC
495FA	103803649	AUDIX-L	DC/DC Converter +5 VDC
495JB	104016746	AUDIX-L	DC/DC Converter ±5 VDC
WP-91602	405522780	Both *	TD-Bus Terminator †
AHF3	103810602	AUDIX-L	TD Cable Adapter Board
AHF102	105167233	AUDIX	DBP/VME-Bus Terminator
AHF104	105190839	AUDIX	Disk Interface Board
AHF107	105408710	AUDIX	S-Bus Extender Board
AHF108	105408728	AUDIX	S-Bus Terminator Board
AHF109	105465603	AUDIX	TD-Bus Extender Board
AMC-1	103834735	AUDIX-L	Battery Holdover Mother Board
AMD-1	103834743	AUDIX-L	Battery Holdover Daughter Board
CDR1	105266498	AUDIX	Alarm Board (AC power only)
CDR1B	105711238	AUDIX	Alarm board (AC or DC power)
PWJ58886U-1	105442941	AUDIX	Backplane (List 2)
PWJ58886U-1	106413933	AUDIX	Backplane (List 4)
SN228B	103981205	(System 85 or Generic 2)	Analog Line Circuit Pack (required for Outcalling)
SN222B	103943304	(System 85)	Analog Line pack for Outcalling
TN366	103279840	Both	ACC (for Networking; see TN539B)
TN366B	106186588	AUDIX	ACC (for Networking; see TN539B)
TN472C	105474126	AUDIX	DBP-CPU
TN475B	105474118	AUDIX	SADI
TN477	103280855	One-cabinet	TDBI-8 (8 ports)
TN500	103281085	Both	TDBI (16 ports)
TN501B	103965182	Both	VPC (2 ports each)
TN506B	105222301	Both	BC
TN507C	103975983	AUDIX-L	IPC
TN508	103281168	AUDIX-L	DBP-RAM
TN509C	105319286	AUDIX-L	DBP-CPU
TN511	103281192	AUDIX	MI
TN520	103281283	Both	VB
TN521	103281291	AUDIX-L	SCP
TN523	103281317	Both	FP-CPU or VSP-CPU

* Both refers to the AUDIX and AUDIX-L models.

† Replaces AHF1 (103810586). Shipped with all new systems.

(Continued)

TABLE A-3. AUDIX Circuit Pack Codes *(Part 2 of 2)*

Circuit Pack	Comcode	AUDIX Model	Description
TN531	103281390	AUDIX-L	MI
TN532	103281408	AUDIX	DBP-RAM (2 Mbyte)
TN533	103281416	Both	SCPI
TN535	103281432	Both	Monitor Board
TN539	103281473	Both	ACC Enhanced (ACCE) for Networking
TN539B	106757768	Both	ACC Enhanced (ACCE) for Networking
TN540	103281481	AUDIX	DBP-RAM (4 Mbyte)
TN547	103281556	Both	MPSI
TN547B	105717359	Both	MPSI
TN591	103281994	AUDIX	Replaces TN523 in new systems
TN714 *	103556676	Both	TC
TN716B *	105442412	Both	FP-BI or VSP-BI (also Interface 1)
TN719 *	103556726	AUDIX-L	SAI
TN727 *	103556809	Both	NC
TN734 *	103556874	Both	FP-RAM or VSP-RAM, 2 Mbytes each
TN747B * †	105167266	Both	VPT (8 ports each)
TN761	103557146	AUDIX	Replaces TN734 in new systems
TN762B * †	103976171	AUDIX	Hybrid port board for SL-1 setups
TN754 * †	103557070	AUDIX-L	Digital Line Board
UN160B	105319818	Both	DBPI
UN161B	103975991	AUDIX-L	DIM
UN162	103666053	Both	VSFI
ZAEH5B	103982237	AUDIX-L	Alarm Board
ZAHF8	103963336	Both	S Bus Terminator
ZAJU1	103953501	AUDIX-L	Disk Controller Cable Terminator

* This circuit pack is also used on System 75 systems.

† This circuit pack is also used on DEFINITY Generic 1 or Generic 3 switches.

AUDIX D-Kits

The following table lists the D-Kits that are used to update AUDIX hardware.

Table A-4. AUDIX D-Kits

Item	Comcode	Description
D-Kit 181509	105040141	Equips MPDM/M1* with ACCUNET 56 capabilities
D-Kit 181757	105308696	Adds networking to AUDIX Large
D-Kit 181895	105434559	AC-DC upgrade: cover plate and connection for gutter-tap ground
D-Kit 181965	105461628	Supplied with ACC(E) board when upgrading a List 1 or List 3 backplane for AUDIX Networking
D-Kit 181972	105466254	Mounting hardware for disk drives
D-Kit 182095	105537773	AUDIX-L upgrade to use TN547(B) MPSI
D-Kit 182216	105716542	Upgrade slot 21 (D02) to insert VPT for SL-1
D-Kit 182229	105727952	Upgrade 10-amp 5 VDC fuse to 15-amp
D-Kit 182236	105733547	AUDIX AC-DC power upgrade
D-Kit 182403	106304330	Adds Enhanced Networking if AUDIX Networking is already present; includes ACCE board, cables, and labels (if networking is not installed, you must also add D-Kit 181965)
D-Kit 182422	106387475	Same Enhanced Networking package as D-Kit 182403 but for AUDIX Large model
D-Kit 182482	106463987	Upgrade RICOH 20-Mbyte RCD to a 50-Mbyte RCD; includes adapter bracket (846675882) and flathead screws (802260711)

AUDIX-L Upgrades

The AUDIX-L hardware model has been discontinued. Only upgrades for software or additional hardware may be ordered.

Table A-5. AUDIX-L Upgrades Ordering Codes *(Part 1 of 3)*

Item	PEC	Required	Notes
AUDIX-L Software (Basic upgrade)	1253-121	For R1V2	Right-to-use AUDIX software; used to upgrade *AUDIX Basic* systems only
AUDIX-L R1V2 Program Cartridge	70257	For R1V2 (2)	Contains AUDIX-L software; use one to install and keep one as a spare (J58889TX1-L3, PG-3E072-01)
AUDIX-L R1V3 (upgrade)	1253-131	For R1V3	Right-to-use AUDIX software for upgrading R1V2 systems to R1V3 (AUDIX R1V1 systems must upgrade to R1V2 before upgrading to R1V3)
AUDIX-L R1V3 Program Cartridge	70273	For R1V3 (2)	Contains AUDIX-L software; use one to install and keep one as a spare (J58889TX1-L4, PG-3E073-01)
AUDIX-L R1V4 (upgrade)	1253-141	For R1V4	Right-to-use AUDIX software for upgrading AUDIX-L R1V2/V3 systems to R1V4
AUDIX-L R1V4 Program Cartridge	70362	For R1V4 (2)	Contains AUDIX-L software; use one to install and keep one as a spare (J58889TX1-L6, PG-3E076-01)
AUDIX-L R1V5 (upgrade)	1253-151	For R1V5	Right-to-use AUDIX software for upgrading AUDIX-L R1V2/V3/V4 systems to R1V5
AUDIX-L R1V5 Program Cartridge	70382	For R1V5 (2)	Contains AUDIX-L software; use one to install and keep one as a spare (J58889TX-1-L10, PG-3E084-01)
AUDIX-L Migration Cartridge	70359	For R1V5	Migrate an AUDIX-L system to an AUDIX two-cabinet system

(Continued)

TABLE A-5. AUDIX-L Upgrades Ordering Codes *(Part 2 of 3)*

Item	PEC	Required	Notes
VPC (TN501B)	70230/A/P	Yes (1 to 16)	Order 1 board for every 2 ports; maximum is 16 for 32 ports
VPT (TN747B)	70231/A/P	Yes (1 to 4)	One required for every 8 ports (4 VPC boards); maximum is 4 for 32 ports
TDBI and VB (TN500, TN520)	70232	Yes (1 or 2)	Order 1 for every 16 ports (maximum is 2)
Disk Controller (TN507C, UN161B)	70233	Yes (1 or 2)	One always required; order a second at 5 or more drives or 18 or more ports (includes ED-1E434-11 Group 364 cable, ZAJU1 board, terminator resistor 403954183)
Disk Cabinet Rectifier (309A/310A Power Supply)	70234	At 5 or more drives	Disk drive cabinet power supply for more than 4 disk drives; includes battery reserve, 309A (103162855), 310A (103560280)
80-Mbyte RSD	70235	Yes	Order one for each AUDIX adjunct (KS-23091-L1, comcode 403587447)
340-Mbyte FSD	70236	Yes (1 to 7)	Order 1 to 7 for AUDIX-L (KS-22875-L13, comcode 403832603)
Blank Cartridge Disk	70237	Yes	One always required for backups; order as many as needed (KS-23092-L1, comcode 403599228)
512K DBP-RAM Memory Board (TN508)	70239	Yes (3 to 7)	Order based on port number: 3 for 2 to 4 ports, 4 for 6 to 10 ports, 5 for 12 to 18 ports 6 for 20 to 24 ports, and 7 for 26 to 32 ports
Disk Drive DC Power Converter	70240	Yes (2 to 7)	Order one for each disk drive (PECs 70235 and 70236); includes ED-1E434-11 Group 355, 362, and 363 cables (403410772)
DBP Power Converter (495JB)	70241	At 12 ports	Required for 12 or more ports (5 RAM boards), 5 drives, two disk controllers, or Networking
EMC Filter	70248	As needed	For remote AUDIX-L AC power; use attribute MAC92 (comcode 843637232)
Networking Kit	70270	For Net.	Contains hardware for AUDIX-L Networking (ACCE, panel and int. cable, backplane wire)
UN160B DBPI	70271	For Net.	Required for AUDIX-L Networking upgrades
TN509C DBP-CPU	70272	Yes	Required for R1V3 or R1V4 upgrades

(Continued)

TABLE A-5. AUDIX-L Upgrades Ordering Codes *(Part 3 of 3)*

Item	PEC	Required	Notes
Extended Power Reserve	70290	DC option	Use this PEC *only for existing* systems; for new systems, use attrib. EPS13 in system PEC
312A Battery Reserve	N/A	Yes	For replacements, order the 398A switch breaker assembly (104023924), 33A housing (104030820), or a 24-cell battery pack (comcode 403736291)
Memory (FP-RAM) Board (TN734)	70302	Yes	Two additional Mbytes of FP-CPU memory needed for all enhanced software upgrades
TN533 SCPI	70363/A	Yes (R1V4)	AUDIX data link board to an AT&T PBX (System 75, System 85, DIMENSION PBX, or DEFINITY Communications System; part of basic PEC in previous releases); use attribute ASV01 for D-Kit 182095 (comcode 105537773); order *instead of* PEC 70364)
TN547(B) MPSI	70364	Yes (R1V4)	AUDIX data link to a 1A ESS Switch or 5ESS Switch; use attribute ASV01 for D-Kit 182095 (comcode 105537773); order *instead of* PEC 70363)
SCA	70365	If needed (R1V4)	Switch Communications Adapter required for 5ESS API interface in R1V4 (comcode 405766460)
TN716B BI	70367	Upgrades	Required for R1V3 or R1V4 upgrades
Equipment Room:			
AC Protector Cabinet	65253/A	As needed	One needed per equipment room for an AC-powered AUDIX-L (capacity is 200 amperes per phase).
Cabinet Ductwork (System 85 R2V2)	65379/A	As needed	Always required for AUDIX-L: order two for AUDIX-L top-of-cabinet cabling (one per cabinet) with attribute PWR08 for AC power. (This outlet is not used on DC-powered AUDIX-L systems.)
Optional Ductwork (System 85 R2V2)	65380/A 65381/A 65382/A 65384/A	As needed As needed As needed As needed	Endcaps and fascias for each cabinet line-up Connects cabinet I/O ductwork to wall Connects ductwork to overhead I/O ladder rack; specify END01 (rear) or END02 (side) ladder Cross-aisle I/O ductwork connection

PERIPHERAL EQUIPMENT

The following tables cover switch and peripheral equipment including circuit packs, data equipment, terminals, and cables.

Switch Equipment

Table A-6, *Switch Equipment Ordering Codes*, covers some equipment needed for a 1A ESS Switch, 5ESS Switch, DIMENSION PBX, System 75, System 85, or DEFINITY Communications Systems. Always refer to the appropriate switch document for complete information.

Table A-6. Switch Equipment Ordering Codes *(Part 1 of 4)*

Item	PEC *	Required	Notes
Any Standalone or Other Switch:			
Silent Knight Autodialer	94273	Yes	Reports alarms to remote maintenance site for DIMENSION PBX, Standalone, 1A ESS Switch, and 5ESS Switch systems
DIMENSION PBX:			
DCIU Data Link	64260	Yes †	DCIU has 4 links; 1 link required per adjunct (2 DCIUs needed for dup. common control)
LC02 Line Circuit	64150	Yes	Used for remote maint., voice terminals, AUDIX voice ports; each board has 4 ports
LC03 Line Circuit	64676	Yes	Used for remote maint., voice terminals, AUDIX voice ports; each board has 4 ports and supports MWLs
System 75:			
Switch Communication Interface (SCI) ‡ INT1=TN716B INT2=TN738 INT3=TN719	63126	Yes †	System 75 data link to AUDIX; has 4 links. Needs to be connected to TN754 Digital Line board (PEC 63114). Also called the AP/DCS/CMS/AUDIX Interface.

* For any items ordered as additions, add an *A* to the PEC.

† A data link is required for an integrated AUDIX (*not* Standalone).

‡ The SCI data link is used *only* on some System 75 models.

(Continued)

TABLE A-6. Switch Equipment Ordering Codes *(Part 2 of 4)*

Item	PEC *	Required	Notes
System 75, Generic 1, and Generic 3:			
TN742 Analog Line	63111/A/P	Yes	Used for remote maint., AUDIX voice ports, and analog CO interface; each board has 8 ports
TN746B Analog Line	63136/A/P	Yes	Same uses as TN742; each board has 16 ports
TN762B Hybrid Line	63113	For SL-1	Used for Call Answer and Voice Mail ports on AUDIX setups with an SL-1 PBX
TN754 Digital Line	63114/A/P	Yes †	Provides 8 DCP ports for switched MPDM dial-up access, digital voice terminals, SCI data link, or digital AUDIX Networking link
TN747B CO Trunk	63115/A/P	For Net. if needed	Used for analog trunk interface to CO for AUDIX Networking
TN753 DID Trunk	63116	For Net. if needed	Used for analog DID trunk interface to CO for AUDIX Networking
TN758 Pooled Modem	63119	For Net. if needed	Used to emulate 212A modems for 1200 bps modem-pooling in AUDIX Networking (each board has 2 ports)
TN722B DS1 Tie Trunk	63122	For Net. if needed	Digital interface to CO used with AUDIX Networking
TN748C Tone Detector	63123 or 63906/A	For 2296 modems	Required if 2296A modems are used for AUDIX Networking
TN760B Analog Tie Trunk	63140	For Net. if needed	Used for analog tie-trunk interface to CO for AUDIX Networking
TN726 Data Line board	63130	For Z3A dial-up	Provides 8 ADU-to-DCP ports for Z3A1/2/4 ADU switched access; also called the DLC or EIA Interface board
TN765 Processor Interface (PI)	63153/P	Yes †	System 75, Generic 1, or Generic 3i/s data link to AUDIX; EIA port link recommended
TN577 Packet Gate (PGATE)	63317/A/P	Yes †	Generic 3r data link to AUDIX

* For any items ordered as additions, add an *A* to the PEC.

† A data link is required for an integrated AUDIX (*not* Standalone).

(Continued)

TABLE A-6. Switch Equipment Ordering Codes *(Part 3 of 4)*

Item	PEC *	Required	Notes
System 85 and Generic 2:			
SN270B GPP Digital Board	65104	For MPDM or Net.	Provides 4 DCP ports for switched MPDM dial-up access, digital voice terminals, or AUDIX Networking digital link
DCIU Data Link	65325	Yes †	DCIU has 8 links; 1 link required per adjunct (maximum of 4 AUDIX adjuncts in R2V2 or R2V3; up to 8 adjuncts in R2V4 and G2; 2 DCIUs needed for dup. common control)
SN228B Analog Line	65346	Yes	Used for remote maint., voice terminals, AUDIX voice ports; each board has 8 ports (*required for Outcalling*)
SN229 Analog Line	65347	Opt.	Used for remote maint., voice terminals, AUDIX voice ports; each board has 8 ports
SN230B CO Trunk	65110	For Net. if needed	Provides analog CO trunk interface for AUDIX Networking
SN232B DID Trunk	65111	For Net. if needed	Provides analog DID trunk interface for AUDIX Networking
SN243B Analog Data Port	65204	For Net. if needed	Used for analog data interface to modem pool in AUDIX Networking
ANN11C DS1 Trunk board	65420	For Net. if needed	Used for digital tie-trunk or CO trunk DS1 interface for AUDIX Networking
ANN11E DS1 CO board	65421	For Net. if needed	Used for upgrading an existing ANN11 board for DS1 interface in AUDIX Networking
SN233C Analog Tie Trunk	65425	For Net. if needed	Used for analog tie-trunk interface in AUDIX Networking
SN255B Tone Detector	65348	For 2296 modems	Required if 2296A modems are used in AUDIX Networking
SN261C ADFTC	65390	For 2296	Required to test 2296A modem pools
SN238 EIA port board	65392	For Z3A dial-up	Provides 4 ADU-to-DCP ports for Z3A1/2/4 ADU switched access (some PCs and terminals have problems in this setup)

* For any items ordered as additions, add an *A* to the PEC.

† A data link is required for an integrated AUDIX (*not* Standalone).

(Continued)

TABLE A-6. Switch Equipment Ordering Codes *(Part 4 of 4)*

Item	PEC	Required	Notes
MERLIN II:			
Control unit	6131-CU-1 *or* 6131-CU-2	Networking	Includes power/processor/base (used with non-DCP switch) Required *instead of* 6131-CU-1 if system requires ongoing administration
– Feature Module II	61381		Allows a maximum of 56 CO lines, 72 stations, and 64 data terminals
– Feature Module III	61378		Includes FM II features plus Automated Attendant, Incoming Line Identification, and Tie Line Support
– 008D line card	61386		8-port digital station module
– Console	 61392 3162-ATD 3167-DSB	Admin.	Order one of the following display sets if administration is to be performed: MERLIN II display console MERLIN II attendant console MERLIN II 34D console
5ESS Switch:			
See the NT1 and SCA in the next table			

Analog and Digital Equipment

Table A-7, *Analog and Digital Equipment Ordering Codes*, covers analog equipment (modems) and digital equipment including Data Service Units (DSUs), Isolating Data Interfaces (IDIs), Modular Processor Data Modules (MPDMs), and Asynchronous Data Units (ADUs).

Table A-7. Analog and Digital Equipment Ordering Codes *(Part 1 of 4)*

Item	PEC	Required	Notes
Analog:			
202T Modem	2121-202	As needed	Stand-alone modem for SMSI data link connections; requires stand-alone mounting (PEC 21472) and 2720-01n channel interface cable (see the B25A cable PEC)
212A Modem	2126-212	Opt.	Option for remote maintenance access
– 40A4 Mounting	21401	As needed	Required for 212A/2212 rack-mount modems
2224 Modem	2224-CEO	As needed	Stand-alone 2400 bps modem with modular cord for remote maint. or administration
2296A Modem	2296-AAA	As needed	Multiple-mount version of 9.6 Kbps modem *without* autodialer option (used for Networking)
– 105A Data Mounting Unit	22481	As needed	Required for 2296-AAA rack-mount modems used in Networking modem pool
DM224 Modem	2260-24A	As needed	Stand-alone version with modular cord; required for remote maint. or administration
DM224 Modem	2260-24B	As needed	Multiple-mount version of DM224 modem
DM424 Modem	2260-M42	As needed	Standalone 9.6 Kbps modem used with 7400A at a switch's DCP ports, or with AUDIX's RS-232 networking ports
Optima 2400	63183	As needed	Stand-alone 2400 bps modem with modular cord for remote maintenance or administration
Comsphere 3830	63184	As needed	Stand-alone 4800 bps modem with modular cord for remote maint., admin., or modem pooling

(Continued)

TABLE A-7. Analog and Digital Equipment Ordering Codes *(Part 2 of 4)*

Item	PEC	Required	Notes
Digital:			
103A Wall Jack Connecting Block	2750-D08	Yes	Jack for 4-pair modular connections to quick-connect field
356A Adapter	2750-A28	MERLIN	Converts 25-pair to eight modular 8-pin jacks
330A Adapter	2750-A03	CO line	Converts single data jack to single voice jack for direct CO line connection
Data Service Unit (DSU)		As needed	Two DSUs may be used back-to-back for an extended data link. DATAPHONE II 2600- or 2700-series models may be used if extra features (diagnostics, multipoint, and DATAPHONE II Service network connections) are needed.
– 2596A DSU	2225-96A	As needed	Multiple-mount digital 2596AL1A/2 DSU that runs at 2.4, 4.8, or 9.6 Kbps; needs 108A Digital Multiple Mounting (PEC 22253) for up to 8 units
– 2596B DSU	2225-96B	As needed	Stand-alone 2596AL1A/3 version with power supply, 25-ft modular cord, user guide
– 2596C DSU	2225-96C	As needed	Multiple-mount DSU that can fit in 2600-series mountings (PEC 22263); more compact version with single power supply
– 2696B DSU	2226-96B	As needed	Stand-alone 2600-series version of 2596A (allows multipoint and DATAPHONE II Service networking)
– 2696C DSU	2226-96C	As needed	Multiple-mount 2600-series DSU (needs PEC 22263 housing)
– 7400A DSU	2171-ADM	As needed	Used for AUDIX Networking modem pools with D-lead controlled 2296-type modems
– 7400A mounting package	21626 attr. 3	As needed	Includes adapter harness (WP90780L0), OR-6316 bridging adapter, and 2296 modem control cable (D-Lead)

(Continued)

TABLE A-7. Analog and Digital Equipment Ordering Codes *(Part 3 of 4)*

Item	PEC	Required	Notes
Digital (cont.):			
Isolating Data Interface (IDI)	65399/A	As needed	For DCIU link on System 85, DIMENSION, and Generic 2 (comcode 103981742); select attribute CNN07 for 4.5-ft ED-1E434-11 Group 174 cable. PEC includes Group 304 RS-449 extender cable (see Table A-3 for length); use CCT01 for single link or CCT02 to add Group 342 Y cable for dup. common control. Also used for System 75, Generic 1, and Generic 3i/s PI data link.
MPDM	2161-101	As needed	Required for AUDIX data link to a PBX; optional for switched administration access. Requires RS-232C card, housing, and digital switch board
MPDM/M1*	2161-103	As needed	Used with networking for 56 or 64 Kbps operation and loopback capability; requires RS-232C card
– RS-232C Card	21611	For MPDM	Provides RS-232C interface connector
– V.35 DTR card	21615	For MPDM	Allows a call to be answered without an attached DTE device
– D-181509 kit	21616	For MPDM	Modifies MPDM so it will work with 56 Kbps facilities; includes instructions
– Stand-alone Mounting	21702	For MPDM	Stand-alone mounting and 7-ft 4-pair modular wall cord
– Multiple-Mounting	21711	For MPDM	Multiple-mount hardware for up to 8 MPDMs; needs auxiliary or data cabinet
NT1 Unit	31960	BRI/API setups	Required to convert 4-wire T-interface API setups to the 2-wire U-interface leading to the 5ESS Switch; includes required D6AP-87 cables
NT1 Power Supply	31963	For NT1	External power supply for the stand-alone NT1 Unit

(Continued)

TABLE A-7. Analog and Digital Equipment Ordering Codes *(Part 4 of 4)*

Item	PEC	Required	Notes
Digital (cont.):			
SCA	70365	For 5ESS	Switch Communications Adapter required for 5ESS Switch API interface (comcode 405766460); includes one H600-258 Group 1 1-ft null-modem cable, and one ED-1E434-11 Group 110 50-ft RS-232C to RS-449 cable.
Z3A ADU – Z3A1 (male) – Z3A2 (no cable) – Z3A4 (female)	 2169-001 2169-002 2169-004	Opt. (at terminal) (at AUDIX) (at terminal)	Two may be used for switched access with SN238 or TN726 boards on the switch. Two may be used back-to-back with a D8AM-87 crossover cord (PEC 2724-38X or 6950-EA9) for extended local access. The Z3A1 has a 3-ft, 25-pin, M-to-F M8AK-87 cable (comcode 105388466); the Z3A4 has a F-to-F M8AJ-87 cable (comcode 105388474). All PECs include a male Z3A2 ADU (comcode 103963971).
External ADU Power	21691	For AUDIX Z3A	Attribute EPS02 is for local ADU power with 7-ft cord; EPS04, 05, and 06 is for remote power (5-, 9-, and 19-ft cords respectively)
Originate/Disc. Switch	21692	For ADU	Order one for each terminal or PC that cannot generate a 2-second break signal
Z3B1 SDU	2169-007	Opt.	Two may be used back-to-back for extended-local synchronous Text Service Interface connections to a host; comcode 405245028
D8AM-87 Crossover Cord	2724-38X	For ADU or SDU	Used only for back-to-back ADU or SDU connections (male-to-female 5-inch cord); comcode 104154414

Cables and Terminal Equipment

Table A-8, *Cables and Terminal Equipment*, covers cables for connecting AUDIX or peripheral equipment, including terminals, Personal Computer (PC), and Work Group Station (WGS) equipment.

Table A-8. Cables and Terminal Equipment *(Part 1 of 4)*

Item	PEC	Required	Notes
Cables:			
A25D cable	2720-04n	As needed	Male-to-male 25-pair cable used for MTDM connections to the switch; order length n where E=5 ft, K=10 ft, P=15 ft, R=20 ft, T=30 ft, W=60 ft, Z=100 ft
B25A cable	2720-01n	As needed	Male-to-female 25-pair cable used for modem connections to switch; order length n as for A25D
Data set cable	2721-28E	As needed	5-foot data set (modem) cable
D8W-87 4-pair Modular Wall Cord (male-to-male)	2725-07n	As needed	Used for stand-alone modems, MPDMs, and Z3A ADUs; order length n (G=7 ft, N=14 ft, and S=25 ft)
M25A cable	2725-17A	As needed	9-foot RS-232C extender cable
M25A cable	2725-18C	As needed	10-foot RS-232C extender cable
D-Lead Modem Control	70368	As needed	Male-to-male, 25-pair to RS-232C control cable for rack-mount MTDM-to-2296 modem pools (comcode 405796046)
H600-210	70308	As needed	Male RS-449 to female RS-232C cable for an AUDIX data link using an IDI (PEC 65399); order length attribute as follows: Group 1: LNG50=10 ft (3 m) (default), Group 2: LNG21=25 ft (8 m), Group 3: LNG11=50 ft (15 m), Group 4: LNG13=100 ft (30 m), Group 5: LNG17=200 ft (60 m), Group 6: LNG??=300 ft (90 m), Group 7: LNG??=400 ft (120 m), LNG99=none.

(Continued)

TABLE A-8. Cables and Terminal Equipment Ordering Codes *(Part 2 of 4)*

Item	PEC	Required	Notes
Cables (cont.):			
H600-258	Included in 70365	Yes	AUDIX null-modem cable; required for the local terminal (replaces the ED-1E434-11 Group 350 cable)
M10L	2721-26G	As needed	Control cable used for 40A rack-mount 7400A-to-2296 modem pools
M25B	2721-02D	As needed	Male-to-male 4 ft (1.2 m) RS-232C cable needed for standalone 7400A/modem connections
RS-449 to RS-232C Data Link Cable(s)	65259/A	As needed	Used with MPDM (for AUDIX data link to a PBX) or DSUs (for extended AUDIX data link to a DCIU). Includes one 50-ft ED-1E434-11 Group 110 RS-232C to RS-449 cable. Select CCT01 (single link) or CCT02 for Group 342 Y cable (duplicated common control).
Terminals:			
715 BCS	6950-ET7	Yes	Order one or two for local maintenance access and system administration (instead of a PC); includes monitor and keyboard. Equivalent terminals (Teletype 5420, 4415, 513/515/610 BCT, 615 MT) may be used, but may need different equipment.
615 MT	691116	Yes	Previously recommended terminal (see 715 BCS)
– Keyboard	33402	For 615	Order one 103-key keyboard for each 615 MT
– Monitor	33415	For 615	Order one 14-inch display for each 615 MT; select COL01 (green) or COL19 (amber) screen
– Software	33461	For 615	Order one 513 BCT emulation cartridge per MT

(Continued)

TABLE A-8. Cables and Terminal Equipment Ordering Codes *(Part 3 of 4)*

Item	PEC	Required	Notes
Printers:			
570 Printer	3330-570	For WGS	Recommended printer for a PC or WGS; 80-column, dot-matrix parallel printer
– Cable	2724-89G	For 570	Required 7-ft (2.1 m) cable
572 Printer	6950-EP5 or 3330-572	For PC or WGS	80-column, dot-matrix serial printer with RS-232C interface
– Cable	6950-EA1 or 2724-92G	For 572	Required 7-ft (2.1 m) cable Required 7-ft (2.1 m) null-modem cable
6417 Printer	6951-417	For 715	Recommended dot-matrix parallel printer for 715 BCS
WGS:			
6386-25 WGS CPU 311	6950-DB1	Yes	May be used for the AUDIX Administration and Data Acquisition Package (instead of a terminal); includes keyboard but *no* hard disk
– Hard disk	69595	For 311	300-Mbyte hard disk for 6950-DB1
6386-25 WGS CPU 314	6950-DB3	Yes	Same PC as 6950-DB1 except it includes a 135-Mbyte hard disk
– Cable	6950-EB1	For WGSs	25 to 36-pin WGS interface cable
– Monitor	69579	For WGSs	Order one 14-inch monochrome display as needed
– Monitor	69586	For WGSs	Order one 14-inch color display as needed; also requires PEC 69587 (VDC)
– Video cont.	69587	For WGSs	Video controller for WGSs (required)

(Continued)

TABLE A-8. Cables and Terminal Equipment Ordering Codes *(Part 4 of 4)*

Item	PEC	Required	Notes
WGS (cont.):			
6286 WGS CPU 343	3709-343	Yes	May be used for the AUDIX Administration and Data Acquisition Package (instead of a terminal); includes 3.5-inch drives and keyboard
6386 WGS CPU 62	3708-062	Yes	May be used for the AUDIX Text Service Interface; includes 3.5-inch drives and keyboard
Monitor	37357	For WGS	Order one monochrome display for each WGS
Video Controller	37354	For WGS	Order one video board for every PC or WGS; needed for DOSS work stations
WGS Software			Order all three packages for each PC or WGS:
	1020-013	Yes	– 513 Terminal Emulation package (required for AUDIX administration); 5 14-inch drives
	1021-012	Yes	– MS-DOS 3.2 operating system; 5 14-inch drives
	1021-017	Yes	– MS-DOS 3.3 operating system; supports 3.5- and 5.25-inch drives
	6950-BC1	Yes	– MS-DOS 4.0 software
	1022-210	For ADAP	– dBASE III PLUS software package (version 1.1 or later); order from Ashton-Tate (5.25-inch disks)

B. AUDIX-L Hardware

Although AUDIX-L is no longer manufactured, it continues to be supported through Release 1 Version 5 (R1V5). This appendix provides hardware information about the AUDIX-L systems still in the field. Information includes descriptions of cabinets, controls and disk drives, circuit packs and carriers, temperature control, and power supplies.

AUDIX-L CABINETS

AUDIX-L uses two cabinets: the control cabinet, which contains all the circuit pack carriers and the basic power equipment, and the disk drive cabinet, which contains the disk drives and additional power equipment if needed.

Control Cabinet (J58886L)

The AUDIX-L control cabinet shown in Figure B-1, *AUDIX-L Control and Disk Drive Cabinets (Front View)*, (J58886L) measures 70 inches (178 cm) in height, 32 inches (81 cm) in width, and 24 inches (60 cm) in depth. It contains the following basic equipment:

- *Circuit Pack Carriers:*
  - — *Control Carrier (J58888H):* Contains the Feature Processor (FP) and Voice Session Processor (VSP), main memory, and interfaces for AUDIX system control
  - — *Data Base Processor DBP Carrier (J58888K):* Contains the DBP subsystem, AUDIX Communications Controller (ACC) board (if AUDIX Networking is used), memory, and interfaces for the disk drives
  - — *Port Carrier (J58888J):* Contains the Voice Port (VPT) and Voice Processor (VPC) boards for voice communications with subscribers
  - — *Power Carrier (J58888L):* Contains the DC-to-DC power converters used by all circuit packs and carriers
- *Connectors:* The connectors for external cabling are on the back of the control cabinet. Four connectors (D00 to D03) are provided for the voice ports. The alarms link, data link, networking link (if installed), and administration and maintenance terminals each use one connector. Table B-1, *AUDIX-L Connectors*, lists these connectors.
- *Power Equipment:* AUDIX-L may use AC power equipment or DC power (with extended-battery holdover on the switch).
- *Temperature Control System:* An alarm board, fan assembly, and thermal sensors regulate cabinet environment.
- *Wiring:* The wiring for power and intercarrier connections is factory installed. Fuse panels, circuit breakers, and backplane interconnections are supplied. Additional wiring may be added to support

AUDIX Networking.

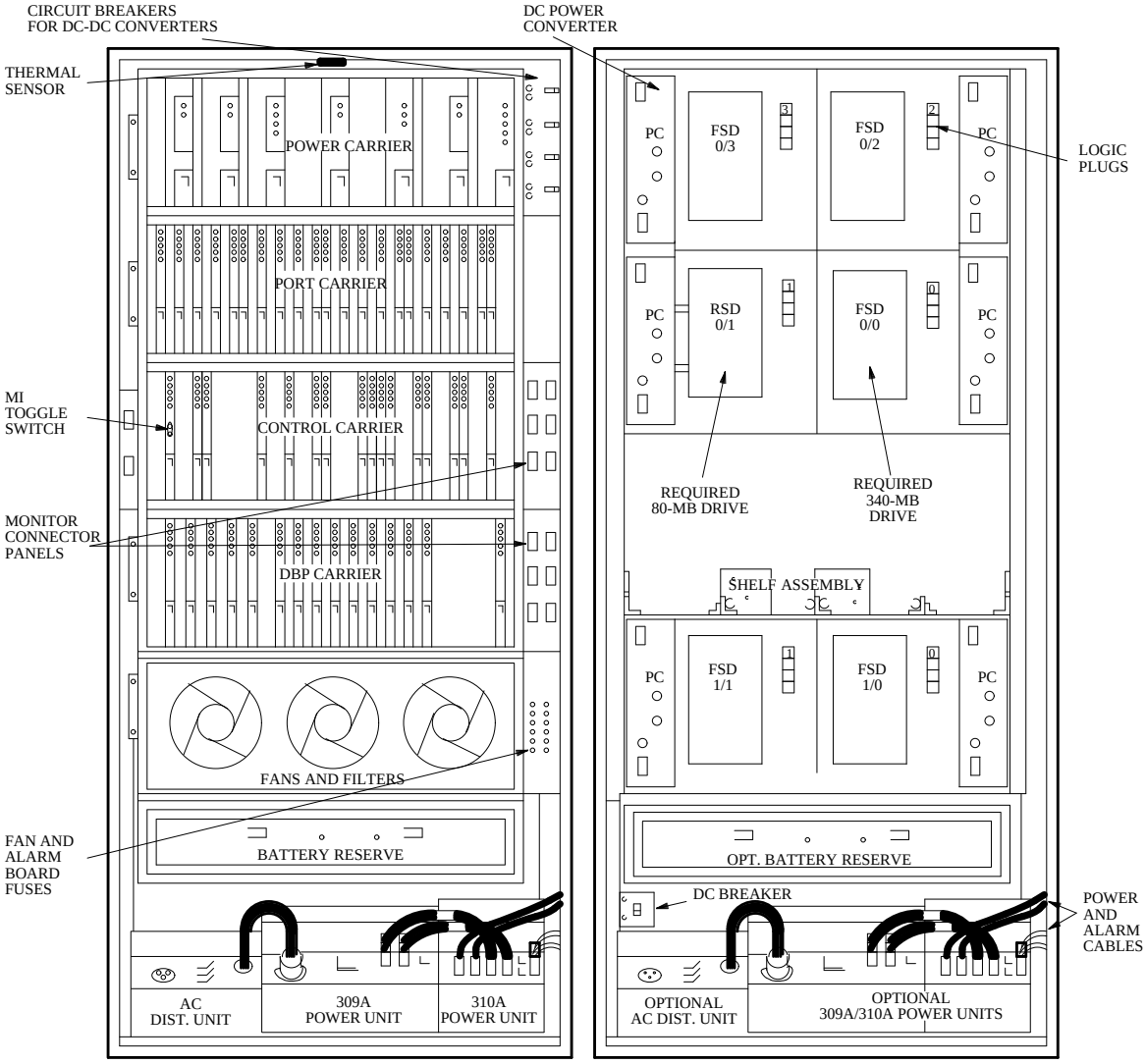


Figure B-1. AUDIX-L Control and Disk Drive Cabinets (Front View)

Table B-1. AUDIX-L Connectors

Function	Description	Labels	
Voice Ports:	Female 25-pair Amphenol (2 to 8 ports)	None	D00
	(10 to 16 ports)	None	D01
	(18 to 24 ports)	None	D02
	(26 to 32 ports)	None	D03
Alarms:	Female 25-pair Amphenol (1 pair)	ALARMS	D04
Data Link (R1V1 – R1V3):	Female 25-pair Amphenol (1 port)	DCP	D05
Data Link (R1V4):	Male 37-pin RS-449 (1 port)	DCP	F00
Networking Link:	Female 25-pair Amphenol (2 ports)	ACC	D06
Maintenance:	Female 25-pin RS-232C	MAINT	H02
Administration:	Female 25-pin RS-232C	ADMIN	H03
Monitor Connectors	Female 25-pin RS-232C (located at sides of DBP and Control carriers; used to monitor various processors under remote supervision)	None	

Disk Drive Cabinet (J58886M-2)

The AUDIX-L disk drive cabinet (J58886M-2) measures 70 inches (178 cm) in height, 32 inches (81 cm) in width, and 31 inches (79 cm) in depth (including the protective rear cover). It contains:

- *Disk Drives:* The required Removable Storage Drive (RSD) and one to seven Fixed Storage Drives (FSDs) are installed in a side-by-side arrangement in the current cabinet (J58886M-2). The older J58886M cabinet used a pigeon-hole (stacked) arrangement [see Figure B-8, *AUDIX-L Disk Drive Positions (Front View)]*.
- *Power Converters:* A DC/DC power converter is required for each disk drive.
- *DC Breaker:* A DC breaker routes power to the bus bar from the required power units in the control cabinet to power the first four disk drives. The older J58886M cabinet uses a DC filter as shown in Figure B-8, *AUDIX-L Disk Drive Positions (Front View)*.
- *Optional Power:* Systems with five or more disk drives always require a second power arrangement in the disk drive cabinet. For a DC-powered system, a dual-circuit filter is needed.

CIRCUIT PACK CARRIERS

The AUDIX-L control cabinet contains all the circuit pack carriers and their backplanes. Circuit breakers and fuse panels are located at the end of each carrier. All loose wiring and cabling from the backplane to the circuit breakers, fuses, and connectors are included in the carrier assembly.

Control Carrier (J58888H)

The control carrier, the third carrier from the top of the cabinet, is shown in Figure B-2, *AUDIX-L Control Carrier Circuit Packs (R1V1 to R1V3)*, and Figure B-3, *AUDIX-L Control Carrier Circuit Packs (R1V4)*. Both required and optional circuit packs and their slot positions are shown.

The VSP and the FP form two primary subsystems. Both processors work together to control AUDIX operations. The FP also controls initialization, administration, and maintenance of the system.

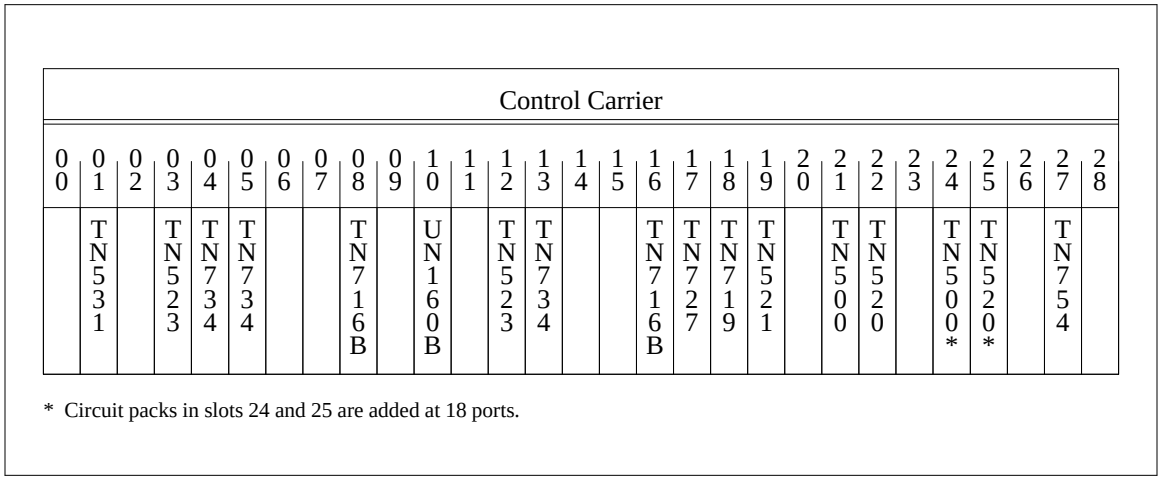


Figure B-2. AUDIX-L Control Carrier Circuit Packs (R1V1 to R1V3)

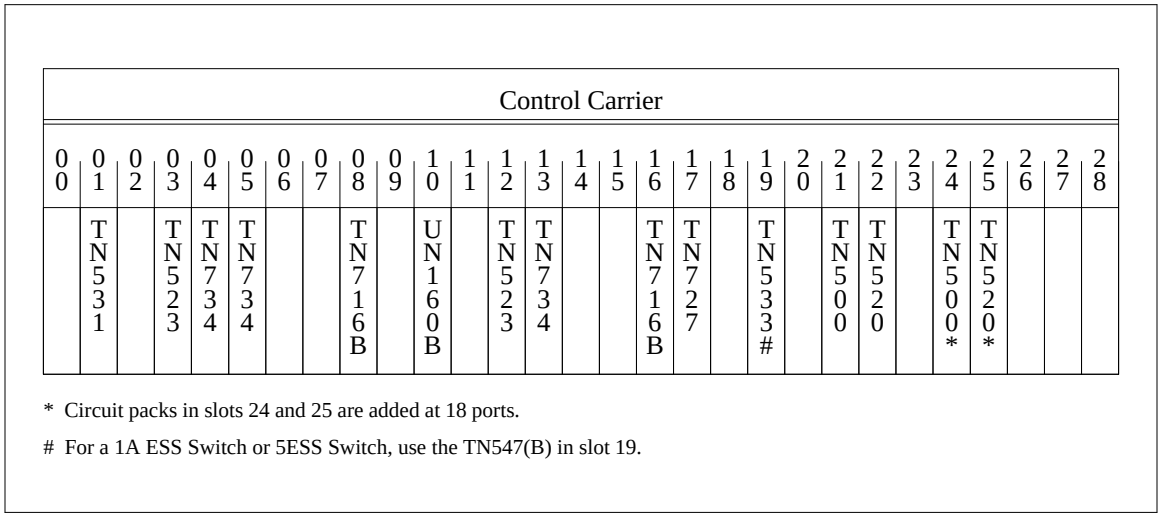


Figure B-3. AUDIX-L Control Carrier Circuit Packs (R1V4)

Individual control carrier circuit packs are described below in numerical order.

- *TN500 — Time Division Bus Interface (TDBI)*: The TDBI Vintage 7 circuit pack is the data-exchange interface between the TN520 Voice Buffer (VB) and TN501B VPC boards. The TN500 TDBI connects up to 16 ports (8 VPC boards) to a TN520 VB board through the Time Division (TD) bus. In systems with more than 17 ports, two sets of TDBI and VB boards are installed. The TDBI board is partly initialized by the TN520 VB and partly by the TN727 Network Controller (NC). Each pack contains three Intel 8051 processors, Random Access Memory (RAM), and Read Only Memory (ROM).
- *TN520 — VB*: The VB Vintage 11 circuit pack provides memory and control functions to handle voice data flow to and from the DBP subsystem. Data passes from the TN520 over the S bus to the UN160B leading to the DBP. The TN520 VB can handle up to 16 active voice ports simultaneously through the TN500 TDBI. The VB supports an announcement channel and play/record channel for each port (32 channels per board). The VB also converts the block voice-data flow to a stream-oriented flow for the TN500 TDBI and vice versa. The VB board contains an Intel 8086 processor with 128 kilobytes (K) of RAM and 64K of ROM.
- *TN521 — Switch Communications Processor (SCP)*: The SCP Vintage 7 circuit pack supports the AUDIX-L data link to the switch. The FP sends messages to the SCP over the S bus, which passes them to the TN719 Synchronous/Asynchronous Interface (SAI) board. The SCP supports a subset of BX.25 protocol (level 2) for the data link. The FP software supports the remainder of this protocol (level 3). The SCP circuit pack contains an Intel 8086 processor with 128K of RAM and 64K of ROM. (*R1V1 through R1V3 systems only.*)
- *TN523 — FP or VSP Central Processing Unit (FP-CPU or VSP-CPU)*: [Also called the Central Processing Unit/Memory Management (CPU/MM) board; sometimes called the Processor Element (PE) board.] The TN523 CPU, TN734 RAM, and TN716B Bus Interface (BI) boards make up a PE which is the heart of the VSP and FP subsystems. There are two sets of these boards (one for each subsystem). In addition, two TN734 RAM boards are needed for the FP on AUDIX R1V2 or later systems. The TN523 board is called the FP-CPU or VSP-CPU, depending on the subsystem with which it is used.

The CPU circuit pack contains an Intel 8086 processor and is responsible for overall operation of the PE. It executes programs loaded from disk to RAM. Firmware runs low-level functions, while software loaded into the TN734 RAM board runs the primary AUDIX programs. A Vintage 8 board is acceptable in most systems; AUDIX-L systems with four or more FSDs require a Vintage 12 TN523. The CPU boards perform the following functions:

— 24-bit address space and associated memory management

— Interrupt handling

— Multimode operation with associated protection

— Initialization and maintenance interface (FP-CPU)

— Support of BX.25 protocol (FP-CPU)

— Voice buffer/voice port interface (VSP-CPU)

The TN523 CPU board has been replaced with the TN591 CPU board; refer to Chapter 2 for a description of this board.

- *TN531 — Maintenance Interface (MI)*: The MI circuit pack is connected to the FP-PE through the M0 bus. It can reset (reboot), restart, or shut down the FP through software or firmware. The MI has an alarm panel with light emitting diodes (LEDs) and a shutdown/reinitialize toggle switch. It receives alarms from the ZAEH5B alarm board and can act on them. A Vintage 8 board is acceptable in most systems; AUDIX-L systems with four or more FSDs require a Vintage 9 TN531. The MI contains an Intel 8088 processor and handles the following tasks:

  — Administration terminal access (RS-232C compatible ADMIN connector)

  — Local and remote maintenance access (RS-232C compatible MAINT connector)

  — Environmental (thermal) monitoring and control

  — Sanity timer monitoring

  — System shutdown after AC power failure or low battery voltage

- *TN533 — Switch Communications Processor Interface (SCPI)*: The SCPI (Vintage 6 or later) circuit pack supports the AUDIX serial data link to a PBX. The SCPI provides an unbalanced RS-449/RS-423 synchronous BX.25-compatible data link that runs at a maximum of 9600 bps. The data devices in the link provide electrical isolation for signals and act as null-modems in directly cabled applications, since both the AUDIX SCPI and switch's Data Communications Interface Unit (DCIU), Processor Interface (PI), or Switch Communications Interface (SCI) data link boards are Data Terminal Equipment (DTE) devices.

  The SCPI circuit pack contains an Intel 80186 processor with 512K of RAM and 64K of ROM. It connects to the S bus and transmits data to and from FP memory over the data link. An Intel 8273 High-Level Data Link Controller (HDLC) device drives the single synchronous data link, provides framing, and checks for errors. SCPI hardware supports up to level 2 of the BX.25 protocol; SCPI firmware and FP software support the higher levels of this protocol. (*R1V4 systems only.*)

- *TN535 — Processor Monitor (MON)*: Qualified service personnel use the monitor boards for testing and circuit pack monitoring. These six slots are usually vacant. If filled, they allow the appropriate monitor (terminal) to access them through one of the monitor connectors at the front of the machine.

- *TN547 or TN547B— Multiprotocol Switch Interface (MPSI)*: The MPSI circuit pack (Vintage 2 or later) supports the asynchronous Simplified Message Service Interface (SMSI) data link to an integrated 1A ESS Switch or 5ESS Switch. The MPSI contains an Intel 80186 processor with 512K of dynamic

RAM and 64K of Electrically Programmable Read Only Memory (EPROM). It connects to the S bus and transmits data to and from FP memory over the data link. An Intel 8274 Multiple Protocol Serial Controller (MPSC) is a synchronous-asynchronous, error-checking chip that drives the data link.

The MPSI board is used instead of the TN533 SCPI board for 1A ESS Switch and 5ESS Switch connections (the SCPI is used only for PBX data links). The MPSI can operate in terminal or computer mode for SMSI connections; terminal mode is always recommended so the switch can detect problems and message acknowledgements in the data link. An Applications Processor Interface (API) connection (possible on 5ESS Switches only) uses computer-to-computer mode (no acknowledgements sent to MPSI) because of the SCA in the link. The SMSI setup uses an asynchronous, RS-232C, ASCII interface that runs at 1200 bps in full duplex. The API link is similar to the SMSI link, except it supports up to 9600 bps operation and AUDIX Leave Word Calling (LWC) messages (*R1V4 systems only*.)

- *TN710 — Dynamic Random Access Memory (DRAM)*: (Replaced by the TN734 RAM board.) The DRAM circuit packs were used in some early (R1V1) AUDIX-L systems. They contained only 512K of memory each and therefore needed more slots in the control carrier.
- *TN716 or TN716B — FP or VSP Bus Interface (FP-BI or VSP-BI)*: The TN716B BI boards work with the TN523 CPU and TN734 RAM boards to form the PE for the VSP and FP subsystems. The board is called the FP-BI or VSP-BI, depending on the subsystem with which it is used. The BI circuit pack provides a bidirectional path for data transfer between the FP-PE (on the M0 bus) and the VSP-PE (on the M1 bus). The BI also provides interrupt and clock functions for control of and communication with processor components on the S bus. A TN716B vintage circuit pack is required for AUDIX Networking.
- *TN719 — SAI*: The SAI circuit pack is the interface between the TN521 SCP and the TN754 Digital Line board. The SAI board has four ports that convert RS-232C format (BX.25 protocol) on the SCP side to the Digital Communications Protocol (DCP) Mode 2 used by the Digital Line side. Currently only one port is used for the data link. The SAI board processes the local clock and serial data stream for delivery to the TD bus. Data passes over the TD bus to the Digital Line board for transmission to the switch. (*R1V1 through R1V3 systems only*.)
- *TN727 — NC*: [Also called NETCON; formerly called the Switch Interface (SI) board.] The NC circuit pack is a bidirectional path for transferring status and control information between the VSP-PE on the M1 bus and devices on the TD bus. An Intel 8051 microprocessor on the NC is the master of the TD bus, passing messages between it and the VSP. The NC continuously scans the TD bus for messages and hardware problems.

  The NC also contains a real-time clock (RTC) used by AUDIX R1V3 software. The time is either set on AUDIX (required for Standalone systems) or synchronized with the switch (in data-link setups only). The clock normally receives power from the backplane. In case of a system power outage, an on-board battery keeps the clock running until regular power is restored (the clock does not have to be reset after power-up). This lithium battery is soldered to the board and has about a 4-year lifespan. The battery does not discharge unless the NC board is plugged into the backplane.
- *TN734 — FP or VSP RAM (FP-RAM or VSP-RAM)*: (Also called FP or VSP Processor Memory or MEM.) Each RAM circuit pack contains 2 megabytes (Mbyte) of RAM (RAM). The TN734 RAM boards work with the TN523 CPU and TN716B BI boards to form the PE for the VSP and FP subsystems. The TN734 board is called the FP-RAM or VSP-RAM, depending on the subsystem with which it is used. It provides dynamic memory control and error detection/correction functions for the CPU associated with it. Background RAM tests on the board run slowly but continuously. The TN734 RAM board has been replaced with the TN761 RAM board; refer to Chapter 2 for a description of this board.

- *TN754 — Digital Line Board*: [Also called the DLC board; formerly called the General Purpose Port (GPP) on AUDIX.] The Digital Line circuit pack is the last part of the data link from the AUDIX-L control carrier to the switch. The Digital Line board receives data from the TN719 SAI over the TD bus and sends it to one of its eight DCP ports on the switch side (only one link is currently used). The DCP transmit and receive data pairs travel through a 25-pair cable. The cable is then connected to another data device near the switch to complete the data link.
- *UN160 or UN160B — Data Base Processor Interface (DBPI)*: The DBPI circuit pack connects the FP and VSP subsystems with the DBP subsystem over the S bus. It works with the UN162 Voice Store and Forward Interface (VSFI) in the DBP carrier to allow communication between the FP and DBP subsystems. The UN160 Vintage 8 may be used in early (non-Networking) AUDIX-L systems. The UN160B Vintage 2 circuit pack is required for AUDIX Networking.

DBP Carrier (J58888K)

The DBP carrier occupies the bottom position in the control carrier. Up to 15 TN- and UN-coded circuit packs may be installed in the DBP carrier. These packs control and support the disk database, provide the interface to and from the disk drives, and store and retrieve voice messages and related information. Figure B-4, *AUDIX-L DBP Carrier Circuit Packs*, shows the AUDIX-L DBP carrier with required and optional circuit packs and their slot positions.

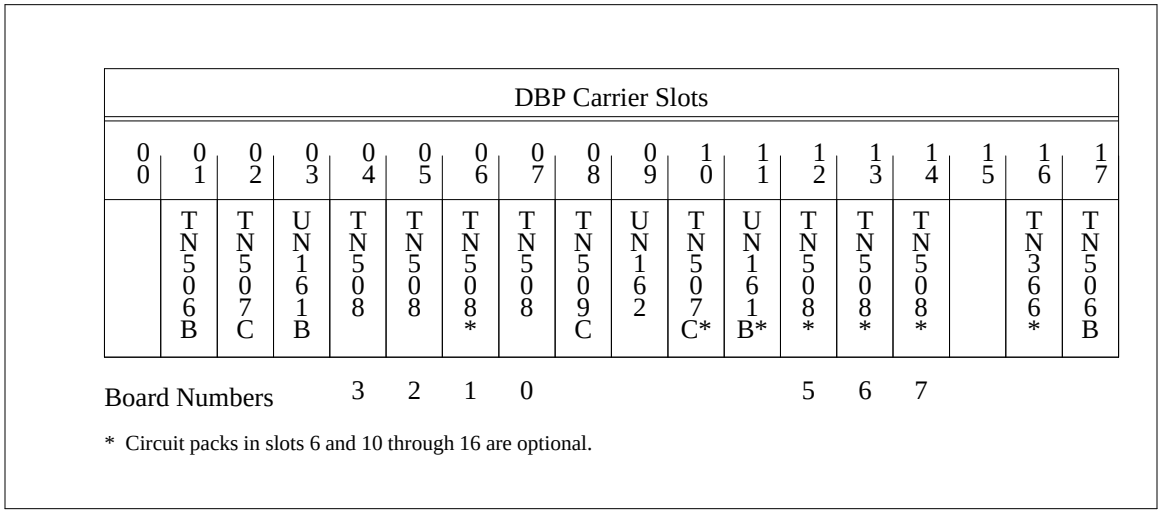


Figure B-4. AUDIX-L DBP Carrier Circuit Packs

The DBP carrier circuit packs are described in numerical order. Minimum vintages are shown for each board (the `maintenance : system : vintage` form displays the boards and vintages currently installed in a system).

- *TN366 or TN366B — ACC:* The AUDIX Communications Controller (ACC) board has a Motorola 68000 CPU which uses 128K of RAM and 256K of ROM to handle communications protocols. Another 512K of shared RAM is used to buffer messages between AUDIX machines (over the network interface) and to communicate with the FP, DBP, and DBPI processors (over the DBP bus interface).

  TN366 ACC Vintage 5 circuit pack or a TN366B is required for AUDIX Networking. The network interface consists of two physical DCP links to a digital port board on the switch; this DCP Link Interface (DLI) is handled by three Intel 8274 HDLC devices which can control four S (signaling) and I (information) channels (two S and I channels per port). The ACC board also provides timers and a monitor (RS-232C terminal) interface.

  The ACC board has been replaced with the TN539B AUDIX Communications Controller Enhanced (ACCE) board; refer to Chapter 2 for a description of this board.

- *TN506 or TN506B — Bus Controller (BC):* [Also called DBP Bus Controller/Terminator, BUS CTRL, or Versa-Module European (VME) Bus Controller/Terminator.] The TN506B BC boards reside at either end of the DBP (VME) bus used by the DBP subsystem. The TN506B BC in slot 01 combines the function of bus controller and bus terminator. The TN506B in slot 17 provides only the bus terminator function. A TN506 Vintage 3 board or TN506B Vintage 1 circuit pack is required for AUDIX Networking. The BC circuit pack provides the following functions:

  — DBP (VME) bus master bus clocks, reset signals, and data flow control

  — Electrical bus termination

  — Return DTACK (ACK) on board ID and vintage read

- *TN507C — Intelligent Peripheral Controller (IPC):* The IPC Vintage 3 circuit pack controls the bidirectional data flow between the DBP (VME) bus and disk drives in conjunction with the UN161B Disk Interface Module (DIM) circuit pack (the DIM is functionally part of the IPC). Each IPC board can support up to four disk drive ports on the DIM. The set of TN507C IPC and UN161B DIM packs is called a disk controller. There must be two disk controllers (0 and 1) for more than 4 disk drives or 16 ports.

  NOTE

  The AUDIX-L TN507C IPC and UN161B DIM do *not* support filesystem mirroring in R1V4. However, the File Redundancy feature *is* available for AUDIX-L customers who upgrade to R1V4.

- *TN508 — DBP-RAM:* The DBP-RAM circuit packs each contain 512K of dynamic memory with parity. There are three to seven DBP-RAM boards in the DBP carrier. The DBP-RAM circuit pack next to the TN509C DBP-CPU circuit pack (DBP-RAM 0) is dedicated for CPU expansion memory. This board adds 512K to the 128K of DBP-CPU private memory for a total of 640K of RAM.

  The DBP-RAM 2 and DBP-RAM 3 boards are always required; additional DBP-RAM boards are added depending on the number of VPC boards installed. These boards support data transfer over the DBP (VME) bus by buffering voice data channels between the TN520 VB(s) and the disk drives. The DBP-CPU controls the DBP-RAM boards. Vintage 4 TN508 boards are required for AUDIX Networking.

- *TN509 or TN509C — DBP-CPU:* [Also called the Dedicated Function Computer (DFC).] The DBP-CPU circuit pack contains a Motorola 68000 CPU chip with 32K of ROM and 128K of RAM. The TN509C DBP-CPU works closely with the 512K of expansion memory on the first TN508 board (DBP-RAM 0). DBP-CPU memory is used for system tables and stacks, kernel text, and utility task-running areas. A TN509 Vintage 7 (or later) board is needed if four or more FSDs are installed). A TN509C Vintage 1 circuit pack is required for AUDIX Networking. The DBP-CPU does interrupt handling, filesystem management, initialization, and memory management.
- *UN161B — DIM:* The set of TN507C IPC and UN161B DIM packs form one disk controller. Controller 0 is always required. If more than 4 disk drives or 16 ports are installed, two disk controllers (0 and 1) must be installed. The Vintage 5 DIM circuit pack provides a bidirectional path for data transfer between the disk drives and the IPC circuit pack. The ZAJU1 circuit board on the DIM board backplane links the disk drive cables to the controller. Each DIM circuit pack supports up to four disk drives. The disk drive interface is the Storage Module Drive (SMD) industry standard.
- *UN162 — Voice Store and Forward Interface (VSFI):* The VSFI Vintage 3 circuit pack is the gateway for all DBP subsystem interactions with the FP and VSP subsystems. The FP places messages for the DBP subsystem in the UN160B DBPI circuit pack in the control carrier, which forwards them to the UN162 VSFI. The VSFI therefore enables voice data transfer between the DBP RAM boards and TN520 VBs in the control carrier. This board is initialized by the UN160B DBPI.

Port Carrier (J58888J)

The port carrier is in the second from the top position in the control carrier. It can contain up to 21 TN-coded circuit packs. Figure B-5, *AUDIX-L Port Carrier Circuit Packs*, shows the AUDIX-L port carrier with required and optional circuit packs and their slot positions.

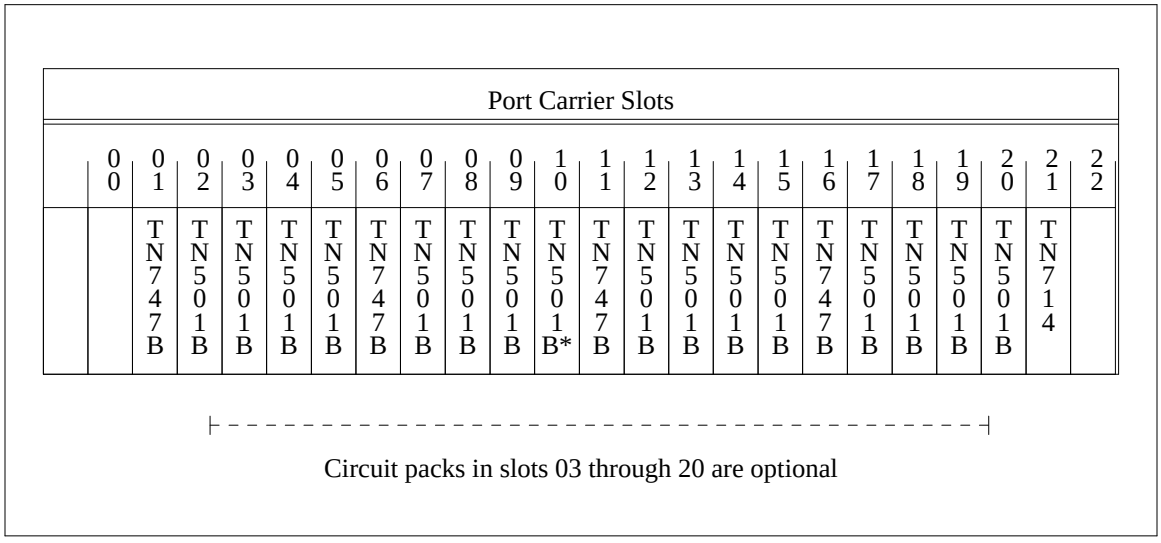


Figure B-5. AUDIX-L Port Carrier Circuit Packs

The port carrier circuit packs provide the voice interface for switch callers and perform the processing for recording, playback, and storage of subscriber voice messages. The TN747B VPT and TN501B VPC (in the port carrier) work with the TN500 TDBI and TN520 VB (in the control carrier) and the TN508 DBP-RAM boards (in the DBP carrier) to transfer and buffer voice data.

The port carrier circuit packs are described below in numerical order.

- *TN501B — VPC:* (Also called Voice Processor Computer.) The VPC circuit pack contains two ports that connect to the TD bus. Each port has two channels: one channel communicates to the TN747B VPT board, and the other communicates to the disk drives through the TN500 TDBI. The VPC circuit pack encodes and compresses messages to reduce disk storage requirements. The VPC performs the following functions:
  - — Automatic gain control on recording
  - — Bandwidth and silent interval encoding and decoding
  - — Speed and volume control on playback
  - — Speech compression and expansion
  - — Touch-tone signal detection and generation during playback
- *TN714 — Tone and Clock (TC):* The TC circuit pack provides the master reference clock for the TD bus and performs digital generation of the standard call progress tones. The TC generates clock signals for the system clock (2.048-MHz) and frame clock (8-kHz) used by all boards on the TD bus, and for the data clock (160-kHz) used by the TN754 Digital Line and TN719 SAI boards.
- *TN717 — VPT:* (Replaced by the TN747B VPT board.) Version of VPT board used in some early AUDIX-L systems.
- *TN747 or TN747B — VPT:* The VPT circuit pack has eight voice-port circuits (loop-start signaling) for analog connections to a call-distribution group on the switch. It performs signaling and analog/digital conversions for each port. One VPT board provides analog interfaces for up to four VPC boards (eight ports) over the TD bus. Some early AUDIX-L systems may have a TN747 vintage VPT installed. New systems must have a Vintage 5 *or* Vintage 8 (or later) TN747B VPT.

Power Carrier (J58888L)

The DC power carrier (also called the DC/DC converter carrier) may have up to seven DC/DC converter circuit packs. These packs provide regulated DC power for all the circuit pack carriers. The power carrier fills the top position in the control cabinet. Figure B-6, *AUDIX-L Power Carrier Circuit Packs*, shows the AUDIX-L power carrier, required and optional circuit packs, and their slot positions.

The input voltage for the DC/DC converters is supplied by the –48 VDC rectifier for the control cabinet. The normal input voltage is –46 VDC to –52 VDC, but emergency and transient inputs from –41.75 VDC to –60 VDC are tolerated.

Power Carrier Slots								
00	01	02	03	04	05	06	07	08
495FA	495FA	TN507C		495FA*		494HA	495JB	495JB*

* Circuit packs in slots 04 and 08 are optional (see text).

Figure B-6. AUDIX-L Power Carrier Circuit Packs

The power carrier circuit packs are described below in numerical order.

- *494HA Converter:* The 494HA DC/DC converter in slot 06 provides power to slot 08 of the DBP carrier for general system use. The –12 VDC output is regulated at –12 VDC ±5 percent at 0 to 5 amps. The +12 VDC output is regulated at +12 VDC ±5 percent at 0 to 1.25 amps.
- *495FA Converter:* The 495FA DC/DC converters provide power for the control and port carriers. The converters in slots 00 and 01 provide power to the control carrier, and the converter in slot 04 provides power for the port carrier if more than 18 ports are installed. For all 495FA converters, the +5 VDC output is regulated at +5 VDC ±3 percent at 0 to 50 amps (250 watts).
- *495JB Converter:* The 495JB DC/DC converter in slot 02 provides power to the port carrier and is always required. The 495JB converters in slots 07 and 08 provide power for the DBP carrier. For all 495JB converters, the +5 VDC output is regulated at +5.067 VDC ±3 percent at 0 to 2 amps. The –5 VDC output is regulated at –5 VDC ±3 percent at 0 to 2 amps. The converter in slot 07 is always required for the DBP carrier; the converter in slot 08 is installed for *any* of the following conditions:
  - — 12 or more voice ports
  - — Two disk controllers (for five or more disk drives)
  - — AUDIX Networking

DISK DRIVES

Two types of disk drives may be installed on an AUDIX-L system: a required 80-Mbyte RSD drive, and one to seven 340-Mbyte FSD drives. Figure B-7, *AUDIX-L Cabinet Connections (Rear View)*, shows a rear view of a fully loaded AUDIX-L disk drive cabinet with cabling and second power arrangement. Figure B-8, *AUDIX-L Disk Drive Positions (Front View)*, shows different disk drive positions.

NOTE

These AUDIX-L disk drives do *not* support filesystem redundancy. However, the File Redundancy feature *is* available for AUDIX-L customers who upgrade to R1V5.

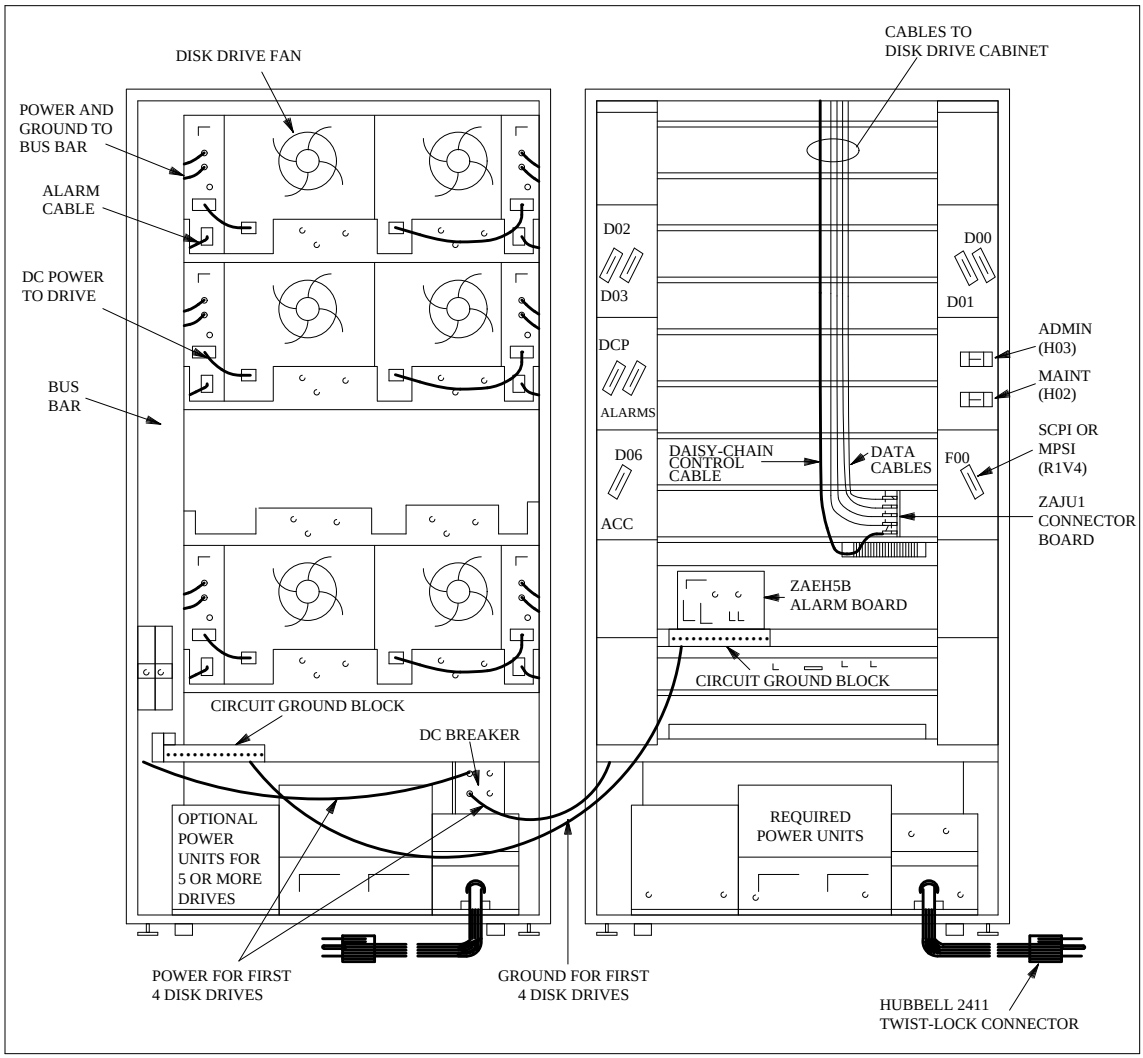


Figure B-7. AUDIX-L Cabinet Connections (Rear View)

RSD (KS-23091-L1)

The RSD is a portable mass-storage device. One RSD is always required per AUDIX system. RSD cartridges are inserted to load new software or make backups of filesystem data. At least one generic-program cartridge (a copy of the system software) and two backup cartridges are required per system.

The RSD has a data rate of 10 Megahertz (MHz) with an average access time of 30 milliseconds (ms). The RSD has three 9-inch platters of magnetic media and can hold up to 80 Mbytes of data before formatting. The heads are part of the RSD drive assembly.

NOTE

The RSD is a sensitive device due to the exposed magnetic media of the cartridge. It requires careful handling and a regulated environment to work properly.

Fixed Storage Drive (KS-22875-L13)

The Fixed Storage Drive (FSD) is a permanent mass-storage device (fixed disk). At least one FSD is required per system, and up to seven FSDs may be installed.

The FSD holds up to 340 Mbytes of data before formatting. The formatting program uses a small percentage of disk space to provide the organization needed to write and access data; the majority of space is free for program and subscriber use. The FSD drives have a data rate of 10 MHz with an average access time of 30 ms. The 340-Mbyte disks each have seven 9-inch platters of magnetic media and 24 heads for reading and writing information. Each disk holds about 27 hours of subscriber messages or other data (one block on the FSD is equivalent to about 8 seconds of voice information).

The front panel of the drive includes a logic plug for identifying the drive's position, a start (power-up) button, a write-protect switch, and diagnostic indicators. FSDs are given names (labels) through software.

Disk Drive Controllers and Position

The drives are arranged in the disk drive cabinet in an order determined by the cabling at the rear of the cabinet, shelf or individual (pigeon-hole) mountings, and the controller (0 or 1) which directs disk read and write operations. The current disk drive arrangement is shown in Figure B-1, *AUDIX-L Control and Disk Drive Cabinets (Front View).* Earlier drive arrangements appear in Figure B-8, *AUDIX-L Disk Drive Positions (Front View).*

Controllers

The first number in a disk drive position designation (such as the **0** in 0/2) indicates the controller used. One or two controllers are installed in the AUDIX-L DBP carrier. A controller is a set of TN507C and UN161B circuit packs. Controller 0 is always required and controls the top four disk drives (the RSD and up to three FSDs). Controller 1 controls the bottom four drives (if installed).

Two controllers are needed for large-capacity AUDIX-L systems. If 18 or more ports or five or more drives are installed on the system, a second controller is needed for good system performance and to handle the disk drive demand. When the second controller is added, a second DBP power converter (495JB) is installed in the power carrier. Additional power is also added to the disk-drive cabinet to support more than four drives (see the *Power Arrangements* section).

All the disk drives for controller 0 do not have to be installed before any drives for controller 1; the drives may be divided between the two controllers for traffic considerations if desired. For example, if drive positions 0/0, 0/1 (an RSD), and 0/2 are filled, two more drives could be installed in positions 1/0 and 1/1. This divides the load more evenly among the four FSDs (two FSDs per controller).

Drive Position

The second number in the disk-drive numbering designation (such as the **2** in 0/2) indicates the position in which the drives are installed. This order is followed when installing the cables at the rear of the cabinet.

In current AUDIX-L systems, the first two drives (0 and 1) are installed side-by-side on the same shelf (ED-1E489-70 covers the sliding shelf assembly). The next two drives (2 and 3) are installed on a shelf above the first two drives. Drives are installed right-to-left from the front (the RSD in position 0/1 is to the left of the FSD in position 0/0). Once the drives are installed, a logic plug on the front panel gives the drive a unique logical address for software access. The position number becomes the *device* number after the plug is inserted.

In the early J58886M cabinet versions of AUDIX-L, disk drives are mounted in individual housings. Instead of the side-by-side shelf arrangement used in the current J58886M-2 cabinet, the drives are installed vertically in pigeon holes; disk 0/0 is above disk 0/1 [see Figure B-8, *AUDIX-L Disk Drive Positions (Front View)*]. The *AUDIX-L Installation* manual (585-300-101) shows disk drive housing and cabling arrangements for different AUDIX-L models.

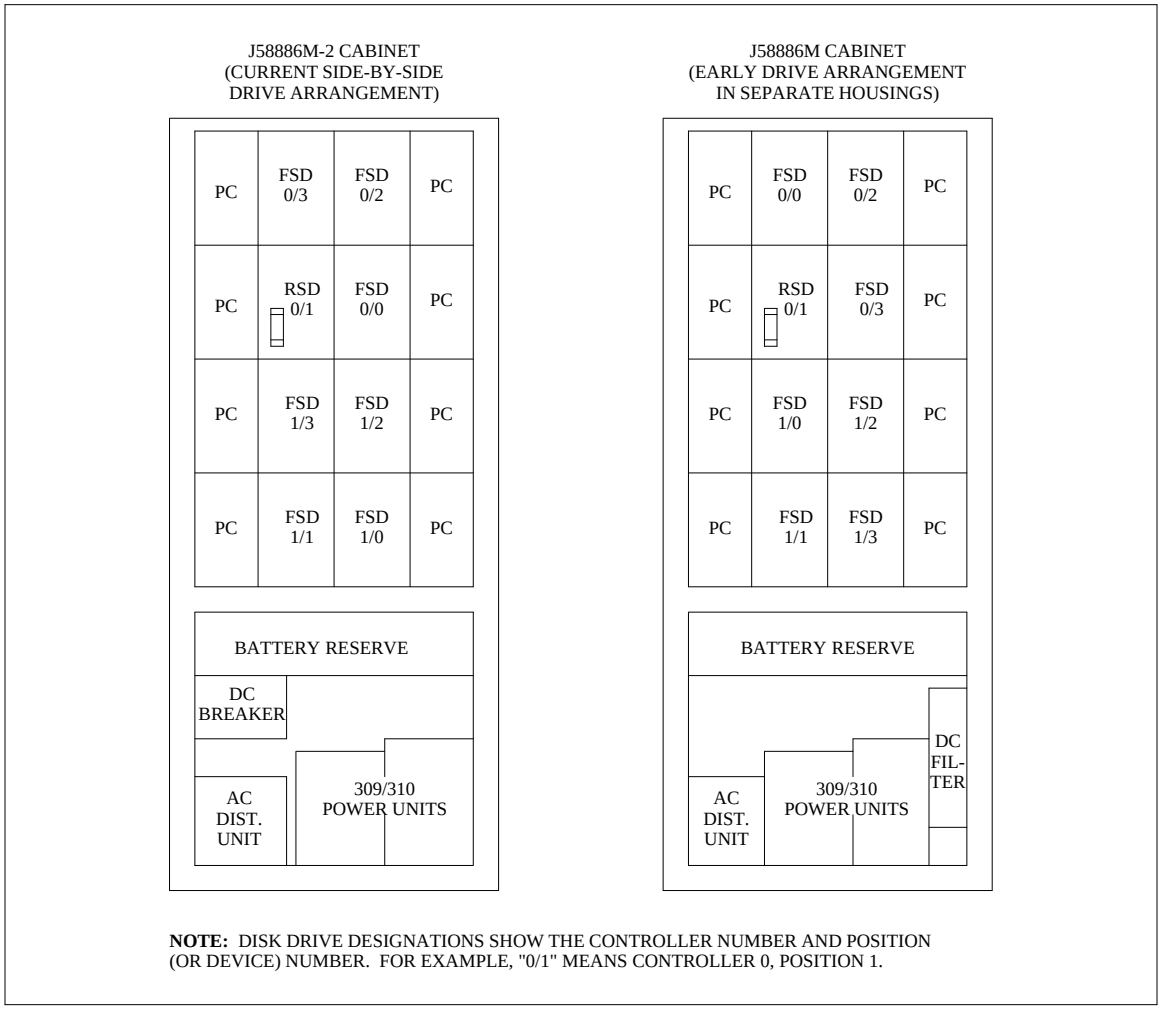


Figure B-8. AUDIX-L Disk Drive Positions (Front View)

Disk Drive Power Converter (KS-22997-L7 or -L8)

AUDIX-L currently uses Zytec DC/DC power converters to provide power to the disk drives. One power converter is required for each drive and is mounted beside the disk drive next to the cabinet edge. The disk drive and its controller require 200 to 300 watts for normal (steady-state) operation, or up to 450 watts during surge (spin-up) conditions. The voltage outputs and their related functions for each converter are listed below:

Channel	Voltage Range	Amperes	Function

+5.1 VDC	+4.9 to +5.25	2 to 5 A	Logic circuitry
–5.1 VDC	–4.9 to –5.3	3 to 6 A	Logic circuitry
+24 VDC	+21.6 to +29	0.2 to 5 A	Control accessing
–24 VDC	–21.6 to –29	0.2 to 5 A	Control accessing
+40 VDC	+38 to +42	0 to 1.7 A	DC motor

Two types of DC/DC disk drive converters are used in AUDIX-L systems. The early converters (KS-22997-L2) had a circuit breaker in series with the power unit; this breaker was removed from later converters. Both early and current power converters have LEDs to indicate working or alarm conditions, a power switch, reset button, and logic switch to control the drive.

The disk drive converters draw –48 VDC power input from the bus bar in the disk drive cabinet. This power may be supplied by AC-DC 309A/310A power units or DC filter(s).

TEMPERATURE CONTROL

Temperature control for AUDIX-L is provided by a fan assembly and thermal sensor in the control cabinet [refer back to Figure B-1, *AUDIX-L Control and Disk Drive Cabinets (Front View)*]. An alarm board mounted at the rear of the fan assembly monitors the environment and passes alarms to the MI board if needed. Fans at the rear of each disk drive complete the temperature control system.

Alarm Board (ZAEH5B)

The ZAEH5B alarm board monitors the AUDIX-L system power, fans, and environment. The board is located on the back of the fan assembly. The ZAEH5B collects alarm signals from the battery reserve and various system components and sends them to the MI board. Functions include monitoring cabinet air flow and fan speed, detecting –48 VDC low voltage, and disconnecting the battery reserve unit if needed.

Early AUDIX-L systems use the ZAEH5 alarm board. This board is identical to the ZAEH5B, except it does not have a strap option for a DC-powered system. On systems with four or more FSDs installed, a Vintage 3 ZAEH5B board and an ED-1E434-11 Group 372 cable to the 312 battery reserve is required (this prevents premature battery disconnects).

Disk Drive Fans

Each disk drive has a fan located behind it to help cool the drive. The fans should always be running during normal system operation. The fans are part of the self-contained drive assembly and are not serviced separately. On some early AUDIX-L systems, cooling venturis (conical air passageways) are located at the

back of the disk drive cabinet over the fans. The venturis aid disk drive cooling by directing air flow. This unit is not included on later AUDIX-L models.

Fan Assembly (J58889V)

The DC-powered fan assembly unit is located in the AUDIX-L control cabinet directly above the battery reserve unit. The assembly includes three fans and a temperature sensing device (thermistor). The fans maintain interior cabinet temperature within acceptable operating limits. The fans are mounted side by side and are designed to run continuously at a low speed.

The thermistor measures the temperature just above the power equipment in the cabinet. When the thermistor records a temperature above 95°F, the system sets the fans on high speed. The fans are also set to high by the system if the difference in temperature readings between the thermistor and the thermal sensor assembly (located at the top of the cabinet) is 30°F or more.

Thermal Sensor (ED-1E430-70)

The thermal sensor assembly (ED-1E430-70 Group 1) is located directly above the power carrier at the top of the AUDIX-L control cabinet. The thermal assembly consists of a mounting bar, thermostats, thermal sensor, and associated wiring and hardware. The two thermostats, S1 and S2, are mounted on the front face of the mounting bar. An alarm is generated if the exit air temperature exceeds permissible limits.

The thermal sensor is used to measure temperature differential. If the difference in temperature readings between the thermistor in the fan assembly and the thermal sensor assembly is 30°F or more, the fans are set to run at high speed.

POWER ARRANGEMENTS

AUDIX-L uses either an AC or DC power arrangement. The 309A/310A power units and battery reserves are used for the AC power arrangement, and DC filters are used for the DC power arrangement. Figure B-9, *AUDIX-L AC and DC Power Arrangements (Rear View)*, shows the different power setups in the AUDIX-L cabinet.

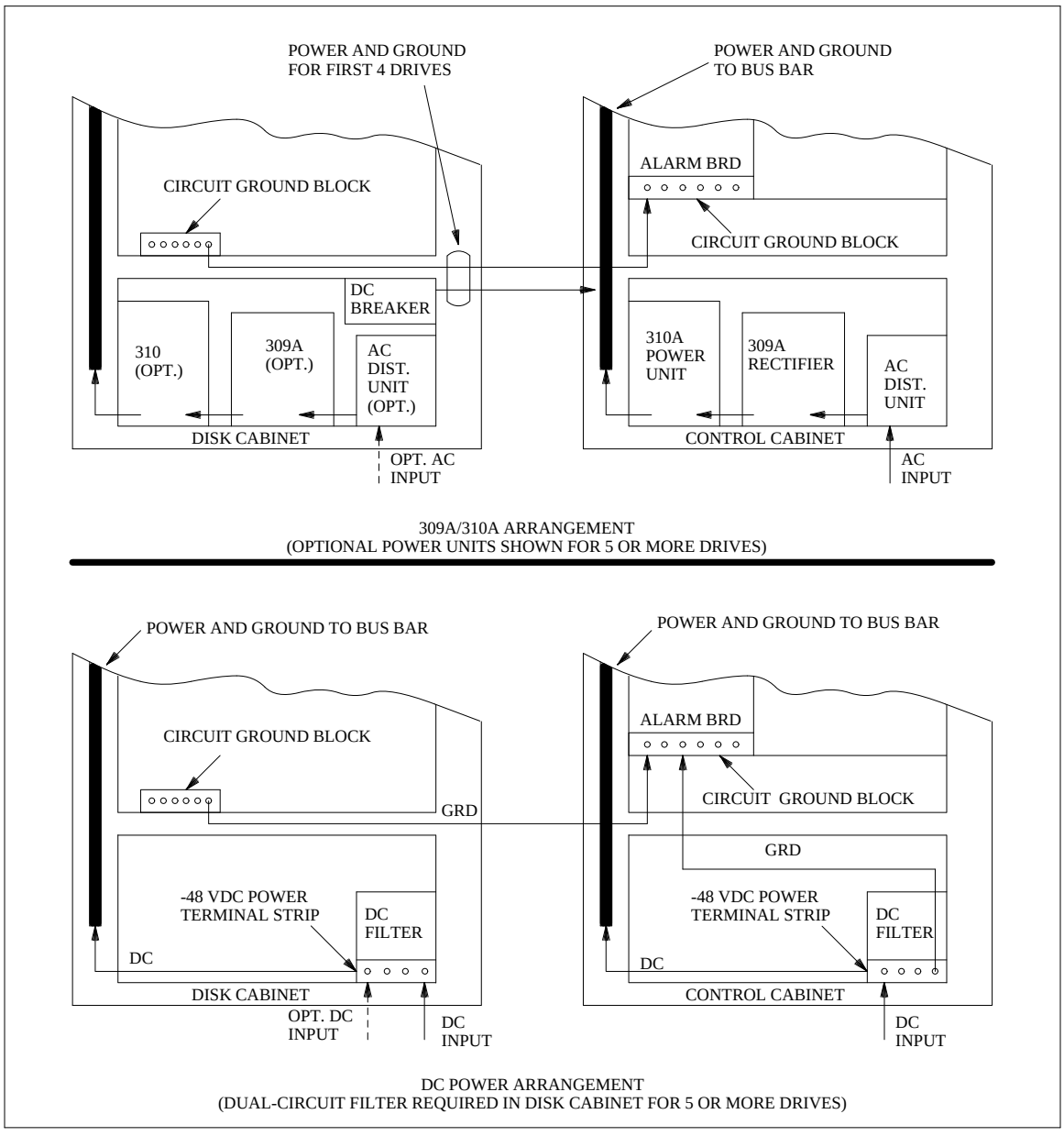


Figure B-9. AUDIX-L AC and DC Power Arrangements (Rear View)

AUDIX-L Power and Ground Bus Bar

AUDIX-L power equipment in each cabinet connects to a power and ground bus bar (ED-1E435). The bus bar is divided into five layers: power (–48V0), ground (GRD0), a divider (GRDSH), and a second set of power and ground layers (–48V1 and GRD1). The required equipment in each cabinet is hooked up to the first set of power and ground connections (–48V0 and GRD0).

The disk drive cabinet bus bar is shipped with a copper strap connecting both sides of the bus bar. This makes both sets of power and ground active (drives may be attached to layer 0 or 1). However, one power supply cannot power more than four drives at a time. If five or more disk drives are installed, the copper strap on the bus bar must be removed and a second power arrangement installed. The required power units then power the top half of the disk drive cabinet (–48V0 and GRD0), and the second set of power units powers the lower half of the cabinet (–48V1 and GRD1).

The following power and ground requirements affect the different AUDIX-L power arrangements as noted.

- *Control Cabinet – 1 Bus Bar Connection:* The bus bar supplies power to the fans and power converter carrier.
  - — *For 309A/310A:* One power unit is required.
  - — *For DC Power:* One DC filter connection is required.
- *Disk Drive Cabinet – 1 Standard Bus Bar Connection:* The first four drives in the disk drive cabinet always require power as follows.
  - — *For 309A/310A:* The first four drives are powered from the required power units in the control cabinet. The disk drive buses are strapped together.
  - — *For DC Power:* One DC filter connection is always required.
- *Disk Drive Cabinet – 5 or More Drives:* An additional set of power units is added to the disk drive cabinet. The copper strap on the bus bar *must* be removed.
  - — *For 309A/310A:* The required control carrier power unit powers the top half of the cabinet (–48V0 and GRD0). The second power unit in the disk drive cabinet powers the lower half of the cabinet (–48V1 and GRD1).
  - — *For DC Power:* A second DC connection to the disk drive cabinet is made through a dual DC filter. The first DC connection powers the top half of the cabinet and the second connection powers the lower half of the cabinet.

309A/310A AC Power Arrangement

Most AUDIX-L systems use the 309A/310A AC-DC power unit arrangement. The power equipment includes an AC distribution unit, the 309A rectifier, 310A voltage regulator, DC breaker, and battery reserve described in this section.

AC Distribution Unit (J58889G)

The AC distribution unit (also called AC filter unit) provides AC power, filtering, and cabinet frame (green-wire) grounding for the cabinet fans, power units, and a 120 VAC utility receptacle. The distribution unit is mounted at the bottom left side of AUDIX control cabinet. If more than four disk drives are installed, a second unit is placed in the disk drive cabinet.

The AC distribution unit receives either 3-phase 208 VAC or single-phase 240 VAC at 60 Hz from a commercial power source (usually through an overhead power duct). A power cord connects to the 309A rectifier to provide 208 or 240 VAC power to the power units.

Because the unit uses a 4-wire connector (which includes neutral), the distribution unit can create the 120 VAC used to power the utility receptacle (4-amps maximum). The 3-prong outlet may be used by services personnel for testing or other equipment. The utility receptacle is mounted on the AC distribution unit housing.

The AC power for remote AUDIX-L installations must pass through an Electromagnetic Interference (EMI) filter (also called EMC filter) before entering the AC distribution unit. The filter reduces conducted emissions in compliance with FCC regulations. Local installations may also use this filter (it is recommended for new installations).

309A/310A Power Units (APS-843382)

The 309A/310A power unit is the –48 VDC power source for the DC/DC converters and fans in the control cabinet and the DC/DC converters for the disk drives. The 309A/310A power unit in the AUDIX-L control cabinet powers up to four disk drives in the disk drive cabinet. If five or more disk drives are installed, a second 309A/310A power unit must be installed in the disk drive cabinet.

The 309A/310A power unit consists of the 309A rectifier (magnetic package) and the 310A low-voltage regulator (electronic package). Input voltage taps on the 309A power unit allow the rectifier to operate from a nominal 3-phase 208 VAC or single-phase 240 VAC 60-Hz input.

The filtered –48 VDC output is regulated at ±2.5 VDC at a maximum of 60 amps. Two outputs are provided by the power unit, but only one is currently used by AUDIX. An AC sense voltage on the output can detect an AC power failure so the unit can switch to the battery reserve power.

DC Breaker (J58889AW)

A DC breaker (also called a disk power disconnect unit) is located on the lower left side of the disk drive cabinet. Power for the first four disk drives runs from the control cabinet to the DC breaker, and then to the disk drive cabinet bus bar. The DC breaker allows DC power to be interrupted to the drives as a safety measure.

In some early AUDIX-L models, a large DC filter (J58889H) is installed instead of the smaller DC breaker to filter the –48 VDC voltage input to the first four disk drive power converters. A terminal block on the face of the DC filter provides connections for the –48 VDC filtered output voltage and ground. The DC filter is located on the lower right side of the disk drive cabinet [see Figure B-8, *AUDIX-L Disk Drive Positions (Front View)*].

Battery Reserve (J87462A-L7)

AUDIX-L always has a battery reserve installed in the control cabinet to protect the system from brief power outages. The battery reserve acts as a nominal power holdover unit for the system. It can maintain partial service and preserve memory during short-term commercial power outages and glitches. When the batteries are fully charged, software maintains system operation for about 1 minute before beginning an orderly shutdown.

NOTE

A second battery reserve is installed in the disk drive cabinet if an additional AC power setup is required (for example, if five or more drives are installed). The two battery reserve units are functionally equivalent, as described in the following section.

The battery reserve unit is located immediately above the power units in the AUDIX-L control cabinet. It provides emergency power for the control cabinet and up to four disk drives in the disk drive cabinet. The battery reserve unit has an AC input to maintain charge and two battery outputs (channel 1 and 2). Each channel consists of two battery packs containing 12 sealed lead-acid batteries (24 batteries per unit). The batteries provide 30 amps per output (up to 60 amps). The regulated –48 VDC output is rated at 5 amp-hours. Power is provided in parallel (each 30-amp output is connected to each –48 VDC power bus used by the system).

The battery reserve has a remote battery disconnect feature. This allows the MI to shut down the system and disconnect the battery if the voltage drops to –41.5 VDC. If power resumes during a system shutdown procedure, the MI immediately disconnects the battery reserve, and –48 VDC power is resumed from the standard AC input through the 309A/310A power unit.

In case of a commercial AC power failure, the battery reserve unit acts as follows:

1. The two battery outputs connect to the inputs of the –48 VDC power buses in the AUDIX-L control cabinet and disk drive cabinet. This provides power to the DC/DC converter carrier and the first four disk drives.
2. For the first minute, service continues for existing calls, but AUDIX denies further access. After 30 seconds, an alarm is given to the MI.
3. If the power outage continues beyond 1 minute, AUDIX shuts down gracefully by transferring vital information from RAM to disk memory and ceasing service.

   NOTE

   Depending on the size of the system, the batteries could supply power for about 4 minutes. However, software requests AUDIX to shut down to ensure that data and equipment are protected.

4. If the battery output drops to –41.5 VDC, the MI disconnects the battery reserve to prevent damage to the batteries.
5. When commercial power resumes, the batteries immediately begin to recharge. The batteries take about 16 hours to fully charge after being completely discharged.

Battery Reserve (J87462A-L5)

The battery reserve unit in the disk drive cabinet is only required for systems that contain five or more disk drives and have a second 309A/310A power unit arrangement installed. The second battery reserve unit has an AC input and one battery output (channel 1). The output connects to the input of the second –48 VDC power bus (–48V1) in the disk drive cabinet during a power outage. This preserves the operations of the DC/DC power converters and disk drives in the lower half of the disk drive cabinet for about 1 minute during an AC power outage.

The second battery reserve unit provides power at the same voltage and amps as the required battery reserve unit. Because the battery reserve in the control cabinet discharges more quickly than the second battery reserve unit, the second battery reserve does not have its own low voltage regulator. Instead, it shuts down when the MI shuts down the required battery reserve unit.

DC Power Arrangement (J58889-AD)

The AUDIX-L DC power arrangement is used with battery-extended holdover (DC power) on the switch. The AUDIX-L DC arrangement assumes that the switch is hooked up to a DC battery plant, and that AUDIX-L is located near enough to share this source.

Connection to Battery Plant

The AUDIX-L DC power arrangement should be locally engineered for less than 1 percent (0.48 VDC) voltage drop at 30 amps from the AUDIX cabinets to the battery plant. The battery plant supplies continuous regulated –48 VDC power; the input is only disconnected if battery plant voltage drops below –42 VDC.

For each –48 VDC connection, a –48 VDC power cable must extend from the 30-amp circuit breakers from the battery plant to the –48 VDC bus bars in the AUDIX-L cabinets. A ground cable to the ground discharge bar on the battery plant is required for each power connection.

- A required set of power and ground cables for the control cabinet
- A second required set of power and ground cables for the first four drives in the disk drive cabinet
- Another optional set of cables needed if five or more drives are installed in the disk drive cabinet

DC Power Equipment

The AUDIX-L DC power equipment is installed instead of the 309A/310A AC power equipment described in the previous section. If DC power is added to an AUDIX-L system already in the field, the AC power equipment must be removed and the DC equipment installed in its place.

The AUDIX-L control cabinet must contain a single-circuit DC filter (J58889-AD List 1) and J58889-AD List A wire assembly for DC power. A ZAEH5B vintage alarm board must also be installed to support DC power. The power and ground cables that extend from the AUDIX-L to the DC power plant are customer supplied.

A single- or dual-circuit filter is installed in the disk drive cabinet (depending on whether one or two –48 VDC buses are used to support the disk drives). The single-circuit filter is J58889-AD List 1; the second (dual-circuit) filter (List 2) should be installed in the disk drive cabinet if needed for five or more drives.

C. Non-AT&T Switch AUDIX Integrations

This appendix describes AUDIX system integrations with non-AT&T switches. For complete information, refer to the appropriate document:

- AUDIX Integration Package for the DMS-100 Switch (585-304-204)
- AUDIX Integration Package for the SL-1 Switch (585-304-203)

SL-1 INTERFACE

An AUDIX system provides the same features and functionality to the Northern Telecom SL-1 family of PBXs that it provides to a System 85-type AT&T PBX.

Data connectivity for Voice Mail, Call Answer, and Bulletin Board applications is controlled via a digital signaling link called the Integrated Voice Message System (IVMS). This interface automatically does the following:

- Provides subscriber greetings
- Causes MW notification to be activated by the SL-1
- Stores LWC messages in the AUDIX system
- Handles transfer messages for calls transferred out of the system to a single extension
- Notifies the SL-1 that ports are busied out for maintenance reasons
- Allows the SL-1 to tell the AUDIX system to disconnect a call

Voice Link

As shown in Figure C-1, *Sample AUDIX/SL-1 VPT Connections*, AUDIX voice ports are configured to ACD hunt groups on the SL-1. The AUDIX system communicates with SL-1 4-wire phone sets. These phones, which do not generate touch tones, must be supported with SL-1 X11 Release 5 or later software. The SL-1 switch must use an End-to-End Signaling package to generate the touch tones.

On a two-cabinet AUDIX system, up to 32 ports are provided for both integrated and nonintegrated voice features. Five TN747B and TN762B cards (VPTs) can be interchanged in three slots (slots 19, 21, 24) on the base cabinet and in slots 19 and 24 in the expansion cabinet to provide needed port usage. If a VPT is used in slot 21, the total voice capacity of the system is diminished to 30 ports.

For the SL-1 switch, the TN762B VPT is used instead of the TN747B.

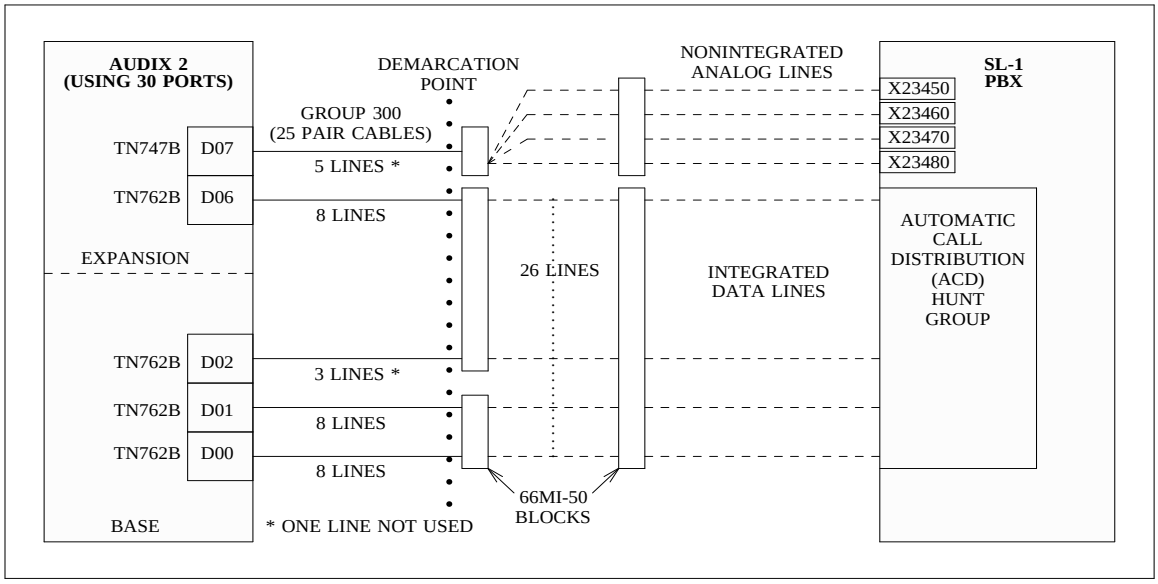


Figure C-1. Sample AUDIX/SL-1 VPT Connections

NOTE

Slot 21 (D02), normally used for a voice processor computer (TN501B), must be changed if a VPT is inserted: the knockout cover must be removed on the connector plate, an added WP-90753 cable must be connected, and a different keyblock must be inserted on the backplane. D-Kit 182216 (comcode 105716542) is used to make the connection.

Data Link

The serial data link, as shown in Figure C-2, *AUDIX/SL-1 Serial Data Link*, is used to acknowledge, control, and monitor the messages that take place between an AUDIX system and the SL-1 switch. It supports the IVMS protocol that requires that data be formatted and sent in packets rather than per message. All data over the link is transmitted asynchronously in full duplex mode. The link uses the EIA Standard RS-232C interface. The TN547 or TN547B MPSI board in the AUDIX system supports the SL-1 data link.

The AUDIX system supports data link speeds of 1200, 2400, 4800, or 9600 baud. In general, the highest speed available on the SL-1 should be used.

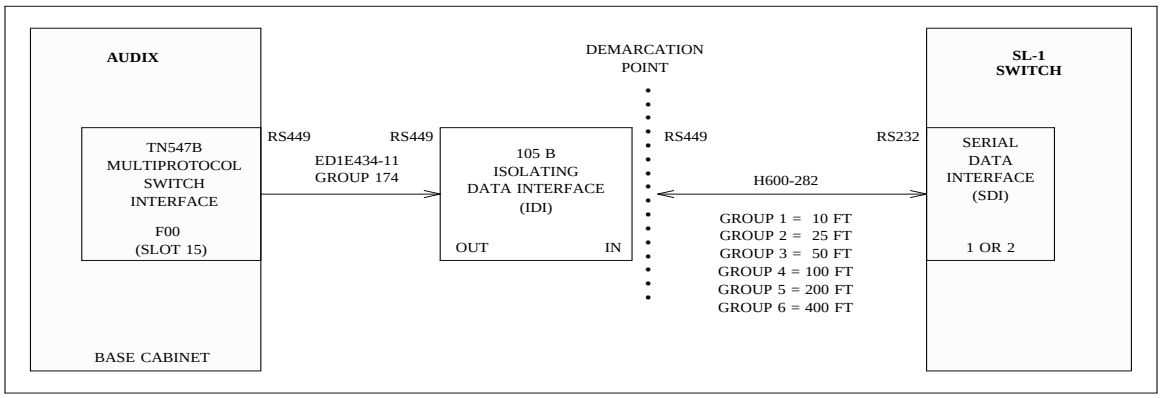


Figure C-2. AUDIX/SL-1 Serial Data Link

DMS-100/SL-100 INTERFACE

The various links used between an AUDIX system and the non-AT&T DMS-100/SL-100 switches are described below.

Voice Link

An AUDIX system will connect to Northern Telecom's DMS-100 or SL-100 switch via up to 32 two-way Centrex lines in a UCD with queuing. Ground-start trunks are required. Cabling for the DMS-100 Switch is identical to the 1A ESS Switch except that a 66M1-50 connecting block is used as the demarcation point.

Data Link

An AUDIX system will provide data service through the DMS-100 or SL-100 switch using the SMDI. Refer to Figure C-3, *AUDIX/DMS-100 Integration*. This integration is similar to that of an AUDIX system and the 1A ESS CO Switch, with differences localized in the data-link management area.

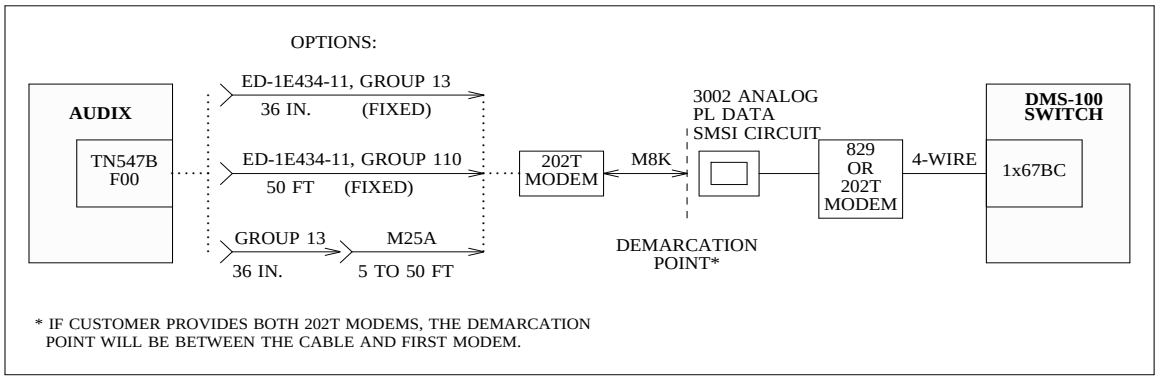


Figure C-3. AUDIX/DMS-100 Integration

The following customer premises equipment is needed to make the data connection between an AUDIX system and a DMS-100 switch:

- A TN547(B) MPSI installed in slot 15 of the AUDIX base cabinet
- A 202T PL modem, including a Standalone mounting kit if needed and an M8K modular cord
- One of the following RS-232C to RS-449 cabling alternatives between the 202T modem and the AUDIX system:
  - — An ED-1E434-11 Group 13 cable, 36 inches (91 cm), RS-232C to RS-449
  - — An ED-1E434-11 Group 110, 50 feet (15 m), RS-232C to RS-449

— An M25A RS-232C extender cable, 5 to 50 feet (1.5 to 15 m), plus an ED-1E434-11 Group 13 RS-232C to RS-449 cable

Switch Equipment

To support full operation of the SMDI data link, the DMS-100 switch requires one full-duplex channel on the 1x67BC Terminal Card, with a recommended 1200 baud transmission rate.

NOTE

An 829 Channel Interface Unit (or equivalent) is used as a repeater when the distance between the AUDIX system and the DMS-100 switch requires it. Otherwise, a straight back-to-back connection can be used.

The DMS-100 requires the BCS24 or later software release to support the SMSI data link. Northern Telecom calls this link the SMDI link. The following software packages are required:

- *NTX100:* Meridian Digital Centrex — Contains the UCD features required for basic message-desk operation
- *NTX101:* Meridian Digital Centrex — Enhanced version of the NTX100
- *NTX119:* Message Service — Allows an AUDIX system to request message-waiting updates
- *NTX730:* ASCII Driver — Enables the DMS-100 switch to send call-setup information to an AUDIX system
- *NTX732:* SMDI — Enables call-setup information to be sent to an AUDIX system

Additional software packages include:

- *NTX020:* Vertical Services I
- *NTX806:* Enhanced Call Forwarding — Allows Plain Old Telephone Service (POTS) customers to use the message desk

Abbreviations

AC	Alternating Current
ACC	AUDIX Communications Controller
ACCE	AUDIX Communications Controller Enhanced
ACD	Automatic Call Distribution
ACP	Advanced Communications Package
ADAP	AUDIX Administration and Data Acquisition Package
ADFTC	Analog/Digital Facilities Test Circuit (System 85 or Generic 2)
ADU	Asynchronous Data Unit (Z3A)
AMIS	Audio Messaging Interchange Specification
AMLS	Automated Message Link Service
AMWI	Audible Message-Waiting Indicator
AMWL	Automatic Message-Waiting Lamp
AP	Applications Processor
API	Applications Processor Interface
AUCC	AUDIX Upgrade Control Center
AUDIX	Audio Information Exchange
AUDIX-L	Audio Information Exchange – Large
AUX	Auxiliary
AVD	Alternate Voice/Data
AWG	American Wire Gauge
BC	Bus Controller (TN506B)
BCS	Business Communications System
BCT	Business Communications Terminal
BI	Bus Interface (TN716B)
bps	bits per second
BRI	Basic Rate Interface
BTU	British Thermal Unit
ICITT	International Consultive Committee for Telephony and Telegraphy
CMS	Call Management System
CPE	Customer Premises Equipment
CO	Central Office
CPU	Central Processing Unit

CSM	Centralized System Management
DAC	Dial Access Code
DBP	Data Base Processor
DBP Bus	Data Base Processor Bus (also VME Bus)
DBP-CPU	Data Base Processor Central Processing Unit (TN472C or TN509C)
DBPI	Data Base Processor Interface (UN160B)
DBP-RAM	Data Base Processor Random Access Memory (TN532 or TN540)
DC	Direct Current
DCE	Data Communications Equipment
DCIU	Data Communications Interface Unit
DCP	Digital Communications Protocol
DCS	Distributed Communications System
DDD	Direct Distance Dialing
DFC	Dedicated Function Computer (alias for DBP-CPU)
DID	Direct Inward Dialing
DIM	Disk Interface Module (UN161B on AUDIX-L)
DLC	Digital Line Circuit (TN754) or Data Line Circuit (TN726)
DMI	Digital Multiplexed Interface
DOSS	Delivery Operations Support System
DRAM	Dynamic Random Access Memory
DS1	Digital Service 1
DSI	Digital Service Interface
DSL	Digital Subscriber Line
DSO	Data Service Organization
DSU	Data Service Unit
DTE	Data Terminal Equipment
ECTS	Electronic Custom Telephone Service
EDC	Electronic Document Communications
EIA	Electronic Industries Association
EMC	Electro-Magnetic Compatibility
EMI	Electro-Magnetic Interference
EPROM	Electrically Programmable Read Only Memory
ES	Enhanced Services
ESS	Electronic Switching System
ETN	Electronic Tandem Network
EUCD	Enhanced Uniform Call Distribution
FAC	Feature Access Code

FAST	Field Assistance Support Team
FIFO	First-In First-Out
FP	Feature Processor
FP-BI	Feature Processor Bus Interface (TN716B)
FP-CPU	Feature Processor Central Processing Unit (TN523 or TN591)
FP-PE	FP Processor Element (includes BI, CPU, and RAM)
FP-RAM	Feature Processor Random Access Memory (TN734 or TN761)
FSD	Fixed Storage Drive (AUDIX-L)
FSO	Field Service Organization
FSW	Failure Status Word
GBCS	Global Business Communications Systems
GPP	General Purpose Port (SN270B)
HAL	High Activity Location
HDD	Hard Disk Drive
HDLC	High-Level Data Link Controller
ID	Identification
IDI	Isolating Data Interface
INADS	Initialization and Administration System
INT	Interface Board 1 to 3 for System 75 SCI
IPC	Intelligent Peripheral Controller (TN507C)
ISDN	Integrated Services Digital Network
ISLU-T	Integrated Services Line Unit – T Interface
ITAC	International Technical Assistance Center
K or Kbyte	Kilobyte (1024 bytes)
kHz	kilohertz
LADS	Local Area Data Set
LAT	Local Administration Terminal
LDN	Listed Directory Number
LEC	Local Exchange Carrier
LED	Light-Emitting Diode
LILO	Last-In Last-Out
LMT	Local Maintenance Terminal
LWC	Leave Word Calling
MAAP	Maintenance and Administration Panel
MADU	Multiple Asynchronous Data Unit
M Bus	Memory Bus

MBO	Marketing Branch Office
Mbyte	Megabyte (≃ one million bytes)
MCS	Message Center Service
MDM	Modular Data Module
MEM	Memory (alias for RAM)
MFAT	Multifunction Analog Terminal
MFET	Multifunction Electronic Terminal
MHz	Megahertz
MI	Maintenance Interface (TN511 or TN531)
MLHG	Multiline Hunt Group
MMC	Material Management Center
MMS	Material Management Services
MPSI	Multiprotocol Switch Interface (TN547B)
MON	Processor Monitor (TN535)
MPDM	Modular Processor Data Module
ms	Millisecond
MSC	Message Service Center
MSS	Message Service System
MT	Multi-Tasking Terminal
MTBF	Mean Time Between Failures
MWI	Message-Waiting Indication
NC	Network Controller (TN727) (also NETCON)
NCSC	National Customer Support Center
NEC	National Engineering Center
NT1	Network Termination 1 Unit
OLS	Off-Line Switcher
PBX	Private Branch Exchange
PC	Power Converter or Personal Computer
PDM	Processor Data Module
PDS	Premises Distribution System
PE	Processor Element
PEC	Price Element Code
PI	Processor Interface
PIB	Processor Interface Board (same as PI)
PMX	Private Message Exchange
PRI	Primary Rate Interface
PROC	Procedure

PROFS	Professional Office System
PROM	Programmable Read Only Memory
QPPCN	Quality Protection Plan Change Notice
RAM	Random Access Memory
RBOC	Regional Bell Operating Company
RCD	Removable Cartridge Drive
RMATS	Remote Maintenance, Administration, and Traffic System
RMT	Remote Maintenance Terminal
ROM	Read Only Memory
RSD	Removable Storage Drive (AUDIX-L)
SADI	SCSI-to-AUDIX Disk Interface (AUDIX)
SAI	Synchronous/Asynchronous Interface (TN719)
SAT	System Administration Terminal
S Bus	System Bus
SC	Systems Consultant
SCA	Switch Communications Adapter
SCI	Switch Communications Interface
SCP	Switch Communications Processor (TN521)
SCPI	Switch Communications Processor Interface (TN533)
SCSI	Small Computer Systems Interface
SDU	Synchronous Data Unit (Z3B1)
SI	Switch Interface (alias for TN727 NC)
SIM	System Implementation Manager
SMDI	Simplified Message Desk Interface
SMSI	Simplified Message Service Interface
SMT	System Management Terminal
TAC	Technical Assistance Center
TC	Tone and Clock (TN714)
TD	Time Division (also Transmit Data)
TDBI	Time Division Bus Interface (TN500)
TD Bus	Time Division Bus
TE	Terminal Equipment
TMC	Technical Marketing Center
TMS	Time Multiplexed Switch
TSC	Technical Service Center
TSO	Technical Support Operations

TRACS	Translation Recovery, Additions and Conversion System
UCD	Uniform Call Distribution
UDM	Universal Data Module
UL	Underwriters Laboratories
UM	Unified Messaging
UPS	Uninterruptible Power Supply
VB	Voice Buffer (TN520)
VDN	Vector Directory Number
VMAAP	Visual Maintenance and Administration Panel
VME Bus	Versa-Module European Bus (also DBP Bus)
VMWI	Visual Message-Waiting Indicator
VPC	Voice Processor Computer (TN501B)
VPT	Voice Port (TN747B)
VSFI	Voice Store and Forward Interface (UN162)
VSP	Voice Session Processor
VSP-BI	Voice Session Processor Bus Interface (TN716B)
VSP-CPU	Voice Session Processor Central Processing Unit (TN523 or TN591)
VSP-PE	VSP Processor Element (includes BI, CPU, and RAM)
VSP-RAM	Voice Session Processor Random Access Memory (TN734 or TN761)
WGS	Work Group System

Glossary

1A ESS Switch

An AT&T Central Office (CO) switch that supports integrated AUDIX applications in AUDIX R1V4 or later software.

5ESS Switch

An AT&T switch that supports Integrated Services Digital Network (ISDN) protocol and integrated AUDIX applications in AUDIX R1V4 or later software. The 5ESS Switch is a Central Office (CO) that connects the Customer Premises Equipment (CPE) to an ISDN network over a U interface (2-wire outside plant wiring) through a Network Termination (NT1) unit, or directly from the switch through an Integrated Services Line Unit (ISLU-T) (4-wire) interface.

Abbreviated Announcements

Prior to R1V8, the customer could choose between two types of AUDIX system voice prompts, verbose or abbreviated. Abbreviated announcements are voice prompts that are given in less detail than verbose announcements. The abbreviated announcement set was discontinued in AUDIX R1V8 and replaced with the *traditional* announcement set.

Accessed Message

Voice mail that a recipient has received and scanned (either the entire message or just the header).

Active Filesystems

The filesystems used to run AUDIX. These include types adat, boot, sdat, sst, vdat, vtext, and (starting in R1V3) ndat. Most are activated by the `system : filesystems` form.

Activity

An option in the highest-level menu voiced to a AUDIX subscriber after first accessing the AUDIX system. Selecting an activity is the starting point for all user operations.

Activity Menu

The list of main options voiced to subscribers when they access AUDIX. To hear the complete menu, press *H. To interrupt an activity and return to the main menu, press *R.

Address

Identification indicating to whom AUDIX is to deliver a message. An address may indicate a subscriber, a mailing list, an AMIS analog recipient, or any telephone list. Name or number addressing can be selected with the *A command.

Adjunct — A separate system that is closely integrated with a switch, such as an AUDIX or an Applications Processor (AP).

Administration — The process of setting up a system (such as the switch or AUDIX) so that it will function as desired. Options and defaults are normally set up (translated) by the AUDIX system administrator or remote service personnel.

Administrative Shutdown — An option on the `shutdown` form used to bring down the system software for administrative reasons, either gradually as calls are ended (camp-on) or immediately (forced). Filesystems are closed but left mounted.

Advanced Communications Package (ACP) — A 3B2 Applications Processor (AP) designed for the 5ESS Switch and compatible with AUDIX Central Office (CO) applications.

Alarm Board — The CDR1B board (on AUDIX) or ZAEH5B (on AUDIX-L) that monitors the system for alarms. It passes warnings or faults to the MI board and alerts remote service personnel over the alarm link leading to the switch.

Alarm Link — A 25-pair cable connection from the back of the AUDIX cabinet to alarm-reporting facilities used for the switch. The link notifies remote service personnel about an AUDIX problem.

Alarm Log — A list of faults, including unit and device numbers, that is stored in a software file on disk. The `maintenance : active alarm : display` form shows alarm log faults in severity order.

Alarms — Hardware, software, or environmental problems detected by maintenance testing that may affect system operation. Alarms (or faults) are classified as major, minor, or warning. They are reported to services personnel through the alarm link and listed in the alarm log on disk.

AMIS Analog Networking — Allows worldwide interchange of voice mail messages between AUDIX and other non-AT&T voice mail systems.

Analog — A continuous signal (versus digital, discrete signals).

Announcement Fragment — A numbered piece of spoken AUDIX information that makes up a system message or prompt.

Applications Processor (AP) — The AP 16 or 3B5 AP switch adjunct on a PBX that provides such services as Directory, (Electronic Document Communications (EDC), Message Center, and Unified Messaging. The AP on a 5ESS Switch is called an Advanced Communications Package (ACP).

Applications Processor Interface (API) — Robust type of data link connection to an integrated 5ESS Switch in AUDIX R1V4 and later software.

Architecture — The composition and functional components of a system.

Asynchronous Transmission — A form of serial communications where each transmitted character is bracketed with a start bit and one or two stop bits. The AUDIX display terminals use an asynchronous link to the Maintenance Interface (MI) board.

Asynchronous Data Unit (ADU) — A small device that can extend data transmissions far beyond recommended Electronic Industries Association (EIA) limits over building wiring. AUDIX normally connects to a Z3A2 model, while terminals may use a Z3A1 or Z3A4 ADU.

Audit — A software program that resolves filesystem incompatibilities and updates restored filesystems to a workable level of service.

Audio Information Exchange (AUDIX) — A complete voice-mail messaging system accessed and operated by touch-tone telephones and integrated with a switch.

AUDIX Administration and Data Acquisition Package (ADAP) — A software package available with AUDIX R1V2 or later software. ADAP allows an AUDIX system administrator to transfer AUDIX subscriber, maintenance, or traffic data over the administration port to a compatible 62xx or 63xx Personal Computer (PC) or Work Group System (WGS).

AUDIX Basic (R1V1) — The original AUDIX software including the Voice Mailbox, Call Answer, Bulletin Board, and Leave Word Calling (LWC) features. This version is only available on installed AUDIX-L machines.

AUDIX (R1V2) Version of AUDIX software with enhanced features including guest passwords, call transfers into and out of AUDIX, and the AUDIX Data Acquisition Package (ADAP).

AUDIX (R1V3) Version of AUDIX software that can run on a one-cabinet AUDIX (AUDIX-S), two-cabinet AUDIX, or AUDIX-L. It includes the AUDIX features plus the Automated Attendant, AUDIX Networking, Outcalling, and Standalone features.

AUDIX (R1V4) Version of AUDIX software that includes all features from previous releases, plus support of integrated 1A ESS Switch and 5ESS Switch interfaces, File Redundancy, Standalone Message Notification, Executive Features summary, administrable login ID length, and the Text Service Interface (TSI).

AUDIX (R1V5) Version of AUDIX software that includes all features from previous releases, plus Broadcast Message/Login, Priority Messages, Priority Outcalling, Multiple Personal Greetings (MPG), Personal Directory, Name Record by Subscribers, Automatic Message Scan, Sending Restrictions, Data Base Processing, Full Mailbox Answer, Enhanced Networking, Call Detail Recording (CDR), Enhanced Automated Attendant, Enhanced Password Security, and Interfaces to SL-1 and Rolm switches.

AUDIX (R1V6) Version of AUDIX software that includes all features of earlier versions, plus AMIS Analog Networking, Call Delivery, and End-of-Message Warning.

AUDIX (R1V7) A version of AUDIX software that includes all features from previous releases, plus network connection turnaround and loop-around testing, the Undelete Message feature, and administrable coverage for the Escape to Attendant feature.

AUDIX (R1V8) Version of AUDIX software that includes all features from previous releases, plus the *standard* (streamlined) and *traditional* abbreviated announcement sets, enhanced AMIS analog networking capabilities, and Automated Attendant transfers by name.

AUDIX-L (Large) AUDIX-L is the original AUDIX model. Its equipment is arranged in two AT&T System 85-type equipment cabinets. AUDIX-L can run any version of AUDIX software.

AUDIX-S (Small)

The AUDIX-S model, now called the *one-cabinet AUDIX*, is the smallest member of the AUDIX family. All AUDIX-S hardware is housed in a single, half-height cabinet. AUDIX-S runs R1V2 or later software.

AUDIX Two-Cabinet Configuration

The newest AUDIX model consists of a one-cabinet (AUDIX-S) base cabinet with an expansion cabinet on top. The two-cabinet AUDIX offers 32 ports and greater disk storage than an AUDIX-L. It runs R1V3 or later software.

Automated Attendant

An AUDIX R1V3 or later feature that allows the customer to set up a main number with a menu of options that route callers to an appropriate department at the touch of a button.

Automatic Call Distribution (ACD)

The System 85 or DEFINITY Generic 2 call-distribution group of analog port boards that connects subscribers and users to AUDIX.

Automatic Message Scan

A feature allowing subscribers to scan all message headers and/or messages at the touch of two buttons.

Backup

A duplicate copy of a filesystem saved on a removable cartridge or a separate disk than the original. The backup filesystem may be copied back (restored) if the active version is damaged (corrupted) or lost.

Background Testing

Testing that runs continuously when the system is not busy doing other tasks.

Basic Call Transfer

A switchhook-flash method used on AUDIX Standalone and many switches to send the AUDIX transfer command over analog voice ports.

Basic Rate Interface (BRI)

International standard protocol for connecting a station terminal to an Integrated Services Digital Network (ISDN) switch. ISDN BRI supports two 64 Kbps information bearer channels (B1 and B2), and one 16 Kbps call status and control (D) channel (a 2B + D format). Also called *Basic Rate Access*.

Baud Rate

Transmission signaling speed (see *bps*).

Blank Cartridge

One or more spare removable cartridges required to back up system information.

Block Service To prevent use of a port, channel, or entire system as a result of a hardware fault or maintenance procedure.

Body The part of subscriber Voice Mail that contains the actual spoken message. For a Leave Word Calling (LWC) message, it is a standard system announcement.

Boot (or Reboot) To bring up the system by loading programs from disk to main memory (part of system initialization).

Boot Filesystem The filesystem selected during system initialization, either automatically or manually, that the system tries to load its initial programs from. The filesystem name is `boot_f` for the active version and `boot_e` for the backup copy.

bps (bits per second) The number of binary units of information (1s or 0s) that can be transmitted per second. Mbps refers to a million bits per second; Kbps refers to a thousand bits per second.

Broadcast Messaging A feature that enables the system administrator and other designated users to send a voice mail message to all local subscribers automatically.

Buffer Memory used to compensate for time differences in transmission by temporarily storing data.

Bulletin Board See *Information Service*.

Bus The circuitry that links the various AUDIX subsystems together. The major AUDIX buses are the Data Base Processor (DBP) [or Versa-Module European (VME)], S (System), TD (Time Division), and M (Memory) bus. The Feature Processor (FP) and Voice Session Processor (VSP) (if installed) each use one M bus.

Busy-Out/Release To remove an AUDIX device from service (make it appear *busy* or in use), and later restore it to service (release it). The AUDIX data link, voice ports, or channels may be busied out if they appear faulty or if service personnel are performing maintenance.

Call Answer

An AUDIX feature that allows AUDIX to answer a call and record a message when the subscriber is unavailable. Callers may be redirected to AUDIX through the call coverage or Call Forwarding switch features. Subscribers may record a personal greeting for these callers.

Call Coverage

A switch feature that defines a preselected path for calls to follow if the first (or second) coverage points are not answered. AUDIX may be placed at the end of a coverage path to handle redirected calls through call coverage, Send All Calls, Go To Cover, etc.

Call Delivery

Allows AUDIX subscribers to send voice mail messages to any touch-tone telephone anywhere in the world.

Call-Distribution Group

The set of analog port boards on the switch that connects subscribers and users to AUDIX by distributing new calls to idle ports. This group (or split) is called Automatic Call Distribution (ACD) on System 85 and DEFINITY Generic 2, Enhanced Uniform Call Distribution (EUCD) on a DIMENSION PBX, and Uniform Call Distribution (UCD) on System 75, DEFINITY Generic 1, and Generic 3.

Call Vectoring

A System 85 R2V4 and Generic 2 feature that uses a vector (switch program), allowing a switch administrator to customize the behavior of calls sent to an Automatic Call Distribution (ACD) group.

Camp-On

A shutdown option that waits for ports to become idle before blocking service to them. This allows subscribers to finish calls in progress.

Central Office (CO)

A main telephone office where private customer lines are terminated and connected to the public network through common carriers.

Central Processing Unit (CPU)

The hardware that controls AUDIX subsystem operation [data transfer, input/output (I/O), and logical instructions] by executing instructions obtained from other processors. The Feature Processor (FP), Data Base Processor (DBP), and Voice Session Processor (VSP) form the major AUDIX subsystems.

Circuit Pack Carrier

The physical box that contains the circuit boards, connects them to a backplane, and provides other system connections.

Class of Service (COS) — The standard set of features given to subscribers when they are first administered (set up with a Voice Mailbox).

Colocated — An AUDIX installed in the same physical location as the host switch (also called a local installation).

Commands — One-, two-, or three-key touch tones that control a Voice Mailbox activity or function.

Configuration — The particular composition and hardware selected for a system, including internal options and peripheral equipment.

Control Mode — A state of the AUDIX machine where firmware is in control and software is shut down. The maintenance terminal displays a Control Mode Menu of options (other forms are not available).

Create Message Activity — Activity 1 on the Activity Menu, used by AUDIX subscribers to record or edit a voice mail message.

Customer Premises Equipment (CPE) — Any Integrated Services Digital Network (ISDN) data or Terminal Equipment (TE) that is installed at the customer site, not the Central Office (CO). The Network Termination (NT1) unit is the normal boundary between Customer Premises Equipment (CPE) and CO (off-site) equipment.

Data Base — A collection of filesystems and files in disk memory that store the voice and nonvoice (program data) necessary for AUDIX system operation.

Data Base Processor (DBP) — One of the major AUDIX subsystems that interacts with the other subsystems to move voice and nonvoice data to and from disk.

Data Communications Equipment (DCE) — Standard type of data interface normally used to connect to Data Terminal Equipment (DTE)-type devices. DCE devices include the Data Service Unit (DSU), Isolating Data Interface (IDI), and Modular Processor Data Module (MPDM).

Data Communications Interface Unit (DCIU) — The switch device that allows nonvoice (data) communication between a System 85, DEFINITY Generic 2, or DIMENSION PBX and AUDIX. Each AUDIX adjunct needs one data link.

Data Link

The connection from the AUDIX cabinet to the switch Data Communications Interface Unit (DCIU), Processor Interface (PI), or Switch Communications Interface (SCI) interface boards that enables nonvoice (data) messages to pass between AUDIX and the switch. This link varies according to the type of AUDIX system and switch used.

Data Service Unit (DSU)

DATAPHONE II 2500 DSUs are synchronous Data Communications Equipment (DCE) devices used for extended-local AUDIX connections. The 2596A DSUs support 2400, 4800, and 9600 bps connections. The 2600 or 2700 series may also be used; these are more expensive DSU options and support diagnostic testing and the DATAPHONE II Service network system.

Data Terminal Equipment (DTE)

Standard type of data interface normally used for the endpoints in a connection. Normally AUDIX, most terminals, and the switch Data Communications Interface Unit (DCIU) or Switch Communications Interface (SCI) are DTE devices.

Dedicated Line

A communications path that does not go through a switch. A dedicated (hard-wired) path may be formed with directly connected cables. Asynchronous Data Units (ADUs), Data Service Units (DSUs), or other devices may also be used to extend the distance signals can travel directly through the building wiring.

Default

A value that is automatically supplied if no other value is specified.

Delivered Message

Voice mail that has been successfully transmitted to a recipient's incoming mailbox.

Demand Testing

Testing performed on request (usually by service personnel).

Device

A replaceable piece of hardware shown on the alarm and error log forms (part of a unit).

Dial-Ahead/Dial-Through

The act of interrupting or preceding AUDIX system announcements by typing (buffering) touch-tone commands in the order the system would normally prompt for them.

Digital — Discrete data or signals such as 0 and 1.

Digital Communications Protocol (DCP) — A 64 Kbps digital data transmission code with a 160 Kbps bipolar bit stream divided into two information (I) channels and one signaling (S) channel.

Digital Subscriber Line (DSL) — The Integrated Services Digital Network (ISDN) Basic Rate Access (BRI) DSL is the 2B+D format used for the T 4-wire (2-pair) interface which connects Customer Premises Equipment (CPE) to ISDN.

Directory — An AUDIX feature allowing you to hear a subscriber's name and extension after typing **N at the Activity Menu. Also, a group of related files accessed by a common name in software, such as the *mount point* on disk where filesystems are located (for example, /ss, /sd, /vd).

Disk Controller — The Intelligent Peripheral Controller/Disk Interface Module (IPC/DIM) (TN507C/UN161B) or SCSI-to-AUDIX Disk Interface (SADI) (TN475B) circuit packs that control the disk drives in the Data Base Processor (DBP) subsystem. AUDIX-L can have two disk controllers (0 and 1), while other AUDIX models have one (controller 0).

Disk Device — The drive number associated with a disk controller that indicates its physical position. For example, device 2 on controller 0 is called disk02 (or 0/2).

Display Terminal — A data terminal with a screen and keyboard used for displaying AUDIX forms and performing maintenance or administration activities.

Distributed Communications System (DCS) — A network of two or more switches that uses logical and physical data links to provide full or partial feature transparency. Voice links are made using tie trunks.

Distribution List — See *Mailing List*.

Ductwork — The overhead structure used for holding cables and supplying power to an AUDIX-L system. Ductwork is optional for most switches, although it may be used to conform to an equipment room layout.

Electronic Document Communications (EDC)

An Applications Processor (AP) program used for composing and sending text messages to other AP and switch users.

Enabled/Disabled

The state of a hardware Data Base Processor (DBP) device that indicates whether or not the AUDIX system can use it. Devices must be equipped before they can be enabled (made active).

Enhanced Call Transfer

An AUDIX Enhanced feature that allows compatible switches to transmit messages digitally over the BX.25 (data) link. This is used for quick, secure AUDIX call transfers and requires a fully integrated digital switch.

Enhanced Uniform Call Distribution (EUCD)

The set of analog port boards arranged in a call-distribution group on a DIMENSION PBX, used to connect subscribers and users to AUDIX.

Escape to Attendant

An AUDIX Enhanced feature that allows an AUDIX subscriber with the Call Answer feature to have a personal attendant or operator administered to potentially pick up an unanswered call. A system-wide extension could also be used to send callers to a live agent.

Executive Features

A set of features introduced in R1V4 or later software that include Private Messaging (**P), Allow Forwarding (**F), Untouched Message (**H or Hold), and a Security Password Length, where a minimum-length password up to 15 characters long is administered to increase system security.

Exit Command

An AUDIX R1V3 or later feature that allows callers to use the **X (Exit) command to have AUDIX disconnect a call *without* hanging up. This is especially useful during calls made from a toll phone or for ending Outcalling sessions from a remote location.

Equipped/Unequipped

The state of a Data Base Processor (DBP) or Voice Session Processor (VSP) hardware device that indicates whether or not AUDIX software has recognized it. Devices must be equipped before they can be enabled (made active) using the `maintenance : dbp : equip` or `maintenance : vsp : equipage` form.

Error Log — A list of errors kept in a software file on disk. The `maintenance : error : display` form normally shows errors in historical order. The `maintenance : error : specification` form can be used first to select errors to display based on type, time, etc.

Errors — Problems detected by the system during maintenance self-tests and recorded in the error log. Errors can produce an alarm (fault) if they exceed a threshold.

Expansion Cabinet — The upper cabinet of an AUDIX two-cabinet configuration, where the base cabinet is the former AUDIX-S system.

Faults — See *Alarms*.

Feature Processor (FP) — The main AUDIX subsystem that controls feature operation, communicates with the switch, and supports the maintenance and administration interfaces.

Field — An area on a form, menu, or report where you can type or display information. For input fields, fill in the blanks or type over information already there. Read-only or output fields cannot be changed; you usually press ENTER to display information.

File — A collection of like records (data) stored under a single name in software.

File Cabinet — A storage area for subscribers to keep copies of messages for future reference or action.

File Redundancy — An AUDIX R1V4 or later feature that allows data from crucial filesystems to be continuously copied to backup (mirror) filesystems while the system is running. If the system has some problem where an original filesystem cannot be used, the backup filesystem is placed in service automatically.

Filesystem — A collection of related files (programs or data) stored on disk. Different types of filesystems are required to initialize AUDIX and provide full service; these include the `adat`, `ndat`, `sdat`, `sst`, `vdat`, `vtext`, and `boot` filesystems.

Fixed Storage Drive (FSD) — A permanently mounted disk drive having a magnetic-media fixed disk. AUDIX-L FSDs have 340 Megabytes.

Format — To set up a disk with a predetermined arrangement of characters so the system can interpret meaningful information.

Forms — Terminal screens of information that allow data to be changed or displayed.

Function — Individual steps or procedures within a Voice Mailbox activity.

Function Keys — See *Programmed Function Keys*.

Generic 1 or 2 — AT&T DEFINITY Communications System software releases. *Generic 1* corresponds to the newest release of System 75-based software. *Generic 2* corresponds to the newest release of System 85-based software.

Generic 3 (i, r, or s) — The most recent AT&T DEFINITY Communications System software releases, where Generic 3i and 3s are based on Generic 1 software, and Generic 3r is a combination of Generic 1 and Generic 2 software features.

Generic 4 or 5 — Compatible 5ESS Switch software, used for integrated AUDIX applications in R1V4 and later versions.

Generic 7, 8, or 9 — Compatible 1A ESS Switch software, used for integrated AUDIX applications in R1V4 and later versions. The different generics support different types of message-waiting indication capability.

Generic-Program Cartridge — A copy of the uncustomized software shipped with a new system.

Get Messages — See *Scan Incoming Mailbox Activity*.

Grade of Service (GOS) — The level of service subscribers receive based on the number of seconds they have to wait before AUDIX answers a call.

Guest Password — An AUDIX Enhanced feature that allows people who are *not* AUDIX subscribers to leave messages on AUDIX by dialing a subscriber's extension and entering a system-wide guest password.

Hard Disk Drive (HDD) — A permanently mounted (fixed) disk drive on a one- or two-cabinet AUDIX. Disk drives have varying capacities from as little as 11 hours to more than 80 hours.

Header — Information that AUDIX creates to identify a message. A message header includes the originator or recipient, type of message, creation time, and delivery time.

Help — A command run by pressing the HELP or CTRL-? key on a display terminal to show the options available at your current form position. In AUDIX, press *H to get a list of options.

Host Switch — The switch directly connected to AUDIX over the data link; also, the physical link connecting an AUDIX to a Digital Communications System (DCS) network. See also *Distributed Communications System.*

Hunt Group — A group of analog ports on the switch usually administered to search for available ports in a circular pattern. Used on AUDIX Standalone systems and some switches.

Information Service — An AUDIX feature that allows a message to be played to callers who dial the extension. Callers cannot leave a message (it is a listen-only service). Also called *Bulletin Board*.

Initialization — The process of bringing a device or system to a predetermined starting state. The AUDIX start-up procedure tests hardware; loads the boot filesystem programs; locates, mounts, and opens other required filesystems; and starts normal service.

Initialization and Administration System (INADS) — Maintenance system used by remote service personnel to track alarms.

Integrated AUDIX — An AUDIX with a data link. Compatible switch software is required.

Integrated Message Notification (IMN) — A feature that allows several message services to alert users of new messages through a common service using descriptive announcements and the message-waiting lamp (MWL). See also *Unified Messaging*.

Integrated Services Digital Network (ISDN)

A protocol being developed in response to a recommendation from an international standards body. It defines how equipment from different manufacturers should communicate with one another in end-to-end digital connections using standard interfaces.

Integrated Services Line Unit — T Interface (ISLU-T)

A 4-wire (2-pair) connection from Customer Premises Equipment (CPE) devices directly to the Integrated Services Digital Network (ISDN) switch. This connection may be used instead of installing a Network Termination (NT1) to convert 4-wire signals to the 2-wire U interface.

Interface

The device or software that forms the boundary between two devices or parts of a system, allowing them to operate together.

Isolating Data Interface (IDI)

A synchronous, full duplex data device used for direct cable connections between an AUDIX and a switch data link.

Label

The name assigned to a disk device (either a removable cartridge or permanent drive) through software. Cartridge labels may have a generic name (such as 3:3) to show the software release, or a descriptive name if for backup copies (such as back01). Disk drive labels usually indicate the disk position (such as disk00 or disk02).

Leave Word Calling (LWC)

A switch feature that allows the calling party to leave a standard (nonvoice) message for the called party using a feature button or dial access code.

Light-Emitting Diode (LED)

Indicator on a circuit pack faceplate or disk drive to show status of AUDIX operations and possible fault conditions.

Listen to Messages

See *Scan Incoming Mailbox Activity*.

Load

To read software from external storage (such as disk) and place a copy in system memory.

Local AUDIX Machine

The AUDIX adjunct where a subscriber's Voice Mailbox is located. All subscribers on this ''home'' machine are called *local* subscribers.

Local Area Data Set (LADS) A signal-extending data device previously used for connecting an AUDIX to a switch Data Communications Interface Unit (DCIU) for distances greater than 400 feet (122 m); replaced with the Data Service Unit (DSU).

Local Installation A system, adjunct, or piece of peripheral equipment installed physically near the host switch or system. See also *Colocated*.

Local Maintenance Terminal (LMT) A display terminal located near the AUDIX cabinet (usually directly cabled) which is temporarily attached to the MAINT connector during an on-site service visit.

Local Networking When more than one AUDIX adjunct is attached to the same switch to give the appearance of one large AUDIX machine.

Login A unique code used to gain approved access to the AUDIX system, either a subscriber's Voice Mailbox or a display terminal. See also *Password*.

Login Announcement A feature enabling the system administrator and other designated users to create a voice mail message that is automatically played to all subscribers every time they log in to AUDIX.

Mailbox A portion of disk memory given to each subscriber for creating and storing outgoing and incoming messages. Space is usually allocated as needed.

Mailing List A group of subscriber addresses assigned a list ID# and public or private status. A mailing list may be used to simplify sending messages to several subscribers.

Maintenance The process of identifying system errors and correcting them, or taking steps to prevent problems from occurring.

Maintenance Interface (MI) An intelligent circuit pack that has two RS-232C ports for maintenance and administration, a shutdown toggle switch, and alarm Light Emitting Diodes (LEDs). The MI controls system maintenance, modes, initialization, and alarm functions.

Maintenance Shutdown The complete shutdown of all filesystems, leaving them unmounted and inaccessible (normally used before powering down the system).

Memory

A device which can store logic states such that data can be accessed and retrieved. Memory may be temporary [such as system Random Access Memory (RAM)] or permanent (such as disk).

Message Categories

Groups of messages in subscribers' mailboxes. Categories include new, unopened, and old for the incoming mailbox, and delivered, accessed, undelivered, not deliverable, and file cabinet for the outgoing mailbox.

Message Center

An Applications Processor (AP) call-answering feature that allows an agent to enter a message for a busy or unanswered extension. Also called *Message Center Service*.

Message-Waiting Lamp

A Light-Emitting Diode (LED) on a voice terminal (telephone) that alerts subscribers to new messages. Also called *Automatic Message-Waiting* or *AMW Lamp*.

Mode

An operating state in which the system can perform certain tasks. AUDIX modes include control mode, normal mode, administrative or maintenance shutdown mode, and initialization.

Modem

A modulator/demodulator for transmitting analog (continuous) signals.

Modem Pool

A group of modems set up to accept incoming data calls from a remote device. The switch's modem-pooling feature inserts modems into the link automatically. The transmission rate could range from 1200 to 9600 bps depending on facilities.

Modular Processor Data Module (MPDM)

A data device that converts RS-232C or RS-449 signals to Digital Communications Protocol (DCP) used by the System 75, System 85, or DEFINITY Communications Systems. MPDMs are Data Communications Equipment (DCE) devices and may be used to connect AUDIX to a switch data link, or to connect terminals to a switch port board. Formerly called *Processor Data Module*.

Modular Trunk Data Module (MTDM)

A Data Terminal Equipment (DTE) device that converts RS-232C or RS-449 signals to Digital Communications Protocol (DCP) used by the System 75, System 85, or DEFINITY Communications Systems. MTDMs are often used in modem pools.

Mount — To identify a filesystem to software and make it accessible by the Data Base Processor (DBP).

Mount Point — A software abbreviation for a filesystem that allows software to find it independent of its physical location. Similar to a *directory*.

Mounted — The state of a filesystem when it is identified to the software and accessible by the Data Base Processor (DBP).

Network Termination 1 (NT1) Unit — A physical and electrical interface between the 2-wire U interface and the 4-wire T interface. The NT1 unit marks the boundary between Customer Premises Equipment (CPE) and the Integrated Services Digital Network (ISDN) network.

Networking — An AUDIX R1V3 and later feature that allows the customer to link together up to 100 remote AUDIX machines for a total of up to 36,000 subscribers.

Networking Prefix — A set of digits that identifies a remote AUDIX machine.

Normal Mode — The state of the AUDIX system after hardware initialization, where software is running and maintenance and administration forms are available.

Not Deliverable Message — A message that could not be delivered after a number of attempts specified by the system administrator (up to ten). This usually means the subscriber's mailbox is full.

On-Line Help — A feature introduced in AUDIX Enhanced software allowing system administrators and maintenance personnel to obtain screen form information by pressing a key for the PATH line, field, or form.

One-Cabinet AUDIX — Current name for the 16-port AUDIX-S (Small) system. This half-height cabinet supports up to 2000 subscribers. See *AUDIX-S*.

Operating System — The set of programs that runs the hardware and interprets software commands.

Oryx/Pecos — The AUDIX operating system (application software shipped on the generic-program cartridge from the factory), a set of programs that runs hardware and interprets software commands.

Outcalling — An AUDIX R1V3 and later feature that allows AUDIX to dial subscribers' numbers or go to pagers to inform them they have new messages [often used with AUDIX Standalone or if subscriber phones do not have message-waiting lamps (MWLs)].

Packet Gate (PGATE) — The data link used by DEFINITY Generic 3r.

Password — A login code assigned to every AUDIX terminal user and subscriber for security reasons. After dialing AUDIX, subscribers must dial their personal password correctly to log on to AUDIX. Passwords with at least six digits, one of which is a noncharacter symbol, offer greater security.

Password and List Administration Activity — Activity 5 on the Activity Menu that allows subscribers to change their password, or to create, scan, or edit mailing lists.

Path — The command string (or directory location) typed on the second line of an AUDIX screen form that identifies the form to display. Parts of the path name are called segments. Each part must be identified with enough characters to uniquely name that segment.

PATH Line — The second line from the top of a terminal display form used to identify the form you wish to display. You may type only enough characters to name a unique form (such as `fi l`), followed with an ENTER or RETURN key.

Peripherals — The voice terminals, printers, display terminals, and other devices external to the AUDIX cabinet, but necessary for full AUDIX operation and maintenance.

Personal Computer (PC) — An AT&T 62xx or 63xx desktop computing device, required for the AUDIX Data Acquisition Package (ADAP) and Text Service Interface (TSI).

Personal Directory — A feature allowing each subscriber to create a private list of customized names.

Personal Greeting Administration Activity

Activity 3 on the Activity Menu that allows subscribers with the Call Answer feature to record personal greetings. These greetings are played to callers who are redirected to AUDIX. The Bulletin Board and Automated Attendant features also use this option for recorded messages or menus.

Port

A connection or link between two devices, allowing information to travel through it to a desired location. For example, a switch port connects to an AUDIX voice port to allow a subscriber on a voice terminal to leave a message on disk.

Primary Rate Interface (PRI)

International standard protocol for connecting a switch or PBX to a computer, network, or another switch. PRI supports twenty-three 64 Kbps information and one 64 Kbps signaling channel [called 23B+D format or Extended Digital Subscriber Line (DSL)] over high-speed T1 facilities.

Priority Messaging

A feature allowing some subscribers to send Priority Messages that will be specially marked and preferentially presented to recipients.

Priority Outcalling

Works with Priority Messaging by allowing the recipient to elect to be notified by outcalling only when a priority message has been received.

Private Mailing List

A list of addresses that only the owning subscriber can access.

Private Messaging

One of the Executive Features that allows a subscriber to send a voice mail message that can’t be forwarded by the recipient using the **P command. The **F (Allow Forwarding) command cancels Private Messaging.

Programmed Function (PF) Keys

User- or system-coded keys that allow information to be inserted or functions to be done by simply pressing the key.

Processor Element (PE)

The combination of Central Processing Unit (CPU), Random Access Memory (RAM), and Bus Interface (BI) boards that together make up the Feature Processor (FP) or Voice Session Processor (VSP). The CPU controls the other PE boards and is the heart of that subsystem.

Processor Interface (PI)

A System 75, System 75 XE, Generic 1, Generic 3i, and Generic 3s data link; AUDIX usually uses the Electronic Industries Association (EIA) port connection (one of four links). Also called *Processor Interface Board* or *PIB.*

Protocol

A set of conventions or rules governing the format and timing of message exchanges (signals) to control data movement and the detection and possible correction of errors.

Public Mailing List

A list of addresses that any subscriber can use if that subscriber knows the owner's list ID# and extension number. Only the owner can modify a public list.

Real-Time Clock (RTC)

An internal system clock in AUDIX which may or may not be synchronized with the clock in the switch.

Remote Installation

A system, site, or piece of peripheral equipment that is installed in a different location from the host switch or system.

Remote Maintenance

Service personnel at a centralized maintenance site can access the AUDIX through the remote MAINT connection to perform off-site troubleshooting or routine checks.

Remote Maintenance, Administration, and Traffic System (RMATS)

A computer-aided maintenance system that offers AUDIX maintenance services at a centralized service location. Replaced with Initialization and Administration System (INADS).

Remote Subscribers

Those subscribers whose mailboxes reside on a receiving (remote) AUDIX machine.

Removable Cartridge Drive (RCD)

A 20-Mbyte one- or two-cabinet AUDIX disk drive with a removable magnetic-media cartridge.

Removable Storage Drive (RSD)

An AUDIX-L disk drive that permits removal and replacement of the 80-Mbyte magnetic-media cartridge. One RSD is required per system for software updates and backup procedures.

Replaceable Unit

Any removable device that the system can identify as faulty. The unit may have more than one part [such as the Feature Processor-Processor Element (FP-PE), which controls three circuit packs].

Restart (AUDIX) An AUDIX Enhanced feature that allows subscribers who have reached AUDIX through the Call Answer feature to access their own mailboxes by typing the *R (Restart) command. This is especially useful for long-distance calls or for AUDIX Standalone users who wish to access AUDIX when all the Voice Mail ports are busy.

Restart (System) A partial system initialization from Feature Processor (FP) memory using booted programs already in Random Access Memory (RAM). This can be done using the Control Mode Menu or the `startup` form. A restart resets the FP and opens and mounts all filesystems that need to be active for full service.

Retention Time The amount of time messages are saved on disk before being automatically deleted from a subscriber's mailbox.

Return Call to Sender An AUDIX Enhanced feature that allows subscribers to immediately place a call to the originator of an incoming message if that person is in the switch's dial plan.

Scan To listen to a message body or header.

Scan Incoming Mailbox Activity Activity 2 on the Activity Menu which allows subscribers to review, forward, or respond to messages they have received from other subscribers or through the Call Answer feature.

Scan Outgoing Mailbox Activity Activity 4 on the Activity Menu which allows subscribers to review, edit, or redirect messages they have scheduled for delivery, or to check the status of messages that are already sent.

Scheduled Delivery Time A time and/or date that a subscriber optionally assigns to a message that tells AUDIX when to deliver it. If a delivery time is omitted, AUDIX sends the message immediately.

Screen-Labeled Keys The top row of eight keys on a display terminal, whose functions are marked by reverse video blocks at the bottom of the screen. The keys' functions change when the screen labels change.

SCSI-to-AUDIX Disk Interface (SADI)

AUDIX disk drives use the Small Computer Systems Interface (SCSI) protocol to communicate with the TN475B SADI board (disk controller 0). The SADI's light-emitting diodes (LEDs) show which drives are active.

Simplified Message Service Interface (SMSI)

Type of data link connection to an integrated 1A ESS Switch or 5ESS Switch in AUDIX R1V4 and later software.

Software Shutdown

A procedure required to disable system operation and protect customer data stored on disk before a power down.

Split

Group (or queue) of analog ports on the switch. See also *Call-Distribution Group.*

Standalone AUDIX

An AUDIX R1V3 or later feature that allows AUDIX to connect to any switch without using a data link. The Standalone feature allows AUDIX to work with a switch built by a different vendor or one that runs an incompatible load of software.

Standard Announcement Set

One of the two announcement sets available in AUDIX R1V8 software. The standard announcement set provides the Streamlined User Interface (SUI); it has shorter prompts and is closely aligned with the standard announcement set used on DEFINITY AUDIX systems.

Status Line

The top line of an administration or maintenance form displayed on a terminal, showing the active system alarms (if any), logins (up to two), and threshold (space) violations.

Subscriber

A person to whom the AUDIX administrator assigns the ability to access the Voice Mailbox feature. Subscribers may also be assigned the optional Call Answer feature on the `subscriber` or `cos` forms or given Leave Word Calling (LWC) permission through the switch.

Subsystem

A major functioning element of AUDIX software and hardware. Subsystems include the Feature Processor (FP), Data Base Processor (DBP), and the Voice Session Processor (VSP).

Switch

An analog, digital, or electronic system where data and voice transmissions are not confined to fixed communications paths, but are routed among available ports or channels.

Switch Communications Adapter (SCA) — Custom device used for making AUDIX connections to a 5ESS Switch.

Switch Communications Interface (SCI) — The System 75 data link. An AUDIX adjunct normally connects to the SCI TN738 Interface-2 (INT2) board.

Switched Access — A connection made from one endpoint to another through switch port boards. This allows the endpoint (such as a terminal) to be used for several applications.

Synchronous Transmission — A type of transmission where the data characters and bits are exchanged at a fixed rate with the transmitter and receiver synchronized. This allows greater efficiency and supports more powerful protocols. The AUDIX-to-switch data link is synchronous.

System Administrator — Person usually at customer site who is responsible for AUDIX system administration and possibly Networking coordination.

System Administration Activity — Activity 9 on the Activity Menu which may be used only by an AUDIX system administrator who has announcement-control permission. This option allows the administrator to record, play, or edit subscriber names or system announcement fragments.

T Interface — The standard Integrated Services Digital Network (ISDN) 4-wire (2-pair) interface used for terminal connection and data transmission on the customer premises. Also called *S interface*.

T1 Carrier — A short-haul digital transmission line that uses time-division multiplexing. A bipolar signal is transmitted at 1.544 Mbps along 16- to 20-gauge copper-conductor cables.

Text Service Interface — An AUDIX R1V4 or later feature that allows AUDIX headers to be sent to electronic mail services such as IBM PROFS using a PC/PBX 2780/3780 interface.

Threshold — A boundary used to indicate when available disk space is getting low. Both subscribers and filesystems are assigned thresholds.

Traditional Announcement Set — One of the two announcement sets available in AUDIX R1V8 software. The traditional announcements have slightly longer prompts and are based on the abbreviated version of the AUDIX R1V7 announcements.

Tone Generator — A device acoustically coupled to a rotary phone, used to produce touch-tone sounds when subscribers cannot use a regular touch-tone generating voice terminal.

Traffic — The flow of attempts, calls, and messages across a telecommunications network.

Translations — Software assignments that tell a system what to expect on a certain voice port or the data link, or how to handle incoming data. They customize AUDIX and switch features for users.

Two-Cabinet AUDIX — See *AUDIX Two-Cabinet Configuration*.

Type — The name entered on a screen form that identifies a kind of filesystem to software. Several types must be active for AUDIX to operate, such as `boot`, `adat`, `ndat`, `sdat`, `sst`, `vdat`, and `vtext`.

U Interface — The standard Integrated Services Digital Network (ISDN) 2-wire (1-pair) interface to the 5ESS Switch. It connects to the Network Termination (NT1) unit and carries signals off-premises to the Central Office (CO).

Undelivered Message — A message that has not yet been sent to a subscriber's incoming mailbox. The message resides in the sender's outgoing message and may be modified or redirected by the sender.

Unfinished Message — A message that has been recorded but not approved or addressed, usually the result of an interrupted AUDIX session. Also called *Working Message*.

Unified Messaging — A switch software feature that allows various message-handling services to keep track of new messages from all internal, switch, and Applications Processor (AP) sources on the system, including Message Center, Electronic Document Communications (EDC), Leave Word Calling (LWC), and electronic mail services such as AT&T Mail and UNIX System mail.

Uniform Call Distribution (UCD) The type of call-distribution group (or hunt group) of analog port boards on some switches that connects subscribers and users to AUDIX. System 75, Generic 1, Generic 3, and some Central Office (CO) switches use UCD groups.

Untouched Message One of the Executive Features that allows a subscriber to keep a message in its current category by using the **H (Hold) command. If the message is in the new category, message-waiting indication (MWI) remains active [for example, the message-waiting lamp (MWL) will remain lit].

User Population A combination of light, medium, and heavy users on which AUDIX configuration guidelines are based.

Vector A customized program in the switch for processing incoming calls.

Verbose Announcements Prior to R1V8, the customer could choose between two types of AUDIX system voice prompts, verbose or abbreviated. Verbose announcements are voice prompts that are given in more detail than abbreviated announcements. Verbose announcements are not standard, therefore the customer must order verbose announcements separately. The verbose announcement set was discontinued in AUDIX R1V8.

Voice Link The AUDIX Voice Port (VPT) connection(s) to a call-distribution group (or hunt group) of analog ports on the switch.

Voice Mailbox The standard AUDIX feature assigned to all subscribers giving them access to disk space on which to store, create, and send Voice Mail messages.

Voice Message Digitized voice information stored by AUDIX on disk memory. Also called *Voice Mail*.

Voice Session Processor (VSP) A major subsystem on 32-port AUDIX systems that processes the voice and data information that control the AUDIX call setup operation, including port hardware and buffers. On one-cabinet AUDIX systems, the Feature Processor (FP) controls these boards: Time Division Bus Interface (TDBI), Voice Buffer (VB), Voice Processor Computer (VPC), and Voice Port (VPT) packs.

Voice Terminal — A telephone used for spoken communications with AUDIX. A touch-tone telephone with a message-waiting lamp (MWL) is recommended for all AUDIX subscribers.

Voicing — Either speaking a message into the AUDIX system during recording, or having the system playback a message or prompt to a subscriber.

Volume — A physical removable cartridge or disk drive device. Volume names in software are called labels.

Work Group System (WGS) — A 6312, 6286, 6386, or equivalent WGS is a Personal Computer (PC)-like device required for the AUDIX Data Acquisition Package (ADAP) and the Text Service Interface (TSI).

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