AT&T

AT&T Product Interfaces
Reference

SYSTEM 85 TO AUDIX

CONTENTS

SYSTEM 85 TO AUDIX

CONFIGURATION

The Audio Information Exchange (AUDIX) has the following switch interfaces:

- Voice links connecting AUDIX Voice Port (VPT) circuit packs to analog circuit packs administered as a call-distribution group on the switch (required for all systems). See figure 1.
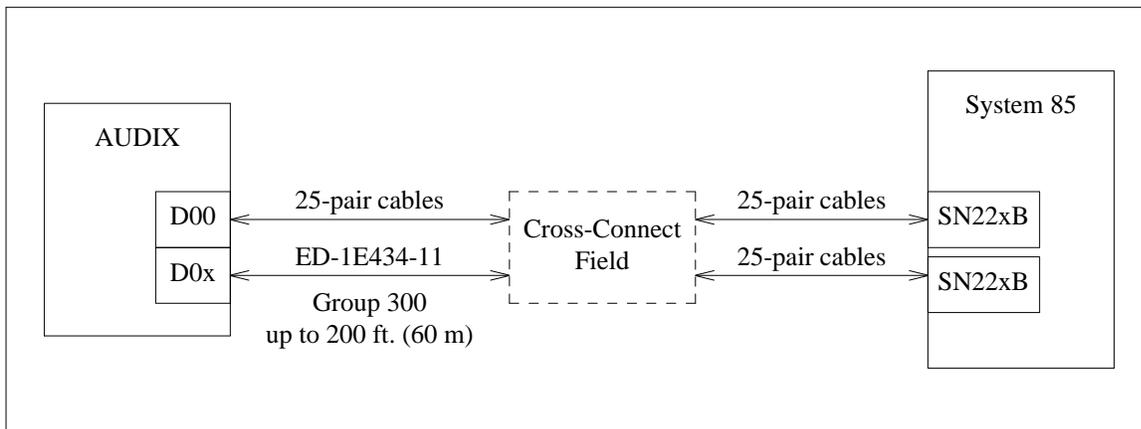
Figure 1: System 85 Voice Port Cabling

- Data link connecting an AUDIX to the switch (required for all fully integrated systems). The link varies depending on the AUDIX model used. See figures 2, 3, and 4 for common System 85 setups.

Note: The AUDIX-S (Small) 16-port model has been renamed the "AUDIX one-cabinet configuration." An AUDIX base cabinet with an expansion cabinet on top (allowing up to 32 ports) is called the "AUDIX two-cabinet configuration." Both AUDIX models use the same type of data link. The AUDIX-L (Large) hardware model has been discontinued, although the software may still be upgraded.
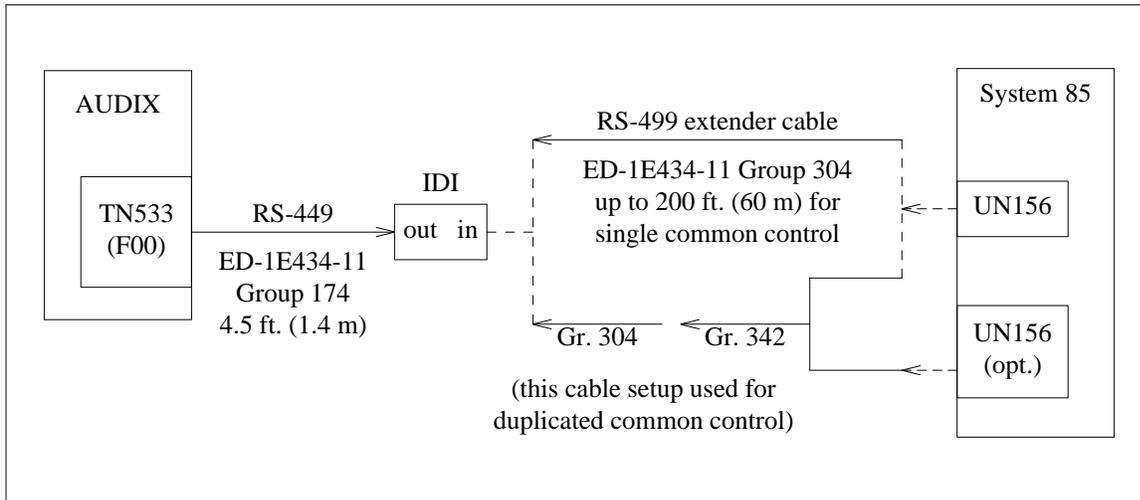
Figure 2: System 85 Data Link (Using IDI) to AUDIX
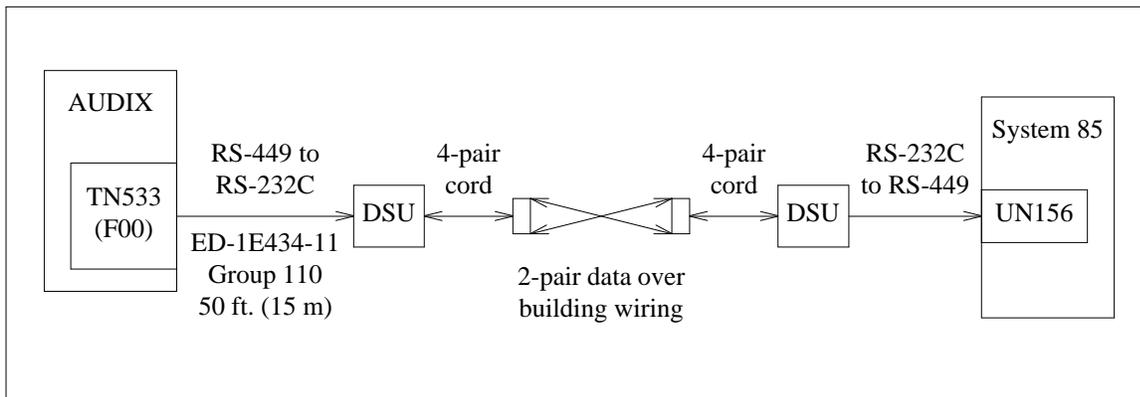
Figure 3: System 85 Data Link (Using DSU) to AUDIX
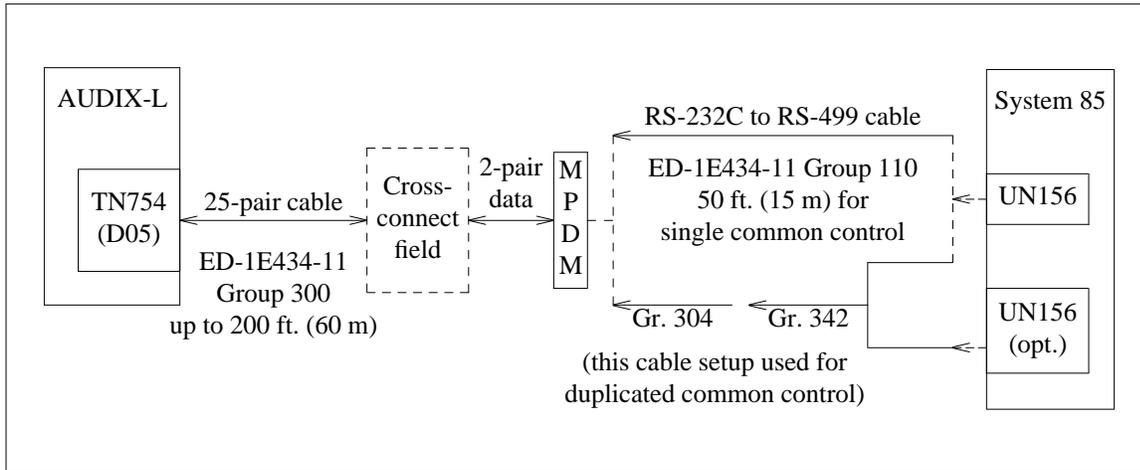
Figure 4: System 85 Data Link (Using MPDM) to AUDIX-L

- Alarms link connecting AUDIX to the switch's alarm-reporting facilities (recommended for all systems). See figure 5.

- Remote maintenance link connecting AUDIX to a remote maintenance site (recommended for all systems and networks). See figure 6.

- AUDIX Networking link (optional), connecting AUDIX to a maximum of 100 other AUDIX machines. Analog or digital facilities may be used between switches. See figure 7.

- Switched-access administration connecting the administration terminal to AUDIX through the switch using digital or analog equipment (optional). See the *AUDIX Reference Manual* for details.

Figure 5: AUDIX System 85 Alarms Link

Figure 6: Remote Maintenance Terminal Cabling

Figure 7: System 85 AUDIX Networking Link

REQUIRED EQUIPMENT

Most of these connections use circuit packs that are always installed in the AUDIX. However, you must check your configuration for the number of optional voice ports installed.

- *One-Cabinet AUDIX* (formerly AUDIX-S): Up to eight 2-port TN501B voice processor (VPC) circuit packs (16 ports) and two 8-port TN747B VPT circuit packs (comcode 105167266) may be installed. The VPT circuit packs connect to AUDIX ports PORT 0 (D00) and PORT 1 (D01).
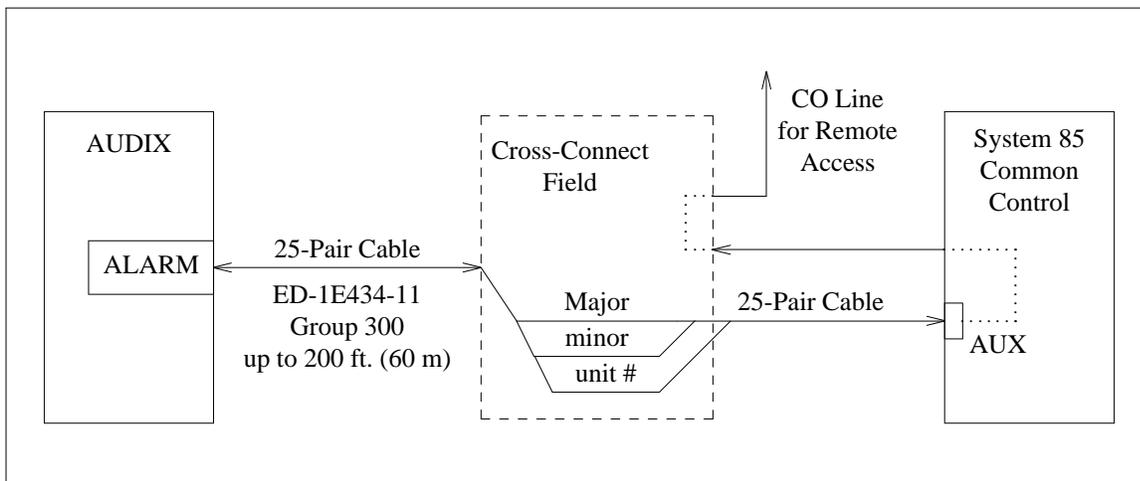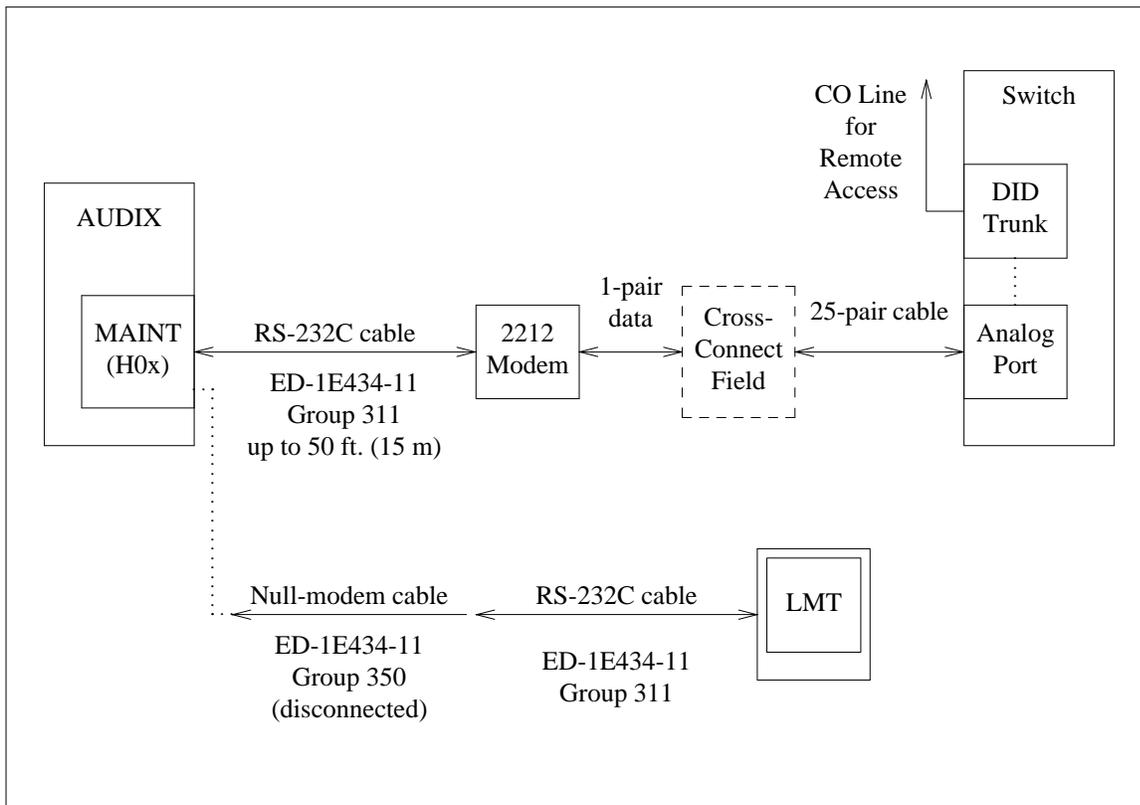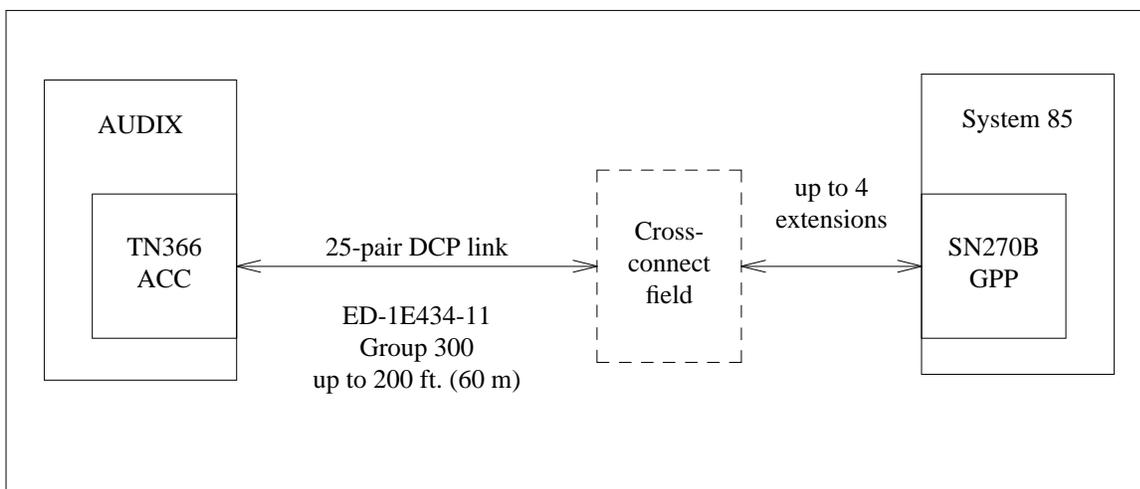
- *Two-Cabinet AUDIX:* Up to sixteen 2-port TN501B VPC circuit packs (32 ports) and four 8-port TN747B VPT circuit packs may be installed on ports 0 and 1 (D00 and D01) in the base cabinet and ports 2 and 3 (D06 and D07) in the expansion cabinet.

- *AUDIX-L:* Up to sixteen 2-port TN501B VPC circuit packs (32 ports) and four 8-port TN747B VPT circuit packs may be installed on AUDIX-L ports (D00, D01, D02, and D03).

System 85 Analog Circuit Packs

The following System 85 Analog Line circuit packs each have eight voice ports. One full analog port circuit pack is therefore needed per 25-pair cable connection to AUDIX (if all eight ports are used).

- *SN222 or SN222B:* Analog Line interface for on-premises or out-of-building voice terminals. Signals may travel up to 3,500 ft (1,067 m) over building wiring.

- *SN228B:* (PEC 65346) This circuit pack provides a switch interface for analog equipment located farther from the switch than SN222 or SN229 circuit packs can reach. Signals may travel from 9,000 ft (2,743 m) on 26-gauge wire to 20,000 ft (6,100 m) on 24-gauge wire over building wiring.

- *SN229:* (PEC 65347) Same as the SN222 except it uses light-emitting diode (LED) type message-waiting lamp signaling and is *not* compatible with the Outcalling feature.

CAUTION: The SN222, SN222B, or SN228B *must* be used for the Outcalling feature in AUDIX Enhanced II (R1V3) software to work correctly on System 85.

System 85 Data Link

AUDIX is connected to the System 85 data communications interface unit (DCIU). The DCIU consists of three circuit packs located in the common control carrier:

- TN405: (comcode 103280238) System interface circuit pack

- TN406: (comcode 103286244) DCIU processor and memory circuit pack

- UN156: (comcode 103665998) Input/Output circuit pack containing eight physical data links for connecting adjuncts or Distributed Communications System (DCS) nodes. Each link consists of an RS-449/423 male 37-pin connector. Software currently limits the number of AUDIX adjuncts to four on System 85 R2V2 or R2V3; System 85 R2V4 supports eight AUDIX adjuncts.

Only one DCIU can provide links for adjuncts or DCS nodes per system. In a duplicated common control system, two sets of DCIU circuit packs are installed, but the circuit packs are used only for redundant operation. Additional adjuncts can *not* be attached to the second DCIU.

Note: The data link is *not* connected for AUDIX Standalone systems.

AUDIX Data Link

A one- or two-cabinet AUDIX requires the following equipment:

IDI. The Isolating Data Interface (IDI) is the recommended setup for local AUDIX connections that are less than 400 ft (122 m) from the switch (see figure 2). The baud rate should be set through the DCIU to 9600 bps (the IDI has no option settings).

DSU. If the AUDIX is far from the switch, a pair of DATAPHONE II 2500 Data Service Units (DSUs) may be used. The 2600 or 2700 series may also be used if diagnostic testing and DATAPHONE II networking is needed. The 2596A DSUs can extend the 9.6K bps 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. All wiring *must* be run within one building.

RS-232C to RS-449 cables connect each DSU to AUDIX and the DCIU (if the switch has duplicated common control, a Group 342 cable ''Y'' cable is needed). The DSUs are connected back-to-back over standard building wiring (see figure 3). The transmit pair of one DSU connects 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. See the *DATAPHONE II 2500 Series Data Service Unit User's Manual* (999-100-188 IS) for details.

AUDIX-L Data Link

The AUDIX-L data port connects to a System 85 DCIU using a Modular Processor Data Module (MPDM) located near the DCIU (see figure 4). The MPDM must have an RS-232C interface card installed. It transmits Digital Communications Protocol (DCP) data through standard building wiring from 4,000 ft (1,220 m) on 26-gauge wire to 5,000 ft (1,524 m) on 24-gauge wire.

AUDIX Alarms Link

A 25-pair cable up to 200 ft (60 m) in length attaches the AUDIX ALARM connector to existing switch-alarm facilities at the cross-connect field (see figure 5). The total length of the connection from the ALARM port to the switch's alarm facilities may be up to 4,900 cable ft (1,493 m). However, the wiring should *never* be run outside of the building.

CAUTION: AUDIX's alarm-contact closures do *not* have current-limiting resistors. Therefore, the cable attached to the ALARM connector must *not* be exposed to damaging surge conditions such as lightning. The cross-connect field may need to be equipped with lightning resistors.

The alarms wiring is broken down at the cross-connect field into a major alarm link, a minor alarm link, and a combined link with a unique unit extension number. The extension number should be 1 to 32 (System 85

allows up to 32 unit numbers). These three connections are then grouped with other alarm signals into a common 25-pair cable that is attached to alarm-contact inputs in the System 85 common control carrier.

If an alarm is reported and remote maintenance such as the Initialization and Administration System (INADS) is available, the switch automatically dials the maintenance number. The switch gives remote service personnel the identification number of the AUDIX with the alarm and the number of the remote maintenance link to dial.

AUDIX Remote Maintenance Link

Two maintenance links are required for AUDIX: local and remote. These links share the same connector (when the local maintenance terminal is in use, the remote maintenance link is disconnected). The remote link should be connected at all times *except* when the local link is being used by on-site service personnel (see figure 6). Usually a 2212, 212AR, or equivalent modem is attached to the MAINT connector for the remote maintenance link. The MAINT connector is labeled H00 on AUDIX and H02 on AUDIX-L.

Note: The 2212 modem needs to have one option adjusted before it can be attached to AUDIX. Using a terminal, set the "Data Transparency" option to "y" (yes) *before* connecting the modem to the AUDIX maintenance port.

The modem's analog signals require only 1-pair wiring. The analog port is usually connected to a remote maintenance site through a trunk administered with Direct Inward Dialing (DID) access. The modem must be assigned an extension number which is accessible from an outside central office (CO) line. If the switch does *not* have DID access or if technicians wish to bypass the switch in case of switch problems, the modem may be connected directly to a CO line, but this connection requires a dedicated trunk.

AUDIX Networking Link

AUDIX Networking is an optional AUDIX R1V3 feature that allows AUDIX adjuncts (which may be different AUDIX models) to communicate with other AUDIX machines (which may be connected to different types of switches) using either analog or digital facilities on the switch. All AUDIX Networking machines require a TN366 AUDIX communications controller (ACC) circuit pack and a 25-pair ED-1E434-11 Group 300 cable to connect the ACC circuit pack to a digital port on the local (host) switch (see figure 7). Two physical Digital Communications Protocol (DCP) links (two transmit and receive pairs) are connected.

If end-to-end digital facilities are used, a 64K bps data transmission rate is always used (DS1/AVD service). System 85 requires an ANN11C or ANN11E circuit pack to support 64K bps CO and tie-trunk DS1 interfaces.

If analog facilities are used, modem-pooling facilities are required; the data transmission rates can range from 1200 to 9600 bps. System 85 requires the following circuit packs for analog networking:

- *SN243B:* (PEC 65204) One port on a four-port SN243B analog data port circuit pack is required for every modem connection to the switch.

- *SN255B:* (PEC 65348) The SN255B vintage tone-detector circuit pack is required for 2296A modems.

- *SN23x:* An SN230B (PEC 65110), SN232B (PEC 65111), or SN233C analog trunk circuit pack (four trunks) is required for the analog-trunk interface.

- *SN270B general purpose port (GPP) circuit pack:* (PEC 65104) The GPP circuit pack is required for the AUDIX Networking connection to the TN366 ACC, and for connecting the modem pool's Modular Trunk Data Module (MTDM).

Recommended modems, required cables, and switch translation procedures for AUDIX Networking are in *AUDIX Reference Manual*, *AUDIX-L Installation Manual*, and *AUDIX Installation Manual*.

System 85 Digital Circuit Packs

Digital port circuit packs on System 85 include:

- *SN270B GPP circuit pack:* (PEC 65104) The GPP circuit pack has four DCP ports which may be used for optional switched-access administration or for AUDIX Networking (see the *AUDIX Reference Manual* for details). One of these ports may be connected to an MPDM or MTDM.

- *SN238 EIA port circuit pack:* (PEC 65392) An EIA port circuit pack translates Asynchronous Data Unit (ADU) protocol (on the RS-232C device side) to DCP (on the switch side). Each SN238 has eight ports, and each ADU (Z3A1, Z3A2, or Z3A4) uses one port. The EIA port circuit pack may also be connected to an 8-port Multiple Asynchronous Data Unit (MADU); this connection requires two SN238 circuit packs.

GPP circuit packs and EIA port circuit packs use DCP protocol and may be connected to each other through the switch. For example, an MPDM-to-GPP arrangement at one end of the switch may be connected to an ADU-to-EIA port circuit pack arrangement at the other.

CAUTION: Some PC 6300s and Business Communications Terminals (BCTs) have problems displaying screens or disconnecting in a dial-up SN238 or ADU setup. These devices may need an Originate/Disconnect switch to generate a 2-second break signal. Applications that use the ADAP software (see *AUDIX Data Acquisition Package*) should avoid the ADU setup. See the *Z3A Asynchronous Data Unit Product Manual* (555-401-708) for additional information on ADUs. Any ADU attached directly to an AUDIX administration or maintenance port should use external power.

REQUIRED SOFTWARE

AUDIX works on any System 85 running R2V2, R2V3, or R2V4 software. However, System 85 R2V4 software is required for the following AUDIX features to work:

- Full Distributed Communications System (DCS) transparency for AUDIX

- Enhanced Call Transfer Out of AUDIX (*T or *0)

- Call Transfer Into AUDIX.

AUDIX Standalone systems do *not* require these switch software loads because they do not use a data link. See the *AUDIX Reference Manual* for details on AUDIX software and differences between releases.

APPLICATION

AUDIX is a message-handling system for recording and distributing spoken messages or "voice mail." It contains stored voice prompts that guide AUDIX users to create, send, retrieve, answer, save, or forward spoken messages. AUDIX gives people the means to record and exchange voice messages when direct communication is inconvenient or unnecessary. Complete information on AUDIX applications and features is in the *AUDIX Reference Manual*. For example, AUDIX provides:

- An automatic call-answering service that:
  - Allows callers to leave detailed messages for personnel who are busy, away from the office, or otherwise unavailable.
  - Allows the called party to work without interruption, and to later receive messages and prepare for a return call.

- A notification to subscribers (users) that they have new messages:
  - For subscribers who have voice terminals (telephones) with message-waiting lamps, AUDIX causes the lamp to light when new messages are received.
  - In addition (or for systems that do *not* have message-waiting lamps), AUDIX can call a personally administered extension when new messages come in.

- Integration with other switch and applications processor (AP) message facilities for more complete and efficient message handling.

- An Automated Attendant that can answer incoming calls, and even route them to the appropriate department, making fewer live attendants necessary.

- AUDIX Networking allows convenient voice-mail communication with different groups in multiple locations. Each networked AUDIX machine can schedule automatic delivery of voice mail messages to a maximum of 100 other AUDIX systems. Up to 32,000 subscribers may be administered on one AUDIX Networking system.

CABLING REQUIREMENTS

Cables for required AUDIX connections are shown in figures 1 through 6. Some descriptions appear in the *Configuration* section. Cable lengths, connector genders, and ordering codes are covered in *AUDIX Reference Manual*, *AUDIX-L Installation Manual*, and *AUDIX Installation Manual*.

Data Link Cabling

The data link is *not* connected for AUDIX Standalone systems. See the *Configuration* section for some common data link setups for fully integrated systems.

Voice Port (VPT) Cabling

Administration: On AUDIX systems, switch port circuit packs must be set up as one or more call-distribution groups to route incoming calls to idle ports on AUDIX. These groups are:

- System 85 R2V3 and R2V4: Automatic Call Distribution (ACD)

- System 85 R2V2: Enhanced Uniform Call Distribution (EUCD).

The switch must be administered so its analog ports are correctly associated with the voice ports on AUDIX. See *AUDIX Reference Manual*, *AUDIX-L Installation Manual*, and *AUDIX Installation Manual* for details on call-distribution group administration.

Reliability: When setting up the call-distribution group for the voice ports, 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. System 85 can ring 4 ports per 1/4 carrier. By physically spreading port circuit packs over more carriers or parts of carriers, more than 4 ports can ring at one time. 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.

PARAMETER SETTINGS

This section summarizes AUDIX hardware and software settings.

Administration Settings

AUDIX administration falls into two major categories: switch administration and AUDIX system administration.

- AUDIX switch administration is covered in the AUDIX installation manuals (*AUDIX-L Installation Manual*, *AUDIX Installation Manual*, and *AUDIX-S Installation Manual*).

- AUDIX system administration is covered in the AUDIX administration manuals. For AUDIX Enhanced (R1V2) or Enhanced II (R1V3) software, see *AUDIX Administration Manual*. For AUDIX Basic (R1V1) software (AUDIX-L only), see the *AUDIX Administrator's Manual*.

Hardware Switch Settings

Some equipment such as DSUs, MPDMs, and modems must have the option switches correctly set to work with AUDIX. Some settings appear in the *Configuration* section. For complete information on customizing the required connecting equipment, see *AUDIX-L Installation Manual*, and *AUDIX Installation Manual*.

TRANSMISSION REQUIREMENTS

AUDIX uses the same type of TN747B CO circuit packs as System 75. The TN747B circuit packs on AUDIX are subject to the same restrictions and use the same ringing voltages as a System 75. For a detailed list of transmission specifications, see *AUDIX Reference Manual*, *AUDIX-L Installation Manual*, and *AUDIX Installation Manual*.

The data link is a synchronous interface. It requires isolated signals and should always run at 9600 bps. The correct options may be set on the device (such as the DSU or MPDM) or through switch software. The AUDIX and switch data link circuit packs are data terminal equipment (DTE) devices. The devices which connect to them (DSUs, IDIs, or MPDMs) are data communications equipment (DCE) devices.

The AUDIX administration and maintenance links can run at either 1200 or 4800 bps in a local (or switched) setup. Because the remote maintenance connection uses a modem, it normally runs at 1200 bps. See the appropriate AUDIX installation manual (*AUDIX-L Installation Manual*, or *AUDIX Installation Manual*) for details on connecting AUDIX links and setting options. The AUDIX administration and maintenance ports are both asynchronous, DTE, RS-232C interfaces.

Physical Layer Protocol

The AUDIX administration and maintenance ports use a standard RS-232C connection. See the *Transmission Requirements* section for analog port specifications.

AUDIX uses BX.25 protocol for its data link. This is the same type of interface used by other switch adjuncts such as APs or DCS nodes. A one- or two-cabinet AUDIX uses a straight RS-449 connection to the System 85 DCIU in an IDI data link (see figure 2). An extended-local AUDIX data link with a DSU needs an RS-449 to RS-232C cable and two modular cords (see figure 3). AUDIX-L has a DCP connector which leads to an MPDM with an RS-232C interface card. An RS-232C to RS-449 cable completes the AUDIX-L connection to the DCIU (see figure 4).

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

High Level Protocol

AUDIX takes advantage of the System 85 R2V4 Enhanced Services message set for the Enhanced Call Transfer Out of AUDIX feature. Most features work consistently from release to release; see the *AUDIX Reference Manual* for details.

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TESTING

The AUDIX physical connections and features should be tested when AUDIX is installed. Complete testing procedures are in *AUDIX-L Installation Manual*, and *AUDIX Installation Manual*.

AUDIX may also need tested as part of problem diagnosis or resolution. See the appropriate AUDIX maintenance manual (*AUDIX-L Maintenance Manual*, or *AUDIX Maintenance Manual*) for complete troubleshooting and test procedures.

UPGRADE REQUIREMENTS

AUDIX may be upgraded to support additional subscribers or new features as described.

Hardware Upgrades. AUDIX hardware upgrades include:

- The AUDIX-S model (2 to 16 ports and up to 3 hard disks) may be upgraded to a two-cabinet AUDIX configuration (up to 32 ports and 6 hard disks). Some circuit packs may need to be upgraded (see the *AUDIX Reference Manual*).

- 380-Mbyte drives may be installed for greater storage (most AUDIX systems ship with 170-Mbyte drives). A TN475 vintage SADI disk controller (if installed) must be exchanged with a TN475B to support 380-Mbyte drives.

- An AUDIX Standalone may be upgraded to use a data link.

- If AUDIX Networking is to be added, the circuit pack vintages must be checked (especially on AUDIX-L) and a TN366 ACC circuit pack must be installed.

Hardware installation for a new system is covered in the AUDIX installation manuals (*AUDIX-L Installation Manual*, and *AUDIX Installation Manual*). Hardware needed for upgrades is covered in *AUDIX Reference Manual* and the appropriate AUDIX maintenance manual (*AUDIX-L Maintenance Manual*, or *AUDIX Maintenance Manual*).

Software Upgrades. AUDIX software upgrades include:

- AUDIX-L may be upgraded from AUDIX Basic (R1V1) software to AUDIX Enhanced (R1V2) software using the directions in *AUDIX(R1V1 to R1V2) Upgrade Instructions*. A TN734 memory circuit pack is needed for this upgrade.

- AUDIX-L or AUDIX-S may be upgraded from R1V2 to AUDIX Enhanced II (R1V3) software using the upgrade utility described in *AUDIX Upgrade Instructions*. No new hardware is required for most R1V3 upgrades.

USER INTERFACE REQUIREMENTS

The AUDIX user interface is model independent (AUDIX subscribers need not know if they are using a one-cabinet, two-cabinet, or AUDIX-L model). Therefore, most AUDIX user and administration guides cover all AUDIX models and software releases (see *AUDIX Administration Manual*, *AUDIX Data Acquisition Package*, and *AUDIX User's Guide*). The exception is AUDIX Basic (R1V1) software which runs only on AUDIX-L and has its own administration manual (see the *AUDIX Administrator's Manual*).

Service technicians, however, *must* have the correct AUDIX documentation for their particular model in order to install, administer, troubleshoot, and repair it. AUDIX-L is described in *AUDIX-L Installation Manual*, and *AUDIX-L Maintenance Manual*. The one- or two-cabinet AUDIX model is covered in *AUDIX Installation Manual* and *AUDIX Maintenance Manual*. AUDIX-S R1V2 systems are covered in *AUDIX-S Installation Manual*.

PEOPLE INTERACTIONS

AUDIX touches many groups of people who must communicate clearly for AUDIX to run smoothly. Some important interactions are noted in the following sections.

AUDIX Configuration

The systems consultant (SC) and Account Team have access to internal documentation that can help them design and customize an AUDIX system. SCs should use this information to work up actual configurations and orders for AUDIX systems. The forms for recording problems and the numbers that customers can call in case of service interruptions or malfunctioning equipment should be shared with the customer. When the customer decides on the final configuration and set of AUDIX features, the SC must communicate this information to the service technician or system implementation manager (SIM) to facilitate AUDIX installation and administration.

If AUDIX is part of a DCS network, the SC, the Regional Engineering Center (REC), or the National Engineering Center (NEC) needs to estimate the impact the additional traffic will have on the tie trunks between the remote switch or switches and the host switch that serves AUDIX.

CAUTION: All DCS or AUDIX Networking setups must be reviewed by the REC. Always obtain technical guidance when setting up a network or AUDIX Automated Attendant.

Before Installation

Before installing AUDIX, an architectural engineer should certify the floor load to be sure the floor can safely support the cabinet(s).

The customer must arrange for a qualified electrician to install the necessary AC or DC power and ground equipment, according to local code. Most of the work may be done before the AUDIX installation begins, or it may be done all at one time after AUDIX is partially installed (when the power receptacles are in place). All AUDIX breakers and wires should be clearly labeled. See *AUDIX Reference Manual*, *AUDIX-L Installation Manual*, or *AUDIX Installation Manual* for details.

AUDIX Installation

Problems during installation should be reported SC, the National Customer Support Center (NCSC), and the appropriate Customer Support Service Organization (CSSO). After customer cutover, problems should be reported to the appropriate CSSO, NCSC, or REC using normal problem-escalation procedures. Usually customers receive a toll-free 800 number for service calls.

Because AUDIX is maintained by both local and remote service personnel, important numbers and system identification must be recorded. These numbers include the alarms link, remote maintenance dial-up number, and all AUDIX access codes. The AUDIX "identification" form should be filled out to aid remote service technicians (see the AUDIX service manuals).

AUDIX Subscribers

The AUDIX system administrator is responsible for training and adding AUDIX subscribers, as well as updating and recording names for subscriber profiles. The system administrator should set up local problem-reporting procedures, and should in turn report subscriber problems or requests for enhancements involving current AUDIX design or operation to the SC or Account Team.

REFERENCES

1.   *AUDIX Reference* manual, 585-300-201, Issue 2

2.   *DATAPHONE II 2500 Series Data Service Unit User's* manual, 999-100-1881S

3.   *AUDIX-L Installation* manual, 585-300-101, Issue 4

4.   *AUDIX Installation* manual, 585-302-105, Issue 1

5.   *AUDIX Administration* manual, 585-302-501, Issue 2

6.   *AUDIX Administrator's Manual*, 999-700-503 IS, Issue 1 (covers R1V1 software only).

7.   *AUDIX-L Maintenance* manual, 585-302-102, Issue 2

8.   *AUDIX Maintenance* manual, 585-300-106, Issue 2

9.   *AUDIX (R1V1 to R1V2) Upgrade Instructions*, 585-302-107, Issue 5

10.   *AUDIX Upgrade Instructions*, 585-302-108, Issue 3 (covers R1V2 to R1V3 software upgrades)

11.   *AUDIX-S Installation* manual, 585-300-105, Issue 1 (covers R1V2 software only)

12.   *AUDIX Data Acquisition Package*, 585-302-502, Issue 2

13.   *AUDIX User's Guide*, 585-302-701, Issue 2

These documents are available from the AT&T Customer Information Center (CIC). To obtain copies of these documents, write to:

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