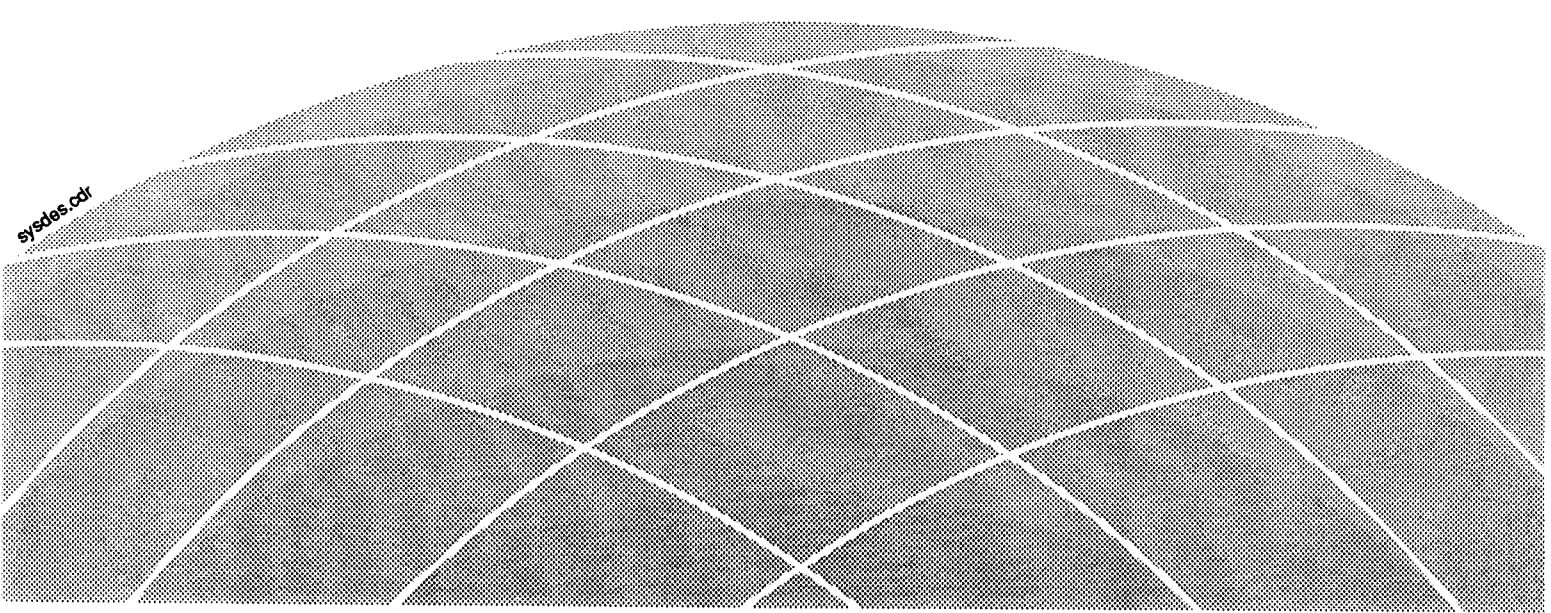


AT&T

555-200-200

DEFINITY[®] Communications System
Generic 1 and System 75
System Description



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CHAPTER 1. OVERVIEW

General

This document provides a technical description of the system hardware, environmental and space requirements, and parameters. Chapter 2 briefly describes system features and services.

The information contained in this document is for Release 1 Version 1, Version 2, and Version 3.

Purpose

This document, along with the *AT&T System 75—Feature Description*, 555-200-201, is intended to serve as an overall reference for the planning, operation, and administration stages of the system. Chapter 13 provides a description of other pertinent documents.

This issue replaces all previous issues of this document. Reasons for reissue are:

- To cover enhancements to the Version 3 system:
 - Addition of the TN765 Processor Interface circuit pack
 - Addition of the TN761 Memory circuit pack
 - Support of Audio Information Exchange (AUDIX) in a Distributed Communications System (DCS) environment
 - Use as a Main location in a Centralized Attendant Service (CAS) arrangement.
- To add references to the 7401D voice terminal
- To revise information on equipment room temperature
- To add information on the ACCUNET® Packet Service
- To revise information on console power
- To add information on digital transmission characteristics
- To make minor clarifications and revisions.

Organization

This document is divided into 16 chapters. The other chapters are as follows:

2. FEATURES AND SERVICES
3. FUNCTIONAL DESCRIPTION
4. HARDWARE DESCRIPTION
5. SOFTWARE DESCRIPTION
6. SYSTEM ADMINISTRATION
7. SYSTEM MAINTENANCE
8. UPGRADES AND ADDITIONS PROCESS
9. TECHNICAL SPECIFICATIONS
10. SYSTEM RELIABILITY AND AVAILABILITY
11. ENVIRONMENTAL REQUIREMENTS
12. POWER AND GROUNDING
13. REFERENCES
14. ACRONYMS AND ABBREVIATIONS
15. GLOSSARY
16. INDEX.

Introduction to System 75

System 75 is a terminal-oriented advanced business communications system (see Figure 1). The system is a processor-controlled digital switch using time division switching techniques to handle voice communications and data communications simultaneously.

Voice communications combine traditional telephone features, such as Hold and Transfer, with more advanced voice features, such as Abbreviated Dialing, Leave Word Calling, Automatic Callback, and Call Information Displays.

The system uses Digital Communications Protocol (DCP) to allow data communications through data terminal equipment connected to the digital switch. The DCP transmits both voice and data over the same link through one signaling channel and two information channels. The signaling channel sends call control and data terminal management

information between the terminal and the digital switch. The two information channels transmit digitized voice or digital data. The digital switch routes each information channel independently so that simultaneous voice and data connections can be completed to the same or separate destination ports.

The system is available in three versions. Version 2 provides more services and features than Version 1. Version 3 expands the Version 2 features and services by offering optional services and features such as Hospitality Services, Call Management Services, and Audio Information Exchange (AUDIX). The following major groups of features and services are provided by the switch and unless specified are available in each version:

- Call Management (V3)
- Data Management
- Hospitality Services (V3)
- Network Services
- System Management
- Voice Management.

Each group of services along with the individual features is discussed in Chapter 2. The hardware and software parameters for each version of the system are provided in Chapter 9.

The messaging capabilities of the system provide for such features as Message Center Service (MCS) and Audio Information Exchange (AUDIX). Chapter 2 briefly describes these features.

The applications processing services are provided through an optional Applications Processor (AP) or Message Server Adjunct (MSA). These services provide features such as Message Center Service, Directory Service, and Electronic Document Communications. See Chapter 2 of this document for a complete list of these services.

System 75 can be arranged as a stand-alone system or can be an integral part of a private network. Version 1 of the system can serve as:

- Tandem or end location in a Tandem Tie Trunk Network (TTTN)
- Main or Tributary location in an Electronic Tandem Network (ETN) [or Enhanced Private Switched Communications Service (EPSCS)/Common Control Switching Arrangement (CCSA) network].

Versions 2 and 3 can also serve as a:

- Main or Satellite location in a Main/Satellite configuration
- Endpoint and tandem in a Distributed Communications System (DCS) with Audio Information Exchange (AUDIX) feature capability
- Main and branch location for Centralized Attendant Service (CAS)
- Tandem in an ETN.

The system can provide the following:

- Up to 400 lines (Version 1) that support digital, hybrid, and analog terminals and peripheral equipment such as printers, loudspeaker paging, etc.
- Up to 800 lines (Version 2 or 3) that support a combination of digital, hybrid, and analog terminals and peripheral equipment such as printers, loudspeaker paging, etc.
- Data switching capacity of up to 200 (Version 1) digital data endpoints* and 32 integrated pooled modems (Version 1).
- Data switching capacity of up to 400 (Version 2 or 3) digital data endpoints* and 160 integrated and combined pooled modems (Version 2 or 3) with optional single-button access to the pooled facilities.
- Up to 200 trunks including central office (CO), Direct Inward Dialing (DID), tie, foreign exchange (FX), Wide Area Telecommunications Service (WATS), and 800 Service trunks. Version 2 or 3 can provide DS1 (Data Services Level 1) tie trunks and release link trunks (RLTs).
- Up to 200 Automatic Call Distribution (ACD) agents.

The limits listed above for each of these three items (lines, data switching capacity, and trunks) probably cannot be achieved simultaneously in any one system. Allowable limits are determined according to expected call usage. See *AT&T System 75—Planning/Configuration*, 555-200-600, and *AT&T System 75—Administration*, 555-200-500, for details on determining the allowable limits.

Three major factors contribute to a highly reliable system. These factors are:

- Design of the Product
- Design of the Manufacturing Process

* Digital data endpoints for System 75 are defined in the Glossary.

- Installation.

Chapter 10 discusses these attributes in detail.

Figure 1-1 shows a typical system configuration.

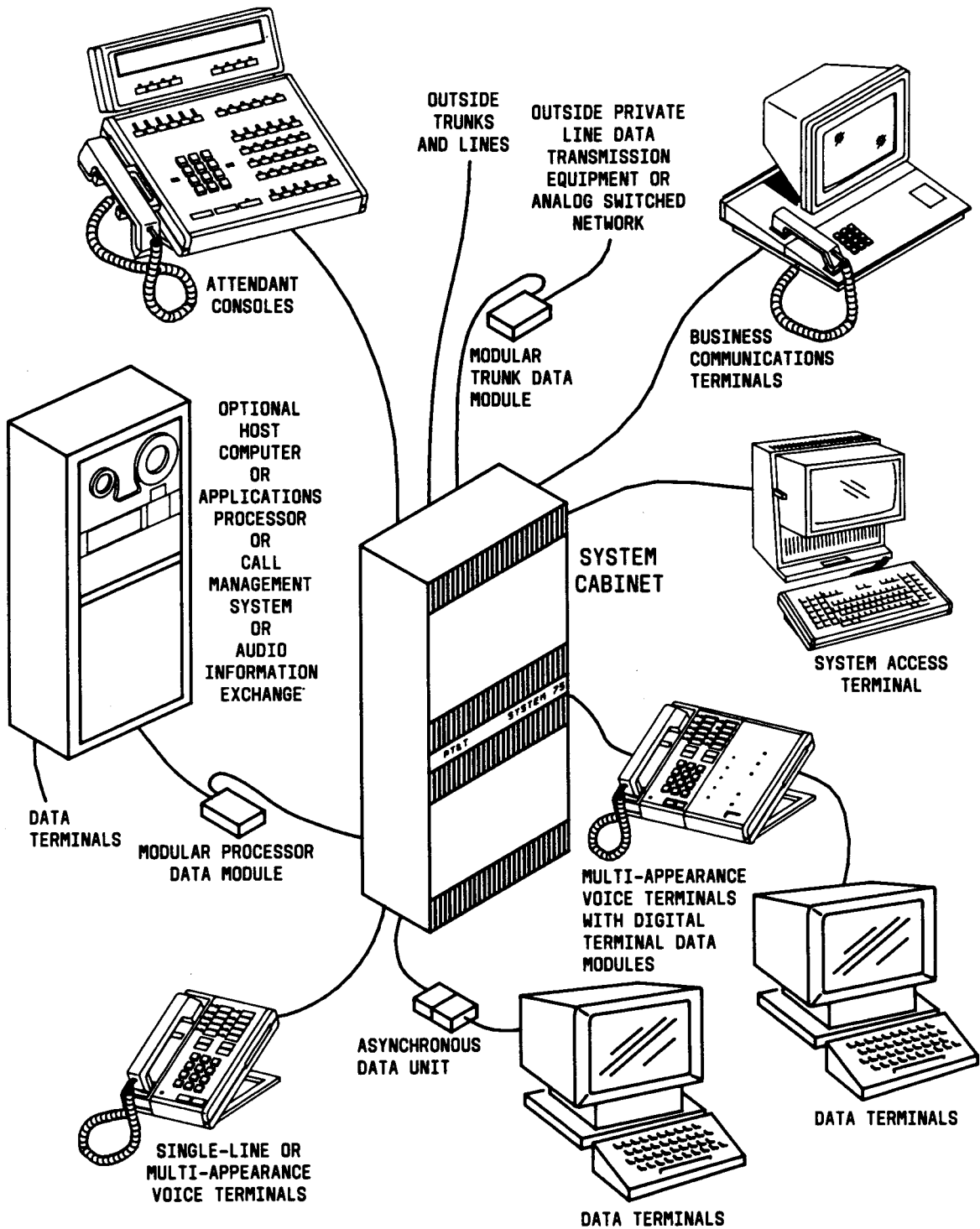


Figure 1-1. Typical System Components

CHAPTER 2. FEATURES AND SERVICES

General

This chapter contains lists of all System 75 features. The features are first listed alphabetically within the following major feature groups:

- Voice Management
- Data Management
- Network Services
- System Management
- Hospitality Services (V3)
- Call Management Services (V3).

All the features are then listed alphabetically with a concise definition or description without regard to the major feature groups.

Table 2-A at the end of this chapter indicates whether or not the feature is provided in Version 1, 2, or 3.

For more detailed information on individual features, refer to *AT&T System 75—Feature Description*, 555-200-201.

Voice Management

This group of features includes all of the voice communications capabilities available with the system.

Each voice capability is designed to improve a particular part of business communications. Many voice features interact with each other and complement applications on the Applications Processor (AP).

The following features are associated with Voice Management:

- Abandoned Call Search (V3)
- Abbreviated Dialing
- Agent Call Handling (V3)
- AP Demand Print
- Attendant Auto-Manual Splitting
- Attendant Call Waiting
- Attendant Control of Trunk Group Access
- Attendant Direct Extension Selection With Busy Lamp Field
- Attendant Direct Trunk Group Selection

- Attendant Display
- Attendant Recall
- Attendant Release Loop Operation
- Audio Information Exchange (AUDIX) Interface (V3)
- Authorization Codes (V3)
- Automatic Callback
- Automatic Call Distribution (V3)
- Automatic Incoming Call Display (V2 or V3)
- Bridged Call Appearance
- Busy Verification of Terminals and Trunks (V2 or V3)
- Call Coverage
- Call Forwarding All Calls (V1)
- Call Forwarding All Calls (V2 or V3)
- Call Park
- Call Pickup
- Call Waiting Termination
- Centralized Attendant Service (V2 or V3)
- Class of Restriction
- Class of Service
- Code Calling Access
- Conference—Attendant
- Conference—Terminal
- Consult
- Coverage Callback
- Coverage Incoming Call Identification
- Dial Access to Attendant
- Dial Plan
- Direct Department Calling and Uniform Call Distribution
- Direct Inward Dialing
- Direct Outward Dialing
- Distinctive Ringing
- Emergency Access To the Attendant (V3)
- Facility Busy Indication
- Forced Entry of Account Codes (V2 or V3)
- Go To Cover
- Hold
- Hot Line Service
- Hunting
- Individual Attendant Access (V2 or V3)
- Integrated Directory
- Intercept Treatment
- Intercom—Automatic
- Intercom—Dial
- Inter-PBX Attendant Calls (V2 or V3)
- Intraflow and Interflow (V3)
- Last Number Dialed
- Leave Word Calling
- Line Lockout
- Loudspeaker Paging Access
- Manual Message Waiting

Manual Originating Line Service
Manual Signaling
Multi-Appearance Preelection and Preference
Multiple Listed Directory Numbers
Music-on-Hold Access
Night Service—Hunt Group (V3)
Night Service—Night Console Service
Night Service—Night Station Service
Night Service—Trunk Answer From Any Station
Night Service—Trunk Group (V3)
Personal Central Office Line
Personalized Ringing (V2 or V3)
Power Failure Transfer
Priority Calling
Privacy—Attendant Lockout
Privacy—Manual Exclusion
Queue Status Indications (V3)
Recall Signaling
Recorded Announcement
Recorded Telephone Dictation Access
Remote Access
Restriction—Controlled
Restriction—Miscellaneous Terminal
Restriction—Miscellaneous Trunk
Restriction—Toll/Code
Restriction—Voice Terminal—Inward
Restriction—Voice Terminal—Manual Terminating Line
Restriction—Voice Terminal—Origination
Restriction—Voice Terminal—Outward
Restriction—Voice Terminal—Termination
Ringback Queuing
Rotary Dialing (V2 or V3)
Send All Calls
Senderized Operation
Service Observing (V3)
Single-Digit Dialing and Mixed Station Numbering (V3)
SMDR Account Code Dialing
Straightforward Outward Completion
Temporary Bridged Appearance
Terminating Extension Group
Through Dialing
Timed Reminder
Touch-Tone Dialing
Transfer
Trunk Group Busy/Warning Indicators To Attendant
Trunk Identification By Attendant (V2 or V3)
Trunk-To-Trunk Transfer
Voice Message Retrieval (V2 or V3)
Voice Terminal Display.

Data Management

This group of features includes all of the data communications and management capabilities available within the system. Data communications is the process of transferring data from one point (usually a data base) to another where it can be used. Data management is the sum total of the planning and control measures applied to effectively use and protect data.

The following features are associated with Data Management:

- Data Call Setup
- Data Hot Line (V2 or V3)
- Data-Only Off-Premises Extensions
- Data Privacy
- Data Restriction
- Digital Multiplexed Interface (V2 or V3)
- DS1 Tie Trunk Service (V2 or V3)
- EIA Interface (V2 or V3)
- Information System Network (ISN) Interface
- Modem Pooling
- PC/PBX Connection
- Permanent Switched Calls (V2 or V3).

Network Services

This group of features includes all of the capabilities that assure efficient interconnection of the private network. This network is the web of trunk and switching facilities dedicated for use by a business or organization. Similar to the public network, a large private network may make use of intermediate (tandem) switches to complete call connections. By concentrating and distributing call traffic, tandem switches and their available features offer a cost-effective alternative to large numbers of direct trunk groups.

The following features are associated with Network Services:

- AAR/ARS Partitioning (V3)
- Automatic Alternate Routing (V2 or V3)
- Automatic Circuit Assurance (V2 or V3)
- Automatic Route Selection (V1)
- Automatic Route Selection (V2 or V3)
- DCS Alphanumeric Display for Terminals (V2 or V3)
- DCS Attendant Control of Trunk Group Access (V2 or V3)
- DCS Attendant Direct Trunk Group Selection (V2 or V3)
- DCS Attendant Display (V2 or V3)
- DCS Automatic Callback (V2 or V3)
- DCS Automatic Circuit Assurance (V2 or V3)
- DCS Busy Verification of Terminals and Trunks (V2 or V3)
- DCS Call Forwarding All Calls (V2 or V3)
- DCS Call Waiting (V2 or V3)
- DCS Distinctive Ringing (V2 or V3)

DCS Leave Word Calling (V2 or V3)
 DCS Multi-Appearance Conference/Transfer (V2 or V3)
 DCS Trunk Group Busy/Warning Indication (V2 or V3)
 Facility Restriction Levels and Traveling Class Marks (V2 or V3)
 Network Access—Private
 Network Access—Public
 Off-Premises Station
 Subnet Trunking (V2 or V3)
 Uniform Dial Plan (V2 or V3).

System Management

This group of features includes all the capabilities to administer, control and maintain the system and to generate system usage reports to help determine if the system is being used as intended.

The following features are associated with System Management:

Automatic Circuit Assurance
 Facility Test Calls
 Move Agent From CMS
 Station Message Detail Recording
 System Measurements
 System Status Report.

The following features are used to initialize the system, monitor its use, and make additions and/or changes as necessary:

System Administration
 Remote Administration
 Dialup Administration
 Initialization and Administration System (INADS).

Changes made to system translations are effected only at the single system for which the changes were made. If a system is part of a network, changes may have to be made at more than one system to achieve the desired changes to the network. Similarly, changes intended for only a single system could affect the network. Therefore, consider the effect on the network before making any changes.

System Administration: Allows the user to implement (initialize) and administer the System 75 voice terminal and system features. System Administration allows the following:

- Initializing the system
- Managing system, voice terminal, and data terminal features on a day-to-day basis
- Performing system backup procedures

- Monitoring, detecting, and determining system performance
- Maintaining system security.

System Administration is performed at the System Access Terminal (SAT), a Remote Administration terminal, or Initialization and Administration System (INADS) location. System maintenance can be performed from the SAT or INADS.

The SAT is a 610 Business Communications Terminal (BCT) that is located within 50 feet of the system cabinet. The SAT consists of a video display and keyboard that allow a System Manager to input system commands and translations. The SAT is used to initialize the system. After initialization, the SAT is used to reconfigure translations and to monitor system performance.

INADS is a service available from an AT&T Service Center for those customers under warranty or under a maintenance contract. INADS has the same administrative capabilities as the SAT.

Remote Administration: Allows the system to be administered from a remote terminal located on or off the customer's premises. A terminal located more than 50 feet from the system cabinet is considered remote. A remote administration terminal can be on the same premises as the local SAT, or can be off-premises. The remote terminal performs the same functions as the local SAT.

The 510D terminal, 513 BCT, 515 BCT, or 610 BCT may be utilized for the on-premises remote terminal. Normally, only the 513 BCT is used as the off-premises remote terminal.

If the remote terminal is a 513 BCT, it must be connected to the system through a Processor Data Module (PDM) or Digital Terminal Data module (DTDM). If a 510D terminal, 515 BCT, or 610 BCT is used as a remote terminal, a PDM or DTDM is not required. The cabling distance from the system to the remote terminal is determined by the type of module associated with the terminal. Distance limitations are as follows:

- Remote terminal to PDM—5000 feet using 24-gauge wire or 4000 feet using 26-gauge wire
- Remote terminal to DTDM—3400 feet using 24-gauge wire or 2200 feet using 26-gauge wire.

For a detailed description of the data modules and BCTS, refer to the *AT&T System 75 and System 85 Reference Manual, Terminals and Adjuncts*, 555-015-201.

Only four users can be logged into the administration functions at one time. This includes a user of the SAT.

Dialup Administration: Allows an off-premises data terminal user to remotely access System 75 and perform administrative tasks. All administrative commands are available to the remote user. Versions 1 and 2 provide synchronous dial-up capabilities with modem pooling. Version 3 provides asynchronous or synchronous dial-up capabilities without modem pooling. In Version 2 or 3, three users can be logged on simultaneously not counting an INADS user. Since the System Access Terminal (SAT) is always logged on, the remaining two users can be either dialed in through data channels or split between dialing in on a data channel and

dialing in asynchronously using the CO trunk on the maintenance board.

Initialization and Administration System (INADS): Allows System 75 administration and maintenance from a remote location.

INADS allows its user to access the System 75 and perform administrative tasks. All administrative commands are available to the INADS users. INADS can also be used to perform maintenance routines.

INADS automatically receives major and minor alarm notifications from the system. When an alarm is received, INADS users can access the system and perform the following tasks:

- Display alarms
- Display errors
- Clear errors
- Test and busyout circuit packs, voice terminals, and trunks
- Set time and date
- Receive backup translations for the system
- Download a copy of the system tape
- Perform any required administration.

Hospitality Services (V3)

This group of features includes support services for the lodging and health industries. These industries, such as hotels, motels, and hospitals, use the features to better manage the property and provide services to their guests/patients.

The following features are associated with Hospitality Services:

- Automatic Wakeup
- Do Not Disturb
- Property Management System Interface
 - Check-In/Check-Out
 - Controlled Restriction
 - Housekeeping Status
 - Message Waiting Notification
 - Room Change/Room Swap.

See *AT&T System 75—Feature Description*, 555-200-201, for details on these features and *AT&T System 75—Hospitality Operation*, 555-200-723, for operation information.

AT&T QUOTE Service, a telephone billing information system, is available for organizations that need to bill back or allocate long-distance charges among callers or customers.

The customer must make arrangements with the AT&T Account Executive to provide the service. In addition, the customer must arrange for the installation of a dial-up line through the local Telephone Company.

Call Management Services (V3)

This group of features supports services for industries, such as airlines and travel agencies that have a large number of calls that are similar and allows balanced call distribution to a group of voice terminals.

The following features are associated with Call Management Services:

- Abandoned Call Search
- Agent Call Handling
- Automatic Call Distribution
- Intraflow and Interflow
- Move Agent From CMS
- Queue Status Indications.

See *AT&T System 75—Feature Description*, 555-200-201, for details on these features and *AT&T System 75—Automatic Call Distribution Operations*, 555-200-724, for operation information.

Additional Adjunct Features

Adjuncts provide the following features for use with System 75. Either Applications Processor (AP16s) or 3B2 Message Server Adjunct (MSA) are configured to support these applications. An interface to these adjuncts allows a System 75 user to control these features.

- Call Detail Recording and Reporting (CDRR)
- Directory
- Electronic Document Communications
- Message Center
- Terminal Emulation.

Refer to the AT&T Business Communications System Publications Catalog, 555-000-010, for publications on these features.

Feature Descriptions

The following is a list of all the system features listed alphabetically with a concise definition or description without regard to the major feature groups

AAR/ARS Partitioning: Provides for the Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS) services to be partitioned among as many as four different groups of users within a single System 75. This provides individual routing treatment for the different groups of users.

Abandoned Call Search: Provides identification of abandoned calls. Before an incoming trunk call to a hunt group or ACD split rings the hunt group member or agent, the system checks to make sure the calling party has not abandoned the call (hung up). If the calling party has abandoned the call, the call does not ring the hunt group member or agent.

Abbreviated Dialing: Provides lists of stored numbers that can be accessed to place local, long-distance, and international calls; to activate features; or to access remote computer equipment. Stored numbers can be accessed by voice terminal users and data terminal users. With Version 2 or 3, certain stored numbers can also be accessed by attendants.

Agent Call Handling: Provides Automatic Call Distribution (ACD) agents with the various capabilities required to answer and process ACD calls.

AP Demand Print: Allows the voice terminal user to print his or her own undelivered messages without calling the AP-based Message Center.

Attendant Auto-Manual Splitting: Allows the attendant to announce a call or consult privately with the called party without being heard by the other party on the call.

Attendant Call Waiting: Allows an attendant originated or extended call to a busy single-line voice terminal to wait at the called terminal. The attendant is free to handle other calls.

Attendant Control of Trunk Group Access: Allows the attendant to control trunk groups, and prevents voice terminal users from directly accessing a controlled trunk group to make outgoing calls.

Attendant Direct Extension Selection With Busy Lamp Field: Allows the attendant to place or extend calls to all extension numbers assigned to the system by pressing a Group Select button and a Direct Extension Selection (DXS) button instead of dialing the extension number.

Attendant Direct Trunk Group Selection: Allows the attendant direct access to an idle outgoing trunk by pressing the button assigned to the desired trunk group.

Attendant Display: Shows call-related information that helps the attendant to operate the console more efficiently. Also shows personal-service and message information. Information is shown on the 40-character alphanumeric display on the attendant console.

Attendant Recall: Allows voice terminal users on a 2-party call, or on an Attendant Conference call held on the console, to recall the attendant for assistance.

Attendant Release Loop Operation: Allows the attendant to hold the connection of any call off the console if completion of the call is delayed (such as a call extended to a busy single-line voice terminal or to a voice terminal that does not answer). This feature frees the attendant to handle other calls.

Audio Information Exchange (AUDIX) Interface: Provides a communications link between the System 75 and the Audio Information Exchange (AUDIX) Interface. AUDIX allows both System 75 users and outside callers to write, edit, send, and forward voice messages to other users. In addition, System 75 users can also receive and store incoming voice messages from others. A single AUDIX can serve a DCS configuration.

Authorization Codes: Provides the means for extending control of system users' calling privileges.

Automatic Alternate Routing: Provides alternate routing choices for private on-network calls. Also provides digit modification to allow on-network calls to route through the public network when on-network routes are not available.

Automatic Callback: Allows internal users who placed a call to a busy or unanswered internal voice terminal to be called back automatically when the called voice terminal becomes available.

Automatic Call Distribution: Provides automatic connection of incoming calls to specific splits (hunt groups). Calls to a specific split are automatically distributed among the agents (hunt group members) assigned to that split. Automatic Call Distribution (ACD) data, transmitted from the switch to the Call Management System (CMS), is used to generate various reports on the status of ACD agents, splits, and trunks.

Automatic Circuit Assurance: Assists users in identifying possible trunk malfunctions. The system maintains a record of the performance of individual trunks relative to short and long holding time calls. The system automatically initiates a referral call to an attendant or display-equipped voice terminal user when a possible failure is detected.

Automatic Incoming Call Display: Provides display-equipped voice terminal users, who are already active on a call, with the identity of a second or subsequent caller. The identity is displayed on the terminal's alphanumeric display.

Automatic Route Selection: Routes calls over the public network based on the preferred (normally the least expensive) route available at the time the call is placed.

Automatic Wakeup: Allows attendants, front desk users, and guests to request that a wakeup call be placed automatically to a certain extension number at a later time. Wakeup requests may be placed from 5 minutes to 23 hours and 55 minutes in advance of the call.

Bridged Call Appearance: Allows multi-appearance voice terminal users to have an appearance of another user's primary extension number. The Bridged Call Appearance can be used to originate, answer, and bridge onto calls to or from the other user's primary extension number.

Busy Verification of Terminals and Trunks: Allows attendants and specified multi-appearance voice terminal users to make test calls to trunks, voice terminals, and hunt groups [Direct Department Calling (DDC) and Uniform Call Distribution (UCD) groups]. These test calls check the status of an apparently busy resource.

Call Coverage: Provides automatic redirection of certain calls to alternate answering positions in a Call Coverage path.

Call Forwarding All Calls: Allows all calls to an extension number to be forwarded to a selected internal extension number, external (off-premises) number, the attendant group, or a specific attendant. This feature is activated or deactivated by dial access code or by a Call Forwarding button.

Call Park: Allows users to put a call on hold and then retrieve the call from any other voice terminal within the system.

Call Pickup: Allows voice terminal users to answer calls to other extension numbers within the user's specified Call Pickup group.

Call Waiting Termination: Provides for calls to busy single-line voice terminals to wait and sends a distinctive call waiting tone to the called party.

Centralized Attendant Service: Allows services performed by attendants in a private network of switching systems to be concentrated at a central, or main location. Each branch in a Centralized Attendant Service (CAS) has its own listed directory number (LDN). Incoming trunk calls to the branch, as well as attendant-seeking voice terminal calls, are routed to the centralized attendants over release link trunks (RLTs).

Class of Restriction: Defines up to 64 different classes of call origination and termination privileges. Systems may have only a single Class of Restriction (COR), one with no restrictions, or may have as many CORs (up to 64) as necessary to effect the desired restrictions.

Class of Service: Defines whether or not voice terminal users may access the following features and functions:

- Automatic Callback
- Call Forwarding All Calls
- Data Privacy
- Priority Calling
- Off-Hook Alert
- Console Permission
- Client Room.

Code Calling Access: Allows attendants, voice terminal users, and tie trunk users to page with coded chime signals.

Conference—Attendant: Allows the attendant to set up a conference call for as many as six conferees, including the attendant. Conferees from inside and outside the system can be added to a conference call.

Conference—Terminal: Allows multi-appearance voice terminal users to set up 6-party conference calls without attendant assistance. Single-line voice terminal users can set up 3-party conference calls without attendant assistance.

Consult: Allows a covering user, after answering a coverage call, to call the principal (called party) for private consultation.

Coverage Callback: Allows a covering user to leave a message for the principal (called party) to call the calling party.

Coverage Incoming Call Identification: Allows multi-appearance voice terminal users without a display in a Coverage Answer Group to identify an incoming call to that group.

Data Call Setup: Provides three methods to set up a data call: Data Terminal (keyboard) Dialing, Voice Terminal Dialing, or dedicating a voice terminal for data calls. Typically, when a data terminal is available, keyboard dialing is more convenient and requires less steps; therefore, it should be used whenever possible.

Data Hot Line: Provides for automatic nondial placement of a data call to an endpoint when the originator goes off-hook.

Data-Only Off-Premises Extensions: Allows users to establish data calls involving Data Communications Equipment (DCE) or Data Terminal Equipment (DTE) that is located remotely from the System 75 site using DATAPHONE® data communications service or other private line data facilities. A Data-Only Off-Premises Extension uses a Modular Trunk Data Module located on-premises. Communication with the remote data equipment is accomplished through the private line facility linking the on-premises Modular Trunk Data Module and the remote data equipment.

Data Privacy: Protects analog data calls from being disturbed by any of the system's overriding or ringing features. Data Privacy, when activated by a user, denies the system the ability to gain access to, or to superimpose tones onto, the protected call.

Data Restriction: Protects analog data calls from being disturbed by any of the system's overriding or ringing features. Data Restriction, when administered to an extension number or trunk group, denies the system the ability to gain access to, or to superimpose tones onto the protected call.

DCS Alphanumeric Display for Terminals: Allows calls to or from terminals equipped with alphanumeric displays to have transparency with respect to the display of call-related information.

DCS Attendant Control of Trunk Group Access: Allows an attendant at any node in the DCS to exercise control over an outgoing trunk group at a different node in the cluster.

DCS Attendant Direct Trunk Group Selection: Allows attendants at one node to have direct access to an idle outgoing trunk at a different node in the DCS.

DCS Attendant Display: Provides some transparency with respect to the display of call-related information.

DCS Automatic Callback: Allows a user at one node to make an automatic callback call to a user at another node in the DCS.

DCS Automatic Circuit Assurance: Allows a voice terminal user or attendant at a System 75 endpoint node to activate or deactivate Automatic Circuit Assurance (ACA) referral calls for the entire DCS network. This transparency also allows the referral calls to be generated at a node other than the node that detects the problem.

DCS Busy Verification of Terminals and Trunks: Allows attendants and multi-appearance voice terminal users to make test calls to voice terminals and trunk groups that are located at other nodes within the DCS.

DCS Call Forwarding All Calls: Allows all calls to an extension number to be forwarded to a selected extension number within the DCS network, or to an external (off-premises) number. This feature is activated or deactivated by dial access code or by a Call Forwarding button. The feature can be activated or deactivated only by voice terminal users within the DCS.

DCS Call Waiting: Allows calls to busy single-line voice terminals to wait until the called party is available to accept the call.

DCS Distinctive Ringing: Activates ringing device of a called terminal so that the user is aware of the type of incoming call before answering it. Distinctive Ringing functions in a DCS environment as it does within a System 75.

DCS Leave Word Calling: Enables System 75 terminal users to leave preprogrammed “call me” messages at other terminals in the DCS network. Messages can be left by calling, called, or covering users.

DCS Multi-Appearance Conference/Transfer: Provides transparency of conference calls and the transfer of calls within a DCS network. A user in the DCS can make conference calls or transfer calls originated from any extension in the DCS network to another extension within the DCS.

DCS Trunk Group Busy/Warning Indication: Provides attendants with a visual indication that the number of busy trunks in a remote group has reached an administered level. A visual indication is also provided when all trunks in a trunk group are busy.

Dial Access to Attendant: Allows voice terminal users to access an attendant by dialing 0. Attendants can then extend the call to a trunk or to another voice terminal.

Dial Plan: The dial plan is the system's guide to digit translation. When a digit is dialed, the system must know what to expect, based on that digit. For example, if a voice terminal user dials a 4, the system must know how many more digits to expect before the code will be processed.

Digital Multiplexed Interface: Supports two signaling techniques: Bit Oriented Signaling and Message Oriented Signaling for direct connection to host computers.

Direct Department Calling and Uniform Call Distribution: Allows direct inward access to an answering group other than the attendant even if the system does not have the Direct Inward Dialing (DID) feature.

Direct Inward Dialing: Connects calls from the public network directly to the dialed extension number without attendant assistance.

Direct Outward Dialing: Allows voice terminal users to access the public network without attendant assistance.

Distinctive Ringing: Helps voice terminal users and attendants distinguish between various types of incoming calls.

Do Not Disturb: Allows guests, attendants, and authorized front desk voice terminal users to request that no calls, other than priority calls, terminate at a particular extension number until a specified time. At the specified time, the system automatically deactivates the feature and allows calls to terminate at the extension normally.

DS1 Tie Trunk Service: Provides for two types of digital tie trunk interfaces: Voice-Grade DS1 and Alternate Voice/Data (AVD) DS1 tie trunks. The Voice-Grade DS1 tie trunks are an alternative to 4-wire analog E&M tie trunks and may be used to interface with other properly-equipped switching systems. AVD DS1 tie trunks permit alternate voice and data calling between System 75 and System 85.

EIA Interface: Provides a lower cost alternative to Digital Terminal Data Modules (DTDMs) and Modular Processor Data Modules (MPDMs), within the system hardware, for interconnection between RS-232 compatible Digital Terminal Equipment (DTE) and the system. The EIA Interface consists of a Data Line circuit pack port and an Asynchronous Data Unit (ADU).

Emergency Access To the Attendant: Provides for emergency calls to be placed to an attendant. These calls can be placed automatically by the system or can be dialed by system users. Such calls can receive priority handling by the attendant.

Facility Busy Indication: Provides multi-appearance voice terminal users with a visual indication of the busy or idle status of an extension number, a trunk group, terminating extension group, a hunt group (Direct Department Calling or Uniform Call Distribution group), or any loudspeaker paging zone, including all zones. The Facility Busy Indication button provides the voice terminal user direct access to the extension number, trunk group, or paging zone.

Facility Restriction Levels and Traveling Class Marks: Provides up to eight levels of restriction for users of the Automatic Alternate Routing (AAR) and/or Automatic Route Selection (ARS) features.

Facility Test Calls: Provides a voice terminal user with the capability of making test calls to access specific trunks, touch-tone receivers, time slots, and system tones. The test call is used to make sure the facility is operating properly. A local voice terminal user can make a test call by dialing an access code. An Initialization and Administration System (INADS) terminal user can make a test call over a trunk if remote access is supported.

Forced Entry of Account Codes: Requires users to dial an account code when making certain types of outgoing calls. The conditions under which dialing of account codes is required depends on system administration.

Go to Cover: Allows users, when making a call to another internal extension, to send the call directly to coverage.

Hold: Allows voice terminal users to disconnect from a call temporarily, use the voice terminal for other call purposes, and then return to the original call.

Hot Line Service: Allows single-line voice terminal users, by simply lifting the handset, to automatically place a call to a preassigned extension number, public or private network telephone number, or feature access code.

Hunting: Checks for the active or idle status of extension numbers in one or more ordered groups. If all members of a group are active, the call can route to another group through Call Coverage or can wait in a queue for an available group member, if a queue is provided.

Individual Attendant Access: Allows users to call a specific attendant console. Each attendant console can be assigned an individual extension number, to provide access to each individual attendant.

Information System Network (ISN) Interface: The AT&T ISN is a packet switched local area network that links mainframe computers, minicomputers, word processors, storage devices, personal computers, printers, terminals, and communications processors into a single system. The interface to System 75 is via an Asynchronous Data Unit (ADU). A Modular Processor Data Module (MPDM) may be used but the ADU is more economical. Also, future versions of the ISN will have integrated ADUs.

Integrated Directory: Allows internal system users with display-equipped terminals to access the system data base, use the touch-tone buttons to key in a name, and retrieve an extension number from the system directory. The directory contains an alphanumeric listing of the names and extension numbers assigned to all voice terminals administered in the system.

Intercept Treatment: Provides an intercept tone or a recorded announcement or routes the call to an attendant for assistance when calls cannot be completed or when use of a feature is denied.

Intercom—Automatic: Provides a talking path between two voice terminal users. Calling users press the Automatic Intercom button and lift the handset, or vice versa. The called user receives a unique intercom ringing signal, and the status lamp associated with the Dial or Automatic Intercom button, if provided, flashes.

Intercom—Dial: Allows multi-appearance voice terminal users to gain rapid access to as many as 32 other voice terminal users within an administered group. Calling voice terminal users lift the handset, press the Dial Intercom button, and dial the 1- or 2-digit code assigned to the desired party. The called user receives ringing tone, and the status lamp associated with the Intercom button, if provided, flashes.

Inter-PBX Attendant Calls (Inter-PBX Attendant Service-(IAS): Allows attendant positions for more than one branch location to be concentrated at one central, or main, location. Each branch location has its own Listed Directory Number (LDN). Incoming trunk calls to the branch location, as well as attendant-seeking voice terminal calls, are routed over tie trunks to the attendants at the main location.

Intraflow and Interflow: Allows Automatic Call Distribution (ACD) calls to be redirected from one split to another split under busy or unanswered conditions. Intraflow provides redirection of ACD calls to other splits within the system. Interflow uses the Call Forwarding All Calls feature to redirect ACD calls to an external location.

Last Number Dialed: Automatically redials the last number dialed when users press the Last Number Dialed button or dial the Last Number Dialed feature access code.

Leave Word Calling: Allows internal system users to leave a short preprogrammed message for other internal users. Users can activate Leave Word Calling (LWC) at any time during a call attempt.

Line Lockout: Removes single-line voice terminal extension numbers from service when users fail to hang up after receiving intercept tone for 30 seconds and then dial tone for 10 seconds. The out-of-service condition remains in effect until the voice terminal user hangs up.

Loudspeaker Paging Access: Provides attendants and voice terminal users dial access to voice paging equipment.

Manual Message Waiting: Enables multi-appearance voice terminal users, by pressing a designated button on their own terminals, to light the status lamp associated with the Manual Message Waiting button at another multi-appearance voice terminal. Activating the feature causes the lamp to light on both the originating and receiving voice terminals. Either terminal user can cause the lamp to go dark by pressing the button.

Manual Originating Line Service: Connects users to attendant automatically when the user lifts the handset.

Manual Signaling: Allows a voice terminal user to signal another voice terminal user. The receiving voice terminal user hears a 0.2-second burst of tone.

Modem Pooling: Allows switched connections between digital data endpoints (data modules) and analog data endpoints, and acoustic coupled modems. The analog data endpoint can be either a trunk or line circuit.

Move Agent From CMS: Allows a Call Management System (CMS) user to move agents from one split to another via the screen on the CMS terminal. This feature gives the user of the CMS screen some of the same capabilities that the System Manager has with the System Access Terminal (SAT). The user of the CMS screen can, with a single request, move one agent or multiple agents from the same split to another split.

Multi-Appearance Preselection and Preference: Provides multi-appearance voice terminal users with options for placing or answering calls on selected appearances.

Multiple Listed Directory Numbers: Allows a publicly published number for each incoming and two-way (incoming side) foreign exchange (FX) and local central office (CO) trunk group assigned to the system. Also allows up to eight Direct Inward Dialing (DID) numbers to be treated as Listed Directory Numbers (LDNs).

Music-on-Hold Access: Provides music to a party that is on hold, waiting in a queue, parked, or on a trunk call that is being transferred. The music lets the waiting party know that the connection is still in effect.

Network Access—Private: Allows calls to be connected to the following types of networks:

- Common Control Switching Arrangement (CCSA)
- Electronic Tandem Network (ETN)
- Enhanced Private Switched Communications Service (EPSCS)
- Tandem Tie Trunk Network (TTTN).

Network Access—Public: Provides voice terminal users and attendants with access to and from the public network.

Night Service—Hunt Group: Allows an attendant or a split supervisor to individually assign a hunt group or split to the night service mode. All calls terminating on the hunt group or split in the night service mode will be redirected to the hunt group/split's designated Night Service Extension (NSE).

Night Service—Night Console Service: Directs all calls for the primary and daytime attendant consoles to a night console.

Night Service—Night Station Service: Redirects incoming attendant-seeking trunk calls to designated extension numbers whenever the system is placed in Night Service.

Night Service—Trunk Answer From Any Station: Allows voice terminal users to answer all incoming attendant-seeking calls when the attendant(s) is not on duty and when other voice terminals have not been designated to answer the calls.

Night Service—Trunk Group: Allows an attendant or a designated voice terminal user to individually assign a trunk group or all trunk groups to the night service mode. Specific trunk groups (individually) assigned to Trunk Group Night Service are in the “Individual Trunk Night Service Mode.” In this mode, incoming calls made on a specific trunk group will be redirected to its designated Night Service Extension (NSE). Incoming calls on the trunk groups not assigned to Trunk Group Night Service will be processed normally. The specific trunk groups can be assigned to Trunk Group Night Service by pressing the individual Trunk Night Service button(s) on the attendant console or a voice terminal.

Off-Premises Station: Allows a voice terminal located outside the building where the switch is located to be connected to the system. If central office (CO) trunks are used, the voice terminal must be analog and must be FCC-registered.

PC/PBX Connection: Brings the voice terminal and personal computer (PC) together into an integrated voice and data workstation. The PC can be an AT&T PC or other IBM compatible PC.

Permanent Switched Calls: Maintains a call between two data endpoints that should always be connected while the system is active. The specified calls are automatically placed when the system is started or restarted, and remain active until the system becomes inactive.

Personal Central Office Line: Provides a dedicated trunk for direct access to or from the public network for multi-appearance voice terminal users.

Personalized Ringing: Allows users of certain voice terminals to uniquely identify their own calls. Each user can choose one of a number of possible ringing patterns.

Power Failure Transfer: Provides service to and from the local telephone company central office (CO), including incoming Wide Area Telecommunications Service (WATS), during a power failure.

Priority Calling: Provides a special form of ringing between internal voice terminal users. The called voice terminal user receives a distinctive 3-burst ringing signal.

Privacy—Attendant Lockout: Prevents an attendant from reentering a multiple-party connection held on the console unless recalled by a voice terminal user.

Privacy—Manual Exclusion: Allows multi-appearance voice terminal users to keep other users with appearances of the same extension number from bridging onto an existing call.

Property Management System Interface: Provides a communications link between the System 75 and a customer-owned Property Management System (PMS). The PMS allows a customer to control certain features used in both a hospital-type and a hotel/motel-type environment.

Queue Status Indications: Provides indications of queue status for Automatic Call Distribution (ACD) calls based on the number of calls in queue and time in queue. These indications are provided via lamps assigned to the terminals or consoles of split agents or supervisors. In addition, an auxiliary warning lamp can be provided to track queue status based on time in queue. Also, display-equipped voice terminals and consoles can display the time in queue of a split's oldest call and the number of calls in that split's queue.

Recall Signaling: Allows a single-line voice terminal user, who is active on a call, to place the party on hold and obtain recall dial tone by pressing the Recall button or by flashing the switchhook. The user can then place another call or activate a feature, and return to the held party by pressing Recall twice or by flashing the switchhook twice.

Recorded Announcement: Provides a recorded announcement to the following types of calls:

- Direct Inward Dialing (DID) calls that cannot be completed as dialed
- Incoming Private Network Access calls that cannot be completed as dialed
- Direct Department Calling and Uniform Call Distribution calls that have been in queue for an assigned interval
- Automatic Call Distribution (ACD) calls that have been in queue for an assigned interval
- Any call whose destination is a Recorded Announcement extension.

Recorded Telephone Dictation Access: Permits voice terminal users, including Remote Access and incoming tie trunk users, to access dictation equipment.

Remote Access: Permits callers from the public network to access the system and then use its features and services.

Restriction—Controlled: Allows the attendant to activate and deactivate the following restrictions for an individual voice terminal or a group of voice terminals:

- Outward—The voice terminal(s) cannot be used for placing calls to the public network. Such call attempts receive intercept tone.
- Total—The voice terminal(s) cannot be used for placing or receiving calls. Direct Inward Dialing calls are routed to the attendant or a recorded announcement. All other calls receive intercept tone.
- Station-to-Station—The voice terminal cannot receive or place station-to-station calls. Such call attempts receive intercept treatment.
- Termination—The voice terminal cannot receive any calls. Incoming calls are routed to the attendant, are redirected via Call Coverage, or receive intercept treatment.

Restriction—Miscellaneous Terminal: Restricts callers at specified voice terminals from accessing certain other voice terminals.

Restriction—Miscellaneous Trunk: Restricts users at specified voice terminals from accessing certain trunk groups, such as Wide Area Telecommunications Service (WATS).

Restriction—Toll/Code: Restricts users at specified voice terminals from placing public network calls to certain numbers within the local area code, to certain foreign (nonlocal) area codes, and to service codes (such as 411 for directory assistance and 911 for emergency service).

Restriction—Voice Terminal—Inward: Restricts callers at specified voice terminals from receiving public network, attendant-originated, and attendant-extended calls. A denied call is routed to intercept tone, a recorded announcement, or the attendant.

Restriction—Voice Terminal—Manual Terminating Line: Restricts callers at specified voice terminals from receiving calls other than those from an attendant. All other calls are routed to intercept tone, a recorded announcement, or an attendant. The voice terminal user can originate calls and activate features.

Restriction—Voice Terminal—Origination: Restricts callers at specified voice terminals from originating calls. Voice terminal users can receive calls.

Restriction—Voice Terminal—Outward: Prevents specified voice terminal users from placing calls to the public network. Calls can be placed to other voice terminal users, to the attendant, and over tie trunks.

Restriction—Voice Terminal—Termination: Restricts voice terminal users on specified extension numbers from receiving any calls. The restricted users can, however, originate calls.

Ringback Queuing: Places outgoing calls in an ordered queue (first-in, first-out) when all trunks are busy. The voice terminal user is automatically called back when a trunk becomes available. The voice terminal receives a distinctive 3-burst ringing signal (Priority Calling) when called back.

Rotary Dialing: Allows rotary dialing voice terminals to be used with a System 75.

Send All Calls: Allows users to temporarily direct all incoming calls to coverage regardless of the assigned Call Coverage redirection criteria. Send All Calls also allows covering users to temporarily remove their voice terminals from the coverage path. A feature access code or a button activates this feature.

Senderized Operation: Reduces the time necessary to place calls to distant locations equipped to receive touch-tone signals and allows end-to-end signaling to remote computer equipment.

Service Observing: Allows a specified user, such as a supervisor, to observe a call that involves other users while the call is in progress. While observing a call, the specified user can toggle between a listen-only and a listen/talk connection to the call (see Note).

Note: The use of service observing features may be subject to federal, state, or local laws, rules or regulations or require the consent of one or both of the parties to the conversation. Customers should familiarize themselves with

and comply with all applicable laws, rules and regulations before using these features.

Single-Digit Dialing and Mixed Station Numbering: Allows easy access to internal hotel/motel services and provides the capability to associate room numbers with guest room voice terminals.

SMDR Account Code Dialing: Allows certain calls to be associated with a particular project or account number. This is accomplished by dialing specified account codes before making outgoing calls. This information is recorded by the Station Message Detail Recording (SMDR) feature and can be used later for accounting and/or billing purposes.

Station Message Detail Recording: Records detailed call information on all incoming and outgoing calls on specified trunk groups and sends this information to a Station Message Detail Recording (SMDR) output device. Internal calls are not recorded. The SMDR output device provides a detailed printout which can be used by the System Manager to compute call costs, allocate charges, analyze calling patterns, and keep track of unnecessary calls.

Straightforward Outward Completion: Allows an attendant to complete an outgoing trunk call for a voice terminal user, without requiring the voice terminal user to hang up.

Subnet Trunking: Provides modification of the dialed number so an Automatic Alternate Routing (AAR) or Automatic Route Selection (ARS) call can route over trunk groups that terminate in switches with different dial plans.

System Measurements: Provides reports on trunk group usage, hunt group usage and efficiency, attendant group activity and efficiency, and attempted security violations.

System Status Report: Allows the user to view data associated with attendants, major and minor alarms, and traffic measurements. The information is displayed on the System Access Terminal (SAT) and presents a basic picture of the System 75 condition. The report can only be displayed by the System Manager and maintenance personnel.

Temporary Bridged Appearance: Allows multi-appearance voice terminal users in a Terminating Extension Group or Personal Central Office Line Group to bridge onto an existing group call. If a call has been answered using the Call Pickup feature, the originally called party can bridge onto the call. Also allows a called party to bridge onto a call that redirects to coverage before the called party can answer it.

Terminating Extension Group: Allows an incoming call to ring (either audible or silent alerting) as many as four voice terminals at one time. Any user in the group can answer the call.

Through Dialing: Allows the attendant to select an outgoing trunk for a voice terminal user. The attendant then releases from the connection, and the user completes the call.

Timed Reminder: Automatically rings the attendant after a predetermined time for the following types of calls:

- Extended calls waiting to be answered or waiting to be connected to a busy single-line voice terminal
- One-party incoming calls placed on hold on the console
- Incoming calls answered by a voice terminal user, but which are unanswered after being transferred.

Touch-Tone Dialing: Provides quick and easy pushbutton dialing. Touch-Tone Dialing is always provided with the system. In addition to the 0 through 9 buttons, the * and # buttons have special functions, such as forming a part of a feature access code. A distinctive tone is generated when each button is pressed.

Transfec: Allows voice terminal users to transfer trunk or internal calls to other voice terminals within the system without attendant assistance.

Trunk Group Busy/Warning Indicators to Attendant: Provides the attendant with a visual indication that the number of busy trunks in a group has reached an administered level. A visual indication is also provided when all trunks in a group are busy.

Trunk Identification by Attendant: Allows an attendant or display-equipped voice terminal user to identify a specific trunk being used on a call. This capability is provided by assigning a Trunk ID button to the attendant console or voice terminal.

Trunk-to-Trunk Transfer: Allows the attendant or voice terminal user to connect an incoming trunk call to an outgoing trunk.

Uniform Dial Plan: Provides a common 4- or 5-digit dial plan that can be shared among a group of switches. Interswitch dialing and intraswitch dialing both require 4- or 5-digit dialing. The Uniform Dial Plan (UDP) is used with Main/Satellite/Tributary and Distributed Communications System (DCS) configurations. Additionally, UDP can be used alone to provide uniform 4- or 5-digit dialing between two or more private switching systems without Main/Satellite/Tributary or DCS configurations.

Voice Message Retrieval: Allows attendants, voice terminal users, and remote access users to retrieve Leave Word Calling (LWC) and Call Coverage messages in the form of a voice output.

Voice Terminal Display: Provides multi-appearance voice terminal users with updated call and message information. This information is displayed on a display-equipped terminal. The information displayed depends upon the display mode selected by the user.

For more detailed information on the individual features, refer to *AT&T System 75—Feature Description*, 555-200-201.

Table 2-A. Features Available

FEATURE	VERSION 1	VERSION 2	VERSION 3
AAR/ARS Partitioning			✓
Abandoned Call Search			✓
Abbreviated Dialing	✓	✓	✓
Agent Call Handling			✓
AP Demand Print	✓	✓	✓
Attendant Auto-Manual Splitting	✓	✓	✓
Attendant Call Waiting	✓	✓	✓
Attendant Control of Trunk Group Access	✓	✓	✓
Attendant Direct Extension Selection With Busy Lamp Field	✓	✓	✓
Attendant Direct Trunk Group Selection	✓	✓	✓
Attendant Display	✓	✓	✓
Attendant Recall	✓	✓	✓
Attendant Release Loop Operation	✓	✓	✓
Audio Information Exchange (AUDIX) Interface			✓
Authorization Codes			✓
Automatic Alternate Routing (AAR)		✓	✓
Automatic Callback	✓	✓	✓
Automatic Call Distribution			✓
Automatic Circuit Assurance		✓	✓
Automatic Incoming Call Display		✓	✓
Automatic Route Selection	✓	✓	✓
Automatic Wakeup			✓
Bridged Call Appearance	✓	✓	✓
Busy Verification of Terminals and Trunks		✓	✓
Call Coverage	✓	✓	✓
Call Forwarding All Calls	✓	✓	✓
Call Park	✓	✓	✓
Call Pickup	✓	✓	✓
Call Waiting Termination	✓	✓	✓
Centralized Attendant Service (CAS)		✓	✓
Class of Restriction	✓	✓	✓

Table 2-A. Features Available (Contd)

FEATURE	VERSION 1	VERSION 2	VERSION 3
Class of Service	✓	✓	✓
Code Calling Access	✓	✓	✓
Conference—Attendant	✓	✓	✓
Conference—Terminal	✓	✓	✓
Consult	✓	✓	✓
Coverage Callback	✓	✓	✓
Coverage Incoming Call Identification	✓	✓	✓
Data Call Setup	✓	✓	✓
Data Hot Line		✓	✓
Data-Only Off-Premises Extensions	✓	✓	✓
Data Privacy	✓	✓	✓
Data Restriction	✓	✓	✓
DCS Alphanumeric Display for Terminals		✓	✓
DCS Attendant Control of Trunk Group Access		✓	✓
DCS Attendant Direct Trunk Group Selection		✓	✓
DCS Attendant Display		✓	✓
DCS Automatic Callback		✓	✓
DCS Automatic Circuit Assurance		✓	✓
DCS Busy Verification of Terminals and Trunks		✓	✓
DCS Call Forwarding All Calls		✓	✓
DCS Call Waiting		✓	✓
DCS Distinctive Ringing		✓	✓
DCS Leave Word Calling		✓	✓
DCS Multi-Appearance Conference/Transfer		✓	✓
DCS Trunk Group Busy/Warning Indication		✓	✓
Dial Access to Attendant	✓	✓	✓

Table 2-A. Features Available (Contd)

FEATURE	VERSION 1	VERSION 2	VERSION 3
Dial Plan	✓	✓	✓
Dialup Administration	✓	✓	✓
Digital Multiplexed Interface (DMI)		✓	✓
Direct Department Calling and Uniform Call Distribution	✓	✓	✓
Direct Inward Dialing	✓	✓	✓
Direct Outward Dialing	✓	✓	✓
Distinctive Ringing	✓	✓	✓
Do Not Disturb			✓
DS1 Tie Trunk Service		✓	✓
EIA Interface		✓	✓
Emergency Access to the Attendant			✓
Facility Busy Indication	✓	✓	✓
Facility Restriction Levels and Traveling Class Marks		✓	✓
Facility Test Calls	✓	✓	✓
Forced Entry of Account Codes		✓	✓
Go To Cover	✓	✓	✓
Hold	✓	✓	✓
Hot Line Service	✓	✓	✓
Hunting	✓	✓	✓
Individual Attendant Access		✓	✓
Information System Network (ISN) Interface		✓	✓
Initialization and Administration System (INADS)	✓	✓	✓
Integrated Directory	✓	✓	✓
Intercept Treatment	✓	✓	✓
Intercom—Automatic	✓	✓	✓
Intercom—Dial	✓	✓	✓
Inter-PBX Attendant Calls		✓	✓
Intraflow and Interflow			✓
Last Number Dialed	✓	✓	✓

Table 2-A. Features Available (Contd)

FEATURE	VERSION 1	VERSION 2	VERSION 3
Leave Word Calling	✓	✓	✓
Line Lockout	✓	✓	✓
Loudspeaker Paging Access	✓	✓	✓
Manual Message Waiting	✓	✓	✓
Manual Originating Line Service	✓	✓	✓
Manual Signaling	✓	✓	✓
Modem Pooling	✓	✓	✓
Move Agents From CMS			✓
Multi-Appearance Preelection and Preference	✓	✓	✓
Multiple Listed Directory Numbers	✓	✓	✓
Music-on-Hold Access	✓	✓	✓
Network Access—Private	✓	✓	✓
Network Access—Public	✓	✓	✓
Night Service—Hunt Group			✓
Night Service—Night Console Service	✓	✓	✓
Night Service—Night Station Service	✓	✓	✓
Night Service—Trunk Answer from Any Station	✓	✓	✓
Night Service—Trunk Group			✓
Off-Premises Station	✓	✓	✓
PC/PBX Connection	✓	✓	✓
Permanent Switched Calls		✓	✓
Personal Central Office Line (PCOL)	✓	✓	✓
Personalized Ringing		✓	✓
Power Failure Transfer	✓	✓	✓
Priority Calling	✓	✓	✓
Privacy—Attendant Lockout	✓	✓	✓
Privacy—Manual Exclusion	✓	✓	✓

Table 2-A. Features Available (Contd)

FEATURE	VERSION 1	VERSION 2	VERSION 3
Property Management System Interface			✓
Check-In/Check-Out			✓
Controlled Restriction			✓
Housekeeping Status			✓
Message Waiting Notification			✓
Room Change/Room Swap			✓
Queue Status Indications			✓
Recall Signaling	✓	✓	✓
Recorded Announcement	✓	✓	✓
Recorded Telephone Dictation Access	✓	✓	✓
Remote Access	✓	✓	✓
Remote Administration	✓	✓	✓
Restriction—Controlled	✓	✓	✓
Restriction—Miscellaneous Terminal	✓	✓	✓
Restriction—Miscellaneous Trunk	✓	✓	✓
Restriction—Toll/Code	✓	✓	✓
Restriction—Voice Terminal	✓	✓	✓
Inward Restriction	✓	✓	✓
Manual Terminating Line Restriction	✓	✓	✓
Origination Restriction	✓	✓	✓
Outward Restriction	✓	✓	✓
Termination Restriction	✓	✓	✓
Ringback Queuing	✓	✓	✓
Rotary Dialing		✓	✓
Send All Calls	✓	✓	✓
Slenderized Operation	✓	✓	✓
Service Observing			✓

Table 2-A. Features Available (Contd)

FEATURE	VERSION 1	VERSION 2	VERSION 3
Single-Digit Dialing and Mixed Station Numbering			✓
SMDR Account Code Dialing	✓	✓	✓
Station Message Detail Recording (SMDR)	✓	✓	✓
Straightforward Outward Completion	✓	✓	✓
Subnet Trunking		✓	✓
System Administration	✓	✓	✓
System Measurements	✓	✓	✓
System Status Report		✓	✓
Temporary Bridged Appearance	✓	✓	✓
Terminating Extension Group	✓	✓	✓
Through Dialing	✓	✓	✓
Timed Reminder	✓	✓	✓
Touch-Tone Dialing	✓	✓	✓
Transfer	✓	✓	✓
Trunk Group Busy/Warning Indicators to Attendant	✓	✓	✓
Trunk Identification By Attendant		✓	✓
Trunk-to-Trunk Transfer	✓	✓	✓
Uniform Dial Plan		✓	✓
Voice Message Retrieval		✓	✓
Voice Terminal Display	✓	✓	✓

CHAPTER 3. FUNCTIONAL DESCRIPTION

General

This chapter provides a brief description of the system operation. A general description of the individual circuits is provided under the heading *Port Circuits* in the *Switching Network* part of this chapter.

Switch Hardware

Figure 3-1 shows the System 75 communications switch. The basic switch hardware consists of the following:

- Switching network
- Switch processing element (SPE)
- High capacity minirecorder (HCMR)
- Removable Mass Storage Subsystem (RMSS)
- Adjunct Interface
- Maintenance circuit
- Power system.

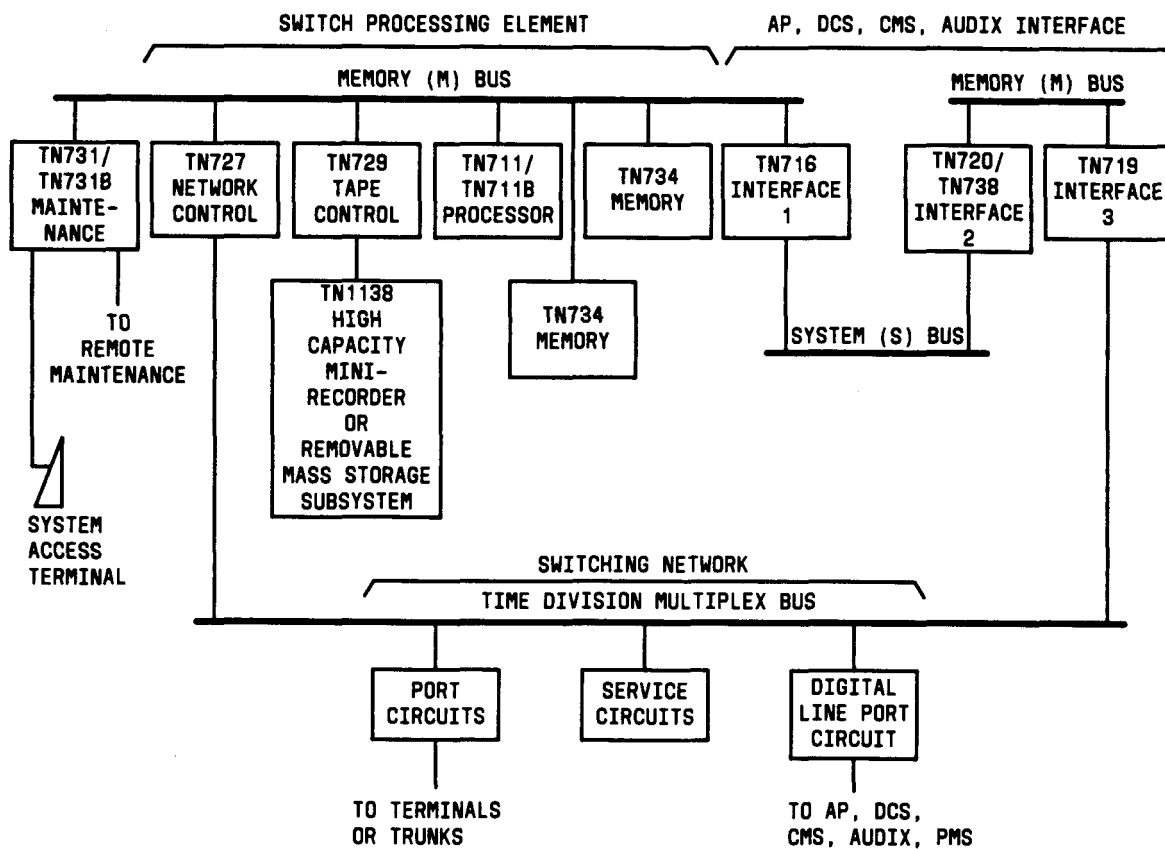


Figure 3-1. Communications Switch

Switching Network

System 75 uses distributed processing techniques to provide switched voice and data services. The switching network consists of the following:

- Time division multiplex (TDM) bus
- Port circuits
- Service circuits.

The port circuits connect terminals and external communications facilities to the TDM bus. The TDM bus connects the port circuits to each other and to the SPE through the network control circuit. The service circuits provide tone sources, receivers, detectors, pooled modems, speech synthesis, and announcements. The SPE provides high level control of the port and service circuits.

Time Division Multiplex Bus

The TDM bus consists of two identical 8-bit buses that are referred to as bus A and bus B. The port circuit packs place digitized voice [Pulse Code Modulated (PCM)] signals on the bus. Control channel information is carried on the TDM bus. The Common Channel Message Set (CCMS) data signal allows the SPE to communicate with the port circuit packs.

The TDM bus operates at 2.048 MHz. The system framing pulse is 8 kHz. The system framing pulse provides 256 time slots on each bus to provide a total of 512 time slots for voice conversations, data calls, and control information. Each time slot is 488 nanoseconds wide. Time slots are generated as shown in Figure 3-2.

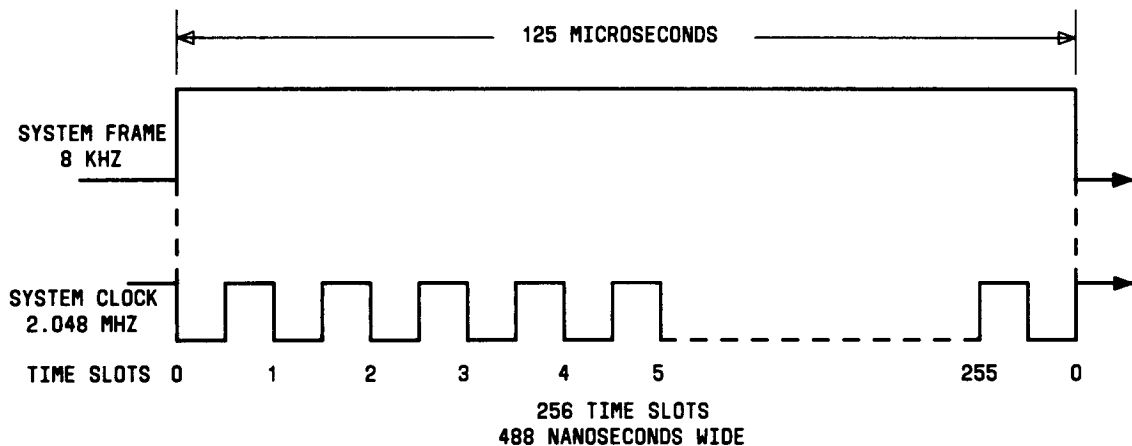


Figure 3-2. TDM Bus Time Slot Generation

Two time slots are required for a 2-party conversation. Each party transmits (talks) on one time slot and receives (listens) on another. The system software limits the number on a conference call to six. During a conference connection, each member of the conference transmits on an individual time slot while receiving on as many as five other time slots.

For V1, the actual switch capacity is 236 simultaneous conversations because some time slots are reserved for system use. The first five slots on Bus A (00—04) are used for the internal control channel on which the ports talk to the SPE. Seventeen slots on the B bus are used for system tones. Slots 05 through 12 on bus A and slots 256 through 260 on bus B are reserved for system use. The last two slots on each bus (254, 255, 510, and 511) are currently not used.

For V2 or V3, the actual switch capacity is 241 simultaneous conversations.

Physical Characteristics: The TDM bus runs continuously through all the carriers within the cabinet as shown in Figure 3-3. The total length is about 15 feet for a system with four port carriers. The bus is driven from any of the circuit pack slots in the carriers. Similarly, a signal on the bus can be received by any circuit pack.

Within a carrier, the bus is printed on one side of the backplane; the other side is solid ground. Shielded ribbon cables are used between carriers to minimize electromagnetic interference (EMI).

Electrical Characteristics: The TDM bus is an unbalanced, low characteristic impedance transmission line. Paths printed over a ground plane on the carriers and the ribbon cables between carriers maintain this impedance level over the full length of the bus.

Each end of the bus is terminated to ground with a separate resistor for each of the 16 bits (8 bits on bus A and 8 bits on bus B). Each circuit pack connects to the bus through a custom bus driver device. The bus driver is a switchable constant current source so that even in the “high” output state there is no bus loading to cause reflections. The current output of the drivers is adjusted so that logic “high” is 1.5 volts compared to a “low” of 0 volt.

Port Circuits

The following port circuits provide the link between trunks or external communications equipment and the TDM buses (see Figure 3-4):

- Analog Line (TN769) (V3)—Supports neon message indicators (8 ports)
- Analog Line (TN742)
- Analog Line (TN746) (V2 or V3)—Support LEDs and neon message indicators (16 ports)
- Auxiliary Trunk (TN763)
- Auxiliary Trunk (TN763B) (V3)—Supports Audichron* announcement equipment
- CO Trunk (TN747)
- CO Trunk (TN747B) (V3)--Supports Abandon Call feature for Automatic Call Distribution (ACD)
- Data Line (TN726) (V2 or V3)-- Supports asynchronous data equipment
- DID Trunk (TN753)
- Digital Line (TN754)
- DS1 Tie Trunk (TN722/TN722B) (V2 or V3)—TN722B supports Digital Multiplexed Interface (DMI) service
- Hybrid Line (TN762B)
- MET Line (TN735)
- Tie Trunk (TN760)
- Tie Trunk (TN760B)—Also used for Release Link Trunks (V2 or V3)—Supports Centralized Attendant Service (CAS).

* Registered trademark of Audichron Company

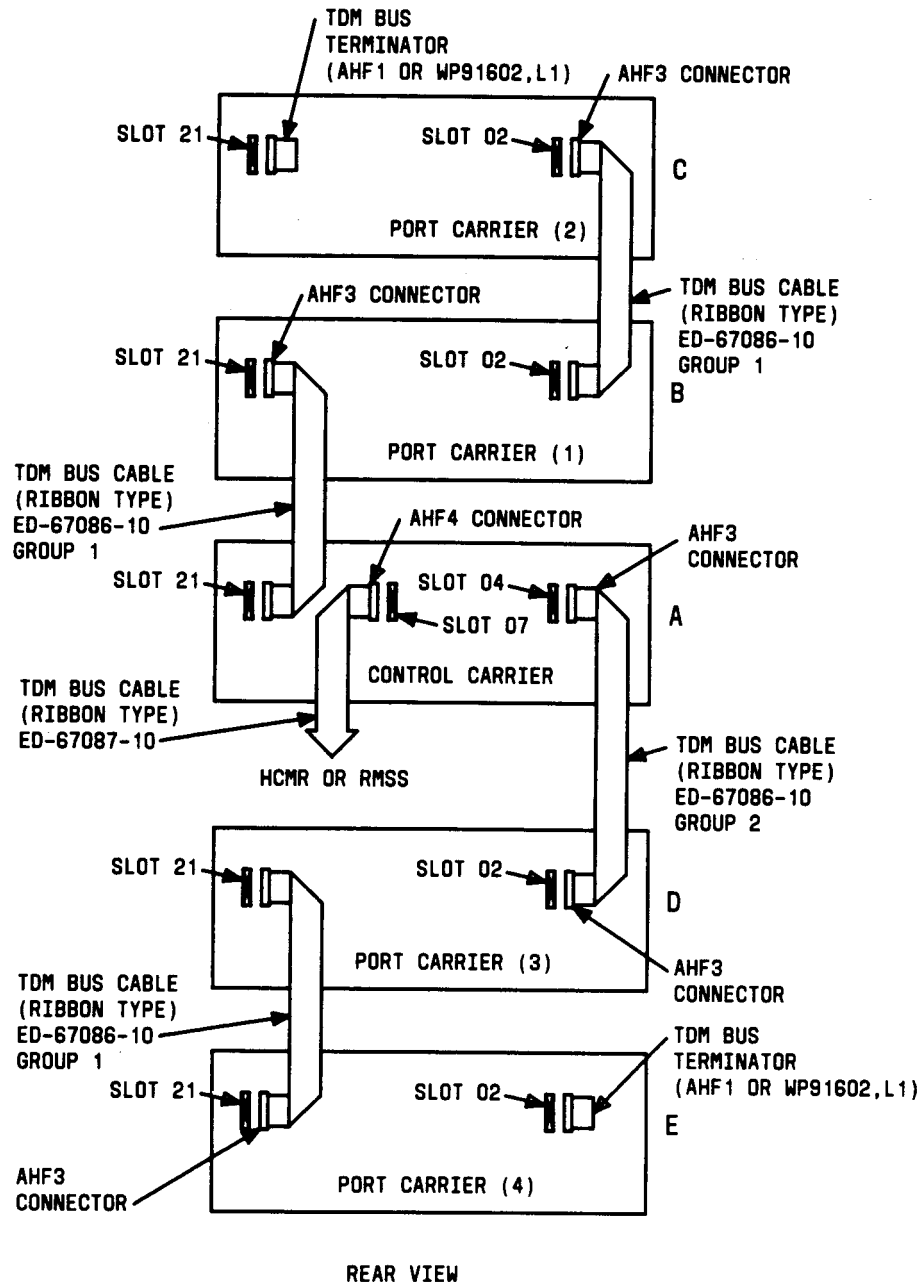


Figure 3-3. TDM Bus Wiring Diagram--Fully Loaded (4-Port Carrier and Control Carrier Configuration)

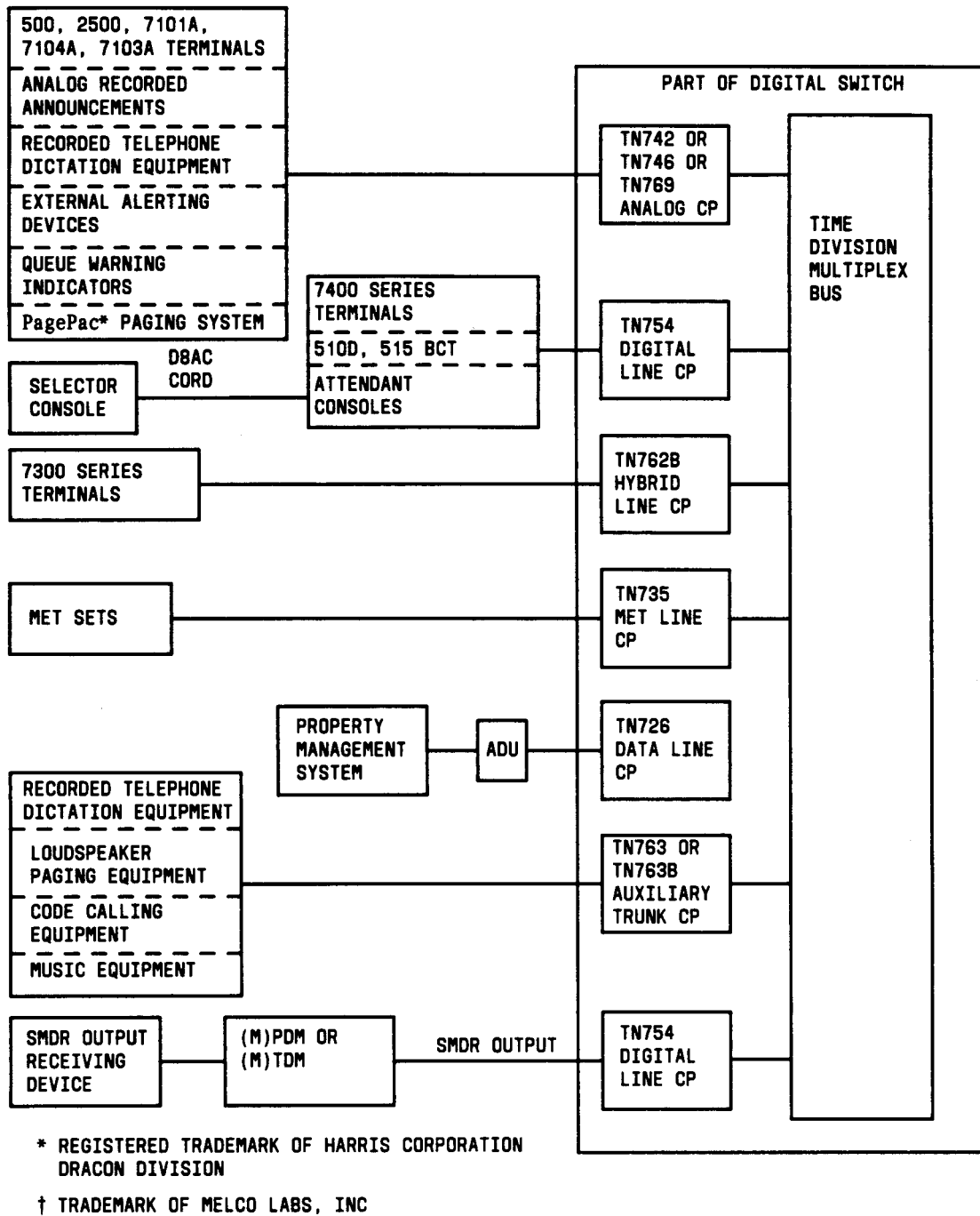
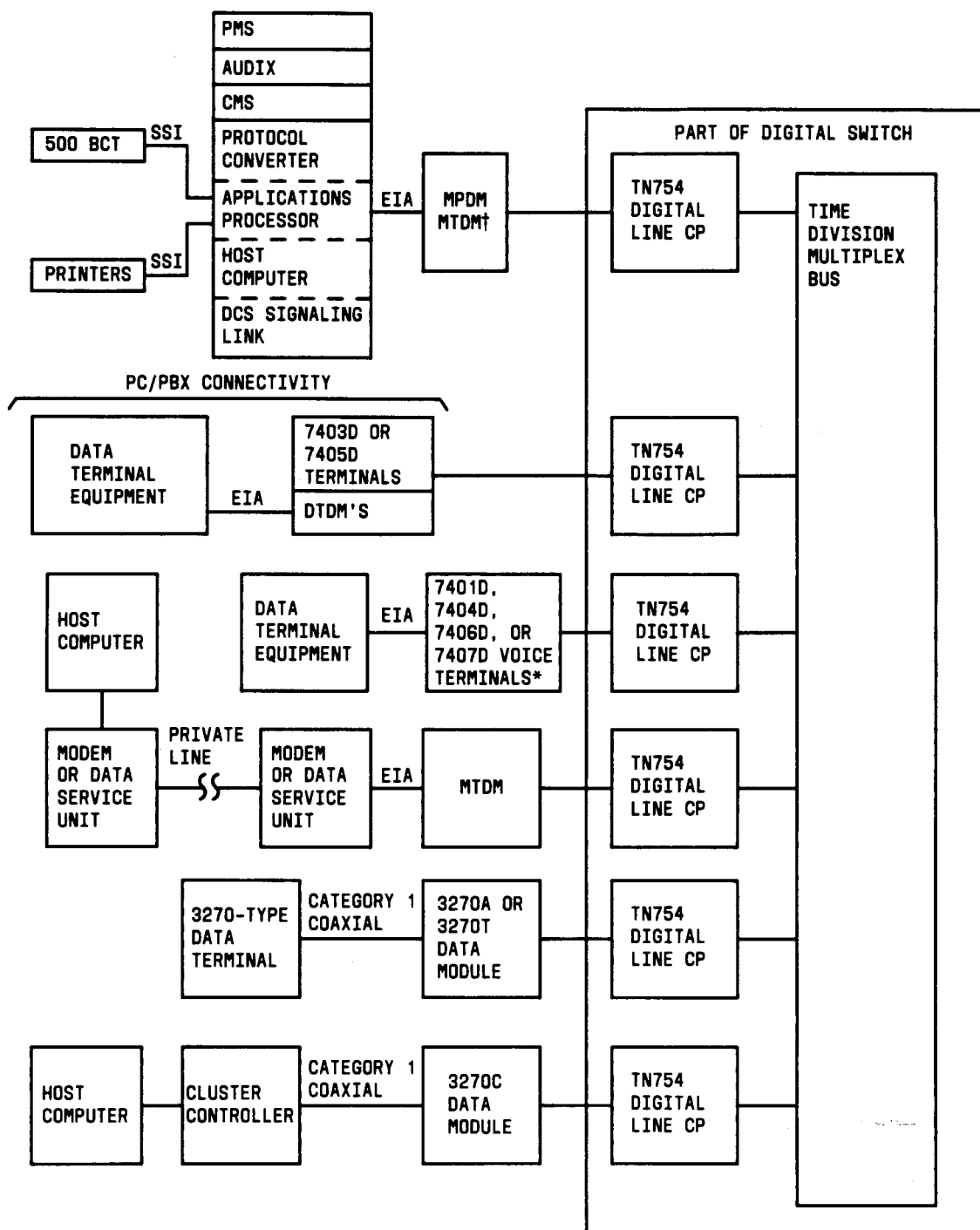


Figure 3-4. Equipment Connected To Digital Switch by Port Circuits (Sheet 1 of 4)



* 7407D MUST BE EQUIPPED WITH OPTIONAL DATA MODULE BASE

† MTDM IS REQUIRED FOR A LARGE AUDIX

Figure 3-4. Equipment Connected To Digital Switch by Port Circuits (Sheet 2 of 4)

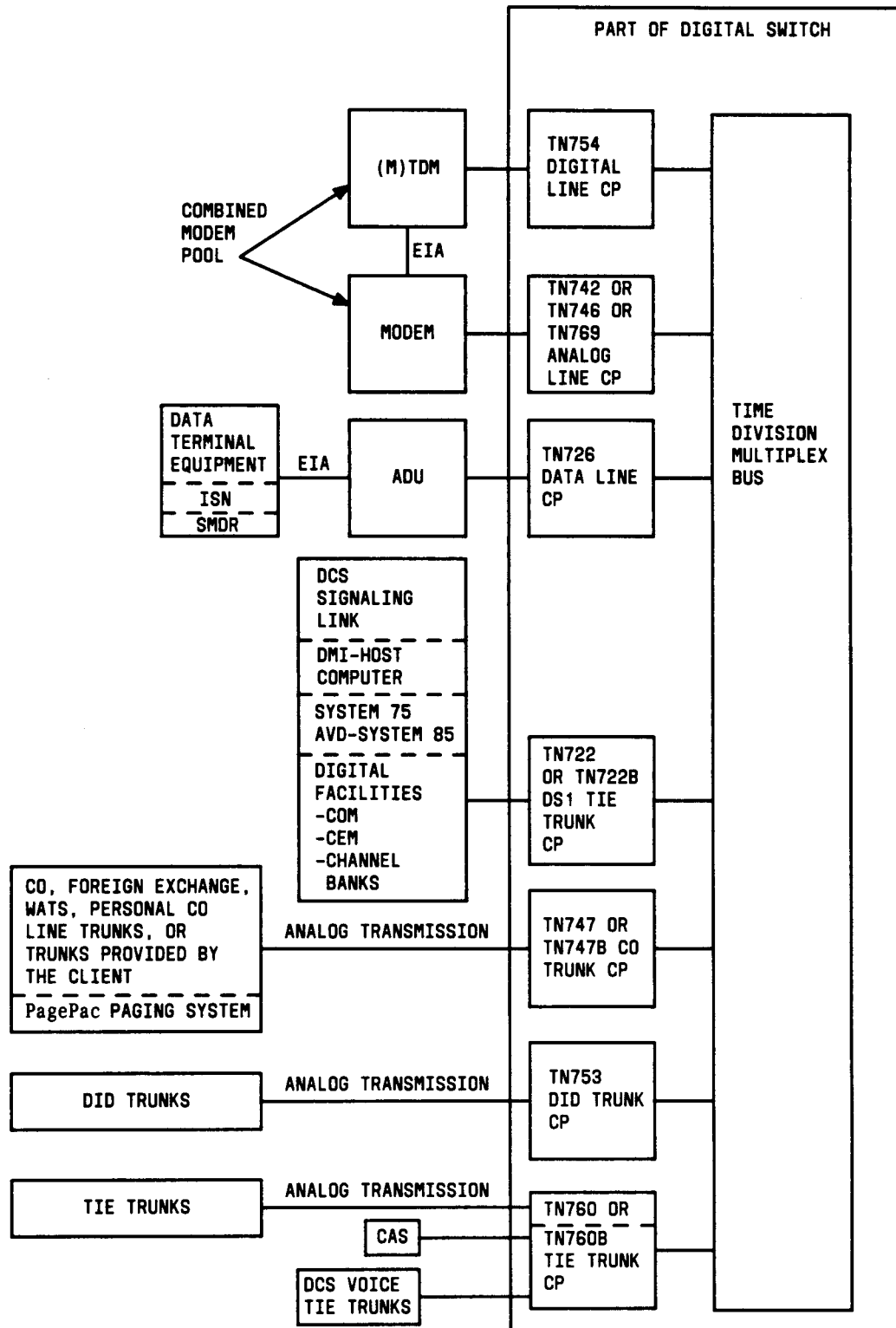


Figure 3-4. Equipment Connected To Digital Switch by Port Circuits (Sheet 3 of 4)

LEGEND:

ADU - ASYNCHRONOUS DATA UNIT
AUDIX - AUDIO INFORMATION EXCHANGE
BCT - BUSINESS COMMUNICATIONS TERMINAL
CAS - CENTRALIZED ATTENDANT SERVICE
CDM - CHANNEL DIVISION MULTIPLEXING
CMS - CALL MANAGEMENT SYSTEM
CO - CENTRAL OFFICE
CP - CIRCUIT PACK
DCS - DISTRIBUTED COMMUNICATIONS SERVICE
DID - DIRECT INWARD DIALING
DMI - DIGITAL MULTIPLEXED INTERFACE
DTDM - DIGITAL TERMINAL DATA MODULE
EIA - ELECTRONICS INDUSTRIES ASSOCIATION
[CONNECTIONS SHOWN ARE 50 FT (15.3M) MAX.]
ISN - INFORMATION SYSTEMS NETWORK
MET - MULTIBUTTON ELECTRONIC TELEPHONE
(M)PDM - (MODULAR) PROCESSOR DATA MODULE
(M)TDM - (MODULAR) TRUNK DATA MODULE
PMS - PROPERTY MANAGEMENT SYSTEM
PT - PERSONAL TERMINAL
SMDR - STATION MESSAGE DETAIL RECORDING
SSI - STANDARD SERIAL INTERFACE
WATS - WIDE AREA TELECOMMUNICATIONS SERVICE

Figure 3-4. Equipment Connected To Digital Switch by Port Circuits (Sheet 4 of 4)

Port Circuits (Contd)

Each of the System 75 port circuit packs contains a number of elements common to all port circuits (see Figure 3-5). The common elements are as follows:

- Bus buffers
- Sanity and control interface (SAKI)
- On-board microprocessor with external random access memory (RAM)
- Network processing elements (NPEs).

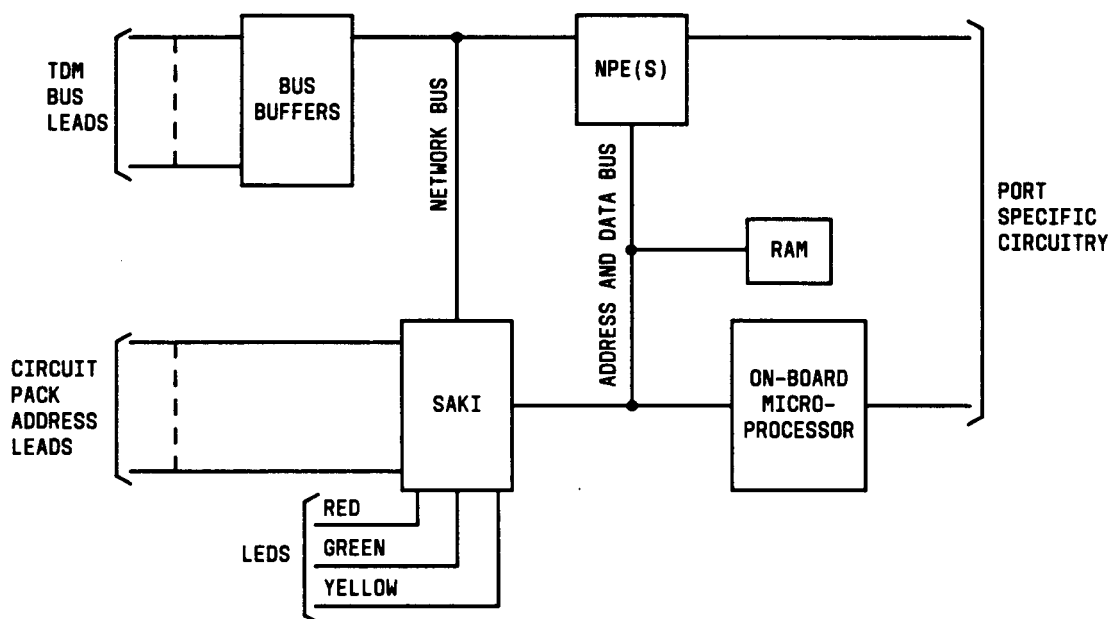


Figure 3-5. Port Circuit Pack Common Elements

Bus Buffers: The bus buffers are the digital interface between the backplane TDM bus wires and the on-board circuitry. These buffers receive or transmit on either of the two 8-bit TDM buses.

SAKI: The SAKI is the port circuit pack's interface to control channel information on the TDM bus. The SAKI receives the TDM bus common channel information intended for the circuit pack and passes the information to the on-board microprocessor. When the on-board microprocessor has control channel information to transmit, the microprocessor passes the control channel information to the SAKI which transmits the information over the TDM bus.

The SAKI also does the following:

- Controls status indicator Light-Emitting Diodes (LEDs)—red (failure), green (test), and yellow (circuit busy)
- Initiates power-on start up procedures
- Checks the on-board microprocessor for sanity and causes reinitialization in case of problems
- Takes the whole circuit pack out of service on command from the SPE or when it determines that on-board interference is present in the control time slots.

On-Board Microprocessor With External RAM: The on-board processor performs all low level functions such as scanning for changes and relay operations. In general, the on-board processor carries out commands received from the SPE and reports status changes to the SPE. The Announcement and Speech Synthesizer circuit packs contain an additional microprocessor to control and coordinate internal circuit pack activity. The external RAM stores control channel information and port-related information.

NPEs: The NPEs perform conference and gain-adjust functions. Under control of the on-board microprocessor, an NPE can connect a port circuit to any one of the TDM bus time slots. Each port circuit pack contains from one to six NPEs.

Service Circuits

The service circuits that connect to the TDM bus are as follows (see Figure 3-6):

- Tone Detector (TN748)
- Tone Detector (TN748B) (V2 or V3)—Supports Automatic Route Selection feature
- Tone/Clock (TN714)
- Tone/Clock (TN741) (V2 or V3)—Supports tones for DS1 tie trunks
- Pooled Modem (TN758)
- Announcement (TN750) (V3)—Supports integrated announcements
- Speech Synthesizer (TN725)
- Speech Synthesizer (TN725B) (V2 or V3)—Supports Automatic Wake-up feature.

As shown in Figure 3-6, the service circuits do not connect to any outside equipment. The service circuit packs contain basically the same common elements as the port circuit packs. These common elements perform similar functions for the service circuit packs. The port and service circuit packs connect to the TDM bus.

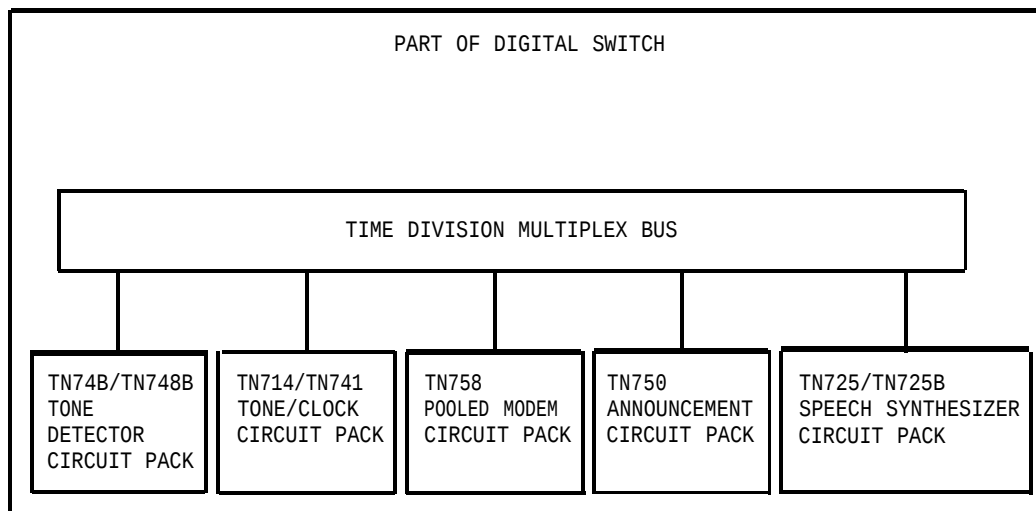


Figure 3-6. Service Circuits

Switch Processing Element

The main components of the switch processing element (SPE) areas follows (see Figure 3-1):

- Processor (TN711) (V1)
- Processor (TN711B) (All Versions)
- Memory (TN734) (2-Megabytes)
- Memory (TN761) (4-Megabytes)
- Network Control (TN727)
- Tape Control (TN729).

These components are interconnected by the 16-bit M (memory) bus located on the backplane. The M bus, containing 24 address and 30 interrupt and control lines, provides a communication link among the control circuit packs.

The processor performs high-level call processing by executing programs stored in memory. This circuit pack monitors and controls port-to-port connections, provides status indications to users, and initiates the operations required to implement system features. In addition, the

processor provides the following:

- An interface to the System Access Terminal (SAT) that is used to manage the system
- An interface to a Station Message Detail Recording output device
- An asynchronous 212A serial channel interface that allows Remote Dial-up for system administration and dial-out for alarm reporting.

The memory circuit pack contains 2 megabytes of Dynamic Random Access Memory (RAM) that stores the system translations including addresses of equipment connected to the switch through the port circuit packs and call processing software.

The Network Control circuit is the interface to the TDM bus. This circuit pack monitors the port circuit packs for activity and transfers this information to the processor. Information from the processor circuit is transferred back to the port circuits through the network control.

The Tape Control circuit is the interface between the High Capacity Minirecorder (HCMR) or Removable Mass Storage Subsystem (RMSS) and the M bus. The interface provides control and data transfer between the M bus and the HCMR or RMSS.

The Maintenance circuit pack is associated with the SPE on the same M bus. The interface circuit packs are also associated with the SPE via the M bus, the S (system) bus, and an identical but separate M bus.

High Capacity Minirecorder (HCMR) (All Versions)

The high capacity minirecorder (HCMR) provides a nonvolatile system bootstrap and translation storage device. The HCMR uses either the incremental or streaming operating mode. In the incremental mode, data is efficiently read or written one single block of data at a time. In the streaming mode, data is continuously read or written.

Version 1 uses the incremental mode exclusively. Version 2 or Version 3 uses the streaming mode for system boot and the incremental mode for all other operations. The HCMR tape cartridge stores up to 12M bytes of data in the incremental mode and up to 25M bytes of data in the streaming mode.

Removable Mass Storage Subsystem (RMSS)

The Removable Mass Storage Subsystem (RMSS) replaces the HCMR and functionally closely emulates the HCMR. It provides a nonvolatile system bootstrap and translation storage device. It emulates both the incremental and streaming operating modes, and the tape cartridge stores up to 18M bytes of data. The RMSS consists of a cartridge tape drive and the Removable Mass Storage Controller (RMSC) circuit pack with power converters mounted on it. The RMSC contains a microprocessor, a tape controller, and a shared Random Access Memory (RAM).

Adjunct Interface Circuits

The interface is provided by the interface 1 (TN716B), Interface 2 (TN720) (V1 systems with an AP) or Interface 2 (TN738), and Interface 3 (TN719) circuit packs or the Processor Interface (TN765) circuit pack (Version 3 only).

As shown in Figure 3-1, the Interface 1, Interface 2, and Interface 3 circuit packs are connected to one of the M buses. Interface 1 and Interface 2 are connected to each other by the S bus. The S bus contains 16 data, 24 address, 5 parity, 10 interrupt, and 11 control lines. The S bus is located on the backplane of the control carrier and provides the medium for the SPE to transfer data.

The TN765 Processor Interface circuit pack can be used in place of the TN716B Interface 1, TN720/TN738 Interface 2, and TN719 Interface 3 circuit packs currently provided with a Version 3 system. When the TN765 Processor Interface is used, it is inserted in the PROCR INTRFC slot (MEM3 slot in earlier Version 3 systems) on the Control Carrier (J58890AA).

The TN765 Processor Interface circuit pack provides four data links to the TDM bus and a link through the memory bus to the processor. This circuit pack has four ports that provide interfaces to the 362 Message Server Adjunct (MSA), Distributed Communications System (DCS), Call Management System (CMS), and Audio Information Exchange (AUDIX).

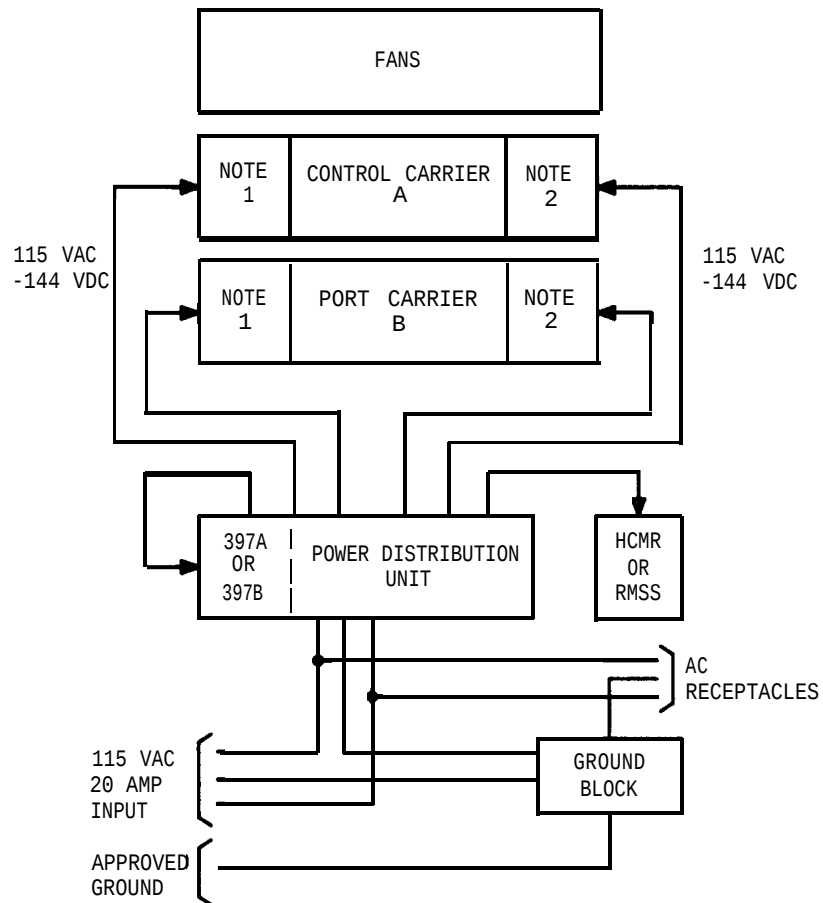
Maintenance Circuit

The Maintenance circuit is a peripheral processor for the SPE. The Maintenance circuit pack communicates with the SPE on the M bus. When the Maintenance circuit is initialized, the SPE sends the Maintenance circuit necessary administration data [Initialization and Administration System (INADS) phone number, product identification, and software vintage]. Version 3 of the Maintenance circuit supports both synchronous and asynchronous communications.

Power System

Figures 3-7 and 3-8 show the power distribution schemes for the 2-carrier and 5-carrier System 75 cabinets, respectively. Five-conductor power distribution cables connect the Power Distribution Unit to the power units in the carrier, to the HCMR or RMSS, and to the 397A or 397B battery charger.

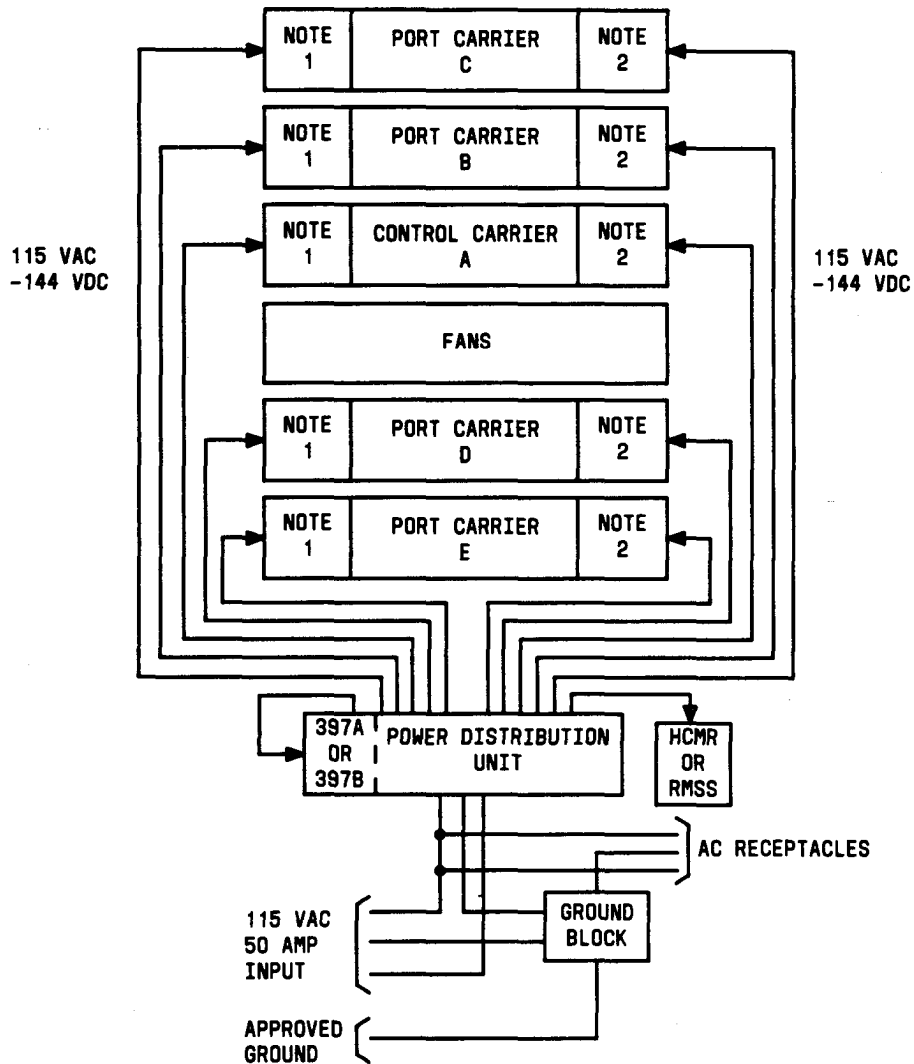
The power distribution cables provide 115-volt ac power on three of the leads during normal operation and -144 volt dc power on the other two leads during emergency transfer (Power Failure Transfer mode). The -144 volt dc power is not provided for the battery charger.



Notes:

1. 631AR, 631WA1, or 631DA1 power unit
2. 631BR, 631WB1, or 631DB1 power unit

Figure 3-7. Power Distribution Scheme for 2-Carrier Cabinets



Notes:

1. 631AR, 631WA1, or 631DA1 power unit
2. 631BR, 631WB1, or 631DB1 power unit

Figure 3-8. Power Distribution Scheme for 5-Carrier Cabinets

Call Processing

The number of calls that can be processed per hour by System 75 varies according to the mix of voice terminals (analog, hybrid, and digital) in the system. A typical System 75 can process up to 3600 calls per hour for all versions.

The following is a step-by-step description of a call originated by a System 75 digital voice terminal to another System 75 digital voice terminal. Calls originated by other type voice terminals or incoming calls on trunk circuits are similar. In the following description, the 8-bit microprocessors on the port and service circuits are referred to as port controllers.

1. The Digital Line port controller detects that the terminal handset is off hook.
2. The Digital Line port controller sends an off-hook uplink message to Network Control.
3. The Network Control stores the message for the SPE.
4. The SPE software retrieves the message and interprets it as a call origination.
5. The SPE sends downlink messages via Network Control to the port controllers.
 - a. The first set of messages instructs the originating port on the Digital Line circuit pack to listen for dial tone on a dedicated time slot and to light the call appearance status lamp on the terminal.
 - b. The second set of messages instructs the originating port to talk on an available time slot. They also instruct a Tone Detector port controller to connect a touch-tone detector. The touch-tone detector interprets each individual touch-tone digit as it is dialed.
6. When the terminal user dials the first digit, the terminal converts the analog touch-tone signal to a digital signal and the Digital Line port circuit places the digital signal on the previously allocated time slot for that port.
7. The touch-tone detector, listening on the same time slot, interprets the tone. The Tone Detector port controller sends the value of the digit in an uplink message via Network Control to the SPE.
8. The SPE sends a downlink message to the Digital Line port controller instructing it to stop listening to dial tone on the dedicated time slot.
9. The SPE analyzes the first digit, determines that the call is being placed to another System 75 extension, and continues collecting digits.
10. When the SPE collects enough digits to identify an extension (as specified in translations), it discontinues collecting digits.
11. The SPE recognizes that the called extension is a digital voice terminal (see Note) and sends a downlink message to the appropriate Tone Detector port controller to disconnect its touch-tone detector from the time slot.

Note: If the dialed extension number is invalid, the SPE sends a message to the Tone/Clock port controller to place intercept tone on the time slot assigned to the originating port. Intercept tone continues until calling party hangs up.

12. The SPE determines if there is an available call appearance for the called digital voice terminal user and sends a message to the Tone/Clock port controller to place ringback or busy tone, as appropriate, on the time slot assigned to the originating port. Busy tone continues until calling party hangs up.
13. The SPE sends a downlink message via Network Control to the Digital Line port controller associated with the called extension. The message instructs the port controller to turn on the ringer and to flash a call appearance lamp on the called party's digital voice terminal.
14. When the called party lifts the handset, the Digital Line port controller sends an off-hook message to the SPE.
15. The SPE interprets the off-hook message as an answer.
16. The SPE sends downlink messages to the Digital Line port controller to turn off the ringer and to light steady a call appearance lamp on the called party's digital voice terminal.
17. The SPE then sends downlink messages to the Digital Line port controller associated with the answering party to talk on an available time slot and to listen on the time slot assigned to the calling party.
18. The SPE instructs the Digital Line port controller associated with the called party to listen on the time slot assigned to the calling party for talking.
19. When either of the parties hangs up, the associated Digital Line port controller sends an on-hook message via the Network Control to the SPE.
20. The SPE interprets the on-hook message as the end of the call.
21. The SPE sends downlink messages to the Digital Line port controllers to disconnect the time slot connections and to darken the lamps for the two call appearances.

Private Network Configurations

Included in this section is a general description of private network configurations with four specific examples involving the System 75: Electronic Tandem Network (ETN), Distributed Communications System (DCS), Main/Satellite/Tributary, and Tandem Tie Trunk Network.

Do not assume System 75 has any capabilities other than those explicitly stated herein. Refer to *AT&T—Network and Data Services*, 555-025-201, for differences between System 75 and other AT&T systems.

A private network is a configuration of trunk and switching facilities dedicated to the use of a business or organization. It may have as few as two switches or as many as hundreds of switches located throughout the country. The following configurations make it possible for organizations of all sizes to realize the benefits of a private network.

- **Distributed Communications System**—Serves the needs of customers with several locations in a small or large geographic area. This configuration normally serves moderate to heavy calling between locations. A DCS appears as a single switch with respect to certain attendant and voice terminal features.
- **Electronic Tandem Network**—Serves the needs of customers with many locations in a large geographic area. This configuration normally serves moderate to heavy calling between locations, with or without accessing toll facilities.
- **Main/Satellite/Tributary**—Serves the needs of customers with a few locations in a small geographic area. This configuration normally serves moderate to heavy calling between locations.

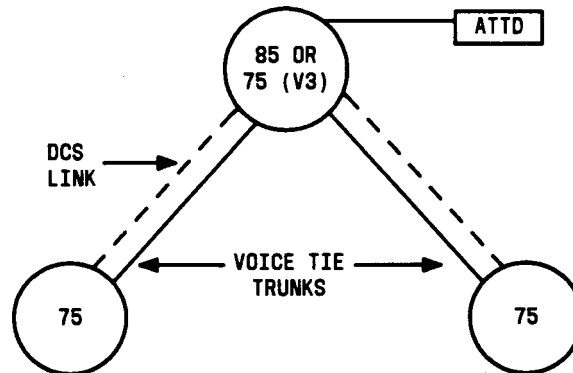
System 75 also can be used within a Tandem Tie Trunk Network (TTTN). A TTTN is a nonhierarchical network of tie trunks interconnecting three or more switches. User dialing into each switch in the call's path is required. That is, the user at one switch dials the trunk access code for a tie trunk group to another switch, receives dial tone from that switch, and then dials another trunk access code to reach another switch. When dial tone is received from the final (desired) switch, the user dials the desired extension number.

Distributed Communications System (DCS) (V2 or V3)

DCS is a cluster of two or more switches that provides transparency in certain attendant and voice terminal features as if the cluster were a single large switch. Transparency exists when a user at one switch can call or activate a feature toward a user at a different switch without noticing a difference in operation. This provides simplified dialing procedures between locations and provides also the convenience of using some of the system's features between locations. DCS is particularly attractive if there is frequent interlocution calling.

DCS switches are interconnected by tie trunks for voice communications and data links for control and feature information. The data links, also called DCS signaling links, support the feature transparency. Figure 3-9 shows examples of DCS configurations.

SYSTEM 75 WITH SYSTEM 85 OR SYSTEM 75 (V3) TANDEM; CENTRALIZED ATTENDANTS



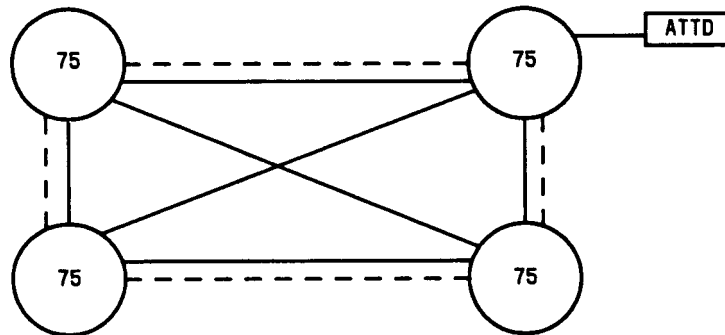
THE SYSTEM 85 OR SYSTEM 75 (V3) IS SERVING AS A DCS TANDEM SWITCH AND AS A CENTRALIZED ATTENDANT SERVICE MAIN; ALL OTHER SYSTEMS ARE ENDPOINT NODES.

SYSTEM 75 WITH NO TANDEM; SEPARATE ATTENDANTS



EACH SYSTEM HAS ITS OWN ATTENDANT POSITION(S).

SYSTEM 75 WITH NO TANDEM; CENTRALIZED (IAS) ATTENDANT



NOTE THAT EACH SWITCH HAS A TIE TRUNK GROUP TO EVERY OTHER SWITCH, BUT NOT NECESSARILY A DCS SIGNALING LINK. MESSAGE HOPPING IS BEING USED TO TAKE ADVANTAGE OF EXISTING FACILITIES. THE SWITCH WITH THE ATTENDANT IS AN INTER-PBX ATTENDANT SERVICE (IAS) MAIN; THE OTHERS ARE IAS BRANCHES.

Figure 3-9. Examples of Distributed Communications System Configurations

Some of the applications of the DCS configuration are as follows:

- In a “campus environment” that has two or more separate buildings and the switches are connected by local cable
- In a larger area such as a city, several states, or even the entire country, where the switches are separated by distances too great for local cable and may be connected to different central offices

For a detailed description of the DCS, refer to *AT&T System 75—Feature Description*, 555-200-201, and *AT&T—Network and Data Services*, 555-025-201.

Electronic Tandem Network (ETN)

An ETN is a hierarchical network of privately owned trunk and switching facilities that can provide a cost-effective alternative to toll calling between locations. An ETN consists of tandem switches, the intertandem tie trunks that interconnect them, the access or bypass access tie trunks from a tandem switch to a main switch, and the capability to control call routing over these facilities. Figure 3-10 shows a typical ETN configuration. As shown in the figure, a Main/Satellite/Tributary configuration can be served by an ETN. Although not shown in the figure, a DCS can also be part of an ETN.

System 75 has limited capabilities to serve as an ETN tandem switch

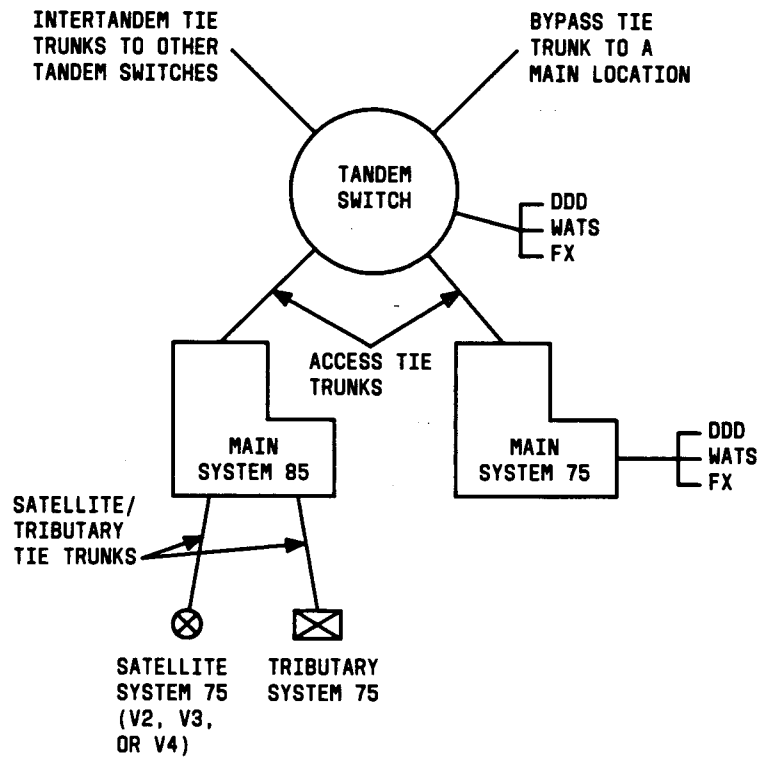


Figure 3-10. Typical ETN Configuration

Within an ETN, each location is identified by a unique private network office code (RNX). An RNX never matches an Area Code, so there are 640 possible RNXs available for each ETN. After accessing the ETN by dialing a feature access code, the user simply dials the RNX plus the desired extension number. At most, seven digits are required.

Public network office codes (NXXs) are unique within an Area Code, whereas RNXs are unique within an ETN. RNXs are assigned when the ETN is established and, for convenience, may match NXXs (although this is not always possible). When Direct Inward Dialing (DID) is provided by the local central office, the extension numbers (last four digits of the number) will match. Network Inward Dialing (NID) is the ETN equivalent of DID and can be provided without DID.

The software program that controls call routing over an ETN is called Automatic Alternate Routing (AAR). AAR not only determines the route for a call, but, through the Facilities Restriction Level (FRL) function, defines up to eight levels of calling privileges for users of the ETN. Another function of AAR, Subnet Trunking, can convert an on-network number to a public network or international number. This function is useful when all on-network routes are busy or are not provided. System 75 AAR, FRL, and Subnet Trunking are described

briefly in Section 2 of this manual. For more details, refer to *AT&T System 75—Feature Description*, 555-200-201, and *AT&T—Network and Data Services*, 555-025-201.

Main/Satellite/Tributary

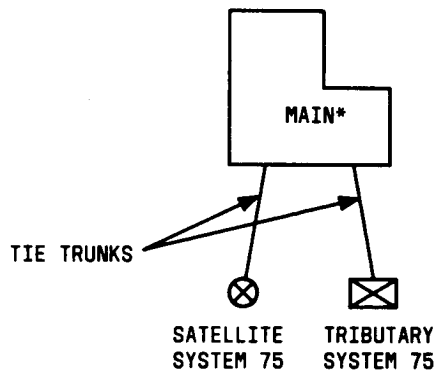
Figure 3-11 shows a Main/Satellite/Tributary configuration. It can function independently or serve as an ETN access arrangement. For a Main/Satellite configuration, attendant positions and public network trunk facilities are concentrated at the Main, and calls to or from satellite locations pass through the Main. To a caller outside the Main/Satellite complex, the system appears to be a single switch with one Listed Directory Number (LDN).

A Tributary location is similar to a satellite location with the following exceptions: (1) a Tributary has one or more attendant positions, and (2) a Tributary has its own LDN.

System 75 V1 can serve as a Satellite or Tributary. Version 2 or 3 can serve as a Main, Satellite, or Tributary.

A small business can start with a single Main/Satellite or Main/Tributary complex and add trunk and switching facilities as the business grows. In this situation, tie trunks connect the main locations within an urban area and intercity traffic is routed by way of the public network. This arrangement favors a medium-size organization or one that has small isolated locations where the intercity traffic is too light to justify the cost of tie trunks.

The Uniform Dial Plan (UDP) feature enables a terminal user at any switch to call any other terminal on any switch in the UDP complex by using the 4- or 5-digit extension number.



* THIS MAIN LOCATION IS EITHER A SYSTEM 75,
SYSTEM 85, OR ENHANCED "DIMENSION" PBX

Figure 3-11. Main/Satellite/Tributary Configuration

Trunking

Trunking is the use of communications links to interconnect two switching systems, such as connecting the system to a local central office or to another private switch. These links, called trunks, can be grouped together in Trunk Groups when all the trunks in the group perform the same function. This grouping simplifies administration and call processing. Calls requiring a trunk are routed to the appropriate trunk group and an idle trunk, if available, is selected from the group.

The following types of trunk groups can be used with the system:

- **Auxiliary**—Provides internal trunk applications for features such as Loudspeaker Paging and Music-on-Hold.
- **Central Office (CO)**—Provides a link with the local central office.
- **Direct Inward Dialing (DID)**—Provides a link with the local central office for incoming calls that normally by-pass the attendant and go directly to the voice terminal user.
- **DS1 Tie Trunk**—Provides for two types of digital tie trunk interfaces: Voice-Grade DS1 and Alternate Voice/Data (AVD) DS1 Tie Trunks. The Voice-Grade DS1 tie trunks are an alternative to 2-wire analog E&M tie trunks and may be used to interface with other properly-equipped switching systems. AVD DS1 tie trunks permit alternate voice and data calling between the system and System 85. DS1 tie trunks are used to access the following:
 - **MEGACOM® Service**—A new WATS-service that can be accessed from the system.
 - **MEGACOM® 800 Service**—An INWATS-like service available from the system.
- **Foreign Exchange (FX)**—Provides a link with a central office other than the local central office.
- **Tie and Release Link**—Provide a link with another private switching system for calls between the systems. Release Link trunks are used only with Centralized Attendant Service. Tie trunks are used on calls to or from the following:
 - A Private Branch Exchange (PBX)
 - An Electronic Tandem Network (ETN) switch
 - An Enhanced Private Switched Communications Service (EPSCS) or Common Control Switching Arrangement (CCSA) office.
- **Wide Area Telecommunications Service (WATS)**—Provides a link with an Outward WATS office or an 800 Service office.

Data Communications

System 75 is a private digital switching system that permits connections with a variety of data equipment. The System 75 switch connects to data equipment provided with an Electronic Industries Association (EIA) RS-232C interface, or an RS-449, RS-366, V.35, or Category A coaxial interface. Supported types of equipment include the following:

- Data terminals
- Printers
- Graphic and facsimile equipment
- Computers
- Personal Computers.

Data modules provide the digital interface between the System 75 switch and data terminals, hosts, and off-premises facilities. For V2 or V3, data equipment can be connected directly to the switch by the EIA Interface [Data Line circuit pack and an Asynchronous Data Unit (ADU)].

The connectivity between System 75 and the data endpoints is provided by several Data Management interface features. Modem Pooling provides analog-to-digital and digital-to-analog conversion resources for both on-premises and off-premises connections. The resources are pooled for switched access operation. Remote data equipment can be provided switched access from local data terminals through Off-Premises Data-Only Extensions. Analog or digital private-line facilities, dedicated to data, can be used.

When multiplexing and digital connectivity is advantageous, the DS1 Interface (V2 or V3) provides a means to replace analog tie trunks with DS1 facilities. This arrangement can be expanded to increase the capacity or add dedicated data channels by using Channel Expansion and Channel Division Multiplexing. The EIA Interface (Data Line circuit pack and ADU) for V2 or V3 provides the direct connection to on-premises data endpoints.

The DS1 Interface can provide three types of digital tie trunk interfaces: Voice-Grade DS1, Alternate Voice/Data (AVD), and Digital Multiplexed Interface (DMI). The Voice-Grade DS1 tie trunks are an alternative to 4-wire analog E&M tie trunks and may be used to interface with other properly equipped switching systems. AVD DS1 tie trunks permit alternate voice and data calling between other System 75s and System 85.

The DMI specifies the interface requirements for multiplexed data communications, over DS1 digital facilities, between a host computer and a private switch system. The system supports the DMI by using Bit Oriented Signaling, with the DS1 circuit pack optioned for Common Channel Signaling.

Data management user features provide an efficient and reliable means of establishing data connections from the data terminals. Data Call Setup, along with several Voice Communications features, provides the user with access to the data network. Data Protection adds reliability to the system by preventing other System 75 features from interrupting the data transmissions.

The system connects to the ACCUNET® Packet Service through a Memotec X.25 PAD. ACCUNET® Packet Service (APS) is an X.25 Packet Switch Public Data Network (PSPDN). The Memotec X.25 PAD SP-830 allows the system to access the APS, any X.25 PSPDN, or any X.25 hosts. The Memotec PAD can be connected directly to the switch by the Data Line circuit pack and an Asynchronous Data Unit (ADU). A system user can access remote X.25 hosts connected to the APS through the Memotec PAD as shown in Figure 3-12. Direct access to an X.25 host is shown in Figure 3-13.

For a more detailed discussion of data communications, refer to *AT&T System 75—Feature Description*, 555-200-201.

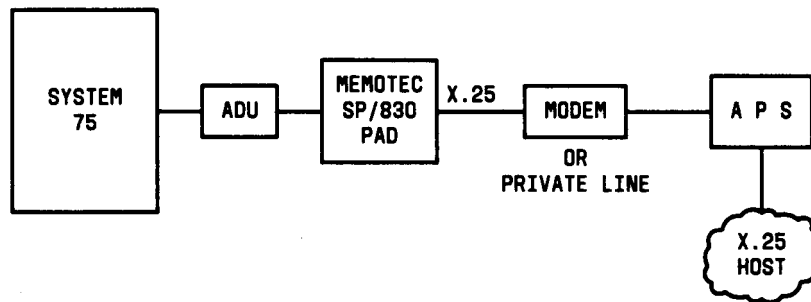


Figure 3-12. System 75 to ACCUNET® Packet Service Connectivity

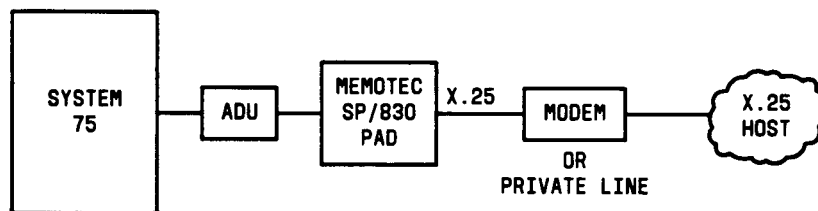


Figure 3-13. System 75 to X.25 Host Connectivity

Information System Network (ISN) Interface

The AT&T ISN is a packet switched local area network that links mainframe computers, minicomputers, word processors, storage devices, personal computers, printers, terminals, and communications processors into a single system. The interface to System 75 is via an Asynchronous Data Unit (ADU). A (Modular) Processor Data Module [(M)PDM] may be used but the ADU is more economical. Also, future versions of the ISN will have integrated ADUs. The (M)PDM or ADU connects to an Asynchronous Interface Module (AIM) on the Packet Controller or Terminal Concentrator (see Figure 3-13). This interface allows System 75 and the ISN to share data capabilities.

Connectivity between ISN and System 75 provides the following major benefits:

- Users on ISN may (in addition to having access to other endpoints directly connected to ISN) have access to any endpoint connected to System 75 or addressable from System 75.
- Users who either connect to or have access to System 75 may also access endpoints connected to ISN.

For a detailed description of the ISN, refer to *AT&T System 75—Feature Description*, 555-200-201.

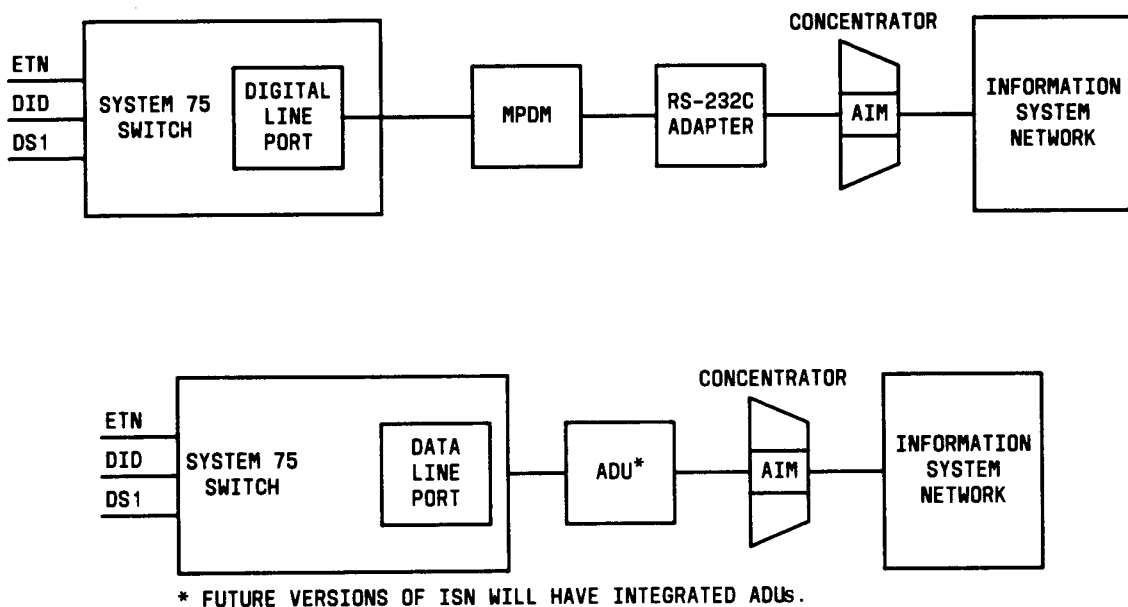


Figure 3-14. System 75 to ISN Connectivity

Star-Based Local Area Network (STARLAN NETWORK)

The STARLAN NETWORK interconnects small numbers of personal computers, data terminals, resource units, and printers. When a STARLAN NETWORK and System 75 are collocated, voice and data can be shared at the same information outlet (see Figure 3-14).

The voice pair that connects to a TN742, TN769, or TN746 Analog Line circuit pack port occupies the first pair of the information outlet. The data pairs that connect to the STARLAN NETWORK occupy the second and third pairs of the information outlet. The voice and data pairs must be separated at the blue or white field located in the equipment room or at the blue field located in a satellite location.

The two major components of STARLAN NETWORK are the Network Access Unit (NAU) and the Network Sharing Unit (NSU). NSUs are plugged into spare slots of workstations that enable the workstation to connect to the media and thus access the network. A stand-alone NAU is provided that will attach up to two RS-232C devices to the network. The NAU is then connected to a port of the NSU located in the satellite closet. The network hub function is provided by the NSU. A single NSU can terminate up to 11 NAU links, where each NAU link can have up to 10 NAU-equipped devices connected together in a daisy chain.

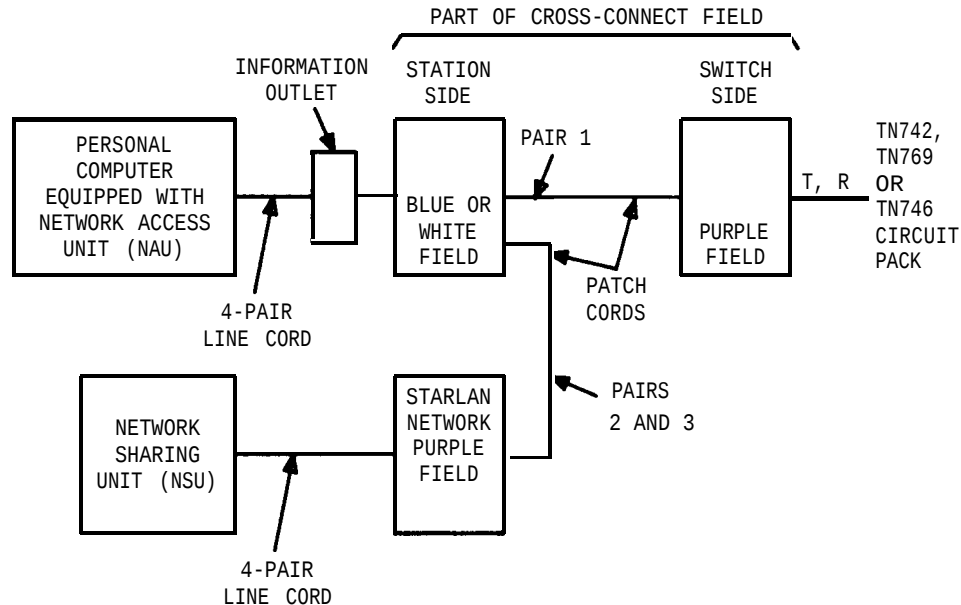


Figure 3-15. System 75 to STARLAN NETWORK Connectivity

CHAPTER 4. HARDWARE DESCRIPTION

This chapter describes the system hardware components, their functions and their interconnections. The hardware is described under the following major headings:

- System Cabinets
- Auxiliary Equipment
- Peripheral Equipment.

System Cabinets

Two system cabinets (see Figure 4-1) are available, a 5-carrier cabinet (J58890A) and a 2-carrier cabinet (J58890B).

The cabinets have a beige front with charcoal brown sides and back. The 5-carrier cabinet has a system identification stripe across the center. Brown slotted areas at the top, bottom, and center are for air circulation. The 2-carrier cabinet is identical except that the system identification stripe is near the top, and the slotted areas are at the top and bottom only.

Physical characteristics of each cabinet are as follows:

- 5-Carrier Cabinet (J58890A)—This cabinet weighs about 800 pounds when fully equipped. It is 70 inches high by 32 inches wide by 24 inches deep including the door.
- 2-Carrier Cabinet (J58890B)—This cabinet weighs about 400 pounds when fully equipped. It is 42 inches high by 32 inches wide by 24 inches deep including the door.

The 5-carrier cabinet door is secured by three screw-type latches, and the 2-carrier cabinet door is secured by two latches. These latches must be loosened by turning the screws clockwise to release the door.

Each cabinet is equipped with wheels on the front and casters on the back. When a cabinet is in place, stabilizing screws keep it from rolling. Each corner of a cabinet can be bolted to the floor when required.

Both cabinets have two ac receptacles in the back. One of the receptacles is used to power the System Access Terminal (SAT). The other receptacle should not be used for other than System 75 applications.

The power cord on each cabinet has a heavy-duty 3-prong plug and must be connected to a dedicated power source (115-volt ac 50 amp for the 5-carrier cabinet and 115-volt ac 20 amp for the 2-carrier cabinet). (Power requirements are described in Chapter 12.)

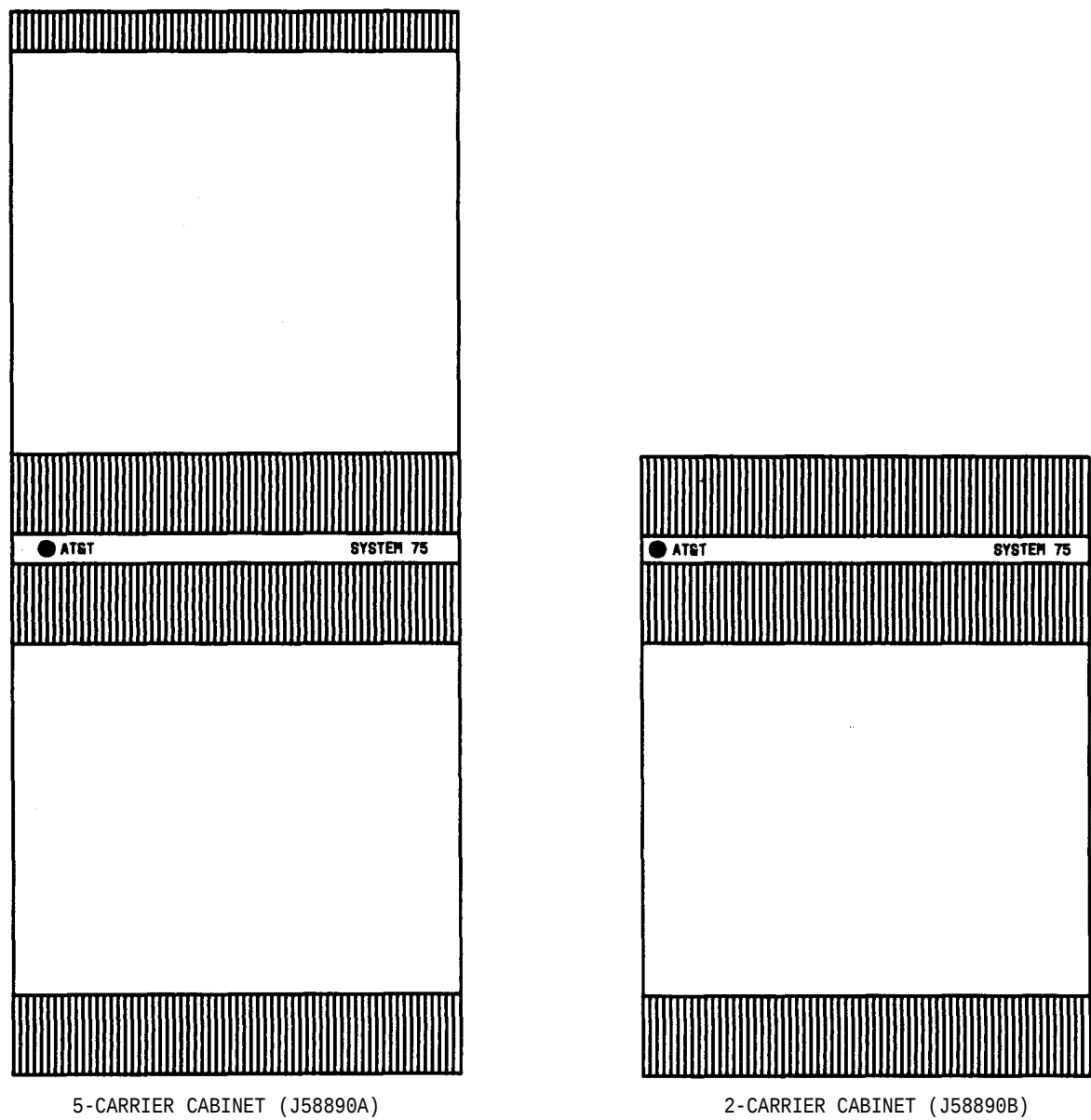
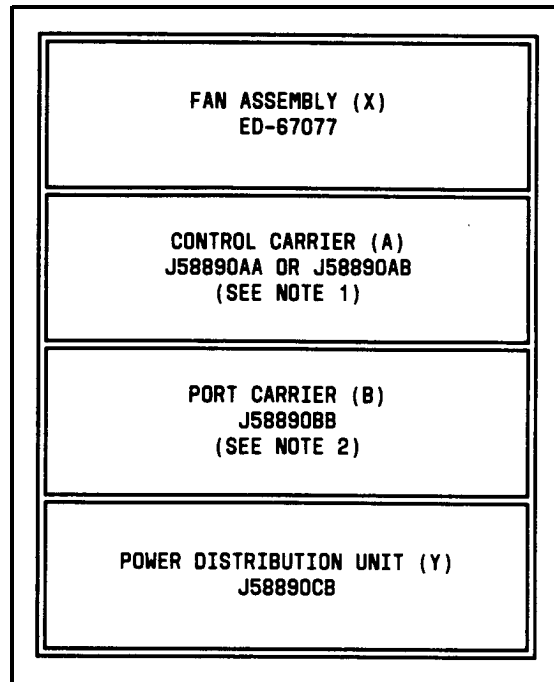


Figure 4-1. System Cabinets (J58890A and J58890B)

System Configurations

The system cabinet houses the main hardware of the system. Each fully equipped cabinet (see Figures 4-2 and 4-3) contains the following:

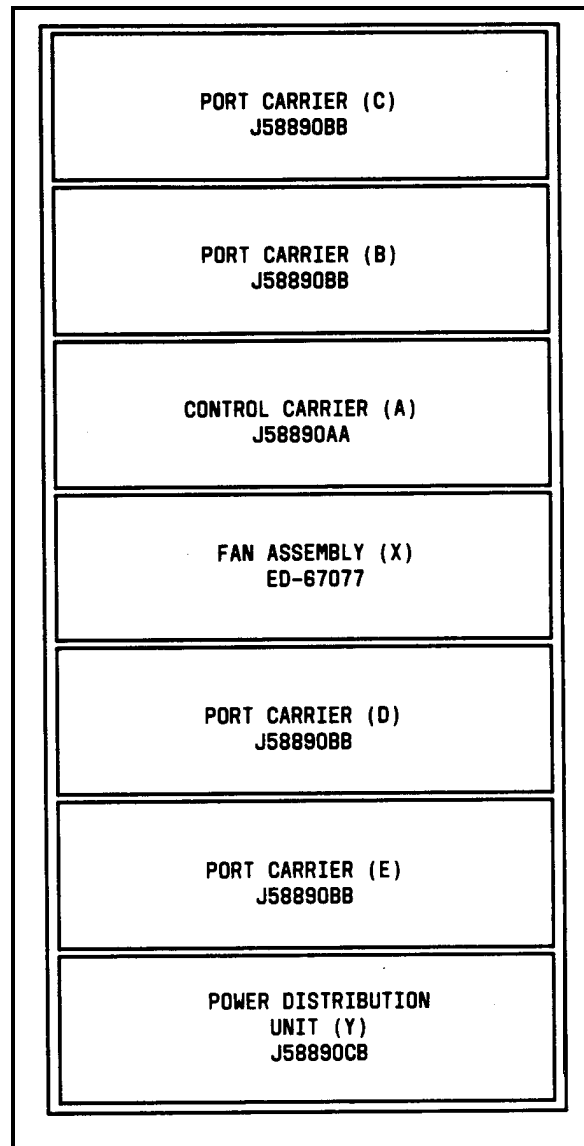
- Fan Assembly—Circulates air through the cabinet.
- Control Carrier—Houses power units, system logic, control circuit packs, and port circuit packs.
- Port Carrier—Houses power units and up to 20 port circuit packs. A 5-carrier cabinet can house up to four port carriers. The number of trunks and lines in a system determines the number of port carriers needed. The 2-carrier cabinet can house only one port carrier.
- Power Distribution Unit—Provides backup power for system software and translations; contains a battery charger, three batteries, a frequency generator, a High Capacity Minirecorder or Removable Mass Storage Subsystem, electromagnetic interference (EMI) filters, and a dc power relay.



NOTES :

1. MODEL 1 SYSTEMS USE J58890AB.
MODEL 2 SYSTEMS USE J58890AA.
2. MODEL 1A AND 2A SYSTEMS DO NOT
USE A PORT CARRIER.

Figure 4-2. Fully Equipped 2-Carrier Cabinet (J58890B)



NOTE: MODEL 3A HAS PORT CARRIER IN POSITION B.
MODEL 3B HAS PORT CARRIERS IN POSITIONS B AND C.
MODEL 3C HAS PORT CARRIERS IN POSITIONS B, C, AND D.
MODEL 3D HAS PORT CARRIERS IN POSITIONS B, C, D, AND E.

Figure 4-3. Fully Equipped 5-Carrier Cabinet (J58890A)

Eight system models are available. Table 4-A lists the models and corresponding cabinets. All models contain one control carrier. Model 1A and 1B systems do not support the Applications Processor (AP), Distributed Communications System (DCS), Call Management System (CMS), or Audio Information Exchange (AUDIX) services.

Table 4-A. System Sizes

MODEL	CABINET	PORT CARRIERS	PORT CIRCUIT PACKS	AP, DCS, CMS, OR AUDIX INTERFACE CAPABILITY
1A		0	11	No
1B		1	30	No
2A	2-Carrier (J58890B)	0	7	Yes
2B		1	26	Yes
3A	5-Carrier (J58890A)	1	26	Yes
3B		2	45	Yes
3C		3	65	Yes
3D		4	85	Yes

- The number of ports per circuit pack are defined in this chapter under the heading **Circuit Packs**.

Carriers

Control Carrier

Two control carriers (J58890AA and J58890AB) are available. The J58890AA control carrier is used with all Model 2 and Model 3 systems.

The J58890AB control carrier is used with Models 1A and 1B.

The control carriers are made of structural foam. They have a slotted-steel faceplate that is grounded through a brass strip to the cabinet mounting frame. The J58890AA control carrier (see Figure 4-4) and the J58890AB control carrier (see Figure 4-5) contain the following:

- Circuit Pack Slots—Provide dedicated slots that are always equipped with control circuit packs. Slots are also provided that can be equipped with port circuit packs (see Figures 4-4 and 4-5).

Note: To maintain proper airflow, a Z100A apparatus blank covers all slots that do not contain circuit packs.

- 631AR, 631WA1, or 631DA1 Power Unit—Provides +5 volt dc power to the carrier.

- 631BR, 631WB1, or 631DB1 Power Unit—Provides -48 volt dc power to the carrier. With the J58890AA-3 control carrier, the -5 volt dc power from the 631DB1 Power Unit is distributed to the circuit pack slots.
- TN736 Power Unit—Converts -48 volts dc to -5 volts dc required by the circuit packs.
- TN752 Power Unit (V3)—Converts -48 volts dc to -5 volts dc required by the circuit packs and also provides 150 volts dc for neon message waiting. The J58890AA-2 control carrier uses this power unit.
- TN755 Power Unit (V3)—Provides 150 volts dc for neon message waiting. This unit is used with the J58890AA-3 control carrier that is wired to distribute the -5 volt dc power from the 631 DB1 Power Unit to the carrier circuit pack slots.

631AR/631MA1/631DA1 POWER UNIT (5V, 60A)	
MAINTENANCE, TN731/TN731B (V3)	
PROCESSOR, TN711/TN711B (V2 OR V3)	
INTERFACE 1, TN716/TN716B NOTE 2	
MEMORY, TN734/TN761 NOTE 1	
MEMORY, TN734 (V2 OR V3) NOTE 1	
PROCR INTRFC, TN765 NOTE 1	
TAPE CONTROL, TN729	
NETWORK CONTROL, TN727	
INTERFACE 2, TN720/TN738 (V2 OR V3) NOTE 2	
INTERFACE 3, TN719 NOTE 2	
TONE-CLOCK, TN714/TN741 (V2 OR V3)	
TONE DETECTOR, (NOTE 3)	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
SEE NOTE 4	
POWER UNIT, TN736/TN752 (V3) (-48 V DC TO -5 V DC) TN755 (V3) (150 V DC)	
631BR/631MB1 POWER UNIT (-48 V, 6A) 631DB1 POWER UNIT (5V, 6A 48V, 6A)	

PORT SLOT: 1 2 3 4 5 6 7 8

NOTES:

1. THE TN765 PROCESSOR INTERFACE CAN BE USED IN PLACE OF TN716/TN716B INTERFACE 1, TN720/TN738 INTERFACE 2, AND TN719 INTERFACE 3 IN VERSION 3. THE TN765 PROCESSOR INTERFACE IS LOCATED IN THE PROCR INTRFC SLOT (ITEM3 SLOT IN EARLIER VERSION SYSTEMS).
2. THE TN716/TN716B INTERFACE 1, TN720/TN738 INTERFACE 2, AND TN719 INTERFACE 3 ARE NOT USED IN VERSION 3 WHEN TN765 IS PROVIDED
3. TONE DETECTOR TN748/TN748B CAN BE LOCATED IN ANY PORT SLOT: HOWEVER IT IS ALWAYS SHIPPED IN PORT SLOT 1.
4. PORT SLOTS 2 THROUGH 8 CAN CONTAIN THE FOLLOWING TYPES OF CIRCUIT PACKS:

- | | |
|-------------------------------------|--------------------------------|
| ● DS1 TIE TRUNK TN722/TN722B | ● ANNOUNCEMENT TN750 |
| ● SPEECH SYNTHESIZER TN725/TN725B | ● DID TRUNK TN753 |
| ● DATA LINE TN726 | ● DIGITAL LINE TN754 |
| ● MET LINE TN735 | ● POOLED MODEM TN758 |
| ● ANALOG LINE (8 PORTS) TN742/TN769 | ● TIE TRUNK TN760/TN760B |
| ● ANALOG LINE (16 PORTS) TN746 | ● HYBRID LINE TN762B |
| ● CO TRUNK TN747/TN747B | ● AUXILIARY TRUNK TN763/TN763B |

Figure 4-4. Control Carrier (J58890AA)

631AR/631MA1/POWER UNIT (5 V, 60A) 631DA1	MAINTENANCE, TN731/TN731B (V3)	PROCESSOR, TN711/TN711B (V2 OR V3)	MEMORY, TN734	MEMORY, TN734 (V2 OR V3)	TAPE CONTROL, TN729	NETWORK CONTROL TN727	TONE-CLOCK, TN714/TN741 (V2 OR V3)	TONE DETECTOR, (SEE NOTE 1)	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	SEE NOTE 2	POWER UNIT, TN736/TN752 (V3) (-48 V DC TO -5 V DC)	631BR/631MB1 POWER UNIT (-48 V, 6A) 631DB1 POWER UNIT (5V, 6A 48V, 6A)
PORT SLOT: 1	2	3	4	5	6	7	8	9	10	11	12									

NOTES:

1. TONE DETECTOR TN748/TN748B CAN BE LOCATED IN ANY PORT SLOT; HOWEVER, IT IS ALWAYS SHIPPED IN PORT SLOT 1.
2. PORT SLOTS 2 THROUGH 12 CAN CONTAIN THE FOLLOWING TYPES OF CIRCUIT PACKS:

- DS1 TIE TRUNK TN722/TN722B
- SPEECH SYNTHESIZER TN725/TN725B
- DATA LINE TN726
- MET LINE TN735
- ANALOG LINE (8 PORTS) TN742/TN769
- ANALOG LINE (16 PORTS) TN746
- CO TRUNK TN747/TN747B
- ANNOUNCEMENT TN750
- DID TRUNK TN753
- DIGITAL LINE TN754
- POOLED MODEM TN758
- TIE TRUNK TN780/TN760B
- HYBRID LINE TN762B
- AUXILIARY TRUNK TN763/TN763B

Figure 4-5. Control Carrier (J58890AB)

The control carrier backplanes are equipped with the following:

- Eight 25-Pair Connectors (J58890AA) and twelve 25-Pair Connectors (J58890AB)—Used to interface the port circuit pack slots to the cross-connect field or the cable access panel (if provided).
- Two RS-232C EIA Connectors—One used to connect to the System Access Terminal (SAT) and the other is reserved for future use.
- One AUXILIARY Connector—Used to connect control carrier input and output to the cross-connect field or the cable access panel (if provided) for maintenance purposes.

Port Carrier

The port carrier (J58890BB) is made of structural foam. It has a slotted steel faceplate that is grounded through a brass strip to the cabinet mounting frame.

Model 1A and 2A systems do not have a port carrier, and Model 1B and 2B systems have one port carrier.

All Model 3 systems have from one to four port carriers.

Note: To maintain proper airflow, a blank carrier panel covers all openings in cabinets that do not contain port carriers.

Each port carrier (see Figure 4-6) contains the following:

- Port Circuit Pack Slots—Provide 20 slots that can be equipped with any type of trunk or line circuit pack.

Note: To maintain proper airflow, a Z100A apparatus blank covers all slots that do not contain circuit packs.

- 631AR, 631WA1, or 631DA1 Power Unit—Provides +5 volt dc power to the carrier.
- 631BR 631WB1, or 631DB1 Power Unit—Provides -48 volt dc power to the carrier. The 631DB1 Power Unit also provides -5 volt power to the carrier.
- TN736 Power Unit—Converts -48 volts dc to -5 volts dc required by the circuit packs.
- TN752 Power Unit (V3)—Converts -48 volts dc to -5 volts dc required by the circuit packs and also provides 150-volts dc for neon message waiting. The J58890BB-2 carrier supports the TN752 Power Unit.
- TN755 Power Unit (V3)—Provides 150-volts dc for neon message waiting. This unit is used with the J58890BB-3 port carrier that is wired to distribute the -5 volt dc power from the 631DB1 Power Unit to the carrier circuit pack slots.

The port carrier backplane is equipped with twenty 25-pair connectors used to interface the circuit pack slots with the cross-connect field or the cable access panel (if provided).

631AR/631WA1/631DA1 POWER UNIT (5 V, 60A)	1
POWER UNIT TN736/TN752 (V3) (-48 V DC TO -5 V DC) TN755 (V3) (150 V DC)	2
SEE NOTES 1 AND 2	3
SEE NOTE 2	4
SEE NOTE 2	5
SEE NOTE 2	6
SEE NOTE 2	7
SEE NOTE 2	8
SEE NOTE 2	9
SEE NOTE 2	10
SEE NOTE 2	11
SEE NOTE 2	12
SEE NOTE 2	13
SEE NOTE 2	14
SEE NOTE 2	15
SEE NOTE 2	16
SEE NOTE 2	17
SEE NOTE 2	18
SEE NOTE 2	19
SEE NOTE 2	20
631BR/631WB1 POWER UNIT (-48 V, 6A) 631DB1 POWER UNIT (5V, 6A 48V 6A)	

NOTES:

- IN ADDITION TO THE TN748/TN748B TONE DETECTOR LOCATED IN THE CONTROL CARRIER, MODEL 1B, 2B, AND 3A SYSTEMS REQUIRE ONE ADDITIONAL TONE DETECTOR. MODEL 3B, 3C, AND 3D SYSTEMS REQUIRE TWO ADDITIONAL TONE DETECTORS. THE ADDITIONAL TONE DETECTOR(S) CAN BE LOCATED IN ANY PORT SLOT; HOWEVER, THEY ARE SHIPPED IN PORT SLOT 1 OF PORT CARRIER B AND PORT CARRIER C.
- PORT SLOTS 1 THROUGH 20 CAN CONTAIN THE FOLLOWING TYPES OF CIRCUIT PACKS:

● DS1 TIE TRUNK TN722/TN22B	● TONE DETECTOR TN748/TN748B
● SPEECH SYNTHESIZER TN725/TN725B	● ANNOUNCEMENT TN750
● DATA LINE TN726	● DID TRUNK TN753
● MET LINE TN735	● DIGITAL LINE TN754
● ANALOG LINE (8 PORTS) TN742/TN769	● POOLED MODEM TN758
● ANALOG LINE (16 PORTS) TN746	● TIE TRUNK TN760/TN760B
● CO TRUNK TN747/TN747B	● HYBRID LINE TN762B
	● AUXILIARY TRUNK TN763/TN763B

Figure 4-6. Port Carrier (J58890BB)

Circuit Packs

All system circuit packs have the following features:

- Solid-state logic circuitry mounted on an 8-inch by 14-inch printed wiring board
- Color-coded faceplate labels to identify the circuit type
- Individual circuits are fully contained on one circuit pack
- Fault, test, and busy Light-Emitting Diodes (LEDs)

- Metal tab for electromagnetic signaling device (ESD) protection.

Control Circuit Packs

The following control circuit packs, located in the control carrier, are provided with all system models:

- Maintenance Circuit Pack (TN731 or TN731B)

Provides direct access to the dedicated SAT; provides alarm LEDs for system status; monitors power units and controls emergency transfer; monitors and controls Processor circuit pack conditions; monitors cabinet temperature and airflow; and originates alarms to the remote maintenance system (INADS—which stands for initialization and Administration System). This circuit pack contains an 8088 microprocessor that implements the BX.25 protocol used for remote access. (See **Protocol** in Chapter 9.) A digital signal processor provides 212-type modem emulation and a line circuit provides direct connection to the network. The TN731 B Maintenance circuit pack allows remote technicians to dial up the system and run maintenance and administration communications either synchronously or asynchronously in V3.

- Network Control Circuit Pack (TN727)

Synchronizes control channel messages between the switch processing element (SPE) over the M bus and the port circuits over the TDM bus. Scans the port circuit packs for activity and then switches this information over one of four DCP data channels to the Processor circuit pack. Information from the Processor circuit pack is also transferred over one of these channels to the port circuit packs. The circuit pack provides switched data access to the SPE for system administration, Station Message Detail Recording (SMDR), Property Management System (PMS) interface, and switch maintenance.

- Tape Control Circuit Pack (TN729)

Provides control and data transfer between the memory circuit pack and the High Capacity Minirecorder (HCMR) or Removable Mass Storage Subsystem (RMSS).

- Processor Circuit Pack (TN711 or TN711B)

Manages control of the entire system and executes stored programs to effect call processing functions. Has 64,000 bytes of Read-Only Memory (ROM)/Erasable Programmable ROM (EPROM); 2,000 bytes of Random Access Memory (RAM); and timers. TN711B, required for Version 2 or 3, provides additional programming in ROM to boot the system from tape in the streaming mode (see Chapter 5 for details).

- Memory Circuit Pack (TN734)

Contains system translations including addresses of equipment connected to the switch through the port circuit packs and call processing software. Provides 2 megabytes of memory and contains a memory array, on-board refresh logic, address

decode logic, and bus buffers. For V2 or V3, an additional TN734 Memory circuit pack is provided.

- Memory Circuit Pack (TN761)

Contains system translations including addresses of equipment connected to the switch through the port circuit packs and call processing software. Provides 4 megabytes of dynamic RAM with a single-bit error correction and double-bit error detection. Contains a memory array, on-board refresh logic, address decode logic, and bus buffers.

- Tone-Clock Circuit Pack (TN714 or TN741)

Supplies call progress tones, touch tones, answer-back tones, and trunk transmission test tones; provides 2-megahertz (MHz), 160-kilohertz (kHz), and 8-kHz clocks. TN741 provides clock signals required for DS1 synchronization for digital tie trunks in V2 or V3.

The following optional circuit packs are located in the control carrier and are required only if the system has an AP, DCS, CMS, or AUDIX. The AP, DCS, CMS, or AUDIX capability is available with all Model 2 and 3 systems.

- Interface 1 Circuit Pack (TN716B)

Supports the System (S) bus protocol for interrupts, error reporting, and bus control.

- Interface 2 Circuit Pack (TN720 or TN738)

Contains an 8086 microprocessor, 64,000 bytes of ROM, 128,000 bytes of dynamic RAM, and timers; communicates with the Processor circuit pack via the Interface 1 circuit pack and with the Interface 3 circuit pack; forms a channel to the AP for transmission of Message Center data, Leave Word Calling data, and SMDR data (for the Call Detail Recording and Reporting feature of the AP) using the BX.25 protocol. (See Protocol in Chapter 9.) TN720 provides for one-channel only connection to the AP. TN738 provides the capability of using all four internal channels at the same time. This capability is required for the DCS service in V2 or V3 and the CMS and AUDIX service in V3.

- Interface 3 Circuit Pack (TN719)

Terminates Data Communications Protocol (DCP) for data coming from the AP and passes data from the AP to the Interface 2 circuit pack, contains special logic and several microcomputers, and includes some of the data module functions. (See Protocol in Chapter 9.)

The TN765 Processor Interface circuit pack can be used in place of the TN716B Interface 1, TN720/TN738 Interface 2, and TN719 Interface 3 circuit packs currently provided with a V3 system. The Processor Interface circuit pack provides four data links to the TDM bus and a link through the memory bus to the processor. This circuit pack is set to operate at 9600 baud and has four ports that provide interfaces to the 3B2 Message Server Adjunct (MSA), Distributed Communications System (DCS), Call Management System (CMS), and Audio Information Exchange (AUDIX). An EIA port on the first data link allows direct connection to

MSA, CMS, DCS, or AUDIX applications. The EIA port always operates at a 9600 baud rate. All four ports are capable of accessing these applications through a digital line circuit and a data module. The TN765 circuit pack adjusts to the baud rate set at the data module.

Port Circuit Packs

Mounting spaces (slots) are provided in the carriers for the following port circuit packs:

- **CO Trunk Circuit Pack (TN747 or TN747B)**

Provides eight ports for loop-start or ground-start central office (CO), foreign exchange (FX), or Wide Area Telecommunications Service (WATS) trunks. A port can also be used for a PagePac* Paging System. The circuit pack provides 1-Way In, 1-Way Out, or 2-Way 2-Wire 600 Ohms or RC Balance Network transmission. The TN747B CO Trunk circuit pack supports the Abandoned Call Search feature for ACD applications in V3. The following lead appearances are provided for each port: T, R.

- **Data Line Circuit Pack (TN726)—V2 or V3**

Provides eight ports for asynchronous equipment with RS-232C serial interfaces. An on-board asynchronous data unit extends the serial communications link out to the customer-provided equipment (CPE) over two pairs of standard, voice grade wire. The following lead appearances are provided for each port: TXT, TXR, PXT, PXR.

- **DID Trunk Circuit Pack (TN753)**

Provides eight ports for immediate-start or wink-start Direct Inward Dialing (DID) trunks with the capability of accepting Touch-Tone dialing. The circuit pack supports 1-Way incoming fixed impedance transmission to the trunk. The following lead appearances are provided for each port: T, R.

- **DS1 Tie Trunk Circuit Pack (TN722 or TN722B)—V2 or V3**

Provides interface capability to a DS1 facility. Three types of digital tie trunk interfaces can be provided: Voice Grade DS1, Alternate Voice/Data (AVD) DS1 tie trunks, and Digital Multiplexed Interface (DMI). The interface provides 2-pair (send and receive) full-duplex circuitry operating at 1.544 Mbps in each direction. Twenty-four independent trunks are available for Voice Grade service. For Alternate Voice/Data (AVD) or Digital Multiplexed Interface (DMI) service, the circuit pack provides twenty-three trunks with one trunk being used for signaling. Each trunk can provide 64 kbps data transmission. The TN722 does not support DMI. The data transmission formats are specified by the DMI. The circuit can also provide bit-oriented signaling on a per trunk basis for automatic, immediate-start, delay-dial, or release-link trunks. The following lead appearances are provided for the circuit pack: LBACK2, LBACK1, LO, LO (high), LI, LI (high).

* Trademark of Harris Corporation Dracon Division

- Tie Trunk Circuit Pack (TN760 or TN760B)

Provides four ports for Type 1 or Type 5 four-wire E&M lead signaling tie trunks. Trunks can be automatic, immediate-start, wink-start, or delay-dial. TN760 can only be used for Type 1 E&M Standard tie trunks. TN760B contains option switches on each port for connection to the following signaling formats:

- Type 1 E&M Standard (Unprotected)
- Type 1 E&M Compatible (Unprotected)
- Type 1 E&M Compatible (Protected)
- Type 5 Simplex.

The TN760B also serves as the release link trunks required for Centralized Attendant Service (CAS) in V2 or V3. The trunk supports 4-Wire tip and ring transmission. The following lead appearances are provided for each port: T, R, T1, RI, E, M.

- Auxiliary Trunk Circuit Pack (TN763 or TN763B)

Provides four ports for on-premises trunk applications such as Music-on-Hold, Loudspeaker Paging, Code Calling, and Recorded Telephone Dictation Access. The trunk uses loop start on tip and ring with 1-Way In, 1-Way Out, or 2-Way 2-Wire transmission. Two additional pairs of leads provide seizure and answer supervision and/or make busy information. The TN763B Auxiliary Trunk circuit pack supports Audichron* announcement equipment in V3. The following lead appearances are provided for each port: T, R, SZ, SZ1, S, S1.

- Digital Line Circuit Pack (TN754)

Provides eight ports for connection to multi-appearance 7400 Series digital voice terminals, attendant consoles, 510D Personal Terminal, 515 Business Communications Terminals, or data modules over DCP links. The following lead appearances are provided for each port: TXT, TXR, PXT, PXR.

- MET Line Circuit Pack (TN735)

Provides four ports for the Multibutton Electronic Telephone (MET) sets. The following lead appearances are provided for each port: T, R, BT, BR, LT, LR.

- Hybrid Line Circuit Pack (TN762B)

Provides eight ports for multi-appearance hybrid voice terminals (7300 Series). The following lead appearances are provided for each port: VT, VR, CT, CR, P-, P+.

* Registered trademark of Audichron Company

- Analog Line Circuit Pack (TN742, TN769, or TN746)

The Analog Line circuit pack provides the electrical interface between analog voice terminal lines and the TDM bus. The circuit pack consist of a ringing application circuit, a port input/output (I/O) circuit, and port circuits. The TN742 circuit pack (all versions) and TN769 circuit pack (V3) provide 8 ports. The TN746 circuit pack (Versions 2 and 3) provides 16 ports. Each port has the following lead appearances: T, R.

TN742 circuit pack: Supports on-premises (in building) or off-premises wiring (out of building only with AT&T certified protection equipment) with either touch-tone or rotary dialing and with or without the LED message waiting indicators. The LED message waiting indicators are not supported off premises. The TN742 does not support neon message waiting indicators.

TN746 circuit pack (in building only): Intended to meet the needs of the majority of analog line applications requiring a single voice terminal. This circuit pack supports on-premises (in building) wiring, without hard-wired bridging, where the maximum loop range does not exceed 3100 feet with 24-gauge wiring. Each port supports one voice terminal with or without the LED message waiting indicators, such as AT&T 500 and 2500 terminals (rotary or DTMF dialing). The ringer load for this circuit pack is 3. The TN746 circuit pack along with a TN752 or TN755 Power Unit per carrier will support voice terminals equipped with neon message waiting lamps. Auxiliary equipment, such as line status indicators, answering machines, modems, or amplifier handsets, is not recommended with this circuit pack.

TN769 circuit pack (V3): Supports on-premises (in building) or off-premises wiring (out of building only with AT&T certified protection equipment) with either touch-tone or rotary dialing and with or without the LED message waiting indicators and neon message waiting indicators. The LED message waiting indicators or neon message waiting indicators are not supported off premises. In addition to the TN769 circuit pack, a TN752 or TN755 Power Unit per carrier is required to support neon message waiting lamps.

TN742 and TN769 circuit packs: Support three ringer loads, for example, six voice terminals with .5 ringer loads each. Only one of the voice terminals can have a LED or neon message waiting indicator. A maximum of two voice terminals per port (TN742 and TN769) can be off-hook at any given time.

The TN742 and TN769 also support the following conditions:

- Queue warning level lamps associated with the Direct Department Calling and Uniform Call Distribution features
- Recorded announcements associated with the Intercept Treatment feature
- Dictation machines associated with the Recorded Telephone Dictation Access feature
- PagePac Paging System for Loudspeaker Paging feature
- External alerting devices associated with the Trunk Answer From Any Station feature
- Modems.

Table 4-B summarizes the analog line circuit pack characteristics.

Table 4-B. Analog Line Circuit Pack Characteristics

CHARACTERISTICS	ANALOG LINE CIRCUIT PACKS		
	TN742	TN746	TN769
Number of Ports	8	16	8
Neon Message Waiting Indicators	No	Yes	Yes
LED Terminals	Yes	Yes	Yes
Bridging	Yes	No	Yes
Secondary Lightning Protection	Yes	No	Yes
Same Premises— Out-of-Building	Yes	No	Yes
Terminals	500-Type 2500-Type 7100 Series	500-Type 2500-Type	500-Type 2500-Type 7100 Series
Range With 500-Type and 2500-Type Terminals (24-Gauge Wire)	20,000	3,100	20,000
Range With 7100 Series Terminals (24-Gauge Wire)	15,200	Not Supported	15,200
Ringer Loads	3	3	3

•Pooled Modem Circuit Pack (TN758)

Provides two conversion resources per circuit pack for switched connections between digital data endpoints (data modules) and analog data endpoints (modems). A maximum of 16 Pooled Modem circuit packs (32 conversion resources) are allowed in a V1 system. A maximum of 160 conversion resources are allowed in a V2 or V3

system. A conversion resource in V2 or V3 can also be a Trunk Data Module (or Modular Trunk Data Module) and an analog modem combination.

- Speech Synthesizer Circuit Pack (TN725 or TN725B)—V2 or V3

Provides four ports with tone detection capability that provide retrieval of Leave Word Calling and Automatic Wakeup messages. The TN725B Speech Synthesizer circuit pack supports the Automatic Wakeup feature in V3.

- Tone Detector Circuit Pack (TN748 or TN748B)

Provides four touch-tone receivers and two general purpose tone receivers that detect call progress tones, modem answer-back tones, transmission test tones, and noise. TN748B provides additional tone detection capability required for enhanced Automatic Route Selection (ARS), Off-Premises Keyboard Dialing, and Off-Premises Abbreviated Dialing in V2 or V3.

In addition to the TN748 or TN748B Tone Detector located in the control carrier, Model 1B, 2B, and 3A systems require one additional tone detector. Model 3B, 3C, and 3D systems require two additional tone detectors. The additional tone detectors can be located in any port slot but are shipped in port slot 1 of port carrier B and port carrier C. Up to five Tone Detector circuit packs can be provided to meet heavy traffic requirements.

- Announcement Circuit Pack (TN750) (V3)

Provides an integrated means for recording announcements that can then be played back on demand from call processing as part of a calling feature. Messages can be recorded by customers from their voice terminals, on- or off-premises, and have flexible message lengths. It provides 4 minutes of storage at 32 Kbits/second. It has 16 channels, and any announcement can be played on any channel. There are 50 queue slots for the board. Five call connections can listen per channel which results in a total simultaneous call capacity of 80 calls. There is a limit of one TN750 per System 75. The TN750 cannot be used for the Automatic Wakeup feature. If possible, the TN750 should be mounted in the control carrier to preserve the announcements as long as possible in case of a power failure.

Power Units

The following power units are located in the control and port carriers:

- 631AR, 631WA1, or 631DA1 Power Unit

This power unit provides +5 volt dc 60-amp power on the backplane of the control carrier and the port carriers.

The power unit contains two separate converters. During normal operation, this unit converts the 115-volt ac input to +5 volt dc outputs. If ac power fails, the power unit converts the -144 volt dc supplied by the batteries to +5 volt dc outputs. The power unit contains a relay circuit that detects the highest equivalent input voltage (ac or dc) and switches to the correct converter path accordingly.

- 631BR, 631WB1, or 631DB1 Power Unit

This power unit provides -48 volt dc 6-amp power on the backplanes of the carriers. The control carrier contains one 631BR, 631WB1, or 631DB1 Power Unit to power the circuit packs in slots 11 through 20. The 631DB1 Power Unit provides -5 volt dc 6-amp power from the -48 volt dc power.

This power unit contains two separate converters. During normal operation, this unit converts the 115-volt ac input to -48 volt dc outputs. The 631DB1 Power Unit provides a de/de converter to convert the -48 volt dc to -5 volt dc power. If ac power fails, the power unit converts the -144 volts dc supplied by the batteries to -48 volt dc outputs. The power unit contains a relay circuit that detects the highest equivalent input voltage (ac or dc) and switches to the correct converter path accordingly.

- TN736 Power Unit Circuit Pack

This circuit pack provides -5 volts dc on the backplanes of all carriers for the port circuit packs.

The Power Unit circuit pack is a de/de converter. It contains two identical power supplies that convert the -48 volts dc on the backplane to two -5 volt dc outputs.

- TN752 Power Unit Circuit Pack (V3)

This circuit pack converts -48 volts dc to -5 volts dc required by the circuit packs and also provides 150-volts dc for neon message waiting. It should be used in conjunction with the Analog Line circuit packs that support neon message waiting (TN746 and TN769). Each carrier that will have analog circuit packs for neon message waiting requires this power circuit pack. The J58890BB-2 port carrier supports the TN752 Power Unit. This control carrier backplane accommodates the TN752 without change.

- TN755 Power Unit Circuit Pack (V3)

This circuit pack provides 150 volts dc for neon message waiting. It should be used in conjunction with the Analog Line circuit packs that support neon message waiting (TN746 and TN769). Each carrier that will have analog circuit packs for neon message waiting requires this power circuit pack. This power unit is used instead of the TN752 Power Unit if the carrier backplane is wired to distribute the -5 volt dc power from the 631DB1 Power Unit to the circuit pack slots. The J58890AA-3 control carrier and the J58890BB-3 port carrier support the TN755 Power Unit.

Power Distribution Unit

The Power Distribution Unit (J58890CB) (see Figures 4-7 and 4-8) is located at the bottom of the system cabinet (see Figures 4-2 and 4-3). The Power Distribution Unit consists of the following items:

- Three 48-Volt Batteries

These batteries are connected in series providing a nominal -144 volts dc, and automatically take over during an emergency transfer (Power Failure Transfer mode). These batteries power the entire system for about 10 seconds and the control carrier for about 10 minutes. The -144 volt dc power is fused at 20 amperes. The batteries are trickle charged and take about 30 hours to recharge.

- DC Power Relay

This relay disconnects the batteries from the system when ac power is being used. This relay also disconnects the batteries if ac power fails for more than 10 minutes. This protects the batteries from overdischarging.

- Four Electromagnetic Interference (EMI) Filters

These filters suppress ac line voltage noise.

- 397A or 397B Power Unit (Battery Charger)

When power is restored following the Power Failure Transfer mode, this unit recharges the batteries. The system should fully charge the batteries within 30 hours. If the batteries are not fully charged in that time, the system continues the high rate of charge and sends a minor alarm to the Maintenance circuit pack.

- 124B2 Frequency Generator

This unit converts -48 volt dc input to 75- to 100-volt ac 20-hertz outputs. These outputs are distributed to all carriers through an inter-unit connecting cable. The Analog Line circuit packs use the outputs to provide ringing to their associated voice terminals.

•High Capacity Minirecorder (HCMR) or Removable Mass Storage Subsystem (RMSS)

The HCMR or RMSS stores the software information for the system. If the system goes into the Power Failure Transfer mode for more than 10 minutes, information stored in memory is lost but remains on the tape. When power is restored, the recorded information is automatically transferred to the Memory circuit pack to reprogram the system.

Five-conductor power distribution cables connect the Power Distribution Unit to the power units in the carriers. These cables provide 115-volt ac power during normal operation and -144 volt dc power during emergency transfer.

The ac input power is distributed to the power distribution cables through terminal strips. The ac power on the power distribution cables is fused at 20 amperes.

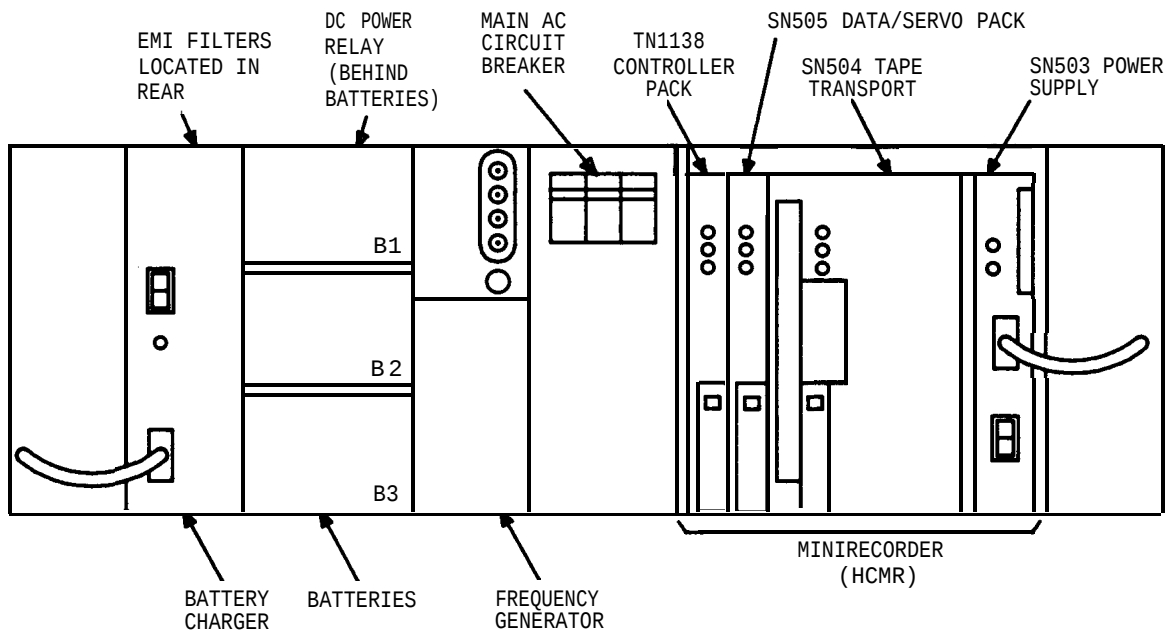


Figure 4-7. Power Distribution Unit (Cover Removed)—With HCMR

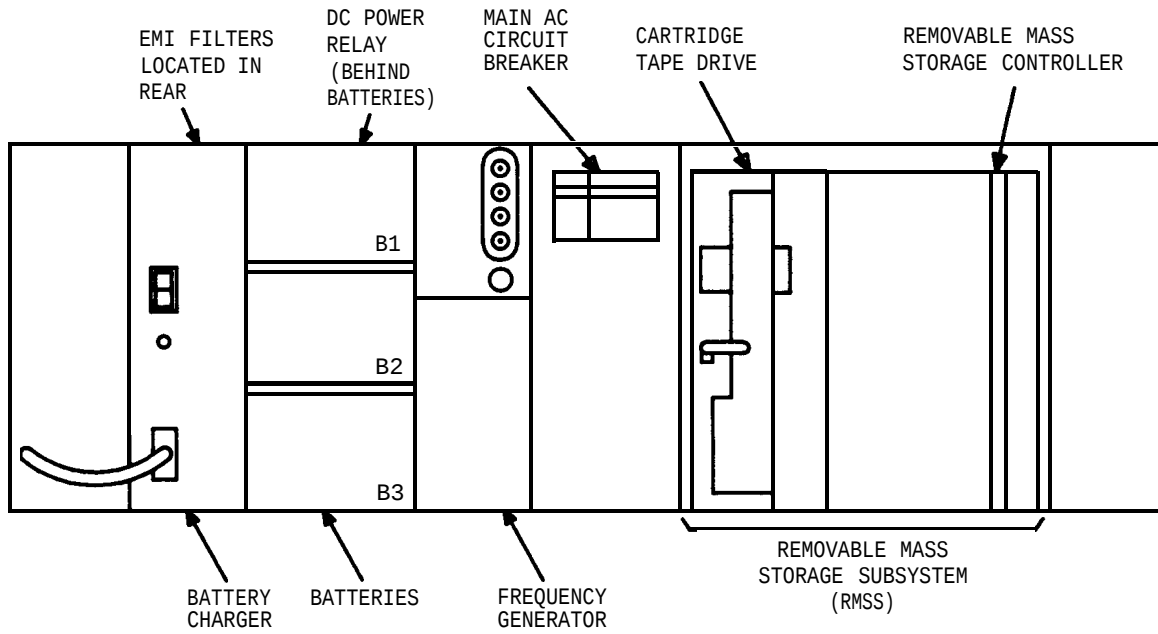


Figure 4-8. Power Distribution Unit (Cover Removed)—With RMSS

Fan Assembly

The fan assembly (ED-67077) is mounted at the top of the 2-carrier cabinet and in the center of the 5-carrier cabinet (see Figures 4-2 and 4-3). The fan assembly consists of the following equipment:

- Fans

The large cabinet has six fans and the small cabinet has three. All fans operate at three speeds.

- Thermistor Sensors

Four sensors monitor the cabinet temperature.

- Fan Speed Control/Thermal Alarm Circuit Pack (AHD1)

This circuit pack constantly monitors the thermal sensors. When the sensors indicate a change in cabinet temperature, this circuit pack adjusts the fan speeds accordingly.

The Fan Speed Control/Thermal Alarm circuit pack sends a major or minor alarm to the Maintenance circuit pack for the following reasons:

- Reduced airflow in the cabinet
- Intake air and exhaust air temperatures differ greatly

Reduced airflow might indicate a fan assembly malfunction or that the air filters require cleaning. A minor alarm is sent when the intake versus the exhaust air temperatures differ by more than 27 degrees Fahrenheit (15 degrees Celsius). A major alarm is sent if the exhaust temperature reaches 149 degrees Fahrenheit (65 degrees Celsius). If the exhaust temperature reaches 167 degrees Fahrenheit (75 degrees Celsius), the system shuts itself down.

- Air Filters

One air filter is located above the fan assembly and one below it. These foam filters can be easily removed and cleaned or replaced when the cabinet door is opened and the fan assembly cover is removed.

Auxiliary Equipment

Auxiliary Cabinet

A J58886N auxiliary cabinet (see Figure 4-9) can be provided to contain the equipment required for features such as Recorded Announcement, Loudspeaker Paging Access, Music-on-Hold, and Recorded Telephone Dictation Access. It is 70 inches high by 32 inches wide by 24 inches deep including the door.

The cabinet allows for carrier, rack (23 inches wide), or panel mounting of hardware. The cabinet is powered by 115 volts ac.

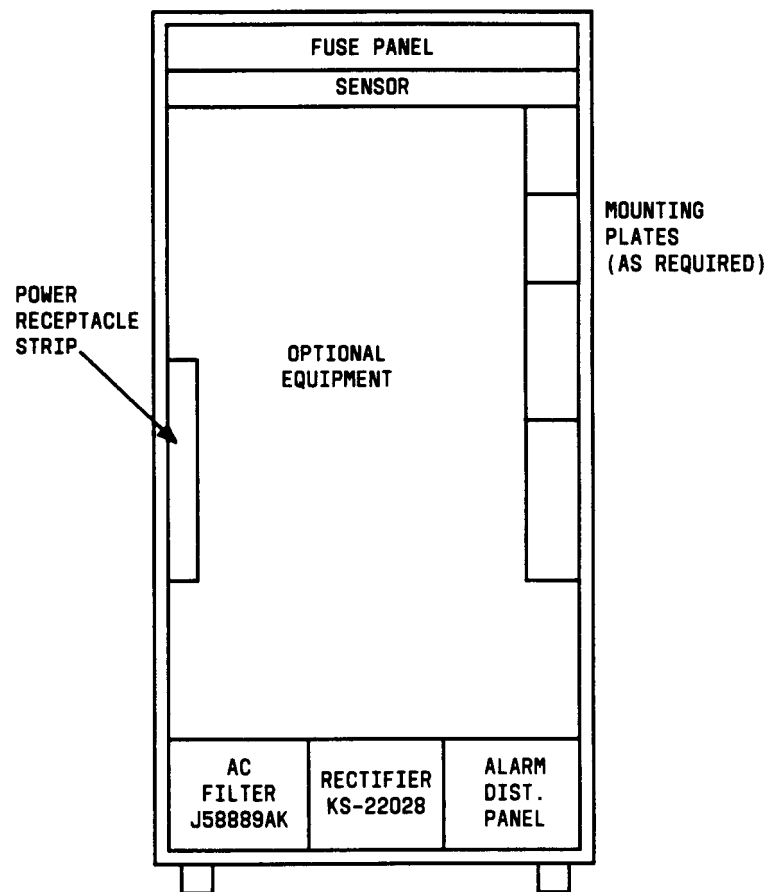


Figure 4-9. Auxiliary Cabinet (J58886N)

The following equipment (see Figure 4-9) is provided in the cabinet:

- Fuse Panel (J58889AB)—Distributes -48 volts dc to fused cabinet circuits.
- Thermal Sensor—Monitors cabinet temperature.
- Power Receptacle Strip—Provides thirteen 115-volt ac receptacles.
- AC Filter Unit (J58889AK, List 2)—Provides ac power, filtering, and frame grounding as required.
- Rectifier (KS-22028)—Provides -48 volt dc power. It can be shelf-mounted or mounted at the base of the cabinet. This rectifier has an output capacity of 20 amperes.
- Alarm Distribution Panel (J58889AE)—Detects and reports equipment malfunctions.

The following equipment can be optionally mounted in the cabinet:

- Cook Electric Model NT7M00AA (see Note) or NT7M25AA (see Note) Digital Announcer—Provides recorded announcements for Intercept Treatment—Recorded Announcement feature.

Note: Refer to the Cook Electric Digital Announcers product description and ordering information for complete ordering codes.

Model NT7M00AA provides one channel of voice with a message length of up to 16 seconds. Model NT7M25AA provides four channels of voice with a message length of up to 16 seconds for each channel. Both models require a Cook Electric Model 213288 ac adapter for 115-volt ac power.

Note: Models NT7M00AA (one channel) or NT7M00AA (four channels) can be ordered when an auxiliary cabinet is not provided and the digital announcer is shelf-mounted.

- PagePac Paging System—Provides an amplifier system for Loudspeaker Paging feature. Three models are available:
 - PagePac 20—Provides a single zone of paging with an input source for music. The unit can also be modified to provide 3, 9, or 39 paging zones.
 - PagePac VS—Provides one to three paging zones. It also permits all zone paging. Two optional feature cards are available to provide music or talkback over paging.
 - PagePac 50/100/200—Provides one to 24 paging zones. Optional add-ons are available to provide music or talkback over paging. It is also possible to use a customer-supplied music source.

All PagePac models require 115-volt ac power.

- **278A Adapters**—Provide an interface, when required, for customer-provided equipment for Loudspeaker Paging feature. The 278A adapter has circuitry for seizing the paging system, providing answer supervision, and providing protective isolation between the system and customer-provided paging equipment. The adapter is required when connecting to customer-provided equipment that is not FCC registered. Both the PagePac 20 and the PagePac 50/100/200, with single zone paging, require a 278A adapter. The 278A adapter requires -24 volt dc power. It can be modified for -48 volt dc power with a D-181321 kit-of-parts. The 278A adapter can also be wall-mounted.
- **89A Control Unit**—Also provides an interface, when required, to customer-provided equipment for Loudspeaker Paging feature. This unit performs the same functions as the 278A adapter. A 2012D transformer provides -48 volt dc power to the 89A.
- **36A Voice Couplers**—Provides an interface and system protection for customer-provided equipment for Intercept Treatment—Recorded Announcement, Music-on-Hold, and Recorded Telephone Dictation Access features. The 36A voice coupler is powered by a 2012D power transformer (set at -15 dBm). The 36A voice coupler can also be wall-mounted.
- **3270C Data Module**—Provides the interface (protocol conversion) to a cluster controller connected to a host computer. One data module can contain up to eight ports. The data module requires 115-volt ac power.
- **71A Multiple Data Mounting**—Provides mounting space and power for up to eight processor data modules (PDMs), modular processor data modules (MPDMs), trunk data modules, or modular trunk data modules (MTDMs). The 71A data mounting requires 115-volt ac power.
- **J58889B Fan Assembly**—Required for cooling when two or more 71A data mountings are provided. The fan assembly requires 115-volt ac power.

Emergency Transfer Panels

Power for seven emergency transfer units is available with the system. Two types of emergency transfer panels are available for connection to any FCC registered terminal:

- **Z1A Panel**—Each unit serves up to six Power Failure Transfer terminals. A ground-start key is required at each preselected voice terminal when ground-start trunks are used.
- **PORTA SYSTEMS* Model 574-5 Panel**—Each unit serves up to five Power Failure Transfer terminals. The unit provides automatic ground start or loop start.

* Trademark of PORTA SYSTEMS Corporation

When Z100-type (modular) hardware is provided, the panels are mounted in (or adjacent to) the cable access panel. When 110-type hardware is provided, the panels are mounted adjacent to the cross-connect field.

Automatic Wakeup Recorder/Announcer

The Automatic Wakeup feature may use the TN725B Speech Synthesizer circuit pack or recorded announcement equipment.

If recorded announcements are used, an Audichron Company Model HQD614B Recorder/Announcer and power supply is required, unless mounted in the Auxiliary Cabinet, in which case the Audichron Company power supply will not be needed.

Each Recorder/Announcer requires four TN763B Auxiliary Trunk ports that must be on the same circuit pack.

Station Message Detail Recording

A Station Message Detail Recording (SMDR) output device may optionally be provided. The SMDR output device provides a detailed printout which can be used to compute costs, allocate charges, analyze calling patterns, and keep track of unnecessary calls. The output device may be a Comm-Stor* II SMDR unit (V1 only), TELESEER® SMDR unit, printer, 94A Local Storage Unit, or customer-provided equipment.

Optional SMDR Account Code Dialing software is available to associate certain calls with a particular project or account number for accounting and/or billing purposes.

Peripheral Equipment

Peripheral equipment is any equipment that can be connected to the system switch. The following equipment is described in detail in *AT&T System 75 and System 85—Terminal and Adjuncts*, 555-015-201.

- Attendant Console
- System Access Terminal
- Voice Terminals
- Data Modules

* Comm-Stor is a registered trademark of Sykes Datatronics, Inc.

•Printers

The wiring required to connect the peripheral equipment is discussed briefly in Chapter 12. For detailed information, see *AT&T System 75—Wiring*, 555-200-111.

Attendant Console

The attendant console (Figure 4-10) is a digital, call-handling position with pushbutton control used not only to answer incoming calls and place outgoing calls but also to manage and monitor some of the system operations.

A system can have as many as six consoles in operation at any time. A daytime console can double as a night console, or a seventh console can be provided. If a seventh console is provided, it must be classified as night-only and cannot operate when the other six operate. However, it is not required that an attendant console be provided.

The attendant console is available, with or without a selector console, in black. *AT&T System 75—Console Operations*, 555-200-700, provides detailed information and complete operating instructions for both consoles.

Basic Attendant Console

The basic attendant console (see Figure 4-10) is 11 inches wide by 10-1/2 inches deep by 7-1/2 inches high. It can be used on a table, a desk, or any other flat surface. Cabling distances are explained in Chapter 9.

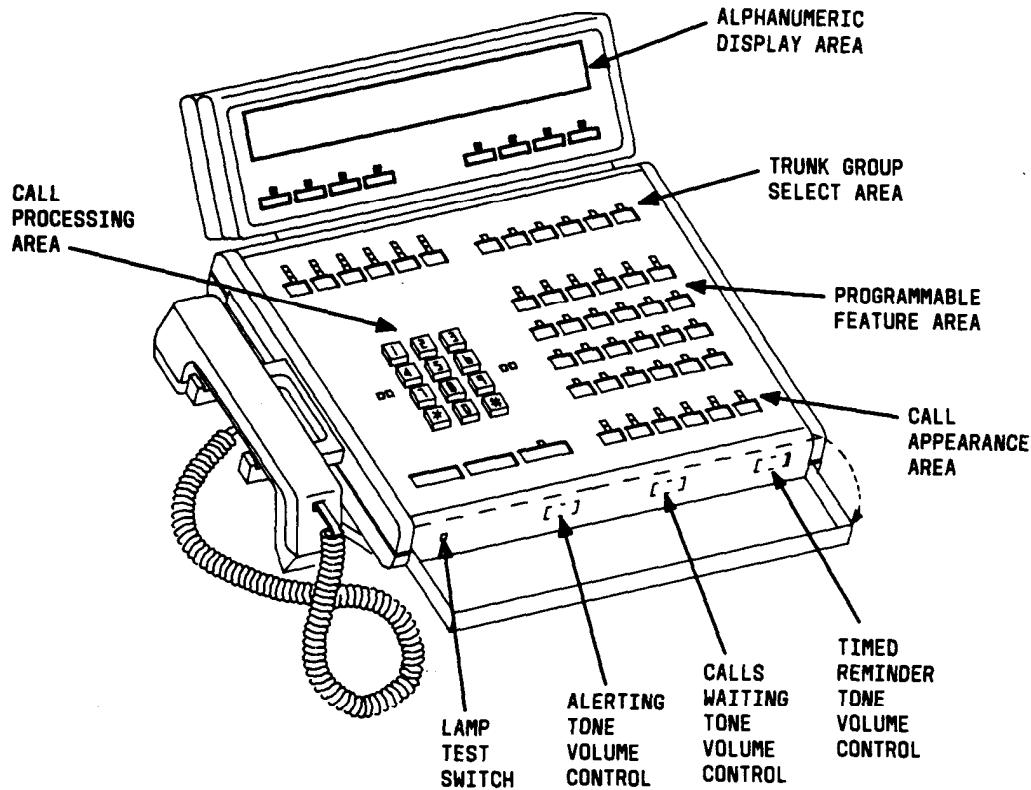


Figure 4-10. Basic Attendant Console

The basic console includes the following:

- **Two Handset or Headset Jacks**—These jacks, located on the left side and the right side of the console, connect a handset or a headset. If a handset is used, a handset adapter is required. The handset adapter is available in two colors: 854-03 (black) or 854-143 (burgundy). An adapter is not required for a headset. The handset cradle can be moved from one side to the other simply by unscrewing the knob and moving the cradle to the opposite side. The handset or headset jack not being used by the attendant may be used by another person for service observing in V3.
- **DXS Jack**—This jack, located on the bottom of the console, connects the optional selector console.
- **Line Jack**—This jack, located on the bottom of the console, connects the console to the information outlet (modular wall jack).
- **Lamp Test Switch**—This switch tests the lamps on the basic console and the optional selector console.

- Three Audible Tone Volume Controls—These slide controls adjust the volume of the ringing, calls waiting, and timed reminder tones.
- Alphanumeric Display Area—This display shows call-related information and optional personal-service information. Eight buttons and associated status lamps in this area are used to change the display-mode. (Refer to the Attendant Display feature in Chapter 2.)
- Call Processing Area—This area contains the following buttons and lamps:
 - Pushbuttons for touch-tone dialing.
 - Start, Release, and Cancel buttons—These buttons are used for call processing.
 - Alarm-Acknowledge (Alm-Ack) lamps—The alarm lamp (left lamp) lights when a system alarm is detected. Both lamps light when the remote maintenance center (INADS) is notified. The Ack light flashes if the system was unable to notify the remote maintenance center. Both lamps are dark when the alarm condition is clear or when an alarm does not exist.
 - Two Call Waiting lamps—These lamps light when calls in the attendant queue are waiting to be processed. The left lamp lights when at least one call is waiting to be answered. The right lamp lights when the calls waiting exceed the limit preset by the customer for the system.
 - Position Available lamp—This lamp lights when the console is available for calls and goes dark when the console is not available.
- Call Appearance Area—This area contains 6 buttons with 12 associated status lamps. The buttons are used to answer incoming calls or to originate calls. The lamps show the status of the call appearance.
- Programmable Feature Area—This area contains 24 feature buttons. The topmost 6 buttons have 2 status lamps each and the other 18 buttons have 1 status lamp each. Even though the 6 topmost buttons have 2 status lamps each, only the bottom row of lamps is used in V1. In V2 or V3, the Forced Release and Position lamps are used. The following 5 buttons are preset and the other 19 are programmable.
 - Split—Reconnects the attendant to a call that was split from the console but not from the system.
 - Hold—Places a call on hold.
 - Forced Release—Releases the attendant and disconnects all parties on a call, including those on hold.
 - Night—Places the primary and daytime consoles in the Night Service mode and makes the night console available for calls, if a night console is active. (See the Night Service features in Chapter 2 for the various night answering arrangements.)

- Position Busy—Places the console in a busy mode. Incoming calls cannot be received; however, calls can be originated.
- Trunk Group Select Area—This area contains 12 Trunk Group Select buttons used to select predesignated outgoing trunk groups. The left group of six buttons has three status lamps each, and the attendant can control the trunk groups assigned to the buttons. The right group of six buttons has one status lamp each, and the attendant cannot control the trunk groups assigned to the buttons. (See the Attendant Direct Trunk Group Selection, Attendant Control of Trunk Group Access, and Trunk Group Busy/Warning Indicators to Attendant features in *AT&T System 75—Feature Description*, 555-200-201, for details.)

For V3, the attendant console has a special alerting tone for the Emergency Access to the Attendant feature.

Console Power

Several arrangements are available for providing power to the console. Two basic consoles, with or without a selector console, can receive power from the switch cabinet Accessory Power for battery backup or a separate 48-volt power supply can power each console. The 48-volt Emergency Transfer Relay Power is not to be used for attendant console power.

If power is not supplied from the switch cabinet Accessory Power, a separate 48-volt power supply can provide power for the console. The power supply can be a KS-22911 List 1 Power Unit or a 346A Power Unit depending on the distance of the power supply from the console. Table 4-C shows these power supply options along with the switch cabinet Auxiliary Power and the recommended console cable distance for each arrangement.

Table 4-C. Power Supply and Console Cable Distance

POWER UNITS	CABLE DISTANCE FROM ATTENDANT CONSOLE WITH/WITHOUT SELECTOR CONSOLE*
KS-22911, list 1	175 feet
346A (10 Watts)	175 feet
346A (20 Watts)	350 feet
Accessory Power	350 feet

* These distances are based on minimum 26 gauge wire. Distance limitations shown are the recommended distances for attendant console powering. Actual distances can vary for each installation.

Note: The 329A Power Unit should not be used to power attendant consoles.

A voltage of 42 volts dc or greater is required for proper console operation under load. If recommended distances for console powering are exceeded, then measurements can be made at the console to insure proper voltage. This measurement of 42 volts minimum can be made across pins 7 and 8 of the console mounting cord connector at the console. An 85A connecting block, or equivalent, can be used to access these pins with the console mounting cord connected to the console.

The KS-22911 List 1 Power Unit plugs directly into a 115-volt ac receptacle and powers only one console.

The 346A Power Unit provides four 10-watt jack outputs that can be used to power attendant consoles. Slide switches located between the top two and bottom two jacks on the 346A Power Unit allow the unit to be arranged for two 20-watt jack outputs. With a slide switch in the up position, 20 watts of power is available at the jack above the switch. The jack below the switch will have no power.

The 346A Power Unit is powered by a 346A1 Power Panel that plugs into a 115-volt ac receptacle. As many as three 346A Power Units can be mounted in one 346A1 Power Panel.

For additional information on console power requirements and Accessory Power connections to the console, see *AT&T System 75—Wiring*, 555-200-111.

Optional Selector Console

The selector console (see Figure 4-11) is 8-1/2 inches wide by 8-3/4 inches deep by 4-3/4 inches high. The selector console is located adjacent to, and receives power from, the attendant console.

The optional selector console provides the Direct Extension Selection (DXS) With Busy Lamp Field (BLF) feature (see Chapter 2). This feature provides the attendant with a visual indication of the active or idle status of the extension numbers assigned to the system. When a multi-appearance voice terminal user is active on a call, the BLF lamp will light even though other call appearances are available for incoming calls.

This feature also allows the attendant to place calls to system users by pressing a particular Group Select button and a DXS button.

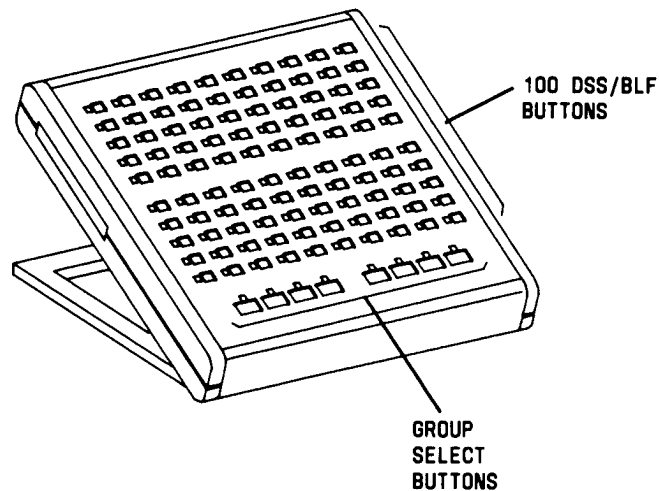


Figure 4-11. Selector Console

System Access Terminal

The System Access Terminal (SAT) (see Figure 4-12) is a 610 Business Communications Terminal (BCT). The SAT is a general purpose asynchronous data terminal that provides a standard EIA RS-232C interface for administrative and maintenance functions. The SAT can be connected through a Digital Terminal Data Module (DTDM), a Processor Data Module (PDM), or an Asynchronous Data Unit (ADU) (V2 or V3) used in conjunction with a TN726 Data Line circuit pack, and can serve as a remote on-premises administration terminal.

The system can be equipped to use four different types of SATs. The type of SAT used depends on the version of the system. The four types of terminals and the version of system that can use these terminals are listed below:

- 610 BCT (V2, V3)
- 4410 (V2, V3)
- 4425 (V2, V3)
- 513 BCT (V1, V2, V3).

The 610, 4410, and 4425 can be used for a V2 or V3 system. The 513 BCT is the standard terminal that can be used with V1, V2, or V3 systems. The 513 is the only terminal that can be used with a V1 system. The 513 is the default terminal selected by system software (V2 or V3) if no other type of terminal is selected when the user logs in.

Maximum cabling distances from the switch are explained in Chapter 9.

The SAT requires 115-volt 60-hertz commercial power from a 3-wire grounded outlet. Power for the dedicated SAT is provided by an outlet located at the bottom rear of the system cabinet. The dedicated SAT must be located in the same equipment room as the switch cabinet.

The terminal can be used on a table or desk. It requires approximately 3 square feet of space.

See *AT&T System 75 and System 75 XE—Administration*, 555-200-500 for terminal operating instructions. Refer to the following manuals for additional information on these terminals:

- *AT&T Information Systems 513 Business Communications Terminal (BCT)*, 999-700-485, for the 513
- *AT&T Information Systems 610 Business Communications Terminal (BCT)*, 999-300-270, for the 610
- *AT&T Information Systems Display Terminal*, 999-300-180, for the 4410
- *AT&T Information Systems Display Terminal*, 999-310-181, for the 4425.

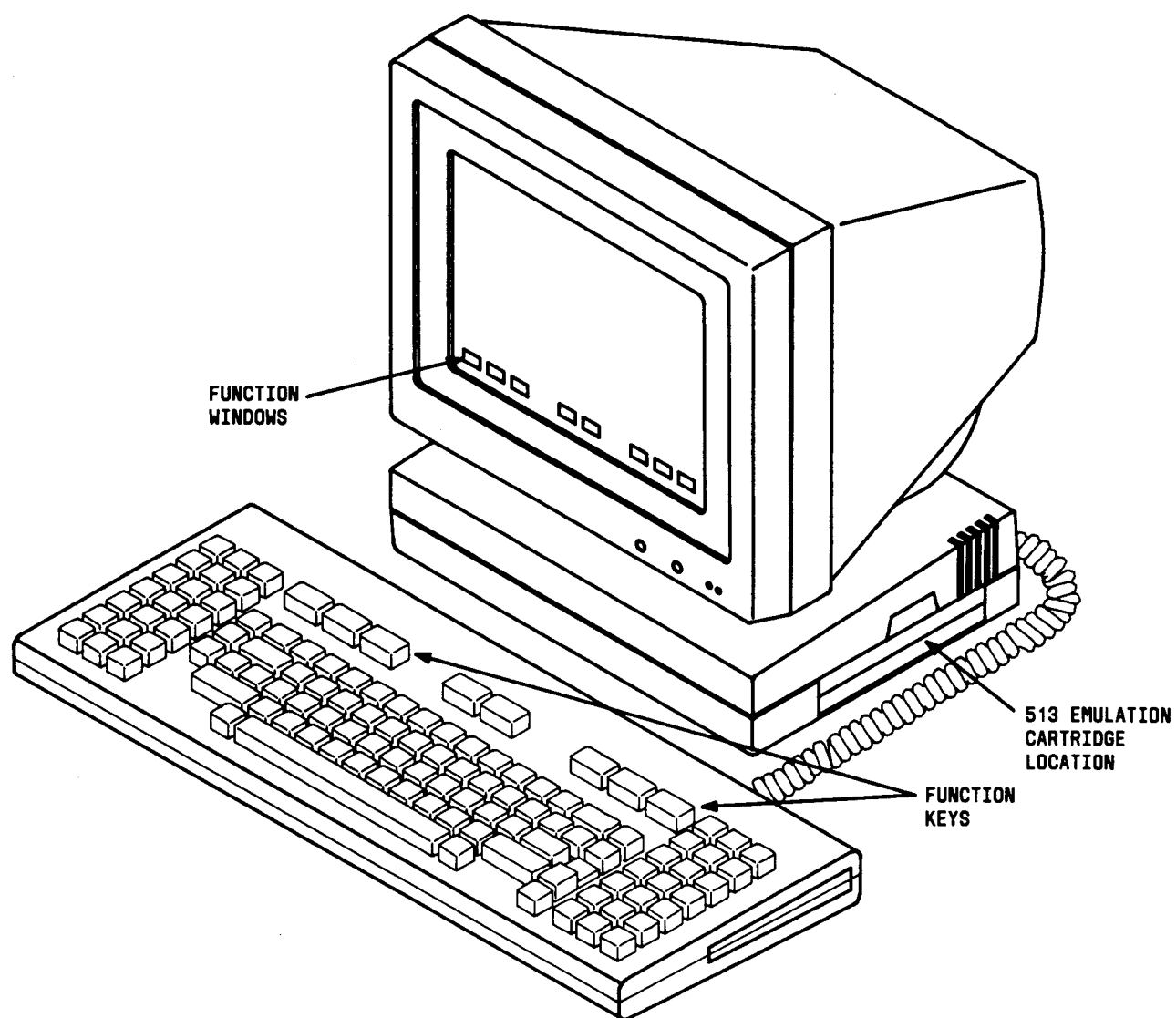


Figure 4-12. 610 BCT

Voice Terminals

Voice terminals combine the capabilities of both telephone and computer and have a variety of controlling and monitoring capabilities. While providing basic telephone service (placing and answering calls), voice terminals can also be used to activate the advanced features of the system.

Table 4-D lists the various System 75 voice terminals. Terminals not supported by screen forms must be implemented as other type terminals. See *AT&T System 75—Implementation*, 555-200-650 for V1, 555-200-651 for V2, 555-200-652 for V3, for details.

Table 4-D. System Voice Terminals

TERMINAL TYPE	MODEL	SCREEN FORM SUPPORTED	
		VERSION 1	VERSION 2 OR 3
Single-Line Analog	2500/2554	Yes	Yes
	2500 With Message Waiting Adjunct	No	Yes
	2500DMGC	Yes	Yes
Multi-Appearance Hybrid	7303S	Yes	Yes
	7305S	Yes	Yes
Multi-Appearance Digital	7401D (Note)	No	Yes
	7403D	Yes	Yes
	7404D	No	Yes
	7405D	Yes	Yes
	7406D (With Display)	No	Yes
	7407D	No	Yes

Note: Single line digital with a second virtual call appearance

Table 4-E lists the voice terminals used in other systems that can be reused in System 75. Terminals not supported by screen forms must be implemented as other type terminals. See *AT&T System 75—Implementation*, 555-200-650 for V1, 555-200-651 for V2, 555-200-652 for V3, for details.

Table 4-E. Reusable Voice Terminals

TERMINAL TYPE	MODEL	SCREEN FORM SUPPORTED	
		VERSION 1	VERSION 2 OR 3
Single-Line Analog	500	No	Yes
	7101A	Yes	Yes
	7103A Programmable	Yes	Yes
	7104A	Yes	Yes
Multi-Appearance Hybrid	7302H	No	No
	7303H	No	No
	7305H01B	No	No
	7305H02B	No	No
	7305H03B	No	No
Multi-Button Electronic Telephone (MET) Sets	10 Button	Yes	Yes
	10 Button With Built-In Speakerphone	Yes	Yes
	20 Button	Yes	Yes
	30 Button	Yes	Yes

Data Modules

Data modules provide an interface between the digital switch, Data Terminal Equipment (DTE), and Data Communications Equipment (DCE). DTE is equipment that provides the data source, termination, or both—a host computer or a data terminal is an example of DTE. DCE is equipment that provides the functions required to establish, maintain, and terminate a data call—a modem is an example of DCE.

Both sides of a data call require DCE and DTE. Thus, a host computer (DTE) connected to a DCE-type data module would meet the requirement on one side of a data call. The digital switch provides a Digital Communications Protocol (DCP) interface to the data module.

The DCE and DTE interconnect via an RS-232C, V.35, RS-449, RS-366, or Category A coaxial interface. The interface is transparent to the code being used.

Data modules contain option switches that are set to match the data equipment. These options are as follows:

- Half- or full-duplex operation
- Standard data rates of 300 bps, 1.2 kbps, 2.4 kbps, 4.8 kbps, 9.6 kbps, 19.2 kbps, 56 kbps, and 64 kbps

- Nonstandard asynchronous data rates below 1800 bps (low)
- Internal or external timing
- Parity—even, odd, or none.

The data modules also provide several lamps that display operating status and test results.

The following data modules are available with the system:

- Digital Terminal Data Module (DTDM)
- Built-In 7404D Data Module Base (asynchronous only)
- Z702AL1-DSU Data Module Base (Optional base for 7407D voice terminal) (asynchronous only)
- Z703AL1-DSU Data Module Base (Optional base for 7406D voice terminal) (asynchronous only)
- Processor Data Module (PDM)
- Trunk Data Module (TDM)
- Modular Processor Data Module (MPDM)
- Modular Trunk Data Module (MTDM)
- 3270 Data Module
- Asynchronous Data Unit (ADU) (V2 or V3).

Data Terminals

A data terminal is a work station for entering and retrieving data. The terminal communicates through lines, trunks, switches, and data modules with data endpoints such as computers and other data terminals. Some data terminals contain built-in voice capabilities similar to digital voice terminals.

The following data terminals are available with System 75:

- AT&T Personal Terminal 510D
- Model 513 Business Communications Terminal (BCT)
- Model 515 BCT
- Model 610 BCT.

The 513 BCT and 610 BCT, in addition to being optional units of peripheral equipment, are used in System 75 as System Access Terminals (SATs). The SAT is dedicated to system administration and maintenance and is located in or nearby the equipment room with the System 75.

Printers are often used in conjunction with data terminals in order to obtain hardcopy output from the data terminal. A brief description of some of the printers available with the System 75 follows.

Printers

Table 4-F lists the printers available for use with System 75. All these printers have RS-232C and DCP interfaces.

Table 4-F. Printers

PRINTER	DESCRIPTION	APPLICATION
443	132 Columns Matrix printer Tractor feed 30 characters per second (cps) Draft quality output Standard Serial Interface (SSI)	Provides hard copy of data received under the direction of a data communications processor or controller.
445 (AP only)	132 Columns Line printer Tractor feed 55 cps Draft quality output 3 Interface Options: EIA, IBM* computer, Centronics† 96 Upper/Lower Case Characters 2000 feet maximum distance from AP	Prints messages received on-line from an AP or controller.

* Trademark of International Business Machines, Inc.

† Trademark of Centronics Data Communications Corporation.

Table 4-F. Printers (Contd)

PRINTER	DESCRIPTION	APPLICATION
450	10, 12, 15 characters per inch (variable setting) Vertical line spacing 3/6/8 lines per inch (variable setting) Full font printer Document quality output 5000 foot maximum distance from host SSI Interface 45 cps	Auxiliary printer where document quality is the primary consideration. A slave device (auxiliary only) to an applications processor via an SSI data link.
460	Medium speed Bidirectional Draft quality Matrix printer Interface Options: EIA, SSI, IBM computer Up to 240 cps 5000 feet maximum distance from Host	Prints data received under direction of a communications processor or controller when copy quality is essential.
470	Desk Top Dot Matrix Draft quality 120 cps 10 characters per inch Interface Options: IBM computer or Centronics	Prints data received under direction of a communications processor or controller.
475	Matrix printer Letter quality 120 cps 10 characters per inch Bidirectional EIA Interface 50 feet maximum distance from Host	Interface to a printer system. Prints under the direction of a communications processor or controller.

CHAPTER 5. SOFTWARE DESCRIPTION

General

The System 75 software consists of the switched services software, administrative software, and maintenance software. This software runs on top of the real-time operating system software.

Switched Services Software

The switched services software provides the call (switched voice and data) services, the message and display services, and other terminal services. The software resides in the switch processing element (SPE), the Network Control circuit, the Interface 2 circuit or Processor Interface (when provided), and the 8-bit on-board microprocessors in the port and service circuits.

The message and display services of the SPE provide incoming and outgoing call identification, the Leave Word Calling feature, and the interface to AP-provided or Message Server Adjunct-provided Leave Word Calling feature. The terminal services provide programming of abbreviated dialing list entries and terminal display services such as time of day.

The switched services software in the SPE, the Network Control circuit, and the 8-bit on board microprocessors in the port and service circuits use the operating system to provide a process based, message passing, execution environment. The operating system scheduler provides SPE scheduling for the software according to process priority.

The software in the Interface 2 or Processor Interface circuit pack provides the protocol support for the communications link between the AP, Distributed Communications System (DCS), Call Management System (CMS), or Audio Information Exchange (AUDIX) and the SPE. The Interface 2 or Processor Interface software also communicates between the System 75 commands and the format the AP, DCS, CMS, MSA, or AUDIX accepts.

Administrative Software

The administrative software provides the control for system rearrangement and change via a forms-based interface. This software resides in the SPE. Specifically, this software:

- Organizes the translation data for administrable entities in the system into forms that can be viewed and changed at the System Access Terminal (SAT) or by the Initialization and Administration System (INADS). The forms provide for administering the system, obtaining system traffic measurements, and performing maintenance operations.

- Tests entered data for consistency with data previously entered in order to avoid such errors as the assignment of the same extension number to two voice terminals. An erroneous or inconsistent data entry is disallowed and an error indication is provided.
- Causes the translation data to be downloaded (saved), on command, to the tape located in the High Capacity Minirecorder (HCMR) or Removable Mass Storage Subsystem (RMSS). The download operation can also be administered to automatically occur daily.

Maintenance Software

The maintenance software contains two levels. A high-level subsystem exists on top of the operating system and a low-level subsystem resides independently of the operating system. The high-level maintenance software resides entirely in the SPE. The low-level maintenance software resides in the SPE and Maintenance circuit.

The high-level maintenance software operates during normal system operation. The low-level maintenance software operates when the system is in a state that it is unable to process calls, such as after a system outage (Power Failure Transfer mode) or during the initial installation.

High-Level Maintenance Software

The high-level maintenance software provides the following:

- System Initialization and Recovery—Ability of system to recover on its own from serious temporary malfunctions or failures
- Software Maintenance—Ability to recover from a process in the system software that is in an infinite loop or waiting for an event that will never occur
- Dynamic System Configuration—Automatic tracking of port and service circuit pack insertion, removal, failure, and translations
- Hardware Diagnostics and Tests—Automatic periodic testing of System 75 hardware and an interface for the customer or AT&T's technician to do the periodic tests on demand
- Maintenance Load Regulation—Ability to reduce the amount of periodic testing when a large amount of call processing is required.

Low-Level Maintenance Software

When the system is first powered up, or restarted from a system level recovery, the low-level maintenance software has control. It loads the operating system from tape, if necessary. The operating system then has control and creates the high-level maintenance software. The high-level maintenance software then starts all of the administrative and switched services software.

Memory Allocation

The system software, like the hardware, is identified by release number and by version. Each version pertains to a particular memory configuration for the release number. Main memory is located in the SPE. The main memory contains the operating system, call processing, system data, system translations, and other related programs.

Real-Time Constraints

Real-time constraints are a function of the speed of the SPE and the traffic load. The switch is designed so that many time-consuming and repetitious functions are performed by processors in the port and service circuit packs, thus relieving the SPE.

Traffic load, defined as the sum of static and dynamic loads, is a function of the number of features that are executed, the frequency with which they are executed, the customer configuration (dynamic load), and the instantaneous (peak) call processing load. For additional information concerning traffic engineering, refer to *AT&T System 75—Administration*, 555-200-500.

Tape Cartridge

Overview

The HCMR or RMSS provides a nonvolatile system bootstrap and translation storage device. The software is contained on a tape cartridge cassette. The cassette provides a flexible and convenient way to transport software from the factory to the field. Therefore, software updates/revisions can be easily incorporated into existing systems.

The HCMR or RMSS has extensive error detection and correction capabilities that minimize the need to have multiple copies of data on the tape. The drive can read or write in either the forward or reverse tape directions.

Organization

Data is recorded on the tape cartridge in 1024 word blocks using a 5-track format for the HCMR and a 6-track format for the RMSS. Data is organized in a logically ordered format that assures the quickest reload of the system in case of a power failure.

Data is written sequentially, a block at a time, on each of the tracks on the tape cartridge. The tracks are arranged in serpentine fashion. Subsequent access, for reading or editing, can be done randomly over the blocks previously written.

The HCMR records data on the tape in the incremental or streaming mode. In the incremental mode, data is efficiently read or written—a single block of data at a time. In the streaming mode, data is continuously read or written. For Version 1, the HCMR uses the incremental operating mode exclusively. Version 2 or Version 3 uses the streaming mode during a system boot and the incremental mode for all other operations. The HCMR tape cartridge stores up to 12M bytes of data in the incremental mode and up to 25M bytes of data in the streaming mode.

The RMSS records data on the tape in the incremental mode for all operations but emulates the streaming mode during system boot for Version 2 or 3. The RMSS tape cartridge stores up to 18M bytes of data.

The high density digital tape in the cartridge is approximately 600 feet long. During read or write operations, the HCMR tape speed is 50 inches per second; and, during search operations, the tape speed is 100 inches per second. During read, write, and search operations the tape speed for the RMSS is 78 inches per second and during rewind it is 90 inches per second.

Configuration

The tape cartridge is available in a generic configuration. The generic cartridge contains the program instructions with default values for some of the administrable translations. The formatted HCMR and RMSS tape cartridges are not interchangeable.

CHAPTER 6. SYSTEM ADMINISTRATION

Screen Forms

The system is administered using screen forms (see Figure 6-1) displayed on the System Access Terminal (SAT). The forms are used to display and list data, and to add, change, and remove system and voice terminal features.

Page 1 of 4

STATION

Extension:

Type: 7401D

Lock Messages: n

COR: 1

Room: _____

Port : _____

Security Code: _____

COS: 1

Jack: _____

Name: _____

Coverage Path: _____

Cable: _____

FEATURE OPTIONS

LWC Reception? _____

Headset? n

Coverage Msg Retrieval? y

LWC Activation? y

Auto Answer? n

Data Restriction? n

Redirect Notification? y

Idle Appearance Preference? n

PCOL/TEG Call Alerting? n

Data Module? n

Restrict Last Appearance? _____

Display? _____

ABBREVIATED DIALING

List1: _____

List2: _____

List3: _____

BUTTON ASSIGNMENTS

1: call-appr

6: _____

2: call-appr

7: _____

3: _____

8: _____

4: _____

9: _____

5: _____

Figure 6-1. Typical Defaulted Screen Form

Copies of screen forms are provided in *AT&T System 75—Implementation*, 555-200-650 for V1, 555-200-651 for V2, 555-200-652 for V3. Procedures and requirements for entering the data are provided in *AT&T System 75 Administration*, 555-200-500. A formal training course on system administration is offered by AT&T. In addition, a PC-based program (555-200-550) is available.

Commands

Screen forms are accessed by entering valid system commands at the SAT. These commands are standard English words and phrases that instruct the system to do a specific function.

CHAPTER 7. SYSTEM MAINTENANCE

General

This chapter provides general information on System 75 maintenance. For more details, see *AT&T System 75—System Maintenance*, 555-200-105.

The primary objective of System 75 maintenance is to detect, report, and clear troubles as quickly as possible and with minimum disruption of normal service. This goal is supported by periodic tests, automatic software diagnostic programs, and fault detection hardware. System design allows most troubles to be reduced to the circuit pack level.

The System 75 hardware is maintained as a group of independent units or maintenance objects, as far as possible. Each maintenance object is normally a separately replaceable unit. These units include circuit packs, power units, fans, the tape unit, voice terminals, lines, and trunks.

There are two general categories of troubles in system maintenance: system-alarmed troubles and user-reported troubles. For alarmed troubles, both the remote maintenance facility Initialization and Administration System (INADS) and the local attendant console are automatically alerted. Most alarms are also reported by light-emitting diodes (LEDs). User-reported troubles usually result from service problems at individual voice and data terminals and are often related to alarmed conditions. In System 75, the major part of the maintenance effort is directed toward system-alarmed troubles. The system itself is responsible for detecting and reporting most problems automatically, without human intervention.

The system automatically retires alarms as well as raises them. After a trouble has been cleared, in response to an alarm, the system retests the previously faulty area. When the trouble is no longer detected, the alarm is removed. It is not necessary for maintenance personnel to retire alarms after a problem has been fixed.

Maintenance Hardware

The following hardware is provided for speed and accuracy in fault detection diagnosis and repair.

- Maintenance Circuit Pack—Functions as follows:
 - Originates alarm information to the attendant.
 - Provides alarm LEDs for system status.
 - Provides emergency transfer switch and emergency transfer control.
 - Monitors and controls the reset condition and sanity of the switch processing element (SPE).

- Monitors and controls the power units.
 - Monitors the cabinet environment.
 - Monitors the auxiliary cabinet and battery plant for alarms.
 - Provides direct access to System Access Terminal (SAT).
 - Supports maintenance and administration commands on the synchronous INAD's link. Version 3 supports synchronous and asynchronous links.
- System Access Terminal—Provides a maintenance interface for the maintenance technician.
- Attendant Console LEDs—Provide two red LEDs, labeled Alm and Ack. The left LED lights steadily when there is a major or minor alarm at the switch cabinet. The right LED lights steadily if the alarm has been successfully reported to INADS. If the system is unable to report the alarm to INADS, the right LED flashes; this is a signal for the attendant to call INADS and report the alarm.
- Multifunction Voice Terminals—Major, minor, and warning buttons may be administered.
- Circuit Pack LEDs—indicate the following when lighted:
 - Red (alarm)—The system has detected a fault in this circuit pack.
 - Green (test)—The system is running tests on this circuit pack.
 - Amber (busy)—This circuit pack is in use.
- In-Line Error Detection Circuitry—Checks for correct operation each time a maintenance object is used.

Maintenance Tests

The maintenance tests used in System 75 can be divided into two groups: periodic and demand. The periodic tests are run automatically at fixed intervals on a specific schedule. The short tests are run hourly and the long tests are run every 24 hours. Heavy call processing may push these tests out.

Demand tests are run by the system when it detects a need for them, or by maintenance personnel when required in trouble clearing activities. Demand tests include the periodic tests, plus others that are required only when trouble occurs. Some of the non periodic tests may be disruptive to system operation. Maintenance personnel, using the SAT, can initiate the same tests that the system can, with the results being displayed on the screen.

Maintenance Procedures

Alarm Reporting

If a maintenance object in the system fails some of the periodic tests a preset number of times, the system automatically generates an alarm. This alarm is an indication to maintenance personnel that action is required to restore the system to a normal condition. The system supports three levels of alarms:

- Major Alarms—Failures that cause critical degradation of service and require immediate attention.
- Minor Alarms—Failures that cause marginal degradation of service while not rendering a crucial portion of the system inoperable. This condition requires action, but its consequences are not immediate. Problems might be impairing service to a few trunks or stations or interfering with one feature across the entire system.
- Warning Alarms—Failures that cause no noticeable degradation of service. Warning Alarms are not reported to the attendant console or INADS.

Logs of Errors and Alarms

The system produces a software record of every error detected in the system. This record, the Error Log, can be displayed on the SAT by maintenance personnel. It can be useful when analyzing problems that have not caused an alarm or when alarms cannot be retired by replacement of maintenance objects.

When errors result in alarms, the alarms are listed on another software record, the Alarm Log. This can also be displayed at the SAT. If a number of alarms are active, the Alarm Log can be used to determine which alarms should be cleared first.

Both the Alarm Log and the Error Log are historical. They list current conditions that have not been resolved as well as past alarms and errors to provide a profile of system maintenance. For Version 2 or 3, the Error Log is saved on tape after a major system failure or restart.

Local and Remote Testing

The SAT or the remote administration terminal located at INADS can do the following:

- Display error and alarm logs
- Test circuit packs
- Test other system functions

- Busyout and release system equipment
- Reset the system.

Port Circuit Pack Replacement and Verification Testing

A System 75 port circuit pack can be replaced without turning off power or interrupting service except in the area directly affected by the replacement. In most cases, verification tests are automatically run on the circuit pack as soon as it is plugged in.

CHAPTER 8. UPGRADES AND ADDITIONS PROCESS

General

A System 75 upgrade is the process of transforming the hardware and software of a previously installed system to that of a later version system. This upgrade is performed when increased call processing demands, need for greater feature capabilities, and other changes in customer requirements justify such an action.

The additions process refers to adding voice terminals, circuit packs, carriers, or software features to an existing system without upgrading the version of the system. The design of the system makes additions to a system easy and aids a customer in planning and managing system growth.

This chapter provides a synopsis of the upgrades and additions process. For details on the upgrade process and administration required, see *AT&T System 75—System Upgrades and Additions*, 555-200-106, and *AT&T System 75—Administration*, 555-200-500.

Table 2-A in Chapter 2 (Features and Services) lists the features available for Versions 1, 2, and 3.

Upgrade Version 1 to Version 2

Basic Upgrade

The basic Version 1 (V1) to Version 2 (V2) upgrade process requires the following:

- Replacing the software tape.
- Converting TN711 Processor circuit pack to TN711B Processor circuit pack
- Converting TN748 Tone Detector circuit packs to TN748B Tone Detector circuit packs
- Adding an additional TN734 Memory circuit pack if required
- Saving and reloading translation data
- Recentering some translation data manually (Automatic Route Selection translations)
- Activating and administering new features
- Creating the Version 2 operational and backup tapes.

Circuit Pack Additions and Replacements

The following circuit packs, although not required for the basic upgrade, may need to be added or replaced for additional Version 2 features:

- TN722B DS1 Tie Trunk—Provides connection capability to DS1, alternate/voice data (AVD), and Digital Multiplexed Interface (DMI) facilities.
- TN725B Speech Synthesizer—Provides speech synthesis application for Leave Word Calling feature and supports the Automatic Wakeup feature in Version 3.
- TN726 Data Line—Provides direct connection capability to asynchronous equipment with RS-232C interfaces.
- TN738 Interface 2—Replaces TN720 Interface 2 circuit pack. Provides the interface to Distributed Communications System (DCS) and Applications Processor (AP). The AP may also need to be upgraded for Version 2. The AP upgrade is discussed in this section under the heading Applications Processor Upgrade. If the three interface packs are added as part of the V2 upgrade, S-bus terminators must be added on the Processor and Interface 2 backplane.
- TN765 Processor Interface—Replaces three interface circuit packs. Provides the interface to Distributed Communications System (DCS) and Applications Processor (AP).
- TN741 Tone-Clock—Replaces TN714 Tone-Clock circuit pack only when DS1 Tie Trunk circuit packs are ordered. Provides clock signals required for DS1 synchronization for AVD tie trunks.
- TN760B Tie Trunk—Provides the release-link trunks required for Centralized Attendant Service (CAS). The release-link trunks can also be provided by the TN722 DS1 Tie Trunk circuit pack.
- TN746 Analog Line (16 ports)—May be used instead of TN742 (8 ports) to provide an additional 8 ports per circuit pack for on-premises (in building) analog terminals. TN746 must be used to provide 800-line capacity.

Applications Processor Upgrade

The AP may need to be upgraded for Version 2. Version 1 of the system supports Release 1 Version 2 and Release 2 Version 1 of the AP. Version 2 of the system supports only Release 2 Version 1 of the AP. Confer with your Technical Consultant for details.

Upgrade Version 1 or Version 2 to Version 3

The upgrade to Version 3 (V3) can be done from V1 or from V2, and with either a High Capacity Minirecorder (HCMR) or Removable Mass Storage Subsystem (RMSS) unit. All new V3 systems will be shipped with RMSS only.

Since the hardware required for the V1 to V3 upgrade is that required of the V1 to V2 upgrade, the three circuit packs required for the basic V2 upgrade must be installed. Also, some translation data must be saved and recentered manually. In essence, the required hardware and administration must be done as they were for the V2 upgrade. V2 is an “intermediate step” on the way to V3. In other words, if upgrading directly from V1 to V3, perform a union of the procedures from V1 to V2 and V2 to V3 and only make the V3 tape.

Basic Version 2 to Version 3 Upgrade

The basic V2 to V3 upgrade requires the following:

- Replacing the software tape. Two tapes are offered to support either HCMR or RMSS.
- Replacing the TN731 Maintenance circuit pack with TN731B Maintenance circuit pack. The TN731B is required to support both synchronous and asynchronous maintenance and administration commands in Version 3.
- Saving and reloading translation data.
- Recentering some translation data manually (announcement translations).
- Activating and administering new features.

Circuit Pack Additions and Replacements

The following circuit packs, although not required for the basic upgrade, may be added or replaced for additional Version 3 features:

- TN750 Announcement—Provides an integrated means for recording announcements that can then be played back on demand from call processing as part of a calling feature. Messages can be recorded by customers from their voice terminals, on- or off-premises, and have flexible message lengths. Up to 16 different messages can be played back simultaneously. The TN750 cannot be used for the Automatic Wakeup feature.
- TN769 Analog Line—Provides eight ports for up to eight on-/off-premises analog terminals and supports touch-tone and rotary dial and the neon message waiting indicator.

- TN752 Power Unit—Converts -48 volts dc to -5 volts dc required by the circuit packs and also provides 150 volts dc for neon message waiting. The J58890BB port carrier backplane must be a List 2 to support the TN752 Power Unit. The control carrier backplane accommodates the TN752 without change.
- TN747B CO Trunk—Supports the Abandoned Call Search feature for Automatic Call Distribution (ACD) applications.
- TN763B Auxiliary Trunk—Supports Audichron announcement equipment.
- TN725B Speech Synthesizer—Supports the Automatic Wakeup feature.

Attendant Console Replacement

To support the Emergency Access to the Attendant feature, the console must be replaced (apparatus code 301A1-A).

Upgrade Small Cabinet to Medium Cabinet

The small cabinet to a medium cabinet upgrade process requires the following:

- Disconnecting and moving small cabinet; moving medium cabinet into place
- Moving port carrier from small cabinet to port carrier position C in medium cabinet
The medium cabinet is shipped with a control carrier and a port carrier in position B.
- Moving circuit packs and adding circuit packs as required
- Cabling and wiring medium cabinet
- Powering up system
- Saving, loading, and recentering system translations.

This upgrade process requires service interruption.

Additions to the System

The following additions can be made to an existing system. Detailed procedures on making these additions are discussed in *AT&T System 75—System Upgrades and Additions*, 555-200-106.

Voice Terminal Additions

Voice terminals are added to a system if unused port slots are available. The voice terminals must be physically wired to the cross-connect field and the system. The SAT is used to administer these voice terminals.

Circuit Pack Additions

Circuit packs are added to provide additional port capacity for voice terminals and features. The universal port slots available with a system allow the installation of port and service circuit packs without a service interruption.

Carrier Additions

With System 75, adding a port carrier increases the port slot capacity. The system cabinet houses up to 3 port carriers. Installing additional carriers interrupts service.

Software Feature Additions

Software Feature additions allow customers to buy an added software package feature such as Automatic Route Selection (ARS). A special login is required to activate these features that are always resident on the system tape.

CHAPTER 9. TECHNICAL SPECIFICATIONS

General

This chapter provides information on the overall characteristics and capacities of the system. Detailed specifications for system features are contained in *AT&T System 75—Feature Description*, 555-200-201.

The items presented in this chapter are grouped here for ease of reference. However, most items are discussed in other chapters of this manual. Items such as Cabling Distances are not discussed in other chapters of this manual and are presented here only.

Hardware and Software Parameters

A list of System 75 maximum parameters for hardware and software items are listed below and on the next several pages.

ITEM	R1V1	R1V2	R1V3
Abbreviated Dial Lists:	502	802	802
Personal Lists	400	800	800
Max Entries	10	10	10
Per Extension Number	1	3	3
Group Lists	100	100	100
Max Entries	15	90	90
Per Extension Number	3	3	3
System List	1	1	1
Max Entries	50	90	90
Enhanced List	-	-	1
Enhanced List	-	-	1000
Size of List Entry	16	24	24
Total Entries	2500	4010	4010
Adjuncts:			
Application Processors (AP16)	1	1	1
3B2 Message Server Adjuncts (MSA)	-	-	1
AUDIX Systems	-	-	1
CMS Systems	-	-	1
PMS Systems	-	-	1
SMDR Output Devices	1	1	1

ITEM	R1V1	R1V2	R1V3
Attendant Service:			
Queue Length	30	30	30
Daytime Consoles	6	6	6
Night-Only Console	1	1	1
Emergency Access Queue Slots	-	-	50
Authorization:			
Authorization Codes	-	-	5000
Length of Authorization Codes	-	-	4-7
Barrier Codes (Remote Access)	10	10	10
Length of Barrier Code	4-7	4-7	4-7
Automatic Alternate Routing (AAR) and Automatic Route Selection (ARS):			
Patterns	16	254	254
ARS Patterns for Measurement	-	20	20
Trunks in a ARS Pattern	6	6	6
Toll Tables	4	32	32
NPA(X-0/1-X)	200	200	200
NXYs	800	800	800
RNXs	-	640	640
ARS HNPA Tables	1	1	4
ARS RHNPA Tables	4	32	32
FNPA Tables	1	1	4
RNX Tables	-	1	4
Choices per RHNPA Table	-	12	12
Entries in TOLL Table	800	800	800
Entries in HNPA & RHNPA Tables	800	800	800
Entries in RNX Table	-	640	640
Entries in FNPA Table	200	200	200
FRLs	8	8	8
Digits Inserted for ARS/AAR	-	36	36
Digits Deleted for ARS/AAR	-	11	11
Partition Groups	-	-	4
Automatic Call Distribution (ACD) (See Hunt Group)	-	-	-
Automatic Callback Calls	40	80	80
Automatic Wakeup			
Wakeup Requests per Extension	-	-	1
Max Wakeup Requests	-	-	800
Max Wakeup Requests in any 15-min Interval	-	-	200
Advance Wakeup Request Time	-	-	23 hrs, 55 min
Attendant Consoles and/or Front Desk Terminals in Display Mode	-	-	10

ITEM	R1V1	R1V2	R1V3
Bridged Call Appearances	400	500	800
Cabinets (Basic)	1	1	1
Call Coverage:			
Coverage Paths per System	200	400	400
With Hospitality Parameter Reduction	-	-	5
Coverage Points per Path	3	3	3
Coverage Answer Groups	100	200	200
Members per Coverage Answer Group	8	8	8
Max number of Coverage Paths in a Coverage Path List	1	1	4
Call Park			
Attendant Group Common Shared Extension Numbers	10	10	10
Call Pickup Groups	200	400	400
With Hospitality Parameter Reduction	-	-	5
Members per Group	25	50	50
Total Members	400	800	800
Carriers:			
Control	1	1	1
Port (5-Carrier Cabinet)	4	4	4
Port (2-Carrier Cabinet)	1	1	1
Centralized Attendant Service			
Release Link Trunks as Branch	-	16	16
Release Link Trunks as Main	-	-	200
Branches per Main	-	-	99
Classes of Restriction	64	64	64
Classes of Service	16	16	16
Code Calling Ids	125	125	125
Communications Interface Links*	1	4	4
Conference Parties	6	6	6
Dial Plan			
Extensions	600	1200	1200
Dial Access Codes	50	50	70
Trunk Access Codes	100	118	157
Name Size in Chars	15	15	15
Min Extension Size	2	1	1
Max Extension Size	4	5	5
Prefix Extensions			Y†
Digital Data Endpoints (Note 1) (Defined in the Glossary)	200	400	400

* Only one link can be used for the Applications Processor (all versions).

† A prefixed extension number can be six digits.

ITEM	R1V1	R1V2	R1V3
Do Not Disturb			
Maximum Do Not Disturb Requests	-	-	800
Attendant Consoles and/or Front Desk Terminals in Display Mode	-	-	10
DS1 Circuit Packs	-	20	20
Facility Busy Indicators	1000	1600	1600
Buttons per Tracked Resource	100	100	100
Hunt Groups (DDC and UCD Combined)	32	32	32
With Hospitality Parameter Reduction	-	-	5
Measured ACD Agents per System	-	-	200
ACD Supervisors per System	-	-	32
Members per Group	32	32	100
Members per System	448	448	448
Queue Slots per Group	35	35	100
Queue Slots per System	1120	1120	1000
Announcements per Group	1	1	2
Intercom Groups (Automatic and Dial Combined)	32	32	32
Members per Group	32	32	32
Members per System	128	128	128
Integrated Directory Entries	400	800	800
Size of List Entry	15	15	15
Leave Word Calling (Switch-Based, No Adjunct):			
Messages Stored	1000	2000	2000
Messages per User	125	125	125
Individual Message Retrievers	60	60	60
Systemwide Message Retrievers	10	10	10
Remote Message Waiting Indicator:			
Per Extension Number	1	1	80
Per System	50	80	80
Loudspeaker Paging Zones*	9	9	9
Move Agents from CMS			
Max Agents Moved per Request	-	-	32
Multiple Listed Directory Numbers	50	50	50
DID Numbers	8	8	8
Personal Central Office Lines (PCOL) Group			
PCOL Groups	25	40	40
PCOL Members in a Group	4	4	4

* These maximum parameters do not apply if PagePac Paging Systems are used.

ITEM	R1V1	R1V2	R1V3
Pooled Modems:			
Groups	1	5	5
Members per Group	32	32	32
Integrated	32	160	160
Combined	-	160	160
Port Circuit Packs (excluding Tone Detectors)	85	85	85
Power Failure Transfer Extensions			
Model 574-5 Panel	35	35	35
Z1A Panel	42	42	42
Recorded Announcements	10	10	64
Integrated Recorded Announcements:			
Integrated Announcement Circuit Packs	-	-	1
Channels per Integrated Announcement Circuit Pack	-	-	16
Calls Connected per Integrated Announcement	-	-	5
Integrated Announcement Queue Slots per System	-	-	50
Integrated Announcement Circuit Pack Capacity	-	-	4 min 16 sec
Analog Line Recorded Announcements:			
Analog Line Circuit Packs (8 Port)	2	2	8
Analog Line Circuit Packs (16 Port)	1	1	4
Calls Connected per Analog Announcement	1	1	1
Analog Line Announcement Queue Slots per System	50	50	150
Analog Line Announcement Queue Slots per Announcement	5	5	150
Remote Access Barrier Codes	10	10	10
Restriction—Toll/Code			
Allowed Calls List Codes	10	10	10
Digit Absorption Lists	5	5	5
Ringback Queue Slots	100	120	120

ITEM	R1V1	R1V2	R1V3
Speech Synthesizer Circuit Packs	-	6	6
Channels per Speech Circuit Pack	-	4	4
Terminating Extension Groups	32	32	32
Members per Group	4	4	4
Time Slots:			
Total	512	512	512
Call Switching	473	483	483
Simultaneous Conversations	236	241	241
Tone Detectors:			
Call Progress	10	10	10
Touch-Tone	20	20	20
Traffic Handling Capability [in Hundred Call Seconds (CCS)]	8500	8670	8670
Busy Hour Call Completions	3600	3600	3600
ACD	-	-	2000
Trunks	200	200	200
Trunk Groups	50	60	99
Trunks per Group	60	60	60
Queue Slots for Trunks	100	120	198
With Hospitality Parameter Reduction	-	-	50
Trunk Groups	-	-	50
Voice Terminals			
Combination of Digital, Hybrid, and Analog Terminals (Also includes 515 or 510D terminals, external alerts, and announcement machines).	400	800	800
Digital Terminals (Note 2)	400	680	680
Max Button Modules (Terminal Modules [adjuncts] Terminals with more than 10 assignable buttons) (Note 3)	125	450	450
Max Digital Display Modules (Note 3)	62	225	225
Phantom Users (Note 4)	125	125	125

Notes:

1. Digital data endpoints terminate on a port of the switch. Up to 400 ports can terminate digital data endpoints and the remaining system ports are available for terminating digital voice terminals, trunks, etc.
2. A fully equipped system has 85 port circuit pack slots (excluding the Tone Detector circuit packs slots). A system using all these slots for digital line circuit packs has a maximum digital line capacity of 680 lines (85 slots x 8 ports per slot). Replacing one of the digital line circuit packs with a trunk circuit pack or a circuit pack other than a digital line circuit pack reduces the digital line capacity by 8 lines.
3. A button module (function key module) is a portion of memory required to store button translations. Some digital voice terminals require no button modules while other terminals need one or more modules. Digital voice terminal button module and display requirements are listed below. These button module and display requirements limit the number of digital voice terminals with more than 10 feature buttons and/or displays that can be connected to a system. However, the digital voice terminal line capacity remains at 680 lines.

Digital Terminals	Button Modules
7401D	0
7403D (16 Button)	0
7404D (12 Button)	0
7405D (40 Button)	1
7405D With Button Module	2
7405D With Display	2
7405D With Button Module & Display	3
7406D	1
7406 With Display	2
7407D	2

4. The system automatically initiates phantom user calls without any dialing from a voice terminal. An automatic wakeup call is an example of a phantom user call.

Power

In order to maintain system integrity, dedicated power feeders must be used. Separate feeder circuits from a dedicated service are sufficient to serve this purpose. The feeders should not be used to power other equipment.

All system cabinets require 99- to 130-volt 47- to 63-Hz ac service. Fused curent drain requirements for the various cabinets are as follows:

CABINET	FUSED CURRENT DRAIN (AMPS)
5-Carrier Switch Cabinet	50
2-Carrier Switch Cabinet	20
Auxiliary Cabinet	20
AP Cabinet	20

Cabling Distances

When the system layout is determined, maximum cabling distances to the system cabinet must be considered. On the following page, the allowable intra-premises cabling distances are shown. In case of mixed wire sizes, use the columns for 26-Gauge Wire.

EQUIPMENT	24-GAUGE WIRE (0.5106-mm)		26-GAUGE WIRE (0.4049-mm)	
	FEET	METERS	FEET	METERS
Attendant Console	2400	732	1500	457
Powered from Switch	350	107	350	107
510D or 515 Terminals	3000	914	2200	670
513 BCT, 4410 or 4425 terminals, 610 BCT (See Data Module or EIA Interface) 50 ft. max. distance from term. or BCT to Module or ADU	-	-	-	-
Data Modules:				
Z702AL1-DSU Data Module Base	5000	1524	4000	1219
Z703AL1-DSU Data Module Base	5000	1524	4000	1219
7404D Data Module	5000	1524	4000	1219
Digital Terminal Data Module	3400	1037	2200	670
Modular Processor Data Module	5000	1524	4000	1219
Modular Trunk Data Module	5000	1524	4000	1219
3270 Data Module	5000	1524	4000	1219
EIA Interface (Data Line CP and ADU):				
19.2 kbps	2000	610	2000	610
9.6 kbps	5000	1524	4000	1219
4.8 kbps	7000	2130	6000	1827
2.0 kbps	12000	3654	10000	3050
1.2 kbps	20000	6100	16000	4875
0.3 kbps	40000	12200	30000	9150
Voice Terminals:				
Analog				
8 Port Board (TN742, TN769)				
(On-Premises or				
Out-of-Building—Same Premises)				
500 or 2500 Type (Note 1)	20000	6100	13000	3962
7100 Series	15200	4633	10000	3050
16 Port Board (TN746) (On-Premises Only				
—no Out-of-Building or bridging)(Note 2)				
AT&T 500 or 2500 Type	3100	945	2000	610
Terminals Without Adjuncts				
Hybrid (TN762)				
7300 Series (Without Aux Power)	1000	305	750	229
7300 Series (With Aux Power)	2000	610	2000	610
Digital (TN754)				
7401D, 7403D, 7404D, 7405D, 7406D, 7407D				
On-Premises Only Term.	3000	914	2200	670
Out-of-Bldg. Same Premises Term. (Note 3)	2400	732	1300	396
MET Sets (TN735)	1000	305	650	198

Notes:

1. Only AT&T 500 or 2500 type terminals can be used off-premises through a Central Office.
2. See Analog Line circuit pack description in Chapter 4 for detailed limitations.
3. An out of building—same premises terminal installation requires a Digital Line Protector (DLP) and a Carbon Block or Gas Tube at each end of the interbuilding cable.

Tones

The following call progress tones are generated by the system:

TONE	FREQUENCY	PATTERN (in ms)
Ringback Tone	440 Hz + 480 Hz	1000 on, 3000 off; repeated
Bridging Warning Tone*	440 Hz	500 on, 15000 off; repeated
Busy Tone	480 Hz + 620 Hz	500 on, 500 off; repeated
Call Waiting Tones		
Internal	750 Hz + 20 Hz	300 on; not repeated
External or Handled by Attendant	750 Hz + 20 Hz	100 on, 100 off, 100 on; not repeated
Priority Call	750 Hz + 20 Hz	100 on, 100 off, 100 on, 100 off, 100 on; not repeated
Coverage Tone	440 Hz	600 on, followed by silence; not repeated
Confirmation Tone	350 Hz + 440 Hz	100 on, 100 off, 100 on, 100 off, 100 on followed by silence; not repeated
Dial Tone	350 Hz + 440 Hz	Continuous
Intercept Tone	480 Hz & 620 Hz	250 on (480 Hz), 250 on (620 Hz); repeated
Reorder Tone	480 Hz + 620 Hz	250 on, 250 off; repeated
Call Waiting Ringback Tone	440 Hz + 480 Hz; 440 Hz	1000 on (440 Hz + 480 Hz), 200 on (440 Hz), 2800 off; repeated

* This tone is used with the Busy Verification feature.

The following ringing tone patterns are generated by the system:

RINGING TONE	PATTERN (in ms)
1	1200 on, 4000 off; repeated
2	400 on, 200 off, 600 on, 4000 off; repeated
3	200 on, 100 off, 200 on, 100 off, 600 on, 4000 off; repeated.

Indicator Lamp Signals

The following lamp signals are generated by the system for the attendant console and multi-appearance voice terminals.

LAMP SIGNAL	PATTERN (In ms)
Dark	Off
Lighted	On
Flashing	500 on, 500 off repeated
Fluttering	50 on, 50 off; repeated
Broken Flutter	5 cycles of 50 on, 50 off, followed by 500 off; repeated
Wink	350 on, 50 off; repeated

Protocols

The various protocols used in the system are listed below, and on the next page, with system application and maximum limitations.

PROTOCOL	APPLICATIONS	MAXIMUM DATA RATE	MAXIMUM DISTANCE
DCP	Digital Switch to Data Endpoints	160 kbps*	5000 ft (1524 m) for data 3400 ft (1036 m) for voice
RS-232C	PDM to AP Switch to SAT PDM to Host Computer AP to Data Set (M)PDM to Printer	19.2 kbps	50 ft (15.2m)
	MPDM to AP	64 kbps	17 ft (5.9 m)

- * The DCP sends digitized voice and digital data in frames. Each frame consists of four fields or channels. The first field is a unique 3-bit framing pattern (24 kbps) that defines the frame boundary. The second field is a 1-bit control or signaling channel (8 kbps) between the digital switch and digital data endpoint. The third and fourth fields are two independent information (I) channels (64 kbps each).

PROTOCOL	APPLICATIONS	MAXIMUM DATA RATE	MAXIMUM DISTANCE
RS-232C (Contd)	MTDM for Downloading and High-Speed Data Transfer EIA Interface (Data Line to ADU)	64 kbps	17 ft (5.9 m)
		19.2 kbps	2000 ft (610 m)
		9.6 kbps	5000 ft (1524 m)
		4.8 kbps	7000 ft (2130 m)
		2.4 kbps	12000 ft (3654 m)
		1.2 kbps	20000 ft (6100 m)
		0.3 kbps	40000 ft (12200 m)
RS-449	AP to AP	19.2 kbps	200 ft (61 m)
		9.6 kbps	400 ft (122 m)
		4.8 kbps	800 ft (244 m)
		2.4 kbps	1600 ft (488 m)
SSI	500 BCT to AP	56 kbps	5000 ft (1524 m)
	400 Series Printers to AP		
BISYNC	AP Line Controller to Host Computer for Terminal Emulation (9.6 kbps)	2.4 kbps	
		4.8 kbps	
		9.6 kbps	
BX.25	Communications Interface to AP, DCS, CMS, or AUDIX	9.6 kbps	(see Note)
	Communications Links Between Multiple APs and With Net 1000	9.6 kbps	(see Note)
SDCPI	(M)PDM to AP	64 kbps	17 ft (5.9 m)
RS-366	Host Computer to ACU	64 kbps	50 ft (15.2 m)
	MTDM to ACU		17 ft (5.9 m)
V.35	MPDM to Data Endpoints	56 kbps	50 ft (15.2 m)
Category A Coaxial	3270 Data Modules to 3270-Type Terminals or Cluster Controller	9.6 kbps	500 ft (152 m)

Note: Data endpoint determines distance limitation.

Trunk Specifications

The specifications for the various trunk-type circuit packs are as follows:

TRUNK TYPE	CIRCUIT BACK	SPECIFICATIONS
Central Office	TN747 TN747B	Capacity: 8 Circuits Transmission: 1-Way In, 1-Way Out, or 2-Way 2-Wire 600 Ohms or RC Balance Network Signaling: Ground Start or Loop Start
Auxiliary Trunk	TN763 TN763B	Capacity: 4 Circuits Transmission: 1-Way In, 1-Way Out, or 2-Way 2-Wire Signaling: Loop Start on Tip and Ring; Two Additional Pairs Provide Seizure and Answer Supervision and/or Make Busy Information
Direct Inward Dialing	TN753	Capacity: 8 Circuits Transmission: 1-Way Incoming Fixed Impedance to DID Trunk Signaling: Wink or Immediate Start Accepts Touch-Tone Dialing
Tie Trunk	TN760 TN760B	Capacity: 4 Circuits Transmission: 4-Wire Tip and Ring Signaling: E&M. 760B supports Type 1 or Type 5 E&M Signaling
DS1 Trunk	TN722 TN722B	Capacity: 24 Trunks for Voice Grade Service 23 Trunks for Alternate Voice/Data Service or DMI, One Trunk Used for Signaling. TN722 does not support DMI. Mode: Multiplexes 24 or 23 Trunks onto 1 Facility and Demultiplexes 1 Facility into 24 or 23 Trunks Speed: Trunks at 64 kbps, 1 Facility at 1.544 Mbps Signaling: DS1 Over 4-Wire

Switch Transmission Characteristics

System 75 transmission characteristics comply with the American National Standards Institute/Electronic Industries Association (ANSI/EIA) PBX standard RS-464A (SP-1378A). For a complete listing of transmission and signaling characteristics, refer to the ANSI/EIA document. Some of the general switch transmission characteristic are listed below.

Frequency Response:

(Station-to-Station or Station-to-CO-Trunk, relative to loss at 1 kHz)

ANALOG TO ANALOG		
FREQUENCY	MAX LOSS	MIN LOSS
60 Hz	–	20 dB
200 Hz	5 dB	0 dB
300-3000 Hz	1 dB	-0.5 dB
3200 Hz	1.5 dB	-0.5 dB
3400 Hz	3 dB	0 dB

(Station or CO-Trunk-to-Digital Interface (DS0), relative to loss at 1 kHz)

ANALOG TO DIGITAL		
FREQUENCY	MAX LOSS	MIN LOSS
60 Hz	-	20 dB
200 Hz	3 dB	0 dB
300—3000 Hz	0.5 dB	-0.25 dB
3200 Hz	0.75 dB	-0.25 dB
3400 Hz	1.5 dB	0 dB

Insertion Loss (Port-to-Port):

(Analog or Digital Port Types)

TYPICAL CONNECTION TYPES	NOMINAL LOSS at 1 kHz
On-Premises Station to On-Premises Station	6 dB
On-Premises Station to Off-Premises Station	3 dB
Off-Premises Station to Off-Premises Station	0 dB
On-Premises Station to 4-Wire Trunk	3 dB
Off-Premises Station to 4-Wire Trunk	2 dB
Station-to-Trunk	0 dB
Trunk-to-Trunk	0 dB

Overload Level: +3 dBm0

Crosstalk Loss: ≥ 70 dB

Intermodulation Distortion:

(Analog-to-Analog or Analog-to-Digital—Up to 9.6 kb/s data)

FOUR TONE METHOD	
Second Order Tone Products	>46 dB
Third Order Tone Products	>56 dB

Quantization Distortion Loss:

ANALOG PORT-TO-ANALOG PORT	
SIGNAL LEVEL	DISTORTION LOSS
0 to -30 dBm0	>33 dB
-40 dBm0	>27 dB
-45 dBm0	>22 dB

ANALOG PORT-TO-DIGITAL PORT OR DIGITAL PORT-TO-ANALOG PORT	
SIGNAL LEVEL	DISTORTION LOSS
0 to -30 dBm0	>35 dB
-40 dBm0	>29 dB
-45 dBm0	>25 dB

Terminating Impedance: 600 ohms Nominal

Trunk Balance Impedance (selectable): 600 ohms Nominal
or Complex Z
[350 ohms + (1 kohms in
parallel with 0.21 μ F)]

Impulse Noise:

On 95% or more of all connections the impulse noise is 0 count (hits) in 5 minutes at +55 dBmC during the busy hour.

Echo Return Loss (ERL) and Single Frequency Return Loss (SFRL) (Talking State):

Return loss performance is usually dominated by termination and/or loop input impedances. System 75 will provide an acceptable level of echo performance if the ERL and SFRL are met.

Station to station	ERL should meet or exceed 18 dB, SFRL should meet or exceed 12 dB
Station to 4-wire trunk connection	ERL should meet or exceed 24 dB, SFRL should meet or exceed 14 dB
Station to 2-wire trunk connection	ERL should meet or exceed 18 dB, SFRL should meet or exceed 12 dB
4-wire to 4-wire trunk connection	ERL should meet or exceed 27 dB, SFRL should meet or exceed 20 dB

Peak Noise Level:

Analog to analog—20 dBrnC
 Analog to digital—19 dBrnC
 Digital to analog—13 dBrnC

Echo Path Delay:

Analog Port to Analog Port— ≤ 3 mS
 Digital Interface Port to Digital Interface Port— ≤ 2 mS

Service Codes and Facility Interface Codes

To help administer the Registration Program with respect to Private Line services, the FCC has established a requirement that Service Codes and Facility Interface Codes (FICs) be provided by the customer/vendor to the telephone company to technically identify the service requested. These codes are a shorthand way to describe the technical information necessary to design and implement a connection request.

Service Codes

Service Codes are issued by the FCC to equipment manufacturers/registrants that denote the type of registered terminal equipment and the protective characteristics with respect to the premises wire of the terminal equipment ports.

Private Line Service Codes are as follows:

7.0Y — Totally Protected Private Communications (microwave) Systems
 7.0Z — Partially Protected Private Communications (microwave) Systems
 8.0X — Port for Ancillary Equipment

- 9.0F — Fully Protected Terminal Equipment
- 9.0P — Partially Protected Terminal Equipment
- 9.0N — Unprotected Terminal Equipment
- 9.0Y — Totally Protected Terminal Equipment.

Service Code Example

The System 75 product line Service Code is 9.0F which indicates it is terminal equipment that has fully protected premises wire at the Private Line ports.

Facility Interface Codes (FICs)

An FIC does not relate to a particular item of terminal equipment but is simply a method to provide the technical information to order a specific Private Line circuit. In effect, it identifies registered Private Line port interfaces. These FICs consist of five alphanumeric characters constructed as follows:

First Character: Identifies the type of service

- A = Automatic Identification Outward Dialing, or
- M = Message Registration, or
- O = Off-Premises Station, or
- T = Tie Trunk

Second Character: Defines the transmission parameters

- C = Conventional Term Set, or
- L = Lossless Interface, or
- X = Reserved

Third Character: Defines the number of conductors

- 1 = Type I Transmission Interface (2-wire) or
- 3 = Type III Transmission Interface (4-wire)

Fourth Character: Determines the signaling type

- 1 = Type I E&M Signaling Interface, or
- 2 = Type II E&M Signaling Interface, or
- 3 = Loop Signaling Interface, or
- 4 = Reserved, or
- 5 = Simplex Signaling

Fifth Character: Describes signaling arrangement and class of OPS Port

- A = Registered Class A OPS Port (see Note)
- B = Registered Class B OPS Port (see Note)
- C = Registered Class C OPS Port (see Note)

E = Registered equipment provides ground on E lead to originate
M = Registered equipment provides battery on M lead to originate
X = Reserved Each type of Port (A, B, or C) indicates the capability of operation over loops with resistances in the following ranges:

Class A: 0—199 ohms
Class B: 200—899 ohms
Class C: 900 ohms or more

Facility Interface Code Example:

System 75 Tie Trunks—FIC TL31M which indicates it is:

T — Tie Trunk
L — Lossless
3 — 4 Wire
1 — Type I E&M
M — Battery on the M Lead

System 75 Service Connection Information:

1. Trunk Type: Either ground start or loop start.
2. Signaling Arrangement Type (OPS): Type C Ringing Frequency 20 Hz.
3. Incoming Call Control: Wink Start, DID, Delay, Immediate are all available.

Private Line Connections:

SERVICE	PE CODES	REGISTERED CIRCUIT PACKS	FACILITY INTERFACE CODE	SERVICE CODE	JACK USOC
Tie Trunks	63117	TN760	TL31M	9.0F	RJ2GX
	63140	TN760B	TL31M	9.0F	RJ2GX
OPS	63111	TN742	OL13C	9.0F	RJ2GX RJ21X RJ11X

CHAPTER 10. SYSTEM RELIABILITY AND AVAILABILITY

General

This chapter provides information on the overall reliability and availability of the system. Reliability refers to the failure rate of a system. Maintainability is the ease of troubleshooting or servicing a system with a minimum of downtime or degradation of service. Availability refers to the probability that a system is operational at any given time and depends on its reliability and maintainability.

System 75 provides continuous service with a predicted interval of several years between outages. This high level of system availability can be attributed to three major factors:

- Design of the Product
- Design of the Manufacturing Process
- Installation.

Design of the Product

Introduction

The System 75 design uses state-of-the-art custom integrated circuit devices and other firmware and software design techniques to create a highly reliable system. The basic design strategy is to:

- **Reduce the number of single points of failure** by minimizing the number of circuit packs that can cause system failure. The advanced system design includes a distributed architecture, limited redundancy where appropriate, and a high level of Very Large Scale Integration (VLSI).
- **Detect failures early** to reduce the period of time a system is out of service and to prevent the occurrence of complex multiple failure situations. System 75 uses hardware error detection circuitry, firmware testing and checking, and periodic maintenance to find problems before the customer becomes aware of them.
- **Minimize the impact on the system of any particular failure** so that each user's voice terminal is highly available. System 75 architectural design restricts most of the failures to affecting only a single voice terminal or trunk. A much smaller and less frequent class of failures affects up to eight stations or trunks. Only a very small class of failures affects the entire system.
- **Provide automatic recovery actions** to allow the system to work around the failure. Failure operation appears identical to the normal operation for the user, minimizing the impact of a failure on the system user. For example, when a trunk fails, it is

taken out of service and is not accessed by the user until it works properly. If a port board fails, it is removed from service so that all the other port boards are not affected. If a bit in the memory fails, automatic correction allows continuous service until the faulty board can be replaced.

- **Report trouble automatically** so that the system, and not the customer, identifies the problems. These problems are automatically reported to a central maintenance organization, the AT&T INADS Center, for immediate action. The AT&T INADS Center is available to customers with systems under warranty or under a maintenance contract. This organization analyzes the problem and, in some cases, fixes the trouble remotely without a costly and time consuming visit to the user location. If a visit to the customer site is required, the central maintenance organization can identify the problem and send a qualified repair person, along with the necessary equipment, to fix the problem on the first visit. Thus, the system is restored to full service as quickly as possible.
- **Keep diagnostics and repair simple** to speed up the repair process and insure that repair is done correctly the first time. Making the system simple to repair results in less time out of service. System 75 is easy to repair. Almost every part of the circuitry, including the power supplies, is fixed through a simple plug-in replacement requiring only a few seconds. In addition, all of the packs except for the common control circuit packs can be replaced during normal system operation with no impact on the user. The same terminal interface used for administration is also used for maintenance activities. The standard English command language and screen form displays on the terminal make testing and repairing the system easy.

Using these concepts, the system is designed for a high level of availability with emphasis on protecting the critical elements of the system: the network, the memory, the power, and the software. Some examples of the application of these principles are given below.

Switch Network

The switch network employs a distributed architecture to protect against total switch network failure. With this architecture, a Network Processing Element (NPE) and other devices on each port circuit pack provide all of the switching for the ports on that pack. All port circuit packs in the system have access to all 512 time slots in the dual Time Division Bus, and all of the circuitry needed to set up a call between any two System 75 ports is contained on these two port circuit packs. This arrangement is highly reliable and there is no single point of failure of the switch network. Port circuit pack failures affect only the stations or trunks attached to that pack and most failures affect only a single station or trunk. The port circuit packs are all designed for easy removal and repair while the system is operating without any impact on other circuit packs in the system or other calls in progress.

Memory

The memory failure protection available with the system is Single Bit Error Detection and Correction, also known as Cyclical Redundancy Checking (CRC). With CRC, memory is organized so that the failure of any single memory device is automatically detected and corrected with no system outage and without any impact on system performance.

Power

Commercial power is delivered directly to the power units on each cabinet of System 75. This power is then converted to +5 volts or -48 volts as needed by the circuitry. The power units are highly reliable plug-in circuit packs that slide into a slot on the carrier. This design allows easy and rapid replacement of the units to minimize out of service time.

Power is distributed so that the failure of a single power unit only causes a loss of power to the circuit packs in a single carrier. Only the single power unit providing power to the common control circuit packs can cause a system outage. This unit is smaller and therefore more reliable than having a single power supply for the entire system.

Battery Back-up System

System 75 has a standard 10-minute battery back-up system for the common control. Outages of less than 10 seconds cause no service interruptions. During commercial power outages lasting more than 10 seconds and less than 10 minutes, service is restored automatically within a minute after power is restored, eliminating any need to reload the programs or translations from the memory tape. During an extended power failure, customer-designated lines are automatically transferred to central office trunks. Long-term holdover (engineered to customer needs, typically 8 hours) is also available as an option. (See Standby Power System in Chapter 12.)

Software

The system software monitors the system and performs periodic tests. The software protects the system against traffic overloads, data inconsistencies, and accidental failures. Traffic overloads are highly unlikely, but if the system's call-handling capacity is exceeded, the system will first postpone non-critical background maintenance and administrative actions and then will slowly decrease the grade of service in order to prevent a system crash.

The system continually audits itself for data base inconsistencies. If inconsistencies are found, they are automatically corrected and a record is made of the problem. This not only corrects the problem, but prevents the problem from spreading and causing further inconsistencies. The software is also monitoring itself to make sure that all of the critical processes are running correctly. If a problem is discovered, the process is restarted to insure that all of the system remains fully functional.

Maintenance

The System 75 maintenance circuitry has a built-in microprocessor with its own memory. This maintenance circuitry continuously monitors the system for potential troubles. When a trouble condition is identified, it is recorded in the system alarm log. An alarm is automatically sent directly to the AT&T Initialization and Administration (INADS) Center if the customer is under warranty or has a maintenance contract. This strategy allows minor troubles to be fixed quickly before they have a chance to become, or to cause, a major system failure. A failure of the maintenance circuitry will not interrupt service.

Emergency Transfer

The System 75 Emergency Transfer mode connects system trunks directly to selected voice terminals in the event of power failure, giving these voice terminals access to central office dial tone. In the unlikely event of processor failure, the system also transfers and allows key voice terminals to receive central office dial tone. This transfer is under the control of the maintenance circuitry.

Electronic Fusing

The system port circuits and power supplies use current limiting devices and electronic fusing. These devices automatically recover from overloads caused by power surges or short circuits. This arrangement increases the availability of these circuits and power supplies since no human intervention is required to change a fuse or reset a circuit breaker.

Design of the Manufacturing Process

The System 75 manufacturing process uses only quality components and examines each system several times during the production cycle. All component parts are sampled to insure that they meet design specifications. Circuit packs are tested in several different ways before being installed in the cabinets. After a cabinet is assembled, it is tested for Underwriter Laboratories (UL) standards before it is given a 40-hour burn-in test. Before each system is shipped, it receives a Quality Review check.

A quality assurance test is made on random system samples. Each sample is given a complete functional test followed by a 120-hour burn-in test. Another complete functional test is performed on the sample after this burn-in period. This quality assurance procedure verifies the reliability of the system as well as the manufacturing process.

Installation

System 75 receives a complete series of installation checks at the customer site or at an area staging location. The equipment is unpacked and inspected for possible shipping damage. After installation is completed, the system is tested for proper operation in the customer's environment.

CHAPTER 11. ENVIRONMENTAL REQUIREMENTS

Main Equipment Room Requirements

This chapter provides information on the floor and wall space required for System 75 equipment and associated peripheral equipment installed in the equipment room. Also included are specifications for temperature, humidity, air purity, and lighting levels.

Floor Plans and Layouts

Floor plan arrangements will vary depending on size and shape of the equipment room and the amount of growth planned for the system. Typical floor plans are shown in Figures 11-1 (2-carrier cabinet) and 11-2 (5-carrier cabinet).

The wall behind the system cabinet must be clear of all objects (pictures, shelves, or windows) that are not required in the system installation. The entire area behind the cabinet must be reserved for the cross-connect field and the cable access panel (when provided). Also, room for system growth should be considered.

Floor Loading

The floor must have a commercial floor loading code of at least 50 pounds per square foot. A fully loaded 5-carrier (J58890A) cabinet weighs about 800 pounds and a fully loaded 2-carrier cabinet weighs about 400 pounds. Thus, a free maintenance area of at least 16 square feet is required for a 5-carrier cabinet and 8 square feet is required for a 2-carrier cabinet.

Earthquake Protection

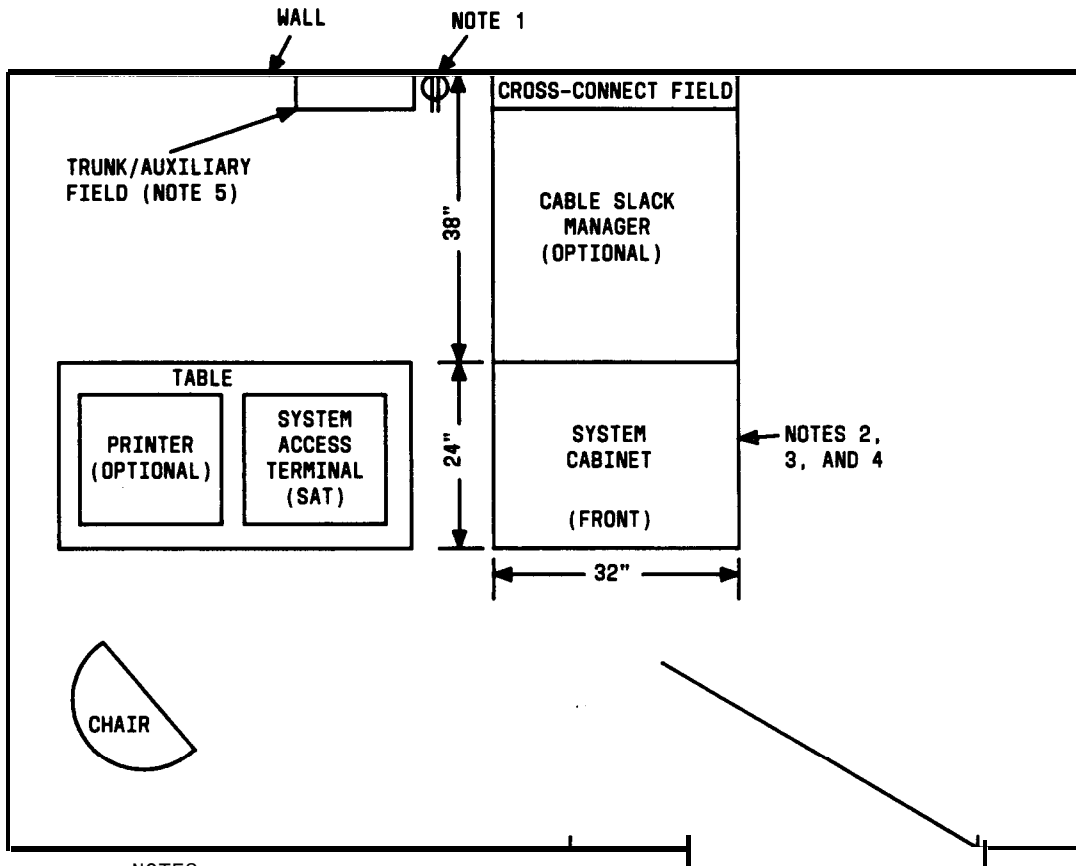
When earthquake or disaster bracing is required by law or when local engineering feels that bracing is necessary, the system cabinet can be bolted to the floor. Figure 11-3 shows the zones in the continental United States where bracing may be desirable. Follow local procedures for installing earthquake protection.

Floor Space

The following system equipment and optional peripheral equipment occupies floor space in the equipment room:

- **System Cabinet and Cable Slack Manager**—The system cabinet is 32 inches wide and 24 inches deep. The 5-carrier cabinet is 70 inches high. The 2-carrier cabinet is 42 inches high. The cable slack manager requires 38 inches between the cabinet and wall. Each cabinet (including the door opening) and cable slack manager occupies about 22 square feet of floor space.

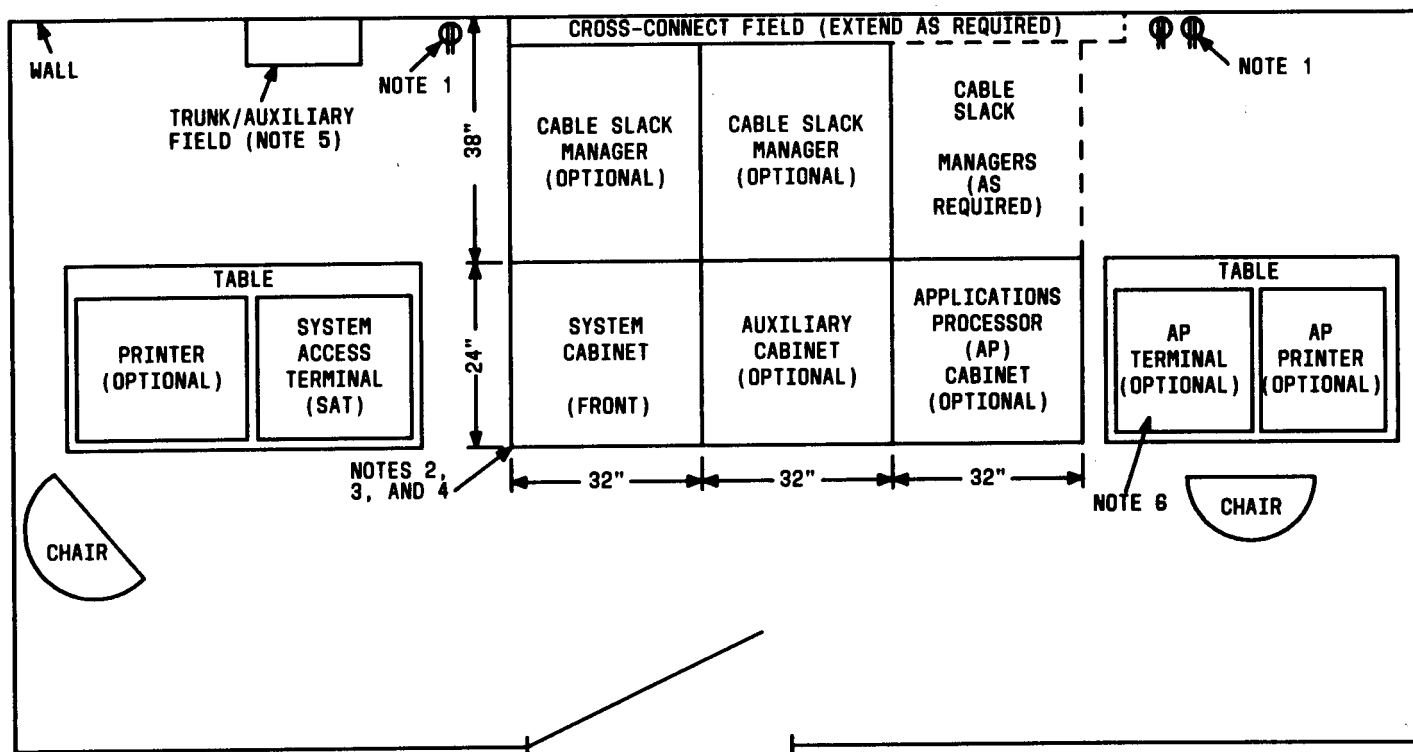
- Auxiliary Cabinet—The auxiliary cabinet is 32 inches wide, 24 inches deep, and 70 inches high. This cabinet (including the door opening and maintenance area behind the cabinet) occupies about 22 square feet of floor space.



NOTES:

1. THE POWER OUTLET SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA. POWER OUTLET MUST NOT BE UNDER SWITCH CONTROL AND MUST NOT BE SHARED WITH OTHER EQUIPMENT.
2. ALLOW AT LEAST 36 INCHES OF SPACE IN FRONT OF CABINET TO PERMIT DOOR TO SWING OPEN.
3. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS LISTED IN THIS SECTION.
4. EARTHQUAKE PROTECTION MAY BE REQUIRED.
5. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.

Figure 11-1. Typical Floor Plan—Small Cabinet System



NOTES :

1. POWER OUTLETS MUST NOT BE UNDER SWITCH CONTROL, MUST NOT BE SHARED WITH OTHER EQUIPMENT, AND SHOULD BE LOCATED OUTSIDE THE CROSS-CONNECT FIELD AREA.
2. ALLOW AT LEAST 36 INCHES (91.4CM) OF SPACE IN FRONT OF CABINET TO PERMIT DOOR TO SWING OPEN.
3. SYSTEM MUST BE GROUNDED BY ONE OF THE APPROVED METHODS.
4. EARTHQUAKE PROTECTION MAY BE REQUIRED.
5. THE TRUNK/AUXILIARY FIELD MAY BE LOCATED WITHIN THE CROSS-CONNECT FIELD.
6. THE AP TERMINAL IS NOT OPTIONAL IF AP PROVIDED.

Figure 11-2. Typical Floor Plan—Medium Cabinet System

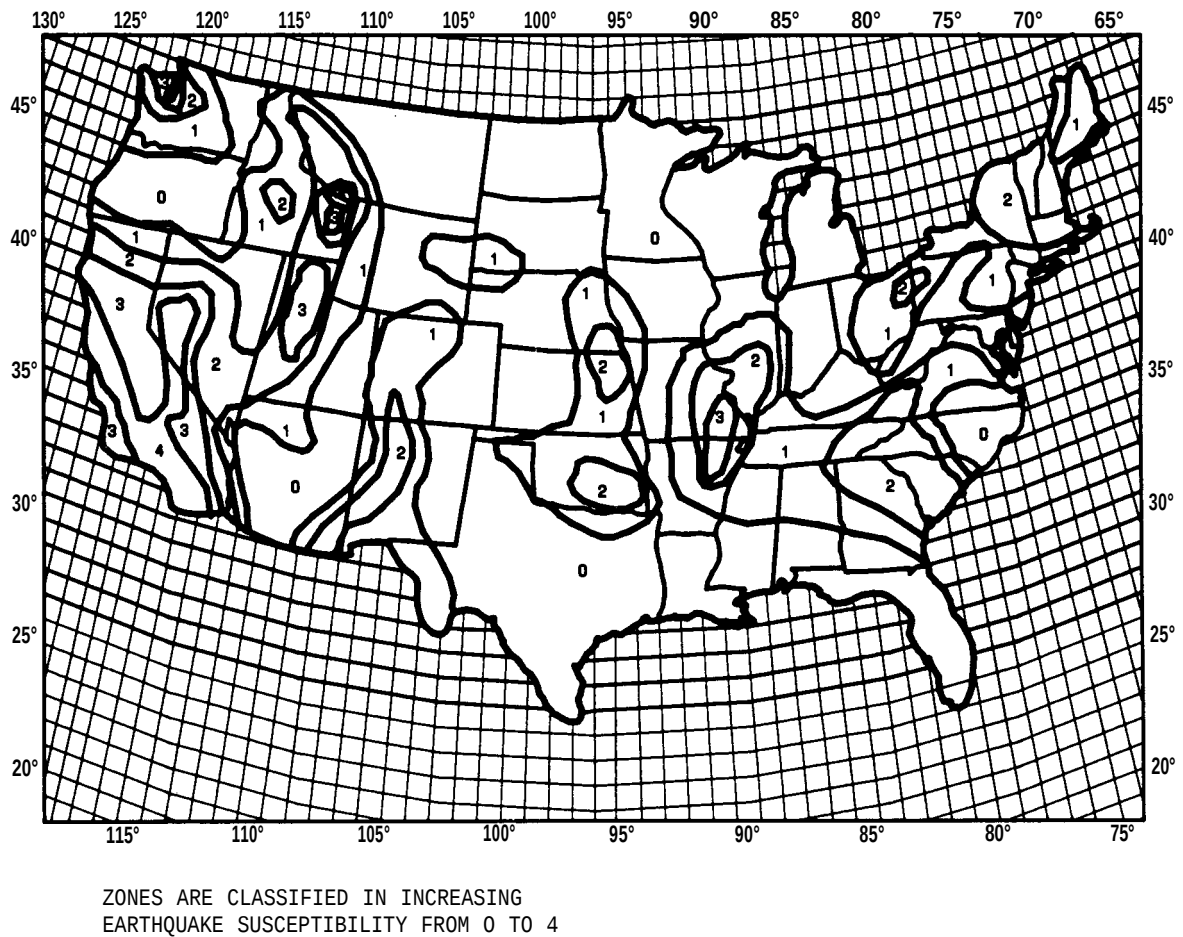


Figure 11-3. Earthquake Environment (Continental USA)

References for Optional Equipment Requiring Floor Space

Refer to the following documents for additional information on optional equipment that can be used with the system and that will require floor space:

445 Printer	999-700-023
Applications Processor	999-700-407.

Desk-Top Space

The 510A or 510D Personal Terminal and 513, 515, 610, 4410, and 4425 terminals can be located in the equipment room and require space on a desk or table.

The 513, 515, 610, 4410, and 4425 terminals each require approximately 3.2 square feet of space. The 510A or 510D with optional keyboard each requires approximately 2.1 square feet of space.

References for Optional Equipment Requiring Desk-Top Space

Refer to the following documents for additional information on optional equipment that will require desk-top space:

500 Business Communications Terminal	999-700-021
443 Printer	999-700-024
450 Printer	999-700-025
460 Printer	999-700-022
475 Printer	999-700-303.

Wall Space Required

Wall space required in the equipment room depends on the type of cross-connect equipment being installed—Z100-type (modular), 66-type, or 110-type. The space required also depends on the size of the system. Adequate wall space must be provided for mounting the cross-connect equipment. *AT&T System 75—Wiring*, 555-200-111, provides details on the cross-connect hardware.

If existing cross-connect hardware is utilized, the space requirements and hardware requirements must be detailed in the system floor plan. Contact the Technical Consultant for assistance in planning for reuse of existing equipment.

Temperature and Humidity

The System 75 equipment should be installed in a well-ventilated area. Maximum equipment performance is obtained at an ambient temperature between 40 and 120 degrees Fahrenheit (4 and 49 degrees Celsius) for short term operation and up to 110 degrees Fahrenheit (43 degrees Celsius). The relative humidity range is 10 to 95 percent up to 84 degrees Fahrenheit (29 degrees Celsius). Above 84 degrees Fahrenheit (29 degrees Celsius), maximum relative humidity decreases from 95 percent down to 34 percent at 120 degrees Fahrenheit (49 degrees Celsius). Installation outside these limits may reduce system life or impede operation.

Air Purity

The cabinet should not be installed in an area where the air may be contaminated with any of the following:

- Excessive dust, lint, carbon particles, paper fiber contaminants, or metallic contaminants
- Corrosive gases, such as sulfur and chlorine.

Lighting

Lighting should be bright enough to allow administration and maintenance personnel to perform their tasks. The recommended light intensity level is 50 to 70 footcandles. This level complies with the Occupational Safety and Health Act (OSHA) standards.

Noise

In most cases, noise is introduced into the system through trunk or station cables, or both. However, electromagnetic fields near the system control equipment may also cause noise in the system. Therefore, the system and cable runs should not be placed in areas where a high electromagnetic field strength exists. Radio transmitters (AM or FM), television stations, induction heaters, motors (with commutators) of 0.25 horsepower (187 watts) or greater, and similar equipment are leading causes of interference. Small tools with universal motors are generally not a problem when they operate on separate power lines. Motors without commutators, whether synchronous or asynchronous, generally do not cause interference.

Field strengths below 1.0 volt per meter are unlikely to cause interference. These weak fields can be measured by a tunable meter such as the Model R-70 meter manufactured by Electro-Metrics Division. Field strengths greater than 1.0 volt per meter can be measured with a broadband meter such as the HOLADAY* HI-3001 meter or the Model EFS-1 meter

* Trademark of Holaday Industries

manufactured by Instruments for Industry, Inc.

The field strength produced by radio transmitters can be estimated by dividing the square root of the emitted power in kilowatts by the distance from the antenna in kilometers. This yields the approximate field strength in volts per meter and is relatively accurate for distances greater than about half a wavelength (150 meters for a frequency of 1000 kHz).

Additional Considerations

Acoustic Noise Levels

The noise produced by a system with a 5-Carrier Cabinet is 51, 53, and 56 dBA at low, medium, and high fan speeds, respectively, at a distance of 5 feet.

The noise produced by a system with a 2-Carrier Cabinet is 48, 50, and 53 dBA at low, medium, and high fan speeds, respectively, at a distance of 5 feet. If the system cabinet door is open, there is an additional 1 dBA of noise. The tape drive also causes additional noise. When the tape drive is reading data, there is an additional 2 dBA of noise. When the tape recorder is rewinding or fast winding, there is an additional 7 dBA of noise.

Heat Dissipation

A fully-loaded 5-carrier cabinet dissipates approximately 8000 BTUs per hour. However, the typical average for a cabinet is a dissipation of 5000 BTUs per hour. The 2-carrier system heat dissipation is about half that of the 5-carrier system.

CHAPTER 12. POWER AND GROUNDING

General

This chapter provides information on power, grounding, lightning protection, sneak current protection, standby power, and wiring requirements for System 75 equipment and associated peripheral equipment installed in the equipment room.

AC Power Requirements

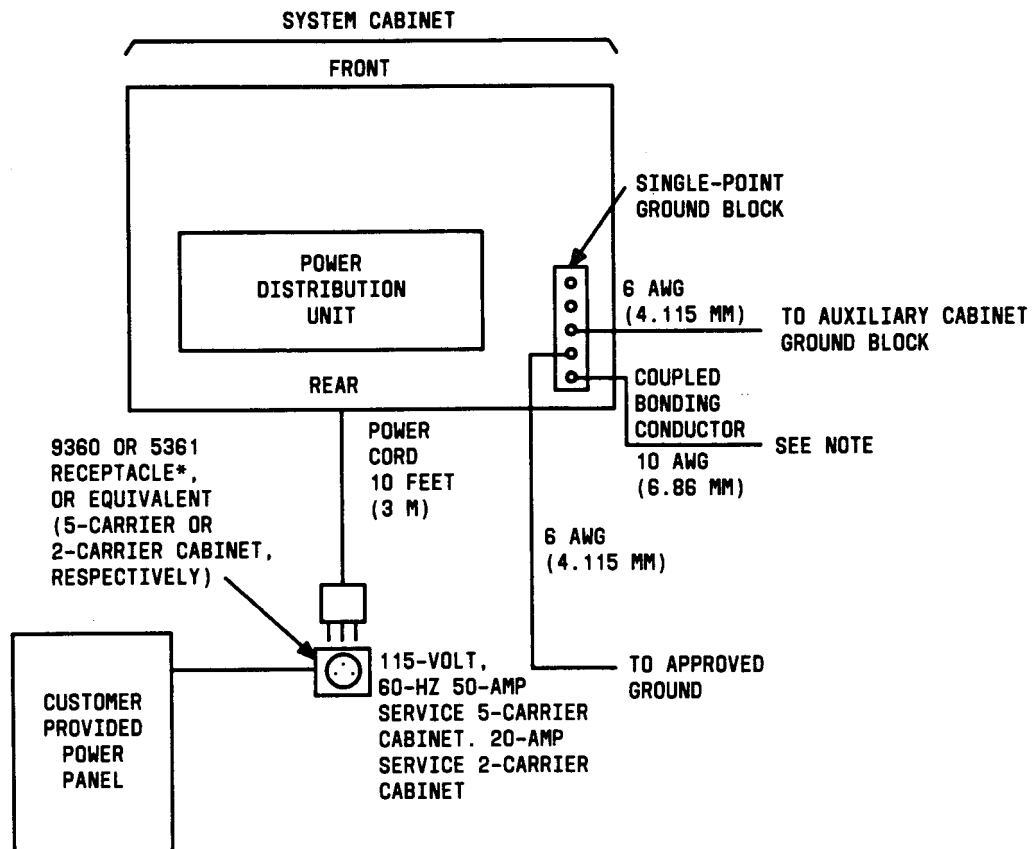
The customer must provide the main ac distribution panel (panel board). Any available power source can be used, as long as the phase or leg provides 115 volts ac at the required current drain. The panel board must be equipped with a bolt-on 50-amp 115-volt thermal magnetic circuit breaker for each cabinet. One of the following panel boards, or equivalent, can be provided:

- QMR fusible panel board by General Electric
- QMB fusible panel board by Square D
- VB5 fusible panel by ITE
- FPD fusible panel by Westinghouse.

The system cabinet, auxiliary cabinet, and Applications Processor (AP) cabinet each require a separate power outlet. These outlets must not be shared with other equipment, must not be under switch control, and should be located outside the cross-connect field area, if possible. Individual requirements are as follows:

- 5-Carrier Cabinet—This cabinet requires a special 115-volt 60-Hz 50-amp power outlet. The outlet must be located within 10 feet of the cabinet.
- 2-Carrier Cabinet—This cabinet requires a special 115-volt 60-Hz 20-amp power outlet. This outlet must be located within 10 feet of the cabinet.
- Auxiliary Cabinet and AP Cabinet (optional)—Each cabinet requires a special 115-volt 60-Hz 20-amp power outlet. These outlets must be located within 12 feet of the cabinets.

Figure 12-1 depicts a typical power and grounding layout for the system cabinet(s).



* MANUFACTURED BY HUBBELL-HARVEY, INC., WIRING DEVICE DIV. (CUSTOMER PROVIDED)

NOTE:

TO APPROVED GROUND LOCATED NEAREST THE
TELEPHONE COMPANY OWNED PROTECTOR GROUND BLOCK
AT THE BUILDING ENTRANCE FACILITY

Figure 12-1. Typical Power and Grounding Layout

Grounding

An approved ground for the cabinets used in the equipment room is essential. An approved ground may consist of any of the following:

- **Grounded Building Steel**—The metal frame of the building where effectively grounded.
- **Water Pipe**—A continuous metal water pipe, not less than 1/2 inch in diameter, that is connected to an underground metal water pipe that is in direct contact with earth for 10 feet or more.
- **Concrete-Encased Ground**—An electrode encased by at least 2 inches of concrete and located within and near the bottom of a concrete foundation or footing in direct contact with the earth. The foundation must be at least 20 feet of one or more steel reinforcing bars or rods, not less than 1/2 inch in diameter, or at least 20 feet of bare, solid copper wire not smaller than No. 4 gauge.
- **Ground Ring**—A ring that encircles a building or structure in direct contact with earth at a depth of at least 2-1/2 feet. The ring must consist of at least 20 feet of bare copper conductor not smaller than No. 2 gauge.

All approved grounds used must be bonded together to form a single grounding electrode system.

Lightning Protection

A coupled bonding conductor is tie-wrapped to all trunks. The coupled bonding conductor can be any one of the following:

- 10 AWG ground wire
- Continuous cable sheath
- Six unused pairs of wire.

The coupled bonding conductor connects the cabinet single-point ground block and runs all the way to the approved ground located nearest the telephone company owned protector block at the building entrance facility.

When an auxiliary cabinet is provided, a 6-AWG ground wire connects the system cabinet single-point ground block to the auxiliary cabinet ground block (see Figure 12-1). It is recommended that the ground wire be routed as close as possible to the cables connecting the system cabinet and the auxiliary cabinet.

If auxiliary equipment is not mounted in the auxiliary cabinet, then the power supply for this equipment must be plugged into one of the two convenience outlets located on the back of the System 75 cabinet to preserve ground integrity. The convenience outlet is fused at 5 amps. The dedicated System Access Terminal (SAT) should be plugged into the other convenience outlet.

Sneak Current Protection

Sneak fuses protect the building wiring and circuit packs from “foreign potential” by providing a current interruption capability. Sneak fuse panels, when provided, are installed on the switch side of the network interface. All incoming and outgoing trunks and off-premises station lines pass through the sneak fuses. Sneak current protection is required for installations in Canada. The sneak fuses must be CSA certified.

Standby Power System

The system provides a 10-second power holdover during power interruptions. A battery reserve supplies power to the control carrier for up to 10 minutes during a commercial power failure. If additional holdover power is required, an alternate, independent source of on-premises power is required to maintain the System 75 for a limited time. An external, commercial Uninterruptible Power Supply (UPS) or a battery backup arrangement are used as an alternate source of power during a commercial power failure.

Uninterruptible Power Supply

The uninterruptible power supply (UPS) protects the system equipment from voltage lags, over-voltage conditions, blackouts, and line frequency fluctuations. The UPS uses a microprocessor controlled device to regulate and condition the commercial power. During commercial power failure, UPS provides dependable and reliable backup power for short durations.

Any UPS that meets the requirements given in Table 12-A can be used with the system for standby power.

Table 12-A. Approximate System 75 Standby Power Requirements

CABINET	POWER CONSUMPTION
5-Carrier	3.5 kilowatts-hr
2-Carrier	1.3 kilowatts-hr

Battery Backup

A battery supply and an inverter can be used to provide standby power for up to 8 hours after a commercial power failure.

When standby power is provided, the following items must be taken into consideration:

- Size and weight of the batteries
- Size and weight of the inserter
- Heat dissipation
- Air flow and circulation
- Items of equipment to receive power.

This standby power system contains the following:

- Inverter
- Batteries
- Battery stand.

System 75 requires a 115-volt ac input that is provided by the inverter. The size of the inverter is determined by the System 75 carrier configuration and the additional equipment to be provided with power in the event of a commercial power failure. The size of the battery supply required depends upon the length of time power is to be provided and the particular power demands of the system. Table 12-A shows the approximate power consumption requirements that can be used to size System 75 for emergency generators or battery backup.

House Wiring

House wiring includes all on-premises wiring on the customer side of the cross-connect field. The cross-connect field can be either Z100-type (modular jacks), 66-type, or 110-type hardware.

Wiring is distributed from the cross-connect field by 25-pair cables. The 25-pair cables are connected either directly to terminal wall jacks using adapters or to satellite locations. Satellite locations are used when already present or when required by the length of the wiring runs from the switch to the terminals. The 25-pair cables can be divided into either 4-pair or 3-pair wiring groups (4-pair wiring groups are recommended). From the satellite locations, 4-pair D-inside cables connect the satellite locations to information outlets (modular wall jacks).

AT&T System 75—Wiring, 555-200-111, provides details on the cross-connect hardware and wiring distribution.

CHAPTER 13. REFERENCES

The following is an abbreviated listing of System 75 documents. Included is a brief description of each document in the list. For a complete listing of System 75 documents, refer to the *A T&T System 75—Documentation Guide and Subject Index*, 555-200-010.

To order copies of any of these documents, refer to the address on the back of the title page.

AT&T Telecommunication Electrical Protection 350-060

Provides practical, functional information and application detail combined with training material for telecommunication engineers in the electrical protection field.

Business Communications Systems Publications Catalog 555-000-010

Provides a list of publications that support AT&T business communications systems. Also provides a brief description of each publication listed.

AT&T System 75 and System 85—Terminals and Adjuncts 555-015-201

Provides concise physical and functional descriptions of the peripheral equipment that can be used with System 75 and System 85. It is intended as an aid for both AT&T and customer personnel in selecting appropriate components for these systems and in training and management.

AT&T System 75 and System 85—DS1/DMI Interface 555-025-101

Provides both a broad and detailed description of the System 75 and System 85 DS1/DMI Interface. Introduces and defines concepts and terminology unique to DS1/DMI. Also includes applications, engineering procedures and considerations, cabling and connection arrangements, administration requirements, restrictions and limitations, etc.

AT&T System 75—Installation and Test 555-200-104

Provides the information necessary to perform the tasks of installing and testing the system's common equipment. Includes a description of the necessary tools and equipment.

AT&T System 75—System Maintenance 555-200-105

Provides the information necessary for monitoring, testing, and maintaining the AT&T System 75. It is intended to cover many of the faults and troubles that can occur in the system.

AT&T System 75—Upgrades and Additions 555-200-106

Provides procedures and information required to upgrade an R1V1 System 75 to a R1V2 or R1V3 System 75, to upgrade an R1V2 System 75 to an R1V3 System 75, and to make additions to an operational System 75, after the initial switch installation.

AT&T System 75—Wiring 555-200-111

Provides the information necessary for installing inside wiring for the AT&T System 75 and System 75 XE.

AT&T System 75 Electrical Protection, Grounding, and Exposure Checklists 555-200-120

Provides coverage of the conditions that must be met before adequate electrical protection can be assured for a System 75 installation. It reflects the requirements of AT&T and the National Electrical Code for protecting equipment against electrical disturbances or exposures including: lightning, power contact, power induction, and ground potential rise.

AT&T System 75—Feature Description 555-200-201

Provides a technical description of System 75 and System 75 XE features and parameters.

AT&T System 75—Administration 555-200-500

Describes the management of the AT&T System 75 and System 75 XE administration and operation. Includes the guidelines for initialization, reconfiguration, backup procedures, monitoring system performance, and maintaining system security. Includes a description of the tasks that can be performed via the System Access Terminal and the prerequisites for completion.

AT&T System 75—Planning/Configuration 555-200-600

Provides a method for defining the customer's system requirements and for collecting the information used to estimate System 75 and System 75 XE hardware requirements.

AT&T System 75—Implementation—Release 1 Version 1 555-200-650

Provides the procedures and associated forms for collecting system and terminal software information. This information is used to initialize the system using the System Access Terminal.

AT&T System 75—Implementation—Release 1 Version 2 555-200-651

Provides the procedures and associated forms for collecting system and terminal software information. This information is used to initialize the AT&T System 75 and System 75 XE using the System Access Terminal.

AT&T System 75—Implementation—Release 1 Version 3 555-200-652

Provides the procedures and associated forms for collecting system and terminal software information. This information is used to initialize the AT&T System 75 and System 75 XE using the System Access Terminal.

AT&T System 75—Console Operations 555-200-700

Provides “how-to-operate” instructions for the attendant console. Serves as a reference when defining the console control keys and Incoming Call Identification requirements.

AT&T System 75—Voice Terminal Operations 555-200-701

Describes all the voice features and provides the “how-to-operate” instructions for each voice terminal. Serves as a reference when defining user requirements.

AT&T System 75—Automatic Call Distribution (ACD)—Agent Instructions 555-200-722

Provides information for use by agents after training is completed. The various ACD features are described and the procedures for using them are provided in this document. The information in this document applies only to Release 1 Version 3 systems.

AT&T System 75—Hospitality Operations 555-200-723

Contains the procedures for using the Hospitality Services of AT&T System 75, Release 1 Version 3. These services include a group of System 75-based features that support the lodging industry. Hotels and motels use the features to improve their property management and to provide assistance to their employees and clients.

AT&T System 75—Automatic Call Distribution (ACD)—Supervisor Instructions 555-200-724

Provides information for use by supervisors after training is completed. The various ACD features are described and the procedures for using them are provided in this document. The information in this document applies only to Release 1 Version 3 systems.

User instruction booklets are also available for all terminals.

CHAPTER 14. ACRONYMS AND ABBREVIATIONS

AAR	Automatic Alternate Routing
AC	Alternating Current
ACA	Automatic Circuit Assurance
ACD	Automatic Call Distribution
ACU	Automatic Call Unit
ADU	Asynchronous Data Unit
AIM	Asynchronous Interface Module
ALM-ACK	Alarm Acknowledge
ARS	Automatic Route Selection
AUDIX	Audio Information Exchange
AVD	Alternate Voice Data
BCT	Business Communications Terminal
BLF	Busy Lamp Field
BTU	British Thermal Unit
CAS	Centralized Attendant Service
CCMS	Common Channel Message Set
CCS	Hundred Call Seconds
CCSA	Common Control Switching Arrangement
CDM	Channel Division Multiplexing
CDRR	Call Detail Recording and Repairing
CEM	Channel Expansion Multiplex
CMS	Call Management System
CO	Central Office
COR	Class of Restriction
COS	Class of Service
CP	Circuit Pack
CPE	Customer Premises Equipment
CRC	Cyclical Redundancy Checking
CSA	Canadian Safety Association
DC	Direct Current
DCE	Data Communications Equipment
DCP	Digital Communications Protocol
DCS	Distributed Communications System
DDC	Direct Department Calling
DID	Direct Inward Dialing
DMI	Digital Multiplexed Interface
DS1	Digital Signal Data
	Data Services Level 1
DTDM	Digital Terminal Data Module
DTE	Data Terminal Equipment
DTMF	Dual Tone Multifrequency

DXS	Direct Extension Selection
E&M	Receive and Transmit
EIA	Electronic Industries Association
EMI	Electro-Magnetic Interference
EPROM	Erasable Programmable Read Only Memory
EPSCS	Enhanced Private Switched Communications Services
ETN	Electronic Tandem Network
FCC	Federal Communications Commission
FIC	Facility Interface Codes
FNPA	Foreign Numbering Plan Area Code
FRL	Facilities Restriction Level
FX	Foreign Exchange
HNPA	Home Numbering Plan Area Code
INADS	Initialization and Administration System
INWATS	Inward Wide Area Telephone Service
ISDN	Integrated Service Data Network
ISN	Information Systems Network
KBPS	Kilo-Bits Per Second
LAN	Local Area Network
LDN	Listed Directory Number
LED	Light-Emitting Diode
LSU	Local Storage Units
LWC	Leave Word Calling
M-Bus	Memory Bus
MBPS	Mega-Bits Per Second
MET	Multibutton Electronic Telephone
MSA	Message Service Adjunct
MPDM	Modular Processor Data Module
MTDM	Modular Trunk Data Module
NAU	Network Access Unit
NPA	Numbering Plan Area Code
NPE	Network Processing Element
NSE	Night Service Extension
NSU	Network Sharing Unit
NXX	Public Network Office Codes
OPS	Off-Premises Station
OSHA	Occupational Safety and Health Act
PBX	Private Branch Exchange
PC	Personal Computer
PCOL	Personal Central Office Line
PCM	Pulse Code Modulated
PDM	Processor Data Module
PMS	Property Management System
PSPDN	Packet Switch Public Data Network
PT	Personal Terminal

RAM	Random Access Memory
RHNPA	Remote Home Numbering Plan Area Code
RLT	Release Link Trunk
RNX	Private Network Office Code
ROM	Random Access Memory
SAKI	Sanity and Control Interface
SAT	System Access Terminal
SMDR	Station Message Detail Recording
SPE	Switch Processing Element
SSI	Standard Serial Interface
STARLAN	Star-based Local Area Network
TDM	Trunk Data Module
TTTN	Tandem Tie Trunk Network
UCD	Uniform Call Distribution
UDP	Uniform Dial Plan
UPS	Uninterruptible Power Supply
WATS	Wide Area Telecommunications Service

CHAPTER 15. GLOSSARY

Access Code

A 1-, 2-, or 3-digit dial code used to activate or cancel a feature or access an outgoing trunk. The star (*) and pound (#) can be used as the first digit of an access code.

Access Tie Trunks

Tie trunks used to handle normal ETN calls between Main and Tandem switches.

Administer

To access and change the parameters associated with the services or features of the system.

Answer-Back Code

A code dialed to retrieve a parked call.

Appearance

See Call Appearance.

Asynchronous Data Transmission

A scheme for transmitting data where each character is preceded by a start bit and followed by a stop bit, thus permitting data elements to occur at irregular intervals. This type transmission is advantageous when transmission is not regular (characters typed at a keyboard).

Asynchronous Data Unit (ADU)

A data communications equipment (DCE) type device that allows direct connection between RS-232C equipment and the system digital switch.

Attendant

The operator of the console.

Applications Processor

A minicomputer used to support several user-controlled applications such as traffic analysis and electronic documentation.

Attendant Console

An electronic call-handling position with pushbutton control. Used by attendants to answer and place calls and to manage and monitor some of the system operations.

Audio Information Exchange (AUDIX)

A unit that provides voice mail service to users.

Automatic Trunk

A trunk that does not require the sending or receiving of digits. The destination is predetermined. A request for service on the trunk (called a seizure) is sufficient to route the call. The normal destination of an automatic trunk is the system attendant group.

Barrier Code

A security code used with the Remote Access feature to prevent unauthorized access to the system.

Bit (Binary Digit)

One unit of information in binary notation (having two possible states or values, zero or one).

Bridge (Bridging)

The appearance of a voice terminal's extension at one or more other voice terminals.

Bridged Appearance

A call appearance on a voice terminal that matches a call appearance on another voice terminal for the duration of a call.

Buffer

A circuit or component that isolates one electrical circuit from another. Typically, a buffer holds data from one circuit or process until another circuit or process is ready to accept the data.

Bus

A multi-conductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.

Bus, Time Division Multiplex

See Time Division Multiplex Bus.

Business Communications Terminal

An advanced series of semi-intelligent terminals.

Bypass Tie Trunks

One-way, outgoing tie trunks from a Tandem switch to a Main switch in an ETN. These trunks, provided in limited quantities, are used as a “last-choice” route when all trunks to another Tandem switch are busy. Bypass tie trunks are used only if all applicable intertandem trunks are busy.

Byte

A sequence of bits, 8 bits long, that is usually shorter than a word. A word is 16 bits long.

Call Appearance, Attendant Console

Six buttons, labeled a through f, used to originate, receive, and hold calls. Each button has two associated lamps to show the status of the call appearance.

Call Appearance, Voice Terminal

A button labeled with an extension number used to place outgoing calls, receive incoming calls, or hold calls. Two lamps next to the button show the status of the call appearance or status of the call.

Call Management System (CMS)

An adjunct processor that collects data from an ACD and generates reports to be stored or displayed concerning status of agents, splits, and trunks.

Callback Call

A call that is automatically returned to a voice terminal user who activated the Automatic Callback or Ringback Queuing feature.

Call Waiting Ringback Tone

A low-pitched tone identical to the ringback tone except the tone decreases the last 0.2 second. This tone notifies the attendant that the Attendant Call Waiting feature has been activated and that the called user is aware of the waiting call.

Central Office

The location housing telephone switching equipment that provides local telephone service and access to toll facilities for long-distance calling.

Central Office Codes

The first three digits of a 7-digit public network telephone number. These codes are numbered from 200 through 999.

Central Office Trunk

A telecommunications channel that provides access from the system to the public network through the local central office.

Channel

A communications path for transmitting voice and data.

Class of Restriction (COR)

A number (0 through 63) that specifies the restrictions assigned to voice terminals, voice terminal groups, data modules, and trunk groups.

Class of Service (COS)

A number (0 through 15) that specifies if voice terminal users can activate the Automatic Callback, Call Forwarding—All Calls, Data Privacy, or Priority Calling features.

Common Control Switching Arrangement (CCSA)

A private telecommunications network using dedicated trunks and a shared switching center for interconnecting company locations.

Confirmation Tone

Three short bursts of tone followed by silence; indicates that the feature activated, deactivated, or canceled has been accepted.

Console

See Attendant Console.

Coverage Answer Group

A group of up to eight voice terminals that ring simultaneously when a call is redirected to it by Call Coverage. Any one of the group can answer the call.

Coverage Call

A call that is automatically redirected from the called party's extension number to an alternate answering position when certain coverage criteria are met.

Coverage Path

The order in which calls are redirected to alternate answering positions.

Coverage Point

The attendant positions (as a group), Direct Department Calling group, Uniform Call Distribution group, Coverage Answer Group, a voice terminal extension, or Message Center Hunt Group designated as an alternate answering position in a coverage path.

Covering User

The person at an alternate answering position who answers a coverage call.

Data Channel

A communications path between two points used to transmit digital signals.

Data Communications Equipment (DCE)

The equipment on the network side of a communication link that provides all the functions required to make the binary serial data from the source or transmitter compatible with the communications channel.

Data Terminal Equipment (DTE)

Equipment comprising the source or sink of data, or both, that also provides communication control functions (protocol). DTE is any piece of equipment at which a communications path begins or ends.

Delay-Dial Trunk

After a request for service (called a seizure) is detected on an incoming trunk, the system sends a momentary signal followed by a steady tone over the trunk. This informs the calling party that dialing can start. This type of trunk allows dialing directly into the system. That is, the digits are received as they are dialed.

Designated Voice Terminal

The specific voice terminal to which calls, originally directed to a certain extension number, are redirected. Commonly used to mean the "forwarded-to" terminal when Call Forwarding All Calls is active.

Dial Repeating Tie Trunk

A telecommunications channel between two private switching systems. The number dialed is repeated or dialed-in at the distant end.

Digital Communications Protocol (DCP)

Defines the capability for providing simultaneous voice and data transmission over the same channel.

Digital Data Endpoints

In System 75, digital data endpoints include the following:

- 510D Personal Terminal or 515-Type Business Communications Terminal
- 7404D Terminals
- 7406D or 7407D Equipped With Optional Data Module Base
- Asynchronous Data Units
- Digital Terminal Data Modules
- (Modular) Processor Data Modules
- (Modular) Trunk Data Modules
- 3270 Data Modules
- Internal Data Channels

Digital Multiplexed Interface (DMI)

Specifies the remote interface requirements for multiplexed data communications between a host computer and a private switching system.

Digital Terminal Data Module (DTDM)

An adjunct to Model 7403D or 7405D voice terminals. Provides the required interface between the system and a data terminal such as a 513 Business Communications Terminal.

Digital Trunk

A circuit in a telecommunications channel designed to handle digital voice and data.

Direct Extension Selection (DXS)

An option at the attendant console that allows an attendant direct access to voice terminals by pressing a Group Select button and a DXS button.

Distributed Communications System (DCS)

A network of two or more switches, each with its terminals and trunks, configured to function as a single large system.

Electronic Tandem Network (ETN)

A special tandem tie trunk network that has automatic call routing capabilities based on the number dialed and most preferred route available at the time the call is placed. Each switch in the network is assigned a unique private network office code (RNX) and each voice terminal is assigned a unique extension number.

End-to-End Signaling

The transmission of touch-tone signals generated by dialing from a voice terminal user to remote computer equipment. A connection must first be established over an outgoing trunk from the calling party to the computer equipment. Then additional digits can be dialed to transmit information to be processed by the computer equipment.

Enhanced Private Switched Communications Service (EPSCS)

A private telecommunications network that provides advanced voice and data telecommunications services to companies with many locations.

Extension Number

A 1- to 5-digit number assigned to each voice terminal, certain system groups, data modules, 510D Personal Terminal, or 515 Business Communications Terminal within the system. A 1- or a 5-digit extension number is available for Version 2 and Version 3.

External Call

A connection between a system user and a party on the public telephone network or on a tie trunk.

Facility

A general term used for the telecommunications transmission pathway and associated equipment.

Feature

A specifically defined function or service provided by the system.

Feature Button

A labeled button on a voice terminal or attendant console designating a specific feature.

Foreign Exchange (FX)

A central office other than the one providing local access to the public telephone network.

Foreign Exchange Trunk

A telecommunications channel that directly connects the system to a central office other than its local central office.

Foreign Numbering Plan Area Code

An area code other than the local area code. The foreign area code must be dialed to call outside the local geographical area.

Ground-Start Trunk

On outgoing calls, System 75 transmits a request for services to the distant switching system by grounding the trunk ring lead. When the distant system is ready to receive the digits of the called number, that system grounds the trunk tip lead. When System 75 detects this ground, the digits are sent. (Tip and ring are common nomenclature to differentiate between ground-start trunk leads.) On incoming calls, detection of ground on the ring lead is sufficient to cause the call to route to a predetermined destination, normally the system attendant group. No digits are received.

Handshaking Logic

A format used to initiate a data connection between two data module devices.

Home Numbering Plan Area Code

The local area code. The area code does not have to be dialed to call numbers within the local geographical area.

Immediate-Start Tie Trunk

After establishing a connection with the distant switching system for an outgoing call, the system waits a nominal 65 milliseconds before sending the digits of the called number. This allows time for the distant system to prepare to receive the digits. Similarly, on an incoming call, the system has less than 65 milliseconds to prepare to receive the digits.

Information Exchange

The exchange of data between users of two different systems (System 75 and host computer) over a local area network.

In-Use Lamp

A red lamp on a multi-appearance voice terminal that lights to show which call appearance will be selected when the handset is lifted or which call appearance is active when a user is off-hook.

Intercept Tone

An alternating high and low tone; indicates a dialing error or denial of the service requested.

Interface

A common boundary between two systems or pieces of equipment.

Internal Call

A connection between two users within the system.

Link

A transmitter-receiver channel or system that connects two locations.

Loop-Start Trunk

After establishing a connection with the distant switching system for an outgoing call, System 75 waits for a signal on the loop formed by the trunk leads before sending the digits of the called number. On incoming calls, the received request for service is sufficient to cause the call to route to a predetermined destination, normally the system attendant group. No digits are received.

Main/Satellite/Tributary

A Main switch provides: interconnection, via tie trunks, with one or more subtending switches, called Satellites; all attendant positions for the Main/Satellite configuration; and, access to and from the public network. To a user outside the complex, a Main/Satellite configuration appears as a single switch, with a single Listed Directory Number (LDN). A Tributary is a switch, connected to the Main via tie trunks, but which has its own attendant position(s) and its own LDN.

Message Center

An answering service for calls that might otherwise go unanswered; an agent accepts and stores messages for later retrieval. (Requires an Applications Processor.)

Message Center Agent

A member of the Message Center Hunt Group who takes and retrieves messages for voice terminal users.

Modular Processor Data Module

See Processor Data Module.

Modular Trunk Data Module

See Trunk Data Module.

Modem Pooling

Provides shared-use conversion resources that eliminate the need for a dedicated modem when a data module accesses, or is accessed by, an analog line or trunk.

Multi-Appearance Voice Terminal

A terminal equipped with several call appearance buttons for the same extension number. Allows the user to handle more than one call, on that same extension number, at the same time.

Multiplexer

A device for simultaneous transmission of two or more signals over a common transmission medium.

Network

An arrangement of inter and/or intra location circuits designed to perform specific functions.

Paging Trunk

A telecommunications channel used to access an amplifier for loudspeaker paging.

Pickup Group

A group of individuals authorized to answer any call directed to an extension number within the group.

Port

A designation of the location of a circuit that provides an interface between the system and lines and/or trunks.

Principal (User)

In terms of Call Coverage, a person for whom a call was originally intended.

Private Network

A network used exclusively for handling the telecommunications needs of a particular customer.

Private Network Office Code (RNX)

The first three digits of a 7-digit private network number. These codes are numbered 220 through 999, excluding any codes that have a 0 or 1 as the second digit.

Processor Data Module (PDM)

Provides the required interface between the system and an EIA computer or data terminal.

Property Management System (PMS)

A stand-alone computer which Lodging and Health Services organizations use for services such as reservations, housekeeping, billing, etc.

Protocol

A set of conventions or rules governing the format and timing of message exchanges to control data movement and correction of errors.

Public Network

The network that can be openly accessed by all customers for local or long-distance calling.

Queue

An ordered sequence of calls waiting to be processed.

Queuing

The process of holding calls in order of their arrival to await connection to an attendant, to an answering group, or to an idle trunk. Calls are automatically connected in first-in, first-out sequence.

Random Access Memory (RAM)

A storage arrangement whereby information can be retrieved at a speed independent of the location of the stored information.

Read Only Memory (ROM)

A storage arrangement primarily for information retrieval applications.

Recall Dial Tone

Three short bursts of tone followed by steady dial tone; indicates the system has completed some action (such as holding a call) and is ready to accept dialing.

Redirection Criteria

The information administered for each voice terminal's coverage path that determines when an incoming call is redirected to coverage.

Remote Home Numbering Plan Area Code (RHNPA)

A foreign numbering plan area code that is treated as a home area code by the Automatic Route Selection feature. Calls can be allowed or denied based on the area code and the dialed central office code rather than just the area code. If the call is allowed, the Automatic Route Selection pattern used for the call is determined by these six digits.

Removable Mass Storage Subsystem (RMSS)

A tape storage device that stores the software information for the system.

Reorder Tone

A fast-busy tone repeated 120 times a minute; indicates that at least one of the facilities, such as a trunk or a digit transmitter, required for the call was not available at the time the call was placed.

Single-Line Voice Terminals

Voice terminals served by a single-line tip and ring circuit (Models 500, 2500, 7101A, 7103A).

Software

A set of computer programs that accomplish one or more tasks.

Split

A condition whereby a caller is temporarily separated from a connection with the attendant. This split condition automatically occurs when the attendant, active on a call, presses the Start button.

Standard Serial Interface (SSI)

A communications protocol developed by AT&T Teletype Corporation for use with the 500 Business Communications Terminals and the 400-series printers.

Status Lamp

A green lamp that shows the status of a call appearance or a feature button by the state of the lamp (lighted, flashing, fluttering, broken flutter, or dark).

Switchhook

The button(s) on a voice terminal located under the receiver.

Synchronous Data Transmission

A scheme for sending and receiving data, where data elements may occur only at regular specified times. Sending and receiving devices must operate in step with each other.

System Manager

A person responsible for specifying and administering features and services for the system.

System Reload

A process that allows stored data to be written from a tape into the system memory (normally after a power outage).

Tandem Switch

A switch within an ETN that provides the logic to determine the best route for a network call, possibly modifies the digits outputted, and allows or denies certain calls to certain users.

Tandem Through

The switched connection of an incoming trunk to an outgoing trunk without human intervention.

Tandem Tie Trunk Network

A private network that interconnects several customer switching systems by dial repeating tie trunks. Access to the various systems is dictated by codes that must be individually dialed for each system.

Tie Trunk

A telecommunications channel that directly connects two private switching systems.

Time Division Multiplex Bus

A special bus that is time shared by preallocating short time slots to each transmitter on a regular basis. In a PBX, all port circuits are connected to the time division multiplex bus permitting any port to send a signal to any other port.

Tone Ringer

A device with a speaker, used in electronic voice terminals to alert the user.

Trunk

A telecommunications channel between two switching systems.

Trunk Data Module

Provides the required interface between the system and a data set (modem) or data service unit connected to a private or switched data line.

Trunk Group

Telecommunications channels assigned as a group for certain functions.

Voice Terminal

A single-line or multi-appearance voice instrument (telephone).

Uniform Dial Plan

A feature that allows a unique 4- or 5-digit number assignment for each terminal in a multi-switch configuration, such as a Distributed Communications System (DCS) or Main/Satellite/Tributary configuration.

Wide Area Telecommunications Service (WATS)

A service that allows calls to a certain area or areas for a flat-rate charge based on expected usage.

Wink-Start Tie Trunk

After establishing a connection with a distant switching system for an outgoing call, the system waits for a momentary signal (wink) before sending the digits of the called number. Similarly, on an incoming call, the system sends the wink signal when ready to receive digits.

Write Operation

The process of putting information onto a storage medium such as magnetic tape.

800 Service

A service that allows incoming calls from a certain area or areas to an assigned number for a flat-rate charge based on usage.

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