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MERLIN LEGEND ™
COMMUNICATIONS SYSTEM
Data Guide

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Notice

Every effort was made to ensure that the information in this book was complete and accurate at the time of printing. However, information is subject to change.

Federal Communications Commission (FCC) Information

For important FCC interference, registration, and repair information, see "Customer Support Information" in this book.

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Support Telephone Number

AT&T provides a toll-free customer Helpline (1-800-828-2888) 24 hours a day (U.S.A. only). Call the Helpline, or your authorized dealer, if you need assistance when installing, programming, or using your system.

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CUSTOMER WARNING

This manual is designed for use **by qualified service technicians only.** Technician qualification includes completion of an AT&T hands-on instructor-led course covering installation and maintenance for this product. Installation or maintenance of this product by anyone other than a qualified service technician may void the warranty. **Hazardous electrical voltages are present inside this product.**

The exclamation point in an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

IMPORTANT SAFETY INSTRUCTIONS

When installing telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock, and injury to persons, including:

- Read and understand all instructions.
- Follow all warnings and instructions marked on or packed with the product.
- Never install telephone wiring during a lightning storm.
- Never install telephone jacks in a wet location unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone wiring has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Use only AT&T manufactured MERLIN LEGEND™ circuit modules, carrier assemblies, and power units in the MERLIN LEGEND (511A) control unit.
- Use only AT&T-recommended/approved MERLIN LEGEND accessories.
- If equipment connected to the analog station modules (008/408/408 GS/LS) or to the MLX telephone module (008 MLX) is to be used for in-range out-of-building (IROB) applications, IROB protectors are required.
- Do not install this product near water, for example, in a wet basement location.
- Do not overload wail outlets as this can result in the risk of fire or electric shock.

- The MERLIN LEGEND is equipped with a three-wire grounding-type plug, a plug having a third (grounding) pin. This plug will fit only into a grounding-type power outlet. This is a safety feature, If you are unable to insert the plug into the outlet, contact an electrician to replace the obsolete outlet. Do not defeat the safety purpose of the grounding plug.
- The MERLIN LEGEND system requires a supplementary ground.
- Do not attach the power supply cord to building surfaces. Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Slots and openings in the module housings are provided for ventilation. To protect this equipment from overheating, do not block these openings.
- Never push objects of any kind into this product through module openings or expansion slots, as they may touch dangerous voltage points or short-out parts, which could result in a risk of fire or electric shock. Never spill liquid of any kind on this product.
- Unplug this product from the wall outlet before cleaning. Do not use liquid or aerosol cleaners on this product. Use a damp cloth for cleaning.

Customer Support Information

Support Telephone Number

AT&T provides atoll-free customer Helpline (1-800-628-2888) 24 hours a day (U.S.A. only). Call the Helpline, or your authorized dealer, if you need assistance when installing, programming, or using your system.

Federal Communications Commission (FCC) Electromagnetic Interference Information

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense.

Canadian Department of Communications (DOC) Interference Information

This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numerique n'émet pas de bruits radioélectriques dépassant Ies limites applicable aux appareils numéiques de la classe A prescribes dans Ie Réglement sur Ie brouillage radioélectrique édicté par Ie ministére des Communications du Canada.

FCC Notification and Repair Information

This equipment is registered with the FCC in accordance with Part 68 of its rules. In compliance with those rules, you are advised of the following:

- **Means of Connection.** Connection of this equipment to the telephone network shall be through a standard network interface jack: USOC RJ11 C, RJ14C, RJ21X. Connection to E&M tie trunks requires a USOC RJ2GX. Connection to off-premises stations requires a USOC RJ11C or RJ14C. Connection to 1.544 Mbs digital facilities must be through a USOC RJ48C or RJ48X. Connection to DID requires a RJ11 C, RJ14C or RJ21X. These USOCs must be ordered from your telephone company.

  This equipment may not be used with party lines or coin telephone lines.

- **Notifcation to the Telephone Companies.** Before connecting this equipment, you or your equipment supplier must notify your local telephone company's business office of the following:

  - The telephone number(s) you will be using with this equipment.
  - The appropriate registration number and ringer equivalence number (REN), which can be found on the back or bottom of the control unit, is as follows:

    If this equipment is to be used as a Key System, report the following number AS593M-72914-KF-E, and if the system provides both manual and automatic selection of incoming/outgoing access to the network, report AS593M-72682-MF-E. The ringer equivalence number for both systems is 1.5A.

  - For tie line connection, provide the telephone company the facility interface code (FIC) of TL31M and the service order code (SOC) 9.0F.

- For connection to off-premises stations, report the FIC OL13C and SOC 9.0F.
- If this equipment is to be connected to digital service (1.544 Mbs), the FIC is 04DU9-B for D4 framing format or 04DU9-C for extended framing format, and SOC 6.0P.
- If this equipment is to be connected to DID facilities, the FIC is 02RV2-T, and the SOC is 9.0F.
- The quantities and USOC numbers of the jacks required.
- For each jack, provide the sequence in which lines are to be connected: the type lines, the FIC, and REN by position when applicable,

You must also notify your local telephone company if and when this equipment is permanently disconnected from the line(s).

The REN is used to determine the quantity of devices which may be connected to the telephone line. Excessive REN's on the telephone line may result in the devices not ringing in response to an incoming call. In most, but not all, areas the sum of the REN's should not exceed five (5.0). To be certain of the number of devices that maybe connected to the line, as determined by the total REN's, contact the telephone company to determine the maximum REN for the calling area.

Installation and Operational Procedures

The manuals for your system contain information about installation and operational procedures.

- **Repair Instructions.** If you experience trouble because your equipment is malfunctioning, the FCC requires that the equipment not be used and that it be disconnected from the network until the problem has been corrected. Repairs to this equipment can be made only by the manufacturers, their authorized agents, or by others who may be authorized by the FCC. In the event repairs are needed on this equipment, please contact the National Service Assistance Center (NSAC) at 1-800-628-2888, or your authorized AT&T dealer.
- **Rights of the Local Telephone Company.** If this equipment causes harm to the telephone network, the local telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice is not practical, you will be notified as soon as possible, You will also be informed of your right to file a complaint with the FCC.

  Your local telephone company may make changes in its facilities, equipment, operations, or procedures that affect the proper functioning of this equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.
- **Hearing Aid Compatibility.** The custom telephone sets for this system are compatible with inductively coupled hearing aids as prescribed by the FCC.
- **Automatic Dialers.** WHEN PROGRAMMING EMERGENCY NUMBERS AND/OR MAKING TEST CALLS TO EMERGENCY NUMBERS:
  - Remain on the line and briefly explain to the dispatcher the reason for the call.
  - Perform such activities in the off-peak hours, such as early morning or late evening.

DOC Notification and Repair Information

NOTICE: The Canadian Department of Communications (DOC) label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective, operational, and safety requirements. The DOC does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to connect it to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, the company's inside wiring for single-line individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or any equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility, telephone lines, and internal metallic water pipe system, if present, are connected. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority or electrician, as appropriate.

To prevent overloading, the **Load Number** (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop used by the device. The termination on a loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100.

DOC Certification No. 230 4095A
CSA Certification No. LR 56260
Load No. 6

Renseignements sur la notification du ministére des Communications du Canada et la réparation

AVIS: L'étiquette du ministére des Communications du Canada identifie le matériel homologué. Cette étiquette certifie que le matériel est conforme à certaines normes de protection, d'exploitation et de sécurité des réseaux de télécommunications. Le Ministére n'assure toutefois pas que le matériel fonctionnera à la satisfaction de l'utilisateur.

Avant d'installer ce matériel, l'utilisateur doit s'assurer qu'il est permis de le raccorder aux installations de l'entreprise locale de télécommunication. Le matériel doit également étre installé en suivant une méthode acceptée de raccordement. Dans certains cas, les fils intérieurs de l'enterprise utilisés pour un service individual à ligne unique peuvent étre prolongés au moyen d'un dispositif homologué de raccordement (cordon prolongateur téléphonique interne). L'abonné ne doit pas oublier qu'il est possible que la conformité aux conditions énoncées ci-dessus n'empéchent pas la degradation du service clans certaines situations. Actuellement, les entreprises de télécommunication ne permettent pas que l'on raccorde leur matériel à des jacks d'abonné, sauf clans les cas précis prévus par les tarifs particuliers de ces entreprises.

Les reparations de matériel homologué doivent étre effectuées par un centre d'entretien canadien autorisé désigné par le fournisseur. La compagnie de télécommunications peut demander à l'utilisateur de débrancher un appareil à la suite de réparations ou de modifications effectuées par l'utilisateur ou à cause de mauvais fonctionnement.

Pour sa propre protection, l'utilisateur doit s'assurer que tous les fils de mise à la terre de la source d'énergie électrique, des lignes téléphoniques et des canalisations d'eau métalliques, s'il y en a, sont raccordés ensemble. Cette precaution est particuliérement importante dans les régions rurales.

AVERTISSEMENT: L'utilisateur ne doit pas tenter de faire ces raccordements lui-méme; il doit avoir recours a un service d'inspection des installations électriques, ou à un électricien, selon le cas.

L'indite de charge (IC) assigné à chaque dispositif terminal indique, pour éviter toute surchage, le pourcentage de la charge totale qui peut étre raccordée à un circuit téléphonique bouclé utilise par ce dispositif. La terminaison du circuit bouclé peut étre constitute de n'importe quelle combinaison de dispositifs, pourvu que la somme des indices de charge de l'ensemble des dispositifs ne dépasse pas 100.

No d'homologation 230 4095A
Node certification CSA: LR 56260
L'indite de charge: 6

AT&T

MERLIN LEGEND™

Model 511 A Control Unit

LISTED 538E

MADE IN USA

TELEPHONE EQUIPMENT

LR 56260

This device complies with Part 15 of the FCC Rules. Operation IS subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

Complies with Part 68. FCC Rules. FCC Reg. No AS593M-72682-MF-E. Ringer Equivalence 1.5A. When equipped with the "KF" option (key only), FCC Reg. No. AS593M-72914-KF-E. Ringer Equivalence 1.5A.

Use only AT&T manufactured MERLIN LEGEND circuit modules, carrier assemblies, and power units, as specified in the Installation Manual, in this product. There are no user serviceable parts Inside Contact your authorized agent for service and repair.

This digital apparatus does not exceed the Class A limits for radio noise emissions set out in the radio interference regulations of the Canadian Department of Communications.

Le présent appareil numénque n'érnet pas de bruits radioélectnques dépassant les limites applicables aux appareils numériques de la classe A prescrites dans le Règlement sur le brouillage radioélectrlque edicté par le ministère des Communications du Canada.

WARNING: If equipment is used for out-of-building applications, approved secondary protectors are required. See Installation Manual.

AVERTISSEMENT: Si l'éauipment est utilise pour des applications extérieures, l'installation d'un protecteur secondair est requise. Voir le manuel d'installation.

MERLIN LEGEND D.O.C. Location Label Placement

Ministerè des Communications du Canada emplacement de l'étiquette

CANADA

DR ID

Security of Your System—Preventing Toll Fraud

As a customer of a new telephone system, you should be aware that there exists an increasing problem of telephone toll fraud. Telephone toll fraud can occur in many forms, despite the numerous efforts of telephone companies and telephone equipment manufacturers to control it. Some individuals use electronic devices to prevent or falsify records of these calls. Others charge calls to someone else's number by illegally using lost or stolen calling cards, billing innocent parties, clipping on to someone else's line, and breaking into someone else's telephone equipment physically or electronically. In certain instances, unauthorized individuals make connections to the telephone network through the use of remote access features.

The Remote Access feature of your system, if you choose to utilize it, permits off-premises callers to access the system from a remote telephone by using an 800 number or a 7- or 10-digit telephone number. The system returns an acknowledgement signaling the user to key in his or her authorization code, which is selected and administered by the system manager. After the authorization code is accepted, the system returns dial tone to the user. If you do not program specific egress restrictions, the user will be able to place any call normally dialed from a telephone associated with the system. Such an off-premises network call is originated at, and will be billed from, the system location.

The Remote Access feature, as designed, helps the customer, through proper administration, to minimize the ability of unauthorized persons to gain access to the network. Most commonly, phone numbers and codes are compromised when overheard in a public location, through theft of a wallet or purse containing access information, or through carelessness (writing codes on a piece of paper and improperly discarding it). Additionally, hackers may use a computer to "dial" an access code and then publish the information to other hackers. Enormous charges can be run up quickly. It is the customer's responsibility to take the appropriate steps to properly implement the features, evaluate and administer the various restriction levels, protect access codes, and distribute access codes only to individuals who have been fully advised of the sensitive nature of the access information.

Common carriers are required by law to collect their tariffed charges. While these charges are fraudulent charges made by persons with criminal intent, applicable tariffs state that the customer of record is responsible for payment of all long-distance or other network charges. AT&T cannot be responsible for such charges and will not make any allowance or give any credit for charges that result from unauthorized access.

To minimize the risk of unauthorized access to your communications system:

- Use a nonpublished Remote Access number.
- Assign authorization codes randomly to users on a "need-to-have" basis, keeping a log of ALL authorized users and assigning one code to one person.
- Use random sequence authorization codes, which are less likely to be easily broken.
- Deactivate all unassigned codes promptly.
- Ensure that Remote Access users are aware of their responsibility to keep the telephone number and any authorization codes secure.
- When possible, restrict the off-network capability of off-premises callers, via use of Call Restrictions and Disallowed List capabilities.
- When possible, block out-of-hours calling.
- Frequently monitor system call detail reports for quicker detection of any unauthorized or abnormal calling patterns.
- Limit Remote Call Forward to persons on a "need-to-have" basis.

Limited Warranty and Limitation of Liability

Limited Warranty

AT&T warrants to you, the customer, that your MERLIN LEGEND Communications System will be in good working order on the date AT&T or its authorized reseller delivers or installs the system, whichever is later ("Warranty Date"). If you notify AT&T or its authorized reseller within one year of the Warranty Date that your system is not in good working order, AT&T will without charge to you repair or replace, at its option, the system components that are not in good working order. Repair or replacement parts may be new or refurbished and will be provided on an exchange basis. If AT&T determines that your system cannot be repaired or replaced, AT&T will remove the system and, at your option, refund the purchase price of your system, or apply the purchase price towards the purchase of another AT&T system.

If you purchased your system directly from AT&T, AT&T will perform warranty repair in accordance with the terms and conditions of the specific type of AT&T maintenance coverage you selected. A written explanation of AT&T's types of maintenance coverage may be obtained from AT&T by calling 1-800-247-7000. If you purchased your system from an AT&T authorized reseller, contact your reseller for the details of the maintenance plan applicable to your system.

This AT&T limited warranty covers damage to the system caused by power surges; including power surges due to lightning.

The following will not be deemed to impair the good working order of the system, and AT&T will not be responsible under this limited warranty for damages resulting from

- failure to follow AT&T's installation, operation, or maintenance instructions
- unauthorized system modification, movement, or alteration
- unauthorized use of common carrier communication services accessed through the system
- abuse, misuse, or negligent acts or omissions of the customer and persons under the customer's control
- acts of third parties and acts of God

AT&T'S OBLIGATION TO REPAIR, REPLACE, OR REFUND AS SET FORTH ABOVE IS YOUR EXCLUSIVE REMEDY.

EXCEPT AS SPECIFICALLY SET FORTH ABOVE, AT&T, ITS AFFILIATES, SUPPLIERS, AND AUTHORIZED RESELLERS MAKE NO WARRANTIES, EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIM ANY WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

LIMITATION OF LIABILITY

EXCEPT FOR PERSONAL INJURY, DIRECT DAMAGES TO TANGIBLE PERSONAL PROPERTY PROXIMATELY CAUSED BY AT&T, AND LIABILITY OTHERWISE EXPRESSLY ASSUMED IN A WRITTEN AGREEMENT SIGNED BY AT&T, THE LIABILITY OF AT&T, ITS AFFILIATES, SUPPLIERS AND AUTHORIZED RESELLERS FOR ANY CLAIMS, LOSSES, DAMAGES OR EXPENSES FROM ANY CAUSE WHATSOEVER (INCLUDING ACTS OR OMISSIONS OF THIRD PARTIES) REGARDLESS OF THE FORM OF ACTION, WHETHER IN CONTRACT, TORT OR OTHERWISE, SHALL NOT EXCEED AN AMOUNT EQUAL TO THE LESSER OF THE DIRECT DAMAGES PROVEN OR THE PURCHASE PRICE OF THE SYSTEM. IN NO EVENT SHALL AT&T OR ITS AFFILIATES, SUPPLIERS OR AUTHORIZED RESELLERS BE LIABLE FOR INCIDENTAL, RELIANCE, CONSEQUENTLY, OR ANY OTHER INDIRECT LOSS OR DAMAGE (INCLUDING LOST PROFITS OR REVENUES) INCURRED IN CONNECTION WITH THE SYSTEM. THIS LIMITATION OF LIABILITY SHALL SURVIVE FAILURE OF THE EXCLUSIVE REMEDY SET FORTH IN THE LIMITED WARRANTY ABOVE.

About This Book

This book describes how to use data features in your communications system. It supplements the information you use to set up the system's voice communications. It is intended for persons who plan, implement, coordinate, and manage the system (called "system managers") and for data users.

Setting Up Data Options for the First Time

To setup data options for the first time:

- Study the system features and components described in Chapters 1 and 2.
- Use the information in Chapter 3 to decide which options you want for this system.
- Complete the appropriate forms listed in Chapter 3.
- Use the procedures in Chapter 4 to program options for the system.
- Follow the procedures in Chapter 5 to use data in your communications system.

Changing Data Options in an Existing System

To change data options in an existing system:

- Update the planning forms listed in Chapter 3 with the changes you want to make.
- Follow the appropriate procedures in Chapter 4 to change the system.

Related Documentation

The following books are available to help you set up, use, and maintain the communications system:

- reference
- setup and modification
- telephone user support
- operator guides
- miscellaneous

How to Order Books

The books needed for operating the communications system were supplied with the system. You can order additional copies of these and other books listed below from the AT&T Customer Information Center:

- Within the continental United States, call 1-800-432-6600.
- In Canada, call 1-800-255-1242.

MERLIN LEGEND Book Title	Order Number
System Setup and Modification	
Data Guide	555-610-114
Data Planning Forms	555-610-118
System Programming	555-610-111
Key System Planning	555-610-112
Key System Planning Forms	555-610-116
PBX System Planning	555-610-113
PBX System Planning Forms	555-610-117
System Reference	
System Reference	555-610-110
Telephone User Support	
Analog Multiline Telephones User's Guide	555-610-120
MLX-10D,™ MLX-28D,™ and MLX-20L™ Digital/ISDN Display Telephones User's Guide	555-610-122
MLX-10™ Digital/ISDN Non-Display Telephone User's Guide	555-610-123
MLX-10™ and MLX-10D™ User Cards	555-610-124
MLX-28D™ and MLX-20L™ User Cards	555-610-125
Single-Line Telephones User's Guide	555-610-121

MERLIN LEGEND Book Title	Order Number
Operator Guides	
Analog Direct-Line Consoles Operator's Guide	555-610-131
Digital/ISDN Direct-Line Consoles Operator's Guide	555-610-132
Digital/ISDN Queued Call Console Operator's Guide	555-610-133
Miscellaneous	
Calling Group Supervisor's Guide	555-610-130

Additional Ordering Information

For information on ordering replacement parts, accessories, and other equipment that is compatible with the system, see Appendix A in *System Reference.*

Product Safety Labels

Throughout this book, hazardous situations are indicated by an exclamation point inside a triangle, along with the word caution or warning.

WARNING:

Warning indicates the presence of a hazard that could cause death or severe personal injury if the hazard is not avoided.

CAUTION:

Caution indicates the presence of a hazard that will or can cause minor personal injury or property damage if the hazard is not avoided.

How to Comment on This Book

We welcome your feedback on this book. Please use the feedback form that follows. If the form is missing, send your comments to A. Sherwood, AT&T, 99 Jefferson Road, Rm. #2A25, Parsippany, NJ 07054.

Data Communications with This System

1

Data communications is the transmission of words or symbols from a source to a destination by means of electrical signals. This chapter gives you an overview of the features and equipment used for data communications with this system.

Data Communications Overview

The communications system offers many advanced data features designed to reduce costs, improve efficiency, and automate your data communications process. These features can be used to share resources, share data (with advanced data connectivity features), and provide advanced network services that integrate voice and data (telemanagement).

Resource Sharing

Resource sharing lets users share data terminal equipment (DTE) including personal computers, printers, ports, or computer systems and data communications equipment (DCE), including modems or data modules, to reduce costs.

The advantages include simplified and less expensive wiring and reduced cabling costs; better use of expensive hardware, including printers, plotters, and high speed modems; and fewer host computer port requirements.

The communications system supports these data features through

- data hunt groups (DHGs)
- external modem pooling
- analog data support
- digital data support
- clear channel 64-kbps digital transmission
- ISDN 7500B Data Module

Data Connectivity

Data connectivity is the process of linking dispersed computer resources and data equipment. Data connectivity applications include host access at speeds up to 19.2 kbps (asynchronous) or 64 kbps (synchronous), PC-to-PC connectivity, data sharing between workstations, and enhanced LAN access among LANs or to wide area networks (WANs).

Advantages include high-speed (up to 64 kbps) digital connectivity; simplified and less expensive wiring; reduced networking costs (for file transfer and peripheral sharing); interconnection of LANs (if you don't need dedicated network services like Accunet® Switched 56 Service); and integrated voice and data.

The communications system supports these data features through

- data hunt groups (DHGs)
- external modem pooling
- analog data support
- ISDN 7500B Data Module
- Basic Rate Interface
  - digital end-to-end connectivity
  - clear channel 64-kbps communications
  - simultaneous voice and data transmission
- Primary Rate Interface
  - Accunet switched digital services
  - simultaneous voice and data transmission

Call Processing and Telemanagement

Telemanagement allows for efficient call completion and call-processing features and applications capture calling information. You can use telemanagement to get call-accounting information or to handle calls as transactions rather than as voice communications.

Telemanagement can

- enhance customer service through faster call pickup and reduced hold times
- increase productivity and accuracy through automated caller-record lookup
- reduce expenses through facility optimization (for example, using PRI-based Call-by-Call Service Selection) and improved call routing
- improve network management and call-center personnel resource allocation
- provide more contacts from abandoned call returns
- offer more personalized services through automated client profiles and database access

Data Stations

A data station is a combination of equipment, such as a personal computer (PC), printer, or fax machine, connected to the system with a modem or a data module. The modem or data module sends information to and from the data terminal and, in many cases, provides dialing and answering capability. The data communications capability of the modem or data module is similar to that of a telephone—it places, maintains, and ends a data call.

Two types of data stations can connect to the system—analog and digital. Analog and digital data stations can include a telephone for users who need simultaneous voice and data capability.

- **Analog Data Stations** use modems to send and receive information. A modem converts digital signals from the data terminal to analog signals. The analog signals are then sent as continuous electrical waves in the voice frequency band, The modem places, receives, or maintains the data call over the regular telephone company network or with another data station inside the system.
- **Digital Data Stations** use a data module such as the Integrated Services Digital Network (ISDN) 7500B Data Module to send and receive digital data. A data module does not convert the digital signal to an analog signal. The digital signal is sent as a sequence of separate electrical impulses. The data module places, receives, or maintains the data call over digital telephone company facilities such as ISDN Primary Rate Interface (ISDN-PRI) or with another data station inside the system.

Calls between analog data stations and digital data stations are possible only if the system includes a conversion resource to convert signals from analog to digital or digital to analog. To do this conversion, modems are connected to data modules to make a modem and data module pair.

System Features Used for Data

See System Reference *for descriptions of all the features offered by the communications system.*

Many features are available to data station users through the communications system software:

- **Modem Pools** (also called conversion resources) consist of one or more pairs of an ISDN 7500B Data Module and a modem. A pool is used to optimize and share conversion resources to reduce costs. Modem pools can be grouped so that costly resources can be shared by many users.
- **Data Hunt Groups** are groups of the same type of stations (all analog or all digital) or one or more modem pool pairs that are assigned one extension number. Specific lines/trunks can also be assigned to ring directly into the data hunt group (DHG) so that outside callers can dial a published telephone number to reach the DHG. DHGs connect calls in a round-robin fashion to the first available data station or modem pool pair in the group.
- **Account Code Entry** allows tracking of outgoing data calls for billing, forecasting, or budget reports.
- **Auto Answer All** allows a modem with automatic answering capability to answer data calls when the user is away from the station.
- **Data Status** is used when a data station includes an analog multiline or Digital/ISDN (MLX) telephone to monitor when data equipment is in use.
- **Privacy** prevents loss of data by ensuring that data transmission is not interrupted accidentally. Privacy for data calls is provided automatically on digital data stations and on analog data stations with analog multiline telephones, but must be manually activated on all other analog data stations.
- **System Speed Dial or Personal Speed Dial** permits quick dialing of frequently used numbers.

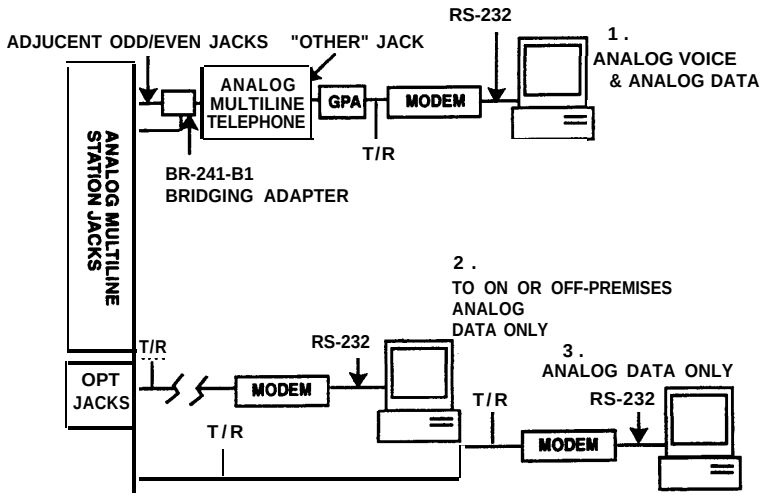
Data Communications Components

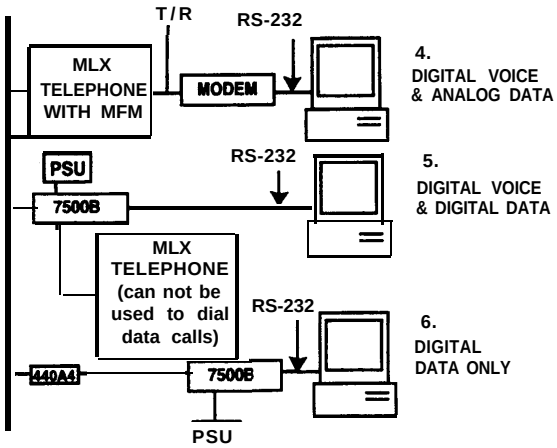
Diagrams of voice and data equipment commonly connected to the system are shown in the following pages. The numbers in the diagrams correspond to numbers in the accompanying text on the facing page. The text explains what the equipment is, where it's connected to the control unit, and how it's used to make data calls.

Individual Use Data Stations

Figure 1-1 shows configurations for an analog data station and a digital data station, both intended for individual use.

1. **Analog Voice and Analog Data** includes a data station with an endpoint, such as a data terminal or PC connected via a modem, and an analog multiline telephone. A GPA supplies the tip/ring (T/R) interface for the modem. To provide simultaneous voice and data calls, two adjacent station jacks must be assigned on a 408, 408 GS/LS, or 008 module using a BR-241-B1 bridging adapter.
2. **On- or Off-Premises Analog Data-Only** is an endpoint connected via a modem, Connection to the control unit is through an off-premises telephone (OPT) jack on a 008 OPT module.
3. **Analog Data-Only** is an endpoint connected via a modem to a basic station jack on a 008 OPT or 012 (basic telephone) module in the control unit.
4. **Digital Voice and Analog Data** is an endpoint connected via a modem and a Multi-Function Module (MFM) in an MLX telephone connected to the control unit. The modem converts the digital signal to an analog signal that is sent through the MFM in the MLX telephone connected to the control unit.
5. **Digital Voice and Digital Data** is an endpoint connected via an ISDN 7500B Data Module attached to an MLX telephone. The ISDN 7500B Data Module supplies the RS-232 interface to the endpoint. The MLX telephone connects to a station jack on a 008 MLX module.
6. **Digital Data-Only** is an endpoint connected via an ISDN 7500B Data Module. Since an MLX telephone is not attached, a 440A4 terminating resistor must be installed. The data station is connected to a station jack on a 008 MLX module.





T/R = TIP/RING
440A4 = TERMINATING RESISTOR
PSU = WP-90110-L1 POWER UNIT, 115 VAC

Figure 1-1 Individual Use Data Station Configurations

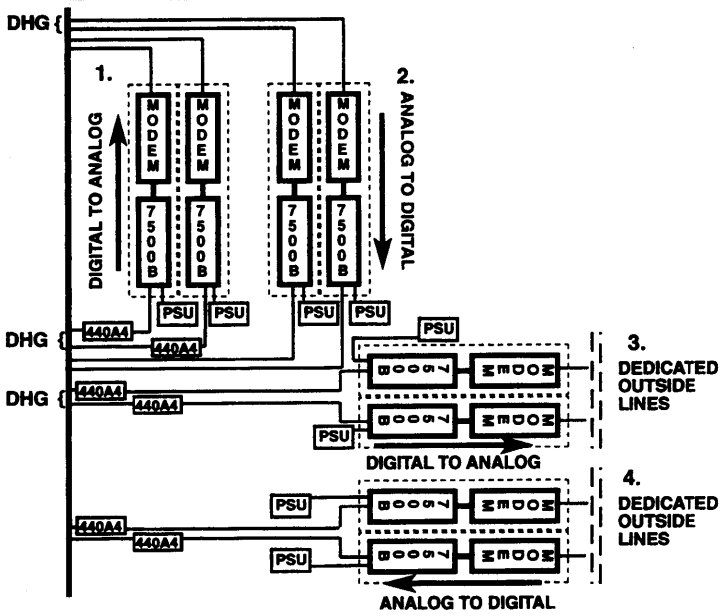
Modem Pools and Data Hunt Groups

See "Data Hunt Group Planning" in Chapter 3 of this guide.

Figure 1-2 shows analog modems and digital data modules assigned to modem pools and DHGs so that analog and digital stations can communicate with each other.

1. **Digital to Analog** converts digital signals to analog signals so a digital station can communicate with an inside or outside analog station. Each modem is assigned to a basic station jack on a 012 or 008 OPT (basic telephone) module, and each data module is assigned to a 008 MLX module.
2. **Analog to Digital** converts analog signals to digital signals so an analog data station can communicate with an inside or outside digital data station. Each modem is assigned to a basic station jack on a 012 or 008 OPT (basic telephone) module, and each data module is assigned to a 008 MLX module.
3. **Digital to Analog (Outgoing)** converts digital signals to analog signals so a digital data station can communicate with an outside analog station over outside dedicated lines. These lines are used solely for data communications. The data module is connected to the control unit using station jacks on a 008 MLX module.
4. **Analog to Digital (Incoming)** converts digital signals to analog signals so a digital data station can communicate with an outside analog station over outside dedicated lines. These lines are used solely for data communications. The data module is connected to the control unit using station jacks on a 008 MLX module.

Note: Since an MLX telephone is not connected, a 440A4 terminating resistor must be installed.



T/R = TIP/RING
440A4 = TERMINATING RESISTOR
PSU = WP-90110-L1 POWER UNIT, 115 VAC

Figure 1-2 Modem Pools Assigned to Data Hunt Groups

Local Host Computer and LAN Workstations

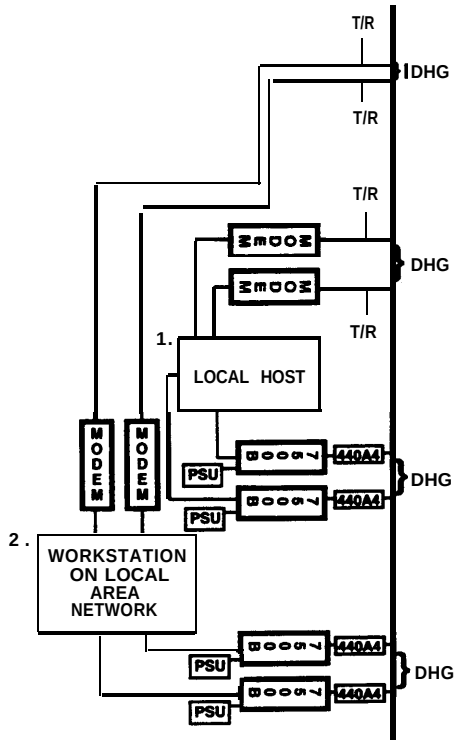
Figure 1-3 shows how data stations can be assigned to DHGs to provide access to a local host computer and a workstation on a local area network (LAN).

1. **Local Host Computer** connects a local host computer via a modem or data module to the control unit.

   The modems and data modules connect to RS-232 ports on the host computer. Each modem is assigned to a station jack on a 012 or 008 OPT module and each data module connects to a 008 MLX module station jack.

2. **LAN Workstation** connects a data terminal or computer (workstation) on the IAN via modems or data modules to the system. A LAN is a group of terminals or PCs connected to each other or to a local host.

Figure 1-3 shows how a data station communicates with a local host computer or another workstation by dialing one extension number. For example, extension 711 could be assigned to the data station DHG, and extension 773 could be assigned to the modem DHG for communicating with the local host computer. Extension 774 could be assigned to the data station DHG and extension 775 could be assigned to the modem DHG for communicating with other workstations on the LAN.



T/R = TIP/RING
440A4 = TERMINATING RESISTOR
PSU = WP-90110-L1 POWER UNIT, 115 VAC

Figure 1-3 Data Stations Connected to Local Host Computer and LAN Workstation

Outside Lines/Trunks

Figure 1-4 shows the types of outside lines/trunks that can be used to make and receive data calls to outside data stations.

1. **GS (ground-start) lines/trunks** are used to place and receive data calls from an outside analog data station and also provide improved signaling and a dependable disconnect (for secure toll restriction).

   LS (loop-start) lines/trunks are the standard for home and small businesses. They are less expensive in some areas but

   - they do not protect against “glare." Glare occurs when an outside call is made at the same time as another call is arriving.
   - they cannot provide dependable disconnect for toll restriction

   The following outside GS/LS lines/trunks can be used for data:

   - basic lines/trunks
   - WATS (wide area telecommunications service)
   - 800 service (in-WATS)
   - foreign exchange (FX)

   GS/LS lines/trunks connect to GS/LS jacks on the system.

See System Reference *for detailed information and programming requirements for tie trunks.*

2. **Tie Trunks** provide private communications between two systems. Tie trunks “tie” the two systems together, providing access to all telephones or data stations on each system.

   Tie trunks are usually used for data communication with analog stations connected to a system at a different location, such as different floors of a building, different buildings, and different cities or states.

   Tie trunks connect to the system on a 400EM module.

See System Reference *for detailed information and programming requirements for DID trunks.*

3. **DID (Direct Inward Dial) Trunks** allow incoming calls to reach specific individuals or facilities in the system without the help of a system operator. DID trunks are available only in the Hybrid/PBX mode.

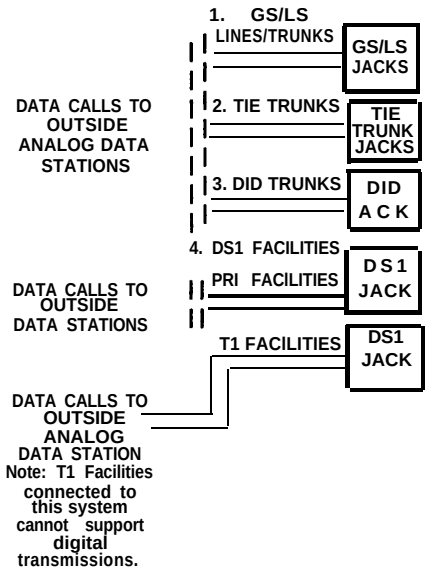
   DID trunks are used to receive calls from outside analog data stations. Outgoing calls cannot be placed on DID trunks.

   DID trunks connect to the system on an 800 DID module.

4. **DS1 facility** carries digital signals in the Digital Signal 1 (DS1) format.

   The DS1 format passes digital data at 1.5444 Mbps by multiplexing twenty-four 64-kbps Digital Signal 0 (DS0) signals and an 8-kbps framing signal. Even though there is only one physical jack, the 100D module supports up to twenty-four logical endpoints or ports (one for each channel) for voice and data calls.

   Each DS0 channel in the DS1 signal corresponds to a line/trunk or logical ID.



T/R = TIP/RING
440A4 = TERMINATING RESISTOR
PSU = WP-90110-L1 POWER UNIT, 115 VAC

Figure 1-4 Outside Lines/Trunks

The DS1 provides a digital signal so data calls from a digital station can be placed to outside digital stations and transmitted at higher speeds (up to 56 kbps).

See System Reference *for detailed information and programming requirements for DS1 facilities.*

A DS1 facility provides either T1 or PRI access.

- T1 is the factory setting. Each of the 24 channels can emulate any combination of E&M tie, LS, or GS lines/trunks. A single 100D module can replace 24 outside lines/trunks. T1 facilities are used to place and receive data calls from outside analog data stations. Outside digital data communications are not supported.
- ISDN-PRI is the standard format for ISDN service. Any combination of the following AT&T Switched Network (ASN) Services provided through an ISDN-PRI line/trunk can be used:
  - Accunet® switched digital service for 56-kbps and 64-kbps restricted, and 64-kbps clear circuit-switched data calls
  - Megacom® WATS service for domestic long-distance outward voice calls
  - Megacom® 800 for domestic toll-free voice calls
  - Software Defined Network (SDN) for voice and circuit-switched data calls (up to 56 kbps)

  The benefits of ISDN-PRI include
  - Speed. Data calls to outside destinations can be made on the same B channels used for voice calls if the service allows. Modems and dedicated, conditioned lines/trunks are not needed.
  - AT&T's INFO-2 automatic number identification (ANI) service. Customers who subscribe to this service can identify the caller on an incoming call on an ISDN-PRI line/trunk by either telephone number or billing number.

    Note: The availability of the caller identification information may be limited by local-serving (caller's) jurisdiction, availability, or central office equipment.
  - Dynamic B-channel assignment. An individual B channel can be removed from service without blocking calls to or from any other B channels.
  - Improved toll restriction. Bypassing of toll restriction is limited on ISDN-PRI lines/trunks.
  - Reliable indication of far-end disconnect. Blocking of incoming calls is prevented because a line/trunk is not immediately released; instead there is a delayed indication of disconnect.
  - Improved SMDR reports. Call timing for SMDR reports is improved since calls recorded are closer to the actual billed duration.
  - Shared use of B channels for Megacom WATS and Megacom 800 on a call-by-call basis for more efficient use of facilities.

Data Communications Hardware

2

ISDN 7500B Data Modules and modems connect data terminal equipment (DTE) such as a PC, printer, optical scanner, local host computer, or LAN workstation to the communications system.

This chapter explains how data modules and modems work, how they connect to the system, how to configure them, and the features they offer.

ISDN 7500B Data Module

The Integrated Services Digital Network (ISDN) 7500B Data Module connects digital data terminal equipment to the system via a 008 MLX module on the system. Unlike a modem, which converts digital data signals to analog signals, a data module transmits digital data to other digital stations.

The data module provides an RS-232 interface for asynchronous transmission from DTE at speeds of up to 19.2 kbps. It can also provide a V.35 interface for synchronous transmission at speeds of up to 64 kbps if you order a separate board.

Figure 2-1 shows the following on the ISDN 7500B Data Module's front panel:

- POWER/TEST **LED.** Lights when power is supplied and flashes when tests are made.
- DATA **LED.** Flashes when a data call comes in and lights when a call is in progress; flashes when tests are made.
- Display. Shows status information and option settings.
- NEXT, BACK, **and** ENTER **buttons.** Used to operate the data module and to adjust the screen's contrast.

Figure 2-1 also shows the following on the underside of the ISDN 7500B Data Module's top cover:

- DCE/DTE Flip Board. Used to select whether the data module operates with data terminal equipment connected directly or as part of a modem pool.

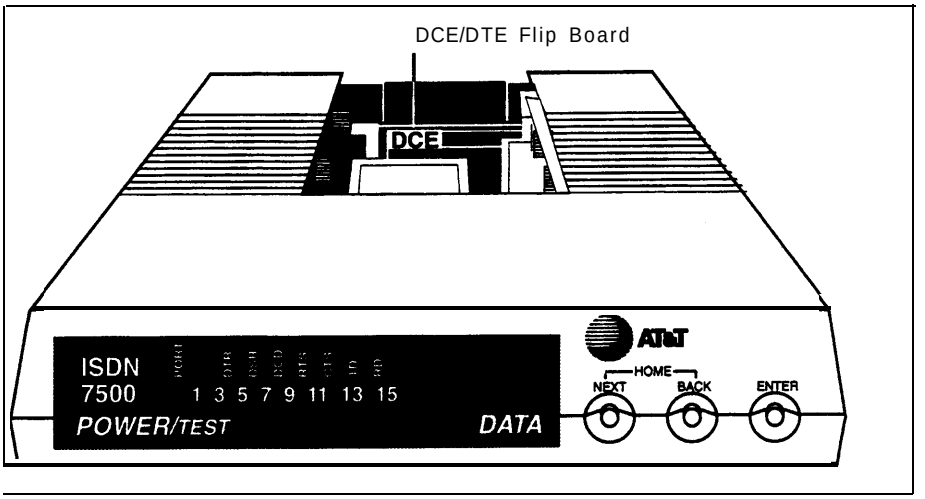


Figure 2-1 ISDN 7500B Data Module Front Panel

Figure 2-2 shows the following on the data module's back panel:

- PHONE **jack.** Connects an MLX telephone to the data module.
- LINE **jack.** Connects the data module to the digital station jack on the 008 MLX module.
- POWER **connector.** Connects the data module to the DC power supply, which connects to an AC outlet.
- PORT 1. Connects the data module to a data terminal (such as a PC) or, when the data module is used in a modem pool, to a modem.
- PORT 2. When an enhancement board is installed for synchronous operation, connects a second data terminal, an automatic calling device (with an RS-366 interface), or a data terminal with a V.35 interface (depending on the type of enhancement board you have).

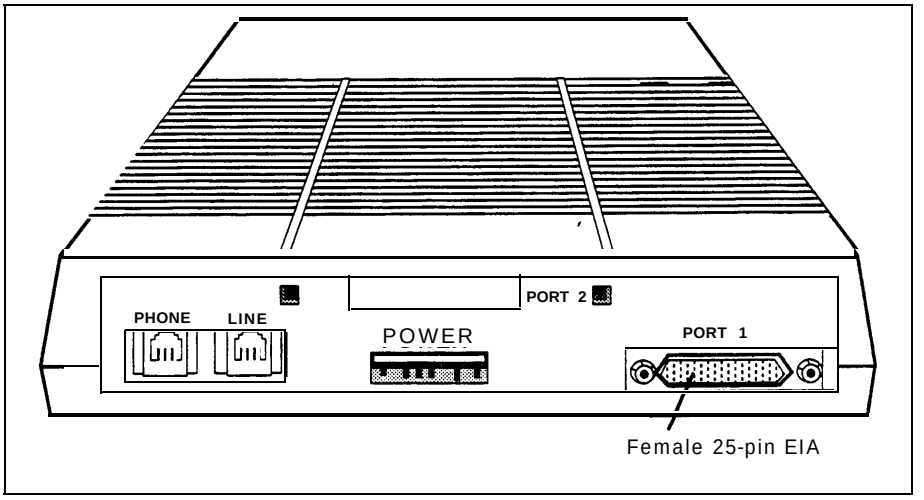


Figure 2-2 ISDN 7500B Data Module Back Panel

Hardware

When you use the ISDN 7500B Data Module with an MLX telephone, one end of a D8W cord connects to the PHONE jack on the data module and the other end of the cord connects to the LINE jack on the MLX telephone.

When you use the ISDN 7500B Data Module without an MLX telephone, you must install a 100-ohm 440A4 terminating resistor adapter (PEC 2709-A59) on the line near the data module.

Note: You cannot locate the data module more than 80 feet from the telephone.

You can configure the data module as a stand-alone (order a WP-90110-L1 power unit [PEC 21625]) or in a multiple-mount arrangement (order a Z77A data mounting [PEC 21626]). The multiple-mount arrangement provides a common power supply for up to eight data modules. Both the power unit and the data mounting need a 115-VAC power outlet. You must order the power unit and data mounting separately.

For synchronous operation at speeds of up to 64 kbps, order one of the following circuit boards:

- **Multipurpose Enhancement Board.** Provides an RS-366 Automatic Calling Unit (ACU) interface on PORT 2 and converts the RS-232 interface on PORT 1 on the main circuit board from asynchronous to synchronous. You must order a V.35 adapter cable separately to operate at data rates of 56 and 64 kbps. Without the adapter cable, data rates are limited to 1200, 2400, 4800, 9600, and 19,200 bps.
- **High-Speed Synchronous Interface Enhancement Board.** Provides a V.35 interface at synchronous data rates of 48, 56, or 64 kbps on PORT 2. A V.35 adapter cable that converts the 25-pin male connector on PORT 2 to the industry-standard 34-pin V.35 interface is included. PORT 1 is not used.

Features

See the Integrated Services Digital Network (ISDN) 7500 Data Module User's Manual *for detailed information on the features available and how they are used for data calls.*

The data module offers both asynchronous and synchronous features:

Asynchronous Features

- RS-232 interface
- asynchronous full-duplex operation
- data rates of 300, 1200, 2400, 4800, 9600, or 19,200 bps
- data options set by data terminal equipment
- data options set without dropping a data call
- autobaud (also called data metering or speed matching)—adjusts the transmission speed to match the speed of the data terminal being called
- auto-adjust—adjusts to the speed and parity of the data terminal equipment used

- call setup (dialing) from the keyboard of an ASCII data terminal using the local command (CMD) mode or AT mode
- automatic or manual answering of incoming data calls

Synchronous Features with Multipurpose Enhancement Board

- RS-232 interface
- half- or full-duplex operation using the RS-232 interface at data rates of 1200, 2400, 4800, 9600, and 19,200 using data transport Mode 2
- half- or full-duplex operation at 56 kbps with the V.35 interface adapter cable
- full-duplex operation at 64 kbps with the V.35 interface adapter cable
- automatic answering of incoming data calls
- ability to place outgoing data calls manually and select user-programmable telephone numbers from the data module display on the front panel
- RS-366 interface to an automatic calling unit (ACU)

Synchronous Features with High-Speed Synchronous Enhancement Board

- V.35 interface (The adapter cable is provided when you order the board using PEC 21624.)
- full-duplex operation at 48, 56, and 64 kbps
- half-duplex operation at 56 kbps only
- automatic answering of incoming data calls
- ability to place data calls manually and select user-programmable telephone numbers from the data module display on the front panel

Modems

A modem is used at an analog data station to place or answer data calls. Modems convert outgoing digital signals from the data terminal into analog signals for transmission, and convert incoming analog signals to digital signals for the data terminal.

Hardware

Since you can connect different types of modems to the system, specific modem hardware is not discussed in this' book. Modems also provide a variety of features in addition to the basic features listed below. Modems used in modem pools, however, must have the following features:

- full-duplex operation
- support of 10-bit code (start, 8 data bits, stop)
- RS-232 asynchronous interface
- data rates of 300, 1200, 2400, 4800, and 9600 bps
- dual-tone multi-frequency (DTMF) dialing through the RS-232 interface
- ability to turn on or maintain the Clear-to-Send indicator when it is ready to receive ASCII dialing sequences from the data module in response to a Data-Terminal-Ready signal from the data module
- ability to keep the Data-Set-Ready lead on (and not turn it off) during transition from the interactive dialing mode to the data mode
- ability to terminate a data call or dialing sequence when the data module turns off its Data-Terminal-Ready lead
- ability to turn off the Data-Set-Ready or Receive-Line-Signal-Detect lead for a minimum of 50 ms when hanging up at the termination of a data call
- ability to turn on the Ring indicator lead for at least 100 ms in the presence of an incoming analog call
- support of Electronic Industries Association (EIA) signals Cl and CI2 if the modem is multispeed

AT&T model 2224G (PEC 2224-CEO for stand-alone, PEC 2224-GED for rack-mounting arrangement) is recommended for modem pools.

See System Reference *for information on the MFM and GPA.*

To use a modem with an MLX telephone, install a Multi-Function Module (MFM) in the telephone to provide a tip/ring (T/R) interface for the modem. The modem connects directly to the MFM. You use the data terminal keyboard to dial data calls and use the telephone dialpad to dial voice calls. Each device operates independently, and features are assigned to each device independently.

To use a modem with an analog multiline telephone, install a General Purpose Adapter (GPA) to provide a T/R interface. You use the telephone dialpad to dial data and voice calls. Features assigned to the telephone are also assigned to the analog data station.

Features

Analog data stations (those not in a modem pool) in the system offer the following features, depending on your modem:

- dialing of asynchronous data calls from the keyboard when connected to a basic telephone station jack on a 012 or 008 OPT module or when connected to an MLX telephone using an MFM
- autobaud (also called data metering or speed matching) for adjusting the speed of transmission to match the speed of the data terminal being called
- automatic or manual answering of incoming data calls
- self-test and maintenance procedures
- ability to set data options for the call on the keyboard and change-the options without dropping the call

Modem Pools

A modem pool (also called a conversion resource) consists of one or more pairs of data modules and modems. A modem pool converts data signals from digital to analog or from analog to digital for communications between digital and analog data stations.

Modem pools can be

- **Analog to Digital.** Converts analog signals to digital signals so that analog data stations can communicate with inside digital stations or outside digital ISDN-PRI facilities.
- **Digital to Analog.** Converts digital signals to analog signals so that digital data stations can communicate with inside analog data stations or place data calls using the regular telephone network.

Modem pools can operate in one direction only—analog-to-digital or digital-to-analog (incoming or outgoing). Dedicated outside analog lines can be connected directly into analog modems in an analog-to-digital modem pool (and through a data module to 008 MLX ports on the system).

Hardware

In a modem pool, the modem connects to the control unit via a basic station jack on a 012 or 008 OPT module. An ISDN 7500B Data Module (PEC 2164-BDM) connects to the control unit via a digital station jack on a 008 MLX module.

In an analog-to-digital modem pool, data calls are placed to outside data stations through the control unit using system lines (outside ISDN-PRI facilities connected to the DS1 line/trunk jack on a 100D module in the control unit).

In a digital-to-analog modem pool, data calls are placed to outside data stations through the control unit using system lines (outside lines/trunks connected to a line/trunk jack on a 400, 400 GS/LS/TTR, 800, 800 GS/LS, 408, 408 GS/LS, 800 DID, or 400EM module in the control unit).

Since the data module in a modem pool operates without an MLX telephone, you must install a 100-ohm 440A4 terminating resistor adapter (PEC 2709-A59) on the line near the data module.

You can configure the ISDN 7500B Data Module as a stand-alone by ordering a WP-90110-L1 power unit (PEC 21625) or in a multiple-mount arrangement by ordering a Z77A data mounting (PEC 21626). The Z77A provides a common power supply for up to eight data modules. Both the power unit and the data mounting require a 115-VAC power outlet. Neither is provided with the data module and both must be ordered separately.

Option Settings

See the user manuals provided with the modem and the ISDN 7500B Data Module for setting hardware and software options, and for explanations of the options.

The options set for a modem and data module in a modem pool differ depending on whether the modem pool is digital-to-analog or analog-to-digital.

If the modem or Data Module is rack-mounted, you may have to supply or remove power to a single modem or data module.

Digital-to-Analog Settings

Data Module Setting

To prepare the data module for a digital-to-analog modem pool:

1. Set the DCE/DTE flip board to the DTE position.
2. Use the front panel controls on the data module to get the following option display.

Table 2-1 Data Module Settings for Digital-to-Analog Modem Pool

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	L	1	:	3	3	3	0	0	0	b	0	0	1	0	1	1
	L	2	:	0	1	1	1	0	0	0	3	1	0	0	0	0

b = blank
L = Line #

Modem Setting

The AT&T model 2224G modem is designed for modem pools. One way to prepare this modem for operation in a digital-to-analog modem pool is shown below and may be different depending on your type of modem.

1. Connect a data terminal such as a PC to the modem and plug both the modem and data terminal into an AC outlet.
2. Use the instructions provided with the modem to set all bit switches to default positions.
3. Save all bit-switch settings by unplugging the modem from the wall outlet and plugging it back in.
4. Set the data terminal speed to match the modem's default speed.
5. The modem is now operating in the AT&T command protocol. Use these steps to set the default options:
   - Type **od.**
   - Press **Enter.**
6. Set all bit switches according to Table 2-2.

Table 2-2 Modem Option Settings for Digital-to-Analog Modem Pool Operation

Bit Number:	1	2	3	4	5	6	7	8
Switch								
1	L	R	L	R	R	R	L	L
2	L	R	L	L	L	L	L	L
3	D	D	D	D	U	U	D	D
4	D	D	D	D	D	U	D	D
5	U	D	U	U	U	D	D	D
7	on	on						

L = left U = up
R = right D = down

7. Unplug the modem from the wall outlet; then plug it back in. Set switch 1, bit 2 to the left to store the switch settings in the modem's memory. The modem is now operating in the AT&T command protocol.
8. Enter command mode, set the options, and save the options in protected memory to prevent loss of settings in case of a power failure:
   - Type **AT** and press **Enter** to enter the local mode.
   - Type **AT&D2** and press **Enter.** Option set: drop call when DTR low.
   - Type **AT&C1** and press **Enter.** Option set: data carrier detect follow call.
   - Type **ATS0=1** and press **Enter.** Option set: Auto Answer.
   - Type **ATQ0** and press **Enter.** Option set: enable result codes (factory setting).
   - Type **AT&W** and press **Enter** to save the options in protected memory and prevent loss of settings in case of a power failure.

Analog-to-Digital Settings

ISDN 7500B Data Module Option Setting

Use the following procedure to prepare the ISDN 7500B Data Module for operation in an analog-to-digital modem pool:

1. Set the DCE/DTE flip board to the DTE position.
2. Use the front panel controls on the data module to see the following.

Table 2-3 Data Module Settings for Analog-to-Digital Modem Pool

Position:	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	L	1	:	3	3	3	0	1	0	b	0	0	1	0	1	0
	L	2	:	0	1	1	1	0	0	0	3	1	0	0	0	0

b = blank
L = Line #

Modem Setting

The AT&T model 2224G modem is designed for modem pools. One way to prepare this modem for operation in a digital-to-analog modem pool is shown below and may be different depending on your type of modem:

1. Connect a data terminal such as a PC to the modem and plug both the modem and data terminal into an AC outlet.
2. Use the instructions provided with the modem to set all bit switches to the default positions.
3. Save all bit-switch settings by unplugging the modem from the wall outlet and plugging it back in.
4. Set the data terminal speed to match the modem's default speed.
5. The modem is now operating in the AT&T command protocol. Use these steps to set the default software options:
   - Type **od.**
   - Press **Enter.**
6. Set all bit switches according to Table 2-4.

Table 2-4 Modem Settings for Analog-to-Digital Modem Pool

Bit Number:	1	2	3	4	5	6	7	8
Switch								
1	L	L	L	R	R	R	L	L
2	L	R	L	L	L	L	L	L
3	D	D	D	D	U	U	D	D
4	D	D	D	D	D	U	D	D
5	U	D	U	U	U	D	D	D
7	on	on						

L = left U = up
R = right D = down

7. Unplug the modem from the wall outlet; then plug it back in. Set switch 1, bit 2, to the left to store the switch settings in the modem's memory. The modem is now operating in the AT&T command protocol.
8. Set the options, and save the options into protected memory to prevent loss of settings in case of a power failure:
   - Type **AT** and press **Enter** to enter the local mode.
   - Type **AT&D2** and press **Enter.** Option set: drop call when DTR low.
   - Type **AT&C1** and press **Enter.** Option set: data carrier detect follow call.
   - Type **ATS0=1** and press **Enter.** Option set: Auto Answer.
   - Type **ATQ1** and press **Enter.** Option set: disable result codes.
   - Type **AT&W** and press **Enter** to write options to protected memory

Hardware Decision Flowcharts

The following flowcharts show hardware required for specific data communications uses. Figure 2-3 is for asynchronous transmission and Figure 2-4 is for synchronous transmission.

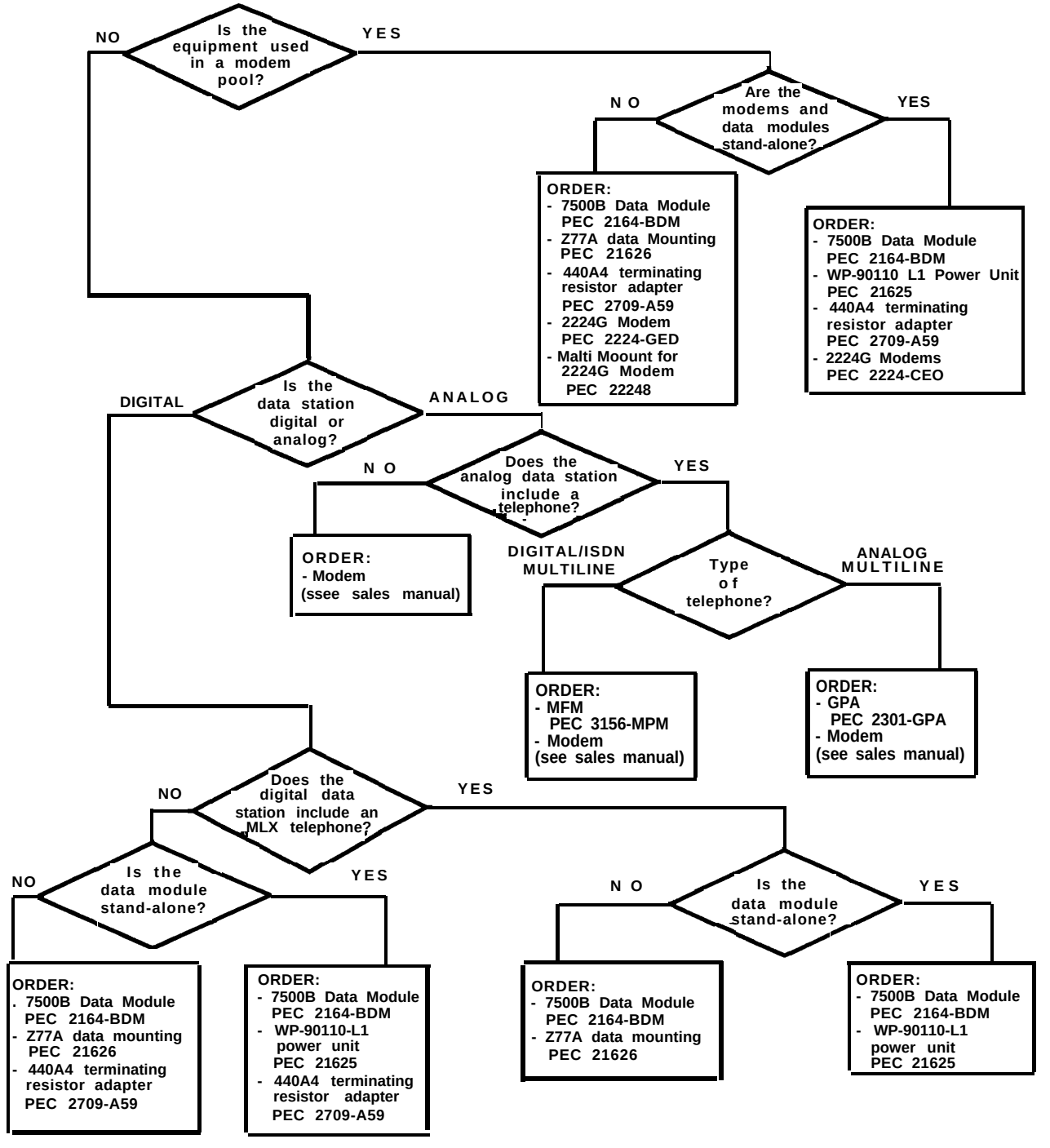


Figure 2-3 Asynchronous Hardware Decision Flowchart

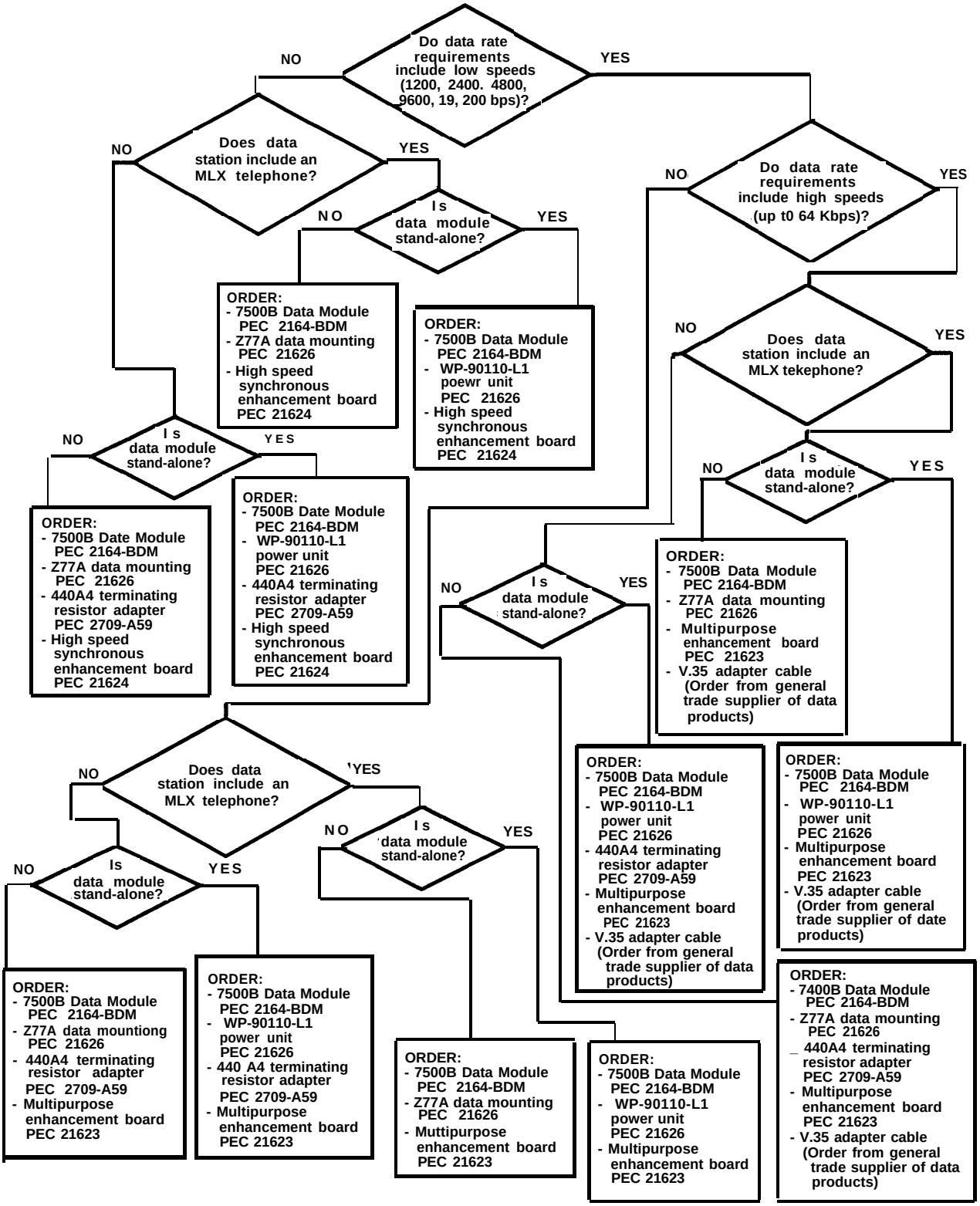


Figure 2-4 Synchronous Hardware Decision Flowchart

Planning

3

Planning is the key to making the most of the data features offered by the communications system. This chapter tells you how to plan analog and digital data stations.

Planning Overview

By using *System Planning* (Key or PBX), you should have already reserved the following:

- line/trunk jacks for outside lines/trunks
- station jacks for voice telephone users
- station jacks for either:
  - analog multiline telephones with an analog data station connected to a General Purpose Adapter (GPA)
  - digital/ISDN (MLX) telephones with either an analog data station connected via an MFM or a digital data station connected via an ISDN 7500B Data Module.

Note: Features and lines for analog data stations connected to an analog multiline telephone via a GPA cannot be assigned independently of the telephone. This includes reserving two consecutive analog station jacks on the control unit for the Simultaneous Voice and Data feature. Planning for these types of analog data stations and the Simultaneous Voice and Data feature is covered in *System Planning* (Key or PBX) and is not included in this book.

On a new system, you can either plan and program voice communications equipment first and data communications equipment second, or plan and program voice and data equipment concurrently.

Forms

Whether you are planning data options for a new system or modifying an existing system, record your decisions on the appropriate data forms shown in Table 3-1. Duplicate the master forms in Appendix A and work on the copies. Use the Key or PBX system forms listed in Table 3-2, as needed.

When you finish planning, see Chapter 4, “System Programming," to program these data options.

Table 3-1 Data Planning Forms

To Plan New or Modify Existing	Use These Forms
Modem pools **Note:** To plan or modify digital-to-analog modem pools using dedicated outside lines, you may need telephone circuits from your local telephone company.	1a, Modem Pool—Analog to Digital 1b, Modem Pool—Digital to Analog
Line assignments	2a, Analog Data Station 2b, Digital Data Station
Feature assignments	2a, Analog Data Station 2b, Digital Data Station
Data hunt groups	3, Data Hunt Groups

Table 3-2 Key or PBX System Forms

To Plan	You Need Key or PBX System Form	To Use as Reference	To Make Entries
Station jack connections ■ analog data stations ■ digital data stations ■ local host computer connections ■ LAN workstation access connections	2a, System Numbering—Station Jacks (for all configurations)	✓	✓
Modem pools **Note:** Modem pool planning includes station jack identification and determining pool type—analog-to-digital or digital-to-analog.	2a, System Numbering—Station Jacks	✓	✓
Line assignments (Key and Hybrid/PBX) **Note:** Behind Switch is not included in these instructions.	2a, System Numbering—Station Jacks 2b, System Numbering—Digital/ISDN Station Adjuncts 2c, System Numbering—Trunk/tine Jacks 3b, Outside Trunks—Pools (Hybrid/PBX only)	✓ ✓ ✓ ✓	
Feature assignment	2a, System Numbering—Station Jacks 2b, System Numbering—Digital/ISDN Station Adjuncts 4b, Digital/ISDN (MLX) Telephone —reverse side, MFM Adjunct 5b, Direct-Line Console (DLC) Digital/ISDN —reverse side, MFM Adjunct	✓ ✓ ✓ ✓	
These features also need			
■ pool dial-out code (Hybrid/PBX only)	3b, Outside Trunks—Pools	✓	
■ ARS Facility Restriction (Hybrid/PBX only)	9b, Automatic Route Selection Tables 9c, ARS Default and Special Numbers Table	✓ ✓	
■ data hunt groups	2c, System Numbering—Trunk/Line Jacks 2d, System Numbering—Special Renumbers 3b, Outside Trunks—Pools 6e, Group Calling	✓ ✓ ✓ ✓	

Station Jacks

To plan how data equipment connects to station jacks on the control unit:

1. Review System Form 2a, on which you entered codes (A for analog, D for digital, and B for basic telephone) and find the telephone type and the user, location, or function for each data station to be connected. Table 3-3 shows station jack types, corresponding module types, and the equipment that can be connected.

   Note: Plan the connections for analog data, digital data, and local host computer communications stations according to the following instructions only if the system includes that station type.

2. Add the station jack assignments to System Form 2a using the “Planning Form Instructions" in the shaded boxes.

Table 3-3 Station Jack Types

Station Jack Type	Module Type	Connects
Analog	008 408 408 GS/LS	Analog multiline telephones (including telephones with an analog data station connected through a GPA)
Digital	008 MLX	MLX telephones (including telephones with an analog data station connected through an MFM) Digital data stations connected through ISDN 7500B Data Modules
Basic Telephone	012	T/R equipment: Single-line telephones Adjuncts, such as answering or fax machines Analog data stations (using modems)
	008 OPT	Tip/ring equipment in another building or off premises

Analog Data Stations

An analog data station consists of a data terminal connected to the control unit using an internal or external modem. This station does not include a telephone.

Assign a basic telephone station jack on a 012 or 008 OPT module; either an on- or off-premises station can be connected to a 008 OPT module.

See System Planning *(Key or PBX) for instructions for reassigning station extension numbers. (The same instructions are used for data as for voice stations.)*

Planning Form Instructions

Record the station jack assignments for analog data stations on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "B" next to the number for each basic station jack.
2. In the "Person, Location, or Function" column, write "modem," then identify each analog data station by person, location, or function.

Digital Data Stations

A digital data station consists of a PC or a data terminal connected to a data module. This station does not include a telephone.

Although only one logical ID is assigned to each digital station jack, the system automatically assigns two extension numbers: the extension number shown on Form 2a is assigned to an MLX telephone connected to the digital station jack, and a second extension number is assigned to each jack. The second extension number is reserved for an adjunct such as an analog data station connected to the MLX telephone through an MFM or a digital data station connected through a data module and data terminal. Both extension numbers are automatically. assigned whether or not the station includes an MFM or ISDN 7500B Data Module. Calls can be placed to both extension numbers independently. Note that an MLX station cannot have both a data module and an MFM. The digital data station uses only the adjunct extension.

Each digital data station connects to a digital station jack on a 008 MLX module.

See System Planning *(Key or PBX) for instructions for reassigning station extension numbers. (The same instructions are used for data as for voice stations.)*

Planning Form Instructions

Record the station jack assignments for digital data stations on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "D" next to the number for each digital station jack.
2. In the "Person, Location, or Function" column, write "ISDN 7500B Data Module" and identify each digital data station by person, location, or function.
3. Fill in System Form 2b with the logical ID and the extension number of the ISDN 7500B Data Module.

Local Host Computer Data Stations

See configuration 1 on Figure 1-3 in this guide.

A local host computer data station consists of a local host computer (sometimes called a "mainframe" computer), a data terminal, and a data module. Digital signals from the data station are converted by the data module to RS-232 data signals (and vice versa) so that the host computer can receive the signals.

Modems convert digital data signals to analog signals (and vice versa).

Assign each data module used for access to a host computer to a digital station jack on a 008 MLX module and each modem to a basic telephone station jack on a 012 or a 008 OPT module. Users access the computer by placing a data call to the extension number for either a data module or modem assigned for communications with the local host computer.

See "Data Hunt Groups" in this chapter.

If you have a limited number of data modules or modems to share among many users, assign some or all of the modems or data modules to a data hunt group. In this way, users can access all the conversion resources in the data hunt group by dialing one extension number.

For example, analog data station users could dial extension 771 to place a data call to the local host computer using a modem assigned to the data hunt group for modems. Similarly, digital station users could dial extension 772 to place a call to the local host computer using a data module in the data hunt group for data modules.

Planning Form Instructions

Record the station jack assignments for local host computer access stations on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "D" next to the number for each digital station jack used to connect an ISDN 7599B Data Module.
2. In the "Person, Location, or Function" column, write "ISDN 7500B—host."
3. In the "Jack Type" column, make sure there is a "B" next to the number for each basic telephone station jack you plan to use to connect a modem.
4. In the "Person, Location, or Function" column, write "modem—host."

LAN Workstations

Local Area Network (IAN) workstations are PCs connected together to share resources.

See configuration 2 in Figure 1-3 in this guide for information on connections.

Assign each data module used for access to a LAN workstation to a digital jack on a 008 MLX module. Each modem must be connected to a basic telephone station jack on a 012 or 008 OPT module.

To access the workstation, users place a data call to the extension number resewed for either an ISDN 7500B Data Module or modem.

See "Data Hunt Groups" in this chapter.

If you have a limited number of ISDN 7500B Data Modules or modems that must be shared by many users, you can assign some or all of the modems or data modules to a data hunt group. In this way, users can access all the conversion resources in the data hunt group by dialing a single extension number.

For example, an analog data station user could dial extension 773 to place a data call to the workstation on the LAN using a modem assigned to the data hunt group for modems. Similarly, a digital station user could dial extension 774 to place a call to the workstation on the LAN using an ISDN 7500B in the data hunt group for 7500Bs.

Planning Form Instructions

Record the station jack asignments for access to a workstation on a LAN on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "D" next to the number for each digital station jack you plan to use to connect an ISDN 7500B Data Module.
2. In the "Person, Location, or Function" column, write "ISDN 7500B—LAN."
3. In the "Jack Type" column, make sure there is a "B" next to the number for each basic telephone station jack used to connect a modem.
4. In the "Person, Location, or Function" column, write "modem—LAN."

See System Planning *(Key or PBX), Chapter 2, for details on system renumbering.*

Note: *System Planning* (Key or PBX) describes how to reassign station extension numbers, The same considerations apply to data stations as those that apply to voice stations.

Modem Pools

See Chapter 1 for information about connections.

A modem pool consists of one or more pairs of data modules and modems. Modem pools convert digital data signals to analog data signals or convert analog data signals to digital signals and are called “conversion resources.” A modem pool allows data communications between digital data stations and analog data stations.

An analog-to-digital modem pool is used to call digital data stations from analog stations. A digital-to-analog modem pool is used to call analog data stations from digital stations.

A modem pool can use either system lines (shown in Figure 3-1) or dedicated outside lines (shown in Figure 3-2) and can be either analog to digital or digital to analog.

Modem pools using dedicated outside lines are useful when

- many data calls are made and you want to be sure data lines are kept separate from outside system lines used for voice calls
- your business uses specialized outside lines (such as private circuits for high-speed transmission) for data communications

Modem Pools Using System Lines

Figure 3-1 shows modem pools using system lines. Calls to and from outside data stations are placed through outside lines connected to the system. These lines can be reserved for members of a modem pool, or they can be the same lines that are used for voice communications.

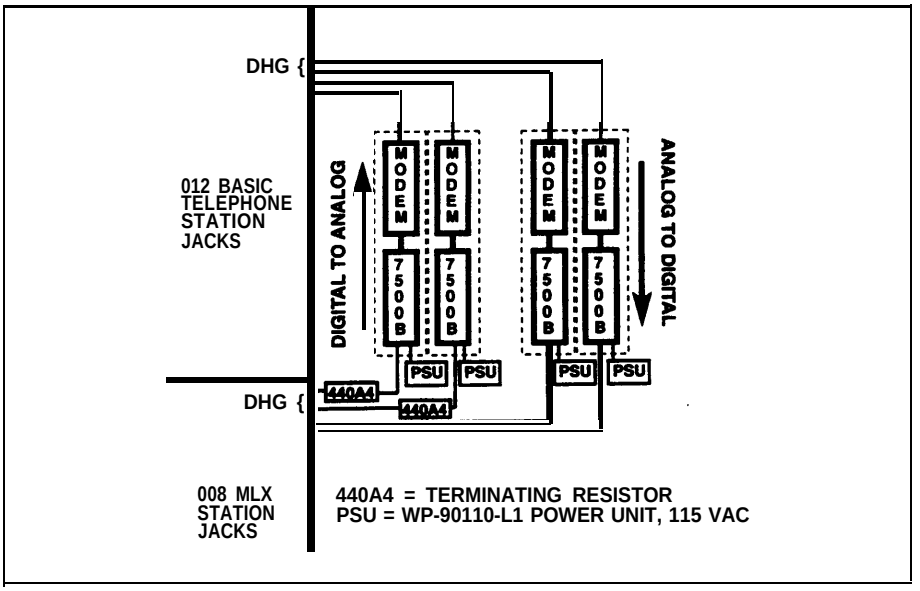


Figure 3-1 **Modem Pools Using System Lines**

For a modem pool using system lines, assign one digital station jack for each data module and one basic station jack for each modem.

Planning Form Instructions

Record the station jack assignments for modem pool equipment on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "D" next to the number for each digital station jack used to connect an ISDN 7500B Data Module.
2. In the "Person, Location, or Function" column, write "ISDN 7500B—modem pool."
3. In the "Jack Type" column, make sure there is a "B" next to the number for each basic telephone station jack you plan to use to connect a modem.
4. In the "Person, Location, or Function" column, write "modem—pool."

See System Planning *(Key or PBX), Chapter 2, for details on system renumbering.*

Note: *System Planning* (Key or PBX) describes how to reassign station extension numbers. The same considerations apply to data stations as those that apply to voice stations.

Modem Pools on Dedicated Lines

To dedicate an outside line exclusively for data communications, you can bypass the control unit and connect the outside line directly to a modem in a modem pool. The line is then dedicated for use with that modem pool pair only.

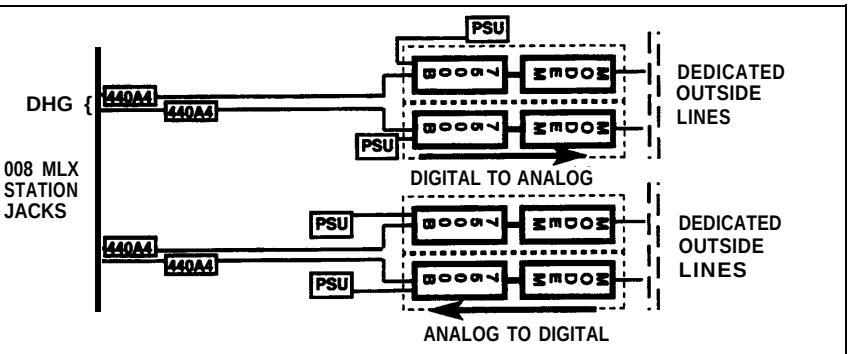


Figure 3-2 Modem Pools on Dedicated Outside Lines

Modem pools on dedicated lines require only one digital station jack for each ISDN 7500B Data Module.

Note: Data calls placed using modem pools on dedicated outside lines bypass the control unit and are not reported by Station Message Detail Recording (SMDR).

See System Planning *(Key or PBX), Chapter 2, for details on system renumbering and planning form instructions.*

Planning Form Instructions

Record the station jack assignments for modem pools on dedicated outside lines on **System Form 2a, System Numbering—Station Jacks:**

1. In the "Jack Type" column, make sure there is a "D" next to the number for each digital station jack used to connect an ISDN 7500B Data Module.
2. In the "Person, Location, or Function" column, write "ISDN 7500B—modem pool dedicated."

Analog-to-Digital Modem Pool

To create an analog-to-digital modem pool, choose a modem and a data module to be paired and the number of pairs you want in the modem pool.

When modems and ISDN 7500B Data Modules are connected to station jacks, an extension number is automatically assigned to each. To create an analog-to-digital modem pool, if you have only one modem pair in the pool, publish the extension number assigned to the modem. If you have more than one pair and the modems are assigned to a data hunt group, publish the extension for the data hunt group.

See "Data Hunt Groups" in this chapter.

If you have more than one modem and data module pair (member) in your modem pool, use a data hunt group to distribute incoming calls uniformly among members in the group. A data hunt group can include up to 20 members.

Do not assign system lines and dedicated outside lines in the same modem pool.

Planning Form Instructions

The logical ID and extension numbers for the modems and data modules assigned to each analog-to-digital modem pool are listed on **System Form 2a, System Numbering—Station Jacks.**

Record the analog-to-digital modem pools on **Data Form 1a, Modem Pool —Analog to Digital.**

Note: Data Form 1a provides planning space for 4 modem pools. If you are planning more than 4 modem pools, make copies of Data Form 1a.

1. Number the modem pools consecutively—starting with 1. Write the number in the "Modem Pool Number" space at the top of each modem pool block.
2. If you have more than one pair and members will be grouped in a data hunt group, check the "Yes" box. You will enter the extension number when you create the data hunt group.
3. In the "Modem" column, write the logical ID and extension number of each modem in the modem pool. On the same line, in the "Data Module" column, write the logical ID and extension number of the ISDN 7500B Data Module you want paired with the modem in the first column.

Digital-to-Analog Modem Pool

To create a digital-to-analog modem pool, choose a data module and modem to be paired and choose the number of pairs you want in the modem pool.

When modems and ISDN 7500B Data Modules are connected to station jacks, an extension number is automatically assigned to each. To create a digital-to-analog modem pool, if you have only one pair in the pool, publish the extension number assigned to the ISDN 7500B. If you have more than one pair and the 7500Bs are assigned to a data hunt group, publish the extension for the data hunt group.

Do not assign system lines and dedicated outside lines in the same modem pool.

See "Data Hunt Groups" in this chapter.

If you have more than one modem and data module pair (member) in your modem pool, use a data hunt group to distribute incoming calls uniformly among members in the group. A data hunt group can include up to 20 members.

Planning Form Instructions

The logical ID and exteinsion numbers for the modems and data modules addigned to each digital-to-analog modem pool are listed on **System Form 2a, System Numbering—Station Jacks.**

Record digital-to-analog modem pools on **Data Form 1b, Modem Pool—Digital to Analog.**

Note: Data Form 1b provides planning space for 4 modem pools. If you are planning more than 4 modem pools, make copies of Data Form 1b.

If the modem pool uses dedicated outside lines, get the telephone number of the outside lines from your local telephone company.

1. Number the modem pools consecutively—starting with 1. Write the number in the "Modem Pool Number" space at the top of each modem pool block.
2. If you have more than one pair and members will be grouped in a data hunt group, check the "Yes" box. You will enter the extension number when you create the data hunt group.
3. If the modem is connected to the control unit, write the logical ID and extension number of each ISDN 7500B Data Module in the modem pool in the "Data Module" column. On the same line, in the "Modem column, write the logical ID and extension number of the modem you want paired with the data module in the first column.

   If the modem is connected to a dedicated outside line, leave the "Logical ID" space blank and write the telephone number in the "Extension" column. Be sure not to mix dedicated outside line connections with control unit connections.

Assigning Lines to Data Stations

Decide on the types of line buttons that are assigned to the data terminal portion of each digital or analog data station and to each modem and ISDN 7500B Data Module.

This includes

- analog data stations connected through MFMs to MLX telephones
- digital data stations that include a telephone
- analog data stations
- digital data stations

Note: Lines cannot be independently assigned to analog data stations connected to analog multiline telephones using a General Purpose Adapter (GPA). The line assignment for the telephone also includes the analog data station; therefore, these instructions are not used for these types of data stations.

Planning Form Instructions

For analog data stations that are connected to an MLX telephone using an MFM, use the reverse side of **Key or PBX System Form 4b—Digital/ISDN (MLX) Telephone,** and **Key or PBX System Form 5b—Direct-Line Console (DLS)—Digital/ISDN.** You should have already filled out preliminary information on these forms when you planned voice communications. The lines for the MLX telephone have already been assigned.

There are two different forms for data stations:

- **Data Form 2a** is for analog data stations, for modems included in modem pools, for modems used to communicate with the local host computer, or for modems used to communicate with a workstation on a LAN.
- **Data Form 2b** is for digital data stations and for ISDN 7500B Data Modules included in modem pools. Data modules used to communicate with the local host computer, or Data Modules used to communicate with a workstation on a LAN.

Make enough copies of each form so that you can complete **one** form for each piece of data equipment.

Locate **System Form 2a, System Numbering—Station Jacks** and use it to fill in the identification information for each data station.

Planning Form Instructions Continued

Record the information on the appropriate Data Form (2a or 2b) for each data station and for each modem and ISDN 7500B Data Module included in a modem pool or used to communicate with a local host computer or with a workstation on a LAN:

1. In the "Logical ID" space write the logical ID for each station.
2. In the "Extension No." space, write the extension number for each station.
3. In the "Person or Location" space, write the name of the person or the location of the data equipment.
4. Under the "Data Station Use" heading, check the "Individual use," "local host computer," or "LAN workstation" box to indicate the use for the data station.

Each analog or digital data station (including an analog data station connected to an MLX telephone via an MFM) and each modem or ISDN 7500B Data Module pair is treated by the system as a multibutton telephone with 34 buttons.

When you choose the mode of operation (Key, Behind Switch, or Hybrid/PBX), Intercom or System Access buttons are automatically assigned to every station connected to the control unit. However, you can customize the system by changing the factory-set assignments and reassigning line buttons. The number and types of buttons assigned depends on the mode chosen and the type of station jack you are using.

Assigning Lines in Hybrid/PBX Mode

The line buttons you can assign to data stations are

- **System Access Ring—** used to make and receive inside and outside data calls. To make outside calls, the user selects an outside trunk by dialing either the code for Automatic Route Selection (ARS) or the dial-out code for the trunk pool. Users at digital data stations can also dial the trunk number (801-880) to select an outside trunk.
- **System Access Originate Only—** used only to make inside and outside calls. Calls are not received on this button so that the data user always has a line available to make data calls. To make outside calls, the user selects an outside trunk by dialing either the code for ARS or the dial-out code for a trunk pool. Users at digital data stations can also dial the trunk number (801-880) to select an outside trunk.
- **Personal Line—** used to make and receive outside data calls from a data station on a specific outside trunk. A personal line is an outside trunk assigned to a line button on one or more data or voice stations. The outside trunk cannot be a member of a trunk pool. To dedicate an outside trunk for data calls and have the calls automatically answered at a data station, do not assign the same outside trunk to both data stations and telephones because modems answer voice calls as data calls.

  On analog data stations, the personal line can be used to receive incoming calls. You can use the personal line for outgoing calls by selecting the line button on the analog multiline telephone, dialing on the analog multiline telephone, and then activating the modem connected through a GPA.

On digital stations, the personal line can be used to make and receive outside data calls. For an outgoing call, dial the trunk number (801-880) to select the trunk.

To allow the user at a digital station access to the digital network for making and receiving calls to outside digital stations, assign ISDN-PRI trunks as personal lines. If ISDN-PRI trunks are not available, the digital data station user can make calls over the regular analog telephone network only by using a digital-to-analog modem pool.

Notes:

- You must use ISDN-PRI facilities with Accunet Switched Digital Data service for digital stations.
- ISDN-PRI trunks can also be used for analog data and voice calls and can be assigned to telephones to allow the voice user to make and receive voice calls using these types of facilities.

- **Pool—** used when you want the data station to make and receive outside data calls on a specific trunk pool (for example, a pool with ISDN-PRI channels) without dialing a dial-out code. The Pool button is used to make and receive only outside calls. To make an outside call, the data station user selects the pool button and dials the telephone number.

  Note: Do not assign System Access Voice buttons for data stations.

The following line button assignments are factory set for Hybrid/PBX mode and are prerecorded on the "Button Diagram" on Data Forms 2a and 2b:

- One System Access Originate Only button and two System Access Ring buttons are assigned to all analog data equipment connected to a 012 or 008 OPT module.
- One System Access Originate Only button and one System Access Ring button is assigned to all data equipment connected to a digital station jack on a 008 MLX module.

The factory settings can be changed; however, the settings should be adequate to meet most user needs since System Access lines can be used to make both inside and outside data calls. Each data station must have at least one System Access button.

If you want a data station (digital only) to make and receive outside data calls on a specific outside trunk, assign a Personal Line button. If you want the data station to make and receive outside calls on a specific trunk pool, assign a Pool button.

To allow users outside the system access to the modem pool, assign outside trunks to the data hunt group that is assigned to the modem pool (you will assign trunks to modem pools later). If a data hunt group is not assigned to the modem pool, you must assign personal lines or pods to the modem for analog-to-digital modem pools or to the ISDN 7500B Data Module for digital-to-analog modem pools.

To dedicate a specific line or pool to receive outside data calls, assign a personal line or pool to a data station, modem pool, or data hunt group that is assigned to a modem pool.

To dedicate specific trunks for use in data communications only (such as Primary Rate Interface channels or other special data lines), consider grouping those trunks in a pool. Use the instructions on pools in Chapter 3 of *PBX System Planning.*

If the system uses Automatic Route Selection, follow the instructions on ARS in Chapter 4 of *PBX System Planning* to specify routes for outgoing data calls.

To restrict non-data users from dial access to data trunk pools, use the “Pool Dial-Out Code" instructions in this chapter.

Planning Form Instructions

Locate **System Form 2c, System Numbering—Trunk/Line Jacks** and **PBX System Form 3b, Outside Trunks—Pools.**

Record your decisions for each data station on the Hybrid/PBX Mode "Button Diagram" or Data Form 2a or 2b.

1. If you want to assign personal lines to the data station, write "Personal Line" and the telephone number (form System Form 2c) of the outside line on the appropriate button. For digital stations, include the trunk number.
2. If you want to assign a pool to the data station, write "Pool" and the pool's extension number (from system Form 3b) on the appropriate button.

Note: On analog data stations where the user does not need to make internal calls, you can assign only personal lines or pools; the user will get a CO line by automatic line selection when going off-hook. This will automatically get central office dial tone.

Assigning Lines in Key Mode

There are two kinds of line buttons you can assign to data stations used to make and receive data calls:

- **Intercom Ring** — used to make and receive inside data calls only.
- **Outside Line** — used to make and receive outside data calls on a specific outside trunk. An outside line can be assigned to a line button on one or more data or voice stations. To dedicate an outside line for data calls and have the calls automatically answered at a data station, do not assign the same outside line to data stations and to telephones because modems answer voice calls as data calls.

  For digital stations, the outside line can be used to make and receive outside data calls. For an outgoing call, dial the line number (801-880) to select the line.

To allow the user at a digital station access to the digital network for making and receiving calls to outside digital stations, assign ISDN-PRI lines to digital stations. If ISDN-PRI lines (with Accunet Switched Digital Data Services) are not available, the digital data station user can make calls over the regular analog telephone network only by using a digital-to-analog modem pool.

Note: ISDN-PRI lines can also be used for analog data and voice calls and can be assigned to telephones to allow the voice user to make and receive voice calls using these types of facilities. You must use ISDN-PRI trunks with Accunet Switched Digital Data Services for digital data stations.

The following line button assignments are factory set for Key mode and are prerecorded on the "Button Diagram" on Data Forms 2a and 2b:

- Two Intercom Ring buttons are assigned to all data equipment connected to a 012 or 008 OPT module.
- Two Intercom Ring buttons are assigned to all equipment connected to a digital station jack on a 008 MLX module.

The factory settings can be changed; however, at least one Intercom button must be assigned to each data station. To allow the user to make and receive outside data calls, you must assign outside lines to the data station.

To allow users outside the system access to your modem pool, you can assign outside lines to the data hunt group that is assigned to the modem pool (you will assign lines to modem pools later). If a data hunt group is not assigned to the modem pool, you must assign outside lines to the modem for analog-to-digital modem pools or to the ISDN 7500B Data Module for digital-to-analog modem pools.

To dedicate a specific line to receive outside data calls, assign an outside line to a data station, modem pool, data hunt group, LAN, or local host.

See Chapter 2, "Features," of System Reference *for details on Idle Line Preference.*

On a digital or analog station the user selects an outside line by dialing the Idle Line Preference code (usually 9) on an Intercom button. On a digital data station the user can also select lines assigned to the station by dialing the line number (801-880) assigned to that outside line.

It is extremely important that the factory-set Idle Line Preference (the line to which the user is automatically connected when going off-hook) not be changed. (The user must be connected to an intercom line to activate features such as Privacy or to select an available outside line by dialing the Idle Line Preference coda.)

Planning Form Instructions

Locate **System Form 2c, System Numbering—Trunk/Line Jacks.**

Record your decisions for each data station on the Key Mode "Button Diagram" of Data Form 2a or 2b. If you want to assign outside lines to the data station, write the telephone number (from System Form 2c) of the outside line on the appropriate button. For digital stations, include the line number.

Assigning Features to Data Stations

This section describes how to assign features to each digital or analog data station and to each modem and ISDN 7500B Data Module pair. This includes analog data stations connected to an MLX telephone using an MFM or digital data stations that include a telephone and analog and digital data stations (data stations that do not include a telephone).

Note: Features cannot be independently assigned to analog data stations connected to analog multiline telephones using a General Purpose Adapter (GPA). The feature assignment for the telephone also includes the analog data station; therefore, the following planning instructions are not used for these types of data stations.

Assign optional features to data stations. The features are

- Voice Announce, Call Waiting, and Automatic Callback
- Pool Dial-Out Code (Hybrid/PBX systems only)
- Call Restrictions
- Forced Account Code Entry
- Ringing Options
- ARS Facility Restriction Level
- System Speed Dial

Record your optional features on **Data Form 2a, Analog Data Station** and **Data Form 2b, Digital Data Station,** the reverse of **Key or PBX System Form 4b, Digital/ISDN (MLX) Telephones,** and the reverse of **Key or PBX System Form 5b, Direct-Line Console (DLC)—Digital/ISDN.**

Notes:

- The System Speed Dial feature is programmed system wide for both voice and data stations, Follow the instructions in *System Planning* (Key or PBX) to assign System Speed Dial codes to data station users.
- All members of a modem pool should have the same feature assignment.

Voice Announce, Call Waiting, and Automatic Callback

For each digital or analog data station and each modem and ISDN 7500B Data Module pair, the following features must be **disabled:**

- Voice Announce
- Call Waiting
- Automatic Callback

Pool Dial-Out Code

Use these instructions only if the system is operating in the Hybrid/PBX mode.

When a data station is first connected, the user can access any trunk pool by dialing the dial-out code assigned to the pool. However, you can restrict data stations from using one or more trunk pools.

The pool dial-out code restriction places data calls only on specific trunk pools: for example, to restrict users to trunk pools that are made up of special data lines such as PRI channels used for data services or to reserve other trunk pools for voice communications only.

Planning Form Instructions

Use the "Optional Features" section of **Data Form 2a or 2b** for each data station to record your decisions. Under the "Pool Dial-OUt Code Restriction" heading:

If you want the data station restricted from using one or more trunk pools, check "Yes". Use **PBX System Form 3b, Outside Trunks—Pools** to locate the dial-out codes for each pool that the data station is restricred from using. Write the dial-out codes on the lines below the "Yes" box. If the data station is a member of a modem pool, assign the same restriction to **all** members of the pool.

Call Restrictions

When the system is first set up, all data stations are unrestricted. This means that you can place local and long-distance calls from all data stations. However, you can restrict selected data stations from making any outside calls and allow only intercom (inside) calls. This is useful for data stations used only for accessing a local host computer.

The calling privileges you assign to a modem or data module in a modem pool determine what types of outside and toll calls are permitted and which line or pool is used for the call. For example, a person with a data station restricted to inside calls only can place an outside call using a modem pool if the modem or data module used in the second stage of dialing is not restricted.

You can also restrict the types of data calls made through modem pools. For example, to restrict a digital-to-analog modem pool to local calls to a host computer in your city, you can restrict the modems from making long-distance calls but still allow intercom and local calls. This type of restriction is useful to prevent the abuse of long-distance calling privileges.

Note: Since modems in digital-to-analog modem pools on dedicated outside lines are not connected to the control unit, they cannot be restricted by the system.

If modem pools are to be used by outside callers, modems or data modules can be restricted from making outside calls (to prevent abuse of services) by setting up separate pools for incoming and outgoing calls.

See System Planning *(Key or PBX), Chapter 4, for instructions on Allowed List and Disallowed List.*

Note: If you assign restrictions to a modem pool, assign the same restriction to **all** members of the pool. If these restrictions are too limited, you can use the Allowed List feature to setup numbers (such as local host computer numbers) that can be dialed regardless of the restriction on the data station. Or, instead of restricting the data stations, you can use the Disallowed List feature to set up numbers that cannot be dialed by any user.

Planning Form Instructions

Use the "Optional Features" section of **Data Form 2a or 2b** for each data station to record your decisions. Under the "Call Restriction" heading:

1. If you do not want Call Restrictions, check Unrestricted.
2. If you want the data station restricted from making any outside calls (only intercom calls can be made), check "Outward Restrict,"

   If the data station is a member of a modem pool, be sure to assign the same restriction to all members of the pool.
3. If you want the data station restricted from making long-distance calls (intercom and local calls can be made), check "Toll Restrict."

   If the data station is a member of a modem pool, be sure to assign the same restriction to all members of the pool.

Forced Account Code Entry

The Forced Account Code Entry feature can be used for billing or for tracking data calls by requiring data station users to enter account codes (1 to 16 digits) for outside calls. Assign this feature to data stations so that you can associate outgoing data calls with specific client accounts.

Note: Account codes cannot be used to track incoming calls to data stations.

Planning Form Instructions

Use the "Optional Features" section of **Data Form 2a or 2b** for each data station to record your decisions. Under the "Forced Account Code Entry" heading:

1. If the user must enter an account code for outgoing calls, check "Yes".
2. If you do not want the feature assigned to the data station, check "No".

Ringing Options

For modems assigned to a digital-to-analog modem pool, set the ringing option for the line buttons to "no ring." This prevents the modem from answering calls placed in error to the wrong side of the modem pool (the side away from the data hunt group or extension assigned to the modem in an analog-to-digital modem pool or to the ISDN 7500B Data Module in a digital-to-analog modem pool).

Planning Form Instructions

On the "Button Diagram" section of **Data Form 2a or 2b** for each data station:

For each outside line. write "No Ring" on the line provided on the left side of the button.

ARS Facility Restriction Level

See "Automatic Route Selection" in Chapter 4 of PBX System Planning *for additional information on ARS planning.*

Use these instructions only if the system is operating in the Hybrid/PBX mode.

If your PBX system uses Automatic Route Selection (ARS) for data calls, you can assign a Facility Restriction Level (FRL) to each data station. This value (from 0 to 6) corresponds to the FRL assigned to each route and is used to restrict data users from access to specific routes. Before restricting a data station, review the values assigned to each route.

To restrict a data station from specific routes, assign an FRL value lower than the route's lowest value. (Values equal to or greater than the route's values allow data station users to access those routes.) A value of 0 is the most restrictive, and a value of 6 is the least restrictive. The factory setting is 3.

For example, to give an analog data station unlimited use of any ARS route, assign a value of 6. If you have digital data stations, assign a value of 0 to prevent users from inadvertently using ARS to select an analog line for outside data calls.

Planning Form Instructions

Locate **System Form 9b, Automatic Route Selection Table** and **System Form 9c, ARS Default and Special Numbers Table.**

1. Review the values assigned to the routs.

   Use the "Optional Features" section of **Data Form 2a or 2b** for each data station to record your decisions about Facility Restriction Level.

2. Next to the "ARS Facility Restriction Level" heading, write the value (0 to 6) for the ARS Facility Restriction level you want to assign to each data station.

   ■ Check "3" to keep the factory setting.

System Speed Dial Codes

To avoid giving the telephone number of a remote computer to modem pool users, assign a System Speed Dial code to the telephone number. Users can dial this 3-digit code to place data calls to the remote computer.

For data calls, the telephone number programmed for a Speed Dial code must include the access code (the pool dial-out code or the ARS dial-out code).

To specify that the remote computer's telephone number does not appear on call reports, use the "System Directory System Speed Dial" instructions in Chapter 4 of *System Planning* (Key or PBX).

Data Hunt Groups

The Data Hunt Group feature is used to designate a group of either modems or ISDN 7500B Data Modules (not both) to receive calls in a modem pool or to communicate with a local host computer or workstation on a LAN. All modems or data modules in a data hunt group are assigned to a single extension number that is used both by inside and outside callers to reach the group. Individual lines/trunks can be assigned to ring directly into the data hunt group to allow outside callers to use the modem pool.

Calls to the group are distributed among group members in a circular pattern. The system hunts for the first available modem or data module, starting with the one that received the last call, If all group members are unavailable, the caller hears a busy tone.

A data hunt group is the same as a voice-station calling group assigned using the Group Calling feature.

Consider grouping the following data stations in data hunt groups as shown in Figure 3-3:

- **Data Hunt Groups A and B** — Data hunt group A includes the modems and data hunt group B includes the ISDN 7500B Data Modules that are used to communicate with a local host computer with multiple ports.
- **Data Hunt Groups C and D** — Data hunt group C includes the modems and data hunt group D includes the ISDN 7500B Data Modules that are used to communicate with a workstation on a local area network (LAN).
- **Data Hunt Group E** — Modems in an analog-to-digital modem pool using system lines are assigned to a data hunt group.
- **Data Hunt Group F** — Data modules in a digital-to-analog modem pool using system lines are assigned to a data hunt group.
- **Data Hunt Group G** — Data modules in a digital-to-analog modem pool using dedicated lines are assigned to a data hunt group.

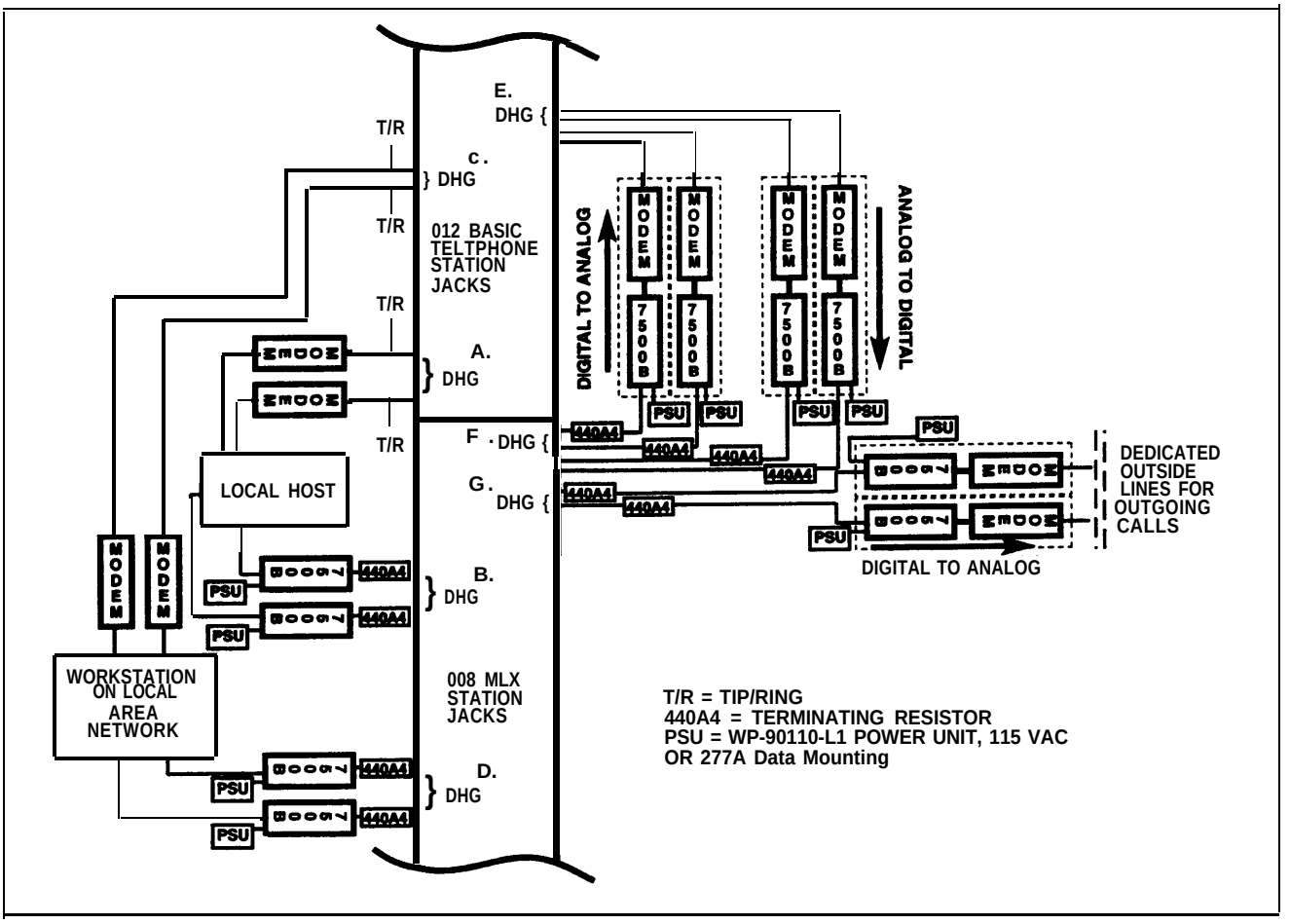


Figure 3-3 Data Hunt Groups

Members of a data hunt group must be the same data station—digital or analog. When you assign members of a modem pool to a data hunt group, be sure to assign only those members that are reached during the first stage of dialing. In an analog-to-digital modem pool, assign the modems to the data hunt group; in a digital-to-analog modem pool, assign the ISDN 7500B Data Modules to the data hunt group.

If you have a digital-to-analog modem pool on a dedicated outside line, you cannot place members of this type of modem pool in the same data hunt group as members of a modem pool that uses system lines.

You can assign up to 32 data hunt groups or calling groups, or a combination of both types. Each data hunt group can have a maximum of 20 members and each data station can be a member of only one data hunt group.

You can also designate particular lines/trunks or pools (Hybrid/PBX only) to ring directly into a data hunt group. However, incoming calls on a given trunk can be directed to only one data hunt group.

See System Planning *(Key or PBX), Chapter 4, for details on system renumbering and planning form instructions.*

Extension numbers 770 through 791 and 7920 through 7929 are automatically reserved for calling groups and data hunt groups. If you want to change the extension numbers assigned to data hunt groups, see *System Planning* to reassign station extension numbers. The same considerations apply to data stations as those that apply to voice stations.

Planning Form Instructions

Locate System Form 2a, **System Numbering—Station Jacks** and **System Form 2c, System Numbering—Trunk/Line Jacks.**

If you have trunk pools (PBX only), also locate **System Form 3b, Outside Trunks—Pools.**

If your system includes voice calling groups, locate **System Form 6e, Group Calling.**

If you plan to renumber the factory-set extensions, locate **System Form 2d, System Numbering—Special Renumbers.**

Duplicate enough copies of **Data Form 3, Data Hunt Groups,** for the number of data hunt groups you plan.

1. Write the group number in the "Group No." space (1-32).
2. Write the name of the group in the "Group ID" space.
3. Check the box to indicate the group use: local host computer access, workstation on LAN access, Analog-to-Digital Modem Pool, Digital-to-Analog Modem Pool.
4. Write the factory-set extension number for the data hunt group in the space provided.

   Note: Check all pages of **System Form 6E** to be sure that you have not assigned the extension to a voice calling group.
5. If you want to reassign the factory-set extension number for the data hunt group, write the new number in the "Renumber to" space.

   Also write the new extension number you want to reassign in the calling group or data hunt group on **System Form 2d, System Numbering—Special Renumber.**
6. In the "Stations" area, write the extension number of each member of the group in the "Ext. No." column and the name of the person or liocation in the "Person or Location" column.
7. In the "Lines/Trunks or Pools" area, for each line/trunk or pool that you want to ring derectly into the data hunt gtoup, write the trunk number or pool extension number next to the logical ID in the "Line/Trunk or Pool No." column. Refer to System Form 2b for the line/trunk numbers and to System Form 3b for the pool extension numbers.

System Programming

4

This chapter describes the system programming that you use to add lines and features for analog and digital data stations.

Note that programming for an analog data station connected to an analog multiline telephone using a General Purpose Adapter (GPA) cannot be done independently of programming for the telephone and is not covered in this book. Note, too, that features such as Automatic Route Selection (ARS) are used by both voice and data stations and that instructions for this programming are in *System Programming.*

Preparation and Forms

See Chapters 1, 2, and 3 in System Programming for instructions.

Before you begin programming, you must

- make sure the system programming console or personal computer with System Programming and Maintenance (SPM) software is set up correctly for programming and that you fully understand the programming sequence.
- review the completed data planning forms using Table 4-1, Planning Forms, to see which form you need for each programming procedure (data forms are provided in Appendix A).

You will also need the following Key or PBX System Forms:

- Key or PBX System Form 4b (reverse) Digital/ISDN (MLX) Telephone
- Key or PBX System Form 5b, Direct-Line Console (DLC)—Digital/ISDN

Planning Forms

Table 4-1 Planning Forms

Programming procedure	Planning Form
To assign lines/trunks or pools	
■ analog data-only stations	Data Form 2a, Analog Data Station—Button Diagram
■ digital data-only stations	Data Form 2b, Digital Data Station—Button Diagram
■ analog data stations connected to an MLX telephone using an MFM	System Form 4b, Digital/ISDN (MLX) Telephone (reverse) MFM Adjunct System Form 5b, Direct-Line Console (DLC)—Digital/ISDN (reverse) MFM Adjunct
Assign features	
■ analog data-only stations	Data Form 2a, Analog Data Station
■ digital data-only stations	Data Form 2b, Digital Data Station
■ analog data station connected to an MLX telephone using an MFM	System Form 4b (reverse) Digital/ISDN (MLX) Telephone System Form 5b (reverse) Direct-Line Console (DLC)—Digital/ISDN
Create data hunt groups	Data Form 3, Data Hunt Groups

The following features can be used for data:
- Disable Voice Announce, Call Waiting, and Automatic Callback
- Pool Dial-Out Code Restriction
- Call Restrictions
- Forced Account Code Entry
- Ringing Options (Modem Pool)
- System Speed Dial
- ARS Facility Restriction Level*

* This feature is programmed system-wide for both voice and data stations. Follow the procedures given in Chapter 4 of *System Programming.*

Programming Instructions

Assign Line/Trunks or Pools to Data Stations

Description

Assigns outside lines/trunks connected to the control unit to specific buttons on each telephone. In the Hybrid/PBX mode, the trunks assigned to a button on a telephone are called Personal Lines.

Factory Setting

Key Mode

- Intercom Ring button, Intercom Voice button, and the first eight lines connected to the control unit are assigned to all analog data stations and MLX telephones (excluding operator positions) using a Multi-Function Module (MFM), digital data stations, modems or data modules connected to a local area network (LAN) or local host computer, and ISDN 7500B Data Modules in modem pools.
- Two Intercom Ring buttons are assigned to data stations and modems in modem pools; no outside lines are assigned.

PBX Mode

- System Access Ring, System Access Voice, and System Access Originate Only buttons are assigned to all analog multiline and MLX telephones (excluding operator positions); no Personal Line or Pool buttons are assigned.
- Two System Access Ring buttons and one System Access Originate Only button are assigned to single-line telephones; no Personal Line or Pool buttons are assigned.

Considerations

- The data station being programmed must be idle while you program this option.
- This procedure is used only to change or add lines/trunks or Pool buttons (Hybrid/PBX only) on data stations including tip/ring data stations, the data portion of an MLX connected to an MFM and modem, an MLX connected to an ISDN 7500B Data Module, and an ISDN 7500B Data Module alone.

  If the system is Key or Behind Switch, you cannot change the factory settings or add more Intercom Ring and Intercom Voice buttons.
- If the system is Hybrid/PBX, see "Intercom or System Access Button Assignment" in this chapter for procedures on adding buttons or changing factory settings for these buttons.
- The following lines/trunks cannot be assigned to a button on a telephone:
  - Lines/trunks used for Music-on-Hold feature

Note: If you use equipment that rebroadcasts music or other copyrighted materials, you may be required to obtain a copyright license from and pay license fees to a third party such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI). Or, you can purchase a Magic on Hold® system, which does not require you to obtain such a license, from AT&T or your authorized dealer.

- Lines/trunks used for Maintenance Alarm

- The factory setting for the analog data stations connected to an MLX telephone using an MFM and for digital data stations should be changed to one Intercom/System Access Ring button and one Intercom/System Access Originate Only button plus lines/trunks and pools as required.
- For MFMs, the idle line preference must be set to Intercom Voice (Key) or SA Originate Only (PBX) (this is programmed using centralized programming).
- An MFM endpoint (not the endpoint of the MLX telephone containing the MFM) must have its automatic line selection set to SA (Intercom in Key mode) to place a call (this is programmed using centralized programming).
- The Copy procedure described in the next section can be used to copy assignments from a data station previously programmed to an individual data station or block of data stations with identical button assignment requirements.
- An alternate method for steps 5 and 6 (below) is to select Entry Mode (F6). For each individual line/trunk to be programmed, identify the line/trunk (dial or type the line/trunk number, logical ID, or slot and port number), and select Enter (F10) or Next (F9) to assign the line/trunk to a button on the telephone or Delete (F8) to remove the line/trunk from a button on the telephone.

Planning Form

Key or PBX System Forms 4b and 5b (reverse) MFM Adjunct

- Button diagram

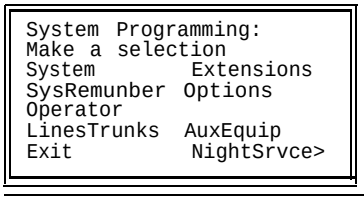
Entering Programming

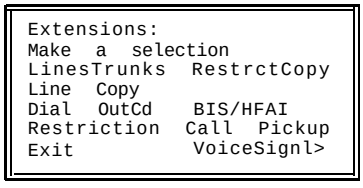
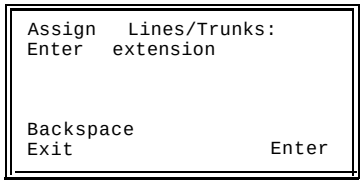
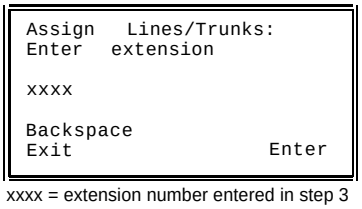
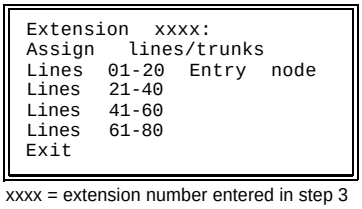
Console: Select **Menu,** `Sys Program` , `Exit`

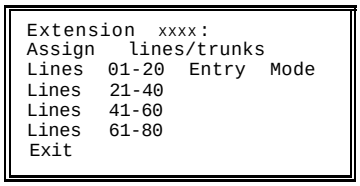
PC/SPM: Type **SPM,** press [any key], **F1, F5**

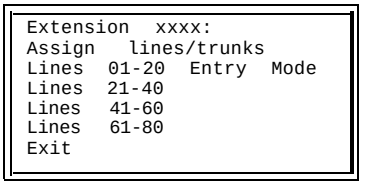
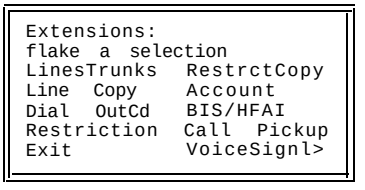
Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	`Extensions`	**F6**

What You See	What You Do...	Console	PC
	2. Select Assign Lines and Trunks	LinesTrunks	**F1**
	3. Identify data station you want to program in any **one** of the following ways:	Dial:	Type:
	Extension no.	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		
 xxxx = extension number entered in step 3	4. Save your entry	Enter	**F10**
	If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.		
 xxxx = extension number entered in step 3	5. Select the specific lines or trunks associated with the 20 line buttons on the console or SPM screen		
	To select lines or trunks with logical IDs 1-20	Lines 01-20	**F1**
	To select lines or trunks with logical IDs 21-40	Lines 21-40	**F2**
	To select lines or trunks with logical IDs 41-60	Lines 41-60	**F3**
	To select lines or trunks with logical IDs 61-80	Lines 61-80	**F4**

What You See	What You Do...	Console	PC
 Your choice is highlighted.	6. Check red and green LEDs next to each line button for feature status: ■ Green LED off or no letter on SPM screen = line/trunk or pool is not assigned to data station ■ Green LED on or letter ”G” on SPM screen = line/trunk or pool is assigned to data station Hybrid/PBX only: ■ Red LED on or letter “R" on SPM screen = trunk assigned to a pool		
	To assign line/trunk to a line button	Press line buttons for each line/trunk to turn on green LED	Press function key for each line/trunk to make letter “G” appear on screen
	To remove line/trunk from line button	Press line button for each line/trunk to turn off green LED	Press function key for each line/trunk to erase letter “G”
	To assign Pool button	Press line button for any one of trunks in pool to turn on green LED (red LED remains on)	Press function key for any one of trunks in pool to make both letter “G” appear on screen (letter “R” remains on screen)
	To remove Pool button	Press line button for any one of trunks in pool to turn off green LED (red LED remains on)	Press function key for any one of trunks in pool to erase letter “G” (letter “R” remains on screen)

What You See	What You Do...	Console	PC
	7. When all entries are complete) return to Assign Lines and Trunks menu	Exit	F 5
	8. To assign lines/trunks to another data station	Repeat steps 2–7 or use Line Copy procedure	Repeat steps 2–7 or use Line Copy procedure
	To continue programming extension features	Select another option	Select another option
	To return to System Programming menu	Exit	F 5

Copy Line/Trunk Assignments

Description

Copies outside line/trunk button assignments made on one data station to an individual data station or block of data stations with identical line assignment requirements.

Considerations

- The data station(s) that line assignments are being copied **to** must be idle while you program this option.
- If you are copying assignments to a block of data stations, they must be sequentially numbered, for example, 11, 12, 13.
- Assignments are not copied to any station that is in use while this option is being programmed.

Planning Forms

Data Form 2a, Analog Data Station

- Button diagram

Data Form 2b, Digital Data Station

- Button diagram

Key or PBX System Forms 4b and 5b (reverse) MFM Adjunct

- Button diagram

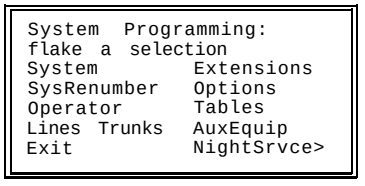
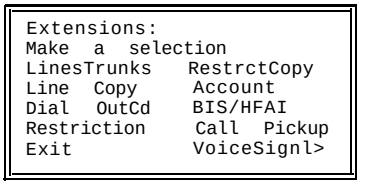
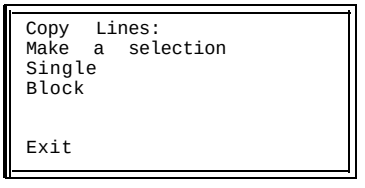
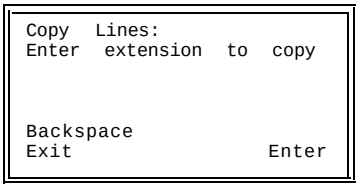
Entering Programming

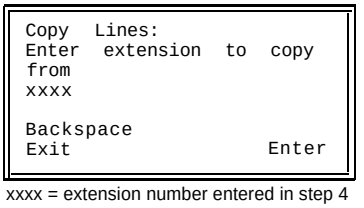
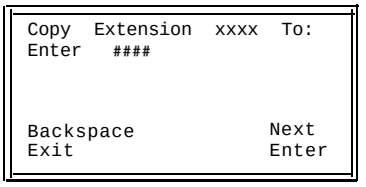
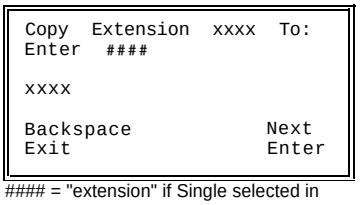
Console: Select **Menu,** `Sys Program` , `Exit`

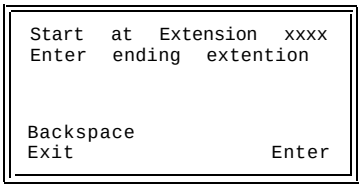
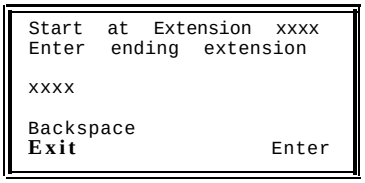
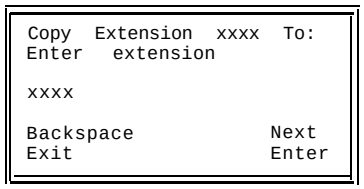
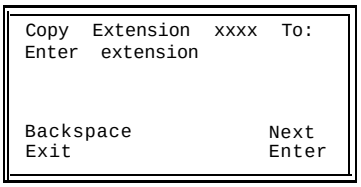
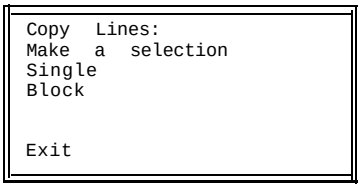
PC/SPM: Type **SPM,** press [any key], **F1, F5**

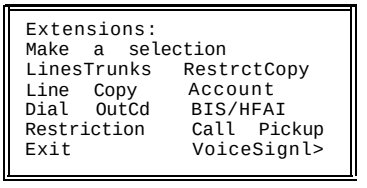
Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	`Extensions`	**F6**
	2. Select Line Copy	`Line Copy`	**F2**
	3. If you want to copy line assignments to individual data station	`Single`	**F1**
	If you want to copy line assignments to sequentially numbered block of data stations	`Block`	**F2**
	4. Identify data station you want to copy line assignments **from** in any **one** of the following ways:	Dial:	Type:
	Extension no.	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	If you plan to copy from more than one data station, enter the lowest extension number.		
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		

What You See	What You Do...	Console	PC
 xxxx = extension number entered in step 4	5. Save our entry *It you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.*	Enter	**F10**
 xxxx = "extension" if Single selected in step 3; "starting extension" if Block selected in step 3 Next command is only shown if you selected Single in step 3.	6. If you selected Single in step 3, identify data station you want to copy assignments **to** or If you selected Block in step 3, identify first data station in block of data stations you want to copy assignments **to** Enter the extension number in any **one** of the following ways: Extension no. Slot and port no. Logical ID no. DSS *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	 Dial: [nnnn] ✶ [sspp] # [nnn] Press DSS button for extension no.	 Type: [nnnn] ✶ [ssppJ # [nnn]
 #### = "extension" if Single selected in step 3 "starting extension" if Block selected in step 3	7. If you selected Single in step 3 If you selected Block in step 3, save your entry *If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.*	Go to step 10 Enter	Go to step 10 **F10**

What You See	What You Do...	Console	PC
 xxxx = extension number entered in step 6	8. If you selected Block in step 3, identify **last** data station in the block with the Logical ID no. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial # [nnn]	Type # [nnn]
	9. Save your entry *If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.*	Enter Go to step 12	**F10** Go to step 12
	10. If you selected Single in step 3: To save your entry and copy line assignments from same data station shown on line 1 to another individual data station To copy line assignments **from** another extension to an individual data station: ■ If next extension number is sequential (difference between extension numbers is 1) *Your previous entry is saved and next extension number displays on line 1.* ■ If next extension number is not sequential (difference between extension numbers is greater than 1)	Enter Exit Repeat steps 6 and 7 Next Repeat steps 6 and 7 Enter Exit Repeat steps 3-6	**F10** **F5** Repeat steps 6 and 7 **F 9** Repeat steps 6 and 7 **F10** **F 5** Repeat steps 3-6
	11. When all entries are complete	Exit	**F5**
	12. To copy line assignments to more individual or blocks of data stations When copy process is complete, return to Extensions menu	Repeat steps 3–11 Exit	Repeat steps 3-11 **F5**

What You See	What You Do...	Console	PC
	13. To program more extension options	Select another option	Select another option
	To return to System Programming menu	Exit	**F 5**

Intercom or System Access Button Assignment

Description

Key or Behind Switch Only

Assigns or changes assignments for intercom buttons used to make and receive inside calls. This includes the Ring, Voice, or Originate Only (Ringer Voice) intercom buttons.

Hybrid/PBX Only

Assigns or changes assignments for System Access buttons used to make and/or receive inside and outside calls. This includes the Ring, Voice, Originate Only (Ring or Voice), and Shared (Ring or Voice) System Access buttons.

Factory Setting

Key Only

- Intercom Ring button, Intercom Voice button, and the first eight lines connected to the control unit are assigned to all analog data stations and MLX telephones (excluding operator positions) using a Multi-Function Module (MFM), digital data stations, and ISDN 7500B Data Modules in modem pools.
- Two Intercom Ring buttons are assigned to analog data stations connected to an MLX telephone using an MFM, digital data stations, and ISDN 7500B data modules used in modem pools; no outside lines are assigned.
- An Intercom Ring and an Intercom Originate Only (Ring) button are assigned to tip/ring equipment connected on a Multi-Function Module (MFM); no outside lines are assigned.

Behind Switch Only

- An Intercom Ring, an Intercom Voice, and a Prime Line button are assigned to all analog multiline and MLX telephones excluding operator positions; no outside lines are assigned.

- Two Intercom Ring buttons and a Prime Line button are assigned to analog data stations connected to an MLX telephone using an MFM, digital data stations, and ISDN 7500B data modules used in modem pools; no outside lines are assigned.
- An Intercom Ring and an Intercom Originate Only (Ring) button are assigned to tip/ring equipment connected on a Multi-Function Module (MFM); no outside lines are assigned.

Hybrid/PBX Only

- System Access Ring, System Access Voice, and System Access Originate Only (Ring) buttons are assigned to all analog multiline telephones and MLX telephones (excluding operator positions); no Personal Line or Pool buttons are assigned.
- Two System Access Ring and a System Access Originate Only button are assigned to analog data stations connected to an MLX telephone using an MFM, digital data stations, and ISDN 7500B data modules used in modem pools; no Personal Line or Pool buttons are assigned.

Considerations

- The data station being programmed must be idle while this option is being programmed.
- The system treats each data station as if it were a 34-button telephone.
- This procedure is used only to change or add the following types of System Access or Intercom buttons: Ring, Voice, Originate Only (Ring or Voice), and Shared (System Access Only, Ring or Voice). See “Assign Lines/Trunks or Pools to Data Stations" instructions for assigning outside lines/trunks, Loudspeaker Page, or Pool buttons (Hybrid/PBX only) to data stations.
- Hybrid/PBX only: You cannot change the factory setting for Call buttons assigned to QCC operator positions. You cannot assign System Access, Ring, Voice, Originate Only, or Shared buttons to QCC operator positions.
- System Access or Intercom buttons can be assigned to only the first 10 buttons on a data station.
- You can assign a combination of up to 10 System Access or Intercom Voice, System Access or Intercom Ring, System Access or intercom Originate Only (Ring or Voice), or Shared System Access (Ring or Voice) buttons to each data station (excluding QCC operator positions).
- You can remove System Access or Intercom buttons, but at least one System Access or Intercom Ring or System Access or Intercom Voice button must remain on the data station.
- System Access and Intercom buttons are centrally programmed and cannot be programmed by individual data station users.
- To speed programming, dial codes are shown starting in step 8. If you prefer, you can program by selecting items from the display instead of using programming codes.

Planning Forms

Data Form 2a, Analog Data Station

- Button diagram

Data Form 2b, Digital Data Station

- Button diagram

Key or PBX System Form 4b and 5b (reverse) MFM Adjunct

- Button diagram

Entering Programming

Console: Select **Menu,** `Sys Program` , `Exit`

PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC

`System Programming:`
`Make a selection`
`System Extensions`
`SysRenumber Options`
`Operator Tables`
`LinesTrunks AuxEquip`
`Exit NightSrvce>`
	1. Display next page of System Programming menu	**More**	**Pg up**

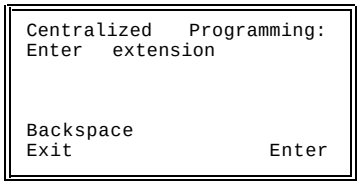
`System Programming:`
`Make a selection`
`Labeling`
`Data`
`Print`
`Cntr-Prg`
`Exit`
	2. Select Centralized Telephone Programming	`Cntr-Prg`	**F 4**

`Centralized Programming:`
`Enter extension`
 	
`Backspace`
`Exit Enter`
	3. Identify data station you want to program in any **one** of the following ways:	Dial:	Type:

	Extension no.	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		

What You See	What You Do...	Console	PC
Centralized Programming: Enter extension xxxx Backspace Exit Enter xxxx = extension number entered in step 3	4. Save your entry *If you get the station busy message, wait for an idle condition, or exit system programming and try again later.*	Enter	**F10**
Extension Program xxxx: Press HOME to Exit System Prog Start	5. Start centralized telephone programming process	Start	**F10**
Press Line/Feat Btn: <Program Mode> Page 1 Page 2 System Prog	6. Select specific line buttons associated with the 20 line buttons on the console or PC with SPM To select buttons 1-20 To select buttons 21-34	Page 1 Page 2	**F7** **F8**
Press Line/Feat Btn: <Program Mode> Page 1 Page 2 System Prog Your choice is highlighted.	7. Indicate button you want to program	Press button being programmed	Press function key for button being programmed
✶✶✶✶✶ Press HOME to Exit Delete System Prog List Feature ***** = button contents	8. Continue programming process	List Feature	**F10**
Select a Feature: <Program Mode> FindFeature AutoAnsIcom Account AutoLineSel Alarm BargeIn Auto Dial CallWaiting AutoAns All Camp On	9. **Note:** To speed programming, dial codes are shown in this step. If you prefer, you can select items from the display instead. To assign System Access or Intercom **Ring** button Continued	Dial ✶ **16**	Type ✶ **16**

What You See	What You Do...	Console	PC
	9. Continued		
	To assign System Access or Intercom **Voice** button	Dial ✶ **16**	Type ✶ **16**
		Press button being programmed again	Press **Shift** + function key for button being programmed again
		Dial ✶ **19**	Type ✶ **19**
	To assign System Access or Intercom **Originate Only—Ring** button	Dial ✶ **18**	Type ✶ **18**
	To assign System Access or Intercom **Originate Only—Voice** button	Dial ✶ **18**	Type ✶ **18**
		Press button being programmed again	Shift + function key for button being programmed again
		Dial ✶ **19**	Type ✶ **19**
	To assign System Access **Shared** button	Dial ✶ **17** + extension number of principal telephone: [nnnn] + button number of specific button being shared: [nn]	Type ✶ **17** + extension number of principal telephone: [nnnn] + button number of specific button being shared: [nn]
	To change current assignment for System Access or Intercom Voice, Originate Only or Shared System Access button from Voice to Ring	Dial ✶✶ **19**	Type ✶✶ **19**
Press Line/Feat Btn: <Ext Program Mode> System Prog	10. To program another button on same data station identified in step 3	Repeat steps 6-9	Repeat steps 6-9
	To program another data station	System Prog	**F5**

What You See	What You Do...	Console	PC
	11. To program another data station	Repeat steps 2-9	Repeat steps 2-9
	To return to System Programming menu	Exit	F 5

Pool Dial-Out Code (Hybrid/PBX Only)

Description

Allows or restricts the dialing of a pool dial-out code and the placing of calls on specific trunk pools.

Factory Setting

All data stations can dial any trunk pool dial-out code

Considerations

The data station being programmed must be idle while you program this option.

Planning Forms

Data Form 2a, Analog Data Station

- Optional Features—Pool Dial-Out Code Restriction

Data Form 2b, Analog Data Station

- Optional Features—Pool Dial-Out Code Restriction

PBX or Key System Forms 4b and 5b (reverse) MFM Adjunct

- Pool Dial-Out Code Restriction

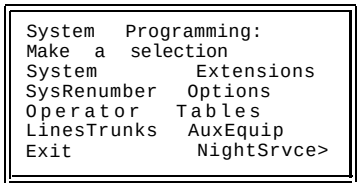
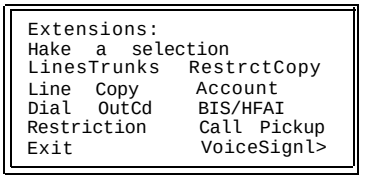
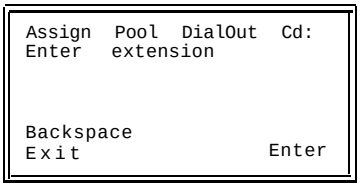
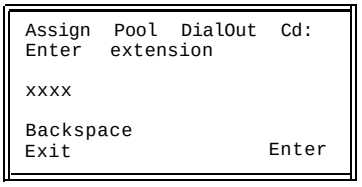
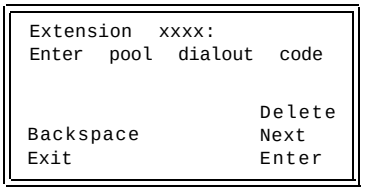
Entering Programming

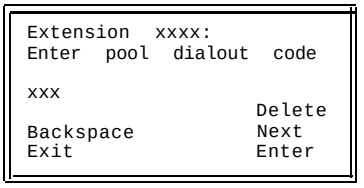
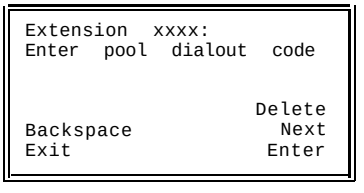
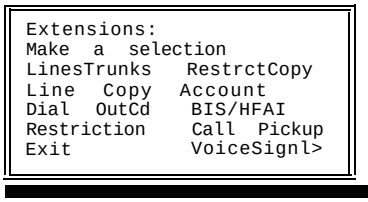
Console: Select **Menu,** Sys Program , Exit

PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	Extensions	F6
	2. Select Pool Dial-Out Code	Dial OutCd	F3
	3. Identify data station you want to program in any **one** of the following ways: Extension no. Slot and port no. Logical ID no. DSS If you preprogramming more than one sequentially numbered data station, enter lowest extension number. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial: [nnnn] ✶ [sspp] # [nnn] Press DSS button for extension no.	Type: [nnnn] ✶ [sspp] # [nnn]
	4. Save your entry *If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.*	Enter	F10
	5. Identify pool dial-out code you want to allow or restrict data station from using *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial pool dial-out code: [nnn]	Type pool dial-out code: [nnn]

What You See	What You Do...	Console	PC
 xxxx = extension number currently being programmed xxx = pool dial-out code entered in step 5	6. To restrict data station from using pool dial-out code	Delete	**F8**
	To allow data station to use pool dial-out and allow data station shown on linel to use another pool dial-out code	Enter	**F10**
	To allow data station to use pool dial-out code and allow pool dial-out code use for another data station	Next	**F9**
	■ If next extension number is sequential (difference between extension numbers is 1) *Your previous entry is saved and next extension number is displayed on line 1.*	Repeat step 5	Repeat step 5
	■ If next extension number is not sequential (difference between extension numbers is greater than 1)	Enter	**F10**
	To allow data station to use pool dial-out code when all entries are complete	Enter	**F10**
	7. To assignor remove pool dial-out code use from extension shown on line 1	Repeat steps 5 and 6	Repeat steps 5 and 6
	To assignor remove pool dial-out code use from another extension	Exit Repeat steps 2-6	**F 5** Repeat steps 2-6
	When all entries are complete, to return to Extensions menu *****	Exit	**F 5**
	8. To program more data station options	Select another option	Select another option
	To return to System Programming menu	Exit	**F 5**

***** If a printer is available, print an Extension Information report.

Call Restrictions

Description

Changes individual data station calling restrictions to unrestricted, restricted from making all outgoing calls—both local and toll (Outward Restrict), or restricted from making toll calls (Toll Restrict).

Factory Setting

Unrestricted

Considerations

- The data station being programmed must be idle while you program this option.
- If you want to copy restrictions from a data station to an individual or group of data stations, use-the instructions in the "Copy Restrictions" procedure that follows.

Planning Forms

Data Form 2a, Analog Data Station

- Optional Features—Call Restriction

Data Form 2b, Digital Data Station

- Optional Features—Call Restriction

Key or PBX System Form 4b and 5a (reverse) MFM Adjunct

- Optional Features—Call Restriction

Entering Programming

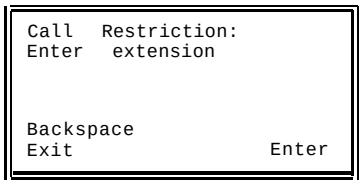
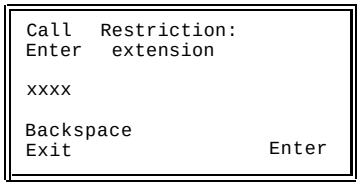
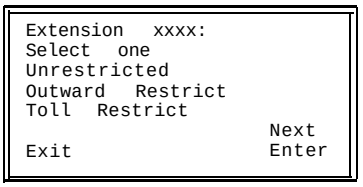
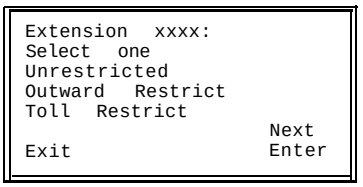
Console: Select **Menu,** `Sys Program` , `Exit`

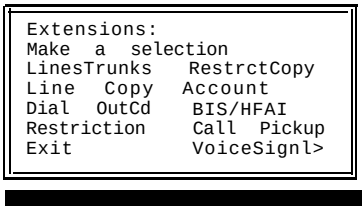
PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
System Programming: Hake a selection System Extensions SysRenumber Options Operator Tables LinesTrunks AuxEquip Exit NightSrvce>	1. Select Extensions	`Extension`	**F 6**
Extensions: Make a selection LinesTrunks RestrctCopy Line Copy Account Dial OutCd BIS/HFAI Restriction Call Pickup Exit VoiceSignl>	2. Select Restriction	`Restriction`	**F 4**

What You See	What You Do...	Console	PC
	3. Identify data station you want to program in any **one** of the following ways:	Dial:	Type:
	Extension no,	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	If you preprogramming more than one sequentially numbered extension, enter lowest extension number.		
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		
 xxxx = extension number entered in step 3	4. Save your entry	Enter	**F10**
	If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.		
 Currently programmed choice is highlighted.	5. To remove restrictions	Unrestricted	**F1**
	To restrict data station from making outside calls (local and toll)	Outward Restrict	**F2**
	To restrict data station from making toll calls	Toll Restrict	**F3**
 Your choice is highlighted.	6. To assign or remove restrictions from another extension:		
	■ If next extension number is sequential (difference between extension numbers is 1)	Next Repeat step 5	**F 9** Repeat step 5
	Your previous entry is saved and next extension number displays on line 1.		
	Continued		

What You See	What You Do...	Console	PC
	6. Continued		
	■ If extension number is not sequential (difference between extension numbers is greater than 1)	Enter Repeat steps 2–5	**F10** Repeat steps 2–5
	To save your entry when all entries are complete	Enter	**F10**
	7. To continue programming data station options	Select another option	Select another option
	To return to System Programming menu	Exit	**F5**

Copy Call Restrictions

Description

Copies the calling restrictions assigned to a data station to another individual or block of data stations with identical calling restrictions requirements.

Considerations

- The data station being programmed must be idle while you program this option. The restrictions will not be copied to any station in use while this option is being programmed.
- If you are copying restrictions to a block of data stations, they must be sequentially numbered—for example, 11, 12, 13.
- This procedure also copies any Allowed List or Disallowed List assignments.

Planning Forms

Data Form 2a, Analog Data Station

- Optional Features—Call Restriction

Data Form 2b, Digital Data Station

- Optional Features—Call Restriction

Key or PBX System Forms 4b and 5b (reverse) MFM Adjunct

- Optional Features—Call Restriction

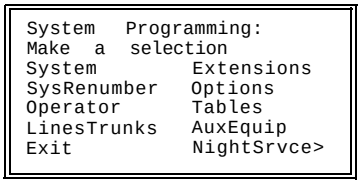
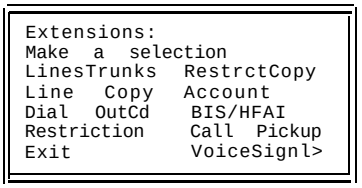
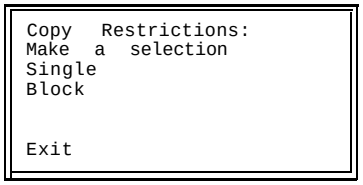
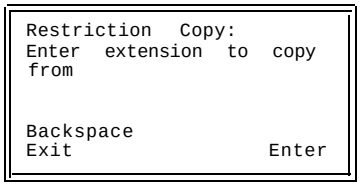
Entering Programming

Console: Select **Menu,** `Sys Program` , `Exit`

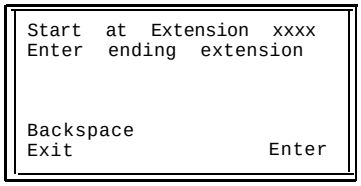
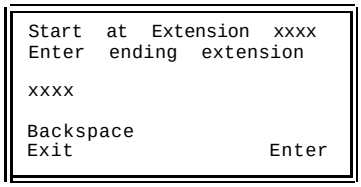
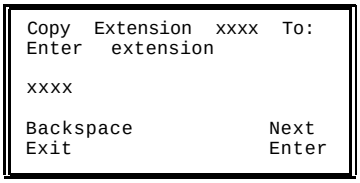
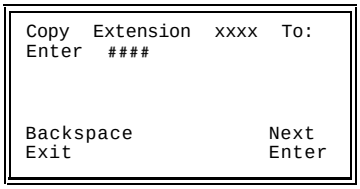
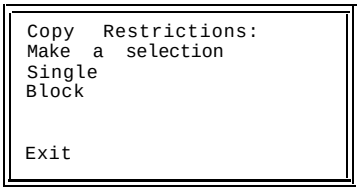
PC/SPM: Type **SPM,** press [any key], **F1, F5**

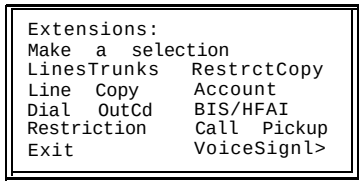
Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	`Extensions`	**F6**
	2. Select Restriction Copy	`RestrctCopy`	**F6**
	3. If you want to copy calling restrictions to individual data station	`Single`	**F1**
	If you want to copy calling restrictions to sequentially numbered block of data stations	`Block`	**F2**
	4. Identify data station you want to copy calling restrictions **from** in any **one** of the following ways:	Dial:	Type:
	Extension no.	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	If you are copying from more than one sequentially numbered extension, enter lowest extension number.		
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		

What You See	What You Do...	Console	PC
Restriction Copy: Enter extension to copy from xxxx Backspace Exit Enter xxxx = extension number entered in step 4	5. Save your entry *If you get the Station Busy message, wait for an idle condition, or exit system programming and try again later.*	Enter	**F10**
Copy Extension xxxx To: Enter #### Backspace Next Exit Enter #### = "extension" if Single selected in step 3; "starting extension" if Block selected in step 3	6. If you selected Single in step 3, identify data station you want to copy call restrictions **to** or If you selected Block in step 3, identify **first** data station in the block of data stations you want to copy call restrictions **to** Enter data station you want to copy call restrictions **to** in any **one** of the following ways: **Note:** Block only accepts Logical ID numbers. Extension no. Slot and port no. Logical ID no. DSS *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	 Dial: [nnnn] ✶ [sspp] # [nnn] Press DSS button for extension no.	 Type: [nnnn] ✶ [sspp] # [nnn]
Copy Extension xxxx To: Enter #### xxxx Backspace Next Exit Enter #### = "extension" if Single selected in step 3; "starting extension" if Block selected in step 3	7. If you selected Single in step 3 If you selected Block in step 3, save your entry	Go to step 10 Enter	Go to step 10 **F10**

What You See	What You Do...	Console	PC
 xxxx = extension number entered in step 6	8. If you selected Block instep 3, identify **last** data station in the block with the Logical ID no. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial # [nnn]	Type # [nnn]
	9. Save your entry	Enter Go to step 12	**F10** Go to step 12
 #### = "extension" if Single selected in step 3; "starting extension" if Block selected in step 3	10. If you selected Single in step 3 To save your entry and to copy line assignments **from** another extension to an individual data station:		
	■ If next extension number is sequential (difference between extension numbers is 1) *Your previous entry is saved and next extension number displays on line 1.*	Next Repeat steps 6 and 7	**F9** Repeat steps 6 and 7
	■ If extension number is not sequential (difference between extension numbers is greater than 1)	Enter Repeat steps 3–7	**F10** Repeat steps 3-7
	To save your entry when all entries are complete	Enter	**F10**
	11. When all entries are complete, return to Copy Restriction menu	Exit	**F5**
	12. To copy calling restrictions to more individual or blocks of data stations	Repeat steps 3-11	Repeat steps 3-11
	When copy process is complete, to return to Extensions menu	Exit	**F5**

What You See	What You Do...	Console	PC
	13. To program more extension options	Select another option	Select another option
	To return to System Programming menu	Exit	**F5**

Forced Account Code Entry

Description

Assigns or removes Forced Account Code Entry. When this feature is programmed on individual data stations, the user must enter a 1- to 16-digit account code before making an outside call.

Planning Forms

Data Form 2a, Analog Data Station

- Optional Features—Forced Account Code Entry

Data Form 2b, Digital Data Station

- Optional Features—Forced Account Code Entry

Key or PBX System Forms 4b and 5b (reverse) MFM Adjunct

- Optional Features—Forced Account Code Entry

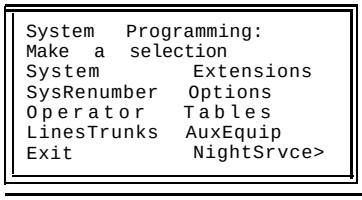
Entering Programming

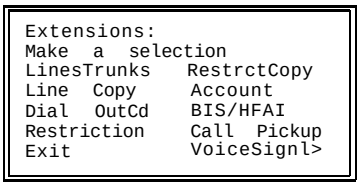
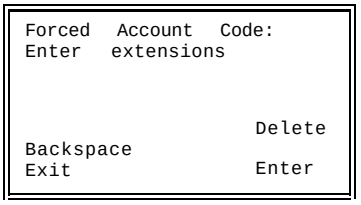
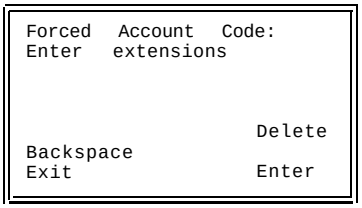
Console: Select **Menu,** Sys Program , Exit

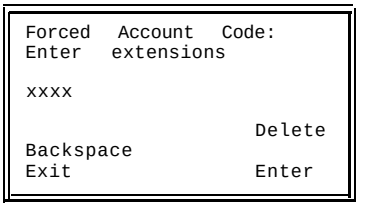
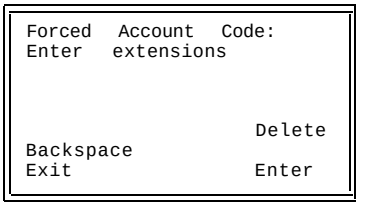
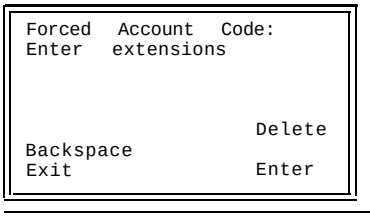
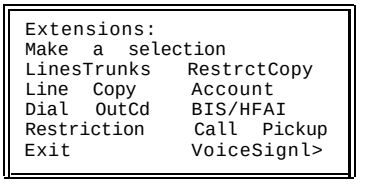
PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	Extensions	**F6**

What You See	What You Do...	Console	PC
	2. Select Forced Account Code Entry	Account	**F 7**
	3. If a DSS is **not** attached to your system programming console or you are programming with SPM If you have a DSS attached, check red LEDs next to DSS buttons for feature status: ■ Red LED on = Forced Account Code Entry is assigned to data station ■ Red LED off = Forced Account Code Entry is not assigned to data station To assign Forced Account Code Entry to data stations To remove Forced Account Code Entry from data stations	Go to step 4 Press DSS button to turn on red LED Go to step 7 Press DSS button to turn off red LED Go to step 7	Go to step 4
	4. If you **do not** have a DSS or you are programming with SPM: Identify data station you want to program in any **one** of the following ways: Extension no. Slot and port no. Logical ID no. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	 Dial: [nnnn] ✶ [sspp] # [nnn]	 Type: [nnnn] ✶ [sspp] # [nnn]

What You See	What You Do...	Console	PC
 xxxx = extension number entered in step 4	5. To assign Forced Account Code Entry to extension number entered in step 4	Enter	**F10**
	To remove Forced Account Code Entry from extension number entered in step 4	Delete	**F8**
	6. To program more data stations	Repeat steps 4 and 5	Repeat steps 4 and 5
	To view all extensions with Forced Account Code Entry feature programmed	Inspct then Exit Go to step 8	**PgDn** then **F5** Go to step 8
	7. To return to Extensions menu when all entries are complete	Exit	**F10**
	8. To program more Extension options	Select another option	Select another option
	To return to System Programming menu	Exit	**F5**

Ringing Options

Description

To set lines on data stations so that incoming data calls ring immediately.

Factory Setting

Immediate Ring

Considerations

- The data station being programmed must be idle while you program this option.
- Lines on digital data stations should be set to ring immediately since they do not have audible ringing.
- The immediate ring option is the only option recommended for digital data stations, since they do not have audible ringing.

Planning Forms

Data Form 2a, Analog Data Station

- Button diagram

Data Form 2b, Digital Data Station

- Button diagram

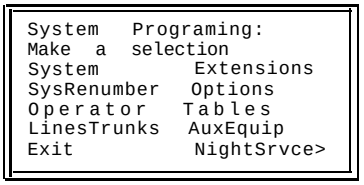
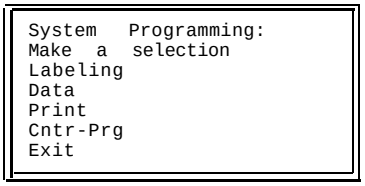
Entering Programming

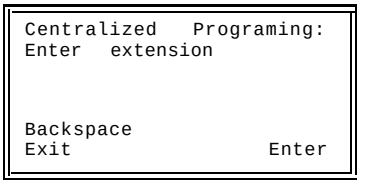
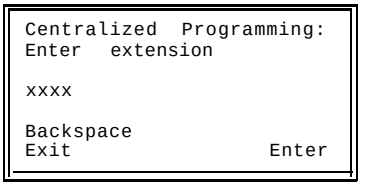
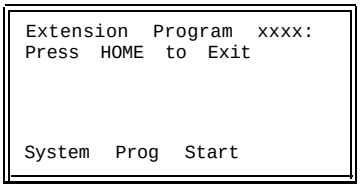
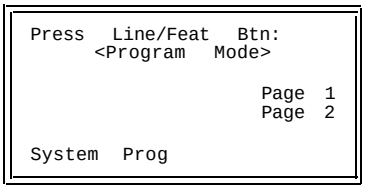
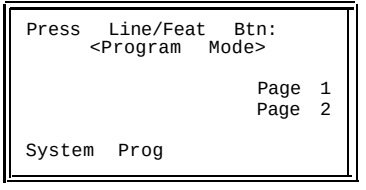
Console: Menu, Sysprog, Exit

PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What you see	What you do...	Console	PC
	1. Display next page of System Programming menu	**More**	**PgUp**
	2. Select Centralized Programming	Cntr-Prg	**F 4**

What You See	What You Do...	Console	PC
	3. Identify data station you want to program in any **one** of the following ways:	Dial:	Type:
	Extension no.	[nnnn]	[nnnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	DSS	Press DSS button for extension no.	
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		
 xxxx = extension entered in step 3		Enter	**F10**
	5. Start centralized programming	Start	**F10**
	6. Select specific line buttons for the 20 line buttons on the console or PC with SPM		
	To select buttons 1-20	Page 1	**F7**
	To select buttons 21-34	Page 2	**F8**
 Your choice is highlighted.	7. Indicate button you want to program	Press button being programmed	Press function key for button being programmed

What You See	What You Do...	Console	PC
xxxxx Press HOME to Exit Delete System Prog List Feature xxxxx = feature currently programmed	8. Continue programming process	List Feature	**F10**
Select a Feature: <Program Mode> Account AutoLineSel Alarm BargeIn Auto Dial CallWaiting AutoAns All Camp On AutoAnsIcon FindFeature	9. **Note:** To speed programming, dial codes are shown in this step. If you prefer, you can select items from the display instead.		
	To program immediate ring for all lines	Dial ✶ **347**	Type ✶ **347**
	To program immediate ring for only the line you selected	Dial ✶ **37**	Type ✶ **37**
	To program no ring for all lines	Dial ✶ **345**	Type ✶ **345**
	To program no ring for only the line you selected	Dial ✶ **35**	Type ✶ **35**
Press Line/Feat Btn: <Program Mode> Page 1 Page 2 System Prog	10. To program another button on same data station identified in step 3	Repeat steps 6-9	Repeat steps 6-9
	To program another data station	System Prog Repeat steps 2–9	**F 5** Repeat steps 2-9
	To return to System Programming menu	Exit	**F 5**

Data Hunt Group Member Assignments

Description

Assigns or removes a data station from a data hunt group. A data hunt group is used to direct calls to groups of analog or digital data stations (not both). Through data hunt groups a single extension number is assigned to the group and is used by both inside and outside callers to reach the group.

Considerations

- A maximum of 32 data hunt groups with a maximum of 20 data stations per group are allowed.
- A data station can belong to only one group.
- If you want to reassign a data station from one data hunt group to another, you must remove the data station from the current data hunt group before you assign it to the new group.
- Extension Status feature must be set to Calling Group/CMS operation in order for all groups to be available. See "Extension Status" instructions in *System Programming.*
- The recommended settings are
  - Circular Hunt (factory setting) assures equal distribution among modems.
  - No Delay Announcement (factory setting) used for voice communication only.
  - Login status set to Auto Login (factory setting is Auto Logout) so you do not have to login again after power failures or system restarts.
- Programming menus and data entry screens labeled "Group Calling" are used to program data hunt groups and voice station calling groups.

Planning Form

Data Form 3, Data Hunt Groups

- Stations

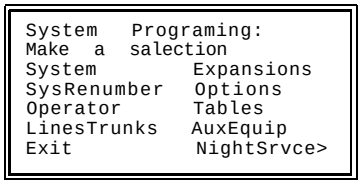
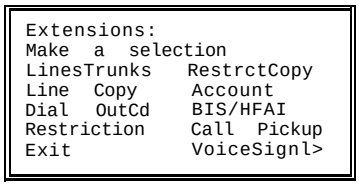
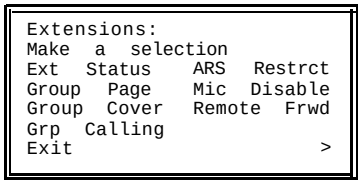
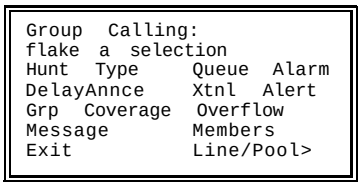
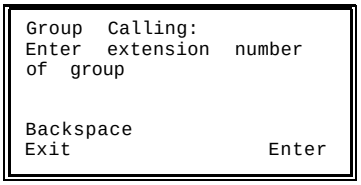
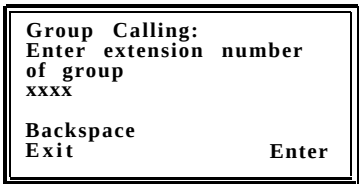
Entering Programming

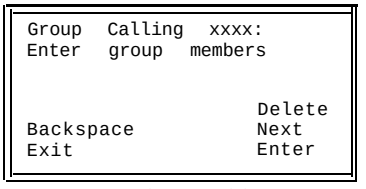
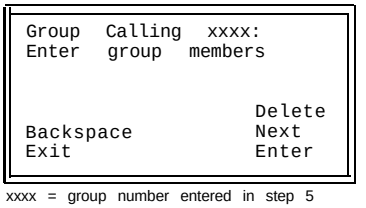
Console: Select **Menu,** `Sys Program` , `Exit`

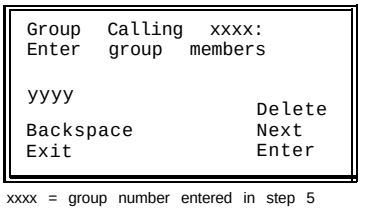
PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

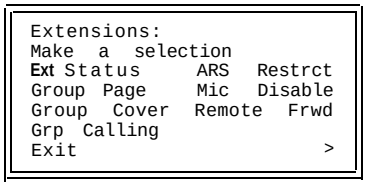
To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	Extensions	F 6
	2. Display second page of menu	**More**	**PgUp**
	3. Select Group Calling	Grp Calling	F4
	4. Select Members	Members	F9
	5. Identify data hunt group you want to program If you preprogramming more than one sequentially numbered group, enter lowest group extension number. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial data hunt group extension number: [nnnn]	Type data hunt group extension number: [nnnn]
 xxxx = group number entered in step 5	6. Save your entry	Enter	F10

What You See	What You Do...	Console	PC
 xxxx = group number entered in step 5	7. If a DSS is **not** attached to your system programming console or you are programming with SPM If you have a DSS attached, check red LEDs next to DSS buttons for feature status: ■ Red LED on = data station is member of data hunt group ■ Red LED off = data station is not member of data hunt group To assign data station to data hunt group To remove data station from data hunt group When all entries are complete	Go to step 8 Press DSS buttons to turn on red LED Press DSS buttons to turn off red LED `Exit` Go to step 11	Go to step 8
 xxxx = group number entered in step 5	8. If you **do not** have a DSS or you are programming with SPM, identify data station you want to program in any **one** of following ways: Extension no. Slot and port no. Logical ID no. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial: [nnnn] ✶ [sspp] # [nnn]	Type: [nnnn] ✶ [sspp] # [nnn]


xxxx = group number entered in step 5
yyyy = extension number entered in step 8
	9. To remove data station from data hunt group
	
	To assign data station to data hunt group and assign another data station to calling group shown on line 1
	
	Continued
		`Delete`
		
		`Enter`
			F8
			
			F10

What You See	What You Do...	Console	PC
	9. Continued		
	To assign data station to data hunt group and assign data stations to another data hunt group		
	■ If next group extension number is sequential (difference between extension numbers is 1) *Your previous entry is saved and next group extension number displays on line 1.*	Next Repeat step 8	**F 9** Repeat step 8
	■ If next group extension number is not sequential (difference between extension numbers is greater than 1)	Enter	**F10**
	To assign data station to data hunt group when all entries are complete	Enter	**F10**
Group Calling xxxx: Enter group members Delete Backspace Next Exit Enter xxxx = group number currently being programmed	10. To assignor remove another data station from data hunt group shown on line 1	Repeat steps 8 and 9	Repeat steps 8 and 9
	To assignor remove data stations from another data hunt group	Exit Repeat steps 4-9	**F 5** Repeat steps 4–9
	When all entries are complete:		
	To view all members of data hunt group	**Inspect** then Exit	**PgDn** then **F5**
	To return to Calling Group menu without viewing all members of data hunt group	Exit	**F5**
Group Calling: Make a selection Hunt Tvpe Queue Alarm DelayAnnce Xtnl Alert Grp Coverage Overflow Message Members Exit Line/Pool>	11. To program more data hunt group features	Select another option	Select another option
	To return to Extensions menu	Exit	**F5**

What You See	What You Do...	Console	PC
	12. To program more data station features	Select another option	Select another option
	To return to System Programming menu	Exit	**F 5**

Data Hunt Group Line/Trunk or Pool Assignment

Description

Assigns or removes lines/trunks or pools (Hybrid/PBX only) that ring directly into a data hunt group.

Considerations

- Incoming calls on each line/trunk, or pool can redirected to only one data hunt group.
- When you reassign a line/trunk or pool from one data hunt group to another, you must remove it from the current data hunt group before you assign it to the new group.

Planning Form

Data Form 3, Data Hunt Groups

- Lines/Trunk or Pools

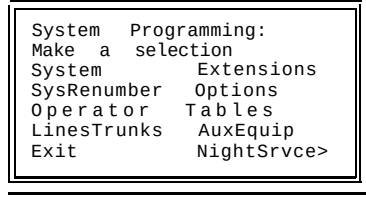
Entering Programming

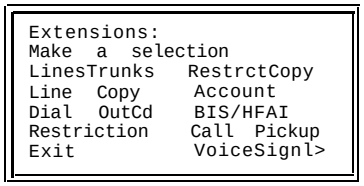
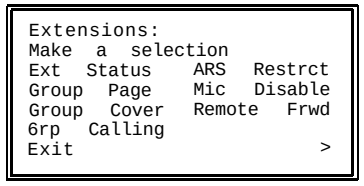
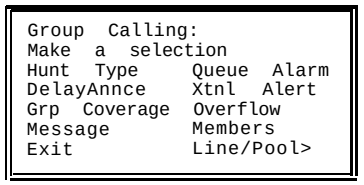
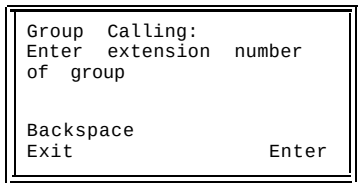
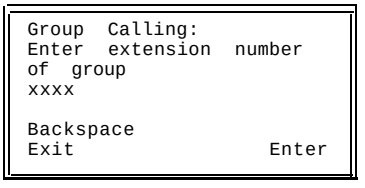
Console: Select **Menu,** Sys Program , Exit

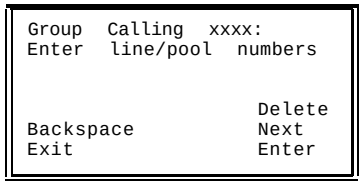
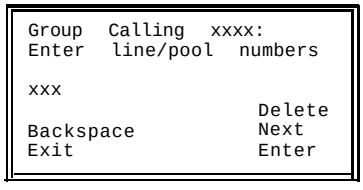
PC/SPM: Type **SPM,** press [any key], **F1, F5**

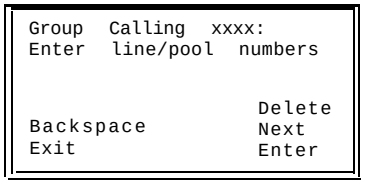
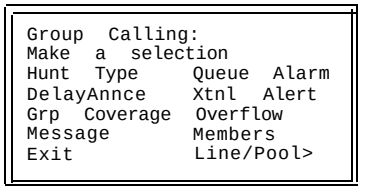
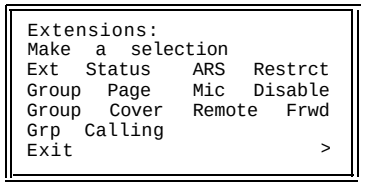
Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

What You See	What You Do...	Console	PC
	1. Select Extensions	Extensions	**F6**

What You See	What You Do...	Console	PC
	2. Display second page of menu	**More**	**PgUp**
	3. Select Group Calling	`Grp Calling`	**F4**
	4. Select Line/Pool Assignment	`Line/Pool`	**F10**
	5. Identify data hunt group you want to program If you preprogramming more than one sequentially numbered group, enter lowest group extension number. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and refype.*	Dial data hunt group extension number: [nnnn]	Type data hunt group extension number: [nnnn]
 xxxx = group nurnber entered in step 5	6. Save your entry	`Enter`	**F10**

What You See	What You Do...	Console	PC
 xxxx = group number entered in step 6	7. Identify line/trunk or pool you want to assign to data hunt group in any **one** of following ways:	Dial:	Type:
	Line/trunk no. (801-880)	[nnn]	[nnn]
	Slot and port no.	✶ [sspp]	✶ [sspp]
	Logical ID no.	# [nnn]	# [nnn]
	Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.		
 xxxx = group number entered in step 4 xxx = extension number entered in step 7	8. To remove line/trunk or pool from data hunt group	Delete	**F 8**
	To assign line/trunk or pool to data hunt group and assign another line/trunk or pool to data hunt group shown on line 1	Enter	**F10**
	To assign line/trunk or pool to data hunt group and assign lines/trunks or pools to another data hunt group		
	■ If next group extension number is sequential (difference between extension numbers is 1)	Next Repeat step 7	**F9** Repeat step 7
	Your previous entry is saved and next group extension number displays on line 1.		
	■ If next group extension number is not sequential (difference between extension numbers is greater than 1)	Enter	**F10**
	To assign line/trunk or pool to data hunt group when all entries are complete	Enter	**F10**

What You See	What You Do...	Console	PC
 xxxx = group number currently being programmed	9. To assign or remove another line/trunk or pool from data hunt group shown on line 1	Repeat steps 7 and 8	Repeat steps 7 and 8
	To assignor remove lines/trunks or pools from another data hunt group	Exit Repeat steps 4-8	**F5** Repeat steps 4-8
	When all entries are complete:		
	To view all lines/trunks or pools assigned to data hunt group	**Inspct** then Exit	**PgDn** then **F5**
	To return to Group Calling menu without viewing all lines/trunks or pools assigned to data hunt group	Exit	**F5**
	10. To program more data hunt group features	Select another option	Select another option
	To return to Extensions menu	Exit	**F5**
	11. To program more data station features	Select another option	Select another option
	To return to System Programming menu	Exit	**F5**

Group Type

Description

The Group Type setting determines whether or not the system automatically logs in members of a calling group following a power failure and also determines the type of voice messaging interface (VMI) when the data hunt group is used to connect voice messaging or automated attendant applications. The following are the possible settings:

- Automatic Logout—used when the calling group is made up of agents. The system does not automatically log in the agents following a power failure and agents can manually log themselves in. This setting does not work for digital data stations.

- Auto Login—used for data hunt groups. The system automatically logs in data hunt group members following a power failure.
- Integrated VMI—used when a voice messaging system such as AUDIX Voice Power–IS II, MERLIN MAIL™ Voice Messaging System for the MERLIN LEGEND™ Communications System, MERLIN Attendant for the MERLIN LEGEND™ Communications System, or Integrated Voice Power Automated Attendant–IS II, which requires special signaling for integrated operation, is connected to one or more station jacks assigned to a calling group. The system automatically logs in the group members following a power failure.
- Generic VMI—used when a voice messaging system that does not require special signaling is connected to one or more station jacks assigned to a calling group. The system automatically logs in the group members following a power failure.

Factory Setting

Automatic Log-Out

Consideration

Data hunt group member assignments must be made before programming Group Type.

Planning Form

Data Form 3, Data Hunt Groups

- Group No.

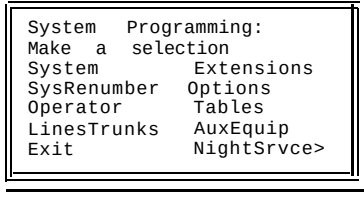
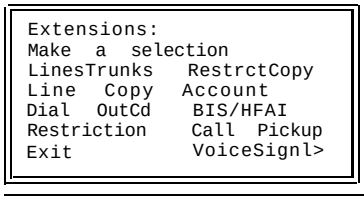
Entering Programming

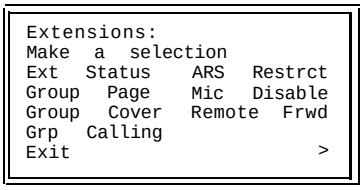
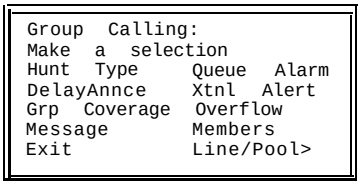
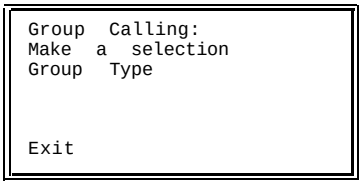
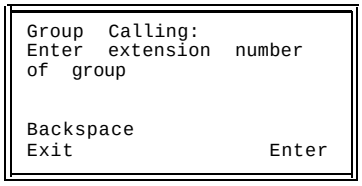
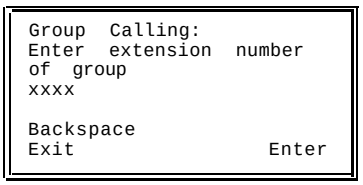
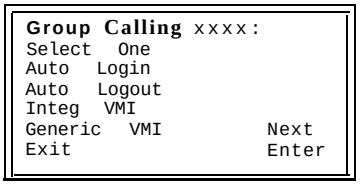
Console: Select **Menu,** `Sys Program` , `Exit`

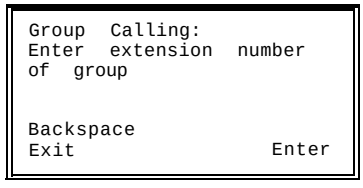
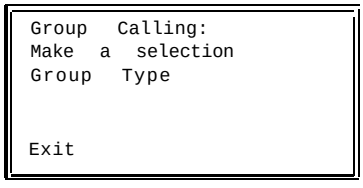
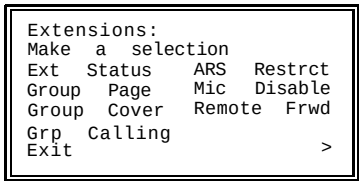
PC/SPM: Type **SPM,** press [any key], **F1, F5**

Exiting Without Changes

To exit from any screen without making changes, **select Exit before saving** your entry or menu selection.

Display	What to Do	Console	PC
	1. Select Extensions	`Extensions`	**F 6**
	2. Display second page of menu	**More**	**PgUp**

What You See	What You Do...	Console	PC
	3. Select Group Calling	Grp Calling	**F4**
	4. Display next page of menu	**More**	**PgUp**
	5. Select Group Type	Group Type	**F1**
	6. Identify group you want to program If you preprogramming more than one sequentially numbered group, enter lowest extension number. *Digits appear on screen as you dial or type. If you make an error, select Backspace or press F4 and retype.*	Dial data hunt group extension number: [nnnn]	Type data hunt group extension number: [nnnn]
 xxxx = extension entered in step 16	7. Save your entry	Enter	**F10**
 Currently programmed choice is highlighted.	8. Specify automatic log-in after power failure	Auto Login	**F1**

What You See	What You Do...	Console	PC
	9. To return to Group Calling menu	Exit	**F 5**
	10. To program more data hunt group features To return to Extensions menu	Select another option Exit	Select another option **F5**
	11. To program more data station features To return to System Programming menu	Select another option Exit	Select another option **F5**

Making and Receiving Data Calls

5

This chapter tells you how to make and receive data calls and how to use the communications system's data features. If you have a modem, your station is **analog:** see the instructions for "Calling with Analog Data Equipment." If you have an ISDN 7500B Data Module, your station is **digital:** see the instructions for "Calling with Digital Data Equipment."

Note: These instructions are general and maybe different from the detailed instructions supplied with your modem or data module. You must follow the instructions supplied with your modem or data module.

Calling with Analog Data Equipment

You can use analog data equipment to

- call directly to another analog station
- call through a modem pool
- answer a data call

How you make data calls depends on the type of data station you are calling and where it is located.

If your analog data station is connected to an analog multiline telephone via a General Purpose Adapter (GPA), use your telephone dialpad to dial. If your analog data station is connected to an MLX telephone via a Multi-Function Module (MFM), or if you have an analog data-only station (connected directly to a 012 or 008 OPT module), use your data terminal keyboard to dial (if your modem supports a terminal).

The instructions supplied with your equipment may list the call progress messages your modem uses.

Your data terminal screen may report the status of your call. The wording of call progress messages depends on your modem and data communication software.

Making Direct Data Calls

Use the following instructions

- to call inside and outside analog data stations
- to call the modem connected to a local host computer's communication ports
- to call the modem connected to workstations on a local area network (LAN)
- to call outside analog data stations including calls made over the regular analog telephone network and calls to ISDN facilities (T1 or PRI)

To Call Inside Analog Stations

To Call an Analog Multiline Telephone from an Analog Data Station Connected via GPA:

Enter modem commands and dial the number using the telephone dialpad:

1. If the red light next to the Ring (ICOM or SA) button is not on, press the ***Fleature*** button.

   Note: The GPA must be in Auto Mode.

2. Lift the handset or press **Speaker.**
3. Dial the **extension** for the analog data station or data hunt group you are calling.
4. When you hear a steady tone, a data connection has been made. Put your modem in the interactive mode using the instructions provided with it.

   Note: The data call is automatically private.

5. Use the instructions supplied with your modem and data communications software to send data, receive data, and disconnect the call.

To Call an MU Telephone from an Analog Data-Only Station and Analog Data Station Connected via MFM:

Use the following steps to enter modem commands and dial the number using the data terminal keyboard:

1. Put your modem into the data state using the instructions provided with your modem and communications software.
2. Type the appropriate modem command and the **extension number** for the analog data station or data hunt group you are calling.

   For example, when using a Hayes-type modem to make an inside call to another analog data station at extension 22:

   - Type **atdt22.**
   - Press **Enter.**
3. Use the instructions supplied with your modem and data communications software to send data, receive data, and disconnect the call.

To Call Outside Analog Stations

See the user's guide for your telephone for details on types of line buttons.

To Call an Analog Multiline Telephone from an Analog Data Station Connected via GPA:

There are two ways to dial outside lines: with a dial-out code and without one. If your communications system is operating in the Hybrid/PBX mode and you place outside calls using a System Access (SA) button, you must dial a dial-out code before the telephone number. If your communications system is operating in the Key or Behind Switch mode, you must select a button labeled with a telephone number or a special-purpose button such as WATS to make an outside call (dial-out codes are not needed).

Enter modem commands and dial the number using the telephone dialpad:

1. If the red light next to the Ring (ICOM or SA) button is not on, press the ***Feature*** button.
2. Lift the handset or press **Speaker.**
3. Dial the **outside telephone number** for the outside analog data station you are calling, including the dial-out code if you used an SA button. You can use a Speed Dial code instead of dialing the telephone number.

   See "System Data Features," "Account Code Entry," and "System Speed Dial" in this chapter.

   Note: To enter an account code, dial **#82,** the account code, and # before you dial the dial-out code and telephone number.
4. When you hear a steady tone, a data connection has been made. Put your modem into the data mode.
5. Use the instructions supplied with your modem and communications software to send data, receive data, and disconnect the call.

To Call an MLX Telephone from Analog Data-Only Stations and Analog Data Stations Connected via MFM:

In Hybrid/PBX mode, a System Access (SA) button is automatically selected when you type the modem command to get dial tone (for example, **atdt**). You must dial a dial-out code before the telephone number. In Key or Behind Switch mode, an Intercom button is automatically selected when you type the modem command to get dial tone. You can select an outside line assigned to your data station by dialing the line selection dial-out code (9).

Note: Activate the Privacy feature on each outside call to ensure that the data call is not interrupted by another user.

Enter modem commands and dial the number using the data terminal keyboard:

1. Put your modem into the data state using the instructions provided with your modem and communications software.
2. Type the appropriate modem command, activate Privacy **(#31),** and dial the **outside telephone number** including the dial-out code. You can also use a Speed Dial code to dial the number.

   Note: To enter an account code, dial **#82,** the account code, and # before you dial the dial-out code and telephone number.

   For example, when using a Hayes-type modem to make an outside call to another analog data station at telephone number 555-1234 with an account code of 12345 and a dial-out code of 9:

   - Type **atdt#31#8212345#9,5551234#** (comma represents a pause symbol).
   - Press **Enter.**
3. Use the instructions supplied with your modem or data communications software to send data, receive data, and disconnect the call.

Making Data Calls Through a Modem Pool

You can make the following types of data calls through an analog-to-digital modem pool:

- inside calls to digital data stations including
  - calls to a local host computer
  - calls to a workstation on a local area network (LAN)
- outside calls to digital data stations using a Primary Rate Interface (PRI) digital line/trunk or pool (Hybrid/PBX only)

Calls through a modem pool are placed using two-stage dialing. In the first stage you dial the extension for the data hunt group for the analog-to-digital modem pool, and in the second stage you dial the extension or telephone number of the digital data station you are calling. The second stage of the call is automatically private.

Note: You must enter account codes (if required) during the first stage of dialing. If you enter the codes during the second stage of dialing, the extension for the modem in the modem pool appears on the call reports instead of your extension.

To Call Digital Stations Through a Modem Pool

To Call-man Analog Multiline Telephone to an Analog Data Station Connected via GPA:

1. If the red light next to the Ring (ICOM or SA) button is not on, press the button.

   Note: The GPA must be in Auto Mode.

2. Lift the handset or press **Speaker.**

3. Dial the **extension** for the data hunt group for the analog-to-digital modem pool you are using. This is the first stage of two-stage dialing.

4. When you hear a steady tone, a data connection has been made. Put your modem into the data mode using the instructions provided with the modem. A message similar to the following appears on your terminal screen.

   ```
   Connected
   Call  Status:  Idle
   Type  H  for  help:
   ```

5 Using the data terminal keyboard, dial the **number for the digital data station** you are calling. This is the second stage of dialing.

   If you are calling an inside digital data station, type a **"d,"** a space, and the **extension number** of the digital data station you are calling and press **Enter.** For example, to call a digital data station at extension 725:

   - Type **d 722.**
   - Press **Enter.**

   If you are calling an outside digital data station, dial the **outside telephone number** for the outside analog data station you are calling, including the dial-out code required to select the outside line/trunk. In addition, you can use a Speed Dial code instead of dialing the telephone number.

See "System Data Features," "Account Code Entry," and "System Speed Dial" in this chapter.

Note: Calls to outside digital data stations must be made using ISDN-PRI lines/trunks. To enter an account code, dial **#82,** the account code, and # before you dial the dial-out code and telephone number.

See ISDN 7500B user's manual for instructions on the second stage of dialing.

For example, when using an account code of 12345 and a dial-out code of 815 (where 815 is the dial-out code for Accunet switched digital data services lines) to make a call to a digital station at telephone number 555-1234:

- Type **d #8212345#8155551234#.**
- Press **Enter.**

6. Use the instructions supplied with your modem and/or data communications software to send data, receive data, and disconnect the call.

To Call an MLX Telephone from Analog Data-Only Stations and Analog Data Stations Connected via MFM:

1. Use the instructions provided with your modem and the communications software to put the modem in the data mode.
2. Type the appropriate modem command and the **extension number** for the data hunt group for the analog-to-digital modem you are using. For example, when using a Hayes-type modem to make a data call to a digital data station using the analog-to-digital modem pool at extension 775

   ■ Type **atdt775.**

   ■ Press **Enter.**

   When you are connected to the ISDN 7500B Data Module in the pool, a message similar to the following appears:

   ```
   Connected
   Call  Status:  Idle
   Type  H  for  help:
   ```

3. Using the data terminal keyboard, dial the **number for the digital data station** you are calling. (This is the second stage of dialing.)

   When calling an inside digital data station, type a **"d"** followed by a space and the **extension number** of the digital data station you are calling and press Enter.

   Use the data terminal keyboard to enter modem commands and dial the number.

   For example, to call a digital data station at extension 725:

   ■ Type **d 725.**

   ■ Press **Enter.**

   To call an outside digital data station, dial the **outside telephone number** including the dial-out code (if required) to select the outside line/trunk. You can use a Speed Dial code instead of dialing the telephone number.

See "System Data Features," "Account Code Entry," and "System Speed Dial" in this chapter.

   Note: Calls to outside digital data stations must be made using ISDN-PRI lines/trunks. To enter an account code, you must dial **#82,** the account code, and # before you dial the dial-out code and telephone number.

4. Use the instructions supplied with your modem or data communications software to send data, receive data, and disconnect the call.

Answering Data Calls

See the instructions supplied with your modem.

Your modem can automatically answer incoming data calls, such as electronic mail messages, if your computer or data terminal is on and you have set your modem for automatic answer.

If you have an analog multiline telephone, see the "Auto Answer All" instructions in this chapter.

Calling with Digital Data Equipment

Check the ISDN 7500B user's manual for operating instructions.

This section contains examples of asynchronous data calls. Synchronous data calls are controlled from the front panel of the ISDN 7500B Data Module.

The following tells you how to

- make data calls, including calling directly to another digital station and calling through a modem pool. The method you use to make a data call depends on the type of data station you are calling and where it is located. Instructions for answering calls are general. You **must** also use the instructions packed with your ISDN 7500B Data Module.
- answer data calls. Instructions for answering calls are general. You **must** also use the instructions packed with your ISDN 7500B Data Module.
- use data features. You must have a **digital/ISDN multiline (MLX)** telephone connected to your data station to use this feature

Dialing Data Calls

Place data calls by typing the digits of the **extension** or **telephone number** you want to reach on the keyboard of your computer and then pressing the **Enter** key.

Note: The key you use to signal the end of data entry may be labeled Return, Enter, CR, or ↵. The instruction for this key in this chapter is **Enter.** If you make an error while typing the number, you can use the Backspace key to correct the digits before pressing the **Enter** key.

Call Progress Messages

Your computer screen shows messages about the progress of your call—for example, when it's ringing or when the number is busy.

The following table shows examples of messages you may see on your computer screen when you place and receive data calls.

Table 5-1 Call Progress Messages

When you see	It means
CALLING 723 or CALLING 9555-1234	You are placing a call, and the digits being dialed (including the dial-out code for outside calls) appear.
RINGING RINGING	Your call is ringing at the data station you called. This message appears only when you call another digital data station.
INCOMING CALL	You are receiving an incoming data call.
CONNECTED-NODE 2 FAR END SPEED 1200	The call you placed or received is answered, and you can begin data transmission. The mode of data transport and transmission speed selected are shown.
CLEARING ENDED	You disconnected a data call. If the data user at the other end disconnects the call, FAR END REQUESTED appears after this message.
WRONG ADDRESS	You typed an invalid character in your dialing sequence or dialed incorrectly (space and "-" are invalid characters).
ACCESS DENIED	The call you are making is not permitted.
BUSY BUSY	The data station you are calling is busy,
BUSY	The line/trunk you want to use is not available.
NETWORK BUSY	No B channel is available.
CALL OPTION ERROR	The feature is not applicable for the data call.
WRONG CALL TYPE	The data station you are calling is an analog data station, and you have not dialed using a modem pool.
FAR END REQUESTED	The station you are calling is an MLX telephone or an analog station connected to an MLX telephone using an MFM.

Making Direct Data Calls

Use the following instructions to make data calls **directly** to **other digital stations.** These include

- internal calls to other digital data stations
- internal calls to ISDN 7500B Data Modules connected to the ports of a local host computer
- internal calls to ISDN 7500B Data Modules connected to the ports of a workstation on a local area network (LAN)
- outside calls to other digital data stations using digital lines or trunks supplied in Primary Rate Interface (PRI) service

To Call Inside or Outside Digital Stations

If the communications system is operating in the Hybrid/PBX mode, a System Access (SA) button is automatically selected when you type a modem command to get dial tone (for example, “d” to dial an outside line). You must dial a dial-out code before the telephone number.

If the communications system is operating in the Key or Behind Switch mode, an Intercom button is automatically selected when you type the command to get dial tone. You can select an outside line or dial-out code for a personal line assigned to your data station by dialing the line selection dial-out code (9). The Privacy feature is automatically activated for all your data calls. Use the data terminal keyboard to enter commands and dial the number:

Note: Calls to outside digital data stations must be made using ISDN-PRI lines/trunks.

1. From the `CMD:` prompt, type **d** (for dial) and the **dial-out code** and **telephone number** for the outside digital data station you are calling.

   Note: If you are required to enter an account code, you must type **#82,** the account code, and **#** before you type the dial-out code and telephone number. In addition, you can use a Speed Dial code instead of typing the telephone number.

2. Press **Enter.** The call progress messages appear.
3. To disconnect the call, after entering the data mode, type `+++` to get to the `CMD:` prompt, then type **e** for end. The `CLEARING ENDED` message appears on your computer screen.

See "System Data Features," "Account Code Entry," and "System Speed Dial" in this chapter.

Making Data Calls Through a Modem Pool

Use the following instructions to make calls **through a digital-to-analog modem pool** to reach analog stations. These include

- internal calls to analog data stations
- internal calls to a local host computer using modems connected to the ports
- internal calls to a workstation on a local area network (LAN) using the modems connected to the workstation
- outside calls to analog data stations, including calls made over the regular analog telephone network or calls made using ISDN facilities (T1 or PRI)

When you make data calls using a modem pool, the call is placed using two-stage dialing. In the first stage you dial the extension for the data hunt group for the digital-to-analog modem pool, and in the second stage you dial the extension or telephone number of the analog data station you are calling.

Note: Synchronous data calls cannot be made through a modem pool.

The following are general instructions for placing and receiving calls; details are in the instructions supplied with your ISDN 7500B Data Module.

1. From the `CMD:` prompt, type **d** (for dial) and the **extension** for the data hunt group for the digital-to-analog modem pool you are using and press **Enter.** For example, to make a data call to an analog data station using the analog-to-digital modem pool at extension 776:

   ■ Type **d 776.**

   ■ Press **Enter.**

   When you are connected to the ISDN 7500B Data Module in the pool, a message similar to the following appears on your screen:

   ```
   CONNECTED  -  MODE  2

   END  SPEED  -  2400
   ```

2. Using the data terminal keyboard, dial the number for the analog data station you are calling. (This is the second stage of dialing.)

   If you are calling an inside analog data station, type **atdt** and dial the **extension number** of the analog data station you are calling and press **Enter.** For example, to call an analog data station at extension 25:

   ■ Type **atdt25.**

   n Press **Enter.**

   If you are calling an outside analog data station, type **atdt,** activate the Privacy feature, then dial the **outside telephone number** for the outside analog data station you are calling, including the dial-out code required to select the outside line/trunk. In addition, you can use a Speed Dial code instead of dialing the telephone number.

See "System Data Features," "Account Code Entry," and "System Speed Dial" in this chapter.

   If you are required to enter an account code, you must dial **#82,** the account code, and # before you dial the dial-out code and telephone number.

3. Use the instructions supplied with your modem and/or data communications software to send data, receive data, and disconnect the call.

4. To disconnect the call, after entering the data mode, type `+++` to get to the `CMD:` prompt, then type **e** for end. The `CLEARING ENDED` message appears on your computer screen.

Answering Data Calls

See the instructions supplied with your data module.

The ISDN 7500B Data Module automatically answers incoming data calls, such as electronic mail messages, when your computer or data terminal is on and you have it set for automatic answer.

System Data Features

The system can use the following features for data. However, not all of the data station types can use all of the features. Table 5-2 shows the features for each station type.

Account Code Entry for tracking outgoing data calls for reports used for billing, forecasting, or budgets

Auto Answer All to let your modem automatically answer calls while you're away from your desk (your station must include an analog multiline telephone to use this feature)

Data Status button to monitor when your data equipment is in use (your station must include either an analog or digital multiline telephone to use this feature)

Privacy to prevent loss of data by ensuring that your data transmission is not accidentally interrupted

Personal Speed Dial to quickly dial frequently called numbers

System Speed Dial to quickly dial frequently called system-wide numbers

Table 5-2 Data Station Features

Feature Name	Data Terminal	Modem
Account Code Entry	✓	✓
Auto Answer All	✓	
Data Status		✓
Privacy	✓	
Personal Speed Dial	✓	✓
System Speed Dial	✓	✓

Account Code Entry

The Account Code Entry feature lets your company track incoming and outgoing data and voice calls and identify the employee, project, or client associated with the call. Use this feature to bill clients, forecast and budget telephone usage costs, and control personal telephone use.

The account codes and instructions on when to use them are supplied by your company.

There are two ways of using account codes:

- **Required.** You must enter an account code before making a data call.
- **Optional** You can choose to enter an account code before a data call or not at all.

Analog Data Stations Connected to an MLX Telephone via an MFM:

1. Follow your modem user's guide instructions to get dial tone.
2. Type **#82.**
3. Type **account code** and **#.**
4. Type **dial-out code** and **telephone number.**

Analog Data Stations Connected to an Analog Multiline Telephone Using a GPA:

1. Lift receiver or press **Speakerphone.**
2. Press ***Feature.***
3. Dial **82.**
4. Dial **account code** and **#.**
5. Dial **dial-out code** (if required) and **telephone number.**

Digital Data Stations:

1. At `CMD:` prompt, type **# 82** to activate the account code feature.
2. Enter account code.
   - Type **account code.**
   - Type **#.**
3. Type **dial-out code** and the **telephone number** or use **System Speed Dial code.**

Auto Answer All

Use these instructions only if your data station includes an analog multiline telephone.

If your data station is connected to an analog multiline telephone, check to see that your modem and your computer or data terminal are both set to **on** to ensure that you receive data calls.

Your modem automatically answers incoming data calls if your GPA is in Auto mode (automatic answer) and you press a programmed ***Auto Answer All*** button to send all calls to the modem to be answered. For example, you can receive electronic mail messages at your computer or data terminal while you are away from your desk.

Programming an Auto Answer All Button:

1. Label button to be programmed as ***Auto Answer All.***
2. Slide T/P switch to P.
3. Press labeled ***Auto Answer All*** button.
4. Dial ✶ **754.**
5. Slide T/P switch to center to end programming.

Data Status Button

Use these instructions only if your data station does not include an MLX telephone. A Data Status button allows you to monitor the activities of your computer or data terminal. The light next to your Data Status button will goon when a data call is being made or received from the digital data station connected to the telephone.

Programming a Data Status Button:

1. Label the button you want to program as ***Data Status*** with the extension of the equipment you want to monitor.
2. Begin programming.
   - Press **Feature.**
   - Dial **00.**
   - Press labeled ***Data Status*** button.
   - Dial ✶ **83.**
3. Identify the equipment you want to monitor.
   - Dial **extension number.**
4. Slide the T/P switch to center.
   - Press **Feature.**
   - Dial ✶ **00.**

Privacy

Use these instructions only if your analog data station does not have an analog multiline telephone connected.

See System Reference *for more on Barge-In.*

For analog data-only stations and analog data stations connected to an MLX telephone using an MFM, use the Privacy feature before you make a data call to prevent unwanted interruptions during transmission. Privacy prevents co-workers from accidentally connecting to your data call and causing a loss of data by using the same line or trying to use the Barge-In feature. Co-workers picking up the line you are using hear a busy signal instead of being connected.

Privacy is automatically activated on data calls from **digital data stations** or from analog data stations connected to an analog multiline telephone using a GPA. For analog data-only stations or analog data stations connected to MLX telephones using an MFM, you activate Privacy by dialing a feature code. Once activated, the feature remains active until turned off.

It is a good idea to activate Privacy on every data call you make or every time you are expecting a call so your calls are not interrupted. Privacy cannot be activated from analog data stations while a data call is in progress.

Activating Privacy on an Analog Data-Only Station:

1. Activate Privacy.
   - Type **#31.**
2. Place the call.
   - Type **dial-out code** (if required) and **telephone number.**

Personal Speed Dial

The Personal Speed Dial feature lets you type a 2-digit code for frequently used numbers instead of typing an entire sequence. Personal Speed Dial is useful when account codes, long-distance access codes, area codes, and computer access codes make the calling process long.

See Chapter 5 in System Programming *for more on the centralized programming of Personal Speed Dial numbers.*

For analog data-only and analog data stations connected to an MLX telephone using an MFM, Personal Speed-Dial codes must be programmed centrally for you to activate them. Up to 24 two-digit Personal Speed Dial codes can be programmed for your data station.

The number programmed for each Personal Speed Dial code includes a dial-out code, if one is required, and a pause to allow the system to provide dial tone to your data station. Your system manager can give you a list of Personal Speed Dial codes and the numbers they represent.

Activating Personal Speed Dial:

1. Type **#.**
2. Type **code** (01-24).

System Speed Dial

System Speed Dial lets you dial a 3-digit code for frequently used numbers that are important to you and other data station users. (These codes are often used to ensure security of telephone numbers for outside host computers.)

Your company can provide you with a list of System Speed Dial codes and the numbers they represent.

Digital data Stations, analog data-only, and analog data stations connected to an MLX talephone using an MFM:

1. Type **#.**
2. Type **code** (600-729).

Analog data station connected to an analog multiline telephone using a GPA:

1. Lift handset or press **Speakerphone.**
2. Press ***Feature*** button.
3. Dial **code** (600-729).

Data Forms

A

This appendix provides a master copy of each data form you need to plan and program data features on the system.

The data forms are

- Form 1a, "Modem Pool-Analog to Digital"
- Form 1b, "Modem Pool—Digital to Analog"
- Form 2a, "Analog Data Station"
- Form 2b, "Digital Data Station"
- Form 3, "Data Hunt Groups"

Duplicate these masters and work on the copies.

Data Form la

Modem Pool — Analog to Digital

Modem Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Modem		Data Module		Pair	Modem		Data Module	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Modem Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Modem		Data Module		Pair	Modem		Data Module	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Modem Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Modem		Data Module		Pair	Modem		Data Module	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Modem Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Modem		Data Module		Pair	Modem		Data Module	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Data Form 1 b

Modem Pool — Digital to Analog

Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Data Module		Modem		Pair	Data Module		Modem	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Data Module		Modem		Pair	Data Module		Modem	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Data Form 1 b, Continued

Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No. _____

Pair	Data Module		Modem		Pair	Data Module		Modem	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Pool Number _____

Pool Member in data hunt group?

❑ Yes, DHG Extension No, _____

Pair	Data Module		Modem		Pair	Data Module		Modem	
	Logical ID	Extension	Logical ID	Extension		Logical ID	Extension	Logical ID	Extension
1					11				
2					12				
3					13				
4					14				
5					15				
6					16				
7					17				
8					18				
9					19				
10					20				

Data Form 2a

Analog Data Station

Logical ID _____ Extension No. _____ Person or Location _____

Data Station Use
- ❑ Individual use
- ❑ Local host computer
- ❑ LAN workstation

Modem Pool Member
- ❑ Yes, Pool Number _____
- ❑ No

Assigned to Data Hunt Group
- ❑ Yes, DHG Extension _____
- ❑ No

Optional Features

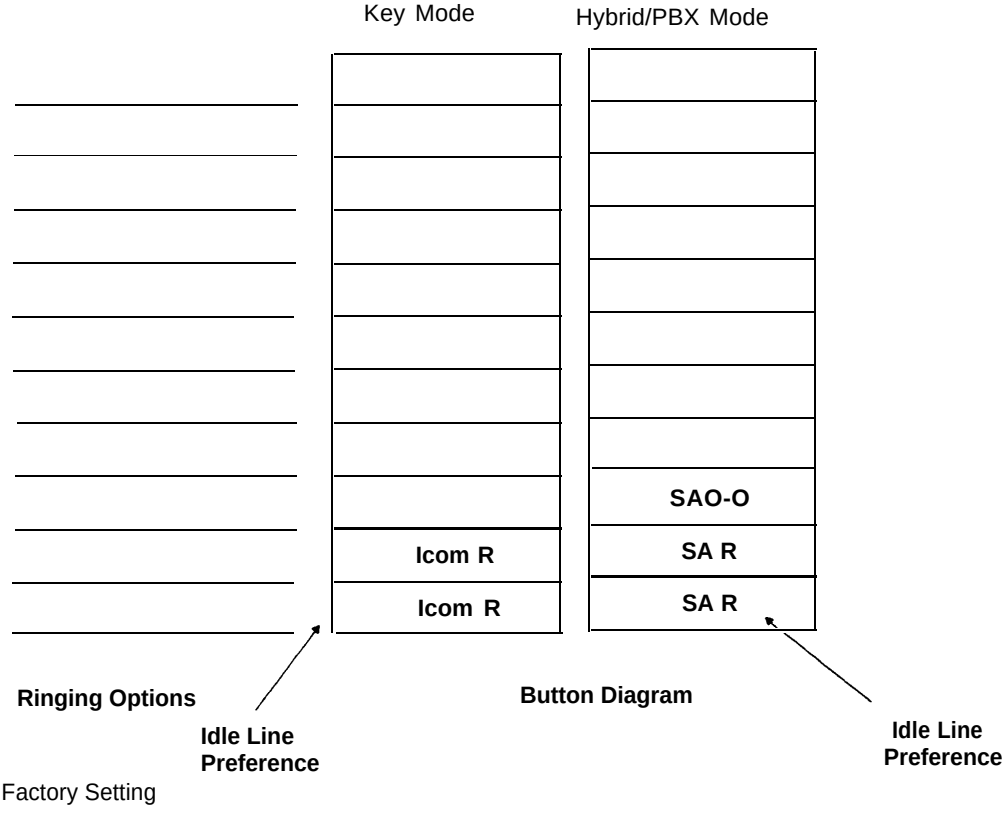
Pool Dial-Out Code Restriction
- ❑ Yes, dial out codes

_____ _____ _____ _____
_____ _____ _____ _____

Call Restriction
- ❑ Unrestricted ✥
- ❑ Outward Restrict
- ❑ Toll Restrict

Forced Account Code Entry
- ❑ Yes
- ❑ No ✥

Facility Restriction Level
- ❑ 3 ✥
- ❑ _____ (0-6)



✥ Factory Setting

Data Form 2b

Digital Data Station

Logical ID _____ Extension No. _____ Person or Location _____

Data Station Use
- ❑ Individual use
- ❑ Local host computer
- ❑ LAN workstation

Modem Pool Member
- ❑ Yes, Pool Number _____
- ❑ No

Assigned to Data Hunt Group
- ❑ Yes, DHG Extension _____
- ❑ No

Optional Features

Pool Dial-Out Code Restriction
- ❑ Yes, dial out codes

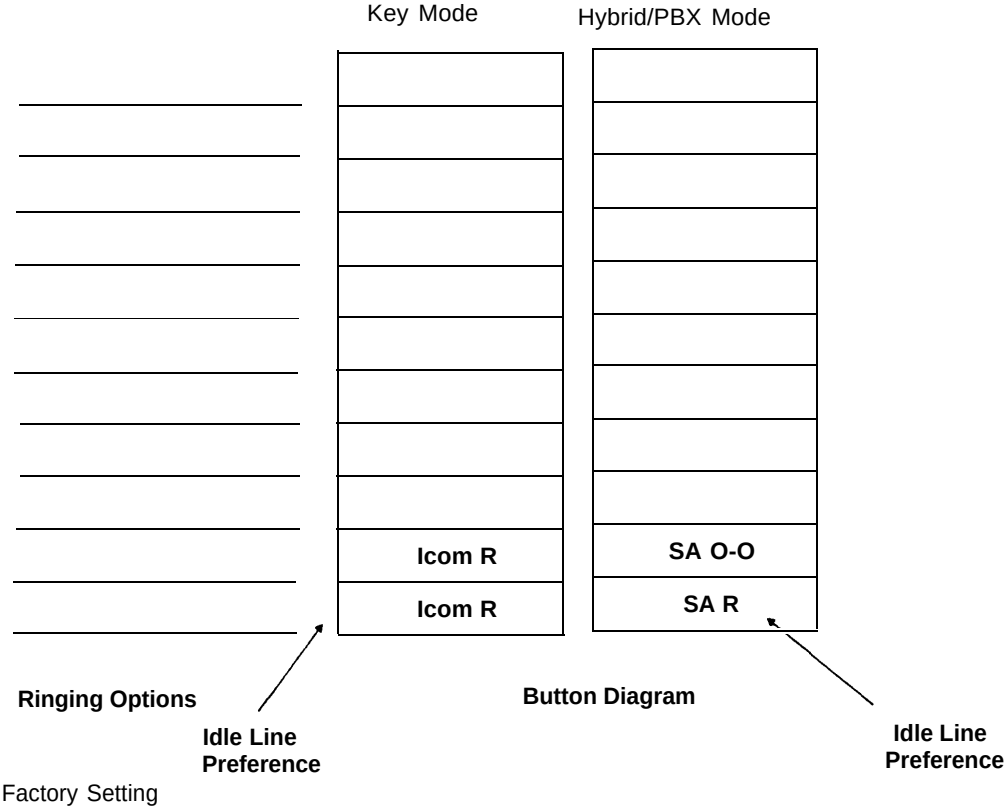
  _____ _____ _____ _____

  _____ _____ _____ _____

Call Restriction
- ❑ Unrestricted ❖
- ❑ Outward Restrict
- ❑ Toll Restrict

Forced Account Code Entry
- ❑ Yes
- ❑ No ❖

Facility Restriction Level
- ❑ 3 ❖
- ❑ _____ (0-6)



❖ Factory Setting

Data Form 3

Data Hunt Groups

Make a copy for each group.

Group No. (1-32) _____ Factory-Set Ext. No. _____

Group ID _____ Renumber To _____

Group Use

- ❑ Local Host Computer Acess
- ❑ Workstation on IAN Access
- ❑ Analog-to-Digital Pool
- ❑ Digital-to-Analog Pool

Stations

	Ext. No.	Person or Location		Ext. No.	Person or Location		Ext. No.	Person or Location		Ext. No.	Person or Location
1			6			11			16		
2			7			12			17		
3			8			13			18		
4			9			14			19		
5			10			15			20		

Lines/ Trunks or Pools

Logical ID	Line/Trunk or Pool	Logical ID	Line/Trunk or Pool	Logical ID	Line/Trunk or Pool	Logical ID	Line/Trunk or Pool
1		21		41		61	
2		22		42		62	
3		23		43		63	
4		24		44		64	
5		25		45		65	
6		26		46		66	
7		27		47		67	
8		28		48		68	
9		29		49		69	
10		30		50		70	
11		31		51		71	
12		32		52		72	
13		33		53		73	
14		34		54		74	
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17		37		57		77	
18		38		58		78	
19		39		59		79	
20		40		60		80	

Abbreviations Glossary

A	ampere
AC	alternating current
ACD	automatic call distribution
ACW	After Call Work (CMS)
AMI	alternate mark inversion
amps	amperes
ANI	automatic number identification
ARS	Automatic Route Selection
ASCAP	American Society of Composers, Artists, and Producers
ASI	alternate space inversion
ASN	AT&T Switched Network services
AUDIX	Audio Information Exchange
AVP	AUDIX Voice Power
B8ZS	bipolar 8 zero substitution
BIS	Built-in Speakerphone
BMI	Broadcast Music Incorporated
bps	bits per second
BRI	Basic Rate Interface
BTMI	basic telephone modem interface
BTU	British thermal unit
CAS	Call Accounting System for the MERLIN LEGEND™ Communications System
CAS-B	Call Accounting System — Business
CAS-H	Call Accounting System — Hospitality
CAT	Call Accounting Terminal
CAT-B	Call Accounting Terminal/Business
CAT-H	Call Accounting Terminal/Hospitality
CCITT	Comitee Consultatif International Telephonique et Telegraphique
CCS	common-channel signaling
CIB	customer information bulletin
CMS	Call Management System
ComCode	component code
CRC	cyclic redundancy check
CSC	Customer Service Center
CSU	channel service unit
dB	decibel
DC	direct current
DCE	data communications equipment
DCP	Digital Communications Protocol
DFT	direct facility termination
DHG	data hunt group
DID	direct inward dialing
DIP	dual in-line package
DISA	Direct Inward System Access
DLC	direct-line console
DNIS	Dialed Number Identification Service
DOS	Disk Operating System
DS0	Digital Signal 0
DS1	Digital Signal 1
DSE	digital switch element
DSS	direct station selector
DTE	data terminal equipment
DTMF	dual-tone multifrequency
DXS	direct extension selector
E&M	ear and mouth (receive and transmit)
EIA	Electronic Industries Association
EMI	electromagnetic interference
EPROM	erasable and programmable read-only memory
ES	Extension Status
ESD	electrostatic discharge
ESF	extended superframe format
ESS	electronic switching system
ETN	electronic tandem network
ETU	emergency transfer unit
F	Farenheight
FACE	Forced Account Code Entry
FCC	Federal Communications Commission
FRL	Facility Restriction Level
FX	foreign exchange
GPA	General Purpose Adapter
GS	ground-start
HFAI	Hands Free Answer on Intercom
HFU	hands-free unit
Hz	hertz
ICOM	Intercom
I/O	input/output
IROB	in-range out-of-building
IS II	Integrated Solution II
ISDN	Integrated Services Digital Network
IVP	Integrated Voice Power
kbps	kilobits per second
KF	FCC Classification
LAN	local area network
LDN	listed directory number
LED	light-emitting diode
LS	loop-start
Mbps	megabits per second
MET	multibutton electronic telephone
MFM	Multi-Function Module
MIS	management information system
MOH	Music-on-Hold
ms	millisecond
NSAC	National Service Assistance Center
OPT	off-premises telephone
OPX	off-premises extension
PAM	pulse amplititude modulation
PBX	private branch exchange
PC	personal computer
PCM	pulse code modulation
PEC	price element code
PFT	power failure transfer telephone
PRI	Primary Rate Interface
PSTN	public switched telephone network
QCC	queued call console
RAM	random access memory
RBS	robbed-bit signaling
ROM	read-only memory
SA	System Access
SAA	Supplemental Alert Adapter
SDN	Software Defined Network
SMDR	Station Message Detail Recording

SPM	System Programming and Maintenance
SSN	Switched Services Network
TEI	terminal equipment identifier
TDM	time-division multiplexing
T/R	tip and ring
TSI	time-slot interchanger
TTR	touch-tone receiver
UDM	universal data module
UPAM	Universal Paging Access Module
UPS	uninterruptible power supply
VA	volt-ampere
VAC	volts AC
VAN	value-added network
VAU	voice announcement unit
VMI	voice messaging interface
V.T.	voice terminal
W	watts
WATS	wide area telecommunications service
ZCS	zero code suppression

Glossary

A

access line
A connection from the customer to the local telephone company that provides access to the public network. Also called local loop.

account code
A code used to associate incoming and outgoing calls with corresponding accounts, employees, projects, and clients.

Accunet
AT&T's switched digital service for 56-kbps, 64-kbps restricted, and 64-kbps clear circuit-switched data calls.

address
A coded representation of the destination of data or of the data's originating terminal, such as the dialed extension number assigned to the data terminal. Multiple terminals on one communications line, for example, must each have a unique address.

adjunct
Optional equipment used with the communications system such as an alerting device that connects to a multiline telephone or to a station jack.

administration port reassignment
Reassignment of the system programming position to any of the first five station jacks on the first 008 MLX module in the communications system control unit.

alternate mark inversion (AMI)
A line coding format in which a binary 1 is represented by a positive or negative pulse, a binary 0 is represented by no line signal, and subsequent binary 1's must alternate in polarity or there will be a bipolar violation. AMI is used in the DS1 interface.

analog transmission
A mode of transmission in which information is represented in continuously variable physical quantities such as amplitude, frequency, phase, or resistance. See also *digital transmission.*

application
Software and/or hardware that allows users to perform specific tasks. For example, the Call Management System (CMS) is a DOS-based application that simulates the actions of a system operator by answering calls and distributing them to individual telephones.

asynchronous data transmission
A method of transmitting a short bit stream of data, such as printable characters represented by a 7- or 8-bit ASCII code. Each string of data bits is preceded by a start bit and followed by a stop bit, thus permitting data to be transmitted at irregular intervals. See also *synchronous transmission.*

AT&T Switched Network (ASN)
AT&T telecommunications services provided through an Integrated Digital Services Network Primary Rate Interface (ISDN-PRI) line or trunk: Accunet® switched digital service, Megacom® WATS, Megacom 800, Software Defined Network (SDN), MultiQUEST®, and Shared Access for Switch Services (SASS).

AUDIX Voice Power (AVP)
A voice-processing application, part of Integrated Solution II, that provides automated attendant, call answering, voice-mail, message drop, and information services for use with the communications system.

automatic number identification (ANI)
The process of automatically identifying a caller's billing number and transmitting that number from the caller's local central office (CO) to another point on or off the public network. INFO-2 (INformation FOrwarding-2) is AT&T's ANI service.

automatic-ringdown tie trunk
See *automatic-start tie trunk.*

automatic-start tie trnk
A tie trunk on which incoming calls are routed to an operator or other designated destination without a start signal. Also called automatic-ringdown tie trunk or auto-in tie trunk.

auxiliary power unit
A device that provides additional power to the communications system.

B

B channel
For an Integrated Services Digital Network (ISDN), a 64-kbps channel that carries a variety of digital information streams, such as voice at 64-kbps, data at up to 64 kpbs, wideband voice encoded at 64 kpbs, and voice at less than 64 kbps, alone or combined with other digital information streams. Also called bearer channel.

bandwidth
The difference, expressed in hertz, between the highest and lowest frequencies in a range of frequencies that determine channel capacity.

barrier code
A password used to limit access to the Remote Access feature of the communications system.

basic carrier
A piece of hardware that holds and connects the processor module; power supply module; and up to five line, trunk, or station modules in the communications system. See also *expansion carrier.*

Basic Rate Interface (BRI)
A standard Integrated Services Digital Network (ISDN) frame format that specifies the protocol used between the communications system and a terminal. BRI runs at 192 kbps and provides two 64-kbps voice or B channels and one 16-kbps signaling or D channel per port. The remaining 48 kbps are used for framing and D-channel contention.

baud
In telecommunications applications, a unit of transmission speed equal to the number of signal events per second. See also *bit rate* and *bits per second*

Behind Switch
A mode of operation in which the communications system control unit is connected to (is “behind”) another communications system.

binary code
An electrical representation of quantities or symbols expressed in the base-2 number system.

bipolar 8 zero substitution (B8ZS)
A line-coding format that encodes a string of 8 zeros in a unique binary sequence using bipolar violation. See also *bipolar signal* and *bipolar violation.*

bipolar signal
A digital signal in which pulses (1 ‘s) alternate between positive and negative. See also *alternate mark inversion, alternate space inversion, bipolar 8 zero substitution,* and *bipolar violation.*

bipolar violation
A condition that occurs when two positive or two negative pulses are received in succession. See also *alternate mark inversion, alternate space inversion, B8 zero substitution,* and *bipolar signal.*

bit (binary digit)
One unit of information in binary notation, having two possible values: zero or one.

bit rate
The speed at which bits are transmitted, usually expressed in bits per second. Also called data rate. See also *baud* and *bits per second.*

bits per second (bps)
The number of binary units of information that are transmitted or received per second. See also *baud* and *bit rate.*

blocking
A condition in which end-to-end connections cannot be made on calls because of a full load on all possible services and facilities.

broadband
A transmission path having a bandwidth greater than a voice-grade channel.

bus
A multiconductor electrical path used to transfer information over a common connection from any of several sources to any of several destinations.

button
A key on the face of a telephone or console that is used to access a line, activate a feature, or enter a code on a communications system.

byte
A sequence of bits (usually eight) processed together. "Octet" is used instead of "byte" in CCITT (International Telegraph and Telephone Consultative Committee) documentation.

C

Call Accounting System (CAS)
A vendor-supplied DOS or UNIX-based application that monitors and manages telecommunications costs.

Call Accounting Terminal (CAT)
A vendor-supplied stand-alone unit with a built-in microprocessor and data buffer that provides simple call accounting at a low cost.

Callback queue
The queue used to hold Callback callers who have requested a busy pool or extension.

calling group
A team of agents who answer the same types of calls.

Call Management System (CMS)
A DOS-based application that simulates the actions of a system operator by answering and distributing calls. CMS also produces management reports for call analysis.

campus cable
Cable that runs between buildings connected to the same communications system.

central office (CO)
The location of telephone switching equipment that provides local telephone service and access to toll facilities for long-distance calling.

central processor
The part of a computer that interprets and executes instructions. Also called central processing unit.

Centrex
A set of communications system features a user can subscribe to on telephone lines from the local telephone company.

channel
A telecommunications transmission path for voice and/or data.

channel service unit (CSU)
Equipment used at a customer's premises to provide DS1 facility terminations and signaling compatibility.

checksum
The sum of ones in a sequence of ones and zeros to detect or correct errors in data transmission.

circuit-switched data call
A data call made via a connection exclusively established and maintained between data stations for the duration of the data call.

clock synchronization
The operation of digital facilities from a common clock.

coaxial cable
A cable consisting of one conductor, usually a small copper tube or wire, within and insulated from another conductor of large diameter, usually copper tubing or copper braid.

codec (coder-decoder)
A device used to convert analog signals such as speech, music, or television to digital form for transmission over a digital medium and back to the original analog form.

CO line/trunk jack
A jack that connects an outside line/trunk to the communications system control unit.

common-channel signaling (CCS)
Signaling in which one channel of a group of channels carries signaling information for each of the remaining channels, permitting each of the remaining channels to be used to nearly full capacity. In the system's DS1 module, channel 24 can be designated as the signaling channel for channels 1-23 by selecting "common channel" for emulated service when programming the system. CCS must be used for ISDN-PRI service.

communications system
The software-controlled processor complex that interprets dialing pulses, tones, and/or keyboard characters and makes the proper interconnections both inside and outside the system. The communications system itself consists of a digital computer, software, a storage device, and carriers with special hardware to perform the actual connections. A communications system provides voice and/or data communications services, including access to public and private networks, for telephones and data terminals on a customer's premises.

commanding
The compression or expansion of the quantizing scale to reduce distortion. See also *quantizing.*

control unit
The housing, carriers, power supply module, processor module, and line/trunk and station modules of a communications system.

conversion resource
See *modem pool.*

cyclic redundancy check (CRC)
An error-detection code used on DS1 facilities with the extended superframe framing (ESF) format.

D

D channel
The 16-kbps or 64-kbps channel carrying signaling or data on an Integrated Services Digital Network Basic Rate Interface (ISDN-BRI) or 64-kbps channel carrying signaling or data on an ISDN Primary Rate Interface (ISDN-PRI).

D4 framing format
A framing format consisting of a sequence of individual frames of 24 eight-bit slots and 1 signal bit (193 bits) in a 12-frame superframe. See also *extended superframe format.*

data communications equipment (DCE)
Equipment such as modems or data modules used to establish, maintain, and terminate a connection between the communications system and data terminal equipment (DTE), such as printers, host computers, or workstations.

data hunt group (DHG)
A group of analog or digital data stations that share a common access code. Calls are connected in a round-robin fashion to the first available data station in the group.

data rate
See *bit rate.*

data terminal
An input/output (I/O) device that can be connected to the communications system control unit via an interface.

data terminal equipment (DTE)
The equipment that makes up the endpoints in a connection over a data circuit — forexample, a data terminal, host computer, or printer.

dedicated feature buttons
The imprinted feature buttons on a telephone: Conf or Conference, Drop, HFAI (Hands Free Answer on Intercom), Hold, Mute or Microphone, Speaker or Speakerphone, Transfer, Message, and Recall.

delay-dial-start tie trunk
A type of tie trunk on which the originating end of the tie trunk transmits an off-hook signal to the receiving end and waits for the receiving end to send an off-hook signal followed by an on-hook signal. Also called a dial-repeating tie trunk.

dial access
See *feature code.*

Dialed Number Identification Service (DNIS)
A service provided by the AT&T Switched Network that routes incoming 800 or 900 calls according to customer-selected parameters, such as area code, state, or time of call.

dial-out code
A code (usually a 9) dialed by single-line telephone users and multiline telephone users with System Access (SA) buttons to get an outside line.

DID (direct inward dialing) trunk
An incoming trunk that receives dialed digits from the local exchange, allowing the communications system to connect directly to a station without assistance from the system operator.

digital
The representation of information in discrete elements such as off and on or 0 and 1. See also *analog transmission.*

Digital Communications Protocol (DCP)
An AT&T proprietary protocol to transmit both digitized voice and data over the same communications link. A DCP link is made up of two 64-kbps information (I) channels and one signaling (S) channel similar to the B and D channels used in an Integrated Services Digital Network (ISDN).

digital switch element (DSE)
A device in each jack on each module in the communications system control unit that interfaces with the TDM (time-division multiplex) bus.

digital transmission
A mode of transmission in which the information to be transmitted is first converted to digital form and then transmitted as a serial stream of pulses. See also *analog transmission.*

DIP (dual in-line package) switch
A switch on a 400EM module used to select the signaling format for tie-line transmission. DIP switches are also used on other equipment for setting hardware options.

direct facility termination (DFT)
A central office (CO) line/trunk that terminates directly on one or more telephones; in PBX mode a DFT cannot be part of a trunk pool.

direct inward dialing (DID)
A service that transmits the called station number to the communications system from the central office (CO) and routes incoming calls directly to the called station, calling group, or outgoing trunk pool, bypassing the system operator.

Direct Station Selector (DSS)
A 60-button adjunct that enhances the call-handling capabilities of an MLX-20L telephone or MLX-28D telephone when used as an operator console.

display buttons
The buttons on an MLX display telephone used to access the telephone's display.

door answering unit
A device that is connected to a basic telephone jack and used at an unattended station or front desk.

DS0 (Digital Signal 0)
A single 64-kbps voice or data channel.

DS1 (Digital Signal 1)
A bit-oriented signaling (BOS) interface that multiplexes 24 64-kbps channels into a single 1.544-Mbps stream.

dual-tone multifrequency (DTMF) signaling
Touch-tone signaling from telephones using the voice transmission path. The code for DTMF signaling provides 12 distinct signals, each composed of two voice-band frequencies.

E

E and M signaling
Trunk supervisory signaling, used between two communications systems, in which signaling information is transferred through two-state voltage conditions (on the E and M leads) for analog applications and through two bits for digital applications. Used in tie trunks.

EIA (Electronic Industries Association)
A trade association of the electronics industry that establishes electrical and functional standards.

electronic switching system (ESS)
A class of modern switching central office (CO) systems developed by AT&T in which the control functions are performed principally by electronic data processors operating under the direction of a stored program.

endpoint
The final destination in the path of an electrical or telecommunications signal.

expansion carrier
A carrier added to the control unit when the basic carrier cannot house all the modules needed. An expansion carrier houses a power supply module and up to six additional line/trunk and station modules.

extended superframe (ESF) format
A framing format consisting of individual frames of 24 eight-bit slots and 1 signal bit (193 bits) in a 24-frame extended superframe. See also *D4 framing format.*

F

facility
The equipment constituting a telecommunications path between the communications system and the central office (CO).

factory setting
The default state of a device or feature if the user does not choose an optional setting.

fax (facsimile)
A processor the result of a process in which graphic material is scanned and the information converted into electrical signal waves to produce an exact likeness.

feature
A function or service provided by a hardware or software product.

feature code
A code entered on a dialpad to activate a feature. For example, a user might press the feature button or might dial #33.

Feature screen
A display screen on digitaI/ISDN display telephones that provides quick access to commonly used features.

foil shield
A copper foil sheet for power units on expansion carriers that is used to prevent excessive noise on the module immediately to the right of the power supply module in each expansion carrier.

frame
One of several segments of an analog or digital signal that has a repetitive characteristic. For example, a DS1 frame consists of a framing bit and 24 octets, which equals 193 bits.

frequency generator
A circuit pack added to the power unit module that generates a high-voltage, 20-30-Hz signal to ring a telephone. Also called a ring generator.

FX (foreign exchange)
A central office (CO) other than the one providing local access to the public network.

G

General Purpose Adapter (GPA)
A device that connects an analog multiline telephone to optional equipment such as an answering machine or a fax machine.

glare
The loud dual-tone multi-frequency (DTMF) signal an incoming caller hears when another caller tries to call out on a line/trunk at the same time the call is coming in on that line/trunk.

ground-start (GS) line/trunk
A line/trunk on which, after verifying that the line/trunk is idle (no ground on tip), the communications system transmits a request for service (puts ground on ring) to a distant central office (CO).

H

headset
An ultralight earpiece and microphone for hands-free telephone operation.

Home screen
The "home base" of the display screen on digital/ISDN telephones, which shows time, date, and call information, and when a feature is in use.

house cable
Cable that runs from the equipment room to a small, walk-in closet (called a satellite closet) elsewhere in the building,

Hybrid/PBX
A mode of operation in which the communications system uses trunk pools and Automatic Route Selection (ARS) in addition to personal lines—that is, direct facility terminations (DFTs) on line buttons. The Hybrid/PBX mode also provides a single interface to users for both internal and external calling.

I

immediate-start tie trunk
A tie trunk on which no start signal is necessary and dialing can begin immediately after the tie trunk is seized.

in-band signaling
See *robbed-bit signaling.*

inside dial tone
A tone the user hears when they are connected to an intercom line.

Inspect screen
A display screen on digital/ISDN telephones that allows users to preview incoming calls and see a list of the features programmed on line buttons.

integrated access
The use by customers of voice, data, images, and fax simultaneously on an Integrated Services Digital Network (ISDN).

Integrated Services Digital Network (ISDN)
A public or private network that provides end-to-end digital connectivity for all services to which users have access by a limited set of standard multipurpose user-network interfaces defined by the CCITT (International Telegraph and Telephone Consultative Committee). Through internationally accepted standard interfaces, ISDN provides digital circuit-switched or packet-switched connectivity within the network and links to other ISDNs to provide national and international digital connectivity.

Integrated Solution II (IS II)
One or more UNIX-based applications for improving voice and data communications and automating office operations.

Integrated Voice Power Automated Attendant
An IS II application that automatically answers incoming calls with a recorded announcement and directs callers to a department, an extension, or the system operator.

interface
Hardware, software, or both that links systems, programs, or devices.

I/O (input/output) device
Equipment that can be attached to a computer internally or externally for managing a computer system's input and output of information.

IROB (in-range out-of-building) protector
A surge protection device for off-premises telephones at a location within 1000 feet of cable distance from the communications system control unit.

ISDN 7500B Data Module
A data communications device that allows connection between RS-232 data terminal equipment (DTE) and the communications system control unit via MLX station jacks on the 008 MLX module, The ISDN 7500B Data Module is used together with a modem in a modem pool to change digital data signals to analog signals, and vice versa, which allows transmission between digital and analog data stations.

J

jack
A device, accessed by inserting a plug, that is used to terminate the permanent wiring of a circuit.

K

Key
A mode of operation in which the communications system uses direct facility terminations (DFTs) on line buttons with a separate path for internal calling.

L

LED (light-emitting diode)
A semiconductor device that produces light when voltage is applied, LEDs show the operational status of hardware components, the results of maintenance tests, the alarm status of circuit packs, and the activation of telephone features.

line coding
The pattern data assumes as it is transmitted over a communications channel.

line compensation
An adjustment for the amount of cable loss in decibels (dBs), based on the length of cable between a 0S1 module and a channel service unit (CSU) or other far-end connection point.

line/trunk and station module
A module on which the jacks for connecting central office (CO) lines/trunks and/or the jacks for connecting the stations are located.

line and trunk assignment
The assignment of lines and trunks connected to the communications system control unit to specific buttons on each telephone.

local area network (LAN)
A networking arrangement designed for a limited geographical area.

local host computer access
A method for connecting a station jack to an on-site computer for data-only calls through a modem or data module.

logical ID
A numbering sequence used to identify station and line/trunk locations on the communications system control unit.

loop-start (LS) line/trunk
A line/trunk on which a closure between the tip and ring leads is used to originate or answer a call. High-voltage 20-Hz AC ringing from the central office (CO) signals an incoming call.

M

Magic on Hold®
A customized Music-on-Hold (MOH) system enhancement that promotes the customer's products and services.

Megacom
AT&T's tariffed digital WATS (wide area telecommunications service) offering for outward calling.

Megacom 800
AT&T's tariffed digital 800 service for inward calling.

MERLIN LEGEND™ Attendant
An application with equipment that connects to one or more tip/ring station ports and automatically answers incoming calls with a recorded announcement, In response to touch-tone digits dialed by the caller, MERLIN LEGEND™ Attendant directs the caller to a department, an extension, or the system operator.

MERLIN MAIL® Voice Messaging System
An application that provides automated attendant, call answering, and voice-mail services on the communications system.

MLX-10/MLX-10D telephone
A 10-button telephone offered with or without a 2-line by 24-character, menu-driven display.

MLX-20L telephone
A telephone with 20 programmable line or feature buttons and a 7-line by 24-character, menu-driven display.

MLX-28D telephone
A telephone with 28 programmable line or feature buttons and a 2-line by 24-character, menu-driven display.

modem
A device that converts digital data signals to analog signals for transmission over telephone lines. The analog signals are converted back to the original digital data signals by another modem at the other end of the line.

modem pool
A pair, or group of pairs, of modems and data modules with interconnected RS-232 interfaces that converts digital signals to analog, or analog signals to digital, thereby allowing users with Integrated Digital Services Network (ISDN) digital data stations to communicate with users who have analog stations.

Multi-Function Module (MFM)
An adapter that provides a tip/ring interface for the connection of optional equipment such as answering machines, external alerts, and fax machines to a digital/ISDN (MLX) telephone. The optional equipment and the MLX telephone operate simultaneously and independently. The MFM is installed inside the MLX telephone.

multiplexing
A process in which a transmission channel is divided into two or more channels, either by splitting the frequency band into a number of narrower bands or by dividing the channel into successive time slots.

Music-on-Hold (MOH)
Magic on Hold or a customer-provided music source connected to the communications system via a loop-start (LS) jack. Most MOH equipment is designed for LS operation.
Note: If you use equipment that rebroadcasts music or other copyrighted materials, you maybe required to obtain a copyright license from and pay fees to a third party such as the American Society of Composers, Artists, and Producers (ASCAP) or Broadcast Music Incorporated (BMI). Or you can purchase a Magic on Hold system, which does not require such a license, from AT&T or your authorized AT&T dealer.

N

network
A configuration of communications devices and software connected for information interchange.

network interface
Hardware, software, or both that links two systems in an interconnected group of systems, for example, between the local telephone company and a PBX.

O

off-premises telephone
A telephone located in a building other than where the control unit is located.

ones density
The requirement for channelized DSI service to the public network that eight consecutive zeros cannot be in a digital data stream.

Outcalling
A feature of the MERLIN MAIL Voice Messaging System application. When outcalling is activated, the user is automatically called by the system at a programmed number when a new message is received in his or her mailbox.

out-of-band signaling
Signaling that uses the same path as voice-frequency transmission and in which the signaling is outside the band used for voice frequencies.

P

parity
The addition of a bit to a bit string so that the total number of 1‘s is odd or even. Parity can be used to detect and correct transmission errors.

pass through
A connection from an internal modem to a programming port on the communications system.

personal line
A central office (CO) line that rings only at the user’s telephone

pool
On a Hybrid/PBX system, a grouping of outside trunks that users can choose with multiple pool buttons or by dialing access codes on an SA (System Access) button on the telephone. Pools are also used by the Automatic Route Selection (ARS) feature to choose the cheapest method to route a call.

port
A point of access into a communications system, computer, network, or other electronic device.

power supply module
A device that directs electricity to modules and telephones on the communications system. One power supply module is needed for each carrier, and an auxiliary power unit is added if the module exceeds capacity.

Primary Rate Interface (PRI)
A standard Integrated Services Digital Network (ISDN) access interface that specifies the protocol used between two or more communications systems. PRI runs at 1.544 Mbps and, as used in North America, provides twenty-three 64-kbps B channels (voice or data) and one 64-kbps D channel (signaling). The D channel is the 24th channel of the interface and contains multiplexed signaling information for the other 23 channels.

prime line
An individual extension number assigned to a telephone in a Behind Switch system. Each telephone user has his or her own prime line and is automatically connected to that line when he or she lifts the handset.

processor module
The module in the second slot of the basic carrier that contains the software that runs the communications system.

protocol
A set of conventions governing the format and timing of message exchanges between devices, such as a multiline analog telephone and the communications system control unit.

public network
A network that is commonly accessible for local or long-distance calling. Also called public switched telephone network (PSTN).

pulse amplitude modulation (PAM)
A modulation technique in which an analog signal, such as speech, modulates a carrier signal consisting of a series of precisely timed pulses of equal amplitude, See also *pulse code modulation.*

pulse code modulation (PCM)
An extension of pulse amplitude modulation (PAM) in which each PAM pulse is quantized and encoded into a 8-bit code to represent the amplitude of each PAM pulse. See also *pulse amplitude modulation.*

Q

quantizing
The process of converting a pulse amplitude modulation (PAM) sample into a discrete number of amplitude values.

R

RAM (random access memory)
Computer memory in which an individual byte or range of bytes can be addressed and read or changed without affecting other parts of the memory.

riser cable
Cable that runs between floors in a multistory building and connects wire closets.

robbed-bit signaling (RBS)
Signaling in which the least significant bit (LSB) of every sixth frame per channel is used for signaling in that channel.

ROM (read-only memory)
Computer memory that can be read but cannot be changed.

RS-232
A physical interface, specified by the EIA (Electronics Industries Association), that transmits and receives asynchronous data at speeds of up to 19.2 kbps over cable distances of 50 feet.

S

signaling
The sending of control and status information between devices to set up, maintain, or take down a connection.

simplex signaling
The transmission of signals in one direction only across a telecommunications channel.

single-line telephone
An industry-standard, touch-tone or rotary telephone that only handles one line/trunk and is connected to the communications system via a jack on a basic telephone module.

SMDR printer
A printer used for Station Message Detail Recording (SMDR) that is connected to the communications system via an RS-232 jack on the processor module.

Software Defined Network (SDN)
An AT&T private networking service created by specialized software within the public network.

special charactcr
A pause, stop, or end-of-dialing signal in a programmed dialing sequence such as an Auto Dial or personal Speed Dial number.

Square Key
A way of configuring the communication system in Key mode so that all lines appear on all telephones.

station
The endpoint on the station side of the communications system. A station can be a telephone with or without an adjunct or can be a data terminal with a modem (analog) or an ISDN 7500B Data Module (digital) attached.

station jack
An analog, digital, or tip/ring (T/R) interface on the control unit module for connecting telephones and other equipment.

Supplemental Alert Adapter (SAA)
A device that permits alerting equipment to be connected to an analog multiline telephone jack so that people working in noisy or remote areas of a building can be alerted to incoming calls.

switched service network (SSN)
A network consisting of terminals, transmission lines, and at least one exchange on which a user can communicate with any other user at any time.

switchhook flash
Operation of the telephone switchhook in which the on-hook period is in the range of 250-500 ms.

synchronous
A method for transmitting a continuous digital data stream in which the transmission of each binary bit is synchronized with a master clock.

system acceptance test
A test of all trunks, telephones, data terminals, and features after installation to ensure they are working correctly.

system date
The date that appears on display telephones and Station Message Detail Recording (SMDR) reports.

System Programming & Maintenance (SPM)
A DOS-or UNIX-based application for programming and maintaining the communications system.

system renumbering
A process used to change the extension numbers assigned to stations, adjuncts, calling groups, paging groups, Call Park zones, and Remote Access.

system time
The time that appears on display telephones and is printed on Station Message Detail Recording (SMDR) reports.

T

T1
A digital transmission carrier path that in North America transmits at the DS1 rate of 1.544 Mbps.

telephone power supply unit
Equipment that provides power to an individual telephone.

tie trunk
A private line directly connecting two communications systems together.

time-division multiplexing (TDM)
A process where the transmission channel is divided.

timer
A built-in timing device in a display telephone.

time-slot interchanger
An element of a time-division switching network that separates and switches time-division multiplexed (TDM) signals.

tip/ring (T/R)
The contacts and associated conductors of a single-line telephone plug or jack.

touch-tone gate
An operation used to determine if a call is from a touch-tone or rotary telephone.

touch-tone receiver (TTR)
A device used to decode touch-tones dialed from single-line telephones or Remote Access telephones.

translation
The information used to identify a particular user with a particular telephone.

U

uninterruptible power supply (UPS)
A device that connects to the communications system to provide 117 VAC to the equipment when the commercial power source fails.

unit load
A measure of the power load drain of a module, telephone, or adjunct.

V

voice-band channel
A transmission channel, generally the 300-3400-Hz frequency band.

voice-only
A station that is set up for making and receiving voice calls but not data calls.

voice signal pair
A pair of leads on an analog multiline telephone station used for the Voice Announce to Busy feature.

W

WATS (wide area telecommunications service)
A service that allows calls to certain areas for a flat-rate charge based on expected usage.

wink-start tie trunk
A tie trunk on which the originating end transmits an off-hook signal and waits for the remote end to send back a signal (a wink) that it is ready for transmission.

Z

zero code suppression (ZCS)
A binary coding scheme that ensures a data stream contains at least a minimum number of information bits (1's) for receiver synchronization.

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