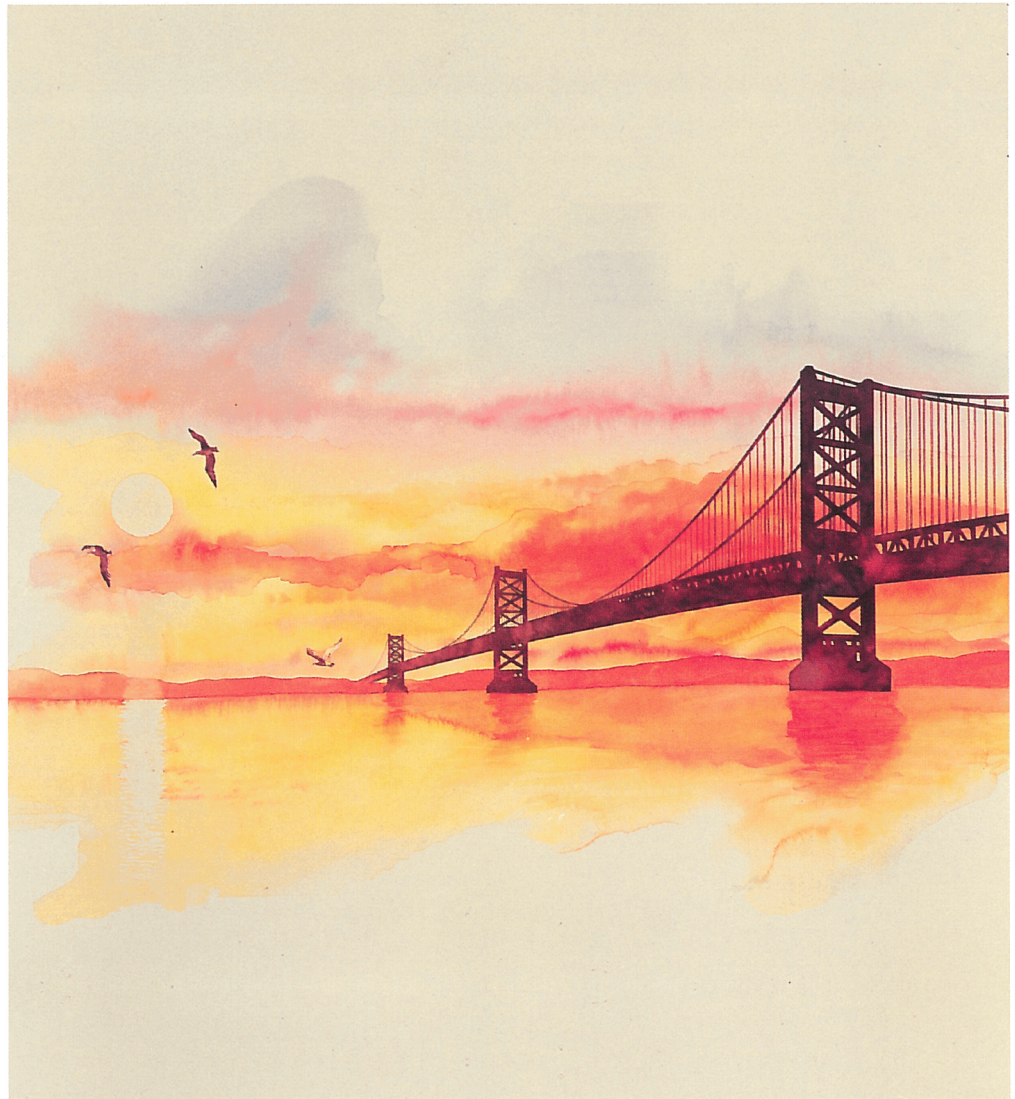


Planning for the 9371 Model 14





Enterprise System/9370™

GA24-4258-01

Planning for the 9371 Model 14

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Preface

Who Should Use This Book

This publication assists anyone planning to order the 9371 Model 14, a new member of the Enterprise System/9370* family. The information in this publication is useful to both first-time data processing users and experienced users. The chapters provide a building-block approach for planning for the 9371 Model 14. First-time users should read all the information in the order presented. Experienced users can use the book as a quick reference to specific topics. The *Planning Forms*, which will be used to order and install your system are included as an appendix to this book.

The 9371 Models 10 and 12 have a separate set of planning publications:

- *Enterprise System/9370, Introducing the 9371 Models 10 and 12, GA24-4127*
- *Enterprise System/9370, Planning for the 9371 Models 10 and 12, GA24-4128.*

How This Book is Organized

Chapter 1, "General Planning Activities," gives an overview of the planning process. It identifies those tasks that must be performed to ensure a smooth installation.

Chapter 2, "Planning Your System Unit Features," describes the features of the Model 14's system unit, its attached consoles, its processors, and storage devices contained within it. It also provides directions for selecting the system unit optional features and integrated storage devices.

Chapter 3, "Planning Your Local Work Stations," explains how various local work station devices can attach to the 9371 Model 14. It lists some of the IBM products you can use and provides directions for planning local work stations.

Chapter 4, "Planning Your Communications," explains how various communication devices attach to the 9371 Model 14. It lists some of the IBM products that you can use as remote work stations and provides directions for planning local area networks and telecommunications networks.

Chapter 5, "Preparing Your Physical Site," instructs you on preparing your physical site for the system installation.

Chapter 6, "Ordering and Installing the System," summarizes system planning and provides directions for ordering and site preparation.

Appendix A describes the communication cables used with the 9371 Model 14. It also provides information for assembling these cables and wrap connectors.

Appendix B lists configuration rules and slot assignments for adapter cards.

Appendix C includes the planning forms for ordering the system and documenting the planned configuration.

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Chapter 1. General Planning Activities

The 9371 Model 14 is a member of the Enterprise System/9370 family. This book will help you select hardware devices and plan for the installation of your 9371 Model 14 system. The 9371 Models 10 and 12 have their own set of publications. A quick look at the chapter titles can give you an idea of what you can expect to accomplish. As you progress through the planning stages, you will fill out forms and draw diagrams that become a *permanent record* of the system features, configuration data, and communication networks. These records must be kept up to date and can be used repeatedly during the ordering, installation, upgrade, and maintenance of your system. The information recorded on *Device Configuration, Form D*, in particular, will be required when installing external I/O devices and communication lines.

Depending on your data processing experience, you should be able to plan for a relatively small system like the 9371 Model 14 without any help. To simplify planning and installation, you may accept decisions made by the IBM ordering system to select adapters for you and assign commonly-used System/370 addresses to the I/O devices you specify. IBM ordering system programs are flexible in that they can be used to experiment with different configurations before placing an order. You and your IBM marketing representative can try different combinations of adapters, and I/O devices to find out if they are valid, and if they meet your performance and budget objectives. All 9371 systems are shipped fully configured with all adapters in place and default S/370 addresses already assigned to your S/370 I/O devices. If you anticipate expansion, and want to order more than the minimum number of adapters, or if you want to assign your own distinctive device addresses, the configuration defaults can be overridden.

If you have minimal experience or if you are planning for a larger system with multiple processors, many work stations, or complex teleprocessing networks, you may need the assistance of your IBM marketing representative. The representative can also help you select suitable software packages. You should be very familiar with the contents of *Introducing the 9371 Model 14*, GA24-4257. It describes the system features, I/O adapters, I/O devices, and available software packages.

With the 9371 Model 14, you can quickly respond to changes in your business. You can add features or relocate system devices to match your changing needs. When considering changes to your system, come back to this book and the accompanying forms to review the decisions that you initially made. Exercise the same diligence in planning upgrades as you would for defining the original system requirements. Proper planning ensures that your business will immediately benefit from your new system and will continue to do so as your enterprise expands.

System Planning

During your system planning activities, you will make decisions concerning what features and devices to order, where to locate your equipment, who will operate the computer, and so on. You will also ensure that any additional equipment and materials are ready to use when your new computer arrives.

You may have been selected as the primary coordinator for your planning efforts. One person is typically responsible for most of the system planning, but it may be advisable to share the responsibilities with several other people.

Chapter 2. Planning Your System Unit Features

The 9371 Model 14 system is comprised of a system unit (which contains the processors, storage devices, and I/O adapters), external I/O devices, communication networks, and appropriate software to fill your data processing needs. A System/370 processor, its main storage, and I/O adapters occupy one of two system boards inside the enclosure. A Personal System/2* processor, its storage, and I/O adapters occupy the other system board. Before selecting system unit features and any other hardware devices, you should know your *total system* requirements. Some items to consider are:

- Computer applications
- Volume of your business transactions
- Number of system users
- Amount of data that you wish to process
- Amount of data storage space required
- Operating system (control program) to be used.

Note: The operating systems you choose and the system hardware features you select must support each other. You should, therefore, plan for your hardware devices in conjunction with selecting an operating system and application software for each of the processors.

While reading this chapter, you will complete parts of the following forms:

- Processor Configuration (Form B)
- I/O Devices (Form C).

All forms are in Appendix C of this book. Remove the pages and make as many copies as you need. Save the unmarked originals for future use.

These forms will be used to specify your hardware requirements to the IBM ordering system programs. The ordering system programs can be used to order the minimum hardware necessary to meet your specifications or to verify that a customized configuration does not exceed any system capabilities. You can use the ordering system programs repeatedly to help plan for expansion, to obtain cost information, and to verify enhanced configurations before ordering.

This publication assists you in planning a system hardware configuration. There are some *configuration restrictions* to which your system must conform in order to maximize its performance. These rules are *summarized in Appendix B* and will be mentioned throughout this book. When you have completed the hardware planning tasks, you will have filled out several forms which your IBM marketing representative can then use to verify that the configuration you have defined is valid.

The following diagrams show *typical configurations* for the 9371 Model 14. You can refer to these throughout the planning process as examples of how the system can be applied and expanded. Other configurations with different I/O adapters and devices are certainly possible. You can, no doubt, devise many valid combinations of system models, adapters, devices, and networks to solve your data processing problems.

Consult your IBM marketing representative for the availability dates of the features described in this book.

Model 14 Features

Refer to *Introducing the 9371 Model 14*, GA24-4257, for a detailed description of the available features, adapters, and devices. Contact your IBM marketing representative for the availability dates of the features.

The *processor type number* is 9371.

The Model 14 can run both S/370 and PS/2 software concurrently.

See the following tables for an overview of the type of features available on this model. These tables show the *standard* features and the *maximum number of each optional* feature allowed on specific models. Some combinations of features and optimum performance requirements can reduce the maximum number allowed.

See Appendix B for configuration rules.

The types of activities and the system configuration will surely have an effect on the ability of your system to attain or surpass your performance objectives. Your IBM marketing representative will help you to make cost-effective decisions in selecting components that can deliver the performance you require.

Some brief highlights:

- The Model 14 requires either two separate consoles (one for the S/370 side and one for the PS/2 side) or the Virtual Console option (a single PS/2 display and keyboard that serves both sides).
- Each Model 14 has a Remote Facilities Adapter on the S/370 side for attaching the modem and cables needed for the Remote Facilities Option. This adapter cannot be used for other purposes.
- Each Model 14 has at least 4MB of S/370 main storage which may be increased to 16MB in increments of 4MB.
- Each Model 14 also has at least 2MB of PS/2 storage which may be increased to 16MB in increments of 2MB.
- Remote power on, timed power on, and programmed power off are standard on the Model 14, but the Battery Backup feature is optional.
- All necessary microcode is preloaded. Preloaded S/370 software is optional.
- Each Model 14 includes two 3.5-inch (1.44 MB) diskette units; one for the S/370 side and one for the PS/2 side.
- One DASD/Tape Adapter, which can control up to six fixed disk drives and the quarter-inch tape unit, is included as standard equipment.
- Two fixed disk drives are standard as S/370 Direct Access Storage Devices (DASD). Up to four more disk drives may be split between the S/370 and PS/2 sides of the Model 14.
- An optional DASD Adapter is used for DASD on the PS/2 side.
- The Quarter-Inch Tape Unit is optional on the S/370 side.
- The total number of optional I/O adapters in a system unit cannot exceed three on the S/370 side and eight on the PS/2 side.
- Feature numbers for adapters on the PS/2 side are different from the numbers for equivalent adapters on the S/370 side.
- Features on the PS/2 side must be supported by the selected operating system.

See Appendix A for cable feature information.

Standard Features

Feature Name	Quantity
Keyboard for PS/2 side	1
Diskette Drives	2
Power Controls	1
S/370 Processor Storage (in megabytes)	4
PS/2 Processor Memory (in megabytes)	2
S/370 Direct Access Storage Devices (DASD)	2
DASD/Tape Adapter for the S/370 side	1
Remote Facilities Adapter (Modem, cable included for World Trade)	1

Maximum Number of Optional Features for the S/370 Side

Feature Name	Number	(Note 1)
S/370 Console Keyboard and Display	4037	1
Remote Facilities Option (Note 2)	7020	1
Software Preload Service	4010	1
S/370 Processor Storage (additional 4MB)	4004	3
Additional Control Storage for S/370 (2MB)	8002	1
Additional DASD for S/370	4043	4
Quarter-Inch Tape Unit	4060	1
Half-Inch Tape Adapter	4051	1
Dual Async Adapter	6011	1
8-Port RS-232C Adapter (512KB)	6022	3
8-Port RS-232C/RS-422A Adapter (512KB)	6024	3
8-Port RS-422A Adapter (512KB)	6026	3
8-Port RS-232C Adapter (1MB) (Note 3)	7022	3
8-Port RS-232C/RS-422A Adapter (1MB) (Note 3)	7024	3
8-Port RS-422A Adapter (1MB) (Note 3)	7026	3
High Performance SDLC Adapter	6027	3
X.25/HDLC Packet Network Adapter	6029	1
IBM Token-Ring Adapter	6034	1
IEEE 802.3 LAN Adapter	6035	1
3270 Adapter	6120	1
5080 Graphics Adapter	7010	1
High Speed Printer Adapter	7040	1
Optional I/O Adapter Card Positions Available		3

Notes:

1. Maximums are for the S/370 side only; See following table for PS/2 features.
2. Uses the *standard* Remote Facilities Adapter above.
3. Used only for programmable communications applications.

The PS/2 display and keyboard attach to the Display Port (J12) and the Keyboard Port (J8) of the PS/2 system board (Board B) and control the operation of the PS/2 processor. The Virtual Console option supplies a cable that connects the PS/2 Serial Port (J11) to the S/370 Serial Port (J2) and microcode that allows the PS/2 keyboard and display to control the S/370 processor as well as the PS/2 processor. This feature requires that OS/2* is installed on the PS/2 side.

Selecting a Processor Configuration

Get planning Form B, *Processor Configuration*, from Appendix C. You will now start to fill in this form. Use a pencil so you can erase entries when making changes later.

Customer Name and Number

Fill in your *Customer Name* and *Customer Number* at the upper right corner of the form. If you are planning to order multiple systems, fill out separate planning forms for each system and identify each with a specific number or a name.

Processor Model

Place a check in the box next to:

- Model 14.

System/370 Storage

Place a check in the appropriate box to indicate the amount of *S/370 Storage* you want. The available storage sizes are:

- 4MB (Standard)
- 8MB
- 12MB
- 16MB.

Additional Control Storage (Feature 8002)

This feature provides increased I/O device work space to extend the S/370 device addressing capability of the system. Feature 8002 must be added when any of the following are true:

- The number of device addresses on the S/370 side, without an IBM Token-Ring Adapter or IEEE 802.3 LAN Adapter, exceeds 20.
- The number of device addresses on the S/370 side, with an IEEE 802.3 LAN Adapter but without an IBM Token-Ring Adapter, exceeds 16.
- The number of device addresses on the S/370 side, with an IBM Token-Ring Adapter, exceeds 12.

“Devices” include the total number of:

- DASD drives
- Console sessions (up to four)
- Tape drives
- Asynchronous devices
- Communication lines
- Work stations
- 3270 control units
- Printers

- Other devices attached to serial ports, parallel ports, and 3151 Display Station auxiliary ports.

Each 3174 Subsystem Control Unit and each 3270 Adapter are counted as one device regardless of the number of devices attached to them.

Each 8-port adapter used in Group Multiplex Mode is counted as eight devices.

Each 8-port adapter used for customer programmable applications is counted as one device.

If you need the additional control storage space for any of the stated reasons, check the appropriate box near *Feature 8002* on Form B.

PS/2 Storage

Place a check in the appropriate box to indicate the amount of *PS/2 Storage* you want. The available PS/2 storage sizes for Model 14 are:

- 2MB (Standard)
- 4MB
- 6MB
- 8MB
- 10MB
- 12MB
- 14MB
- 16MB.

Virtual Console (Feature 4035)

This feature includes microcode that lets you control the S/370 processor and the PS/2 processor from the same keyboard and display. It also provides a cable that connects the serial port on the PS/2 side to the serial port on the S/370 side. This eliminates the need for a separate console on the S/370 side of the Model 14.

Feature 4035 also includes a System Function Panel with a liquid crystal display and switches to control basic system functions during problem analysis. Check the box near *Feature 4035* on Form B if you want the Virtual Console option. This feature requires that OS/2 is installed on the PS/2 side.

S/370 Keyboard and Display (Feature 4037)

You must select this feature if you are not ordering the Virtual Console. The display has a twelve-inch monochrome screen. The keyboard has special keys for controlling S/370 functions. Its national language characteristics will be determined by the nomenclature you select for the system. Check the box near *Feature 4037* on Form B if you need a keyboard and display for the S/370 side.

PS/2 Display (Feature 7095 or 7096)

For the PS/2 side, you can order an IBM monochrome display or you can add one of your own. This may be a display that you have acquired previously, such as the IBM 8503, 8512, 8513, 8514, or some other PS/2-compatible display. The PS/2 keyboard is standard equipment for the Model 14. Its national language characteristics will be determined by the *nomenclature* you select for the system. Check the box near *Feature 7095* on Form B if you want the IBM-supplied monochrome display. Check the box near *Feature 7096* on Form B if you will be supplying your own PS/2-compatible display.

Power Controls

Power controls provide the following functions on the 9371 Model 14:

- *Timed Power-on*: Allows the system unit power to be switched on at a prescribed time set on an internal battery-powered clock.
- *Remote Power-on*: Allows the system unit power to be switched on from a remote location by using the Remote Operation Facility.
- *Programmed Power-off*: Allows the system unit power to be switched off through program control.
- *Battery Backup*: Keeps system unit power on for at least 1.8 minutes during short power outages.

All the preceding features except Battery Backup are standard on the 9371 Model 14. Place a check in the appropriate box on Form B to order the optional Battery Backup feature (Feature 3005).

Note: These power controls apply only to the system unit. External I/O devices must be powered on or off manually.

Remote Facilities

If you plan to use the Remote Facilities, you must have the following equipment:

In the United States:

- The following is included with every 9371 Model 14:
 - A Remote Facilities Adapter card.
- The following is included with Remote Facilities Option (feature 7020):
 - An EIA¹ RS-232C/CCITT² V.24 cable to allow the modem to be located up to 6 meters (20 feet) from the system unit.
- You must provide:
 - A 2400 bps (bits per second) auto-answer modem (IBM 5853).
 - A switched network communication line terminated with an RJ11 modular jack.
 - A compatible telephone, either tone or pulse dial.

For most IBM World Trade countries:

- The following is included with every 9371 Model 14:
 - A Remote Facilities Adapter card.
 - The correct modem for the ordering country (In those countries that cannot use an IBM modem, a Request for Price Quotation must be used to remove the modem from the order).
 - A cable to allow the modem to be located up to 6 meters (20 feet) from the system unit.
- You must provide:
 - A switched network communication line and a compatible telephone.

¹ Electrical Industries Association

² Consultative Committee on International Telegraph and Telephone

Note: The Remote Facilities Adapter card provided as standard equipment is for remote facilities only. It cannot be used for other purposes.

In order to use the Remote Operator Console Facility, you may require a *stand-alone* remote operator's console. This console must be purchased separately, but the hardware requirements are listed along with more Remote Facilities equipment information in:

- *Chapter 5 – Preparing Your Physical Site.*

If you want the Remote Facilities Option, feature 7020, place a check in the appropriate box on planning Form B to indicate your preference. You may also check the box near *ROCF Diskettes (Specify Code 9992)* if you need the diskettes containing the Remote Operation Console Facility programs for a stand-alone remote operator's console.

Software Preload Service (Feature 4010)

This service can benefit those customers who are installing many 9371 systems that require the same S/370 software. This service does not apply to software for the PS/2 side. IBM will replicate a S/370 software image, from tapes that you have created on an initial development system, to the fixed disk DASD of other systems you order, prior to shipping these other systems to your designated locations. For details on this service, please read *ES/Express Software Preload Service, Planning Guide, GC24-5405*, which is available from your IBM marketing representative.

When you have your S/370 software running error-free on an initial development system, your IBM marketing representative will help you obtain the necessary forms for requesting the ES/Express Software Preload Service. IBM will send you a kit of magnetic tapes with an assigned serial number and instructions for their use. You can copy your system software image onto these tapes and send the kit back to IBM for preloading into successive *target* systems.

If you are now planning for one of the target systems, check the *Software Preload Service: Feature 4010* block on Form B and, in the space provided, enter the *Serial Number* of the kit containing the system image you want replicated on the new system's DASD. This target system, with its software already installed, will be shipped, ready-for-use, to your specified location.

Specifying System Unit Features

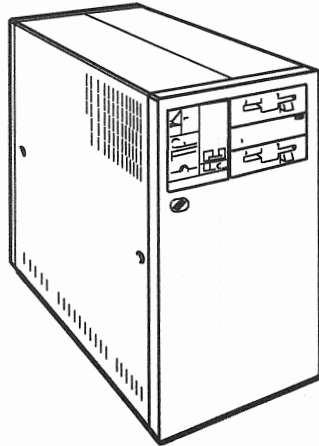


Figure 2-4. 9371 Model 14 System Unit

All of the 9371 Model 14 system components, except for the processor console, work stations, and modems, reside within the system unit. The system unit dimensions for the Model 14 are:

- Height 650 mm (25.6 in.)
- Depth 790 mm (31.1 in.)
- Width 380 mm (15.0 in.).

The maximum weight of a system unit is 87 kg (193 pounds).

Nomenclature

The *nomenclature* for the operator panel and keyboard will default to the language of the country in which the system is ordered. To override this default, write in the nomenclature that you want. Valid entries are:

- Belgian-Dutch
- Belgian-French
- Canadian-French
- Danish
- Dutch
- Finnish
- French
- German
- Italian
- Latin American Spanish
- Norwegian
- Portuguese
- Spanish
- Swedish
- Swiss/French
- Swiss/German
- United Kingdom English
- United States English.

Power Requirements

The input power requirements of the system unit will also default to the country in which the system is ordered. Refer to Chapter 5, *Preparing Your Physical Site*, for details on the available power specifications and connector types. Place a check in the appropriate box to indicate the type of system unit power required as follows:

- 100/127 Volt, 1 Phase, 12 Amp, 1.2 kVA
 - Option available outside the United States
 - Systems installed in the United States must have this type.
- 200/240 Volt, 1 Phase, 6 Amp, 1.2 kVA
 - Option available outside the United States only.

Note: Some external I/O devices have a voltage selection switch that must be set when the system is installed. This voltage selection switch must be set to match the actual AC input voltage supplied.

Power Cord/Plug Type

Select the desired system unit power cord/plug type by placing a check in the appropriate box. The non-watertight power cord/plug is used for above the floor or non-raised floor installations. The watertight power cord/plug is for raised-floor installations in the United States and Canada only.

The standard power cord is 4.3 meters (14 feet) long. The 1.83-meter (6-foot) power cord is required for Chicago, Illinois. A 1.83-meter (6-foot) watertight power cord/plug for raised-floor installations in Chicago, Illinois is also available. Place a check in the box on Form B next to the power cord type your installation requires.

Processor console and modem power cords are both 1.83 meters (6 feet) long and non-watertight in any case.

The rest of this chapter describes the DASD/Tape Subsystem and explains how to fill in the Forms B and C for the DASD/Tape adapters, the DASD drives, and the tape drives.

Please *continue* reading this chapter for information on the DASD/Tape Subsystem features. You will be given directions on how to fill out the *last* section of Form B (I/O Adapters) later in this book.

Defining a DASD/Tape Subsystem

The DASD/Tape Subsystem in the Model 14 is used for mass storage of data and to provide a means of program distribution among systems. The subsystem consists of data storage devices, including direct-access storage devices (DASD) and tape units, device-controlling microcode, and adapter cards that supply the necessary interface signals.

Data Storage Devices

The DASD/Tape subsystem supports the following devices:

- Direct-Access Storage Devices (DASD)
- Quarter-Inch Tape Unit
- IBM 9348 Model 12 Half-Inch Tape Unit.

Half-Inch Tape Adapter (Feature 4051)

This adapter has an external connector that allows you to attach one IBM 9348-12 Half-Inch Tape Unit to the S/370 side of the Model 14. An external cable and terminators are also included with the feature. One of these adapters can be installed on the S/370 side of the Model 14. The Half-Inch Tape Adapter is not supported on the PS/2 side of the Model 14.

Selecting the DASD/Tape Devices

When you decide what DASD and tape devices you need, get Form B and Form C from Appendix C and start filling out the *DASD/Tape* section.

Enter the *Quantity* for each of the following:

- Additional DASD for S/370, Feature 4043 (4 maximum)
- Additional DASD for PS/2, Feature 4045 (4 maximum)
- Quarter-Inch Tape Unit, Feature 4060 (1 only).

If you want to attach DASD to the PS/2 processor, enter a quantity of 1 near *Feature Number 4050* (DASD Adapter) under *I/O Adapters* on Form B. Place a check in *Adapter Locations*, column B2, to indicate that the optional DASD Adapter will fill that slot.

Indicate the number of DASD that you want attached to the standard DASD/Tape Adapter on the S/370 side by entering the quantity on Form C near *Feature 4043*. Use *Feature 4045* to indicate the number of DASD to be attached to the optional DASD Adapter on the PS/2 side. A maximum of four Additional DASD (Feature 4043 plus Feature 4045), split between the two processors, may be ordered.

If you are planning to attach an IBM 9348-12 Half-Inch Tape Unit, enter a quantity of 1 near *Feature Number 4051* under *I/O Adapters* on Form B. Check column A2 under *Adapter Locations* to indicate the slot the adapter will occupy.

List the 9348-12 Tape Unit on Form C under *I/O Devices* along with its *Adapter Location* and its *S/370 Address* if you have a preference. You can write in the address later if you wish to accept the default address that the system assigns when the device is installed. For more information, see the *IBM 9348 1/2-Inch Magnetic Tape Unit, Service Information, SY31-0697*.

Using the Model 14 as a BiProcessor

The 9371 Model 14 has two separate processors (S/370 and PS/2) which can operate completely independent of each other. Each has its own operating system software, storage facilities, I/O adapters, I/O devices, and applications. The two processors can operate together as a BiProcessor to share data and other resources when the optional Data Exchange Adapter (Feature 4014) and its controlling software are installed.

Data Exchange Adapter (Feature 4014)

When used, this adapter must be installed in slot B1 on the PS/2 side of the Model 14. It has an internal cable that reaches over to a similar adapter in slot A4 on the S/370 side. This adapter can be programmed with high-level commands or low-level instructions to transfer data between the two processors. IBM will supply a high-level software interface, a low-level software interface, and examples of programs that may be developed for BiProcessor applications.

If you want to use the Model 14 as a BiProcessor, enter a quantity of 1 near *Feature Number 4014* under *I/O Adapters* on Form B. Check column B1 under *Adapter Locations* to indicate the slot the Data Exchange Adapter will occupy. Feature 4014 has the highest priority for slot B1. Any adapter previously assigned to B1 would have to be moved to another slot.

Note: There are also external means by which the S/370 and PS/2 can communicate. For instance, if both sides of the Model 14 are attached to the same IBM Token Ring LAN, they may use existing software methods supporting that local area network to share data.

The Data Exchange Adapter uses a shared storage buffer (RAM memory) to provide a memory-mapped window for communications between the adapter and application programs. This shared storage buffer must be an unused ROM or RAM address range. The available addresses are below the 1MB line in what is referred to as "channel ROM space" (memory ranges C:0000 thru D:FFFF), or above the 1MB line in RAM memory.

Standard PS/2 configuration utilities provided on the 9371 Reference Diskette let you select the memory address for placement of this DEA buffer area. An automatic configuration utility is also provided and uses default address values for each installed adapter.

The DEA buffer requires 32KB of memory space. If real memory does not extend to 16MB, the DEA buffer area may be reconfigured there, thus maximizing the channel ROM space available for other adapters. If the PS/2 side has 16MB of real memory, the DEA buffer area must be configured into the channel ROM space since the buffer area may not overlap with real memory. The Data Exchange Adapter also has a 16KB ROM that must always be configured in the channel ROM area.

Certain combinations of adapters may conflict with DEA buffer and ROM memory requirements when all adapters are to be configured into the channel ROM space.

This completes the selection of system unit features and devices. Continue with one of the following:

- Chapter 3, "Planning Your Local Work Stations," for planning local work stations.
- Chapter 4, "Planning Your Communications," for planning remote work stations and communication networks.
- Chapter 5, "Preparing Your Physical Site," for planning your installation.

You can attach *local display stations and printers* using:

- System board parallel ports
- System board serial ports
- Dual Async Adapter
- 8-Port RS-232C Adapter (512KB)
- 8-Port RS-232C/RS-422A Adapter (512KB)
- 8-Port RS-422A Adapter (512KB)
- High Speed Printer Adapter.

Note: Only the 8-port adapters with 512KB of storage are supported for standard communications and ASCII work station attachments. The 1MB versions of the 8-port adapters can be used only for programmable applications.

You can directly attach *local 3270-type display stations, printers, and personal computers* using:

- 3270 Adapter.

You can attach *local graphics work stations* using:

- 5080 Graphics Adapter.

These ports and adapters are described in *Introducing the 9371 Model 14, GA24-4257*. Some of these same adapters and ports may also be used in the telecommunications subsystem. When laying out both subsystems, it is important to remember that some adapter card ports not used for attaching local work stations may be used for connecting communication lines from remote devices and systems. Planning for telecommunications is included in Chapter 4.

There are restrictions on the number and types of adapters, devices, and networks that can be combined on the 9371 Model 14. For more information on the combinations of adapters, work stations, and communications networks allowed on the 9371 Model 14, see the adapter slot assignments and configuration rules summarized in Appendix B. This book and your IBM marketing representative will help you to understand those restrictions.

For instance, each 8-port adapter has limits on the sum of the data rates of all its attachments. Each work station or communication line contributes a specific number of bits per second as determined by its data transfer rate. The total number of bits per second contributed by all attachments must not exceed the limits specified in Appendix B. Failure to comply could result in subsystem failure. You could, for example, connect eight asynchronous work stations to the same 8-port adapter at 9600 bps, but you must not connect five attachments at 19,200 bps on the same adapter.

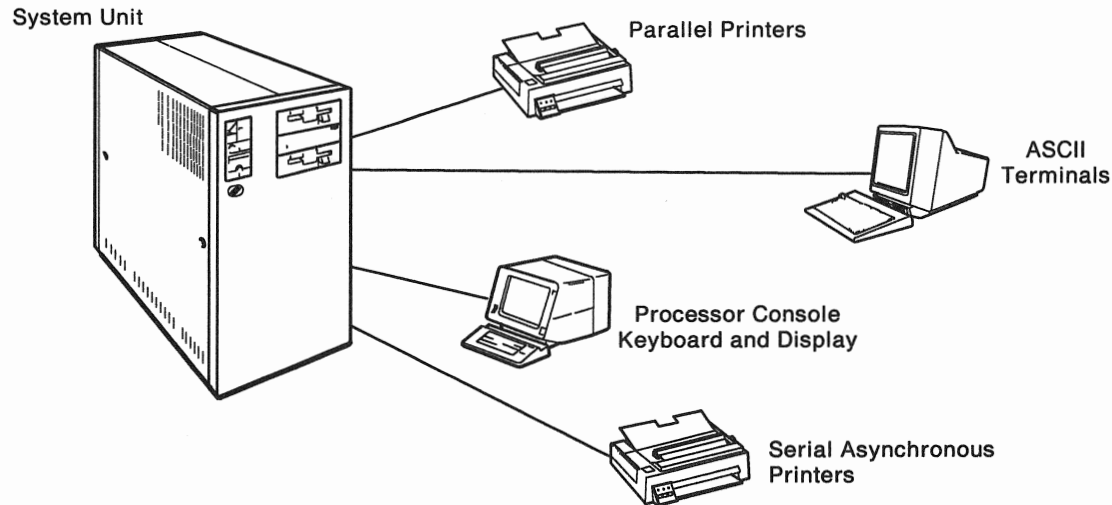


Figure 3-1. Local Work Stations Attached to the 9371 Model 14

Attaching Local ASCII-Type Terminals as 3278 Terminals

IBM 3151 ASCII display stations can be locally attached to the S/370 side of the Model 14. They can be cabled directly to the following RS-232C ports:

- The system board serial port
- Either port of the Dual Async Adapter
- Any of the RS-232C ports of an 8-Port RS-232C Adapter (512KB)
- The four RS-232C ports of an 8-Port RS-232C/RS422A Adapter (512KB).

These work stations may be located up to 15.2 meters (50 feet) away and appear to System/370 programs in the 9371 as IBM 3278-2 or 3278-5 terminals.

IBM 3151 display stations can also be connected up to 1219 meters (4000 feet) away if they are attached to:

- The four RS-422A ports of the 8-Port RS-232C/RS-422A Adapter (512KB)
- Any port of the 8-Port RS-422A Adapter (512KB).

The *Cartridge for Expansion* feature must be installed in the 3151 if you want to:

- Connect it to an RS-422A interface
- Emulate a 3278-5 terminal
- Attach a printer to its auxiliary port.

For more information, refer to *IBM 3151 ASCII Display Station, Reference Manual*, GA18-2634.

The optional S/370 processor console or the Virtual Console keyboard and display can also be used as a work station by S/370 application programs when they are not performing system software or support processor functions. The keyboard and display are attached directly to ports at the rear of the system unit. They are also treated by the software as an IBM 3278-2 terminal.

Note: The EBASE subset of the Write Structured Field (WSF) command is supported for both 3151 and processor console 3270 sessions. Some 3278

other devices used to produce graphic designs. For more information on 5080 graphics planning see the *IBM 5080 Graphics System Site Planning and Installation Guide*, GA23-0135. One 5080 Graphics Adapter can be installed on the S/370 side of the Model 14. This feature is not allowed on the PS/2 side.

Attaching Local 3270-Type Terminals

The 3270 Adapter (Feature 6120) allows you to attach *local* 3270-type terminals, printers, and personal computers to the 9371 system. This adapter functions like the IBM 3174-61R Subsystem Control Unit, but is integrated onto a single card that can be placed in the system unit. This adapter can support "down stream load" devices and has three coaxial connector ports that let you directly attach devices up to 1500 meters (4920 feet) away. With IBM 3299 Multiplexers attached to its ports, this adapter can support up to 24 devices at twice the distance from the system unit. See Table 4-4, Table 4-5, and Table 4-6 in Chapter 4 and the *3270 Information Display System* publications for more information on attachable devices and site planning. One of these adapters is allowed on the S/370 side of the Model 14. This feature is not supported on the PS/2 side of the Model 14.

Other useful information about planning for 3270-type work stations is available in:

- *Enterprise System/9370, Work Station Subsystem, Planning Guide*, GA24-4244
- *Enterprise System/9370, Work Station Subsystem, Utilities Guide*, GA24-4044.

Chapter 4 describes methods for *remotely* attaching members of the 3270 family of products through the telecommunications subsystem using external control units. As you will see, the IBM 3174-91R Subsystem Control Unit is especially well suited for attaching small clusters of 3270-type terminals to the S/370 side of the system. When used with the IBM 3299 Terminal Multiplexer, it allows you to control up to eight 3270-type display stations, printers, or personal computers from a single adapter port. An IBM 3174-61R control unit can be attached in the same manner, but can accommodate up to sixteen terminals using one or two 3299 multiplexers. These control units connect to adapters on the S/370 side of the 9371 Model 14 with cables, modems, and phone lines and can be controlled in the same manner as they are by the integrated communication adapters (ICAs) of other IBM systems.

IBM 3270-type displays, printers and personal computers can also communicate with the 9371 Model 14 through the IBM Token Ring subsystem and other control units, like the IBM 3174-63R, that have token ring attachment capability. For details on the IBM family of terminals and control units, see *IBM 3270 Information Display System, Introduction*, GA27-2739. Detailed information on attaching 3270-type terminals to the system is presented in Chapter 4, *Planning Your Communications*.

Selecting Local Work Stations

Your IBM marketing representative can help you select the local work stations and devices you need and help you complete the planning forms. Table 3-1 and Table 3-2 list IBM terminals and printers that can attach locally to the work station subsystem.

Displays

<i>Table 3-1. Local Terminals</i>	
Product Number and Model	Product Name
3151 Models 310 and 410	Display Station
S/370 Processor Console	Display Station
IBM 3270-type	Displays

Printers

<i>Table 3-2. Locally-Attached Printers</i>	
Product Number and Model	Product Name
4201, 4202, 4207, 4208	Proprinters
4224	Dot Matrix Printer
4234	Dot Band Printer
5204	Quickwriter*
4019	LaserPrinter
3825, 3827, 3835	Pageprinters
6262 Model 14, 22	Line Printer
IBM 3270-type	Printers

Diagramming a Configuration

While planning your local work stations, *draw a diagram* to show how they will be attached. It will help organize your thinking, will give you a place to record your decisions, and will serve as a reminder for planning yet to be done. You can include such things as:

- Work station types and physical locations
- System/370 device address of each
- System unit adapter slot and port used for attachment
- Connecting cable part number, length, and identification
- Device data rates for performance evaluations.

This information will be useful later when ordering, installing, maintaining, or updating your system and should be kept in the planning binder.

Note: I/O devices are normally configured with default System/370 addresses unless you specify otherwise. If you want specific addresses assigned to any devices, your IBM service representative can override the default addresses for you during installation, or you can do it yourself later.

Filling in Forms B and C

After you select your local work station devices and decide how you want them connected, you can determine the number of work station subsystem *adapters* that you need. Appendix B shows the locations and priorities for installing adapters in the 9371 Model 14. Remember that there are maximums for each adapter type and rules to which your configuration must conform for best system performance.

record the appropriate information in the *Loc*, *Addr*, and *Port* spaces in the *Multiplexer* block.

Device Block

The *Device* block allows you to record specific information about the device you are planning to attach to the port.

Type: Usually an IBM type number and the kind of device (printer, display, personal computer) for which you are planning.

Loc: Record the location of the office or function in which the device can be found.

Addr: Every device attached to a S/370 system must have its own distinctive address that is different from all others in the configuration. This must match the address or be within the range you entered in the *S/370 Processor* block. You may specify a particular address if it is required by a special program or configuration, or you may accept the system assigned address by entering *default*. You can enter the system-assigned address in the block after the configuration program has chosen one for you.

Speed: This is a measure of the data transfer rate expressed in bits per second. Some devices have selectable speeds while others have fixed rates. See the planning literature for the respective device to be sure. You can specify a speed or accept the default speed that will be assigned, depending on device type, during installation. In any case, the total of speeds for all devices attached to all ports of an adapter should not exceed the maximum aggregate speed defined for that type of adapter.

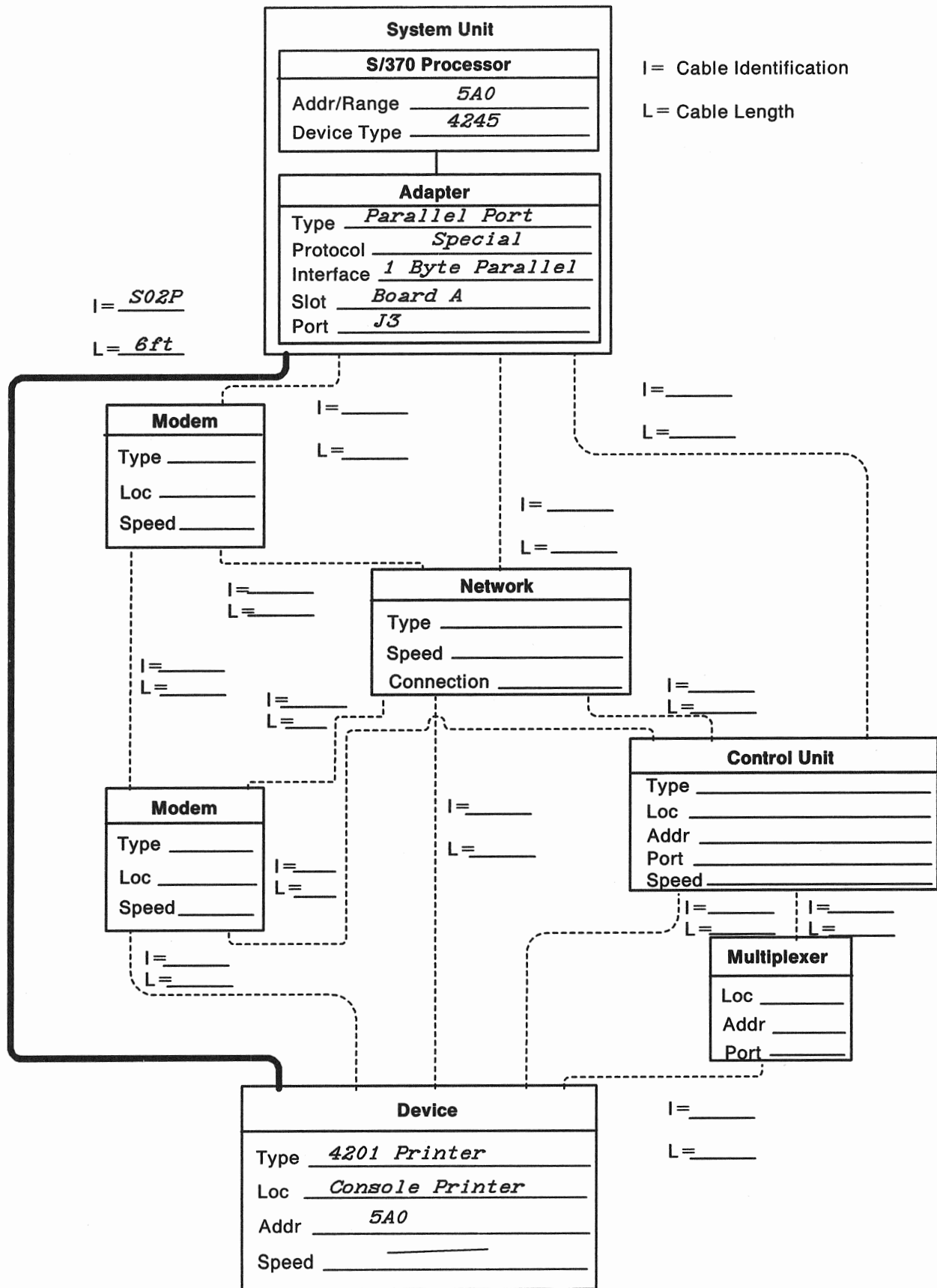


Figure 3-2. Parallel Printer Configuration Example

Remember to complete a separate Form D for each local work station. Store these forms in your planning binder so that they will be available for further planning or updates.

Important. Your IBM marketing representative will need copies of all your Form Ds to properly verify and order your system. Your IBM service representative will also need copies to properly install and configure your system.

This completes the tasks necessary for planning your local work station networks. Continue with one of the following:

- Chapter 4, "Planning Your Communications," for planning communications subsystems.
- Chapter 5, "Preparing Your Physical Site," for planning your installation.

Chapter 4. Planning Your Communications

This chapter does not discuss planning for communications attachments to the PS/2 side of the 9371 Model 14. The PS/2 attachments are governed by Personal System/2 configuration rules and have a separate set of adapters and features. See your IBM marketing representative for more information on PS/2 planning.

Use this chapter when planning your System/370 communications subsystems. This involves remote work stations, local area networks, and public telephone lines for the purpose of sharing data and ideas with others. You should be familiar with data communication terminology before you begin planning your networks. The *Data Communications Concepts* manual, GC21-5169, provides you with an overview of the basic elements and terminology of data communications.

You will find information in this chapter that can help you select the proper adapters and define your communication networks. You should contact your local communication *common carrier* (the telephone company or public data network) to arrange to have communication lines installed.

While planning the communications subsystems, you will use one or more of the following planning forms:

- Processor Configuration (Form B)
- I/O Devices and Accessories (Form C)
- Device Configuration (Form D)
- Communication Line Information (Form F1, F2, F3, or F4)
- Modem Information (Form G).

Defining communications can be the most difficult task in planning for any modern information system. There are many decisions to be made and many details to consider. IBM will help to make the job as easy as possible. When filling in the planning forms, the instructions may ask for information that you are not sure of the first time through. In those cases, leave the spaces blank and come back to them later when you can complete them confidently. Your IBM marketing representative will help with any problems.

Consider the following *before* you select your equipment:

- Volume of interchanged data
- Type of application
- Specifications of the remote devices.

For a detailed description of the communications subsystems, refer to *Introducing the 9371 Model 14*, GA24-4257.

Communications Subsystems

In addition to the work station subsystem, which is used to control locally-attached I/O devices, there are three other types of communications subsystems available on the S/370 side of the 9371 Model 14.

- The *Telecommunications Subsystem* is used for communicating with remote terminals, controllers, and other processing systems over switched, nonswitched and X.25 packet-switching networks. If you are planning to use this subsystem, go to "Telecommunications Subsystem" on page 4-2.

- The *IBM Token-Ring Subsystem* is used for communicating with terminals using the IBM Token-Ring network. If you are planning to use this subsystem, go to "IBM Token-Ring Subsystem" on page 4-35.
- The *IEEE 802.3 Local Area Network Subsystem* is used for communicating with other systems, controllers, and work stations that use the *Carrier-Sense Multiple Access with Collision Detection* transmission control. If you are planning to use this subsystem, go to "IEEE 802.3 Local Area Network Subsystem" on page 4-38.

Telecommunications Subsystem

The telecommunications subsystem on the S/370 side of the 9371 Model 14 consists of:

- The integrated I/O processor
- The telecommunications subsystem microcode
- One or more of the following adapters:
 - System board serial port
 - Dual Async Adapter
 - 8-Port RS-232C Adapter (512KB)
 - 8-Port RS-232C/RS-422A Adapter (512KB)
 - 8-Port RS-422A Adapter (512KB)
 - High Performance SDLC Adapter
 - X.25/HDLC Packet Network Adapter
- Programmable communications capability
- A communication network and terminals.

When using this subsystem, the 9371 Model 14 can:

- Be a host to remote terminals or other systems
- Act as a terminal to a remote host system.

Although the S/370 telecommunications subsystem in the Model 14 provides functions similar to the integrated communication adapters of the IBM 4331/4361 processors and the telecommunication subsystems of other ES/9370s, there is *no support* for:

- IBM Terminal Control Type 1
- Dynamic Trace Feature
- Link Problem Determination Aid (LPDA) channel commands.

Also, the following TTC2 functions are not supported for the serial port and the Dual Async Adapter:

- DF Pad character
- Delay Select option
- Break Signal Duration Timing
- Auto-Dial.

These restrictions do not apply to TTC2 protocol for any of the 8-Port Adapters. For more information, see the *9371 Telecommunications Subsystem Description and Reference*, SA24-4199.

The 9371 Model 14 as a Host System

As a System/370 host system, the 9371 Model 14 can communicate with remote terminals, controllers, or systems. When your system communicates with remote terminals, it treats them as if they were directly attached to the system unit. The only difference is that you must first establish the communication path before the system can access the device.

The 9371 Model 14 as a Remote System

The 9371 Model 14 can communicate as a remote terminal to another ES/370 host system. Normally, the host system dictates many of the variables for communication planning, such as line type, line speed, modem type, and protocol. Consequently, before you begin planning, contact the host system personnel to determine their requirements relative to your system.

The I/O Processor and Microcode

The I/O Processor is an integral part of every 9371 Model 14 and does not have to be ordered separately. When driven by the telecommunication subsystem microcode, it controls the transfer of data between the main storage and the communication networks through the various adapters. The telecommunications subsystem shares the I/O Processor with the work station subsystem and the support subsystem.

A complete set of telecommunication subsystem microcode also resides on the S/370 side of the 9371 Model 14 and does not have to be ordered separately or customized by the user. It works with IBM hardware to develop all the supported communication protocols.

Telecommunication Subsystem Adapters

Telecommunication adapters are discussed in *Introducing the 9371 Model 14*, GA24-4257. Some of these adapters listed for the telecommunications subsystem are the same as those listed for the work station subsystem; others are used for telecommunications only. Telecommunications adapters may be shared with the workstation subsystem, but are also subject to the slot priorities and performance restrictions listed in Appendix B. See "Maximum Number of Optional Features for the S/370 Side" on page 2-5 for the maximum number of each adapter type permitted on the S/370 side of the 9371 Model 14.

Adapter location diagrams in Appendix B designate slots where the various adapters can be plugged and assign priorities for filling those slots. The list of configuration rules published in the same appendix presents conventions for selecting combinations of adapters and line speeds to give the best system performance. These are the same rules your IBM representative will use to verify your system configuration before ordering it. You can save time in the ordering process if you carefully follow these rules during your planning activities. Make sure that you fully understand the rules before continuing to plan your communications.

The actual number of adapters required is often determined by the telecommunications subsystem aggregate line speed. As discussed in the local work station planning section, the 8-Port Adapters have limited total data rates. The bps contributors for communication lines are equal to the baud rates. The data rates for I/O devices are included in their planning manuals. The bps contributors from all attached devices and lines must be totaled for each adapter to ensure that its maximum limit is not exceeded. Your IBM Marketing representative can work

with you to make sure you do not exceed the capability specified for the system and its adapters. See Appendix B for more information.

Remote Facilities Adapter

Even though it does not strictly belong to the telecommunications subsystem, the Remote Facilities Adapter provides a single port with a 25-pin, standard D-shell connector that can be used in the 9371 Model 14 for communicating with other systems. One of these adapters is supplied with each system for remote support functions only. This adapter cannot be used for controlling work stations or any purpose other than supporting the Remote Facilities Option.

- Protocol:
 - Synchronous Data Link Control (SDLC) using the Two-Way-Simultaneous Mode.
- Interface:
 - EIA RS-232C/CCITT V.24.
- Speed:
 - 2,400 bps.

Serial Port

The serial port provides one standard D-shell, 25-pin, connector to support one serial asynchronous attachment. There are two serial ports available on the Model 14; one on the S/370 side and one on the PS/2 side. Only the serial port on the S/370 side supports S/370 communications.

The serial port supports:

- Protocol:
 - US Telegraph Terminal Control – Type 2 (TTC2/ASYNC).
- Interface:
 - EIA RS-232C/CCITT V.24.
- Speeds:
 - 600 to 9,600 bps for work stations
 - 600 to 9,600 bps for ASYNC communications.

The RS-232C interface on the serial port allows you to directly attach work stations at a maximum distance of 15.2 meters (50 feet). Modems may also be connected for ASYNC (TTC2) communications.

Dual Async Adapter (Feature 6010)

The Dual Async Adapter provides two serial asynchronous ports, each having a standard D-shell, 9-pin connector. Either port can be independently configured for line speed. When connecting device cables with 25-pin connectors, a 9-to-25-pin converter cable (Feature 3056) is required (one for each port used). When this adapter is used with the telecommunications subsystem, it supports:

- Protocol:
 - US Telegraph Terminal Control – Type 2 (TTC2/ASYNC).
- Interface:
 - EIA RS-232C/CCITT V.24.

- Speeds:
 - 600 to 9,600 bps for work stations
 - 600 to 9,600 bps for ASYNC communications.

The RS-232C interface on the Dual Async Adapter allows you to directly attach work stations at a maximum distance of 15.2 meters (50 feet). Modems may also be connected for ASYNC (TTC2) communications.

8-Port RS-232C Adapter (512KB) (Feature 6022)

This multiport adapter and its breakout cable provide eight serial ports. Six ports can supply asynchronous (TTC2/ASYNC) protocol only. The other two can be programmed for synchronous (BSC or SDLC, but not both on the same adapter) or asynchronous protocols. All eight ports supply the RS-232C electrical interface. Each port has a standard D-shell, 25-pin connector.

- Protocols:
 - TTC2, Ports 0 through 7
 - BSC, Ports 0 and 1; **or**
 - SDLC, Ports 0 and 1.
- Interface:
 - EIA RS-232C/CCITT V.24, Ports 0 through 7.
- Speeds:
 - 600 to 19,200 bps for asynchronous work stations
 - 600 to 19,200 bps for ASYNC communications
 - 600 to 19,200 bps for BSC communications
 - 600 to 19,200 bps for SDLC communications.

Each port is independently capable of the maximum 19,200 bps data rate, but when more than one port is used, there are limits on the *cumulative data rate* as specified in Appendix B. Attachments with the highest data rates must be connected to the lowest-numbered ports.

The RS-232C interfaces on this adapter allow you to directly attach work stations at a maximum distance of 15.2 meters (50 feet). Modems may also be connected for ASYNC, BSC, or SDLC communications.

8-Port RS-232C/RS-422A Adapter (512KB) (Feature 6024)

This multiport adapter and its breakout cable provide eight serial ports. Six ports can supply asynchronous (TTC2) protocol only. The other two can be programmed for synchronous (BSC or SDLC, but not both on the same adapter) or asynchronous protocols. Four of the ports supply the RS-232C electrical interface and the other four ports supply the RS-422A interface.

- Protocols:
 - TTC2, Ports 0 through 7
 - BSC, Ports 0 and 1; **or**
 - SDLC, Ports 0 and 1.
- Interfaces:
 - EIA RS-232C/CCITT V.24, Ports 0 through 3
 - EIA RS-422A, Ports 4 through 7.

Programmable Communications Capability

Any of the 8-port adapters can be programmed for nonstandard protocols and various combinations of physical interfaces. This is an "open" interface that you can use to connect your own communication lines to the S/370 side of the 9371 Model 14. IBM will supply you with programming information that allows you to use either the RS-232C or RS-422A interface to control these lines with your own protocol. These programs can then be accessed by S/370 Serial OEMI Access Method macros. Each of the eight ports is separately programmable.

Features 6022, 6024, and 6026 all have 512KB of on-card storage for your communication control programs. If your programs require more space, you may order the following adapter features which have 1MB of storage:

- Feature 7022, 8-Port RS-232C Adapter (1MB)
- Feature 7024, 8-Port RS-232C/RS-422A Adapter (1MB)
- Feature 7026, 8-Port RS-422A Adapter (1MB).

When used this way, the cumulative data rate restrictions for 8-port adapters depend on the new application.

Remote Devices

Table 4-1, Table 4-2, and Table 4-3 show work stations, controllers, and systems that you can use for communications with the S/370 side of the 9371 Model 14. The tables also show the protocol supported on each device. Your IBM marketing representative can provide further information on these and many other devices that do not appear in these tables.

<i>Table 4-1. Remote Work Stations</i>		
Product Type	Product Name	Protocol Supported
3101	Display Terminal	TTC2
3812	Page Printer	BSC
3820	Page Printer	SDLC
5150	Personal Computer	TTC2, BSC, SDLC
5160	Personal Computer XT*	TTC2, BSC, SDLC
5170	Personal Computer AT*	TTC2, BSC, SDLC
85XX	Personal System/2	TTC2, BSC, SDLC
6670	Page Printer	BSC, SDLC
8775	Display Terminal	SDLC
8815	Scan Master I	SDLC

<i>Table 4-2 (Page 1 of 2). Remote Controllers</i>		
Product Type	Product Name	Protocol Supported
3174	Terminal Control Unit	BSC, SDLC
3274	Terminal Control Unit	BSC, SDLC
3276	Terminal Control Unit	BSC, SDLC

Table 4-2 (Page 2 of 2). Remote Controllers

Product Type	Product Name	Protocol Supported
3704	Communication Controller	BSC
3705	Communication Controller	BSC, SDLC
3725	Communication Controller	BSC, SDLC
7426	Terminal Interface Unit	SDLC

Table 4-3. Remote Systems

Product Type	Product Name	Protocol Supported
4331	Processor	BSC, SDLC
4361	Processor	BSC, SDLC
495X	Series/1	BSC
5340	System/34	BSC, SDLC
536X	System/36	BSC, SDLC
538X	System/38	BSC, SDLC
81XX	Processor	BSC, SDLC
937X	Processor	BSC, SDLC

Attaching Remote Devices to Telecommunication Subsystem Adapters

There are several ways you can physically connect remote devices (or other systems) to the S/370 side of the 9371 Model 14 through its telecommunication subsystem adapters:

- Directly, with a cable (or modem eliminator)
- Through a pair of modems with a cable between them
- Through a pair of modems with a communication network between them
- Through a subsystem control unit (with or without a multiplexer)
- Through the combination of modems, a network, and a control unit.

In all cases, the protocol used by the device must match the protocol supplied by the telecommunications subsystem adapter, and the data rate required by the device must not exceed the capability (line speed) of the adapter.

Modems used to attach asynchronous terminals and printers to RS-232C interfaces must be set up for auto-answer before using.

Remember also that you must comply with the configuration rules listed in Appendix B of this book.

Publications for the devices you wish to attach will list their protocols, line speeds, electrical interfaces, software requirements, cable connections, and any restrictions that apply. Consult your IBM marketing representative for the latest list of devices that are supported on the 9371 Model 14, and for documentation describing those devices.

Appendix A of this book has information regarding the types and part numbers of cables you can order to connect your Model 14 to the various networks.

Using the IBM 3174-61R Subsystem Control Unit: For larger clusters of 3270-type devices, you may consider using the IBM 3174-61R. The -61R can, with the help of 3299 multiplexers, attach up to sixteen terminals to a single port.

Selecting Remote Work Stations

Your IBM marketing representative can help you select the work stations and devices you need and help you complete the planning forms.

Table 4-4, Table 4-5, and Table 4-6 show some common IBM terminals and printers that attach to the 9371 through the telecommunication subsystem and 3174-91R or -61R control units.

Note: The I/O devices mentioned here serve only as an example. They do not represent all of the devices that can attach to the system. See your IBM marketing representative for additional information on these and other products that can attach to the S/370 side of the 9371 Model 14 through the telecommunications subsystem.

Displays

Product Number and Model	Product Name
3178 Models C1, C2, C3 and C4	Display Station
3179 Model 1	Color Display Station
3180-1	Display Station
3191 Models A1X, A2X, B1X, and B2X	Display Station
3194 Models H20 and H50	Display Terminal
3278 Models 2, 3, 4 and 5	Display Station
3279 Models S2A, S2B, S3G, 2X and 3X	Color Display Station
5578	Japanese Work Station

Note: The IBM 3174-91R does not support downstream load (DSL) terminals.

Personal Computers (with 3278/3279 Emulator Feature 5050)

You can use the 3278/3279 Emulator Feature to use the following personal computers as S/370 work stations.

Table 4-5. Personal Computers Attached Through the 3174-91R

Product Number and Model	Product Name
5271	3270 PC
5273	3270 PC/AT*
5371	3270-PC/G and GX
5373	3270-PC AT/G*, AT/GX*
5150	Personal Computer
5160 Models 068, 078, 086, 087, 088, 089, 267, 268, and 277	Personal Computer XT
5170 Models 068, 099, 239, 319, and 339	Personal Computer AT
5170 Models 599, 739, 919, and 939	Personal Computer AT/370*
6150 Models 20, 25, and A25	RT Personal Computer*
6151 Model 10	RT Personal Computer
8530 Model 021	Personal System/2 Mod 30
8550 Model 021	Personal System/2 Mod 50
8560 Models 041 and 071	Personal System/2 Mod 60
8580 Models 041 and 071	Personal System/2 Mod 80

Printers

Table 4-6. 3270-Type Printers Attached Through the 3174-91R

Product Number and Model	Product Name
3262 Models 3 and 13	Line Printer
3268 Models 2 and 2C	Color Matrix Printer
3287 Models 1 and 2	Matrix Printer
3287 Models 1C and 2C	Color Matrix Printer
4214 Model 1	Line Printer
4224 Models 201, 202, 2E2, and 2C2	Line Printer
4234 Model 1	Dot Band Printer
4245 Models D12 and D20	Line Printer
4250 Model 1	High resolution nonimpact printer
5210 Models G1 and G2	Correspondence Quality Printer
5227 Model 11	Printer

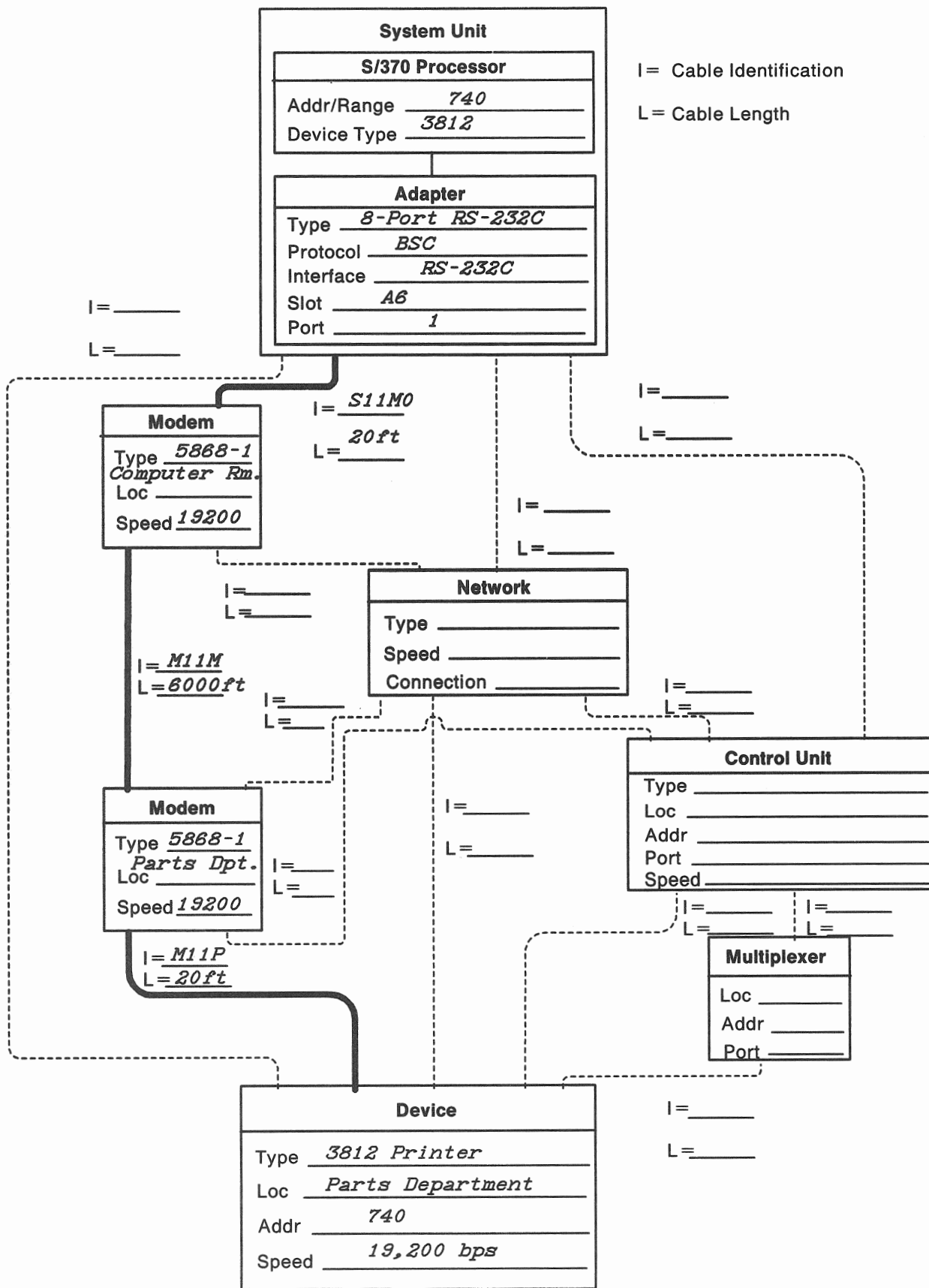


Figure 4-2. Remote Printer Configuration Example

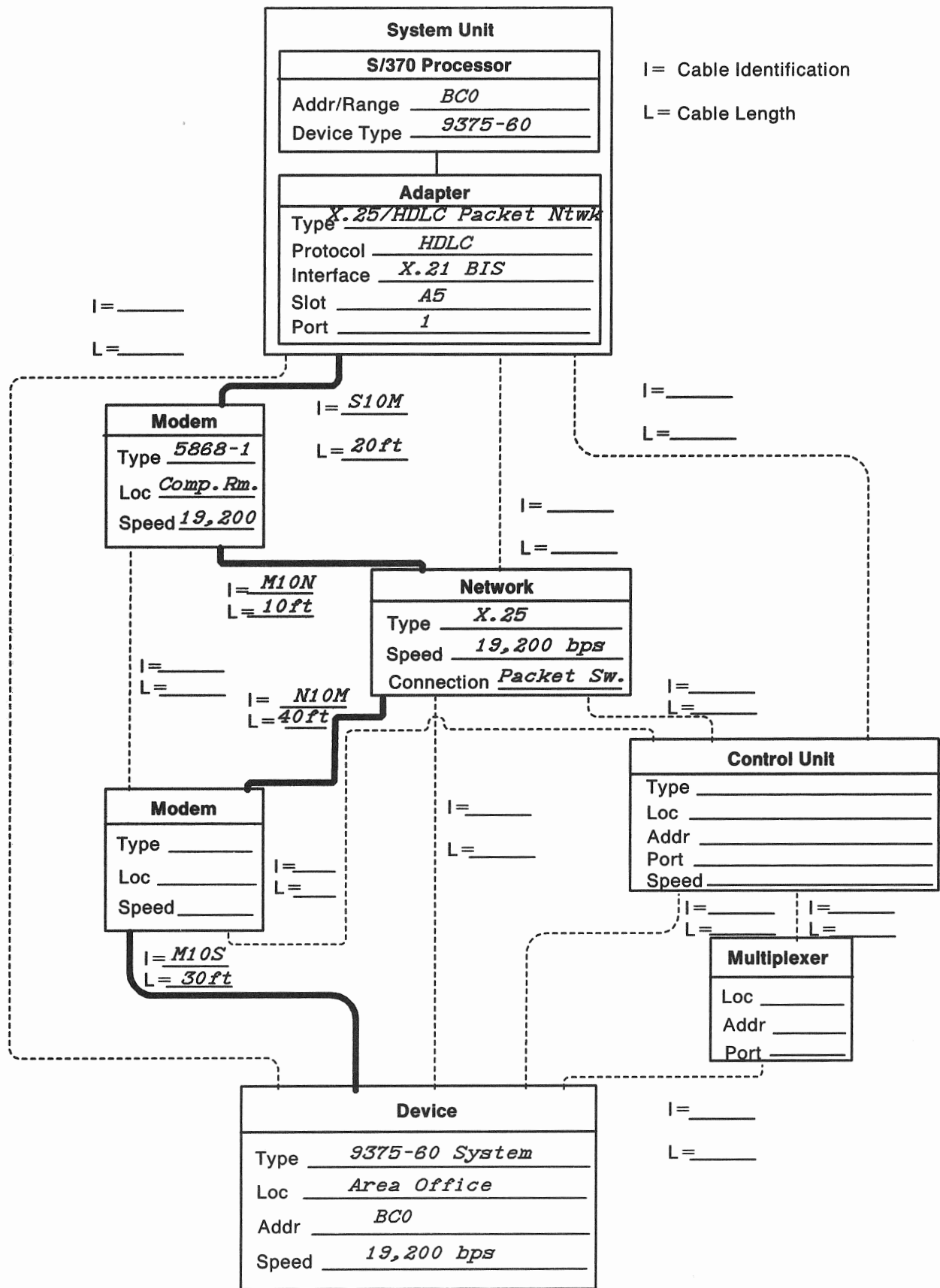


Figure 4-3. Remote System Network Configuration Example

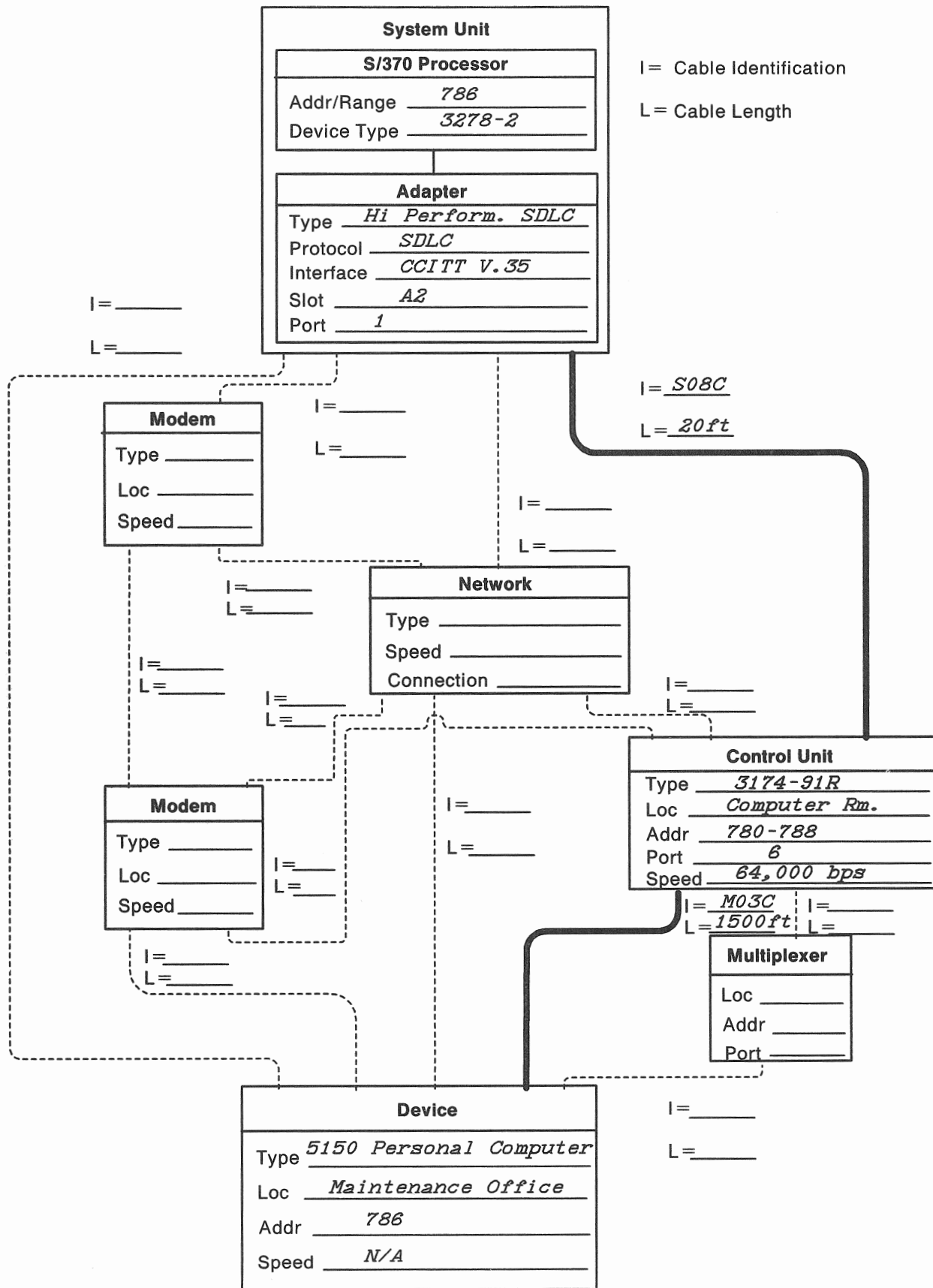


Figure 4-4. Device-Control Unit Configuration Example

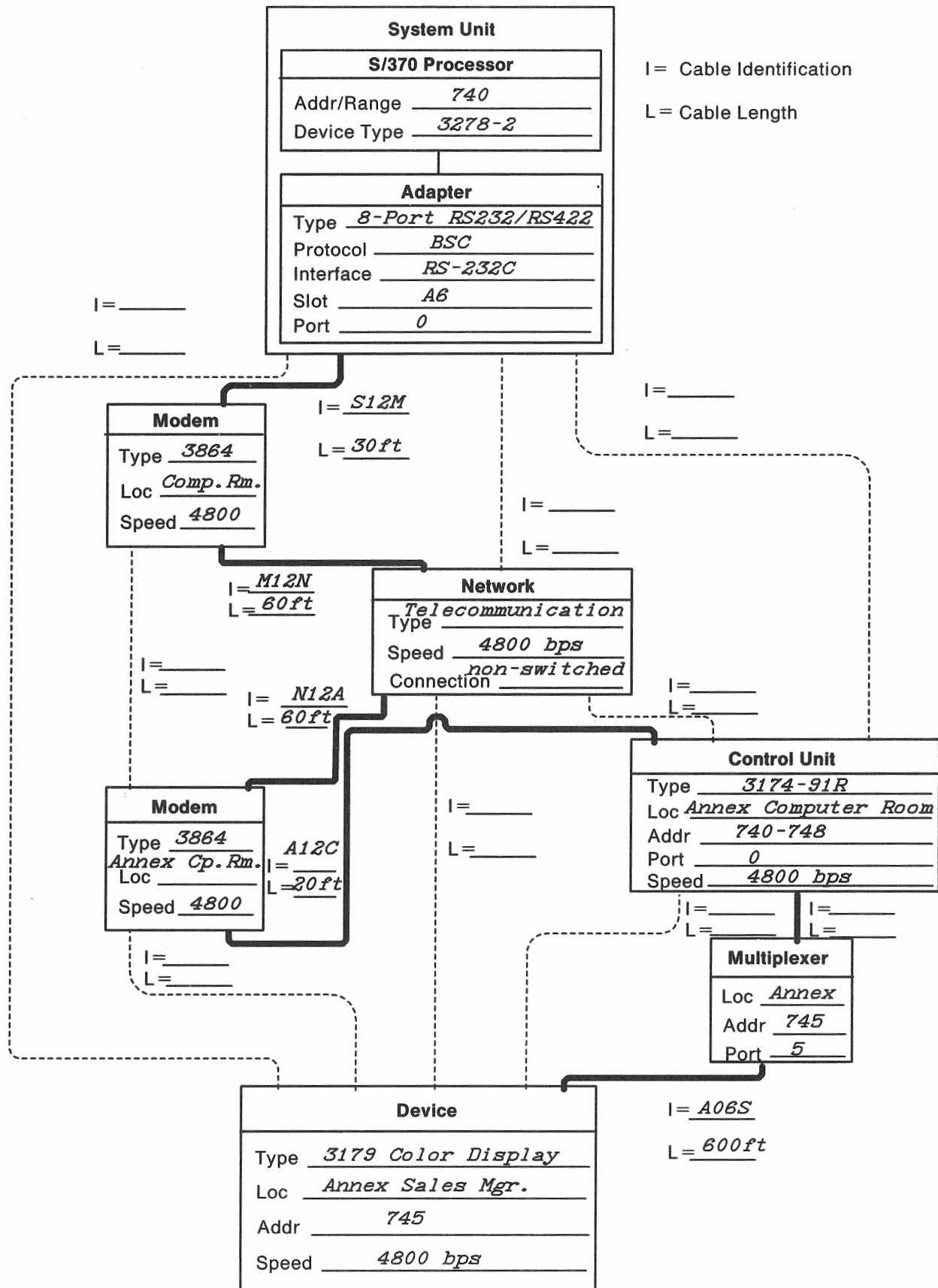


Figure 4-5. Remote Control Unit Configuration Example

S/370 Processor and Adapter Blocks

Enter the required information in the *System Unit — S/370 Processor and Adapter* blocks just as you did for local work stations. If necessary, refer back to Chapter 3 for instructions on filling these blocks.

Modem Blocks

If you are using *modems*, they must always be used in pairs, one on the system unit side and the other on the device side of the configuration. Modems may be used in combination with a telecommunication network, or may be directly connected with a cable between them. Enter the following information in the *Modem* blocks on Form D.

Type: Either an IBM or other manufacturer's type number and model number (such as IBM 5811-10).

Loc: The physical location (room or area) where you can find the modem.

Speed: Data rate, in bits per second, at which the modem operates.

Network Block

If you are planning to use a *telecommunication network* in the path to the device, fill in the dotted lines to and from the *Network* block to show the physical connections. Write the required information in the block.

Type: Telecommunication and switched, nonswitched or X.25 packet switching.

Speed: The maximum rate, in bits per second, at which data can be transferred across the network.

Connection: The type of communication line connection you intend to use, (such as Switched with Auto-Call). A *Form F1, F2, F3, or F4*, depending on the protocol used, will also be required to further define each telecommunication network that you need. Instructions for filling out Form F follow later in this chapter.

Control Unit and Multiplexer Blocks

If you plan to use subsystem *control units* to attach clusters of IBM 3270-type devices to your system, the connection can be made directly (using a cable or modem eliminator), through a pair of modems with a cable between, or through a pair of modems with a telecommunications network between. Multiplexers can also be used to extend the control unit's capacity for attaching devices. Draw the lines to show the path through the *Control Unit* block (and *Multiplexer* block, if used) to the device you are attaching and fill in the required information.

Type: IBM control unit type and model number (such as 3174-91R).

Loc: The area at your site where the control unit or multiplexer will be placed.

Addr: The S/370 address range assigned to the control unit, or "default" if you want the system to assign addresses during installation.

Port: The physical connector on the control unit or multiplexer to which the device cable will be plugged.

Speed: The data rate, in bits per second, at which the control unit operates.

Cables

Do not forget to include cable *identifications* and *lengths*. These will be important to the system verification and installation tasks. When you have completed a separate Form D for every device or system that you want to attach remotely to the S/370 side of you 9371 Model 14, make copies of each for your IBM marketing representative and store the originals in the planning binder for safe keeping.

Blank cable labels will be included in the shipping carton with your new system. These will be used to mark cables from the I/O devices as they are installed. To avoid confusion, make sure that the identification placed on the cable labels matches what you indicated on your system planning diagrams and device configuration forms.

Defining a Network

Network Types

A data communications network consists of data processing devices connected by telecommunication lines for information exchange among stations. Every remotely-attached device, control unit, or system must have a network defined for it to spell out the protocol, interface, connection methodology, line speed, and any peculiarities that apply in each case. The telecommunications subsystem provides the following types of data communication networks:

- Switched
- Nonswitched
- X.25 packet switching.

Switched Networks

A switched network:

- Is always considered to be a point-to-point network
- Is connected to the communication line by dialing
- Can use the auto-call feature to perform automatic dialing
- Can use auto-answer to automatically answer incoming calls.

Nonswitched Networks

A nonswitched network:

- Is permanently connected to the communication line
- Can be either a 2-wire or a 4-wire connection
- Can be conditioned to reduce transmission errors and increase transmission speed
- Is a point-to-point network when only two stations are connected to the communication line
- Is a multipoint network when three or more stations connect to the same communication line.

In a multipoint network, the host system is normally the primary or control station and the remote stations are the secondary or tributary stations.

TTC2 Interface, Line Connection, and Line Speed

Listed below are the valid combinations of interface, line connections, and line speeds that you can use with TTC2. The type of *interface* and *line connection* has a *digit* shown in parentheses () next to it. Enter these *digits* in the space provided on Form F1.

- Using RS232 (4):
 - Switched (6)
 - Directly attached system-to-work station without clock (7)
 - Nonswitched (9).
- Using RS422 (5):
 - Directly attached system-to-system without clock (6)
 - Directly attached system-to-work station without clock (7)
 - IBM Cabling System; either system-to-system or system-to-work station without clock (9).
- Using V.24 (6):
 - Switched (6)
 - Nonswitched (9).

Select the *Line Speed* by entering the appropriate digit as follows:

- 4 for 600 bps
- 5 for 1,200 bps
- 6 for 2,400 bps
- 7 for 4,800 bps*
- 8 for 9,600 bps*
- 9 for 19,200 bps*.

** Line speeds of 4,800, 9,600, and 19,200 are recommended to only be used with directly attached system-to-work station or system-to-system line connections that have the 'permanent request to send' parameter specified in the line configuration.*

At the bottom of the form, fill in the system unit, board, card, and jack locations for each line connection.

The following TTC2 functions are not supported for the serial port and the Dual Async Adapter:

- DF Pad character
- Delay Select option
- Break Signal Duration Timing
- Auto Dial.

These restrictions do not apply to TTC2 protocol for any of the 8-Port Adapters. For more information, see *Telecommunications Subsystem Description and Reference*, SA24-4199.

If you are using any other lines with TTC2 protocol, go back to "TTC2 Interface, Line Connection, and Line Speed."

If you want to order any communication lines using BSC, SDLC, or HDLC, go to "Defining a Network" on page 4-21.

Otherwise, continue with "Communication Line Customization" on page 4-27.

BSC Interface, Line Connection, and Line Speed

Listed below are the valid combinations of interface, line connections, and line speeds that you can use with BSC. The type of *interface* and *line connection* has a *digit* shown in parentheses () next to it. Enter these *digits* in the space provided on Form F2.

- Using RS232 (4):
 - Switched (6)
 - Nonswitched (9).
- Using V.24 (6):
 - Switched (6)
 - Nonswitched (9).

Select the *Line Speed* by entering the appropriate digit as follows:

- Using RS232 or V.24:
 - 0 for 600 bps
 - 1 for 1,200 bps
 - 2 for 2,400 bps
 - 3 for 4,800 bps
 - 4 for 9,600 bps
 - 5 for 14,400 bps
 - 6 for 19,200 bps.

At the bottom of the form, fill in the system unit, board, card, and jack locations for each line connection.

If you are using any other lines with BSC protocol, go back to "BSC Interface, Line Connection, and Line Speed."

If you want to order any communication lines using TTC2, SDLC, or HDLC, go to "Defining a Network" on page 4-21.

Otherwise, continue with "Communication Line Customization" on page 4-27.

SDLC Interface, Line Connection, and Line Speed

Enter either a six for SDLC without NRZI (non-return-to-zero inverted) or a seven for SDLC with NRZI next to *protocol* on Form F3.

Listed below are the valid combinations of interface, line connections, and line speeds that you can use with SDLC. The type of *interface* and *line connection* has a *digit* shown in parentheses () next to it. Enter these *digits* in the space provided on Form F3.

- Using RS232 (4):
 - Switched (6)
 - Nonswitched (9).
- Using V.24 (6):
 - Switched (6)
 - Nonswitched (9).

from an IBM World Trade country. For those countries that cannot use the IBM modem, a Request for Price Quote must be used to remove the modem from the order. You can order additional modems from IBM, the communication common carrier [telephone company or PTT (Post Telephone and Telegraph Administration)], or a modem supplier.

Note: The modem must provide for turnaround delay, except when 'permanent request to send' is specified on a four-wire nonswitched network.

Turnaround Delay

Turnaround delay is the time required to reverse the direction of transmission from send to receive or receive to send. Time is required for line propagations, line distortions, modem timing, and the terminal equipment reaction time.

The required turnaround delay is dependent on the line speed. The actual delay must be equal to or greater than the duration of three characters. The delay time in milliseconds for each data rate is shown in the following table:

Line Speed (bps)	Turnaround Delay (milliseconds)
600	40.0
1200	20.0
2400	10.0
4800	5.0
9600	2.5
14400	1.7
19200	1.3

IBM Modems

Although one modem may be included with the Remote Facilities option, it cannot be used for other purposes, and you may wish to order more. See Table 4-9 for some of the IBM external modems that you can use with the communication adapters. Contact your IBM marketing representative for information on other IBM modems that do not appear in this table.

Type	Model	Maximum Speed (bps)	Network Type	Modem Enclosure
3863	1	2,400	Nonswitched	None
	2	2,400	Switched	None
3864	1	4,800	Nonswitched	None
	2	4,800	Switched	None
3865	1	9,600	Nonswitched	None
	2	9,600	Multipoint	None
3868	1	2,400	Nonswitched	3866
	2	4,800	Nonswitched	3866
	3	9,600	Nonswitched	3866
	4	9,600	Nonswitched	3866

Table 4-9 (Page 2 of 2). IBM External Modems

Type	Model	Maximum Speed (bps)	Network Type	Modem Enclosure
5811	10	9,600	Limited distance	None
	18	14,400	Limited distance	5810
5853	—	2,400	Switched	None
5865	—	9,600	Nonswitched	None
5866	—	14,400	Nonswitched	None
5868	51	9,600	Nonswitched	3866
	61	19,200	Nonswitched	3866

PTT Mandatory Modems

The communication adapters support attachment of PTT (Post Telephone and Telegraph Administration) mandatory modems meeting International Organization Standardization 2111 (1979) and one of the following CCITT recommendations (1976):

- Switched network:
 - V.23: up to 600/1200 bps
 - V.25: all modems
 - V.26 BIS: 1200/2400 bps
 - V.27 TER: 2400/4800 bps.
- Nonswitched network:
 - V.23: up to 600/1200 bps
 - V.26: 1200/2400 bps
 - V.27: 4800 bps
 - V.27 BIS: 2400/4800 bps
 - V.29: 4800/7200/9200 bps.

Modem Options

You will need to know several options about each modem before you can order one. Make copies of Form G, *Modem Information*, from the one in Appendix C. Use a separate copy of Form G for each communication line requiring modems. Form G has two parts. The first part, on the front of the form, is for the local modem; the second part, on the back of the form, is for the remote location(s).

Note: While planning for modems and communication equipment, Forms F1, F2, F3, and F4 will be referred to as Form F only.

Fill in the following information on Form G:

- *Customer Name*
- *Customer Number*
- *Communication Line Identification* (this should be the same line identification you used on Form F).

Fill in the *Location(s) and Phone Number(s)* of both the local and remote modem(s), [items 1 for the local modem and 22 for the remote modem(s)].

- *Modem Manufacturer:* (items 13 and 34 on Form G)
- *Modem Type and Model:* (items 14 and 35 on Form G)
- If no external coupler is required, ask for the following information and record it on Form G:
 - *FCC Registration Number:* (United States only, items 15 and 36)
 - *Ringer Equivalence Number:* (switched lines only, items 16 and 37).

If external couplers are required, go to "Ordering External Couplers."

If no couplers are required, continue with "Ordering Communication Lines from the Common Carrier" on page 4-33 to order your communication lines.

Ordering External Couplers

Call the coupler supplier and order the required couplers for all communication lines. Record the following information for each line on Form G:

- *Manufacturer's Name:* (items 18 and 39)
- *Coupler Type:* (items 19 and 40)
- *FCC Registration Number:* (United States only, items 20 and 41)
- *Ringer Equivalence Number:* (switched lines only, items 21 and 42).

Go to "Ordering Communication Lines from the Common Carrier" on page 4-33 to order your communication lines.

Ordering Modems and Lines from a Common Carrier

Call the common carrier and specify the following from Form F:

- *Interface:*
- *Line Connection:* (for nonswitched lines also specify 2 or 4-wire)
- *Line Speed:*
- *Homologation Number:* (except US and Canada, Form F —this number can be obtained from the IBM marketing representative).

Also specify the following from Form G:

- *Modem Options:* (items 2 through 12 and 23 through 33).

If you are planning another type of network and interface, see Table 4-11 for your next step. Otherwise, continue with "Communication Adapter Cables" on page 4-40 for information on adapter cables.

<i>Table 4-11 (Page 1 of 2). Type of Network and Interface Determines Your Next Step</i>	
Network and Interface	Continue With
Switched and nonswitched networks using RS232/V.24 interface	"Selecting Modems" on page 4-27
All networks using X.21 interface	"Ordering Data Circuit-Terminating Equipment for CCITT X.21" on page 4-34

<i>Table 4-11 (Page 2 of 2). Type of Network and Interface Determines Your Next Step</i>	
Network and Interface	Continue With
Direct attachment system-to-system or system-to-work station using RS232 or RS422 interface	"Communication Adapter Cables" on page 4-40

Ordering Communication Lines from the Common Carrier

Call the common carrier and order the lines by specifying the following from Form F:

- *Line Connection:* (for nonswitched lines also specify 2 or 4-wire)
- *Line Speed:*
- *Line Termination Requirements:*
- *Line Conditioning:* (for nonswitched lines only)
- *Telephone Set Options* (for switched lines only).

Also specify the following information from Form F or G:

- *FCC Registration Number:* (United States only, Form G—items 15 and 36 or 20 and 41)
- *Ringer Equivalence Number:* (for switched lines only, Form G—items 16 and 37 or 21 and 42)
- *Homologation Number:* (for countries other than the United States or Canada, Form G—items 17 and 38, or form F).

Note: If you do not have the homologation number, contact your IBM marketing representative for it.

If you are planning another type of network and interface, see Table 4-12 for your next step. Otherwise, continue with "Communication Adapter Cables" on page 4-40 for information on adapter cables.

<i>Table 4-12. Type of Network and Interface Determines Your Next Step</i>	
Network and Interface	Continue With
Switched and nonswitched networks using RS232/V.24 interface	"Selecting Modems" on page 4-27
All networks using X.21 interface	"Ordering Data Circuit-Terminating Equipment for CCITT X.21" on page 4-34
Direct attachment system-to-system or system-to-work station using RS232 or RS422 interface	"Communication Adapter Cables" on page 4-40

Filling in Form D

In a manner similar to what you did for *local* attachments, you must complete a separate Form D, *Configuration*, for each token ring network that you plan to attach to your system. This information will also be used to order your system, and to pass any special configuration requirements to the person who installs the devices.

Make copies of Form D from the one in Appendix C and fill in your *Customer Name* and *Customer Number*. The following example of completed a Form D shows the connection you can make to a token ring. The devices, control units, and systems with which you wish to communicate must of course also have IBM Token Ring attachment capability and the necessary software support.

Fill in the dotted lines to show the path from the network to the token-ring adapter in the system unit. Write in the *identifier* ($I = _$) and *length* ($L = _$) of the cable you have defined. See Appendix A for cable specifications and length limitations.

S/370 Processor and Adapter Blocks

Enter the required information in the *System Unit — S/370 Processor and Adapter* blocks as follows:

Addr/Range: 300-30B (default).

Device Type: Token Ring.

Network Block

Write the required information in the *Network* block.

Type: IBM Token Ring.

Speed: The maximum rate, in bits per second, at which data can be transferred across the network; either 4,000,000 bps or 16,000,000 bps.

Connection: Leave blank.

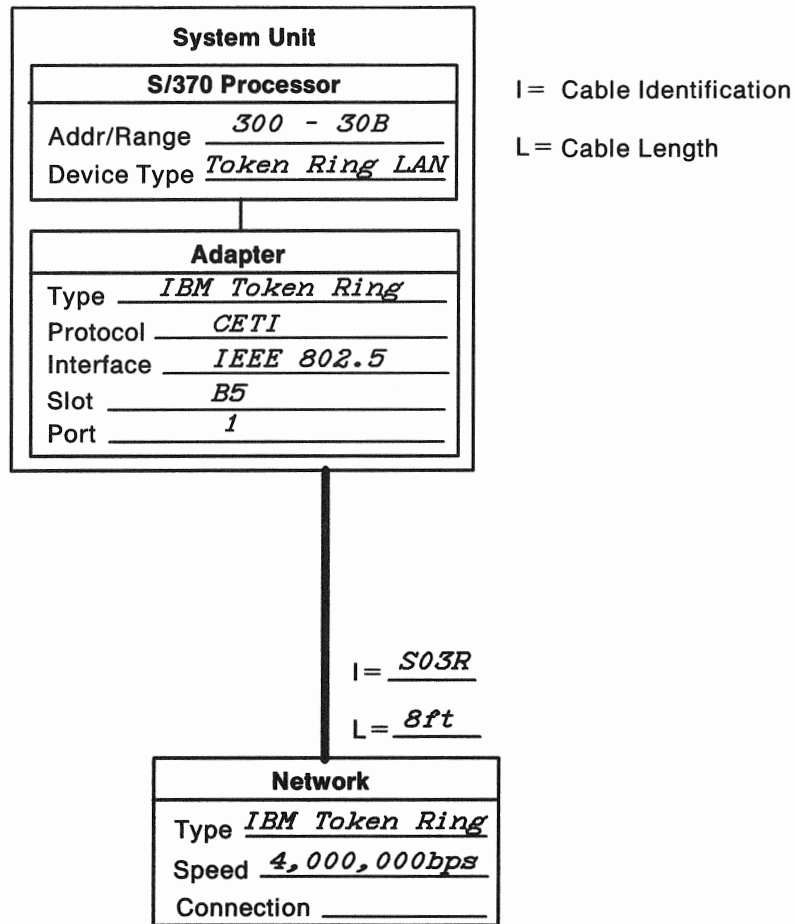


Figure 4-6. Token-Ring Configuration Example

Cables

Do not forget to include cable *identifications* and *lengths*. These will be important for the system verification and installation tasks. A 2.94-meter (8-foot) cable is available (Feature 6040) for attaching to the IBM Cabling System. When you have completed a separate Form D for each IBM Token-Ring network, make copies of each for your IBM marketing representative and store the originals in the planning binder for safe keeping.

For additional information on the IBM Cabling System, which supports IBM Token-Ring networks, refer to the following:

- *IBM Cabling System Planning and Installation Guide*, GA27-3361
- *Using the IBM Cabling System with Communication Products*, GA27-3620
- *A Building Planning Guide for Communication Wiring*, G320-8059.

Information on customization and using the token-ring network will be provided in the *Configuring Your System* section of *9371 System Programmer's Reference*, SA24-4141. This is one of the manuals shipped with every system.

Continue with "Communication Adapter Cables" on page 4-40.

Network Block

Write the required information in the *Network* block.

Type: IEEE 802.3 LAN.

Speed: The maximum rate, in bits per second, at which data can be transferred across the network.

Connection: Leave blank.

Cables

Do not forget to include cable *identifications* and *lengths*. These will be important to the system verification and installation tasks. When you have completed a separate Form D for each IEEE 802.3 local-area network, make copies of each for your IBM marketing representative and store the originals in the planning binder for safe keeping.

The external LAN hardware consists of multi-wire cables, terminators, transceivers, repeaters, and coaxial cables. **Only version 2 transceivers are supported.** This external equipment is not available from IBM and must be purchased from other manufacturers.

Continue with Communication Adapter Cables.

Communication Adapter Cables

The type of cable you use determines the interface for the communication line. Changing the interface or line connection may require using a different communication adapter cable. Each communication adapter cable is wired for a specific interface and line connection. You can order cables from IBM or build your own.

Refer to *Appendix A, "External Attachment Cables"* for information on the communication cables. A table there lists existing types of cables for attaching various devices and communication lines to the 9371 Model 14. Cable part numbers for IBM's standard lengths and ordering codes are listed. If you have special cable-length requirements, or prefer to purchase your cables elsewhere, the information necessary for assembling cables is also provided in Appendix A.

All communication adapter cables must be located within a building. They cannot be used outside or between buildings.

The following items on Forms F1, F2, F3, and F4 cannot be completed until the communication networks are installed:

- Cable part number
- Adapter card location and cable connector.

If you want to plan another type of communication subsystem:

- Go back to “Telecommunications Subsystem” on page 4-2 for planning a telecommunications subsystem.
- Go back to “IBM Token-Ring Subsystem” on page 4-35 for planning an IBM Token-Ring subsystem.
- Go back to “IEEE 802.3 Local Area Network Subsystem” on page 4-38 for planning an IEEE 802.3 Local Area Network subsystem.

This completes the tasks necessary for planning and selecting the equipment for the communications subsystems. Continue with:

- Chapter 5, “Preparing Your Physical Site,” for planning your installation.

Chapter 5. Preparing Your Physical Site

Whether you put the 9371 Model 14 in a raised-floor or office environment, you will need to plan for such things as electrical power, and system unit and remote facility considerations. You must also supply a flat table or desk top for the processor console keyboard and display. If you are planning to use the remote support facilities, you must supply connections for the modem as explained in Chapter 2, Remote Facilities.

Physical planning requirements for other external I/O devices (other than the keyboard, display, and modem) are *not* included in this book. Those devices (printers, displays, control units, personal computers, graphics systems) have their own planning publications.

Cables for the external I/O devices (other than the keyboard, display, and modem) are *not* delivered with the system. You must order them separately or build them yourself in compliance with the directions presented in Appendix A of this book.

Note: Cabling for Electronic Computers/ Data Processing Equipment is addressed by NEC article 645, or other National Codes.

Where IBM system cables leave the confines of the computer room, they may have to be installed in approved raceways or conduit, per local authority and/ or requirements of applicable articles of National Codes.

All other low voltage cable used for communication or signal transmission (voice/data) outside the computer room or area may have to be installed in compliance with the local authority, and requirements of applicable articles of National Codes.

Electrical Power

Primary Computer Power Service

For maximum reliability, the computer power panel should connect to feeders *that do not serve other loads*. Connect electrical noise-producing devices, such as accounting equipment, card punches, typewriters, and calculators to panels separate from those feeding the computer units. (See Figure 5-1 on page 5-2)

The branch circuit panel for the computer should be in a convenient, well-lighted area of the computer room. Protect the individual branch circuits on the panel with circuit breakers properly rated according to the manufacturer's specifications and applicable codes. Label each circuit breaker to identify the branch circuit it controls. The grounding wire of the branch circuit must be equal to or larger in size than the neutral and phase conductors.

Terminate the receptacle/connector as close as possible to the unit they supply—within three meters (10 feet). Run branch circuits in either rigid or nonrigid metallic conduit (or in compliance with local or national standards). The conduit system should be continuous, uninterrupted, and connected to the building or transformer ground.

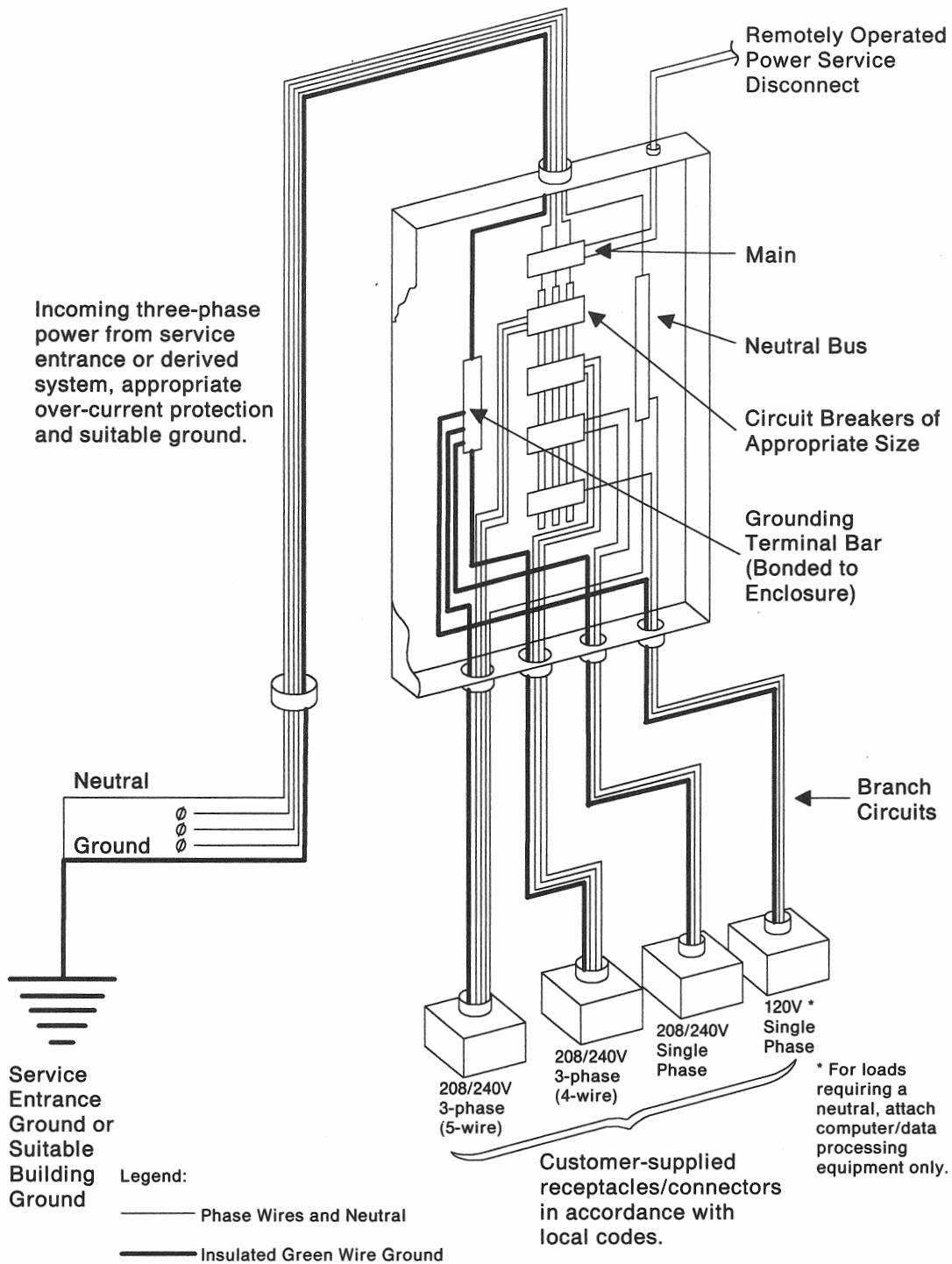


Figure 5-1. Power Distribution Systems

Grounding

All system components must be properly grounded. It is required that an insulated green wire ground, the same size as the phase wire, be installed between the branch circuit panel and the receptacle. For some small components such as terminals, a continuous metallic conduit is adequate for grounding.

To ensure proper grounding, a licensed electrician should check the grounding and receptacles for conformance with the electrical codes. For personnel safety, the ground must have sufficiently low impedance to limit the voltage to ground and to operate the circuit protective devices if a phase-to-frame short occurs. For example, the ground path must not exceed one ohm for 120-volt, 20-ampere branch circuit devices.

Computer Room Emergency Power-Off Controls

As a safety precaution, provide room emergency power-off controls for disconnecting the *main service wiring* that supplies the computer equipment. Install these controls at a convenient place for the operator and next to the main exit doors of the room. Follow national and local electrical codes.

Acoustics (Noise-Emission Levels)

Acoustical data is intended to answer requests for information and is for consultants and planners requiring the data to help predict the levels of acoustical noise. The format in which the data is presented conforms to the standard used by the computer industry. The measurement procedures used to acquire the data conform to American National Standard S12.10-1985 and International Standard 7779 and reported in conformance with ISO DIS 7574/4. The following terms are used to present acoustical data in this manual.

- LwAd** is the declared sound power emission level for a production series of machines.
- LpAm** is the mean value of the A-weighted pressure levels at the operator position (if any) for the random sample of machines.
- <LpAm>** is the mean value of the space-averaged sound pressure emission levels at the one-meter positions for a production series of machines.
- N/A** Not Applicable (No operator position).

9371 Plan View (not to scale)

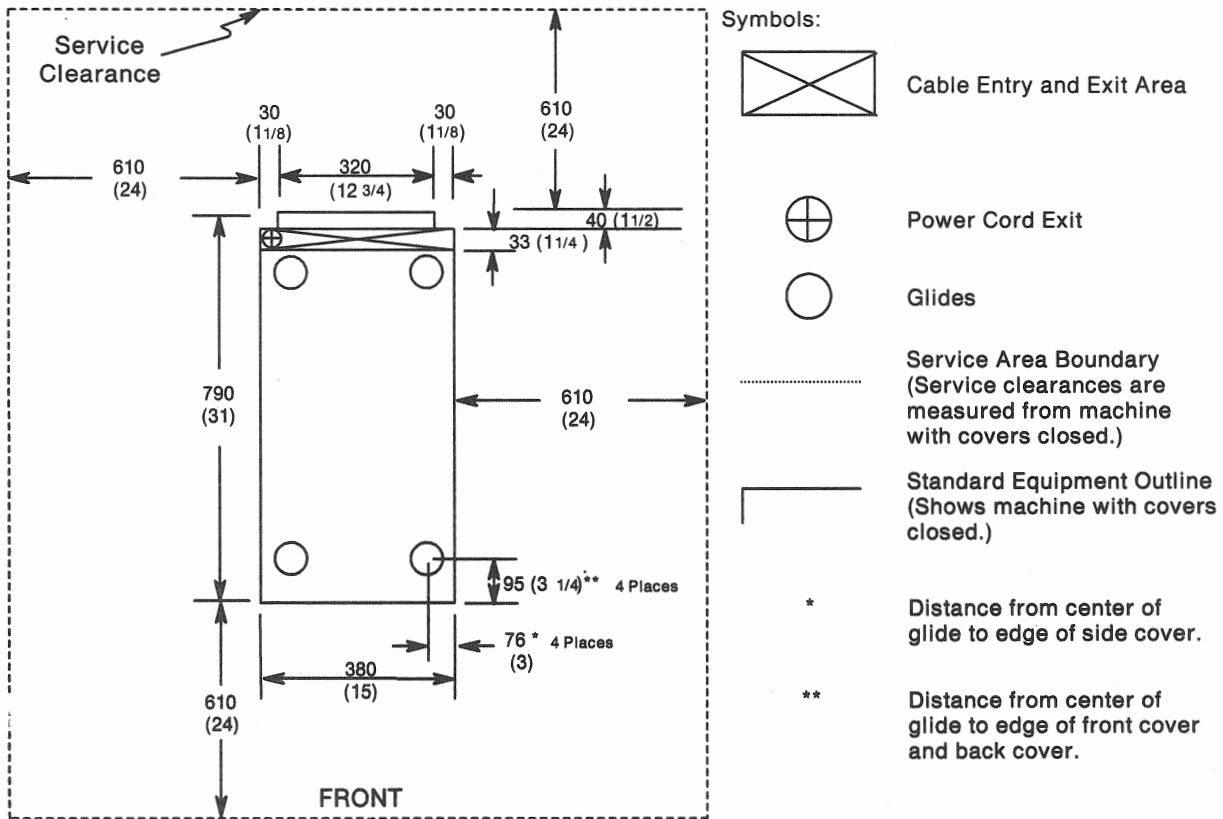


Figure 5-2. 9371 Plan View

Notes:

1. Dimension shown in millimeters with inches in parenthesis.
2. Location of glides measured from cover edge.
3. Glide edge even with frame edge.
4. Depth of glides from frame bottom to floor is 19 mm (3/4 inches).

9371 Operational Clearances (not to scale)

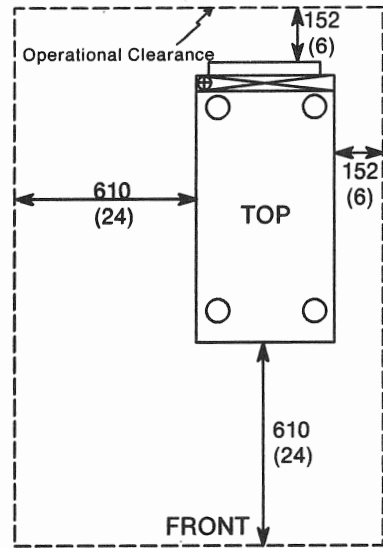


Figure 5-3. Single Unit Operational Clearance

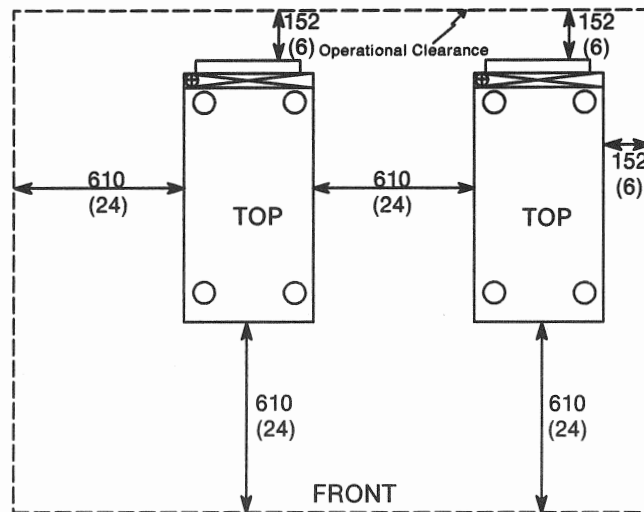
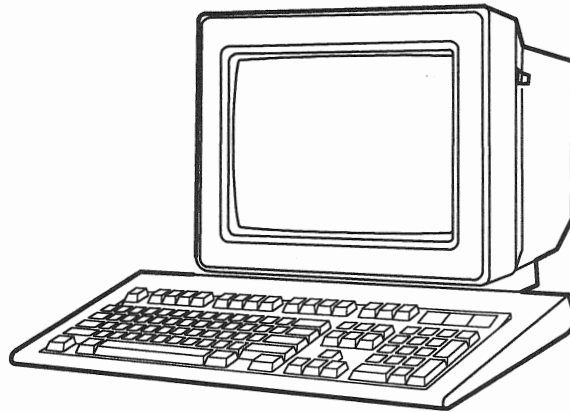


Figure 5-4. Multiple Unit Operational Clearance

Notes:

1. The recommended operational clearance dimensions allow unobstructed clearance on both sides of the machine for system airflow requirements.
2. The system air inlets at the lower left side and upper right side must be maintained within the System Environmental Specification of 16 to 32°C (60 to 90°F).
3. The system should not be placed under a table or other structure that would inhibit room or system exhaust air circulation.
4. Care should be taken so that heating, ventilating, and air conditioning ducts or exhaust from nearby equipment is not directed in a way that would cause the inlet air temperature to exceed the System Environmental Specification.

Processor Console



Dimensions:

Height: 277 mm (11 in.)
Width: 321 mm (12 7/8 in.)
Depth: 311 mm (12 3/8 in.)

Weight: 8.5 kg (18 1/2 lb.)

Heat Output: 55 W (188 BTU/HR)

Power: 0.088 kVA

Power Cord: 1.8 M (6 ft)

AC Voltage: 120 or 220 volts, single phase

Plug Type: NEMA 5-15P

Receptacle: NEMA 5-15R

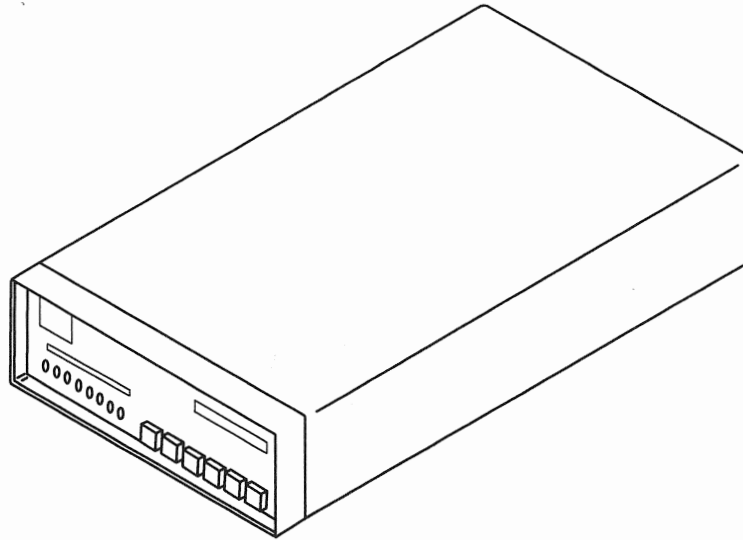
Noise Emission:

LwAd		<LpA>m	
Operating (bels)	Idling (bels)	Operating (dB)	Idling (dB)
<3.6	N/A	<29	N/A

Note: For definitions, see "Acoustics (Noise-Emission Levels)" on page 5-3.

Note: Flat desk top or table required.

5853 Modem

**Dimensions:**

Height: 64 mm (2 1/2 in.)
Width: 165 mm (6 1/2 in.)
Length: 280 mm (11 in.)

Weight:

2 kg (4 lbs.)

Heat Output:

100 W (341 BTU/HR)

Power: .020 kVA

Power Cord: 1.8 M (6 ft)

AC Voltage: 120 volts, single phase

Plug Type: NEMA 5-15P

Receptacle: NEMA 5-15R

Operating Environment:

Temperature 10 to 40.6°C (50 to 105.6°F)
Rel Humidity 8 to 80%
Max Wet Bulb 26.7°C (80°F)

Nonoperating Environment:

Temperature 10–51.7°C (50–125°F)
Rel Humidity 8–80%
Max Wet Bulb 26.7°C (80°F)

Noise Emission:

LwAd		<LpAm>	
Operating (bels)	Idling (bels)	Operating (dB)	Idling (dB)
<3.6	N/A	<29	N/A

Note: For definitions, see “Acoustics (Noise-Emission Levels)” on page 5-3.

The following figure shows the plugs and receptacles for these countries. Refer to this figure to make sure you have the proper receptacle(s) installed in your computer area.





Plug	Receptacle/ Connector	Type	Specify Code
		Russell and Stoll Waterproof Plug, Receptacle/Connector 120V/20A	9988 or 9990
		NEMA Plug/Receptacle 120V/15A	Default

Figure 5-6. US, Canada, AG and APG Plugs and Receptacles

EMEA

For EMEA (Europe/Middle East/Africa) countries, IBM supplies the power cord with an attached plug that corresponds to the power-outlet receptacle most used in that country. Refer to the following illustration to make sure you have the proper receptacle(s) installed in your computer area. To find the plugs and receptacles/connectors you need for your country, match the listing of countries on this page with the letter of the illustrations in Figure 5-7 on page 5-16.

Table 5-4. EMEA. Cross-reference list for EMEA countries and power plugs.

Country	Plug ID	Country	Plug ID
Algeria	A	Malawi	B
Andorra	A	Maliuras	A
Angola	A	Malta	B
Austria	A	Mauritania	A
Bahrain	B	Mauritius	A
Belgium	A	Monaco	A
Benin Republic	A	Morocco	A
Bulgaria	A	Mozambique	A
Cameroon	A	Netherlands	A
Central Africa Rep.	A	New Caledonia	A
Chad	A	Niger	A
Chile	F	Norway	A
Channel Islands	B	Oman	B
Congo	A	Pakistan	C
Cyprus	B	Poland	A
Czechoslovakia	A	Portugal	A
Denmark	G	Qatar	B
Egypt	A	Romania	A
Ethiopia	F	Senegal	A
Finland	A	Siera Leone	B
France	A	Somalia	B
Germany	A	South Africa	C
Ghana	B	Spain	A
Guinea	A	Sudan	A
Greece	A	Sweden	A
Hungary	A	Switzerland	E
Iceland	A	S.A.R. (Southeast Asia Region)	B
Indonesia	A	Tanzania	B
Iran	A	Togo	A
Ireland	B	Tunisia	A
Israel	D	Turkey	A
Italy	F	Uganda	B
Ivory Coast	A	United Arab Emirates	B
Jordan	B	United Kingdom	B
Kenya	B	Upper Volta	A
Kuwait	B	USSR	A
Lebanon	A	Yemen	B
Libya	B	Yugoslavia	A
Liechtenstein	E	Zaire	A
Luxembourg	A	Zambia	B
Malagasy	A	Zimbabwe	A

Cable Schematic

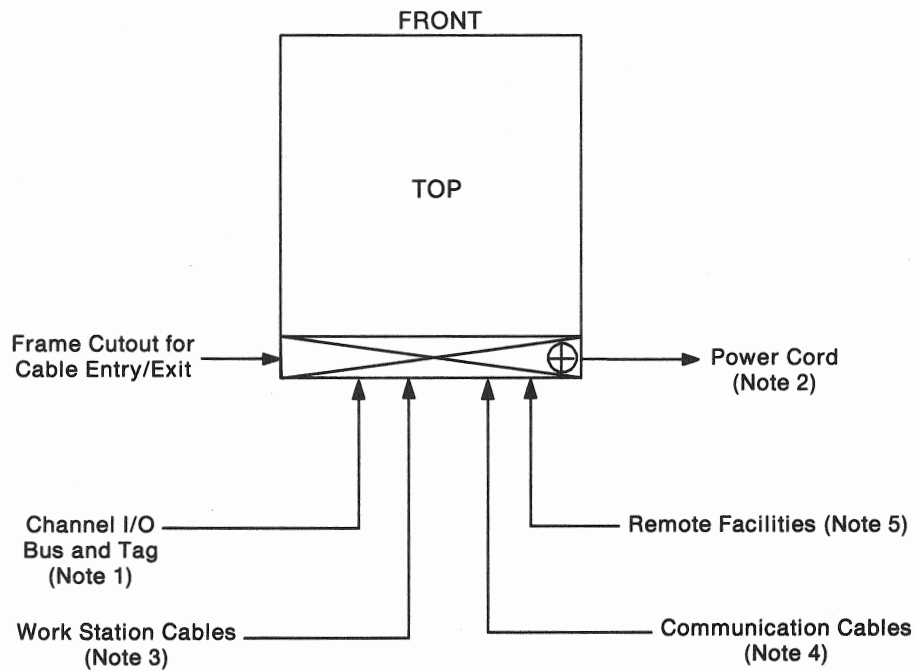


Figure 5-8. Cable Schematic

Notes:

1. The High Speed Printer Adapter feature supports the 3825, 3827, 3835, 6262-014, and 6262-022 Printers. Leave the "TO" side of the cable order sheet blank or enter "OEM" when ordering bus and tag cables from the printer to the 9371. The power sequence and control cable (Group Number 1178) cannot be used with a 9371. The printer must be powered on and off in local mode. For more information concerning channel cabling refer to:

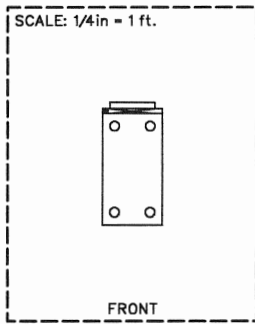
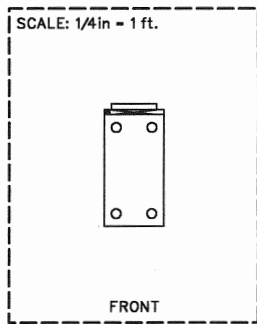
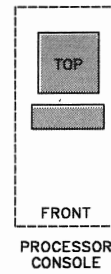
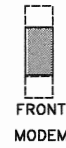
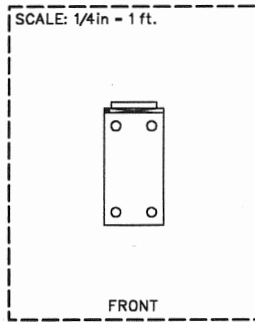
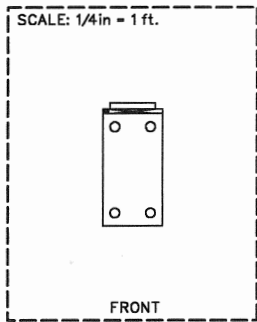
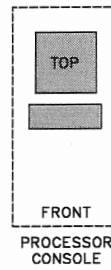
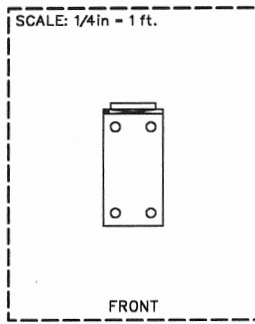
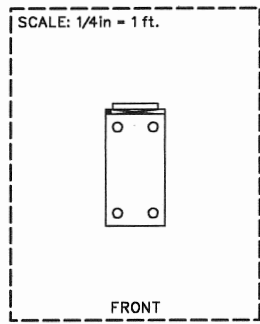
- The device specification pages of *IBM Sys/360, Sys/370, 4300 Processors I/O Equipment Installation Manual – Physical Planning*, GC22-7064, and
- *General Information Manual, IM-PP*, GA24-4032.

The High Speed Printer Adapter feature contains:

- A single adapter card
 - A 3 meter (10 ft) cable set
 - S/370 bus and tag terminators.
2. IBM supplies a power cord with attached plug. You must supply the matching receptacle/connector.
 3. See Chapter 3, "Planning Your Local Work Stations" on page 3-1 for information on Feature 7060.
 4. See Chapter 4, "Planning Your Communications" on page 4-1 for more information.
 5. See "Remote Facilities" in this chapter and "Remote Facilities" on page 2-10.

Physical Planning Templates

English Units



- SCALE: 1/4 in = 1 ft
- Glide
 - ⊕ Power Cord Exit
 - ⊠ Cable Exit Area

Figure 5-9. 9371 Physical Planning Template (English)

Remote Facility Considerations

The Remote Facilities are optional on the 9371. In the event the system malfunctions, the Remote Service facility allows fast maintenance response. The Remote Operation facility allows you to control the processor at a remote location.

The Remote Facilities provide the following functions:

- *Remote Operation* allows you to control multiple systems from a central site.
- *Electronic Services Call Placement* with automatic receipt of microcode fixes, if the 9371 has an IBM warranty or maintenance agreement.
- *Remote Service* allows service representatives to control and analyze the system from a remote location.

The connection to the 9371 is through the support processor function with a synchronous communication data link. All systems have a Remote Facilities Adapter. IBM provides two different Processor Console Modems. The 9371 uses the 5853 Modem in the USA and Canada. An equivalent Modem is used in IBM World Trade countries where it is approved by the national communications authority. Both modem types have the capability of auto-dial and auto-answer at a line speed of 2400 bits per second (bps).

General Information

Standards for telephone networks vary from country to country. The information in this chapter is of a general and fundamental nature. Contact your local IBM representative concerning the regulations in your country.

Protection of the switched line telephone network is required in most countries. Protective circuits are contained in the IBM processor console modems, eliminating the need for a separate coupler.

Operation of telephones and modems on public switched line telephone network need registration by the operator of the network (telephone company).

Equipment connected to a public telephone network must be approved by the national communications authority. In the USA the regulation by the Federal Communications Commission (FCC), Part 68, Rules and Regulations (July 1979) apply. In other World Trade countries similar regulations have to be obeyed. The communications authorities provide the approval numbers for the equipment when it is manufactured. The IBM Processor Console Modems are approved in many countries.

The auto-dial feature can be disabled for those countries which the network operator (telephone company) does not allow auto-dialing. In this case, installation of a telephone set is required. The telephone set is optional where the auto-dial feature is allowed.

Note: The Federal Republic of Germany always requires a telephone set. In some World Trade countries (Korea, Australia, and New Zealand), IBM does not provide a modem. If a modem is used, it must be provided by the user.

Communication Facilities

The Processor Console Modems provided by IBM are capable of a transmission speed of 2400 bps, auto-dialing, and auto-answering. They also include protective coupler circuits.

- In the USA and Canada, obtain a dedicated analog switched network line that terminates at an RJ11 data jack (four-position modular jack). In World Trade countries a similar receptacle may be required according to the modem cable connector and local regulations.
- The data jack/receptacle should be within 4.5 meters (15 feet) of the modem for the USA and Canada. IBM provides a 4.5 meter (15 foot) cable for use between the modem and the switch line data jack, see Figure 5-11 on page 5-24. For other World Trade countries, the data jack/receptacle should be within 7.5 meters (24 feet), see Figure 5-12 on page 5-25.
- If the processor console auto-dial function is disabled, you must provide a normal telephone with a modular plug that is compatible with the telephone line service (pulse or tone dialing). The telephone is optional if auto-dial is enabled.
- Register the modem and telephone with the network operator (telephone company). The FCC registration number and ringer equivalency number (REN), provided on the equipment, is needed in the USA. For other countries, the respective approval number of the local communications authority is required.

Requirements

The IBM Processor Console Modems are registered with the FCC in the USA, the Department of Communications (DOC) in Canada and with the communication authorities in many other countries. Your IBM modem has the approval number for your country. When you register the modem and the telephone with the network operator (telephone company) the following information may be required:

- Device name and model number
- Communication authority approval number (FCC registration in the USA)
- Ringer equivalency number (REN).

A fixed-length cable is shipped with the Remote Facilities feature to connect the modem, see Figure 5-11 on page 5-24 and Figure 5-12 on page 5-25. For convenience, install the remote facility telephone handset next to the processor console keyboard and display.

The following restriction applies in countries where the IBM Modem is used:

- Connection of the IBM Modem through any Private Branch Exchange (PBX) is not supported. Such an operation is under customer responsibility.

Communication Facility Requirements

Line Type: Dedicated analog switched network line (may be Touch-Tone** or rotary dial).

Line Speed : 2400 bps.

Line Termination: For USA and Canada RJ11 modular jack, for other World Trade countries receptacle suitable for the modem cable connector and in accordance with local regulations.

Registration information: FCC (USA) or equivalent World Trade country communications authority approval number, and ringer equivalency number (REN).

Telephone handset: Only needed if auto-dial feature is disabled, otherwise it is optional. It can be Touch-Tone or rotary dial, depending on line type. Required in the Federal Republic of Germany.

Telephone connector: For USA and Canada RJ11 modular jack; for World Trade countries similar connector or direct connection, depending on local regulation.

Modem: In countries where the IBM Modem is not approved by the national communications authority a modem is needed which is in accordance with CCITT standards V.22 and V.22 bis. Auto-dial requires V.25 bis with V.22 or V.22 bis.

Hardware Requirements of the Stand-Alone Processor Console

Any of the following configurations can be used as a stand-alone console:

- PS/2 Models 30 (version 021) and 30 – 286 (version E21)
 - DOS 3.3 or higher
 - Storage
 - 640KB (KB equals 1024 bytes) for version 021
 - 512KB for version E21
 - Fixed disk, 20MB (MB equals 1,048,576 bytes)
 - 3.5-inch diskette drive
 - Monochrome display IBM 8503
 - SDLC adapter card P/N 1501205 (P/N 11F0567 for autodial)
 - Communications adapter cable P/N 1502067
 - External modem compatible with the ES/9370 installed modem
 - IBM 5842 modem (or equivalent) for nonautodial
 - IBM 5853 modem (or equivalent) for autodial
- PS/2 Models 50Z – 031 and 50Z – 061
 - DOS 3.3 or higher
 - 1MB storage
 - Fixed disk
 - 30MB for 50Z – 031
 - 60MB for 50Z – 061
 - 3.5-inch diskette drive
 - Monochrome display IBM 8503
 - Multiprotocol adapter (MPA) card P/N 6451003 (P/N 33F6719 for autodial)
 - Communications adapter cable P/N 1502067
 - External modem compatible with the ES/9370 installed modem

** Touch-Tone is a trademark of American Telephone and Telegraph Company.

- IBM 5842 modem (or equivalent) for nonautodial
- IBM 5853 modem (or equivalent) for autodial
- PS/2 Model 70 – E61 and Models 80 – 041 and 80 – 071
 - DOS 3.3 or higher
 - 1MB storage
 - Fixed disk
 - 60MB for 70 – E61
 - 44MB for 80 – 041
 - 70MB for 80 – 071
 - 3.5-inch diskette drive
 - Monochrome display IBM 8503
 - Multiprotocol adapter (MPA) card P/N 6451003 (P/N 33F6719 for autodial)
 - Communications adapter cable P/N 1502067
 - External modem compatible with the ES/9370 installed modem
 - IBM 5842 modem (or equivalent) for nonautodial
 - IBM 5853 modem (or equivalent) for autodial
- Personal Computer AT Model 339
 - DOS 3.3 or higher
 - 512KB storage
 - Fixed disk (20 or 30MB)
 - 5.25-inch diskette drive for 1.2MB diskettes
 - Monochrome display
 - SDLC adapter card P/N 1501205 (P/N 11F0567 for autodial)
 - Communications adapter cable P/N 1502067
 - External modem compatible with the ES/9370 installed modem
 - IBM 5842 modem (or equivalent) for nonautodial
 - IBM 5853 modem (or equivalent) for autodial.

Reference Documentation

- *9371 Remote Facilities: Operation and Problem Analysis*, SA24-4169
- *9371 Work Station Subsystem Description and Reference*, SA24-4156
- *Operating the 9371 System*, SA24-4140.



Chapter 6. Ordering and Installing the System

The previous chapters have guided you on planning and selecting the hardware devices and features that will comprise your system. This chapter provides you with necessary information for ordering and installing your system.

Preparing to Order the System

Your IBM marketing representative will need copies of the following planning forms to check the results of your planning, to properly configure the features, and to order the system. The forms needed (if applicable) are:

- Form B, *Processor Configuration*, which includes:
 - Nomenclature
 - Power Requirements
 - Main Storage
 - I/O Adapters.
- Form C, *I/O Devices and Accessories*, the following must be included:
 - DASD and Tape Units
 - Work stations (displays, printers, plotters, personal computers)
 - 5080 Graphics Systems
 - 3174 Subsystem Control Units
 - 3299 Multiplexers
 - Communication devices (modems, terminals, control units)
 - Cables and other accessories.
- Form D, *Device Configuration*; one for each device.
- Form F1, F2, F3, and F4, *Communication Line Information*.
- Form G, *Modem Information*.

This information will be used by your IBM marketing representative to determine the total minimum system hardware to satisfy your requirements. If, for future expansion, you have described a special configuration that requires more than the minimum hardware, your representative can verify that no configuration rules are violated. Some modifications of the planned configuration may be necessary at this time. Working with the representative, you may decide to alter the system configuration for even better performance or expandability.

After your IBM marketing representative has verified your order, you will then know the exact quantity, type, and placement of adapters within the system unit. You can also know the optimum interconnection of adapters, cables, control units, networks, and devices to achieve your performance objectives. You can use the new configuration information to update your system diagrams and planning forms, then make a final assessment of your needs.

Your IBM marketing representative can then determine the current price of the system you have specified. The system will not be ordered without your authorization.

Ordering Communication Facilities

After you confirm the system order, you should order any other needed equipment.

- If you are ordering modems from a modem supplier, contact them and order your modems.
- Order any other communication equipment, such as line couplers.
- Order your communication lines through the local PTT or common carrier.
- Plan for the fabrication and installation of all system communication cables. See Appendix A and *IBM Cabling System Planning and Installation Guide*, GA27-3361.

Operating System and Application Software

The operating system and application software should be ordered now to be sure that it will be available when your hardware arrives. Choosing an operating system depends on your type of business, the kind of hardware on the system, and the type of data processing that is being done. Your IBM marketing representative will help you select the operating system and applications that best meet your requirements. See *Introducing the 9371 Model 14*, GA24-4257, for information regarding software available from IBM. IBM S/370 software for the Model 14 is distributed on quarter-inch tape cartridges or half-inch tape reels. If you want to install software directly from tape, you must have a Quarter-Inch Tape Unit or Half-Inch Tape Unit on your system.

IBM software for the PS/2 side of the Model 14 is distributed on 3.5-inch diskettes. Every Model 14 has a 3.5-inch diskette unit dedicated to PS/2 use.

Customizing Microcode

When your system is installed, you may want to customize specific areas of the microcode. The following items may be customized:

- Work Station Subsystem
- Telecommunications Subsystem
- IBM Token-Ring Subsystem.

Although there is no prior planning needed for these tasks, you should choose someone to be responsible for customizing microcode when the system is installed.

Ordering Computer Supplies

IBM offers a variety of supplies and accessories to operate your computer. Some of these supplies are:

- Diskettes
- Tape cartridges
- Printer paper and ribbons
- Office supplies.

All items can be ordered by phone. To get your catalog, call 1-800-IBM-2468. In Alaska or Hawaii, call 1-800-526-2484. Outside the United States, call 001-914-686-1900.

Some applications such as billing, payroll, and invoice may require special forms. If necessary, you should order the *Form Design Reference Guide for Printers*, GA24-3488 to help you plan for those.

Ordering Publications

You should have a complete library of publications to help you understand and use your system hardware and software.

At the time your IBM marketing representative gave you the manuals you are now using, you should have also received a copy of your System Library Subscription Service (SLSS) profile. This profile lists all the manuals that you ordered. If you find that you will not be receiving a manual that you need, call your IBM marketing representative and ask to have it added to your SLSS profile.

Preparing for System Delivery and Installation

The system unit, processor console keyboard/display, modem, cables, and documentation will all be shipped together from IBM in the same cardboard carton, shock-mounted, and on casters. You, the customer, will be responsible for moving the package in your building from the receiving area to the system installation site. You should therefore plan a route along which the package can be rolled on its casters with relative ease. You must avoid tipping the package to get it through doorways or up and down stairs. Reasonable care should always be used to prevent damage to its contents. The shipping carton is about 36 inches long, 20 inches wide and 55 inches high. It weighs approximately 300 pounds.

You will also be responsible for unpacking all system components. Your IBM service representative may help. Easy-to-follow unpacking instructions are attached on the outside of the carton, and no special tools are required.

Once all the items are unpacked, your IBM service representative will interconnect the basic system components, will make any necessary changes to the internal microcode or processor configuration, and will verify that the internal diagnostics run successfully. These internal diagnostics will test:

- Processing unit
- Processor storage
- I/O adapters
- Internal DASD
- Diskette unit
- Tape unit
- Processor console keyboard and display
- Remote services modem.

Once the basic system has been verified to be working properly, either you or the IBM service representative can begin installing and testing other external I/O devices and software. These items are ordered, shipped and installed separately, and have their own documentation libraries.

Instructions in the user publications and online information will help you modify the system configuration to accommodate the additional devices. Integrated checks will warn you if you attempt to violate any of the configuration rules.

Appendix A. External Attachment Cables

This appendix describes the cables used with the system communication adapters. A section is provided for each cable (according to *Type*), which gives the information necessary for assembling your cables.

The type of cable you need is determined by the way you defined the communication line when it was ordered. If a length more than the IBM standard is required, you will have to assemble (or have a vendor assemble) the cable. If you want more information on cables, refer to:

- *A Building Planning Guide for Communication Wiring*, G320-8059
- *IBM Installation and Assembly of Coaxial Cables and Accessories*, GA27-2805
- *IBM Cabling System Planning and Installation Guide*, GA27-3361
- *Using the IBM Cabling System with Communication Products*, GA27-3620
- *Cabling System Technical Interface Specification*, GA27-3773.

Assembling Cables

If you are assembling your own cables, read the following information on bulk cable, connectors, and grounding. IBM part numbers are listed in the following tables for reference to cable assembly specifications.

Bulk Cable: Always use shielded bulk cable. To reduce the effects of crosstalk on the RS-232C and CCITT V.24 interfaces, use a bulk cable with individually shielded conductors. Bulk cable is not available from IBM and must be purchased from other manufacturers.

Connectors: Always use tin-plated, D-shell type connectors with industry-standard pins. IBM recommends that pins with snap-in, precision-formed contacts with insulation support be used. The connectors should be encased in a shielded housing. These are not available from IBM and must be purchased from other manufacturers.

Grounding: The braided shield of the bulk cable should be attached to the D-shell connector at both ends of the cable. The braid must be soldered continuously to the entire circumference of the D-shell connector. The shields of individually shielded conductors should be soldered to the signal ground conductor (pin 7) at the adapter end only. They should be left open, not connected, at the data circuit equipment (DCE) end.

National Electrical Code Cable Considerations

Cabling for Electronic Computers/ Data Processing Equipment is addressed by NEC (National Electrical Code) article 645, or other National Codes. Where IBM system cables leave the confines of the computer room, they may have to be installed in approved raceways or conduit, per local authority or requirements of applicable articles of National Codes. All other low voltage cables used for communication or signal transmission (voice/data) outside the computer room or area may have to be installed in compliance with the local authority, or requirements of applicable articles of National Codes, or both.

Cable Types

The cables used with the system are shown in the following table. Each cable is assigned a *Type* number.

Type	Cable Feature Code	Bulk Cable		IBM Cable		Description
		Part Number	Max Length	Part Number	Length	
1	3050	93X2086	50 feet	28F1983	20 feet	System to modem, DTE to DCE (modem) cable or modem eliminator
2	3052	60X8685	50 feet	28F1984	20 feet	Direct connect RS-232C cable (no modem)
3	3054	4716743	4000 feet	28F1985	100 feet	Direct connect RS-422A cable (to 3151 only)
4	3056	—	50 feet (Note 1)	68X3873	10 inches	Dual Async 9-to-25 pin converter cable
5	3058	60X8685	50 feet	28F1986	20 feet	3151 auxiliary port to printer cable
6	6030	—	—	07F3151	10 feet	X.21 modem cable
7	6031	—	—	07F3161	10 feet	V.24 modem cable
8	6032	—	—	07F3171	10 feet	V.35 modem cable
9	6033	—	—	07F3176	10 feet	V.35 modem cable (France)
10	6036	—	—	46F2035	10 feet	V.35 direct connect cable
11	—	—	25 feet	1525612	6 feet	Parallel printer cable
12	6040	(Note 2)	—	6339098	8 feet	Token-Ring network adapter cable
13	Part of RSF feature	1863309	6 feet	1332174 1332007 1332008	5 feet	RSF modem cable (7020) RSF modem cable (Japan) RSF modem cable (Germany)
14	(Note 3)	—	—	—	—	IEEE 802.3 network adapter cable
15	(Note 4)	—	400 feet	6245998	15 feet	5080 adapter cable
16	Part of 7040, 7041	—	(Note 5)	70X4865	10 feet	High speed printer adapter cable
17	Part of 4051	—	—	46F2133	16 feet	External tape cable
18	Part of 4034	—	—	46F5906	12 inches	Virtual console cable

Notes:

1. Maximum length (cable Type 4 plus cable Type 2) from adapter to device.
2. See *Cabling System Technical Interface Specification, GA27-3773*.
3. Obtain this cable from the network supplier.
4. Cable is coaxial RG-59/U with male BNC connectors on both ends (customer supplied). See *IBM 5080 Site Planning and Preparation* for cable type and distance calculations. This cable must be kept indoors and must not be more than 122 meters (400 feet) long.
5. Total cable length can be extended up to 160 feet using S/370 standard channel interface cables. Terminators are included with feature 7040.
6. Bulk cable part numbers are for reference to specifications only.

Device to Adapter Cables

The following table lists the cable type used with each device connection:

<i>Table A-2. Cable Types. Adapter Port to Device</i>		
Device	Cable Type	Adapter Port and Feature Code
3151 Display	2	Serial (Standard)
		8-Port RS-232C (6024 or 6022)
	4 and 2	Dual Async (6011)
	3	8-Port RS-422A (6024 or 6026)
GMM Attached ASCII Devices	2	8-Port RS-232C (6024 or 6022)
	3	8-Port RS-422A (6024 or 6026)
4201 Printer	2	Serial (Standard)
		8-Port RS-232C (6024 or 6022)
	4 and 2	Dual Async (6011)
	5	3151 Auxiliary port
	11	Parallel (Standard)
5853 Modem	1	Serial (Standard)
		4 and 1
	8-Port RS-232C (6024 or 6022)	Dual Async (6011)
	7	High Performance SDLC (6027) X.25/HDLC Packet Network (6029)
3174-61R/91R Control Unit with modem	1	8-Port RS-232C (6024 or 6022)
	7 (V.24 modem)	High Performance SDLC (6027)
	8 (V.35 modem)	
	9 (V.35 modem, France)	
3174-61R/91R without modem	2 (Note 3)	8-Port RS-232C (6024 or 6022)
	10	High Performance SDLC (6027)
5853 Modem (Note 1)	13	Remote Facilities (Standard)
WT Modem (Note 2)		
Token-Ring LAN	12	Token-Ring (6034)
IEEE 802.3 LAN	14	IEEE 802.3 LAN (6035)
5080 device attachments	15	5080 (7010)
High speed printers	16	High Speed Printer (7040)
Half-Inch Tape Unit	17	Half-Inch Tape (4051)
S/370 Serial Port	18	PS/2 Serial (Standard)

Notes:

1. Cable is part of Remote Facilities (Feature 7020).
2. World Trade (WT) modem will be supplied by IBM and compatible with the communication facilities of the country where the system will be located.
3. This requires a customer-supplied gender changer with a 25-pin female connector on each end.

Point-to-Point Cable Wiring by Type

The point-to-point wiring for all cables used with the system is shown on the following pages by *Type* number. The end of the cable attaching to the system end is referred to as the adapter connector, and the other end is called the DCE (data circuit-terminating equipment) connector. When more than one pin number is shown in a column, it means that those pins are connected at the connector. See IBM cable specifications for additional information.

Note: One 8-port connector cable comes with each 8-port adapter and is thus included with Features 6021, 6022, 6023, 6024, 6025, 6026, 7021, 7022, 7023, 7024, 7025, and 7026.

System to Modem (Type 1) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmit Data	2	2
Receive Data	3	3
Request to Send (RTS)	4	4
Clear to Send (CTS)	5	5
Data Set Ready (DSR)	6	6
Signal Ground (SG)	7	7
Data Carrier Detect (DCD)	8	8
Transmit Clock Input (TXCLK)	15	15
Receive Clock Input (RXCLK)	17	17
Local Loopback (LLB)	18	18
Data Terminal Ready (DTR)	20	20
Remote Loopback (RLB)	21	21
Ring Indicate (RI)	22	22
Data Signal Rate Selector (HRS)	23	23
DTE Transmit Clock (DTECLK)	24	24
Test Indicate (TI)	25	25

Note: The connector type on both the adapter and the DCE end is a 25-position D-type connector. The adapter end is female and the DCE end is male.

Direct Connect RS-232C (Type 2) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Received Data to Transmitted Data (RXD to TXD)	3	2
Transmitted Data to Received Data (TXD to RXD)	2	3
Data Carrier Detect to Request to Send (DCD to RTS)	8	5
Data Carrier Detect to Clear to Send (DCD to CTS)	8	4
Data Terminal Ready to Data Set Ready (DTR to DSR)	20	6
Data Set Ready to Data Terminal Ready (DSR to DTR)	6	20
Signal Ground (SG)	7	7
Request to Send to Data Carrier Detect (RTS to DCD)	4	8
Clear to Send to Data Carrier Detect (CTS to DCD)	5	8
DTE Clock to Transmit Clock (DTECLK to TXCLK)	17	24
DTE Clock to Receive Clock (DTECLK to RXCLK)	15	24
Ring Indicate (RI)	22	22
Data Signal Rate Selector (HRS)	23	23

Note: The connector type on both the adapter and the DCE end is a 25-position D-type connector. The adapter end is female and the DCE end is male.

Direct Connect RS-422A (Type 3) Cable to 3151

Interface Line Name	Adapter Connector Number	DCE Connector Number
+Receive Data to Transmit Data	17	2
-Receive Data to Transmit Data	15	4
+Transmit Data to Receive Data	25	3
-Transmit Data to Receive Data	19	5

Note: The connector type on both the adapter and the DCE end is a 25-position D-type connector. The adapter end is female and the DCE end is male.

Dual Async 9-to-25 Pin Converter (Type 4) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmit Data (TXD)	3	2
Receive Data (RXD)	2	3
Request to Send (RTS)	7	4
Clear to Send (CTS)	8	5
Data Set Ready (DSR)	6	6
Signal Ground (SG)	5	7

Interface Line Name	Adapter Connector Number	DCE Connector Number
Data Carrier Detect (DCD)	1	8
Data Terminal Ready (DTR)	4	20
Ring Indicate (RI)	9	22

Note: The connector type on the adapter end is a 9-position female D-type; the DCE end has a 25-position male D-type connector.

3151 Auxiliary Port to Printer (Type 5) Cable

Interface Line Name	Display Connector Number	Printer Connector Number
Receive Data to Transmit Data	2	2
Transmit Data to Receive Data	3	3
Data Carrier Detect (DCD) to Request to Send (RTS)	8	8
Data Carrier Detect (DCD) to Clear to Send (CTS)	8	7
Data Terminal Ready (DTR) to Data Set Ready (DSR)	20	6
Signal Ground (SG)	7	7
Request to Send (RTS) to Data Carrier Detect (DCD)	5	1
Clear to Send (CTS) to Data Carrier Detect (DCD)	4	1
Data Set Ready (DSR) to Data Terminal Ready (DTR)	6	4

Note: The connector type on the display end is a 25-position male D-type; the printer end has a 25-position female D-type connector.

X.21 (Type 6) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmitted data-A (T-A)	10	2
Transmitted data-B (T-B)	28	9
Control-A (C-A)	11	3
Control-B (C-B)	29	10
Received data-A (R-A)	12	4
Received data-B (R-B)	30	11
Indication-A (I-A)	13	5
Indication-B (I-B)	31	12
Signal Element Timing-A (S-A)	14	6
Signal Element Timing-B (S-B)	32	13
Signal Ground (SG)	7, 9	8

Notes:

1. The connector type on the adapter end is a 37-position, D-type female; the DCE end has a 15-position, D-type male connector.
2. The cable ID is obtained by connecting pins 7 and 9 on the cable socket at the adapter end.

V.24 (Type 7) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmitted Data (TXD)	2	2
Received Data (RXD)	3	3
Request to Send (RTS)	4	4
Clear to Send (CTS)	5	5
Data Set Ready (DSR)	6	6
Carrier Detect (CD)	8	8
Transmit Clock (TX CLK)	24	15
Receive Clock (RX CLK)	26	17
Local Loopback Test (LLBT)	27	18
Data Terminal Ready (DTR)	20	20
Remote Loopback Test (RLBT)	21	21
Calling Indicator (CI)	22	22
Test Indicate (TI)	25	25
Signal Ground (SG)	7, 9, 15	7

Notes:

1. The connector type on the adapter end is a 37-position, D-type female; the DCE end has a 25-position, D-type male connector.
2. The cable ID is obtained by connecting pins 7 and 9 and 15 on the cable socket at the adapter end.
3. This cable supports DCE clocking only. DTE clocking is not supported.

V.35 (Type 8) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Request to Send (RTS)	4	C
Clear to Send (CTS)	5	D
Data Set Ready (DSR)	6	E
Carrier Detect (CD)	8	F
Data Terminal Ready (DTR)	20	H
Calling Indicator (CI)	22	J

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmit Data-A (TXD-A)	35	P
Transmit Data-B (TXD-B)	17	S
Receive Data-A (RXD-A)	37	R
Received Data-B (RXD-B)	19	T
Transmit Clock-A (TX CLK-A)	36	Y
Transmit Clock-B (TX CLK-B)	18	AA
Receive Clock-A (RX CLK-A)	34	V
Receive Clock-B (RX CLK-B)	16	X
Signal Ground (SG)	7, 15	B

Notes:

1. The connector type on the adapter end is a 37-position, D-type female; the DCE end has a 34-position, M-type male connector.
2. The cable ID is obtained by connecting pins 7 and 15 on the cable socket at the adapter end.

V.35 France (Type 9) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Request to Send (RTS)	4	C
Clear to Send (CTS)	5	D
Data Set Ready (DSR)	6	E
Carrier Detect (CD)	8	F
Data Terminal Ready (DTR)	20	H
Calling Indicator (CI)	22	J
Transmit Data-A (TXD-A)	35	P
Transmit Data-B (TXD-B)	17	S
Receive Data-A (RXD-A)	37	R
Received Data-B (RXD-B)	19	T
Transmit Clock-A (TX CLK-A)	36	Y
Transmit Clock-B (TX CLK-B)	18	AA
Receive Clock-A (RX CLK-A)	34	V
Receive Clock-B (RX CLK-B)	16	X
Signal Ground (SG)	7, 15	B

Note: The connector type on the adapter end is a 37-position, D-type male; the DCE end has a 34-position, M-type male connector.

V.35 Direct Connect (Type 10) Cable

Interface Line Name	Adapter Connector Number	DCE Connector Number
Transmitted Data-A to Received Data-A (TXD-A to RXD-A)	35	R
Transmitted Data-B to Received Data-B (TXD-B to RXD-B)	17	T
Received Data-A to Transmitted Data-A (RXD-A to TXD-A)	37	P
Received Data-B to Transmitted Data-B (RXD-B to TXD-B)	19	S
Request to Send to Data Carrier Detect (RTS to DCD)	4	F
Clear to Send to Data Carrier Detect (CTS to DCD)	5	F
Data Carrier Detect to Request to Send (DCD to RTS)	8	C
Data Carrier Detect to Clear to Send (DCD to CTS)	8	D
Data Set Ready to Data Terminal Ready (DSR to DTR)	6	H
Data Terminal Ready to Data Set Ready (DTR to DSR)	20	E
DTE Clock-A to Transmit Clock-A (DTECLK-A to TXCLK-A)	33	Y
DTE Clock-A to Receive Clock-A (DTECLK-A to RXCLK-A)	33	V
DTE Clock-B to Transmit Clock-B (DTECLK-B to TXCLK-B)	23	AA
DTE Clock-B to Receive Clock-B (DTECLK-B to RXCLK-B)	23	X
Signal Ground (SG)	7, 15	B

Notes:

1. The connector type on the adapter end is a 37-position, D-type male; the DCE end has a 34-position, M-type female connector.
2. This cable does not use the signal lines: Calling Indicate, TX-Clock, or RX-Clock.

Parallel Printer (Type 11) Cable

Interface Line Name	Adapter Connector Number	Printer Connector Number
-STROBE	1	1
Data Bit 0	2	2
Data Bit 1	3	3
Data Bit 2	4	4
Data Bit 3	5	5
Data Bit 4	6	6

Interface Line Name	Adapter Connector Number	Printer Connector Number
Data Bit 5	7	7
Data Bit 6	8	8
Data Bit 7	9	9
–ACK	10	10
BUSY	11	11
PE	12	12
SLCT	13	13
–AUTO FEED XT	14	14
–ERROR	15	32
–INIT	16	31
–SLCT IN	17	36
Ground	18–25	19–30, 33

Note: The connector type on the adapter end is a 25-position D-type male; the printer end has a 36-position D-shell male connector with spring clip retention.

Token-Ring (Type 12) Cable

Refer to *Cabling System Technical Interface Specification, GA27-3773*. This cable may be ordered as optional Feature 6040.

RSF Modem (Type 13) Cable

This cable is part of the Remote Facilities Option. Three different cables are used, depending on the country for which the feature is ordered.

Part Number	Country Used
1332174	USA and world trade
1332007	Japan only
1332008	Germany only

IEEE 802.3 (Type 14) Cable

Refer to the IEEE Standard 802.3 Manual.

5080 (Type 15) Cable

This cable is an RG-59/U coaxial cable with BNC connectors on both ends.

High Speed Printer (Type 16) Cable

This cable is part of Feature 7040.

External Tape Unit (Type 17) Cable

This cable is part of Feature 4051.

Virtual Console (Type 18) Cable

This cable is part of Feature 4034.

Appendix B. Configuration Rules

The 9371 Model 14 allows you much flexibility in selecting features and attaching I/O devices. Countless valid combinations of adapters, work stations, and communication lines are possible, but there are also a few restrictions to which your order must conform.

This appendix contains rules that will be followed by the 9371 ordering system with regard to:

- Priorities for adapter card slot assignments
- Limitations for DASD and Tape subsystems
- Restrictions for attaching work stations and communication lines.

Orders for new 9371 systems will be processed in compliance with these rules. System orders which specify requirements in violation of these rules will be rejected. You can use the ordering system repetitively to help select features. You can even override its decisions if you want to order more than the minimum hardware. But, to save unnecessary work, you should be familiar with the rules.

These rules are subject to change as new features are added. Your IBM marketing representative will always have the most recent information.

Note: Installed adapters must also comply with feature maximums listed in Chapter 2.

Adapter Card Slot Assignments

The following diagram shows the rear view of the 9371 Model 14. Below the diagram is a table with columns listing all the features (adapter types) that can be inserted into the available slots. Slots will be filled as listed from left to right. That is:

- Slot A5 first, slot A6 second, then A2 on the S/370 side
- Slot B3, then B5, B6, B7, B8, B2, B4 and B1, in that order, on the PS/2 side.

See Chapter 2, "Maximum Number of Optional Features." Higher priority adapters are listed first for each slot.

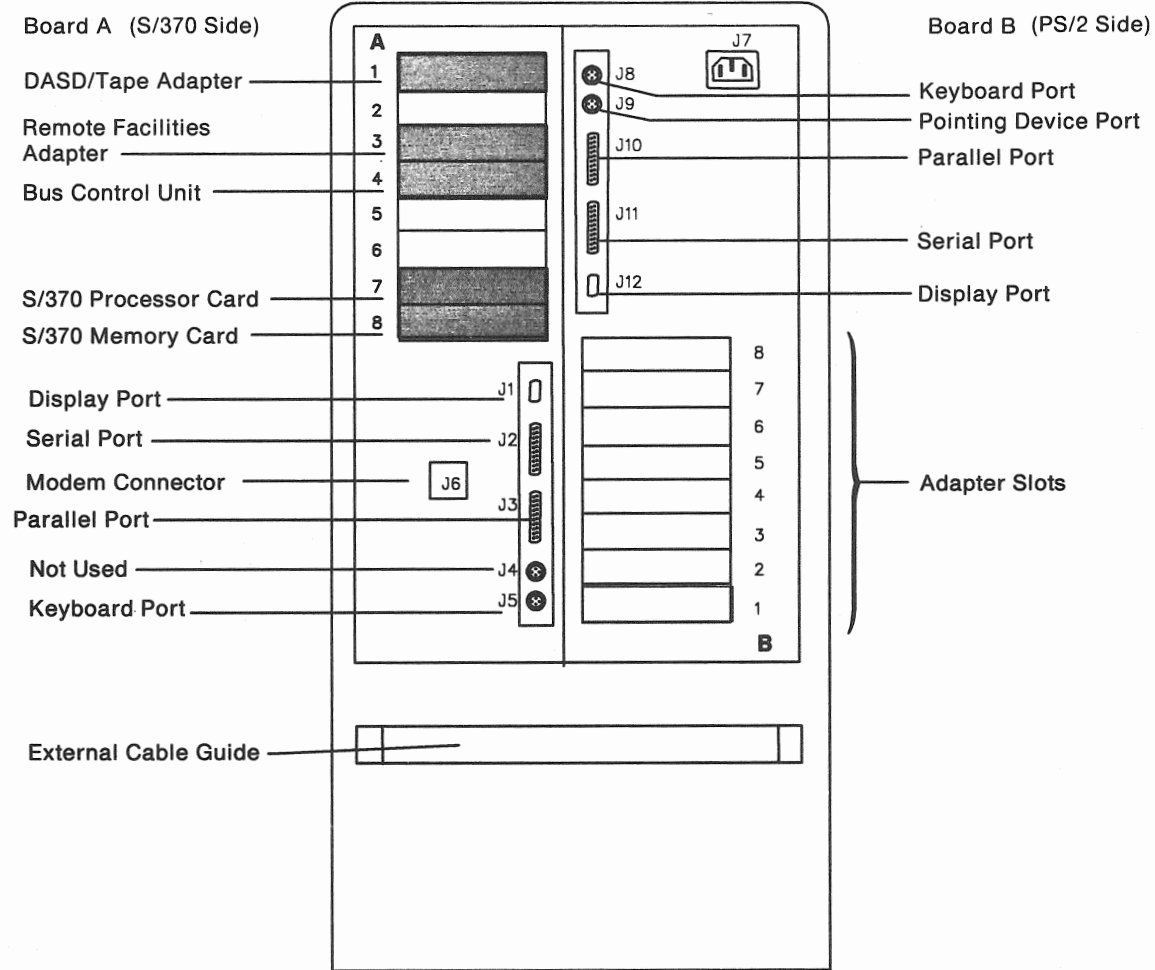
An example: If you have a Dual Async Adapter (Feature 6011) in slot A5 and you want to add an 8-port RS-232C Adapter (Feature 6022), which has a higher priority for slot A5, you must move Feature 6011 to slot A6 so that Feature 6022 can occupy slot A5.

Notice that some listed adapters have two feature numbers; a different one for each side of the Model 14. When installed on the PS/2 side, adapters are governed by PS/2 configuration rules.

When used, the optional Data Exchange Adapter must be installed in slot B1. The optional DASD Adapter must occupy slot B2. The PS/2 Storage Expansion card (Feature 8005) will be installed in slot B4 for any system requiring more than 4MB of PS/2 storage.

Consult your IBM marketing for the availability dates of all features.

Model 14 Adapter Locations



Features (Board A - S/370 Side)	Features (Board A - S/370 Side)
<ul style="list-style-type: none"> • 4051 - Half-Inch Tape Adapter • 6011 - Dual Async Adapter • 6022 - 8-Port RS232C Adapter (512KB) • 6024 - 8-Port RS232C/RS422A Adapter (512KB) • 6026 - 8-Port RS422A Adapter (512KB) • 7022 - 8-Port RS232C Adapter (1MB) • 7024 - 8-Port RS232C/RS422A Adapter (1MB) • 7026 - 8-Port RS422A Adapter (1MB) 	<ul style="list-style-type: none"> • 6120 - 3270 Adapter • 6027 - High Performance SDLC Adapter • 6029 - X.25/HDLC Packet Network Adapter • 6034 - IBM Token-Ring Adapter • 6035 - IEEE 802.3 Local Area Network Adapter • 7010 - 5080 Graphics Adapter • 7040 - High Speed Printer Adapter

Slot A5	Slot A6	Slot A2
<ul style="list-style-type: none"> • 7040 • 6035 • 6034 • 6029 • 6027 • 7026 • 7024 • 7022 • 6026 • 6024 • 6022 • 6011 	<ul style="list-style-type: none"> • 6120 • 7040 • 7010 • 6035 • 6034 • 6029 • 6027 • 7026 • 7024 • 7022 • 6026 • 6024 • 6022 • 6011 	<ul style="list-style-type: none"> • 4051 • 7040 • 7010 • 6035 • 6034 • 6029 • 6027 • 7026 • 7024 • 7022 • 6026 • 6024 • 6022 • 6011

Features (Board B - PS/2 Side)	Features (Board B - PS/2 Side)
<ul style="list-style-type: none"> • 4014 – Data Exchange Adapter • 4050 – DASD Adapter • 6010 – Dual Async Adapter • 6021 – 8-Port RS232C Adapter (512KB) • 6023 – 8-Port RS232C/RS422A Adapter (512KB) • 6025 – 8-Port RS422A Adapter (512KB) • 7021 – 8-Port RS232C Adapter (1MB) 	<ul style="list-style-type: none"> • 7023 – 8-Port RS232C/RS422A Adapter (1MB) • 7025 – 8-Port RS422A Adapter (1MB) • 6049 – X.25/HDLC Packet Network Adapter • 6044 – IBM Token-Ring Adapter • 6045 – IEEE 802.3 Local Area Network Adapter • 7041 – PS/2 S/370 Channel Emulator Adapter • 8005 – PS/2 Storage Expansion Option

Slot B3	Slot B5	Slot B6	Slot B7	Slot B8	Slot B2	Slot B4	Slot B1
• 7041	• 7041	• 7041	• 7041	• 7041	• 4050	• 8005	• 4014
• 6045	• 6045	• 6045	• 6045	• 6045	• 7041	• 7041	• 7041
• 6044	• 6044	• 6044	• 6044	• 6044	• 6045	• 6045	• 6045
• 6049	• 6049	• 6049	• 6049	• 6049	• 6044	• 6044	• 6044
• 7025	• 7025	• 7025	• 7025	• 7025	• 6049	• 6049	• 6049
• 7023	• 7023	• 7023	• 7023	• 7023	• 7025	• 7025	• 7025
• 7021	• 7021	• 7021	• 7021	• 7021	• 7023	• 7023	• 7023
• 6025	• 6025	• 6025	• 6025	• 6025	• 7021	• 7021	• 7021
• 6023	• 6023	• 6023	• 6023	• 6023	• 6025	• 6025	• 6025
• 6021	• 6021	• 6021	• 6021	• 6021	• 6023	• 6023	• 6023
• 6010	• 6010	• 6010	• 6010	• 6010	• 6021	• 6021	• 6021
					• 6010	• 6010	• 6010

DASD/Tape Rules

1. Every 9371 system unit contains at least two Direct Access Storage Devices (DASD) and one DASD/Tape Adapter as standard equipment.
2. The Quarter-Inch Tape Unit is an optional feature.
3. Up to six DASD can be installed in any system unit.
4. The Model 14 may contain one standard DASD/Tape Adapter on system board A and one optional DASD Adapter on system board B.
 - a. The standard DASD/Tape Adapter will control the two standard DASD, the optional Quarter-Inch Tape Unit, and any additional DASD (Feature 4043) assigned to the S/370 processor.
 - b. The optional DASD Adapter will control any additional DASD (Feature 4045) assigned to the PS/2 processor.
 - c. Additional DASD controlled by the adapter in Board B must be sequentially installed in the available slots from back to front.
5. The Half-Inch Tape Adapter must be installed in slot A2 on Board A.
6. Only one IBM 9348-12 Half-Inch Tape Unit can attach to each Half-Inch Tape Adapter.

Work Station and Communication Rules

The rules on the next few pages refer to various device types. Here are some examples of those device types:

Device Type	IBM Examples
Parallel-interface printers	4201, 4202, 4207, 4208, 4234, 5204, 4019
High-speed printers	3825, 3827, 3835, 6262
Asynchronous printers	4201, 4202, 4207, 4208, 4224, 4234, 5204, 4019 (serial interface option)
Asynchronous display stations	3151
Synchronous/asynchronous modems	5843, 5853
Synchronous printers	3812 (BSC), 3820 (SDLC)
Synchronous controllers	3174 (BSC or SDLC)
3270-type display stations	3178, 3191, 3194, 3278, 3279, 5578
3270-type printers	3262, 3287, 4224, 4245, 5210, 5227
3270-type personal computers	5150, 5160, 5170, 6150, 8550, 8580

Note: Only one adapter of each of the following adapter types is allowed on the S/370 side of the Model 14:

- X.25/HDLC Packet Network Adapter (Feature 6029)
- 5080 Graphics Adapter (Feature 7010)
- IBM Token Ring Adapter (Feature 6034)
- IEEE 802.3 LAN Adapter (Feature 6035)
- Dual Async Adapter (Feature 6011)
- Half-Inch Tape Adapter (Feature 4051)
- High-Speed Printer Adapter (Feature 7040)
- 3270 Adapter (Feature 6120).

Warning: Any adapter from the following group, when used to attach asynchronous work stations or communication lines with standard protocols to the S/370 side of the Model 14, is limited to a total aggregate (cumulative) data rate specified in the following rules. This is the sum of the data rates of all devices and communication lines attached to all ports of that adapter.

- The 8-Port RS-232C Adapter (512KB) (Feature 6022)
- The 8-Port RS-232C/RS-422A Adapter (512KB) (Feature 6024)
- The 8-Port RS-422A Adapter (512KB) (Feature 6026).

Failure to comply may cause a subsystem malfunction.

Rule 1 - BSC and SDLC protocol cannot coexist on the same 8-port adapter.

When BSC is resident, only asynchronous communication lines or asynchronous work stations may be attached to the other ports. Likewise, when SDLC is resident, only asynchronous lines and work stations can be attached to the other ports.

Rule 2 - Each port of an 8-port adapter is independently capable of supporting the maximum data rate for its assigned protocol and physical interface. However, when more than one port is

used, inter-relationships exist that may limit the data rates of the ports. These dependencies vary depending on the mixture of protocols and the configured data rate of each. To determine the maximum cumulative data rate for an adapter with a mixture of protocols, select the smallest of the data rates for the protocols used from the table below.

Protocol	Maximum Cumulative Data Rate
-----	-----
ASYNC COMM. LINES	57,600 bps
BSC	38,400 bps
SDLC	76,800 bps
ASYNC WORK STATIONS	76,800 bps

Rule 3 - When assigning data rates to ports, always attempt to place the highest line speeds on the lowest number port.

Rule 4 - Asynchronous Group Multiplex Mode (GMM) devices may not coexist with non-GMM devices on the same 8-port adapter.

For example:

Two SDLC lines and six asynchronous work stations could all be attached to the same adapter at 9,600 bps; but if two BSC lines are attached at 19,600 bps each, no other attachments can be made to that adapter.

Note: When used for Group Multiplex Mode or for customer programmable applications, the preceding rules for 8-port adapters are not in effect.

Attaching Local Work Stations

General Rules

1. The standard S/370 processor console keyboard and display must attach to the Keyboard Port J5 and the Display Port J1 of system board A on all systems.
2. The PS/2 console keyboard and display on the Model 14 must attach to the Keyboard Port J8 and the Display Port J12 of system board B.
3. One PS/2 pointing device can attach to the Pointing Device Port J9 of Model 14 only.
4. Group Multiplex Mode (GMM) devices may only be used on the 8-port adapters on the S/370 side (Board A) and GMM devices cannot be mixed with non-GMM devices on the same adapter.
5. GMM devices may not share a channel with non-GMM devices and a maximum of 16 GMM devices are allowed on one channel.

Note: There is no restriction on the number of 8-port adapters that may be configured with GMM devices as long as rules 4 and 5 are observed.

6. *Selected serial asynchronous printers* (IBM 4201-3, 4202-3, 4207-2, 4208-2, 4224, and 4234 only) can attach to the RS-422A ports of 8-port adapters.

7. Devices other than display stations or the printers listed previously must not be attached to the RS-422A ports of an 8-Port RS-232C/RS422A Adapter or to any port of an 8-Port RS422A Adapter. **Group Multiplex Mode (GMM) devices can attach to RS-422A ports but a powered-off state in the device cannot be detected.**
8. The 8-port adapters with 512KB of storage can be used for any of the stated purposes, but any 8-port adapter with 1MB of storage can only be used for customer programmable applications.
9. Printers with a PC-compatible parallel interface must attach to the system board standard parallel ports, either J3 or J10.
10. One IBM 5080 Graphics System can attach to the S/370 side of the Model 14 using the 5080 Graphics Adapter card. (Due to physical constraints on the newer system boards, this adapter cannot be installed in slot A5.) Up to four 5085 or 5086 Graphics Processors may be connected, in a serial fashion, to a single adapter port.
11. One IBM 3825, 3827, or 3835 Page Printer or one 6262-14 or -22 line printer can attach to the S/370 side of the Model 14 using the High Speed Printer Adapter card.

Local Asynchronous Devices Attached to the S/370 Side

1. Asynchronous display stations located and *selected* serial asynchronous printers located less than 1219 meters (4000 feet) away from the system unit can be attached to RS-422A ports of the 8-Port RS-232C/RS-422A Adapter or to any port of the 8-Port RS-422A Adapter.
2. Any asynchronous display stations, printers, modems, or other asynchronous devices with data rates in the ranges indicated below, that are located less than 15.2 meters (50 feet) away from the system unit, may be attached to:
 - The four RS-232C ports of an 8-Port RS-232C/RS-422A Adapter (600 to 19,200 bps)
 - Any port of an 8-Port RS-232C Adapter (600 to 19,200 bps)
 - Either port of the Dual Async Adapter (600 to 9,600 bps)
 - Any system board serial port (600 to 9,600 bps).

Note: On an 8-port adapter, asynchronous attachments with the highest line speeds should be connected to the lowest numbered ports available.

Order of Attachment: Printers with a serial asynchronous interface and other asynchronous I/O devices must be assigned to ports in the following order:

1. Use the RS-422A ports of the 8-Port RS-232C/RS-422A Adapter for attaching up to four devices up to 1219 meters (4000 feet) away.
2. Use the 8-Port RS-422A Adapter for attaching up to eight devices up to 1219 meters (4000 feet) away.
3. Use the RS-232C ports of the 8-Port RS-232C/RS-422A Adapter for attaching up to four devices less than 15.2 meters (50 feet) away.
4. Use the 8-Port RS-232C Adapter for up to eight devices that are attached less than 15.2 meters (50 feet) away.
5. Use the Dual Async Adapter if only another one or two devices are attached less than 15.2 meters (50 feet) away.
6. Use the system board serial port if only one additional device is required less than 15.2 meters (50 feet) away.

Note: One printer with a serial asynchronous interface can attach to the auxiliary RS-232C port of every IBM 3151 ASCII Display Station. The distance from the 3151 display to the printer may be up to 15.2 meters (50 feet) and the maximum data rate is 1200 bps.

Local 3270-type Devices

1. Up to three 3270-type devices can be connected directly to the 3270 Adapter on the S/370 side of the Model 14.
2. Up to eight 3270-type devices can be connected to each of the three ports of a 3270 Adapter through an IBM 3299 Multiplexer.
3. Only one 3270 Adapter is allowed on Board A (slot A6) in the Model 14.
4. The 3270 Adapter is not allowed on the PS/2 side.

Attaching Remote Work Stations to the S/370 Side

1. Printers, control units, or other devices using a serial asynchronous or synchronous (BSC or SDLC) interface can be remotely attached to:
 - The 8-Port RS-232C Adapter (BSC or SDLC to Port 0 or Port 1 only, Async to any port)
 - The four RS-232C ports of an 8-Port RS-232C/RS-422A Adapter (BSC or SDLC to Port 0 or Port 1 only, Async to any port).

Note: Devices using BSC protocol and devices using SDLC protocol cannot attach to ports of the same 8-Port Adapter. Only the 8-port adapters with 512KB of storage can be used for these functions.

Attaching Devices Through a Control Unit

IBM 3174-91R or 3174-61R Subsystem Control Units (used for controlling clusters of 3270-type I/O devices) can be remotely attached using any BSC or SDLC port of an 8-Port adapter, but for the best performance, use the High-Performance SDLC Adapter, which can support data rates up to 64,000 bps over a V.35 or X.21 interface.

1. IBM 3174-61R or 3174-91R control units, may be attached through adapters to the S/370 side of the Model 14 Biprocessor.
2. Up to four 3270-type devices can be connected directly to a 3174-91R.
3. Up to eight 3270-type devices can be connected to a 3174-91R through an IBM 3299 Multiplexer.
4. Up to nine 3270-type devices can be connected directly to a 3174-61R.
5. Up to sixteen 3270-type devices can be connected to a 3174-61R through IBM 3299 Multiplexers.

When Using Communication Lines on the S/370 side...

1. Communication lines using Async/TTC2 protocols can attach to the following adapters at the indicated data rates:
 - Any system board serial port (600-9,600 bps)
 - Either port of the Dual Async Adapter (600-9,600 bps)
 - Any port of an 8-Port RS-232C Adapter (600-19,200 bps)
 - The four RS-232C ports of an 8-Port RS-232C/RS-422A Adapter (600-19,200 bps).

2. Communication lines using BSC protocol can attach to the following adapters at the indicated data rates:
 - Port 0 or Port 1 of an 8-Port RS-232C Adapter (600-19,200 bps)
 - Port 0 or Port 1 of an 8-Port RS-232C/RS-422A Adapter (600-19,200 bps).
3. Communication lines using SDLC protocol and the specified interface can attach to the following adapters at the indicated data rates:
 - Using the RS-232C interface:
 - The standard Remote Facilities Adapter can be used only for the Remote Facilities Option (600-2,400 bps)
 - Port 0 or Port 1 of an 8-Port RS-232C Adapter (600-19,200 bps)
 - Port 0 or Port 1 of an 8-Port RS-232C/RS-422A Adapter (600-19,200 bps)
 - The High Performance SDLC Adapter (600-19,200 bps).
 - Using the X.21/X.21 BIS interface (for leased, point-to-point, and circuit-switched lines):
 - The High Performance SDLC Adapter (2,400-64,000 bps).
 - Using the V.35 interface:
 - The High Performance SDLC Adapter (600-64,000 bps).
4. Communication lines using HDLC protocol over X.25 packet-switching networks, with an X.21 (for leased, point-to-point lines) or X.21 BIS interface, can attach to the following adapter at the indicated data rates:
 - X.25/HDLC Packet Network Adapter (2,400-64,000 bps).

Note: BSC and SDLC protocols cannot coexist on the same 8-Port Adapter. Async/TTC2 protocol can coexist with either BSC or SDLC, but not both. Only the 8-port adapters with 512KB of storage can be used for these functions.

Attaching Local Area Networks to the S/370 Side

1. The IBM Token-Ring Adapter is used to provide a single attachment to an IBM Token-Ring network.
2. The IEEE 802.3 LAN Adapter is used to provide a single attachment to an IEEE 802.3 local area network.
3. The IBM Token-Ring network allows the software to configure a maximum of 64 logical connections between the S/370 side of the 9371 Model 14 and other token-ring stations. Since the overall throughput capability is shared between logical connections, the number of links actually doing data transfer simultaneously is limited by the required data rate per individual link. See your IBM marketing representative for details.

Appendix C. Planning Forms

The planning forms in this appendix must be filled out according to the step-by-step instructions presented in the previous chapters. The forms can be removed from the book for copying. In some cases, several copies of the same form may be necessary. **Save unmarked copies of each form for future use.**

After you complete them, these forms will:

- Provide your IBM marketing representative with basic system hardware requirements
- Help you install your system
- Identify data paths and devices for problem analysis
- Provide a configuration record for upgrading your system.

The forms that you use depend on your system configuration. If you need more copies of any form in this package, you may reproduce them locally.

A System Planning Schedule

Customer Name _____

Customer Number _____

Estimated Delivery Date _____

Planning Tasks	Responsible Person	Completion Date		Comments
		Planned	Actual	
Assigning Planning Tasks				
Selecting System Unit Features				
Planning Work Stations				
Planning Communications				
Planning System Hardware				
Ordering Cables				
Ordering Communication Facilities				
Physical Planning				
Ordering Publications				
Ordering Supplies				
Planning Microcode Customization				
Planning Applications				
Installing the System				
Customizing the Microcode				
Installing the Operating System				
Installing the Applications				



B — Processor Configuration

Customer Name _____
 Customer Number _____

Processor:

- Model 14

S/370 Storage:

- 4MB (Basic)
 8MB
 12MB
 16MB

Additional Control Storage:

- Feature 8002 (Board A)

PS/2 Storage:

- 2MB (Basic)
 4MB
 6MB
 8MB
 10MB
 12MB
 14MB
 16MB

Virtual Console:

- Feature 4035

S/370 Keyboard and Display:

- Feature 4037

PS/2 Display:

- Feature 7095 (IBM)
 Feature 7096 (Customer)

Battery Backup:

- Feature 3005

Remote Facilities:

- Feature 7020
 ROCF Diskettes
 (Specify Code 9992)

Software Preload Service:

- Feature 4010
 KIT Serial Number

Power Requirements:

- 100/127 Volt, 1 Phase,
 12A, 1.2 kVA (50/60 HZ)
 200/240 Volt, 1 Phase,
 6A, 1.2 kVA (50/60 HZ)

Power Cord/Plug Type:

- Non-Watertight Power
 Cord/Plug
 Watertight Power Cord/Plug
 (Specify Code 9990)
 1.83-meter (6-foot) Power
 Cord (Chicago, Illinois)
 (Specify Code 9986)
 1.83-meter (6-foot)
 Watertight Power Cord/Plug
 (Chicago, Illinois.)
 (Specify Code 9988)

Nomenclature:

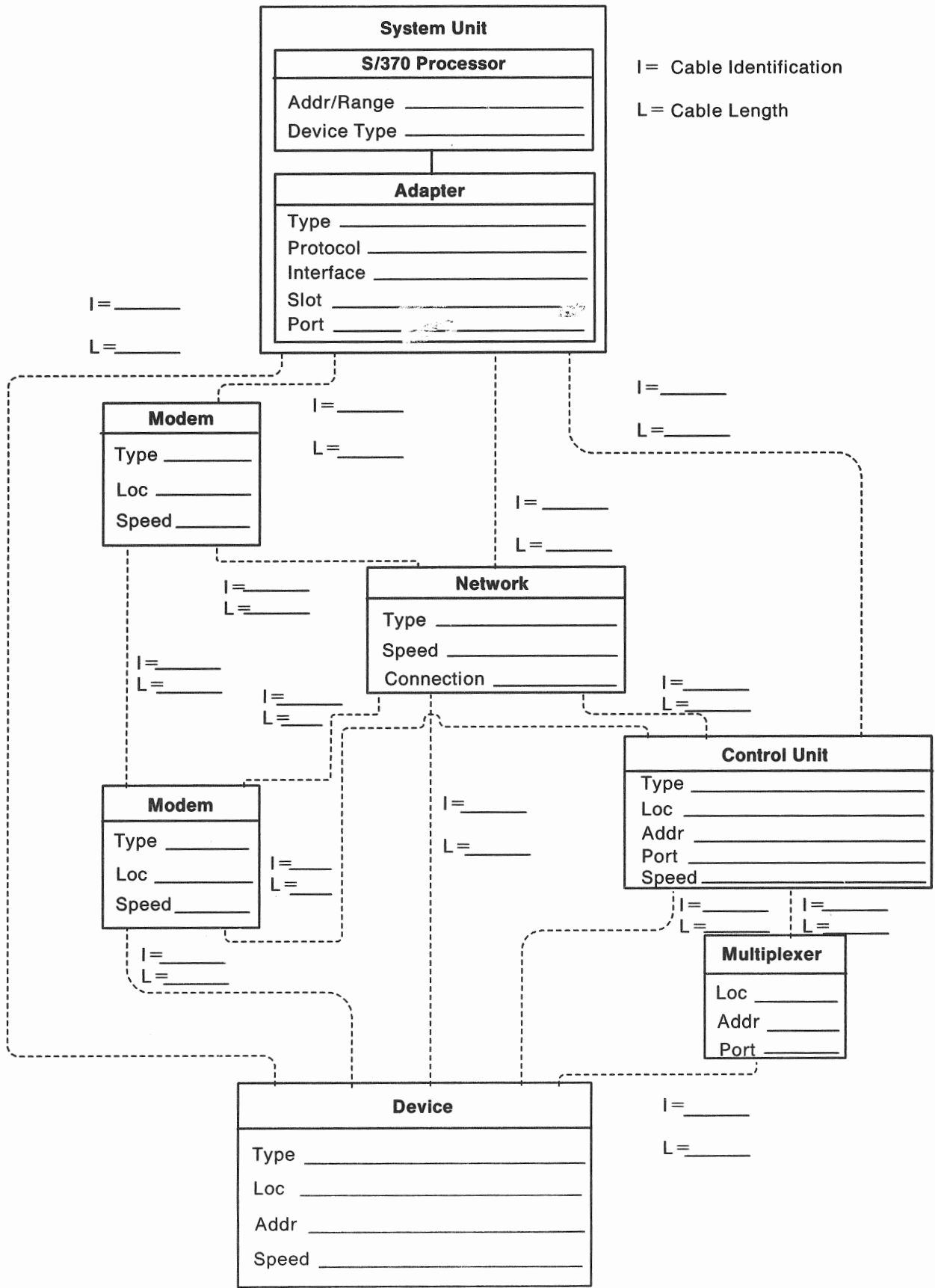
I/O Adapters:

Quantity	Feature Number	Adapter Description	Adapter Locations											
			A2	A5	A6	B1	B2	B3	B4	B5	B6	B7	B8	
	-----/4014	Data Exchange Adapter												
	-----/4050	DASD Adapter (Optional)												
	4051/-----	Half-Inch Tape Adapter												
	6011/6010	Dual Asynchronous												
	6022/6021	8-Port RS232C (512KB)												
	6024/6023	8-Port RS232C/RS422A (512KB)												
	6026/6025	8-Port RS422A (512KB)												
	6027/-----	High-Performance SDLC												
	6029/6049	X.25/HDLC Packet Network												
	6034/6044	Token-Ring Adapter												
	6035/6045	IEEE 802.3 Adapter												
	6120/-----	3270 Adapter												
	7010/-----	5080 Graphics Adapter												
	7022/7021	8-Port RS232C (1MB)												
	7024/7023	8-Port RS232C/RS422A (1MB)												
	7026/7025	8-Port RS422A (1MB)												
	7040/-----	High Speed Printer Adapter												
	-----/7041	PS/2 S/370 Channel Emulator												

D Device Configuration

Customer Name _____

Customer Number _____





F1 — TTC2 Communication Line Information

Customer Name _____
 Customer Number _____

Line Identification																
S/370 Line Address																
Protocol: 4 = TTC2	4	4	4	4												
Interface: 4 = RS232 5 = RS422																
Line Connection: Using RS232 6 = Switched 7 = System to Work Station without Clock 9 = Nonswitched Using RS422: 6 = System to System without Clock 7 = System to Work Station without Clock 9 = IBM Cabling System Using V.24: 5 = Switched/Nonswitched with SNBU 6 = Switched 9 = Nonswitched																
Line Speed: 4 = 600 8 = 9,600 5 = 1,200 9 = 19,200 6 = 2,400 7 = 4,800																
2- or 4-wire (nonswitched line)																
Line Termination																
Line Conditioning																
Telephone Set Options																
Homologation Number																
Cable Part Number																
Adapter Card Location and Cable Connector	S	B	C	J	S	B	C	J	S	B	C	J	S	B	C	J



F2 — BSC Communication Line Information

Customer Name _____
 Customer Number _____

Line Identification																
S/370 Line Address																
Protocol: 5 = BSC	5	5	5	5												
Interface: 4 = RS232 6 = V.24																
Line Connection: Using RS232/V.24 6 = Switched 9 = Nonswitched																
Line Speed: 0 = 600 3 = 4,800 6 = 19,200 1 = 1,200 4 = 9,600 2 = 2,400 5 = 14,400																
2- or 4-wire (nonswitched line)																
Line Termination																
Line Conditioning																
Telephone Set Options																
Homologation Number																
Cable Part Number																
Adapter Card Location and Cable Connector	S	B	C	J	S	B	C	J	S	B	C	J	S	B	C	J

F3 — SDLC Communication Line Information

Customer Name _____
Customer Number _____

Line Identification																
S/370 Line Address																
Protocol: 6 = SDLC without NRZI 7 = SDLC with NRZI																
Interface: 4 = RS232 6 = V.24 8 = V.35 9 = X.21																
Line Connection: Using RS232/V.24: 6 = Switched 9 = Nonswitched Using V.35: 9 = Nonswitched Using X.21: 6 = Switched 9 = Nonswitched or circuit-switched																
Line Speed: Use for all EXCEPT V.35: 0 = 600 4 = 9,600 1 = 1,200 5 = 14,400 2 = 2,400 6 = 19,200 3 = 4,800 Use for V.35: 0 = 2,400 4 = 19,200 8 = 57,600 1 = 4,800 5 = 48,000 9 = 64,000 2 = 9,600 6 = 50,000 3 = 14,400 7 = 56,000																
2- or 4-wire (nonswitched line)																
Line Termination																
Line Conditioning																
Telephone Set Options																
Homologation Number																
Cable Part Number																
Adapter Card Location and Cable Connector	S	B	C	J	S	B	C	J	S	B	C	J	S	B	C	J

F4 — HDLC Communication Line Information

Customer Name _____
 Customer Number _____

Line Identification																
S/370 Line Address																
Protocol: 1 = HDLC	1	1	1	1												
Interface: 6 = X.21 BIS/V.24 8 = X.21 BIS/V.35 9 = X.21																
Line Connection: 9 = Nonswitched	9	9	9	9												
Line Speed: 2 = 2,400 For V.35, X.21 only: 3 = 4,800 7 = 48,000 4 = 9,600 8 = 56,000 5 = 14,400 9 = 64,000 6 = 19,200																
2- or 4-wire (nonswitched line)																
Line Termination																
Line Conditioning																
Homologation Number																
Cable Part Number																
Adapter Card Location and Cable Connector	S	B	C	J	S	B	C	J	S	B	C	J	S	B	C	J



G — Modem Information (Part 1 of 2)

Customer Name _____
Customer Number _____

Communication Line Identification _____

Local Modem:

1. Location and Phone Number _____

- 2. Type of Station Control Tributary
- 3. Clocking DCE DTE
- 4. Continuous Carrier Yes No
- 5. Data Set Ready (DSR) on during Loopback Yes No
- 6. Grounding to Modem Frame Yes No
- 7. Local Loopback Initiated by Pin 18 Yes No
- 8. Full Duplex Yes No
- 9. Auto-answer Control (switched line) Yes No
- 10. Auto-call Unit (switched line) Yes No
- 11. Ring Indicator (switched line) Yes No

12. Other Options _____

13. Manufacturer _____

14. Type and Model _____

15. FCC Registration Number (US only) _____

16. Ringer Equivalence _____

17. Homologation Number (other than US and Canada) _____

Local Coupler:

18. Manufacturer _____

19. Type _____

20. FCC Registration Number (US only) _____

21. Ringer Equivalence _____

(Continued)

G — Modem Information (Part 2 of 2)

Remote Modem(s):

22. Location(s) and Phone Number(s) _____

- | | | |
|---|----------------------------------|------------------------------------|
| 23. Type of Station | <input type="checkbox"/> Control | <input type="checkbox"/> Tributary |
| 24. Clocking | <input type="checkbox"/> DCE | <input type="checkbox"/> DTE |
| 25. Continuous Carrier | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 26. Data Set Ready (DSR) on during Loopback | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 27. Grounding to Modem Frame | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 28. Local Loopback Initiated by Pin 18 | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 29. Full Duplex | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 30. Auto-answer Control (switched line) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 31. Auto-call Unit (switched line) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| 32. Ring Indicator (switched line) | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

33. Other Options _____

34. Manufacturer _____

35. Type and Model _____

36. FCC Registration Number (US only) _____

37. Ringer Equivalence _____

38. Homologation Number (other than US and Canada) _____

Remote Coupler(s):

39. Manufacturer _____

40. Type _____

41. FCC Registration Number (US only) _____

42. Ringer Equivalence _____



Glossary

This glossary includes terms and definitions from the *IBM Dictionary of Computing*, SC20-1699.

A

adapter. See input/output adapter.

address. A name, label, or number that identifies a location in storage, a device in a network, or any other data source.

alphabetic. Pertains to the characters A through Z and sometimes includes the special characters #, \$, and @.

alphanumeric. Consisting of both letters and numbers and often other symbols, such as punctuation marks and mathematical symbols.

ANSI (American National Standards Institute). An organization sponsored by the Computer and Business Equipment Manufacturers Association for establishing voluntary standards.

APA. All-points-addressable.

application. The use to which a data processing system is put; for example, a payroll application, an airline reservation application, a network application.

application program. A program used to perform an application.

ASCII (American National Standard Code for Information Interchange). The code developed by ANSI for information interchange among data processing systems, data communication systems, and associated equipment. The ASCII character set consists of 7-bit coded characters (8 bits including parity bit), providing 128 possible characters. The ASCII character set consists of 34 control codes and 94 text characters including the letters of the alphabet in both upper and lower case, the 10 digits, and a number of special characters.

asynchronous transmission. In data communication, a method of transmission in which the bits representing a character are preceded by a "start" bit and followed by a "stop" bit. The start and the stop bit are used to separate the characters and to synchronize the receiving with the transmitting station. Contrast with synchronous transmission.

auxiliary storage. Data storage other than main storage; usually, a direct access storage device.

B

BASIC (beginners all-purpose symbolic instruction code). An easy-to-use problem-solving language that lets you write programs in English-like statements.

batch processing. A processing method in which a program or programs process data with little or no operator interaction. Contrast with interactive processing.

binary. Pertains to a system of numbers to the base of two; the binary digits are 0 (zero) and 1 (one).

binary synchronous communication (BSC). A form of communication line control that uses transmission control characters to control data transmission over a communication line.

BiProcessor. Two different computer architectures coupled into a multiprocessing system with both processors capable of independent or cooperative processing.

bit. In binary notation, either the characters 0 or 1.

bps. Bits per second.

BSC. See binary synchronous communication.

bus. (1) One or more conductors used for transmitting signals or power. (2) A physical facility in the processor on which data is made available to all attachments, but on which only addressed attachments may read or write in accordance with established conventions.

byte. (1) In System/370, eight adjacent bits that are operated upon as a unit and that constitute the smallest addressable unit in the system. (2) The amount of storage required to represent one alphanumeric character.

C

carrier sense multiple access with collision avoidance. A network in which the protocol requires carrier sense and in which a data station that intends to transmit first sends a jam signal. Later, while transmitting, if it detects another station's jam signal, it stops for a designated time before transmitting again.

CCITT. The Consultative Committee for International Telegraph and Telephone.

centimeter (cm). 0.39 inch.

CETI. Continuously Executing Transfer Interface.

channel. A path along which signals can be sent, for example, input/output channel.

channel-attached. (1) Pertaining to attachment of devices directly by data channels to a computer.(2) Pertaining to devices attached by cables rather than by telecommunication lines.

clocking. A method of controlling the number of data bits sent on a telecommunication line in a given time.

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. Also known as coax.

common carrier. In data communication, any government-regulated company that provides communication services to the general public.

communication. See data communication.

communication line. Any physical link (wire, telephone circuit, microwave, satellite) that is used to transmit data between computers and remote devices.

communications adapter. A hardware feature that lets you attach either communication lines, ASCII devices, or a local area network to the processing unit.

compatibility. The capability of a functional unit to meet the requirements of a specified interface.

configuration. The devices and programs that make up a system, subsystem, or network. The term configuration may refer to a hardware configuration or a software configuration.

configure. To describe to the system the devices and optional features installed on the system.

connectivity. A term used to describe the physical interconnections of multiple devices/computers/networks employing similar or different technology and architecture together to accomplish effective communication between and among connected members involving data exchange or resource sharing.

console. See processor console, system console.

controller. See input/output controller.

control program. A computer program that schedules and supervises the execution of programs in a computer system.

control station. The primary or controlling station on a multipoint communication line which controls the sending or receiving of data.

control unit. Circuitry or a device used to coordinate and control the operation of one or more I/O or storage devices and to synchronize the operation of such devices with the operation of the computer system as a whole.

control unit terminal (CUT). Same as general-purpose work station.

cps. characters per second.

crosstalk. The disturbance caused in a circuit by an unwanted transfer of energy from another circuit.

CUT. See control unit terminal.

D

DASD. See direct access storage device.

data communication. The transmission and reception of data between computers and remote devices according to appropriate protocols.

DBCS. See double-byte character set.

device. See input/output device.

device address. The identification of an input/output device by its channel and unit number.

DFT. See distributed function terminal.

diagnostics. Microcode that provides functions to detect and isolate hardware malfunctions.

direct access storage device (DASD). (1) A storage device in which the location of each data record can be directly addressed. (2) A device in which the access time is effectively independent of the location of the data. (Restriction: Does not refer to diskette unit.)

diskette. A thin, flexible magnetic disk and a protective jacket in which the disk is permanently enclosed.

diskette unit. The mechanism and electronics used to read and write data on diskettes.

display station. An input/out device containing a display screen and keyboard that allows a user to send information to, or receive information from, a system.

distributed data processing. Data processing in which some or all of the processing, storage and control functions, in addition to input/output functions, are

situated in different places and connected by transmission facilities.

distributed function terminal (DFT). Same as programmed work station.

distributed system. A corporate system that can function independently from the host to provide local processing capabilities that meet end-user requirements, yet connect into the host network for file transfer, access to other applications, and host-specific functions. See also distributed data processing and interconnected systems.

double-byte character set. A set of characters which are represented by two coded bytes of data. Contrast to single-byte characters.

duplex. Pertains to communication in which data can be transmitted between two stations in both directions at the same time. Duplex is possible only on nonswitched lines. Same as full duplex. Contrast with half-duplex.

E

ECMA. European Computer Manufacturers Association.

EIA (Electronic Industries Association). One EIA unit is equal to 44.45 mm (1.75 inches).

electrostatic printer. A nonimpact printer that electronically creates a latent image which is then made visible by adding toner to the paper.

end user. The ultimate source or destination of data flowing through a system. An end user may be an application program or a terminal operator.

F

FCC. Federal Communications Commission.

feature. A particular part of an IBM product that can be ordered separately.

fixed disk drive. A nonremovable disk drive used for DASD.

foot (ft). 12 inches, or 30.48 centimeters (cm).

G

graphics. The making of charts, pictures, and computer images.

general-purpose work station. A work station that needs a processing unit (for example, a 3274 Information Display Control Unit) to do functions like key stroke decoding, text formatting on the screen and more. A general-purpose work station may therefore also be referred to as control unit terminal (CUT). Contrast with programmed work station.

GMM. Group Multiplex Mode.

H

half-duplex. Pertains to communications in which data can be transmitted between two stations in both directions, but not at the same time. Switched lines, for example, are half-duplex only. Contrast with duplex.

hardware. The equipment, as opposed to the programs, of a computer system.

HDLC. See high-level data link control.

high-level data link control (HDLC). A form of communications line control that uses a specified series of bits rather than control characters to control data transmission over a communication line.

host system. The primary or controlling computer in a network.

I

IEEE. Institute of Electronic and Electrical Engineers.

inch (in). 0.083 feet, or 2.54 centimeters (cm).

initialize. To prepare for use. See IML, IPL.

initial microcode load (IML). The process of loading the system microcode and preparing the system for initial program load.

initial program load (IPL). The process of loading the system control programs and preparing the system to run jobs.

input/output (I/O). (1) Pertains to a device or to a channel that may be involved in an input process, and, at a different time, in an output process. (2) Pertains to a device whose parts can be performing an input process and an output process at the same time. (3) Pertains to either input or output, or both.

input/output adapter. A functional unit of an input/output controller that allows you to attach I/O devices directly, without separate control units.

input/output channel. In a data processing system, a functional unit, controlled by the processing unit, that handles the transfer of data between main storage and peripheral equipment.

input/output controller. A feature of the processing unit that acts as control unit and allows direct attachment of I/O devices to the computer.

input/output device. A unit in a data processing system by means of which data can be entered into the system, received from the system, or both.

input/output processor. A functional unit of an input/output controller that controls one or more input/output adapters.

installation. In system development, preparing and putting a functional unit (hardware or software) in place for use.

integrated adapter. An integral part of the processing unit that provides for direct connection of a device.

integrated communication adapter. An integrated adapter that allows connection of one or more telecommunication lines to a processing unit.

programmed work station. A work station that does functions that were previously done by the processing unit, such as key stroke decoding, text formatting on the screen, and other more complex tasks. Same as distributed function terminal (DFT). Contrast with general-purpose work station.

interconnected systems. Systems linked together in local or remote networks. The exchange of data between systems in a network is through standard channels or through communication lines. Communication between interconnected systems normally occurs without manual intervention; it is provided by combined hardware and software supporting the interconnection.

interface. A shared boundary. An interface might be a hardware component to link two devices or it might be a portion in storage or registers accessed by two or more computer programs.

I/O. See input/output.

IPL. See initial program load.

ISO. International Standards Organization.

J

job. A unit of work to be done by a system. May consist of more than one program.

K

KB. See kilobyte.

keyboard. A device with a systematic arrangement of keys by which a machine is operated or by which data are entered.

kilobyte. 1,024 bytes.

kilometer (km). 1000 meters, or 0.62 U.S. miles.

L

LAN. See local area network.

LAPB. Link access procedure balanced.

laser printer. See electrostatic printer.

local. Pertains to a device that is connected directly to the computer without using a communication line. Contrast with remote.

local area network (LAN). A network that is limited to a small area, for example the premises of an office building or plant.

M

magnetic tape. A tape with a magnetizable surface layer on which data can be stored by magnetic recording.

main storage. The part of the processing unit where all user programs are executed.

matrix printer. A printer in which each character is represented by a pattern of dots. Same as dot printer.

MB. See megabyte.

megabyte (MB). 1,048,576 bytes.

meter (m). 39.37 inches.

microprocessor. A hardware chip containing integrated circuits that execute instructions.

microcode. A group of microinstructions that control data flow and sequencing in a processor at a more fundamental level than a machine instruction.

mile (mi). 1.609 kilometers.

millimeter (mm). 0.04 inch.

mode. A method of operation.

modem. A device (modulator/demodulator) that converts data from the computer to a signal that can be sent over a communication line, and converts the signal received to data for the computer.

monitor. To supervise, control, and verify the operations of a system.

multipoint. In data communication, pertains to a network that allows two or more stations to communicate with a single system on one line.

MVS. Multiple virtual storage.

N

network. A collection of data processing products connected by communication lines for data processing or information interchange.

network control. In a network, the establishment, authorization, and maintenance of logical and physical connections between stations and applications, plus the synchronization, routing, integrity, and recovery of data transmitted during the established connections.

networking. Communication between stations in a network.

non-SNA terminal. A device supported by VTAM that does not use the SDLC/HDLC protocol. See also SNA-terminal.

nonswitched line. In data communication, a permanent connection between computers or devices that does not have to be established by dialing. Contrast with switched line.

numeric. Pertains to any of the digits 0 (zero) through 9 (nine).

O

OEM. See original equipment manufacturer.

online. Being controlled directly by or directly communicating with a computer.

open systems interconnection (OSI). Standardized procedures developed by the International Standards Organization (ISO) that make the interconnection of data processing systems in a network possible.

operate. To do a defined action, such as adding or comparing, performed on one or more data items.

operating system. Same as control program.

original equipment manufacturer (OEM) device. A device produced by a manufacturer other than IBM.

OSI. See open systems interconnection.

output. Data that has been processed.

P

packet switching. The process of routing and transferring data by means of addressed packets so that a communication path is occupied only during the transmission of a packet. On completion of the transmission, the communication path is made available for the transfer of other packets.

parity. The state of being either even-numbered or odd-numbered. A parity bit is a binary digit appended to a group of binary digits to make the sum of the digits either all odd (odd parity) or all even (even parity).

parallel port. A port used to attach devices such as matrix printers; it transmits one byte of data at a time.

PC. IBM personal computer. See also 3270-PC.

performance. That part of the system that is basically evident in elapsed time. Performance is largely determined by three factors: throughput, response time, and availability.

peripheral. Pertaining to an operation of to a device that is used to support the primary operations of a computer.

personal computer. A desktop, floor-standing, or portable microcomputer that usually consists of a system unit, a display, diskette drives, fixed-disk storage and an optional printer.

plotter. An output device that presents data in the form of a two-dimensional graphic representation.

point-to-point. In data communication, pertains to a communication line that connects a single remote station to a computer.

port. An access point for data entry and exit.

primary station. On a point-to-point communication line, the station that gains control of the line first. On a multipoint line, the station controlling communications.

printer. A device that writes output data from a system on paper or other media.

problem analysis. The process of identifying the source of a problem; for example, a program component, a machine failure, telecommunication

facilities, user or contractor-installed programs or equipment, an environment failure such as a power loss, or a user error.

processing unit. The part of the system that does the arithmetic and logical processing of data and contains processor storage.

processor. Same as processing unit.

processor console. The work station from which an operator can control and observe system hardware operation. See also system console.

processor storage. (1) The storage in a processing unit. (2) In virtual storage systems, synonymous with real storage.

program. Sequence of instructions for a computer. A program interacts and relies on either the hardware or other programs.

protocol. In data communication, a general term for the set of rules, requirements, and procedures for transmitting information to and from a particular type of terminal in a network.

PSTN. Public Switched Telephone Network.

public network. A communication common carrier network that provides data communication services over switched, nonswitched, or packet-switching lines.

R

read/write head. a magnetic head capable of reading and writing.

reference code. An error indication, displayed on the processor console screen, that refers the operator to a corrective action.

remote. Pertains to a computer or device that is connected to another computer or device over a communication line. Contrast with local.

RS-232-C. Interface between data terminal equipment and data communication equipment employing serial binary data interchange. (EIA communications standard interface.)

RS-422-A. Electrical characteristics of balanced voltage digital interface circuits. (EIA communications standard interface.)

S

SDLC. See synchronous data link control.

secondary station. The station that receives control from a primary station.

serial port. A port used to attach devices such as display stations and printers that transfer data one bit at a time.

SNA. See Systems Network Architecture.

SNA-terminal. A terminal designed to be compatible with SNA. SNA uses the as primary protocol SDLC. See also non-SNA terminal.

software. Programs, procedures, rules, and any associated documentation pertaining to the operation of a system. Contrast with hardware.

start/stop (S/S). A form of asynchronous communication line control that uses start elements and stop elements to control the transfer of data over a communication line. Each group of signals representing a character is preceded by a start signal and followed by a stop element.

station. A computer or device that can send and receive data over a communication line.

storage. (1) A device, or part of a device, that can hold data. (2) The action of placing data into a storage device.

streaming tape drive. A magnetic tape unit designed to make a nonstop dump or restore of magnetic disks without using interblock gaps. Contrast with start/stop tape drive.

subsystem. A part of a system that does defined functions.

switched line. In data communication, a temporary connection between computers or devices that is established by dialing. Contrast with nonswitched line.

synchronous data link control (SDLC). A form of communication line control that uses commands to control data transfer over a communication line.

synchronous transmission. In data communication, a method of transmission in which the sending and receiving of characters is controlled by timing signals. Contrast with asynchronous transmission.

system. The computer and its associated devices and programs.

system board. The planar assembly inside the system unit that contains the input/output processor and slots for input/output adapter cards.

system console. The work station from which you can control system software operation and do software service functions. See also processor console.

Systems Network Architecture (SNA). SNA specifies how products connect and communicate with one another in a network. SNA is a design for a total data communication system, encompassing every part of the communication network from the user's application program at the central site to the terminal at a remote location possibly hundreds of miles away. SNA itself is not a system, but an architecture — a specified set of formats and protocols to guide the design of machines and programs. The purpose of SNA is to define uniform formats and protocols for data communication networks, which have traditionally been characterized by programs, devices, and communication techniques that often were not compatible.

system reference code (SRC). A code that contains information, such as a failing field-replaceable unit, for a service representative.

system unit. The part of a computer that contains the processing unit and devices, such as fixed-disks and diskette drive.

S/370. System/370.

System/370 architecture. The attributes of a System/370 machine as seen by a programmer, and as defined in IBM System/370 principles of operation. The structure and behavior of the machine as distinct from its physical implementation.

T

tablet. In computer graphics, a locator device with a flat surface and a mechanism that converts indicated positions on the surface into coordinate data.

telecommunication. Communication over a distance, as by telegraph or telephone. Same as data communication.

Telegraph Terminal Control type 2. An asynchronous communication line control that uses the US ASCII transmission code. It is a line protocol suitable for TTY/TWX terminals.

terminal. Same as work station.

terminal multiplexer. A device that permits two or more terminals to share one coaxial cable as data transmission path.

token-ring network. A ring network that allows unidirectional data transmission among data stations using a token passing procedure. Tokens are passed in a circuit from node to node. A node that is ready to send can capture the token and insert data for transmission.

topology. The geometric configuration of connected units.

tributary station. In data communication, a secondary station on a multipoint line.

TTC2. See Telegraph Terminal Control type 2.

TTY. Teletypewriter equipment.

TWX. Teletypewriter exchange service.

U

upgrade. To add features to a system.

V

virtual machine (VM). The functional simulation of a computer and its associated input/output devices. Contrast with real machine.

VM. See virtual machine.

VM/IS. Virtual Machine/Integrated System.

VM/SP. Virtual Machine/System Product.

voice-grade line. A telephone line that is normally used for transmission of voice communications.

V.11. Electrical characteristics for balanced double-current interchange circuits for general use with integrated circuit equipment. (CCITT communications standard interface.)

V.24. List of definitions for interchange circuits between data terminal equipment and data circuit-terminating equipment. (CCITT communications standard interface.)

V.28. Electrical characteristics for unbalanced double-current interchange circuits. (CCITT communications standard interface.)

V.35. Data transmission at 48,000 bits per second using 60-108 kHz group band circuits. (CCITT communications standard interface.)

W

wide-area network. A network that provides communication services to a geographic area larger than that served by a local area network.

work station. A device that lets you transmit or receive information from a computer as needed to perform a job.

X

X.21. The physical interface between data terminal equipment and data circuit-terminating equipment for synchronous operation on public data networks. (CCITT communications standard interface.)

X.25. The CCITT recommendation that defines the

interface between data terminal equipment and packet switching networks.

Numerics

3270-type device. A device that appears as a 3270 device to the system; for example, a 3278/3279, or 3178/3179 display station, or a personal computer with the 3270 Emulation Adapter.

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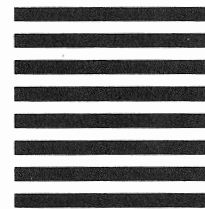
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