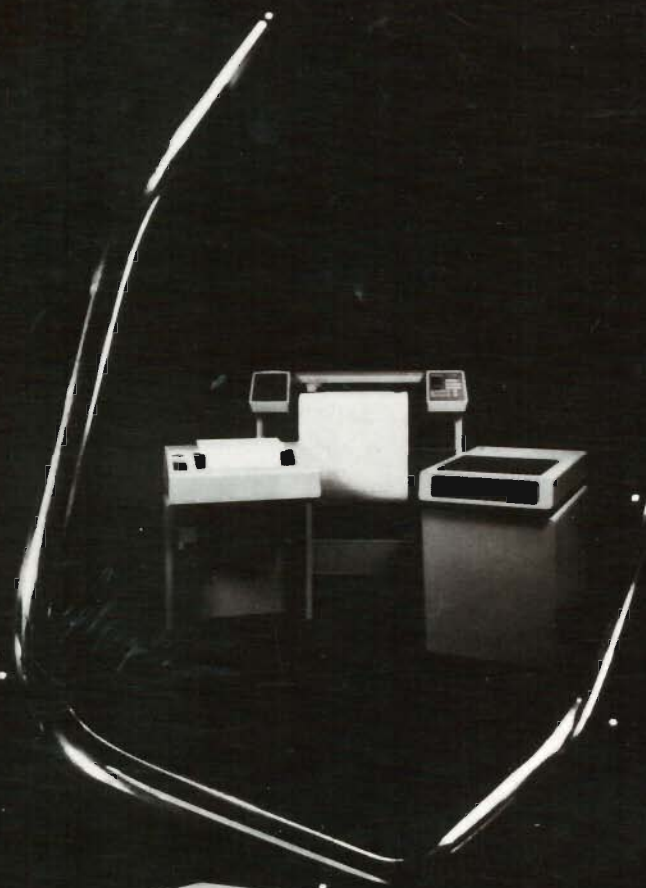


HP 9000 Data Communications

A Technical Supplement* for the
HP 9000 Computers

 HEWLETT
PACKARD

* Data subject to change.



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Introduction

Historically, computers have been large time-sharing systems with users clustered around them. These systems provided considerable computing and storage capabilities, but not always at the convenience of the users.

The past decade has seen the introduction of the "personal" computer system, available to individual users on a full-time basis. These smaller computers have in many cases proved to be much more convenient, and have reduced dependency on large mainframes.

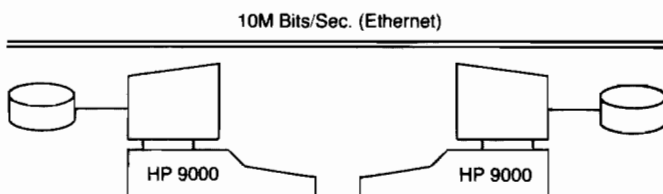
As the power of personal computers has increased dramatically during recent years, the restrictions of isolated systems have become apparent. For example, when a large software project is divided among several programmers using separate systems, there is a need to make each person's work available to the other members of the software team. The exchange of data can be done by exchanging media, such as flexible discs, or tapes. This method, however, tends to be inefficient and uses time that could be spent more productively.

Because of the need for many users facility-wide to share programs and data through a common system, Hewlett-Packard has committed itself to networking and data communications for all of the HP 9000 computers. The technique involves linking individual computer workstations to one another and to larger host computers now using terminal emulators, and in the future using local area networks.

Currently available HP networking products are described on the following pages.

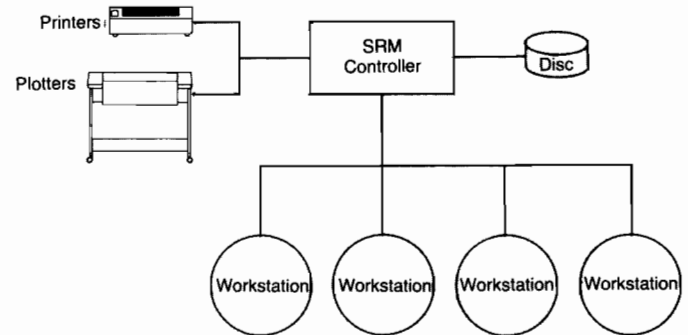
LAN 9000

The **LAN 9000** local area network provides a high-performance local area facility for connecting HP 9000 workstations running the HP-UX operating system. **LAN 9000** enables you to transfer files across the network, to access remote files, to start and terminate remote processes, and to communicate between processes running anywhere on the network.



Shared Resource Management System

The Hewlett-Packard Shared Resource Management System is a file-server and peripheral manager. This system allows users to share data and programs, and to share peripheral equipment such as printers and plotters. Up to 68 users can have their workstations connected to the controller unit of an SRM system. However, the system design center is 20 to 30 users.



Asynchronous HP-UX Communications

Several of the asynchronous communications utilities designed for the UNIX operating system are available for HP 9000 Series 500/600/700 and Series 210 systems running HP-UX. These utilities are designed to allow communications between HP-UX systems and other systems that are running HP-UX, UNIX*, or other operating systems.

These facilities include:

- atrm — Acts as an asynchronous terminal to any other system.
- cu — Acts as a terminal to another HP-UX or UNIX system.
- uucp — Copies a file to or from a HP-UX or UNIX remote system, or between remote systems.
- uux — Executes a process on a remote system.

* UNIX is a trademark of Bell Laboratories.

Terminal Emulators

For communication to central host computers, there are several terminal emulators available. These terminal emulators make it possible for a workstation to emulate a standard terminal to a host system. Some of the terminal emulators also provide the ability to transfer data to and from host systems.

The communications formats that are available are: standard asynchronous communications, IBM RJE 2780/3780 and IBM 3270.

Datacomm Interface Products

For users who wish to develop customized datacomm interfaces, there are three interface products available for HP 9000 computers:

Data Communications Interface — For users who require an asynchronous or Factory Data Link interface.

Programmable Datacomm Interface – For users who wish to develop their own custom Z-80 firmware for controlling asynchronous or synchronous communications.

IBM 3270 Datacomm Interface – For users who wish to use IBM 3270 protocol and wish to develop their own communications software.

Datacomm capabilities are closely related to the operating system that is being run on a computer. Hewlett-Packard offers two operating systems on HP 9000 Series 500/600/700 computers: HP-UX and BASIC. On the Series 200 computers, BASIC, Pascal, and HPL are available. The only operating system for Series 210 computers is HP-UX.

For information on HP 9000 product numbers, see:

- HP 9000 Series 500 Configuration Information and Order Guide, HP Publication No 5953-9403
- and
- Configuration Guide, HP Series 200 and 210 Computers, HP Publication No 5953-4659

Several of the terminal emulators for the Series 200 computers can be run with an environment disc that is shipped with the emulator software. Additionally, a full Pascal system can be used to invoke the Series 200 terminal emulators.

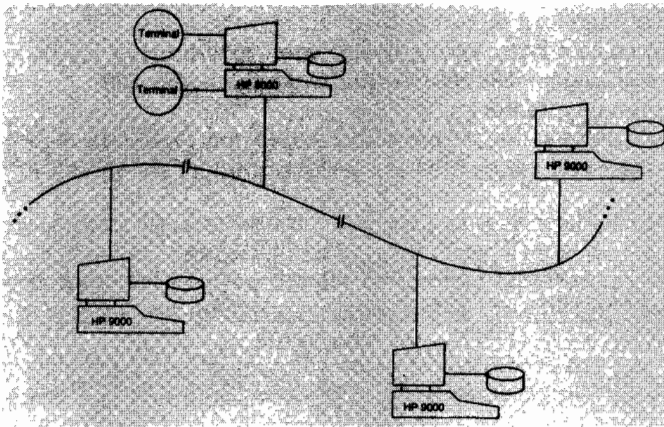
The operating systems and datacomm capabilities available for each of the HP 9000 computers are shown in Table 2.

Product Name	Operating Systems Languages	Models
LAN 9000	HP-UX	Series 500/600/700
Shared Resource Manager	BASIC, Pascal	Can be used with 9835, 9845, Series 200 Models 16, 20, 26, and 36. Can also be used with Series 500 Model 20 (BASIC only).
HP-UX Asynchronous Communications	HP-UX	Series 500/600/700 Series 210 (Aterm does not run on Series 210)
BASIC Asynchronous Terminal Emulator	BASIC	Series 500 Model 20
Asynchronous Terminal Emulator	Stand-alone	Series 200 Models 16, 20, 26 and 36
IBM RJE 2780/3780	HP-UX	Series 500/600/700
IBM 3270	Stand-alone (Can also be executed from Pascal)	Series 200 Models 16, 20 and 36
Programmable Datacomm Interface	BASIC, Pascal	Series 200 Models 16, 20, 26, and 36



LAN 9000 Local Area Network

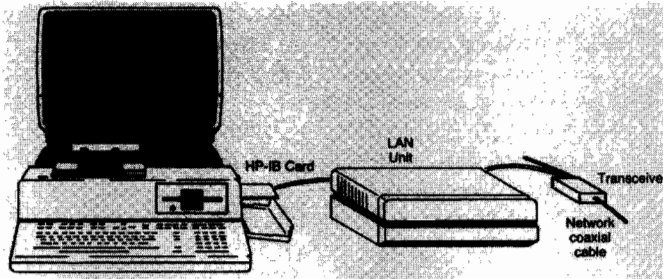
LAN 9000 is a high-performance local area network of HP-UX based HP 9000 Series 500/600/700 computers. Up to 100 workstations can be linked together by the LAN 9000 10 megabit/second coaxial cable.



LAN 9000 is virtually transparent to the user, and in many cases acts as an extension to the HP-UX operating system.

LAN 9000 Overview

HP 9000 Series 500/600/700 systems are connected to the network through a microprocessor-based device known as a LAN Unit. The LAN Unit is then connected to a transceiver on the network coaxial cable.



When a system has the LAN 9000 software installed, it has four network services available:

- **Remote File Access (RFA)** allows you to access directories, data files, and programs on other systems on the network.
- **Network File Transfer (NFT)** enables you to transfer files across the network.
- **Remote Process Management (RPM)** enables you to start or terminate processes on other network systems.
- **Interprocess Communication (IPC)** enables routines running on one system to communicate with processes running on other systems on the network.

A menu-driven diagnostic program is also provided with the network software. This diagnostic can be used to check the local network communications, and to check communications with other systems on the network.

Although the LAN 9000 software greatly adds to the capabilities of a workstation, the user interface is designed to be an extension of the HP-UX shell and intrinsic levels.

The network software has been designed with a layered approach, following the ISO Open Systems Interconnect model. The transport implementation follows the US Government standard ARPA specification, though it has not yet been verified for compatibility.

Network Utilities

Network File Transfer

The command **dscopy** is used to copy files over the network. This command is similar to the HP-UX command **cp**, which is used for local file copies. Unlike **cp**, however, you must specify a system name and the appropriate login information before a file can be copied.

For example, to copy a file from a system named **PC_design** to a system named **PC_fab**, you could execute the command:

```
dscopy PC_design#alpha:beta#source_file
PC_fab#delta:gamma#dest_file
```

The source and destination files are **source_file** and **dest_file** respectively. The login for **PC_design** is **alpha:beta**, and the login for **PC_fab** is **delta:gamma**.

If a file copy is to be copied to or from the local system, the local system name and login information can be omitted. An interactive mode is available for multiple network file copies. This interactive mode eliminates the need to rebuild the connection to a remote system for every file that needs to be copied.

Remote File Access

Remote file access allows you to extend your local HP-UX file system to include remote file systems. This allows you to access remote directories and files from your local system.

Remote device files can be accessed over the network, so devices such as printers and disc drives can be shared over the network. To use remote file access, you must "log in" to the remote system with the command **netunam**. For example, to log in to a remote system named **PC_design** with the username **alpha** and the password **beta**, you would execute the command:

```
netunam /net/PC_design alpha:beta
```

To access the remote file structure, a pathname must then be preceded by **/net** and then the system name. For example, if you wanted to change your working directory to a directory named **/users/hardware** on the remote system **PC_fab**, you would execute the command:

```
cd /net/PC_fab/users/hardware
```

Another example that demonstrates the use of remote file access is printing a file on a remote printer. First, you must log in with the command **netunam**. For this example, assume that the login from the previous example is still valid.

You can then print a file named **/documents/forecast** on a remote printer named **lpr** with the command:

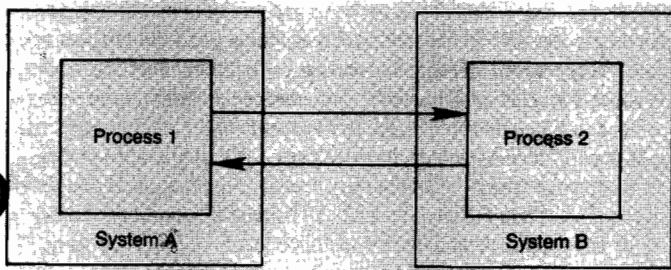
```
pr /documents/forecast > /net/PC_fab/
dev/lpr
```

Remote Process Management

Remote process management (RPM) makes it possible for you to start and terminate processes on remote systems. RPM is done through two intrinsics, **urpmcreate** and **urpmkill**. A list of parameters can be passed to a remote process when it is started. To start a remote process, a program must specify the name of the program, the location of that program, the login information, and a list of arguments if one is needed. When a remote process is started with **urpmcreate**, a 128-bit number assigned to that process is returned. If a remote process has been started with **urpmcreate**, it can be terminated with **urpmkill**. To terminate a remote process, a program must specify the location of the remote process, and the number that was assigned to that process when it was started.

Interprocess Communication

Interprocess communication (IPC) allows data to be passed among processes that are running at the same time on a network. IPC is done through a series of intrinsics that are used to build socket-based connections between processes. To communicate with IPC, two processes must cooperate in the connection-building process.



Connections can be made to several processes, thus allowing complex communications structures to be built. For example, one process could be sorting data from a file. A second process could then analyze that data, and a third process could display the information on a terminal.

LAN 9000 Specifications

Architecture	Bus Network
Implementation	Ethernet 1.0
Data Rate	10 megabits/second
Maximum number of Nodes	100
Maximum Length of Network Coaxial Cable	500 meters
Minimum Node Separation ..	2.5 meters
Maximum distance between ??? and network cable	50 meters

Ordering Information

HP Prod. No.

LAN Unit, transceiver, 15m transceiver cable and N-type connectors, HP-IB card and cable, N-type connectors, network software, and manuals	2285A
All items above, less the HP-IB card and cable	Opt. 001
230V 50 Hz operation	Opt. 015
Network Software only (on CS-80 tape cartridge)	Opt. 022
LAN Installation Kit. Includes tools, terminators, and N-type connectors	28656A
Installation kit described above, less tools	Opt. 001
15.2-meter transceiver cable (max. of 2 in addition to the cable supplied with 2285A)	1150-1629
Network Cable	
Ethernet Ver. 1.0 compatible coax (PVC)	92179E
Ethernet Ver. 1.0 compatible coax (teflon)	92179F

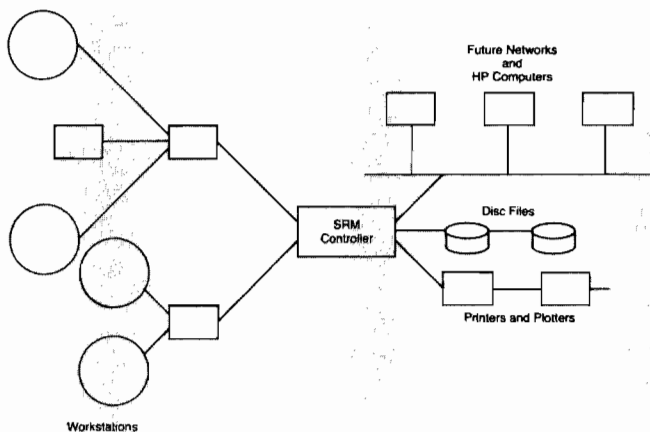
Shared Resource Management System

The past few years have seen the rise of the individual workstation, with a dedicated CPU for each user. This has brought considerable processing power to the individual, but it has also created the need for sharing data, programs, and peripheral equipment among workstations in a local cluster.

The Shared Resource Management (SRM) system provides a shared hierarchical file system for workstations, and enables all connected workstations to share high-performance peripherals, such as disc drives, printers, and plotters. This allows the individual workstations to remain autonomous for processing, but to still have the file and peripheral sharing capabilities of a large mainframe computer. Additionally, if a single workstation goes down, it does not degrade the performance of the remaining systems.

The Shared Resource Manager system is currently an independent file server and peripheral manager for single-user workstations. In the future, the SRM will integrate into the overall Hewlett-Packard strategy for networking computers by assuming two additional roles:

- As an intelligent file server for all systems connected to a network of different systems.
- As a gateway to allow SRM workstations to communicate with the rest of a network.



An SRM system currently enables a maximum of 68 users to share discs, printers, and plotters. If you connect more than 25 users to an SRM, you may notice some degradation in file access performance. Since processing power is a property of individual workstations, an SRM system can be expanded without losing the processing power of individual workstations.

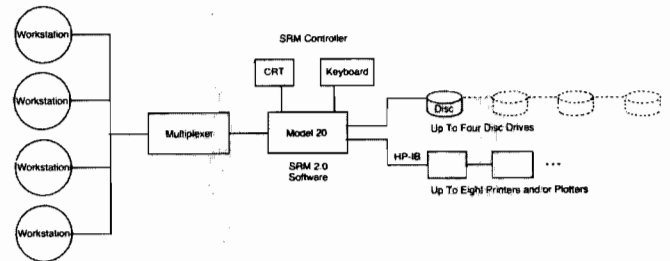
The SRM file system is a hierarchical file system. This file system can be accessed with the same mass storage commands normally used with BASIC and Pascal. The SRM file system is discussed in greater detail later in this chapter.

Supported Workstations

HP 9000 Series 200 Models 16, 20, 26, 36, 36C running Pascal or BASIC. Series 500/600/700 Model 20 (BASIC only)
9835A/B, 9845B/C

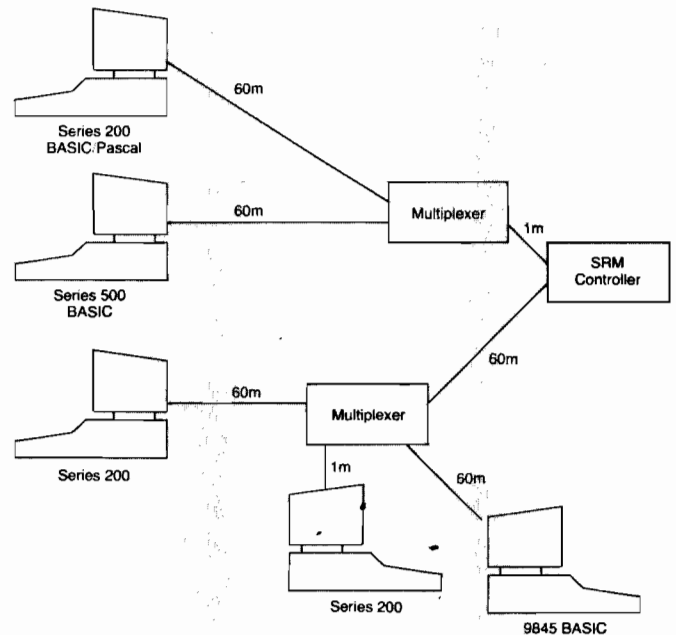
SRM System Design

An SRM system consists of a controller, one or more multiplexer/interface pairs, one to four disc drives, up to eight shared printers and/or plotters, and the connected workstations.



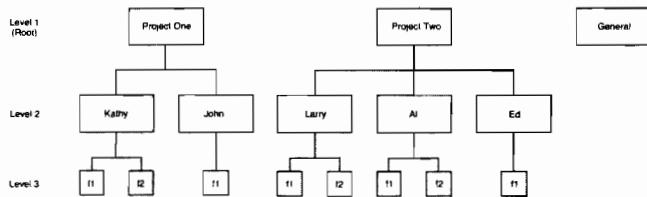
A dedicated Series 200 Model 20 or 26 is used as the heart of an SRM system. The Model 20 controller requires a keyboard and a CRT, which are used as the SRM console. The keyboard and CRT are built in to the Model 26. These systems are used to run the SRM operating system and execute console commands, and cannot be used as workstations.

For every four workstations on an SRM system, there must be an SRM multiplexer/interface pair. Multiplexers can be up to 60 meters from the controller, but must be within 1 meter of the SRM controller, or within 1 meter of a Series 200 Model 20, 26, or 36 for power. Workstations can be up to 60 meters away from a multiplexer. With this arrangement, workstations can be up to 120 meters away from the SRM console. When you order an SRM system, you automatically receive one multiplexer/interface pair, which can support four users. You can purchase additional multiplexers and interfaces.



SRM File Structure

Workstations connected to an SRM can access data and program files created by other workstations on that SRM. These files are accessed through a hierarchical directory structure. This tree-like structure allows files to be logically grouped. A typical, but small hierarchical directory structure is:



File names can be DIRectories, PROGRAM, BDAT, BIN, or ASCII file types. The DIR (directory) file type was created specifically for the SRM. SRM files are accessed by Series 200 and Series 500/600/700 systems from a non-scratchable binary with the commands CREATE DIR and CREATE ASCII (a non-scratchable binary cannot be erased from memory without cycling power).

The number of directories that can be located in the root (top) directory is limited only by the size of the discs being used on the SRM. Similarly, the number of levels and files stored is essentially unlimited. If a file is expanded and needs more disc space than was originally allocated, then that disc space is added in a completely transparent manner. Similarly, if the size of a file is decreased, only the necessary amount of disc space is used for that file. This guarantees that files only use as much disc space as they require.

Time Stamps

Each file on an SRM disc is given a time stamp that indicates the day, month, year, hour, and minute when the file was last modified. This time stamp is useful for informing users how current a data or program file is.

File Names

SRM networks allow file names of up to 16 characters. This lets you assign descriptive, meaningful names to directories and files.

File Interchangeability

Files can be read interchangeably between HP 9000 Series 500/600/700 Model 20 and Series 200 Model 16, 20, 26, and 36 systems and the 9835 or 9845 on an SRM. DIRectory, BDAT, and ASCII files are the only files that can be read interchangeably between 9835/45s and HP 9000 workstations on the SRM system.

Using SRM From BASIC

Before you can access SRM files from BASIC, you must specify the mass storage device as remote. One way to do this is to execute the command:

```
MASS STORAGE IS ":REMOTE"
or
MSI ":REMOTE"
```

To specify a file on an SRM, you must specify the unique pathname to that file. This pathname starts at the root (top) of the hierarchical file structure. For example, to

access the file PRICE_UPDATES in the file structure described above, you could specify the pathname /MARKETING/NICK/FINANCE/PRICE_UPDATES.

Another way for you to access an SRM file is to designate an SRM directory as your "active" mass storage device. This makes the SRM directory seem as if it were a dedicated local device. For example, you could specify a particular directory as your mass storage device with the command:

```
MSI "/MARKETING/NICK/FINANCE"
```

if you have executed one of the previous commands, or:

```
MSI "/MARKETING/NICK/FINANCE:REMOTE"
```

if not. All Series 200 and Series 500 BASIC commands may be used with SRM files.

Using SRM From Pascal

As with BASIC, you can change your current directory through the Pascal files. For a Pascal program to access an SRM file, it must execute one of four commands:

- reset – Open an SRM file for reading only.
- rewrite – Open a file for reading and writing.
- open – Open a file for random access.
- append – Add to an existing file.

When a file is opened with any one of these four commands, a filename internal to the program must also be specified. All read and write operations are then performed on that internal file.

A descriptor must also be included when a Pascal program opens an SRM file. This descriptor designates the access mode of the SRM file that you are using. The three possible SRM file modes are:

- shared – The SRM file is open for everyone with the correct pathname and security information to read and write.
- exclusive – Only you can access the file.
- lockable – Your program locks the file before accessing it, and unlocks it after accessing it.

File Protection

When you create a directory or a file, you can specify a password of up to 16 characters in length. When you assign a password to a file or a directory, you also specify the read and write capabilities that the password is granted. If no password is assigned, every user on the SRM Network has complete read and write capabilities for a file. After a password has been assigned to a file or directory, any SRM pathnames to that file or directory must include the proper passwords.

Using Shared Printers and Plotters

Closed ASCII files may be spooled to shared printers and plotters on an SRM system. To print a file, all you have to do is save that file and then copy it to the printer's spooler directory.

Plotters can be shared in much the same way as printers. Before you can plot a file, though, you must load the plotter and set the plotter pen limits.

Link Speed Vs. Throughput

System throughput is different from link speed. Link speed itself is usually not the factor that limits system performance.

Benchmarks must be run to measure system throughput for a particular application. The actual link speed of an SRM system is 700 Kbps.

An SRM system performs best when performing tasks that are not disc-intensive. For disc-intensive operations, a dedicated disc drive is recommended.

Commands Not Supported On the SRM

The following list describes the dedicated 9835/9845 mass storage commands not supported by the SRM. All HP 9000 Series 200 and Series 500/600/700 (BASIC only) commands are supported.

BUFFER#
CHECKREAD
FCREATE/FPRINT/FREAD
ILOAD/ISTORE
INITIALIZE
LOAD BIN/KEY/ALL
RE-SAVE/STORE
STORE ALL/BIN/KEY
TYP

Image Data Base Management Commands

Peripherals Supported On the SRM

The following is a complete list of the peripherals supported on SRM systems.

	HP Prod. No.
Hard Discs (up to four)	
16.5 Mbyte disc/tape drive	7908P
28.1 Mbyte disc/tape drive	7911P
65.6 Mbyte disc/tape drive	7912P
132 Mbyte disc/tape drive	7914P
Printers (only HP-IB devices are supported)	
400 line-per-minute line printer	2608A
Matrix impact	2608S
180 character-per-second matrix impact printer	2631G
Plotters	
B-Size 4-8 pen plotter	9872B/C/S/T
8-pen drafting plotter	7580, 7585

Ordering Information

The HP 9000 Series 200 Model 20 is recommended as the controller for SRM systems. The Model 20 has 16 slots that can be used to plug in memory, multiplexers, and to connect peripheral equipment. If you use a Model 26 as the controller, then you have eight slots available. Two slots must be used to hold two 256K RAM cards for either system. To order an SRM system with a Model 20 controller, order 9920A Opt. 500.

This includes the following items:

	HP Prod. No.
HP Series 200 Model 20	9920A
Two 256K byte RAM cards	98256A
DMA Controller Card	98620A
High Speed Disc Interface	98625A
Resource Manager Interface	98629A

Resource Manager Multiplexer	98028A
Video Card Set	98204A
Keyboard	98203A
SRM Operating System	98619A

In addition to the SRM package, you must order a monitor. Monitors for the Series 200 Model 20 are:

	HP Prod. No.
9-inch monitor	82912A
12-inch monitor	82913A

Since one multiplexer is required for every four users, you should order additional multiplexers and interfaces if you wish to connect more than four users to your SRM system.

If you wish to use a Model 26 system as your SRM controller, you should order 9826A Opt. 500.

This includes one each of the following items:

	HP Prod. No.
Series 200 Model 26	9826A
256K byte RAM card	98256A
DMA Controller Card	98620A
High-Speed Disc Interface	98625A
Resource Manager Interface	98629A
Resource Manager Multiplexer	98028A
SRM Operating System	98619A

Note: If you wish to use a Model 26 system as the SRM controller, you must order one additional 256K byte RAM card.

To Connect Workstations To the SRM

When you order the items to connect a workstation to an SRM, you must order an interface, the correct software or firmware, and cables. The cables are described after the system-specific ordering information. To connect any HP 9000 Series 200 computer to an SRM, order the following items:

	HP Prod. No.
Resource Management Interface	98629A
Resource Management Access Pack for:	
3½-inch external disc	09800-10320
5¼-inch external disc	09800-10520
5¼-inch internal disc	09800-10620
The 09800-10620 Resource Management Access Pack is also included with BASIC Extensions 2.1	98612A

To Connect a Series 500 Model 20 (BASIC only)

	HP Prod. No.
SRM Interface	27123A
Resource Management Software	97058A/M/R

To Connect a 9835A/B Or a 9845B/C

	HP Prod. No.
Resource Management Interface	98029A
Resource Management ROM	98419A

To Order Cables

	HP Prod. No.
10M (molded) Resource Management Cable	97061A
25M (molded) Resource Management Cable	97061B
60M (molded) Resource Management Cable	97061C
60M (molded on one end, unterminated on the other) Resource Management Cable	98691D

HP-UX Asynchronous Communications

Several asynchronous communication commands can be used on systems running the HP-UX operating system. These commands are:

- atrm** – Asynchronous terminal emulator for communicating with remote host systems. The host (remote) systems do not need to be running the HP-UX operating system.
- cu** – Asynchronous terminal emulator for communicating with remote host systems running either HP-UX or UNIX.
- uucp** – Routine to copy files to or from remote systems running HP-UX or UNIX.
- uux** – Routine to execute commands on remote HP-UX or UNIX systems.

Cu, **uucp**, and **uux** are included with the HP-UX operating system for HP 9000 Series 210 computers. **Aterm** is currently not available for Series 210 computers.

Aterm, **cu**, **uucp**, and **uux** are available for HP 9000 Series 500/600/700 computers with the product **HP-UX Asynchronous Communications** (HP Product No 97076).

Aterm

The HP-UX asynchronous terminal emulator **atrm** enables your HP-UX 9000 Series 500/600/700 system to communicate with other systems that are not running HP-UX. The parameters for this terminal emulator, including data rate, character size, and prompt character, are determined by a configuration file. This file must be created before the emulator can be invoked.

Because the parameters of the emulator are determined by configuration files, files can be built for communications among several remote systems. For example, you could build a file for communication over a direct link to an HP 3000 computer. If you named this file **fig3000** (for HP 3000 configuration file), you could establish communications with the command:

```
atrm fig3000
```

Some of the emulator parameters that can be determined by the configuration file are:

- input modes – Character, line, or block.
- output modes – Character or line.
- data bits – 5, 6, 7, or 8 data bits.
- stop bits – 1, 1.5, or 2 bits.
- parity – Odd, even, one, zero, or none.
- data rate – 50, 75, 110, 134.5, 150, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, or 19200 bits/second.
- modem – Enabled or disabled.
- gap – 0 to 254.
- echo – Enabled or disabled.
- handshaking – Terminal ENQ/ACK, host ENQ/ACK, terminal XON/XOFF, and host XON/XOFF.
- prompt timeout – 0 to 600 seconds.

Aterm File Redirection

An important feature of the **atrm** asynchronous terminal emulator is that both input and output can be redirected. This allows you to easily upload and download files to/from the remote computer. Command files can also be written that use **atrm** to automatically log in to a remote system.

Cu

Another HP-UX asynchronous terminal emulator is **cu**. This emulator is part of the Series 210 HP-UX operating system, but must be added to the Series 500/600/700 operating system. **Cu** is used for communicating with other HP-UX or UNIX systems.

Cu can be used over direct or modem lines, and at speeds ranging from 110 to 9600 bits per second.

When you execute **cu**, you must name an HP-UX device file. This named device file then specifies the direct or modem connection that is to be used for communications.

The options for **cu** are:

- data rate** – Speeds are determined by the device files available. Speeds up to 9600 bits/second are available, but speeds above 1200 bits/second are not recommended.
- echo** – Local echo enabled or disabled.
- handshaking** – ENQ/ACK enabled or disabled.
- parity** – Odd, even, or no parity.

As an example of the use of **cu**, suppose that you want to communicate with a remote HP-UX system through a direct connection. The remote system requires that communications be at 9600 bits per second. If the direct connection is through a line named **ttv12**, the command to establish the connection could be:

```
cu -s9600 -l ttv12 dir
```



Uucp

The command **uucp** is used to copy files between HP-UX systems, or between HP-UX and UNIX systems.

When you copy a file between systems, you only need to specify the source system and filename, and the destination system and filename. **Uucp** then automatically checks which line should be used to connect to the remote system, establishes the connection, and transfers the specified file.

Files are transferred in 64-byte packets. Error checking is done after each packet is received. If an error is indicated on a received packet, that packet is retransmitted up to five times. If that packet cannot be received after these attempts, the transmission is suspended.

As an example, suppose that you wish to copy a file named **/inventory/price_updates** on your system to a file named **/ledger/price_changes** on a remote system named **design_2**, then you could execute the command:

```
uucp /inventory/price_updates  
design_2!/ledger/price_changes
```

Uucp then automatically checks for a connection to the system **design_2**, establishes the connection, transfers the file, and then takes down the connection.

Before you can use **uucp**, several files must be added to your HP-UX system to make connections possible. After these files have been added (usually by the system manager), users only need to specify the system and file names when using **uucp**.

Uux

The command **uux** is used to execute commands on remote HP-UX or UNIX systems. Every HP-UX system contains a file that specifies which routines can be executed by users on remote systems, so you can protect your system against unauthorized remote execution of commands.

One possible use of **uux** would be to invoke a shellscript named `status_check` on a remote system. If a system named `design_2` has been configured to let you execute this command, you could start this process by entering:

```
uux design_2!status_check
```

If you attempt to execute a command on a remote system and you are not allowed to execute that command, you are notified through the remote mail facility.

Ordering Information

Cu uucp, and **uux** are included with the HP-UX operating system for the HP 9000 Series 210. To use the asynchronous communication facilities on a Series 210 computer, you must order:

HP Prod. No.

Series 210 Communication Hardware

RS-232 Interface Card 98626A

Or

Serial Datacomm Interface 98628A

To receive HP-UX Asynchronous Communications (including `atrm`, `cu`, `uucp`, and `uux`) for a Series 500/600/700 computer, you must order HP P/N 97076A/M/R.

If you add **HP-UX Asynchronous Communications** to a Series 500/600/700 computer, then you must install an interface card if you want that system to be able to originate communications requests, and you must install another interface card if you want that system to be able to respond to requests from other systems.

If a system is only able to respond to requests from other systems, then it will still be able to transfer files with **uucp**. After an originating system has completed its file transfers, it checks to see if the responding system has any pending files that have to be transferred in the other direction. The responding system, however, has no control over how often a requesting system checks for pending file transfers.

Similarly, if a system is to be able to originate and receive connection requests over phone lines, then that system must be connected to two modems.

HP Prod. No.

Series 500/600/700 Hardware

Asynchronous Serial Interface Card
(includes 5m RS-232-C cable with a
female connector) 27128A

Series 210 Hardware

Data Communications Interface 98628A

Or

Serial Datacomm Interface 98626A

Terminal Emulators

Hewlett-Packard offers several terminal emulators for HP 9000 datacomm. Terminal emulators enable workstations to act as terminals for large host systems. Workstations can be connected to host computers through direct connections, or through phone lines with modems.

Some terminal emulators provide general-purpose asynchronous communication with host systems, while others provide special communication formats.

BASIC Asynchronous Terminal Emulator For the Series 500/600/700 Model 20

The BASIC Asynchronous Terminal Emulator can be used on HP 9000 Series 500/600/700 computers running BASIC. This emulator can be used to communicate over RS-232 lines. This emulator enables your system to act like a remote terminal to the host system, and to transfer files to and from a local mass storage device. If you wish to transfer files and still be able to use the keyboard for other tasks, then the emulator can be run as a background process.

The emulator can easily be configured to match the host computer's datacomm format through a series of configuration menus. Many of the parameters can be selected by simply pressing the appropriate softkey.

Mode – Character or line mode.

Gap – 0 to 250.

Parity – Even, odd, one, zero, and none.

Bits/char – 5–8 bits/character.

Speed – 50, 75, 110, 135, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, and 19200 bits/second.

Echo – Remote, local, both, or none.

Handshaking – Host ENQ/ACK, terminal ENQ/ACK, Host XON/XOFF, and terminal XON/XOFF.

Other parameters include end-of-line characters for both the emulator and the host, and prompt characters.

Many of the keys, including the special function keys, can be redefined for special user functions.

Ordering Information

HP Prod. No.

BASIC Asynchronous Terminal
Emulator 97056
Asynchronous Serial Interface Card
with female connector 27128A

Aterm

The HP-UX asynchronous terminal emulator **aterm** provides asynchronous communication capabilities for systems that are running the HP-UX operating system. **Aterm** is added to the HP-UX operating system when you install **HP-UX Asynchronous Communications**. Since **aterm** becomes part of the operating system, it can use standard HP-UX pathnames to specify input and output files.

The emulator parameters, such as data rate, parity, and handshaking are determined by configuration files. This makes it possible to build a custom configuration file

for each remote system with which the emulator is to communicate.

Aterm is described in the preceding section, **HP-UX Asynchronous Communications**.

Series 200 Asynchronous Terminal Emulator

The Asynchronous Terminal Emulator is a program that runs on the HP 9000 Series 200 Model 16, 20, 26 and 36 computers.

This program allows these computers to emulate a subset of the HP 2621 terminal, and can operate either in character or line modify modes. Other capabilities include file transfer between a local mass storage device and the remote computer, menu-driven configuration, automatic configuration on power up, and support of display enhancements.

The emulator provides a 24-by-80 character display screen.

You can program the emulator's characteristics, including the data rate, echo, and parity. With proper handshaking, the emulator can handle data rates up to 19200 bits per second.

Some of the features that can be selected on the emulator are:

Characteristic	Legal Values	Default Values
Speed (Baud rate)	50 baud – 19.2K baud	2400 baud
Bits/character	5, 6, 7 or 8	7 bits/character
Number of stop-bits	0, 1, 1.5 or 2	1 stop bit
Parity	Odd, Even, "0" or "1"	Odd parity
Software Handshake	ENQ/ACK, DC1/DC3 host or terminal	ENQ/ACK
Modem Handshake	Full-duplex or handshake off	Handshake off
Prompt sequence	Any two ASCII characters	DC1
End-of-Record sequence	Any two ASCII characters	C _R
End-of-File sequence	Any two ASCII characters	None

If you wish to save your current emulator configuration, you can write it out to a mass storage file. That file is read for configuration information the next time the emulator is started. Line-drawing characters are not supported.

Terminal Emulators

Hewlett-Packard offers several terminal emulators for HP 9000 datacomm. Terminal emulators enable workstations to act as terminals for large host systems. Workstations can be connected to host computers through direct connections, or through phone lines with modems.

Some terminal emulators provide general-purpose asynchronous communication with host systems, while others provide special communication formats.

BASIC Asynchronous Terminal Emulator For the Series 500/600/700 Model 20

The BASIC Asynchronous Terminal Emulator can be used on HP 9000 Series 500/600/700 computers running BASIC. This emulator can be used to communicate over RS-232 lines. This emulator enables your system to act like a remote terminal to the host system, and to transfer files to and from a local mass storage device. If you wish to transfer files and still be able to use the keyboard for other tasks, then the emulator can be run as a background process.

The emulator can easily be configured to match the host computer's datacomm format through a series of configuration menus. Many of the parameters can be selected by simply pressing the appropriate softkey.

Mode – Character or line mode.

Gap – 0 to 250.

Parity – Even, odd, one, zero, and none.

Bits/char – 5–8 bits/character.

Speed – 50, 75, 110, 135, 150, 300, 600, 900, 1200, 1800, 2400, 3600, 4800, 7200, 9600, and 19200 bits/second.

Echo – Remote, local, both, or none.

Handshaking – Host ENQ/ACK, terminal ENQ/ACK, Host XON/XOFF, and terminal XON/XOFF.

Other parameters include end-of-line characters for both the emulator and the host, and prompt characters.

Many of the keys, including the special function keys, can be redefined for special user functions.

Ordering Information

HP Prod. No.

BASIC Asynchronous Terminal

Emulator 97056

Asynchronous Serial Interface Card

with female connector 27128A

Aterm

The HP-UX asynchronous terminal emulator **aterm** provides asynchronous communication capabilities for systems that are running the HP-UX operating system. **Aterm** is added to the HP-UX operating system when you install **HP-UX Asynchronous Communications**. Since **aterm** becomes part of the operating system, it can use standard HP-UX pathnames to specify input and output files.

The emulator parameters, such as data rate, parity, and handshaking are determined by configuration files. This makes it possible to build a custom configuration file

for each remote system with which the emulator is to communicate.

Aterm is described in the preceding section, **HP-UX Asynchronous Communications**.

Series 200 Asynchronous Terminal Emulator

The Asynchronous Terminal Emulator is a program that runs on the HP 9000 Series 200 Model 16, 20, 26 and 36 computers.

This program allows these computers to emulate a subset of the HP 2621 terminal, and can operate either in character or line modify modes. Other capabilities include file transfer between a local mass storage device and the remote computer, menu-driven configuration, automatic configuration on power up, and support of display enhancements.

The emulator provides a 24-by-80 character display screen.

You can program the emulator's characteristics, including the data rate, echo, and parity. With proper handshaking, the emulator can handle data rates up to 19200 bits per second.

Some of the features that can be selected on the emulator are:

Characteristic	Legal Values	Default Values
Speed (Baud rate)	50 baud – 19.2K baud	2400 baud
Bits/character	5, 6, 7 or 8	7 bits/character
Number of stop-bits	0, 1, 1.5 or 2	1 stop bit
Parity	Odd, Even, "0" or "1"	Odd parity
Software Handshake	ENQ/ACK, DC1/DC3 host or terminal	ENQ/ACK
Modem Handshake	Full-duplex or handshake off	Handshake off
Prompt sequence	Any two ASCII characters	DC1
End-of-Record sequence	Any two ASCII characters	C _R
End-of-File sequence	Any two ASCII characters	None

If you wish to save your current emulator configuration, you can write it out to a mass storage file. That file is read for configuration information the next time the emulator is started. Line-drawing characters are not supported.

Emulator Operation

In addition to the standard terminal emulation abilities, the emulator enables you to transfer ASCII files between a local mass storage device and a remote system.

An environment disc is included with the terminal emulator software. This minimum system, or a Series 200 Pascal 2.0 or more recent Pascal system can be used to drive the emulator.

The terminal emulator uses the built-in serial interface on Model 16 computers. For other Series 200 computers, a serial datacomm interface card must be used. The Asynchronous Terminal Emulator and the Block Mode Terminal Emulator can utilize either of two interface cards: the 98626A RS-232 Interface card, or the 98628A Data Communications Interface Card.

Ordering Information

	HP Prod. No.
Series 200 Terminal Emulator for:	
3½-in. external disc drives	09800-10380
5¼-in. external disc drives	09800-10580
5¼-in. internal disc drives	09800-10680
Required hardware:	
Series 200 computer with any language system and 384Kb RAM.	
Data Communications Interface	98628A
Or	
Serial Interface	98626A
Cable Options:	
4.9M RS-232-C DTE (male) cable with test connector	Opt. 001
4.9M RS-232-C DCE (female) cable with test connector	Opt. 002
4.9M RS-449/423 DTE (male) cable with test connector	Opt. 003
Optional supported hardware:	
Pods:	
13265A 300 Baud Modem (U.S./Canada only)	
Printers:	
All HP-IB and GPIO printers, and serial printers interfaced to the 98626A supported by Pascal 2.0 on the Series 200 computer.	
Mass Storage:	
All disc drives supported by Pascal 2.0 on the Series 200 computer.	
Note: The Opt. 003 cable cannot be used with the Model 16 or with the 98626 Interface Card.	

Series 200 Block Mode Terminal Emulator

The Series 200 Block Mode Terminal Emulator provides all of the capabilities of the Series 200 Terminal Emulator, plus several enhancements. In addition to line and character mode operation, the Block Mode Terminal Emulator supports:

- **Block Mode** – The emulator provides the block mode transfer capabilities of an HP 2622A terminal.
- **Multiple configuration files** – Five files can be used to store and recall emulator configurations.
- **Protected fields**
- **Line Modify Mode**
- **German, French, Swedish, Finnish, Spanish, and Katakana keyboards**

Like the Series 200 Terminal Emulator, the Block Mode Terminal Emulator requires a system with a minimum of 512K of memory. The Block Mode Emulator also does not support the line-drawing character set. Unlike the other emulator, though, the block mode emulator does not support the Series 200 Model 26.

The Block Mode Terminal Emulator can be run with either an environment disc that is included with the emulator software, or with a Series 200 Pascal 2.1 or more recent Pascal system.

Ordering Information

	HP Prod. No.
Block Mode Asynchronous Terminal Emulator for:	98790A/M/R
3½-inch external disc	Opt. 630
5¼-inch external disc	Opt. 650
5¼-inch internal disc	Opt. 655
Required hardware:	
Series 200 computer with any language system and 512Kb RAM.	
Data Communications Interface	98628A
Or	
RS-232 Interface	98626A
Cable Options:	
4.9M RS-232-C DTE (male) cable with test connector	Opt. 001
4.9M RS-232-C DCE (female) cable with test connector	Opt. 002
4.9M RS-449/423 DTE (male) cable with test connector	Opt. 003
Optional supported hardware:	
Pods:	
13265A 300 Baud Modem (U.S./Canada only)	
Printers:	
All HP-IB and GPIO printers, and serial printers interfaced to the 98626A supported by Pascal 2.1 on the Series 200 computer.	
Mass Storage:	
All disc drives supported by Pascal 2.1 on the Series 200 computer.	
Note: The Opt. 003 cable cannot be used with the Model 16 or with the 98626 Interface Card.	

IBM Communications

There are two IBM communication formats available for HP 9000 computers: RJE 2780/3780 (batch communications) and 3270 (interactive communications).

2780/3780 Communications

The RJE Emulator package enables your HP 9000 Series 500/600/700 computer to communicate with remote computers and peripherals that support IBM 2780/3780 Remote Job Entry (RJE) data transmission protocols. The remote computer is usually an IBM 360 or 370 computer, but it can also be any other computer that supports IBM 2780/3780 protocols.

The emulator can also communicate with other 2780/3780-compatible devices for file transfer. These devices include:

1. An HP 3000 system that is using RJE/3000,
2. An HP 1000 system that is using RJE/1000, or
3. Another HP 9000 running another emulator.

RJE is a batch-mode means of exchanging data between computers. Data can be transmitted with 2780 communications over leased, privately owned, or switched telephone networks at up to 4800 baud. Data can be transmitted at up to 7200 baud over leased or private lines with 3780 communications. Additionally, a 3780 terminal permits space compression, thereby raising the throughput rate.

The supported features of the RJE Terminal Emulator are:

- Binary Synchronous Communications with your choice of EBCDIC or ASCII transmission codes.
- Space compression and expansion (in 3780 mode only).
- Transparent mode – the transparency feature allows all possible ASCII or EBCDIC bit combinations to be used as data.
- Full or half-duplex operation.
- Programmable modem timeout value.

The following IBM 2780/3780 features are not supported:

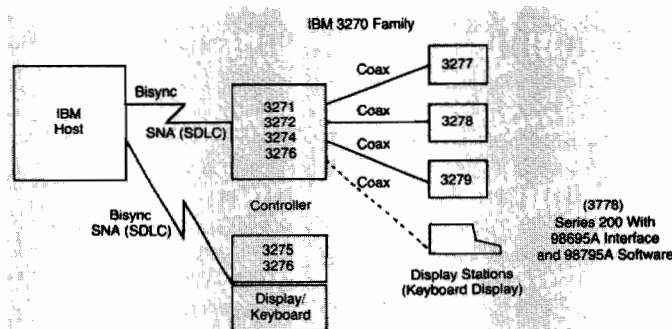
- Interactive mode (instead of ACK a message is transmitted).
- Multipoint transmission.
- 6-bit transcode.
- Bell messages.

Ordering Information

	HP Prod. No.
HP 9000 Series 500/600/700 RJE PSI Card	27122A
RJE Software:	
Single-user	97077A
Multi-user	97087A

3270 Communications

IBM 3270 is an interactive standard for communications with IBM computers. For an IBM mainframe to communicate with 3270 display stations, there must be a control unit to which the display stations can connect. This control unit can either be connected directly to the mainframe, or through modems and phone lines.



The Series 200 3270 Display Station Emulator allows HP 9000 Series 200 computers to act like IBM 3278-2 display stations when connected to a controller. The emulator provides the 3278-2 24 x 80-character screen. Additionally, the emulator simulates the 3278-3 (32 x 80) and the 3278-4 (43 x 80) display screens. Because of the physical limitations of the Series 200 display screens, only 24 lines are displayed at a time. The additional lines can be accessed by rotating a knob on the keyboard.

The emulator is capable of emulating the 3279 (color) display station. When emulating a 3279 display station, the emulator provides only base color capability and no graphics capabilities.

You must have the 98695 3270 Coax Interface to use this emulator. The emulator cannot be used on Series 200 Model 26 computers because of the limited screen size. Model 16 computers must contain the 09816-66582 alpha highlights board. All systems must have at least 384K of RAM.

The Series 200 3270 Display Station Emulator can be used with these controller units:

- 3274 with Type A coax Model Numbers 1A, 1C, 1D, 21C, 21D, 31C, 31D, 41A, 41C, 41D, and 51C.
- 3276 with Type A coax Model Numbers 01, 02, 03, 04, 11, 12, 13, 14.
- IBM Integral Controller with Type A coax for the IBM Model 4331 and 4341 CPUs.
- Memorex Model 2076 with Type A coax.

Although the emulator is restricted in which 3270 display stations it can simulate, the interface card is capable of performing all forms of 3278 and 3279 communication, if you wish to write your own terminal emulator.

You can order the card separately. This card is described in Datacomm Interface Products.

Ordering Information

	HP Prod. No.
3270 Terminal Emulator for the Series 200	98795A
HP 9000 3270 Card for Models 16, 20, and 36	98695A

Datacomm Interface Products

Three special datacomm products are available for HP 9000 computers, including the Data Communications Interface (HP 98628A), the Programmable Datacomm Interface (HP 98690A), and the 3270 Interface. These three interface products can be used on the HP 9000 Series 200 computers.

The Data Communications Interface is intended for BASIC and Pascal users who wish to use asynchronous or Data Link (DL) communications on HP 9000 Series 200 computers.

The Programmable Datacomm interface is the same card as the Data Communications Interface, but is supplied with no ROM and 4K (instead of 2K) of RAM. This card is intended for customers who wish to develop their own communications protocols.

Data Communications Interface

The 98628A Data Communications Interface provides both protocol management and electrical levels for asynchronous serial communications. This card also supports the Distributed System Network/Data Link (DSN/DL) protocol for communications with HP 1000 minicomputers. Several terminal emulator programs are available that use this card for communication with host computers.

Data Rates and Formats

All signals present at the Data Communications Interface card's connector conform electrically to EIA RS-232-C and CCITT V.28/V.24 specifications.

The card supports:

Bits/char – 5–8 bits/character.
Parity – Even, odd, one, zero, and none.
Speeds – 50, 75, 110, 134.5, 150, 200, 300, 600, 1200, 1800, 2400, 3600, 4800, 7200, 9600, and 19200 bits/second.
Stop bits – 1, 1.5, or 2.

Interrupt Capability

The 98628A Serial Interface Card is capable of generating interrupts to the computer. The interface can be programmed to interrupt on the following conditions:

ASYNC

- Data or control block available
- Prompt received
- Framing and/or parity error
- Modem line change (DSR, DCD, CTS, RI)
- No activity timeout
- Lost carrier or connection timeout
- End-of-line received
- Break received

DATA LINK

- Data block available
- Space available for new transmission block
- Receive or transmit error
- Modem line change (DSR, DCD, DTS, RI)
- No activity timeout
- Lost carrier or connection timeout

Switch Configuration

The following parameters can be set with switches on the Data Communications Interface:

ASYNC

These settings are active then the ASYNC/DATA LINK switch is set to its ASYNC position.

Parity – Bits/Char – A two-bit switch that selects parity and bits/character combinations.

Hardware Handshake – A 2-bit switch that selects Handshake Off non-modem connection; full-duplex modem connection, half-duplex modem connection, and handshake-on non-modem connection.

Baud Rate – Stop Bit – A 3-bit switch that selects between combinations of baud rate/stop bit settings. Valid settings are:

Baud Rate	Stop Bits
110	2
150	2
300	1
600	1
1200	1
2400	1
4800	1
9600	1

DATA LINK

These settings are active when the ASYNC/DATA LINK switch is set to its DATA LINK position.

DID – A 3-bit switch that selects a device address for the 98628. Address values are @, A, B, C, D, E, F, or G.

Baud Rate – A 2-bit switch that selects the data rate. The data rates are 300, 1200, 9200, and 9600 bits/second.

Hardware Handshake – A 2-bit switch that selects between a handshake off non-modem connection, a full-duplex modem connection, a half-duplex modem connection, and a handshake-on non-modem connection.

Electrical Specifications

Interface Compatibility

RS-232-C, V.24/V.28
RS-449
RS-423, V.10

Power Consumption

Power for the Data Communications Interface and accessories must be supplied by the Series 200 mainframe.

	+5V Typ	+12V Typ	–12V Type
Card power consumption	715mA	37mA	60mA
13265 300 baud modem	100mA	45mA	45mA
13264A Data Link adapter	30mA	160mA	23mA

Data Communications Interface Licensing

Datacomm licenses for the 98628A Opt. 100 have been applied for in Germany, UK, Finland, Sweden, Norway, and Denmark. Licenses have been approved in Australia and by the German PTT. These licenses do not apply to the 98691A PDI card!

Ordering Information

	HP Prod. No.
Data Communications Interface	98628A
4.9M RS-232-C DTE (male) cable with test connector	Opt. 001
4.9M RS-232-C DCE (female) cable with test connector	Opt. 002
4.9M RS-449/423 DTE (male) cable with test connector	Opt. 003
Data Link Adapter	13264A
300 Baud Modem	13265A

Programmable Datacomm Interface

The 98691A Programmable Datacomm Interface is a serial communications card that can be tailored for special data communications applications. This card is intended for the user who wishes to develop his own Z-80 firmware to control communications. Hewlett-Packard offers several development tools to help users develop their firmware.

PDI Development Package

The PDI Development package contains:

- **The Firmware Development Guide** – Intended for the OEM or end user as a foundation for designing applications-oriented communications products. To use this guide, you should be able to understand and program Z-80 assembly language. This manual leads you from a general overview of the 98691A hardware and firmware capabilities into the detailed specifics of the card.
- **An extender board** – Allows access to the PDI card while it is connected to a system.
- **Loopback connectors** – Can be used with the 98628 disc exerciser on the system disc if recommended firmware is included in your custom ROM. Both balanced and unbalanced connectors are provided.
- **A Starter Firmware Disc** – Provides the ASCII source code of the Z-80 routines listed in the Firmware Development Guide. The Starter Firmware Disc also contains a utility to download the Z-80 ASCII source code to an HP 64000 Logic Development Station or a similar Z-80 development station.

Programmable Datacomm Interface

Some of the features of the 98691 Programmable Datacomm Interface card are:

- One Z-80A-SIO/serial I/O channel "USART" controller. This chip provides:
 - One full-duplex channel
 - Synchronous and asynchronous communications
 - CRC-16 or CCITT block frame check for synchronous operation
 - Vectored interrupts

- One Z80A-CTC Counter Timer Chip. This chip provides a system timer and a programmable baud rate for the SIO channel. In synchronous mode, the baud rate can range from 50 to 460 Kbaud. In asynchronous mode, the baud rate can range from 50 to 57 Kbaud. An external clock of up to 736 Kbaud can be used for the synchronous mode.
- 4K bytes of Static RAM for buffers and/or tables.
- One EPROM/ROM socket capable of holding a 2732, 2764, or similar EPROMS or ROMS compatible with the JEDEC pinout. The board must be jumpered for the type of memory chip used.
- Multidrop capability.
- Eight switches which are accessed as two nibbles. These switches can be used to control firmware functions.

Physical Description

Size 13.5 by 17 cm
Weight 310 grams (11 oz)

Electrical Specifications

Interface Compatibility

RS-232C, V.24/V.28
RS-449
RS-423, V.10
RS-422, V.11 (with user-built cable)

Power Consumption

Power for the PDI card and accessories must be supplied by the Series 200 mainframe.

	+5 Typ	+12 Typ	-12 Typ
HP 98691 PDI Card	720mA	37mA	60mA
HP 13264A Current Loop Adapter	200mA	90mA	80mA
HP 13265A 300 Baud Modem Adapter	100mA	45mA	45mA
HP 13266A Data Link Adapter	30mA	160mA	23mA

PDI Support

Because of the customizable nature of the PDI card, the support policies are:

Customer Support

The 98690A PDI Development package will be included in the Series 200 Software Notification Service. Notification of upgrades, including ordering procedures to either the Firmware Development Guide or to the Starter Firmware Disc, will be published in the *communicator Magazine*.

CE Support

No monthly service contracts are offered, because if an HP Computer Engineer should accidentally damage a user ROM/EPROM, the liability incurred by Hewlett-Packard is ambiguous and potentially large. However, on-site hardware service can be specially arranged through the local HP office.

No PDI card installation service is offered.

The PDI card is eligible for exchange and repair, if all firmware is removed.

Except for the PDI card, systems including a PDI may still be covered by by monthly maintenance contracts. HP Computer Engineers will service systems with PDIs

installed. However, if the problem is isolated to the PDI card, the HP Computer Engineer will not service the PDI card, and will charge for time and materials.

PDI Datacomm Licensing

If you will be selling or using the PDI card in any country requiring a datacomm license, you will have to submit an application for the PDI card to the proper authorities with your custom firmware.

Ordering Information

Series 200 Desktop Computer with either a Pascal 2.0 or BASIC 1.0 language system and standard memory or a custom driver for the 98628A interface.

	HP Prod. No.
Programmable Datacomm Interface Development Package (all included components may be ordered separately).....	98690
For use with 3½-in. external flexible disc drives.....	Opt. 630
For use with 5¼-in. external flexible disc drives.....	Opt. 650
For use with 5¼-in. internal flexible disc drives.....	Opt. 655
Firmware Development Guide.....	98690-90001
Expander Board.....	09826-66544
Unbalanced Loopback Connector.....	5061-4248
Balanced Loopback Connector.....	5061-4247
Programmable Datacomm Interface with:.....	98691A
RS-232 DTE (male) 4.6m cable with test connector.....	Opt. 001
RS-232 DCE (female) 4.6m cable with test connector.....	Opt. 002
RS-449/423 DTE (male) 4.6m cable with test connector.....	Opt. 003
No cable.....	Opt. 099

3270 Datacomm Interface

The 3270 Datacomm Interface can be used to send and receive data from a 3270 controller unit over a Type A Coax. This interface can be used by programmers who wish to develop their own programs to communicate with mainframe computers that support the 3270 protocol.

The following commands to the interface are supported:

- Read one byte from the card buffer
- Write one byte to the card buffer
- Read status and cursor position
- Clear main status bits
- Send keystroke
- Selector pen location
- Power-on reset
- Load trigger and mask
- Set terminal type
- Read revision ID

The 3270 Datacomm Interface can be used on all Series 200 computers, but the 3270 Terminal Emulator software is not written to support the smaller screen size of the Model 26 or Series 200 computers without display enhancements. 3270 emulators for the model 26 must be written by the user.

This card can only be used with the following 3270 controllers:

- 3274 with Type A Coax
Model Numbers 1A, 1C, 1D, 21C, 21D, 31C, 31D, 41A, 41C, 41D, and 51C.
- 3276 with Type A Coax
Model Numbers 01, 02, 03, 04, 11, 12, 13, 14.
- IBM Integral Controller with Type A Coax for the IBM Model 4331 and 4341 CPUs.
- Memorex Model 2076 with Type A Coax.

Ordering Information

	HP Prod. No.
3270 Datacomm Interface.....	98695A
Series 200 3278 Emulator (recommended).....	98795A
For 3½-inch external discs.....	Opt. 630
For 5¼-inch external discs.....	Opt. 650
For 5¼-inch internal discs.....	Opt. 655
Emulator Right to Reproduce.....	98795R
For 3½-inch external discs.....	Opt. 630
for 5¼-inch external discs.....	Opt. 650
For 5¼-inch internal discs.....	Opt. 655