Shared Resource Management (SRM) Coax Network

Technical Data

For HP 9000 Series 200, 300 and 500 Computers and the Vectra PC Product Numbers 50960A, 50960U, 50961A, 50962A, 50963A

The Shared Resource Management (SRM) system is a file and printer/plotter server for the HP 9000 engineering workstations and the Vectra PC (with the BASIC or Pascal Language Processor). It provides the capability to share resources among workstations in a local cluster.

The SRM system combines the major advantages of distributed processing typical of personal workstation computers and the centralized shared resources of traditional multiuser systems

as illustrated below. When multiple workstations are required within an organization, replicating peripherals on each system can be expensive, and excharging information between workstations via flexible disks can be inconvenient. SRM provides a cost-saving and space-saving alternative by providing shared disks, printers and plotters that are managed by a dedicated central controller.

This scheme has advantages over conventional multiuser minicomputer and mainframe

systems. In a multiuser environment, the user at a terminal can suffer poor response time and performance if the shared CPU is too heavily loaded. The SRM configuration maintains the advantage of the dedicated CPU for each user while allowing the sharing of peripherals and information.
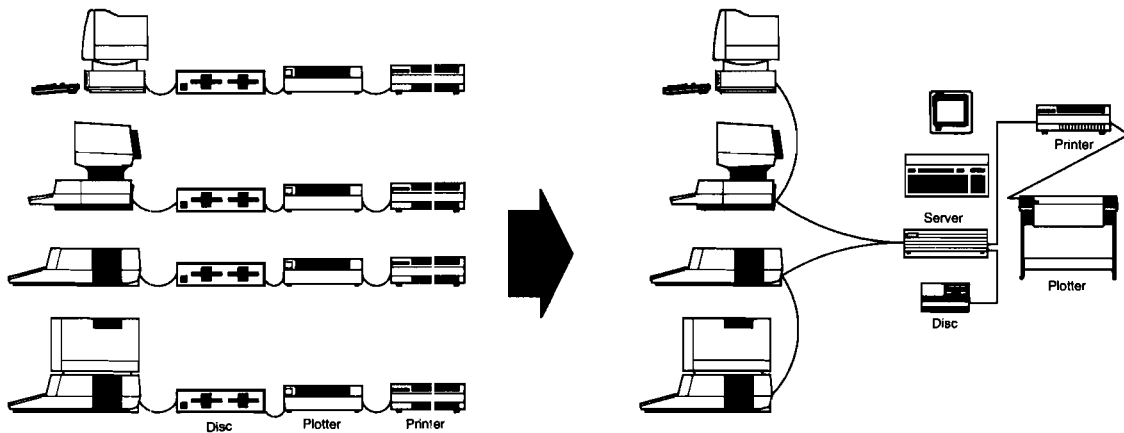
Standalone Systems   Shared Resources

SRM File System

Information Sharing

Workstations connected to the SRM can access data and program files created by other workstations on the SRM. This is more convenient than using removable disks to exchange files between workstations, especially if they are not located close to each other. Local disks are not necessary on each SRM workstation.

File Interchangeability

Certain file types can be read interchangeably among different types of workstations connected to the SRM. DIR (directory) type files specific to SRM, and files containing ASCII data can be accessed by all supported workstations, no matter what language system they operate under.

Workstations operating under the same operating system can exchange file types specific to that system. For example, a Series 300 Pascal workstation deals equally well with .ASCI, .TEXT or .DATA files created by another Series 200 or 300 Pascal workstation on the SRM. Similarly, Series 300 BASIC workstations on the SRM can exchange PROG, BDAT or BIN files.

Hierarchical File Structure

Files can be accessed through a hierarchical or tree-like structure of directories. The number of directories, files and levels is limited only by the size of the disks being used on the SRM. This structure allows a more convenient organization of files to match the nature of the applications or the organization of people. For example, each user can have his own directory with his projects logically grouped under his name. Each project could have a separate sub-directory or there could be separate directories for graphs, memos, spreadsheet files, etc.

File Names

Up to 16 characters are allowed in SRM file names. This encourages the use of more descriptive names for files and directories than is possible with local disks.

File Protection

For each directory and file, you can specify passwords of up to 16 characters. When you assign a password to a file or directory, you also specify access privileges (such as read or write) that the password grants. Files having no passwords can be accessed by any user on the SRM system. Once a password has been assigned to a file or directory, users must include the password in the SRM file specifier to gain access to the file.

Workstation Operating System Boot from SRM

Each Series 200/300 workstation or Vectra PC can be configured so that when it is powered up or reset, the desired operating system is automatically booted from the SRM disk, a customized autostart file is executed to put the user into a specified directory, and execution of an application program is initiated. This makes the SRM system very easy to use by an inexperienced user. This feature also allows these workstations to be configured without a local disk drive.

File Time Stamps

Each file on an SRM disk is given a time stamp that indicates the day, month, year, hour and minute a file was last modified. This is useful in determining how current a data or program file is.

An Example of SRM's Hierarchical File Structure
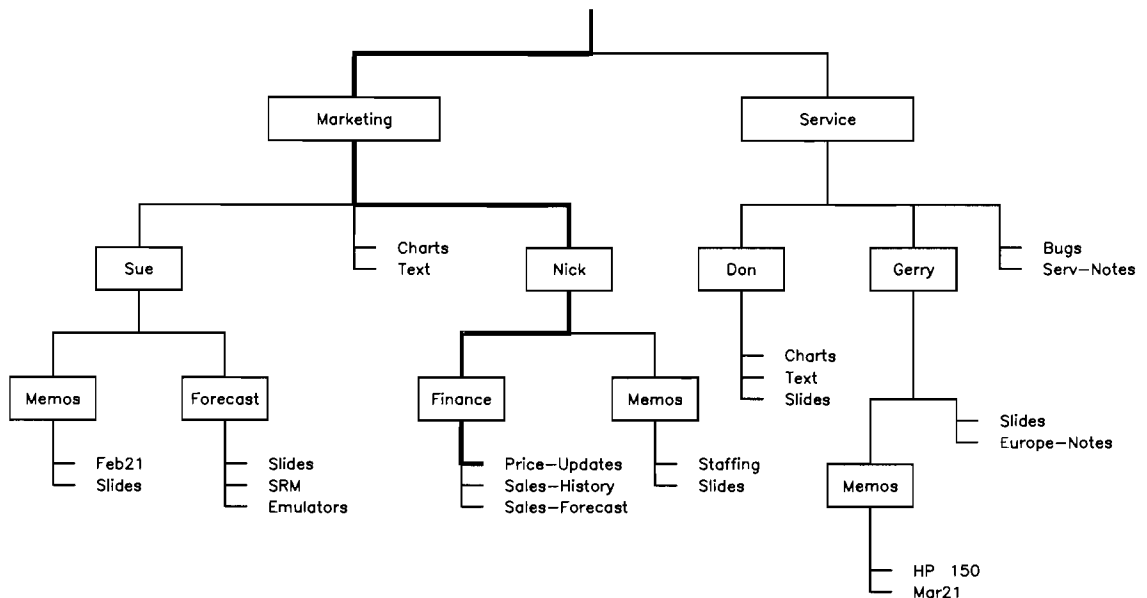
HP Computer Museum
www.hpmuseum.net

For research and education purposes only.

Duplicate File Links

A file that needs to be duplicated in more than one directory can be duplicated as needed. Alternately, it can exist in only one place on the disk and can be referenced in multiple directories. This saves space on the disk and facilitates keeping all "copies" of the file identical.

Backup

Selection of files for backup can be any of the following criteria:
- All files on the disk
- All files that have changed or were created since the last full backup (files are automatically found by system during backup)
- User-selected files
- All files and subdirectories below a specified directory

Backups can be scheduled to begin at specified times and can execute unattended. The system can remain online and available during backup. All files or user-specified files may be selected from the backup media for restoration to a disk.

Shared Printers and Plotters

Sharing SRM printers and plotters among multiple workstations can save money over duplicating peripherals on each workstation. The SRM system's method of managing shared peripherals is printer and plotter spooling.

One way to use this feature is to copy an ASCII file to be printed or plotted into a special directory on the SRM. The file is queued until the device is available to accept the data. In BASIC, for example, you can save a program to a file in the SRM printer/spooler directory to obtain a file listing.

Some workstation operating systems (Series 200/300 BASIC 3.0 or later and Pascal 2.1 or later, for example) allow a file to be designated in place of a printer or plotter in selected commands and program statements. In this way, the ASCII output data can be redirected to an SRM spooler file instead of a local peripheral. Input operations from the peripheral (such as plotter digitizing) are not supported on the SRM.

Using SRM from a Workstation

In general, the workstations request the use of the central shared resources and the server fills the request. Direct communication between workstations is not available. However, one workstation can retrieve or share information placed on the SRM disk by another.

The SRM is accessed by the BASIC and Pascal workstations simply as a disk volume. Individual records can be accessed under program control. Files can be copied, directories listed, etc., by keyboard commands or under program control just as with local disks. The SRM disk and the desired directory are designated by the standard commands to specify a disk volume.

Using SRM from BASIC

Before you can access SRM from BASIC, you must specify the data 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 may 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 from the file structure illustration shown earlier, 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" data storage device. This makes the SRM directory act as if it were a dedicated local device. For example, if you have executed the MASS STORAGE IS command shown above, you could specify a directory as your data storage device with the command:

MSI "/Marketing/Nick/ Finance"

Otherwise, you would use:

MSI "/Marketing/Nick/ Finance:REMOTE"

You could then reference Price_Updates directly, without including the rest of the pathname.

All Series 200/300 and Series 500 BASIC data storage commands may be used with SRM files. IMAGE database commands are not supported, however.

Using SRM from Pascal

At workstation powerup, the Pascal system automatically recognizes all local and remote disk volumes connected to the workstation and associates with each a unit number. To access SRM files, you need only include the appropriate unit number in the file specifier (typically #5 for SRM data storage).

For example, to access the file Price_Updates in the example file structure shown earlier (assuming the file is on the remote device identified as #5), you would specify the pathname:

#5:/Marketing/Nick/ Finance/Price_Updates

As with BASIC's MASS STORAGE IS command, you can specify your current working directory through the Pascal Filer (Prefix Command). Thus, if you specify your current prefix as:

#5:/Marketing/Nick/ Finance

you could reference Price_Updates directly without supplying the rest of the pathname.

All Series 200/300 Pascal data storage commands may be used with SRM.

Using SRM from Vectra

A Vectra equipped with the HP BASIC Language Processor (HP 82300A) or HP Pascal Language Processor (HP 82310A) can execute the same BASIC 5.13 and Pascal 3.22 languages used by Series 200 and 300 systems. When the Vectra console is in BASIC or Pascal mode, access to the SRM is identical to that described above. For example, programs used by other Series 200 and 300 systems can be loaded from the SRM into the Vectra and data stored on the SRM disk can be copied to the internal Vectra disk or any Vectra-compatible mass storage device for subsequent analysis.

Using SRM from HP-UX

You access SRM from HP-UX with eight commands provided by the "SRM Access Utilities for HP-UX." The commands provide the following capabilities:

- **srmcp** — copy files between an SRM system and the HP-UX system
- **srmmkdir** — make SRM directories
- **srmls** — obtain SRM directory listings
- **srmmv** — move files from one SRM location to another
- **srmlink** — create links between SRM files
- **srmrm** — delete files on the SRM
- **srmprotect** — protect SRM file with passwords
- **srmclean** — reinitialize the link to the SRM after the system has been down

For example, to copy the SRM file Price_Updates (assuming it is a Pascal.TEXT type file) to a file called temp in the current directory on the HP-UX system, you would type the following command (usually typed on one line):

```
srmcp -p /dev/
srm:Marketing/Nick/
Finance/Price_Updates.TEXT
temp
```

/dev/srm is the typical name of a device file for the hardware interface to the SRM system. The **-p** optional parameter causes a conversion of the data from the Pascal.TEXT format to the HP-UX file format. Both .TEXT and ASCII files can be converted. Files of any other type on the SRM (including binary files) can be copied without any conversion.

Optional parameters on each of the commands above (except **srmclean**) specify one of several disk units or volume names if multiple SRM disks are installed. All commands (except **srmclean**) comply with the use of passwords on SRM files.

The utility commands can be used in user-written HP-UX shell scripts to access the SRM under program control. These programs can be scheduled to execute unattended as background processes. Such a program could act as a "spooler" by monitoring a directory on the SRM that contained work to do. In this manner, the workstation acts as a communication gateway to other computer installations or as a batch-mode "support processor" to the SRM network.

Performance

Performance — or system throughput — depends on several factors, including network speed, data-handling speeds of the interface/CPU hardware and the software at both ends of the transmission. SRM's network speed (the rate of transfer of binary information on the network or cable) is 700,000 bits per second. System performance is determined not so much by network speed, however, as by the nature and quantity of applications being executed simultaneously. Because the mix, type and number of tasks handled by the CPU at one time is dynamic, performance is difficult to quantify.

An SRM system enables up to 63 users to share disks, printers and plotters, but performance is affected by how frequently users access the SRM simultaneously with extensive data transfer tasks. An SRM system performs best when applications on the workstations do not require constant disk access, which represents a heavy load for the SRM. For very disk-intensive applications, a disk drive should be connected directly to the workstation (and is required for IMAGE database applications).

System Configuration

An SRM system consists of a controller or server, shared peripherals connected to the server, the network between the server and the supported workstations. Additional information helpful in planning your system configuration — cable layout, power requirements, etc. — is available in the Shared Resource Management System Planning Guide, P/N 5954-7035, available from your HP Sales office.

Ordering Information for the SRM Server

An order for an SRM server must include the following:
- 50960A — Includes special SRM server hardware and the latest revision of the SRM Operating System. The server hardware includes a CPU, .5 megabytes of memory, DMA circuitry, an HP-IB interface for printers and plotters, a battery-powered clock, a high-speed HP-IB interface for disks and cartridge tape drives, interface cards for a video monitor and a keyboard and an SRM coax interface for connection to an SRM coax network cable.

Order option 022 to get the SRM Operating System on 1/4-inch cartridge tape.

Order option 045 to get it on 3-1/2-inch floppy disks.

- 82913A — 12-inch (304.8mm) monochrome monitor
- 46021A — keyboard (ASCII only)

You may also need to order the following:
- Additional Memory — If you wish to use the RS-232 interface (e.g., to connect to a LaserJet Printer) and/or you wish to use the online backup/restore facility, then you must order at least an additional .25 megabytes of memory. To maximize the SRM's performance, increase the memory to a total of 1.5 megabytes. The product number for .25 megabytes is 50960A Opt. 100. For 1 megabyte, the product number is 50960A Opt.110.
- A 9888A Bus Expander and additional 50962A SRM Interfaces — If you wish to connect more than 24 workstations to an SRM server, it will be necessary to add one or more additional 50962A SRM Interfaces. The SRM Interface included in the 50960A SRM Server and each additional 50962A SRM Interface can support up to 24 workstations on a coax cable up to 1000 meters long. A maximum of 63 workstations can be supported by an SRM server. In order to add 50962A SRM Interfaces, it is first necessary to add a 9888A Bus Expander because the 50960A SRM Server hardware has no slots that can accept an additional 50962A SRM Interface. Note that only 50962A SRM Coax Interfaces and 98626A Serial Interfaces are supported in the 9888A Bus Expander.

Upgrading an Existing SRM Server

In order to take advantage of the features added to the SRM in the 3.0 and 3.1 revisions, you may need to add the following upgrade options:
- 98619A and 98619A Option 001 SRM Operating System and upgrade discount — This will give you the latest version of the SRM Server Operating System software.

Order option 022 to get the SRM Operating System on 1/4-inch cartridge tape.

Order option 045 to get it on 3-1/2-inch floppy disks.

- 50960U Opt. 100 Battery-powered Clock — This will give you a new interface card that contains a battery-powered clock. This clock is used by the SRM Operating System to set the date and time each time the SRM is reinitialized. This assures that even in the event of a power failure or an operator who forgets to enter the date and time, your files will be marked with the correct date and time.
- Additional Memory — If you wish to use the RS-232 interface (e.g., to connect to a LaserJet Printer) and/or you wish to use the online backup/restore facility, then you must order at least an additional .25 megabytes of memory above the .5 megabytes that is built into the 50960A SRM server. To maximize the SRM's performance, increase the memory to a total of 1.5 megabytes. The product number for .25 megabytes is 98256A. For one megabyte, the product number is 98257A.
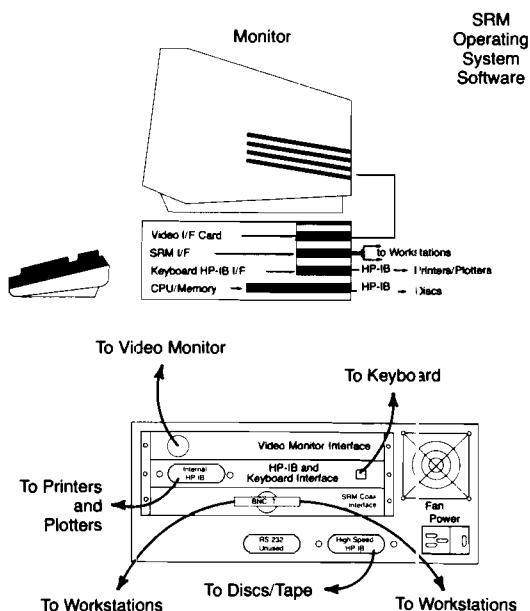
Ordering Information for HP 9000 Workstations and Vectra PCs

Series 200/300 BASIC and Pascal Workstations

Hardware — 50962A SRM Coax Interface for Series 200/300.

Software — The software to access the SRM is included in 98613B BASIC Revision 4.0 and later, and in 98615C Pascal Revision 3.1 and later.

Series 200/300 HP-UX Workstations

Hardware — 50962A SRM Coax Interface for Series 200/300.

Software — 98693A SRM Access Utilities for HP-UX
– Opt. 022 Software on 1/4-inch (6.4mm) tape cartridge
– Opt. 045 Software on 3-1/2-inch (88.9mm) dual-sided disk

Series 500 BASIC Workstations

Hardware — 50961A Opt. 500 Coax Adapter and Interface for Series 500.

Software — 97058A Resource Management Software.

– Opt. 042 on 5-1/4-inch (6.4mm) floppy disk

Series 500 HP-UX Workstations

Hardware — 50961A Opt. 500 Coax Adapter and Interface for Series 500.

Software — 98694A SRM Access Utilities for HP-UX.

Vectra/HP BASIC and Pascal Language Systems

Hardware — 50963A SRM Coax Interface for the Vectra PC.

Note: The BASIC and Pascal Language Processor board (82300A or 82310A) plus extended memory is required in a Vectra to communicate with SRM.

Software — The access software is included in BASIC 5.13 (82300A, 82301A and 82302A) and Pascal 3.22 (82301A and 82311A).

SRM Cables and Accessories

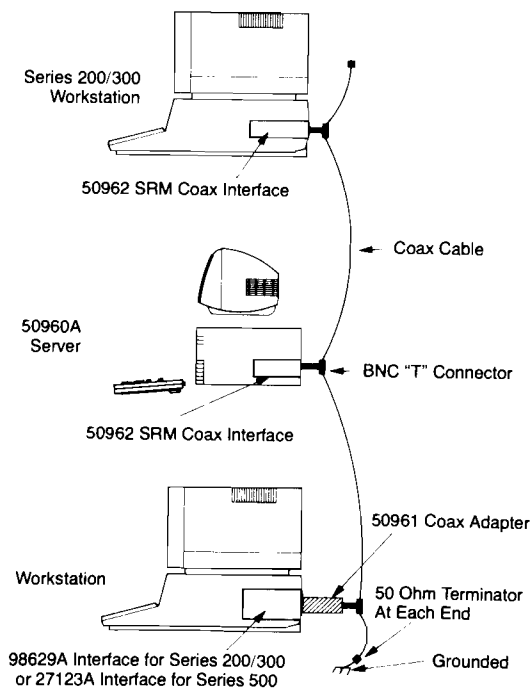The SRM coax network uses thin coax cable connected in daisy-chain fashion from computer to computer. Up to 25 computer nodes (including HP 9000 workstations and SRM servers) can be connected on the same daisy-chained cable. The maximum total length of a daisy-chained cable is 1000 meters; there must be at least one meter between adjacent nodes.

More than one daisy-chained SRM cable can be attached to a server or workstation at the same time. Each must be attached to its own SRM interface in the SRM server. A 9888A Bus Expander will have to be added to the SRM server to provide slots for SRM interfaces beyond the one included with the SRM server.

The SRM coax cable is connected using standard BNC connectors to the 50962A Interface or coax adapter module that in turn connects directly to a Series 200/300 Interface Card (HP 98629A) or to a Series 500 Interface (HP 50961A Opt. 500). The computers are connected in bus fashion, so the network is not broken if any computer on the network is powered down. The coax adapter can also be ordered separately (50961U) to upgrade existing HP 9000 interface cards for use on the coax network.

SRM coax cable is thin enough to be installed in cable conduit. It is available from HP and elsewhere both in plastic (PVC) jackets or Teflon (FEP) jackets. The PVC cables are used where the cable will be installed in conduit. The FEP cables have Teflon jackets and are for installing without conduit in ceiling and walls.

The cables and associated accessories may be ordered from the HP Direct Marketing Division, 1-800-538-8787. For more information, see the HP Computer User's Catalog.

Series 200/300 Workstation
50962 SRM Coax Interface
Coax Cable
50960A Server
50962 SRM Coax Interface
BNC "T" Connector
50961 Coax Adapter
Workstation
50 Ohm Terminator At Each End
98629A Interface for Series 200/300 or 27123A Interface for Series 500
Grounded

Standard Cables

The following cables with PVC jackets have a BNC connector mounted at each end:

- 92227A   PVC   1 meter
- 92227B   PVC   2 meters
- 92227C   PVC   4 meters
- 92227D   PVC   8 meters
- 92227E   PVC   16 meters
- 92227F   PVC   32 meters
- 92227G   PVC   64 meters
- 92227H   PVC   128 meters

Custom Cables

For custom lengths and bulk quantity, unterminated cable can be ordered to a specified length. The connectors must be ordered separately and installed by the user.

- 92227J PVC (300 meters to 3000 meters)

- 92227K FEP (100 meters to 3000 meters)

- 92227L BNC Connector Pair

- 92227M BNC Connector Tool Kit

  Each end of the coax network must be terminated by a 50-Ohm terminator with a protective rubber insulating cover for safety. One end of the terminator must be grounded. A terminator pair is supplied with the 50960A server.

- 45695A BNC 50-Ohm Terminator Kit

  A BNC T-connector with a protective rubber insulating cover for safety is provided with each 50962A SRM Coax Interface and 50961A/U Coax Adapter. Cables may be connected together to make a longer length using a T-connector.

- 92227N BNC T-connector

  For additional information, consult the SRM System Planning Guide, Pub. No. 5954-7035.

Support Services

Software

- **98619A+H22** Response Center Support

- **98619A+S22** Software Material Subscription

- **98619A+V00** Additional System Coverage

- **98619A+W00** Extended SMS

Hardware

- 50960A PMMC, BMMC, SMMC

- 50962A

- 50961A FMMC, PMMC, BMMC, SMMC
  – Opt. 500 BMMC, SMMC

Contact your local HP sales and service office for more information on these services.

For quick implementation of your network, a simplified service interface, verified network operation, and assured ongoing supportability, please refer to the HP Network Startup data sheet in this guide.

Shared Peripherals

The shared peripherals include one to four disk drives and up to eight printers and plotters (a maximum of four plotters). The disks are connected to the high-speed port of the server in daisy-chain fashion with HP-IB cables. The printers and plotters are connected in similar fashion to the regular HP-IB port.

The following list of peripherals shows all of the peripheral devices currently supported on the SRM server. The number to the right of each peripheral is the earliest release of SRM that supports the device. All subsequent releases of the SRM will also support the device. The word "obsolete" following the release number indicates that the device is no longer sold by HP but is still supported on the SRM server. The word "untested" means that this device has not been tested on the SRM and is not supported. Devices not listed below are either new and untested or have been tested and do not work on the SRM server. The symbol "#" refers to Option number.

Monitors		
82913A 12-inch monochromatic		2.0

Keyboards		
46020A HP-HIL Keyboard	on 50960A only	2.1
46021A HP-HIL Keyboard	on 50960A only	2.1

Up to 8
Printers and Plotters
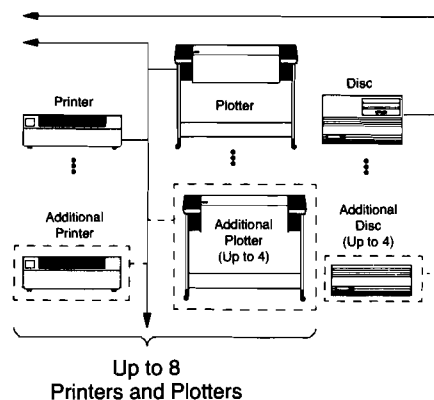
Printers

On RS-232 Interface (98626A) using cable 13242G

2676A	DeskJet Printer	3.12
2686A	LaserJet Printer	3.1
2686A #300	LaserJet Plus Printer	3.1
2686D	LaserJet 500 Plus Printer	3.1
2686TA	Tempest LaserJet Printer	3.1
2686TA #200	Tempest LaserJet Plus Printer	3.1
33440A	LaserJet II Printer	3.1

On HP-IB Interface

2227B	QuietJet Plus Printer	3.1
2235B	RuggedWriter Printer	3.1
2235D	RuggedWriter Printer w/spool feed	3.1
2563A #850	300 lpm dot-matrix impact	2.0
2564B #850	600 lpm dot-matrix impact	Untested
2565A #850	600 lpm dot-matrix impact	Untested
2566A #850	900 lpm dot-matrix impact	Untested
2567A #850	1200 lpm dot-matrix impact	Untested
2608A #046	400 lpm dot-matrix impact	1.0
2608S #290	400 lpm dot-matrix impact	2.0
2631B #046	180 cps dot-matrix impact	1.0 Obs
2631G	2631B plus graphics	1.0 Obs
2932A #046	200 cps dot-matrix impact	2.0
2933A #046	200 cps "Factory Data Printer"	2.0 Obs
2934A #046	200 cps dot-matrix impact	2.0
3630A #002	PaintJet (color) Printer	3.1
9876A	400 lpm dot-matrix thermal	1.0 Obs

Plotters

HP-IB interface only

7440A	Colorpro A-size, 8-pen	2.1
7550A	B-size, 8-pen, sheet feed	2.0
7570A w/17570A	Draftpro, C/D-size, 8-pen	3.0
7580A #002	D-size, 8-pen	2.0 Obs
7580B	D-size, 8-pen	2.0 Obs
7585A	E-size, 8-pen	2.0 Obs
7585B	E-size, 8-pen	2.0 Obs
7586B	E-size, 8-pen, roll feed	2.1 Obs
7595A	DraftMaster A4/A-A0/E, 8-pen	3.1
7596A	DraftMaster, A4-A0, 8-pen, roll feed	3.1
9872B/S	B-size, 8-pen	2.0 Obs
9872C/T	B-size, 8-pen	2.0

Disk Drives

HP-IB and SC/80 or SS/80 drives only

7907A	20.5 MB removable+fixed (20+20)	3.0
7908P/R	16.7 MB disk+tape*	1.0 Obs
7911P/R	23.8 MB disk+tape*	1.0 Obs
7912P/R	65.6 MB disk+tape*	1.0 Obs
7914P/R	132 MB disk+tape*	2.0
7914CT	132 MB disk+tape*	2.1 Obs
7935H	404 MB removable disk only	3.0
7936H	307 MB disk only	3.0
7937H	571 MB disk only	3.0
7941A	23.8 MB disk only	2.1 Obs
7942A	23.8 MB disk+tape*	2.1 Obs
7945A	55.5 MB disk only	2.1
7946A	55.5 MB disk+tape*	2.1
7957A	81 MB disk only	3.0
7957B	81 MB disk only	3.1
7958A	131 MB disk only	3.0
7958B	152 MB disk only	3.1
7959B	304 MB disk only	3.1
7962B	152 MB disk only	3.1
7963B	304 MB disk only	3.1
9133H	22.3 MB disk+floppy*	3.0 Obs
9133L	44.7 MB disk+floppy*	3.0 Obs
9134H	22.3 MB disk only	3.0 Obs
9134L	44.7 MB disk only	3.0 Obs
9153B	20 MB disk+floppy*	3.0 Obs
9153C #20	20 MB +floppy*	3.1
9153C #40	40 MB +floppy*	3.1
9154B	20 MB disk	3.0 Obs
97962B	152 MB disk upgrade	3.1
97963B	304 MB disk upgrade	3.1

Backup Devices

The following devices can be used ONLY to make backup copies of files on the SRM:

HP-IB and CS/80 or SS/80 drives only

35401A	1/4-inch tape autochanger	3.0
9144A	1/4-inch tape cartridge	2.1
7935H	404 MB removable disk only	3.0
9122C	Dual 3-1/2-inch floppy disk	3.1
9122S/D	3-1/2-inch microfloppy disk	3.0

*The removable media of these drives are supported only as backup devices, i.e., they cannot be used for file storage by workstation users.

(HP field personnel can get updated SRM configuration information by sending an HPDESK message to SRM INFO/HPF100/00.)