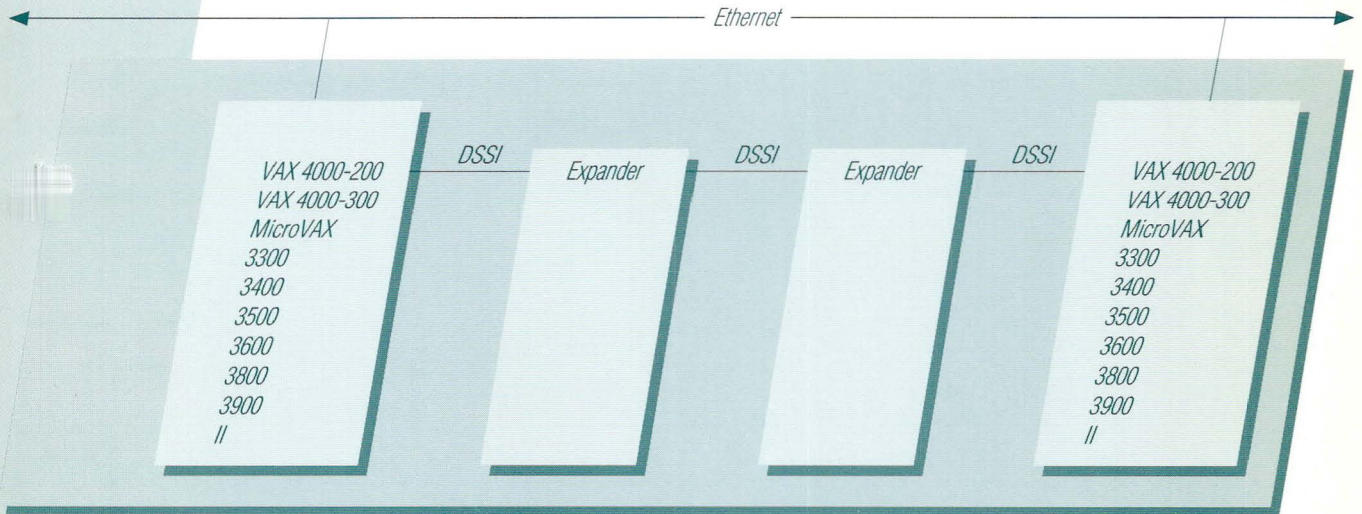


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## Which DSSI VAXcluster Dual-host Configuration is Right for You?

3rd Edition



DSSI VAXcluster Systems—3rd Edition is the third Dual-Host document produced by Digital. The former documents were called Dual-Host; DSSI VAXclusters will replace the term “Dual Host” throughout this document. This edition includes the new VAX 4000 Model 200 which extends our DSSI VAXcluster System offerings.

## What Is a DSSI VAXcluster Configuration?

A DSSI VAXcluster configuration is made up of at least two Q-bus MicroVAX or VAX 4000 systems connected by a Digital Storage Systems Interconnect (DSSI). Another name for a two-node DSSI VAXcluster is "dual host." The two systems share Integrated Storage Elements across the DSSI bus (ISE to be called "disks" for the remainder of this document). Digital offers many ways to design two-node DSSI VAXcluster configurations, but it always includes a minimum of two Q-bus MicroVAX or VAX 4000 systems with RF Disks, Ethernet, a DSSI bus, the VMS operating system, DECnet and VAXcluster software.

The addition of the VAX 4000 Model 200 creates new possibilities for dual-host configurations. The VAX 4000 Model 200 is the second member of the VAX 4000 family of systems and incorporates the same high performance embedded DSSI adapter and ethernet controller technology which were introduced with the VAX 4000 Model 300. The VAX 4000 Model 300 incorporates two embedded DSSI adapters on the CPU board. One of these embedded adapters is provided on the 4000 Model 200 CPU board. The DSSI adapter, utilizing its own RISC processor, can provide up to 800 I/O's per second.

The high performance Ethernet Adapter used in both the VAX 4000 Model 300 and VAX 4000 Model 200 is a second generation one-chip implementation which, like the embedded DSSI adapter, utilizes on chip RISC processing to provide high Ethernet data bandwidth, measured at up to 9.6 Mbits. These two new I/O adapters, coupled with 5 VUP processing power, make the VAX 4000 Model 200 a powerful new low cost entry system into the VAX 4000 family.

With multiple CPUs, multiple DSSI adapters, replicated disks and VMS Volume Shadowing Phase II (Host Based Volume Shadowing) software, a dual-host VAX 4000 can provide an extremely high level of system and data availability. There are single level components that can fail and do not have redundancy. However, with the redundancy of the major components, that is, multiple CPUs, Shadowed Disks in separate DSSI expansion cabinets, and the addition of an optional Uninterruptible Power Supply, a dual-host VAX 4000 offers a very high level of availability.

Installed base Q-bus systems that are experiencing I/O or CPU bottlenecks can be connected to a VAX 4000 system via the DSSI to create a DSSI VAXcluster configuration that can take advantage of the added I/O and CPU capacity of the VAX 4000. This is an important message for growth and for investment protection.

This brochure documents examples of the currently supported DSSI VAXcluster configurations. You don't have to buy new systems to have a DSSI VAXcluster dual-host configuration, nor must you have two of the same systems. As you will see on the following pages, the configurations are flexible, allowing for incremental growth in performance and levels of system availability while protecting investments in earlier Q-bus MicroVAX models.

DSSI VAXclusters allow for the creation of configurations which can provide redundant boot node and disk serving functions, as well as high availability time share systems.

### **Higher Disk Availability**

DSSI VAXclusters provide higher disk availability for critical applications, and a growth path for coupling MicroVAX or VAX 4000 systems. A dual-host MicroVAX or VAX 4000 system can provide automatic failover when used as a boot node for satellites in a local area VAXcluster system. As such, the dual-host system increases your ability to access data, by providing uninterrupted access to the disks if one of the CPUs fails. A shadowed set of two or three disks on which the data is duplicated is provided by VMS Volume Shadowing Phase II software (available with VMS V.5.4-1). This software can increase the protection of system and user data by providing enhanced data availability by duplicating multiple copies of the same data on up to three disks of the same size on a single system or within a VAXcluster system. Host Based Volume Shadowing can be utilized in DSSI VAXcluster configurations. In the event of failure to access a disk within a shadow set, I/O operations will continue on the remaining members of the shadow set. The shadowing software automatically responds to shadow set changes and failures. Recovery operations occur in a manner that is transparent and nondisruptive to the user.

Volume shadowing software improves data availability since users have access to multiple copies of their data. This is true when volume shadowing software is added to single systems as well as to DSSI VAXcluster configurations (dual-host). The combination of dual-host DSSI VAXcluster configurations (two paths to data and system disks) and volume shadowing software (shadowed data sets) yields a high level of system and user data availability.

The use of VAXsimPLUS reduces the number of disks required for shadowing. VAXsimPLUS is a knowledge-based software tool that analyzes the number and type of errors recorded by the system, predicts failures, and suggests proactive correction maintenance to achieve high availability. With this predictive capability, impending disk problems can be identified and a shadow SET MEMBER created TO MIRROR the problem disk (as opposed to creating shadow sets for all drives needing to be protected). VAXsimPLUS is part of standard Digital Hardware Product Services.

### **Minimized Downtime**

In a timesharing environment, a dual-host DSSI VAXcluster minimizes downtime. If a job is interrupted, you simply log in and restart the job on the other system, just as in a CI VAXcluster. The second member of the dual-host assumes the responsibility for the application and lets you access data on the storage devices. Other advantages of dual-host DSSI VAXcluster configurations as a timesharing system include:

- Ability to use existing timesharing systems and expand CPU and I/O capabilities with the creation of a dual-host system.
- The ability to provide high availability for timesharing in an open workspace environment.

## Local Area VAXcluster Boot Node

Before dual-host DSSI VAXcluster systems were available, local area VAXcluster systems relied on single MicroVAX systems as boot nodes. Having a single system as the boot node can be an Achilles' heel for the VAXcluster system. If something happens to the MicroVAX boot node, satellites cannot be booted, nor can satellites that are running continue to operate.

Using a MicroVAX or VAX 4000 dual-host system for a boot node can eliminate that risk. It allows you to provide the satellites two paths to disk storage, ensuring that the local area VAXcluster users WILL continue to operate even if one of the boot nodes fails. When a system acting as a boot node fails, all services required by the satellites fail over to the other system. This failover is transparent to applications running on the satellites. The time to complete the failover, or cluster state transition, depends upon the complexity of the cluster including the number of systems in the configuration, locks outstanding, and quorum voting. This ability to fail over dramatically increases satellite availability to necessary boot and disk serving functions. Advantages of a dual-host DSSI VAXcluster include:

- Automatic failover of file access when the application is running on the satellite node.
- Higher availability to data for satellites and timesharing users.
- Read/write file sharing down to the record level.
- Resource sharing via distributed buffers and print queues.
- Data and resource sharing via a distributed file system.
- Centralized system management and security.

- Ability to run any VMS application.
- Growth path from a single MicroVAX or VAX 4000 system.
- Greater performance and more I/O than with a single MicroVAX or VAX 4000 system.

### Configuration Rules for DSSI VAXclusters

1. You must have a minimum of two Q-bus MicroVAX or VAX 4000 systems.
2. The two systems must have Ethernet hardware.
3. The two systems must have the following software licenses:

First System	Second System
VMS	VMS
VAXcluster	VAXcluster
DECnet full-function*	DECnet endnode

\* DECnet Full-Function on one system allows the use of cluster aliases, or routing function.

4. Any DSSI channel can support no more than 8 nodes. DSSI adapters and shared disks count as 1 node each. In a DSSI Dual-Host configuration, each system has one DSSI adapter on each end of the DSSI bus, so the maximum number of disks that can be added is six: 2 adapters + 6 disks = 8 Nodes. A DSSI VAXcluster can support multiple DSSI buses (see rule 5 for limitations of each system).
- 4a. Both systems must share RF Disks, with a maximum of six RF ISEs per DSSI adapter (see rule 4).
5. The maximum number of DSSI adapters that can be utilized per system in a DSSI VAXcluster configuration is as follows:
  - a. MicroVAX II: 1
  - b. MicroVAX 33,34,35,36,38, and 3900: 2
  - c. VAX 4000-200 systems: 3
  - d. VAX 4000-300 systems: 4

6. A maximum of four boxes (CPU boxes, DSSI expanders) per DSSI channel can be configured (to accommodate maximum cable length for signal integrity). This length includes the BC21M-09 DSSI cable used to interconnect boxes.
7. The ability to use mixed adapters, embedded and KFQSA, in a dual-host system requires VMS V5.3 or greater.
8. All MicroVAX or VAX 4000 Model 200 systems used in dual-host configurations must have DSSI storage adapters, whether they are embedded on the system module (embedded adapter) or connected via the Q-bus (KFQSA module).

The type of DSSI adapter determines performance attributes which should be considered when evaluating configurations. Furthermore, cluster traffic (e.g. Lock Management Traffic) is supported by the embedded adapters (DSSI channel will be used instead of Ethernet).

- a. KFQSA (Q-bus Interface): 190 I/O per sec
- b. 1st Generation EDA640 (on MicroVAX 33/3400): 360 I/O per sec
- c. 2nd Generation EDA660/760 (on VAX 4000 Systems): 800 I/O per sec

Table 1 shows the type of DSSI adapter each MicroVAX/VAX system uses, and the maximum number of Disks available. RF30, RF71, and expanders are still supported.

**Table 1. Adapter and Disk Storage**

System	Adapter	Maximum Disks in System Cabinet	Maximum Disks in Expansion Enclosures*
MicroVAX 3300	Embedded	2 x RF31	+ 3 in RF31B or RF72B
MicroVAX 3400	Embedded	3 x RF31 or RF72	+ 3 in RF31B or RF72B
MicroVAX 3800	KFQSA (incl)	3 x RF31 or RF72	+ 3 in RF31B or RF72B
VAX 4000-300	Embedded	4 x RF31 or RF72	+ 3 in RF31B + 7 x RF72 or RF31 or RF71 in R400X Enclosure
VAX 4000-200	Embedded	4 x RF31 or RF72	+ 3 in RF31B + 7 x RF72 or RF31 in R400X Enclosure
MicroVAX II	KFQSA-AA/BA	No sys cab storage	3 in RF31B, 3 in RF72B
MicroVAX 3500	KFQSA-SG	No sys cab storage	3 in RF31B, 3 in RF72B
MicroVAX 3600	KFQSA-SG	No sys cab storage	3 in RF31B, 3 in RF72B
MicroVAX 3900	KFQSA-SG	No sys cab storage	3 in RF31B, 3 in RF72B

\* For details on expansion enclosures, see Table 3.

+ For additional storage or to improve availability.

**Note:** The disk variant must match the enclosure variant as follows:

- BA2xx or BF2xx or RF2xx enclosures = SA or SF disk variant
- BA4xx or R400x or BF4xx enclosures = AA or AF disk variant

The first set of systems (MicroVAX 3300, 3400, 3800, VAX 4000 Model 300, and VAX 4000 Model 200) offers storage for disks in the system cabinet. To increase storage capacity, you can put additional disks in storage expansion enclosures and connect them to the system cabinet Disks using the DSSI. In some situations, you may want to place disks in storage expansion enclosures only, that is, not in the system cabinet.

The second set of systems (MicroVAX II, 3500, 3600, 3900) do not offer storage for Disks within the system cabinet. DSSI storage expansion enclosures must be used for Disks. Remember the eight node maximum on a DSSI channel. A node can be either a host adapter or a Disk. The combination can be the following:

- One adapter and seven Disks per DSSI adapter (local storage only)
- Two adapters and six Disks per DSSI adapter (shared storage as in a DSSI VAXcluster dual-host configuration)

### Example Configurations

The following pages show example DSSI VAXcluster configurations. The first examples begin with minimum configurations utilizing existing hardware or minimally configured 4000 systems. Configurations which follow show how DSSI VAXclusters can grow to address CPU or I/O capacity needs as well as the requirement to increase the levels of availability the total system can deliver. The final configurations show examples of maximally configured DSSI VAXcluster Dual-Host systems utilizing the full complement of DSSI adapters, Disks and DSSI storage expander boxes.

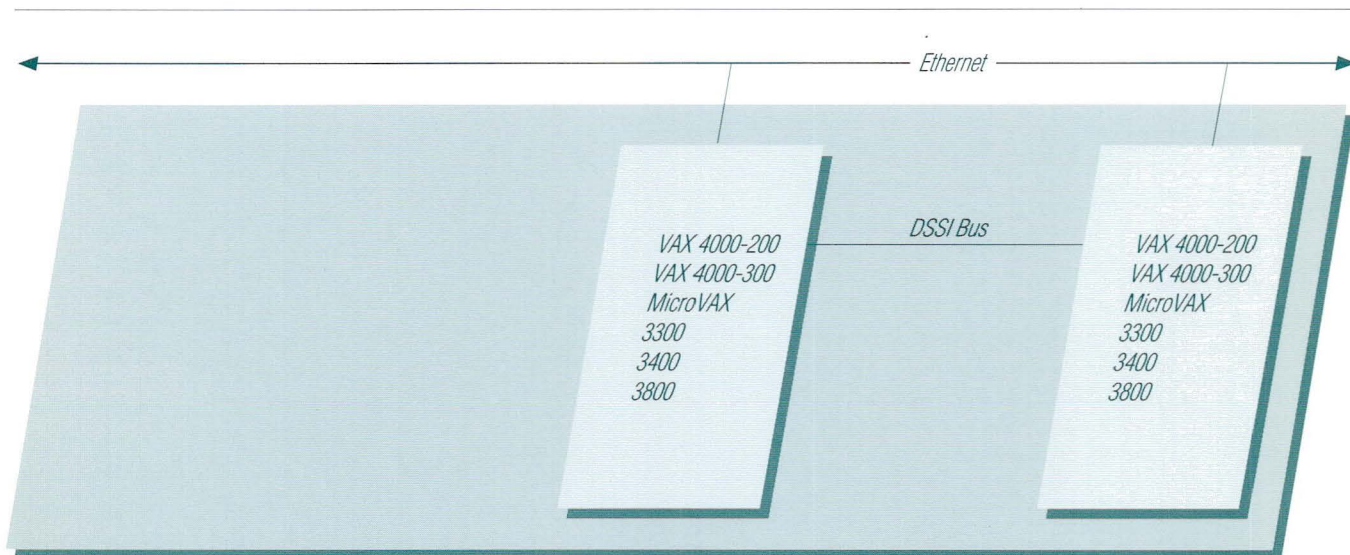
Remember that you don't have to have a new MicroVAX or VAX 4000 system to benefit from dual-host configurations. Previously purchased Q-bus MicroVAX systems can become dual-host systems, thereby enhancing their value and increasing their productive life. If a MicroVAX system does not already have a DSSI storage bus, the DSSI can be easily added to upgrade the system.

If one of the systems in a dual-host fails, the second system continues to operate allowing users to access data on all of the disks in both systems, unless one of the following situations occurs:

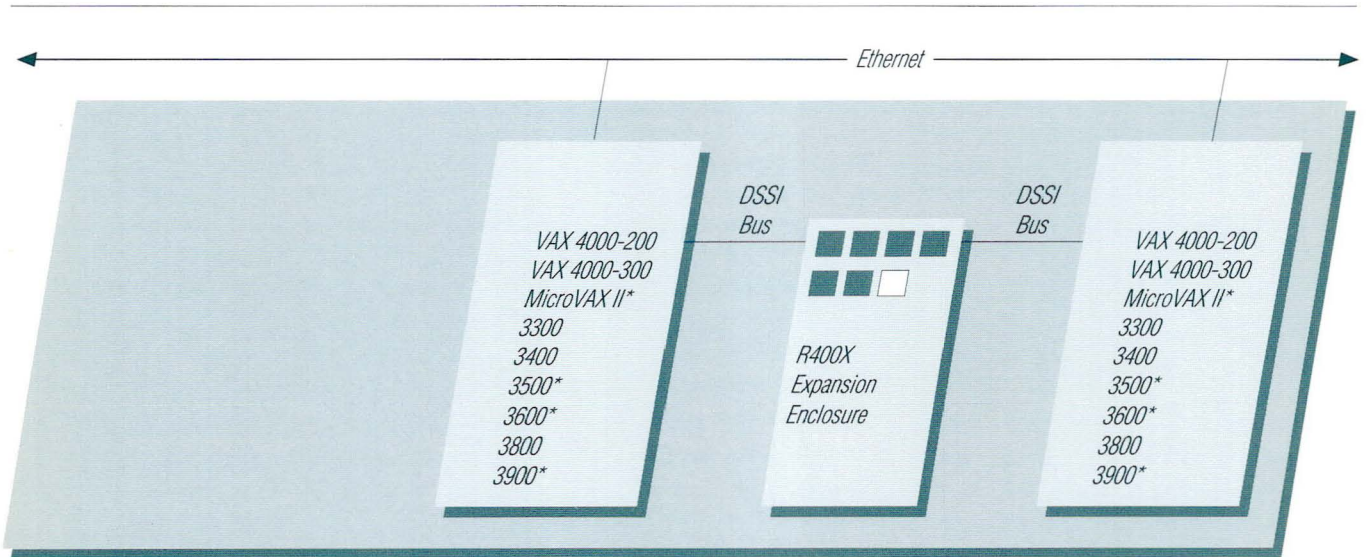
- The failure is in the storage subsystem.
- The failure is in the power supply.
- The failing system is powered off. (Servicing of failed components must be deferred to a time when the entire system can be safely shut down for maintenance. You should not attempt to service components that are part of an active DSSI VAXcluster.)

These situations can be minimized by installing the disks into separate expansion enclosures.

## Minimum DSSI VAXcluster System

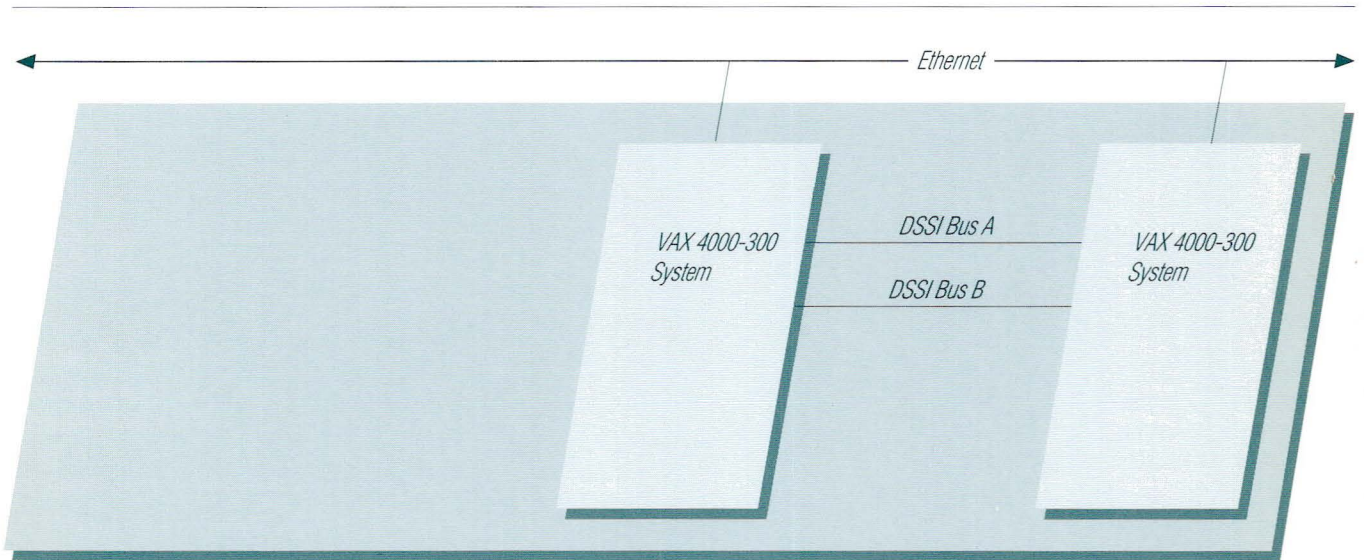


- The simplest dual-host configuration has Digital Storage Systems Interconnect (DSSI) Disks embedded in the system enclosures.
- Moving from a single system to a DSSI VAXcluster increases system-wide availability, adds I/O capacity, and increases compute capacity for the system.
- The VAX 4000 Model 200, MicroVAX 3300, and MicroVAX 3400 each have 1 embedded DSSI adapter; the 3300/3400 embedded adapter allows 360 I/Os per second while the VAX 4000 Model 200 embedded adapter allows 800 I/Os per second (see Rule 8). The VAX 4000 Model 300 has 2 embedded DSSI adapters, each at 800 I/Os per second.
- Create this minimum DSSI VAXcluster system with any combination of MicroVAX 3300, 3400, 3800, VAX 4000 Model 200, or VAX 4000 Model 300 systems, all of which include internal DSSI storage.
- This configuration is available as a standard prepackaged MicroVAX 3400, 3800, VAX 4000 Model 200, or VAX 4000 Model 300 dual-host system with all the required hardware and software components.
- Add VMS Volume Shadowing Phase II software for data redundancy.
- Add an optional Uninterruptible Power Supply (UPS) for a continuous power source.



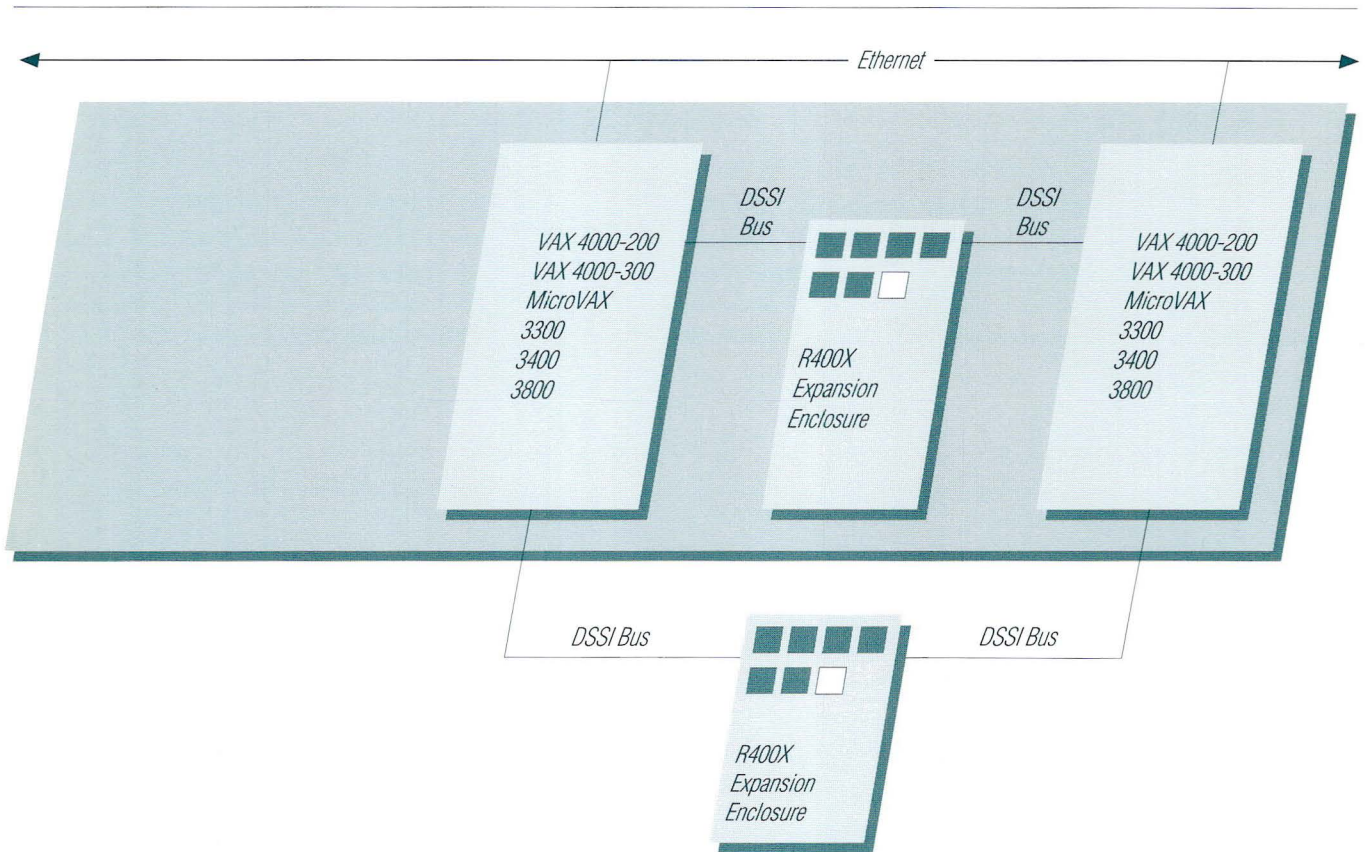
- For systems above that do not support internal DSSI disk storage (MicroVAX II, 3500, 3600, and 3900) and/or those systems above that do support internal DSSI storage (MicroVAX 3300, 3400, 3800, VAX 4000 Model 200 and VAX 4000-300), two MicroVAX or VAX 4000 systems can share an expansion enclosure.
  - When sharing an R400x expansion enclosure between two hosts in a cluster system, only six of the seven storage bays can be used (see Rule 4).
  - Customers with existing R215F DSSI expansion enclosures have the following options:
    - a. Keep the R215F(s) to provide support for 3 shared Disks in the R215F expansion box per DSSI channel or 2 R215F's to provide 6 shared Disks per DSSI channel (see Rules 4 & 6).
    - b. Use an R215F with an R400X. Keep in mind that only 6 disks can be shared per DSSI channel. Therefore, the R400X would be underutilized.
    - c. Replace the R215F with a R400X to provide up to 6 shared disks on one DSSI channel in one expansion enclosure.
      - This configuration increases the level of availability for dual-host systems with internal DSSI devices by placing the system and critical data disks in the expansion enclosure (which has a separate power supply). The disks in the expansion enclosure can continue to operate if either of the MicroVAX or VAX 4000 systems is unavailable.
  - Any combination of Q-bus MicroVAX or VAX 4000 systems can be used to create this dual-host configuration.
  - VMS Volume Shadowing Phase II software can be added for data redundancy.
  - An optional Uninterrupted Power Supply (UPS) can be added to the configuration to increase the level of availability.
- \* Note: MicroVAX II, 3500, 3600, and 3900 systems cannot have internal DSSI storage. These systems can share DSSI storage when a KFQSA storage adapter is added and the disks are placed in an expansion enclosure.

## Increasing Availability with the VAX 4000 Model 300 system



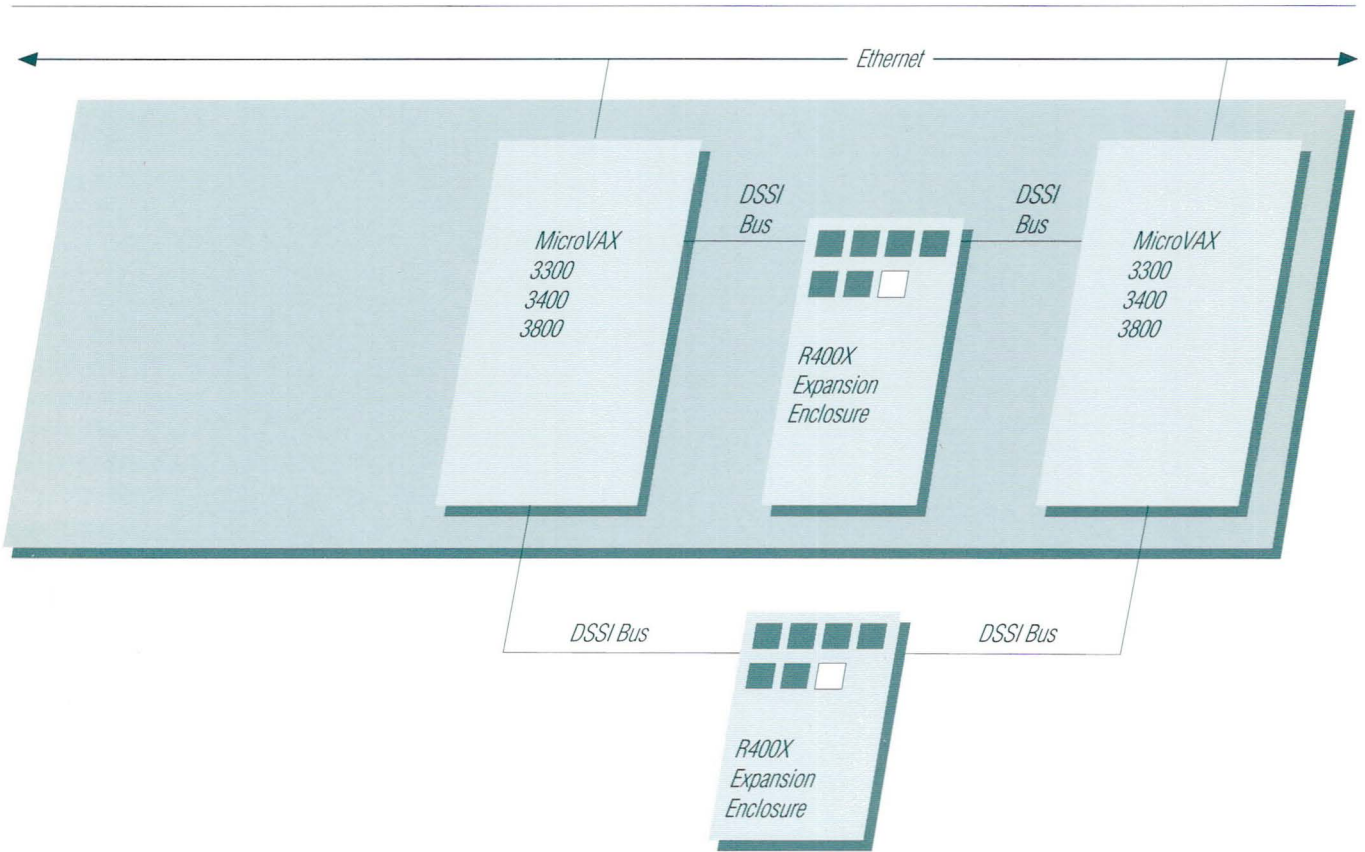
- The VAX 4000 Model 300 comes with 2 embedded DSSI adapters to provide two DSSI channels: A and B.
- Each DSSI Adapter can provide access to the other system's drives.
- The I/O load is split between the two DSSI Adapters by putting half the drives on each bus. By doing this, you can utilize both DSSI adapters in each system to balance the I/O load on each adapter.
- Each embedded DSSI adapter supports 800 I/Os per second.
- VAX 4000 Model 300s can be configured with 3 disks and 1 Tape or 4 disks in the system enclosure.
- Add VMS Volume Shadowing Phase II software for data redundancy.
- An optional Uninterrupted Power Supply (UPS) can be added to the configuration to increase the level of availability.

## Increasing Storage, I/O Capacity, and Availability



- This configuration has two DSSI paths; both paths can be used to create a dual rail DSSI VAXcluster system.
- The configuration doubles the amount of shared storage.
- When configuring systems that have embedded DSSI adapters, embedded adapters should always be connected to embedded adapters.
- Customers with existing R215F DSSI expansion enclosures have the following options:
  - a. Keep the R215F(s) to provide support for 3 shared Disks in the R215F expansion box per DSSI channel or 2 R215Fs to provide 6 shared Disks per DSSI channel (see Rules 4 & 6).
  - b. Use an R215F with an R400X. Keep in mind that only 6 disks can be shared per DSSI channel. Therefore, the R400X would be underutilized.
  - c. Replace the R215F with a R400X to provide up to 6 shared disks on one DSSI channel in one expansion enclosure.
- The dual DSSI VAXcluster configuration can be created with any combination of DSSI-based Q-Bus MicroVAX or VAX 4000 systems that conform to the rules.
- When sharing an R400x expansion enclosure between two hosts in a cluster system, only six of the seven slots can be used (see Rule 4).
- VMS Volume Shadowing Phase II software can be added for data redundancy.
- An optional Uninterrupted Power Supply (UPS) can be added to the configuration to increase the level of availability.

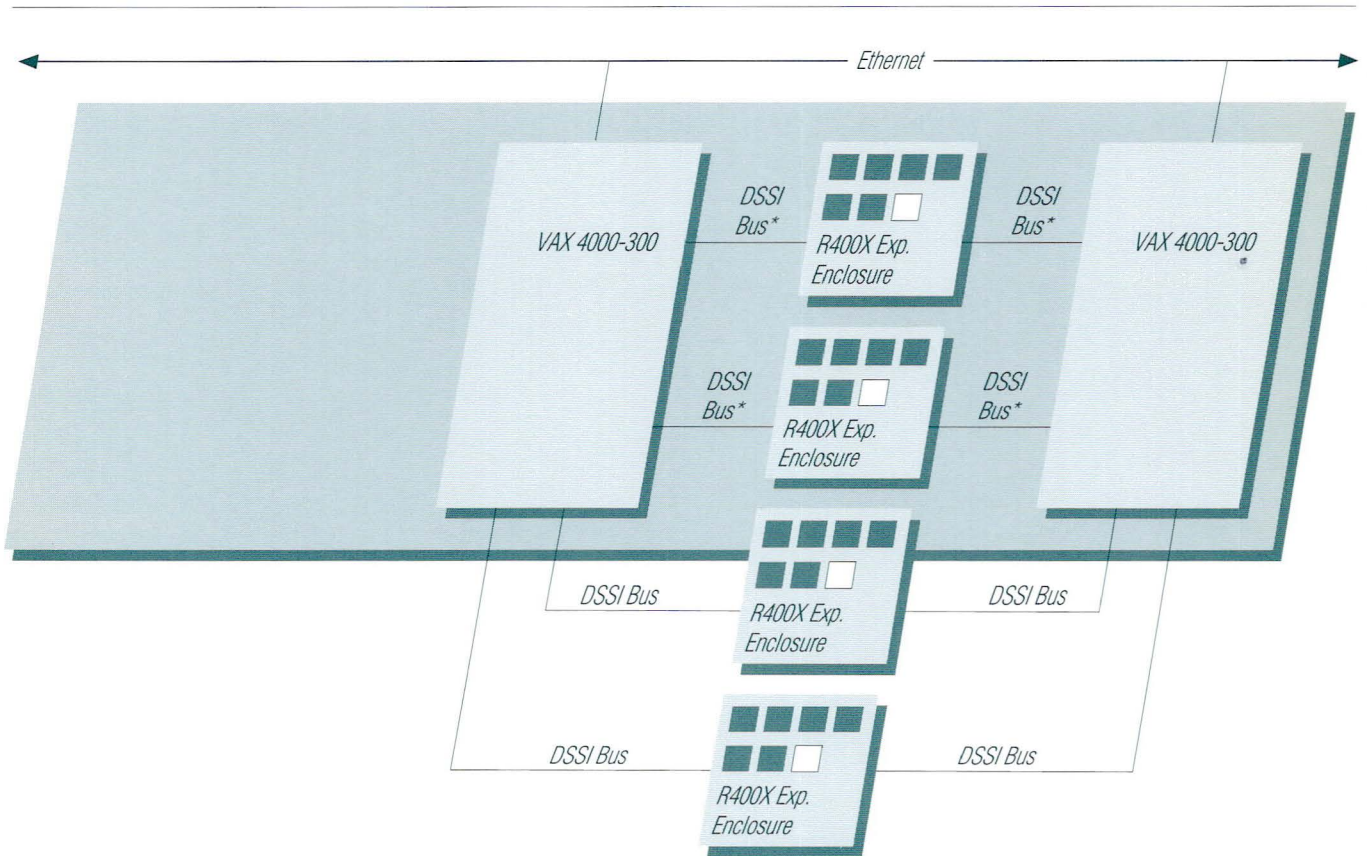
## Maximum Configuration using MicroVAX 3300, 3400, and 3800



- These maximum configurations are determined by the DSSI adapter limit (see Rule 5).
- This configuration is a dual DSSI dual-host MicroVAX 3300, 3400, or 3800 that is sharing two R400X expander cabinets.
- When sharing an R400x expansion enclosure between two hosts in a cluster system, only six of the seven slots can be used (see Rule 4).
- Customers with existing R215F DSSI expansion enclosures have the following options:
  - a. Keep the R215F(s) to provide support for 3 shared Disks in the R215F expansion box per DSSI channel or 2 R215Fs to provide 6 shared Disks per DSSI channel (see Rules 4 & 6).
  - b. Use an R215F with an R400X. Keep in mind that only 6 disks can be shared per DSSI channel. Therefore, the R400X would be underutilized.
  - c. Replace the R215F with a R400X to provide up to 6 shared disks on one DSSI channel in one expansion enclosure.
- VMS Volume Shadowing Phase II software can be added for data redundancy.
- An optional Uninterrupted Power Supply (UPS) can be added to the configuration to increase the level of availability.



## Maximum Configuration using the VAX 4000 Model 300



- This maximum configuration is determined by the DSSI adapter limit. The VAX 4000 Model 300 has 2 embedded DSSI adapters. When 2 additional KFQSA's are added to the configuration, there becomes a maximum of 4 DSSI channels (see Rules 5 and 8).
- \* Two embedded DSSI adapters for 2 DSSI Channels.
- Remember, connect embedded DSSI adapter to embedded DSSI adapter when possible.
- Customers with existing R215F DSSI expansion enclosures have the following options:
  - a. Keep the R215F(s) to provide support for 3 shared Disks in the R215F expansion box per DSSI channel or 2 R215Fs to provide 6 shared Disks per DSSI channel (see Rules 4 & 6).
  - b. Use an R215F with an R400X. Keep in mind that only 6 disks can be shared per DSSI channel. Therefore, the R400X would be underutilized.
  - c. Replace the R215F with a R400X to provide up to 6 shared disks on one DSSI channel in one expansion enclosure.
- When sharing an R400x expansion enclosure between two hosts in a cluster system, only six of the seven slots can be used (see rule 4).
- Up to 24 Disks can be shared between two VAX 4000 Model 300 systems.
- VMS Volume Shadowing Phase II Software can be added to increase data availability and redundancy.
- With two embedded DSSI adapters on the VAX 4000 Model 300, VMS Volume Shadowing Phase II software, and an optional uninterruptible power supply, a dual DSSI multi-rail VAX 4000 Model 300 offers an extremely high level of data availability.

## Configuration Rules

Refer to Tables 2 and 3 when configuring the systems described in this document. The numbers in parentheses refer to notes following the table.

**Table 2:  
Hardware and Software  
Requirements Matrix**

	MicroVAX II/BA23	MicroVAX II/BA123	MicroVAX 3300/3400	MicroVAX 3800	MicroVAX 3500/3600 3900	VAX 4000 Model 300/ 200
MicroVAX II/BA23	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax*	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax*	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax*	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax*	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax*	RF30C-Ax or RF71B-Ax or RF31B-Dx* or RF72B-Ax* or R400X-B9*
	KFQSA-AA BC21M-09 VMS V5.1-1 (1)	KFQSA-BA BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3 (1)	BC21M-09 VMS V5.1-1 (1)	KFQSA-SG BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3-2 (1)
MicroVAX II/BA123		RF30C-Bx or RF71B-Bx or RF31B-Dx** or RF72B-Bx*	RF30C-Bx or RF71B-Bx or RF31B-Dx** or RF72B-Bx*	RF30C-Bx or RF71B-Bx or RF31B-Dx** or RF72B-Bx*	RF30C-Bx or RF71B-Bx or RF31B-Dx** or RF72B-Bx*	RF30C-Bx or RF71B-Bx or RF31B-Dx** or RF72B-Bx* or R400X-B9**
		KFQSA-BA BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3 (1)	BC21M-09 VMS V5.1-1 (1)	KFQSA-SG BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3-2 (1)
MicroVAX 3300/3400			BC21M-09 VMS V5.02A (1,2)	BC21M-09 VMS V5.3 (1,2)	KFQSA-SG BC21M-09 VMS V5.3 (1)	BC21M-09 VMS V5.3-2 (2,3)
MicroVAX 3800				BC21M-09 VMS V5.1-1 (1,2)	KFQSA-SG BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3-2 (2,3)
MicroVAX 3500/3600 3900					RF30C-Cx or RF71B-Cx or RF31B-Dx*** or RF72B-Dx***	RF30C-Cx or RF71B-Cx or RF31B-Dx*** or RF72B-Dx*** or R400X-B9***
					KFQSA-SG BC21M-09 VMS V5.1-1 (1)	BC21M-09 VMS V5.3-2 (1)
VAX 4000 Model 300/ 200						BC21M-09 VMS V5.3-2 (2,3)
	VMS versions indicate minimum requirement; VMS Volume Shadowing Phase II requires VMS V.5.4.-1					

\*Additional RF30B-Dx, RF71B-Dx, RF31B-Dx, or RF72B-Dx can be added to achieve maximum of 6 RF ISEs per DSSI adapter, or to put all ISEs in expansion enclosures.

<sup>2</sup>A dual DSSI dual-host is possible with this configuration.

<sup>3</sup>R400X-B9 can be added to put all ISEs in an expansion enclosure.

\*KFQSA-AA required if RF31B-Dx, RF72B-Ax, or R400X-B9 is used.

\*\*KFQSA-BA required if RF31B-Dx, RF72B-Bx, or R400X-B9 is used.

\*\*\*KFQSA-SG required if RF31B-Dx, RF72B-Dx, or R400X-B9 is used.

**Table 3:**  
**Orderable Components**  
**for Dual-host Systems**

BC21M-09	9-foot DSSI interconnect cable
KFQSA-AA	Q-bus/DSSI adapter for MicroVAX II/BA23 configurations, field installed.
KFQSA-BA	Q-bus/DSSI adapter for MicroVAX II/BA123 configurations, field installed.
KFQSA-SG	Q-bus/DSSI adapter for MicroVAX 3xxx systems, field installed.
KFQSA-SE	Q-bus/DSSI adapter for VAX 4000 systems; factory installed. Two maximum per VAX 4000; uses one Q-bus slot each.
KFQSA-SG	Q-bus/DSSI adapter for VAX 4000 systems; field installed. Two maximum per VAX 4000; uses one Q-bus slot each.
RF30C-Ax*	RF30C-Dx components plus KFQSA-AA DSSI adapter, field installed.
RF30C-Bx	RF30C-Dx components plus KFQSA-BA DSSI adapter, field installed.
RF30C-Cx	RF30C-Dx components plus KFQSA-SG DSSI adapter, field installed.
RF30C-Dx	R215F expansion enclosure with two RF30s included, and space for one additional RFxx Disk; BC21M-09 included, field installed.
RF31B-Dx +	R215F expansion enclosure with RF31E Disk, space for two additional RFxx Disks, BC21M-09 included, 120-V power cord, factory or field installed. (Use SA or SF disk variant.)
RF71B-Ax	RF71B-Dx components plus KFQSA-AA DSSI adapter, field installed.
RF71B-Bx	RF71B-Dx components plus KFQSA-BA DSSI adapter, field installed.
RF71B-Cx	RF71B-Dx components plus KFQSA-SG DSSI adapter, field installed.
RF71B-Dx	R215F expansion enclosure with RF71 included, and space for two additional RFxx Disks; BC21M-09 included, field installed.
RF72E-AA	1-GB full-Ht DSSI Disk for BA400 based systems, factory installed.
RF72E-AF	1-GB full-Ht DSSI Disk for BA400 based systems, field installed.
RF72E-SA	1-GB full-Ht DSSI Disk for BA200 based systems, factory installed.
RF72E-SF	1-GB full-Ht DSSI Disk for BA200 based systems, field installed.
RF72B-AA	1-GB full-Ht DSSI Disk for MicroVAX II in BA23 enclosure, 120V
RF72B-AA	1-GB full-Ht DSSI Disk for MicroVAX II in BA23 enclosure, 240V
RF72B-BA	1-GB full-Ht DSSI Disk for MicroVAX II in BA123 enclosure, 120V
RF72B-BB	1-GB full-Ht DSSI Disk for MicroVAX II in BA123 enclosure, 240V
RF72B-CA	1-GB full-Ht DSSI Disk for non-DSSI-based BA2xx MicroVAX systems in R215F expansion enclosure, 120V
RF72B-CB	1-GB full-Ht DSSI Disk for non-DSSI-based BA2xx MicroVAX systems in R215F expansion enclosure, 240V
RF72B-DA	1-GB full-Ht DSSI Disk for non-DSSI-based BA2xx MicroVAX systems in R215F expansion enclosure, 120V
RF72B-DB	1-GB full-Ht DSSI Disk for non-DSSI-based BA2xx MicroVAX systems in R215F expansion enclosure, 120V
RF72B-KA	Single RF72-RA Removable Storage Element, R23RF-A2, 110V
RF72B-KB	Single RF72-RA Removable Storage Element, R23RF-A3, 220V
RF72C-KA	Double RF72-RA Removable Storage Element, R23RF-A2, 110V
RF72B-KB	Double RF72-RA Removable Storage Element, R23RF-A2, 220V
RF30E-SA	150-Mbyte half-height DSSI Disk for MicroVAX 3xxx systems, factory installed.
RF30E-SF	150-Mbyte half-height DSSI Disk for MicroVAX 3xxx systems, field installed.

\*-----s A for 120-V systems, B for 240-V systems

+ Supported only on VAX 4000 Model 300 configurations

Table 3 continued on next page

**Table 3:  
Orderable Components  
for Dual-host Systems  
Cont'd.**

RF31E-AA	381-Mbyte half-height DSSI Disk for VAX 4000 Model 300 systems, factory installed.
RF31E-AF	381-Mbyte half-height DSSI Disk for VAX 4000 Model 300 systems, field installed.
RF71E-AA	400-Mbyte full-height DSSI Disk for VAX 4000 Model 300 systems, factory installed.
RF71E-AF	400-Mbyte full-height DSSI Disk for VAX 4000 Model 300 systems, field installed.
RF71E-SA	400-Mbyte full-height DSSI Disk for MicroVAX 3xxx systems, factory installed.
RF71E-SF	400-Mbyte full-height DSSI Disk for MicroVAX 3xxx systems, field installed.
R400X-B9 +	R400X expansion enclosure with space for seven RFxx Disks with special mounting hardware; universal power supply, 120-V power cord, BC21M-09 included; factory or field installed. (Use AA or AF disk variant.)
QL-AB2A-AA	VMS Volume Shadowing Phase II software license
HA1000-xx	Uninterruptible Power Supply (variant depends on system current requirements).

+ Supported only on VAX 4000 Model 300 configurations

**For More Information on Dual-host Configurations**

MicroVAX/VAXserver 3500 Dual-host Manual	EK-338AA-DH
MicroVAX 3800 System Technical Manual	EK-167AA-IS
MicroVAX Dual-Host Systems	EK-338AC-DH-003
VAX 4000 Dual-Host Systems	EK-390AB-DH-002

**For More Information on VMS Volume Shadowing**

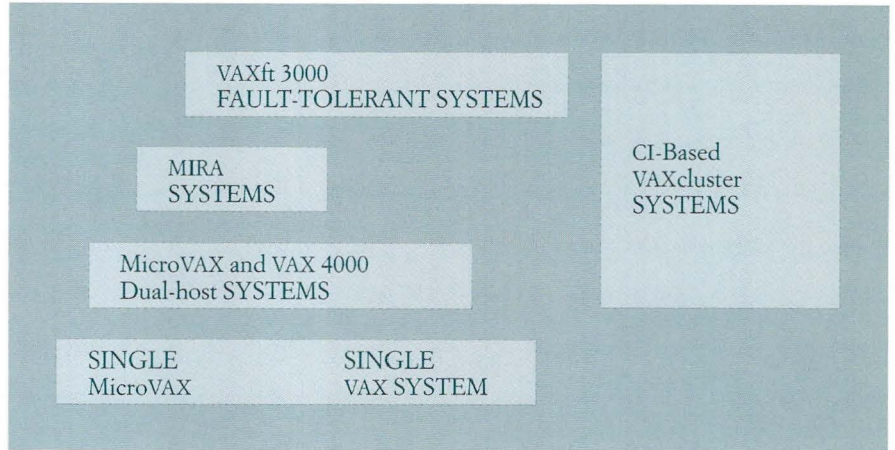
SPD 27.29xx	
CSO Update Special DECtp Issue	February 19, 1990, Vol. 21 No. 21
VMS Volume Shadowing Manual	AA-PBTVA-TE
VMS Operating Systems Info Sheet	EC-F0566-48
VMS Handbook	EC-H0533-48

## Questions and Answers

- Q** Is it true that with a dual-host system when one MicroVAX system fails I maintain full system operation with the remaining system?
- A** No. That would be redundant processing. A Digital sales representative can tell you about redundant processing, with ftVAX, MIRA, or major component redundancy in a dual-host configuration. In most dual-host systems, the remaining processor takes over some of the operations of the failed system. However, this occurs at a reduced performance level because the remaining system is doing the work of two systems. Full continuous processing with no loss of work in progress is offered only on VAXft 3000 systems.
- Q** Will a dual-host system deliver twice the processor performance of each Q-bus MicroVAX/VAX operating independently?
- A** No. A dual-host is actually a two-node VAXcluster system with the associated overhead. You will not get 200-percent performance. However, both members of a dual-host are active systems; they do not have a master/slave or standby relationship.
- Q** Can two non-DSSI MicroVAX systems be combined in a dual-host configuration using the KFQSA in each system, sharing an expander?
- A** Yes. By adding a KFQSA to each non-DSSI MicroVAX system, such as MicroVAX II, 3600, and 3900, and adding an expander box, a dual-host configuration can be created. Any Q-bus MicroVAX system can be dual-hosted to any other Q-bus MicroVAX or VAX 4000 system.
- Q** Will my current RD-series or RA-series disk drives continue to function if I add DSSI Disks?
- A** Yes. The KFQSA adapter will coexist with the RQDX3 and the KDA50.
- Q** Can RA70 disks be added internally to DSSI-based systems, such as MicroVAX 3300, 3400, and 3800? Also, can RF disks instead of RA70 disks be added internally to the MicroVAX 3600 or 3900 system?
- A** No. The differences in the mechanical configuration and the cabling arrangements between the two storage interconnects make this impossible. However, RF Disks can be added to the MicroVAX 3600 or 3900 systems via the expander.
- Q** Can I embed RF-series Disks in MicroVAX II BA23 or BA123 enclosures?
- A** No. However, you can add DSSI functionality to your MicroVAX II system by using RF-series Disks in storage expansion enclosures. These expanders come with the appropriate KFQSA DSSI adapter and DSSI cable so that customers can easily connect to their system.
- Q** What is the maximum number of disks shared in a dual host system?
- A** This really depends on the systems that you use in your dual host configuration. A dual host configuration of two VAX 4000 Model 300 systems, for example, can share 24 disks, 6 on each of 4 DSSI adapters. See the configuration examples for details.

## Digital Product Positioning

Unscheduled  
Downtime



Price and Performance

This chart shows Digital's various High-availability/Fault-tolerant solutions. The vertical axis represents the level of availability, the horizontal axis represents price.

A DSSI VAXcluster dual-host system provides higher availability and dual CPU performance in a noncomputer room environment. Dual-host systems are not fault-tolerant systems. However, they do provide high-availability options that position clearly with Digital's other High-availability/Fault-tolerant solutions including the VAXft 3000, MIRA II, and VAXcluster systems.

For more information on these high availability/fault tolerant systems, contact your local sales representative.

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