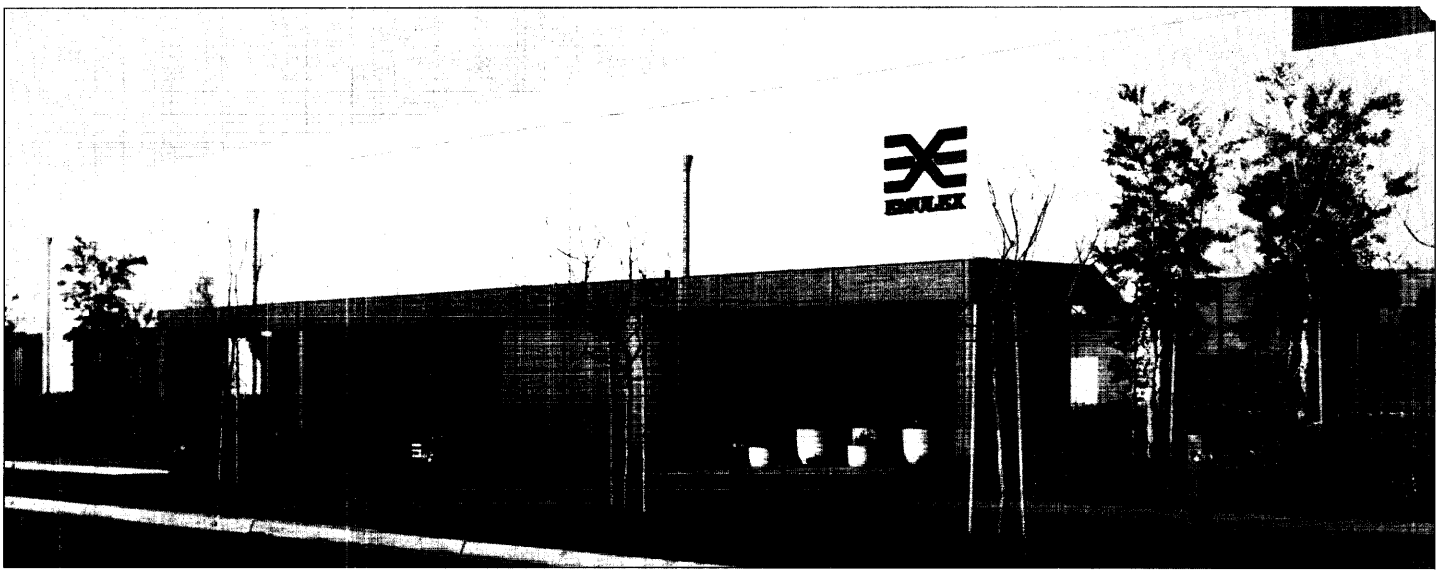
DEC-Compatible Product Summary

EMULEX



The Company

Emulex is an acknowledged leader in one of the most technologically demanding segments of the computer industry, and now is also rapidly proving its technical and marketing capabilities in another.

Founded in 1978, the company was chartered to apply its microprocessor expertise to the design and production of peripheral controllers for minicomputers, in particular those manufactured by Digital Equipment Corporation. Its initial board-level disk and tape controller products offered higher performance alternatives to DEC's own, and quickly gained acceptance. Those original DEC-compatible controllers were quickly joined by communications multiplexers for computer terminals, then by entire storage subsystems, and later by performance-enhancing products for IBM-compatible personal computers, and an integrated circuit product line.

All of these excelled at their applications; and, among other distinctions, Emulex became the world's largest supplier of DEC-compatible products.

Now Emulex has embarked on another growth path in another segment of the computer industry, data communications. Applying the VLSI integrated circuit technology and advanced manufacturing techniques already proven in support of its other businesses, the company has begun manufacturing and marketing OEM and end-user data communications products — which also demonstrate clear technical and price/performance advantages over earlier-technology versions.

Today what was once a privately funded high tech start-up specializing in board-level hardware for one segment of the computer industry has become a publicly traded $100 million-plus enterprise employing more than 850 persons. Current products range from chips to boards, to standalone "boxes," to complete storage subsystems; for use with computers from DEC and IBM and others; and for applications ranging from storage to graphics to communications.

Those products are produced both domestically and internationally, either at the company's 212,000 square foot headquarters facility in Costa Mesa, California, in its 52,000 square foot manufacturing plant in Dorado, Puerto Rico, or in a smaller facility in Bracknell, England.

Sales and Service

Emulex has 20 direct sales/field support offices located across the U.S., plus international sales and service offices in the United Kingdom, France, West Germany, Australia, Japan, and Canada.

Our products are made available through a direct sales force, industrial distributors, OEMs, and through a separate distributor network specializing in data communications. They also appear on GSA schedules.

Support is provided through a dedicated technical staff in Costa Mesa, pre-sales support personnel in regional offices, and specialists dedicated to on-site installation and support in key geographic areas.

Well staffed and well equipped repair centers are maintained in Costa Mesa and in Bracknell, and it is the company's policy to promptly honor service requests for in- and out-of-warranty equipment regardless of purchase source. Third-party repair service is also available in more than 50 cities. Finally, the company conducts regularly scheduled repair courses which can also be provided at customer locations.

For More

DEC-compatible products are briefly described in the following pages. For more information on these or other offerings, please use the Business Reply Card bound into this issue or call direct: (800) EMULEX-3 or (714) 662-5600 in California.

Regional and international sales offices are listed on the inside back cover. For information on the availability or price of any of these products, or for general information on products which might have been introduced after the date of this publication, please call those offices directly.

Introduction to The Summary

Digital Equipment Corporation has become the world's second largest computer manufacturer — with products ranging from single-board microprocessors to super-minicomputers with mainframe capabilities — by keeping things simple.

The entire DEC product line is built around the handful of DEC computer buses listed on this page. Whatever your application, therefore, you can choose from a wide variety of third-party DEC-compatible controllers, peripherals, subsystems, and data-communication equipment by simply identifying the DEC bus that applies to your computer system.

Emulex has become, in turn, the industry's leading supplier of DEC-compatible data storage and communications products by making certain that whatever bus architecture applies to your system, there is an Emulex "emulation-plus" controller or subsystem that will significantly increase your system performance, lower your system costs, or simultaneously accomplish both goals.

Q-bus — An asynchronous 16-bit parallel backplane bus with an addressing space of up to 4 megabytes. Applies to LSI-11/2, LSI-11/23, LSI-11/23 PLUS, Micro PDP-11, MicroVAX I, and MicroVAX II computer systems. *(Page 5.)*

UNIBUS — An asynchronous 16-bit parallel backplane bus with an addressing space of up to 4 megabytes. Applies to PDP-11/24 through PDP-11/70, VAX-11/730, VAX-11/750, VAX-11/780, VAX-11/782, VAX 8200, VAX 8300, VAX 8500, VAX 8600, VAX 8650, and VAX 8800 computer systems. *(Page 12.)*

Cache Bus — A synchronous 16-bit parallel memory bus that applies only to PDP-11/70 processors. *(Page 19.)*

CMI Bus — A synchronous 16-bit parallel memory bus that applies only to VAX-11/750 computer systems. *(Page 19.)*

SBI Bus — A synchronous 16-bit parallel memory bus that applies to VAX-11/780, VAX-11/782, VAX 8600 and VAX 8650 computer systems. *(Page 19.)*

VAXBI Bus — A synchronous 32-bit parallel backplane bus with an address space of 4 gigabytes. Is a standard feature of VAX 8200, VAX 8300, VAX 8500, and VAX 8800 computer systems. *(Page 24.)*

CI Bus — A dual-path computer interconnect bus for assembling VAXclusters. May be applied to VAX-11/750, VAX-11/780, VAX-11/785, VAX 8200, VAX 8300, VAX 8600, VAX 8650, and VAX 8800 computer systems. *(Page 24.)*

SCSI Bus — An industry-standard external 8-bit parallel I/O bus that can be used to interconnect any DEC computer with a range of industry-standard storage drives and other peripheral devices. *(Page 27.)*

Emulex Products for

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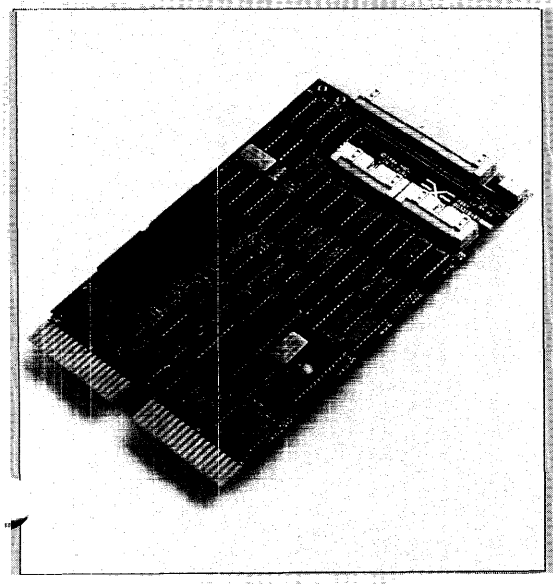
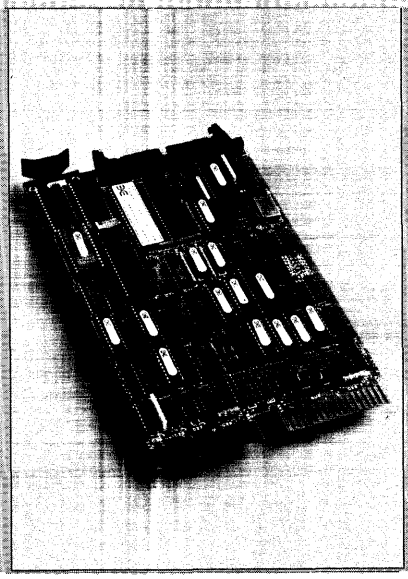
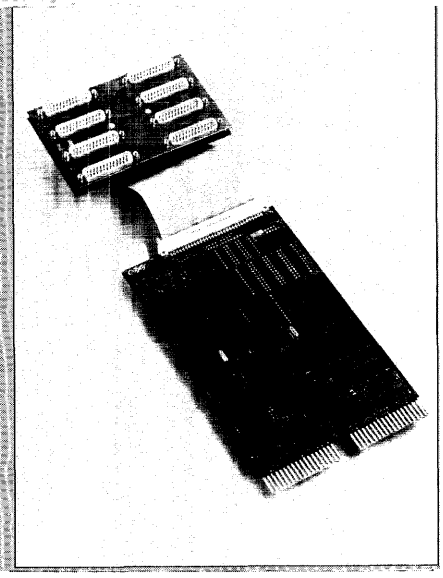
Q-bus Compatible Disk Controller supports two SMD/SMD-E Disk Drives



Microprocessor Based Tape-Coupler for the MicroVAX and Micro-11

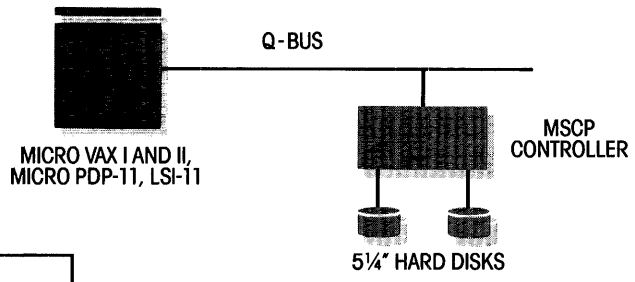


8-Line Asynchronous Multiplexer Emulator DHV 11. Shown with RS232 Distribution Panel.



Q-bus MSCP Disk Controllers for 5¼" Disks

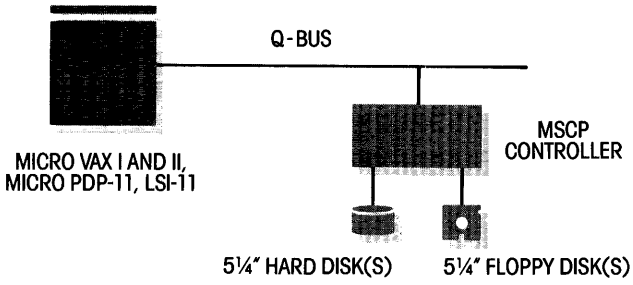
Emulex Q-bus controllers for 5¼" hard disks give you a choice: the ST506/412 interface for standard drives, or ESDI for the new higher capacity, higher performance devices. Both controllers provide full MSCP emulation.



	QD01/D	QD21
Emulation	MSCP (KDA50)	MSCP (KDA50)
Board Size	Dual	Dual
Drive Interface	ST506/412	ESDI
Data Rate	2 Mbytes/second	2 Mbytes/second
Data Buffer	10 Kbytes	26 Kbytes
Interleave	1:1	1:1
DMA Mode(s)	Block, Adaptive	Block, Adaptive
Address Space	4 Mbytes	4 Mbytes
ECC / CRC	48/16 bit	48/16 bit

Q-bus MSCP Dual-function Disk Controllers for 5¼" Disks

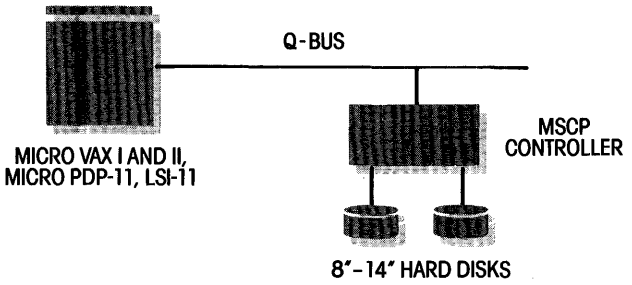
Why use two Q-bus slots when one will do? Emulex dual-function controllers combine multiple floppy-disk interfaces with your choice of ST506/412 or ESDI hard-disk interfaces. Plus full-function MSCP emulation.



	DM01		DM02	
Emulation-Plus	MSCP (KDA50)	MSCP (RX50)	MSCP (KDA50)	MSCP (RX50)
Board Size	Dual	Dual	Dual	Dual
Drive Interface	ST506/412	SA450	ESDI	SA450
No. of Drives	2	2	2	2
Data Rate	600 Kbytes/second	250 Kbytes/second	1.2 Mbytes/second	250 Kbytes/second
Data Buffer	26 Kbytes	26 Kbytes	26 Kbytes	26 Kbytes
Interleave	1:1	1:1	1:1	1:1
DMA Mode(s)	Block, Adaptive	Block, Adaptive	Block, Adaptive	Block, Adaptive
Address Space	4 Mbytes	4 Mbytes	4 Mbytes	4 Mbytes
ECC/CRC	48/16-bit	48/16-bit	48/16-bit	48/16-bit

Q-bus MSCP Disk Controller for 8"-14" Disks

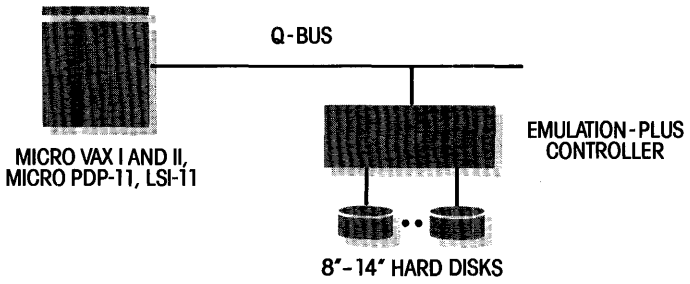
Increase the potential of your Q-bus systems with the highest capacity disk devices now available. The Emulex big-disk MSCP controller can transfer data at rates up to 3.0 Mbytes per second — and address the full 22-bit memory space of your MicroVAX I or II.



	QD33
Emulation-Plus	MSCP (KDA50)
Board Size	Dual
Drive Interface	SMD-E
No. of Drives	2
Data Rate	3.0 Mbytes/second
Data Buffer	26 Kbytes
Interleave	1:1
DMA Mode(s)	Block, Adaptive
Address Space	4 Mbytes
ECC/CRC	48/16-bit

Q-bus Emulating Disk Controller for 8"-14" Disks

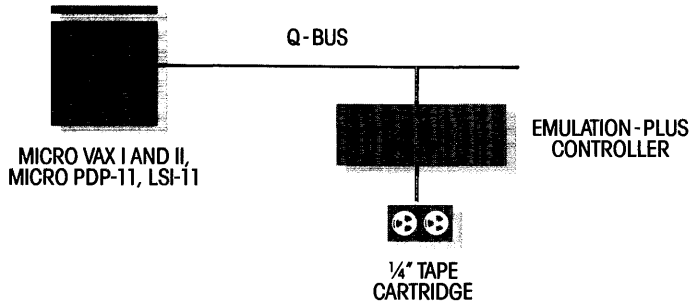
Now you can connect up to two industry-standard disks (four logical disks) with a single Emulex Q-bus controller — without changing a single line of your existing system software. Secret: full emulation of your existing DEC controllers — and the extra features you can always expect from Emulex.



	SC03/BX
Emulation-Plus	RH11/RH70
Board Size	Quad
Drive Interface	SMD-E
No. of Drives	2
Data Rate	1.8 Mbytes/second
Data Buffer	8 Kbytes
Interleave	1:1
DMA Mode(s)	Block, Adaptive
Address Space	4 Mbytes
ECC/CRC	32/16-bit
Special Features	Emulation of RM02, RM05, or RP06

Q-bus Tape Controllers/Couplers for 1/4" Tape

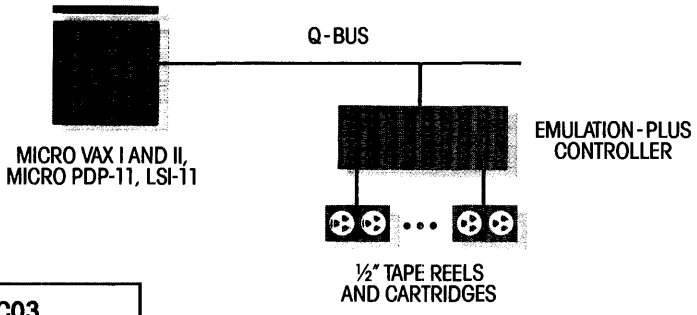
Back up your disk files — fast — with compact 1/4" streaming tape cartridges. Emulex Q-bus controllers support all standard QIC-02 cartridge drives. Or connect your Q-bus to an intelligent CDC Sentinel drive with the Emulex TC05 tape coupler.



	QT12	TC05
Emulation-Plus	TS11	TS11
Board Size	Dual	Quad
Drive Interface	QIC-02	CDC Sentinel
Recording Format	QIC-24	11-Track Serpentine
No. of Drives	1	1
Data Rate	200 Kbytes/second	50 Kbytes/second
Data Buffer	16 Kbytes	35 Kbytes
Address Space	4 Mbytes	4 Mbytes

Q-bus Tape Couplers for 1/2" Tape

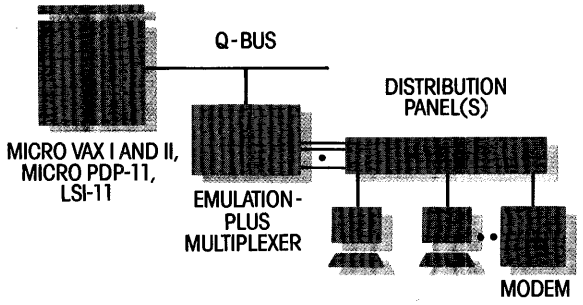
Reel-to-reel or cartridge, streaming or start-stop, NRZI, PE or GCR recording — there's an Emulex coupler which will allow you to expand your Q-bus system with your choice of high-capacity, high-throughput 1/2-inch tape transports.



	TC02	TC03
Emulation-Plus	TS11	TS11
Board Size	Quad	Quad
Drive Interface	Pertec	Pertec
Recording Format	NRZI, PE	NRZI, PE, GCR
No. of Drives	4	4
Data Rate	200 Kbytes/second	1 Mbyte/second
Data Buffer	64 Bytes	3.5 Kbytes
DMA Mode(s)	—	Block, Adaptive
Address Space	4 Mbytes	4 Mbytes

Q-bus Data Communication Multiplexers

When it comes to Q-bus communications multiplexers, there's no comparison. Emulex Q-bus multiplexers provide up to eight times as many lines and four times the throughput as the DEC DHV11, all in the same or less mounting space.



	CS01	CS02	CS04	CS08	CS09
Emulation-Plus	DH11	DHV11/DH11	DHV11	DHV11	DHV11
Number of Lines	8-64	16	16-64	8	16
Board Size	Quad	Quad	Quad	Dual	Dual
Type	Asynchronous	Asynchronous	Asynchronous	Asynchronous	Asynchronous
Transmission Modes	Full/half duplex	Full/half duplex*	Full/half duplex	Full/half duplex	Full/half duplex
Terminal Interface	RS-232 RS-422 20mA opt. MIL-STD-188-C opt.	RS-232 RS-422 opt.	RS-232 RS-422	RS-232	RS-232
Throughput	50,000 ch/sec	60,000 ch/sec	50,000 ch/sec	60,000 ch/sec	60,000 ch/sec
Receive FIFO	64/128 words per 16 lines	256 words per 8/16 lines	256 words per 8 lines	256 words per 8 lines	256 words per 8 lines
DMA Mode(s)	16-bit words	16-bit words	16-bit words	16-bit words	16-bit words
Modem Control	Full/none	Partial & Full*	Full	Full/none	Full/none
Special Features	Isochronous			Menu-option driven configuration	Menu-option driven configuration

*12 lines with partial modem control and full-duplex transmission, plus 4 lines with full modem control and both full- and half-duplex transmission.

Q-bus Terminal/Modem Distribution Panels

	CP02	CP08	CP09	CP12	CP12/V2	CP22/B	CP24	CP24/B	CP25	CP34
COMMUNICATION SUBSYSTEMS										
CS01				●	●					●
CS02	●					●	●	●	●	
CS04										●
CS08		●								
CS09			●							
FEATURES*										
No. of Channels	16	8	16	8/16	8/16	16	16	4	16	16
Modem Control**	P	F/M N/J	F/M N/J	F	F	P/F*	P	F	P/F*	F
RS-232-C	●	●	●	●	●	●	●	●	●	●
RS-422-A									●	●
20 mA				●						
MIL-STD-188-C					●					
Full Duplex	●	●	●	●	●	●	●	●	●	●
Half Duplex		/M	/M	●	●	● *		●	● *	●
Asynchronous	●	●	●	●	●	●	●	●	●	●
Synchronous					●					
Isochronous					●					
DB 9							●			
DB 25		/M	/M	●	●	●		●	●	●
Modular Jack	●	/J	/J							

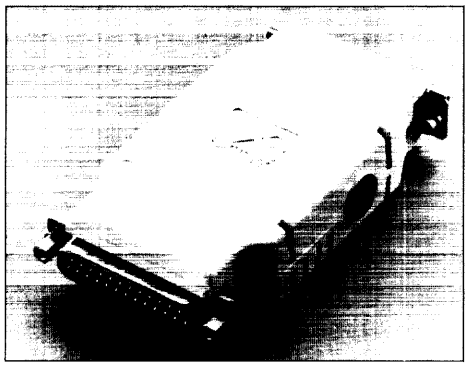
*12 lines with partial modem control and full-duplex transmission and 4 lines with full modem control and both full- and half-duplex transmission.

**P = Partial; F = Full; N = None.

NOTE: M and J are model designations.

CV422 RS-232-to-RS-422 Converter

Need to locate a terminal at a large distance from your host computer? The CV422 is a compact low-cost device which converts the data leads of an RS-232 terminal to the newer RS-422 standard, for support of distances up to 4000 feet. The CV422 can communicate either to another CV422 connected to an RS-232 host computer port, or to an RS-422-compatible device such as the Emulex CP34 or CP25 distribution panel.



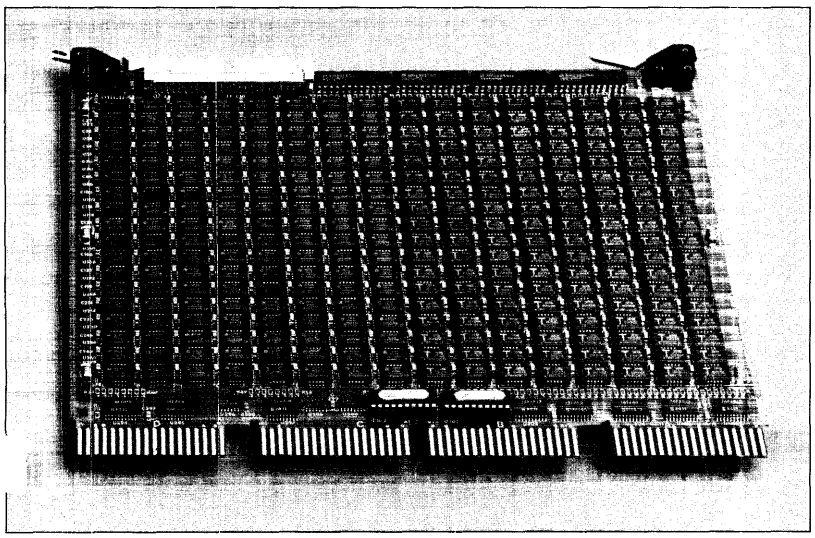
Q-bus Expanded Memory Boards

You can expand your MicroVAX II to the system's maximum — 16 Mbytes — by installing two quad-wide 8-Mbyte LM08s. The LM08s achieve this by automatically disabling the 1-Mbyte of CPU-resident memory. The LM08 boards interface to the KA630-A CPU module via the MicroVAX II's Local Memory Interconnect (LM) and C-D backplane connectors. The board is compatible with DEC's MS630 series memory boards.

The LM08 also has a user-selectable board-disable toggle switch that allows you to disable the memory array in case of memory errors. All signals are passed to the next slot. Thus, if you are unable to boot the diagnostics, you can disable the board, load the diagnostics, re-enable the board and test it.

Error detection is provided on a parity bit per byte basis. Thus, a long word operation has four parity bits. Parity generation occurs on a write operation; parity verification on a read.

Computer Interface	MicroVAX II LM1.
Data Organization	32 data bits plus 4 parity bits.
RAM Type	High-speed, surface-mount high performance 256 x 1 dynamic RAMs (120 NS).
Memory Speed	Memory timing is provided by the CPU/MEM board in the MicroVAX II system.
LM1 Interface Connector	Through card-edge connectors embedded in the backplane.
Mounting	Mounts in slot 2 or 3 of the MicroVAX II backplane. You must fill slot 2 in order to be able to add a board in slot 3.
Length	8.7 inches (22.098 cm).
Width	10.486 inches (26.63 cm).
Power Requirements	+5VDC, ±5%, 2.6 amps.
Power Consumption	Operating — 2.6 amps.



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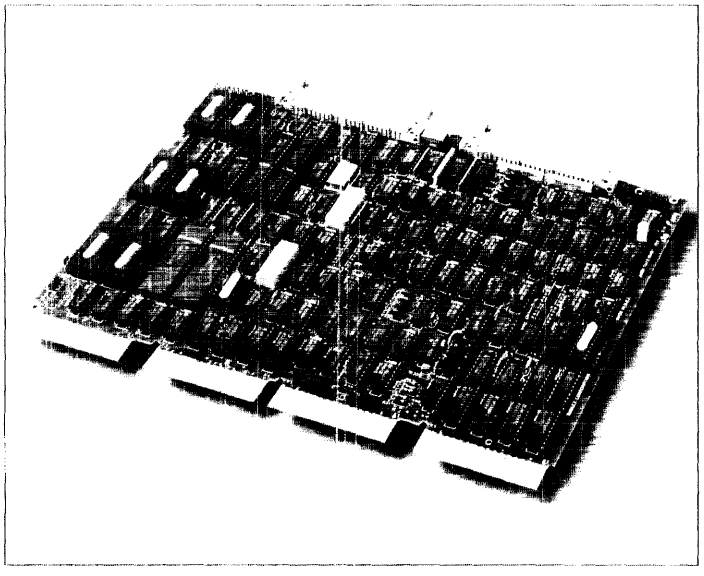
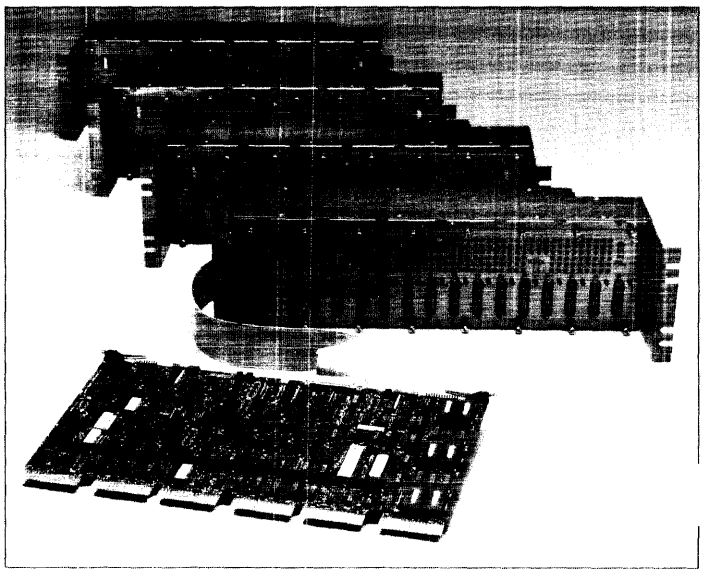
UNIBUS Tape Controller/Coupler for 1/2″ Tape

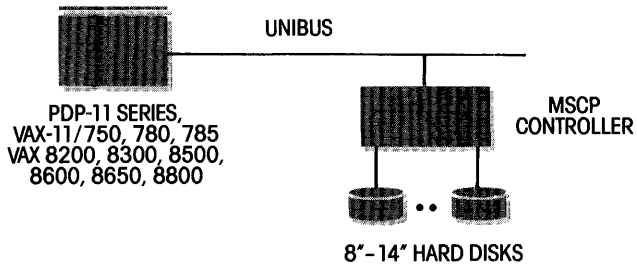


UNIBUS Multiplexer with Distribution Panels



UNIBUS MSCP Disk Controller for 8"-14" Disks

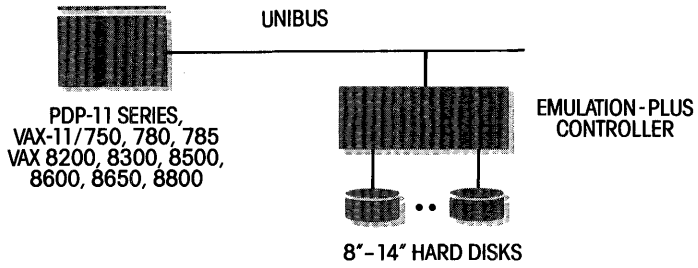
Combine the best of MSCP and the new generation of more cost-effective, higher capacity, higher throughput industry-standard disk drives. Emulex UNIBUS disk controllers give you all the performance you will ever need today, tomorrow—and beyond.



	UD33
Emulation-Plus	MSCP (UDA50)
Board Size	Hex
Drive Interface	SMD-E
Number of Drives	4
Data Rate	3.0 Mbytes/second
Data Buffer	26 Kbytes
Interleave	1:1
DMA Mode(s)	Adaptive
Direct DMA Address Range	128 Kwords (256 Kbytes)
ECC/CRC	48/16-bit

UNIBUS Emulating Disk Controller for 8"-14" Disks

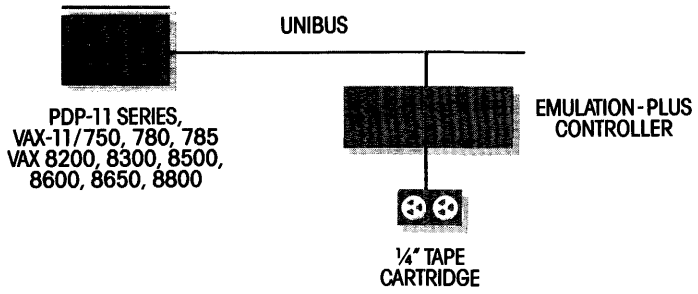
Replace your present DEC boards with an Emulex UNIBUS disk controller—and open up a world of data storage possibilities. Emulex emulation allows you to pick almost any industry-standard drive to meet your exact performance and cost requirement.



	SC31/BX
Emulation-Plus	RH11
Board Size	Hex
Drive Interface	SMD
Number of Drives	4
Data Rate	1.9 Mbytes/second
Data Buffer	8 Kbytes
Interleave	3:1
DMA Mode(s)	Adaptive
Direct DMA Address Range	256 Kbytes
ECC/CRC	32/16-bit
Special Features	RM02, RM05 and RP06 emulations

UNIBUS Tape Coupler for 1/4" Tape

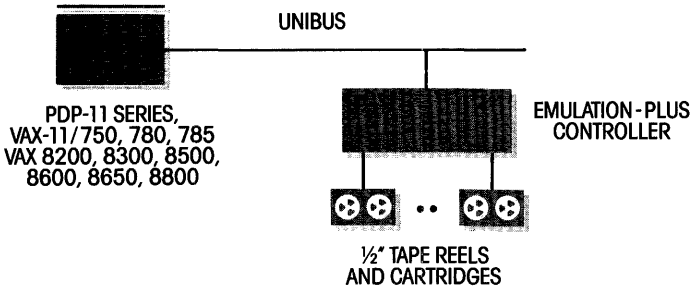
Add a new dimension to your UNIBUS system. A 1/4" streaming cartridge tape drive and Emulex tape coupler will permit you to exchange data and software with a whole new population of desktop computers and workstations — and give your users a new medium for keeping their private files private.



	TC15
Emulation-Plus	TS11
Board Size	Quad
Drive Interface	CDC Sentinal
Recording Format	11-Track Serpentine
Number of Drives	1
Data Rate	50 Kbyte/second
Data Buffer	3.5 Kbyte
DMA Mode(s)	Full Word
Direct DMA Address Range	128 Kwords (256 Kbytes)

UNIBUS Tape Controller/Couplers for 1/2" Tape

Emulex tape couplers let you pick exactly the industry-standard 1/2" tape drive that fits your application — including the compact new triple-format NRZI/PE/GCR drives operating in start-stop or streaming mode.



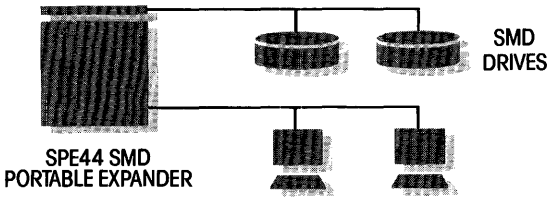
	TC12	TC13
Emulation-Plus	TS11	TS11
Board Size	Quad	Quad
Drive Interface	Pertec	Pertec
Recording Format	NRZI, PE	NRZI, PE, GRC
Number of Drives	4	4
Data Rate	250 Kbytes/second	1 Mbyte/second
Data Buffer	64 Bytes	3.5 Kbytes
DMA Mode(s)	—	Adaptive
Direct DMA Address Range	256 Kbytes	256 Kbytes

UNIBUS Disk System Accessories

Emulex SPE44 SMD Portable Expander is a versatile electronic switching unit for interfacing multiple DEC CPUs to a single bank of up to four SMD-compatible disk drives.

The SPE44 makes it possible to share a database without physically recabling the drives. The SPE44 also offers you enhanced system reliability. In the event of a processor failure, drives on the failed CPU can be routed to another CPU for continued operation.

The SPE44 consistently scans all enabled channels, giving each a time-shared access to the drive bank. Channels which are simply idling are quickly skipped over. Channels can be enabled or disabled at any time. Adding to the SPE44 flexibility is a switch-selectable disk drive address translation. The most significant bit of the disk drive address can be changed, allowing the drive bank to be addressed differently, if necessary, without reconfiguring the operating system.



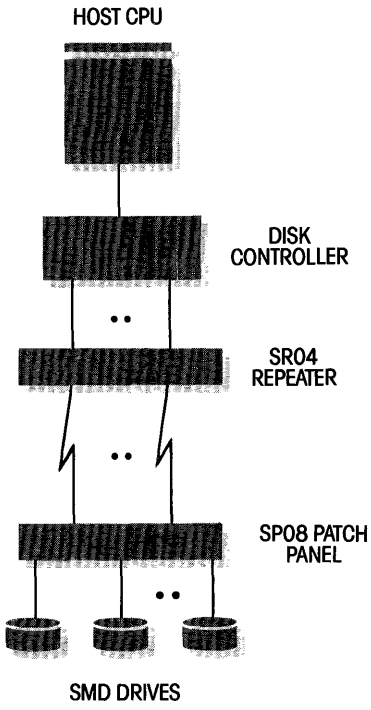
Controls/Indicators Control Panel LED's for:
- Channel ACTIVE
- Channel SCAN START
- EXPANDED SKLAVE
- WRITE PROTECTED
- WRITE OPERATION
- READ OPERATION
- DRIVE RESERVED
- RUN

Control Panel Switches for:
- Channel ENABLE
- DRIVE WRT PROT (Write Protect)
- DRIVE ADDRESS TRANSLATION

Dimensions 5.25 inches (13.34 cm) high.
19.00 inches (48.26 cm) wide.
30.00 inches (76.20 cm) deep.

Weight 50 lbs (22.68 kilos).

Power 120 VAC ± 10%, 50 – 60 Hz, 1.5 amps, or
220 VAC ± 10%, 50 – 60 H, 0.8 amps.
(Amps are max., continuous.)



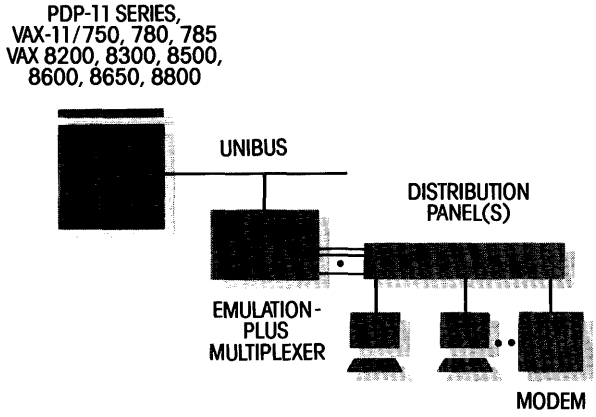
Emulex SR04 Repeater and **SP08 Patch Panel** allow you to extend the distance between controller and SMD drives to up to 100 feet. They also make it possible to easily switch drives between controller ports.

Each SR04 Repeater has four ports which will accommodate up to four B cables from the disk controller, plus one A-in and one A-out cable. Controllers which provide connection to more than four ports will require a second repeater for B cables 5 through 8. A cables daisy chain from the first to second repeater.

An SP08 Patch Panel on the disk side of the SR04 Repeater allows any one of 8 disk drives to be connected to any one of 8 controller ports. The front side of the Patch Panel has 8 connectors for cables coming from the one or two repeaters. Rear-panel connector and special Emulex FCC-compliant patch cables in 2-, 4- and 6-foot lengths are then used to patch any of up to 8 disk drives to any of the controller channels.

UNIBUS Data Communication Multiplexers

Look to Emulex UNIBUS multiplexers for fast, space-saving data communications. Higher throughput means more users can be served. And you can pack up to eight times more lines in the space required by an equivalent DEC multiplexer.



	CS11	CS21	CS23	CS32
Emulation-Plus	/H: DH11 /V: DV11	/F: DMF32 /H: DH11 /Z: DZ11	DHU11	DMF32
Number of Lines	/H: 8-64 /V: 8-32	16	12-32	16-64
Board Size	Hex	Hex	Hex	Hex
Type	/H: Async /V: Async/sync	Async	Async	Async
Transmission Modes	Full/half duplex	Full duplex	Full/half duplex*	Full/half duplex
Terminal Interface	RS-232 RS-422 20mA opt. MIL-STD-188-C opt.	RS-232 RS-422 opt. 20mA opt.	RS-232 RS-422 opt. 20mA opt.	RS-232 RS-422 20mA opt. MIL-STD-188-C opt.
Throughput	50,000 ch/sec	50,000 ch/sec	50,000 ch/sec	70,000 ch/sec
Receive FIFO	/H: 64/128 words per 16 lines /V: 128 words per 16 lines	/F: 48 words per 8 lines /H: 64/256 words per 16 lines /Z: 64/128 words per 8 lines	256 words per 16 lines	256 words per 8 lines
DMA Mode(s)	16-bit words	16-bit words (except /Z)	16-bit words	16-bit words
Modem Control Special Features	Full Isochronous option	Partial	Partial or Full*	Full Isochronous option

*Full modem control and half duplex operation require CP26 panel. This panel provides 8 lines with full modem control and half- or full-duplex operation, and 4 lines with partial modem control and full duplex operation. The CS23 can support up to two CP26 panels.

UNIBUS Terminal/Modem Distribution Panels

	CP12	CP12/V2	CP22	CP23	CP25	CP26	CP34	CP41
COMMUNICATION SUBSYSTEM								
CS11/H	●	●					●	
CS11/V		●						
CS21/F			●	●	●			
CS21/H			●	●	●			
CS21/Z			●	●	●			
CS23			●	●	●	●		
CS32	●	●					●	
CS41								●
FEATURES								
Number of Channels	8/16	8/16	16	16	16	12	16	12/24
Modem Control***	F/N	F	P	P	P	P/F**	F	F/N
RS-232-C	●	●	●	●	●	●	●	●
RS-422-A					● *		●	
20 mA	● *			● *				
Full Duplex	●	●	●	●	●	●	●	●
Half Duplex	●	●				● **	●	●
Asynchronous	●	●	●	●	●	●	●	●
Synchronous		●						
Isochronous	●	●						
DB 9								
DB 25	●	●	●	●	●	●	●	●
Modular Jack								

*RS-422 and 20 mA interfaces are for local terminals only when used with Statcon Series.

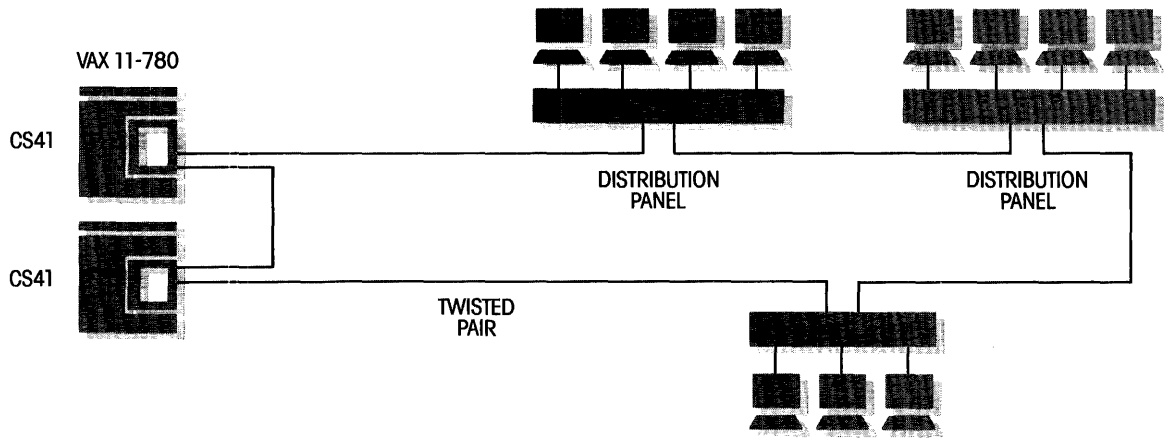
**8 lines with full modem control and full- or half-duplex operation; remaining lines with partial modem control and full-duplex capability.

***P = Partial; F = Full; N = None

UNIBUS T1 Communications Multiplexer

If you need maximum economy and flexibility for connecting terminals in a building or campus environment, the CS41 144-line T1 multiplexer is exactly what you've been looking for. The CS41 provides virtually all of the benefits of other Emulex multiplexers, plus the added advantage of T1 interface. T1 allows distribution panels to be connected up to 5000 ft. away from the host processor via a single twisted pair cable, so you greatly reduce cabling costs. It also vastly simplifies adding and relocating terminals at a future date. For even greater flexibility, the CS41 is compatible with microwave and infrared links, fiber optics, and CATV coaxial cable.

And with the new NET41 switching option, up to 143 terminals can be switched between as many as six host VAX computers with no external switching hardware. The switching function is divided among the host computers, so terminals can continue to communicate as long as there is one host active on the network. These features make the CS41 perfect for distributed computing applications, VAXclusters, and system backup.



	CS41
Emulation-Plus	DMF32
Number of Lines	144
Board Size	Hex
Type	Asynchronous
Transmission Mode	Full/half duplex
Terminal Interface	RS-232
Receive FIFO	256 words per 8 lines
DMA Modes	16-bit words
Modem Control	Full or none
Special Features	T1 interface NET41 multi-host switching operation

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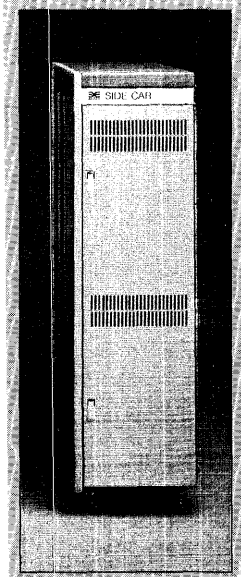
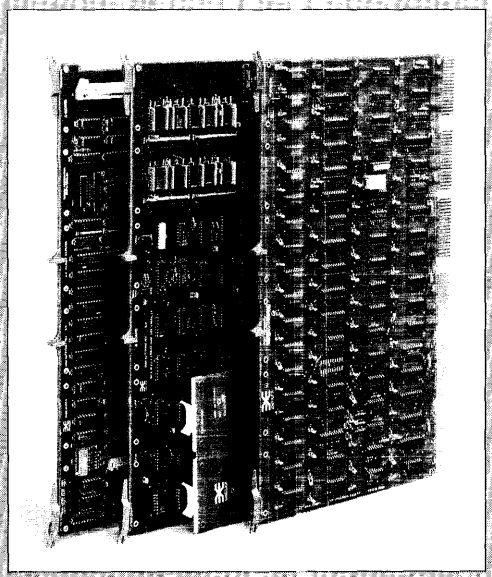
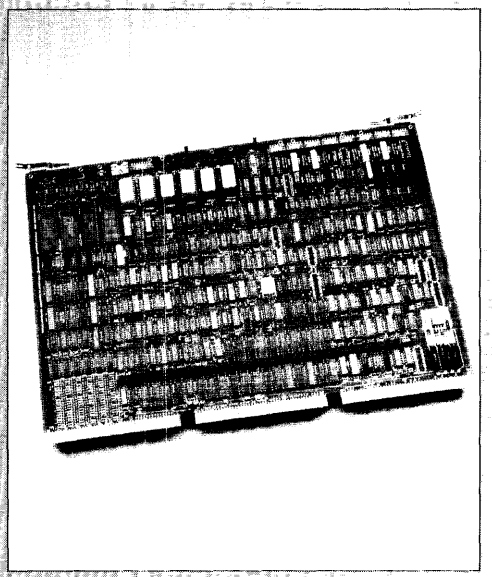
Expansion Chassis
for VAX 8600/8630



Cache-Bus
Disk Controller
for 8″–14″ Disks

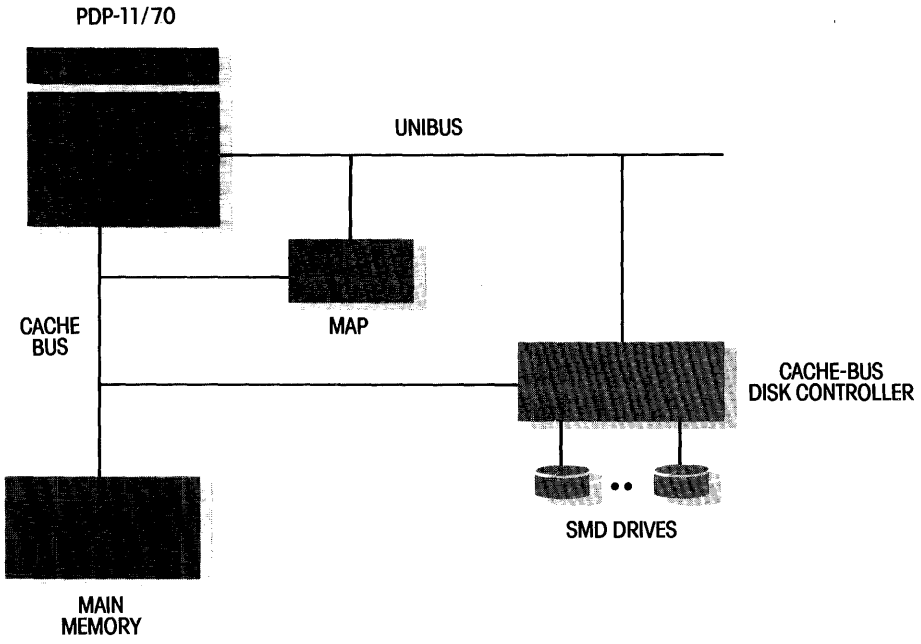


CMI/SBI Disk
Controller
for 8″–14″ Disks



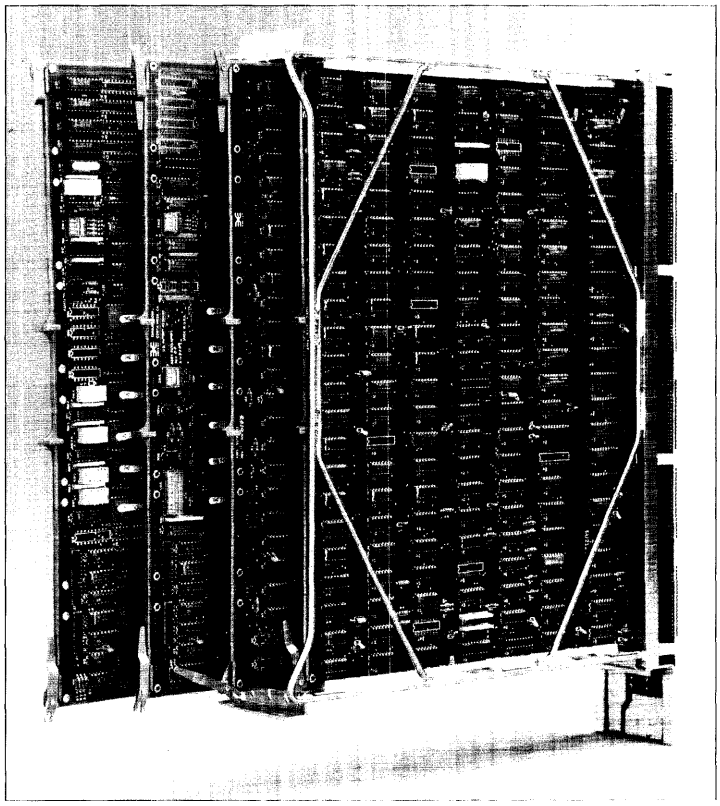
Cache-bus Disk Controller for 8"-14" Disks

Plug the Emulex SC72 disk controller into any slot in the RH70 backplane of your PDP-11/70 computer — and you have direct high-speed access to your cache memory board. Moreover, you can mix and match the four drives supported by the controller. Switch settings let you pick any one of 32 different predefined configurations for each drive.



	SC72/BX
Emulation-Plus	RH70
Board Size	3 Hex, 1 Interconnect Board
Drive Interface	SMD-E
Number of Drives	4
Data Rate	1.8 Mbytes/second
Data Buffer	8 Kbytes
Interleave	1:1
DMA Mode(s)	—
Address Space	2 Kwords
ECC/CRC	32/16-bit
Special Features	RM02, RM03, RM05 and RP06 Emulations

Emulex V-Master/780



The Emulex V-Master/780 represents a unique approach to adding alternative mass storage devices to a VAX-11/780 system. The V-Master/780 consists of a compact System Chassis which houses one or two separate Emulex Massbus-type disk or tape controllers. The peripheral-controller boards interface directly to the internal high-speed Synchronous Backplane Interconnect (SBI) bus.

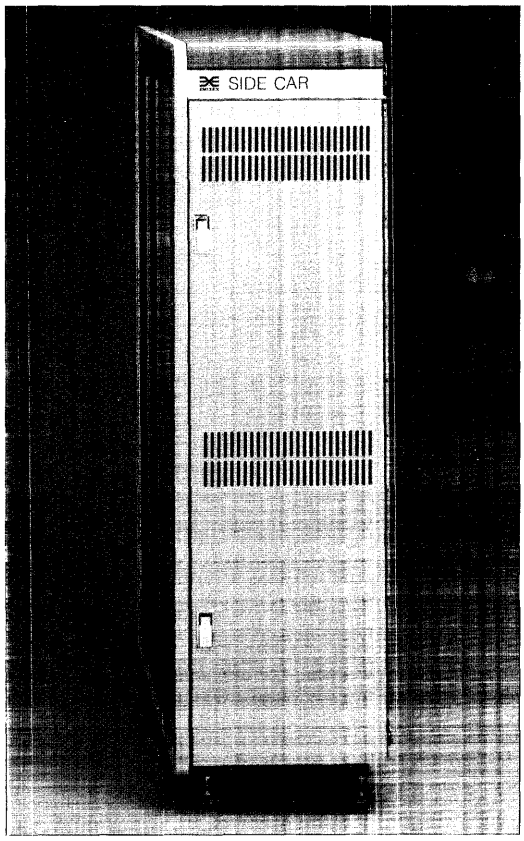
Embedded in the host VAX-11/780 cabinet, the V-Master/780 chassis uses mounting space and internal power normally allocated for standard DEC RH780 Massbus Adapters (MBAs) or the SBI bus terminator.

System Chassis Card cage with 4-slot backplane, 13″ x 16″ x 3.2″, mounts in a RH780 MBA option panel space or SBI Terminator space in main CPU cabinet or optional CPU cabinet.

Power Sources Uses Emulex-supplied power cables for connection to internal optional power supplies (if available); optional power supplies are available for mounting in standard power supply location.

Power (from CPU)
Bus Interface Board
7 amps @ +5VDC;
0.5 amps @ −5.2VDC.
Bus Translator Board
6 amps @ +5VDC;
0.25 amps @ −5.2VDC.

Emulex Side Car



The Emulex Side Car takes up minimum space, yet can house up to two V-Master chassis, a power distribution unit, a cooling fan, and, optionally, a terminator and a power supply. The 12-inch wide, custom-designed enclosure simply bolts up to a VAX 8600/8650 CPU with the trim kit provided. For visual continuity, the exterior is custom-designed to match the VAX 8600/8650 cabinet.

At half the price, half the size and half the power consumption of a DEC expansion chassis, the Side Car offers you maximum flexibility, compact packaging, and most importantly, space for Emulex V-Master chassis and controllers.

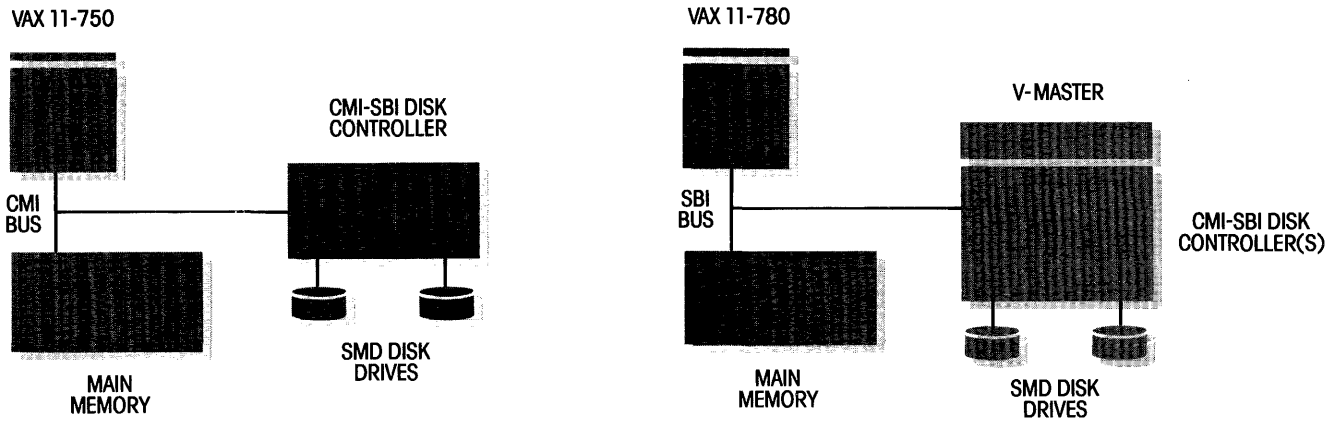
Design: Includes a power distribution unit, a cooling fan, CPU trim kit with FCC shielding, four casters and four levelers, space for one or two V-Master chassis, a power supply and a terminator. Left side of CPU cabinet and trim kit can then be used to cover exposed right side of Side Car. The 54 inch x 12 inch cabinet bolts directly to VAX 8600/8650.

Power: Single power distribution unit with 8 electrical outlets.

U.S.A.	Input	110 VAX, 24 amps, 60 Hz. L5-30 NEMA plug type
	Output	110 VAX, 24 amps, 60 Hz. 4 Duplex NEMA 5-15R outlets
International	Input	220 VAC, 15 amps, 50 Hz. 6-15R NEMA plug type
	Output	220 VAC, 15 amps, 50 Hz. 4 Duplex NEMA 6-15R outlets

CMI/SBI-bus Disk Controllers for 8"-14" Disks

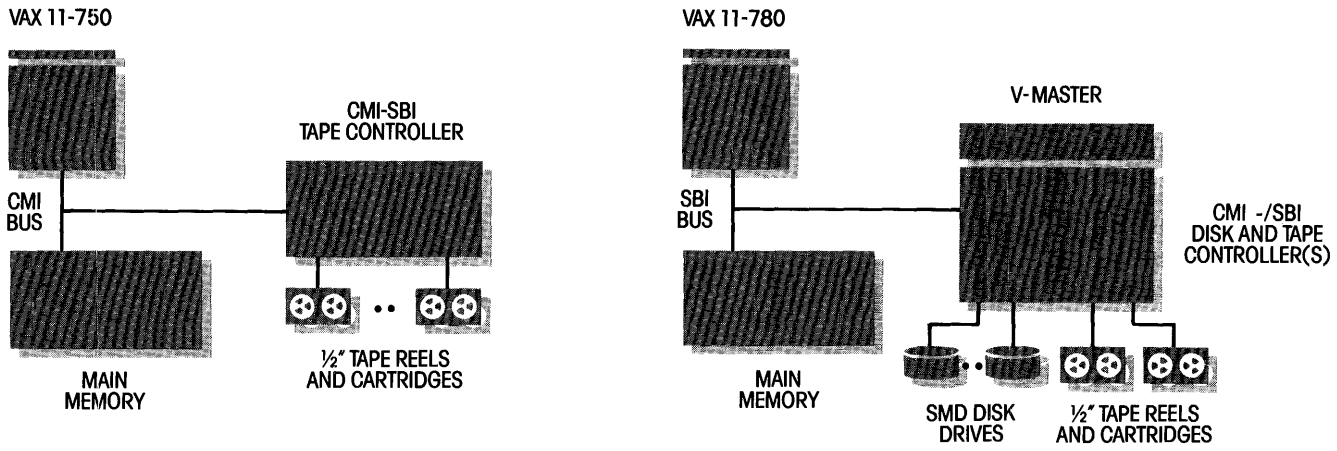
Add a V-Master, flip a few switches — and you can convert an Emulex SC7002/3 disk controller from an RH750-emulating disk interface for the VAX750 CMI backplane to a Massbus emulator connected to the SBI bus in a VAX 780/785 or 8600/8650. And enjoy the same high level of Emulex performance in both configurations.



	SC7002		SC7003	
	VAX-11/750	**VAX-11/780/785 8600/8650**	**VAX-11/750**	**VAX-11/780/785 8600/8650**
Emulation-Plus	RH750	Massbus Adapter	RH750	Massbus Adapter
Board Size	Extended Hex	Extended Hex	Extended Hex	Extended Hex
Drive Interface	SMD	SMD	SMD-E	SMD-E
Number of Drives	4	4	4	8
Data Rate	2.5 Mbytes/second	2.5 Mbytes/second	3.0 Mbytes/second	3.0 Mbytes/second
Data Buffer	4 Kbytes	4 Kbytes	8 Kbytes	8 Kbytes
Interleave	1:1	1:1	1:1	1:1
DMA Mode(s)	32-bit parallel	64-bit parallel	32 Bit	64 Bit
DMA Address Range	16 Mbytes	537 Mbytes	16 Mbytes	537 Mbytes
ECC/CRC	32/16	32/16	32/16	32/16
Special Features	RM02, RM03, RM05 and RM80 emulations.			

CMI/SBI-bus Tape Coupler for 1/2" Tape

The same CMI/SBI versatility applies to the Emulex TC7000 tape coupler. Plus a switch-selectable choice of STC or Pertec interfaces, and all the speed you need to support a GCR tape transport running at a full 125 inches per second.



	TC7000	
	VAX-11/750	**VAX-11/780/785**
Emulation-Plus	TGU77, TEU77	Massbus Adapter
Board Size	Extended Hex	Extended Hex
Drive Interface	Pertec, STC	Pertec, STC
Recording Format	NRZI, PE, GCR	NRZI, PE, GCR
Number of Drives	8 Pertec, 4 STC	8 Pertec, 4 STC
Data Rate	1.5 Mbytes/second	1.5 Mbytes/second
Data Buffer	512 Bytes	512 Bytes
DMA Mode(s)	32-bit parallel	64-bit parallel
DMA Address Range	16 Mbytes	537 Mbytes

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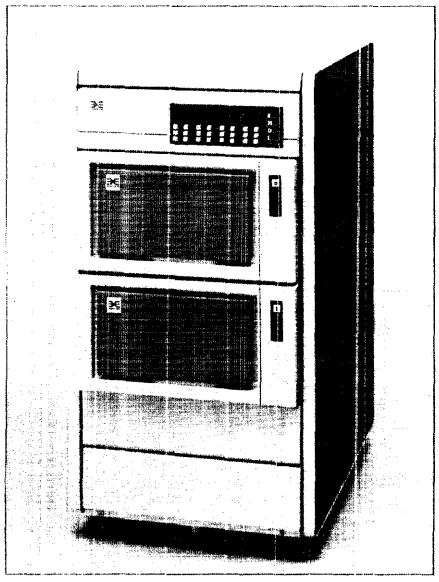
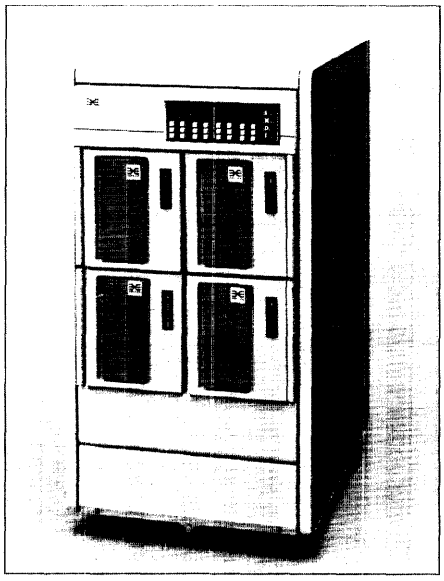
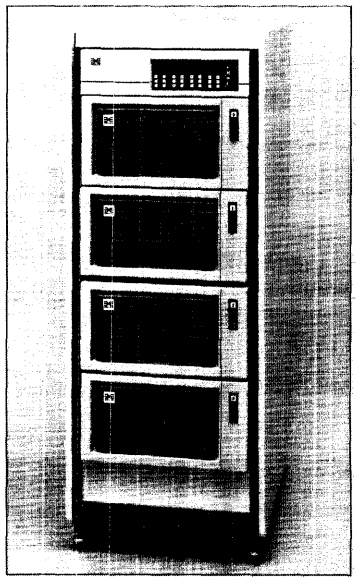
SM 822
2 Drives
1.1 GB of Storage



SM 152
4 Drives
1.5 GB of Storage



SM 834
4 Drives
4.2 GB of Storage



SMDI (Storage Module Disk Interconnect) Subsystem

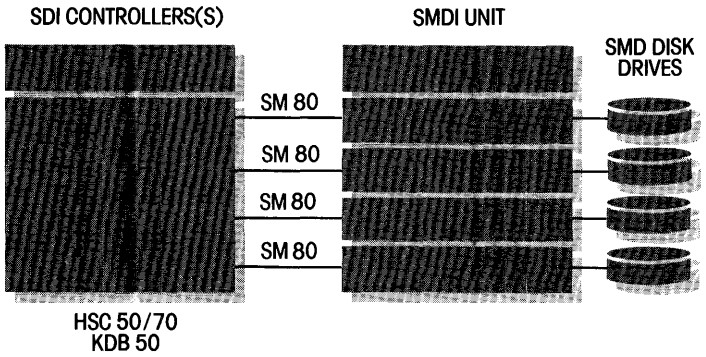
Emulex SMDI subsystems allow you to expand your VAXBI- or CI-interconnected VAXcluster storage with the fastest, highest capacity, and most cost-effective disk drives now available.

Each SMDI subsystem is a 42″ or 60″ FCC-compliant cabinet with space for up to four drives. Separate sets of front-panel control switches and LED indicators are provided on each SMD port for port select, run, write protect and fault analysis.

Each drive in an Emulex SMDI subsystem appears to its host VAX system or cluster as a DEC RA8X device, compatible with all existing DEC software. Emulex's SMDI subsystems can be upgraded, however, to much higher capacity SMD drives. As a result, multiple gigabytes of disk capacity are available in space-saving packages with almost unlimited growth potential as additional SMDI subsystems are installed.

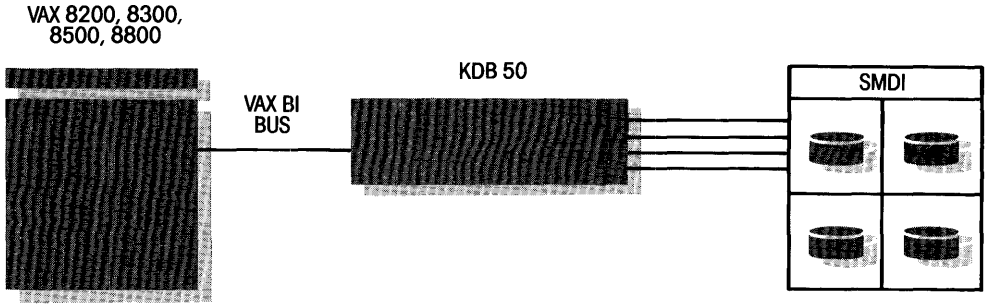
Advanced SMD drives in Emulex SMDI storage subsystems also give you enhanced system performance and throughput.

Even more important in multi-user, inquiry-response environments is the fast average seek time of the newer SMD-E drives — as low as 15msec, or nearly twice as fast as the equivalent speeds for DEC's RA drives.



Pre-Cluster Storage

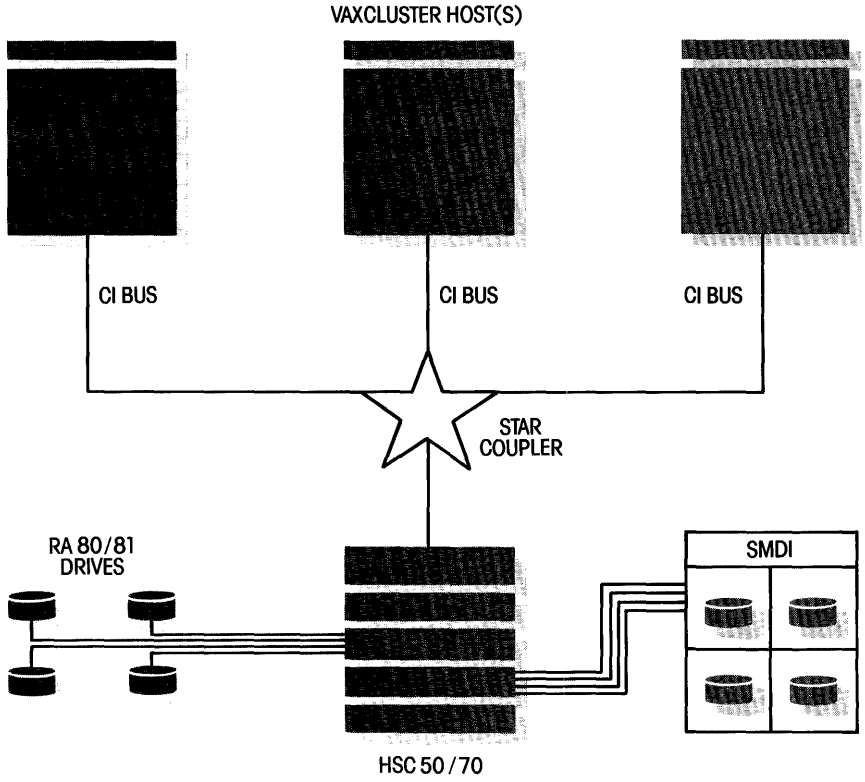
Emulex SMDI storage subsystems can give you all the advantages of SMD/SMD-E storage technology — even before you start to cluster your VAXs. SMDI subsystems can be simply plugged into your installed VAX KDB50 controller for a VAXBI connection



Cluster Storage

The same Emulex SMDI subsystems can provide all the storage capacity you need — and more — as you convert to the VAXcluster architecture. Instead of separate subsystems for each VAX, you now have a single CI-bus connection via a HSC50/70 Intelligent I/O Server and Star Coupler.

Whether you have started with an Emulex SMDI subsystem or standard RA drives, you can continue to expand your system with additional high capacity, economical SMD/SMD-E drives. The HSC50 can support up to 24 SDI and/or SMDI-connected disks. The HSC70 expands this number to 32 storage units.



SMDI Interconnect Specifications

DSA Controllers	HSC50/70, KDB50.
Disk Interface	Industry-standard SMD or SMD-E.
Port Options	Single port, dual access, or static dual port.
SMDI Unit Dimension	5.25″ High x 19″ Wide x 16″ Deep.
Power Requirements (for MSDI Unit Only)	110 VAC, 1.5A, 50 Hz. 220 VAC, 1.5A, 50 Hz.
Front Panel Switches	One set per channel: RUN (start/stop) PORT SELECT (A or B) WRITE PROTECT FAULT (clear) DIAGNOSTIC MODE/NORMAL
Indicator LEDs	Status, diagnostic and fault codes.

Typical Emulex SMDI Storage Subsystems

(See page 30 for a complete listing)

	PER DRIVE CAPACITY	MAXIMUM NUMBER OF DRIVES	SUBSYSTEM CAPACITY	AVERAGE SEEK TIME	CABINET HEIGHT
SM822	664 MB	2	1.33 GB	16 ms	42″
SM824	664 MB	4	2.66 GB	16 ms	60″
SM832	1050 MB	2	2.1 GB	16 ms	42″
SM834	1050 MB	4	4.2 GB	16 ms	60″

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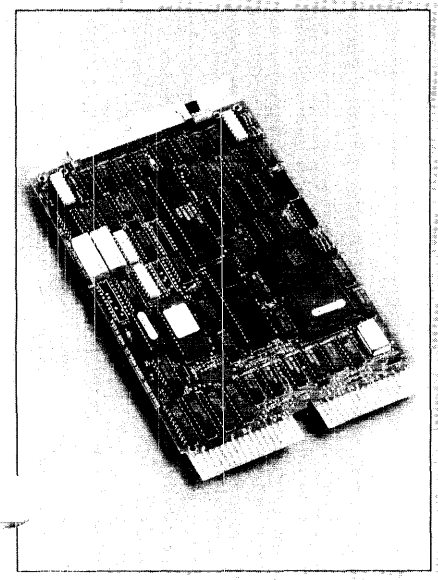
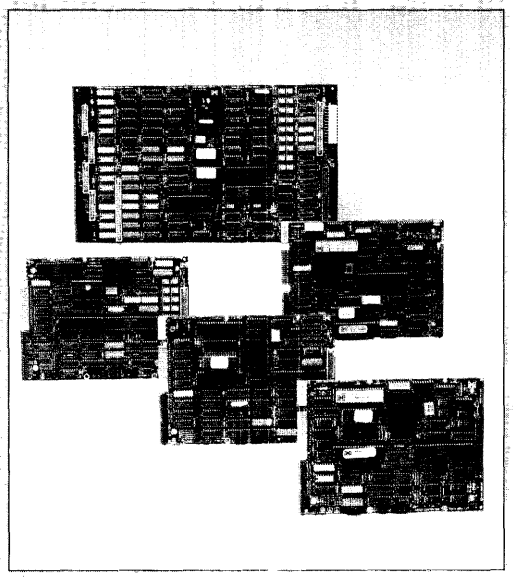
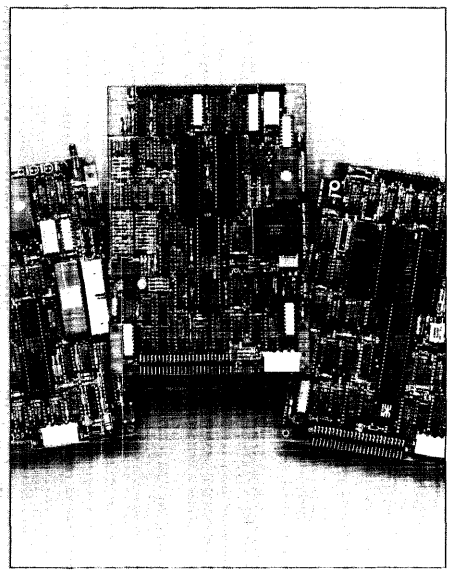
UC04 SCSI Host Adapter for LSI, Micro-11 and MicroVAX I and II



SCSI-Bus Disk Controller for 8″–14″ Hard Disk Drives

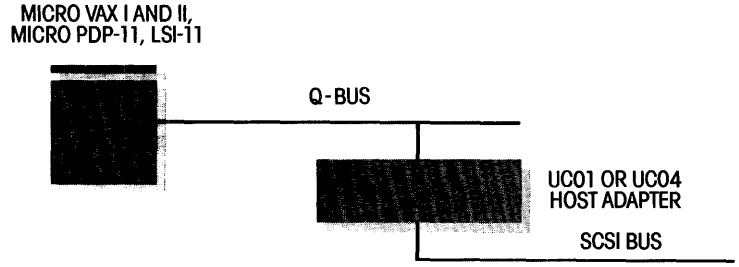


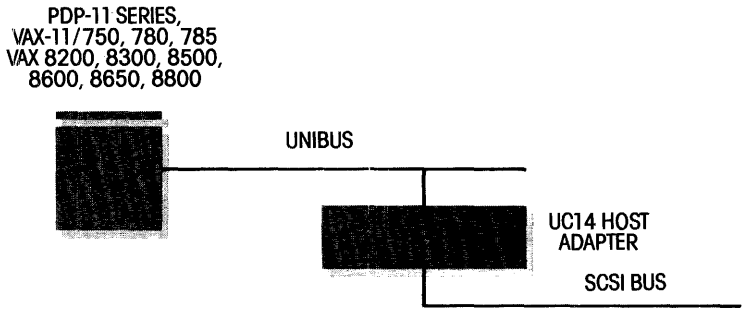
SCSI-Bus Tape Controller for 1/4″ Tape



SCSI-bus Host Adapters

Every SCSI starts with a host adapter board. Emulex gives you the choice of a Q-bus or UNIBUS interface with full SCSI functionality — including connect/disconnect and arbitration.

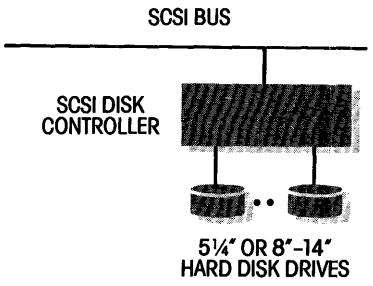




	UC01	UC04	UC14
Emulation-Plus	RL01/02	MSCP	MSCP
CPU Interface	Q-bus	Q-bus	UNIBUS
Device Interface	SCSI	SCSI	SCSI
Direct DMA Address	4 Mbytes	4 Mbytes	256 Kbytes
Bus Register	2 Selectable 2 Alternates	2 Selectable 2 Alternates	2 Selectable 2 Alternates
Vector Address	1 Standard/set 1 Alternate/set	Programmable by Host CPU	Programmable by Host CPU
Priority Level	5	4 and 5	5
Data Buffer	64 Byte	20 Kbyte	20 Kbyte
Command Buffer	—	13 MSCP Commands	13 MSCP Commands
Packaging	Quad	Dual	Quad
Power	5.7 amps max @ +5V	2.6 amps max @ +5V	2.6 amps max @ +5V
Features	— Q-bus Termination Module — Bootstrap Prom — Switch Selectable BVD-11 Compatible Clock	— Optical Support	— Optical Support

SCSI-bus Disk Controllers

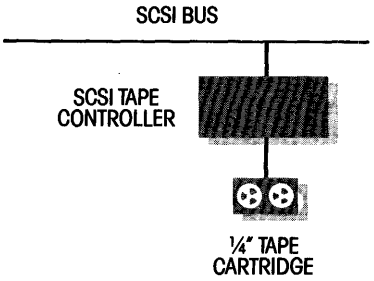
Complete your SCSI-based data storage subsystem with a full spectrum of Emulex SCSI disk controllers. Hook up to 2 or 4 drives to each controller, and take your pick of industry-standard disk interfaces: ST506/412 ESDI, SMD, and SMD-E.



	MD01	MD21/S2	MD23	MD24	MD32
Emulation-Plus	SCSI	SCSI	SCSI	SCSI	SCSI
Board Size	5¼" FF	5¼" FF	5¼" FF	5¼" FF	14" FF
Drive Interface	ST506/412	ESDI	ESDI	ESDI	SMD/SMD-E
No. of Drives	2	2	4	4	4
Data Rate	5 Mbits	15 Mbits	15 Mbits	15 Mbits	24 Mbytes
Data Buffer	13 Kbytes	64 Kbytes	64 Kbytes	64 Kbytes	32 Kbytes
Interleave	1:1	1:1	1:1	1:1	1:1
SCSI Cable	Single-Ended	Single-Ended	Single-Ended	Differential	Single-Ended

SCSI-bus Tape Controllers for 1/4" Tape

Emulex's streaming tape-cartridge SCSI interfaces give you complete backup flexibility for your SCSI system. Just as important, media is interchangeable from drive to drive. All data is recorded in industry-standard QIC 11/24 format. Plus, selected controllers can support up to 120 MB data cartridges known as QIC-120.



	MT01	MT02	MT03	MT02/64
Emulation-Plus	SCSI	SCSI	SCSI	SCSI
Board Size	5¼" FF	5¼" FF	5¼" FF	5¼" FF
Drive Interface	Cipher 540	QIC 36	QIC 44	QIC 36
Recording Format	QIC 11/24	QIC 11/24	QIC 11/24/ 120 (Tandberg)	QIC 11/24/ 120 (Kennedy)
No. of Drives	1	1	1	1
Data Rate	90 Kbytes/second	90 Kbytes/second	90 Kbytes/second	90 Kbytes/second
Data Buffer	14 Kbytes	14 Kbytes	14 Kbytes	64 Kbytes
SCSI Cable	Single-Ended	Single-Ended	Single-Ended	Single-Ended

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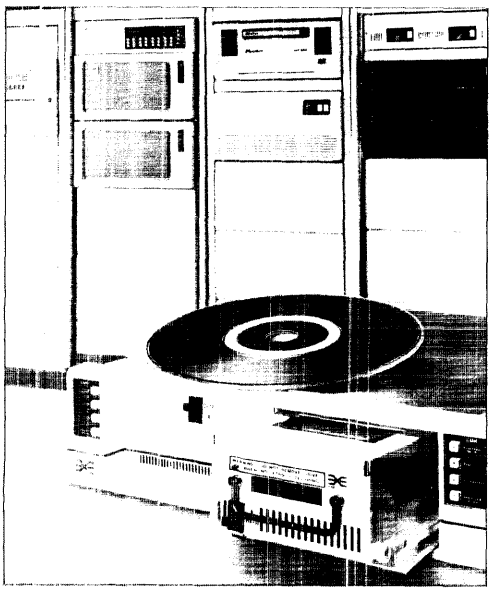


LX400 SCSI Optical Disk Subsystem

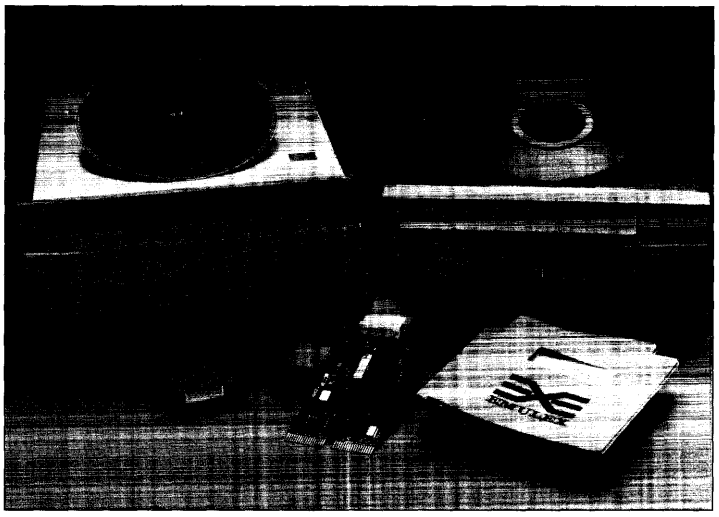
The LX400 optical disk subsystems make the physical transfer of large, on line data bases practical for the first time. The LX400 subsystems include all the hardware and software utilities you need to add gigabytes of optical disk storage to your DEC system. To make it even easier, Emulex provides a complete File Management System for all VMS-based systems.

A basic LX400 subsystems includes:

- A 2-gigabyte optical disk drive.
- A Q-bus or UNIBUS host adapter.
- Installation/diagnostic utilities.
- FCC-compliant cables.
- A comprehensive documentation set.

Plus:

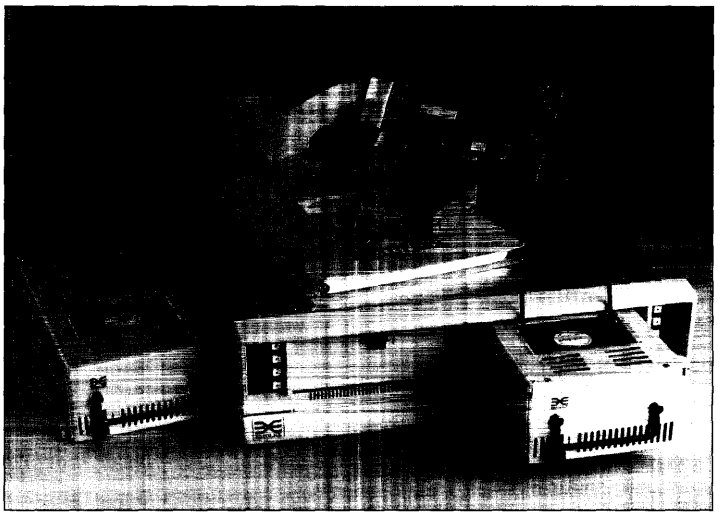
- Emulex file management software system (for VMS-based systems).
- 12-inch removable optical disk cartridges.
- Add-on optical disk drives and cables.



Emulex Removable SCSI Subsystem

The Emulex Removable SCSI Subsystem consists of one or two lightweight, easily removable 5¼" Winchester disk drives, each encased in a Portable Drive Module (PDM); an Emulex Small Computer System Interconnect (SCSI) MD21/S2 controller, and a power supply. The Emulex Removable SCSI Subsystem is aimed at applications requiring portable, modular data storage, and it's designed for installation in an FCC-compliant cabinet with the host computer.

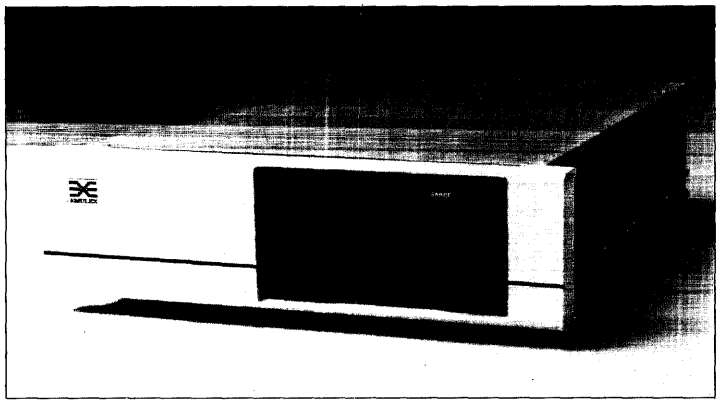
Storage capacities range from 170 Mbytes in a single PDM to 760 Mbytes in two PDMs. Furthermore, users could obtain as much as 2.2 Gbytes by daisy chaining three Emulex Removable SCSI Subsystems with the SCSI interface. The subsystem transfers data at the Enhanced Small Disk Interface (ESDI) rate of 10 Mbits/second.



ER2 SCSI Subsystem

The ER2 subsystem is a sharp solution for users who need more storage and back-up. This attractive peripheral subsystem packs 36 Mbytes of main storage onto a 5¼" Winchester and 10.4 Mbytes of back-up onto a removable 8" cartridge disk.

The desktop or rack-mount subsystem comes complete with power supply and connecting cables. Emulex offers host adapters to interface the ER2 to the DEC Q-bus, UNIBUS or the IBM personal computers. As with all Emulex products, the ER2 is fully tested as a complete package.



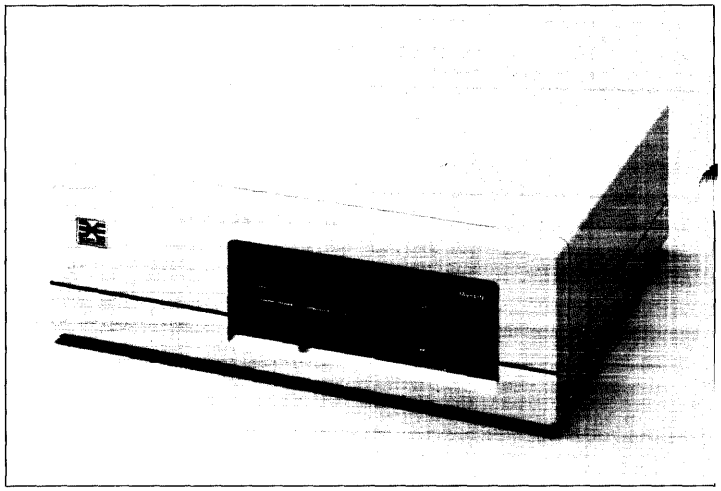
ED2 SCSI Subsystem

The ED2 is a versatile, compact subsystem with space for two disk drives, or a disk drive and tape drive.

The basic ED2 subsystem package includes the chassis with power supply, disk controller and/or a tape controller, either one 5¼" Winchester disk drive and a 1/4" streaming cartridge tape drive, or two disk drives.

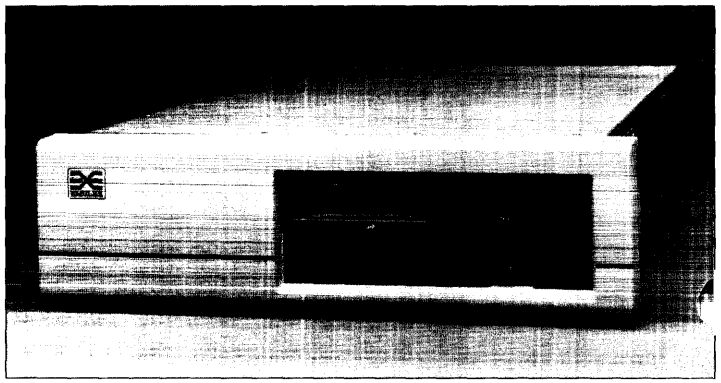
Emulex offers drives with unformatted capacities of 170 and 380 Mbytes. The formatted capacity varies depending upon the application. The disk drives have an ESDI interface to provide a 10 Mbits per second transfer rate and direct track addressing.

This attractive package is connected to a host CPU via the popular SCSI bus utilizing the appropriate Emulex host adapter, UC04 for Q-bus, UC14 for Unibus and IB02 for the IBM PC.



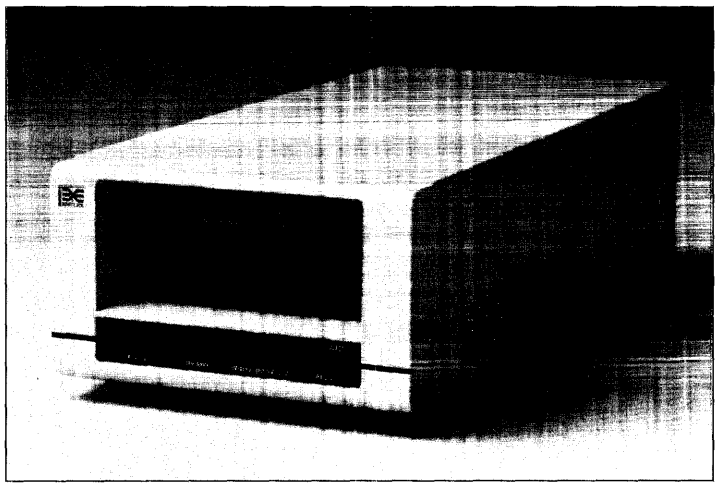
EQ3 SCSI Subsystem

Choose three peripherals from a variety of disk and tape drives to configure your own storage subsystem with Emulex's EQ3 storage/back-up subsystem. The EQ3 is a compact, rack-mounted disk and tape subsystem with space for three 5¼" formfactor peripheral devices. In its standard configuration, the EQ3 comes with a chassis, two disks to provide high-capacity disk storage, plus 1/4" streaming tape back-up, a SCSI disk and/or tape controller and a power supply. The selection of 5¼" Winchester disk drives includes unformatted storage capacities of 170 or 380 Mbytes.



ED1 Tape Subsystem

The ED1 Tape Subsystem opens up a whole new range of applications and product configurations for MicroVAX, MicroPDP-11, LSI-11 and VAX-11 systems. At the same time, it provides software compatibility to DEC's TS11, using CDC's new 1/4" streaming magnetic tape unit. With this exceptional new product, you get the advantages of incorporating the CDC Sentinel 1/4" streamer tape drive, which features high capacity in a compact, convenient desktop package.



EMS Disk Subsystem Kits

Embedded Micro Subsystems (EMS) kits marry high performance and pacity, including everything you need to quickly and easily build your MicroVAX II or MicroPDP-11 into a powerful system. EMS kits provide internal Winchester formatted storage capacities ranging from 170MB to 380MB, an Emulex skid plate and an Emulex User panel interface. They also offer fast ESDI controllers that enable you to configure the maximum performance and capacity solution for your system.

Emulating Disk Subsystems

EMULATION	DISK CAPACITY (MB)	TRANSFER RATE (MB/sec)	MICRO-11 Q-BUS	PDP-11 UNIBUS	VAX-11 UNIBUS	PDP-11/70 CACHE BUS	VAX/750 CMI	VAX/780 SBI
RM02/03	67.4	1.2	R0310/BX	R3110/J	R3110/V	R7210/BX		
RM02	413.9	1.8	W0351/BX	W3151/J	W3151/V	W7251/BX		
	436.8	1.8	W0315/BX	W3115/J	W3115/V	W7215/BX		
RM05	269.7	2.4					W7533/BC	W7833/BS
	413.8	1.8					W7551/BC	W7851/BS
	436.8	1.8	W0315/BX	W3115/J	W3115/V	W7215/BX	W7515/BC	W7815/BS
	512.4	2.4					W7544/BC	W7844/BS
	551.8	2.4					W7544/BC	W7844/BS
	697.3	3.0					W7572/BC	W7872/BS
RP06	379.4	1.8	W0351/BX	W3151/J	W3151/V	W7251/BX		
	348.8	1.8	W0351/BX	W3115/J	W3115/V	W7215/BX		
RM80	405.2	1.8	W0351/BX	W3151/J	W3151/V	W7251/BX	W7551/BC	W7851/BS
	428.1	1.8					W7515/BC	W7815/BS
	688.6	3.0					W7572/BC	W7872/BS

MSCP Disk Subsystems

FOR Micro-11, MicroVAX, PDP-11 AND VAX UNIBUS SYSTEMS

DISK CAPACITY (formatted)	TRANSFER RATE (MB/sec)	MICRO-11 Q-BUS	MicroVAX Q-BUS	PDP-11 UNIBUS	VAX-11 UNIBUS
67.0 MB	1.2	R3310/MQ	R3310/MV	R3310/J	R3310/V
280.7 MB	2.4	W3333/MQ	W3333/MV	W3333/J	W3333/V
403.0 MB	1.8	W3351/MQ	W3351/MV	W3351/J	W3351/V
442.8 MB	1.8	W3315/MQ	W3315/MV	W3315/J	W3315/V
575.0 MB	2.4	W3344/MQ	W3344/MV	W3344/J	W3344/V
729.0 MB	3.0	W3372/MQ	W3372/MV	W3372/J	W3372/V
1.157 GB	3.0	W3373/MQ	W3373/MV	W3373/J	W3373/V

Magnetic Tape Subsystems

CONTROLLER TYPE	Micro-11 MicroVAX Q-BUS	PDP-11 UNIBUS	VAX-11 UNIBUS	VAX/750 CMI	VAX/780 SBI
STREAMING 1600/3200 bpi PE 6250 bpi GRC 100 ips/70 ips	S03C07/Q	S13C07/J	S13C07/V	S70C07/C	S70C07/S
START/STOP 800 bpi PE 1600 bpi PE 6250 bpi GRC 75 ips/45 ips	F03K94/Q	F13K94/J	F13K94/V	F70K94/C	F70K94/S
STREAMING CARTRIDGE 10666 bpi Serpentine 45--180 ips	S03M18F/Q	S13M18F/J	S13M19F/V	S70M50F/C	S70M50F/S
STREAMING CARTRIDGE 16000 bpi Serpentine 60--180 ips	S03M75F/Q	S13M75F/J	S13M75F/V	S70M75F/C	S70M75F/S

SMDI Disk Subsystems

FOR VAXBI SYSTEMS AND VAXCLUSTERS

	TOTAL DISK CAPACITY				
MODEL	1 DRIVE	2 DRIVES	3 DRIVES	4 DRIVES	CABINET HEIGHT
SM512	366 MB	732 MB			42″
SM514	366 MB	732 MB	1.098 GB	1.464 GB	60″
SM152	404 MB	808 MB	1.212 GB	1.616 GB	42″
SM442	517 MB	1.034 GB	1.551 GB	2.068 GB	42″
SM822	664 MB	1.328 GB			42″
SM824	664 MB	1.328 GB	1.992 GB	2.656 GB	60″
SM162	800 MB	1.600 GB	2.400 GB	3.200 GB	42″
SM832	1.055 GB	2.110 GB			42″
SM834	1.055 GB	2.110 GB	3.165 GB	4.220 GB	60″

Emulex Disk Subsystems By Model Number

MODEL	HOST	EMULATION	DISK CAPACITY	EMULEX CONTROLLER
R0310/BX	Micro-11	RM02/03	67.4 MB	SC03/BX
R3110/J	PDP-11 UNIBUS	RM02	67.4 MB	SC31/BX
R3110/V	VAX UNIBUS	RM02	67.4 MB	SC31/BX
R3310/J	PDP-11 UNIBUS	MSCP	67.0 MB	UD33
R3310/MQ	Micro-11	MSCP	67.0 MB	QD33
R3310/MV	MicroVAX	MSCP	67.0 MB	QD33
R3310/V	VAX UNIBUS	MSCP	67.0 MB	UD33
R7210/BX	11/70	RM02/03	67.4 MB	SC72/BX
SM152	VAXBI	RA8x (1-4)	1.6 GB	KDB50/HSC
SM162	VAXBI	RA8x (1-4)	3.2 GB	KDB50/HSC
SM442	VAXBI	RA8x (1-4)	2.1 GB	KDB50/HSC
SM512	VAXBI	RA8x (1-2)	732.0 MB	KDB50/HSC
SM514	VAXBI	RA8x (1-4)	1.4 GB	KDB50/HSC
SM822	VAXBI	RA8x (1-2)	1.3 GB	KDB50/HSC
SM824	VAXBI	RA8x (1-4)	2.6 GB	KDB50/HSC
SM832	VAXBI	RA8x (1-2)	2.1 GB	KDB50/HSC
SM834	VAXBI	RA8x (1-4)	4.2 GB	KDB50/HSC
W0315/BX	Micro-11	RM0/2/05	436.8 MB	SC03/BC
W0351/BX	Micro-11	RM02	413.9 MB	SC03/BX
	Micro-11	RM80	405.2 MB	SC03/BS
	Micro-11	RP06	348-379 MB	SC03/BX
W3115/J	PDP UNIBUS	RM02	436.8 MB	SC31/BX
		RP06	348.8 MB	SC31/BX
W3115/V	VAX UNIBUS	RM02	436.8 MB	SC31/BX
		RP06	348.8 MB	SC31/BX
W3151/J	PDP UNIBUS	RM02	413.9 MB	SC31/BX
		RP06	348.8 MB	SC31/BX
		RM80	405.2 MB	SC31/BX
W3151/V	VAX UNIBUS	RM02	413.9 MB	SC31/BX
		RP06	348.8 MB	SC31/BX
		RM80	405.2 MB	SC31/BX
W3310/J	PDP UNIBUS	MSCP	67.0 MB	UD33
W3310/MQ	Micro-11	MSCP	67.0 MB	QD33
W3310/MV	MicroVAX	MSCP	67.0 MB	QD33
W3310/V	VAX UNIBUS	MSCP	67.0 MB	UD33

Emulex Disk Subsystems By Model Number (cont.)

MODEL	HOST	EMULATION	DISK CAPACITY	EMULEX CONTROLLER
W3315/J	PDP UNIBUS	MSCP	442.8 MB	UD33
W3315/MQ	Micro-11	MSCP	442.8 MB	QD33
W3315/MV	MicroVAX	MSCP	442.8 MB	QD33
W3315/V	VAX UNIBUS	MSCP	442.8 MB	UD33
W3333/J	PDP UNIBUS	MSCP	280.7 MB	UD33
W3333/MQ	Micro-11	MSCP	280.7 MB	QD33
W3333/MV	MicroVAX	MSCP	280.7 MB	QD33
W3333/V	VAX UNIBUS	MSCP	280.7 MB	UD33
W3344/J	PDP UNIBUS	MSCP	575.0 MB	UD33
W3344/MQ	Micro-11	MSCP	575.0 MB	QD33
W3344/MV	MicroVAX	MSCP	575.0 MB	QD33
W3344/V	VAX UNIBUS	MSCP	575.0 MB	UD33
W3351/J	PDP UNIBUS	MSCP	403.0 MB	UD33
W3351/MQ	Micro-11	MSCP	403.0 MB	QD33
W3351/MV	MicroVAX	MSCP	403.0 MB	QD33
W3351/V	VAX UNIBUS	MSCP	403.0 MB	UD33
W3372/J	PDP UNIBUS	MSCP	729.0 MB	UD33
W3372/MQ	Micro-11	MSCP	729.0 MB	QD33
W3372/MV	MicroVAX	MSCP	729.0 MB	QD33
W3372/V	VAX UNIBUS	MSCP	729.0 MB	UD33
W3373/J	PDP UNIBUS	MSCP	1.1 GB	UD33
W3373/MQ	Micro-11	MSCP	1.1 GB	QD33
W3373/MV	MicroVAX	MSCP	1.1 GB	QD33
W3373/V	VAX UNIBUS	MSCP	1.1 GB	UD33
W7215/BX	11/70	RM02/05 RP06	436.8 MB 348.8 MB	SC72/BX SC72/BX
W7251/BX	11/70	RM02 RP06	436.8 MB 348.8 MB	SC72/BX SC72/BX
W7515/BC	CMI	RM05	436.8 MB	SC7002/B2
W7533/BC	CMI	RM05	269.7 MB	SC7002/B2
W7544/BC	CMI CMI	RM05 RM05	512.4 MB 551.8 MB	SC7002/B2 SC7002/B2
W7554/BC	CMI CMI	RM80 RM05	688.6 MB 697.3 MB	SC7002/B2 SC7002/B2
W7572/BC	CMI	RM80	688.6 MB	SC7002/B2
W7815/BS	SBI	RM05	436.8 MB	V782/D1
W7833/BS	SBI	RM05	269.7 MB	V782/D1
W7844/BS	SBI SBI	RM05 RM05	512.4 MB 551.8 MB	V782/D1 V782/D1
W7851/BS	SBI	RM05	413.8 MB	V782/D1
W7872/BS	SBI	RM80	688.8 MB	V782/D1

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EMULEX

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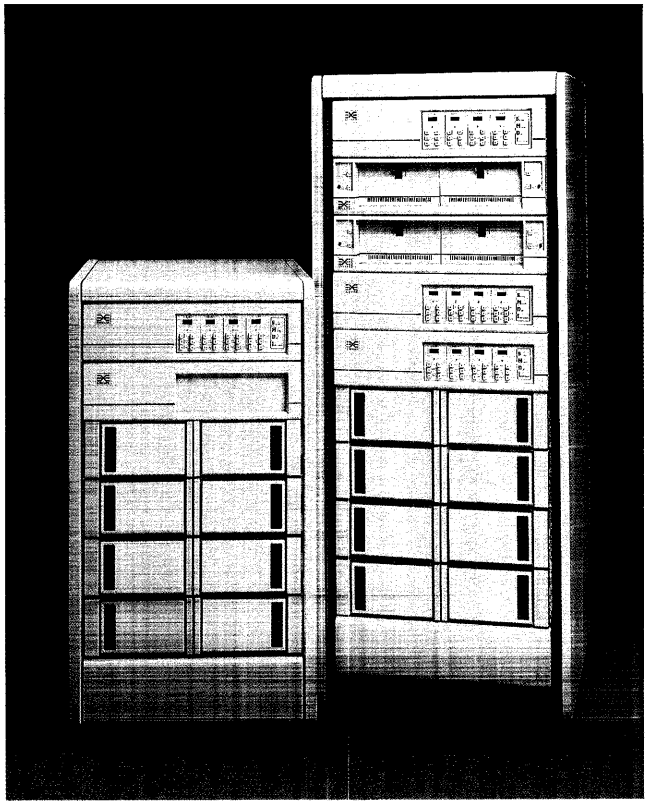
EMULEX SMDI VAX STORAGE ARRAY



- SDI Compatible
- Expandable Storage Solutions
- Configuration Flexibility
- Leading Edge Technology
- Engineered Subsystems
- Proven Reliability

Emulex can provide you with a complete storage solution that addresses all of your VAX storage requirements. The Emulex solution will not only meet your current needs, but will let you be confident that your future expansion requirements will be met as you need them. And you can be assured that you will be ready for the best of new disk technology as it becomes available. . .all without sacrificing any of the functionality of DSA (Digital Storage Architecture).

The Emulex Storage Module Disk Interconnect (SMDI) VAX Storage Array of disk subsystems is engineered to integrate DSA with the performance, economy, and reliability of the best of industry-standard disk drives.

Proven Technology

Because Emulex pioneered in offering an alternative to DEC's Standard Disk Interconnect (SDI) RA-series drives, Emulex's technology has already been proven in the field many times over. By emulating DEC's RA series of drives, SMDI subsystems can be used with VAXclusters and the VAXBI, as well as with Q-bus or UNIBUS based VAXes. The SMDI is designed to function exclusively with DEC DSA controllers: the HSC50/70, KDB50, or UDA50. The SMDI simply converts SDI bus protocol signals to SMD or ESDI signals, producing a logical emulation of DEC's RA series disk drives. As a result, the SMDI subsystem is totally transparent to the software operating system — no modifications are required.

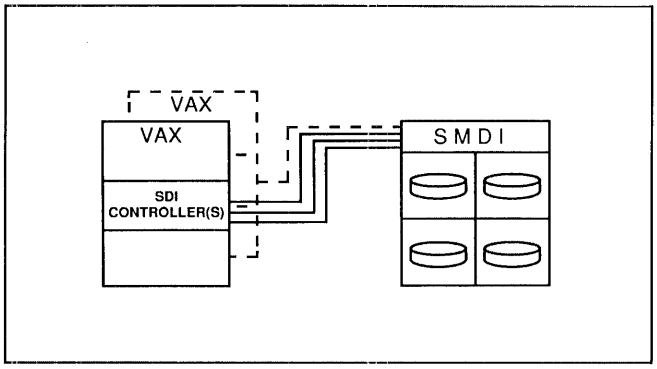
A Better Solution

With SMDI subsystems you retain all the advantages of DSA, without DEC's packaging restrictions. Instead of being confined to a preconfigured, narrowly defined subsystem, there are dozens of options from which to choose, ranging from a single-drive 288MB removable subsystem to a twelve-drive configuration in a single cabinet that has a formatted capacity of 10.5GB.

EMULEX

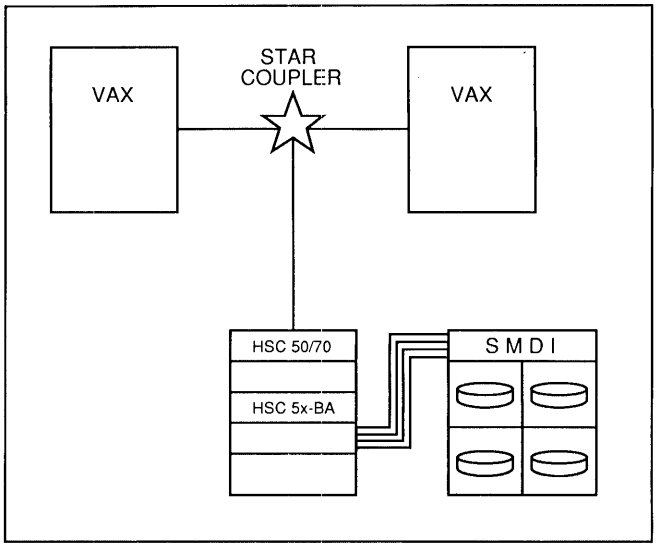
The Logical Migration

Begin with any VAX with a DSA controller. The SMDI subsystem can be plugged directly into the controller, setting the stage for long term product migration to a cluster environment.



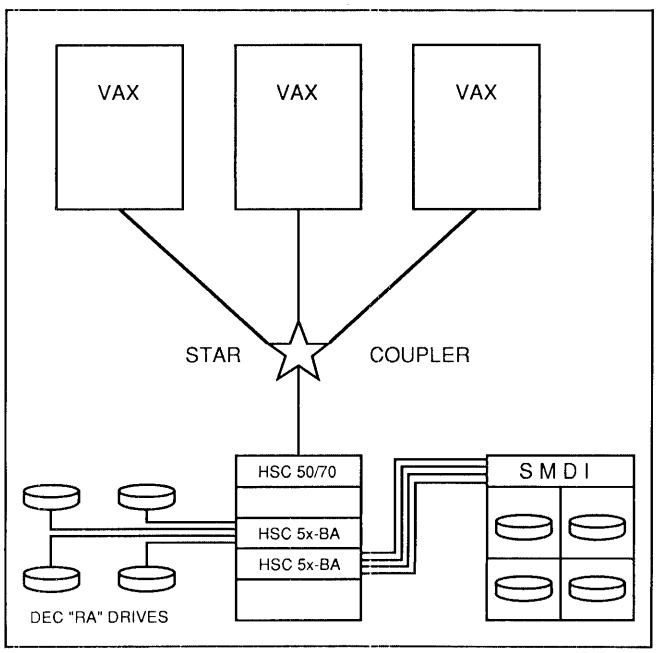
Pre-Cluster Storage

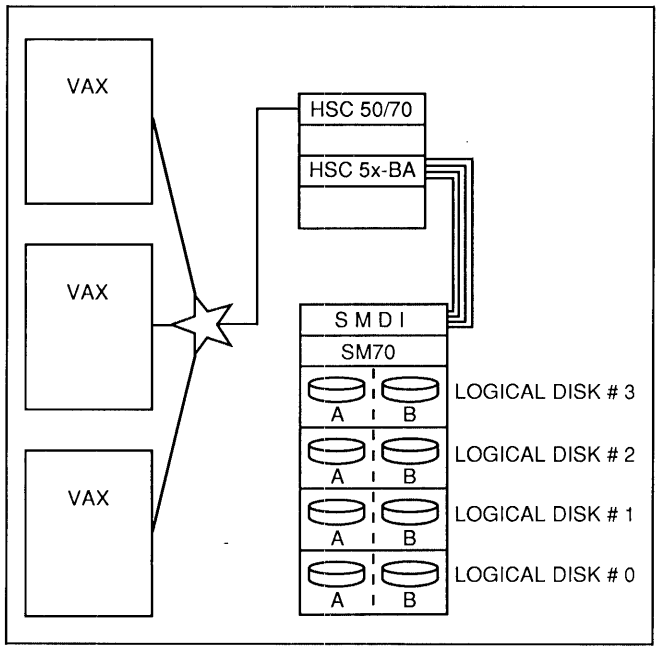
Small Cluster Storage



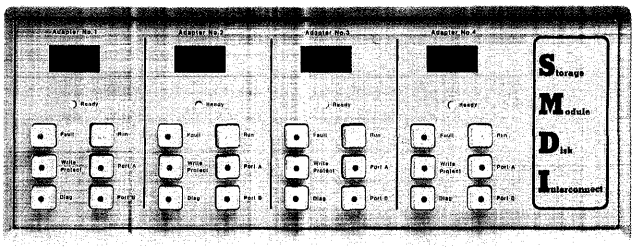
From that point, convert to a VAXcluster architecture. For example, a single HSC 50/70 intelligent I/O server by means of the CI-bus connection and a Star Coupler, can access the SMDI subsystem.

Now you have a choice as to how to expand your cluster further with SMDI.





Expanded SMDI Subsystems



Multiple Families

The SMDI consists of three different families, each of which was designed to address a different environment.

SM800

The SM800 family uses 8- or 14-inch fixed Winchester drives with an SMD/E interface. Members of this family are targeted for those environments requiring maximum throughput and capacity per spindle. . .without using more floor space. It can be used in a clustered or a non-clustered environment, or as an entry-level cluster product.

SM600

This group of subsystems was created for the high security environment. The SM600 family incorporates 5¼-inch removable Winchesters with an ESDI interface. As an added advantage, fixed and removable disk drives can both be in the same cabinet.

SM700

The SM700 family employs a different approach, utilizing pairs of 8-inch fixed Winchesters that are logically concatenated so that each pair appears as a single logical drive to the operating system. The SM700 offers the opportunity to greatly expand disk storage without having to add more HSC/channel cards or DSA controllers.

Physical Description

Physically the SMDI subsystem consists of a 42-in or 60-in tall FCC-compliant cabinet that contains the adapter board chassis and interface adapters, user panels, the disk drives, and all the necessary internal cabling. The SMDI adapterboard chassis consists of a standard 19-inch rack-mountable enclosure with room for up to four interface adapters (SM800 and/or SM600). The SM700 adapterboard chassis contains one interface adapter capable of logically concatenating up to 6 pairs of 8-in SMD/E drives. SM800 and SM600 can be mixed in a single cabinet.

Each SMDI chassis has a front-mounted control panel equipped with switches and LED indicators for each drive to handle RUN, PORT, SELECT, WRITE PROTECT, FAULT, and DIAGNOSTICS functions. Unit number switches are located on the user panel PCB behind the bezel which can be easily removed. The switch controls are identical to those used on the RA series.

Configuration Convenience

Each disk interface adapter is equipped with a PROM containing predefined configurations. By setting the switches to select the desired drive geometry for each drive, the storage subsystem can be configured easily.

Diagnostic Capability

The SMDI can run three diagnostic sequences. The power-up sequence automatically runs when the unit is powered up. Whenever the SMDI receives an SDI request to run test 0, a default sequence kicks in. And finally there is an internal diagnostic sequence, accessed through the front panel, that can be enabled at the user's discretion.

Drive Support

The SMDI subsystem supports various disk geometries, both ESDI and SMD/E, with data transfer rates up to 2.75MB/sec. In the same amount of floor space, the total formatted capacity of a configuration can range from a single drive configuration with disk capacities ranging from 288MB (removable) to 1.05GB (fixed), to a twelve drive subsystem with a total formatted capacity of 10.5GB.

Reliability

One of the most important factors to be considered when choosing a storage solution is reliability. SMDI subsystems utilize drives that have in the field a Mean Time Between Failure (MTBF) exceeding 50,000 hours. And for support, DEC, CDC, TRW, and other maintenance organizations have given the SMDI their stamp of approval through their willingness to maintain the products.

Availability

With Emulex, your VAX storage wish list is a reality. An SMDI subsystem in a made-to-order configuration will be ready when you are. The technology is here, it's proven, it's available. Emulex is ready to engineer a storage solution for you.

VAX Storage Arrays

Fixed Drives, 42-inch Cabinet

Model	Actuators	Formatted Capacity (GB)	Ports	Average Seek Time	Transfer Rate (MB/sec)
SM202	1-4	.663 to 2.65	1-4	16ms	2.48
SM212	1-4	.873 to 3.49	1-4	16ms	2.75
SM702	2, 4, 6, 8	1.33 to 5.30	1-4	16ms	2.75
SM712	2, 4, 6, 8	1.75 to 6.98	1-4	16ms	2.48

Fixed Drives, 60-inch Cabinet

Model	Actuators	Formatted Capacity (GB)	Ports	Average Seek Time	Transfer Rate (MB/sec)
SM204	1-4	.663 to 2.65	1-4	16ms	2.48
SM206	1-12	.663 to 7.96	1-12	16ms	2.48
SM208	1-8	.663 to 5.30	1-8	16ms	2.48
SM214	1-4	.873 to 3.49	1-4	16ms	2.75
SM216	1-12	.873 to 10.50	1-12	16ms	2.75
SM218	1-8	.873 to 6.98	1-8	16ms	2.75
SM708	2, 4, 6, 8, 10, 12	1.33 to 7.96	1-6	16ms	2.48
SM718	2, 4, 6, 8, 10, 12	1.75 to 10.50	1-6	16ms	2.75
SM834	1-4	1.06 to 4.22	1-4	16ms	2.75

Removable Drives, 42-inch Cabinet

Model	Actuators	Formatted Capacity (GB)	Ports	Average Seek Time	Transfer Rate (MB/sec)
SM602	1-4	.59 to 2.36	1-4	18ms	1.86
SM212	1-4	.29 to 1.15	1-4	18ms	1.25

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