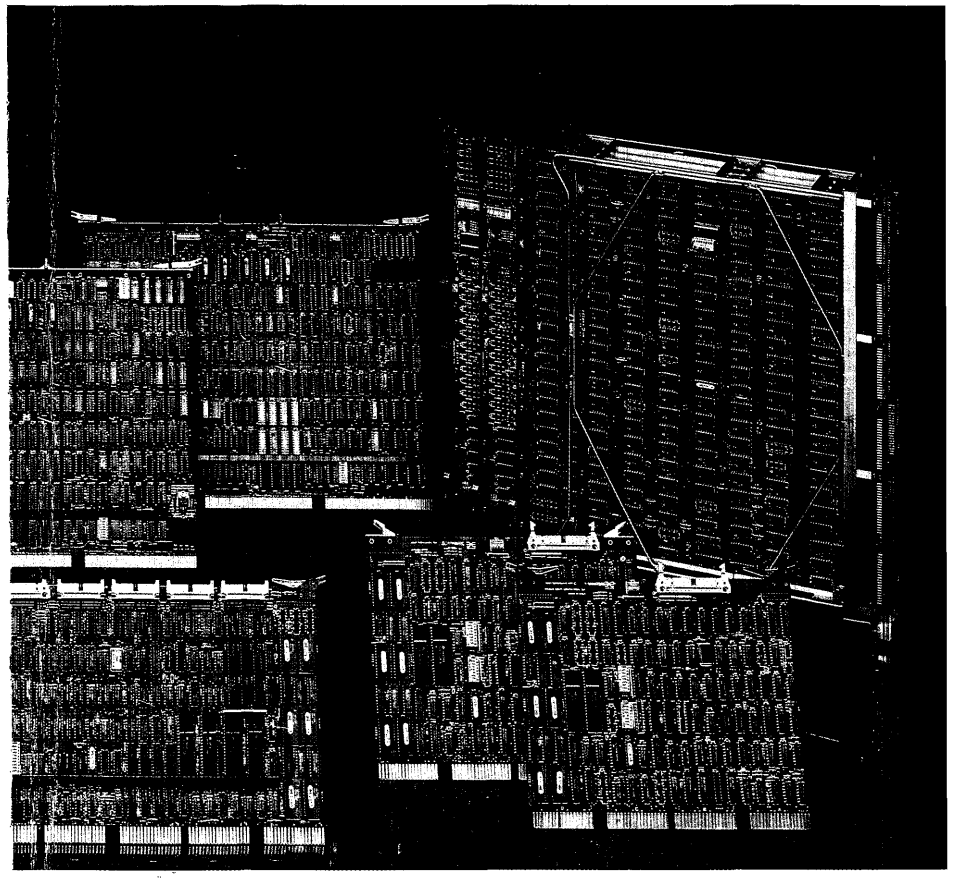
DISK AND TAPE PRODUCTS HANDBOOK



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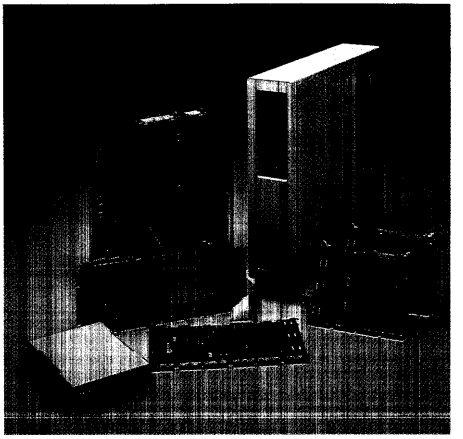

Our Track Record.

Emulex is the acknowledged champion in the field of disk, tape, communications controllers and subsystems for Digital Equipment Corporation (DEC) equipment. In little more than five years we have achieved a performance history for the industry to envy. Emulex controllers have routinely broken all the records for disk, tape and communications capability. And we have earned a reputation for quality and consistency that is second to none.

From the LSI, through the PDP minis, to the high-capability VAX super minis, the Emulex product line has matched and surpassed original equipment hardware across the full line of DEC systems.

Now with the emergence of DEC's new micros such as the MICRO/PDP-11 and MICRO/VAX, Emulex looks forward to proving itself again to DEC OEMs and system houses.

Emulex is looking beyond the DEC world, too. Through its Persyst product line, the company also markets a complete line of memory graphics communications, and functions enhancement products for the IBM PC and other compatible microcomputers. We feel the Emulex brand of quality and performance will be more than competitive in the PC world at large. A series of new host adapters will allow Emulex controllers and subsystems to compete across the board. Winning is a philosophy at Emulex. And competition always brings out our best.

EMULEX

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DISK AND TAPE PRODUCTS HANDBOOK

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FORWARD

The Emulex *Controller Handbook* began as a set of simple typewritten notes prepared with the objectives of: (1) explaining the underlying concept of the Emulex product line; and (2) giving a prospective user enough information to make an informed judgement on its applicability to his particular needs.

The Emulex *Controller Handbook* still seeks to meet these objectives. But keeping up with output from our engineering group continues to be a challenge. During the past year, Emulex has introduced fifteen new products for a total of thirty-five distinct products. At least the eight new products now in development will be added by the time the next issue arrives. Compounding this problem is the enormous functional flexibility in the line which leads to a vast number of different models and versions provided for almost every basic hardware product offered. Additionally, Emulex mass storage controllers are designed to work with a very large percentage of the many 8 and 14 inch hard disk drives and 1/2 inch magnetic tape transports and streaming devices offered by different peripheral manufacturers.

As a result of the rapid expansion of the Emulex product line, the Controller Handbook has been expanded to three separate volumes, each of which concentrates on a specific group of products. This first book, the *Disk and Tape Products Handbook,* describes the Emulex line of disk and tape controllers for DEC LSI-11, PDP-11, and VAX-11 CPU's. The *Communications Products Handbook* provides an extensive study of communications concepts and describes the complete line of Emulex communications multiplexers and subsystems for DEC CPU's. The third book is the *Micro-Products Handbook,* which describes the newest Emulex products, a series of controllers, host adapters, and packaged subsystems which interface to the versatile new Small Computer System Interface (SCSI).

The handbooks are organized to present an overview of each product line, including some background on the characteristics of the peripheral devices supported and the input/output environment in which the products operate. Detailed application information such as media type, formatted capacities, emulation modes, and hardware specifications - are provided in a series of Appendices.

As in the previous Issue, the content of these handbooks has also been expanded to include some other useful information, not only about Emulex products but also about peripheral devices made by others. Useful data, such as infant mortality and calculated and actual MTBF figures for controller products, is included. Also, specific applications are outlined and the optimum solutions discussed.

The accompanying table gives an overview of the present Emulex product line and several new products scheduled for introduction in 1984. This

matrix shows the breadth of coverage and the general scope of peripheral selection available to Emulex customers.

When Emulex began operations in late 1978, it was dedicated to providing to DEC computer users a broad series of products based on design excellence and built to exacting standards of quality and reliability. We continue that commitment today along with the policy and dedicated staff to completely support our products in the U.S. and abroad. As we grow and move into new markets, we believe that this philosophy and discipline is essential for long-term success in markets which exist by virtue of the technical excellence and quality inherent in the industry. Users of alternate sources of peripherals and CPU enhancements should expect and demand the same or better standards when considering alternate sources for their needs. We at Emulex intend to be recognized for our technical leadership and product quality . . . as the Genuine Alternative.

TABLE F-1 Emulex Product Family

PRODUCT CLASS	LSI-11 QBus	PDP-11 Unibus	PDP-11/70 Cache Bus	VAX-11 Unibus	VAX-11/750 CMI Bus	VAX-11/780 SBI Bus	Other
Large Disk Controller	SC03/BX SPE 44	SC21/B SC31/BX SPE 44	SC72/BX SPE 44	SC21/V SC31/BX SPE 44	SC7000/B1 SC750/B2 SC758/B1 SPE 44	SC7000/B1 SC780/B2 SC788/B1 SPE 44	
Small Disk CMD/SMD Disk Controller	SC02/A,C,L UC01/L UC02/M	SC12/A,C,L UC12/M		SC12/V UC12/M			
Half-Inch Tape, Unformatted: Start/Stop	TC01/N TC01/P	TC11/N TC11/P		TC11/N TC11/P			
Half-Inch Tape, Formatted: Streamer and/or Start/Stop GCR Formatted	TC02/FS	TC12/FS TC13		TC12/FS TC13	TC7000	TC7000	
One-Quarter Inch Tape, Formatted: Streamer	TC05/SX	TC15/SX		TC15/SX			
Communications Multiplexer	CS01/H CS02/H	CS11/H CS11/V CS21/H CS21/Z STATCON 11 STATCON 21		CS11/F CS11/U CS21/F CS21/U CS21/Z CS32/F STATCON 11 STATCON 21 STATCON 32			
Micro-Controllers and Host Adapters							Medalist Champion Titleist IBM Host Adapter Multibus Host Adapter
Packaged Subsystems	SABRE Vault Medley Decathlon Javelin	Vault Medley Decathlon Javelin		Vault Medley Decathlon Javelin			SABRE Vault Medley Decathlon Javelin

THE COMPANY

Emulex Corporation designs, manufactures and markets communications and mass storage peripheral controller and subsystem products for use with minicomputers and microcomputers manufactured by Digital Equipment Corporation (DEC)*. Additionally, Emulex designs, manufactures, and markets disk and tape controllers, host adapters, and packaged subsystems for use with the IBM-PC and Intel's Multibus.

During its four year history, the Company has developed over forty distinct hardware product lines—described inside—which cover all models of the DEC LSI-11, PDP-11, and VAX-11 computers. As of January 1984, over 25,000 of these units have been delivered. This superb product line reflects the basic strength of Emulex, namely its excellent technical group, which currently has more new products typical of those in our present product lines under development. We believe that these products will make the same dynamic contribution to the industry as have the current Emulex products.

The company also markets a complete line of memory, graphics, communications, and functional enhancement products for personal computers made by IBM and other micro-computer manufacturers through its wholly-owned subsidiary, Persyst (Personal Systems Technology, Inc.), located in Irvine, California.

Emulex intends to continue an aggressive development program and to maintain our position as a recognized technology leader. The engineering staff has been expanded in all areas to make certain that we meet this objective and we will continue this expansion effort for the foreseeable future.

Corporate Organization

Emulex was founded in September 1978. The Corporation has experienced significant revenue growth since its inception. Net sales for fiscal year ending June 1983 were $31,012,089. Sales for the first six months of fiscal year 1984 exceed $28 million. The Company is publicly held with shares traded on the over-the-counter market under the NASDAQ symbol EMLX. For further information on these aspects of Emulex Corporation, please write the company at its Costa Mesa corporate headquarters and request the latest annual report.

Facilities

Corporate facilities located in Costa Mesa, California, presently include over 100,000 square feet of modern, industrial buildings, with approximately 48,000 devoted to production and an additional 30,000 square feet dedicated to product development and technical support.

September 1984 is the target completion date for a new two-story 60,000 square foot engineering and manufacturing building located adjacent to the Costa Mesa headquarters facility. The Emulex manufacturing facility in Dorado, Puerto Rico, has been expanded to a total of 51,000 square feet.

The Company also opened a new 6000 square-foot headquarters facility in Bracknell, England, for sales administration, repair and service support throughout the United Kingdom and Europe. In addition, a future plant site has been chosen near Dublin, Ireland, to inaugurate a new European manufacturing operation later during 1984. The company has 16 direct sales/field support offices located across the U.S., with international sales offices in the United Kingdom, The Netherlands, West Germany, Australia, and Canada.

Manufacturing

Manufacturing is dedicated to high-volume production of the Company's proprietary controller products. Production planning is oriented to a build-to and ship-from inventory. Quality control and testing procedures are stressed to assure a level of excellence to match that of the product designs.

Infant mortality failures are minimized by thorough pretesting and burn-in prior to shipment of a controller. All Emulex stand-alone controllers incorporate almost 100% active component parts. These parts are pretested and pre-aged for a period of 160 hours at 70°C prior to the time of assembly. Completed assemblies are further burned-in under dynamic microcode execution for a period of at least 96 hours in an environmental oven, which automatically cycles the temperature from 5-50 degrees C. This testing occurs after parts have been thermal-shocked during the flow solder process. Any dynamic failure which occurs results in a microcode self-test failure. The defective component is then isolated and replaced and the assembly completes the cycling process.

As a result, MTBF (Mean-Time-Between-Failure) figures for Emulex stand-alone controllers are extremely favorable, with a range of 28,000 to 76,000 hours, depending on the product. Complete details on specific MTBF and infant mortality rate figures for Emulex products are found in Appendix U of this Controller Handbook.

Micro-Products From Emulex

In addition to the basic stand-alone controller products for mini and super-mini computers, Emulex now offers a Genuine Alternative for microcomputer and personal computer applications. As always this new line of disk, tape, and packaged subsystem products offers the same high quality and unexcelled performance that the computer world has come to expect from Emulex.

The new micro-controllers for disk and tape applications incorporate Emulex's latest design feature, VLSI chips designed in-house to meet the quality and performance specifications required to be an innovative leader in the microcomputer field.

These controllers support the latest industry bus structure technology. This includes the Small Computer System Interface (SCSI) and the Enhanced Small Disk Interface (ESDI). Used in combination with Emulex host adapters, the micro-controllers can interface multiple types of 5-1/4" disk and tape drives to a variety of host processors via the SCSI bus. Different disk controllers tie ESDI and/or ST506 types of drives to the SCSI bus. Host

adapters of several types then connect from the host processor to the SCSI bus. A new micro-tape controller interfaces in a similar manner to a 1/4" tape cartridge drive.

Emulex also offers complete 5¼" Winchester disk and ¼" cartridge tape packaged subsystems for DEC LSI-11 through 11/23 PLUS, PDP-11, VAX-11 Series computers, MICRO/PDP-11, and MICRO-VAX. These products are marketed and sold as complete system units, including controller or coupler, storage media (disk or tape), and power supply, all housed in a standard chassis. The systems also include all cables and diagnostics, and emulating host adapter if applicable. As with all Emulex products, these packaged subsystems are pretested and burned in prior to delivery to the installation site.

For more information on Emulex Micro-Products, please contact your local Emulex Sales Representative.

Subsystem Products

Emulex offers complete peripheral 14" stand-alone disk and ½" stand-alone tape subsystems to U.S. customers only. Housed in an adjacent facility, the Subsystems Group integrates Emulex controllers with a wide range of disk and tape drives obtained by Emulex from several leading peripheral suppliers. These subsystems support the full range of DEC LSI-11, PDP-11, and VAX-11 computers. Installation of these subsystems is handled by the Emulex Field Service group. All peripherals and media are pretested and burned in at Emulex prior to delivery to the installation site. Detailed information regarding Emulex Subsystem Products is found in separate "Disk Subsystems" and "Tape Subsystems" brochures. These brochures, as well as information regarding the application/purchase of subsystems, are available from your local Emulex Sales Representative, or the Emulex Subsystems Group, phone 714/662-5600.

Sales Programs

Emulex products and subsystems are sold throughout the U.S. by a direct sales organization with offices in 16 U.S. cities and 6 foreign countries. Users may also purchase Emulex products through a well-established Authorized Dealer, Sales Representative, and reseller organization, both domestically and in most countries throughout the free world.

Emulex now conveniently offers GSA Contracts to agencies of the U.S. Government (Contract Number GS-00K-8401S5575).

Details of Emulex sales programs are available through your nearest Emulex Sales Representative.

Technical Support

Application support consultation is always available. Emulex provides a dedicated technical support staff of senior hardware and software engineers at its headquarters in Costa Mesa, California. In addition, each regional sales office has a pre-sales support engineer on hand to answer any questions you may have. The staff is available to all users for any required telephone assistance. System support specialists are located in Emulex field service offices in New York, Boston, Philadelphia, Pittsburgh,

Washington, D.C., Chicago, Houston/Dallas, Atlanta, San Francisco, and Los Angeles. These specialists are dedicated to the on site installation and support of Emulex products in these key geographical areas. Additional field service offices are planned in other major metropolitan areas in the near future. It is the policy of the Company to provide the full level of such assistance required to properly integrate and use all Emulex products.

The Company conducts regularly-scheduled, customer and service courses at its facilities on an approximately monthly basis. Specialized courses at customer locations are provided by arrangement.

Product Repair

Emulex maintains a dedicated, well staffed and equipped repair facility at its headquarters. It is policy to promptly honor all requests for source. Requests for both routine and expedited support should be directed to the Repair Center.

For U.S. customers, a unique end-user swap-out policy is available to Emulex subsystem customers, whereby a replacement product will be shipped to the customer's site within 24 hours after a request is made.

Field Service

Emulex has a formal service agreement with Control Data Corporation/ Engineering Services Division for maintenance of its complete controller and subsystem product line. This program now covers 50 key U.S. cities, with plans for expansion in other locations. In each location, Control Data offers complete DEC system maintenance of LSI-11, PDP-11, and VAX-11 based systems as well as maintenance for Emulex products, thus providing a single vendor service arrangement. In addition, maintenance of Emulex products is also offered in the countries of Canada, United Kingdom and Germany. For information, contact Emulex directly or Control Data at 800/328-3980.

A similar arrangement has been implemented with General Electric in key cities across the U.S. Information on this program is available from Emulex. Other excellent organizations, such as Tymeshare and Grumman furnish maintenance on a regional or national basis.

INTRODUCTION

Disk Products

When introduced in early 1979, the Emulex SCXX Series of disk controllers represented the first complete family of synergistic disk controller products for all makes and models of DEC LSI/PDP-11 host computers. This unique situation continues today, but on a greatly expanded base of product offerings. These controllers have a common 2901 bipolar bit-slice microprocessor-based architecture which is carried throughout all hardware configurations. From this design base, microcoded versions are derived to support almost every non-captive 8 and 14 inch form factor OEM disk drive incorporating an SMD interface. This technology encompasses fixed and moving head drives, drives with fixed, fixed/removable, and/or removable media. It applies, as well, to drives of different sizes (e.g. 8", 14" diameter) and capacities.

Because of the single-thread architecture, a given microcode version is carried almost without change between the different hardware models offered for LSI-11, 11/2, 11/23, 11/23 PLUS, 11/73; PDP-11/04-60, PDP-11/70, and VAX-11 Series. This means that a user can generally expect to be able to put the same makes and models of disk drives on every level of DEC CPU and to be able to use the same basic operating and diagnostic software in every similar configuration. Conversely, any given Emulex controller model can be configured (or reconfigured) to any standard (or custom) version by simply installing the proper microcode PROM chips and/or setting on-board configuration option switches. The advantages to the user of this approach in such factors as application flexibility, spares stocking, quantity purchasing, and long-term end product growth, is obvious.

Equally important to the Emulex product concept is packaging. Each hardware model is designed specifically—and exclusively—for an intended DEC host computer. The mechanical and electrical design is optimized for that application, and is not simply "adapted" as are some other competing designs.

The LSI-11 (SC01) and PDP-11 (SC11) controllers are a two-board configuration designed with a common piggy-back board which contains the microprocessor. The SC02 was subsequently announced as a low-cost single board controller for LSI-11 QBus applications and has taken the place of the SC01 in certain applications. Unlike the SC01, the SC02 has the capacity to handle the 4 MBytes memory and faster data transfer rates of the LSI-11/23 PLUS. The SC03 was added to the product line to allow users of medium and large capacity disk drives to take advantage of the faster data transfer rates of the new high-speed disk drives like the Fujitsu "Eagle" on the LSI-11 QBus. The SC12 has been developed to integrate small-to-medium capacity moving head SMD disk drives in the range of 12 -160 MBytes with the VAX or PDP-11. The SC21 is a single-board controller for

PDP-11 and VAX-11 Unibus applications and has supplanted the SC11 in many applications. The SC31 for application with the PDP-11/04 – /60 and VAX-11 Unibus and the new 1.8 MByte per second transfer rates of drives like the Fujitsu "Eagle". The SC31 also has improved ECC and 8 KBytes of buffer space required to handle the throughput of these disk drives. The PDP-11/70 controller (the original SC70 and the later SC7l and SC72 models) are contained on three active boards plus one small signal interconnect board (because of signal distribution considerations in the host backplane) but carries the same design architecture as the other controllers. It allows mixed drive capability on the same controller, and can handle the 1.8 MByte per second transfer rates of drives like the Fujitsu "Eagle."

The Emulex SC750 disk controller is designed for the VAX-11/750 CPU. It is packaged on a single "extended" hex-sized board and offers software transparency to VMS and UNIX users who wish to incorporate large disks compatible with the DEC Massbus class controllers. The newer SC758 supports up to 8 SMD-type drives on VAX-11/750 CPU's.

The V-Master/780 Mass Storage Adapter is a unique device which will support disk drives, tape drives, or both, by providing an interface and control through the internal high-speed Synchronous Bus Interface (SBI) of a VAX-11/780 computer. The SC780 is a disk controller which fits in the V-Master/780 chassis and handles up to four disk drives. The newer SC788 also fits in the V-Master chassis and supports up to 8 SMD-type drives on VAX-11/780 CPU's.

The UC01 emulating host adapter, for LSI-11 QBus applications, features use of the SCSI (Small Computer System Interface) specification which has been endorsed by the ANSI (American National Standards Institute) organization. The UC01 emulates two DEC RLV11 or RLV12 controllers and is transparent to all applicable operating systems and most RL01/RL02 diagnostics. Like the SC03, the UC01 handles the 22-bit addressing and 4 MByte memory capability of the LSI-11/23 PLUS.

Two new host adapters have been added to the product line -- the UC02 for LSI-11 QBus, and the UC12 for PDP-11 and VAX-11 Unibus. Both the UC02 and the UC12 feature the SCSI interface, and utilize Mass Storage Control Protocol (MSCP). Features include 22-bit addressing and 4 MByte memory capacity for the LSI-11/23 PLUS (UC02 only), seek ordering, error control, and self-sizing.

Another new addition is the SC7000, a large disk controller designed for the VAX-11/750 and 11/780 CPU. Packaged on an "extended" hex-size pcb, the SC7000 interfaces the VAX-11/750 through the CMI bus, or the VAX-11/780 via the Emulex V-Master. The same board will operate in either CPU–instant configuration is achieved by simple switch selection. The SC7000 features transfer rates up to 1.8-2.0 MBytes/second, and is software transparent to operating systems and diagnostics of both the VAX-11/750 and 11/780.

The SPE 44 SMD Port Expander is a unique product in the Emulex line. Acting as an electronic switching unit, the SPE 44 provides the capability of interfacing multiple DEC PDP-11 or VAX-11 CPU's to a single bank of up to four SMD-compatible disk drives. The Port Expander provides DEC users

the means to achieve shared storage access and system capabilities previously not possible.

In all cases, the Emulex controllers mount directly in a standard backplane or system unit; no specially wired unit, no wiring modifications, no separate "boat anchor" boxes and cables, and no extra power supplies are required. These controllers are inexpensive and easy to ship, install, remove, relocate, and return for repair, if necessary. The result is minimum cost to purchase and use after initial acquisition. And the use of fewer components and ancillary parts, plus elimination of wired interconnects, means greater inherent reliability of the product.

On the drive side, all controller products except the UC01, UC02, and UC12 incorporate the standard SMD interface as originally defined by CDC, later adopted as the industry standard, and now offered on almost all 14" and many 8" class drives. The standard physical connection is the so-called "flat cable" interface; Emulex also has an adapter for the less-common "round cable" interface connectors.

In introducing the UC01 and UC02 for the LSI-11 CPU's, and the UC12 for PDP/VAX-11 CPU's, Emulex has explicitly endorsed the SCSI interface specifications for 8" and 5-1/4" diameter disk drives. One reason for the delay in marketing acceptance for the 8" and 5-1/4" class products is that there were almost as many interface designs as there were companies in the business (about 30), and this has made it impossible for controller suppliers to respond to the needs of many users. Unique interfaces require special-purpose controllers, and the result is generally sole sourcing of both the drive and controller. This places the user in an uncomfortable, if not dangerous, situation. Emulex believes that a common interface, permitting application of controllers to a broad spectrum of peripheral devices, is a healthy situation for both manufacturers and users alike. It is hoped that peripheral manufacturers will respond by offering the ANSI and SCSI interface as an option, if not a standard, in their 8" and 5-1/4" product lines.

Emulex presently supports a very broad range of disk drives of varying capacity, configuration, and media. The list of standard versions offered is constantly growing to meet the needs of all potential users. As new drive technology emerges, new controller versions will be introduced to ensure that customers can continue to upgrade their own products.

Generally, disk drive selection is coupled to the controller microcode version since the objective is to derive a complete subsystem which emulates, and is software transparent to, an existing DEC subsystem. The customary approach is to map a defined "logical drive" unit onto a designated physical drive. The configuration of the drive (e.g., number of tracks and cylinders, bit density, etc.) determines the feasibility of using a given disk drive with a given microcode emulation.

In the original SC01 and SC11 controllers, a different version of each basic emulation was required to support each unique drive configuration, resulting in a long list of PROM sets which had to be supported. All subsequent controllers have been designed to incorporate a "universal" type emulation (e.g. RM02, RK06, etc.) and a unique configuration PROM which

Generally, disk drive selection is coupled to the controller microcode version since the objective is to derive a complete subsystem which emulates, and is software transparent to, an existing DEC subsystem. The customary approach is to map a defined "logical drive" unit onto a designated physical drive. The configuration of the drive (e.g., number of tracks and cylinders, bit density, etc.) determines the feasibility of using a given disk drive with a given microcode emulation.

In the original SC01 and SC11 controllers, a different version of each basic emulation was required to support each unique drive configuration, resulting in a long list of PROM sets which had to be supported. All subsequent controllers have been designed to incorporate a "universal" type emulation (e.g. RM02, RK06, etc.) and a unique configuration PROM which defines the drive parameters with later controllers. It is also possible to mix drive types/capacities on the same controller. Selection of drive configurations and mixes is made by means of option switches on the board, without requiring a PROM set change.

Emulex also supports several custom microcode versions which meet the software/disk drive requirements of specific OEM customers. Because these custom adaptations still use hardware common to the standard product line, development cost and lead times can be held to an absolute minimum, and production purchasing and planning problems for building and delivering such products are essentially nil. Users with unique application requirements are encouraged to discuss the feasibility of a custom microcode package.

Tape Products

The Emulex TCXX tape controller/coupler product line is a direct derivative of the disk controller technology. The TCXX tape controller/coupler series uses the same basic microprocessor architecture common to all Emulex controller products. This synergistic design approach results in providing the same basic user benefits in all Emulex products — regardless of peripheral type or host computer model.

The TC01 and TC11 tape controllers are designed to emulate DEC's TU10/TM11 and interface to any standard half-inch, reel-to-reel, magnetic tape drive incorporating an industry standard (Pertec) interface. Because of the degree of commonality among drives in this category, all tape peripherals are supported by a single microcode version of the controllers.

These TCXX controllers follow the same dedicated design concept of the disk controller series. The LSI-11 controller (TC01) is contained on two quad height boards, one of which contains the Phase Encoded (PE) demodulation circuitry. The PDP-11 and VAX-11 controller (TC11) is contained on a hex height controller/formatter board, plus the same PE board used for the TC01. These controllers mount directly in a standard backplane or system unit. Since the quad PE board does not interface to the bus, it need not be adjacent to the controller board and often can be located in one of the "free" quad slots at the front or rear of a system unit. The result is an optimum product for the application.

The TC02 and TC12 Series are single board tape couplers that emulate DEC's TS11 and handle every industry standard ("Pertec") formatted half-inch tape transport, including conventional NRZI/PE start/stop and the 1600/3200 bpi start/stop streaming tape drives. Both the TC02, for LSI-11 CPU's, and the TC12, for PDP-11 and VAX-11 applications, will also interface the new breed of low cost GCR (6250 bpi) start/stop/streaming transports.

The new TC13 tape coupler for PDP-11 and VAX-11 CPU's is a single board tape coupler which also emulates DEC's TS11 subsystem. The TC13 handles industry standard half-inch tape transport, including conventional NRZI/PE start/stop/streaming, and the new generation of GCR units.

Two other new additions to the tape coupler family are the TC05 (for LSI-11 CPU's) and the TC15 (for PDP/VAX-11). These single board couplers, combined with the new CDC Sentinel 1/4-inch tape cartridge streamer, emulates DEC's TS11 subsystem, including execution of operating system software and diagnostics.

The TC7000 is another new addition. This coupler interfaces the CMI bus in the VAX-11/750 and the SBI bus of the VAX-11/780 via the Emulex V-Master. Like the SC7000 disk controller, the TC7000 can be configured by simple switch selection to operate transparently in either CPU. The TC7000 handles industry standard formatted start/stop STC or Pertec-compatible tape drives, 800/1600/6250 bpi, at speeds from 12.5 to 125 ips.

Communications Products

The Emulex communications product line is also a direct derivative of Emulex disk controller technology. Using the same basic microprocesser technology and some advanced design, Emulex communications products provide the same performance and reliability afforded by our disk and tape controllers. The communications product line is made up of five FCC-compliant communications multiplexers, designated the CS01, CS02, CS11, CS21, and CS32, providing a complete range of products for LSI-11, PDP-11 and VAX-11 CPU's.

Complete detailed information regarding the Emulex communications products can be found in the new Emulex *Communications Products Handbook.* Please write the corporate headquarters to request a copy.

Micro-Products

Emulex now offers a Genuine Alternative for microcomputer and personal computer applications. This new line of disk, tape, and packaged subsystems products offers the same high quality and performance that the computer world has come to expect from Emulex.

Three micro-controller products have been introduced: the Medalist and Champion disk controllers, and the Titleist tape controller. Additionally, there are currently five host adapters available for interfacing a wide variety of host processors to the Small Computer System Interface (SCSI): the UC01, UC02, UC12, IBM Host Adapter (Model HA01), and the Multibus Host Adapter (Model HA51). The Micro-Products line also includes five complete disk and tape packaged subsystems: SABRE, Vault, Medley, Decathlon, and Javelin.

Complete details on these Emulex products may be found in the Emulex *Micro-Products Handbook.* Please write the corporate headquarters and request a copy.

Summary

The Emulex product line philosophy and architecture has permitted rapid development and volume production of an almost unlimited range of controller versions and drive configurations for the DEC LSI/PDP/VAX-11 lines. The benefit to Emulex customers has been our ability to provide immediate solutions to almost all current application problems, plus the inherent flexibility to handle foreseeable future requirements using the same product hardware.

But advantages to Emulex users do not stop at the product design level. A full-time senior applications staff is available on call, both before *and* after the sale, to identify and solve problems. Product repair services are conducted by the customer service group under marketing direction, using a staff and equipment dedicated to this sale function. And excellent field service is available across the U.S. and in several foreign countries through well-recognized third-party organizations trained and equipped by Emulex.

SECTION I
DISK CONTROLLERS

CHAPTER 1
DISK DRIVE CONSIDERATIONS

Because of the recent proliferation of excellent disk products, a user can consider an almost unlimited selection of drives to meet mass storage requirements. Emulex controllers have the inherent capability to effectively use all applicable disk drives now available and known to be forthcoming in the near future. Because CDC has so far served the largest segment of the independent disk drive market, their product line has set a certain level of defacto standard at the hardware interface level. Fortunately for the industry, there are many excellent alternative selections to be made, some of which are a second-source type design and others of which are uniquely configured for specific price/performance/ application objectives. The Emulex objective is to support as many different drive makes/models as possible, either through standard or custom microcode versions. Users are encouraged to discuss drive selection with us prior to making a final decision.

For convenience, disk drives considered below are relative to the kind of media used. The CDC nomenclature is used as a basis for this discussion.

Removable Media Drives

The basic removable media drive supported is the Storage Module Drive (SMD) type, using a removable, multi-platter pack with moving heads. Capacities now range from 40 - 300 MBytes. Capacity of a model is basically determined by the number of platters, track density, and bit packing density. The basic SMD drive incorporates a top loading removable disk pack.

Emulex controllers are designed to handle a bit rate of 9.67 MHz derived from an approximate 6000 bpi density at 3600 RPM used in most SMD class drives. New controllers such as SC31, SC03, SC72, and SC7000 support 16 MHz drives.

Current, standard controller versions are available to support SMD class drives having 40, 80, 200, and 300 MByte unformatted capacities. Typical makes/models presently supported include those given in Table 1-1.

Fixed Media Moving Head Drives

These drives generally incorporate so-called Winchester technology and mount the fixed media in a sealed enclosure for high reliability and low

cost. There are a large number of such drives presently available, and many new designs are scheduled to appear soon. Generally, these drives use the same high packing density and rotational speed as the SMD's, and the Emulex controllers are capable of handling these designs on a functional and performance level. This type of drive is produced with platter sizes of 5 1/4", 8", 10", and 14" diameters. Most 14" drives and some 8" drives offer an SMD interface option. Current Emulex controllers can support all drives with an SMD interface.

Typical 14" disk drives supported are given in Table 1-2. This list will be continually expanding because of the present high level of design activity by the drive manufacturers.

TABLE 1-1
Typical Removable Media Drives
Supported By SCXX Series Controllers

MAKE	MODEL					
	40 MB	80 MB	160 MB	200 MB	300 MB	500/600
CDC	9760[1]	9762 9710			9766	
Century[3]		T-82RM		T-202	T-302RM T-306	T-602[2]
Ampex		980	9160	9200	9300	
Memorex[4]				677	677-30	
Ball		BD-80	BD-160			

Notes

1. The CDC 9760 (40) MB is supported as a one-half RM02 emulation, switch selectable, in the microcode.
2. The T-602 was originally announced as 600 MBytes, but will be slightly in excess of 500 MBytes.
3. The standard T-82 and T-302 drives have 815 cylinders; the RM versions have 823 cylinders, which is required for operation in the B1 controller versions without software patches. Emulex does not supply patches for 815 cylinder drives, and the RM versions are recommended.
4. The Memorex 677-30 is a 300 MByte upgrade of the 200 MByte 677 and may be retrofitted in the field to the higher capacity. Configuration is the same as CDC 9766, but the media is not interchangeable with CDC or with the DEC RM05.
5. This list may not be complete. Additional drives are indentified in Section V (BLUE). Check with the factory for models not shown.

Fixed/Removable Media Drives

Typical 14" drives in this category presently supported by Emulex are given in Table 1-3.

The basic minimum drive of this type consists of one removable pack plus one fixed platter. One or two additional fixed platters can be added for expanded capacity. This type of drive is similar to the older 2315/5440 type cartridge disk drives but is considerably more effective on both a performance and cost-per-megabyte basis. The removable pack provides an excellent

and cost-per-megabyte basis. The removable pack provides an excellent backup to the fixed media and can also serve as a data/software exchange medium within a user's system.

Originally, drives in this category all had 14" platters with SMD interfaces. Smaller capacity drives of this type using 8" or 5-1/4" platters are now announced or in production. These all have SMD interface options and they will be supported by current Emulex controllers.

TABLE 1-2
Typical 14" and 8" Fixed Media Moving Head Drives
Supported by SCXX Series Controllers

MAKE/MODEL	CAPACITY						
	12-20 MB	20-40 MB	40-70 MB	70-80 MB	130-170 MB	300-500 MB	600+ MB
CDC 9730[1]	12	24		80	160		
CDC 9715					160	340,515	
CDC 9775							675
CDC 9771							825
Kennedy 53XX	14		42	70,80			
Priam 50		34	68		159		
Fujitsu 228X			66		132,166		
Memorex 659							675

Notes

1. CDC designates the 9730 as a Mini-Module Drive (MMD) which is available in the indicated capacities. The 9730-80 is functionally identical to the 9762.
2. This list is not complete. Additional drives are identified in Section V (BLUE). Check with the factory for models not shown.

TABLE 1-3
Typical Fixed/Removable Media Drives
Supported by SCXX Series Controllers

MAKE	CAPACITY		
	32 MB	50-70 MB	96 MB
CDC 9449 (CMD)	32	64	96
CDC 9457 (Lark)		50	
CDC 9458 (Lark)		52	
Amcodyne		52	
Century Data 2075		70	
Ampex DFR 900	32	64	96

Notes

1. The CDC and Ampex packs are not interchangeable with any DEC media. CDC/Ampex packs are interchangeable.

CHAPTER 2
DEC DISK SUBSYSTEM CHARACTERISTICS

Emulex disk controller products are designed to provide the same functional capability as any one of four large-capacity disk subsystems which incorporate a controller plus one or more disk drives sold and supported by DEC. A summary of these subsystem formatted drive configurations is given in Table 2-1.

It should be noted that all referenced DEC large capacity disk subsystems apply only to the PDP-11 minicomputer Series (Unibus, Massbus). DEC does not offer a large disk on its LSI-11 microcomputer Series; the only hard disks offered are the 5 and 10 MByte RL01/02 drives. Emulex also currently offers RL01/02 equivalent products. A description of these can be found following the discussion of large capacity devices.

Emulex offers large and small capacity disk controllers across the entire mini and microcomputer line by using the functional characteristics of the DEC subsystems and adapting them to the appropriate bus structure.

RP11E/RP02/RP03

The RP11E controller interfaces to the PDP-11 Unibus and supports either RP02 or RP03 disk drives (refer to Figure 2-1). These devices are older disk pack designs which are no longer in production. Although this subsystem is no longer sold by DEC, it is supported by most current software although later versions of some operating systems will probably drop this support.

The RP02 has a capacity of 20.8 MBytes; the RP03 is a double track density version with a formatted capacity of 41.6 MBytes.

Although the hardware is obsolete by today's standards, this subsystem configuration is still supported under most current DEC PDP-11/04-70 (but not VAX) operating system versions, including RT-11. The functional emulation provided by Emulex controllers is convenient for handling certain disk drives, particularly those having capacities below 80 MBytes.

The RP02/03 disk drives rotate at 2400 RPM and pack data at about 2000 bpi. This is in contrast to today's large drives which typically rotate at 3600 RPM with bit densities of up to 6000 bpi. From a functional standpoint, this is of no consequence, and because Emulex controllers handle the more modern drives, the performance of the emulating subsystem will be considerably improved, with an average data rate of 4–5 times the RP02 or RP03.

The DEC RP11E controller does not provide any error correcting capability since this was not common for the low density RP02/03 packs. However, ECC is generally considered mandatory for the modern high density media,

TABLE 2-1
DEC Subsystem Characteristics

CONTROLLER	RL11		RK611		RP11E		RH11, RH70				
Drive	**RL01**	**RL02**	**RK06**	**RK07**	**RP02**	**RP03**	**RM02**	**RM03**	**RM05**	**RM80**	**RP06**
Platters/Drive	2	2	2	2	11	11	3	3	11	4	11
Tracks/Cylinder	2	2	3	3	20	20	5	5	19	14	19
Cylinders/Drive	256	512	411	815	203	406	823	823	823	561	815
Sectors/Track	40	40	22	22	10	10	32	32	32	32	32
Bytes/Sector	256	256	512	512	512	512	512	512	512	512	512
MBytes/Drive	5.12	10.24	13.9	27.5	20.8	41.6	67.2	67.4	256.2	124.0	174.4
Speed	2400	2400	2400	2400	2400	2400	2400	3600	3600	3600	3600
Bit Density (BPI)	3725	3725	2400	2400	2020	2020	6060	6060	6060	6339	4040
Data Rate (K Words per Sec) - Average	512.5	512.5	270	270	102.4	102.4	403	492	493	492	400

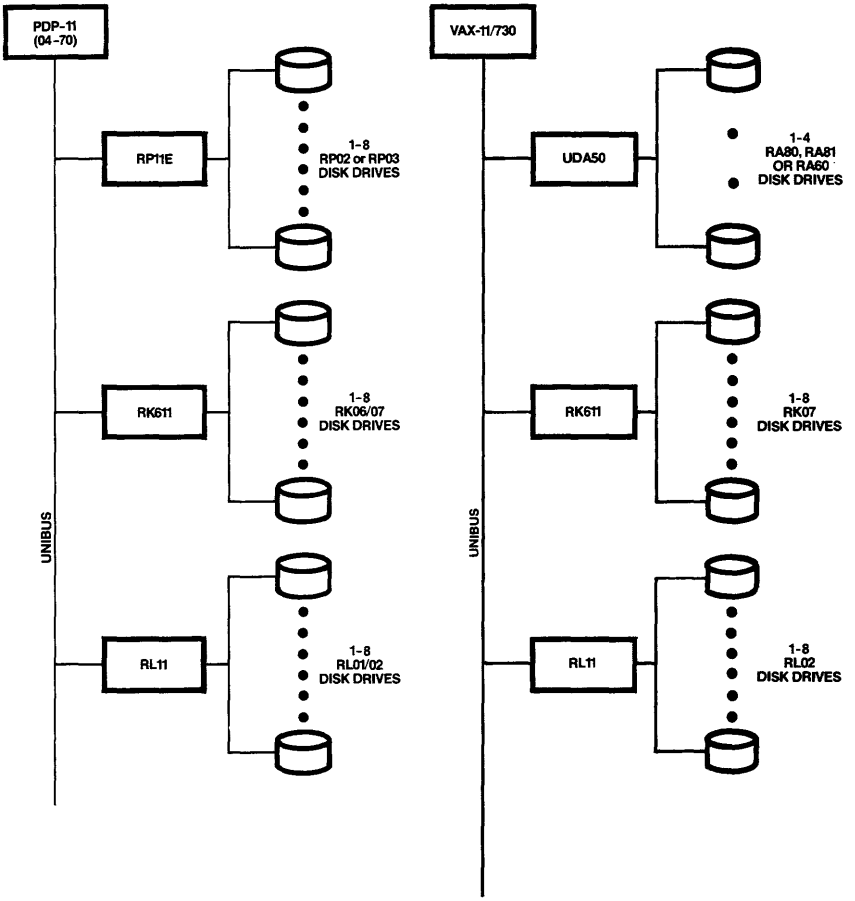


FIGURE 2-1
DEC Unibus Disk Subsystems

and Emulex controllers provide this necessary capability (switch option) as an extended controller feature. The controller will automatically perform error correction and will also provide status information for logging detected errors under the operating system. Some controller designs emulating the RP11E have been provided by other manufacturers which overlooked inclusion of ECC capability; this is a significant omission when the controller is used with a high-density drive.

Massbus Disks (RM02/03/05, RM80, RP04/05/06, RP07)

The DEC Massbus concept entails providing a separate peripheral I/O bus on which all high-speed devices, such as disk and tape drives, are attached. A diagram of the Massbus disk peripheral organization for the three different applicable CPU's is shown in Figure 2-2.

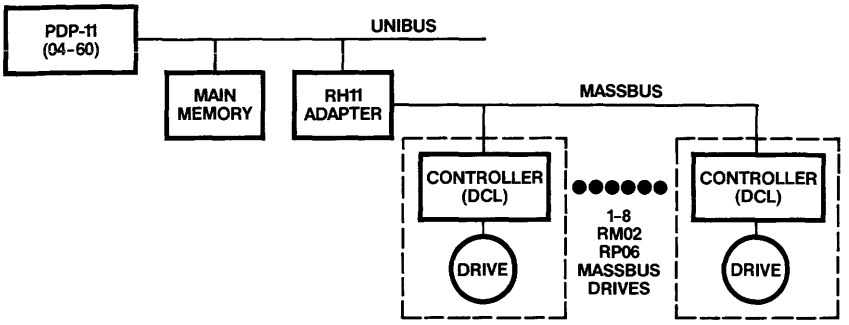
As shown, the Massbus itself is common to all systems which handle Massbus peripherals. The bus is created by a Massbus Adapter: RH11 for Unibus-only machines, 11/04/-11/60; RH70 for the 11/70, RH750 and RH780 for the VAX-11/750 and VAX-11/780, respectively.

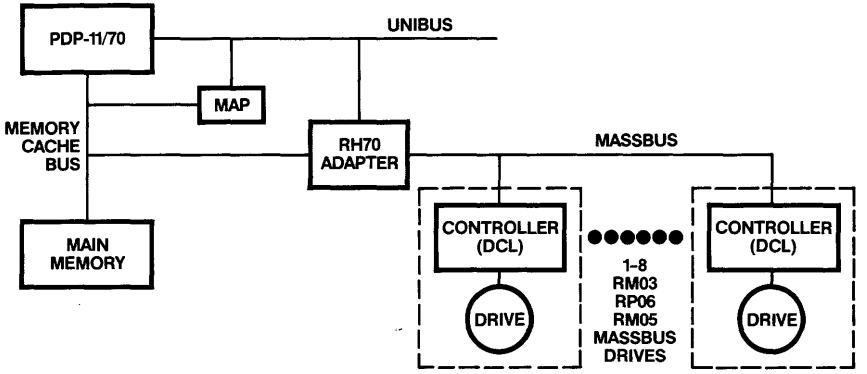
In the smaller machines, the RH11 interfaces only to the Unibus, and all data, control, and status transfers take place over this path. In the PDP-11/70, the RH70 adapter interfaces to the internal memory bus, sometimes referred to the Cache bus, for DMA data transfers, and to the Unibus for control and status transfers. The DMA transfers are in 32-bit double-word form, whereas the Unibus transactions are in l6-bit word form. Also, data transferred over the 11/70 Unibus requires a memory address mapping since the Unibus address is limited to l28K words. The standard software drivers for 11/70 Massbus peripherals do not contain any mapping provision. Therefore, if a controller emulating a Massbus drive is run on the 11/70 Unibus, the software must be modified accordingly.

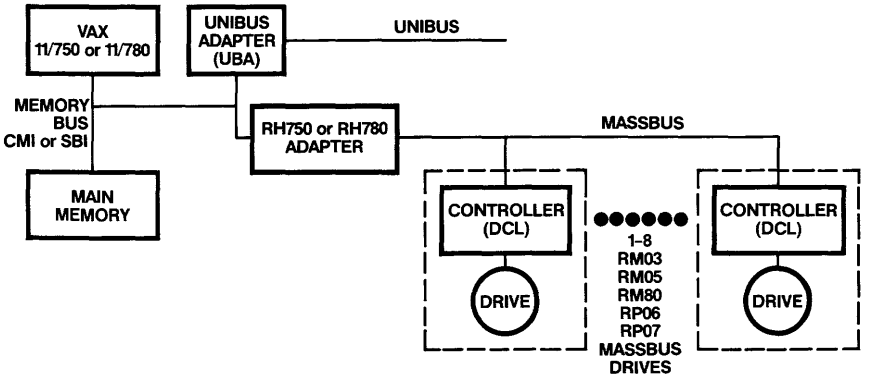
The VAX-11/780 is organized somewhat similar to the 11/70 in that the RH780 Massbus adapter interfaces to the internal memory bus (SBI) and to the Unibus Adapter (UBA). A controller emulating a Massbus peripheral, when run on a VAX Unibus, will require a custom driver because of the memory address limitation. However, UBA data transfers are 32 bits which reduces the effective internal transfer rate between the UBA and memory.

The VAX-11/750 also incorporates a high-speed memory bus in addition to a standard Unibus. The RH750 Massbus adapter interfaces RM03/05, RM80, and RP06 drives in a similar manner to the RH780. It should be noted that the 750 and 780 memory buses are entirely different so that the RH750 and 780 Massbus Adapters are functionally the same but require entirely different implementations.

In all cases, the Massbus disk drives are functionally identical. Each drive contains its own controller (DCL) which is considered integral to the drive itself. This concept is convenient in that the same drive can presumably be connected to any Massbus. It does, however result in considerable hardware redundancy.







Massbus Organization

The currently available Massbus disk drives are:

RM02 - 67 MByte, 2400 RPM, 6000 bpi
RM03 - 67 MByte, 3600 RPM, 6000 bpi
RM05 - 256 MByte, 3600 RPM, 6000 bpi
RP04/05 - 87 MByte, 3600 RPM, 4000 bpi
RP06 - 174 MByte, 3600 RPM, 4000 bpi
RP07 - 512 MByte, 3600 RPM, 6000 bpi (Winchester)
RM80 - 124 MByte, 3600 RPM, 6000 bpi (Winchester)

The RM02 and RM03 are an OEM version of the 80 MByte CDC 9762. The RM02 is slowed down to 2400 RPM for Unibus operation (this speed reduction is required more by DEC because of inadequate buffering in the controller than because of a limitation on Unibus bandwidth). Emulex controllers have more than adequate buffering to support the 3600 RPM operation of standard drives. The RM03 is run at 3600 RPM and is used on the PDP-11/70, VAX-11/750, and VAX-11/780. The RM05 is presently offered by DEC only on these models.

The DEC RM05 is an OEM version of the 300 MByte CDC 9766 drive, operating at 3600 RPM. The only configuration difference is 19 data tracks in the 300 MByte versus 5 data tracks in the 80 MByte (CDC 9762) drive.

The RP04/05 drives are half density versions of the RP06 and are no longer in production. Emulex presently uses the RP04/05 formats on the SC03/BX, SC31/BX, and the SC72/BX, and emulates the RP06 configuration on the other "B"-type controllers. The RP06 is available on all 11-Series machines and is an OEM version of the Memorex 677 disk drive. The RM80 is a recently introduced 124 MByte Winchester and is offered only on the VAX-11/750 and 780 CPU's. The larger RP07 538 MByte Winchester is supported by DEC only on the VAX-11/780.

DEC uses the designator "J" for RH11 adapter and "W" for a RH70 and "E" for an RH780 adapter. Thus, the adapter and first drive of a system are denoted as given in the following examples:

RJM02 - Unibus RM02 (2400 RPM) 67 MB drive
RWM03 - 11/70/70 RM03 (3600 RPM) 67 MB drive
REM03 - 11/780 RM03 (3600 RPM) 67 MB drive
RWM05 - 11/70 RM05 (3600 RPM) 256 MB drive
REM05 - 11/780 RM05 (3600 RPM) 256 MB drive
RJP06 - Unibus RP06 (3600 RPM) 174 MB drive
RWP06 - 11/70 RP06 (3600 RPM) 174 MB drive
REP06 - 11/780 RP06 (3600 RPM) 174 MB drive

RK611/RK06/RK07

The DEC RK06 and RK07 are removable cartridge disk drives having 13.9 and 27.5 MByte formatted capacities, respectively. The RK611 controller is a Unibus interface device (refer to Figure 2-1), and these subsystems are supported on the Unibus under all current operating systems for the PDP-11 and VAX Series'. The RK06 is no longer in production, having been replaced by the double track density RK07.

The RK06/07 drives are proprietary to and made only by DEC, including the media. Therefore, there is no industry equivalent drive available. The RK06 format is used by Emulex to support the current fixed/removable combination drives and will also be used for other drives in the future.

The RK06/07 is available for all PDP-11 and VAX-11 Series' machines via the RK611 Unibus interface.

RL11/RL01/RL02

The DEC RL01 and RL02 are top-loading, rack-mounted cartridge disk drives having 5.2 and 10.4 MByte formatted capacities, respectively. The RL11 controller is a Unibus interface device while the RLV11 controller is used on the LSI-11 QBus.

CHAPTER 3
EMULEX DISK CONTROLLER SUMMARY

The following summarizes the basic Emulex disk controller products and the range of applications presently supported by each. More detail on the features and specifications for each controller model and the versions available is given in the Appendices. In addition, for quick reference, SECTION V (BLUE) and SECTION VI (GOLD) give complete information on all Emulex products, emulations and the drives and software supported by each. The list of standard versions is continually being expanded to include support for drives which are not listed here, and users are urged to inquire on the availability of support for any drive of particular interest.

HARDWARE DESIGNS

The following briefly summarizes the many hardware designs—SC02, SC03, SC12, SC2I, SC31, SC71, SC72, SC750, SC758, SC7000, and V-MASTER/780 and SC788—now in the SCXX Series family. The new UC01, UC02, and UC12 are also considered within this 'Disk Controller' section, as they are primarily disk products at this time. Also considered to be part of the Disk section is the SPE 44 SMD Port Expander. The purpose is to define the differences which exist among these products. The many features - common to all are covered in product literature, manuals, and the specifications, given in the Appendices of this *Handbook.*

SC02

For the LSI-11, 11/2, 11/23, 11/23 PLUS, and 11/73. Packaged on a single quad-sized PC board which plugs into a standard QBus quad backplane. Incorporating a standard SMD interface, the SC02 is optimum for 14" drives up to 160 MBytes (including CMD type drives) and for all current 8" drives which offer an SMD interface option.

The SC02 is available in three standard models which emulate standard DEC disk storage subsystems. The SC02 includes a configuration PROM which permits definition of up to 64 different switch selectable combinations of disk drive configurations on two controller ports.

Model SC02/A emulates the DEC RP11E controller with standard-sized RP02 (20.8 MByte), RP03 (41.6 MByte) or expanded capacity, logical units. The SC02/A includes all RP11E functional features and capability plus extended features, such as on-board pack formatting capability and switch selection of transparent ECC, with errors reporting to system software. This model supports essentially all standard SMD (removable media), Winchester (fixed media), and CMD (removable/fixed media) type drives of various capacities from 12-160 MBytes.

Model SC02/C emulates DEC's RK611 controller combined with multiple RK06 (13.9 MByte) or RK07 (27.5 MByte) logical units. The SC02/C includes all RK611 capability plus the same extended features provided in the Model A Series. It is particularly well-suited for support of 32-96 MByte CMD-type drives having a removable and multiple fixed platters, with a logical RK06 mapped onto each data surface. The SC02/C also supports other 8" and 14" drives by mapping 1 or more standard RK06/RK07 drives onto 1 or 2 physical drives.

Model SC02/L emulates DEC's RL11 combined with multiple RL01 (5.12 MByte) or RL02 (10.24 MByte) logical units. It includes all RL11 capability plus the same extended features provided in the Model A Series. The Model SC02/L supports essentially all standard SMD, Winchester, and CMD-type drives of various capacities from 8 - 60 MBytes.

The SC02 has many features in common with other SCXX series controllers, including ECC and CRC capability and bus register start and vector addresses that are slide/switch selectable. The buffer scheme, which uses 3-to-1 sector interlace media formatting, eliminates the possibility of data late conditions and permits the controller to be operated at low bus priorities. It also features 22-bit bus addressing permitting direct access to the full 4 MByte memory range of the LSI-11/23 PLUS (Model C and Model L only). Additional features include a built-in clock for software controllable line time functions (BDV11 compatible) and boot strap and terminator options, which allow the controller to boot other devices in the system and utilize the controller as a bus terminator.

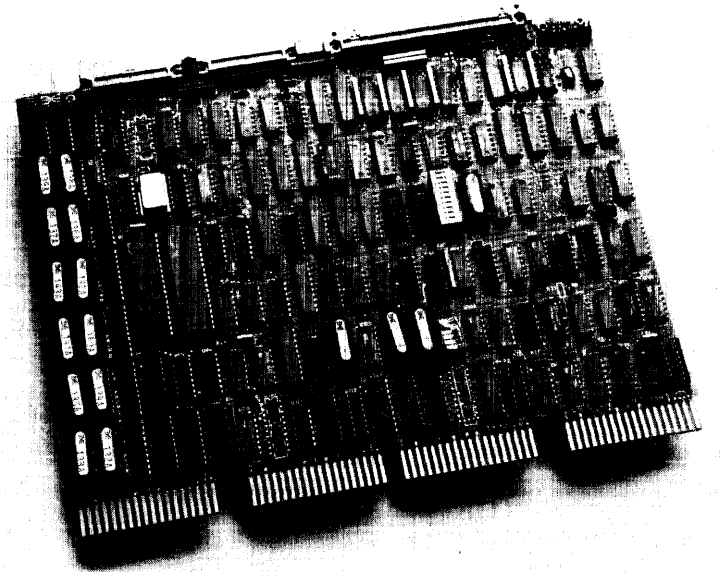


FIGURE 3-1 Emulex SC02 Series

Appendix A gives more detail on the features and specifications of the Model SC02. Also see Tables SC02/AX and SC02/CX for information on the drives and software supported by these specific emulations.

SC03

For the LSI-11, 11/2, 11/23, 11/23 PLUS, and 11/73. Packaged on a single quad height board that interfaces to the QBus, incorporating the standard Emulex microprocessor design. It is optimum for interfacing one or two large disk storage devices to LSI-11 CPU's.

The SC03 controller is only available in the SC03/BX model which emulates DEC's RH11/RH70 interface with RM02/03 (67.4 MByte), RM05 (256.2 MByte), RM80 (124.6 MByte) and/or RP06 (174.4 MByte) logical units. The SC03 includes all standard features offered by the DEC controller it emulates, plus many added features, including the following:

Software transparency to DEC operating systems and diagnostics.

ECC/CRC correction and detection to insure reliable operation with most types of high density disk drives, including the new 1.8 MByte/second transfer rate of the Fujitsu Eagle.

22-bit addressing to support a full 4 MByte memory address range for the LSI-11/23 PLUS and 11/73.

Generation of compatible, interchangeable media with the DEC RM02/03/05 and RP06 disk packs.

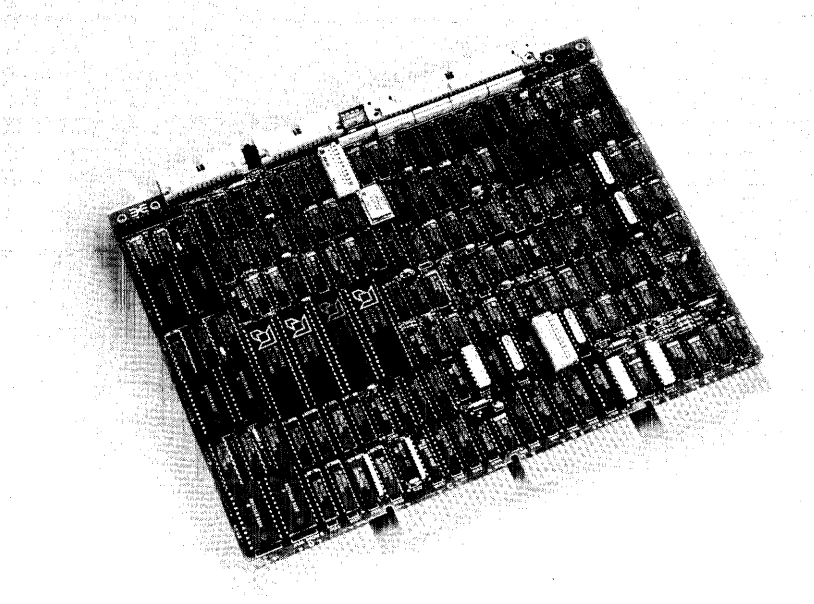


FIGURE 3-2 Emulex SC03 Series

Built-in clock for software-controllable line time functions (BDV11 compatible).

Bootstrap and terminator options to allow the controller to boot other devices in the system and to utilize the controller as a bus terminator. These features combined with the line time clock can often eliminate separate system hardware (typically the BDV11) used for these functions.

Mixed drive capacity made available by the use of a configuration PROM which allows disk drives of various sizes and characteristics to be used on one controller.

Mixed emulation capability which allows a single controller to handle different emulations at the same time.

14 sector buffering scheme implemented to alleviate data lates.

These and other features, such as internal self-test and low power consumption make the SC03/BX an excellent choice for integration with DEC's LSI-11 line of processors.

Appendix B gives further details on the features and specifications of the Model SC03. Also see Table SC03/BX for information on the drives and software supported by this specific emulation.

SC12

For the PDP-11/04 through 11/60, and VAX-11/750 and 780. Packaged on a single quad-sized PC board which plugs into a standard Unibus backplane. The SC12 supports up to two 8-inch or 14-inch physical drives having capacities in the range of 8-160 MBytes. The SC12 controller is format compatible with Emulex SC02 controller, which is used with the LSI-11 Q-Bus. SC12 features include a choice of two selectable bus register start locations, selectable bus addressing, and two selectable vector addresses. Other features include ECC/CRC correction and detection, mixed drive capacity, and a full sector of data buffering.

The SC12 is available in three standard models for emulation of specific DEC subsystems.

The SC12/A (for PDP-11 only) emulates the RP11E controller with standard size RP02 (20.8 MByte) or RP03 (41.6 MByte) disk drives. The SC12/A supports essentially all standard SMD (removable), Winchester, or CMD-type drives of various capacities from 12 to 160 MBytes.

The SC12/C (for PDP-11 only) emulates the RK611/711 controller combined with multiple RK06 and RK07 drives to support SMD type drives which have both fixed and removable media and capacities in the range of 16—300 MBytes.

The SC12/V emulates DEC's RK711 controller combined with multiple RK07 drives on the VAX-11 Unibus.

Users considering Winchester and/or CMD drives or smaller minicomputer configurations can use the SC12 as a low cost alternative to the Emulex high-performance SC21 controller.

The SC12 can also be used with smaller capacity drives on the VAX-11/750 and VAX-11/730. In particular, the CMD 14-inch drive can be run in a software transparent mode as multiple RK06/07 drives on the VAX Unibus using the SC12/V.

Appendix C gives more detail on the features and specifications of the Model SC12. Also see Table SC12/CX for information on the drives and software supported by these specific emulations.

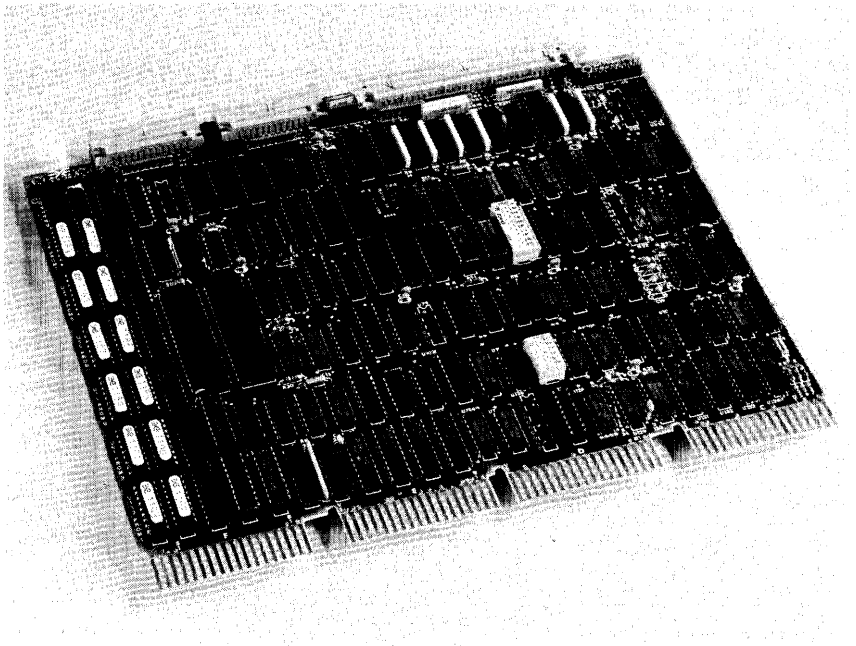


FIGURE 3-3 Emulex SC12 Series

SC21

For the PDP-11/04 through 11/60, and VAX-11/750 and 780. This controller is a second-generation version of the SC11, packaged on a single hex-size PC board. In addition to improved performance, this controller provides several other very useful features, including the ability to operate many combinations of disk drives having different configurations on the same controller.

The SC21 is available in two standard models which emulate standard DEC disk storage subsystems.

Model SC21/B emulates DEC's RH11 interface with RM02 (67.4 MByte), RM05 (256.2 MByte), or RP06 (174.4 MByte) logical units. The SC21/B includes all standard functional features plus extended features such as command pack formatting and auto bootstrap. This Model supports standard SMD and Winchester-type drives of 40-600 MByte capacity.

Model SC21/V emulates DEC RM03 (80 MByte) and RM05 (300 MByte) storage subsystems. The standard SC21 controller has been provided with specialized microcode to optimize the data transfer strategy to the VAX Unibus adapter. The SC21/V includes the Emulex-developed VAX/UM software package, which completely supports installation, operation, and maintenance of the SC21/V on the VAX-11/730, VAX-11/750, and VAX-11/780 computers under VMS (Version 2.0 and above). On the 11/730 and 11/750, drives may be operated as the system disk or as a data disk; on the 11/780, the drive is used as a data storage device.

Appendix D gives more detail on the features and specifications of the Model SC21. Also, see Tables SC21/B and /V for information on the drives and software supported by these specific emulations.

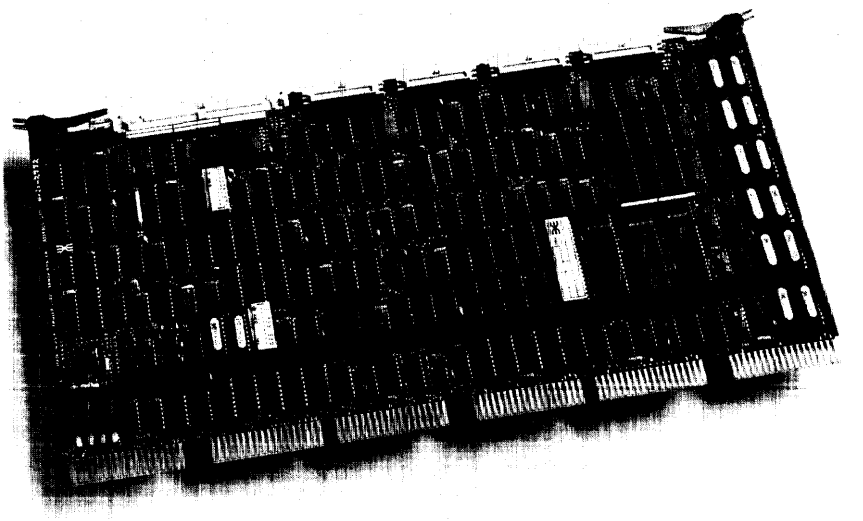


FIGURE 3-4 Emulex SC21 Series

SC31

For the PDP-11/04—11/70 and VAX-11 Unibus. Packaged on a single hex-sized pcb which plugs into a standard Unibus backplane, the SC31 is optimum for use with the 1.8 MByte/second data transfer rates of the new high-speed Winchester disk drives, such as the Fujitsu Eagle. It also operates on drives with a 1.2 MByte/second transfer rate. The SC31 has been configured, through a single "universal" firmware version—the SC31/BX—to emulate DEC's RH11—RM02/RM03/RM05/RM80/RP04/RP05/RP06 disk subsystems on PDP-11 CPU's or the RH11—RM03/RM05/RM80 or expanded RM80 on VAX-11/730, 11/750, and 11/780 computers.

The SC31 has the same performance and features of larger Emulex VAX disk controllers.

For PDP-11 Unibus applications, the SC31 emulates applicable DEC disk subsystems using essentially any SMD industry standard drive. All standard models for the PDP-11 Series are DEC diagnostic and operating system compatible. In addition, the SC31 generates DEC-compatible media when the disk pack and equivalent DEC drive are mapped identically.

In the case of VAX-11 applications, the SC31 consists of a hardware/software package designed to add economical big disk storage to a VAX-11 system. Hardware is the SC31/BX controller, which is coupled with a software package, the Emulex developed and supported VAX/UM, consisting of four modules: Formatter, Driver, Boot, and Diagnostics.

Appendix E gives more detail on the features and specifications of the Model SC31. Also, see Table SC31/BX for information on the drives and software supported by this emulation.

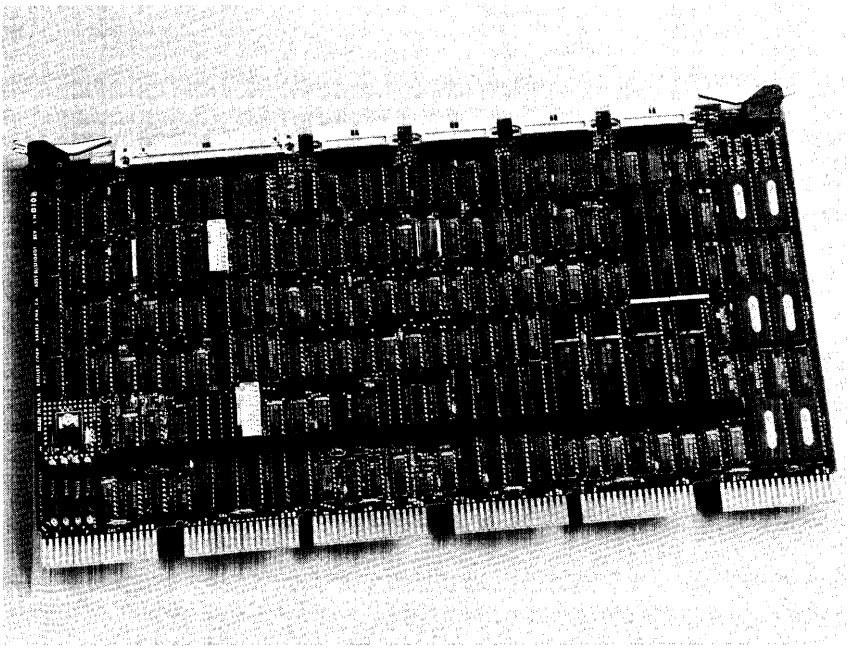


FIGURE 3-5 Emulex SC31 Series

SC71 and SC72

For the PDP-11/70. Interface directly to the PDP-11/70 internal memory (Cache) bus with full 22-bit (4 MByte) memory addressing capability to ensure software transparency and full system performance. Incorporate the same capability as the SC2l in that these controllers operate different drive configurations on the same controller. Packaged on three active PC boards

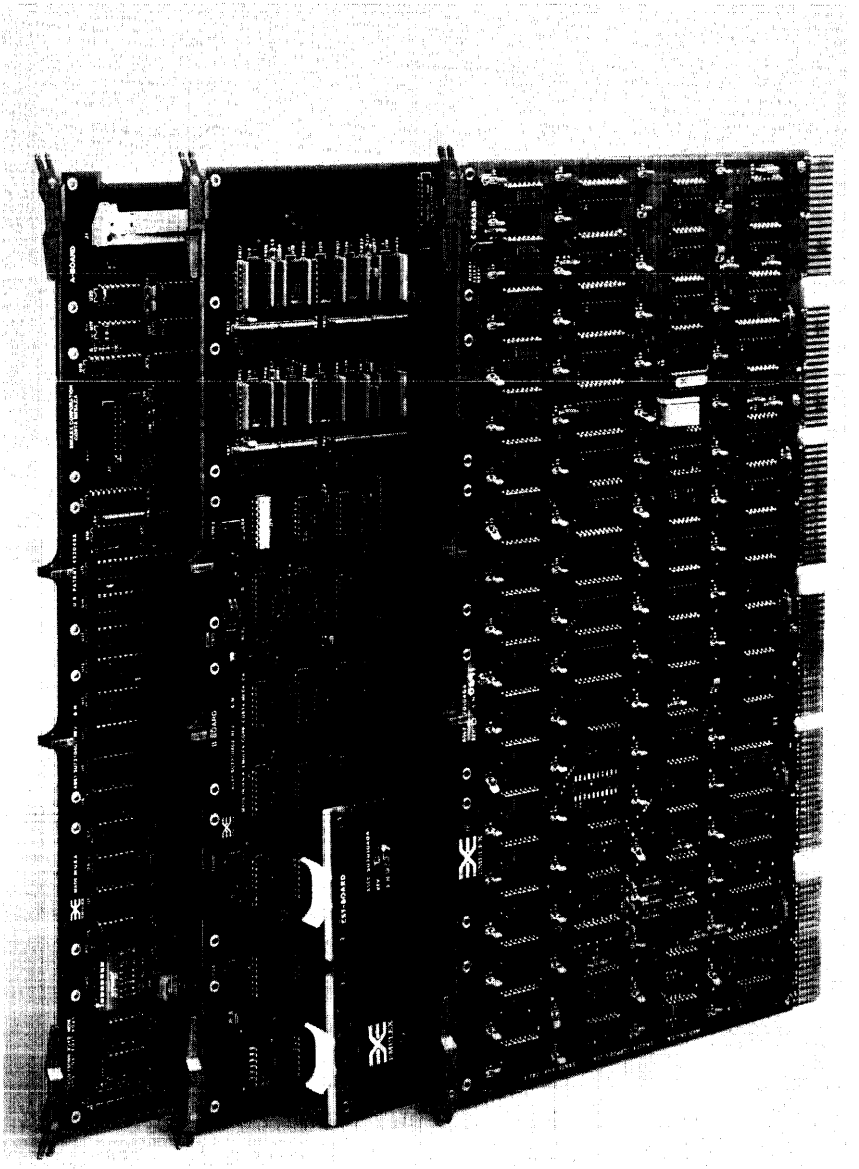


FIGURE 3-6 Emulex SC72 Series

plus one small signal interconnect PC board which plugs directly into the RH70 controller backplane. Support up to four physical drives, and bus register start and vector addresses are slide/switch selectable. The SC71 and SC72 use the same buffer strategy as the other controllers.

The SC72 has been introduced as an upgraded version of the SC71. The SC72/BX is packaged on the same basic board set as its predecessors and is offered in a single version which emulates DEC RH70/RM03/RM05/RM80/RP04/RP05/RP06, operating transparently to standard DEC operating systems and diagnostics. The SC72 offers the additional feature of handling the new high-speed Winchester disks having transfer rates of 1.8-2.0 MByte/second, such as the Fujitsu "Eagle."

Appendix F gives the features and specifications of the SC7l and SC72, respectively. Also, see Tables SC71/BX and SC72/BX for information on the drives and software supported by these specific emulations.

SC750

For the VAX-11/750. Packaged on a single 'extended' hex-sized PC board which plugs into a standard RH750 backplane interface. The SC750 provides everything provided by DEC Massbus controllers—VMS software execution, high-speed CMI bus data transfer, mixed drive capability, and large disk storage capacity. In addition, there is single board packaging and built-in disk formatting. The SC750 handles from 1—4 SMD-type disk drives from a wide selection of manufacturers.

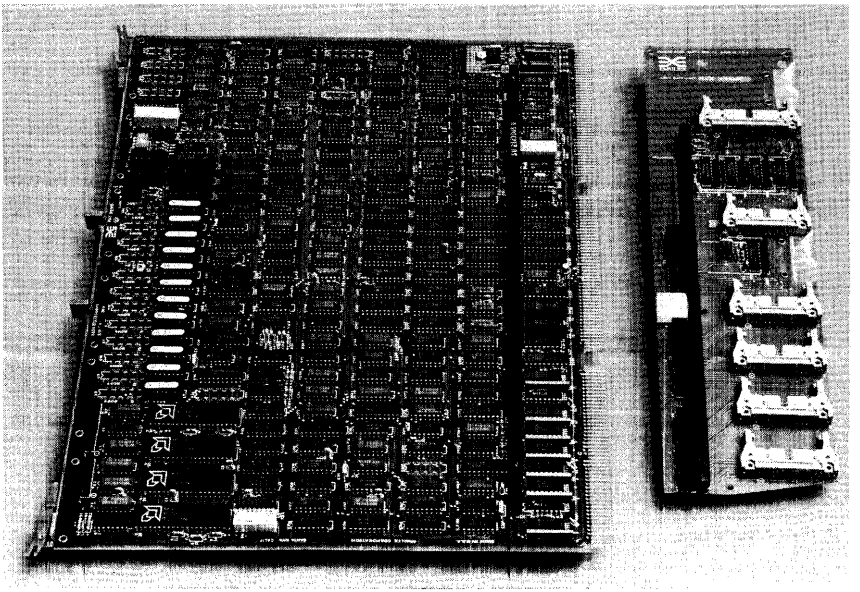


FIGURE 3-7 Emulex SC750 Series

The SC750 is available in two models which emulate standard DEC Massbus disk subsystems supported under VMS and UNIX on the VAX-11/750 computer. Model SC750/B3 provides concurrent emulation of an RM03 (67.4 MByte), RM05 (256.2 MByte), and/or RM80 (124.6 MByte) Massbus disk subsystem. The Model SC750/B2 emulates DEC's RP06 (174.4 MByte) removable Massbus disk subsystem.

Appendix G gives the features and specifications of the Model SC750. See Tables SC750/B3 and /B2 for information on the drives and software supported by these specific emulations. Also, Section III gives further details on the SC750.

The SC758 is, likewise, packaged on a single "extended" hex-sized PC board. It differs primarily from the SC750 in that it handles up to eight disk drives per controller instead of up to four as is the case with the SC750. Users are urged to discuss their particular application requirements with Emulex Applications Engineers for the most optimum use of this product.

Appendix H gives detailed specification on the Model SC758.

SC7000

For VAX-11/750 and VAX-11/780. Packaged on a single "extended" hex-sized PC board which plugs into a standard RH750 backplane interface in the VAX-11/750 or into the Emulex V-Master in the VAX-11/780. The SC7000 provides maximum flexibility, allowing up to four industry-standard large-

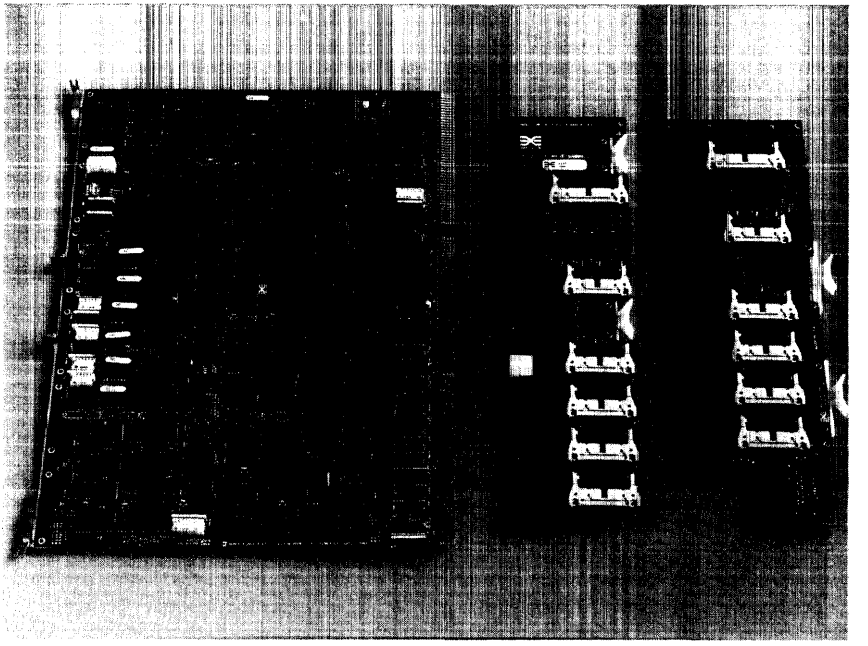


FIGURE 3-8 Emulex SC7000 Series

capacity drives, of 825 MBytes, to be connected to either VAX system, with instant configuration by simple switch selection. The SC7000 features transfer rates of 1.8-2.0 MBytes per second, DEC-compatible ECC/CRC hardware, 12 sectors of RAM buffer, 32-bit data word transfers, and media compatibility.

The SC7000 is available in a single model, the SC7000/B1, which emulates DEC RM03 (67.4 MByte), RM05 (256.2 MBytes), and/or RM80 (124.6 MBytes) Massbus disk subsystems on the VAX-11/750. Emulations available on the VAX-11/780 are described in the V-Master/780 section which follows.

Appendix I gives the features and specifications of the Model SC7000. See Table SC7000/B1 for information on the drives and software supported by this specific emulation.

V-MASTER/780 and SC788

The V-MASTER/780 is a mass storage adapter which will support disk drives, tape drives, or both, by providing an interface and control through the Synchronous Bus Interface (SBI) of a VAX-11/780 computer.

The V-MASTER package consists of the following basic elements:

Chassis	Capable of supporting 4 PCB's.
Interface PCB	Provides two-way communication with the SBI.
Translator PCB	Converts the SBI information to the CPU Memory Interface (CMI) used by the VAX-11/750.
SC7000 or SC780	Disk controller for 11/780 which controls up to four disk drives.
TC7000	Tape coupler for 11/780 which controls up to four STC or up to 8 Pertec-compatible tape drives. Occupies one slot of the V-Master chassis and provides DEC TU77 emulation.

In most DEC systems, Emulex controllers plug directly into PCB slots which exist in the DEC backplane incorporated in the appropriate system. This is true for all DEC systems except the 11/780. In the 11/780, there is simply no common backplane. Each component module of the 11/780 is free-standing. The processor itself has its own backplane, and bolts into the frame. The memory has its own backplane which bolts into the frame alongside the processor. Interconnect cables then join the two component members together. Therefore, in order to install disk and tape controllers it is necessary that a backplane first be bolted into the system. The V-MASTER provides the required backplane and interconnect capability. To this is then added one or two SC7000 or SC780 disk controllers, TC7000 tape controllers, or combination thereof.

The SC7000 used in the V-Master/780 is available in one model which emulates standard DEC Massbus disk subsystems supported under VMS on the VAX-11 series of computers. This model executes basic diagnostic and all operating system software. The emulation includes all basic functional features of the equivalent DEC subsystem, plus extended capability

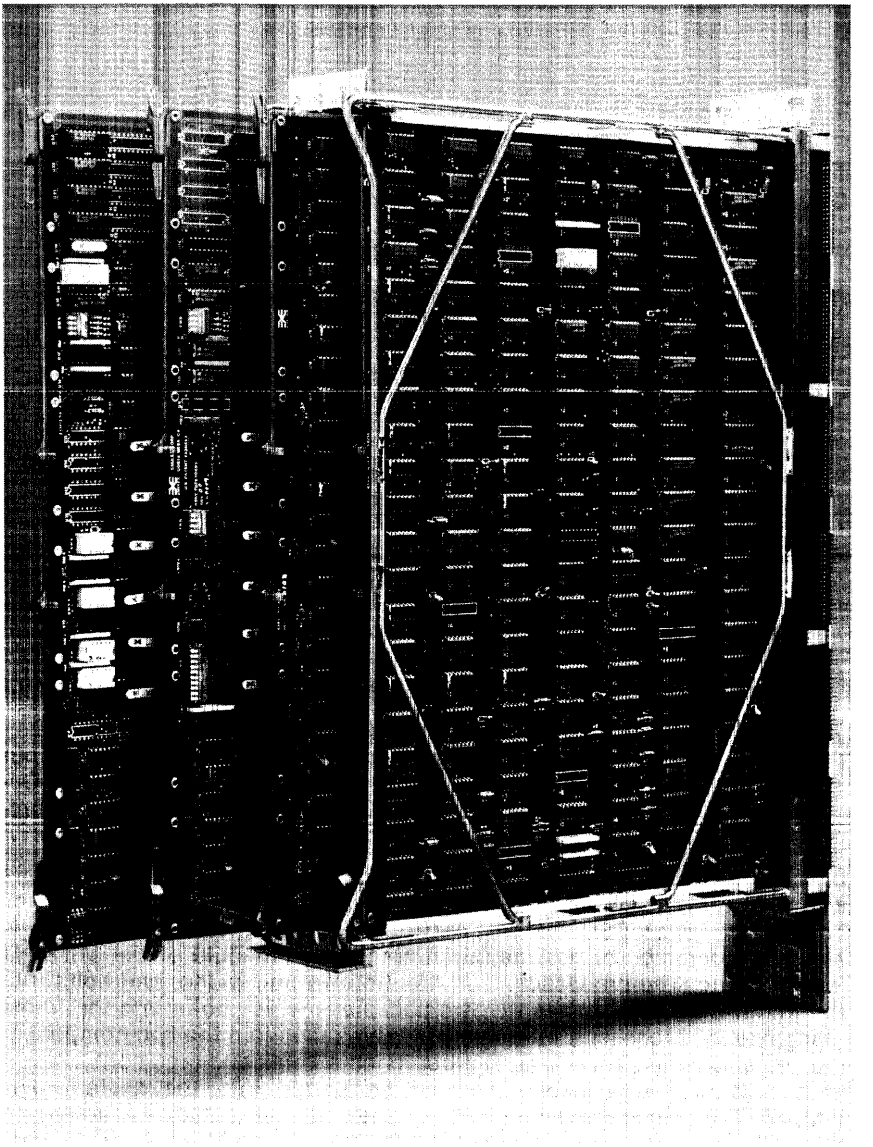


FIGURE 3-9 Emulex V-MASTER/780

which includes built-in disk formatting and the ability to operate with a mix of standard and non-standard drive types and capacities.

Model SC7000/B1 provides concurrent emulation of an RM03 (67.4 MByte), RM05 (256.2 MByte), and/or RM80 (124.6 MByte). Another disk controller,

the Model SC780/B2 provides emulation of DEC's RP06 (174.4 MByte) removable Massbus disk subsystem.

Appendix J gives detailed information on the overall concept, features and specifications of the V-MASTER Mass Storage Adapter. See Tables SC7000/B1 and SC780/B2 for information on the drives and software supported by these specific emulations. Also, Section III gives further details on the V-MASTER, SC7000, SC780 and their application in the VAX-11/780 environment.

The SC788 disk controller has been announced for use within the V-Master chassis. Each SC788 controls up to eight disk drives. Thus, a user may control up to 16 disk drives by employing two SC788's within the two V-Master/788 controller slot locations of the V-Master chassis.

A standard version of the SC788 emulates the DEC RH780 MBA with attached RM03, RM05, and/or RM80 drives, and operate transparently to VAX/VMS operating system and DEC diagnostics.

Users are urged to discuss their specific application requirements with Emulex Applications Engineers for the most optimum use of this product.

Appendix K gives detailed specifications of the Model SC788.

UC01

For the LSI-11, 11/2 and 11/23. Packaged on a single quad-sized PC board which plugs into a standard QBus backplane, the UC01 emulating host adapter is designed to interface the Small Computer System Interface

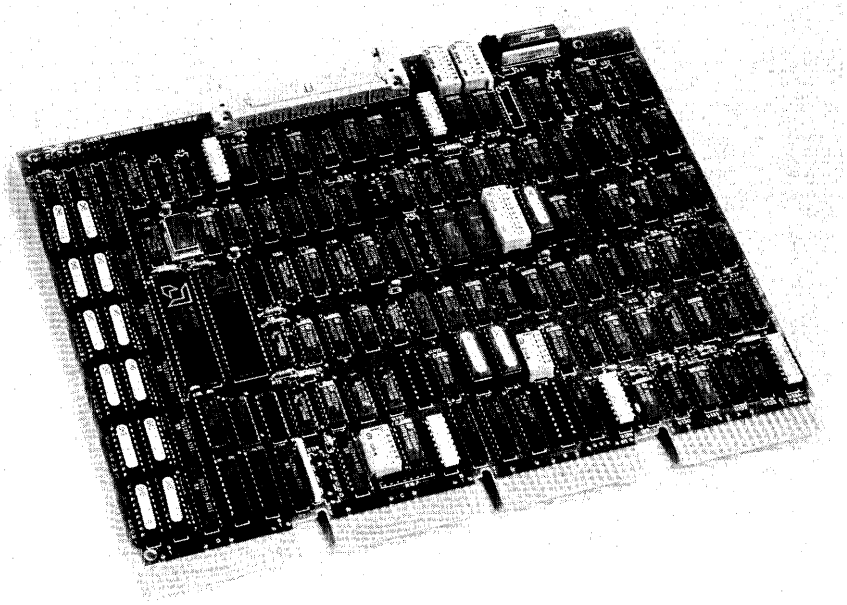


FIGURE 3-10 Emulex UC01 Series

(SCSI), which meets the ANSI X3T9.2 specification, to the DEC LSI-11 computer. The UC01 emulates the RLV11/RLV12 controller combined with multiple RL01 and RL02 disk drives to allow use of disk controllers which communicate via the SCSI Bus.

A significant feature of the UC01 is its support of 22-bit addressing, which provides the capability to address the full 4 MByte memory capacity available on DEC LSI-11/23 PLUS. The UC01 has an additional unique feature of emulating two controller register sets on a single quad-sized board. The present configuration supports 4 RL01/RL02 drives on each of the register sets, thereby providing a maximum capability to support 8 RL01 or RL02 equivalent drives. This feature allows users to support from 1 to 8 drives thru a single UC01 host adapter.

For added economy, built-in clock control and optional 512 word bootstrap and bus terminators allow users to eliminate a separate board (such as a BDV11) from the system.

Appendix L details the features and specifications of the UC01 emulating host adapter.

UC02

For the LSI-11 through 11/23 PLUS, 11/73, and MICRO/PDP-11. Packaged on a single quad-sized PC board which plugs into a standard QBus slot, the UC02 emulating host adapter is designed to interface the SCSI to the QBus. The UC02 utilizes the Mass Storage Control Protocol

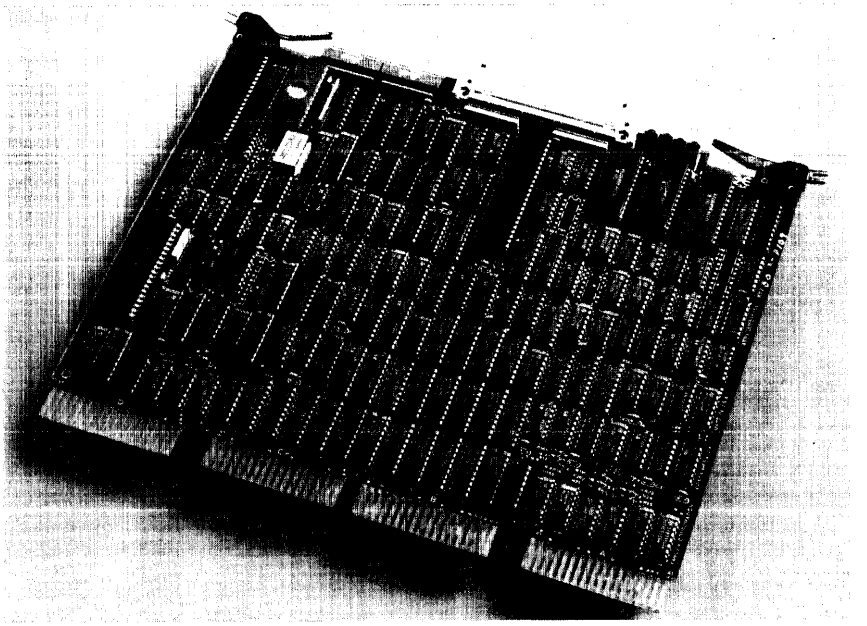


FIGURE 3-11 Emulex UC02 Series

(MSCP). This flexible protocol allows the operating system to utilize the precise characteristics of the Winchester disk drive without patches or modifications to the operating system.

The UC02 provides full 22-bit addressing to utilize the 4 MByte memory capacity of the LSI-11/23 PLUS, MICRO/PDP-11, and MICRO/VAX. Other features include command stacking, seek ordering, error control, and block mode DMA.

Appendix M details the features and specifications of the UC02 emulating host adapter.

UC12

For the PDP-11/04 through 11/70 and VAX-11/730 through 11/780 Unibus. The UC12 emulating host adapter is packaged on a single hex-sized PC board which plugs directly into a standard Unibus slot. The UC12 utilizes the Mass Storage Control Protocol (MSCP), and acts as an intelligent interface between the SCSI subsystem and Unibus of the CPU.

Significant features of the UC12 include self-sizing, command stacking capability, error control, and seek ordering.

Appendix M gives more details on the features and specifications of the Model UC12.

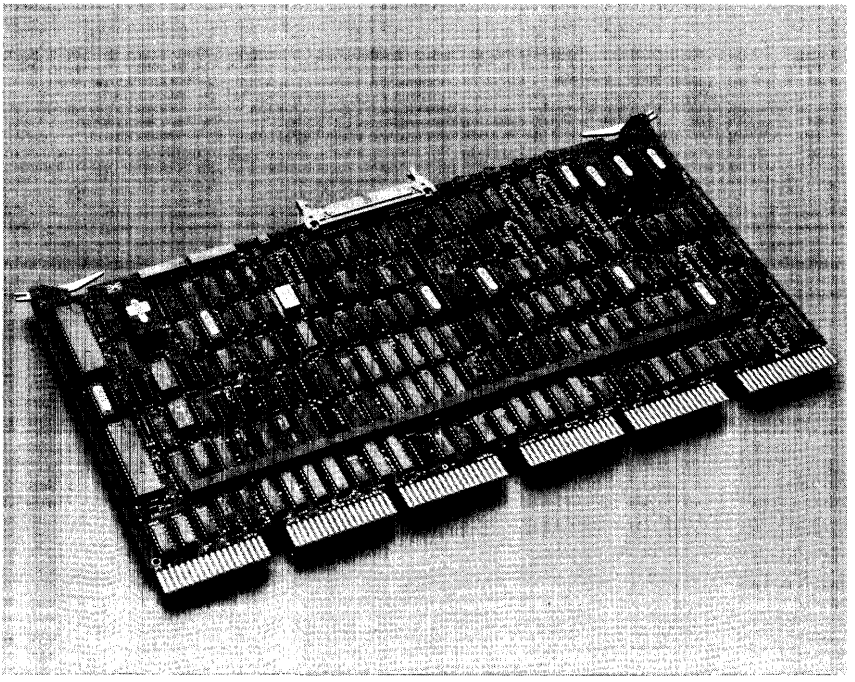


FIGURE 3-12 Emulex UC12 Series

SPE 44

SMD Port Expander for LSI-11, PDP-11 and VAX-11 Series. The SPE 44 is a truly unique electronic switching unit which provides the capability of interfacing multiple DEC CPUs to a single bank of up to four SMD-compatible disk drives. By employing a combination of multiple Emulex controllers, port expander units and dual ported drives, the DEC user can achieve shared storage access and system backup capabilities previously not possible.

The SPE 44 is offered in a single model which can interface to any DEC LSI-11, PDP-11 or VAX-11 CPU with the appropriate Emulex controller and any SMD-compatible disk drive. The SPE 44 operates transparently to operating system software that supports dual access or dual port operation. The Port Expander is housed in a chassis which can be slide rail mounted in a standard cabinet.

Appendix N gives more detail on the features and specifications of the Model SPE 44.

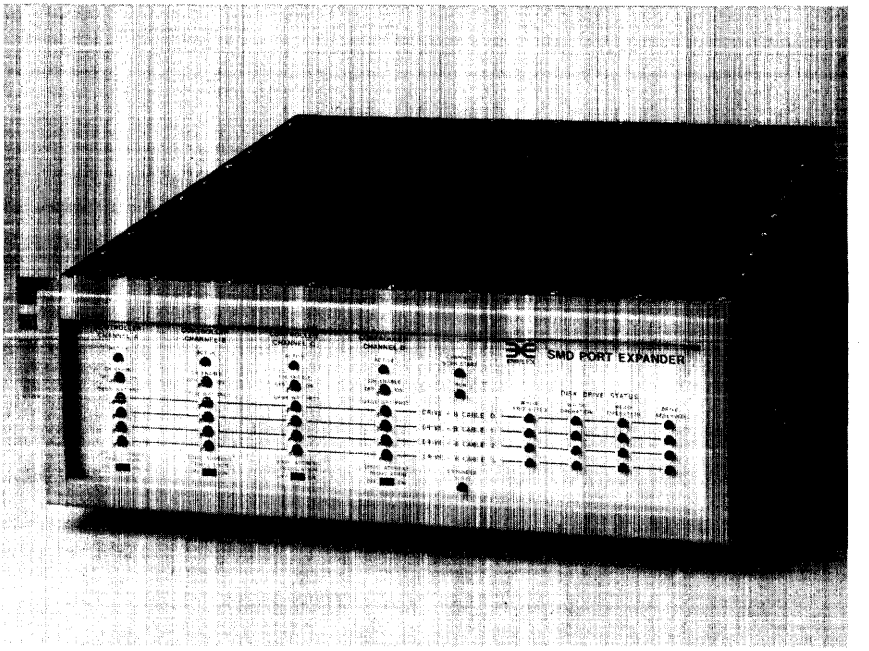


FIGURE 3-13 Emulex SPE 44

MICROCODE VERSIONS

There are four basic microcode models—designated Models A, B, C, and L –which correspond to an existing DEC controller design. In the original SCXX controller designs - SC01, SC11 and SC70 - the basic models have multiple microcode versions which handle the different disk drive con-

figurations supported by the controller. In principal, each of these models/versions could be provided on any of the controller hardware designs. All possibilities have not been implemented for practical reasons. Any disk controller may be reconfigured to any model/version by changing only the microcode PROM chips.

In the later Emulex controller designs - SC02, SC03, SC12, SC2I, SC3I, SC71, SC72, SC750, SC758, SC788, SC7000 - the same basic models (A, B, C, L) are provided, but drive configuration is accomplished by means of a configuration PROM and option switches on the board. Therefore, different operating modes required to adapt the controller to a drive is inherent to the microcode for each model, and different PROM sets are not required to support different drive types.

Model A
Emulates the DEC RP11E controller. The RP11 controller is an early design, no longer in production since the drives it supported (RP02, RP03) are obsolete by today's standards. Functionally, however, this model has a number of distinct advantages which make it particularly attractive:

It is supported by RT11 and is therefore directly useful in most existing LSI-11 installations;

It is a simpler architecture than other models, and users with custom operating systems can easily write supporting software drivers;

It is well suited to many smaller disk drives which fit nicely within the RP02 (2I MB) or RP03 (42 MB) logical capacities;

The RP11 controller architecture permits physical sectors on the disk to be arranged in any order by software and thus permits a sector interlace scheme to be set up by the application program. This could be useful in a heavy loaded and/or slow bus system (such as an LSI-11);

Header CRC and 32-bit ECC code capability is included in the SCXX/A, and the controller is set up to make error corrections transparent to the software. Error flagging is still accomplished so that the software can perform its usual error logging function.

The Model A is applicable to almost all LSI-11, 11/2 and 11/23 installation regardless of the disk drive. There is no practical application of this model for drives greater than 80 MBytes (or 96 MBytes for a CMD type drive); therefore Emulex does not support this model on the SC21, SC31, SC70/71/72, or SC750/SC780/SC7000 controllers.

Model B
Emulates the more modern DEC RH11 (PDP-11/04 through 11/60), RH70 (PDP-11/70), or RH750 Massbus Adapter with disk drives and DCL. Note that the Massbus Adapters interface to the Unibus and to an internal memory bus to create an external Massbus which goes to the so-called Massbus peripherals - RM02/03, RM05, RM80, and RP06. (Refer to Figure 2-2.)

The embedded RH11 and RH70 interfaces contain only a small part of the total controller hardware. The majority of the controller hardware is distri-

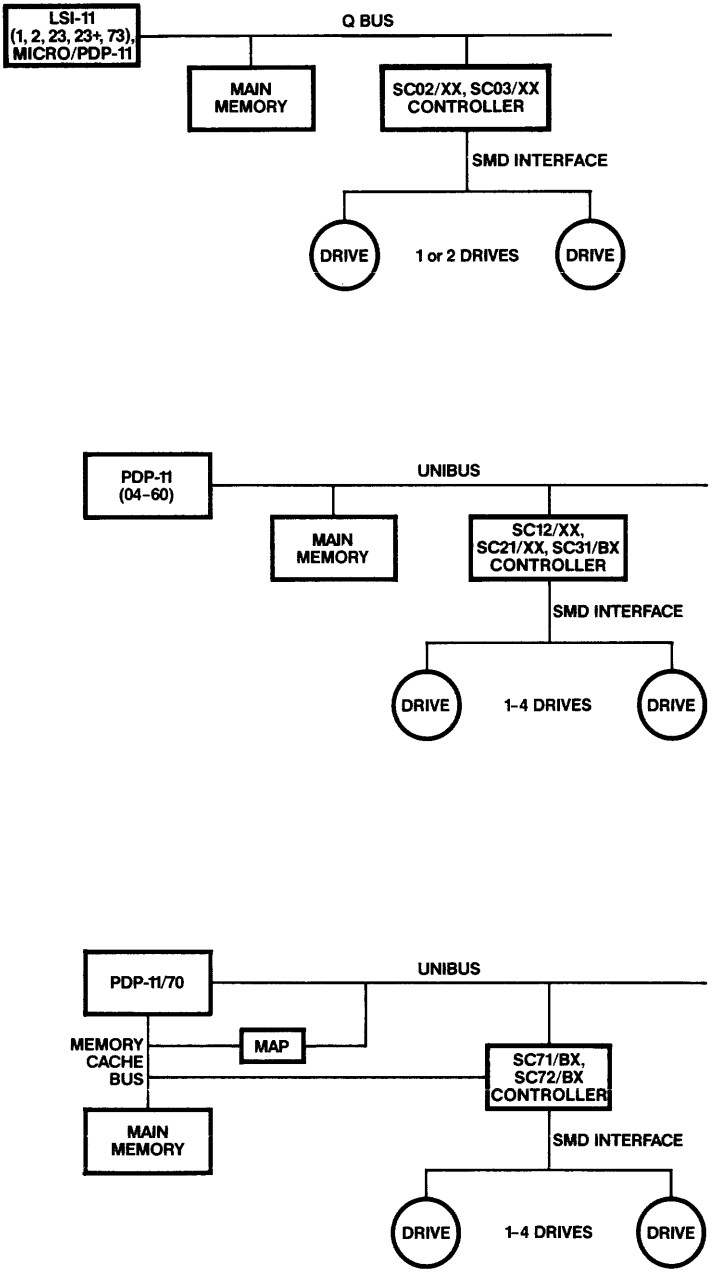
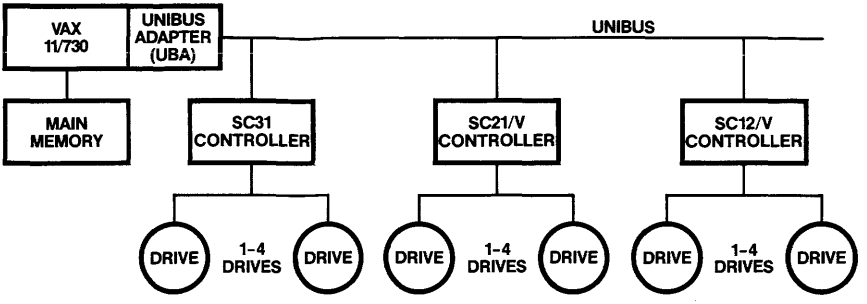
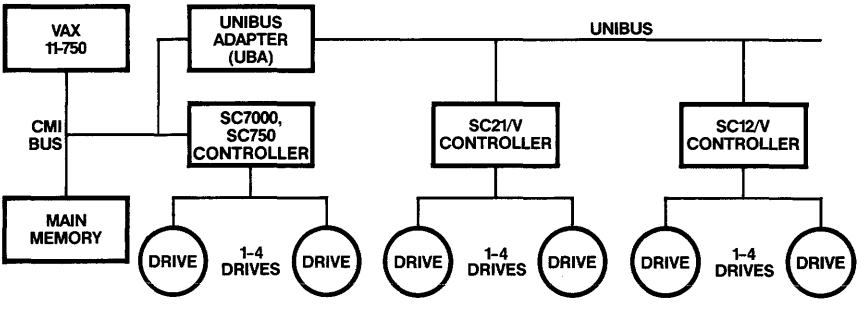
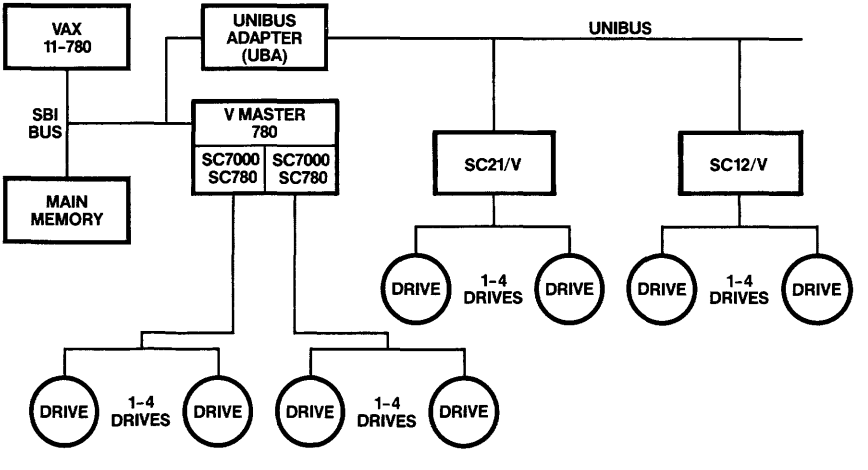


FIGURE 3-14 SCXX Controller Subsystems


VAX 11/730
UNIBUS ADAPTER (UBA)
UNIBUS
MAIN MEMORY
SC31 CONTROLLER
SC21/V CONTROLLER
SC12/V CONTROLLER
DRIVE
1-4 DRIVES
DRIVE
DRIVE
1-4 DRIVES
DRIVE
DRIVE
1-4 DRIVES
DRIVE


VAX 11-750
UNIBUS ADAPTER (UBA)
UNIBUS
CMI BUS
SC7000, SC750 CONTROLLER
SC21/V CONTROLLER
SC12/V CONTROLLER
MAIN MEMORY
DRIVE
1-4 DRIVES
DRIVE
DRIVE
1-4 DRIVES
DRIVE
DRIVE
1-4 DRIVES
DRIVE


VAX 11-780
UNIBUS ADAPTER (UBA)
UNIBUS
SBI BUS
V MASTER 780
SC7000 SC780
SC7000 SC780
SC21/V
SC12/V
MAIN MEMORY
DRIVE
1-4 DRIVES
DRIVE
DRIVE
1-4 DRIVES
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1-4 DRIVES
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DRIVE

buted physically in each Massbus-type drive. Therefore, each time a DEC Massbus drive is added, a large portion of the control logic is duplicated. (Add-on DEC drives cost almost as much as the first drive and controller).

The SCXX/B does not create a Massbus per se. It functionally emulates, and therefore replaces, the entire Massbus subsystem. The SCXX/B controls multiple drives without adding duplicate hardware, and the cost differential compared to a DEC subsystem further improves in multi-drive installations. Figure 2-14 shows the organization of SCXX controllers which emulate Massbus operation.

The B model is particularly attractive to the CDC 9762 or an equivalent (80 MB), CDC 9730 (160 MB), CDC 9766 or equivalent (300 MB), and Memorex 677 (200 MB) users. The DEC RM02/03, RM05, and RP06 subsystems are, in fact, versions of the CDC 9762, CDC 9766, and Memorex 677 drives, respectively. The Model B emulation is, therefore, an exact replica of those disk subsystems.

The SCXX/B emulation furthermore offers media compatibility with DEC RM02/03, RM05, and RP06 packs when used with CDC-compatible 80 and 300 MByte SMD drives, or Memorex 677 drives, respectively. The SCXX/B also provides a number of enhancements which may also prove to be important.

In addition the Model B controller supports dual-port drive operations by separate controllers and the Model A does not. Thus, the Model B is required for applications that call for dual-port capability (note: current DEC software does not support dual port operations, and custom drivers are required). The Model B is the only controller model which can reasonably support drives above 80 MBytes since DEC has offered these capacities only on the RH11/RH70/RH750/RH780 Massbus Adapters. Therefore, users who someday plan to use very large capacity drives should consider the B Model. In the LSI-11 area, users should use the 11/23 and RSX11M to incorporate the larger drives (above 80 MB) or plan to support their own drivers and/or operating system.

A 300 MByte drive today is generally more cost-effective than a 200 MByte drive, since the only difference is the bit packing density (4000 vs. 6000) and there is very little cost difference for the extra 100 MBytes. However, the standard DEC RP06 is 175 MB formatted on a 200 MB drive, and a software "patch" is needed to expand the drive size parameters in the software drivers to fully utilize a 300 MB capacity. The SCXX/B offers switch option configurations which permit a 300 MB drive to be operated either as an expanded RM02/03 (19 tracks vs. 5) or RP06 (32 sectors vs. 22). DEC has announced a 300 MB system, designated the RM05, which corresponds to the SCXX/B1 expanded versions, (i.e., the 19 track RM02/03). (Note: RM05 drivers have been offered in VMS, RSX11M-PLUS, RSTS/E, and RSX11M. Hopefully these will also be made available in other operating systems).

Model C

Emulates the DEC RK611 controller with RK06 and RK07 disk drives having 13.9 and 27.5 MByte formatted capacities. This model is particularly useful in support of the fixed/removable drive configuration (e.g., CDC 9448,

Ampex DFR 900). Formatting of this type of drive requires that a logical unit be mapped onto each data surface of the drive to permit complete logical blocks to be transferred between the fixed surfaces and the removable cartridge. Since the 13.9 MByte RK06 formatted capacity fits exactly on a single surface, users may run standard drivers without size parameter modification. In addition, the RK611 is supported under current versions of RT11, RSX11M, RSTS-E, and VMS, meaning standard software is available across all VAX/PDP/LSI-11 models.

It should be pointed out that the media of these drives is not interchangeable with the DEC RK06/RK07. The CDC and Ampex packs are also not physically interchangeable. Users are cautioned that these drives do not serve as an RK06/RK07 replacement in situations where DEC software interchangeability, via this media, is a requirement.

DEC RK07 drives are not emulated on the SC01, SC11, or SC21 controller.

This model is not applicable to the SC71 or SC72 since the RK06/07 is a Unibus device. However, the SC11/C, SC12/C, or SC2I/C may be run on the 11/70 Unibus with full software support (unmodified) in DEC operating systems. To achieve RK06/07 emulation with software transparency to DEC's VMS on VAX-11 computers, the SC12/V should be used.

Model L

Emulates the DEC RL11 controller and RL01/02 disk drive which has a formatted capacity of 5.1 and 10.2 MBytes, respectively. This model is provided specifically to support small capacity drives, primarily 8". The RL emulation is very convenient because it is supported universally across the LSI-11 and PDP-11 product lines. The RL emulation suffers some performance limitations compared to other models because of burdens placed on supporting drives. Also, the maximum RL subsystem capacity is 40 MBytes which is too restrictive for many applications. A major advantage of the RL emulation is in its ability to utilize standard DEC software written to support the full 22-bit memory address range (4 MBytes) of the recently-announced LSI-11/23 PLUS. This is presently the only hard disk supported by DEC on this expanded addressing range machine.

Model M

Emulates the DEC Mass Storage Control Protocol (MSCP), DEC's new approach to mass storage data handling. This model is provided primarily to support 5-1/4" disk drives of various capacities. The MSCP supports virtually any drive capacity, and thus provides limitless possibilities for storage expansion on the QBus or Unibus.

One of the major benefits of the MSCP is its flexibility. MSCP allows standard DEC operating systems to utilize the precise characteristics of the disk drives without patches or modifications to the operating system. The host CPU is provided with the specific characteristics of the attached drives. This information includes the number of drives and their sizes, including block size, number of surfaces, sectors per track, etc. Under MSCP, the operating system is very flexible and adjusts according to the drive characteristics reported to it. A single driver is able to handle the variations

in disk drives, i.e., the operating system does not have to be modified every time the drive is changed.

The Emulex host adapters which support MSCP incorporate the feature of seek optimization. The host adapters are able to buffer up to 13 commands and determine the most efficient order of execution. This is an especially important feature in heavily loaded systems. This ability to arrange seeks in the optimum order can save a great deal of time and make the entire system more efficient.

MSCP is also unique in its handling of errors. This protocol simulates error-free media by never reporting routine errors to the host CPU. When an error is encountered, an attempt is made to correct is, and only uncorrectable errors are reported to host. This feature provides a significant savings in CPU overhead normally associated with error detection and correction.

The Model M is supported only on the UC02 and UC12 emulating host adapters. Additional information on MSCP and its applications can be found in the Emulex *Micro-Products Handbook.*

CHAPTER 4
SOFTWARE CONSIDERATIONS

For Unibus-oriented (PDP-11/04 through 11/60), QBus-oriented (LSI-11, 11/2, 11/23, 11/23 PLUS), and 11/70 machines, the standard SCXX products are made to look functionally like the DEC controller they emulate (plus, of course, the enhancement features which may or may not be used). Every microcode version is also designed to execute the associated DEC diagnostics as a further test and proof of its software transparency. This design philosophy is of major benefit to users for a number of reasons. The most significant is that special drivers do not have to be written to use an Emulex controller with operating software written for a standard DEC controller. The user, therefore, is relieved of writing his own software.

A fundamental design philosophy in all Emulex controllers designed for software transparency, is to extend the design compatibility to include execution of the standard DEC diagnostics as well as the system operating software. This principle requires extra effort in the design phase and extra hardware in the controller; but, this discipline gives a much higher level of confidence in achieving true software transparency and protection against future software revisions which might find new "holes" in the emulation.

In addition, new emulation versions can be created without requiring implementation of a whole new diagnostic package, a fact which can be of immense benefit to a user who later needs adaptation of his controllers to a new or revised application requirement.

A factor which may influence controller model and/or disk drive selection is the fact that there is not an exact replica of a DEC disk subsystem for every possible version of controller and type of disk drive which can be handled by the versions of the SCXX series. Therefore, many such combinations do not exactly conform to the same logical size definition of the baseline DEC unit. For example, when a certain drive provides greater potential capacity, it is desirable to use it; conversely, for a drive having smaller capacity, software access must be limited to the physical drive size to avoid undesired software "crashes".

For example, the SC21/B2 may be run as a standard 22-sector RP06 (174.4 MB), or as an expanded 32-sector RP06 (253.7 MB) unit. The latter selection is desirable when using a 300 MB (vs. a 200 MB) drive. However, the software driver has certain numerical values which must be redefined in the operating system to permit access to this increased capacity. The basic requirement is to "patch" in new maximum data block limits which are converted by the operating system software drivers into the track and sector addresses which match those of the drive being used. This principle applies

to "patching up" for expanded logical sizes. These patches do not modify code sequences in the driver and are generally entered as part of the system generation procedure or into absolute locations later. It should be noted that "patching up" is not always necessary if the additional capacity is not to be used, and "patching up" to expand logical capacity is a routine procedure. The system first brought up with the disk at standard capacity, and then patches are installed as part of a sysgen procedure.

"Patching down" to contract logical drive capacity can be a problem, however, if the disk itself is used as the only system device since the boot operation will usually overrun the smaller drive and cause a system error before the patches can be installed. Therefore, another system device must be available to make use of a patched-down capacity drive.

The specific parameters of patching depend upon such factors as operating system, emulation, and drive type. Emulex supplies these parameters and entry procedures for the most commonly used DEC operating systems. In addition, these same kinds of patches are also necessary in the corresponding diagnostics. The required diagnostic patches for a specific controller version are generated by Emulex as part of the initial development effort, and such modifications are provided to users who have standard diagnostics at their site. Such procedures entail modifications of a limited number of locations. While it may be desirable to stay with a version which requires no patching (e.g., RM02/03), adaptability to a specific application often makes this small effort more than worthwhile.

Emulex currently supports the models SC12/V, SC21/V, and SC31/BX disk controllers on the VAX-11/730, VAX-11/750 and 11/780 Unibus. The SC12/V is an RK07 equivalent and runs under the standard RK07 driver in VMS. However, the larger 80-825 MByte drives, such as RM03's, RM05's, etc., are supported under VMS only as Massbus devices, and the standard drives rely on the hardware memory mapping facilities of the RH750 and RH780 interfaces which are not available to Unibus devices. Hence, the SC21/V and SC31/BX, which are supported on the Unibus, require a driver - supplied by Emulex - to be incorporated in any VAX-11 application. The Emulex driver emulates an RM03, RM05, or RM80 and produces a compatible disk pack to the equivalent DEC media. VMS is structured for easy incorporation of user-supplied drivers, and the original Emulex driver has been used under all published versions of VMS. System generation with the Emulex drivers has proven to be a straightforward procedure.

Considerations for the specific DEC operating systems supported can be found in the following paragraphs. These notes assume some familiarity with the operating systems and discuss only the special points that must be kept in mind when configuring Emulex disks with those systems.

RT11 V5.0

RT11 is a single-user real-time system designed for use with the small-to-medium sized PDP-11 processors. Targeted for use on small systems, RT11 is not designed for use with large mass storage devices, and will not support any Emulex "B" emulations, because it does not include driver soft-

ware for the RP06 or RM02/03/05/80 disks. RT11 does support DEC's new Mass Storage Control Protocol (MSCP).

RT11 V5.0 will not support any disks with a logical size greater than 65536 decimal blocks. It includes RP03 support only by mapping two logical drives onto one physical drive. Though this is similar to the way some of Emulex' controllers remap drives, this is done internally by the operating system, and not the controller. The controller will still look at the drive as one RP03. Between controller remapping and RT11 software remapping, RT11 V5.0 can be patched to handle any of the standard SCXX/AX emulations, using drives of up to 160 megabytes.

RSTS/E V8.0

RSTS/E is a multi-user timesharing system for the medium-to large-sized PDP-11 processors that include memory management. RSTS/E V7.0 has two releases, V7.0-07 (Sysgen level "G"), and V7.0-08 (Sysgen level "H"). The only difference between the two is that V7.0-08 includes support for the RM05 300MB disk. V7.0-07 will support only RM02 and RM03 emulations for DR-type disks. RSTS/E also supports RM05, RM80, and Mass Storage Control Protocol (MSCP).

RSTS/E will support all of the standard SCXX/AX, /BX, and /CX emulations available from Emulex, though some of the /AX and /BX emulations will require patching. Supported patches are available from Emulex (either in the technical documentation or from the software support center) for some of the more common expanded or reduced emulations at no charge. Patches for other emulations can be specially created at a nominal charge.

All patches to RSTS/E must be done when running from the disk; those systems that include a RSTS-supported disk other than the Emulex disk being installed will have no problem, as RSTS can be patched while it is on the standard disk. Customers that run their Emulex subsystem in a DEC-compatible mode will likewise have no patching problems.

Customers that have only a magnetic tape and the Emulex disk controller on their system, and who wish to run in non-standard capacity, will have to go through some extra steps in order to do their sysgen and create a system disk at the expanded capacity. These extra steps are detailed in the patch procedure appendices in the individual controller technical manuals.

RSX11M V4.1

RSX11M is a multiuser, real-time software system designed to run on any PDP-11 processor from the 11/04 through the 11/70. RSX11M V3.2 can use any of the standard SCXX/AX, /BX, and /CX emulations. RM02, RM03, RM05, RM80, and MSCP are supported under this version of the operating system.

As in RSTS, some of the /AX and /BX controllers will require patches to be applied to the operating system, and patches are available for the most popular emulations. As in RSTS, any system that includes the Emulex disk subsystem and at least one other standard disk subsystem will have no problem having patches installed because the patches are installed on the standard disk, and the patched system is used to initialize the Emulex disk. There is only one limitation that arises in the patching scheme: if the ex-

panded or reduced mode would require a geometry change (modifying the number of tracks per cylinder or sectors per track) on any system that has only a tape drive and the Emulex modified disk capacity subsystem, the patch cannot be installed and the disk will have to be run in DEC-compatible mode.

RSX11M-PLUS (+) V2.1

RSX11M-PLUS is an enhanced version of RSX11M, designed to take advantage of the new large-capacity disk drives, especially the advanced features of the PDP-11/44 and 11/70 processors. These are the only processors presently supported. RSX11M+ does not support the RP02/03 or the RK06, (SC11/C, SC21/C, and SC12/C (RK06 emulations only)). The only "C" emulation controller that supports RK07 is the SC12/C. All "B" emulations are supported, as RSX11M+ does allow the use of RP06 and RM02/3/5 disks. As in the other operating systems, any non-standard emulations of these disks will need patching, and patching will require the existence of some standard disk device on the system. If the only devices on the system are a tape drive and the Emulex disk subsystem, and if the patch that would be applied would necessitate a geometry change (modifying the number of tracks per cylinder or sectors per track), the patches cannot be installed and disk will have to be run in DEC-compatible mode.

SECTION II
TAPE CONTROLLERS

CHAPTER 5
DEC TAPE SUBSYSTEMS

TM11/TU10 Tape Subsystem

Functionally, the Emulex TC01 and TC111 tape controllers emulate the DEC TM11 controller which is combined with one or more TU10 transports having the following characteristics (the subsystem is designated TE10):

7/9 Track
200/556/800 bpi
45 ips
10½" (2400 ft.) reel

The TM11 interfaces directly to the Unibus and is supported on all PDP-11/04 through 11/70 CPUs; it is not supported by DEC's VMS on VAX-11/730/750/780 systems.

TS11 Tape Subsystem

The Emulex TC02 and TC12 functionally emulate the DEC TS11 magnetic tape subsystem which consists of a tape transport with integrated formatter and a single hex sized controller board. The TS11 subsystem has the following characteristics:

9 Track
1600 bpi
45 ips
10½" (2400 ft.) reel

The DEC TS11 features diagnostic and software transparency across the entire LSI-11, PDP-11 and VAX-11 CPU lines.

DEC also offers two other Unibus-oriented tape subsystems:

TJE16 - 9 Track, 800 bpi (NRZI) or 800/1600 bpi (Dual Density), 45 ips, Tension Arm, 10½" reel.
TS03 - 9 Track, 800 bpi (NRZI), 12½ ips, Tension Arm, 7" reel.

TM03/TU77 Tape Subsystem

The Emulex TC7000 functionally emulates the DEC RH750 Massbus interface with attached TM03 controller combined with one or more TU77

transports. The TU77 subsystem has the following characteristics:

9 Track
1600 bpi or 800 bpi
125 ips
10½" (2400 ft.) reel

The TU77 subsystem connects to the processor via the Massbus controller/adapter, and is supported by Unibus PDP-11 systems (TJU77 and TWU77), VAX-11/750 systems (TGU77), and VAX-11/780 systems (TEU77). The TU77 subsystem was designed to operate at high speeds in high usage environments.

DEC also offers two other Massbus-adapted tape subsystems:

TJU45 (RH11)	9 Track, 800/1600 or 1600 bpi,
TWU45 (RH70, RH780)	75 ips, Vacuum Column, 10½" reel.

Except for the Massbus peripherals, each tape controller is different. For the Massbus devices, each peripheral has a separate controller/formatter which creates considerable hardware redundancy at no increase in performance.

It should be noted that for the 11/70, DEC usually recommends the TWU45 or TWU77 since data transfers in these subsystems are made directly to/from memory rather than via the Unibus. However, the TE10 is supported on the 11/70 Unibus by all current software operating systems, and performance is usually acceptable for this configuration.

CHAPTER 6
EMULEX TAPE CONTROLLERS/COUPLERS

Emulex currently offers eight distinct tape product lines comprised of tape controllers and tape couplers.

The Models TC01 and TC11 tape controllers are designed to emulate DEC's TU10/TM11 and are for use on the LSI-11 (QBus) and PDP-11 and VAX-11 (Unibus) Series of computers, respectively. The TC01 LSI-11 controller is contained on two quad height boards, one controller/formatter board and one board containing Phase Encoded (PE) demodulation circuitry. The TC11 Unibus controller is contained on a hex height controller/formatter board, plus the same PE board used for the TC01.

These controllers mount directly into a standard backplane or system unit. Since the quad PE board does not interface to the bus, it need not be adjacent to the controller board and often can be located in one of the "free" quad slots at the front or rear of the system unit. The result is an optimum product for the application.

The Models TC02 and TC12 tape couplers are single board tape couplers that emulate DEC's TS11 and handle every industry standard "Pertec" formatted half-inch tape transport, including conventional NRZI/PE start/stop and the 1600/3200/6250 bpi start/stop streaming tape drives. The TC02, for LSI-11 (QBus) CPU's, and the TC12, for PDP-11 and VAX-11 applications, will also interface GCR (6250 bpi) start/stop/streaming transports.

The Model TC13 tape coupler is a single board tape coupler which handles up to four industry-standard 1/2 inch formatted start/stop or streaming tape drives, 1600/3200/6250 bpi, at speeds from 12.5 to 125 ips. The TC13, for PDP-11 and VAX-11 CPU's, provides full emulation of DEC's TS11 subsystems.

The Models TC05 and TC15 tape couplers are single board couplers which emulate DEC's TS11 and interface to the CDC 92192 Sentinel 1/4 inch streaming tape drive. The TC05, for the LSI-11 QBus CPU's, and the TC15, for PDP-11 and VAX-11 Unibus, plug directly into a standard SPC slot and operate transparently to DEC's TS11 subsystem.

The Model TC7000 tape coupler is a single 'extended' hex-size pcb which emulates DEC TM03/TU77 and handles the industry-standard Pertec and STC tape formatter interfaces in the manufacturer's standard configuration. The TC7000 ties directly to the CMI in VAX-11/750 and to the SBI in VAX-11/780 via the Emulex V-Master/780, and can handle any conventional NRZI/PE/GCR tape drive (800/1600/6250 bpi), at speeds from 12.5 to 125 ips.

The following summarizes the basic Emulex tape controller and coupler products and the range of applications presently supported by each. More details on the features and specifications for each controller/coupler is given in the Appendices.

TC01 and TC11 Tape Controllers

The basic TC01/11 tape controller is contained on a single PC board. The TC01 is a quad height board and interfaces to the LSI-11 QBus via the A,B connector rows. The TC11 is a hex height board and interfaces to the Unibus via a standard 4-connector SPC slot. These controller boards perform all tape control and formatting operations for 800 bpi (NRZI) operations. The design incorporates a high-performance microprocessor common to both controllers, an approach which provides many inherent benefits to the user.

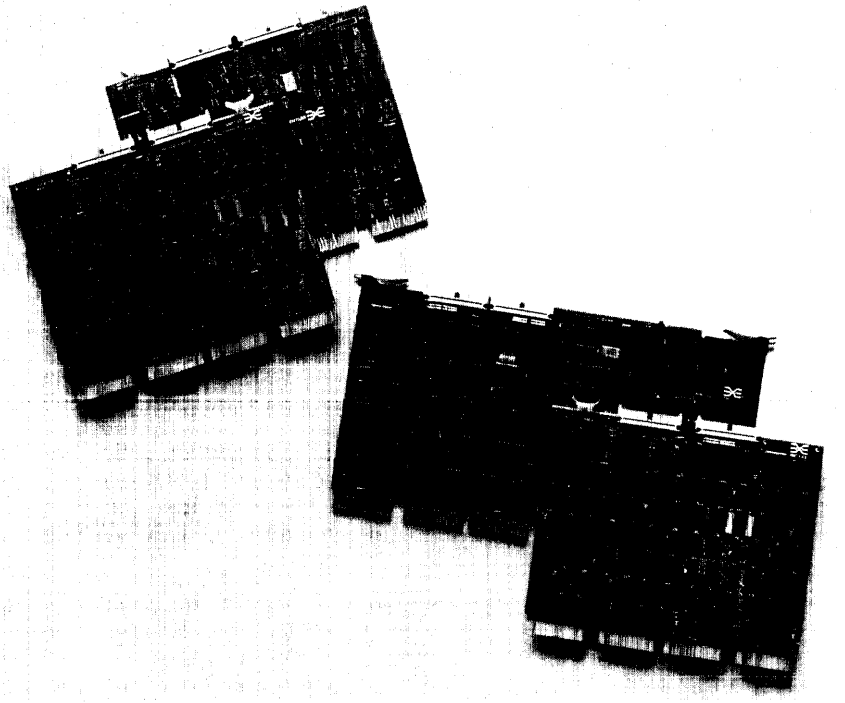


FIGURE 6-1 Emulex TC01 Series **FIGURE 6-2 Emulex TC11 Series**

For handling 1600 bpi (PE) formats, a second quad height board is added. This board is common to both the TC01 and TC11 and contains the PE decode/deskew circuitry for the 9 parallel data channels on the tape. The PE board does not present any load to the bus circuitry except for power and ground connections. A diagram of the tape interconnects is shown in Figure 6-3.

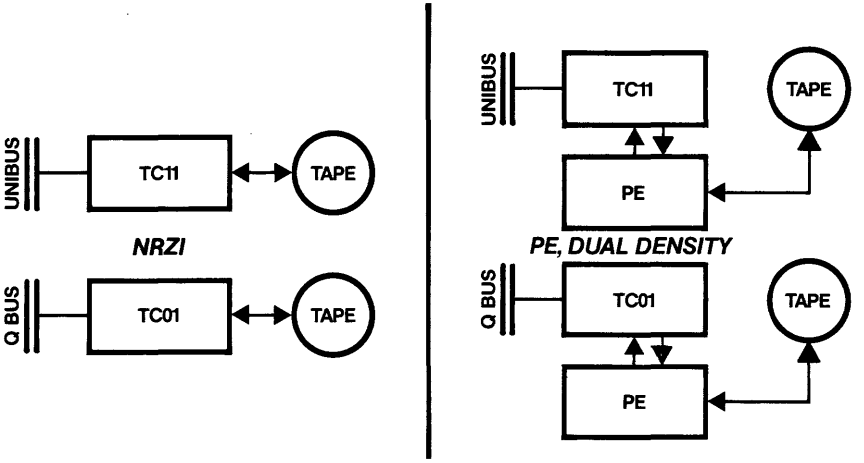


FIGURE 6-3 Tape Controller Interconnects

The PE board may be mounted remotely from the controller board since the two are connected by a soft over-the-top flat cable. This is convenient since there are often "free" quad slots available in backplane locations which contain bus jumpers or other dual height boards in the A and B connectors.

Thus for the PDP-11 Unibus series of DEC computers, Emulex offers a single controller that will handle tape transports having the following ranges:

- 12.5 - 125 ips
- 800, 1600, 800/1600 bpi
- Tension Arm or Vacuum Column
- Any reel size

DEC does not offer an open reel magnetic tape for the LSI-11 series of computers. However, with the TC01 the user may handle any of the same 800,1600, or 800/1600 bpi tapes available on the PDP-11 series. The only difference in performance is that the TC01 can handle speeds of 75 ips maximum (at 1600 bpi) versus the 125 ips capability of the TC11.

The only criteria for interfacing a tape transport to either controller is that it has an industry standard interface (generally referred to as the Pertec interface).

For application on the PDP-11/70, experience has shown that the Massbus interface is usually not needed from a performance standpoint. Many Emulex controllers are successfully installed and operating on the 11/70 with 125 ips tapes. Since the TE10 is supported in this manner by standard software, this approach offers a much more economical system comparable performance to the DEC Massbus tape subsystem.

Appendix O contains a summary of specifications for each of these models. The TC11 may be operated on the VAX Unibus using a software driver supplied by Emulex (refer to Section III for details on Emulex products for the VAX Series).

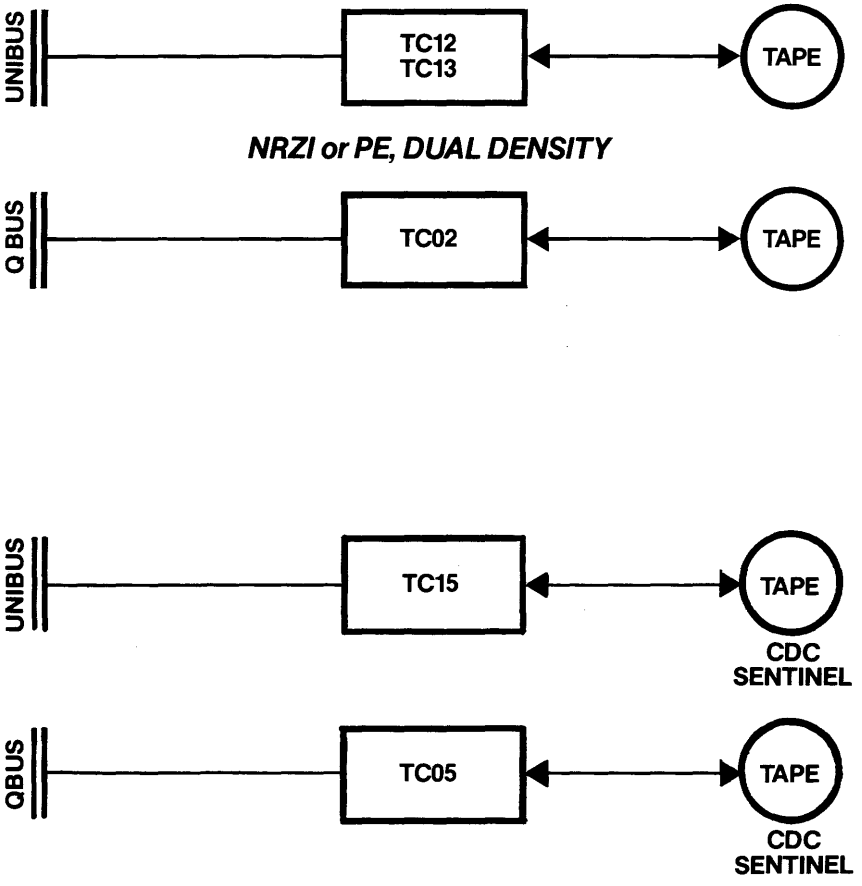


FIGURE 6-4 Tape Coupler Interconnects

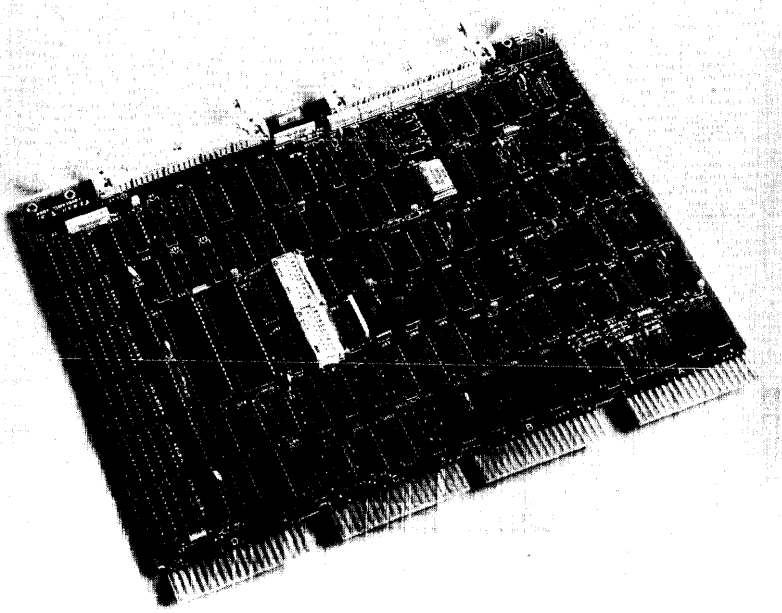


FIGURE 6-5 Emulex TC02 Series

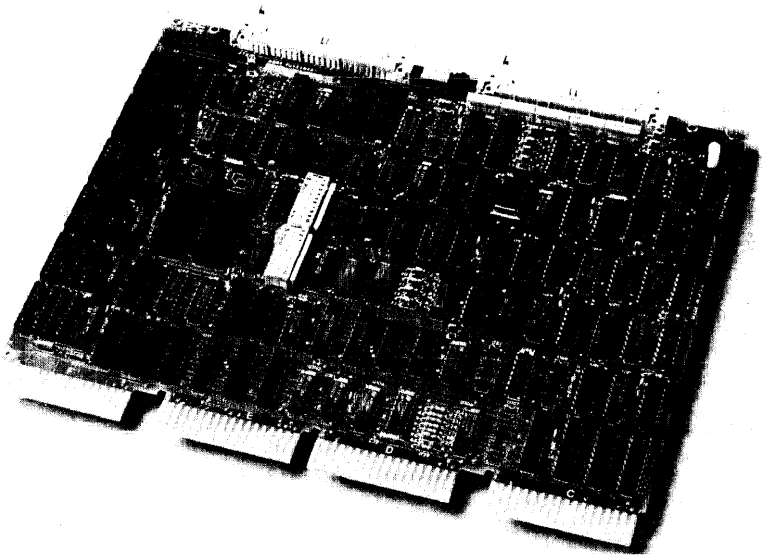


FIGURE 6-6 Emulex TC12 Series

TC02 and TC12 Tape Couplers

The TC02/12 tape couplers are contained on a single quad-sized PC board. The TC02 interfaces to the LSI-11 QBus via the A,B connector rows. The TC12 interfaces to the Unibus of either a PDP-11 or VAX-11 via a standard 4-connector SPC slot. These tape couplers, combined with one to four standard formatted tape drives, emulate all functions of the TS11 subsystem, including standard diagnostic programs. Figure 6-4 is a diagram of the tape coupler interconnects.

The TC02 and TC12 are designed to handle tape data rates up to 250,000 characters per second and operate with high performance transports, including: 1600 bpi at 125 ips; 3200 bpi at 50 ips; and 6250 bpi at 25 ips. The TC02 has full 22-bit QBus hardware for permitting Emulex streaming tape software and/or custom drivers to utilize the full 4 MByte memory capacity of the LSI-11/23 PLUS or the 11/73.

Appendix P contains a summary of specifications for each of these models. See Section III for details on this and other Emulex VAX products.

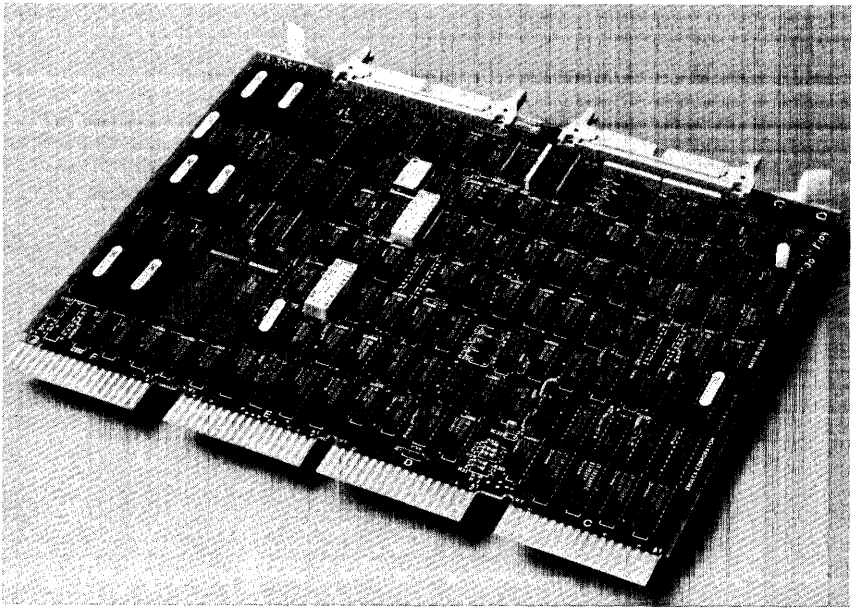


FIGURE 6-7 Emulex TC13 Series

TC13 Tape Coupler

The TC13 tape coupler is contained on a single quad-size pcb which interfaces to the PDP-11 or VAX-11 Unibus. The TC13 handles up to four industry-standard 1/2-inch, formatted, start/stop or streaming drives with a Pertec interface. This coupler emulates all functions of the DEC TS11 subsystem, including operating system and diagnostics. The TC13 supports NRZI, PE, or GCR type drives (800/1600/6250 bpi), at speeds from 12.5 to 125 ips. Other

features include handling of data rates up to 781 KBytes characters per second, and a 3.5 KByte data buffer.

Appendix Q gives details and specifications for the TC13. Also see the VAX section for more information on this and other Emulex products for the VAX Series.

TC05 and TC15 Tape Couplers

The TC05 (for the LSI-11 QBus) and the TC15 (for PDP-11 and VAX-11 Unibus) tape couplers are each packaged on a single quad-size pcb which mounts directly in any available SPC slot in the CPU. Combined with the CDC Sentinel 1/4-inch tape cartridge streaming tape drive, the TC05 and TC15 couplers emulate all function of the DEC TS11 subsystem, including execution of standard operating system and diagnostic software.

Features of the TC05 and TC15 tape couplers include internal self-tests, 22-bit addressing hardware on the TC05 to permit software to utilize the 4 MByte memory capacity of the LSI-11/23 PLUS or the 11/73, and a 3.5 KByte data buffer.

Appendix R provides detailed specifications for both the TC05 and the TC15. The TC15 may also be operated on the VAX Unibus (See Section III for details on this and other VAX products).

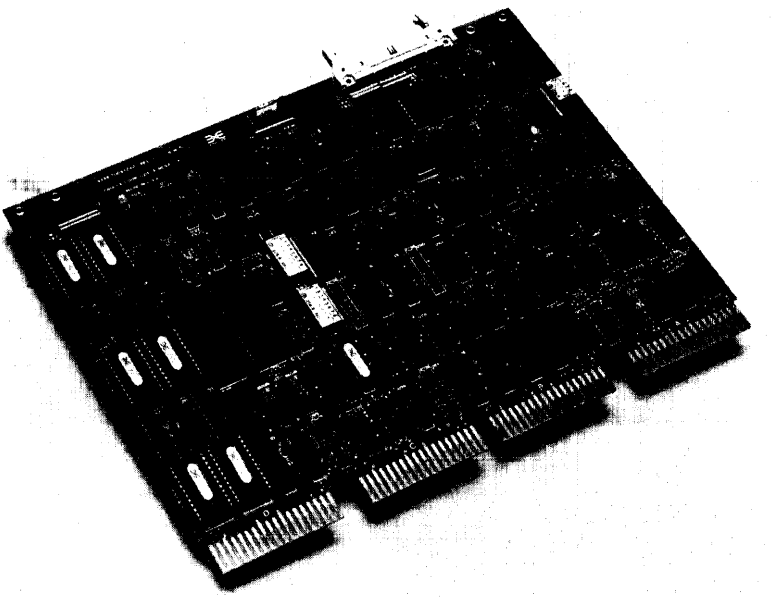


FIGURE 6-8 Emulex TC05 Series

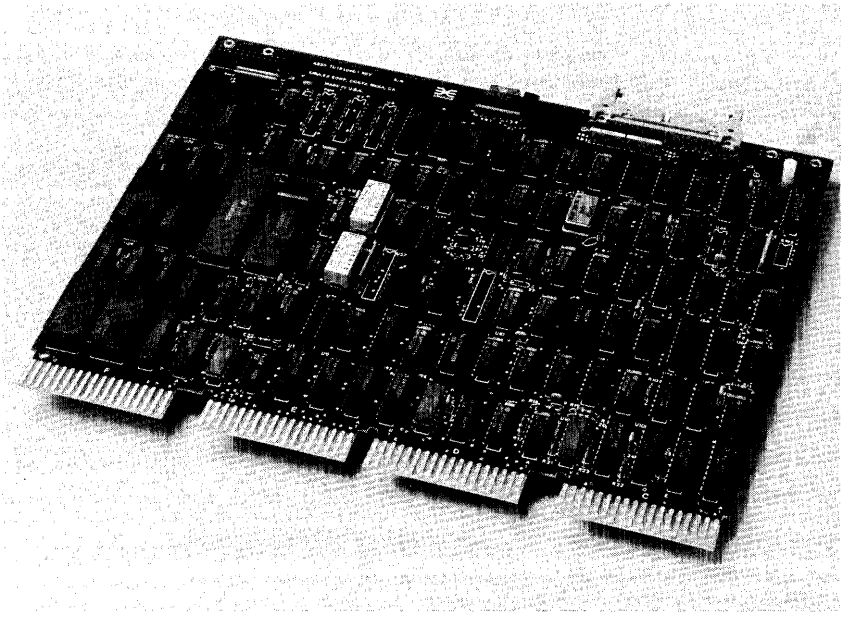


FIGURE 6-9 Emulex TC15 Series

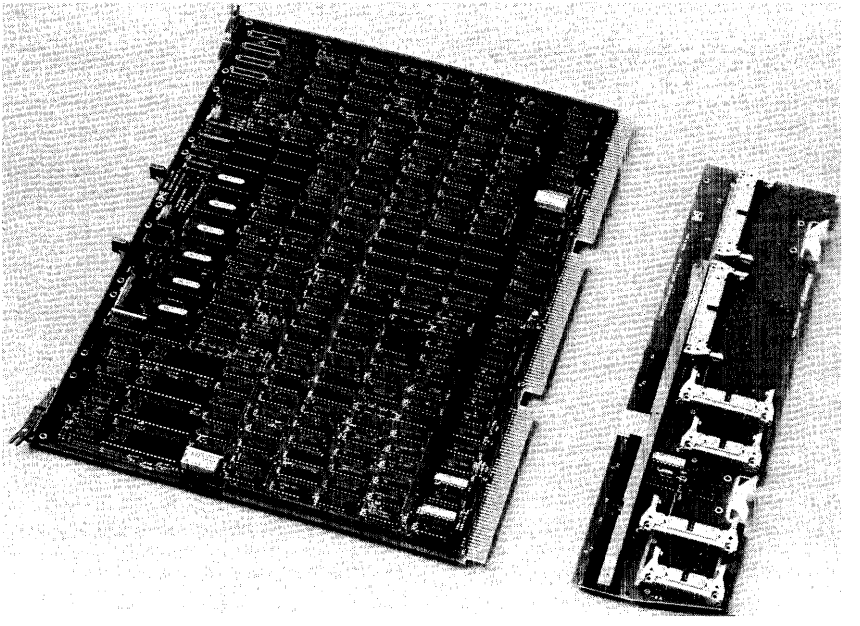


FIGURE 6-10 Emulex TC7000 Series

TC7000 Series

The TC7000 tape coupler is contained on a single "extended" hex-size pcb. The TC7000 interfaces to the CMI Bus of the VAX-11/750 or the SBI Bus of the VAX-11/780 via the Emulex V-Master/780. One TC7000 can be operated in either the VAX-11/750 or Emulex V-Master, simply by flipping a switch. This coupler can handle up to four STC or up to eight Pertec-compatible drives, GCR, PE, or NRZI format, at speeds ranging from 12.5 to 125 ips. Slide switches on the board provide convenient selection of drive type, priority level, bus address range, interrupt vector, and configuration/functional options. The TC7000 operates transparently to DEC TGU77 and TEU77 subsystems, including execution of standard diagnostic and operating software.

Appendix S provides a summary of the features and specifications of the TC7000 tape coupler. Refer to Section III for details on Emulex products for the VAX Series.

CHAPTER 7
TAPE PRODUCTS: FEATURES AND ADVANTAGES

Emulex tape controllers and tape couplers represent the most advanced, modern design architecture available today. These controllers, now fully proven in hundreds of installations and available in production quantities, offer more features and advantages than any other products on the market. The following is an informal review of these advantages.

Packaging

Packaging is an important benefit of the Emulex tape controllers and couplers because:

An external "boat anchor" or multi-board wired system unit is eliminated. Standard backplane slots are used.

Fewer parts and no special backplane wiring provide greater inherent reliability.

In the case of the TC01 and TC11, controller and PE boards need not be in adjacent slots, and the PE needs only power and ground. This can be handy in making full use of available slots. There are often "free" quad slots available in PDP-11 backplanes. And in the 11/70, the PE board can go into an empty RH70 interface slot instead of a Unibus SPC. Since there are only four SPC slots provided, a complete expansion box may be eliminated in some cases.

Self-Test

Only a microprocessor-based controller/coupler can reasonably offer this important and very useful feature. All Emulex tape products incorporate extensive self-test microcode, with the following tests all performed upon unit power-up:

Microprocessor—instructions, sequencer, control memory, etc.

Write Clock time base.

10 KHz maintenance timer.

DMA transfers over Unibus (data and control circuits).

PE Read logic—simulated records transferred with variable data patterns and bad tracks; received data is monitored, (pre and post-ambles are detected and all status bits are checked).

Errors found during self-test are flagged to board level by LED error lamps. Also, an activity LED indicates normal operation.

The advantages of this kind of controller/coupler verification should be obvious. Usually a suspected controller problem can be confirmed or eliminated over the telephone.

Software and Diagnostic Transparency

The **TM11/TU10** emulation is supported by DEC operating and diagnostic software on the PDP-11 and LSI-11 series. Emulex TC01 and TC11 tape controllers offer a variety of features not found in DEC controllers/formatters:

The controllers handle odd byte count and odd byte starting location whereas certain other controllers do not perform these functions.

The PE mode is handled in a completely transparent manner to DEC software. This is essential because the DEC TU10 is an NRZI (200/556/800 bpi) unit only. The TC01/TC11 have a provision for software density select, but the drive select switch will override software control in the PE mode. This avoids any need to modify standard software.

The controllers have the same blank tape timeout feature (about 15 ft.) as the DEC TM11. This prevents tape runaway, and also satisfies a DEC diagnostic test for this feature.

There is a special non-standard way the TM11 handles the tape mark. Controllers which do not handle this non-standard function properly will cause system failure under certain operating systems.

The TC01/TC11 generate both CRC and LRC in the PE mode to satisfy diagnostic checks (LRC is not used in PE, but the standard diagnostics assume the system is NRZI and look for the LRC).

The **TS11** emulation is supported by DEC operating and diagnostic software across the LSI-11, PDP-11 and VAX-11 CPU's. Emulex TC02/12, TC13, and TC05/15 tape couplers offer a variety of features not found in DEC TS11 controllers/formatters:

The DEC TS11 operates at 1600 bpi/45 ips only. The TC02, TC12, and TC13 permit operation at a wide range of densities (800, 1600, 3200, 6250 bpi) and tape speeds (12.5 to 125 ips). The TC05 and TC15 operate with the CDC Sentinel at 8000 bpi, 55 ips.

DEC's TS11 supports only 1600 bpi on conventional NRZI/PE start/stop tape transports. The TC02, TC12, and TC13 support all industry compatible, half-inch formatted tape drives--including conventional NRZI/PE start/stop; 1600/3200 bpi start/stop streaming; and the new breed of low-cost GCR (6250 bpi) start/stop/streaming transports coming soon from the leading independent manufacturers. The TC05 and TC15 support the CDC Sentinel 1/4-inch streaming tape drive.

The **TM03/TU77** emulation is supported by DEC operating and diagnostic software across the PDP-11 and VAX-11/750 and 11/780 CPU's. Emulex TC7000 tape coupler offers a variety of features not found in DEC controllers/formatters:

The DEC TU77 operates at 800 or 1600 bpi/125 ips only. The TC7000 permits operation at a wide range of densities (800, 1600, 6250 bpi) and tape speeds (12.5 to 125 ips).

DEC TU77 supports only conventional 800 bpi NRZI or 1600 bpi PE start/stop tape transports. The TC7000 supports all industry-compatible half-inch NRZI, PE, or GCR start/stop or streaming tape drives.

The DEC TU77 is expandable up to four tape transports per subsystem. The TC7000 can handle up to four STC or up to eight Pertec-compatible drives in one system.

Performance

Emulex tape controllers/couplers support full range performance of conventional tape drives from 12.5-125 ips (75 ips for the TC01) at densities of 800 and 1600 bpi. The TC12, TC13, and TC7000 also support the new low-cost GCR-type drives having a density of 6250 bpi. The TC05 and TC15, in interfacing to the CDC Sentinel, handle a density of 8000 bpi at 55 ips. The units also transfer full 16-bit words, not bytes, via DMA. Several other controllers transfer bytes, and that means lower system performance. For example, at 1600 bpi/l25 ips, the data rate is 100 Kw/s or 200 Kb/s. With a 1-us memory, the full-word DMA transfers use 10 percent of total bus bandwidth. On a byte basis, the tape controller consumes 20 percent. This level of activity may have serious impact on heavily-loaded systems.

Convenience and Utility

No other controllers/couplers offer the same overall degreé of convenience, utility, and flexibility as the TCXX Series. For example:

Speed of operation is selectable by option switches in the range from 12.5-125 ips. For all 9 track drives, two different speed drives can be operated at the same time.

An IBM compatibility mode is provided which allows characters to be reversed in the word.

An edit feature is provided which will allow an individual record within a block to be rewritten without doing the whole block over.

If the wrong kind of tape is mounted on the transport for the controller setup (i.e., NRZI tape in PE mode), the controller will automatically take the drive off line when operation is started. Standard software would never detect such a condition flagged only by a status bit.

SECTION III
VAX SERIES PRODUCTS

CHAPTER 8
INTRODUCTION

The VAX Series presently consists of the VAX-11/730, VAX-11/750 and the VAX-11/780. Each has an entirely different hardware design but all preserve the overall architecture of the 780, with upward/downward compatibility. A single operating system, VMS, is provided by DEC for each machine; UNIX is available from third-party organizations. The VAX Series has a 32-bit word length, and PDP-11 software is not directly usable.

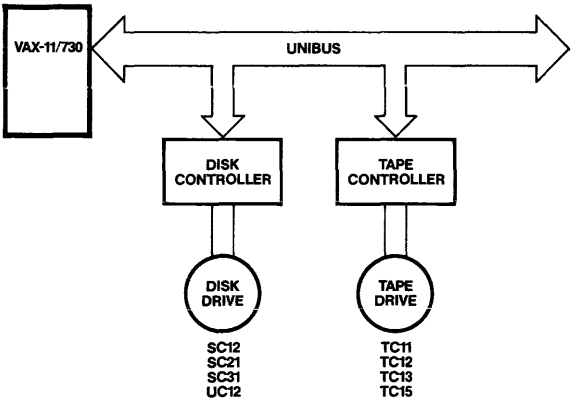
Unofficial reports indicate DEC plans to offer at least 5 models in the VAX Series, including models above and below the 730 and 780. It is anticipated that each will have an entirely different memory bus structure and that each will require a different Massbus Adapter (i.e. interface equivalent to the RH730, RH750 and RH780). It is further anticipated that all VAX-11 Series machines will incorporate a Unibus structure for basic input/output.

VMS supports Massbus peripherals (refer to Chapter 2) only through a Massbus Adapter. Since the RH750 has just recently been completed, only the RM80 (120 MB Winchester) is presently available for that system as a Massbus device. The RK07 is provided as a Unibus peripheral for the 11/750. On the more mature 11/780 model, the RK07 plus larger Massbus peripherals are available, including: RM03, RM05, RM80, RP06 and RP07. The newest member to the VAX-11 family is the VAX-11/730, which is a Unibus only device. The DEC peripherals available for this computer are the RL02 and RK07.

Emulex offers products for use on all current VAX-11 Series computers. This broad range of products exemplifies the Emulex commitment to supplying VAX users with disk, tape and communications products optimized for VAX applications. Table F-1, "Emulex Product Family," demonstrates this commitment across all models of DEC's LSI-11, PDP-11 and VAX-11 Series computers.

The Emulex products common to the VAX-11/730, VAX-11/750 and VAX-11/780 are considered below. A corresponding diagram of the bus structure of each CPU shows that each of these products are available to meet and solve the storage requirements of your VAX-11 CPU.

EMULEX CONTROLLER PRODUCTS



VAX-11/730

Emulex offers a Unibus emulating disk controller (SC31) which interfaces to the Unibus of the VAX-11/730, supporting either standard drives (1.2 MByte-per-second transfer rate) or high-speed (1.8 MByte per-second transfer rate) drives like the Fujitsu "Eagle". Users not requiring support of the high-speed Winchesters on their VAX-11/730 may opt for the more economical SC21/V. Each of these disk products includes the Emulex developed and supported VAX/UM software package.

Also available for use on the VAX-11/730 Unibus is the SC12/V. This disk controller is optimum for incorporating small to medium size 8", and 14" disk drives up to 160 MBytes. The SC12/V is important to VAX users who wish to adapt smaller capacity drives to the VAX-11 Unibus since the RK07 software can be used transparently under VMS.

The UC12 emulating host adapter is available for the VAX-11/730 Unibus. The UC12 is important for VAX users who wish to attach Small Computer System Interface (SCSI) devices to their system. The UC12 is transparent to VMS and includes an Emulex written and supported diagnostic package.

Emulex also supplies four Unibus tape products:

TC11/V Tape Controller (TU10/TM11-compatible; requires VAX/UT software package).

TC12 Tape Coupler (TS11-compatible, transparent to VMS).

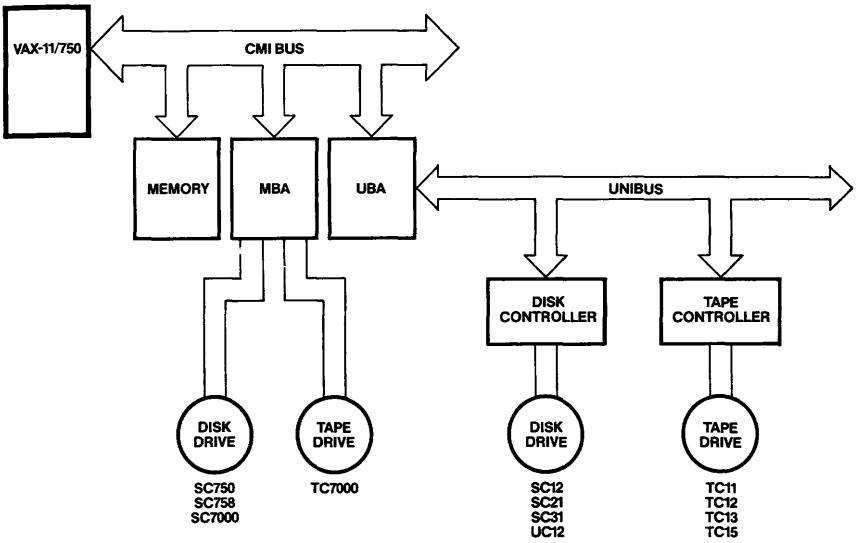
TC13 Tape Coupler (TS11-compatible, transparent to VMS).

TC15 Tape Coupler (TS11-compatible, transparent to VMS).

VAX-11/750

Emulex offers Massbus-equivalent emulating disk controllers (SC750, SC7000, and SC758) which interface directly to the internal high-speed memory bus (CMI) of the VAX-11/750. As such, standard versions of these

EMULEX CONTROLLER PRODUCTS



products operate transparently to VAX/VMS operating systems and DEC diagnostics. The SC21/V is also supported on the Unibus of the VAX-11/750 and can be used to emulates DEC RM03 (80 MByte) and RM05 (300 MByte) storage subsystems. The SC21/V requires the use of the Emulex VAX/UM software driver. Because of this, it is generally recommended that the VAX-11/750 user opt for the SC750, SC758, or SC7000 disk controllers thereby attaining complete software transparency to VMS.

For support of small to medium sized 8" and 14" drives, VAX-11/750 users may use the SC12/V. As in the case of the VAX-11/730, this product emulates DEC's RK07 and runs transparently under VMS.

The UC12 emulating host adapter is also available for the VAX-11/750 Unibus. The UC12 is important for VAX users who wish to attach Small Computer System Interface (SCSI) devices to their system. The UC12 is transparent to VMS and includes an Emulex written and supported diagnostic package.

Emulex also supports the following tape products on the VAX-11/750:

TC11/V Tape Controller (TU10/TM11-compatible; requires VAX/UT software package).

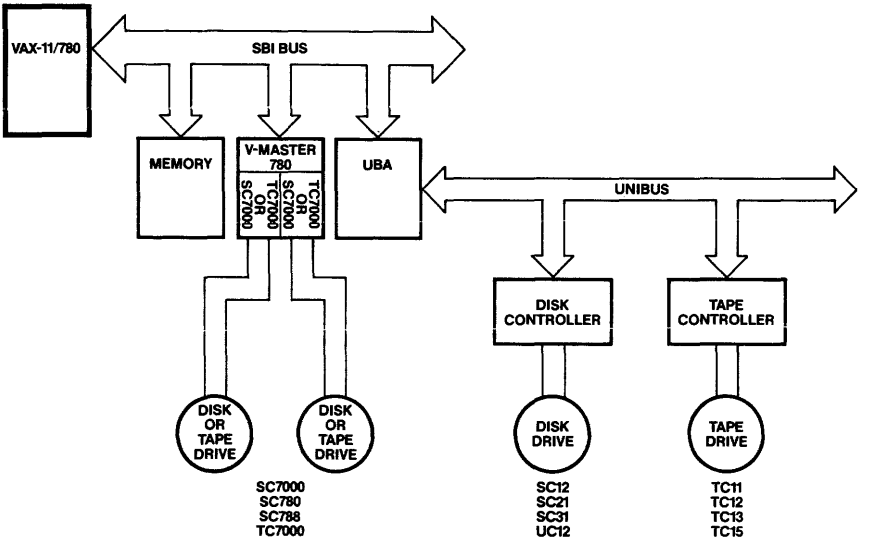
TC12 Tape Coupler (TS11-compatible, transparent to VMS).

TC13 Tape Coupler (TS11-compatible, transparent to VMS).

TC15 Tape Coupler (TS11-compatible, transparent to VMS).

TC7000 Tape Coupler (TM03/TU77-compatible, transparent to VMS).

EMULEX CONTROLLER PRODUCTS



VAX-11/780

The Emulex SC780, SC7000, and SC788, fitting in the V-Master chassis, are offered as Massbus-equivalent emulating disk controllers which interface directly to the internal, high-speed memory bus (SBI) of the VAX-11/780. As such, standard versions of these products operate transparently to VAX/VMS operating systems and DEC diagnostics. The SC21/V is also supported on the Unibus of the VAX-11/780, requiring the use of the Emulex VAX-UM software driver.

The SC12/V is offered to support small to medium 8' and 14' drives on the VAX-11/780 machines. The SC12/V is important to VAX users who wish to adapt smaller capacity drives to the VAX Unibus since the RK07 software can be used transparently with other disks.

The UC12 emulating host adapter is also available for the VAX-11/750 Unibus. The UC12 is important for VAX users who wish to attach Small Computer System Interface (SCSI) devices to their system. The UC12 is transparent to VMS and includes an Emulex written and supported diagnostic package.

Emulex also supports the following tape products on the VAX-11/750:

TC11/V Tape Controller (TU10/TM11-compatible; requires VAX/UT software package).

TC12 Tape Coupler (TS11-compatible, transparent to VMS).

TC13 Tape Coupler (TS11-compatible, transparent to VMS).

TC15 Tape Coupler (TS11-compatible, transparent to VMS).

TC7000 Tape Coupler (TM03/TU77-compatible, transparent to VMS).

CHAPTER 9
DISK CONTROLLERS FOR VAX SERIES PRODUCTS

V-MASTER/780 Mass Storage Adapter–SC7000, SC780 and SC788
The V-MASTER/780 is a mass storage adapter which will support disk drives, tape drives, or both, by providing an interface and control through the Synchronous Bus Interface (SBI) of a VAX-11/780 computer.

The V-MASTER package consists of the following basic elements:

Chassis	Capable of supporting 4 PCB's.
Interface PCB	Provides two-way communication with the SBI.
Translator PCB	Converts the SBI information to the Comet Memory Interface (CMI) used by the VAX-11/750.
SC7000 or SC780	Disk controller for 11/780 which controls up to four disk drives.
SC788	Disk controller for 11/780 which controls up to eight disk drives.
TC7000	Tape coupler for 11/780 which controls up to four STC or up to 8 Pertec-compatible tape drives. Occupies one slot in V-MASTER and provides DEC TU77 emulation.

In most DEC systems, Emulex controllers plug directly into PCB slots which exist in the DEC backplane incorporated in the appropriate system. This is true for all DEC systems except the 11/780. In the 11/780, there is simply no common backplane. Each component module of the 11/780 is free-standing. The processor itself has its own backplane, and bolts into the frame. The memory has its own backplane which bolts into the frame alongside the processor. Interconnect cables then join the two component members together. Therefore, in order to install disk and tape controllers it is necessary that a backplane first be bolted into the system. The V-MASTER provides the required backplane and interconnect capability. To this is then added one or two SC7000, SC780, or SC788 disk controllers, TC7000 tape coupler, or combination thereof.

Appendices I, J, and K give detailed information on the complete V-MASTER concept and include a discussion of the features and specifications of the SC7000, SC780 and SC788 disk controllers.

SC7000, SC750, and SC758 Disk Controllers
The SC7000, SC750 and SC758 Disk Controllers are single-board units much like the SC21, but they interface to the internal CMI bus for high-speed 32-bit parallel DMA data transfers. The primary difference between the

SC7000 and SC750 and SC758 is that the SC7000 and SC750 handle from one to four drives per controller while the SC758 can support up to eight drives. Since they functionally emulate the RH750 and Drive Control Logic of the Massbus, they are software transparent under any operating system designed for Massbus disk devices.

A block diagram of the VAX-11/750 is shown in Figure 9-1, and the photograph in Figure 9-2 shows the physical layout of the RH750 interface area and the Emulex SC7000 or SC750 controller.

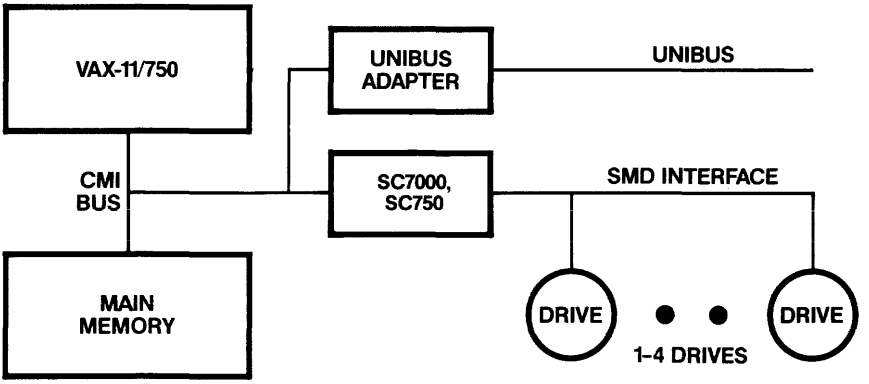


FIGURE 9-1 VAX-11/750 Organization

The 11/750 contains three prewired slots for installation of single-board RH750 interface boards. Separate controllers are implemented by the external Drive Control Logic (DCL) which can handle two disk drives. Up to 8 drives may be installed on an RH750.

The SC7000 and SC750 contain the entire CMI interface and drive controller logic for up to four physical drives and 8 logical drives on a single board of identical dimensions to the RH750. The controllers have an SMD interface and can utilize essentially all drives having the standard SMD interface. Since the SC7000 and SC750 emulate the entire Massbus complex, they are functionally transparent to any software written to support the RH750.

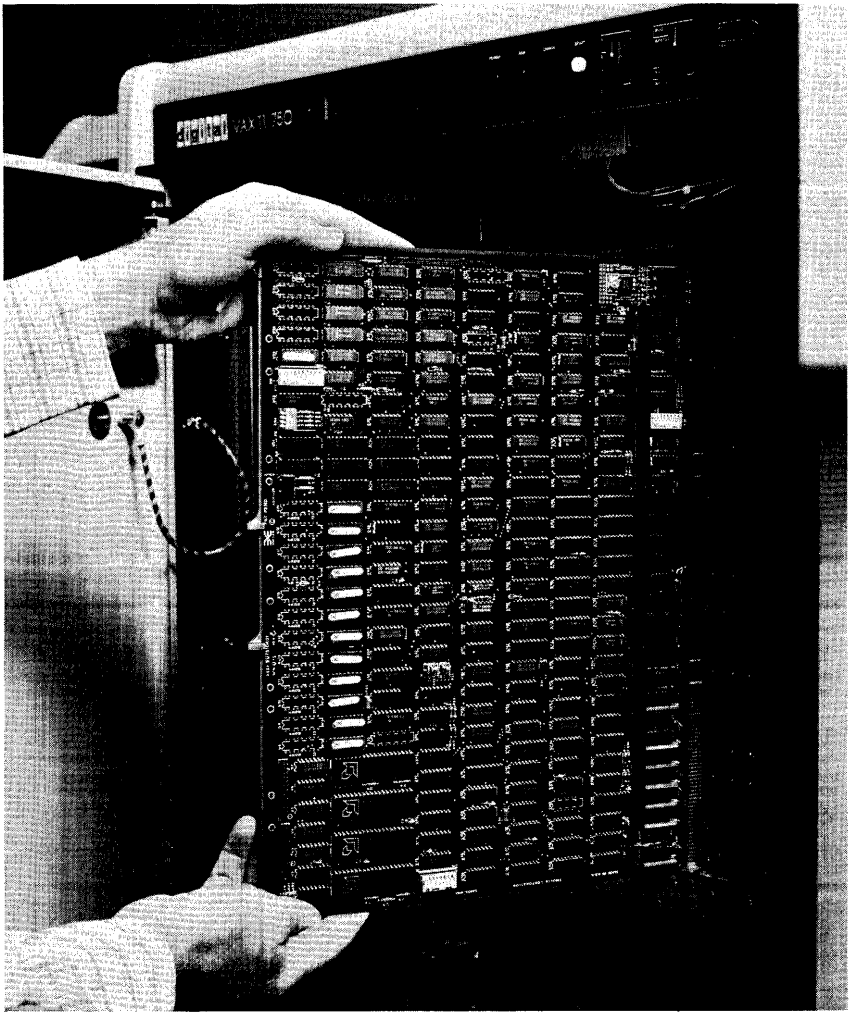


FIGURE 9-2 Integration of SC750 Into VAX-11/750

The CMI interface provides optimum performance at the system level since data transfers (32-bit parallel) are made directly to/from memory. The use of multiple controllers should also improve throughput in very heavily loaded systems.

DEC presently offers only a 121 MByte Winchester, the RM80, on the RH750. VMS software, however, also supports the RM03 (80 MByte SMD), RM05 (300 MByte SMD), RP06 (200 MByte SMD) and RP07 (600 MByte Winchester).

The Emulex SC7000 and SC750 have two microcode sets which provide the following emulations by switch selection on the boards.

TABLE 9-1
SC750 Basic Emulations

EMULATION		FORMATTED CAPACITY	DRIVES (TYPICAL)	COMMENTS
Model	**Type**			
SC750/B3	RM03	67.4 MB	9762 SMD	Media Compatible
		67.4 MB	9730-80 MMD	Std. RM03
		67.4 MB	DM 980 SMD	Std. RM03
		134.8 MB	9730-160 MMD	2 X RM03
		134.8 MB	Fuj-2284 SMD	2 X RM03
SC7000/B1	RM05	256.2 MB	9766 SMD	Media Compatible
		256.2 MB	CDS T302RM SMD	Std. RM05
		256.2 MB	DF 9330 SMD	Std. RM05
		512.4 MB	9775 FMD	2 X RM05
	RM80	121.6 MB	9730-160 MMD	Std. RM80
		121.6 MB	Fuj-2284 SMD	Std. RM80
		243.2 MB	DF 9330 SMD	2 X RM80
		405.2 MB	Fuj-M2351 SMD	Exp. RM80
SC750/B2	RP06	174.4 MB	Memorex 677 SMD	Std. RP06
				Media Compatible
		348.8 MB	Fujitsu "Eagle"	2 X RP06

The above configurations are all software transparent, except the Fujitsu M2351, and require no patches to standard VMS drivers. These drives indicated are media compatible with the DEC drives.

These are by no means the limit of drive manufacturers and/or types. As with all Emulex controllers, essentially any drive with the SMD interface can be supported; some may require patches to the VMS driver if the drive configuration does not match that of a DEC unit.

The SC7000 and SC750 configuration PROMs permit different drive configurations in each model to be selected without changing emulation PROMs. In addition, drive capacities can be mixed as desired. For example, a 300 MByte SMD might be used as backup for a 675 MByte FMD. By placing multiple logical drives on one spindle, the system will run with standard software.

The SC7000 and SC750 have also been designed for handling the very high speed data rates - up to 1.8 MBytes per second - anticipated for several new high-density drives such as the 475 MByte Fujitsu Eagle.

A summary of the primary features of the SC7000 and SC750 controllers is given in Table 9-2. A more complete description of the products and technical specifications are given in Appendices G and I.

The SC7000 and SC750 represent the optimum approach to adapting large-capacity, high-performance disk drives to the VAX-11/750. They contain all the key features and benefits as the corresponding Emulex PDP-11 and 11/70 controllers, plus more. And they have the flexibility and performance to adapt new peripheral devices to the system as they are developed by independent peripheral manufacturers.

TABLE 9-2
SC7000/SC750 Feature/Benefit Summary

FEATURE	BENEFIT
Single extended hex board package	Uses standard RH750 slot; no backplane modifications, easy physical installation
Software transparent	No software changes
Configuration PROM	No microcode changes for drive selection; mixed-drive configurations
Common design to all Emulex controllers	Proven design, parts commonality, established production methods and equipment
Self-test	High confidence at subsystem level, easy trouble shooting
High performance	Equal to RH750 with equivalent drives; can handle high data rate drives (1.8 MByte/second) for future performance/capacity improvements
Low power	Reduced power loading, higher reliability

SC31 Disk Controller
The SC31 has recently been introduced by Emulex to interface the Unibus of the VAX-11 Series. For VAX-11 Unibus applications, the SC31 consists of a hardware/software package. Hardware is the SC31/BX controller, programmable to optimize the controller for VAX-11 Unibus operation. Software is the Emulex developed and supported VAX/UM software package which consists of four modules: Formatter, Driver, Boot, and Diagnostics. The software driver and diagnostic package is provided on a TU58 tape cartridge or RX01 floppy.

The total package provides complete capability to install and operate the large capacity disk drives on the Unibus of any VAX-11 CPU and gives the user the same or even greater storage capability than typical DEC Massbus installations at a fraction of the cost.

SC21/V Disk Controller
Since the SC21 interfaces only to the Unibus, there is no CMI (11/750) or SBI (11/780) interface and all data transfers take place over the Unibus Adapter (UBA). The DEC software for RM devices takes advantage of extended SBI or CMI controller memory address capability, hence it does not support the memory mapping which must take place using the limited 18-bit address facility of the Unibus. For these reasons, system performance may be reduced, and a custom software package is required.

Emulex supports the SC21/V model on the VAX Unibus. Because of the very efficient implementation of the SC750 controller for the 11/750, there is only a small cost advantage with the SC21/V, and most users will generally elect the SC750 unless the need is to add storage capacity at minimum cost.

On the VAX-11/780 the same memory address limitation of the SC21/V requires separate software. However, there is a very large cost differential between an SBI controller and the SC21/V. In addition, installation of an SBI controller involves physical modification to the VAX SBI area which can be a consideration. Also, multiple Unibus Adapters (UBA's) can be installed on the 11/780 to gain performance advantages.

The SC21/V uses the VAX/UM software package written and supported by Emulex. This software offers more flexibility than standard DEC software, and it permits drives to be handled as either a system disk or a data disk on the Unibus of either VAX model. Elements of the VMS/UM software package are:

The VAX/UM software package completely supports installation, operation, and maintenance of the SC21/V based subsystem on the VAX-11/750 and 11/780 computers under VMS, Version 2.0 and above. Drives may be operated as the system disk or as a data disk on both the 11/780 and 11/750.

VMS/UMD DRIVER. Provides handling of mixed-drive capacities running as basic RM03/05 type devices. Non-standard drive configurations defined by the SC21 configuration PROM are automatically handled by the driver to eliminate any need for driver patching or modification.

VMS/UMF FORMATTER. Invokes SC21 built-in hardware formatter, thus eliminating need for separate software routine. Reads and prints out configuration of each installed drive.

VMS/UMB BOOT. Permits disk drives to be operated as the system disk by providing capability to the boot from either an RX01 floppy or TU58 cartridge using standard boot PROMs in the system, or from the disk drive (at higher speeds) using a special bootstrap PROM supplied with each controller.

VAX/UMX DIAGNOSTICS. Stand-alone package tests controller functions, basic disk functions and transfers, and Unibus operations. On-line package provides performance exerciser for media and drive testing in the operating system environment.

The following points should be noted in considering the use of a Unibus controller rather than a Massbus equivalent on the VAX series:

The standard DEC VMS disk software for RM03/05 and RP07 cannot be used. While this is not as convenient, a Unibus controller will prove to be a very capable alternative to a Massbus emulator. The Emulex VMS/UM software support package has been proven in many existing customer installations, because:

VMS is itself designed for convenient addition of user-supplied, internal drivers. Standard DEC documentation and classes are, in fact, available for instructing users in the techniques and procedures. This organization does not old true for PDP-11 series operating systems, such as RSX11M and RSTS, where the DEC drivers must be overlaid with new software. The proper integration of such modifications into those operating systems, as opposed to VMS, represents major effort

and an in-depth knowledge of the design of the entire operating system.

The VMS interface does not change with each version of VMS. Any such change would require every user to rewrite his drivers and present a significant problem to much of the VAX user base. As a result, the Emulex driver has been used in unaltered form through Versions 1.6, 2.0, and up to 3.1. Emulex users, therefore, do not experience the difficulty associated with other operating systems and are not dependent on Emulex for frequent updates.

Installation of a Unibus subsystem with the software package has proven as simple as any other approach. Physical installation is, of course, easier than inserting multiple boards into the RH780 area and does not require physical disassembly and rewiring of the sensitive SBI backplane.

The Emulex software is designed with more features than the standard DEC driver. For example, the drive-type code is read upon command by the SC21/V and passed directly to the driver. During initialization, the driver configures itself to the specific combinations of drives on the controller, hence, users may add drives of different configuration/capacity and run them on the same controller. This feature is not provided in standard DEC software. (The same features are contained in the Berkeley UNIX drivers).

All Emulex VAX software is written and supported in house by a permanent programming staff. Emulex owns and uses four VAX systems (2 11/750's and 1 11/780 and 11/730) for both development and production and is a VMS subscriber. Users are therefore insured that revisions, updates, and improvements are supplied on a timely and continuing basis. All software carries an initial 90-day warranty, and continuing support is available thereafter for a nominal fee.

Concern is often stated over possible overloading of the VAX Unibus. This could be a potential difficulty; however, quite acceptable performance has been achieved on many SC21/V existing installations. When the Unibus disk is used for data storage in conjunction with a Massbus system disk, an overlap of operations is achieved. This may enhance rather than degrade system performance. If a UBA is added for disk operations on the VAX-11/780, better system performance is often obtained. The added cost of the extra UBA is a negative factor, but the combined cost of the SC21/V and the UBA may not exceed that of an SBI controller, and it will certainly be less than another RH780 plus drive. The efficient buffering on the SC21/V, plus its optimized DMA feature, permits it to be run at low bus priorities and permits other device interrupts to be processed in a controlled, timely manner.

The SC21/V will fit across the entire VAX product line without either hardware or software driver changes. This will not be true for any Massbus-equivalent controller because the memory bus structure and packaging are entirely different (e.g. 750 vs. 780). The SC21/V will be immediately applicable, to each new VAX model introduced.

The SC21/V can be used as either a system disk or a data disk on the 11/750 and 11/780. Since many VAX's are delivered with a Massbus system disk, the SC21/V is often used to add large data storage to the system. The split between system disk and data disk operations on separate busses can be advantageous in many applications.

Any SC21 can be converted to/from any version, including the V, with a PROM change only. Users who need multiple versions or wish to change CPU's later, can use SC21's interchangeably.

The final selection of a controller is based upon the best combination of factors for each installation. The advantages of the SC21/V have made it an excellent choice for many users who have found the above meaningful.

SC12/V Disk Controller

The SC12/V is the RK07 compatible version of the standard SC12 controller described fully in Chapter 3.

DEC supports the 27.5 MByte RK07 across the VAX product line under VMS as a Unibus disk device. It may be used as a system disk. The RK07 is a removable cartridge disk manufactured by DEC and is not available as an independent peripheral.

The SC12/V is important to VAX users who wish to adapt smaller capacity drives to the VAX Unibus since the RK07 (27.5 MByte) software can be used transparently with other disks.

UC12/M Emulating Host Adapter

The UC12/M is an emulating host adapter for VAX-11 Unibus applications. It is fully described in Chapter 3.

The UC12/M emulates DEC MSCP and provides an intelligent interface between the SCSI to the subsystem and the Unibus at the CPU. The UC12/M is important to VAX users who wish to take advantage of the versatility of the SCSI on their system.

SPE 44 SMD Port Expander

The SPE 44 is a truly unique electronic switching unit which provides the capability of interfacing multiple DEC VAX-11/730's, /750's, or /780's to a single bank of up to four SMD-compatible disk drives. By employing a combination of multiple Emulex controllers, port expander units and dual ported drives, the VAX user can achieve shared storage access and system backup capabilities previously not possible.

The SPE 44 operates transparently to operating system software that supports dual access or dual port operation. The Port Expander is important to VAX users who wish to achieve maximum utilization and shared access of their SMD-compatible disk drives.

VAX Software Support

All VMS/UX software packages have been developed and are supported in-house by the Emulex software support group. All elements of every package carry a 90-day design warranty plus update service for additions and revi-

sions made, including any required by new releases of VMS software. Update service is available beyond 90 days at nominal cost.

Distribution media supplied with each controller is either TU58 compatible cartridge (VAX-11/730 and VAX-11/750) or RX01 compatible diskette (for VAX-11/780), each media containing the applicable driver/diagnostic package. Except for stand-alone diagnostics, all software is in VMS execution code, permitting easy, immediate integration into the system (load-and-go operation).

CHAPTER 10
TAPE CONTROLLERS/COUPLERS FOR VAX SERIES PRODUCTS

TC11 Tape Controller

The TC11 emulates the basic DEC TM11 controller which supports the TU10 tape transport as described in Chapter 5.

The TU10 is not supported under VMS, hence it is necessary to have a software driver added. Emulex has written and supports a complete tape package, VMS/UT, which can adapt industry standard tape transport to the VAX Unibus. The VAX/UT software package completely supports installation, operation, and maintenance of the TC11 based subsystem on the VAX-11/750 and 11/780 computers under VMS, Versions 2.0 and above. The VMS/UT elements are:

VMS/UTD DRIVER. Provides handling of all tape transport speeds, densities, and mixes permitted by the standard TC11 controller. Operator density select is included.

VMS/UTX DIAGNOSTICS. Stand-alone package test controller functions, and transfers, and Unibus operations. On-line package provides performance exerciser for media and drive testing in the operating system environment.

The decision to add tape to the VAX Unibus is generally not so great a consideration as for disk since it is never a system device, and the performance requirements are not as demanding. The TC11 represents a very effective and economical approach and should be seriously considered in lieu of a Massbus type system.

TC12 Tape Coupler

The TC12 coupler, combined with one to four standard formatted tape drives, emulates all functions of the DEC TS11 subsystem, including execution of standard diagnostic programs. Because the TC12 is supported transparently across the entire VAX-11 line, it is an ideal choice for VAX applications. It incorporates essentially all industry compatible, half-inch formatted tape drives-including conventional NRZI/PE start/stop; 1600/3200 bpi start/stop/streaming; and the new breed of low cost GCR (6250 bpi) start/stop/streaming. This high performance tape coupler is designed to handle tape data rates to 250,000 characters per second. Appendix X gives detailed specifications of the Model TC12. See also Chapter 6.

It should be noted that the DEC TS11 operates only at 1600 bpi/45 ips. Emulex's TC12 permits operation at densities of 800, 1600, 3200 and 6250 bpi and speeds in the range of 12.5 to 125 ips. On the VAX-11 Series under VMS, the standard on-line backup utility (BACKUP) can be used with the

TC12 to support streaming tape backup operations for applicable Emulex and DEC hard disk subsystems.

TC13 Tape Coupler

The TC13 coupler, combined with one to four standard formatted tape drives, emulates all functions of the DEC TS11 subsystem, including execution of standard diagnostic programs. Because the TC13 is supported transparently across the entire VAX-11 line, it is an ideal choice for VAX applications. It incorporates essentially all industry compatible, half-inch formatted tape drives-including conventional NRZI/PE start/stop; 1600/3200 bpi start/stop/streaming; and the new breed of low cost GCR (6250 bpi) start/stop/streaming transports. This high performance tape coupler is designed to handle tape data rates to 800 KByte characters per second, and contains a 3.5 KByte data buffer which provides efficient handling of streaming tape operation. Appendix Q gives detailed specifications of the Model TC13.

TC15 Tape Coupler

The TC15 tape coupler, combined with the CDC Sentinel 1/4' Streaming Tape Drive, emulates all functions of the DEC TS11 subsystem, including execution of standard diagnostic programs. The TC15 interfaces to the Unibus of VAX-11/730, 11/750, and 11/780 computers and is fully supported on all models. The coupler contains a 3.5 KByte data buffer which allows it to efficiently handle the streaming tape operation of the CDC Sentinel. Appendix R gives detailed specifications of the Model TC15.

TC7000 Tape Coupler

The TC7000 coupler is supported on VAX-11/750 and 11/780. Combined with one to four STC drives, or one to eight Pertec-compatible drives, the TC7000 emulates all functions of DEC TGU77/TEU77 subsystems, including execution of standard diagnostic software. Switch settings configure the coupler to interface either the CMI bus of the 11/750 or the SBI bus of the 11/780 (via the EMULEX V-Master). The TC7000 incorporates virtually all industry compatible half-inch formatted tape drives including 6250 bpi GCR, 1600 bpi PE and 800 bpi NRZI. Either start/stop or streaming drives may be handled by this coupler. Appendix S gives detailed specifications of the Model TC7000.

VAX Software Support

All VMS/UX software packages have been developed and are supported in-house by the Emulex software support group. All elements of every package carry a 90-day design warranty plus update service for additions and revisions made, including any required by new releases of VMS software. Update service is available beyond 90 days at nominal cost.

Distribution media supplied with each controller is either TU58 compatible cartridge (VAX-11/730 and VAX-11/750) or RX01 compatible diskette (for VAX-11/780) — each media containing the applicable driver/diagnostic package. Except for stand-alone diagnostics, all software is in VMS execution code, permitting easy, immediate integration into the system (load-and-go operation).

APPENDIX A
SC02 SERIES DISK CONTROLLER

DESIGNED FOR HANDLING SMALL TO MEDIUM CAPACITY DISK DRIVES, THE SC02 GIVES YOU THE ADVANTAGES OF...

USING standard DEC operating systems and diagnostic software.

EMBEDDING the controller in any single quad slot of a standard LSI-11 thru 11/73 backplane.

PERFORMING the full error detection/correction algorithms required for reliable application of modern, high-density disk drives.

EXECUTING a comprehensive set of self-test diagnostics as part of every startup operation.

REPLACING separate system bootstrap, bus terminator, and real time clock hardware with built-in options on the board.

INCORPORATING most currently available small to medium size 8" and 14" disk drives.

MIXING different types and capacities on one controller for optimizing combinations of fixed (Winchester) and/or removable media drives.

YOU GET OPTIMUM COST/ PERFORMANCE IN THIS RANGE BECAUSE...

The SC02 was designed specifically and exclusively to integrate small-to-medium capacity moving head disk drives with the LSI-11 thru 11/73. Incorporating a standard SMD interface, it is optimum for 14 inch drives up to 160 MBytes (including CMD type drives) and for all current 8" drives which offer an SMD interface option. The unit is an excellent companion product to the EMULEX SC03 controller which is designed for SMD class drives having capacities of 80 MByte and above. Together with other EMULEX SCOX models which offer alternate interface configurations, users have complete flexibility in selecting drives and controllers for every LSI-11 hard disk application.

UNIQUE, UNCOMPROMISING DESIGN GIVES YOU BIG SYSTEM CAPABILITY IN A SMALL, ECONOMICAL PACKAGE

The SC02 design is based on EMULEX microprocessor technology, already proven in thousands of controller installations. The following combination of features makes it an unbeatable choice for effectively using today's 14" and smaller 8" disk drives in LSI-11 based systems.

MICROPROCESSOR ARCHITECTURE. The same basic EMULEX bipolar microprocessor architecture which consistently sets the industry standards is used to give the SC02 broad flexibility and high performance.

COMPACT PACKAGING. Only one quad height pcb plugs into any standard Q Bus slot to minimize mounting cost and complexity.

SOFTWARE TRANSPARENCY. Microcode versions provide software transparent emulation of DEC RP02/03, RK06/07, and RL01/02 subsystems, including execution of standard system level diagnostics, which permits use of standard operating system drivers.

4 MEGABYTE QBUS ADDRESS. The SC02/C and SC02/L have full 22-bit address support to utilize the full 4 MByte memory of the LSI-11/23 PLUS and LSI-11/73.

ECC/CRC HARDWARE. The standard 32-bit ECC used for SMD-class disk error detection/correction (single 11-bit error burst), combined with a 32-bit header CRC, is provided to insure reliable operation with all types of high-density drives, particularly those with removable media.

BUILT-IN CLOCK CONTROL. Hardware included on the board enables software control of existing line time clock (BDV11-compatible).

BOOTSTRAP/TERMINATOR OPTION. Sockets are provided for insertion of 512 word bootstrap PROMs and Q Bus terminator resistors. Combined with the clock control, these facilities can often eliminate separate system hardware (typically the BDV11) used for these functions.

MIXED DRIVE CAPACITY. Disk drives having different combinations of heads, surfaces, and densities can be handled by the controller; the drive type code can be read directly from the controller by software to permit adaptive configuring by custom software drivers.

LOW POWER. Only 5.7 amps is required from the CPU internal +5V power supply (no +12V power required) via standard backplane power pins.

INTERNAL SELF TEST. Extensive self-test routines, contained in microcode, automatically verify controller operation when power is applied.

DISK SECTOR BUFFER. A full 512 byte data buffer permits multiple sector reads with a 3-to-1 sector interlace format. Buffer operation eliminates possibility of "data late" conditions and permits controller to be operated at low bus priorities.

SMD INTERFACE. Any two industry compatible drives, each operating at serial data rates to 10 MHz, may be integrated.

APPENDIX A
SC02 SERIES DISK CONTROLLER

AND YOU GET MORE THAN JUST A GREAT PRODUCT

With the SC02 you get superb quality and excellent support. Production capability exists to meet the highest of volume requirements. All components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled over a temperature range for over 96 hours (while operating) to insure high reliability from the moment they are first installed. All products are backed by a full one year warranty and supported internationally by the EMULEX technical group.

GENERAL SPECIFICATIONS

The following specifications apply to all SC02 Series disk controllers.

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of industry-standard SMD, fixed-head, and Winchester type mass storage devices to host LSI-11 computer; incorporates unique design to achieve extreme high-speed operations with minimum hardware.
Computer Interface	Standard Q Bus.
Disk Interface	Storage Module Drive (SMD) interface standard; serial data rate up to 10 MHz.
Bus Address Range	0-128K Words, or 0-2048K Words.
Bus Register	Two switch-selectable start locations.
Vector Address	Four switch-selectable vectors.
Priority Level	Level 5 & 4.
Error Control	On-board 32-bit data ECC and header CRC hardware for error detection/correction under microprogram control.
Status Display	Edge-mounted LED for activity/error/status display under microprogram control.
Option Switches	On-board slide switches for selection of program-controlled operating/configuration options.
Bootstrap/ Terminator Option	Sockets provided for 512 word bootstrap PROMs and Q Bus termination resistor packs.
Software Controllable Line-Time Clock	BDV11 compatible clock control. Switch-selectable.

Characteristic	Specification
FUNCTIONAL (continued)	
Buffer Memory	1024 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 512 bytes used for data buffering.
Media Format	3 to 1 sector interface.
PHYSICAL	
Packaging	One printed circuit board, standard Q Bus 4-connector interface.
Mounting	Any quad slot in standard backplane or system unit.
Cable Connectors	One common 60-pin control (A) flat cable connector and two 26-pin radial data (B) flat cable connectors.
Physical Drives	1 or 2 per controller.
Logical Drives	1 to 8 per controller.
ELECTRICAL	
Q Bus Interface	Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 35 and 25 feet, respectively.
Power	+5V ± 5%, 5.7 amps max; standard backplane/system unit pins used.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial LSI-11 computers and applicable disk drives.

APPENDIX A
SC02 SERIES DISK CONTROLLER

STANDARD MODELS

The SC02 is available in three standard models which emulate standard DEC disk storage subsystems. All models execute applicable DEC diagnostics, operating systems, and applications software. The SC02 includes a configuration PROM which permits definition of up to 64 different switch-selectable combinations of disk drive configurations on the two controller ports. This permits essentially unlimited selection of drive type/capacity combinations.

• Model SC02/A

Emulates the DEC RP11E controller with standard-sized RP02 (20.8 MByte), RP03 (41.6 MByte) or expanded capacity, logical units. Controller includes all RP11E functional features/capability plus extended features, such as command pack formatting and switch selection of transparent ECC with error reporting to system software. Supports essentially all standard SMD (removable media), Winchester (fixed media), and CMD (removable/fixed media) type drives of various capacities from 12-160 MBytes. A single microcode package with switch selection of desired configuration supports all drives applicable to this model.

4 of 64 Switch-Selectable Drive Configurations

CHARACTERISTIC	CONFIGURATION NUMBER			
	0	1	2	3
Drive Type — Capacity	SMD-80	SMD-80	MMD-24	SMD-160
Emulation	RP02	RP03	RP02	RP03
Mode	Standard	Expanded	Standard	Standard
Platters/Drive	3	3	4	5
MBytes/Logical Unit	20.8	62.4	20.8	41.6
Logical Units/Drive	3	1	1	3
MBytes/Drive	62.4	62.4	20.8	124.8
Drives/Controller, Max.	2	2	2	2
MBytes/Controller, Max.	124.8	124.8	41.6	249.6

• Model SC02/C

Emulates the DEC RK611 controller combined with multiple RK06 (13.9 MByte) or RK07 (27.8 MByte) logical units. Controller includes all RK611 capability plus the same extended features provided in the Model A series. Particularly well-suited for support of 32-96 MByte CMD-type drives having a removable and multiple fixed platters, with a logical RK06 mapped onto each data surface. Also supports other 8" and 14" drives by mapping 1 or more standard logical RK06/07 drives onto 1 or 2 physical drives. **Utilizes standard DEC software. Hardware will also support the full 22-bit (4 MByte) address range of the LSI-11/23 PLUS and LSI-11/73. (Requires user-provided software driver).** A single microcode package with switch selection of desired configuration supports all drives applicable to this model.

3 of 64 Switch-Selectable Drive Configurations

CHARACTERISTIC	CONFIGURATION NUMBER		
	0	1	2
Drive Type — Capacity	CMD-32/64/96	SMD-80	SMD-160
Platters/Drive	2/4/6	3	5
MBytes/Logical Unit	13.9	13.9/27.5	27.5
Logical Units/Drive	2/4/6	3	5
MBytes/Drive	27.8/55.6/83.4	68.9	137.5
Drives/System, Max..	2	2	2
MBytes/System, Max.	55.6/111.2/166.8	137.8	220

• Model SC02/L

Emulates the DEC RLV11/RLV12 controller with standard-sized RL01 (5.2 MByte) and RL02 (10.4 MByte) logical units. Controller includes all RL01/02 capability and is particularly well-suited to support small capacity drives, primarily 8 inch, across the LSI-11 product line. **Utilizes standard DEC software. Hardware will also support the full 22-bit (4 MByte) address range of the LSI-11/23 PLUS and LSI-11/73. (Requires user-provided software driver).** A single microcode package with switch selection of desired configuration supports all drives applicable to this model.

3 of 64 Switch-Selectable Drive Configurations

CHARACTERISTIC	CONFIGURATION NUMBER		
	0	1	2
Drive Type — Capacity	CMD-12	MMD-40	CMD-50
Platters/Drive	2	3	2
MBytes/Logical Unit	5.2	5.2/10.4	10.4
Logical Units/Drive	2	4	4
MBytes/Drive	10.4	36.4	41.6
Drives/System, Max.	2	1	1
MBytes/System, Max.	20.8	36.4	41.6

APPENDIX B
SC03 SERIES DISK CONTROLLER

THIS LATEST EMULEX LSI-11 DISK CONTROLLER GIVES YOU ALL THE ADVANTAGES OF...

USING standard DEC operating systems and diagnostic software, even on the 22-bit QBus.

INCORPORATING currently available large capacity Winchester, removable, or fixed-head type disk drives — including Fujitsu's new Eagle drive.

EMBEDDING the controller in only one existing quad slot of your standard LSI-11, LSI-11 PLUS, or LSI-11/73 backplane.

CONVERTING to the new Digital Storage Architecture (DSA) in the future, if desired.

PERFORMING a comprehensive set of self-test diagnostics.

WORKING properly when you plug it in and continuing to work reliably for thousands of hours.

YOU GET ALL THESE ADVANTAGES BECAUSE...

The SC03 was designed specifically and exclusively to integrate large capacity, high performance disk drives with the LSI-11. Incorporating a standard SMD interface, it is optimum for SMD class drives having capacities of 80 MBytes and above. Using advanced, modern microprocessor architecture, the SC03 has been configured through one firmware version, to emulate DEC's RH11/RH70 — RM02/RM03/RM05/RM80/RP06 disk subsystems.

The SC03 gives you the same performance and all the features of our big Unibus and VAX controllers. Plus more. And all on a single quad board that takes up minimum space and consumes low power — both valuable commodities in any LSI-11 system.

But more than that, it's designed to handle the new **1.8 MByte per second transfer rate drives** — like the Eagle — *now*. And we've designed in the capability for quick conversion to the new Digital Storage Architecture (DSA) coming for future controllers.

THE SC03 DESIGN CONTINUES TO SET THE STANDARD FOR USE OF LARGE DISK CONTROLLER TECHNOLOGY ON THE LSI-11

The following combination of features illustrate why the SC03 meets all requirements for the LSI-11 application of large capacity disk subsystems.

ADVANCED MICROPROCESSOR ARCHITECTURE. A unique patented design incorporates high-speed bipolar technology to meet the performance demands of both conventional (1.2 MByte/sec.) and high performance (**1.8 MByte/sec.**) storage module and Winchester disks. The design also incorporates all facilities required to provide future emulations of the new Digital Storage Architecture, such as the UDA-50 controller.

COMPACT PACKAGING. Only one quad height module plugs into any standard QBus slot to minimize mounting space requirements, eliminate external boxes and cables, simplify spares stocking requirements, avoid specially wired system units/backplanes, reduce component count and power consumption, and maximize inherent reliability.

22-BIT BUS ADDRESS. Hardware addressing permits direct access to the full 4 MByte memory range of the 11/23 PLUS. And the RH70 emulation makes it software transparent under RSX11M and RSTS-E.

MEDIA COMPATIBILITY. The SC03 generates compatible, interchangeable media with the DEC RM02/03/05 and RP06 packs.

INTERNAL SELF-TEST. Automatic self-test and operator-initiated subsystem diagnostics are contained in on-board firmware, supported by error display lamps.

BOOTSTRAP/TERMINATOR OPTION. Sockets are provided for insertion of 512 word bootstrap PROMs and QBus terminator resistors. Combined with the clock control, these facilities can often eliminate separate system hardware (typically the BDV11 module) used for these functions.

BUILT-IN CLOCK CONTROL. Hardware included on the board enables software control of existing line time clock (BDV11-compatible).

MIXED DRIVE CAPACITY. Disk drives having different combinations of heads, surfaces, and densities can be handled by the controller; the drive type code can be read directly from the controller by software to permit adaptive configuring by standard or custom software drivers.

ECC/CRC HARDWARE. Thirty-two bit DEC-compatible ECC for data error detection/correction (single 11-bit error burst), and sixteen-bit CRC for header error detection, all under microprogram control, is provided in all controller versions.

LARGE DISK I/O BUFFER. A 8192 byte RAM memory provides a full fourteen sector data buffer in all applications. This level of buffering is essential on the relatively slow QBus because it completely eliminates "data late" worries, permits multiple contiguous sector reads, eliminates the need for a sector interlace scheme, and permits the controller to be operated at a low bus priority level while handling the full data transfer rate performance of modern SMD type disk drives.

STANDARD SMD INTERFACE. Any two industry compatible drives, all operating at data rates of **1.8 MByte/second**, may be integrated into a single subsystem. The SC03 is adaptable to all known present and future disk products of this type. Fully buffered disk I/O circuitry permits operation at radial distances up to 25 feet and daisy chain distances up to 35 feet.

LOW POWER. The unit requires only 6.5 Amps of +5 volt power from standard backplane pins.

APPENDIX B
SC03 SERIES DISK CONTROLLER

CONVENIENCE FEATURES. A host of items — such as a selectable bus address range and configuration/operational options, enabled by switches — eliminates multiple hardware versions and makes the unit simple and easy to configure. Edge-mounted LED for activity/error/status display under microprogram control.

COMMON HARDWARE. Identical physical circuit boards, adapted through firmware only, are used for all SC03 models, including special applications, which eliminate the need for using different hardware for different disk capacities, controller versions, and software modes.

GENERAL SPECIFICATIONS

The following specifications apply to all SC03 Series large disk controllers.

Characteristic	Specification
Design	High-speed bipolar microprocessor-based controller for integration of industry-standard SMD and Winchester type mass storage devices to host LSI-11 computer; incorporates unique patented design to achieve extreme high-speed operations with minimum hardware.
Computer Interface	Standard QBus.
Disk Interface	Storage Module Drive (SMD) interface standard; data rate of **1.8 MByte/second.**
Bus Address Range	4 MBytes (22-bit addressing).
Bus Register	Two selectable start locations.
Base Address	Switch selectable.
Vector Address	Switch selectable.
Error Control	On-board DEC-compatible 32-bit ECC and 16-bit CRC hardware for error detection/correction under microprogram control.
Status Display	Edge-mounted LED for activity/error display under microprogram control.
Option Switches	Seventeen on-board slide switches for selection of program-controlled operating/configuration options.
Bootstrap/ Terminator Option	Sockets provided for 512 word bootstrap PROMs and QBus termination resistor packs.
Software Controllable Line-Time Clock	BDV11 compatible clock control. Switch-selectable.

Characteristic	Specification
FUNCTIONAL	
Buffer Memory	8192 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 7168 bytes (14 sectors) used for data buffering.
PHYSICAL	
Packaging	One printed circuit board, standard QBus 4-connector interface.
Mounting	Any single quad slot in standard QBus backplane or system unit.
Cable Connectors	One common 60-pin control (A) flat cable connector and two 26-pin radial data (B) flat cable connectors.
Physical Drives	1 or 2 per controller.
ELECTRICAL	
QBus Interface	Approved line drivers/receivers used exclusively; one bus load per bus signal line.
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 35 and 25 feet, respectively.
Power	+5VDC +5%, 6.5 Amps max; standard backplane/system unit pins used.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial LSI-11 computers and applicable disk drives.

APPENDIX B
SC03 SERIES DISK CONTROLLER

STANDARD MODELS

The EMULEX Model SC03/B (RM02/RM05/RM80/RP06) is provided in one standard model which handles drive capacities in the range of 80 - 600 MBytes. Either standard or expanded logical units are mapped onto 1 or 2 physical drives, depending on the model/mode. Controller includes all standard features plus; pack format command, auto bootstrap command, programmable bus DMA bandwidth control, and more. Supported by RSX11M, RSX11M **PLUS** and RSTS/E on LSI-11, **11/23 PLUS, and 11/73 computers.**

- **SC03/BX**

  Emulates the DEC RH11/RH70 Massbus controller with multiple RM02 (67.4 MByte), RM05 (256.1 MByte), RM80 (124.2 MByte), or RP06 (174.4 MByte) disk drives. Will operate with the new Fujitsu Eagle disk drive. Two software transparent RP06's are mapped on an Eagle, for a total of 348.8 MBytes per drive.

DISK SUBSYSTEM CHARACTERISTICS

CHARACTERISTIC	DEC SPECIFICATION		EMULEX SPECIFICATION					
	RWM03*	RWP06*	SC03/BX					
Drive Type-Capacity	RM02-80	RP06-200	SMD-80	MMD-160	SMD-300	FMD-675	SMD-200	EAGLE
Emulation	N/A	N/A	RM03	RM03	RM05	RM05	RP06	RP06
Mode	N/A	N/A	Std.	Std.	Std.	Std.	Std.	Std.
Platters/Drive	3	10	3	3	10	10	10	10
Tracks/Cylinder	5	19	5	10	19	19	19	20
Cylinders/Drive	823	815	823	823	823	823	815	842
Sectors/Track	32	22	32	32	32	32	22	44
Data Bytes/Sector	512	512	512	512	512	512	512	512
MBytes/Logical Unit	67.4	174.4	67.4	67.4	256.2	256.2	174.4	174.4
Logical Units/Drive	1	1	1	2	1	2	1	2
MBytes/Drive	67.4	174.4	67.4	134.8	256.2	512.4	174.4	348.8
Drives/Controller, Max	8	8	2	2	2	2	2	2
MBytes/Controller, Max	539.4	1395.5	134.8	269.6	512.4	1024.8	348.8	697.6
Speed, RPM	3600	3600	3600	3600	3600	3600	3600	3961
Bit Density, BPI	6060	4040	6060	6060	6060	6060	4040	12790
Data Rate (K Words/Sec)	491.5	337.9	491.5	491.5	491.5	491.5	337.5	929.5

*DEC's RWM03 and RWP06 disk subsystems are not hardware supported on the QBus.

APPENDIX C
SC12 SERIES DISK CONTROLLER

DESIGNED FOR HANDLING SMALL TO MEDIUM CAPACITY DISK DRIVES, THE SC12 GIVES YOU THE ADVANTAGES OF...

USING standard DEC operating systems and diagnostic software.

IMBEDDING the controller in any single quad slot of a standard VAX or PDP-11 backplane.

PERFORMING the full error detection/correction algorithms required for reliable application of modern, high-density disk drives.

EXECUTING a comprehensive set of self-test diagnostics as part of every startup operation.

INCORPORATING most currently available small to medium size 8" and 14" disk drives.

MIXING different types and capacities of drives on one controller for optimizing combinations of fixed (Winchester) and/or removable media drives.

YOU GET OPTIMUM COST/ PERFORMANCE IN THIS RANGE BECAUSE...

The SC12 was designed specifically and exclusively to integrate small-to-medium capacity moving head disk drives with the VAX or PDP-11. Incorporating a standard SMD interface, it is optimum for 14 inch drives up to 160 MBytes (including CMD type drives) and for all current 8" drives which offer an SMD interface option. The unit is an excellent complementary product to the EMULEX SC21 controller, designed for SMD class drives having capacities of 80 MByte and above.
The SC12, a Unibus companion for, and format compatible with the EMULEX SC02 controller, introduced previously for use with the LSI-11 Q-Bus.

UNIQUE, UNCOMPROMISING DESIGN GIVES YOU BIG SYSTEM CAPABILITY IN A SMALL, ECONOMICAL PACKAGE...

The SC12 design is based on EMULEX microprocessor technology, already proven in thousands of controller installations. The following combination of features makes it an unbeatable choice for effectively using today's 14" and small 8" disk drives in VAX and PDP-11 based systems.

MICROPROCESSOR ARCHITECTURE.
The same basic EMULEX bipolar microprocessor architecture which consistently sets the industry standards is used to give the SC12 broad flexibility and high performance.

COMPACT PACKAGING. Only one quad height pcb plugs into any standard Unibus slot to minimize mounting cost and complexity.

SOFTWARE TRANSPARENCY. Microcode versions provide software transparent emulation of DEC RP02/03 and RK06/07 subsystems, including execution of standard system level diagnostics, which permits use of standard operating system drivers.

ECC/CRC HARDWARE. The standard 32-bit ECC used for SMD-class disk error detection/correction (single 11-bit error burst), combined with a 32-bit header CRC, is provided to insure reliable operation with all types of high-density drives, particularly those with removable media.

MIXED DRIVE CAPACITY. Disk drives having different combinations of heads, surfaces, and densities can be handled by the controller; the drive type code can be read directly from the controller by DEC's software, or by custom software drivers.

LOW POWER. Only 5.7 amps is required from the CPU internal +5V power supply (no −15V power required) via standard backplane power pins.

INTERNAL SELF TEST. Extensive self-test routines, contained in microcode, automatically verify controller operation when power is applied.

DISK SECTOR BUFFER. A full 512 byte data buffer permits multiple sector reads with a 3-to-1 sector interlace format. Buffer operation eliminates possibility of "data late" conditions and permits controller to be operated at low bus priorities.

SMD INTERFACE. Any two industry compatible drives, each operating at serial data rates to 10 MHz, may be integrated.

APPENDIX C
SC12 SERIES DISK CONTROLLER

AND YOU GET MORE THAN JUST A GREAT PRODUCT...
With the SC12 you get superb quality and excellent support. Production capability exists to meet the highest of volume requirements. All components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled for over 96 hours (while operating) to insure high reliability from the moment they are first installed. All products are backed by a full one year warranty and supported internationally by the EMULEX technical applications group.

GENERAL SPECIFICATIONS

The following specifications apply to all SC12 Series disk controllers.

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of industry-standard SMD, fixed-head, and Winchester type mass storage devices to host VAX or PDP-11 computer; incorporates unique design to achieve high-speed operations with minimum hardware.
Computer Interface	Standard Unibus.
Disk Interface	Storage Module Drive (SMD) interface standard; serial data rate up to 10 MHz.
Bus Address Range	0-128K Words.
Bus Register	Four switch-selectable start locations.
Vector Address	Four switch-selectable vectors.
Priority Level	Level 5.
Error Control	On-board 32-bit data ECC and header CRC hardware for error detection/correction under microprogram control.
Status Display	Edge-mounted LED for activity/error/status display under microprogram control.
Option Switches	On-board slide switches for selection of program-controlled operating/configuration options.
Buffer Memory	1024 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 512 bytes used for data buffering.
Media Format	3 to 1 sector interface.

Characteristic	Specification
PHYSICAL	
Packaging	One printed circuit board, Unibus 4-connector interface.
Mounting	Any quad slot in standard backplane or system unit.
Cable Connectors	One common 60-pin control (A) flat cable connector and two 26-pin radial data (B) flat cable connectors.
Physical Drives	1 or 2 per controller.
Logical Drives	1 to 8 per controller.
ELECTRICAL	
Unibus Interface	Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Power	+5V ± 5%, 5.7 amps max; standard backplane/system unit pins used.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial VAX or PDP-11 computers and applicable disk drives.

APPENDIX C
SC12 SERIES DISK CONTROLLER

STANDARD MODELS

The SC12 is available in three standard models which emulate standard DEC disk storage subsystems. All models execute applicable DEC diagnostics, operating systems, and applications software. The SC12 includes a configuration PROM which permits definition of up to 64 different switch selectable combinations of disk drive configurations on the two controller ports. This permits essentially unlimited selection of drive type/capacity combinations.

- **Model SC12/A**

  Emulates the DEC RP11E controller with standard-sized RP02 (20.8 MByte), RP03 (41.6 MByte) or expanded capacity, logical units. Controller includes all RP11E functional features/capability plus extended features, such as automatic pack formatting and switch selection of transparent ECC with error reporting to system software. Supports essentially all standard SMD (removable media), Winchester (fixed media), and CMD (removable/fixed media) type drives of various capacities from 8-160 MBytes. A single microcode package with switch selection of desired configuration supports all drives applicable to this model.

4 of 64 Switch-Selectable Drive Configurations

CHARACTERISTIC	CONFIGURATION NUMBER			
	0	1	2	3
Drive Type—Capacity	SMD-80	SMD-80	MMD-12/24	CMD-32/64/96
Emulation	RP02	RP03	RP02	RP02
Mode	Standard	Expanded	Contracted/Std.	Contracted
Platters/Drive	3	3	2/4	2/4/6
MBytes/Logical Unit	20.8	62.4	10.4/20.8	13.4
Logical Units/Drive	3	1	2	2/4/6
MBytes/Drive	62.4	62.4	10.4/20.8	26.8/53.6/80.4
Drives/Controller, Max.	2	2	2	2/2/2
MBytes/Controller, Max.	124.8	124.8	20.8/41.6	53.6/107.2/160.8

- **Model SC12/C**

  Emulates the DEC RK611 controller combined with multiple RK06 (13.9 MByte) or RK07 (27.5 MByte) logical units. Controller includes all RK611 capability plus the same extended features provided in the Model A series. Particularly well-suited for support of 32-96 MByte CMD-type drives having a removable and multiple fixed platters, with a logical RK06 mapped onto each data surface. Also supports other 8" and 14" drives by mapping 1 or more standard logical RK06/07 drives onto 1 or 2 physical drives. A single microcode package with switch selection of desired configuration supports all drives applicable to this model.

- **Model SC12/V**

  Emulates DEC's RK711 controller combined with multiple RK07 drives on the VAX-11 Unibus. The SC12/V is important to VAX users who wish to adapt smaller capacity drives to the VAX Unibus since the RK06 (14 MByte) and RK07 (28 MByte) software can be used transparently with other disks. The CMD (fixed and removable media) with logical RK06's mapped on each surface is attractive in many cases because the back-up issue is solved with one device.

3 of 64 Switch-Selectable Drive Configurations for Models SC12/C and SC12/V

CHARACTERISTIC	CONFIGURATION NUMBER		
	0	1	2
Drive Type—Capacity	CDC 9730-80	Priam 3350	CDC-9448-96
Platters/Drive	5	3	6
MBytes/Logical Unit	27.4(2) 13.9(1)	27.4	13.9(2) 27.4(2)
Logical Units/Drive	5	1	6
MBytes/Drive	68.7	27.4	82.6
Drives/System, Max.	2	2	2
MBytes/System, Max.	137.4	54.8	165.2

APPENDIX D
SC21 SERIES DISK CONTROLLER

IT'S A PROVEN, HIGH VOLUME PRODUCT...

The EMULEX SC21 Series large disk controller for DEC PDP-11 and VAX-11 computers is a direct follow-on to the EMULEX SC11 controller, introduced in early 1979 and now recognized as *the* product that changed the entire nature of disk controller design.

The SC21 is neatly packaged on a single pcb versus the two-board packaging of the SC11. But more importantly, the SC21 provides more features and better performance than any other Unibus controller available today. The design reflects the experience gained from delivery and installation of over 1500 SC11's and the result is a new, improved product whose hardware/firmware design has already been proven under every available DEC operating system, and with every applicable industry disk drive. Users can therefore count on receiving a controller backed by proven performance, on-time delivery in volume quantities, and solid technical support.

LIKE ALL EMULEX CONTROLLERS...

...the SC21 was designed specifically—and exclusively—for application on the DEC Unibus.

Using the same proven architecture inherent in the entire EMULEX disk and tape controller family, proven microcode versions are available for emulating all applicable DEC disk subsystems using essentially any industry drive with a standard SMD interface. Naturally, all standard models for the PDP-11/04-11/60 Series are DEC diagnostic and operating software compatible. And the SC21 generates DEC-compatible media where the pack is identical to that of the equivalent DEC drive.

AND FINALLY YOU CAN GET ALL THESE ADVANTAGES ON YOUR VAX-11...

The Model SC21/V (VAX/VMS) disk controller version consists of a hardware/software package designed to add economical big disk storage to a VAX-11 system. Hardware is the standard, proven SC21 controller coupled with a special microcode package to optimize the controller for VAX Unibus operation. Software consists of four modules: Formatter, Driver, Boot (for the VAX-11/750), and Diagnostics. This package provides complete capability to install and operate large capacity disk drives on the Unibus of VAX-11 Series computers. It gives you the same storage capability as typical DEC Massbus installations at a fraction of the cost.

ONLY THE SC21 PROVIDES THIS COMPLETE LIST OF FEATURES AND BENEFITS...

...which are implemented in all models/versions of the product.

SINGLE BOARD PACKAGE. For some users, this may be convenient since it saves a bus slot versus the SC11. But what really counts is that there has been no compromise made in either features or performance; both areas have, in fact, been improved and expanded.

MIXED DISK DRIVE CAPACITIES. Disk drives having different configurations (i.e. number of heads and cylinders) may be operated together on the controller. Switch settings permit selection of any one of 32 different combinations of predefined drive configurations.

ADAPTIVE DMA THROTTLE. This exclusive SC21 feature was developed based on experience in a broad range of installations. During each DMA data transfer burst, the controller measures the waiting time for other pending NPR requests and interrupts its own DMA activity to permit other DMA transfers to occur. In addition, a programmable "deadband" time is provided between bursts to insure that CPU functions, including interrupt servicing, are not locked out for excessive periods of time by the high-speed disk transfers.

BUS EFFICIENCY. The SC21 has the most efficient implementation available in a microprocessor-based design and reduces bus delays on programmed I/O and DMA transfers to insignificant levels.

LOW POWER. Only 8 amps at +5V and 0.7 at -15V are required from the internal computer power supply.

RELIABILITY. Calculated MTBF is 30,000 hours; measured results show a much higher actual MTBF figure.

SOFTWARE TRANSPARENCY. All standard models for the PDP-11 Models 04 through 60 are compatible with and transparent to DEC diagnostics and operating systems, such as RSTS-E, RSX11M, etc.

MEDIA COMPATIBILITY. Data packs are media interchangeable with DEC's RM02/03 (80 MByte), RM05 (300 MByte), and RP06 (200 MByte) subsystems using an SMD equivalent drive and SC21 controller.

INTERNAL SELF TEST. Automatic self test executed by internal microcode with LED error status provided.

LARGE DISK I/O BUFFER. A full three sector buffer is provided to eliminate "data late" worries even when operated at low bus priorities. This facility, combined with the Adaptive DMA Throttle feature, permits a system to always operate at optimum rates regardless of Unibus configuration.

FOUR DRIVE SMD INTERFACE. Four disk ports are provided on the controller to eliminate auxiliary paddle boards or wiring panels for handling multidrive installations. The standard SMD interface permits operation at radial B-cable distances of 50 feet and cumulative daisy chain A-cable lengths of 100 feet

APPENDIX D
SC21 SERIES DISK CONTROLLER

UNIVERSAL DRIVE PORTS. Drive ports on the board are entirely transparent to drive number. Therefore, any drive number can be set up on any port and changed at any time without reconfiguring the controller.

ECC/CRC HARDWARE. Thirty-two bit ECC for data error detection/correction (single 11-bit error burst) and 16-bit CRC for header error detection is provided.

COMMON HARDWARE. Controller models/versions are implemented strictly through microcode and on-board operation switches using common hardware.

COMPLETE RANGE OF MODELS. Users may select from many proven emulation models/versions to optimize the controller and disk drives for a particular application. These models include: RH11 controller (RM02/05, RP06); and RK611 controller (RK06).

WIDE CHOICE OF DRIVES. Available models collectively support essentially all disk drives having an industry standard SMD interface, regardless of manufacturer and/or drive configuration.

DUAL PORT DRIVE SUPPORT. Dual port drive operations are supported in applicable emulation models.

STANDARD MODELS

The SC21 is available in three standard models which emulate standard DEC disk storage subsystems. All models for the PDP-11 execute applicable DEC standard diagnostics, operating systems, and applications software. Refer to the EMULEX "Controller Handbook" for detailed functional characteristics of each model.

• Model SC21/B

Emulates the DEC RH11 interface with RM02 (67.4 MByte), RM05 (256.2 MByte), or RP06 (174.4 MByte) logical units. Controller includes all standard functional features plus extended features such as command pack formatting and auto boot-strap. Supports standard SMD and Winchester-type drives of 40-600 MByte capacity; packs are compatible with DEC media and drives equivalent to DEC RM02, RM05, and RP06. Provided in three versions:

SC21/BM

Emulates DEC RJM02 and RJM05 subsystems (with dual-port and two logical drives per physical drive) using drives of 40-600 MByte capacity. Supports mixed RM drive configurations with no software patches. Supercedes EMULEX Model SC21/B1.

SC21/B2

Emulates DEC RJP06 subsystem (with dual-port and single logical drive per physical drive) using drives of 200-600 MByte capacity.

SC21/BE

Emulates DEC RJM02 and RJM05 subsystem (with dual-port and single logical drive per physical drive) using drives of 40-600 MByte capacity. Provides transparent, on-board error correction plus optional selection of sector count in place of word count capability.

• Model SC21/C

Emulates the DEC RK611 controller combined with multiple RK06 (13.9 MByte) logical units. Controller includes all RK611 capability plus the same extended features provided in the Model B series. Does not support dual port. Particularly well-suited for support of 32-96 MByte CMD-type drives having a removable and multiple fixed platters, with a logical RK06 mapped onto each data surface.

• Model SC21/V

Emulates DEC RM03 (80 MByte) and RM05 (300 MByte) storage subsystems. The standard SC21 controller has been provided with specialized microcode to optimize the data transfer strategy to the VAX Unibus Adapter. The SC21/V includes the Emulex-developed VAX/UM software package, which completely supports installation, operation, and maintenance of the SC21/V on the VAX-11/750 and VAX-11/780 computers under VMS. (Version 2.0 and above). On the 11/750 and 11/780, drives may be operated as the system disk or as a data disk. Software driver and diagnostics for use with DEC's diagnostic supervisor are provided on either RX01 diskette or TU58 cartridge and carry a 90-day warranty/update service.

APPENDIX D
SC21 SERIES DISK CONTROLLER

GENERAL SPECIFICATIONS

The following specifications apply to all SC21 Series large disk controllers.

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of essentially any disk drive having an industry-standard SMD interface to host PDP-11 or VAX-11 computer.
Computer Interface	Standard Unibus via SPC interface. Memory data parity check performed on all transfers.
Disk Interface	Storage Module Drive (SMD) interface standard; serial data rate up to 10 Mhz.
Number of Drives	1-4
Drive Configurations	A different drive configuration (type, size, etc.) may be operated on each port, with switch selection of up to 32 combinations of drives on the 4 available ports.
DMA Address Range	0-128K Words.
Base Address	Four preprogrammed addresses, switch-selectable.
Vector Address	Three preprogrammed vector addresses, switch-selectable.
Priority Level	BR5
Error Control	On-board 32-bit ECC and 16-bit CRC hardware for error detection/correction under microprogram control.
Status Display	Two edge-mounted LED's for error and activity display.
Option Switches	On-board slide switches provided for convenient selection of program-controlled operating/configuration options.
Buffer Memory	2048 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 1536 bytes (3 sectors) used for data buffering.

Characteristic	Specification
FUNCTIONAL (continued)	
DMA Transfers	16 word burst per controller DMA request. Burst is interruptable by other DMA requests. "Deadband" period between bursts is programmable/selectable.
PHYSICAL	
Packaging	Single hex height circuit board. Standard SPC 4-connector interface. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex board warping problems and insures integrity of backplane connector alignment.
Mounting	Any standard SPC slot in backplane or system unit.
Cable Connectors	One common 60-pin control (A) flat cable connector plus four 26-pin radial data (B) flat cable connectors.
ELECTRICAL	
Unibus Interface	Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Power	+5V ±5%, 8 amps max; -15V ±5%, 0.7 amps max; standard SPC backplane/system unit pins used.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial PDP-11 and VAX-11 computers and applicable disk drives.

APPENDIX E
SC31 SERIES DISK CONTROLLER

THIS LATEST EMULEX PDP-11 AND VAX-11 CONTROLLER GIVES YOU ALL THE ADVANTAGES OF...

INCORPORATING currently available large capacity Winchester or removable disk drives — including Fujitsu's new Eagle drive.

EMBEDDING the controller in only one existing hex-size slot of your standard PDP-11 or VAX-11 Unibus.

EMULATING the new Digital Storage Architecture (DSA) in the future, if desired.

PERFORMING a comprehensive set of self-test diagnostics.

WORKING properly when you plug it in and continuing to work reliably for thousands of hours.

YOU GET ALL THESE ADVANTAGES BECAUSE...

...the SC31 was designed specifically—and exclusively—to integrate large capacity, high performance disk drives with the DEC Unibus.

Incorporating a standard SMD interface, it is optimum for SMD class drives having capacities of 80 MBytes and above. Using advanced, modern microprocessor architecture, the SC31 has been configured, through a single "universal" firmware version, to emulate either DEC's RM02/RM03/RM05/RM80/RP06 disk subsystems on PDP-11 CPU's or the RM02/RM03/RM05/RP06/RM80 and expanded RM80 on VAX-11 computers.

The SC31 gives you the same performance and all the features of our large VAX controllers. And all on a single hex board that takes up minimum space and with low power consumption. Like our larger VAX controllers, the SC31 is designed to handle the new 1.8 MByte-per-second transfer rate drives — like the Eagle — *now*. And we've designed in the capability for quick conversion to emulate the new Digital Storage Architecture (DSA).

FOR PDP-11 UNIBUS APPLICATIONS...

The SC31 emulates applicable DEC disk subsystems using essentially any industry drive with a standard SMD interface. Naturally, all standard models for the PDP-11 Series are DEC diagnostic and operating system compatible. And the SC31 generates DEC-compatible media when the pack is identical to that of the equivalent DEC drive.

FOR VAX-11 APPLICATIONS...

The SC31 consists of a hardware/software package designed to add economical big disk storage to a VAX-11 system. Hardware is the SC31/BX programmable controller to optimize the controller for VAX-11 Unibus operation. Software is the EMULEX developed and supported VAX/UM software package which consists of four modules: Formatter, Driver, Boot, and Diagnostics. The software driver and diagnostic package is provided on TU58 cartridge or RX01 floppy and carries a 90-day warranty/update service.

The total package provides complete capability to install and operate the large capacity disk drives on the Unibus of any VAX-11 Series computer. It gives you the same or even greater storage capability than typical DEC Massbus installations at a fraction of the cost.

ONLY THE SC31 PROVIDES THIS COMPLETE LIST OF FEATURES AND BENEFITS...

ADVANCED MICROPROCESSOR ARCHITECTURE. A unique patented design incorporates high-speed bipolar technology to meet the performance demands of both conventional (1.2 MByte/sec.) and high performance (1.8 MByte/sec.) storage module and Winchester disks. The design also incorporates all facilities required to provide future emulations of the new Digital Storage Architecture, such as the UDA-50 controller.

COMPACT PACKAGING. Each unit is contained on only one stand-alone hex board which plugs into any standard Unibus SPC slot.

MIXED DISK DRIVE CAPACITIES. Disk drives having different configurations (i.e., number of heads and cylinders) may be operated together on the SC31 controller. Switch settings permit selection of any one of 64 different combinations of predefined drive configurations. Additionally, the SC31 offers the unique feature of being able to handle mixed drive types, i.e. RMXX and RPXX, on a single controller.

ADAPTIVE DMA THROTTLE. This SC31 feature was developed based on experience in a broad range of installations. During each DMA data transfer burst, the controller measures the waiting time for the other pending NPR requests and suspends its own DMA activity to permit other DMA transfers to occur. In addition, a programmable "deadband" time is provided between bursts to insure that CPU functions, including interrupt servicing, are not locked out for excessive periods of time by the high-speed disk transfers.

BUS EFFICIENCY. The SC31 has the most efficient implementation available in a microprocessor-based design and reduces bus delays on programmed I/O and DMA transfers to insignificant levels.

LOW POWER. Only 8 amps at +5V and 0.7 amps at −15V are required from the internal computer power supply.

RELIABILITY. Calculated MTBF is 30,000 hours; measured results show a much higher actual MTBF figure.

MEDIA COMPATIBILITY. Data packs are compatible/interchangeable between DEC RM02/03 (80 MByte), and RM05 (300 MByte) drives and an SC31-based subsystem incorporating media-compatible disk drives.

APPENDIX E
SC31 SERIES DISK CONTROLLER

INTERNAL SELF TEST. Automatic self-test executed by internal microcode with LED error status provided.

LARGE DISK I/O BUFFER. A 7168 byte RAM memory provides a full fourteen sector buffer to eliminate "data late" worries even when operated at low bus priorities. This facility, combined with the Adaptive DMA Throttle feature, permits a system to always operate at optimum rates regardless of Unibus configuration.

FOUR DRIVE SMD INTERFACE. Four disk ports are provided on the controller to eliminate auxiliary paddle boards or wiring panels for handling multi-drive installations. The standard SMD interface permits operation at cumulative daisy-chain A-cable lengths of 100 feet and radial B-cable distances of 50 feet.

UNIVERSAL DRIVE PORTS. Drive ports on the board are entirely transparent to drive number. Therefore, any drive number can be set up on any port and changed at any time without reconfiguring the controller.

ECC/CRC HARDWARE. Thirty-two bit error correction code (ECC) capable of correcting single error bursts up to 11-bits and detecting burst of longer length. Employing 16-bit CRC for header error detection.

COMMON HARDWARE. Controller model/versions are implemented strictly through microcode and on-board operations switches using common hardware.

LOGICAL TO PHYSICAL MAPPING. Switch-selectable configurations to allow mapping of two logical drives per physical drive. Enables user to take advantage of the larger capacity disk drives and their lower cost-per-bit, plus the added advantage of complete operating system transparency.

GENERAL SPECIFICATIONS

The following specifications apply to all SC31 Series large disk controllers.

Characteristic	Specification
Functional Design	High-speed bipolar microprocessor based controller for integration of essentially any disk drive having an industry-standard SMD interface to host VAX-11 or PDP-11 computer.
Computer Interface	Standard Unibus via SPC interface. Memory data parity check performed on all transfers. Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	Storage Module Drive (SMD) interface standard; serial data rate up to 1.8 MBytes per second (15 Mhz.). Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Number of Drive Configurations	A different drive configuration (type, size, etc.) may be operated in each port, with switch selection of up to 64 combinations of drives on the 4 available ports.
DMA Address Range	0-128 K Words.
Base Address	Four preprogrammed addresses, switch-selectable. Eight interrupt vectors.
Priority Level	BR5
Error Control	On-board 32-bit ECC and 16-bit CRC hardware for error detection/correction under microprogram control.

Characteristic	Specification
Status Display	Two edge-mounted LED's for error and activity display.
Option Switches	On-board slide switches provided for convenient selection of program controlled operating/configuration options.
Buffer Memory	8192 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 7168 bytes (14 sectors) used for data buffering.
DMA Transfers	16 word burst per controller DMA request, programmable 1-28. Burst is interruptable by other DMA requests. "Deadband" period between bursts is programmable/selectable.
Physical Packaging	Single hex height circuit board. Standard SPC 6-connector interface. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex board warping problems and insures integrity of backplane or system unit.
Number of Drives	1-4.
Cable Connectors	One common 60-pin control (A) flat cable connector plus four 26-pin radial data (B) flat cable connectors.
Power	+5V ±5%, 8 amps max; -15V ±5%, 0.7 amps max; standard SPC backplane/system unit pins used.
Environmental	Exceeds all environmental ranges and conditions specified for commercial PDP-11.

STANDARD MODELS

The SC31 is available in a single universal model which emulates standard DEC disk storage subsystems. Specific subsystem emulations are set by a switch on the board. Refer to the EMULEX "Controller Handbook" for detailed functional characteristics of DEC logical units.

• MODEL SC31/BX

For PDP-11 Series:

The SC31/BX emulates the DEC RH11 interface with RM02/RM03 (67.4 MByte), RM05 (256.2 MByte), or RP06 (174.4 MByte) logical units.

For the VAX-11:

The SC31/BX emulates the DEC RH11 interface with RM02/RM03 (67.4 MByte), RM05 (256.2 MByte), RM80 (124.6 MByte), or expanded RM80 (413.8 MByte) on Fujitsu's "Eagle."

Controller includes all standard functional features plus extended features such as command pack formatting and on-board ECC correction. Supports standard SMD and Winchester-type drives of 40-600 MByte capacity with a maximum data rate of 1.8 MBytes per second; packs are compatible with DEC Media and drives equivalent to DEC RM02, RM03, and RM05.

Emulates DEC RJM02, RJM05, RJM80, and RJP06 subsystems including dual-port.

DISK SUBSYSTEMS CHARACTERISTICS

CHARACTERISTIC	DEC SPECIFICATION				EMULEX SPECIFICATION					
	RJM03	RJP06	RJM05	RJM80						
Drive Type—Capacity	RM02-80	RP06-200	RM05-300	RM80-158	SMD-80	MMD-160	MMD-160	SMD-300	FMD-600	EAGLE
Emulation	N/A	N/A	N/A	N/A	RM03	2XRM03	RM80	RM05	2XRM05	2XRP06
Mode	N/A	N/A	N/A	N/A	Std.	Std.	Std.	Std.	Std.	Std.
Platters/Drive	3	10	10	4	3	6	6	10	10	6
Tracks/Cylinder	5	19	19	14	5	10	10	19	40	20
Cylinders/Drive	823	815	823	561	823	823	823	823	842	842
Sectors/Track	32	22	32	32*	32	32	32*	32	32	44
Data Bytes/Sector	512	512	512	512	512	512	512	512	512	512
MBytes/Logical Unit	67.4	174.4	256.2	124.6	67.4	67.4	124.6	256.2	256.2	174.4
Logical Units/Drive	1	1	1	1	1	2	1	1	2	2
MBytes/Drive	67.4	174.4	256.2	124.6	67.4	134.8	124.6	256.2	512.4	348.8
Phys. Drives/Controller, Max	8	8	8	8	4	4	4	4	4	4
MBytes/Controller, Max	539.4	1395.5	2049.6	996.8	269.7	539.2	498.4	1024.8	2049.6	1395.2
Speed, RPM	3600	3600	3600	3600	3600	3600	3600	3600	3600	3961
Bit Density, BPI	6060	4040	6060	6060	6060	6060	6060	6060	6060	12800
Data Rate (K Words/Sec)	491.5	337.9	491.5	491.5	491.5	491.5	491.5	491.5	491.5	743.6

*1 - 1 spare (skip) sector

APPENDIX F
SC71/72 SERIES DISK CONTROLLER

THE SC72 GIVES YOU ALL THE BASIC ADVANTAGES OF....

USING Standard DEC PDP-11 operating systems and diagnostic software.

INTERFACING directly to the internal 11/70 cache bus for optimum performance.

INCORPORATING up to four storage module, and/or Winchester, type disk drives in mixed configurations and speeds up to 1.8 MByte/second.

EMBEDDING the controller in the existing slots of the RH70 standard backplane.

PERFORMING a comprehensive set of self-test and subsystem diagnostics.

WORKING properly when you plug it in and continuing to work reliably for thousands of hours.

AND IT ALSO LETS YOU...

MIX disk drives of different type and capacity on the same controller for added system flexibility. Switch settings permit selection of up to 32 combinations of predefined disk drive configurations.

YOU GET THESE ADVANTAGES BECAUSE...

The SC72 was designed specifically—and exclusively—for application in the PDP-11/70 computer. It is *not* simply a general purpose controller which has been adapted to operate on the cache bus. Its packaging and performance are therefore far more efficient than that of any other similar product. Using advanced, modern microprocessor architecture, the SC72 has been configured through various firmware versions to emulate existing DEC disk storage systems, right down to execution of their diagnostics. In addition, many extra features have been added, and custom modes of operation can be provided for special applications.

WHILE YOU STILL GET THESE OTHER KEY FEATURES...

The following combination of key features exist only in the SC72, and illustrate why one or more of the product's standard or custom versions is by far the best choice for your PDP-11/70 mass storage application.

ADVANCED MICROPROCESSOR ARCHITECTURE. The same unique design, already proven in all EMULEX disk controller products, incorporates highspeed bipolar technology to meet the performance demands of present and anticipated storage module, and/or Winchester; disk control/data transfer rates and to provide almost unlimited application flexibility.

MEDIA COMPATIBILITY. Data packs are compatible and interchangeable between DEC RM02/03 (80 MByte), RM05 (300 MByte) and RP06 (200 MByte) drives and the corresponding SC72-based subsystem incorporating media compatible disk drives.

COMPACT PACKAGING. Only one small interconnect plus three active pcb's plug directly into the RH70 backplane area to minimize mounting space requirements, eliminate "boat anchor" boxes and cables, simplify spares stocking requirements, avoid specially wired system units/backplanes, reduce component count and maximize inherent reliability.

INTERNAL SELF-TEST. Automatic controller self-test, supported by error display lamps, is contained in on-board firmware.

LOW POWER. Only 11 amps are required from the internal +5 volt source which eliminates the need for separate power supplies and special cooling provisions.

STANDARD SMD INTERFACE. Any four industry compatible drives, all operating at serial data rates up to 1.8 MByte/second, may be integrated in mixed configurations into a single subsystem. The SC72 is adaptable to all known present and future disk products of this type. Fully buffered disk I/O circuitry permits operations at radial distances up to fifty feet and daisy chain distances up to one hundred feet.

CACHE BUS INTERFACE. The SC72 interfaces directly to the internal cache bus for high speed DMA transfers. This eliminates the expensive Massbus, optimizes system performance, and preserves software transparency. A full 2 Megaword memory address range is provided.

LARGE DISK I/O BUFFER. An 8192 byte RAM memory provides a full 14 sector data buffer in all applications.

ECC/CRC HARDWARE. Thirty-two bit ECC for data error detection/correction (single 11-bit error burst), and sixteen-bit CRC for header error detection, all under microprogram control, is provided in all controller versions.

CONVENIENCE FEATURES. A host of items—such as convenient priority level jumpers and switch selection of bus address range, interrupt vector, and configuration/operational options—eliminates multiple hardware versions and makes the unit simple and easy to configure.

COMMON HARDWARE. Identical physical circuit boards, adapted through firmware only, are used for all SC72 versions, to eliminate the use of different hardware for each disk type and capacity, controller version, and/or software mode.

APPENDIX F
SC71/72 SERIES DISK CONTROLLER

GENERAL SPECIFICATIONS

The following specifications apply to all SC72 Series large disk controllers.

Characteristic	Specification
FUNCTIONAL	
General	All general EMULEX SC72 and DEC RH70/RM03/RM05/RP06/RM80 functional specifications apply.
Design	High-speed bipolar microprocessor-based controller for integration of industry-standard SMD and Winchester type mass storage devices to host PDP-11/70 computer; incorporates unique design to achieve extreme high-speed operations with minimum hardware.
Computer Interface	Direct to internal cache bus via RH70 backplane. Data parity check performed on all transfers.
Self Test	Controller executes internal self-test at power-up; LED display of error conditions.
Bus Address Range	0-2048 K Words.
Bus Register Base Address	8 switch selectable ranges.
Vector Address	Switch selectable, range 0-774.
Priority Level	Jumper selectable, BR4-7.
Error Control	On-Board 32-bit ECC and 16-bit CRC hardware for error detection/correction under microprogram control.
Status Display	Edge-mounted LED's for mode/error/status display under microprogram control.
Option Switches	On-board switches for selection of program-controlled operating/configuration options.
Data Transfer, Cache Bus	Double 32-bit word transfer per access.
Data Transfer, Disk	1.8 MByte/second serial rate; 14 sector data buffer. Multiple successive adjacent sector transfers across track boundaries within a cylinder without sector interlace or loss of disk rotation.
Buffer Memory	8192 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 7168 bytes used for data buffering.

Characteristic	Specification
PHYSICAL	
Packaging	One small interconnect plus three stand-alone active printed circuit boards; edge connector interface to cache bus and Unibus. Extractor handles provided for easy insertion/removal.
Mounting	Standard available slots in RH70 interface area.
Cable Connectors	One common 60-pin control (A) flat cable connector on A board; four 26-pin radial data (B) flat cable connectors on B board.
Physical Drive	1-4 per controller.
ELECTRICAL	
Unibus Interface	Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	Storage Module Drive (SMD) interface standard; serial data rate up to 1.8 MByte/second. Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Dual Port Drives	All standard versions support dual port drive hardware (standard DEC software does not support dual port operations).
Power	+5V ±5%, 11 amp maximum; -15V ±5%, 1 amp maximum.
SOFTWARE COMPATIBILITY	
	Standard Diagnostics: ZJ241-RB kit and ZJ180-RB
	Operating Systems: RSTS-E; RSX11M; RSX11M+
Extended Operations	Disk Pack Format Command Transparent ECC Read Command
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial PDP-11/70 computers and applicable disk drives.

APPENDIX F
SC71/72 SERIES DISK CONTROLLER

STANDARD MODEL

The EMULEX Model BX (RWM03/RWM05/RWM80/RWP06 emulation) is provided in a single standard version which handles drive capacities in the range of 80-600 MBytes. Either standard or "expanded" logical RM03 (67.4 MByte), RM05 (256.2 MByte), RM80 (124.7 MByte), or RP06 (174.4 MByte) units are mapped onto the disk drive in use. The SC72/BX executes DEC diagnostics, operating systems, and applications software.

MODEL SC72/BX

Emulates the DEC RH70 with one or more of the following subsystem configurations selected by on-board option switches. All configurations support 1-4 physical drives per controller.

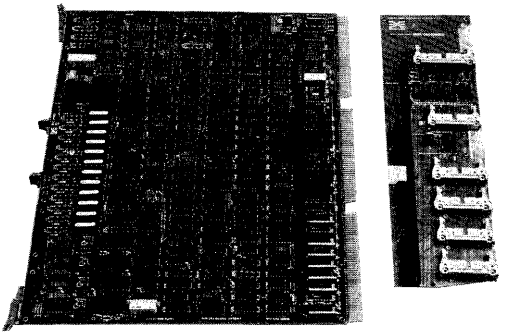
- Standard RM03 logical drive mapped onto an 80 MByte SMD type drive, or two RM03 logical drives mapped onto a 160 MByte MMD type drive;
- Standard RM05 logical drive of 256.2 MBytes mapped onto a 300 MByte SMD type drive, or two RM05 logical drives mapped onto a 600 MByte FMD type drive;
- Standard RM80 logical drive mapped onto a 160 MByte MMD type drive;
- Standard RP06 logical drive mapped onto a 200 MByte SMD type drive, or two RP06 logical drives mapped onto a Fujitsu Eagle (M2351) drive;
- "Expanded" RP06 logical drive of 379 MBytes mapped onto a Fujitsu Eagle drive.

DISK SUBSYSTEM CHARACTERISTICS

CHARACTERISTIC	DEC SPECIFICATION				EMULEX SPECIFICATION							
	RWM03	RWM05	RWM80	RWP06								
Drive Type — Capacity	RM02	RM05-300	RM80-158	RP06-200	SMD-80	MMD-160	SMD-300	FMD-600	MMD-160	SMD-200	EAGLE	EAGLE
Emulation	N/A	N/A	N/A	N/A	RM03	2 X RM03	RM05	2 X RM05	RM80	RP06	2 X RP06	RP06
Mode	N/A	N/A	N/A	N/A	Std.	Std.	Std.	Std.	Std.	Std.	Std.	Exp.
Platters/Drive	3	10	4	10	3	6	10	10	6	10	10	10
Tracks/Cylinder	5	19	14	19	5	10	19	40	10	19	20	20
Cylinders/Drive	823	823	561	815	823	823	823	842	823	815	842	842
Sectors/Track	32	32	32*	22	32	32	32	32	32*	22	44	48
Data Bytes/Sector	512	512	512	512	512*	512	512	512	512	512	512	512
MBytes/Logical Unit	67.4	256.2	124.7	174.4	67.4	67.4	256.2	256.2	124.7	174.4	174.4	413.8
Logical Units/Drive	1	1	1	1	1	2	1	2	1	1	2	1
MBytes/Drive	67.4	256.2	124.7	174.4	67.4	134.8	256.2	512.4	124.7	174.4	348.8	413.8
Drives/Controller Max	8	8	8	8	4	4	4	4	4	4	4	4
MBytes/Controller Max	539.4	2049.6	996.8	1395.5	269.7	539.2	1024.8	2049.6	498.8	697.7	1395.5	1516.8
Speed RPM	3600	3600	3600	3600	3600	3600	3600	3600	3600	3600	3961	3961
Bit Density BPI	6060	6060	6060	4040	6060	6060	6060	6060	6060	4040	12,790	12,790
Data Rate (K words/sec)	491.5	491.5	491.5	337.9	491.5	491.5	491.5	491.5	491.5	337.5	743.6	743.6

* 11 * Spare Sector

APPENDIX G
SC750 SERIES DISK CONTROLLER



THIS IS THE ONE FOR RP06 EMULATION ON YOUR VAX-11/750!

The EMULEX SC750 offers RP06 emulation with DEC software transparency and standard operating system support on your VAX-11/750. But that's just the beginning. The SC750 features maximum flexibility, allowing a variety of drives to be connected to your VAX system. With instant configuration by simple switch selection, the SC750/B2 can even map two logical units onto each drive. The compact SC750 comes packaged on a fully embedded single extended-height hex board with low power consumption and super high reliability. Another optimum solution from EMULEX — THE GENUINE ALTERNATIVE.

THE SC750/B2 GIVES YOU ALL THE ADVANTAGES OF...

INTERFACING the VAX-11/750's own internal bus for optimum performance — an important alternative for busy systems with a crowded Unibus Adapter. The controller ties directly to the Comet Memory Interconnect (CMI) of the VAX-11/750 and resides in an existing RH750 slot of the CMI backplane.

EMULATING the DEC RH750 MBA with attached RP06 drive, and executing standard disk subsystem diagnostics, applications packages and system software under VMS or UNIX.

INCORPORATING up to four industry-standard storage module and/or Winchester-type disk drives in mixed configurations. By handling disk rates of 1.8 MBytes/second or more, the SC750/B2 is suitable for newer high-density disk drives (such as the Fujitsu Eagle†).

CONSIDER THESE OUTSTANDING FEATURES...

...to see why the SC750/B2 is your best choice for handling RP06 disk storage requirements on your VAX-11/750.

HIGH SPEED DATA TRANSFER. Efficient 32-bit data words are transmitted between the SC750/B2 and the internal CPU memory via the CMI bus for maximum system performance.

MIXED DRIVE CAPACITIES. Disk drives of different type and capacity may be operated together on the SC750/B2 for added system flexibility. Switch settings permit instant selection of any one of 32 different combinations of predefined drive configurations on the four ports.

MEDIA COMPATIBILITY. Disk packs formatted by the SC750/B2 controller are media compatible and interchangeable with DEC RP06 (200 MByte) packs when an equivalent Memorex 677** disk drive is used.

WIDE CHOICE OF DRIVES. The SC750/B2 supports essentially all disk drives having an industry-standard SMD interface, regardless of manufacturer and/or drive configuration.

DRIVE CONFIGURATION READOUT. Drive configuration (cylinders, tracks, sectors) can be read by the CPU to permit writing custom, self-configuring device drivers for non-standard disk capacities.

ECC/CRC HARDWARE. The SC750/B2 provides DEC-standard ECC for data error detection/correction and CRC for header error detection.

*DEC, VAX, Massbus, and CMI are Trademarks of Digital Equipment Corporation.

†Eagle is a Trademark of Fujitsu America, Inc.

**Memorex is a trademark of Memorex Corporation.

APPENDIX G
SC750 SERIES DISK CONTROLLER

MODEL SC750/B2 DISK CONTROLLER

The SC750/B2 not only emulates the RH750 subsystem supported under VMS, but also includes built-in disk formatting plus the ability to operate with a mix of standard and non-standard drive types and capacities. Two logical units may be mapped onto each physical drive to handle large drive capacities with unpatched DEC diagnostics and operating software. A sample of possible disk drive types and formatted capacities for use with the SC750/B2 are summarized below. Refer to the EMULEX "Controller Handbook" for more detailed information.

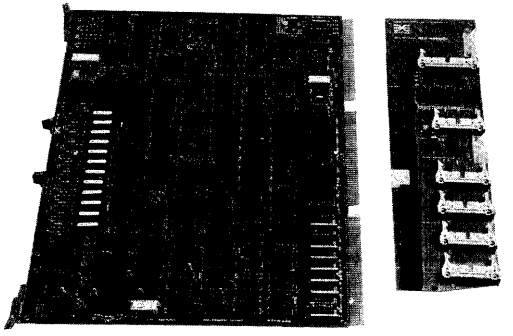
UNFORMATTED DRIVE		EXAMPLE DRIVE MODELS	EMULATION MAPPINGS	FORMATTED DRIVE CAPACITY
TYPE	CAPACITY (MB)			
SWD	200	Memorex 677*	RP06	174.4 MB
Winchester	474	Fujitsu "Eagle"	2 X RP06	348.8 MB

*Media Compatible with DEC

GENERAL SPECIFICATIONS

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of disk drives with an SMD interface to host VAX-11/750 computer via CMI bus.
Disk Interface	Storage Module Drive (SMD) with serial data rate of 1.8 MB/sec. or more.
Number of Drives	1-4 physical; 1-8 logical.
Drive Configurations	Different drive configurations (type and size) may be operated on each port, with switch selection of up to 32 predefined drive configurations on the four disk ports.
Software Transparency	Operating Systems: VMS; UNIX. Diagnostics: EVRAA, EVRAC, EVRDA, EVRDB, EVRGA, EVRGB.
DMA Address Range	16 Megabytes.
CMI Address (HEX)	F28000, F2A000, F2C000, F2E000.
Priority Level	BR5.
Error Control	DEC-compatible 32-bit ECC for data and 16-bit CRC for headers. Correction of single error burst up to 11 bits.
Status Display	Two edge-mounted LED's for self-test fault and data transfer activity.
Option Switches	Selection of base address, arbitration levels, drive configurations, etc. via convenient on-board switches.
DMA Transfers	High speed 32-bit parallel via CMI bus.
Data Buffer	512 Bytes.
Extended Operations	Disk format command.
Self Test	Controller executes extensive self-test routines at power up; LED Fault display.
PHYSICAL	
Packaging	Single extended hex-height circuit board. Standard RH750-type backplane connections. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex-board warping problems and insures integrity of backplane connector alignment.
Disk Cables	One common 60-conductor daisy-chained flat control (A) cable plus up to four 26-conductor radial flat data (B) cables, from an EMULEX cable adapter plugged onto the V-MASTER backplane connector pins. Differential line drivers and receivers used on all signal lines allow cable lengths up to 100 and 50 feet on the A and B cables, respectively.
ELECTRICAL	
Power (from CPU)	Controller: +5V ± 5%, 10 amps max. Cable Adapter: -15V ± 5%, 0.7 amps max.
ENVIRONMENTAL	Exceeds all environmental ranges and conditions specified for commercial VAX-11/750, with applicable disk drives.

APPENDIX H
SC758 SERIES DISK CONTROLLER



NOW YOU CAN MAX YOUR VAX

With the new EMULEX SC758 you can take advantage of even greater expansion possibilities on your VAX-11/750. As a plug-in module to the EMULEX SC750, the SC758 controller now allows you to interface up to *eight* disk drives — 80 to 675 MBytes, at rates up to 1.8 MBytes/second.

And you get everything else you could ask for in a Massbus controller—VMS software, high-speed CMI bus data transfer, mixed drive capability, large storage capacity, and more. With the EMULEX Genuine Alternative you can have it all... performance, flexibility, economy and reliability.

The SC758 Disk Controller Board gives you the following features and performance for your VAX-11/750...

SINGLE BOARD PACKAGE. A single extended hex-height pcb, containing the entire CMI interface and disk controller, installs directly in any one of three available RH750 slots without modification to the VAX-11/750 backplane.

TRANSPARENT OPERATION. Standard versions of the SC758 emulate the DEC RH750 with attached RM02, RM03, RM05 or RM80 drives, and operate transparently to VAX/VMS and UNIX operating systems and DEC diagnostics.

MEDIA COMPATIBILITY. Disk packs formatted by the SC758 are compatible and interchangeable with DEC RM02/03 (80 MByte), and RM05 (300 MByte) packs when an equivalent SMD type drive is used.

HIGH PERFORMANCE DISK CAPABILITY. The SC758 is designed to handle serial data rates up to 1.8 MBytes as required by new generation high-density disk drives.

ECC/CRC HARDWARE. Thirty-two bit ECC for data error detection/correction (single 11-bit error burst) and 16-bit CRC for header error correction is provided.

MIXED DRIVE CAPACITIES. Disk drives having different configurations (i.e. number of heads, cylinders, and sectors) may be operated together on the controller. Switch settings permit selection of any one of 32 different combinations of predefined drive configurations on the eight disk ports.

UNIVERSAL DRIVE PORTS. Eight physical drive ports on the board are entirely transparent to drive address. Therefore, any drive address can be set up on any port and changed at any time without reconfiguring the controller.

DRIVE CONFIGURATION READOUT. Drive configuration (cylinders, tracks, sectors) can be read by the CPU to permit writing custom self-configuring device drivers for non-standard disk capacities.

WIDE CHOICE OF DRIVES. The SC758 supports essentially all disk drives having an industry standard SMD interface, regardless of manufacturer and/or drive configuration.

* DEC, VAX, VMS, and CMI are trademarks of Digital Equipment Corporation

APPENDIX H
SC758 SERIES DISK CONTROLLER

WE OFFER MORE THAN JUST A GREAT PRODUCT.

With the SC758 you get superb quality and excellent support from the EMULEX team. All pcb components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled for over 96 hours (while operating) to insure ultimate reliability from the moment they are installed. Plant production capability exists to meet the highest of volume requirements. All EMULEX products are backed by a full one year warranty and supported worldwide by the company's technical applications group.

GENERAL SPECIFICATIONS

The following specifications apply to all SC758 Series large disk controller models.

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of disk drives with an SMD interface to host VAX-11/750 computer.
Computer Interface	VAX-11/750 CMI bus via RH750 backplane interface.
Disk Interface	Storage Module Drive (SMD).
Disk Data Rate	Serial rate up to 1.8 MB/sec.
Number of Drives	1-8 physical.
Drive Configurations	Different drive configurations (type, size, etc.) may be operated on each port, with switch selection of up to 32 combinations of predefined drive configurations on the eight disk ports.
DMA Address Range	16 Megabytes.
CMI Address (HEX)	F28000, F2A000, F2C000, F2E000.
Priority Level	BR5
Error Control	32-bit ECC for data and 16-bit CRC for headers. Correction of single error burst up to 11 bits.
Status Display	Two edge-mounted LED's for self-test fault and data transfer activity.
Option Switches	On-board slide switches provided for convenient selection of: base address, arbitration levels, and drive combinations.
Data Buffer	512 Bytes.
Self Test	Controller executes extensive self-test routines at power up; LED Fault display.
Extended Operations	Disk format command.
DMA Transfers	32-bit parallel via CMI bus.

Characteristic	Specification
PHYSICAL	
Packaging	Single extended hex-height circuit board. Standard RH750 backplane interface. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex-board warping problems and insures integrity of backplane connector alignment.
Mounting	Any standard RH750 slot in VAX-11/750 backplane (3 available).
Cables	One common 60-conductor control (A) flat cable plus eight 26-conductor radial data (B) flat cables, from an EMULEX cable adapter plugged onto VAX-11/750 backplane connector pins.
ELECTRICAL	
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet respectively.
Power (from CPU)	+5V + 5%, 11 amps max; -15V ± 5%, 0.7 amps max.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial VAX-11/750 and applicable disk drives.
COMPATIBILITY	
Media	Format same as DEC packs for RM03 and RM05.
Software Transparency	Operating Systems: VMS; UNIX Diagnostics: EVRAA, EVRAC, EVRDA, EVRDB, EVRGA, EVRGB.

APPENDIX I
SC7000 SERIES DISK CONTROLLER

THE SC7000 GIVES YOU ALL THE ADVANTAGES OF...

INCORPORATING up to four industry-standard removable and/or Winchester-type storage module disk drives in mixed configurations of 825 MBytes or more — with a single board.

INTERFACING both the VAX-11/750 and 780 computer systems. The SC7000 interfaces with the computer's own internal bus for optimum performance — an important alternative for busy systems with a crowded Unibus. In a VAX 750, the controller ties directly to the Comet Memory Interconnect (CMI) and, in a 780, the controller interfaces through EMULEX's V-Master, where conversion to the Synchronous Backplane Interconnect (SBI) takes place.

EXECUTING standard disk subsystem diagnostics, applications packages and system software under VMS and UNIX on VAX-11 CPU's.

EMBEDDING a single controller in an existing RH750 slot of the standard CMI bus backplane (VAX-11/750) or EMULEX VMaster (fits in a VAX-11/780 option or terminator slot).

FUNCTIONING properly when you plug it in and continuing to work reliably for thousands of hours.

YOU GET THESE ADVANTAGES BECAUSE...

The SC7000 was designed specifically — and exclusively — for the VAX-11/750 and 780 computers. The result: packaging is optimized, performance is maximized and cost is minimized.

CONSIDER THESE ADVANTAGES...

...to see why the SC7000 is your best choice for handling VAX-11/750 and 780 disk storage requirements.

HIGH PERFORMANCE DISK CAPABILITY. The controller's high performance disk interface is designed to handle serial data rates of 1.8 MBytes/sec. or more, making it suitable for the new generation high-density disk drives available today, such as the Fujitsu Eagle Model 2351A or the CDC XMD Model 9771.

TRANSPARENT OPERATION. Naturally, since the controller emulates the DEC RH750 or 780 Massbus Adapter with attached RM03, RM05, or RM80 disk, the subsystem operates transparently to DEC's VMS, UNIX and other VAX operating systems and to DEC diagnostics. If RP06 emulation is required, a similar EMULEX controller — either Model SC750/B2 or SC780/B2 — may be used.

MEDIA COMPATIBILITY. Disk packs formatted by the SC7000 controller are media compatible and interchangeable with DEC RM02/03 (80 MByte), and RM05 (300 MByte) packs when an equivalent removable-pack disk drive is used.

MIXED DRIVE CAPACITIES. The SC7000 supports essentially all disk drives having an industry-standard SMD interface, regardless of manufacturer and/or drive configuration. Disk drives of different type (removable media vs. Winchester) and capacity (having different number of heads and cylinders) may be operated together on the controller for added system flexibility. Switch settings permit instant selection of any one of 64 different predefined disk drive configurations on each port.

UNIVERSAL DRIVE PORTS. The four physical drive ports on the board are entirely transparent to drive address. Therefore, any drive address can be set up on any port and changed at any time without reconfiguring the controller. If more than four drive ports are required, a similar EMULEX controller — either Model SC758 or SC788 — may be used, providing ports for up to eight physical drives.

DRIVE CONFIGURATION READOUT. Drive configuration (cylinders, tracks, sectors) can be read by the CPU to permit writing custom, self-configuring device drivers for non-standard disk capacities.

ECC/CRC HARDWARE. Thirty-two bit DEC-compatible ECC for data error detection/correction (single 11-bit error burst) and 16-bit CRC for header error detection is provided.

ADVANCED MICROPROCESSOR ARCHITECTURE. The same unique (patent pending) design already proven in EMULEX controller products, incorporates high speed bi-polar bit-slice technology to meet the performance demands of emulating DEC Massbus disk subsystems with high disk transfer rates and to provide almost unlimited application flexibility, while reducing component count for low cost and high reliability.

HIGH SPEED DATA TRANSFER. In the 750, 32-bit data words are transmitted between the SC7000 and the internal CPU memory via the CMI bus. In the 780, 64-bit words are transferred on the SBI bus for maximum system performance.

LARGE RAM BUFFER. A large 4K RAM buffer has been provided to give the board maximum buffering (12 sectors). In a system with high-speed drives and a lot of bus and memory activity, this substantially reduces the risk of losing a revolution and virtually eliminates possibility of a data late.

INTERNAL SELF-TEST. During power-up, the controller automatically performs extensive internal firmware-based diagnostic tests and flags detected errors with an LED activity/fault indicator.

APPENDIX I
SC7000 SERIES DISK CONTROLLER

CONVENIENCE FEATURES. A host of items — such as convenient slide switch selection of drive/processor type, priority level, bus address range, interrupt vector, and configuration/functional options — eliminate multiple hardware versions and make the unit simple and easy to configure. And a cable adapter simplifies drive installation.

LOW POWER. Just 10 amps are required from the internal +5 volt source, eliminating the need for separate power supplies or extra cooling.

SINGLE-BOARD PACKAGE. A single extended hex-height pcb, containing the entire CMI interface plus disk controller, installs directly into any one of three available RH750 slots without modification to the VAX-11/750 backplane. In the VAX-11/780, the SC7000 installs into either of the two slots in the EMULEX V-Master, which then mounts directly into a single MBA option panel space or in the SBI bus terminator location, and can use available internal power.

The SC7000's single board design minimizes mounting space requirements, eliminates external "boat-anchor" controller boxes, reduces space requirements, minimizes cost, simplifies spares stocking requirements, reduces component count and maximizes inherent reliability.

SC7000 DISK CONTROLLER SPECIFICATIONS

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bi-polar microprocessor-based controller for integration of disk drives with an SMD interface to host CPU.
Computer Interface	VAX-11/750 CMI bus via RH750 backplane interface. VAX-11/780 via EMULEX V-Master to SBI bus.
Disk Data Rate	Serial data rate of 1.8 MB/second or more
Number of Drives	1-4 physical; 1-8 logical.
DMA Address Range	16 MB on 750, 537 MB on 780.
CMI Address (HEX)	F28000,F2A000, F2C000.
SBI Address (HEX)	20008000 through 20016000
Priority Level	BR5 (or BR4-BR7 via V-Master).
Error Control	32-bit DEC-compatible ECC for data and 16-bit CRC for headers. Correction of single error burst up to 11 bits.
Option Switches	On-board slide switches provided for convenient selection of: CPU type, base address, arbitration levels, and drive configurations, etc.
Data Buffer	12 sectors.
Extended Operations	Disk format command.
DMA Transfers	32-bit parallel via CMI bus; 64-bit parallel via SBI bus.

Characteristic	Specification
PHYSICAL	
Packaging	Single extended hex-height circuit board. Standard RH750-type backplane connections. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex-board warping problems and insures integrity of backplane connector alignment.
Cables	One common 60-conductor control (A) flat cable plus four 26-conductor radial data (B) flat cables, from an EMULEX cable adapter plugged onto VAX-11/750 or V-Master backplane connector pins.
Mounting	Any standard RH750 backplane (3 available). In 780, mounts in either slot of EMULEX V-Master.
ELECTRICAL	
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Power (from CPU)	+5V ±5%, 11 amps max; -15V ±5%, 0.7 amps max.
COMPATIBILITY	
Media	Format same as DEC generated media, when equivalent disk drives are used.
Software Transparency	Operating Systems: VMS; UNIX Diagnostics: EVRAA, EVRAC, EVRDA, EVRDB, EVRGA, EVRGB.

APPENDIX I
SC7000 SERIES DISK CONTROLLER

WE OFFER MORE THAN JUST A GREAT PRODUCT.

With the SC7000 you get superb quality and excellent support from the EMULEX team. Assembly starts with exclusive use of pretested, pre-aged parts per Mil Std 833. Next, all assembled units are thoroughly tested at the component, assembly, and subsystem level. This is followed by dynamic environmental burn-in for 96 hours over a cyclic temperature range of 0-55° C. Units passing environmental tests are then subjected to a 100% QC certification test at the subsystem level. These demanding procedures yield negligible infant mortality rates on production units. Calculated MTBF of the SC7000 exceeds 60,000 hours; and detailed failure data is maintained by EMULEX to insure that actual MTBF experience conforms to predicted results.

DISK CONTROLLER EMULATIONS

The SC7000 used in the VAX-11/750 (or the 780 with the EMULEX V-Master) emulates standard RM03, RM05, and RM80 Massbus disk subsystems supported under VMS and UNIX. Included are all basic functional features of the equivalent DEC subsystem, plus extended capability which includes built-in disk formatting and the ability to operate with a mix of standard and non-standard drive types and capacities.

Standard logical drive formatted capacities are: RM03 — 67.4 MBytes; RM05 — 256.2 MBytes; RM80 — 124.6 MBytes. Standard, expanded, and contracted logical units may be mapped onto each physical drive, with one or two logical units mapped onto each physical drive to handle large drive capacities with unpatched DEC diagnostics and operating system software.

Any drive type may be handled on any port and any of the emulations may be run concurrently on one controller, using unmodified software.

The drive configuration on each controller port is defined by the on-board configuration switches which select from the 64 available configurations resident on the board. For drives equivalent to the CDC 9762 and the 9766, disk packs written by the SC7000 are compatible and interchangeable with the DEC RM03 and RM05 packs, respectively.

The table below lists a small sample of possible disk drive sizes and types for use with the SC7000. Please refer to the EMULEX *"Controller Handbook"* for additional information.

MODEL SC7000/B1

UNFORMATTED DRIVE		EXAMPLE DRIVE MODELS	EMULATION/MAPPINGS	FORMATTED CAPACITY (MB)
TYPE	CAPACITY (MB)			
Removable	80	CDC 9762 CDC 9710	RM03	67.4
Winchester	80	Fujitsu 2312	RM03	67.4
Winchester	160	CDC 9715-160 Fujitsu 2284	RM80 or 2 X RM03	124.6 or 134.8
Removable	300	CDC 9766	RM05	256.2
Winchester	340	CDC 9715-340 Fujitsu 2294	RM05 or 2 X RM80	256.2 or 249.2
Winchester	474	Fujitsu Eagle 2351A	RM80 (Exp) RM05 (Exp)	405.2 413.8
Winchester	515	CDC 9715-500	RM05 (Exp)	436.8
Winchester	675	CDC 9775	2 X RM05	512.4
Winchester	825	CDC 9771	RM05 (Exp)	704.6

ALSO AVAILABLE FOR YOUR DISK NEEDS...

You can choose from a wide variety of EMULEX disk subsystems that couple the SC7000 with CDC (Control Data Corporation) or Fujitsu disk drives.

The drives available are all standard removable media or Winchester type drives with SMD interfaces and are offered in a wide range of sizes. Ask for our separate subsystem data sheets with available configurations and detailed disk drive specifications.

APPENDIX J
V-MASTER/780 MASS STORAGE ADAPTER

THE EMULEX V-MASTER/780 MASS STORAGE ADAPTER...

...represents a unique approach to adding alternative mass storage devices to a VAX-11/780 system. V-MASTER/780 consists of a compact System Chassis which houses pcb's containing basic interface circuitry to the internal high-speed Synchronous Backplane Interconnect (SBI). Within this chassis, either one or two separate, EMULEX Massbus-type peripheral controllers can be installed. The V-MASTER/780 chassis is embedded in the host VAX-11/780 cabinet, using mounting space allocated for standard DEC RH780 Massbus Adapters (MBA's) or the SBI bus terminator, and power from internal sources.

Controllers which may be added to the V-MASTER/780 include the EMULEX disk and tape controller boards with bus structures designed for the VAX-11/750 computer. The disk controller board — designated the SC7000 — provides users with maximum performance, software transparency, and the option of selecting from the many excellent, cost-effective SMD class disk products — 80 MBytes and up — available from independent peripheral manufacturers. The tape controller board — designated the TC7000 — provides users full Massbus-level tape subsystem performance, hardware/software transparency, and the option of selecting from existing and future industry-standard half-inch start/stop or streaming transports with start/stop interfaces, with densities of 800, 1600, 3200 and/or 6250 bpi. Either or both of these controllers may be incorporated into a single V-MASTER/780 to provide a complete mass storage control module in a single, fully-embedded package.

THE V-MASTER/780 CONCEPT...

...follows the same basic, advanced design architecture and innovative implementation that always marks EMULEX controller products. Like all our controllers, the V-MASTER/780 has been designed specifically — and exclusively — for its host CPU environment, namely the VAX-11/780. The result: packaging is optimum, cost is minimized, and performance is maximized.

CONSIDER THESE OBVIOUS ADVANTAGES...

...of the V-MASTER/780 concept and it's easy to see why this product really is the only Genuine Alternative for VAX-11/780 mass storage requirements.

COMPACT PACKAGE. A single extended hex-height pcb, containing the entire V-MASTER Interface (VMI) plus disk or tape controller, installs directly into either of the two V-MASTER/780 controller slot locations. The entire single or dual controller configuration mounts directly in a single MBA option panel space or in the SBI bus terminator location, and can use available internal power. Eliminates external "boat anchor" controller boxes, reduces space requirements, increases reliability, minimizes cost.

STANDARD EMULEX VAX-11/750-TYPE CONTROLLER HARDWARE. The unit incorporates disk and/or tape controller boards with proven hardware and standard microcode. The designs are proven, and spares stocking is minimized for users of both 11/750 and 11/780 CPU's. And future CMI-compatible controllers developed for the VAX-11/750 by EMULEX can be made available on the VAX-11/780 using this same approach.

FLEXIBLE CONFIGURATION. One or two EMULEX SC7000 and/or TC7000 controllers may be installed in the V-MASTER/780 System Chassis with the basic interface boards; the second controller is added at a fraction of the basic single-controller package cost.

THE SC7000 DISK CONTROLLER BOARD...

...provides you with a wide choice of disk drives with the industry-standard SMD interface so popular today. The controller's High Performance interface is designed to handle serial data rates up to 1.8 MBytes/sec or more as required by the new generation high-density disk drives.

TRANSPARENT OPERATION. The standard version of the SC7000 emulates the DEC RH780 MBA with attached RM03, RM05 and RM80, and operates transparently to the VAX/VMS operating system and DEC diagnostics. The SC780, a sister controller, may be used if RP06 emulation is desired. Disk packs formatted by these EMULEX controllers are media compatible and interchangeable with DEC RM03 (67 MByte), RP06 (174 MByte), and RM05 (256 MByte) packs when an equivalent SMD-type drive is used.

UNIVERSAL DRIVE PORTS. The four physical drive ports on the board are entirely transparent to drive address. Therefore, any drive address can be set up on any port and changed at any time without reconfiguring the controller. If more than four drive ports are required, a sister controller — the SC788 — may be used, providing ports for up to eight physical drives.

DRIVE CONFIGURATION SWITCHES. Disk drives having different configurations (i.e., number of heads and cylinders) may be operated together on the controller. Switch settings permit instant selection of any one of 64 different predefined drive configurations on each port.

ECC/CRC HARDWARE. Thirty-two bit DEC-compatible ECC for data error detection/correction (single 11-bit error burst) and 16-bit CRC for header error detection is provided.

APPENDIX J
V-MASTER/780 MASS STORAGE ADAPTER

DRIVE CONFIGURATION READOUT. Drive configuration (cylinders, tracks, sectors) can be read by the CPU to permit writing custom, self-configuring device drivers for non-standard disk capacities.

THE TC7000 TAPE COUPLER BOARD...

...gives you the advantage of high-density GCR tape efficiency plus software transparency, emulating the DEC TM03/TU77 tape subsystem for operation on your VAX-11/750 or 780. PE and NRZI formats are supported, too. With this single board, you can add up to four STC or up to eight Pertec-compatible drives to your VAX. You get everything you could ask for in a Massbus-type controller — VMS software transparency, high-speed data transfer, high speed/high capacity storage, and more.

ADVANCED MICROPROCESSOR ARCHITECTURE. The same unique (patent pending) design already proven in all EMULEX disk and tape controller products, incorporates high speed bipolar bit-slice technology to meet the performance demands of GCR control/data transfer rates and provide almost unlimited application flexibility, while reducing component count for low cost and high reliability.

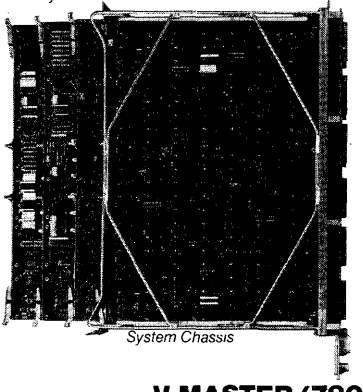
TRANSPARENT OPERATION. The TC7000 combined with an applicable streaming or start/stop tape transport and formatter, emulates the function of DEC's TGU77 and TEU77 tape subsystems including execution of standard diagnostic and operating software.

STANDARD TAPE DRIVES. The TC7000 supports both the industry-standard Pertec and STC tape formatter interfaces in the manufacturer's standard configuration. Switch settings permit selection of either the STC or the Pertec-type interface.

FORMAT CAPABILITIES. Tape drives having different formats (i.e., GCR/PE/NRZI) can be operated together on the coupler. The operator may select the tape format at the drive.

MEDIA COMPATIBILITY. Tapes written by the TC7000 are compatible and interchangeable with those written on the DEC TM03/TU77 and other standard systems.

CONVENIENCE FEATURES. A host of items — such as convenient slide switch selection of drive type, priority level, bus address range, interrupt vector, and configuration/functional options — eliminate multiple hardware versions and make the unit simple and easy to configure. And a universal adapter simplifies cable installation.



System Chassis

Cable Adapter Board

SU78 End Terminator

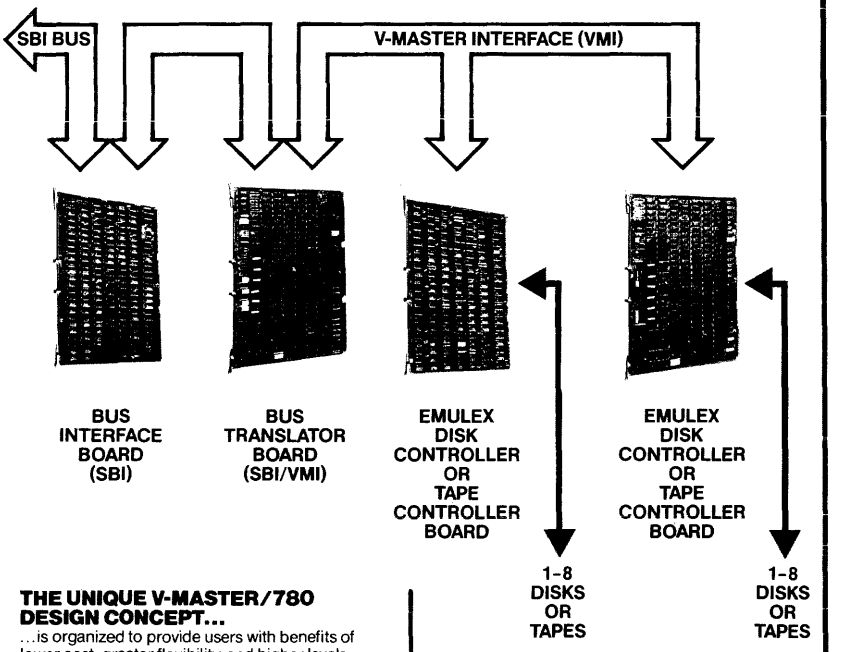
V-MASTER/780 PACKAGING

The System Chassis is a 4-slot card cage which mounts in the cpu and/or expansion cabinet. The first two slots contain the Bus Interface and Bus Translator boards. The third and fourth slots contain SC7000 and/or TC7000 controller boards.

A Cable Adapter board plugs onto the System Chassis backplane pins of each installed controller. Peripheral cables (disk or tape) plug into the flat cable connectors on the board and are routed externally via existing cable runs in the cabinet.

The optional End Terminator assembly is used when the System Chassis is installed in the SBI Terminator location and is the last unit on the bus. It plugs onto the System Chassis backplane pins.

APPENDIX J
V-MASTER/780 MASS STORAGE ADAPTER



THE UNIQUE V-MASTER/780 DESIGN CONCEPT...

...is organized to provide users with benefits of lower cost, greater flexibility, and higher levels of performance than provided by any other VAX-11/780 mass storage hardware. The basic interface electronics are contained on two circuit boards: The Bus Interface Board, which provides the functional/electrical interface to the internal high-speed SBI bus; and the Bus Translator Board, which translates the SBI bus protocol to that of the VMI bus, which is similar to the CMI bus used in the VAX-11/750. This then permits the same EMULEX controller board designed for the VAX-11/750's CMI bus to be used in the V-MASTER/780. And because the controller boards are common to both CPU's, users can minimize the number of different part types and spares needed to implement and maintain a mix of system types.

MICROPROCESSOR ARCHITECTURE. Bipolar bit slice design — used in all EMULEX disk, tape, and communications controllers — gives the product high performance and flexibility while reducing component count for low cost and high reliability.

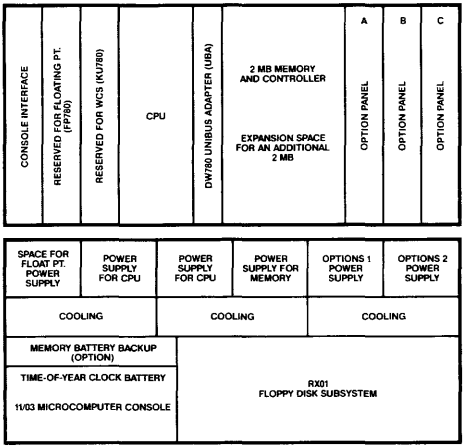
HIGH SPEED DATA TRANSFER. Data is transmitted between the controller(s) and internal memory via the SBI for maximum system performance.

INTERNAL SELF TEST. Automatic self test is executed at power up by internal microcode; LED indicator provides fault status.

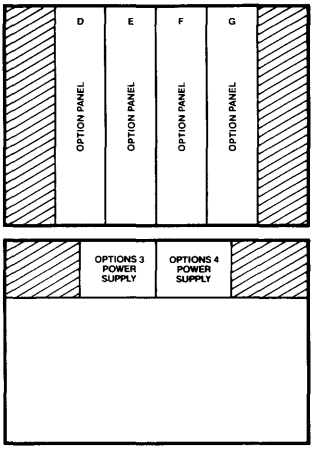
VAX-11/780 COMPATIBLE CABLING. The cable adapter boards provided by EMULEX with each SC7000 and TC7000 install directly on the System Chassis backplane connector pins to implement the same cable ingress-egress scheme used for standard DEC VAX-11/780 peripherals.

LOW POWER. Only 13 amps at +5V and 0.75 amps at -5.2V are required for the two basic interface boards. The SC7000 requires 11/0.7 amps at +5/-15 volts, the TC7000 requires 10 amps at +5 volts, and each Disk Cable Adapter board requires 0.9 amps at +5V.

APPENDIX J
V-MASTER/780 MASS STORAGE ADAPTER



*VAX-11/780 CPU Cabinet**



CPU Expansion Cabinet (Optional)

VAX-11/780 PACKAGING

The basic VAX-11/780 is contained in a double-width highboy cabinet. There are three Option Panel spaces (A, B, C) and two Optional Power Supply spaces (1, 2) in the CPU cabinet. Each option panel space is designed to house a physical unit of the same dimensions as the V-MASTER/780 with provision to extend the SBI bus cables across each unit. Option Panel space C is used normally to mount the SBI Terminator; however, an EMULEX V-MASTER/780 assembly can be mounted in this space if desired.

If more than three Option Panel spaces are needed, a CPU expansion cabinet must be installed adjacent to the main CPU cabinet, and the SBI bus must be extended by cabling (the Unibus must also be extended through this cabinet to an adjacent Unibus expansion cabinet). The CPU expansion cabinet contains 4 Option Panel spaces (D, E, F, G) and two Optional Power Supply spaces (3, 4). EMULEX supplies a CPU expansion cabinet similar to the DEC H9602 and Optional Power Supplies similar to the DEC units. EMULEX installation covers these optional items as well as SBI bus extension cabling when the CPU expansion cabinet is required.

V-MASTER/780 INSTALLATION

V-MASTER/780 is designed to be mounted in Optional Panel spaces A, B or C of the main CPU cabinet and/or spaces D, E, F, or G of the CPU expansion cabinet. If the DEC SBI Terminator is used, it must occupy Option Panel space C, or the last available Optional Panel space in the CPU expansion cabinet, and installation of the V-MASTER/780 follows the same rules and procedures as for an RH780 MBA. If Optional Power Supply 1 is available, no additional power will be required in the main CPU cabinet to power one or two EMULEX controller boards.

EMULEX provides an optional SBI Terminator which replaces the DEC unit and mounts on the back of the V-MASTER/780 System Chassis. This permits Optional Panel space C to be used to mount a third adapter in the main CPU cabinet which will in many cases eliminate the need for adding a CPU expansion cabinet. In this case, an EMULEX Optional Power Supply must be installed in space 2.

The VAX-11/780 computer, RH780 MBA, and CPU cabinet are manufactured and sold only by Digital Equipment Corporation.

APPENDIX J
V-MASTER/780 MASS STORAGE ADAPTER

CONTROLLERS SUPPORTED ON V-MASTER

MODEL	EMULATIONS	NUMBER OF DRIVES
TC7000 Tape Coupler	TM03/TU77	1-8 Pertec-type interface 1-4 STC-type interface
SC7000 Disk Controller	RM03, RM05, RM80	1-4 physical; 1-8 logical
SC780 Disk Controller	RP06	1-4 physical; 1-8 logical
SC788 Disk Controller	RM03, RM05, RM80	1-8 physical

GENERAL SPECIFICATIONS

The following specifications apply to the basic V-MASTER/780 mounting package and interface boards.

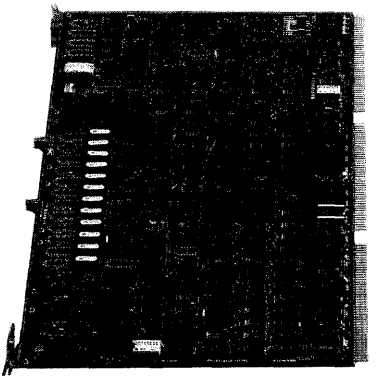
Characteristic	Specification
Design	System Chassis with two basic interface boards for connecting one or two EMULEX peripherals controller boards to host VAX-11/780.
Computer Interface	Bus Interface Board interfaces to the VAX-11/780 SBI via standard bus interconnects.
System Chassis	Card cage with 4-slot 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

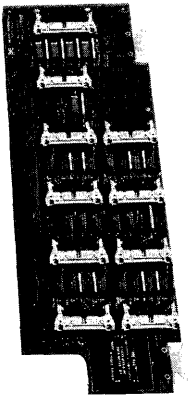
OPTIONS SPECIFICATIONS

Characteristic	Specification
OPTIONAL POWER SUPPLY	
	EMULEX Model No. SU7811802
Design	Self contained unit similar to DEC VAX-11/780 Optional Power Supply.
Rating	AC Input: 90-120 vac, 13.4 amps; DC Output: +5VDC, 100 amps
Dimensions	11 in. (H) x 6.75 in. (W) x 16 in. (D).
Approvals	UL and CSA.

Characteristic	Specification
SU78 END TERMINATOR	
	EMULEX Model No. SU7810406
Design	Passive SBI bus terminator which replaces DEC SBI Bus Terminator.
Physical	Single pcb assembly, 5 in. (W) x 16 in. (D).
Installation	Plugs into V-MASTER/780 System Chassis backplane pins normally used for SBI extension cables.

APPENDIX K
SC788 SERIES DISK CONTROLLER





TAKE YOUR VAX TO THE MAX.

With the new EMULEX SC788 you can take advantage of even greater expansion possibilities on your VAX-11/780. As a plug-in module to the EMULEX V-Master/780 mass storage adapter, the SC788 controller now allows you to interface up to *eight* disk drives—80 to 675 MBytes, at rates up to 1.8 MBytes/second.

The unique V-Master mass storage product concept gives you optimum performance, maximum flexibility, low cost, and high reliability, in a Massbus-compatible card cage chassis that embeds in your VAX-11/780 cabinet. With host CPU space at a premium, no expansion chassis is required to accommodate *two* SC788 controllers—for handling up to sixteen drives! Detailed functional characteristics of the innovative V-Master concept may be examined in the EMULEX V-MASTER/780 brochure.

The SC788 Disk Controller Board gives you the following features and performance for your VAX-11/780...

COMPACT PACKAGE. The entire single or dual controller configuration mounts directly in a single MBA option panel space or in the SBI bus terminator location and can use available internal power. This saves space, increases reliability, minimizes cost. Both the SC780 and SC788 controllers can be used interchangeably in the V-MASTER/780 chassis.

TRANSPARENT OPERATION. Standard versions of the SC788 emulate the DEC RH780 MBA with attached RM03, RM05, RM80 and/or RP06 drives, and operate transparently to VAX/VMS operating system and DEC diagnostics.

MEDIA COMPATIBILITY. Disk packs formatted by the SC788 are compatible and interchangeable with DEC RM02/03 (80 MByte) and RM05 (300 MByte) packs when an equivalent SMD-type drive is used.

HIGH PERFORMANCE DISK COMPATIBILITY. The SC788 is designed to handle serial data rates up to 15 MHz as required by new generation high-density disk drives.

ECC/CRC HARDWARE. Thirty-two bit ECC for data error detection/correction (single 11-bit error burst) and 16-bit CRC for header error detection is provided.

MIXED DRIVE CAPACITIES. Disk drives having different configurations (i.e., number of heads and cylinders) may be operated together on the controller. Switch settings permit selection of any one of 32 different combinations of predefined drive configurations on the eight ports.

UNIVERSAL DRIVE PORTS. Eight physical drive ports on the board are entirely transparent to drive address. Therefore, any drive address can be set up on any port and changed at any time.

DRIVE CONFIGURATION READOUT. Drive configuration (cylinders, tracks, sectors) can be read by the CPU to permit writing of custom, self-configuring device drivers for non-standard disk capacities.

WIDE CHOICE OF DRIVES. SC788 models collectively support essentially all disk drives having an industry standard SMD interface, regardless of manufacturer and/or drive configuration.

* DEC, VAX and Massbus are registered trademarks of Digital Equipment Corporation.

APPENDIX K
SC788 SERIES DISK CONTROLLER

GENERAL SPECIFICATIONS

The following specifications apply to the available SC788 Series disk controller models.

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based controller for integration of disk drives with an SMD interface to V-MASTER/780.
Disk Interface	Storage Module Drive (SMD).
Disk Data Rate	Serial data rate up to 1.8 MBytes/Second.
Number of Drives	1-8 physical.
Drive Configurations	A different drive configuration (type, size, etc.) may be operated on each port, with switch selection of up to 32 combinations of eight drives.
DMA Address Range	537 Megabytes.
Base Address (HEX)	20010000, 20012000, 20014000, 20016000.
Interrupt Request Level	7-4.
Error Control	32-bit ECC for data and 16-bit CRC for headers. Correction of single error burst up to 11 bits.
Status Display	Two edge-mounted LED's for self-test fault and data transfer activity.
Data Buffer	512 Bytes.
Option Switches	On-board slide switches provided for convenient selection of adapter characteristics.
Self Test	Controller executes extensive self-test routines at power up; LED Fault display.
Extended Operations	Disk format command.

Characteristic	Specification
Packaging	Single extended hex-height circuit board. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex-board warping problems and insures integrity of backplane connector alignment.
Mounting	Either controller slot in V-MASTER/780 card cage backplane (2 available).
Cables	One common 60-conductor control (A) flat cable plus eight 26-conductor radial data (B) flat cables, from EMULEX Cable Adapter plugged onto V-MASTER/780 card cage backplane connector pins.
ELECTRICAL	
Disk Interface	Differential line drivers and receivers used on all signal lines. Daisy chain (A) and radial (B) cable lengths up to 100 and 50 feet, respectively.
Power	
Controller	+5V ±5%, 10 amps max.
Cable Adapter	+5V ±5%, 1.0 amps max.
ENVIRONMENTAL	Exceeds all environmental ranges and conditions specified for commercial VAX-11/780 and applicable disk drives.
COMPATIBILITY	
Media	Format same as DEC packs for RM03 and RM05 type drives.
Software Transparency	Operating Systems: VMS Diagnostics: EVRAA, EVRAC, EVRDA, EVRDB, EVRGA, EVRGB.

APPENDIX L
UC01 SERIES EMULATING HOST ADAPTER

DESIGNED TO HANDLE SMALL TO MEDIUM CAPACITY WINCHESTER OR CARTRIDGE DISK DRIVES, THE UC01 GIVES YOU THE ADVANTAGES OF...

USING standard DEC operating systems and diagnostic hardware.

IMBEDDING the host adapter in any single quad slot of a standard LSI backplane.

EXECUTING a comprehensive set of self-test diagnostics as part of every startup operation.

REPLACING separate system bootstrap, bus terminator, and real time clock hardware with built-in options on the board.

INCORPORATING currently available small to medium Winchester and removable-cartridge disk drives with the versatile SCSI interface.

MIXING of different disk drive types and capacities on one host adapter for optimizing system configuration.

YOU GET OPTIMUM COST/ PERFORMANCE IN THIS RANGE BECAUSE...

The UC01 emulating host adapter was designed specifically and exclusively to integrate small to medium capacity Winchester and removable-cartridge disk drives with the LSI-11 incorporating the standard SCSI interface. Combined with EMULEX SCOX controller models, which offer alternate interface configurations (e.g., SMD, ANSI), users have complete flexibility in selecting drives and controllers for every LSI-11 hard disk application.

UNIQUE, UNCOMPROMISING DESIGN GIVES YOU BIG SYSTEM VERSATILITY IN A SMALL, ECONOMICAL PACKAGE.

The UC01 design is based on EMULEX's microprocessor technology, already proven in thousands of controller installations. The following combination of features makes it the unbeatable choice for effectively using today's small, inexpensive intelligent mass storage peripherals in LSI-11 systems.

MICROPROCESSOR ARCHITECTURE. The same EMULEX bipolar microprocessor architecture which consistently sets industry standards is used to give the UC01 broad flexibility and high performance characteristics.

COMPACT PACKAGING. Only one quad-height pcb plugs into any standard QBus slot to minimize installation cost and complexity.

SOFTWARE TRANSPARENCY. Intelligent microcode provides software transparent emulation of DEC RL01/RL02 subsystems, including execution of standard system-level diagnostics, thereby permitting use of standard DEC operating system drivers.

22-BIT ADDRESSING. Full 22-bit hardware provides full 4 MByte memory addressing capability.

BUILT-IN CLOCK. Hardware included on the board provides software-controllable line time clock (BDV11 compatible).

BOOTSTRAP/TERMINATOR OPTION. On-board sockets are provided for insertion of 512 word bootstrap PROMs and QBus terminators. Combined with a line time clock, these facilities can often eliminate the need for separate system hardware (typically the BDV11).

MIXED DRIVE CAPACITY. Disk drives having different combinations of storage capacity can be handled by the UC01 host adapter. The drive type code can be read directly from the host adapter by software to permit adaptive configuring by custom software drivers.

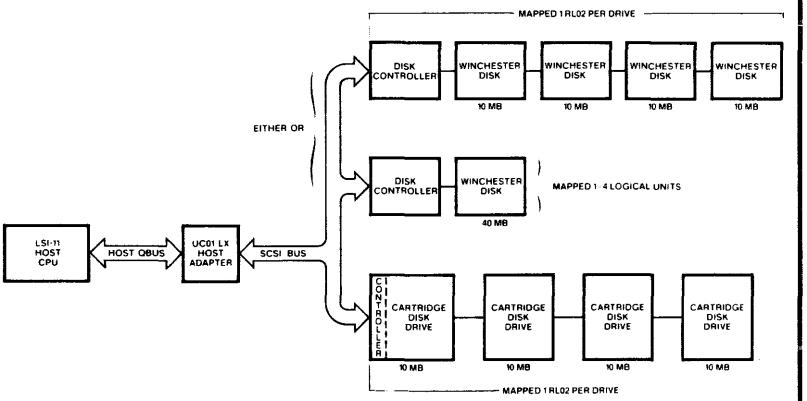
DUAL FUNCTION ARCHITECTURE. DEC's RL01/RL02 mass storage register set is duplicated in the single pcb host adapter, giving the appearance of two RL01/RL02 controllers to the operating system. The UC01/LX provides equal functionality using considerably less space and power than DEC's RLV11/RLV12 system.

LOW POWER. Only 5.7 amps is required from the CPU internal +5V power supply (no +12V power is required) via standard backplane power pins.

INTERNAL SELF TEST. Extensive self-test routines contained in microcode automatically verify host adapter operation when CPU power is applied.

SCSI INTERFACE. The UC01 conforms to the ANSI X3T9.2 Specification.

APPENDIX L
UC01 SERIES EMULATING HOST ADAPTER



UC01 SYSTEM DIAGRAM

DISK DRIVE CONFIGURATIONS

The ability of the UC01/LX to emulate multiple RL01/RL02 logical units on a single 5¼ inch Winchester drive gives the user the benefits of the high storage capacity of new-generation drive technology, while allowing him to continue to maintain compatibility with DEC operating systems.

UC01/LX mapping capabilities can allow substantial cost and space savings over other subsystem configurations. A typical DEC subsystem might consist of two controllers with eight 10.4 MByte drives, for a total storage capacity of 83.2 MBytes. A UC01/LX configuration consisting of two physical drives (mapped as eight logical units), with two controllers, provides the same 83.2 MByte storage capacity. The savings in space and hardware costs between the two configurations makes the UC01/LX a *very* cost-effective alternative for mass storage capability on the QBus.

• Model UC01/LX

Emulates the DEC RLV11/RLV12 controller, combined with multiple RL01 (5.2 MByte) and RL02 (10.4 MByte) logical units. The UC01/LX emulating host adapter provides SCSI interfacing for connection of up to seven intelligent controllers to an LSI-11 QBus and makes transparent use of DEC RL01/RL02 software. It includes the additional benefit of full 22-bit addressing, permitting the unit to operate with DEC RLV21 software for the 4 MByte LSI-11/23+ CPU. It also features 512 word bootstrap, BDV-11 clock control, and QBus termination resistors.

A unique configuration PROM permits switch selection of any one of 120 combinations of multiple drive configurations. Logical units are mapped in contracted, standard, or expanded capacities to best utilize the formatted capacity of each drive model. The host adapter operates transparently to DEC software drivers and diagnostics for standard logical drive sizes; patches are required for non-standard logical mappings.

APPENDIX L
UC01 SERIES EMULATING HOST ADAPTER

WE OFFER MORE THAN JUST A GREAT PRODUCT.

With the UC01 you get superb quality and excellent support from the EMULEX team. All pcb components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled for over 96 hours (while operating) to insure ultimate reliability from the moment they are installed. Plant production capability exists to meet the highest of volume requirements. All EMULEX products are backed by a full one year warranty and supported worldwide by the company's technical applications group.

GENERAL SPECIFICATIONS

The following specifications apply to the UC01/LX Emulating Host Adapter:

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar microprocessor-based emulating host adapter for integration of mass storage devices to LSI-11 host computer. UC01 incorporates unique design to achieve extremely high speed operations with minimum hardware.
Computer Interface	Standard Q Bus.
Disk Interface	SCSI (ANSI X3T9.2 specification). Up to 7 controllers.
Emulation	Emulates two DEC RLV11/RLV12 controllers, using two register sets.
Bus Address Range	0–4 MBytes (22 bits).
Bus Register	Two selectable register sets, two alternates.
Vector Address	One standard and one alternate per register set.
Priority Level	Level 5.
Status Display	Edge-mounted LED for activity/error/status display under micro-program control.
Option Switches	On-board slide switches for selection of program-controlled operating/configuration options.
Bootstrap/ Terminator Option	Sockets provided for 512 word bootstrap PROM and QBus termination module.
Software Controllable Line-Time Clock	Switch-selectable BDV11 compatible clock control.

Characteristic	Specification
FUNCTIONAL (continued)	
Buffer Memory	64 byte buffer allows smooth transfer of data to and from the SCSI bus.
Media Format	Emulates RL01/RL02 format (actual format determined by controller).
PHYSICAL	
Packaging	One printed circuit board, standard QBus 4-connector interface.
Mounting	Any quad slot in standard QBus backplane or system unit.
Cable/ Connector	One 50-pin daisy chain flat cable connector.
Drive Controllers	1 to 7 controllers per UC01 Host Adapter.
ELECTRICAL	
QBus Interface	Approved line drivers/receivers used exclusively; one unit load per bus signal line.
Disk Interface	SCSI (ANSI X3T9.2 spec.); 18 feet (3 meters) max. cable length.
Power	+5V (±5%), 5.7 amps max.; standard QBus backplane/system unit pins used.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial LSI-11 computers and applicable disk drives.

APPENDIX M
UC02/12 SERIES EMULATING HOST ADAPTERS

THE UC02 AND UC12 GIVE YOU THE FULL ADVANTAGES OF...

EMULATING the powerful DEC MCSP protocol, offering high-performance and flexibility for your QBus and Unibus systems.

USING standard DEC operating systems, without patches or modifications.

EMBEDDING the host adapter in any single quad slot of a standard LSI-11 backplane (UC02), or in any single hex slot of a standard PDP/VAX-11 backplane (UC12).

EXECUTING a comprehensive set of self-test diagnostics as part of every startup operation.

INCORPORATING currently available Winchester and removable-cartridge disk drives with the versatile SCSI interface.

MIXING of different disk drive types and capacities on one host adapter for optimizing system configuration.

WHAT MAKES THE UC02 AND UC12 EMULATING HOST ADAPTERS SO UNIQUE?

The host adapters were designed specifically to integrate SCSI compatible controllers with peripherals—such as 5¼-inch Winchester disks and ¼-inch cartridge tapes—with the LSI-11, PDP-11, or VAX-11 CPU's. Combined with EMULEX disk controller models, which offer alternate drive interface configurations (e.g. SMD, ST506, ESDI), and EMULEX tape controllers, which provide a native drive interface to selected ¼-inch cartridge units, users have complete flexibility in selecting peripherals and controllers for every application. The MSCP emulation supports virtually any drive capacity, and thus provides limitless possibilities for storage expansion for your QBus or Unibus systems.

THE INNOVATIONS OF THE MSCP PROTOCOL...

UNIVERSAL OPERATING SYSTEM. The UC02 and UC12 provide standard MSCP emulation, using standard DEC operating systems. This flexible protocol allows the operating system to utilize the precise characteristics of the Winchester disk drive without patches or modifications to operating system. A single driver is able to handle the variations in disk drives. i.e., the operating system does not have to be changed every time the drive is changed.

SELF-SIZING. Through configuration data in PROM, the UC02 and UC12 provide the host CPU with the specific characteristics of the attached drives. This information includes the number of drives and their sizes, including block size, number of surfaces, sectors per track, etc. Under the MSCP emulation, the operating system is very flexible and adjusts according to the drive characteristics reported by the host adapter. No modifications to the software are necessary.

THE VERSATILE, EFFICIENT APPLICATION OF THE SCSI...

SEEK OPTIMIZATION. Both the UC02 and the UC12 host adapters are able to pool the various seeks which need to be performed and determine the most efficient order in which to do them. This is an especially important feature in heavily loaded systems. The host adapters' ability to arrange seeks in the optimum order can save a great deal of time and makes the entire system more efficient.

DISCONNECT/RECONNECT. The host adapters fully support standard SCSI arbitration, including the disconnect/reconnect of devices. Using this feature, drives which are performing time-consuming tasks (e.g. seeks), release the bus temporarily and reconnect when the seek has been completed. Support of this feature permits the UC02 and UC12 to run four commands simultaneously on four drives; thus, several disk operations can be performed at once. The disconnect/reconnect feature ensures efficient use of the bus, and is extremely important in situations where there are multiple hosts and/or devices attached to the bus.

AND THE SPECIAL FEATURES THAT ONLY EMULEX PROVIDES...

COMPACT PACKAGING. The UC02 is packaged on a single stand-alone quad pcb which plugs into any standard QBus slot. The UC12 is packaged on a single hex-size board which plugs into any standard Unibus SPC slot.

COMMAND BUFFER. The UC02 and UC12 contain a buffer which is able to store MSCP commands. This large buffer enables the system to achieve a higher throughput and operate at a very cost effective level.

ADAPTIVE DMA. During each DMA data transfer burst, the UC02/UC12 host adapter monitors the bus for other pending DMA requests and suspends its own DMA activity to permit other DMA transfers to occur. In addition, burst length and burst delay are programmable, to ensure that CPU functions, including interrupt servicing, are not locked out for excessive periods of time by high-speed disk transfers.

FOUR DRIVE SCSI INTERFACE. Both the UC02 and UC12 can handle up to four Winchester disk drives of any standard type or capacity. Drives of different types or capacities can be handled by a single host adapter.

ERROR CONTROL. The host adapters simulate error-free media by never reporting routine errors to the host CPU. When an error is encountered, the host adapter automatically attempts to correct it, and only uncorrectable errors are reported to the host.

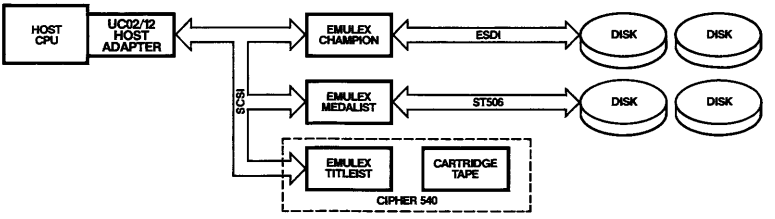
SCSI MODE. The UC02 and UC12 have a unique feature which allows the user to write and add drivers to the operating system to connect the host to the SCSI bus in a non-emulating mode. This "pass through" mode allows the user to communicate directly to the SCSI bus. The EMULEX-provided format and backup (for Titleist/Cipher 540) are examples of this feature.

BLOCK-MODE DMA. The UC02 supports the block mode commands for accessing memory. In this mode, the initial address of the data is transmitted, followed by a burst of up to 16 words of data. The address is automatically incremented to accommodate this burst. In this manner, DMA transfers are achieved much more quickly and efficiently.

22-BIT ADDRESSING. The UC02 supports full 22-bit addressing to utilize the full 4 MByte memory capacity of the LSI-11/23 PLUS, Micro/PDP-11 and 11/73.

STANDARD SELF-TEST. The host adapters automatically perform extensive internal self-tests during initialization and flag detected errors with 4 LED fault indicators.

EMULEX DIAGNOSTICS. The UC02 and UC12 are available with an extensive set of diagnostics, developed and written by EMULEX to provide support for your system. The diagnostics consist of formatter and data reliability tests. All diagnostics sequences are fully supported by EMULEX.



EXAMPLE:
UC02/12 SYSTEM DIAGRAM

APPENDIX M
UC02/12 SERIES EMULATING HOST ADAPTERS

WE OFFER MORE THAN JUST A GREAT PRODUCT.

With the UC02 and UC12 you get superb quality and excellent support from the EMULEX team. All pcb components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled for over 96 hours (while operating) to insure ultimate reliability from the moment they are installed. Plant production capability exists to meet the highest of volume requirements. All EMULEX products are backed by a full one year warranty and supported worldwide by the company's technical applications group.

GENERAL SPECIFICATIONS

Characteristic	Specification
FUNCTIONAL	
Design	High-speed microprocessor-based emulating host adapters for integration of mass storage devices to LSI-11, PDP-11, or VAX-11 host computer. UC02 and UC12 incorporate unique design to achieve efficient operations with minimum hardware.
CPU's	UC02: LSI-11 through 11-73. MICRO/PDP-11. UC12: PDP-11/04 through 11/70, VAX-11/730, 11/750, 11/780.
Bus Interface	UC02: Standard QBus. UC12: Standard Unibus.
Peripheral Interface	SCSI (ANSI X3T9.2 specification). Up to 4 controllers.
Emulation	Emulates DEC Mass Storage Control Protocol (MSCP).
Bus Address Range	UC02: 0-4 MBytes (22-bits). UC12: 0-128 K Words.
Bus Register	Two registers. Two preprogrammed start locations (772150 for IP register, 772152 for SA register), one alternate pair.
Vector Address	Programmed by host CPU.
Priority Level	Level 5.
Status Display	Edge mounted LEDs for activity/error/status display under microprogram control.
Option Switches	On-board slide switches for selection of program-controlled operating/configuration options.
Buffer Memory	Buffers up to 13 MSCP commands.
Media Format	Emulates MSCP format.
PHYSICAL	
Packaging	UC02: Single quad-size board, standard QBus interface. UC12: Single hex-size board, standard Unibus interface.
Mounting	UC02: Any quad slot in standard QBus backplane or system unit. UC12: Any hex slot in standard Unibus backplane or system unit.
Cable/ Connector	One 50-pin daisy-chain flat cable connector.
ELECTRICAL	
Computer Interface	
UC02	Approved QBus line driver/receivers used exclusively; one load per bus signal line.
UC12	Approved Unibus line driver/receivers used exclusively; one load per bus signal line.
Disk Interface	SCSI (ANSI X3T9.2 spec.); 18 feet (3 meters) max. cable length.
Power	+5V (±5%), 4.8 amps max.
ENVIRONMENTAL	Exceeds all environmental ranges and conditions specified for commercial LSI-11, PDP-11, and VAX-11 computers and applicable disk drives.

APPENDIX N
SPE 44 SMD PORT EXPANDER

MAKE MAXIMUM USE OF THE HARDWARE YOU HAVE.

The SPE 44, a versatile, new electronic switching unit, provides the capability of interfacing multiple DEC CPU's to a single bank of up to four SMD-compatible disk drives. And it's possible to share a database without physically recabling the drives. Connecting multiple CPUs to a shared bank of disk drives provides the user with ability to share common peripheral resources.

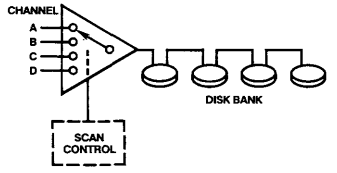
IN ADDITION, the SPE 44 offers you enhanced system reliability. In the event of a processor failure, drives on the failed CPU can be routed to another CPU for continued operation. Thus, with the EMULEX SPE 44, you have both the cost-effective, independent use of a common bank of disk drives by multiple CPU's or backup capability should one processor fail.

Time-sharing of disk drives can occur among combinations of systems comprised of EMULEX disk controllers and their associated DEC computers. Systems which can be supported in this manner are the EMULEX SC21/SC31 disk controllers in PDP-11s and VAX-11s, SC750s in VAX-750s, and/or the EMULEX V-Master in VAX-11/780s.

Up to four EMULEX disk controllers connect to four separate "CONTROLLER IN" ports. The switch logic of the SPE 44 gates or ungates controller channel signals to the bank of disk drives. Front panel switches on the SPE 44 allow the operator to enable or disable any combination of channels, from 0 to 3, for access to the drive bank.

By employing a combination of multiple controllers, port expander units, and dual-ported drives, the DEC user can achieve shared storage access and system backup capabilities previously not possible.

THE FOLLOWING COMBINATION OF FEATURES illustrates why the EMULEX SPE 44 is the best solution for a shared database environment.



SEQUENTIAL SCANNING CAPABILITY. The SPE 44 constantly scans all enabled channels, giving each a time-share to access the drive bank. Channels which are simply idling are quickly skipped over. Channels can be enabled or disabled at any time.

SOFTWARE TRANSPARENCY. SPE 44 is transparent to operating system software that supports dual access or dual port operation.

DAISY-CHAINING FLEXIBILITY. The SPE 44 can be daisy-chained — with another SPE 44 unit or additional unswitched disk drives to expand the number of CPU's and drives that can share disk drive resources. Each of the four controller ports has a connector that allows true daisy-chaining of an additional SPE 44 unit or additional unswitched disk drives. SMD terminating blocks are used for each controller channel within the switch or on the "last" disk drive in the chain.

ENHANCED SYSTEM RELIABILITY. In the case of failure of one CPU, the user will be able to access his database by using any of the remaining data paths provided by the SPE 44.

ADDRESS TRANSLATION OPTION. Adding to the SPE 44 flexibility is a switch-selectable disk drive address translation option. 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.

RESERVED ACCESS FEATURE. In those cases when an operational environment requires that all disk drives be assigned to one specific processor, channel disabling switches on the control panel are used to reserve the drives for that purpose. This eliminates accidental addressing of disk drives from an unauthorized CPU.

WRITE PROTECTION. Individual write protection is provided for each drive in the drive bank via "DRIVE WRITE PROTECT" toggle switches on the control panel. Each channel can be write protected on specific drives, but still allows other sources to write on the same drive. So, if you have two CPU's accessing one drive bank, one CPU can be write-disabled to specific drives within the bank, while the other CPU is not.

PRIORITY ASSIGNING CAPABILITY. Switches on the SPE 44 can assign unequal time-sharing priority levels to the four controller channels.

OPTIONS. An optional synchronization cable can be interconnected between two SPE 44 units. In this case, one is controlled by the other's scanner, and eight drives are controlled as one bank.

APPENDIX N
SPE 44 SMD PORT EXPANDER

GENERAL SPECIFICATIONS

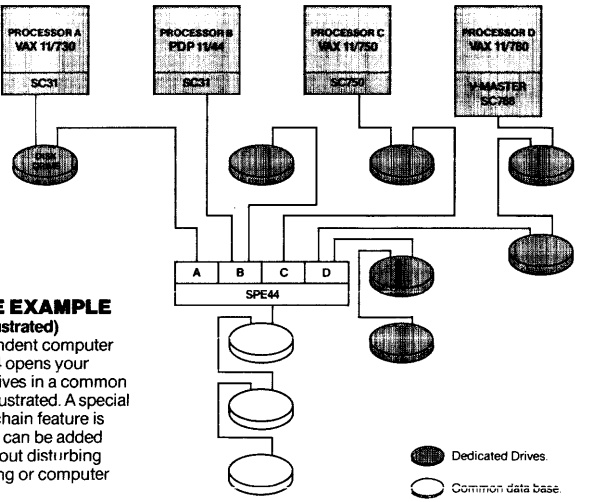
The following specifications apply to the SPE 44 SMD Port Expander.

Characteristic	Specification
Physical	Rack Mountable Enclosure (Slide Rail Mounted) 5.25 inches (13.34 cm) high 19.00 inches (48.26 cm) wide 30.00 inches (76.20 cm) deep All cable connections and circuits are on one board mounted horizontally in the chassis.
Electrical	Input: 120 vac ± 10%, 50-60 Hz, 1.5 amps, or 220 vac ± 10%, 50-60 Hz, 0.8 amps. (Amps are max., continuous.)
Environmental	Meets or exceeds all environmental ranges and conditions specified for DEC equipment, applicable disk drives and EMULEX controllers.

Characteristic	Specification
Controls/ Indicators	Control Panel LED's for: Channel ACTIVE Channel SCAN START EXPANDED SLAVE WRITE PROTECTED WRITE OPERATION READ OPERATION DRIVE RESERVED RUN Control Panel Switches for: Channel ENABLE DRIVE WRT PROT (Write Protect) DRIVE ADDRESS TRANSLATION
Weight	50 lbs (22.68 kilos)

TYPICAL CONFIGURATIONS

Various combinations of controllers, disk drives and SPE 44 units allow for a wide variety of configurations designed for multi-accessing, file sharing and hardware/storage backup. The following diagrams illustrate very useful configurations.



COMMON DATA BASE EXAMPLE
(Upgrade Flexibility Also Illustrated)

Connecting multiple independent computer systems to EMULEX's SPE 44 opens your possibilities for using disk drives in a common data base configuration, as illustrated. A special benefit of the SPE 44 daisy-chain feature is that, once configured, drives can be added anywhere in the system without disturbing established drive cable routing or computer room floor plans.

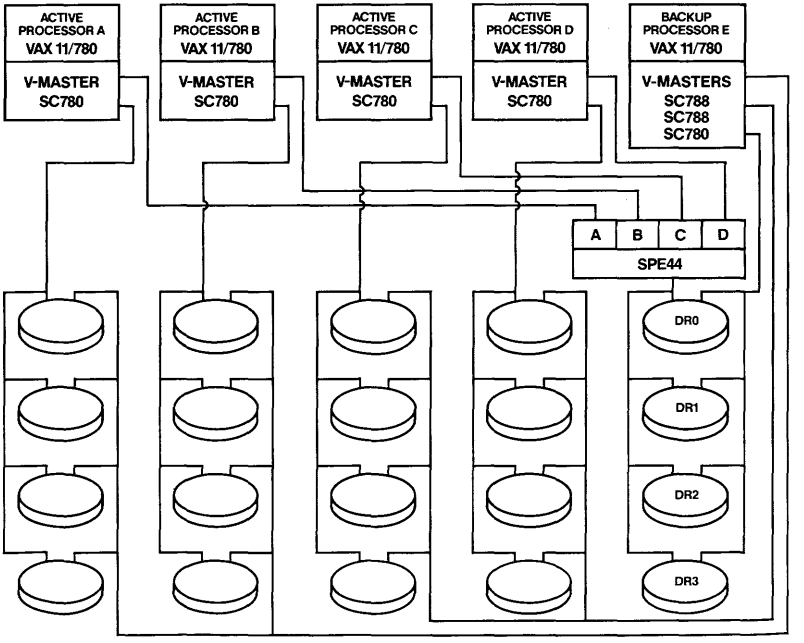
APPENDIX N
SPE 44 SMD PORT EXPANDER

BACKUP SYSTEM EXAMPLE

In this example, five central processors combine to make up a system with twenty dual-port disk drives and one SPE 44. Processors A-D perform independent prime computing functions, each with four dedicated disk drives connected.

Processors A-D are also connected to the SPE 44 which provides a data path to the backup drives DR0-3. Should a problem develop in any of the dedicated sets of drives, the affected computer can then have the backup drives allocated to it as replacements.

Processor E functions as a backup computer system, with access to the backup drives (DR0-DR3) plus access to each dedicated set of drives. This allows replacement of any prime processor instantaneously in the event of a problem.



EMULEX MODEL TC01 FOR LSI-11 COMPUTERS.

THIS FIRST—AND BEST—IMBEDDED DUAL DENSITY CONTROLLER THAT GIVES YOU THE ADVANTAGES OF...

EXECUTING standard DEC and PDP/LSI-11 system and diagnostic software.

INCORPORATING any industry-standard reel-to-reel magnetic tape drives—PE and Dual Density—at speeds up to 75 ips.

IMBEDDING the controller in only one or two existing quad slots of your standard LSI-11 backplane or system unit.

PERFORMING a comprehensive set of controller-generated self-test and subsystem diagnostics.

WORKING when you plug it in and continuing to work reliably for thousands of hours.

YOU GET THESE ADVANTAGES—AND MORE—BECAUSE...

The TC01 was designed specifically—and exclusively—for the LSI-11 computer. Because it is not just a "universal" or Unibus type controller adapted to operate on the Q Bus, its packaging and performance are optimum in every respect. And the unique, powerful bipolar microprocessor-based architecture provides a lot more: full performance required for high-speed/high-density operations; complete diagnostic and operating software transparency; and extensive controller self-test and subsystem diagnostic operations executed entirely by controller firmware.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY OTHER PRODUCT...

...and we think you will agree that the TC01 is the best choice for meeting all your LSI-11 tape storage requirements.

COMPACT PACKAGING. Only two stand-alone pc boards, plugged into any two standard quad slots, handle all NRZ/PE formatting and control operations.

TRANSPARENT OPERATION. The TC01, combined with any standard tape drive, emulates the functions of DEC TU10/TM11 subsystem, including execution of standard diagnostic programs.

INTERNAL SELF-TEST. The TC01 automatically performs extensive tests, not only of itself (including all elements of the PE electronics) but also of the computer interface. On-board LED displays define a probable controller or PE board failure.

FLEXIBLE, HIGH-PERFORMANCE DRIVE INTERFACE. Any four industry standard 9-track tape drives—operating at densities of 800/1600 bpi, speeds up to 75 ips, and at a cumulative cable distance of 25 feet—may be incorporated. Overlapped tape rewinds are permitted.

STANDARD Q BUS INTERFACE. The unit interfaces via the controller pc board only to any standard Q Bus quad slot and presents only one unit load on all lines. Full 16-bit word NPR data transfers are made, and the controller checks for parity errors on all memory read operations.

FLEXIBLE FORMATTING. Data may be packed in either DEC or IBM format. User may edit previously recorded records.

DATA INTEGRITY. LRC and CRC (9-track) is generated and checked. Read-after-write parity check is made on all recorded characters.

RELIABLE OPERATION. Unit meets all specs over wide voltage margin and clock margin ranges. Timing is generated by crystal clock. Conservative derating is made on all components. Environmental range exceeds that of all commercial LSI-11 host computers and applicable industry tape drives.

SPECIFICATIONS (TC01, TC11)

Characteristic	Specification
FUNCTIONAL	
Design	High-speed 16-bit bipolar microprocessor controller.
CPU's	TC01: LSI-11, 11/2, 11/23 TC11: PDP-11/04 thru 11/70 VAX-11/730, 11/750, 11/780
Computer Interface	
TC01/N (NRZ)	Standard Q Bus via quad interface on controller board (A-B connectors).
TC11/N (NRZ)	Standard Unibus via SPC interface on controller board (C-F connectors).
PE Board	Power and ground pins only (common to TC01 and TC11 except for NPG grant line strapping).

EMULEX MODEL TC11 FOR PDP-11 AND VAX-11 COMPUTERS.

THIS MODERN, PROVEN CONTROLLER GIVES YOU ALL THE ADVANTAGES...

INCORPORATING any industry standard reel-to-reel magnetic tape drives—NRZ, PE, and Dual Density—at speeds up to 125 ips.

IMBEDDING the controller in only one (NRZ) or two (PE/Dual Density) existing SPC slot(s) of your standard backplane or system unit.

EXECUTING standard DEC PDP-11 system and diagnostic software.

OPERATING on the VAX-11 using the VMS/UT software package, designed and fully supported by EMULEX.

PERFORMING a comprehensive set of controller-generated self-test and extended subsystem diagnostics.

WORKING when you plug it in and continuing to work reliably for thousands of hours.

YOU GET THESE ADVANTAGES—AND MORE—BECAUSE...

The TC11 was designed specifically—and exclusively—for the VAX/PDP-11 Unibus. Because it is not just a "universal" type controller adapted to operate on a Unibus, its packaging and performance are optimum in every respect. And the unique, powerful bipolar microprocessor-based architecture provides a lot more: full performance required for high-speed/high-density operations; PDP-11 diagnostic and operating software transparency; VAX/VMS software compatibility with the EMULEX supplied package; and extensive controller self-test and extended subsystem diagnostic operations executed entirely by controller firmware.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY OTHER PRODUCT...

...and we think you will agree that the TC11 is the best choice for meeting all your VAX/PDP-11 tape subsystem requirements.

COMPACT PACKAGING. Only one stand-alone pc board, plugged into any standard SPC slot, handles all NRZ formatting and control operations; a second quad height pcb, plugged into any other convenient SPC slot, adds full phase encode (PE) capability.

TRANSPARENT PDP-11 OPERATION. The TC11, combined with any standard tape drive, emulates the functions of a TU10/TM11 subsystem, including execution of standard PDP-11 diagnostic programs.

COMPATIBLE VAX-11 OPERATION. The TC11, combined with any standard tape drive and the EMULEX VMS/UT software driver/diagnostic package, provides reliable, economical tape storage on all VAX-11s.

INTERNAL SELF-TEST. The TC11 automatically performs extensive tests, not only of itself (including all elements of the PE electronics) but also of the computer interface. On-board LED displays pinpoint a probable controller or PE board failure.

FLEXIBLE, HIGH-PERFORMANCE DRIVEN INTERFACE. Any four industry standard tape drives—operating with 9 tracks, at densities up to 1600 bpi, speeds up to 125 ips, and at a cumulative cable distance of 25 feet—may be incorporated. Overlapped tape rewinds are permitted.

STANDARD UNIBUS INTERFACE. The controller interfaces, via the controller pc board only, to any standard SPC slot and presents only one unit load on all lines. Full 16-bit word NPR data transfers are made, and the controller checks for parity errors if a parity controller is installed in the system.

FLEXIBLE FORMATTING. Data may be packed in either DEC or IBM format, 9 channel. Tape drives may be daisy-chained together. User may edit previously recorded records.

DATA INTEGRITY. LRC and CRC (9 track) is generated and checked. Read-after-write parity check is made on all recorded characters.

VAX PRODUCT SUPPORT

The VMS/UT software package—developed and fully supported by EMULEX—consists of a driver (VMS/UTD) and diagnostics (VMS/UTX) which completely supports installation, operation, and maintenance on VAX-11 computers under VMS version 2.0 and above. Software is supplied with each controller on either TU58 compatible cartridge (11/730, 11/750) or RX01 compatible diskette (11/780) and carries a 90-day warranty and update service.

APPENDIX O
TC01/11 SERIES TAPE CONTROLLERS

SPECIFICATIONS (TC01, TC11)

Characteristic	Specification
Tape Speed	
TC01	One selectable: 12.5, 15, 18, 25, 37.5, 45 and 75 ips.
TC11	Two selectable: Same as TC01 plus 125 ips.
Bus Address Range	0-128 K Words.
Register Base Address	772520_8
Interrupt Vector	224_8
Priority Level	5
Tape Transports	Type: ½ inch, reel-to-reel, IBM standard format. Interface: Pertec-standard. Heads: Dual gap, read-after-write. Track/Densities: 9 Track, 800/1600 bpi.
Number of Transports	Daisy-Chain, 1-4 drives. Simultaneous rewind operations permitted.
Data Checking	Read-after-write parity check on all characters; LRC and CRC (9 track).
Self-Test	Controller automatically executes extensive power-up self-test which includes: microprocessor, write clock generator, DMA, and PE Read Board. Runs simulated PE records into PE Read Board with various data Bad Tracks configuration. Complete read out of test progress and errors via tape controller registers. Various operating modes allow for fault detection and scope display.
Fault/Activity Display	LED indicates detected board fault and controller read/write activity.
Option Switches	
Controller Board	Six on-board slide switches for selection of program-controlled operation/ configuration options.
PE Board	Tape speeds set up by slide switches.
PHYSICAL	
Packaging	
TC01/N (NRZ)	Quad-size board, standard quad slot.
TC11/N (NRZ)	Hex-size board, standard SPC slot.
PE Board	Quad-size board, standard quad or SPC slot.
Cabling	One 40-conductor flat cable between boards and two 40-conductor flat cables to first tape transport.
Adapters	Daisy-Chain cable adapters available for most industry tape drives.
ELECTRICAL	
Computer Interface	
TC01	To standard Q Bus using DEC approved drivers and receivers; one unit load per bus line.
TC11	To standard Unibus using DEC approved drivers and receivers; one unit load per bus line.
Transport Interface	24ma drivers used on all output lines, receivers or all inputs, max 25 feet cumulative daisy-chain cable length.
Power	
TC01/N (NRZ)	+5v±5%, 5 amps.
TC11/N (NRZ)	+5v±5%, 5 amps.
PE Board	+5v±5%, 2 amps.
ENVIRONMENTAL	Exceeds all environmental ranges and conditions specified for commercial LSI-11, PDP-11, VAX-11 computers and applicable tape drives.
SOFTWARE	
LSI-11 and PDP-11 Diagnostics	DEC ZJF12-RB Kit
Operating Systems	All applicable to TU10/TM11 subsystem on PDP/LSI-11.
VAX-11 (TC11)	EMULEX VMS/UT package includes driver and on-line diagnostic in execution code for load- and-go integration into VMS, plus stand-alone diagnostic. Furnished on TU58 or RX01-compatible media. Fully supported for VMS V2.0 and above.

APPENDIX P
TC02/12 SERIES TAPE COUPLERS

THE INDUSTRY'S FIRST TS11 COMPATIBLE TAPE COUPLER SERIES...

...provides software compatibility with DEC's newest half-inch magnetic tape subsystem. And at the same time, opens a whole range of new applications and product configurations from which to choose. With these exceptional new products, you get the advantages of:

INCORPORATING essentially all industry compatible, half-inch formatted tape drives — including conventional NRZI/PE start/stop; 1600/3200 bpi start/stop/streaming; and the new breed of low-cost GCR (6250 bpi) start/stop/ streaming transports coming soon from the leading independent manufacturers.

EXECUTING standard diagnostics and system software under all major DEC operating systems — including RT11, RSX11M, RSX11M PLUS, RSTS/E and VMS — supported across the LSI/ PDP/VAX-11 line.

BACKING UP fixed media (Winchester) disk drives with EMULEX-supported software for streaming type tape transports.

EMBEDDING the coupler in any quad slot of a standard Unibus or Q Bus backplane or system unit.

LIKE ALL EMULEX CONTROLLERS...

...the TC02 for LSI-11's, and the TC12 for PDP/VAX-11's, incorporate the same modern bipolar microprocessor technology first introduced by EMULEX, then perfected and proven in the many thousands of units already shipped. Use of this technology results in a product line with full flexibility, optimum packaging, outstanding reliability, extra features, and high performance.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY OTHER PRODUCT...

...and we think you will agree that the TC02 and/or TC12 are the best choices for meeting all your LSI/PDP/VAX-11 tape subsystem requirements.

COMPACT PACKAGING. Each unit is contained on only one stand-alone quad height pc board which plugs into any standard Unibus SPC or Q Bus quad slot.

TRANSPARENT SOFTWARE OPERATION. The coupler, combined with one to four standard formatted tape drives, emulates all functions of the DEC TS11 subsystem, including execution of standard diagnostic programs.

INTERNAL SELF-TEST. The coupler automatically performs extensive diagnostic tests during power-up and flags detected errors with a fault LED indicator.

FLEXIBLE TRANSPORT INTERFACE. The coupler handles all industry standard ("Pertec interface") drives incorporating embedded or integral formatters. Up to four similar type transports (i.e. start/stop or streamer) may be daisy-chained on a single coupler.

HIGH PERFORMANCE. Each coupler is designed to handle tape data rates to 250,000 characters per second. This permits operation with high-performance transports, including: 1600 bpi @ 125 ips; 3200 bpi @ 50 ips; and 6250 bpi @ 25 ips.

STANDARD CPU BUS INTERFACE. The coupler interfaces to any standard quad bus slot and presents only one unit load on all lines. Full 16-bit word NPR data transfers are made, and the controller checks for bus parity errors if a parity controller is installed in the system. The TC02 interfaces via the Q Bus A–B connectors; the TC12 interfaces via SPC connection on the Unibus C–F connectors.

FLEXIBLE FORMATTING. Data may be packed in either DEC or IBM 9-channel format. Tape drives may be daisy-chained together. User may edit previously recorded records.

COUPLER/TRANSPORT DATA INTEGRITY. Data parity is generated and checked on all transfers between the coupler and the tape transport with errors reported by status bits.

4 MEGABYTE Q BUS ADDRESS. The TC02 has full 22-bit Q Bus address hardware implemented for permitting EMULEX streaming software and/or custom drivers to utilize the full 4 MByte memory capacity of the LSI-11/23 PLUS.

FOR STREAMING BACKUP OF WINCHESTER DISKS...

...you're supported across the entire LSI-11, PDP-11 and VAX-11 series of CPU's. On the LSI-11 and PDP-11 series, a stand-alone disk/tape backup program — written and supported by EMULEX — is provided. This package provides physical media backup for *all* EMULEX and DEC hard disk subsystems (except RK05 and UDA50-based subsystems) using the standard file structures of RSX11M, RSX11M-PLUS, RSTS/E and RT11.

On the VAX-11 series under VMS, the standard on-line backup utility (BACKUP) can be used with the TC12 to support tape backup operations for applicable EMULEX and DEC hard disk subsystems.

APPENDIX P
TC02/12 SERIES TAPE COUPLERS

THE SAME QUALITY AND RELIABILITY...
...proven in all EMULEX products is built into the TC02 and TC12. Assembly starts with exclusive use of pretested, preaged parts per MIL STD 833. All assembled units are next thoroughly tested at the component, assembly, and subsystem level. This is followed by dynamic environmental burn-in for 96 hours over a cyclic temperature range of 0-55°C. Units passing environmental tests are then subjected to a one-hundred percent QC certification test at the subsystem level. These demanding procedures yield negligible infant mortality rates on production units. Calculated MTBF's of the TC02 and TC12 exceed 60,000 hours; and complete actual failure data is maintained by EMULEX to insure that actual MTBF experience conforms to predicted results.

AND FINALLY YOU GET SUPPORT...
...from the EMULEX customer service organization and from an application staff devoted solely to customer backup. All EMULEX-supplied software is written and maintained in-house by the EMULEX engineering group, including a 90-day full-support warranty plus renewable update service, so you're never left holding the bag by unsupported packages. Direct field installation is available from EMULEX, and the products are maintained nationwide by Control Data and other qualified service organizations.

PRODUCT SPECIFICATIONS
MODELS TC02 AND TC12

Characteristic	Specification
FUNCTIONAL	
Design	High-speed 8-bit bipolar microprocessor-based tape coupler for formatted tape transports.
CPU's	TC02: 11/23, 11/23-PLUS TC12: PDP-11/04 thru 11/70, VAX-11 Unibus.
Computer Interface	
TC02	Standard Q Bus via quad interface on coupler board (A-B connectors).
TC12	Standard Unibus via SPC interface on coupler board (C-F connectors).
Tape Speeds	12.5 to 125 ips.
Tape Densities (Forward & Reverse)	800, 1600, 3200, 6250 bpi.
Max Tape Data Rate	250,000 characters/second.
Standard Emulation	DEC TS11 Tape Subsystem.
Bus Address Range	TC02: 256 KBytes Standard: 0-4 MBytes optional for LSI-11/23-PLUS. TC12: 0-256 KBytes.
Standard Register Base Address	Variable.
Standard Interrupt Vector	Variable.
Interrupt Level	5
Tape Transports Start-Stop	All 9-track, 800/1600 bpi industry-standard formatted tape drives.
Streamer	Cipher-F880 and F880 II Microstreamer CDC-92181 Streaming Tape Kennedy-6809 Data Streamer Pertec-F1000 Streaming Tape.
Number of Transports	Daisy-Chain, 1-4 drives. (No mixing of start-stop and streamers.)
Coupler/Tape Bus Parity	Parity generated and checked on all byte transfers between coupler and tape transport, with errors flagged as status bits.
Self-Test	Coupler automatically executes extensive power-up self-test.
Fault/Activity Display	LED indicates detected board fault and coupler read/write activity.

PRODUCT SPECIFICATIONS MODELS TC02 AND TC12 (CONTINUED)

Characteristic	Specification
Option/ Configuration Switches	Three on-board slide switch modules for Base Address, Interrupt Vector, and microcode option selection.
Adaptive Streaming	Microprocessor will detect sequences of operations that can support effective streaming and will automatically switch between streaming and start/stop modes.
PHYSICAL	
Packaging	Quad-size four layer board (TC02 and TC12).
Cabling	Two 50-conductor flat cables to first tape transport.
Adapters	Daisy-chain cable adapters available for most industry standard tape drives.
ELECTRICAL	
Computer Interface	
TC02	Standard Q Bus using DEC approved drivers and receivers; one unit load per bus line.
TC12	Standard Unibus using DEC approved drivers and receivers; one unit load per bus line.
Transport Interface	25 ma drivers used on all output lines. Max 25 feet cumulative daisy-chain cable length.
Power	
TC02	+5V ± 5%, 5 amps.
TC12	+5V ± 5%, 5.2 amps.

Characteristic	Specification
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial LSI-11, PDP-11, VAX-11 computers and applicable tape drives.
SOFTWARE	
LSI-11 and PDP-11 Diagnostics	TS11 Controller Logic Test — ZTSIBO
	TS11 Data Reliability Test — ZTSHCO
VAX Diagnostics	TS11 Subsystem Repair — EVMAD
	TS11 Data Reliability — EVMAA
Operating Systems	All applicable to TS11 tape system on LSI-11, PDP-11, and VAX-11; includes RT11, RSX11M, RSX11M-PLUS, RSTS/E, and VMS.
Streaming Backup LSI-11/PDP-11	EMULEX supplied physical media backup stand-alone package supports all EMULEX and DEC hard disk subsystems (except RK05 and UDA50) with standard file structures of RT11, RSX11M, RSX11M-PLUS, RSTS-E and VMS. Supports full 4 MByte memory address range on LSI-11/23-PLUS.
VAX-11	Standard on-line backup utility (BACKUP) can be used for physical backup.

APPENDIX Q
TC13 SERIES TAPE COUPLER

THE INDUSTRY'S LATEST TS11 COMPATIBLE TAPE COUPLER SERIES...

...provides software compatibility with DEC's newest half-inch magnetic tape system. And at the same time, opens a whole new range of new applications and product configurations from which to choose. With this exceptional new product, you get the advantages of:

INCORPORATING essentially all industry compatible, half-inch formatted tape drives — including conventional NRZI/PE start/stop; 1600/3200 bpi start/stop/streaming; and the new breed of low-cost GCR (6250 bpi) start/stop/streaming transports.

EXECUTING standard diagnostics and system software under all major DEC operating systems — including RT11, RSX11M, RSX11M PLUS, RSTS-E and VMS — supported across the PDP/VAX-11 line.

BACKING UP fixed media (Winchester) disk drives with EMULEX-supported software for streaming type tape transports.

EMBEDDING the controller in any quad slot of a standard Unibus backplane or system unit.

LIKE ALL EMULEX CONTROLLERS...

...the TC13 for PDP/VAX-11's incorporate the same modern bipolar microprocessor technology first introduced by EMULEX, then perfected and proven in the many thousands of units already shipped. Use of this technology results in a product line with full flexibility, optimum packaging, outstanding reliability, extra features, and high performance.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY OTHER PRODUCT...

...and we think you will agree that the TC13 is the best choice for meeting all your PDP/VAX-11 tape subsystem requirements.

COMPACT PACKAGING.
Each unit is contained on only one stand-alone quad height pc board which plugs into any standard Unibus SPC quad slot.

TRANSPARENT SOFTWARE OPERATION.
The coupler, combined with one to four standard formatted tape drives, emulates all functions of the DEC TS11 subsystem, including execution of standard diagnostic programs.

INTERNAL SELF-TEST.
The coupler automatically performs extensive diagnostic tests during power-up and flags detected errors with a fault LED indicator.

FLEXIBLE TRANSPORT INTERFACE.
The coupler handles all industry standard ("Pertec interface") drives incorporating embedded or integral formatters. Up to four similar type transports (i.e. start/stop, streamer) may be daisy-chained on a single coupler.

LARGE DATA BUFFER.
The TC13 contains a 3.5 KByte buffer which provides efficient use of the streaming tape operation.

HIGH PERFORMANCE.
Each coupler is designed to handle tape data rates to 800 KB characters per second. This permits operation with high-performance transports, up to 6250 bpi @ 125 ips.

EXTRA TAPE SELECTION FLEXIBILITY. The DEC TS11 operates at 1600 bpi/45 ips only. The TC13 permits operation at any density and tape speed. Density selection is made at the tape drive.

STANDARD CPU BUS INTERFACE.
The coupler interfaces to any standard quad bus slot and presents only one unit load on all lines. Full 16-bit word NPR data transfers are made, and the controller checks for bus parity errors if a parity controller is installed in the system. The TC13 interfaces via SPC connection on the Unibus C-F connectors.

FLEXIBLE FORMATTING. Data may be packed in either DEC or IBM 9-channel format. Tape drives may be daisy-chained together. User may edit previously recorded records.

COUPLER/TRANSPORT DATA INTEGRITY.
Data parity is generated and checked on all transfers between the coupler and the tape transport with errors reported by status bits.

APPENDIX Q
TC13 SERIES TAPE COUPLER

FOR STREAMING BACKUP OF WINCHESTER DISKS...

...you're supported across the entire PDP-11 and VAX-11 series of CPU's. On the PDP-11 series, a stand-alone disk/tape backup program — written and supported by EMULEX — is provided. This package provides physical media backup for *all* EMULEX and DEC hard disk subsystems (except RK05) using the standard file structure of RSX11M, RSX11M-PLUS, RSTS-E and RT11.

On the VAX-11 series under VMS, the standard on-line backup utility (BACKUP) can be used with the TC13 to support tape backup operations for applicable EMULEX and DEC hard disk subsystems.

THE SAME QUALITY AND RELIABILITY...

...proven in all EMULEX products is built into the TC13. Assembly starts with exclusive use of pretested, preaged parts per MIL STD 833. All assembled units are next thoroughly tested at the component, assembly, and subsystem level. This is followed by dynamic environmental burn-in for 96 hours over a cyclic temperature range of 0-55°C. Units passing environmental tests are then subjected to a one hundred percent QC certification test at the subsystem level. These demanding procedures yield negligible infant mortality rates on production units. Calculated MTBF's of the TC13 exceed 60,000 hours; and complete actual failure data is maintained by EMULEX to insure that actual MTBF experience conforms to predicted results.

AND FINALLY, YOU GET SUPPORT...

...from the EMULEX customer service organization and from an application staff devoted solely to customer backup. All EMULEX-supplied software is written and maintained in-house by the EMULEX engineering group, including a 90-day full-support warranty plus renewable update service, so you're never left holding the bag by unsupported packages. Direct field installation is available from EMULEX, and the products are maintained nationwide by Control Data and other qualified service organizations.

PRODUCT SPECIFICATIONS MODEL TC13

Characteristic	Specification
FUNCTIONAL	
Design	High-speed 8-bit bipolar microprocessor-based tape coupler for formatted tape transports.
CPU's	PDP-11/04 thru 11/70, VAX-11/730, 11/750, and 11/780.
Computer Interface	Standard Unibus via SPC interface on coupler board (C-F connectors).
Tape Speeds	12.5 to 125 ips.
Data Buffer	3.5 KBytes.
Tape Densities (Forward and Reverse)	800, 1600, 3200, 6250 bpi.

Characteristic	Specification
Max Tape Data Rate	800 KB characters/second.
Standard Emulation	DEC TS11 Tape Subsystem.
Bus Address Range	0-256 KBytes.
Standard Register Base Address	Variable.
Standard Interrupt Vector	Variable.
Interrupt Level	5
Tape Transports: Start-Stop	All 9-track, 800/1600 bpi industry-standard formatted tape drives.

APPENDIX Q
TC13 SERIES TAPE COUPLER

PRODUCT SPECIFICATIONS
MODEL TC13
(CONTINUED)

Characteristic	Specification
Tape Transports: Streamer	Cipher-F880 and F880 II Microstreamer CDC-92181 Streaming Tape Kennedy-6809 Data Streamer Pertec-F1000 Streaming Tape.
Number of Transports	Daisy-Chain, 1-4 drives.
Coupler/Tape Bus Parity	Parity generated and checked on all byte transfers between coupler and tape transport, with errors flagged as status bits.
Self-Test	Coupler automatically executes extensive power-up self-test.
Fault/Activity Display	LED indicates detected board fault and coupler read/write activity.
Option/ Configuration Switches	Three on-board slide switch modules for Base Address, Interrupt Vector, and microcode option selection.
Adaptive Streaming	Microprocessor will detect sequences of operations that can support effective streaming and will automatically switch between streaming and start/ stop modes.
PHYSICAL	
Packaging	Quad-size four layer board.
Cabling	Two 50-conductor flat cables to first tape transport.
Adapters	Daisy-chain cable adapters available for most industry standard tape drives.
ELECTRICAL	
Computer Interface	Standard Unibus using DEC approved drivers and receivers; one unit load per bus line.
Transport Interface	25ma drivers used on all output lines. Max 25 feet cumulative daisy-chain cable length.
Power	+5V ±5%, 5.2 amps.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial PDP-11, VAX-11 computers and applicable tape drives.
SOFTWARE	
PDP-11 Diagnostics	TS11 Controller Logic Test — ZTSIBO TS11 Data Reliability Test — ZTSHCO
VAX-11 Diagnostics	TS11 Subsystem Repair — EVMAD TS11 Data Reliability — EVMAA
Operating Systems	All applicable to TS11 tape system on PDP-11 and VAX-11; includes RT11, RSX11M, RSX11M-PLUS, RSTS-E, and VMS.
Streaming Backup PDP-11	EMULEX supplied physical media backup stand-alone package supports all EMULEX and DEC hard disk subsystems (except RK05) with standard file structures of RT11, RSX11M, RSX11M-PLUS, RSTS-E, and VMS.
VAX-11	Standard on-line backup utility (BACKUP) can be used for physical backup.

APPENDIX R
TC05/15 SERIES TAPE COUPLERS

DESIGNED TO HANDLE THE CDC SENTINEL 1/4-INCH TAPE STREAMER.

The TC05 and TC15 open up a whole new range of applications and product configurations from which to choose. And at the same time, they provide software compatibility, using CDC's new 1/4-inch streaming magnetic tape unit. With these exceptional new products, you get the advantages of:

INTERFACING the CDC Sentinel 1/4-inch STREAMER tape drive, which features high-capacity in a compact, convenient 8-inch package.

EXECUTING TS11 diagnostics and system software under all major DEC-supported operating systems — including RT11, RSX11M, RSTS-E and VMS.

BACKING UP fixed media (Winchester) disk drives with standard DEC-supported TS11 tape software.

IMBEDDING the coupler in any quad slot of a standard QBus or Unibus backplane or system unit.

FUNCTIONING when you plug it in and continuing to work reliably for thousands of hours.

LIKE ALL EMULEX CONTROLLERS...

...the TC05 and TC15 for LSI/PDP-11's incorporate the same modern bipolar microprocessor technology first introduced by EMULEX, then perfected and proven in the many thousands of units already shipped. Use of this technology results in a product line with full flexibility, optimum packaging, outstanding reliability, extra features, and high performance.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY SIMILAR PRODUCT...

...and we think you will agree that the TC05 and TC15 are the best choices for meeting your 1/4-inch tape subsystem requirements.

COMPACT PACKAGING. Each coupler is contained on just one stand-alone quad pc board which plugs into any standard QBus or Unibus SPC slot.

TRANSPARENT SOFTWARE OPERATION. Combined with CDC's new 1/4-inch formatted tape drive, the TC05 and TC15 couplers emulate all functions of the DEC TS11 subsystem, including execution of the standard data reliability diagnostic program.

INTERNAL SELF-TEST. The coupler automatically performs extensive diagnostic tests during power-up and flags detected errors with an LED fault indicator.

ADVANCED TRANSPORT INTERFACE. The coupler handles CDC's SENTINEL 1/4-inch formatted tape drive, incorporating an integral formatter.

LARGE DATA BUFFER. Provides efficient tape operation while functioning with standard DEC software.

STANDARD CPU BUS INTERFACE. The coupler interfaces to any standard quad bus slot and presents only one unit load on all lines. Full 16-bit word DMA data transfers are made, with the coupler checking for bus parity errors. The TC05 electrically interfaces via the QBus A-B connectors and the TC15 interfaces via connectors C-F in a Unibus SPC slot.

4 MEGABYTE QBUS ADDRESS. The TC05 has full 22-bit QBus address hardware implemented for permitting software to utilize the full 4 megabyte memory capacity of the LSI-11/23 PLUS.

APPENDIX R
TC05/15 SERIES TAPE COUPLERS

FOR BACKUP OF WINCHESTER DISKS...
...you can use your standard PDP/LSI-11 software. A 3.5 KByte data buffer provides capability for physical media backup for *all* EMULEX and DEC hard disk subsystems using the standard RSX11M, RSX11M-PLUS, RSTS-E, RT11...and even VMS software. No special software packages are required.

THE SAME QUALITY AND RELIABILITY...
...proven in all EMULEX products is built into the TC05 and TC15. Assembly starts with exclusive use of pretested, pre-aged parts per MIL STD 833. Next, all assembled units are thoroughly tested at the component, assembly, and subsystem level. This is followed by dynamic environmental burn-in for 96 hours over a cyclic temperature range of 0-55°C. Units passing environmental tests are then subjected to a 100% QC certification test at the subsystem level. These demanding procedures yield negligible infant mortality rates on production units. Calculated MTBF of the TC05 and TC15 exceeds 60,000 hours; and detailed failure data is maintained by EMULEX to insure that actual MTBF experience conforms to predicted results.

AND MOST IMPORTANTLY, YOU GET SUPPORT...
...from the EMULEX customer service organization and from an application staff devoted solely to customer backup. The TC05 and TC15 come with a one-year warranty. You're never left holding the bag by unsupported products. Direct field installation is available from EMULEX, and the products are maintained nationwide by Control Data and other qualified service organizations.

COMPLETE SENTINEL TAPE SUBSYSTEMS!

EMULEX has complete cartridge tape and tape/disk subsystems available to fill your tape storage and backup requirements:

THE VAULT...
...a CDC Sentinel cartridge tape drive, complete with its own power supply in a convenient desktop cabinet.

THE MEDLEY...
...the same CDC Sentinel cartridge tape drive *plus* a 110 MByte Winchester disk drive and UC02 emulating host adapter. The UC02 host adapter features self-sizing, error mapping, and seek ordering. The Medley disk/tape subsystem comes complete with its own power supply...all in a standard 19-inch rackmount cabinet.

Ask for our separate data sheets on the Vault, Medley, and UC02, defining the available configurations and providing detailed specifications.

APPENDIX R
TC05/15 SERIES TAPE COUPLERS

PRODUCT SPECIFICATIONS
MODEL TC05 AND TC15

Characteristic	Specification
FUNCTIONAL	
Design	High-speed 8-bit bipolar microprocessor-based tape coupler for formatted cartridge tape transports.
CPU's	TC05: LSI-11 through 11/23-PLUS, MICRO/PDP-11. TC15: PDP-11/04 through 11/70, VAX.
Computer Interface	TC05: Standard QBus via standard interface connectors on coupler board (A-B connectors). TC15: Standard Unibus via standard interface connectors on coupler board (C-F connectors).
Tape Drive/ Interface	CDC 92192 Sentinel 1/4-inch NRZ 8000 bpi formatted streaming tape drive.
Subsystem Configuration	Single formatted tape drive and coupler per subsystem:
Tape Media	1/4-inch tape data cartridge.
Tape Speed	55 ips.
Tape Density (Forward & Reverse)	8000 bpi.
Recording Mode	Serial recording in NRZ format.
Track Configuration	11 data tracks, with sequential, serpentine track recording per ANSI X3.55-1977.
Standard Emulation	DEC TS11 Tape Subsystem.
Data Buffering	3.5 KBytes.
Bus Address Range	0-256 KBytes standard (0-4 MBytes optional for LSI-11/23-PLUS).
Standard Register Base Address	Variable.
Standard Interrupt Vector	Variable.
Interrupt Level	BR5.

Characteristic	Specification
Self-Test	Coupler automatically executes extensive power up self-test.
Fault/Activity Display	LED indicates detected board fault and coupler read/write activity.
Option/ Configuration Switches	Three on-board slide switch modules for Base Address and Interrupt Vector.
PHYSICAL	
Packaging	Quad-size four layer board.
Cabling	FCC-compliant 40-conductor round cable.
ELECTRICAL	
Computer Interface	TC05: Standard QBus using DEC approved drivers and receivers; one unit load per bus line. TC15: Standard Unibus using DEC approved drivers and receivers; one unit load per bus line.
Transport Interface	Standard CDC Sentinel tape drive formatter interface. Maximum 10 foot cable length.
Power	+5 volts ± 5%, 6 amps.
ENVIRONMENTAL	Exceeds all environmental ranges and conditions specified for commercial LSI/PDP/VAX-11 computers and applicable tape drives.
SOFTWARE	
LSI/PDP-11 Diagnostics	TS11 Controller Logic Test — ZTSIBO (modified). TS11 Data Reliability Test — ZTSHCO.
VAX-11 Diagnostics	TS11 Subsystem Repair — EVMAD (modified). TS11 Data Reliability Test — EVMAA.
Operating Systems	Transparent to all software applicable to TS11 tape system on LSI/PDP/VAX-11. Includes RT11, RSX11M, RSX11M-PLUS, RSTS-E, VMS.

APPENDIX S
TC7000 SERIES TAPE COUPLER

THE ONLY HIGH DENSITY TAPE COUPLER FOR THE VAX-11/750 AND 780 THAT GIVES YOU THE ADVANTAGES OF...

USING standard VAX-11 operating systems and applications software, (TM03/TU77).

INTERFACING to the computer's internal bus for optimum performance — an important alternative for systems with a busy, crowded Unibus. Ties directly to the CPU/Memory Interconnect (CMI) in 750's and through EMULEX's V-Master in 780's, where conversion to the Synchronous Backplane Interconnect (SBI) takes place.

INCORPORATING an industry-standard GCR, PE and/or NRZI tape transport-formatter.

EMBEDDING the coupler in an existing RH750 slot of the CMI Bus (VAX-11/750) or EMULEX V-Master. (Fits in the VAX-11/780 terminator slot).

PERFORMING a comprehensive set of self-test and subsystem diagnostics.

WORKING properly when you plug it in, and continuing to work reliably for thousands of hours.

YOU GET THESE ADVANTAGES BECAUSE...

The TC7000 was designed specifically — and exclusively — for the VAX-11/750 and 780 computers, connecting either directly to the CMI of the 750 or to the SBI of the 780 through the EMULEX V-Master chassis. The TC7000 is not simply a warmed-over general-purpose controller that has been adapted to operate on the VAX. Its packaging and performance are therefore far more efficient then that of any similar product. Using an advanced microprocessor design, the TC7000 has been configured through firmware to emulate the DEC TM03 magnetic tape controller. With this single board, you can add up to four STC or up to eight Pertec-compatible drives to your VAX-11/750 or 780.

You get everything you could ask for in a Massbus-type controller — VMS software transparency, high-speed data transfer, high speed/high capacity storage, and more. Many extra features have been added, and custom modes of operation can be provided for special applications. With the EMULEX Genuine Alternative you can have it all... performance, flexibility, economy and reliability.

THE TC7000 TAPE COUPLER ADDS THE FOLLOWING PERFORMANCE AND FEATURES TO YOUR VAX-11/750 OR 780...

ADVANCED MICROPROCESSOR ARCHITECTURE. The same unique (patent pending) design already proven in all EMULEX disk and tape controller products, incorporates high speed bipolar bit-slice technology to meet the performance demands of GCR control/data transfer rates and provide almost unlimited application flexibility, while reducing component count for low cost and high reliability.

TRANSPARENT OPERATION. The TC7000 combined with an applicable transport and formatter, emulates the function of DEC's TGU77 and TEU77 tape subsystems including execution of standard diagnostic and operating software.

STANDARD TAPE DRIVES. The TC7000 supports both the industry-standard Pertec and STC tape formatter interfaces in the manufacturer's standard configuration. Switch settings permit selection of either the STC or the Pertec-type interface.

FORMAT CAPABILITIES. Tape drives having different formats (i.e. GCR/PE/NRZI) can be operated together on the coupler. The operator may select the tape format at the drive.

MEDIA COMPATIBILITY. Tapes written by the TC7000 are compatible and interchangeable with those written on the DEC TM03/TU77.

COMPUTER COMPATIBILITY. At the flip of a switch, the same TC7000 that runs in your VAX-11/750 will also operate in the EMULEX V-Master in your 780.

CONVENIENCE FEATURES. A host of items — such as convenient slide switch selection of drive type, priority level, bus address range, interrupt vector, and configuration/functional options — eliminate multiple hardware versions and make the unit simple and easy to configure. And a universal adapter simplifies cable installation.

SINGLE BOARD PACKAGE. The "extended" hex pcb, containing the entire CMI interface and tape coupler, installs directly in any one of three available

APPENDIX S
TC7000 SERIES TAPE COUPLER

RH750 slots without modification to the VAX-11/750 backplane. In the VAX-11/780, the TC7000 installs into one of the two slots in the EMULEX V-Master, which resides in the 780 terminator slot. The TC7000's single board design minimizes mounting space requirements, eliminates "boat-anchor" boxes, simplifies spares stocking requirements, avoids specially wired system unit/backplanes, reduces component count and maximizes inherent reliability.

INTERNAL SELF TEST. Automatic coupler self-test, supported by an error/status display, is contained in on-board firmware.

LOW POWER. Only 10 amps are required from the internal +5 volt source which eliminates the need for separate power supplies and special cooling provisions.

COMPARE THIS COMBINATION OF KEY FEATURES AGAINST THOSE OF ANY OTHER PRODUCT...

...and we think you will agree that the TC7000 is the best choice for meeting all your VAX-11 high performance tape system requirements.

WE OFFER MORE THAN JUST A GREAT PRODUCT.

With the TC7000 you get superb quality and excellent support from the EMULEX team. All pcb components are pre-aged for over 160 hours, and final product assemblies are environmentally cycled for over 96 hours (while operating) to insure ultimate reliability from the moment they are installed. Plant production capability exists to meet the highest of volume requirements. All EMULEX products are backed by a full one year warranty and supported worldwide by the company's technical applications group.

TC7000 GENERAL SPECIFICATIONS

Characteristic	Specification
FUNCTIONAL	
Design	High-speed bipolar (2901-type) microprocessor-based coupler for integration of GCR/PE/NRZI tape drives to host VAX-11/750 or 780 computer; incorporates unique (patent pending) design to achieve extreme high speed operations with minimum hardware.
Emulation	The TC7000 combined with an applicable tape transport and formatter, emulates the function of the DEC TGU77 and TEU77 tape subsystem (emulates the DEC RH750 or RH780 Massbus interface with attached TM03 tape controller and TU77 drives), and operates transparently to VAX-VMS and UNIX operating systems, including execution of standard diagnostic and operating software.
Computer Interface	VAX-11/750 CMI bus via RH750 backplane interface. Interfaces to VAX-11/780 SBI Bus via EMULEX V-Master.
Control Functions	No Operation, Rewind Off-Line, Drive Clear, Erase, Write Tape Mark, Space Forward, Space Reverse, Write Forward, Read Forward, Read Reverse, Write Check Forward, Write Check Reverse (depending on drive used).
CMI Address (VAX-11/750)	F28000, F2A000, F2C000, F2E000 (HEX).
SBI Address (VAX-11 780)	20008000 through 20016000 (HEX).
Interrupt Vector Address (HEX)	
(VAX-11 750)	150, 154, 158, and 15C.
(VAX-11 780)	TR4 through TR11 as defined by V-Master.

TC7000 GENERAL SPECIFICATIONS
(CONTINUED)

Characteristic	Specification
Priority Level	BR5 (Switch-selectable BR4-BR7).
DMA Transfers	32-bit parallel via CMI bus. 64-bit parallel via SBI bus.
DMA Address Range	
(VAX-11/750)	16 Megabytes.
(VAX-11/780)	537 Megabytes.
Tape Interface	Either STC or Pertec-type interface with switch selection of desired interface.
Recording Density/ Format	Tape drives with any combination of 6250 bpi GCR, 1600 bpi PE, and 800 bpi NRZI formats are supported, up to a maximum data transfer rate of 1.5 MBytes/sec. Density selection by operator.
Tape Speed	All standard tape speeds from 12.5 to 125 inches per second.
Number of Drives	1-8 Pertec-type interface; 1-4 STC-type interface.
Data Buffer	512 Bytes.
Data Block Capacity	Up to 65 KBytes of data.
Status Display	Edge-mounted LED's for self-test fault and data transfer activity.
Option Switches	On-board slide switches provided for convenient selection of: CPU type, arbitration levels, base address/interrupt, drive interface and drive type.
Self Test	Coupler automatically executes extensive internal self-test routines at power up; LED Fault Display is provided.
COMPATIBILITY	
Media	Format same as DEC-generated media.
Software Transparency	Operating Systems: VMS, UNIX. Diagnostics: TM03/TU77 Data Reliability Test — EVMAA (on drives supporting READ/REVERSE).

Characteristic	Specification
PHYSICAL	
Packaging	Single "extended" hex-height circuit board. Standard RH750 backplane interface. Extractor handles provided for easy insertion/removal. Unique board stiffener eliminates typical hex-board warping problems and insures integrity of backplane connector alignment.
Cables	Different cable sets are used to interface the STC and the Pertec-type formatters. Cables connect to the EMULEX cable interconnect adapter paddleboard which plugs onto the VAX-11/750 or V-Master backplane connector pins.
Mounting	Standard slot 7, 8 or 9 (RH750 Massbus Controller slots) in VAX-11/750 backplane. Standard EMULEX V-Master slot in VAX-11/780. (V-Master fits in the VAX-11/780 terminator slot).
ELECTRICAL	
Tape Formatter Interface	Industry-standard Pertec or STC formatter interface, per manufacturer's specifications. Standard open-collector line drivers and TTL receivers. Total daisy chain cable length up to 25 feet.
CMI Bus Interface	DEC-approved line drivers and receivers. One unit load per bus signal line.
Power (from CPU)	+5V ± 5% @ 10 amps maximum from the internal computer power supply.
ENVIRONMENTAL	
	Exceeds all environmental ranges and conditions specified for commercial VAX-11/750 or 780 computers with applicable tape drives.

APPENDIX T
Emulex Cables and Adapters For Disk and Tape Products

CABLES–NON-FCC COMPLIANT

LSI, PDP-11
DISK CABLES - NON FCC COMPLIANT

SMD INTERFACE CABLE SETS
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC70, SC71, SC72 Cable sets from controller to first drive, consisting of daisy-chain "A" cable, plus radial "B" cable of equal length.

FLAT CABLE SET
Has 60 pin 3M connector on both ends of the "A" cable and 26 pin 3M connector on both ends of the "B"cable.

LENGTH	PART NUMBER
8 FT.	SU1112308
15 FT.	SU1112315
25 FT.	SU1112325
35 FT.	SU1112335
50 FT.	SU1112350

FLAT/ROUND CABLE SET
Has 60 pin 3M connector on controller end and 75 pin AMP connector on drive end of the "A" cable and a 26 pin 3M connector on the controller end and a 32 pin AMP connector on the drive end of the "B" cable.

LENGTH	PART NUMBER
8 FT.	SU0112309
15 FT.	SU0112316
25 FT.	SU0112326
35 FT.	SU0112336
50 FT.	SU0112351

ANSI INTERFACE CABLE
SC04 CONTROLLER

FLAT CABLE
One 50 pin 3M connector on both ends of a shielded cable required for each drive.

LENGTH	PART NUMBER
2 FT.	SU0411201-01
4 FT.	SU0411201-02
6 FT.	SU0411201-03
8 FT.	SU0411201-04
10 FT.	SU0411201-05

INDIVIDUAL CABLES - NON FCC COMPLIANT
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC70, SC71, SC72.

FLAT "A" CABLE
60 pin 3M connector on both ends. This cable may be used to connect drive #1 to the controller and subsequent drives in a chain to drive #1.

LENGTH	PART NUMBER
8 FT.	SU1111201
15 FT.	SU1111203
25 FT.	SU1111205
35 FT.	SU1111207
50 FT.	SU1111209

FLAT/ROUND "A" CABLE
60 pin 3M connector on the controller end and 75 pin AMP connector on the drive end. Connects controller to drive number one.

LENGTH	PART NUMBER
8 FT.	SU0111202
15 FT.	SU0111203
25 FT.	SU0111204
35 FT.	SU0111205
50 FT.	SU0111206

ROUND "A" CABLE
75 pin AMP connector on both ends. Used to daisy chain additional drives.

LENGTH	PART NUMBER
8 FT.	SU0111207
15 FT.	SU0111208

FLAT "B" CABLE
26 pin 3M connector on both ends. One cable is required to connect each drive to the controller.

LENGTH	PART NUMBER
8 FT.	SU1111202
15 FT.	SU1111204
25 FT.	SU1111206
35 FT.	SU1111208
50 FT.	SU1111210

FLAT/ROUND "B" CABLE
26 pin 3M connector on controler end and 32 pin AMP connector on the drive end. Used to connect each drive to the controller.

LENGTH	PART NUMBER
8 FT.	SU0111108
15 FT.	SU0111115
25 FT.	SU0111125
35 FT.	SU0111135
50 FT.	SU0111150

VAX
DISK CABLES - NON FCC COMPLIANT

VAX INTERFACE CABLE SETS
SC7000, SC750, SC758, SC780, SC788, V780-D1, V780-D2, V788-D1, AND V788-D2.

FLAT CABLE SET
The "A" cable has one 26 pin and one 34 pin 3M connector on the controller end, and one 60 pin 3M connector on the drive end. The "B" cable has a 26 pin 3M connector on both ends. Cable number 3 is an insulated ground cable.

LENGTH	PART NUMBER
15 FT.	SU7512301-01
25 FT.	SU7512301-02
35 FT.	SU7512301-03
50 FT.	SU7512301-04

INDIVIDUAL VAX CABLES
SC7000, SC750, SC758, SC780, SC788, V780-D1, V780-D2, V788-D1, and V788-D2 controllers.

FLAT/FLAT "A" CABLE
26 pin and 34 pin 3M connectors on controller end, and 60 pin connector on drive end. Used to connect controller to first drive.

LENGTH	PART NUMBER
15 FT.	SU7511201-01
25 FT.	SU7511201-02
35 FT.	SU7511201-03
50 FT.	SU7511201-04

FLAT "A" CABLE
60 pin 3M connector on both ends. Used to daisy chain additional drives together.

LENGTH	PART NUMBER
8 FT.	SU1111201
15 FT.	SU1111203
25 FT.	SU1111205
35 FT.	SU1111207
50 FT.	SU1111209

FLAT/ROUND "A" CABLE
26 pin and a 34 pin 3M connector on the controller end and 75 pin AMP connector on the drive end. Used to connect controller to first drive.

LENGTH	PART NUMBER
15 FT.	SU7511202-01
25 FT.	SU7511202-02
35 FT.	SU7511202-03
50 FT.	SU7511202-04

NON FCC COMPLIANT

FLAT "B" CABLE

26 pin 3M connector on both ends. Used to connect each drive to the controller.

LENGTH	PART NUMBER
8 FT.	SU1111202
15 FT.	SU1111204
25 FT.	SU1111206
35 FT.	SU1111208
50 FT.	SU1111210

FLAT/ROUND "B" CABLE

26 pin 3M connector on controller end and 32 pin AMP connector on the drive end. Used to connect drive to controller.

LENGTH	PART NUMBER
8 FT.	SU0111108
15 FT.	SU0111115
25 FT.	SU0111125
35 FT.	SU0111135
50 FT.	SU0111150

GROUND CABLE FOR VAX 11-780 SYSTEMS.

LENGTH	PART NUMBER
15 FT.	SU1111211-02
25 FT.	SU1111211-03
35 FT.	SU1111211-04
50 FT.	SU1111211-05

TC01, TC11
TAPE CABLES NON FCC COMPLIANT

TAPE CABLE SETS

TC01 AND TC11

Cable set consisting of two 40-conductor flat cables of equal length, three adpter pcb's, and one 11'interconnect cable for the PE board. Used with industry standard non formatted tape drive.

LENGTH	PART NUMBER
8 FT.	TU1112308
15 FT.	TU1112315
25 FT.	TU1112325

TC01 AND TC11 DAISY CHAIN CABLE SETS

For connection of subsequent transports after the first cable set. Consisting of; two 40 conductor flat cables of equal length and adpter daisy chain pcb's.

LENGTH	PART NUMBER
8 FT.	TU1112309
15 FT.	TU1112316

INDIVIDUAL CABLES

SINGLE CONTROL CABLE

From controller to first transport. 40 pin 3M connector on both ends of the cable.

LENGTH	PART NUMBER
8 FT.	TU1111202
15 FT.	TU1111203
25 FT.	TU1111204
35 FT.	TU1111205
50 FT.	TU1111206

SINGLE DATA CABLE

From controller to first transport. 40 pin 3M connector on the controller end with two 20 pin 3M connectors on the drive end.

LENGTH	PART NUMBER
8 FT.	TU1111207
15 FT.	TU1111208
25 FT.	TU1111209
35 FT.	TU1111210
50 FT.	TU1111211

NON FCC COMPLIANT

SINGLE P.E. CABLE

To interconnect the controller and P.E. PCB.

LENGTH	PART NUMBER
11 INCH	TU1111201

DAISY-CHAIN CONTROL CABLE

First transport to subsequent transport. 40 pin 3M connector on both ends of cable.

LENGTH	PART NUMBER
8 FT.	TU1111202
15 FT.	TU1111203

DAISY-CHAIN DATA CABLE

First transport to subsequent transport. Two 20 pin 3M connectors on both ends of cable.

LENGTH	PART NUMBER
8 FT.	TU1111214
15 FT.	TU1111215

ADAPTER PCB'S

For first transport.

TYPE	PART NUMBER
CONTROL	TU1110403-00
WRITE	TU1110404-00
READ	TU1110405-00

ADAPTER PCB'S
For Daisy-Chain cables.

TYPE	PART NUMBER
CONTROL	TU1110409
WRITE	TU1110407
READ	TU1110408

TC02, TC12
TAPE CABLES NON FCC COMPLIANT

TC02 AND TC12 CABLES
50 pin 3M connector on both ends of cable. Two cables are REQUIRED for each controller. These cables are used to connect industry standard formatted tape drives to the controller.

LENGTH	PART NUMBER
3 FT.	TU1211201-01
5 FT.	TU1211201-02
8 FT.	TU1211201-03
15 FT.	TU1211201-04
25 FT.	TU1211201-05
35 FT.	TU1211201-06
50 FT.	TU1211201-07

DAISY-CHAIN CABLE
For Cipher F880-1 (S01C), F880-2 (S02C), M890-1 (S03C), M890-2 (S04C), M891-1 (S05C), M891-2 (S06C) tape drives. Used to connect additional drives together. Two cables required.

LENGTH	PART NUMBER
3 FT.	TU1211201-01
5 FT.	TU1211201-02
8 FT.	TU1211201-03
15 FT.	TU1211201-04
25 FT.	TU1211201-05

DAISY-CHAIN CABLE
PCB'S for the above drives and cables. Two PCB's required.

TYPE	PART NUMBER
PCB ADAPTER	TU1210402-00

TC05, TC15
TAPE CABLES NON FCC COMPLIANT

TC05 AND TC15 CABLES
40 pin 3M connector on the controller end and 34 pin cable with a 34 pin 3M connector on the drive end.

LENGTH	PART NUMBER
10 FT.	PU0511208-00

DISK CABLES FCC COMPLIANT
Free Standing Drive
(9766, 9775)
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC71

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811219-05 10'	**Part Number Lgth** SU7811214-01 8' SU7811214-02 15' SU7811214-03 25' SU7811214-04 35'	**Part Number Lgth**
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-05 10'	**Part Number Lgth** SU7811222-01 8' SU7811222-02 15' SU7811222-03 25' SU7811222-04 35'	**Part Number Lgth**
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** SU1110201	**(I) PERIPHERAL ADAPTER** **Drive Part Number** 9766 SU7813104 9775 SU7813104

Note: SU7811214, and SU7811222 are UNSHIELDED 16" from the ends.

EXAMPLE: SC31/BX Mounted in CPU Cabinet and a CDC 9766 Drive 15' away from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811219-05	10'
B	1	SU7811214-02	15'

"B" CABLE

Item	Qty	Part Number	Lgth
D	1	SU7811218-05	10'
E	1	SU7811222-02	15'

MOUNTING FRAME

Item	Qty	Part Number
G	1	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	1	SU1110201

PERIPHERAL ADAPTER

Item	Qty	Part Number
I	1	SU7813104

DISK CABLES FCC COMPLIANT
Free Standing Drive
(9766, 9775)
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC71

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811219-05 10'	**Part Number Lgth** SU7811214-01 8' SU7811214-02 15' SU7811214-03 25' SU7811214-04 35'	**Part Number Lgth**
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-05 10'	**Part Number Lgth** SU7811222-01 8' SU7811222-02 15' SU7811222-03 25' SU7811222-04 35'	**Part Number Lgth**
(G) MOUNTING FRAME	**(H) PERSONALITY MODULE**	**(I) PERIPHERAL ADAPTER**
Part Number CU2213002	**Part Number** SU1110201	**Drive Part Number** 9766 SU7813104 9775 SU7813104

Note: SU7811214, and SU7811222 are UNSHIELDED 16" from the ends.

EXAMPLE: SC31/BX Mounted in CPU Cabinet and two (2) CDC 9766 Drives 15' away from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811219-05	10'
B	1	SU7811214-02	15'
B	1	SU7811214-01	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	2	SU7811218-05	10'
E	1	SU7811222-02	15'
E	1	SU7811222-03	25'

MOUNTING FRAME

Item	Qty	Part Number
G	1	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	1	SU1110201

PERIPHERAL ADAPTER

Item	Qty	Part Number
I	1	SU7813104

DISK CABLES FCC COMPLIANT
Cabinet Mounted - 1 Drive
(9710, 9715, 9771, 9730-XXX, 2284, 2294, 2312, 2351)
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC71

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811219-05 10'	Part Number Lgth SU7811212-02 8' SU7811212-03 15' SU7811212-04 25' SU7811212-05 35'	Part Number Lgth SU7811219-04 8'
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-05 10'	Part Number Lgth SU7811213-02 8' SU7811213-03 15' SU7811213-04 25' SU7811213-05 35'	Part Number Lgth SU7811218-04 8'
(G) MOUNTING FRAME	**(H) PERSONALITY MODULE**	**(I) PERIPHERAL ADAPTER**
Part Number CU2213002	Part Number SU1110201	Drive Part Number

EXAMPLE: SC31/BX Mounted in CPU Cabinet and a CDC 9710 Drive 15' away in another cabinet from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811219-05	10'
B	1	SU7811212-03	15'
C	1	SU7811219-04	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	2	SU7811218-05	10'
E	1	SU7811213-03	15'
F	1	SU7811218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	SU1110201

PERIPHERAL ADAPTER

Item	Qty	Part Number
I		

DISK CABLES FCC COMPLIANT
Cabinet Mounted - 2 Drive
(9710, 9715, 9771, 9730-XXX, 2284, 2294, 2312, 2351)
SC01, SC02, SC03, SC11, SC12, SC21, SC31, SC71

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811219-05 10'	**Part Number Lgth** SU7811212-02 8' SU7811212-03 15' SU7811212-04 25' SU7811212-05 35'	**Part Number Lgth** SU7811219-04 8'
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-05 10'	**Part Number Lgth** SU7811213-02 8' SU7811213-03 15' SU7811213-04 25' SU7811213-05 35'	**Part Number Lgth** SU7811218-04 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** SU1110201	**(I) DAISY CHAIN CABLE** **Drive Part No. Lgth** 2312 2312DCC 25' Others SU1111201 8'

EXAMPLE: SC31/BX Mounted in CPU Cabinet and two (2) CDC 9710 Drives 15' away in another cabinet from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811219-05	10'
B	1	SU7811212-03	15'
C	1	SU7811219-04	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	2	SU7811218-05	10'
E	2	SU7811213-03	15'
F	2	SU7811218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	SU1110201

DAISY CHAIN CABLE

Item	Qty	Part Number	Lgth
I	1	SU1111201	8'

DISK CABLES FCC COMPLIANT
Free Standing, 1 Drive
(9766, 9775)
SC750, SC758, V-780/DX, V-788/DX

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811215-06 12'	Part Number Lgth SU7811214-01 8' SU7811214-02 15' SU7811214-03 25' SU7811214-04 35'	Part Number Lgth
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-06 12'	Part Number Lgth SU7811222-01 8' SU7811222-02 15' SU7811222-03 25' SU7811222-04 35'	Part Number Lgth
(G) MOUNTING FRAME	**(H) PERSONALITY MODULE**	**(I) PERIPHERAL ADAPTER**
Part Number CU2213002	Part Number SU1110201	Drive Part Number 9766 SU7813104 9775 SU7813104

Note: SU7811214, and SU7811222 are UNSHIELDED 16" from the ends.

EXAMPLE: SC31/BX Mounted in CPU Cabinet and a CDC 9766 Drive 15' away from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811215-06	12'
B	1	SU7811214-02	15'
C			

"B" CABLE

Item	Qty	Part Number	Lgth
D	1	SU7811218-06	12'
E	1	SU7811222-02	15'
F			

MOUNTING FRAME

Item	Qty	Part Number
G	1	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	1	SU1110201

PERIPHERAL ADAPTER

Item	Qty	Part Number
I	1	SU7813104

DISK CABLES FCC COMPLIANT
Free Standing, 2 Drive
(9766, 9775)
SC750, SC758, V-780/DX, V-788/DX

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811215-06 12'	**Part Number Lgth** SU7811214-01 8' SU7811214-02 15' SU7811214-03 25' SU7811214-04 35'	**Part Number Lgth**
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-06 12'	**Part Number Lgth** SU7811222-01 8' SU7811222-02 15' SU7811222-03 25' SU7811222-04 35'	**Part Number Lgth**
(G) MOUNTING FRAME	**(H) PERSONALITY MODULE**	**(I) PERIPHERAL ADAPTER**
Part Number CU2213002	**Part Number** SU1110201	**Drive Part Number** 9766 SU7813104 9775 SU7813104

Note: SU7811214, and SU7811222 are UNSHIELDED 16" from the ends.

EXAMPLE: SC31/BX Mounted in CPU Cabinet and two (2) CDC 9766 Drives 15' away from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811215-06	12'
B	1	SU7811214-02	15'
B	1	SU7811214-01	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	2	SU7811218-06	12'
E	1	SU7811222-02	15'
E	1	SU7811222-03	25'

MOUNTING FRAME

Item	Qty	Part Number
G	1	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	1	SU1110201

PERIPHERAL ADAPTER

Item	Qty	Part Number
I	2	SU7813104

DISK CABLES FCC COMPLIANT
Cabinet Mounted, 1 Drive
(9710, 9715, 9771, 9730-XXX, 2284, 2294, 2312, 2351)
SC750, SC758, V-780/DX, V788/DX

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811215-06 12'	**Part Number Lgth** SU7811212-02 8' SU7811212-03 15' SU7811212-04 25' SU7811212-05 35'	**Part Number Lgth** SU7811219-04 8'
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-06 12'	**Part Number Lgth** SU7811213-02 8' SU7811213-03 15' SU7811213-04 25' SU7811213-05 35'	**Part Number Lgth** SU7811218-04 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** SU1110201	**(I) DAISY CHAIN CABLE** **Drive Part No. Lgth**

EXAMPLE: SC750 Mounted in CPU Cabinet and a CDC 9710 Drive 15' away in another cabinet from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811215-06	12'
B	1	SU7811212-03	15'
C	1	SU7811219-04	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	1	SU7811218-06	12'
E	1	SU7811213-03	15'
F	1	SU7811218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	SU1110201

DAISY CHAIN CABLE

Item	Qty	Part Number
I		

DISK CABLES FCC COMPLIANT
Cabinet Mounted, 2 Drive
(9710, 9715, 9771, 9730-XXX, 2284, 2294, 2312, 2351)
SC750, SC758, V-780/DX, V788/DX

(A) CPU CABINET "A" Cable Unshielded	(B) EXTERNAL CABLE "A" Cable Shielded	(C) DISK DRIVE "A" Cable Unshielded
Part Number Lgth SU7811215-06 12'	**Part Number Lgth** SU7811212-02 8' SU7811212-03 15' SU7811212-04 25' SU7811212-05 35'	**Part Number Lgth** SU7811219-04 8'
(D) CPU CABINET "B" Cable Unshielded	**(E) EXTERNAL CABLE** "B" Cable Shielded	**(F) DISK DRIVE** "B" Cable Unshielded
Part Number Lgth SU7811218-06 12'	**Part Number Lgth** SU7811213-02 8' SU7811213-03 15' SU7811213-04 25' SU7811213-05 35'	**Part Number Lgth** SU7811218-04 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** SU1110201	**(I) DAISY CHAIN CABLE** **Drive Part No. Lgth** 2312 2312DCC 25' Others SU1111201 8'

EXAMPLE: SC750 Mounted in CPU Cabinet and two (2) CDC 9710 Drives 15' away in another cabinet from the CPU. These are the minimum number of cables required.

"A" CABLE

Item	Qty	Part Number	Lgth
A	1	SU7811219-06	12'
B	1	SU7811212-03	15'
C	1	SU7811219-04	8'

"B" CABLE

Item	Qty	Part Number	Lgth
D	2	SU7811218-06	12'
E	2	SU7811213-03	15'
F	2	SU7811218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	SU1110201

DAISY CHAIN CABLE

Item	Qty	Part Number	Lgth
I	1	SU1111201	8'

TAPE CABLES FCC COMPLIANT
Cabinet Mounted, 1 Drive
TC01, TC11

(A) CPU CABINET 40 Pin Cable Unshielded	(B) EXTERNAL CABLE 40 Pin Cable Shielded	(C) DISK DRIVE Cont. Cable Unshield'd
Part Number Lgth TU1111216-05 10'	**Part Number Lgth** TU1111217-01 4' TU1111217-02 8' TU1111217-03 15' TU1111217-04 25'	**Part Number Lgth** TU1111216-04 8'
(D) CPU CABINET 40 Pin Cable Unshielded	**(E) EXTERNAL CABLE** 40 Pin Cable Shielded	**(F) DISK DRIVE** Data Cable Unshielded
Part Number Lgth TU1111216-05 10'	**Part Number Lgth** TU1111217-01 4' TU1111217-02 8' TU1111217-03 15' TU1111217-04 25'	**Part Number Lgth** TU1111218-04 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** TU1210201	**(I) DAISY CHAIN CABLE** **Part Number Lgth**

EXAMPLE: TC01 Mounted in CPU Cabinet and a Drive 15' away in another cabinet from the CPU. These are the minimum number of cables required.

CONTROL CABLE

Item	Qty	Part Number	Lgth
A	1	TU1111216-05	10'
B	1	TU1111217-02	8'
C	1	TU1111216-04	8'

DATA CABLE

Item	Qty	Part Number	Lgth
D	1	TU1111216-05	10'
E	1	TU1111217-02	8'
F	1	TU1111218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	TU1210201

DAISY CHAIN CABLE

Item	Qty	Part Number
I		

TAPE CABLES FCC COMPLIANT
2 Cabinet Bolted Together Mount, 2 Drive
TC01, TC11

(A) CPU CABINET 40 Pin Cable Unshielded	(B) EXTERNAL CABLE 40 Pin Cable Shielded	(C) DISK DRIVE Cont. Cable Unshield'd
Part Number Lgth TU1111216-05 10'	**Part Number Lgth** TU1111217-02 8' TU1111217-03 15' TU1111217-04 25'	**Part Number Lgth** TU1111216-04 8'
(D) CPU CABINET 40 Pin Cable Unshielded	**(E) EXTERNAL CABLE** 40 Pin Cable Shielded	**(F) DISK DRIVE** Data Cable Unshielded
Part Number Lgth TU1111216-05 10'	**Part Number Lgth** TU1111217-02 8' TU1111217-03 15' TU1111217-04 25'	**Part Number Lgth** TU1111218-04 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** TU1210201	**(I) DAISY CHAIN CABLE** **Part Number Lgth** TU1112309 8'

EXAMPLE: TC01 Mounted in CPU Cabinet and two (2) Drives 15' away in another cabinet from the CPU. These are the minimum number of cables required.

CONTROL CABLE

Item	Qty	Part Number	Lgth
A	1	TU1111216-05	10'
B	1	TU1111217-02	8'
C	1	TU1111216-04	8'

DATA CABLE

Item	Qty	Part Number	Lgth
D	1	TU1111216-05	10'
E	1	TU1111217-02	8'
F	1	TU1111218-04	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	TU1210201

DAISY CHAIN CABLE

Item	Qty	Part Number	Lgth
I	1	TU1112309	8'

TAPE CABLES FCC COMPLIANT
Cabinet Mounted, 1 Drive
TC02, TC12

(A) CPU CABINET 50 Pin Cable Unshielded	(B) EXTERNAL CABLE 50 Pin Cable Shielded	(C) DISK DRIVE 50 Pin Cable Unshielded
Part Number Lgth TU1211204-06 10'	**Part Number Lgth** TU1211202-01 3' TU1211202-02 5' TU1211202-03 8' TU1211202-04 15' TU1211202-05 25'	**Part Number Lgth** TU1211203-05 8'
(D) CPU CABINET 50 Pin Cable Unshielded	**(E) EXTERNAL CABLE** 50 Pin Cable Shielded	**(F) DISK DRIVE** 50 Pin Cable Unshielded
Part Number Lgth TU1211204-06 10'	**Part Number Lgth** TU1211202-01 3' TU1211202-02 5' TU1211202-03 8' TU1211202-04 15' TU1211202-05 25'	**Part Number Lgth** TU1211203-05 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** TU1210201	**(I) DAISY CHAIN CABLE** **Drive Part No. Lgth**

EXAMPLE: SC750 Mounted in CPU Cabinet and a CDC 9710 Drive 15' away in another cabinet from the CPU. These are the minimum number of cables required.

50 PIN CABLE

Item	Qty	Part Number	Lgth
A	1	TU1211204-06	10'
B	1	TU1211202-03	8'
C	1	TU1211203-05	8'

50 PIN CABLE

Item	Qty	Part Number	Lgth
D	1	TU1211204-06	10'
E	1	TU1211202-03	8'
F	1	TU1211203-05	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	TU1210201

DAISY CHAIN CABLE

Item	Qty	Part Number
I		

TAPE CABLES FCC COMPLIANT
2 Cabinet Bolted Together Mount, 2 Drive
TC02, TC12

(A) CPU CABINET 50 Pin Cable Unshielded	(B) EXTERNAL CABLE 50 Pin Cable Shielded	(C) DISK DRIVE 50 Pin Cable Unshielded
Part Number Lgth TU1211204-06 10'	**Part Number Lgth** TU1211202-01 3' TU1211202-02 5' TU1211202-03 8' TU1211202-04 15' TU1211202-05 25'	**Part Number Lgth** TU1211203-05 8'
(D) CPU CABINET 50 Pin Cable Unshielded	**(E) EXTERNAL CABLE** 50 Pin Cable Shielded	**(F) DISK DRIVE** 50 Pin Cable Unshielded
Part Number Lgth TU1211204-06 10'	**Part Number Lgth** TU1211202-01 3' TU1211202-02 5' TU1211202-03 8' TU1211202-04 15' TU1211202-05 25'	**Part Number Lgth** TU1211203-05 8'
(G) MOUNTING FRAME **Part Number** CU2213002	**(H) PERSONALITY MODULE** **Part Number** TU1210201	**(I) DAISY CHAIN CABLE** For Cipher Dr. only 880, 890, 891 **Part Number Lgth** TU1210402 PCB TU1211201-03 8'

EXAMPLE: TC02 Mounted in CPU Cabinet and two (2) Drives 15' away in another cabinet from the CPU. These are the minimum number of cables required.

50 PIN CABLE

Item	Qty	Part Number	Lgth
A	1	TU1211204-06	10'
B	1	TU1211202-03	8'
C	1	TU1211203-05	8'

50 PIN CABLE

Item	Qty	Part Number	Lgth
D	1	TU1211204-06	10'
E	1	TU1211202-03	8'
F	1	TU1211203-05	8'

MOUNTING FRAME

Item	Qty	Part Number
G	2	CU2213002

PERSONALITY MODULE

Item	Qty	Part Number
H	2	TU1210201

DAISY CHAIN CABLE (2 REQUIRED)

Item	Qty	Part Number	Lgth
I	2	TU1210402	PCB
I	2	TU1211201-03	8'
I	2	TU1210402	PCB
I	2	TU1211201-03	8'

APPENDIX U
Emulex Controllers
Reliability Data

MTBF calculations for various Emulex Controllers are as follows:

SC02	Disk Controller	= 76,000 Hours MTBF
SC03	Disk Controller	= 42,110 Hours MTBF
SC12	Disk Controller	= 61,411 Hours MTBF
SC21	Disk Controller	= 43,091 Hours MTBF
SC31	Disk Controller	= 38,460 Hours MTBF
SC70/71	Disk Controller	= 29,276 Hours MTBF
SC750/780	Disk Controller	= 91,542 Hours MTBF
TC01	Tape Controller	= 41,000 Hours MTBF
TC02	Tape Controller	= 65,240 Hours MTBF
TC11	Tape Controller	= 39,373 Hours MTBF
TC12	Tape Controller	= 66,105 Hours MTBF
UC01	Host Adapter	= 53,428 Hours MTBF

The MTBF calculations do not include stress factor derating nor do they include an "infant mortality" factor. The above MTBF figures do not take into consideration the interconnecting cable assemblies required to operate the respective peripherals.

Field failure data given in the following table indicates that actual failure rates are substantially lower (i.e. greater measured MTBF) than predicted by the above calculations for all products. Emulex defines an "infant mortality failure" as one which occurs during the first 90 days from date of shipment, hence, the MTBF figures exclude these failures. Mechanical failures are included except for those determined to be obvious physical abuse.

Infant mortality failures are controlled by thorough pretesting and burn-in prior to shipment of a controller. All Emulex controllers incorporate approximately 90% active component parts which are pretested and pre-aged for a period of 160 hours at 70 degrees C prior to assembly. Completed assemblies are further burned-in under dynamic microcode execution for a period of at least 96 hours in an environmental oven which automatically cycles the temperature between 0 - 55°C. This testing occurs after parts have been thermal-shocked during the flow solder process. Any dynamic failure which occurs, results in a microcode self-test failure; the defective component is isolated and replaced and further cycling occurs. This type of handling has resulted in infant mortality rates given in the following table.

TYPE	CALCULATED MTBF (HRS)	ACTUAL MTBF (HRS)	INFANT MORTALITY RATE*	
			UNIT POPULATION	ACCUM. THRU 11/83
SC02	76,000	209,081	1840	1.14%
SC03	42,110	150,700	366	.55%
SC12	61,411	122,795	532	2.30%
SC21	43,091	161,424	4667	1.46%
SC31	38,460	**	105	.00%
SC70/71	29,276	59,929	1298	3.70%
SC750/780	91,542	139,150	774	1.03%
TC01	41,000	181,923	626	1.40%
TC02	65,240	578,500	275	1.80%
TC11	39,373	93,586	***	***
TC12	66,105	381,566	364	3.60%

*Defects within first 90 days.
**Infinite: no reported failures.
***Data unavailable.

APPENDIX V
SCXX SERIES ERROR DETECTION AND CORRECTION METHODS

All Emulex SCXX series disk controllers incorporate techniques for detection and/or correction of errors which may occur in data recorded on the magnetic media of the drive. This entails use of a redundancy encoding of the information transferred by the controller to the drive and a decoding of this same redundancy encoding of information read back from the drive by the controller.

The characteristics of a redundancy scheme depend on the choice of polynomial which depends on the type of errors to be expected. For example, data transmission usually suffers from long burst errors, whereas high-speed solid-state memories typically suffer from isolated single-bit errors. Error characteristics associated with rotating magnetic memories generally fall between these two extremes in the form of short, concentrated bursts of errors arising from bad spots or dust particles on the medium.

The polynomial used is a so-called Fire Code having the following form:

$$P(X) = P1(X)(X^{c}/2 + 1)$$

Where P (X) is the generator polynomial for a Fire Code which must have two properties: (1) P1 (X) is a primitive (irreducible) polynomial of degree M and order E. (Note, the degree of a polynomial is defined to be the greatest power of X in which the coefficient is non-zero and E is defined to be (2M-1); and (2) the parameter C must not be divisable by E.

The above Fire Code polynomial will have the following properties: (1) the length of the code, N, is equal to the least common multiple of E and C, which works out to be (2M-1)-C; (2) the number of redundancy bits is equal to (M + C); and (3) the number of information bits, M, is equal to (2M-1)-C-(M + C).

The specific polynomial implemented in the SCXX Series disk controllers is as follows:

$$P(X) = (X^{11} + X^{2} + 1)(X^{21} + 1)$$

$$= X^{32} + X^{23} + X^{21} + X^{11} + X^{2} + 1$$

The degree of the P1 (X) portion is 11 and E is therefore equal to (2^{11} - 1) or 2047. The length of the code is equal to (E-C) where C equals 21. Hence, code length equals (2047 - 21) bits. The number of redundancy bits is equal to (M + C) or (11 + 21) = 32.

The above polynomial will support a record length up to 2680 words and each record will be followed by a 32-bit checkword. It will detect two error bursts of combined length 22, one error burst of length 32, and any odd number of errors; it will correct any single error burst up to 11 bits long.

The SCXX Series controllers have an ECC (error correction code) capability which will detect and correct an error by reconstructing a portion of the data within the specified code word length, which is fixed. The burst ECC code will correct an error which must fall within the specified length of the burst. The actual location of the burst within the code word (data field of a sector) is irrelevant. The SCXX controller contains the hardware/firmware to find the burst within which the read error is included and determine the exact location of the burst within the data field. Any errors outside the specified burst length will be detected but not corrected. The ECC hardware of the controller, in this case, will indicate detection of a hard or uncorrectable error.

Depending upon the specific controller microcode version, correctable errors will be handled by the controller itself whereas in other cases the error pattern and position information are presented to the CPU for software handling.

For example, the SCXX/A series emulates the very early DEC RP11-E controller which did not incorporate any error correction scheme, hence, neither the controller nor the software handlers made provision for anything other than logging the fact that an error had been detected (simple parity). In the SCXX/A, the controller performs the ECC encoding/decoding and will notify the CPU of a detected error and also make the correction automatically if desired.

In the usual SCXX/B (RM02, 05, RP06 emulation) and /C (RK06, 07 emulation) series, on the other hand, the DEC procedure is to present the error pattern/location to the CPU for software operations, and this is the procedure followed in the standard Emulex models (NOTE: Special /B versions have also been developed which do implement the error correction in the controller).

It should be noted that when an error is detected by the controller, further block transfers from the disk are immediately inhibited until the software issues a restart command, the CPU therefore has a complete disk revolution (typically 16.7 ms) to execute the correction by software which is ample time to finish correction and issue the restart before the next sector comes up again. If the controller makes the correction, the same full revolution is also lost, and the overall time required to do the error correction is the same in either case.

There is also little or no system performance difference regardless of how the error correction is handled since correctable errors are not frequently found, typically once or twice per day for large (80-300 MByte) removable media disk drives. Therefore, there is usually no excessive burden placed on the software to perform the error correction rather than doing it in the controller hardware. In some applications, however, it has proven convenient to incorporate error correction in the controller hardware (e.g. where data is being "scattered" into many different memory areas) and for this reason the special B versions have been provided.

APPENDIX W
EMULEX SOFTWARE PRODUCTS

EMULEX Software Engineering has created a number of software products. These products relate to certain EMULEX controller products and are normally shipped with these controllers. These software products may also be ordered separately.

The attached table shows the relationship between hardware products and software products. Also included in the table are the software product part numbers.

TABLE W-1
EMULEX SOFTWARE PRODUCTS

RELATED HARDWARE PRODUCT	SOFTWARE PRODUCT (PART NUMBER)	MEDIA	DESCRIPTION
SC02/AX	DIAGNOSTIC (PX9960002) (PX9960302)	LISTING[1] MAG TAPE	Tests basic functionality of SC02/A (RP02/RP03) and provides a formatting utility to initialize and test the media.
SC02/CX	DIAGNOSTIC (PX9960001) (PX9960301)	LISTING[1] MAG TAPE	Tests basic functionality of SC02/C (RK06/RK07) and provides a formatting utility to initialize and test the media.
SC21/V1	VAX/VMS DRIVER[1] (VD9951001) (VD9960401) (VD9960501)	MANUAL TU58[3] FLOPPY[3]	VAX/VMS device driver to support SC21/V1 under DEC VMS operating system.
	DIAGNOSTIC[4] (VX9960401) (VX9960501)	TU58[3] FLOPPY[3]	Tests basic functionality of SC21/V1 (RM03/RM05) and provides a formatting utility to initialize and test the media.
TC11/V	VAX/VMS DRIVER[2] (VD9951001) (VD9960401) (VD9960501)	MANUAL TU58[3] FLOPPY[3]	VAX/VMS device driver to support TC11/V under DEC VMS operating system.
	DIAGNOSTIC[4] (VX9960401) (VX9960501)	TU58[3] FLOPPY[3]	Performs functional testing of the TC11/V.

Notes

1. Diagnostic listings are not shipped with all devices. Instructions on the use of Emulex diagnostics is contained in the appropriate device manual.
2. All VAX/VMS device drivers are distributed as a single distribution.
3. VAX-11/750 systems use TU58 Distribution media. VAX-11/780 systems use floppy distribution media.
4. All VAX/VMS device diagnostics are distributed as a single distribution.

SECTION V
DISK DRIVES VS EMULEX DISK CONTROLLERS

The following BLUE section of this handbook is a technical summary of non-captive 8" and 14" drives potentially applicable to Emulex disk controllers. See SECTION I for a detailed discussion of disk drive considerations and subsystem characteristics.

The GOLD SECTION VI which follows is an EMULEX DISK CONTROLLER VS DISK DRIVE summary. It gives further detail on specific Emulex disk controller emulations and the drives and software supported by each.

Users are urged to inquire on the availability of support for any drive of particular interest.

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
ALPHA DATA							
ATLAS	14"	128.0 MB (F)	128	50	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
AMCODYNE							
7110	8"	26.6 MB (F) 26.6 MB (R)	644 644	2 2	32 32	SMD	SC02/AX,CX,LX; SC12/AX,CX
AMPEX							
DF-980	14"	82.9 MB (F)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DF-9165	14"	165.9 MB (F)	823	10	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
AMPEX							
165-210	14"	210.0 MB (F)	1024	10	35	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DF-9330	14"	330.3 MB (F)	1024	16	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DFR-932	14"	16.3 MB (F) 16.3 MB (R)	823 823	1 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
DFR-964	14"	48.9 MB (F) 16.3 MB (R)	823 823	3 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
DFR-996	14"	81.5 MB (F) 16.3 MB (R)	823 823	5 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
DM-940	14"	41.4 MB (R)	411	5	32	SMD	SC02/AX,CX; SC12/AX,CX,V1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
AMPEX							
DM-980	14"	82.9 MB (R)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DM-9160	14"	165.8 MB (R)	1645	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DM-9200	14"	206.3 MB (R)	815	19	22	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DM-9300	14"	309.5 MB (R)	815	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
AMPEX							
DM-9300	14"	206.3 MB (R)	815	19	22	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DM-9300A	14"	315.0 MB (R)	823	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
CAPRI 165	14"	165.9 MB (F)	1645	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
CAPRI 330	14"	330.3 MB (F)	1024	16	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
APPLIED PERIPHERALS SYSTEMS							
4830	14"	330.3 MB (F)	823	10	64	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
APPLIED INFORMATION MEMORIES (A.I.M.)							
DART 130	14"	105.0 MB (F)	916	7	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
BALL[1]							
BD-80	14"	82.1 MB (R)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
BD-160	14"	158.6 MB (R)	1645	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
BASF							
6172	8"	24.0 MB (F)	614	3	23	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
6172	8"	24.0 MB (F)	614	3	23	ANSI	SC04/CX,LX;
6173	8"	40.0 MB (F)	614	5	23	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
6173	8"	40.0 MB (F)	614	5	23	ANSI	SC04/CX,LX;
CENTURY DATA/XEROX[2]							
2075	8"	63.3 MB (F)	644	6	32	SMD	SC02/AX,CX,LX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
T-82	14"	73.0 MB (R)	815	5	35	SMD	SC02/AX,CX; SC12/AX,CX,V1;
T-82 RM	14"	82.9 MB (R)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CENTURY DATA/XEROX[2]							
T-202	14"	208.1 MB (R)	815	19	22	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
T-202	14"	208.1 MB (R)	815	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
T-302 RM	14"	315.2 MB (R)	823	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
T-602	14"	419.6 MB (R)	1348	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CENTURY DATA/XEROX[2]							
AMS-315	14"	315.2 MB (F)	823	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
AMS-513	14"	513.7 MB (F)	845	19	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
AMS-571	14"	590.0 MB (F)	941	19	57	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
CONTROL DATA/MPI							
9410	8"	41.3 MB (F)	596	5	22	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
9412	8"	72.7 MB (F)	722	5	32	SMD	SC02/AX,CX; SC12/AX,CX,V1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CONTROL DATA/MPI							
9448-32 (PHOENIX)	14"	16.3 MB (F) 16.3 MB (R)	823 823	1 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
9448-64 (PHOENIX)	14"	48.9 MB (F) 16.3 MB (R)	823 823	3 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
9448-96 (PHOENIX)	14"	81.5 MB (F) 16.3 MB (R)	823 823	5 1	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
9455 (LARK)	8"	8.3 MB (F) 8.3 MB (R)	203 203	2 2	32 32	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
9457 (LARK)	8"	20.4 MB (F) 20.4 MB (R)	624 624	2 2	32 32	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
9458	8"	25.9 MB (F) 25.9 MB (R)	644 644	2 2	32 32	SMD	SC02/AX,CX; SC12/AX,CX,V1
9715	8"	165.9 MB (F)	823	10	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CONTROL DATA / MPI							
9715-340	8"	340.0 MB (F)	711	24	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
9730-12	14"	12.9 MB (F)	320	2	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
9730-24	14"	25.8 MB (F)	320	4	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
9730-80	14"	82.9 MB (F)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
9730-160	14"	165.9 MB (F)	823	10	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CONTROL DATA/MPI							
9733-5	14"	5.1 MB (F)	64	4	32	SMD	SC21/B1,B2; SC71/B1,B2
9760	14"	41.4 MB (R)	411	5	32	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
9762	14"	83.0 MB (R)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
9764	14"	157.4 MB (R)	411	19	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
9766	14"	315.2 MB (R)	823	19	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
CONTROL DATA/MPI							
9771	14"	825.0 MB (F)	1024	16		SMD	SC03/BX; SC31/BX; SC72/BX; SC7000/B1
9775	14"	675.0 MB (F)	842	40	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
FUJITSU							
M2280K/N	14"	84.3 MB (F)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
M2284K/N	14"	168.5 MB (F)	823	10	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
FUJITSU							
M2294	14"	268.4 MB (F)	1024	16	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
M2311K	8"	48.2 MB (F)	589	4	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
M2312K	8"	84.4 MB (F)	589	7	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
FUJITSU							
M2322	8"	168.5 MB (F)	823	10	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
M2351A	14"	470.0 MB (F)	842	20	48	SMD	SC03/BX; SC31/BX; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
KENNEDY COMPANY							
5303-70	14"	70.6 MB (F)	700	5	35	SMD	SC02/AX,CX,LX; SC12/AX,CX,LX,V1
5380	14"	83.0 MB (F)	823	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
KENNEDY COMPANY							
7300	8"	41.4 MB (F)	411	5	32	SMD	SC02/AX,CX,LX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
7300	8"	41.4 MB (F)	411	5	32	ANSI	SC04/CX
MEMOREX							
612-25	14"	25.1 MB (F)	350	4	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
612-56	14"	56.0 MB (F)	350	8	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
612-84	14"	84.0 MB (F)	350	12	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
677-0X	14"	208.2 MB (R)	815	19	22	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
MEMOREX							
677-30	14"	309.5 MB (R)	823	19	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
3M (TOSHIBA CORPORATION)							
8432	8"	20.0 MB (F)	280	4	28	ANSI	SC04/CX,L;
8533	8"	60.0 MB (F)	838	4	28	ANSI	SC04/CX,L;
MITSUBISHI							
2860-25	8"	55.5 MB (F)	548	7	23	SMD	SC02/AX,CX; SC12/AX,CX,V1
NEC INFORMATION SYSTEMS							
1510		330.1 MB	560	30	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
NEC INFORMATION SYSTEMS							
1550		550.0 MB	1120	30	32	SMD	SC03/BX; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
2230	8"	41.4 MB (F)	411	5	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
2246	14"	83.7 MB (F)	692	6	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
2257	14"	165.1 MB (F)	1024	8	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
NIPPON PERIPHERALS, LTD.							
NP30-40	8"	40.7 MB (F)	370	5	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
NP30-80	8"	89.7 MB (F)	370	11	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
NP30-120	8"	137.7 MB (F)	568	11	35	SMD	SC02/AX,CX; SC12/AX,CX,V1
OHIO SCIENTIFIC (OKIDATA)							
3301	14"	14.0 MB (F)				SMD	SC02/AX,CX; SC12/AX,CX,V1
3302	14"	28.0 MB (F)				SMD	SC02/AX,CX; SC12/AX,CX,V1
3303	14"	42.0 MB (F)				SMD	SC02/AX,CX; SC12/AX,CX,V1
3304	14"	56.0 MB (F)				SMD	SC02/AX,CX; SC12/AX,CX,V1
3305	14"	67.0 MB (F)	339	10	32	SMD	SC02/AX,CX; SC12/AX,CX,V1
3306	14"	80.0 MB (F)				SMD	SC02/AX,CX; SC12/AX,CX,V1
PERTEC							
D8026	8"	23.1 MB (F)	502	3	30	ANSI	SC04/LX;
D8035	8"	30.8 MB (F)	502	4	30	ANSI	SC04/LX;

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
PRIAM							
DISKOS 2050	8"	21.2 MB (F)	525	3	23	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
DISKOS 2050	8"	21.2 MB (F)	525	3	23	ANSI	SC04/LX
DISKOS 3350	14"	33.9 MB (F)	561	3	32	SMD	SC02/AX,CX,LX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DISKOS 3450	8"	35.3 MB (F)	525	5	23	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
DISKOS 3450	8"	35.3 MB (F)	525	5	23	ANSI	SC04/LX
DISKOS 6650	14"	67.7 MB (F)	1122	3	35	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
DISKOS 7050	8"	76.0 MB (F)	1049	5	23	SMD	SC02/AX,CX; SC12/AX,CX,V1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
PRIAM							
DISKOS 15450	14"	157.9 MB (F)	1122	7	35	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
SLI							
3100-2	8"	24.7 MB (F)	656	3	20	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
3100-2	8"	24.7 MB (F)	656	3	20	ANSI	SC04/LX
3100-3	8"	36.7 MB (F)	656	5	19	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
3100-3	8"	36.7 MB (F)	656	5	19	ANSI	SC04/LX
3100-4	8"	51.4 MB (F)	656	7	19	SMD	SC02/AX,CX,LX; SC12/AX,CX,V1
3100-4	8"	51.4 MB (F)	656	7	19	ANSI	SC04/LX;
MV116	8"	127.0 MB (F)	823	7	35	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1

MANUFACTURER	SIZE	CAPACITY	CYL	TRK	SECT	INTRFC	CONTROLLER/EMULATION
STORAGE TECHNOLOGY (STC)							
8775	14"	679.7 MB (F)	1124	30	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
TEXTOR							
160		169.3 MB (F)	700	12	32	SMD	SC02/AX,CX; SC03/BX; SC12/AX,CX,V1; SC21/BM; SC31//BX; SC71/BM; SC72/BX; SC750/B2,B3; SC758/B1; SC780/B2,B3; SC788/B1; SC7000/B1
UNIVAC							
ISS717			561	14	32	SMD	SC21/BU;

1 BALL DISKS COME IN 3 MODELS: MOD 1=TRIDENT INTERFACE AND MEDIA; MOD 2=TRIDENT MEDIA AND SMD INTERFACE; MOD 3=SMD INTERFACE AND MEDIA.

2 TRIDENT DRIVES SHOULD BE ORDERED WITH A 'RM' EXTENSION (FOR 823 CYL).

SECTION VI
EMULEX DISK CONTROLLERS VS DISK DRIVES

The following GOLD section is a technical summary of specific Emulex disk controllers applicable to non-captive 8" and 14" disk drives. These charts also specify DEC software supported by each. See SECTION I for a detailed discussion of disk drive considerations and subsystem characteristics.

The previous BLUE SECTION V is a DISK DRIVE VS EMULEX DISK CONTROLLER technical summary of non-captive 8" and 14" drives potentially applicable to Emulex disk controllers.

Users are urged to inquire on the availability of support for any drive of particular interest. Also — since DEC operating systems are subject to constant upgrade, and there may be some incompatibility between these charts and new releases of DEC software — questions regarding currently supported DEC software should be directed to Emulex for verification.

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC01/A1	20.8 MB	3 RP02	2	124.8 MB	6 LOGICAL UNITS MAX. STD. RP02	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	S S	S S	N N	S S	N N
SC01/A2	62.4 MB	1 RP03	2	124.8 MB	2 LOGICAL UNITS MAX. EXP. RP03	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	E E	E E	N N	E E	N N
SC01/A3	10.4 MB	1 RP02	2	20.8 MB	2 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-996 CDC 9730-12 KENNEDY 5301-14 OHIO SCIENTIFIC 3301	C C C C	C C C C	N N N N	C C C C	N N N N
	20.8 MB	1 RP02	2	41.6 MB	2 LOGICAL UNITS MAX. STD. RP02	CDC 9448-96/AMPEX DFR-996 CDC 9730-24 MEMOREX 612-25 OHIO SCIENTIFIC 3002	S S S S	S S S S	N N N N	S S S S	N N N N
SC01/A4	13.4 MB 13.4 MB 13.4 MB	2 RP02 4 RP02 6 RP02	2 2 2	53.6 MB 107.2 MB 107.2 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-32/AMPEX DFR-932 CDC 9448-64/AMPEX DFR-964 CDC 9448-96/AMPEX DFR-996	C C C	C C C	N N N	C C C	N N N
SC01/A6	20.8 MB	3 RP02	2	124.8 MB	6 LOGICAL UNITS MAX. STD. RP02	MEMOREX 612-84	S	S	N	S	N
SC01/A7	20.8 MB	1 RP02	2	41.6 MB	2 LOGICAL UNITS MAX. STD. RP02	MEMOREX 612-52 OHIO SCIENTIFIC 3302	S S	S S	N N	S S	N N
	41.6 MB	1 RP03	2	83.2 MB	2 LOGICAL UNITS MAX. STD. RP03	MEMOREX 612-56 OHIO SCIENTIFIC 3304	S S	S S	N N	S S	N N
	62.4 MB	1 RP03	2	124.8 MB	2 LOGICAL UNITS MAX. EXP. RP03	MEMOREX 612-84	E	E	N	E	N
SC01/A8	32.2 MB	1 RP02	2	64.4 MB	2 LOGICAL UNITS MAX. EXP. RP02	KENNEDY 5303 (42 MB) OHIO SCIENTIFIC 3303	E E	E E	N N	E E	N N
	53.8 MB	1 RP03	2	107.6 MB	2 LOGICAL UNITS MAX. EXP. RP03	KENNEDY 5305 (70 MB) OHIO SCIENTIFIC 3305	E E	E E	N N	E E	N N
SC01/A9	20.8 MB	1 RP02	2	41.6 MB	2 LOGICAL UNITS MAX. STD. RP02	BASF 6172 (23.5 MB)	S	S	N	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC01/B1	33.6 MB	1 RM02	2	67.2 MB	2 LOGICAL UNITS MAX. CONTRACTED RM02	AMPEX DM-940 CDC 9760	N N	C C	C C	C C	N N
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO A DEC RM02	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	N N	S S	S S	S S	N N
	134.8 MB	1 RM02	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM02	CDC 9730-160 (2)	N	E	E	E	N
	256.2 MB	1 RM02	2	512.4 MB	2 LOGICAL UNITS MAX. EXP. RM02 EQUALS A DEC RM05	CDC 9766 (4)	N	E	E	E	N
SC01/B2	67.4 MB	1 RP06	2	134.8 MB	2 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9762 (1)	N	C	C	C	N
	174.4 MB	1 RP06	2	348.8 MB	2 LOGICAL UNITS MAX. STD. RP06 COMPATIBLE TO A DEC RP06	MEMOREX 677-0X (3)	N	S	S	S	N
	256.2 MB	1 RP06	2	512.4 MB	2 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
SC01/B3	4.2 MB	1 RM02	2	8.4 MB	2 LOGICAL UNITS MAX. CONTRACTED RM02	CDC 9733-05	N	C	C	C	N
	27.5 MB	1 RM02	2	55.0 MB	2 LOGICAL UNITS MAX. CONTRACTED RM02	PRIAM DISKOS 3350	N	C	C	C	N
	38.6 MB	1 RM02	2	77.2 MB	2 LOGICAL UNITS MAX. CONTRACTED RM02	FUJITSU M2311/K	N	C	C	C	N
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO A DEC RM02	CDC 9762 (1)	N	S	S	S	N
	127.9 MB	1 RM02	2	255.8 MB	2 LOGICAL UNITS MAX. EXP. RM02	CDC 9764	N	E	E	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC01/B3	134.8 MB	1 RM02	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM02	CDC 9730-160 (2)	N	E	E	E	N
	256.2 MB	1 RM02	2	512.4 MB	2 LOGICAL UNITS MAX. EXP. RM02 EQUAL TO A DEC RM05	CDC 9766 (4)	N	E	E	E	N
	512.4 MB	1 RM02	2	1024.8 MB	2 LOGICAL UNITS MAX. EXP. RM02	CDC 9775	N	E	E	E	N
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX. STD. RM05 COMPATIBLE TO A DEC RM05	CDC 9766 (4)	N	S	S	S	N
	524.2 MB	1 RM05	2	1048.4 MB	2 LOGICAL UNITS MAX. EXP. RM05	CDC 9775	N	E	E	E	N
SC01/BM	27.5 MB	1 RM02	2	55.0 MB	2 LOGICAL UNITS MAX. CONTRACTED RM02	PRIAM DISKOS 3350	N	C	C	C	N
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1)	N	S	S	S	N
	67.4 MB 67.4 MB	2 RM02 1 RM02	1 1	134.8 MB 67.4 MB	3 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2) CDC 9762 (1)	N N	S S	S S	S S	N N
	67.4 MB	2 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2)	N	S	S	S	N
	256.2 MB 256.2 MB	2 RM05 1 RM05	1 1	512.4 MB 256.2 MB	3 LOGICAL UNITS MAX. STD. RM05	CDC 9775 CDC 9766 (4)	N N	S S	S S	S S	N N
	256.2 MB	2 RM05	2	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	N
	67.4 MB 13.4 MB	1 RM02 1 RM03	2	134.8 MB 26.8 MB	2 LOGICAL UNITS MAX. 2 LOGICAL UNITS MAX. STD. AND CONTRACTED RM02/03 ON 1 DRIVE	AMPEX DFR-996 CDC 9448-96 PHOENIX	N N	S S	S S	S S	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC01/BM	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNIT MAX.						
	13.4 MB	1 RM03		13.4 MB	1 LOGICAL UNIT MAX.	CDC 9448-96/AMPEX DFR-996	N	S	S	S	N
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX. STD. AND CONTRACTED RM02/03 STD. RM05	CDC 9766 (4)	N	S	S	S	N
	13.9 MB	2 RK06	2	55.6 MB	8 LOGICAL UNITS MAX.	CDC 9448-32/AMPEX DFR-932	S	S	S	S	N
	13.9 MB	4 RK06	2	111.2 MB	STD. RK06	CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	13.9 MB	6 RK06	2	111.2 MB		CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
CONFIGURATION PROM 195 REV H											
SC02/AX	11.4 MB	1 RP02	2	22.8 MB	2 LOGICAL UNITS MAX.	CDC 9730-12	C	C	N	C	N
	18.5 MB	1 RP02	2	37.0 MB	CONTRACTED RP02	PRIAM DISKOS 2050	C	C	N	C	N
	20.8 MB	1 RP02	2	41.6 MB	2 LOGICAL UNITS MAX. STD. RP02	PRIAM DISKOS 3350	S	S	N	S	N
	21.6 MB	1 RP02	2	43.2 MB	2 LOGICAL UNITS MAX.	BASF 6172	E	E	N	E	N
	22.9 MB	1 RP02	2	45.8 MB	EXP. RP02	CDC 9730-24	E	E	N	E	N
	30.1 MB	1 RP02	2	60.2 MB		PRIAM DISKOS 3350	E	E	N	E	N
	30.8 MB	1 RP02	2	61.6 MB		PRIAM DISKOS 3450	E	E	N	E	N
	31.8 MB	1 RP02	2	63.6 MB		SLI SHEYENNE 3	E	E	N	E	N
	33.0 MB	1 RP02	2	66.0 MB		NISSEI NP30-40	E	E	N	E	N
	36.1 MB	1 RP02	2	72.2 MB		BASF 6173	E	E	N	E	N
	40.9 MB	1 RP02	2	81.8 MB		FUJITSU 2311	E	E	N	E	N
	6.6 MB	2 RP02	2	26.4 MB	4 LOGICAL UNITS MAX.	CDC 9455	C	C	N	C	N
	13.4 MB	2 RP02	2	53.6 MB	CONTRACTED RP02	CDC 9448-32/AMPEX DFR-932	C	C	N	C	N
	14.7 MB	2 RP02	2	58.8 MB		CDC 9448-32/AMPEX DFR-932	C	C	N	C	N
	20.4 MB	2 RP02	2	81.6 MB		CDC 9457 LARK	C	C	N	C	N
	30.8 MB	2 RP02	2	123.2 MB	4 LOGICAL UNITS MAX. EXP. RP02	PRIAM 3450	E	E	N	E	N
	20.8 MB	3 RP02	2	124.8 MB	6 LOGICAL UNITS MAX.	KENNEDY 5303-70	S	S	N	S	N
	20.8 MB	3 RP02	2	124.8 MB	STD. RP02	NISSEI NP30-80	S	S	N	S	N
	20.8 MB	3 RP02	2	124.8 MB		OHIO SCIENTIFIC 3306	S	S	N	S	N
	24.2 MB	3 RP02	2	145.2 MB	6 LOGICAL UNITS MAX.	CDC 9762 (1)	E	E	N	E	N
	25.0 MB	3 RP02	2	150.0 MB	EXP. RP02	MEMOREX 612-84	E	E	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC02/AX	14.7 MB	4 RP02	2	117.6 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-64/AMPEX DFR-964	C	C	N	C	N
	13.4 MB 14.7 MB	6 RP02 6 RP02	2 2	107.2 MB 117.6 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-996 CDC 9448-96/AMPEX DFR-996	C C	C C	N N	C C	N N
	20.8 MB	6 RP02	2	166.4 MB	8 LOGICAL UNITS MAX.	CDC 9730-160 (2)	S	S	N	S	N
	20.8 MB 20.8 MB	7 RP02 7 RP02	2 2	166.4 MB 166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	AMPEX 93160 CDC 9730-160 (2)	S S	S S	N N	S S	N N
	41.6 MB	1 RP03	2	83.2 MB	2 LOGICAL UNITS MAX. STD. RP03	CDC 9762 (1)	S	S	N	S	N
	41.6 MB	3 RP03	2	124.8 MB	6 LOGICAL UNITS MAX. STD. RP03	CDC 9730-160 (2)	S	S	N	S	N
	44.6 MB	1 RP03	2	89.2 MB	2 LOGICAL UNITS MAX. EXP. RP03	SLI SHEYENNE 4	E	E	N	E	N
	57.3 MB	1 RP03	2	114.6 MB	2 LOGICAL UNITS MAX. EXP. RP03	KENNEDY 5300-70	E	E	N	E	N
	60.3 MB 61.6 MB	1 RP03 1 RP03	2 2	120.6 MB 123.2 MB	2 LOGICAL UNITS MAX. EXP. RP03	PRIAM DISKOS 6650 PRIAM DISKOS 3450	E E	E E	N N	E E	N N
	71.6 MB	1 RP03	2	143.2 MB	2 LOGICAL UNITS MAX. EXP. RP03	FUJITSU 2312	E	E	N	E	N
	73.7 MB	1 RP03	2	147.4 MB	2 LOGICAL UNITS MAX. EXP. RP03	CDC 9762 (1)	E	E	N	E	N
	134.0 MB 147.3 MB 147.3 MB	1 RP03 1 RP03 1 RP03	2 2 2	268.0 MB 294.6 MB 294.6 MB	2 LOGICAL UNITS MAX. EXP. RP03	PRIAM DISKOS 15450 AMPEX 93160 BALL BD160	E E E	E E E	N N N	E E E	N N N
	50.8 MB 71.5 MB 73.7 MB	2 RP03 2 RP03 2 RP03	2 2 2	203.2 MB 286.0 MB 294.8 MB	4 LOGICAL UNITS MAX. EXP. RP03	NISSEI NP30-120 CDC 9730-160 (2) CDC 9730-160 (2)	E E E	E E E	N N N	E E E	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
CONFIGURATION PROM 194 REV. H											
SC02/CX	13.9 MB	1 RK06	2	37.8 MB	2 LOGICAL UNITS MAX. STD. RK06	PRIAM DISKOS 2050	S	S	S	S	N
	6.7 MB	2 RK06	2	26.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RK06	CDC 9455	C	C	C	C	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	PRIAM DISKOS 3350	S	S	S	S	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	PRIAM DISKOS 3450	S	S	S	S	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	SLI SHEYENNE 3	S	S	S	S	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	KENNEDY 7300	S	S	S	S	N
	51.3 MB	2 RK06	2	205.2 MB	4 LOGICAL UNITS MAX. EXP. RK06	SLI MV116	E	E	E	E	N
	13.9 MB	3 RK06	2	83.4 MB	6 LOGICAL UNITS MAX. STD. RK06	FUJITSU 2311 KENNEDY 7300 MITSU. 2860-25 SLI SHEYENNE 4	S S S S	S S S S	S S S S	S S S S	N N N N
	13.9 MB	4 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	13.9 MB	5 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. SID. RK06	FUJITSU 2312	S	S	S	S	N
	13.9 MB	6 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	27.5 MB	1 RK07	2	55.0 MB	2 LOGICAL UNITS MAX. STD. RK07	PRIAM DISKOS 3350	S	S	S	S	N
	27.5 MB	1 RK07	2	55.0 MB	2 LOGICAL UNITS MAX. STD. RK07	PRIAM DISKOS 3450	S	S	S	S	N
	27.5 MB	1 RK07	2	55.0 MB	2 LOGICAL UNITS MAX. STD. RK07	SLI SHEYENNE 3	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC02/CX	27.5 MB	1 RK07	2	55.0 MB	2 LOGICAL UNITS MAX. STD. RK07	KENNEDY 7300	S	S	S	S	N
	36.7 MB	1 RK07	2	73.4 MB	2 LOGICAL UNITS MAX. EXP. RK07	KENNEDY 7300	E	E	E	E	N
	102.7 MB	1 RK07	2	205.4 MB	2 LOGICAL UNITS MAX. EXP. RK07	SLI MV116	E	E	E	E	N
	140.5 MB	1 RK07	2	281.0 MB	2 LOGICAL UNITS MAX. EXP. RK07	PRIAM DISKOS 15450	E	E	E	E	N
	27.5 MB	2 RK07	2	110.0 MB	4 LOGICAL UNITS MAX. STD. RK07	KENNEDY 5300-70	S	S	S	S	N
						OKIDATA 3305	S	S	S	S	N
						PRIAM 6650	S	S	S	S	N
						PRIAM 7050	S	S	S	S	N
	27.5 MB	3 RK07	2	165.0 MB	6 LOGICAL UNITS MAX. STD. RK07	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	27.5 MB	3 RK07	2	165.0 MB	6 LOGICAL UNITS MAX. STD. RK07	AMPEX 9160	S	S	S	S	N
	27.5 MB	5 RK07	2	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	AMPEX 9160	S	S	S	S	N
						CDC 9730-160 (2)	S	S	S	S	N
						PRIAM 15450	S	S	S	S	N
	27.5 MB	6 RK07	2	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	AMPEX 165-210	S	S	S	S	N
	27.5 MB	8 RK07	1	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	AMPEX 330	S	S	S	S	N
						CDC 9766 (4)	S	S	S	S	N
						FUJITSU 2294	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2 2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	FUJITSU 2311	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2 2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	MEMOREX 612-56	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2 2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	MITSU. 2860-25	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC02/CX	13.9 MB 27.5 MB	1 RK06 1 RK07	2 2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	SLI SHEYENNE 4	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2 2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2 2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	CDC 9762	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2 2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	FUJITSU 2312	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2 2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	MEMOREX 612-84	S	S	S	S	N
	13.9 MB 27.5 MB	2 RK06 1 RK07	2 2	55.6 MB 55.0 MB	6 LOGICAL UNITS MAX. 2 RK06 & 1 RK07 /DR.	AMPEX DFR 964 CDC 9448-96	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 3 RK07	2 2	27.8 MB 165.0 MB	8 LOGICAL UNITS MAX. 1 RK06 & 3 RK07 /DR.	SLI MV116	S	S	S	S	N
	13.9 MB 27.5 MB	2 RK06 2 RK07	2 2	55.6 MB 110.0 MB	8 LOGICAL UNITS MAX. 2 RK06 & 2 RK07 /DR.	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
CONFIGURATION PROM 584 REV A											
SC02/LX	5.2 MB	2 RL01	2	20.8 MB	4 LOGICAL UNITS MAX. STD. RL01	CDC 9455	S	S	S	S	N
	6.7 MB	2 RL01	2	26.8 MB	4 LOGICAL UNITS MAX. EXP. RL01	CDC 9455	E	E	E	E	N
	10.4 MB	1 RL02	2	20.8 MB	2 LOGICAL UNITS MAX. STD. RL02	KENNEDY 7300	S	S	S	S	N
	10.4 MB	1 RL02	2	20.8 MB	2 LOGICAL UNITS MAX. STD. RL02	PRIAM 3350	S	S	S	S	N
	10.4 MB	1 RL02	2	20.8 MB	2 LOGICAL UNITS MAX. STD. RL02	PRIAM 3450	S	S	S	S	N
	10.4 MB	1 RL02	2	20.8 MB	2 LOGICAL UNITS MAX. STD. RL02	SLI 3100-4	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC02/LX	10.4 MB	2 RL02	2	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	BASF 6172	S	S	S	S	N
	10.4 MB	2 RL02	2	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	BASF 6173	S	S	S	S	N
	10.4 MB	2 RL02	2	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	CDC 9448-32/AMPEX DFR-932	S	S	S	S	N
	10.4 MB	3 RL02	2	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	BASF 6173	S	S	S	S	N
	10.4 MB	3 RL02	2	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	SLI 3100-3	S	S	S	S	N
	10.4 MB	4 RL02	1	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	10.4 MB	4 RL02	1	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	FUJITSU 2311	S	S	S	S	N
	10.4 MB	4 RL02	1	41.6 MB	4 LOGICAL UNITS MAX. STD. RL02	SLI 3100-4	S	S	S	S	N
	5.2 MB 10.4 MB	1 RL01 1 RL02	1 1	5.2 MB 10.4 MB	4 LOGICAL UNITS MAX. STD. RL01 & RL02	PRIAM 2050 SLI 3100-2	S S	S S	S S	S S	N N
	8.0 MB 10.4 MB	1 RL01 1 RL02	1 1	8.0 MB 20.8 MB	4 LOGICAL UNITS MAX. EXP. RL01 STD. RL02	PRIAM 2050	E	E	E	E	N
	9.6 MB 10.4 MB	1 RL01 1 RL02	1 1	9.6 MB 10.4 MB	4 LOGICAL UNITS MAX. EXP. RL01 STD. RL02	SLI 3100-2	E	E	E	E	N
	5.2 MB 10.4 MB	1 RL01 2 RL02	1 1	5.2 MB 20.8 MB	4 LOGICAL UNITS MAX. STD. RL01 & RL02	PRIAM 3350	S	S	S	S	N
	5.2 MB 10.4 MB	1 RL01 2 RL02	1 1	5.2 MB 20.8 MB	4 LOGICAL UNITS MAX. STD. RL01 & RL02	PRIAM 3450	S	S	S	S	N
	9.1 MB 10.4 MB	1 RL01 2 RL02	1 1	9.1 MB 20.8 MB	4 LOGICAL UNITS MAX. EXP. RL01 STD. RL02	PRIAM 3350	E	E	E	E	N
	9.8 MB 10.4 MB	1 RL01 2 RL02	1 1	9.8 MB 20.8 MB	4 LOGICAL UNITS MAX. EXP. RL01 STD. RL02	PRIAM 3450	E	E	E	E	N
	5.2 MB 10.4 MB	1 RL01 3 RL02	1 1	5.2 MB 31.2 MB	4 LOGICAL UNITS MAX. STD. RL01 & RL02	KENNEDY 7300	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED		SOFTWARE SUPPORTED				
								RT11	RSX M	RSX M+	RSTS	VMS
SC02/LX	7.5 MB 10.4 MB	2 RL01 2 RL02	1 1	15.0 MB 20.8 MB	4 LOGICAL UNITS MAX. EXP. RL01 STD. RL02	BASF 6173		E	E	E	E	N
CONFIGURATION PROM 697 REV. C												
SC03/B1	27.6 MB	1 RM03	2	55.1 MB	2 LOGICAL UNITS MAX. CONTRACTED RM03	CDC 9760		N	C	C	C	N
	64.3 MB	1 RM03	2	128.6 MB	2 LOGICAL UNITS MAX. CONTRACTED RM03	PRIAM 3350		N	C	C	C	N
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM02	CDC 9762	(1)	N	S	S	S	N
	67.4 MB	1 RM03	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM03	CDC 9762	(1)	N	S	S	S	N
	134.8 MB	1 RM03	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160	(2)	N	E	E	E	N
	124.6 MB	1 RM80	2	249.2 MB	2 LOGICAL UNITS MAX. STD. RM80	CDC 9730-160	(2)	N	S	S	S	N
	134.8 MB	1 RM03	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160	(2)	N	S	S	S	N
	134.7 MB	1 RM03	2	269.4 MB	2 LOGICAL UNITS MAX. EXP. RM03	AMPEX 93160		N	E	E	E	N
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX. STD. RM05	AMPEX 330 CDC 9766 FUJITSU M2294	(4)	N N N	S S S	S S S	S S S	N N N
	268.4 MB	1 RM05	2	536.8 MB	2 LOGICAL UNITS MAX. EXP. RM05	AMPEX 330 FUJITSU M2294		N N	E E	E E	E E	N N
	551.8 MB	1 RM05	2	1103.6 MB	2 LOGICAL UNITS MAX. EXP. RM05	CDC 9775		N	E	E	E	N
	67.4 MB	2 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160	(2)	N	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC03/B1	134.8 MB	2 RM03	2	269.6 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	S	S	S	N
	256.2 MB	2 RM05	2	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	N
	67.4 MB 134.8 MB	1 RM02 2 RM02	1 1	67.4 MB 134.8 MB	3 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	67.4 MB 134.8 MB	1 RM03 2 RM03	1 1	67.4 MB 134.8 MB	3 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	256.2 MB 512.4 MB	1 RM05 2 RM05	1 1	256.2 MB 512.4 MB	3 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) CDC 9775	N N	S S	S S	S S	N N
	13.5 MB 67.4 MB	1 RM03 1 RM02	2 2	27.0 MB 134.8 MB	2 LOGICAL UNITS MAX. 2 LOGICAL UNITS MAX. STD. AND CONTRACTED RM02/03 ON 1 DRIVE	AMPEX DFR 996 CDC 9448-96	N N	C S	C S	C S	N N
	67.4 MB 256.2 MB	1 RM02 1 RM05	1 1	67.4 MB 256.2 MB	2 LOGICAL UNITS MAX. STD. RM02/05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	1 RM03 1 RM05	1 1	67.4 MB 256.2 MB	2 LOGICAL UNITS MAX. STD. RM03/05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB 268.4 MB	2 RM03 1 RM05	1 1	134.8 MB 268.4 MB	2 LOGICAL UNITS MAX. STD. RM03/EXP. RM05	CDC 9730-160 (2) AMPEX 330 FUJITSU M2294	N N N	S E E	S E E	S E E	N N N
	13.5 MB 67.4 MB 256.2 MB	1 RM03 1 RM02 1 RM05	1 1 1	13.5 MB 67.4 MB 256.2 MB	3 LOGICAL UNITS MAX. CONTRACTED RM03 STD. RM02 ON 1 DR. STD. RM05	AMPEX DFR 996 CDC 9448-96 CDC 9766 (4)	N N N	C S S	C S S	C S S	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
CONFIGURATION PROM 899 REV. A											
SC03/BX	27.6 MB	1 RM03	2	55.1 MB	2 LOGICAL UNITS MAX. CONTRACTED RM03	CDC 9760	N	C	C	C	N
	64.3 MB	1 RM03	2	128.6 MB	2 LOGICAL UNITS MAX. CONTRACTED RM03	PRIAM 3350	N	C	C	C	N
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1)	N	S	S	S	N
	67.4 MB	1 RM03	2	134.8 MB	2 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	S	S	S	N
	134.8 MB	1 RM03	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	E	E	E	N
	137.6 MB	1 RM02	2	275.2 MB	2 LOGICAL UNITS MAX. EXP. RM02	TECSTOR 160	N	E	E	E	N
	413.8 MB	1 RM02	2	827.6 MB	2 LOGICAL UNITS MAX. EXP. RM02	FUJITSU 2351	N	U	U	U	N
	124.6 MB	1 RM80	2	249.2 MB	2 LOGICAL UNITS MAX. STD. RM80	CDC 9730-160 (2)	N	S	S	S	N
	134.8 MB	1 RM03	2	269.6 MB	2 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	S	S	S	N
	134.7 MB	1 RM03	2	269.4 MB	2 LOGICAL UNITS MAX. EXP. RM03	AMPEX 93160	N	E	E	E	N
	413.8 MB	1 RM02	2	827.6 MB	2 LOGICAL UNITS MAX. EXP. RM02	FUJITSU 2351	N	E	E	E	N
	405.2 MB	1 RM80	2	810.4 MB	2 LOGICAL UNITS MAX. EXP. RM80	FUJITSU 2351	N	E	E	E	N
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX. STD. RM05	AMPEX 330 CDC 9766 (4) FUJITSU M2294	N N N	S S S	S S S	S S S	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC03/BX	268.4 MB	1 RM05	2	536.8 MB	2 LOGICAL UNITS MAX. EXP. RM05	AMPEX 330 FUJITSU M2294	N N	E E	E E	E E	N N
	551.8 MB	1 RM05	2	1103.6 MB	2 LOGICAL UNITS MAX. EXP. RM05	CDC 9775	N	E	E	E	N
	67.4 MB	2 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2)	N	S	S	S	N
	134.8 MB	2 RM03	2	269.6 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	S	S	S	N
	256.2 MB	2 RM05	2	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	STC 8775 CDC 9775	N N	S S	S S	S S	N N
	67.4 MB 134.8 MB	1 RM02 2 RM02	1 1	67.4 MB 134.8 MB	3 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	67.4 MB 134.8 MB	1 RM03 2 RM03	1 1	67.4 MB 134.8 MB	3 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	256.2 MB 512.4 MB	1 RM05 2 RM05	1 1	256.2 MB 512.4 MB	3 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) CDC 9775 STC 8775	N N N	S S S	S S S	S S S	N N N
	13.5 MB 67.4 MB	1 RM03 1 RM02	2 2	27.0 MB 134.8 MB	2 LOGICAL UNITS MAX. 2 LOGICAL UNITS MAX. STD. AND CONTRACTED RM02/03 ON 1 DRIVE	AMPEX DFR 996 CDC 9448-96	N N	C S	C S	C S	N N
	67.4 MB 256.2 MB	1 RM02 1 RM05	1 1	67.4 MB 256.2 MB	2 LOGICAL UNITS MAX. STD. RM02/05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	1 RM03 1 RM05	1 1	67.4 MB 256.2 MB	2 LOGICAL UNITS MAX. STD. RM03/05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB 268.4 MB	2 RM03 1 RM05	1 1	134.8 MB 268.4 MB	2 LOGICAL UNITS MAX. STD. RM03/EXP. RM05	CDC 9730-160 (2) AMPEX 330 FUJITSU M2294	N N N	S E E	S E E	S E E	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC03/BX	13.5 MB	1 RM03	1	13.5 MB	3 LOGICAL UNITS MAX.	AMPEX DFR 996	N	C	C	C	N
	67.4 MB	1 RM02	1	67.4 MB	CONTRACTED RM03	CDC 9448-96	N	S	S	S	N
	256.2 MB	1 RM05	1	256.2 MB	STD. RM02 ON 1 DR. STD. RM05	CDC 9766 (4)	N	S	S	S	N
	379.3 MB	1 RP06	2	758.6 MB	2 LOGICAL UNITS MAX. EXP. RP06	FUJITSU 2351	N	E	E	E	N
	174.4 MB	1 RP06	1	174.4 MB	3 LOGICAL UNITS MAX.	MEMOREX 677-0X (3)	N	S	S	S	N
	174.4 MB	2 RP06	1	348.8 MB	STD. RP06	FUJITSU 3251	N	S	S	S	N
	174.4 MB	2 RP06	2	697.6 MB	4 LOGICAL UNITS MAX. STD. RP06	FUJITSU 2351	N	S	S	S	N
	67.4 MB	2 RM03	1	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	S	S	S	N
	174.4 MB	2 RP06	1	348.8 MB	STD. RM02 / RP06	FUJITSU 2351	N	S	S	S	N
	124.6 MB	1 RM80	1	124.6 MB	3 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	S	S	S	N
	174.4 MB	2 RP06	1	348.8 MB	STD. RM80 / RP06	FUJITSU 2351	N	S	S	S	N
CONFIGURATION PROM REV A											
UC01/L1	10.4 MB	1 RL02	4	41.6 MB	8 LOGICAL UNITS MAX.	IOMEGA ALPHA 10.5	S	S	S	S	N
	10.4 MB	1 RL02	4	41.6 MB	STD. RL02	IOMEGA ALPHA 10.5	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80, 9710 ;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160, 9715; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC11/A1	20.8 MB	3 RP02	4	166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	S S	S S	N N	S S	N N
SC11/A2	62.4 MB	1 RP03	4	249.6 MB	4 LOGICAL UNITS MAX. EXPANDED RP03	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	E E	E E	N N	E E	N N
SC11/A3	10.4 MB	1 RP02	4	41.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-966 CDC 9730-12 KENNEDY 5301-14 OHIO SCIENTIFIC 3301	C C C C	C C C C	N N N N	C C C C	N N N N
	20.8 MB	1 RP02	4	82.2 MB	4 LOGICAL UNITS MAX. STD. RP02	CDC 9448-96/AMPEX DFR-996 CDC 9730-24 MEMOREX 612-25 OHIO SCIENTIFIC 3002	S S S S	S S S S	N N N N	S S S S	N N N N
SC11/A4	13.4 MB	2 RP02	4	107.2 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-32/AMPEX DFR-932	C	C	N	C	N
	13.4 MB	4 RP02	2	107.2 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-64/AMPEX DFR-964	C	C	N	C	N
	13.4 MB	6 RP02	2	107.2 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-996	C	C	N	C	N
SC11/A6	20.8 MB	3 RP02	4	166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	MEMOREX 612-84	S	S	N	S	N
SC11/A7	20.8 MB	1 RP02	4	83.2 MB	4 LOGICAL UNITS MAX. STD. RP02	MEMOREX 612-25 OHIO SCIENTIFIC 3302	S S	S S	N N	S S	N N
	41.6 MB	1 RP03	4	166.4 MB	4 LOGICAL UNITS MAX. STD. RP03	MEMOREX 612-56 OHIO SCIENTIFIC 3304	S S	S S	N N	S S	N N
	62.4 MB	1 RP03	4	249.6 MB	4 LOGICAL UNITS MAX. EXP. RP03	MEMOREX 612-84	E	E	N	E	N
SC11/A8	32.2 MB	1 RP02	4	128.8 MB	4 LOGICAL UNITS MAX. EXP. RP02	KENNEDY 5303 (42 MB) OHIO SCIENTIFIC 3303	E E	E E	N N	E E	N N
	53.8 MB	1 RP03	4	215.2 MB	4 LOGICAL UNITS MAX. EXP. RP03	KENNEDY 5305 (70 MB) OHIO SCIENTIFIC 3305	E E	E E	N N	E E	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC11/A9	20.8 MB	1 RP02	4	83.2 MB	4 LOGICAL UNITS MAX. STD. RP02	BASF 6172 (23.5 MB)	S	S	N	S	N
SC11/B1	33.6 MB	1 RM02	4	134.4 MB	4 LOGICAL UNITS MAX. CONTRACTED RM02	AMPEX DM-940 CDC 9760	N N	C C	C C	C C	N N
	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO A DEC RM02	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	N N	S S	S S	S S	N N
	256.2 MB	1 RM02	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM02 EQUALS A DEC RM05	CDC 9766 (4)	N	E	E	E	N
SC11/B2	67.4 MB	1 RP06	4	269.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9762 (1)	N	C	C	C	N
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STD. RP06 COMPATIBLE TO A DEC RP06	MEMOREX 677-0X (3)	N	S	S	S	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
SC11/B3	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO A DEC RM02	CDC 9762 (1)	N	S	S	S	N
	134.8 MB	1 RM02	4	539.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9730-160 (2)	N	E	E	E	N
	256.2 MB	1 RM02	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM02 EQUAL TO A DEC RM05	CDC 9766 (4)	N	E	E	E	N
	551.8 MB	1 RM02	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9775	N	E	E	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05 COMPATIBLE TO A DEC RM05	CDC 9766 (4)	N	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC11/B3	551.8 MB	1 RM05	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM05	CDC 9775	N	E	E	E	N
SC11/B4	4.2 MB	1 RP06	4	16.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9733-05	N	C	C	C	N
	134.8 MB	1 RP06	4	539.2 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	AMPEX DM 9160 CDC 9730-160 (2)	N N	C C	C C	C C	N N
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STD. RP06 COMPATIBLE TO A DEC RP06	MEMOREX 677-0X (3)	N	S	S	S	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
	551.8 MB	1 RP06	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9775	N	E	E	E	N
SC11/C1	13.9 MB	2 RK06	4	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	13.9 MB	4 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	13.9 MB	6 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
CONFIGURATION PROM 195 REV J											
SC12/AX	11.4 MB 18.5 MB	1 RP02 1 RP02	2 2	22.8 MB 37.0 MB	2 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9730-12 PRIAM DISKOS 2050	C C	C C	N N	C C	N N
	20.8 MB	1 RP02	2	41.6 MB	2 LOGICAL UNITS MAX. STD. RP02	PRIAM DISKOS 3350	S	S	N	S	N
	21.6 MB	1 RP02	2	43.2 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	BASF 6172	E	E	N	E	N
	22.9 MB	1 RP02	2	45.8 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	CDC 9730-24	E	E	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80; FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/AX	30.1 MB	1 RP02	2	60.2 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	PRIAM DISKOS 3350	E	E	N	E	N
	30.8 MB	1 RP02	2	61.6 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	PRIAM DISKOS 3450	E	E	N	E	N
	31.8 MB	1 RP02	2	63.6 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	SLI SHEYENNE 3	E	E	N	E	N
	33.0 MB	1 RP02	2	66.0 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	NISSEI NP30-40	E	E	N	E	N
	36.1 MB	1 RP02	2	72.2 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	BASF 6173	E	E	N	E	N
	40.9 MB	1 RP02	2	81.8 MB	2 LOGICAL UNITS MAX. EXPANDED RP02	FUJITSU 2311	E	E	N	E	N
	6.6 MB	2 RP02	2	26.4 MB	4 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9455	C	C	N	C	N
	13.4 MB	2 RP02	2	53.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-32/AMPEX DFR-932	C	C	N	C	N
	14.7 MB	2 RP02	2	58.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-32/AMPEX DFR-932	C	C	N	C	N
	20.4 MB	2 RP02	2	81.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9457 LARK	C	C	N	C	N
	30.8 MB	2 RP02	2	123.2 MB	4 LOGICAL UNITS MAX. EXP. RP02	PRIAM 3450	E	E	N	E	N
	20.8 MB	3 RP02	2	124.8 MB	6 LOGICAL UNITS MAX. STD. RP02	KENNEDY 5303-70 NISSEI NP30-80 OHIO SCIENTIFIC 3306	S	S	N	S	N
	24.2 MB	3 RP02	2	145.2 MB	6 LOGICAL UNITS MAX. EXPANDED RP02	CDC 9762 (1)	E	E	N	E	N
	25.0 MB	3 RP02	2	150.0 MB	6 LOGICAL UNITS MAX. EXPANDED RP02	MEMOREX 612-84	E	E	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/AX	14.7 MB	4 RP02	2	117.6 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-64/AMPEX DFR-964	C	C	N	C	N
	13.4 MB	6 RP02	2	107.2 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-996	C	C	N	C	N
	14.7 MB	6 RP02	2	117.6 MB	8 LOGICAL UNITS MAX. CONTRACTED RP02	CDC 9448-96/AMPEX DFR-996	C	C	N	C	N
	20.8 MB	6 RP02	2	166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	CDC 9730-160 (2)	S	S	N	S	N
	20.8 MB	7 RP02	2	166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	AMPEX 93160	S	S	N	S	N
	20.8 MB	7 RP02	2	166.4 MB	8 LOGICAL UNITS MAX. STD. RP02	CDC 9730-160 (2)	S	S	N	S	N
	41.6 MB	3 RP03	2	124.8 MB	6 LOGICAL UNITS MAX. STD. RP03	CDC 9730-160 (2)	S	S	N	S	N
	44.6 MB	1 RP03	2	89.2 MB	2 LOGICAL UNITS MAX. EXP. RP03	SLI SHEYENNE 4	E	E	N	E	N
	57.3 MB	1 RP03	2	114.6 MB	2 LOGICAL UNITS MAX. EXP. RP03	KENNEDY 5300-70	E	E	N	E	N
	60.3 MB	1 RP03	2	120.6 MB	2 LOGICAL UNITS MAX. EXPANED RP03	PRIAM 6650	E	E	N	E	N
	61.6 MB	1 RP03	2	123.2 MB	2 LOGICAL UNITS MAX. EXPANDED RP03	PRIAM 3450	E	E	N	E	N
	71.6 MB	1 RP03	2	143.2 MB	2 LOGICAL UNITS MAX. EXP. RP03	FUJITSU 2312	E	E	N	E	N
	73.7 MB	1 RP03	2	147.4 MB	2 LOGICAL UNITS MAX. EXP. RP03	CDC 9762 (1)	E	E	N	E	N
	134.0 MB	1 RP03	2	268.0 MB	2 LOGICAL UNITS MAX. EXP. RP03	PRIAM DISKOS 15450	E	E	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/AX	147.3 MB	1 RP03	2	294.6 MB	2 LOGICAL UNITS MAX EXP. RP03	AMPEX 93160 BALL BD160	E	E	N	E	N
	50.8 MB	2 RP03	2	203.2 MB	4 LOGICAL UNITS MAX. EXP. RP03	NISSEI NP30-120	E	E	N	E	N
	71.5 MB	2 RP03	2	286.0 MB	4 LOGICAL UNITS MAX. EXP. RP03	CDC 9730-160 (2)	E	E	N	E	N
	73.7 MB	2 RP03	2	294.8 MB	4 LOGICAL UNITS MAX. EXP. RP03	CDC 9730-160 (2)	E	E	N	E	N
CONFIGURATION PROM 194 REV. H											
SC12/CX	13.9 MB	1 RK06	2	37.8 MB	2 LOGICAL UNITS MAX. STD. RK06	PRIAM DISKOS 2050	S	S	S	S	N
	6.7 MB	2 RK06	2	26.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RK06	CDC 9455	C	C	C	C	N
	13.9 MB	2 RK06	2	55.6 MB	4 LOGICAL UNITS MAX. STD. RK06	CDC 9457 CDC 9448-96/AMPEX DFR-996 KENNEDY 7300 PRIAM DISKOS 3350 PRIAM DISKOS 3450 SLI SHEYENNE 3 AMCODYNE 7110 CDC 9448-32/AMPEX DFR-932	S	S	S	S	N
	20.0 MB	2 RK06	2	80.0 MB	4 LOGICAL UNITS MAX. EXP. RK06	CDC 9457	E	E	E	E	N
	51.3 MB	2 RK06	2	205.2 MB	4 LOGICAL UNITS MAX. EXP. RK06	SLI MV116	E	E	E	E	N
	12.1 MB	3 RK06	2	72.9 MB	6 LOGICAL UNITS MAX. CONTRACTED RP06	KENNEDY 7300	C	C	C	C	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/CX	13.9 MB	3 RK06	2	83.4 MB	6 LOGICAL UNITS MAX. STD. RK06	SLI SHEYENNE 4 FUJITSU 2311 KENNEDY 7300 MITSU. 2860-25 CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	18.3 MB	3 RK06	2	110.2 MB	6 LOGICAL UNITS MAX. EXPANDED RP06	KENNEDY 7300	E	E	E	E	N
	13.9 MB	4 RK06	2	111.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64/AMPEX DFR-964	S	S	S	S	N
	13.9 MB	5 RK06	2	139.0 MB	8 LOGICAL UNITS MAX. SID. RK06	FUJITSU 2312	S	S	S	S	N
	13.9 MB	6 RK06	2	166.8 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	27.5 MB	1 RK07	2	55.0 MB	2 LOGICAL UNITS MAX. STD. RK07	PRIAM DISKOS 3350 PRIAM DISKOS 3450 SLI SHEYENNE 3 KENNEDY 7300	S	S	S	S	N
	36.7 MB	1 RK07	2	73.4 MB	2 LOGICAL UNITS MAX. EXP. RK07	KENNEDY 7300	E	E	E	E	N
	102.7 MB	1 RK07	2	205.4 MB	2 LOGICAL UNITS MAX. EXP. RK07	SLI MV116	E	E	E	E	N
	140.5 MB	1 RK07	2	281.0 MB	2 LOGICAL UNITS MAX. EXP. RK07	PRIAM DISKOS 15450	E	E	E	E	N
	27.5 MB	2 RK07	2	110.0 MB	4 LOGICAL UNITS MAX. STD. RK07	OKIDATA 3305 KENNEDY 5300-70 PRIAM 7050 PRIAM 6650 CDC 9412 PRIAM 15450	S	S	S	S	N
	29.3 MB	2 RK07	2	117.5 MB	4 LOGICAL UNITS MAX. EXPANDED RP07	CDC 9412	E	E	E	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/CX	27.5 MB	3 RK07	2	165.0 MB	6 LOGICAL UNITS MAX. STD. RK07	CDC 9448-96/AMPEX DFR-996 AMPEX 9160	S	S	S	S	N
	27.5 MB	4 RK07	1	110.0 MB	4 LOGICAL UNITS MAX. STD. RK07	NESSEI NP30-120	S	S	S	S	N
	27.5 MB	5 RK07	2	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	AMPEX 9160 CDC 9730-160 (2) PRIAM 15450	S	S	S	S	N
	27.5 MB	6 RK07	2	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	AMPEX 165-210	S	S	S	S	N
	27.5 MB	8 RK07	1	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07	CDC 9766 (4) FUJITSU 2294 (6)	S	S	S	S	N
	30.0 MB	1 RK07	2	60.0 MB	2 LOGICAL UNITS MAX. EXPANDED RK07	PRIAM 3350	E	E	E	E	N
	44.3 MB	1 RK07	2	88.6 MB	2 LOGICAL UNITS MAX. EXPANDED RK07	SLI SHEYNNE 4	E	E	E	E	N
	13.9 MB 13.9 MB	6 RK06 2 RK06	1 1	83.4 MB 27.8 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96/AMPEX DRF-996 CDC 9448-32/AMPEX DRF-932	S S	S S	S S	S S	N N
	13.9 MB 13.9 MB	3 RK06 5 RK06	1 1	41.7 MB 69.5 MB	8 LOGICAL UNITS MAX. STD. RK06	FUJITSU 2311 FUJITSU 2312	S S	S S	S S	S S	N N
	13.9 MB 13.9 MB	3 RK06 5 RK06	1 1	41.7 MB 69.5 MB	8 LOGICAL UNITS MAX. STD RK06	FUJITSU 2312 FUJITSU 2312	S S	S S	S S	S S	N N
	27.5 MB 27.5 MB	1 RK07 2 RK07	1 1	27.9 MB 55.0 MB	3 LOGICAL UNITS MAX. STD. RK07	PRIAM 3350 KENNEDY 5300-70	S S	S S	S S	S S	N N
	27.5 MB 27.5 MB	2 RK07 5 RK07	1 1	50.0 MB 137.5 MB	7 LOGICAL UNITS MAX. STD. RK07	PRIAM 15450 PRIAM 15450	S S	S S	S S	S S	N N
	27.5 MB 27.5 MB	3 RK07 5 RK07	1 1	82.5 MB 137.5 MB	8 LOGICAL UNITS MAX. STD. RK07	PRIAM 15450 PRIAM 15450	S S	S S	S S	S S	N N
	27.5 MB 27.5 MB	3 RK07 5 RK07	1 1	82.5 MB 137.5 MB	8 LOGICAL UNITS MAX. STD RK07	CDC 9448-96/AMPEX DFR-996 AMPEX 165	S S	S S	S S	S S	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/CX	13.9 MB 27.5 MB	1 RK06 1 RK07	2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	FUJITSU 2311	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	MEMOREX 612-56	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	FUJITSU 2311	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	SLI SHEYENNE 4	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 1 RK07	2	27.8 MB 55.0 MB	4 LOGICAL UNITS MAX. 1 RK06 & 1 RK07 /DR.	MITSU.2860-25	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 1 RK07	1 1	13.9 MB 27.5 MB	2 LOGICAL UNITS MAX. STD. RK06 & RK07	PRIAM 2050 PRIAM 3450	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	4 RK06 1 RK07	1	55.2 MB 27.5 MB	5 LOGICAL UNITS MAX. 4 RK06 & 1 RK07 /DR.	MITSU. 2860-25	S	S	S	S	N
	13.9 MB 27.5 MB	2 RK06 1 RK07	1 1	27.8 MB 27.5 MB	3 LOGICAL UNITS MAX. STD RK06 & RK07	SLI SHEYENNE 3 SLI SHEYENNE 3	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	2 RK06 1 RK07	1 1	27.8 MB 27.5 MB	3 LOGICAL UNITS MAX. STD RK06 & RK07	PRIAM 3350 PRIAM 3350	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	2 RK06 1 RK07	2	55.6 MB 27.5 MB	6 LOGICAL UNITS MAX. 2 RK06 & 1 RK07 /DR.	KENNEDY 7300	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	2 RK06 1 RK07	2	55.6 MB 55.0 MB	6 LOGICAL UNITS MAX. 2 RK06 & 1 RK07 /DR.	CDC 9448-64/AMPEX DFR-964	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	CENTURY DATA T-82	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	CDC 9448-96/AMPEX DFR-996	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	CDC 9762 (1)	S	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/CX	13.9 MB 27.5 MB	1 RK06 2 RK07	2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	FUJITSU 2312	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 2 RK07	2	27.8 MB 110.0 MB	6 LOGICAL UNITS MAX. 1 RK06 & 2 RK07 /DR.	MEMOREX 612-84	S	S	S	S	N
	13.9 MB 27.5 MB	1 RK06 3 RK07	2	27.8 MB 165.0 MB	8 LOGICAL UNITS MAX. 1 RK06 & 3 RK07 /DR.	SLI MV116	S	S	S	S	N
	13.9 MB 27.5 MB	2 RK06 2 RK07	2	55.6 MB 110.0 MB	8 LOGICAL UNITS MAX. 2 RK06 & 2 RK07 /DR.	CDC 9448-96/AMPEX DFR996	S	S	S	S	N
	13.9 MB 27.5 MB	2 RK06 5 RK07	1 1	27.8 MB 137.5 MB	7 LOGICAL UNITS MAX. STD RK06 & RK07	CDC 9448-32/AMPEX DFR-932 AMPEX 165	S S	S S	S S	S S	N N
	13.9 MB 27.5 MB	2 RK06 5 RK07	1 1	27.8 MB 137.5 MB	7 LOGICAL UNITS MAX. STD RK06 & RK07	CDC 9448-32/AMPEX DFR-932 AMPEX 9160	S S	S S	S S	S S	N N
	13.9 MB 27.9 MB	2 RK06 6 RK07	1 1	27.8 MB 165.0 MB	8 LOGICAL UNITS MAX. STD RK06 & RK07	CDC 9448-32/AMPEX DFR-932 AMPEX 165-210	S S	S S	S S	S S	N N
	51.3 MB 102.6 MB	2 RK06 1 RK07	1 1	102.6 MB 102.6 MB	3 LOGICAL UNITS MAX. EXP. RK06 & RK07	SLI MV116 SLI MV116	E E	E E	E E	E E	N N
	13.9 MB 27.5 MB 13.9 MB	1 RK06 1 RK07 3 RK06	1 1	13.9 MB 27.5 MB 41.7 MB	5 LOGICAL UNITS MAX. STD. RK06 & RK07	MTISU.2860-25 MITSU. 2860-25	S S S	S S S	S S S	S S S	N N N
	13.9 MB 27.9 MB 27.9 MB	2 RK06 1 RK07 2 RK07	1 1	27.8 MB 27.9 MB 55.8 MB	5 LOGICAL UNITS MAX. STD. RK06 & RK07	CDC 9448-64/AMPEX DFR-964 OKIDATA 3305	S S S	S S S	S S S	S S S	N N N
	13.9 MB 27.5 MB 13.9 MB	1 RK06 2 RK07 6 RK06	1 1	13.9 MB 55.8 MB 83.4 MB	7 LOGICAL UNITS MAX. STD RK06 & RK07	CDC 9762 (1) CDC 9448-64/AMPEX DFR-964	S S S	S S S	S S S	S S S	N N N
	13.9 MB 27.5 MB 13.9 MB	2 RK06 2 RK07 2 RK06	1 1	27.8 MB 55.8 MB 27.8 MB	6 LOGICAL UNITS MAX. STD. RK06 & RK07	CDC 9448-96/AMPEX DFR-996 CDC 9448-32/AMPEX DFR-932	S S S	S S S	S S S	S S S	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964; DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC12/CX	13.9 MB 27.5 MB 27.5 MB	2 RK06 2 RK07 2 RK07	1 1	27.8 MB 55.8 MB 55.8 MB	6 LOGICAL UNITS MAX. STD. RK06 & RK07	CDC 9448-96/AMPEX DFR-996 KENNEDY 5300-70	S S S	S S S	S S S	S S S	N N N
	13.9 MB 27.5 MB 27.5 MB	1 RK06 1 RK07 5 RK07	1 1	13.9 MB 27.5 MB 137.5 MB	7 LOGICAL UNITS MAX. STD. RK06 & RK07	CDC 9448-96/AMPEX DFR-996 AMPEX 165	S S S	S S S	S S S	S S S	N N N
	13.9 MB 27.5 MB 13.9 MB 27.5 MB	1 RK06 1 RK07 1 RK06 2 RK07	1 1 	13.9 MB 27.5 MB 13.9 MB 55.8 MB	5 LOGICAL UNITS MAX. STD. RK06 & RK07	MEMOREX 612-56 MEMOREX 612-84	S S S S	S S S S	S S S S	S S S S	N N N N
	13.9 MB 27.5 MB 13.9 MB 27.5 MB	1 RK06 2 RK07 2 RK06 2 RK07	1 1 	13.9 MB 55.8 MB 27.8 MB 55.8 MB	7 LOGICAL UNITS MAX. STD. RK06 & RK07	FUJITSU 2312 CDC 9448-96/AMPEX DFR-996	S S S S	S S S S	S S S S	S S S S	N N N N
CONFIGURATION PROM 012 REV J											
SC21/B1	33.7 MB	1 RM02	4	134.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RM02	CDC 9760	N	C	C	C	N
	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	FUJITSU 2312 CDC 9762 (1)	N	S	S	S	N
	127.9 MB	1 RM02	4	511.6 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9764	N	E	E	E	N
	134.8 MB	1 RM02	4	539.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	AMPEX 93160 CDC 9730-160 (2) SAPPHIRE 160	N	E	E	E	N
	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	AMPEX DM 9300	N	E	E	E	N
	256.2 MB	1 RM02	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9766 (4)	N	E	E	E	N
	268.4 MB	1 RM02	4	1073.6 MB	4 LOGICAL UNITS MAX. EXP. RM02	AMPEX CAPRICORN 330 (6) FUJITSU M2294	N	E	E	E	N

Type
032
031
033
001
004
036

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC21/B1	419.6 MB	1 RM02	4	1678.4 MB	4 LOGICAL UNITS MAX. EXP. RM02	CENTURY DATA T-602	N	E	E	E	N
	551.8 MB	1 RM02	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9775	N	E	E	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05 COMPATIBLE TO A DEC RM05	CDC 9766 (4)	N	S	S	S	N
	552.5 MB	1 RM05	4	2210.0 MB	4 LOGICAL UNITS MAX. EXP. RM05	MEMOREX 659 STC 8775	N	E	E	E	N
	67.4 MB	1 RM02	1	67.4 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM03	CDC 9762 (1)	N	S	S	S	N
	134.8 MB	1 RM03	3	404.4 MB		CDC 9730-160 (2)	N	E	E	E	N
	67.4 MB	1 RM02	1	67.4 MB	4 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1)	N	S	S	S	N
	256.2 MB	1 RM05	3	768.6 MB		CDC 9766 (4)	N	S	S	S	N
	67.4 MB	1 RM02	1	67.4 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM05	CDC 9762 (1)	N	S	S	S	N
	551.8 MB	1 RM05	3	1655.4 MB		CDC 9775	N	E	E	E	N
	67.4 MB	1 RM02	2	134.8 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM03	CDC 9762 (1)	N	S	S	S	N
	134.8 MB	1 RM03	2	269.6 MB		CDC 9730-160 (2)	N	E	E	E	N
	67.4 MB	1 RM02	2	134.8 MB	4 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1)	N	S	S	S	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766 (4)	N	S	S	S	N
	67.4 MB	1 RM02	2	134.8 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM05	CDC 9762 (1)	N	S	S	S	N
	551.8 MB	1 RM05	2	1103.6 MB		CDC 9775	N	E	E	E	N
	67.4 MB	1 RM02	3	202.2 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM05	CDC 9762 (1)	N	S	S	S	N
	256.2 MB	1 RM05	1	256.2 MB		CDC 9766 (4)	N	S	S	S	N
	134.8 MB	1 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. EXP. RM02/ STD. RM05	CDC 9730-160 (2)	N	E	E	E	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766 (4)	N	S	S	S	N
	256.2 MB	1 RM02	1	256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02/ EXP. RM03	CDC 9766 (4)	N	E	E	E	N
	551.8 MB	1 RM03	3	1655.4 MB		CDC 9775	N	E	E	E	N
	256.2 MB	1 RM02	1	256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02/ EXP. RM03	CDC 9766 (4)	N	E	E	E	N
	524.2 MB	1 RM03	3	1572.6 MB		CDC 9775	N	E	E	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX=CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC21/B1	256.2 MB 551.8 MB	1 RM05 1 RM02	1 3	256.2 MB 1655.4 MB	4 LOGICAL UNITS MAX. STD. RM05/ EXP. RM02	CDC 9766 (4) CDC 9775	N N	S E	S E	S E	N N
	256.2 MB 524.2 MB	1 RM02 1 RM03	2 2	512.4 MB 1048.4 MB	4 LOGICAL UNITS MAX. EXP. RM02/ EXP. RM03	CDC 9766 (4) CDC 9775	N N	E E	E E	E E	N N
	256.2 MB 551.8 MB	1 RM05 1 RM02	2 2	512.4 MB 1103.6 MB	4 LOGICAL UNITS MAX. STD. RM05/ EXP. RM02	CDC 9766 (4) CDC 9775	N N	S E	S E	S E	N N
	256.2 MB 268.4 MB	1 RM05 1 RM02	2 2	512.4 MB 536.8 MB	4 LOGICAL UNITS MAX. STD. RM05/ EXP. RM02	CDC 9766 (4) AMPEX CAPRICORN 330 (6)	N N	S E	S E	S E	N N
	67.4 MB 551.8 MB 256.2 MB	1 RM02 1 RM03 1 RM05	2 1 1	134.8 MB 551.8 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM02/ EXP. RM03 STD. RM05	CDC 9762 (1) CDC 9775 CDC 9766 (4)	N N N	S E S	S E S	S E S	N N N
CONFIGURATION PROM 286 REV G											
SC21/BM	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO DEC RM02	CDC 9762 (1) FUJITSU 2312	N	S	S	S	N
	256.2 MB	1 RM02	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9766 (4)	N	E	E	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05 COMPATIBLE TO A DEC RM05	FUJITSU M2294 (6) CDC 9766 (4)	N	S	S	S	N
	256.2 MB 256.2 MB	1 RM05 1 RM05	1 3	256.2 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6)	N N	S S	S S	S S	N N
	552.5 MB	1 RM05	4	2210.0 MB	4 LOGICAL UNITS MAX. EXP. RM05	MEMOREX 659 STC 8775	N	E	E	E	N
	67.4 MB 67.4 MB	1 RM02 2 RM02	1 3	67.4 MB 404.4 MB	7 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	1 RM02 3 RM05	1 3	67.4 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC21/BM	67.4 MB 67.4 MB	1 RM02 2 RM02	2 2	134.8 MB 269.6 MB	6 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	N N
	67.4 MB 13.3 MB	1 RM02 1 RM03	2 2	134.8 MB 26.6 MB	4 LOGICAL UNITS MAX. STD. RM02/ CONTRACTED RM03	CDC 9762 (1) CDC 9455	N N	S C	S C	S C	N N
	67.4 MB 256.2 MB	1 RM02 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	1 RM02 1 RM05	3 1	202.2 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	N N
	13.5 MB 67.4 MB 256.2 MB	1 RM03 1 RM02 1 RM05	2 2 2	27.0 MB 134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. CONTRACTED RM03 STD. RM02/ STD. RM05	CDC 9448-96/AMPEX DFR-996 CDC 9448-96/AMPEX DFR-996 CDC 9766 (4)	N N N	C S S	C S S	C S S	N N N
	67.4 MB 67.4 MB 256.2 MB 256.2 MB	1 RM02 2 RM02 1 RM05 2 RM05	1 1 1 1	67.4 MB 134.8 MB 256.2 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4) CDC 9775	N N N N	S S S S	S S S S	S S S S	N N N N
	13.5 MB 67.4 MB 256.2 MB	1 RM03 1 RM02 1 RM05	3 1	40.5 MB 202.2 MB 256.3 MB	4 LOGICAL UNITS MAX. CONTRACTED RM03 STD. RM02/ STD. RM05	CDC 9448-96/AMPEX DFR-996 CDC 9766 (4)	N N N	C S S	C S S	C S S	N N N
	134.2 MB 134.2 MB	1 RM02 2 RM02	2 	268.4 MB 536.8 MB	6 LOGICAL UNITS MAX. EXP. RM02	AMPEX 9160 AMPEX CAPRICORN 330 (6)	N N	E E	E E	E E	N N
	67.4 MB 256.2 MB	2 RM02 1 RM05	3 1	404.4 MB 256.2 MB	7 LOGICAL UNITS MAX. STD. RM02/ STD. RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	S S	S S	S S	N N
	67.4 MB	2 RM02	4	539.2 MB	8 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2) AMPEX 9160 MODIFIED	N N	S S	S S	S S	N N
	256.2 MB 256.2 MB	1 RM05 2 RM05	1 3	256.2 MB 1537.2 MB	7 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) CDC 9775	N N	S S	S S	S S	N N
	256.2 MB 256.2 MB	1 RM05 2 RM05	1 3	256.2 MB 1537.2 MB	7 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) STC 8775 MEMOREX 659	N N N	S S S	S S S	S S S	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC21/BM	256.2 MB 256.2 MB	1 RM05 2 RM05	2 2	512.4 MB 1024.8 MB	6 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) CDC 9775	N N	S S	S S	S S	N N
	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	S S S	S S S	S S S	N N N
					CONFIGURATION PROM 1145 REV. A						
SC21/BF	67.4 MB 960.0 KB	1 RM02 1 RM03	4 4	269.6 MB 384.0 KB	8 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9730-80F CDC 9730-80F	N N	S C	S C	S C	N N
	67.4 MB 1920.0 KB	1 RM02 1 RM03	4 4	269.6 MB 7680.0 KB	8 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9730-80F CDC 9730-80F	N N	S C	S C	S C	N N
	134.8 MB 960.0 KB	1 RM02 1 RM03	4 4	539.2 MB 364.0 KB	8 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9730-160F CDC 9730-160F	N N	S C	S C	S C	N N
	134.8 MB 1920.0 KB	1 RM02 1 RM03	4 4	539.2 MB 7680.0 KB	8 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9730-160F CDC 9730-160F	N N	S C	S C	S C	N N
	67.4 MB 960.0 KB	1 RM02 1 RM03	4 2	269.6 MB 1920.0 KB	6 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9762 (1) CDC 9730-80F CDC 9730-80F	N N N	S S C	S S C	S S C	N N N
	134.8 MB 1920.0 KB	1 RM02 1 RM03	4 2	539.2 MB 3840.0 KB	6 LOGICAL UNITS MAX. STD. RM02 CONTRACTED RM03	CDC 9730-160 (2) CDC 9730-160F CDC 9730-160F	N N N	S S C	S S C	S S C	N N N
					CONFIGURATION PROM 596 REV. B						
SC21/BU	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02 COMPATIBLE TO DEC RM02	CDC 9762 (1)	N	S	S	S	N
	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	ISS 717	N	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC21/BU	126.6 MB	1 RM02	4	506.4 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	127.1 MB	1 RM02	4	508.4 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	127.5 MB	1 RM02	4	510.0 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	128.0 MB	1 RM02	4	512.0 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	128.2 MB	1 RM02	4	512.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	128.7 MB	1 RM02	4	514.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	ISS 717	N	E	E	E	N
	134.7 MB	1 RM02	4	538.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	AMPEX 93160	N	E	E	E	N
	134.8 MB	1 RM02	4	539.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9730-160 (2)	N	E	E	E	N
	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	AMPEX DM 9300	N	E	E	E	N
	256.2 MB	1 RM02	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9766 (4)	N	E	E	E	N
	419.2 MB	1 RM02	4	1676.8 MB	4 LOGICAL UNITS MAX. EXP. RM02	CENTURY DATA T-602	N	E	E	E	N
	551.8 MB	1 RM02	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM02	CDC 9775	N	E	E	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	S	S	S	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
CONFIGURATION PROM 296 REV C											
SC21/B2	4.2 MB	1 RP06	4	16.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9733-5	N	C	C	C	N
	67.4 MB	1 RP06	4	269.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9762 (1)	N	C	C	C	N
	134.8 MB	1 RP06	4	539.2 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	AMPEX 93160 CDC 9730-160 (2)	N N	C C	C C	C C	N N
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STD. RP06 COMPATIBLE TO A DEC RP06	MEMOREX 677-0X (3)	N	S	S	S	N
	253.7 MB	1 RP06	4	1014.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	AMPEX DM 9300	N	E	E	E	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
	419.6 MB	1 RP06	4	1678.4 MB	4 LOGICAL UNITS MAX. EXP. RP06	CENTURY DATA T-602	N	E	E	E	N
	551.8 MB	1 RP06	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9775	N	E	E	E	N
CONFIGURATION PROM 3100 REV A											
SC31/BX	27.6 MB	1 RM02	4	110.4 MB	4 LOGICAL UNITS MAX. CONTRACTED RM02	PRIAM 3350	N	C	C	C	D
	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) FUJITSU 2312 CDC 9730-160 (2)	N	S	S	S	D
	137.6 MB	1 RM02	4	550.5 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	TECHSTOR 160	N	E	E	E	D

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC31/BX	256.1 MB	1 RM02	4	1024.7 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	CDC 9766 (4)	N	E	E	E	D
	67.4 MB	1 RM03	4	269.6 MB	4 LOGICAL UNITS MAX STD. RM03	CDC 9730-160 (2) CENTURY 2075	N	S	S	S	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6)	N N	S S	S S	S S	D D
	413.8 MB	1 RM02	4	1655.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	FUJITSU 2351	N	E	E	E	D
	263.0 MB	1 RM05	4	1052.1 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMS 513	N	E	E	E	D
	268.4 MB	1 RM05	4	1073.6 MB	4 LOGICAL UNITS MAX. EXP. RM05	AMPEX CAPRICORN 330 (6)	N	E	E	E	D
	413.8 MB	1 RM80	4	1655.2 MB	4 LOGICAL UNITS MAX. EXP. RM80	FUJITSU 2351	N	E	E	E	D
	67.4 MB	2 RM02	4	539.2 MB	8 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2) AMPEX 93160	N N	S S	S S	S S	D D
	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	S S S	S S S	S S S	D D D
	174.4 MB	2 RP06	4	1395.2 MB	8 LOGICAL UNITS MAX. STD. RP06	FUJITSU 2351	N	S	S	S	D
	67.4 MB 67.4 MB	1 RM02 2 RM02	1 3	67.4 MB 404.4 MB	1 LOGICAL UNITS MAX. 6 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) CDC 9730-160 (2)	N N	S S	S S	S S	D D
	67.4 MB 256.2 MB	1 RM02 1 RM05	1 3	67.4 MB 768.6 MB	1 LOGICAL UNITS MAX. 3 LOGICAL UNITS MAX. STD. RM02/STD. RM05	CDC 9762 (1) CDC 9766 (4)	N N	S S	S S	S S	D D
	67.4 MB 174.4 MB	1 RM02 2 RP06	1 3	67.4 MB 1046.4 MB	1 LOGICAL UNITS MAX. 6 LOGICAL UNITS MAX. STD. RM02/STD. RP06	CDC 9762 (1) FUJITSU 2351	N N	S S	S S	S S	D D

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC31/BX	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNIT MAX.	CDC 9762 (1)	N	S	S	S	D
	67.4 MB	2 RM02	1	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	S	S	S	D
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766 (4)	N	S	S	S	D
	256.2 MB	2 RM05	1	512.4 MB	2 LOGICAL UNITS MAX. STD. RM02 STD. RM05	CDC 9775	N	S	S	S	D
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9762 (1)	N	S	S	S	D
	67.4 MB	2 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2)	N	S	S	S	D
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9762 (1)	N	S	S	S	D
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX. STD. RM02 STD. RM05	CDC 9766 (4)	N	S	S	S	D
	67.4 MB	1 RM02	3	202.2 MB	3 LOGICAL UNITS MAX.	CDC 9762 (1)	N	S	S	S	D
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX. STD. RM02 STD. RM05	CDC 9766 (4)	N	S	S	S	D
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766 (4)	N	S	S	S	D
	67.4 MB	1 RM02	3	202.2 MB	6 LOGICAL UNITS MAX.		N	S	S	S	D
	13.5 MB	1 RM03	3	40.5 MB	STD. RM05 STD. RM02 CONTRACTED RM03	CDC 9448-96/AMPEX DFR-996	N	C	C	C	D
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766 (4)	N	S	S	S	D
	67.4 MB	2 RM02	3	404.4 MB	6 LOGICAL UNITS MAX. STD. RM05 STD. RM02	CDC 9730-160 (1)	N	S	S	S	D
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766 (4)	N	S	S	S	D
	256.2 MB	2 RM05	3	1537.2 MB	6 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	D
						STC 8775	N	S	S	S	D
						MEMOREX 659	N	S	S	S	D
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX.	CDC 9766 (4)	N	S	S	S	D
	67.4 MB	1 RM02	2	167.0 MB	4 LOGICAL UNITS MAX.		N	S	S	S	D
	13.5 MB	1 RM03	2	27.0 MB	STD. RM05 STD. RM02 CONTRACTED RM03	CDC 9448-96/AMPEX DFR-996	N	C	C	C	D
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX.	CDC 9766 (4)	N	S	S	S	D
	256.2 MB	2 RM05	2	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	D

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC70/B1	33.6 MB	1 RM03	4	134.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RM03	AMPEX DM-940 CDC 9760	N N	C C	C C	C C	N N
	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STD. RM03 (COMPATIBLE TO A DEC RM03)	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	N N	S S	S S	S S	N N
	256.2 MB	1 RM03	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM03 (EQUAL TO A DEC RM05 IN SIZE)	CDC 9766 (4)	N	E	E	E	N
SC70/B2	67.4 MB	1 RP06	4	269.7 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9762 (1)	N	C	C	C	N
	174.4 MB	1 RP06	4	697.7 MB	4 LOGICAL UNITS MAX. STD. RP06 (COMPATIBLE TO A DEC RP06)	MEMOREX 677-0X (3)	N	S	S	S	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
SC70/B3	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STD. RM03 (COMPATIBLE TO A DEC RM03)	CDC 9448-96/AMPEX DFR-996 CDC 9762 (1)	N N	S S	S S	S S	N N
	134.8 MB	1 RM03	4	539.4 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	E	E	E	N
	256.2 MB	1 RM03	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM03 (EQUAL TO A DEC RM05)	CDC 9766 (4)	N	E	E	E	N
	551.8 MB	1 RM03	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9775 MEMOREX 659 STC 8775	N N N	E E E	E E E	E E E	N N N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05 (COMPATIBLE TO A DEC RM05)	CDC 9766 (4)	N	S	S	S	N
	551.8 MB	1 RM05	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	E E E	E E E	E E E	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
SC70/B4	4.2 MB	1 RP06	4	16.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06 HEAD/TRACK TYPE DRIVE	CDC 9733-5	N	C	C	C	N
	174.4 MB	1 RP06	4	697.7 MB	4 LOGICAL UNITS MAX. STD. RP06 (COMPATIBLE TO A DEC RP06)	MEMOREX 677-0X (3)	N	S	S	S	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
	551.8 MB	1 RP06	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9775 MEMOREX 659 STC 8775	N N N	E E E	E E E	E E E	N N N
CONFIGURATION PROM 299 REV. C											
SC71/B1	33.7 MB	1 RM03	4	134.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RM03	CDC 9760	N	C	C	C	N
	67.4 MB	1 RM03	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	S	S	S	N
	127.9 MB	1 RM03	4	511.6 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9764	N	E	E	E	N
	134.7 MB	1 RM03	4	538.8 MB	4 LOGICAL UNITS MAX. EXP. RM03	AMPEX 93160	N	E	E	E	N
	134.8 MB	1 RM03	4	539.2 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9730-160 (2)	N	E	E	E	N
	253.7 MB	1 RM03	4	1014.8 MB	4 LOGICAL UNITS MAX. EXP. RM03	AMPEX DM 9300	N	E	E	E	N
	256.2 MB	1 RM03	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9766 (4)	N	E	E	E	N
	419.6 MB	1 RM03	4	1678.4 MB	4 LOGICAL UNITS MAX. EXP. RM03	CENTURY DATA T-602	N	E	E	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED		SOFTWARE SUPPORTED				
								RT11	RSX M	RSX M+	RSTS	VMS
SC71/B1	551.8 MB	1 RM03	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RM03	CDC 9775		N	E	E	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766	(4)	N	S	S	S	N
	67.4 MB 134.8 MB	1 RM03 3 RM02	1 3	67.4 MB 404.4 MB	4 LOGICAL UNITS MAX. STD. RM03 EXP. RM02	CDC 9762 CDC 9730-160	(1) (2)	N N	S E	S E	S E	N N
	67.4 MB 256.2 MB	1 RM03 3 RM05	1 3	67.4 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9762 CDC 9766	(1) (4)	N N	S S	S S	S S	N N
	67.4 MB 524.2 MB	1 RM03 1 RM05	1 3	67.4 MB 1572.6 MB	4 LOGICAL UNITS MAX. STD. RM03 EXP. RM05	CDC 9762 CDC 9775	(1)	N N	S E	S E	S E	N N
	67.4 MB 134.8 MB	1 RM03 1 RM02	2 2	134.8 MB 269.6 MB	4 LOGICAL UNITS MAX. STD. RM03 EXP. RM02	CDC 9762 CDC 9730-160	(1)	N N	S E	S E	S E	N N
	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9762 CDC 9766	(1) (4)	N N	S S	S S	S S	N N
	67.4 MB 524.2 MB	1 RM03 1 RM05	2 2	134.8 MB 1048.4 MB	4 LOGICAL UNITS MAX. STD. RM03 EXP. RM05	CDC 9762 CDC 9775	(1)	N N	S E	S E	S E	N N
	67.4 MB 256.2 MB	1 RM03 1 RM05	3 1	202.2 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9762 CDC 9766	(1) (4)	N N	S S	S S	S S	N N
	134.8 MB 256.2 MB	1 RM03 1 RM05	2 2	269.6 MB 512.4 MB	4 LOGICAL UNITS MAX. EXP. RM03 STD. RM05	CDC 9730-160 CDC 9766	(4)	N N	E S	E S	E S	N N
	256.2 MB 551.8 MB	1 RM05 1 RM03	1 3	256.2 MB 1655.4 MB	4 LOGICAL UNITS MAX. STD. RM05 EXP. RM03	CDC 9766 CDC 9775	(4)	N N	S E	S E	S E	N N
	256.2 MB 551.8 MB	1 RM05 1 RM03	2 2	512.4 MB 1103.6 MB	4 LOGICAL UNITS MAX. STD. RM05 EXP. RM03	CDC 9766 CDC 9775	(4)	N N	S E	S E	S E	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED				
							RT11	RSX M	RSX M+	RSTS	VMS
CONFIGURATION PROM 296 REV. C											
SC71/B2	4.2 MB	1 RP06	4	16.8 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9733-5	N	C	C	C	N
	67.4 MB	1 RP06	4	269.6 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9762 (1)	N	C	C	C	N
	134.8 MB	1 RP06	4	539.2 MB	4 LOGICAL UNITS MAX. CONTRACTED RP06	CDC 9730-160 (2) AMPEX 93160	N N	C C	C C	C C	N N
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STD. RP06 COMPATIBLE TO DEC	MEMOREX 677-0X (3)	N	S	S	S	N
	253.7 MB	1 RP06	4	1014.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	AMPEX DM 9300	N	E	E	E	N
	256.2 MB	1 RP06	4	1024.8 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9766 (4)	N	E	E	E	N
	419.6 MB	1 RP06	4	1678.4 MB	4 LOGICAL UNITS MAX. EXP. RP06	CENTURY DATA T602	N	E	E	E	N
	551.8 MB	1 RP06	4	2207.2 MB	4 LOGICAL UNITS MAX. EXP. RP06	CDC 9775	N	E	E	E	N
CONFIGURATION PROM 394 REV.E											
SC71/BM	67.4 MB	1 RM03	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1) FUJITSU 2312	N N	S S	S S	S S	N N
	128.6 MB	1 RM03	4	514.4 MB	4 LOGICAL UNITS MAX. EXP. RM03	PRIAM 15450	N	E	E	E	N
	67.4 MB	2 RM03	4	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9730-160 (2)	N	S	S	S	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) AMPEX 330 FUJITSU 2294	N N N	S S S	S S S	S S S	N N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED		SOFTWARE SUPPORTED				
								RT11	RSX M	RSX M+	RSTS	VMS
SC71/BM	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	STC 8775 CDC 9775 MEMOREX 659		N N N	S S S	S S S	S S S	N N N
	268.4 MB	1 RM05	4	1073.6 MB	4 LOGICAL UNITS MAX. EXP. RM05	AMPEX 330 FUJITSU 2294		N N	E E	E E	E E	N N
	67.4 MB 67.4 MB	1 RM03 2 RM03	1 3	67.4 MB 404.4 MB	7 LOGICAL UNITS MAX. STD. RM03	CDC 9762 CDC 9730-160	(1) (2)	N N	S S	S S	S S	N N
	67.4 MB 67.4 MB	1 RM03 2 RM03	2 2	134.8 MB 269.6 MB	6 LOGICAL UNITS MAX. STD. RM03	CDC 9762 CDC 9730-160	(1) (2)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9762 CDC 9766	(1) (4)	N N	S S	S S	S S	N N
	67.4 MB 67.4 MB	1 RM03 2 RM03	3 1	202.2 MB 134.8 MB	5 LOGICAL UNITS MAX. STD. RM03	CDC 9762 CDC 9730-160	(1) (2)	N N	S S	S S	S S	N N
	67.4 MB 67.4 MB 256.2 MB 256.2 MB	1 RM03 2 RM03 1 RM05 2 RM05	1 1 1 1	67.4 MB 134.8 MB 256.2 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9762 CDC 9730-160 CDC 9766 CDC 9775	(1) (2) (4)	N N N N	S S S S	S S S S	S S S S	N N N N
	67.4 MB 256.2 MB	2 RM03 1 RM05	2 2	269.6 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9730-160 CDC 9766	(2) (4)	N N	S S	S S	S S	N N
	67.4 MB 256.2 MB	2 RM03 1 RM05	3 1	202.2 MB 256.2 MB	7 LOGICAL UNITS MAX. STD. RM03 STD. RM05	CDC 9730-160 CDC 9766	(2) (4)	N N	S S	S S	S S	N N
	256.2 MB 256.2 MB	1 RM05 2 RM05	1 3	256.2 MB 768.6 MB	7 LOGICAL UNITS MAX. STD. RM05	CDC 9766 CDC 9775	(4)	N N	S S	S S	S S	N N
	256.2 MB 256.2 MB	1 RM05 2 RM05	2 2	512.4 MB 1024.8 MB	6 LOGICAL UNITS MAX. STD. RM05	CDC 9766 CDC 9775	(4)	N N	S S	S S	S S	N N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
CONFIGURATION PROM 598, REV. A												
SC12/V1	27.5 MB	1 RK07	8	220.0 MB	8 LOGICAL UNITS MAX. STD. RK07 (NO PHYSICAL DRIVE 1)	CDC 9766 (4)	N	N	N	N	S	S
	13.8 MB 13.8 MB	1 RK06 1 RK06	4 4	55.2 MB 55.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64 CDC 9448-64	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	6 2	82.8 MB 27.6 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64 CDC 9448-32	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	2 2	27.6 MB 27.6 MB	4 LOGIC UNITS MAX. STD. RK06	CDC 9448-32 CDC 9448-32	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	6 2	82.8 MB 27.6 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96 CDC 9448-32	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	2 2	27.6 MB 27.6 MB	4 LOGICAL UNITS MAX. STD. RK06	CDC 9448-32 CDC 9448-32	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	4 4	55.2 MB 55.2 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-64 CDC 9448-64	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	6 2	82.8 MB 27.6 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96 CDC 9448-32	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	6 2	82.8 MB 27.6 MB	8 LOGICAL UNITS MAX. STD. RK06	CDC 9448-96 CDC 9448-32	N N	N N	N N	N N	S S	S S
	27.5 MB 27.5 MB	1 RK07 1 RK07	1 2	27.5 MB 55.0 MB	3 LOGICAL UNITS MAX. STD. RK07	PRIAM 3350 KENNEDY 5300-70	N N	N N	N N	N N	S S	S S
	27.5 MB 27.5 MB	1 RK07 1 RK07	1 1	27.5 MB 27.5 MB	2 LOGICAL UNITS MAX. STD. RK07	PRIAM 3350 PRIAM 3350	N N	N N	N N	N N	S S	S S
	27.5 MB 27.5 MB	1 RK07 1 RK07	2 2	55.0 MB 55.0 MB	4 LOGICAL UNITS MAX. STD. RK07	KENNEDY 5300-70 KENNEDY 5300-70	N N	N N	N N	N N	S S	S S
	13.8 MB 13.8 MB	1 RK06 1 RK06	2 2	27.6 MB 27.6 MB	4 LOGICAL UNITS MAX. STD. RK06	PRIAM 2050 PRIAM 2050	N N	N N	N N	N N	S S	S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC12/V1	13.8 MB	1 RK06	3	41.4 MB	6 LOGICAL UNITS MAX.	FUGITSU 2311	N	N	N	N	S	S
	13.8 MB	1 RK06	3	41.4 MB	STD. RK06	FUGITSU 2311	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	8 LOGICAL UNITS MAX.	AMPEX 165	N	N	N	N	S	S
	27.5 MB	1 RK07	3	82.5 MB	STD. RK07	CDC 9448-96	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	8 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	STD. RK06	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	8 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	STD. RK06	CDC 9448-64	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	7 LOGICAL UNITS MAX	CDC 9730-160 (2)	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	STD. RK06/RK07	CDC 9448-32	N	N	N	N	S	S
	27.5 MB	1 RK07	6	165.0 MB	8 LOGICAL UNITS MAX	AMPEX 165-210	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	STD. RK06/RK07	CDC 9448-32	N	N	N	N	S	S
	27.5 MB	1 RK07	6	165.0 MB	8 LOGICAL UNITS MAX.	AMPEX 165-210	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK07	PRIAM	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	7 LOGICAL UNITS MAX.	AMPEX 9160	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	STD. RK06/RK07	CDC 9448-32	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	8 LOGICAL UNITS MAX.	AMPEX 9160	N	N	N	N	S	S
	27.5 MB	1 RK07	3	82.5 MB	STD. RK07	AMPEX 9160	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	8 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	STD. RK06	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	8 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	STD. RK06	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	8 LOGICAL UNITS MAX	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	4	55.2 MB	STD. RK06	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	5	69.0 MB	8 LOGICAL UNITS MAX.	FUGITSU 2312	N	N	N	N	S	S
	13.8 MB	1 RK06	3	41.4 MB	STD. RK06	FUGITSU 2311	N	N	N	N	S	S
	13.8 MB	1 RK06	5	69.0 MB	8 LOGICAL UNITS MAX.	FUGITSU 2312	N	N	N	N	S	S
	13.8 MB	1 RK06	3	41.4 MB	STD RK06	FUGITSU 2312	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC12/V1	27.5 MB	1 RK07	5	137.5 MB	7 LOGICAL UNITS MAX.	PRIAM 15450	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK07	PRIAM 6650	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	8 LOGICAL UNITS MAX.	PRIAM 15450	N	N	N	N	S	S
	27.5 MB	1 RK07	3	82.5 MB	STD. RK07	PRIAM 6650	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	4 LOGICAL UNITS MAX.	PRIAM 6650	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK07	PRIAM 6650	N	N	N	N	S	S
	27.5 MB	1 RK07	1	27.5 MB	2 LOGICAL UNITS MAX	PRIAM 15450	N	N	N	N	S	S
	27.5 MB	1 RK07	1	27.5 MB	STD. RK07	PRIAM 15450	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	4 LOGICAL UNITS MAX.	PRIAM 7050	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK07	PRIAM 7050	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	4 LOGICAL UNITS MAX.	OKIDATA 3306	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK07							
	13.8 MB	1 RK06	4	55.2 MB	7 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB	STD. RK06	CDC 9762 (1)	N	N	N	N	S	S
	381.3 MB	1 RK07	1	381.3 MB	3 LOGICAL UNITS MAX.	SLI MV116	N	N	N	N	E	E
	190.6 MB	1 RK06	2	381.2 MB	EXP. RK06/RK07	SLI MV116	N	N	N	N	E	E
	381.3 MB	1 RK07	1	381.3 MB	2 LOGICAL UNITS MAX.	SLI MV116	N	N	N	N	E	E
	381.3 MB	1 RK07	1	381.3 MB	EXP. RK07	SLI MV116	N	N	N	N	E	E
	190.6 MB	1 RK06	2	381.2 MB	4 LOGICAL UNITS MAX.	SLI MV116	N	N	N	N	E	E
	190.6 MB	1 RK06	2	381.2 MB	EXP. RK06	SLI MV116	N	N	N	N	E	E
	13.8 MB	1 RK06	2	27.6 MB	6 LOGICAL UNITS MAX.	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK06/RK07							
	13.8 MB	1 RK06	2	27.6 MB		CDC 9448-32	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	8 LOGICAL UNITS MAX.	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK06/RK07							
	13.8 MB	1 RK06	4	55.2 MB		CDC 9448-64	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	4 LOGICAL UNITS MAX.	PRIAM 2050	N	N	N	N	S	S
	27.5 MB	1 RK07	1	27.5 MB	STD. RK06/RK07							
	13.8 MB	1 RK06	1	13.8 MB		FUGITSU 2311	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC12/V1	27.5 MB	1 RK07	1	27.5 MB	5 LOGICAL UNITS MAX.	FUGITSU 2312	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB	STD. RK06/RK07							
	13.8 MB	1 RK06	3	41.4 MB		FUGITSU 2311	N	N	N	N	S	S
	27.5 MB	1 RK07	5	137.5 MB	8 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK06/RK07	CDC 9762 (1)	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB								
	27.5 MB	1 RK07	2	55.0 MB	6 LOGICAL UNITS MAX	KENNEDY 5300-70	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	STD. RK06/RK07	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB								
	27.5 MB	1 RK07	5	137.5 MB	8 LOGICAL UNITS MAX.	AMPEX 165	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB	STD. RK06/RK07	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB								
	13.8 MB	1 RK06	2	27.6 MB	5 LOGICAL UNITS MAX.	CDC 9448-64	N	N	N	N	S	S
	27.5 MB	1 RK07	1	27.5 MB	STD. RK06/RK07		N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB		OKIDATA 3306	N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB	8 LOGICAL UNITS MAX	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK06/RK07							
	13.8 MB	1 RK06	2	27.6 MB		CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB								
	13.8 MB	1 RK06	2	27.6 MB	8 LOGICAL UNITS MAX.	CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB	STD. RK06/RK07		N	N	N	N	S	S
	13.8 MB	1 RK06	2	27.6 MB		CDC 9448-96	N	N	N	N	S	S
	27.5 MB	1 RK07	2	55.0 MB			N	N	N	N	S	S
	27.5 MB	1 RK07	1	27.5 MB	4 LOGICAL UNITS MAX	FUGITSU 2311	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB	STD. RK06/RK07							
	27.5 MB	1 RK07	1	27.5 MB		FUGITSU 2311	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB								
	27.5 MB	1 RK07	2	55.0 MB	6 LOGICAL UNITS MAX.	FUGITSU 2312	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB	STD. RK06/RK07							
	27.5 MB	1 RK07	2	55.0 MB		FUGITSU 2312	N	N	N	N	S	S
	13.8 MB	1 RK06	1	13.8 MB								

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC12/V1	27.5 MB 13.8 MB 27.5 MB 13.8 MB	1 RK07 1 RK06 1 RK07 1 RK06	2 1 2 1	55.0 MB 13.8 MB 55.0 MB 13.8 MB	6 LOGICAL UNITS MAX. STD. RK06/RK07	CDC 9762 (1) CDC 9762 (1)	N N	N N	N N	N N	S S	S S
	13.8 MB 27.5 MB 13.8 MB 27.5 MB	1 RK06 1 RK07 1 RK06 1 RK07	2 2 2 2	27.6 MB 55.0 MB 27.6 MB 55.0 MB	8 LOGICAL UNITS MAX. STD. RK06/RK07	CDC 9448-96 CDC 9448-96	N N	N N	N N	N N	S S	S S
	13.8 MB 27.5 MB 13.8 MB 27.5 MB	1 RK06 1 RK07 1 RK06 1 RK07	2 2 2 2	27.6 MB 55.0 MB 27.6 MB 55.0 MB	8 LOGICAL UNITS MAX. STD. RK06/RK07	CDC 9448-96 CDC 9448-96	N N	N N	N N	N N	S S	S S
	13.8 MB 27.5 MB 13.8 MB 27.5 MB	1 RK06 1 RK07 1 RK06 1 RK07	2 2 2 2	27.6 MB 55.0 MB 27.6 MB 55.0 MB	8 LOGICAL UNITS MAX. STD. RK06/RK07	CDC 9448-96 CDC 9448-96	N N	N N	N N	N N	S S	S S
	27.5 MB 13.8 MB 27.5 MB 13.8 MB	1 RK07 1 RK06 1 RK07 1 RK06	3 1 3 1	82.5 MB 13.8 MB 82.5 MB 13.8 MB	8 LOGICAL UNITS MAX. STD. RK07/RK07	SLI MV 116 SLI MV 116	N N	N N	N N	N N	S S	S S
	13.8 MB 27.5 MB 13.8 MB 27.5 MB	1 RK06 1 RK07 1 RK06 1 RK07	2 1 2 1	27.6 MB 55.0 MB 27.6 MB 27.5 MB	6 LOGICAL UNITS MAX. STD. RK06/RK07	CDC 9448-64 CDC 9448-64	N N	N N	N N	N N	S S	S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
								RSX M	RSX M+	RSTS	VMS	UNIX
CONFIGURATION PROM 3100 REV A												
SC31/BX	27.6 MB	1 RM02	4	110.4 MB	4 LOGICAL UNITS MAX. CONTRACTED RM02	PRIAM 3350	N	C	C	C	N	S
	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9762 (1) FUJITSU 2312 CDC 9730-160 (2)	N	S	S	S	N	S
	137.6 MB	1 RM02	4	550.5 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	TECHSTOR 160	N	E	E	E	N	S
	256.1 MB	1 RM02	4	1024.7 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	CDC 9766 (4)	N	E	E	E	N	S
	67.4 MB	1 RM03	4	269.6 MB	4 LOGICAL UNITS MAX STD. RM03	CDC 9730-160 (2) CENTURY 2075	N	S	S	S	S	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6)	N N	S S	S S	S S	D D	S S
	413.8 MB	1 RM02	4	1655.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02	FUJITSU 2351	N	E	E	E	N	S
	263.0 MB	1 RM05	4	1052.1 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMS 513	N	E	E	E	D	S
	268.4 MB	1 RM05	4	1073.6 MB	4 LOGICAL UNITS MAX. EXP. RM05	AMPEX CAPRICORN 330 (6)	N	E	E	E	D	S
	413.8 MB	1 RM80	4	1655.2 MB	4 LOGICAL UNITS MAX. EXP. RM80	FUJITSU 2351	N	E	E	E	D	N
	67.4 MB	2 RM02	4	539.2 MB	8 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2) AMPEX 93160	N N	S S	S S	S S	N N	S S
	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	S S S	S S S	S S S	D D D	S S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED		SOFTWARE SUPPORTED					
								RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC31/BX	174.4 MB	2 RP06	4	1395.2 MB	8 LOGICAL UNITS MAX. STD. RP06	FUJITSU 2351		N	S	S	S	D	6
	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	67.4 MB	2 RM02	3	404.4 MB	6 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160	(2)	N	S	S	S	N	S
	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	256.2 MB	1 RM05	3	768.6 MB	3 LOGICAL UNITS MAX. STD. RM02/STD. RM05	CDC 9766	(4)	N	S	S	S	D	S
	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	174.4 MB	2 RP06	3	1046.4 MB	6 LOGICAL UNITS MAX. STD. RM02/STD. RP06	FUJITSU 2351		N	S	S	S	D	S
	67.4 MB	1 RM02	1	67.4 MB	1 LOGICAL UNIT MAX.	CDC 9762	(1)	N	S	S	S	N	S
	67.4 MB	2 RM02	1	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9730-160	(2)	N	S	S	S	N	S
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766	(4)	N	S	S	S	D	S
	256.2 MB	2 RM05	1	512.4 MB	2 LOGICAL UNITS MAX. STD. RM02 STD. RM05	CDC 9775		N	S	S	S	D	S
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	67.4 MB	2 RM02	2	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160	(2)	N	S	S	S	N	S
	67.4 MB	1 RM02	2	134.8 MB	2 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX. STD. RM02 STD. RM05	CDC 9766	(4)	N	S	S	S	D	S
	67.4 MB	1 RM02	3	202.2 MB	3 LOGICAL UNITS MAX.	CDC 9762	(1)	N	S	S	S	N	S
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX. STD. RM02 STD. RM05	CDC 9766	(4)	N	S	S	S	D	S
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766	(4)	N	S	S	S	D	S
	67.4 MB	1 RM02	3	202.2 MB	6 LOGICAL UNITS MAX.			N	S	S	S	N	S
	13.5 MB	1 RM03	3	40.5 MB	STD. RM05 STD. RM02 CONTRACTED RM03	CDC 9448-96/AMPEX DFR-996		N	C	C	C	D	S
	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766	(4)	N	S	S	S	D	S
	67.4 MB	2 RM02	3	404.4 MB	6 LOGICAL UNITS MAX. STD. RM05 STD. RM02	CDC 9730-160	(1)	N	S	S	S	N	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC31/BX	256.2 MB	1 RM05	1	256.2 MB	1 LOGICAL UNIT MAX.	CDC 9766 (4)	N	S	S	S	D	S
	256.2 MB	2 RM05	3	1537.2 MB	6 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	D	S
						STC 8775	N	S	S	S	D	S
						MEMOREX 659	N	S	S	S	D	S
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX.	CDC 9766 (4)	N	S	S	S	D	S
	67.4 MB	1 RM02	2	167.0 MB	4 LOGICAL UNITS MAX.		N	S	S	S	N	S
	13.5 MB	1 RM03	2	27.0 MB	STD. RM05 STD. RM02 CONTRACTED RM03	CDC 9448-96/AMPEX DFR-996	N	C	C	C	D	S
	256.2 MB	1 RM05	2	512.4 MB	2 LOGICAL UNITS MAX.	CDC 9766 (4)	N	S	S	S	D	S
	256.2 MB	2 RM05	2	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	CDC 9775	N	S	S	S	D	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DRF-964, DRF-996; CDC 9448-32, 9448-64, 9448-96

6) FUJITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
CONFIGURATION PROM 012, REV. G												
SC21/V1	67.4 MB	1 RM03	4	269.6 MB	4 LOGICAL UNITS MAX STD/ RM03, COMPATIBLE MEDIA	CDC 9762 (1)	N	N	N	N	D	S
	134.8 MB	1 RM03	4	539.2 MB	4 LOGICAL UNITS MAX. STD. RM03	CDC 9730-160 (2)	N	N	N	N	D	S
	256.2 MB	1 RM03	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM03	CDC 9766 (4)	N	N	N	N	D	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05, COMPATIBLE TO DEC	CDC 9766 (4)	N	N	N	N	D	S
	512.4 MB	1 RM03	4	2049.6 MB	4 LOGICAL UNITS MAX. STD. RM03	CDC 9775	N	N	N	N	D	S
CONFIGURATION PROM 2100, REV. B												
SC21/V1	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STD. RM05	NEC 1510	N	N	N	N	D	S
	67.4 MB 67.4 MB	1 RM03 1 RM02	3 1	202.2 MB 67.4 MB	4 LOGICAL UNITS MAX. STD. RM02 & RM03	CDC 9730-160 (2) AMPEX 330 (6)	N N	N N	N N	N N	D D	S S
	67.4 MB 67.4 MB	1 RM02 1 RM03	1 3	67.4 MB 202.2 MB	4 LOGICAL UNITS MAX. STD. RM02 & RM03	CDC 9730-80 (1) CDC 9730-160 (2)	N N	N N	N N	N N	D D	S S
	67.4 MB 256.2 MB	1 RM02 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM02 & RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	D D	S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC21/V1	67.4 MB 67.4 MB	1 RM02 1 RM02	1 3	67.4 MB 202.2 MB	4 LOGICAL UNITS MAX. STD. RM02	CDC 9730-160 (2) CDC 9775	N N	N N	N N	N N	D D	S S
	67.4 MB 67.4 MB	1 RM02 1 RM03	2 2	134.8 MB 134.8 MB	4 LOGICAL UNITS MAX. STD. RM02 & RM03	CDC 9730-80 (1) CDC 9730-160 (2)	N N	N N	N N	N N	D D	S S
	256.2 MB 67.4 MB	1 RM05 1 RM02	1 3	256.2 MB 202.2 MB	4 LOGICAL UNITS MAX. STD. RM02/RM05	AMPEX 9300 CDC 9762 (1)	N N	N N	N N	N N	D D	S S
SPECIAL CONFIGURATION PROM 2181												
SC21/V1	67.4 MB	1 RM02	4	269.6 MB	4 LOGICAL UNITS MAX. STD. RM02 - NOT SUPPORTED, NOT RELEASED	STC MV116	N	N	N	N	D	S
CONFIGURATION PROM 496 REV. K												
SC750/B1	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03 (COMPATIBLE MEDIA)	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03	FUJITSU 2312	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B1	124.6 MB	1 RM80	4	498.4 MB	4 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	1 RM80	4	498.6 MB	4 LOGICAL UNITS MAX. STANDARD RM80	TECSTOR 5160	N	N	N	N	S	N
	370.7 MB	1 RM80	4	1483.0 MB	4 LOGICAL UNITS MAX. EXPANDED RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05	NEC D1510	N	N	N	N	S	S
	268.3 MB	1 RM05	4	1073.3 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMPEX CAPRICORN 330 (6) FUGITSU 2294K/N	N N	N N	N N	N N	E E	E E
	67.4 MB	2 RM03	4	539.4 MB	8 LOGICAL UNITS MAX. STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	124.6 MB 256.2 MB	2 RM80 2 RM05	4 4	996.8 MB 2049.6 MB	8 LOGICAL UNITS MAX. STANDARD RM80 8 LOGICAL UNITS MAX. STANDARD RM05	AMPEX CAPRICORN 330 (6) FUJITSU M2294K/N CDC 9775 STC 8775 MEMOREX 659	N N N N N	N N N N N	N N N N N	N N N N N	S S S S S	N S S S
	67.4 MB 67.4 MB	1 RM03 1 RM03	1 3	67.4 MB 202.3 MB	4 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) FUJITSU 2312	N N	N N	N N	N N	S S	S S
	124.6 MB 370.7 MB	1 RM80 1 RM80	2 2	249.2 MB 741.5 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	N N
	124.6 MB 370.7 MB	1 RM80 1 RM80	1 3	124.6 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE 2351A	N N	N N	N N	N N	S E	N N
	256.2 MB 256.2 MB	1 RM05 1 RM05	3 1	768.6 MB 256.2 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B1	256.2 MB	1 RM05	2	512.4 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STANDARD RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STANDARD RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	6 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	7 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	2 RM03	3	404.5 MB	STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	67.4 MB	2 RM03	3	404.5 MB	7 LOGICAL UNITS MAX.	TECSTOR 5160	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	STANDARD RM03	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	1	124.6 MB	7 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	2 RM80	3	747.6 MB	STANDARD RM80	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	N
						FUJITSU M2294	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.2 MB	6 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	2	1024.8 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	7 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	3	1537.2 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	3	373.8 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	370.7 MB	1 RM80	2	741.5 MB	STD. RM03,EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	370.0 MB	1 RM80	3	1112.2 MB	STD. RM03, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B1	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9762 (1) CDC 9766 (4) (COMPATIBLE MEDIA)	N N	N N	N N	N N	S S	S S
	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9762 (1) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 256.2 MB	2 RM03 1 RM05	2 2	269.7 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	S S
	67.4 MB 256.2 MB	2 RM03 1 RM05	2 2	269.7 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	124.6 MB 256.2 MB	1 RM80 1 RM05	2 2	249.2 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	124.6 MB 256.2 MB	1 RM80 1 RM05	3 1	373.8 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	124.6 MB 256.2 MB	1 RM80 1 RM05	1 3	124.6 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	N S S
	256.2 MB 370.7 MB	1 RM05 1 RM80	1 3	256.2 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	256.2 MB 370.7 MB	1 RM05 1 RM80	2 2	512.4 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	67.4 MB 124.6 MB 256.2 MB	1 RM03 1 RM80 1 RM05	1 2 1	67.4 MB 249.2 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM03/RM80/RM05 (MEDIA COMPATIBLE)	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S N S
	67.4 MB 67.4 MB 256.2 MB	1 RM03 2 RM03 1 RM05	1 2 1	67.4 MB 269.7 MB 256.2 MB	6 LOGICAL UNITS MAX. STANDARD RM03 AND RM05	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S S S
	134.8 MB	1 RM02	4	539.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2)	N	N	N	N	N	E

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82
CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996;
CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B1	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX DM-9300	N	N	N	N	N	E
	268.5 MB	1 RM02	4	1074.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	N N	E E
	379.4 MB	1 RM02	4	1517.5 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	FUJITSU EAGLE M2351A	N	N	N	N	N	E
	134.8 MB 253.7 MB	1 RM02 1 RM02	2 2	269.7 MB 507.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2) AMPEX DM-9300	N N	N N	N N	N N	N N	E E
	379.4 MB 256.2 MB	1 RM02 1 RM05	3 1	1138.1 MB 256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02 AND STD. RM05 FOR UNIX ONLY	FUJITSU EAGLE M2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S
CONFIGURATION PROM 498 REV. A												
SC750/B2	256.2 MB	1 RP05	4	1024.8 MB	4 LOGICAL UNITS MAX. EXPANDED RP05	CDC 9766 (4)	N	N	N	N	E	S
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300	N	N	N	N	S	S
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STANDARD RP06 (COMPATIBLE TO DEC)	MEMOREX 677-0X (3)	N	N	N	N	S	S
	174.4 MB	2 RP06	4	1395.2 MB	8 LOGICAL UNITS MAX. STANDARD RP06	FUJITSU EAGLE M2351A	N	N	N	N	S	S
	174.4 MB 174.4 MB	1 RP06 2 RP06	3 1	523.2 MB 348.8 MB	5 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRP-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B2	174.4 MB 174.4 MB	1 RP06 2 RP06	3 1	523.2 MB 348.8 MB	5 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300 FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	256.2 MB 174.4 MB	1 RP05 2 RP06	3 1	768.6 MB 348.8 MB	5 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	E S
	174.4 MB 174.4 MB	1 RP06 2 RP06	2 2	348.8 MB 697.6 MB	6 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	174.4 MB 174.4 MB	1 RP06 2 RP06	2 2	348.8 MB 697.6 MB	6 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300 FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	256.2 MB 174.4 MB	1 RP05 2 RP06	2 2	512.4 MB 697.6 MB	6 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	S S
	174.4 MB 174.4 MB	1 RP06 2 RP06	1 3	174.4 MB 1046.4 MB	7 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	174.4 MB	1 RP06	1	174.4 MB	7 LOGICAL UNITS MAX.	AMPEX DM-9300	N	N	N	N	S	S
	256.2 MB 174.4 MB	1 RP05 2 RP06	1 3	256.2 MB 1046.4 MB	7 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	S S
CONFIGURATION PROM 496 REV. Q												
SC750/B3	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03 (COMPATIBLE MEDIA)	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03	FUJITSU 2312	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B3	124.6 MB	1 RM80	4	498.4 MB	4 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	1 RM80	4	498.6 MB	4 LOGICAL UNITS MAX. STANDARD RM80	TECSTOR 5160	N	N	N	N	S	N
	405.2 MB	1 RM80	4	1620.9 MB	4 LOGICAL UNITS MAX. EXPANDED RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05	NEC D1510	N	N	N	N	S	S
	268.3 MB	1 RM05	4	1073.3 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	E E	E E
	67.4 MB	2 RM03	4	539.4 MB	8 LOGICAL UNITS MAX. STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	124.6 MB	2 RM80	4	996.8 MB	8 LOGICAL UNITS MAX. STANDARD RM80	AMPEX CAPRICORN 330 (6) FUJITSU M2294K/N	N N	N N	N N	N N	S S	N N
	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STANDARD RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 67.4 MB	1 RM03 1 RM03	1 3	67.4 MB 202.3 MB	4 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) FUJITSU 2312	N N	N N	N N	N N	S S	S S
	124.6 MB 405.2 MB	1 RM80 1 RM80	2 2	249.2 MB 810.5 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	N N
	124.6 MB 405.2 MB	1 RM80 1 RM80	1 3	124.6 MB 1215.7 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE 2351A	N N	N N	N N	N N	S E	N N
	256.2 MB 256.2 MB	1 RM05 1 RM05	3 1	768.6 MB 256.2 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUGITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B3	256.2 MB	1 RM05	2	512.4 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STANDARD RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STANDARD RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	6 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	7 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	2 RM03	3	404.5 MB	STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	67.4 MB	2 RM03	3	404.5 MB	7 LOGICAL UNITS MAX.	TECSTOR 5160	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	STANDARD RM03	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	1	124.6 MB	7 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	2 RM80	3	747.6 MB	STANDARD RM80	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	N
						FUJITSU M2294	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.2 MB	6 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	2	1024.8 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	7 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	3	1537.2 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	3	373.8 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	405.2 MB	1 RM80	2	810.5 MB	STD. RM03,EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	S	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	405.2 MB	1 RM80	3	1215.7 MB	STD. RM03, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B3	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9762 (1) CDC 9766 (4)	N N	N N	N N	N N	S S	S S
	67.4 MB 256.2 MB	1 RM03 1 RM05	2 2	134.8 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9762 (1) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 256.2 MB	2 RM03 1 RM05	2 2	269.7 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	S S
	67.4 MB 256.2 MB	2 RM03 1 RM05	2 2	269.7 MB 512.4 MB	6 LOGICAL UNITS MAX. STD. RM03 AND RM05	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	124.6 MB 256.2 MB	1 RM80 1 RM05	2 2	249.2 MB 512.4 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	124.6 MB 256.2 MB	1 RM80 1 RM05	3 1	373.8 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	124.6 MB 256.2 MB	1 RM80 1 RM05	1 3	124.6 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	N S S
	256.2 MB 405.2 MB	1 RM05 1 RM80	1 3	256.2 MB 1215.7 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	256.2 MB 405.2 MB	1 RM05 1 RM80	2 2	512.4 MB 1215.7 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	67.4 MB 124.6 MB 256.2 MB	1 RM03 1 RM80 1 RM05	1 2 1	67.4 MB 249.2 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM03/RM80/RM05 (MEDIA COMPATIBLE)	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S N S
	67.4 MB 67.4 MB 256.2 MB	1 RM03 2 RM03 1 RM05	1 2 1	67.4 MB 269.7 MB 256.2 MB	6 LOGICAL UNITS MAX. STANDARD RM03 AND RM05	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B3	134.8 MB	1 RM02	4	539.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2)	N	N	N	N	N	E
	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX DM-9300	N	N	N	N	N	E
	268.5 MB	1 RM02	4	1074.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	N N	E E
	413.9 MB	1 RM02	4	1655.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	FUJITSU EAGLE M2351A	N	N	N	N	N	E
	134.8 MB 253.7 MB	1 RM02 1 RM02	2 2	269.7 MB 507.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2) AMPEX DM-9300	N N	N N	N N	N N	N N	E E
	413.9 MB 256.2 MB	1 RM02 1 RM05	3 1	1241.6 MB 256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02 AND STD. RM05 FOR UNIX ONLY	FUJITSU EAGLE M2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S
	413.9 256.2	1 RM02 1 RM05	1 3	413.9 768.6	4 LOGICAL UNITS MAX. EXP. RM02/STD. RM05	FUGITSU 2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S
	370.7 MB 256.2 MB	1 RM80 1 RM05	1 3	370.7 MB 768.6 MB	4 LOGICAL UNITS MAX. EXP. RM80/STD.RM05	FUGITSU 2351A CDC 9766 (4)	N N	N N	N N	N N	E E	N S
	370.7 MB 134.8 MB	1 RM80 2 RM03	2 2	741.4 MB 269.6 MB	4 LOGICAL UNITS MAX. STD RM03/EXP RM80	FUGITSU 2351A CDC 9730-160 (2)	N N	N N	N N	N N	E S	N S
	128.6 MB 413.9 MB	1 RM80 1 RM02	1 3	128.6 MB 1241.7 MB	4 LOGICAL UNITS MAX. STD RM80/EXP RM02	CDC 9730-160 (2) FUGITSU 2351A	N N	N N	N N	N N	S N	N E
	413.9 MB 256.2 MB 67.4 MB	1 RM02 1 RM05 1 RM03	1 1 2	413.9 MB 256.2 MB 134.8 MB	4 LOGICAL UNITS MAX. STD RM03/05, EXP. RM02 FOR UNIX ONLY	FUGITSU 2351A CDC 9766 (4) CDC 9730-80 (1)	N N N	N N N	N N N	N N N	N S S	E S S

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1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B3	413.9 MB 256.2 MB 67.4 MB	1 RM02 1 RM05 1 RM03	2 1 1	827.8 MB 256.2 MB 67.4 MB	4 LOGICAL UNITS MAX. STD RM03/05, EXP. RM02 FOR UNIX ONLY	FUGITSU 2351A CDC 9766 (4) FUGITSU 2280 (1)	N N N	N N N	N N N	N N N	N S S	E S S
	413.9 MB 67.4 MB	1 RM02 1 RM03	3 1	1241.7 MB 67.4 MB	4 LOGICAL UNITS MAX. STD. RM03, EXP. RM02 FOR UNIX ONLY	FUGITSU 2351A CDC 9730-80 (1)	N N	N N	N N	N N	N S	E S
CONFIGURATION PROM 496 REV. K												
SC780/B1	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03 (COMPATIBLE MEDIA)	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03	FUJITSU 2312	N	N	N	N	S	S
	124.6 MB	1 RM80	4	498.4 MB	4 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	1 RM80	4	498.6 MB	4 LOGICAL UNITS MAX. STANDARD RM80	TECSTOR 5160	N	N	N	N	S	N
	370.7 MB	1 RM80	4	1483.0 MB	4 LOGICAL UNITS MAX. EXPANDED RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05	NEC D1510	N	N	N	N	S	S
	268.3 MB	1 RM05	4	1073.3 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	E E	E E
	67.4 MB	2 RM03	4	539.4 MB	8 LOGICAL UNITS MAX. STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S
	124.6 MB	2 RM80	4	996.8 MB	8 LOGICAL UNITS MAX. STANDARD RM80	AMPEX CAPRICORN 330 (6) FUJITSU M2294K/N	N N	N N	N N	N N	S S	N N

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1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B1	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STANDARD RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 67.4 MB	1 RM03 1 RM03	1 3	67.4 MB 202.3 MB	4 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) FUJITSU 2312	N N	N N	N N	N N	S S	S S
	124.6 MB 370.7 MB	1 RM80 1 RM80	2 2	249.2 MB 741.5 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	N N
	124.6 MB 370.7 MB	1 RM80 1 RM80	1 3	124.6 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE 2351A	N N	N N	N N	N N	S E	N N
	256.2 MB 256.2 MB	1 RM05 1 RM05	3 1	768.6 MB 256.2 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	256.2 MB 256.2 MB	1 RM05 1 RM05	2 2	512.4 MB 512.4 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	256.2 MB 256.2 MB	1 RM05 1 RM05	1 3	256.2 MB 768.6 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 67.4 MB	1 RM03 2 RM03	2 2	134.8 MB 269.7 MB	6 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S S
	67.4 MB 67.4 MB	1 RM03 2 RM03	1 3	67.4 MB 404.5 MB	7 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S S
	67.4 MB 67.4 MB	2 RM03 1 RM03	3 1	404.5 MB 67.4 MB	7 LOGICAL UNITS MAX. STANDARD RM03	TECSTOR 5160 CDC 9762 (1)	N N	N N	N N	N N	S S	S S
	124.6 MB 124.6 MB	1 RM80 2 RM80	1 3	124.6 MB 747.6 MB	7 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	N N N
	256.2 MB 256.2 MB	1 RM05 2 RM05	2 2	512.2 MB 1024.8 MB	6 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) CDC 9775	N N	N N	N N	N N	S S	S S

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4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

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EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B1	256.2 MB	1 RM05	1	256.2 MB	7 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	3	1537.2 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	3	373.8 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	370.7 MB	1 RM80	2	741.5 MB	STD. RM03,EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	370.0 MB	1 RM80	3	1112.2 MB	STD. RM03, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	6 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	6 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB	STD. RM80 AND RM05	CDC 9766 (4)	N	N	N	N	S	S
	124.6 MB	1 RM80	3	373.8 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	1	256.2 MB	STD. RM80 AND RM05	CDC 9766 (4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B1	124.6 MB 256.2 MB	1 RM80 1 RM05	1 3	124.6 MB 768.6 MB	4 LOGICAL UNITS MAX. STD. RM80 AND RM05	CDC 9730-160 (2) AMPEX CAPRICORN 330 FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	N S S
	256.2 MB 370.7 MB	1 RM05 1 RM80	1 3	256.2 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	256.2 MB 370.7 MB	1 RM05 1 RM80	2 2	512.4 MB 1112.2 MB	4 LOGICAL UNITS MAX. STD. RM05, EXP. RM80	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	S N
	67.4 MB 124.6 MB 256.2 MB	1 RM03 1 RM80 1 RM05	1 2 1	67.4 MB 249.2 MB 256.2 MB	4 LOGICAL UNITS MAX. STD. RM03/RM80/RM05 (MEDIA COMPATIBLE)	CDC 9762 (1) CDC 9730-160 (2) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S N S
	67.4 MB 67.4 MB 256.2 MB	1 RM03 2 RM03 1 RM05	1 2 1	67.4 MB 269.7 MB 256.2 MB	6 LOGICAL UNITS MAX. STANDARD RM03 AND RM05	CDC 9762 (1) CDC 9730-160 (1) CDC 9766 (4)	N N N	N N N	N N N	N N N	S S S	S S S
	134.8 MB	1 RM02	4	539.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2)	N	N	N	N	N	E
	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX DM-9300	N	N	N	N	N	E
	268.5 MB	1 RM02	4	1074.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	N N	E E
	379.4 MB	1 RM02	4	1517.5 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	FUJITSU EAGLE M2351A	N	N	N	N	N	E
	134.8 MB 253.7 MB	1 RM02 1 RM02	2 2	269.7 MB 507.4 MB	4 LOGICAL UNITS MAX. EXP. RM02 FOR UNIX ONLY	CDC 9730-160 (2) AMPEX DM-9300	N N	N N	N N	N N	N N	E E
	379.4 MB 256.2 MB	1 RM02 1 RM05	3 1	1138.1 MB 256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02 AND STD. RM05 FOR UNIX ONLY	FUJITSU EAGLE M2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
					CONFIGURATION PROM 498 REV. A							
SC780/B2	256.2 MB	1 RP05	4	1024.8 MB	4 LOGICAL UNITS MAX. EXPANDED RP05	CDC 9766 (4)	N	N	N	N	E	E
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300	N	N	N	N	S	S
	174.4 MB	1 RP06	4	697.6 MB	4 LOGICAL UNITS MAX. STANDARD RP06 (COMPATIBLE TO DEC)	MEMOREX 677-0X (3)	N	N	N	N	S	S
	174.4 MB	2 RP06	4	1395.2 MB	8 LOGICAL UNITS MAX. STANDARD RP06	FUJITSU EAGLE M2351A	N	N	N	N	S	S
	174.4 MB 174.4 MB	1 RP06 2 RP06	3 1	523.2 MB 348.8 MB	5 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	174.4 MB 174.4 MB	1 RP06 2 RP06	3 1	523.2 MB 348.8 MB	5 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300 FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	256.2 MB 174.4 MB	1 RP05 2 RP06	3 1	768.6 MB 348.8 MB	5 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	E S
	174.4 MB 174.4 MB	1 RP06 2 RP06	2 2	348.8 MB 697.6 MB	6 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	174.4 MB 174.4 MB	1 RP06 2 RP06	2 2	348.8 MB 697.6 MB	6 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300 FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	256.2 MB 174.4 MB	1 RP05 2 RP06	2 2	512.4 MB 697.6 MB	6 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	E S
	174.4 MB 174.4 MB	1 RP06 2 RP06	1 3	174.4 MB 1046.4 MB	7 LOGICAL UNITS MAX. STANDARD RP06	MEMOREX 677-0X (3) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80; FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B2	174.4 MB 174.4 MB	1 RP06 2 RP06	1 3	174.4 MB 1046.4 MB	7 LOGICAL UNITS MAX. STANDARD RP06	AMPEX DM-9300 FUJITSU EAGLE M2351A	N N	N N	N N	N N	S S	S S
	256.2 MB 174.4 MB	1 RP05 2 RP06	1 3	256.2 MB 1046.4 MB	7 LOGICAL UNITS MAX. EXPANDED RP05 AND STANDARD RP06	CDC 9766 (4) FUJITSU EAGLE M2351A	N N	N N	N N	N N	E S	E S
CONFIGURATION PROM 496 REV. Q												
SC780/B3	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03 (COMPATIBLE MEDIA)	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	4	269.7 MB	4 LOGICAL UNITS MAX. STANDARD RM03	FUJITSU 2312	N	N	N	N	S	S
	124.6 MB	1 RM80	4	498.4 MB	4 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	124.6 MB	1 RM80	4	498.6 MB	4 LOGICAL UNITS MAX. STANDARD RM80	TECSTOR 5160	N	N	N	N	S	N
	405.2 MB	1 RM80	4	1620.9 MB	4 LOGICAL UNITS MAX. EXP. RM80	FUGITSU 2351A	N	N	N	N	E	N
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	4	1024.8 MB	4 LOGICAL UNITS MAX. STANDARD RM05	NEC D1510	N	N	N	N	S	S
	268.3 MB	1 RM05	4	1073.3 MB	4 LOGICAL UNITS MAX. EXPANDED RM05	AMPEX CAPRICORN 330 (6) FUJITSU 2294K/N	N N	N N	N N	N N	E E	E E
	67.4 MB	2 RM03	4	539.4 MB	8 LOGICAL UNITS MAX. STANDARD RM03	CDC 9730-160 (2)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B3	124.6 MB	2 RM80	4	996.8 MB	8 LOGICAL UNITS MAX. STANDARD RM80	AMPEX CAPRICORN 330 (6) FUJITSU M2294K/N	N N	N N	N N	N N	S S	N N
	256.2 MB	2 RM05	4	2049.6 MB	8 LOGICAL UNITS MAX. STANDARD RM05	CDC 9775 STC 8775 MEMOREX 659	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 67.4 MB	1 RM03 1 RM03	1 3	67.4 MB 202.3 MB	4 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) FUJITSU 2312	N N	N N	N N	N N	S S	S S
	124.6 MB 405.2 MB	1 RM80 1 RM80	2 2	249.2 MB 810.5 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE M2351A	N N	N N	N N	N N	S E	N N
	124.6 MB 405.2 MB	1 RM80 1 RM80	1 3	124.6 MB 1215.7 MB	4 LOGICAL UNITS MAX. STD. AND EXP. RM80	CDC 9730-160 (2) FUJITSU EAGLE 2351A	N N	N N	N N	N N	S E	N N
	256.2 MB 256.2 MB	1 RM05 1 RM05	3 1	768.6 MB 256.2 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	256.2 MB 256.2 MB	1 RM05 1 RM05	2 2	512.4 MB 512.4 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	256.2 MB 256.2 MB	1 RM05 1 RM05	1 3	256.2 MB 768.6 MB	4 LOGICAL UNITS MAX. STANDARD RM05	CDC 9766 (4) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S S S
	67.4 MB 67.4 MB	1 RM03 2 RM03	2 2	134.8 MB 269.7 MB	6 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S S
	67.4 MB 67.4 MB	1 RM03 2 RM03	1 3	67.4 MB 404.5 MB	7 LOGICAL UNITS MAX. STANDARD RM03	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S S
	67.4 MB 67.4 MB	2 RM03 1 RM03	3 1	404.5 MB 67.4 MB	7 LOGICAL UNITS MAX. STANDARD RM03	TECSTOR 5160 CDC 9762 (1)	N N	N N	N N	N N	S S	S S
	124.6 MB 124.6 MB	1 RM80 2 RM80	1 3	124.6 MB 747.6 MB	7 LOGICAL UNITS MAX. STANDARD RM80	CDC 9730-160 (2) AMPEX CAPRICORN 330 (6) FUJITSU M2294	N N N	N N N	N N N	N N N	S S S	S N S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B3	256.2 MB	1 RM05	2	512.2 MB	6 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	2	1024.8 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	7 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	2 RM05	3	1537.2 MB	STANDARD RM05	CDC 9775	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	3	373.8 MB	STD. RM03 AND RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	405.2 MB	1 RM80	2	810.5 MB	STD. RM03,EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	3	768.6 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	405.2 MB	1 RM80	3	1215.7 MB	STD. RM03, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05 (COMPATIBLE MEDIA)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	6 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	6 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	STD. RM03 AND RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB	STD. RM80 AND RM05	CDC 9766 (4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B3	124.6 MB	1 RM80	3	373.8 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	1	256.2 MB	STD. RM80 AND RM05	CDC 9766 (4)	N	N	N	N	S	S
	124.6 MB	1 RM80	1	124.6 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	3	768.6 MB	STD. RM80 AND RM05	AMPEX CAPRICORN 330 (6)	N	N	N	N	S	S
						FUJITSU M2294	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	405.2 MB	1 RM80	3	1215.7 MB	STD. RM05, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	256.2 MB	1 RM05	2	512.4 MB	4 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	405.2 MB	1 RM80	2	1215.7 MB	STD. RM05, EXP. RM80	FUJITSU EAGLE M2351A	N	N	N	N	E	N
	67.4 MB	1 RM03	1	67.4 MB	4 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	124.6 MB	1 RM80	2	249.2 MB	STD. RM03/RM80/RM05	CDC 9730-160 (2)	N	N	N	N	S	N
	256.2 MB	1 RM05	1	256.2 MB	(MEDIA COMPATIBLE)	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	1	67.4 MB	6 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	2 RM03	2	269.7 MB	STANDARD RM03 AND	CDC 9730-160 (2)	N	N	N	N	S	S
	256.2 MB	1 RM05	1	256.2 MB	RM05	CDC 9766 (4)	N	N	N	N	S	S
	134.8 MB	1 RM02	4	539.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	CDC 9730-160 (2)	N	N	N	N	N	E
	253.7 MB	1 RM02	4	1014.8 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX DM-9300	N	N	N	N	N	E
	268.5 MB	1 RM02	4	1074.2 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	AMPEX CAPRICORN 330 (6)	N	N	N	N	N	E
						FUJITSU 2294K/N	N	N	N	N	N	E
	413.9 MB	1 RM02	4	1655.4 MB	4 LOGICAL UNITS MAX. EXPANDED RM02 FOR UNIX ONLY	FUJITSU EAGLE M2351A	N	N	N	N	N	E
	134.8 MB	1 RM02	2	269.7 MB	4 LOGICAL UNITS MAX.	CDC 9730-160 (2)	N	N	N	N	N	E
	253.7 MB	1 RM02	2	507.4 MB	EXPANDED RM02 FOR UNIX ONLY	AMPEX DM-9300	N	N	N	N	N	E

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC780/B3	413.9 MB 256.2 MB	1 RM02 1 RM05	3 1	1241.6 MB 256.2 MB	4 LOGICAL UNITS MAX. EXP. RM02 AND STD. RM05 FOR UNIX ONLY	FUJITSU EAGLE M2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S
	413.9 MB 256.2 MB	1 RM02 1 RM05	1 3	413.9 MB 768.6 MB	4 LOGICAL UNITS MAX. EXP RM02/STD RM05 FOR UNIX ONLY	FUGITSU 2351A CDC 9766 (4)	N N	N N	N N	N N	N S	E S
	370.7 MB 256.2 MB	1 RM80 1 RM05	1 3	370.7 MB 768.6 MB	4 LOGICAL UNITS MAX. EXP.RM80/STD RM05	FUGITSU 2351A CDC 9766 (4)	N N	N N	N N	N N	E S	N S
	370.7 MB 134.8 MB	1 RM80 2 RM03	2 2	741.4 MB 269.6 MB	4 LOGICAL UNITS MAX. EXP.RM80/STD.RM03	FUGITSU 2351A CDC 9730-160 (2)	N N	N N	N N	N N	E S	N S
	128.6 MB 413.9 MB	1 RM80 1 RM02	1 3	128.6 MB 1241.7 MB	4 LOGICAL UNITS MAX. EXP RM02/STD RM80 FOR UNIX ONLY	CDC 9730-160 (2) FUGITSU 2351A	N N	N N	N N	N N	S N	N E
	413.9 MB 256.2 MB 67.4 MB	1 RM02 1 RM05 1 RM03	1 1 2	413.9 MB 256.2 MB 134.8 MB	4 LOGICAL UNITS MAX. EXP. RM02, STD. RM03/RM05 FOR UNIX ONLY	FUGITSU 2351A CDC 9766 (4) CDC 9730-80 (1)	N N N	N N N	N N N	N N N	N S S	E S S
	413.9 MB 256.2 MB 67.4 MB	1 RM02 1 RM05 1 RM03	2 1 1	827.8 MB 256.2 MB 67.4 MB	4 LOGICAL UNITS MAX. EXP. RM02/STD. RM05/RM03 FOR UNIX ONLY	FUGITSU 2351A CDC 9766 (4) CDC 9730-80 (1)	N N N	N N N	N N N	N N N	N S S	E S S
	413.9 MB 67.4 MB	1 RM02 2 RM03	3 1	1241.7 MB 67.4 MB	4 LOGICAL UNITS MAX. STD. RM03,EXP. RM02 FOR UNIX ONLY	FUGITSU 2351A CDC 9730-160 (1)	N N	N N	N N	N N	N S	E S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DPR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
					CONFIGURATION PROM #790, REV. C							
SC758/B1	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX STD RM03	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX STD. RM05	FUGITSU 2351A	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DP-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DP-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC750/B1	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD RM80	CDC 9775	N	N	N	N	S	N
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM02	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM02	FUGITSU 2351A	N	N	N	N	N	S
	256.2 MB 67.4 MB	1 RM05 1 RM03	4 4	1024.8 MB 269.6 MB	8 LOGICAL UNITS MAX. STD RM03 & RM05	CDC 9766 (4) CDC 9762 (1)	N N	N N	N N	N N	S S	S S
	67.4 MB 128.6 MB	1 RM03 1 RM80	4 4	269.6 MB 514.4 MB	8 LOGICAL UNITS MAX. RM03 & RM80	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S N
	256.2 MB 128.6 MB	1 RM05 1 RM80	4 4	1024.8 MB 514.4 MB	8 LOGICAL UNITS MAX. STD. RM05, RM80	CDC 9766 (4) FUGITSU 2351A	N N	N N	N N	N N	S S	S N
	256.2 MB 256.2 MB	1 RM05 1 RM05	4 4	1024.8 MB 1024.8 MB	8 LOGICAL UNITS MAX STD. RM05	CDC 9766 (4) FUGITSU 2351A	N N	N N	N N	N N	S S	S S
	67.4 MB 128.6 MB	1 RM03 1 RM80	4 4	269.6 MB 514.4 MB	8 LOGICAL UNITS MAX. STD. RM03/RM80	CDC 9762 (1) FUGITSU 2351	N N	N N	N N	N N	S S	S N
	128.6 MB 256.2 MB	1 RM80 1 RM05	2 6	257.2 MB 1537.2 MB	8 LOGICAL UNITS MAX. STD. RM80/RM05	CDC 9775 CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	256.2 MB 128.6 MB	1 RM05 1 RM80	2 6	512.4 MB 771.6 MB	8 LOGICAL UNITS MAX. STD. RM05/RM80	CDC 9766 (4) CDC 9775	N N	N N	N N	N N	S S	S N
	128.6 MB 256.2 MB	1 RM80 1 RM05	5 3	643.0 MB 768.6 MB	8 LOGICAL UNITS MAX. STD. RM80/RM05	CDC 9775 CDC 9766 (4)	N N	N N	N N	N N	S S	N S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80; FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC758/B1	128.6 MB	1 RM80	4	514.4 MB	8 LOGICAL UNITS MAX.	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	4	1024.8 MB	STD. RM80/RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM02	4	269.6 MB	8 LOGICAL UNITS MAX.	FUGITSU 2351A	N	N	N	N	N	S
	256.2 MB	1 RM05	4	1024.8 MB	STD. RM02/RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	8 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB	STD.RM03/RM05/RM80	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	4	514.4 MB		FUGITSU 2351A	N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	8 LOGICAL UNITS MAX.	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB	STD. RM03 & RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB		CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB		CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB	8 LOGICAL UNITS MAX.	CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB	STD. RM05/RM80	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB		CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	8 LOGICAL UNITS MAX.	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB	STD RM05/RM80	CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB		CDC 9774	N	N	N	N	S	N
	128.6 MB	1 RM80	1	128.6 MB	8 LOGICAL UNITS MAX.	CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	3	768.6 MB	STD. RM80/RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	1	128.6 MB		CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	3	768.6 MB		CDC 9766 (4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
CONFIGURATION PROM #790, REV. C												
SC788/B1	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX STD RM03	CDC 9762 (1)	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	CDC 9730-160 (2)	N	N	N	N	S	N
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX STD. RM05	FUGITSU 2351A	N	N	N	N	S	S
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	67.4 MB	1 RM03	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM03	CDC 9762 (1)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED	SOFTWARE SUPPORTED					
							RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC788/B1	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD RM80	CDC 9775	N	N	N	N	S	N
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	CDC 9775	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	128.6 MB	1 RM80	8	1028.8 MB	8 LOGICAL UNITS MAX. STD. RM80	FUGITSU 2351A	N	N	N	N	S	N
	256.2 MB	1 RM05	8	2049.6 MB	8 LOGICAL UNITS MAX. STD. RM05	CDC 9766 (4)	N	N	N	N	S	S
	67.4 MB	1 RM02	8	539.2 MB	8 LOGICAL UNITS MAX. STD. RM02	FUGITSU 2351A	N	N	N	N	N	S
	256.2 MB 67.4 MB	1 RM05 1 RM03	4 4	1024.8 MB 269.6 MB	8 LOGICAL UNITS MAX. STD RM03 & RM05	CDC 9766 (4) CDC 9762 (1)	N N	N N	N N	N N	S S	S S
	67.4 MB 128.6 MB	1 RM03 1 RM80	4 4	269.6 MB 514.4 MB	8 LOGICAL UNITS MAX. RM03 & RM80	CDC 9762 (1) CDC 9730-160 (2)	N N	N N	N N	N N	S S	S N
	256.2 MB 128.6 MB	1 RM05 1 RM80	4 4	1024.8 MB 514.4 MB	8 LOGICAL UNITS MAX. STD. RM05, RM80	CDC 9766 (4) FUGITSU 2351A	N N	N N	N N	N N	S S	S N
	256.2 MB 256.2 MB	1 RM05 1 RM05	4 4	1024.8 MB 1024.8 MB	8 LOGICAL UNITS MAX STD. RM05	CDC 9766 (4) FUGITSU 2351A	N N	N N	N N	N N	S S	S S
	67.4 MB 128.6 MB	1 RM03 1 RM80	4 4	269.6 MB 514.4 MB	8 LOGICAL UNITS MAX. STD. RM03/RM80	CDC 9762 (1) FUGITSU 2351	N N	N N	N N	N N	S S	S N
	128.6 MB 256.2 MB	1 RM80 1 RM05	2 6	257.2 MB 1537.2 MB	8 LOGICAL UNITS MAX. STD. RM80/RM05	CDC 9775 CDC 9766 (4)	N N	N N	N N	N N	S S	N S
	256.2 MB 128.6 MB	1 RM05 1 RM80	2 6	512.4 MB 771.6 MB	8 LOGICAL UNITS MAX. STD. RM05/RM80	CDC 9766 (4) CDC 9775	N N	N N	N N	N N	S S	S N
	128.6 MB 256.2 MB	1 RM80 1 RM05	5 3	643.0 MB 768.6 MB	8 LOGICAL UNITS MAX. STD. RM80/RM05	CDC 9775 CDC 9766 (4)	N N	N N	N N	N N	S S	N S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

EMULEX CONTROLLER	MBYTES/ LOGICAL UNITS	LOGICAL UNITS/ DRIVE	MAX # DRIVES/ CONTR.	MAX # MBYTES/ CONTR.	COMMENTS	DRIVES SUPPORTED		SOFTWARE SUPPORTED					
								RT11	RSX M	RSX M+	RSTS	VMS	UNIX
SC788/B1	128.6 MB	1 RM80	4	514.4 MB	8 LOGICAL UNITS MAX.	FUGITSU 2351A		N	N	N	N	S	N
	256.2 MB	1 RM05	4	1024.8 MB	STD. RM80/RM05	CDC 9766	(4)	N	N	N	N	S	S
	67.4 MB	1 RM02	4	269.6 MB	8 LOGICAL UNITS MAX.	FUGITSU 2351A		N	N	N	N	N	S
	256.2 MB	1 RM05	4	1024.8 MB	STD. RM02/RM05	CDC 9766	(4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB	8 LOGICAL UNITS MAX.	CDC 9762	(1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB	STD.RM03/RM05/RM80	CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	4	514.4 MB		FUGITSU 2351A		N	N	N	N	S	N
	67.4 MB	1 RM03	2	134.8 MB	8 LOGICAL UNITS MAX.	CDC 9762	(1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB	STD. RM03 & RM05	CDC 9766	(4)	N	N	N	N	S	S
	67.4 MB	1 RM03	2	134.8 MB		CDC 9762	(1)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.0 MB		CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB	8 LOGICAL UNITS MAX.	CDC 9775		N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB	STD. RM05/RM80	CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB		CDC 9775		N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766	(4)	N	N	N	N	S	S
	256.2 MB	1 RM05	2	512.4 MB	8 LOGICAL UNITS MAX.	CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB	STD RM05/RM80	CDC 9775		N	N	N	N	S	N
	256.2 MB	1 RM05	2	512.4 MB		CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	2	257.2 MB		CDC 9774		N	N	N	N	S	N
	128.6 MB	1 RM80	1	128.6 MB	8 LOGICAL UNITS MAX.	CDC 9775		N	N	N	N	S	N
	256.2 MB	1 RM05	3	768.6 MB	STD. RM80/RM05	CDC 9766	(4)	N	N	N	N	S	S
	128.6 MB	1 RM80	1	128.6 MB		CDC 9775		N	N	N	N	S	N
	256.2 MB	1 RM05	3	768.6 MB		CDC 9766	(4)	N	N	N	N	S	S

C = CONTRACTED D = EMULEX UM DRIVER E = EXPANDED N = NOT SUPPORTED S = STANDARD

1) AMPEX DM-980, DF-980; BALL BD-80; CENTURY DATA T-82 CDC 9762, 9730-80;FUJITSU 2280; KENNEDY 5380

2) AMPEX DF-9165; BALL BD-160; CDC 9730-160; FUJITSU 2284

3) AMPEX DM-9200; CENTURY DATA T-202; MEMOREX 677-0X

4) CENTURY DATA T-302; CDC 9766; MEMOREX 677-30

5) AMPEX DRF-932, DFR-964, DFR-996; CDC 9448-32, 9448-64, 9448-96

6) FUGITSU 2294K/N; AMPEX CAPRICORN 330

FIELD SERVICE OFFICES

System support specialists are located in Emulex field service offices in key cities across the U.S. These specialists are dedicated to the on-site installation and field support of Emulex products in these key geographical areas. It is the policy of the company to provide the highest quality of support to the customer for proper integration and use of all Emulex products.

CALIFORNIA
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Los Angeles, CA 90010
213/384-6936

San Francisco Area
510 Lawrence Expressway, Suite 210
Sunnyvale, CA 94086
408/773-1661

PENNSYLVANIA
Philadelphia Area
ADP Building, Route 1, Suite 100
Chadds Ford, PA 19317
215/358-1300

GEORGIA
345 Market Place, Suite 107
Roswell, GA 30075
404/587-3610

ILLINOIS
957-C Plum Grove Road
Schaumburg, IL 60195
312/490-0050

NEW HAMPSHIRE
New England Area
402 Amherst Road, Nashua, NH 03063
603/882-6269

NEW JERSEY
New York Area
Glenpointe Centre East
300 Frank W. Burr Boulevard
Teaneck, NJ 07666-6783
201/836-3717

INTERNATIONAL SALES

AUSTRALIA
EMULEX CORPORATION
175 Rowe Street, Suite 3
P.O. Box 289
Eastland, N.S.W. 2122, Australia
Tele: (02) 858-4833 • TWX: 75586

UNITED KINGDOM
EMULEX CORPORATION
Unit 6, The Western Centre
Western Road, Bracknell
Berkshire RG12 1RW, England
Tele: 344-484234 • Telex: 849781 EMULEX G

THE NETHERLANDS
Holland, Belgium, France
EMULEX CORPORATION
Bruistensingel 104, 5203 DB Den Bosch
The Netherlands
Tele: 73-408-350 • Telex: 50819

CANADA
EMULEX CORPORATION
5945 Airport Road, Suite 288
Mississauga, Ontario L4V 1R9, Canada
Tele: 416/673-1211

WEST GERMANY
EMULEX CORPORATION
Ermekeilstr. 1, 5300 Bonn 1
West Germany
Tele: 0228/223001 • Telex: 886775

All other countries contact:
EMULEX CORPORATION:
International Marketing
3545 Harbor Boulevard, P.O. Box 6725
Costa Mesa, California 92626
Tele: 714/662-5600
TWX: 910-595-2521 EMULEX CSMA
Telex: 183627 EMULEX CSMA

ADDITIONAL SALES INFORMATION

DOMESTIC SALES

CALIFORNIA
Orange County
3545 Harbor Boulevard, P.O. Box 6725
Costa Mesa, CA 92626
714/662-5600

Los Angeles Area
3250 Wilshire Blvd., Suites 943-44
Los Angeles, CA 90010
213/384-6936

San Diego Area
8388 Vickers Street, Suite 214
San Diego, CA 92111
619/277-0719

San Francisco Bay Area
510 Lawrence Expy., Suite 210
Sunnyvale, CA 94086
408/773-1661

FLORIDA
2055 Wood Street, Suite 102
Sarasota, FL 33577
813/955-8015

GEORGIA
345 Market Place, Suite 107
Roswell, GA 30075
404/587-3610 • TWX: 810-766-0804

ILLINOIS
957-C Plum Grove Road
Schaumburg, IL 60195
312/490-0050 • TWX: 910-291-0391

MICHIGAN
4000 Prudential Town Center
Suite 1301
Southfield, MI 48075
313/352-6750

NEW HAMPSHIRE
New England Area
402 Amherst Street
Nashua, NH 03063
603/882-6269 • TWX: 710-228-8968

NEW JERSEY
New York Area
Glenpointe Centre East
300 Frank W. Burr Boulevard
Teaneck, NJ 07666-6783
201/836-3717

OHIO
Anderson Hills Office Park
8078 E. Beechmont Avenue
Cincinnati, OH 45230
513/474-4226

PENNSYLVANIA
Philadelphia Area
ADP Building, Route 1, Suite 100
Chadds Ford, PA 19317
215/358-1300

Bethlehem Area
528 North New Street
Bethlehem, PA 18018
215/867-4104

TEXAS
Dallas
4100 Spring Valley, Suite 400
Dallas, TX 75234
214/392-1822

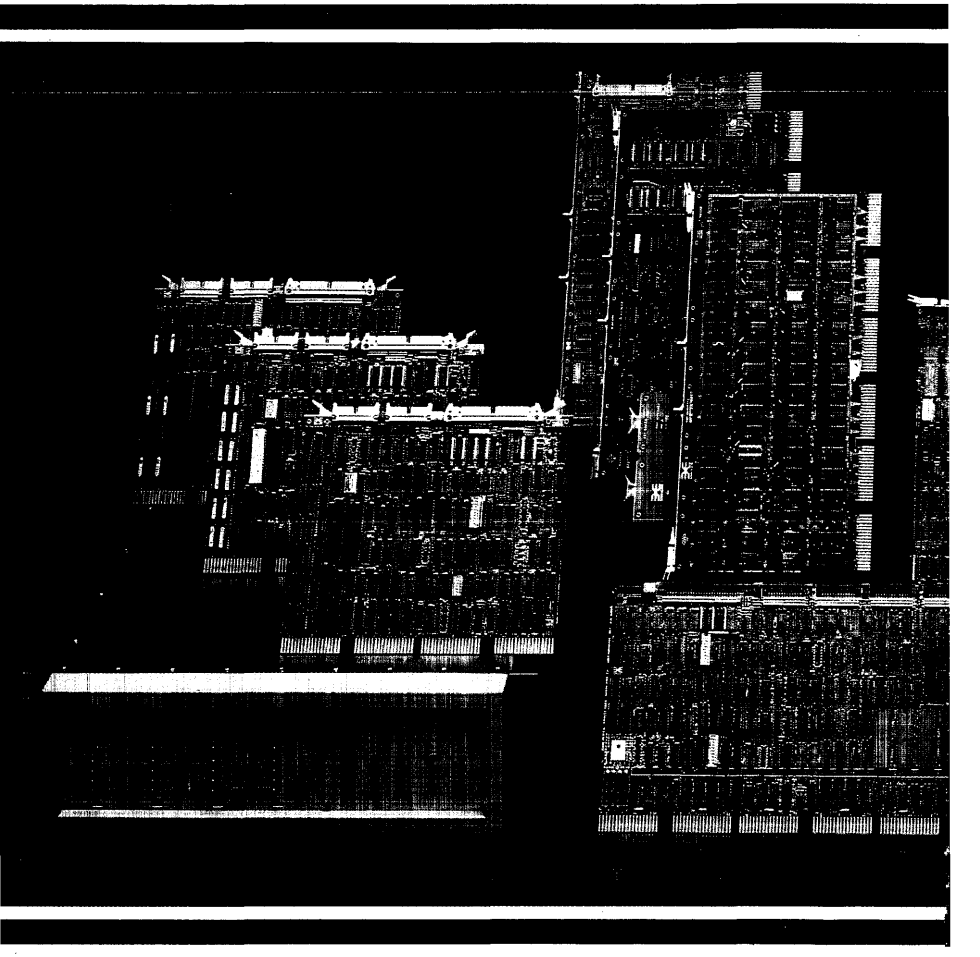
Houston
7322 Southwest Freeway
Suite 1000
Houston, TX 77074
713/271-0805 • 713/271-0806

WASHINGTON, D.C.
Government Contracts
11260 Roger Bacon Drive, 3rd Floor
Reston, VA 22090
703/471-1001

OTHER U.S. SALES AREAS CALL:
CORPORATE HEADQUARTERS
3545 Harbor Boulevard, P.O. Box 6725,
Costa Mesa, California 92626
714/662-5600 • 800/854-7112

Corporate facilities located in Costa Mesa, California, presently include over 100,000 square feet of modern, industrial buildings, with approximately 48,000 devoted to production and an additional 30,000 square feet dedicated to product development and technical support.

Recently, ground was broken for a new two-story 60,000 square foot engineering and manufacturing building located adjacent to the Costa Mesa headquarters facility. The EMULEX manufacturing facility in Dorado, Puerto Rico, has been expanded to a total of 51,000 square feet. The company also opened a new 6000 square-foot headquarters facility in Bracknell, England, for sales administration, repair and service support throughout the United Kingdom and Europe. In addition, a future plant site has been chosen near Dublin, Ireland, to inaugurate a new European manufacturing operation later during the fiscal year. These join numerous direct sales offices located across the U.S., with international sales offices in the United Kingdom, The Netherlands, West Germany, Australia, and Canada.



Emulex Corporation
3545 Harbor Boulevard • P.O. Box 6725 • Costa Mesa, California 92626
714/662-5600 • 800/854-7112 outside California
TWX 910-595-2521 EMULEX CSMA • TELEX: 183627 EMULEX CSMA