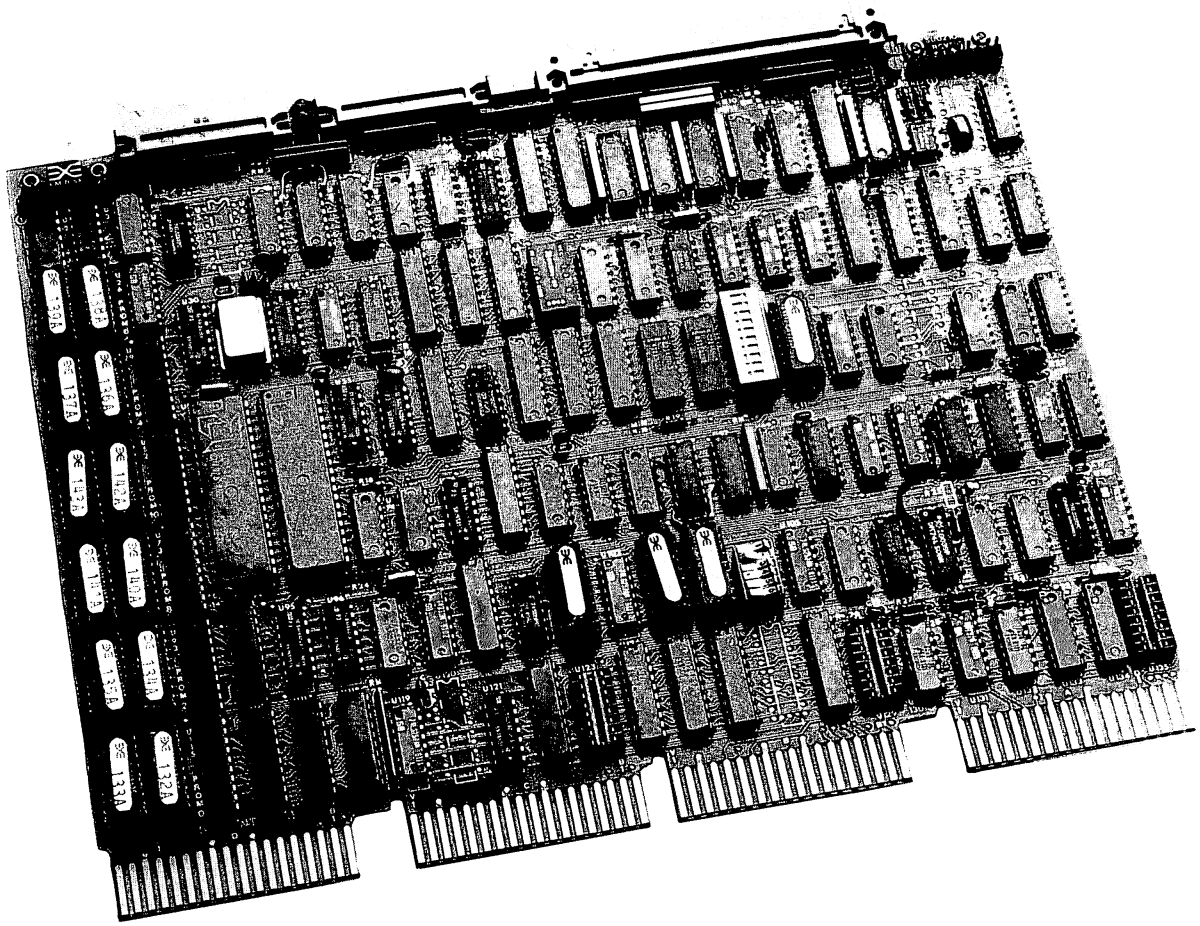
EMULEX

THE GENUINE ALTERNATIVE
FOR LSI-11 DISK CONTROLLER TECHNOLOGY

EMULEX SC02 SERIES



NEED A SMALL/MEDIUM DISK CONTROLLER WITH BIG DISK PERFORMANCE?

Then your only choice is the new SC02. It's designed to match the packaging and economy of today's new breed of small and medium capacity 8" and 14" hard disk drives. It provides the high performance and flexibility demanded for their effective application with the LSI-11, including the 11/73. And it has the usual EMULEX quality and features the industry has learned to depend on.

*DEC, LSI, PDP, VAX, VMS, Unibus, and Q Bus are trademarks of Digital Equipment Corporation.

EMULEX

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.

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 interlace.
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.

EMULEX

datelcare
huis ter heideweg 28, postbus 2
3700 AA zeist, tel 03404-21344

Emulex Corporation
3545 Harbor Blvd. • 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
TLF 84-070 PRINTED IN USA 4-84

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.

• 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.

• 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.

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

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

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