DISK DRIVE CONFIGURATIONS

- Model SC04/C
  Emulates the DEC RK611 Controller combined with multiple RK06 (13.9 MByte) and RK07 (27.4 MByte) logical units mapped to the drive surfaces. The RK06/07 emulation provides performance advantages over the RL01/02 emulation commonly used for small capacity drives, including: greater total system capacity; special read-write across cylinder boundaries; hardware head switching; and overlapped seeks on multiple drives. Includes the additional benefit of full 22-bit addressing, permitting the unit to operate with DEC RLV12 software for the new 4 MByte LSI-11/23A CPU. It also features 512 word bootstrap, BDV-11 clock control, and Q Bus termination resistors.

- Model SC04/L
  Emulates the DEC RL11 controller combines with multiple RL01 (5.2 MByte) and RL02 (10.4 MByte) logical units mapped to the drive surfaces. The SC04/L controller provides ANSI interfacing for connection of up to four 8" Winchester drives to an LSI-11 Q Bus and makes transparent use of DEC RL01/RL02 software. Includes the additional benefit of full 22-bit addressing, permitting the unit to operate with DEC RLV12 software for the new 4 MByte LSI-11/23A CPU. It also features 512 word bootstrap, BDV-11 clock control, and Q Bus termination resistors.

A unique Configuration PROM permits switch selection of any one of 64 combinations of two drive configurations. Logical units are mapped in contracted, standard, or expanded capacities to best utilize the formatted capacity of each drive model. The controller executes DEC software drivers and diagnostics transparently for standard logical drive sizes; patches are required for non-standard logical mappings. EMULEX-furnished diagnostics are self-sizing and automatically adapt their functions to non-standard drive sizes.

The following manufacturers have announced ANSI interfaces for their products:

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<td>3M</td>
<td>8431, 8432, 8533</td>
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Users should contact EMULEX for details of configuration and support for a particular drive type/manufacturer.

NOW YOU CAN GET THE PERFORMANCE, RELIABILITY, AND ECONOMY OF ANSI 8" WINCHESTERS ON YOUR LSI-11

Your only choice is the new SC04. It's designed to match the packaging and economy of today's new breed of small and medium capacity 8" Winchester disk drives using the ANSI standard interface. It provides the high performance and flexibility demanded for their effective application with the LSI-11. And it has the usual EMULEX quality and features the industry has learned to depend on.
DESIGNED FOR HANDLING SMALL TO MEDIUM CAPACITY WINCHESTER DISK DRIVES, THE SCO4 GIVES YOU THE ADVANTAGES OF...

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

The SC04 was designed specifically and exclusively to integrate small-to-medium capacity 8" Winchester disk drives with the LSI-11, incorporating a standard ANSI interface. The unit is an excellent companion product to the EMULEX SC01 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 (e.g. SMD), 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 SCO4 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 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 SCO4 broad flexibility and high performance.

COMPACT PACKAGING.

Only one quad height PCB plugs into any standard 8" Bus slot to minimize mounting cost and complexity.

SOFTWARE TRANSPARENCY.

Microcode provides software transparent emulation of DEC RL01/02 and PK06/07 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-bit error burst), combined with a 32-bit header CRC, is provided to insure reliable operation with all types of high capacity drives, particularly those with removable media.

22-BIT ADDRESSING.

Full 22-bit hardware addressing provided to support full 4096 MByte memory capacity, planned for future LSI-11 models.

BUILT-IN CLOCK.

Hardware included on the board provides software-controllable 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 a line time clock, 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 5.75 mW 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 interface format. Buffer operation eliminates possibility of "data late" conditions and permits controller to be operated at low bus priorities.

ANSI INTERFACE.

Up to eight drives having the ANSI X3T9.3 interface may be daisy chained on one controller.

AND YOU GET MORE THAN JUST A GREAT PRODUCT

With the SCO4 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 48 hours (while operating) to ensure 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 SCO4 Series disk controllers.

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<tr>
<th>Characteristic</th>
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<tr>
<td><strong>FUNCTIONAL</strong></td>
<td><strong>FUNCTIONAL</strong></td>
<td><strong>continued</strong></td>
<td></td>
</tr>
<tr>
<td>Design</td>
<td>High-speed bipolar microprocessor-based controller for integration of industry-standard 8&quot; Winchester type mass storage devices to host LSI-11 computer; incorporates unique design to achieve extreme high-speed operations with minimum hardware.</td>
<td>Software</td>
<td>BDV11 compatible clock control.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Controllable</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Line-Time Clock</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Buffer Memory</td>
<td>1024 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Specifically 512 bytes used for data buffering.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Media Format</td>
<td>3-to-1-sector interface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PHYSICAL</td>
<td>One printed circuit board, standard Q Bus 4-conductor interface.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Mounting</td>
<td>Any quad slot in standard backplane.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Cable/Connector</td>
<td>One 50-pin daisy chain flat cable connector.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Physical Driving</td>
<td>1 to 8 per controller.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ELECTRICAL</td>
<td>Approved line drivers/receivers used exclusively; one unit load per bus signal line.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Q Bus Interface</td>
<td>ANSI X3T9.3 spec.; 3 meters max. cable length.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Disk Interface</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>Power</td>
<td>+5V ± 5%, 5.7 mW max; standard backplane/system</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ENVIROMENTIAL</td>
<td>Exceeds all environmental ranges and conditions specified for commercial LSI-11 computers and applicable disk drives.</td>
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MICROPROCESSOR ARCHITECTURE.

The same basic EMULEX bipolar microprocessor architecture which consistently sets the industry standards is used to give the SC04 broad flexibility and high performance.

COMPACT PACKAGING. Only one quad hook plug fits into any standard Q bus slot to minimize mounting cost and complexity.

SOFTWARE TRANSPARENCY. Microcode provides software transparent emulation of DEC RL01/02 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 1-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.

22-BIT ADDRESSING. Full 22-bit hardware addressing provided to support full 4096 MByte memory capacity, planned for future LSI-11 models.

BUILT-IN CLOCK. Hardware included on the board provides software-controllable time line clock (BDEV11 compatible).

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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 3-2-1 sector interface format. Buffer operation eliminates possibility of 'data loss' conditions and permits controller to be operated at low bus priorities.

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GENERAL SPECIFICATIONS

The following specifications apply to all SC04 Series disk controllers.

### Characteristic | Specification
---|---
**FUNCTIONAL** Design | High-speed bipolar microprocessor-based controller for integration of industry-standard 8" 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 | ANSI X3T9.3 specification. Up to 8 drives, 2 different capacities per controller.

Bus Address Range | 0-4 MBytes (22 bits).

Bus Register | Two selectable start locations.

Vector Address | Four 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-control/operating/ configuration options.

### Characteristic | Specification
---|---
**SOFTWARE (continued)** Software | BDEV11 compatible clock control.

Controlable Line-Time Clock | 1034 byte high-speed RAM buffer, accessible to the microprogram, for data buffering and internal storage operations. Typically 512 bytes used for data buffering.

### PHYSICAL Media Format | 3-to-1 sector interface.

Packaging | One printed circuit board, standard Q Bus 4-conductor interface.

Mounting | Any quad slot in standard backplane or system unit.

### ELECTRICAL Cable/Connector | One 50-pin daisy chain flat cable connector.

Physical Drives | 1 to 8 per controller.

Q Bus Interface | Approved line drivers/receivers used exclusively; one unit load per bus signal line.

Disk Interface | ANSI X3T9.3 spec.; 3 meters max. cable length.

Power | +5 ±5%, 5.7 amps max; standard backplane/system unit pins used.

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