The small x indicates the PROM's revision level letter: A, B, C, etc.

Please in U.S.A.

Emulex Corporation assumes no responsibility for any errors which may appear in the manual.

The information in this manual is for information purposes and is subject to change without notice.

Copyright (C) 1988, 1990 Emulex Corporation

measures may be required to correct the interference.

which case the user at his own expense will be required to take whatever

of the equipment in a residential area is likely to cause interference in

influence when operating in a commercial environment. Operation

rules, which are designed to provide reasonable protection against such

of Part 15 of Federal Communications Commission (FCC)

found to comply with the limits for a Class A Computer Device pursuant

and is not intended and used in accordance with the technical manual.

This equipment generates, uses and can radiate radio frequency energy,

WARNING

Integrated circuit U43 on the QD33

controller firmware is also noted in the label above. This firmware is easily identified by the label on

All of the functions that were provided by software diagnostics and OTT commands has been

functionality (NOVRAM) loading commands and formal drive commands (previously available were no

longer available.

Note function (NOVRAM) loading commands and formal drive commands (previously available were no

longer available.

Resident diagnostics

Optional diagnostics

B

C and above

A

MANUAL P/N

DESCRIPTION

REV C

REVISION

FROM C16x

LOCATION U43

EMULEX PRODUCT/MANUAL REVISION HISTORY
# Table of Contents

## ONE

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Introduction</td>
</tr>
<tr>
<td>1.2</td>
<td>Subsystem Overview</td>
</tr>
<tr>
<td>1.3</td>
<td>Physical Organization Overview</td>
</tr>
<tr>
<td>1.4</td>
<td>Subsystem Components</td>
</tr>
</tbody>
</table>

## TWO

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.1</td>
<td>Controller Specification</td>
</tr>
<tr>
<td>2.2</td>
<td>General Specification</td>
</tr>
<tr>
<td>2.3</td>
<td>Environmental Specification</td>
</tr>
<tr>
<td>2.4</td>
<td>Physical Specification</td>
</tr>
<tr>
<td>2.5</td>
<td>Electrical Specification</td>
</tr>
</tbody>
</table>

## THREE

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>3.1</td>
<td>Overview</td>
</tr>
<tr>
<td>3.2</td>
<td>System Configuration</td>
</tr>
<tr>
<td>3.3</td>
<td>Architecture</td>
</tr>
<tr>
<td>3.4</td>
<td>Peripheral Numbers</td>
</tr>
<tr>
<td>3.5</td>
<td>Peripheral Capabilities</td>
</tr>
<tr>
<td>3.6</td>
<td>Logical Unit Numbers</td>
</tr>
</tbody>
</table>

## FOUR

<table>
<thead>
<tr>
<th>Page</th>
<th>Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>A DEC McSCP Subsystem</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
</tr>
<tr>
<td>------</td>
<td>----------------------------------------------------------------------</td>
</tr>
<tr>
<td>3-2</td>
<td>Supervisor/Warnings</td>
</tr>
<tr>
<td>3-29</td>
<td>News</td>
</tr>
<tr>
<td>3-28</td>
<td>Default Partition Modifications</td>
</tr>
<tr>
<td>3-28</td>
<td>Disk Partition Modifications</td>
</tr>
<tr>
<td>3-21</td>
<td>Authentication</td>
</tr>
<tr>
<td>3-22</td>
<td>Special Files</td>
</tr>
<tr>
<td>3-26</td>
<td>The Kernel</td>
</tr>
<tr>
<td>3-26</td>
<td>Unix-28 Operating Systems</td>
</tr>
<tr>
<td>3-26</td>
<td>Coprime + Bootloop</td>
</tr>
<tr>
<td>3-26</td>
<td>Vcopy</td>
</tr>
<tr>
<td>3-57</td>
<td>NFS</td>
</tr>
<tr>
<td>3-63</td>
<td>Special Files</td>
</tr>
<tr>
<td>3-64</td>
<td>System</td>
</tr>
<tr>
<td>3-19</td>
<td>Unix-12 Operating Systems (V3.0 and above)</td>
</tr>
<tr>
<td>3-17</td>
<td>VMS Operating Systems (V3.2 and above)</td>
</tr>
<tr>
<td>3-20</td>
<td>Installing Multiple MSCP Controllers</td>
</tr>
<tr>
<td>3-17</td>
<td>Installing a Single MSCP Controller</td>
</tr>
<tr>
<td>3-17</td>
<td>RSX-IM Plus Operating Systems (V2.1 and above)</td>
</tr>
<tr>
<td>3-17</td>
<td>R1-11 Operating Systems (V3.1 and above)</td>
</tr>
<tr>
<td>3-17</td>
<td>Installing a Single MSCP Controller</td>
</tr>
<tr>
<td>3-17</td>
<td>RSX-IM Operating Systems (V4.0 and above)</td>
</tr>
<tr>
<td>3-12</td>
<td>Disk Partitioning</td>
</tr>
<tr>
<td>3-11</td>
<td>Installing Multiple MSCP Controllers</td>
</tr>
<tr>
<td>3-11</td>
<td>Installing a Single MSCP Controller</td>
</tr>
<tr>
<td>3-10</td>
<td>RSX-IM Operating Systems (V5.0 and above)</td>
</tr>
<tr>
<td>3-10</td>
<td>R1-11 Operating Systems (V5.1 and above)</td>
</tr>
<tr>
<td>3-10</td>
<td>Installing a Single MSCP Controller</td>
</tr>
<tr>
<td>3-8</td>
<td>Initializing Operating Systems, Device and Vector Addresses</td>
</tr>
<tr>
<td>3-7</td>
<td>Device Numbers</td>
</tr>
<tr>
<td>3-5</td>
<td>Logical Devices</td>
</tr>
<tr>
<td>3-2</td>
<td>UDB3 MSCP Class Superuser Logical Configuration</td>
</tr>
<tr>
<td>4-8</td>
<td>Interrupt Vector Address</td>
</tr>
<tr>
<td>4-7</td>
<td>Disk Controller Bus Address</td>
</tr>
<tr>
<td>4-4</td>
<td>DISK CONTROLLER SETUP</td>
</tr>
<tr>
<td>4-4</td>
<td>UD3 Disk Controller Inspection</td>
</tr>
<tr>
<td>4-4</td>
<td>ISPECIFICATION</td>
</tr>
<tr>
<td>4-3</td>
<td>Maintaining FC Class A Compliance</td>
</tr>
<tr>
<td>4-4</td>
<td>Dip Switch Types</td>
</tr>
<tr>
<td>4-4</td>
<td>System Contributions</td>
</tr>
<tr>
<td>4-1</td>
<td>OVERVIEW</td>
</tr>
<tr>
<td>Page</td>
<td>Section</td>
</tr>
<tr>
<td>------</td>
<td>---------</td>
</tr>
<tr>
<td>4-13</td>
<td>Configuration Bits, High Limit and Low Limit</td>
</tr>
<tr>
<td>4-13</td>
<td>Number of Alternative Cylinders</td>
</tr>
<tr>
<td>4-13</td>
<td>Number of Space Sections per Track</td>
</tr>
<tr>
<td>4-13</td>
<td>Number of Cylinders</td>
</tr>
<tr>
<td>4-13</td>
<td>Number of Heads</td>
</tr>
<tr>
<td>4-12</td>
<td>Number of Sections per Track</td>
</tr>
<tr>
<td>4-12</td>
<td>Number of Units of this Type</td>
</tr>
<tr>
<td>4-12</td>
<td>Format Code</td>
</tr>
<tr>
<td>4-12</td>
<td>Adapter DMA Threshold</td>
</tr>
<tr>
<td>4-11</td>
<td>Drive Configuration Parameters</td>
</tr>
<tr>
<td>4-11</td>
<td>Option 11 - Direct Doovram</td>
</tr>
<tr>
<td>4-10</td>
<td>Option 10 - Display Doovram</td>
</tr>
<tr>
<td>4-10</td>
<td>Option 9 - Replace Block</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 8 - First Known Units</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 2 - Read Only Test</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 7 - Real/Verify and Data Reliability Test</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 6 - Formal/Verify and Data Reliability Test</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 5 - Data Reliability Test</td>
</tr>
<tr>
<td>4-9</td>
<td>Option 4 - Formal and Verify</td>
</tr>
<tr>
<td>4-8</td>
<td>Option 3 - Verify</td>
</tr>
<tr>
<td>4-8</td>
<td>Option 2 - Formal and Verify</td>
</tr>
<tr>
<td>4-8</td>
<td>Option 1 - Serial Loop</td>
</tr>
<tr>
<td>4-7</td>
<td>F.R.D. Options, Terminating F.R.D.</td>
</tr>
<tr>
<td>4-6</td>
<td>Storing F.R.D. on a PDP-11 System</td>
</tr>
<tr>
<td>4-5</td>
<td>Starting F.R.D. on a VAX System</td>
</tr>
<tr>
<td>4-4</td>
<td>F.R.D. Conversions</td>
</tr>
<tr>
<td>4-4</td>
<td>NOVARAM LOADING, DISK FORMATTING, AND TESTING</td>
</tr>
<tr>
<td>4-4</td>
<td>CABLING</td>
</tr>
<tr>
<td>4-4</td>
<td>Index and Sector Signals</td>
</tr>
<tr>
<td>4-4</td>
<td>Drive Numbering</td>
</tr>
<tr>
<td>4-3</td>
<td>Sectioning</td>
</tr>
<tr>
<td>4-3</td>
<td>Local/K Remote</td>
</tr>
<tr>
<td>4-3</td>
<td>-drive Placement</td>
</tr>
<tr>
<td>4-3</td>
<td>SDI DISK DRIVE PREPARATION</td>
</tr>
<tr>
<td>4-3</td>
<td>Mounting</td>
</tr>
<tr>
<td>4-3</td>
<td>NPQ Session Number</td>
</tr>
<tr>
<td>4-2</td>
<td>Slot Selection</td>
</tr>
<tr>
<td>4-2</td>
<td>System Preparation</td>
</tr>
<tr>
<td>4-4</td>
<td>PHYSICAL INSTALLATION</td>
</tr>
<tr>
<td>4-4</td>
<td>Index and Sector</td>
</tr>
<tr>
<td>4-4</td>
<td>Adaptive DMA Mode</td>
</tr>
<tr>
<td>4-4</td>
<td>DMA Direct Delay</td>
</tr>
<tr>
<td>4-4</td>
<td>First Logical Unit Number for an Alternate UD33</td>
</tr>
<tr>
<td>4-4</td>
<td>MSC Device Number</td>
</tr>
<tr>
<td>4-4</td>
<td>Options</td>
</tr>
<tr>
<td>Page</td>
<td>Title</td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table of Contents

**SIX**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.1</td>
<td>OVERVIEW OF MSCF SUBSYSTEM</td>
</tr>
<tr>
<td>6.2</td>
<td>OVERVIEW</td>
</tr>
<tr>
<td>6.3</td>
<td>PROGRAMMING</td>
</tr>
<tr>
<td>6.4</td>
<td>Registers and Programming</td>
</tr>
<tr>
<td>6.5</td>
<td><strong>FALL ERROR CODES</strong></td>
</tr>
<tr>
<td>6.6</td>
<td>POWER-UP SELF-DIAGNOSTIC</td>
</tr>
<tr>
<td>6.7</td>
<td>FALLOUT ISOLATION PROTOCOL</td>
</tr>
<tr>
<td>6.8</td>
<td>SERVICE</td>
</tr>
<tr>
<td>6.9</td>
<td>OVERVIEW</td>
</tr>
</tbody>
</table>

**FIVE**

<table>
<thead>
<tr>
<th>Page</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1</td>
<td>TROUBLESHOOTING</td>
</tr>
<tr>
<td>4.2</td>
<td>Indicators</td>
</tr>
<tr>
<td>4.3</td>
<td>OPERATION</td>
</tr>
<tr>
<td>4.4</td>
<td>Special Case</td>
</tr>
<tr>
<td>4.5</td>
<td>Gp 0.1 and 2 Parameters</td>
</tr>
<tr>
<td>4.6</td>
<td>Removable Media</td>
</tr>
<tr>
<td>4.7</td>
<td>Cylinder Other</td>
</tr>
<tr>
<td>4.8</td>
<td>Starting Head Other</td>
</tr>
<tr>
<td>4.9</td>
<td>SPILL Code</td>
</tr>
<tr>
<td>4.10</td>
<td>Local Drive Spills</td>
</tr>
<tr>
<td>4.11</td>
<td>Firmware Resident Diagnostics (F.R.D.) Support</td>
</tr>
<tr>
<td>4.12</td>
<td>Failure Requirements</td>
</tr>
<tr>
<td>4.13</td>
<td>Static Dual Port Mode (Conque Type 3)</td>
</tr>
<tr>
<td>4.14</td>
<td>Dynamic Dual Port Mode (Conque Type 1)</td>
</tr>
<tr>
<td>4.15</td>
<td>Single Port Mode (Conque Type 0)</td>
</tr>
<tr>
<td>4.16</td>
<td>Dual Port Options</td>
</tr>
</tbody>
</table>
Table of Contents

D-1
Special Considerations for Large Capacity Drives

D-1

C-1

C-1
Parameter Values

C-1
Overview

C

B-1
Disk Drive Configuration Parameters

B-1
Overview

B

A-1

A-1

Exchanging Proms

A-2
Overview

A-2

A-3
Determining the Vector Address for Use With Autoconfiguration

A-3

A-4
Autoconfiguration, CSR, and Vector Addresses

A-4

A-6
A System Configuration Example

A-6

8-1

8-1

8-2

8-2

8-3

8-3

8-4

8-4

8-5

8-5

8-6

8-6

8-7

8-7

Discrete Signals

Logical Signals

I/O Signals Processing

I/O Cable

A Cable

I/O Cables

USB3 SMD Disk Drive Interface

USB3 Interface

NPI Operations

Register Address

Interrupt Priority Level

Overview

EIGHT INTERFACES

7-1

7-1

7-2

7-2

7-2

7-2

7-2

7-2

7-2

7-2

7-2

OVERVIEW

OVERVIEW

FUNCTIONAL DESCRIPTION

The

TABLE OF CONTENTS
RETURNED MATERIAL AUTHORIZATION (RMA) number assigned by Emulex.

The following conditions apply to Emulex Controller products:

1. WARRANTY PERIOD. A replaced product, or part thereof, shall become the property of Emulex and will be returned to Buyer with the applicable warranty period.

2. WARRANTIES. Emulex warrants that each Emulex controller product supplied shall be free from defects in material and workmanship for a period of twelve (12) months from the date of shipment.

Emulex Controller Warranty

Cable Warranty: All Emulex provided cables are warranted for ninety (90) days.

Warranty terms:

- WARRANTY PERIOD: Twelve (12) months from the date of shipment.
- EXCLUSIONS: Environmental damage such as flood, fire, or vandalism.

Table of Contents

- RETURNED MATERIAL AUTHORIZATION (RMA) number assigned by Emulex.
- WARRANTY PERIOD: A replaced product, or part thereof, shall become the property of Emulex and will be returned to Buyer with the applicable warranty period.
- WARRANTIES: Emulex warrants that each Emulex controller product supplied shall be free from defects in material and workmanship for a period of twelve (12) months from the date of shipment.

Cable Warranty: All Emulex provided cables are warranted for ninety (90) days.

Warranty terms:

- WARRANTY PERIOD: Twelve (12) months from the date of shipment.
- EXCLUSIONS: Environmental damage such as flood, fire, or vandalism.
Introduction

1.1

GENERAL DESCRIPTION

Section 1

Appendix A (Architecture): This appendix describes the DEC and SMIB interfaces. This section describes the controller. UNIBUS architecture.

Section 2 (Controller): This section describes the controller. UNIBUS architecture.

Section 3 (Control Specifiers): This section contains an overview of error messages and service register contents. The contents of the eight sections of configuration, UNIBUS architecture and techniques, and interpretation of controller. If assumes that you have some knowledge of hardware controller. This manual is designed to help you install and use your UDD3 disk is an SMD-compatible controller that interfaces SMID disk drives with DEC's UNIBUS. This manual is designed to help you install and use your UDD3 disk controller, designed and manufactured by Emelux Corporation.
is capacity (the number of logical blocks that the subsystem can store).

During system startup, the host operating system queries the subsystem to find
sector, etc.). This feature also makes autoconfiguration a simple matter.

To have detailed knowledge of the peripheral's geometry (cylinders, tracks,
identified by simple logical block numbers (LBNS). Thus, the host does not need
computer's operating system software to store data in logical blocks that are
last feature is perhaps the most important. This feature allows the host
mapping.

representations, seek optimization, command primitives and ordering, and data
performance, seek optimization, command primitives and ordering, and data
performed by the MSCL functions: error detection and correction, read block
relies on the host CPU of many the maintenance tasks. The UDDS Disk Controller
managed into an intelligent mass storage subsystem. In concert with SMD
MSCL is a software interface designed to lower the host computer's mass

4.2.1

Mass Storage Control Protocol (MSCP)

information on the UDDS, SMD Interface, see subsection 8.3.
SMD and SMD.ol interfaces are extensively and logically compatible. For more
extended range of addressing functions of the SMD-E (extended) Interface.
The UDDS provides the support for the
standard SMD interface as its peripheral interface. The UDDS uses the industry
traditional block multiplexed addressing in peripheral section. The UDDS uses the industry
a software-transparent interface for the host DC controller. To provide
The UDDS implements DC's Mass Storage Control Protocol (MSCP) to provide
UNIBUS in computers manufactured by Digital Equipment Corporation (DEC).
The UDDS Disk Controller connects high-capacity mass storage peripherals to the

1.2

Subsystem Overview

Appendix D (Special Considerations for Large Capacity Drives): This
Appendix contains information specifically concerning large capacity disk
Appendix C (Disk Drive Configuration Parameters): This appendix
Appendix B (PROM Removal and Replacement): This appendix
Appendix A (Special Considerations for Supported SMD disk drives).

can upgrade the UDDS Disk Controller in the field.

Appendix C (Disk Drive Configuration Parameters): This appendix
Appendix B (PROM Removal and Replacement): This appendix
Appendix A (Special Considerations for Supported SMD disk drives).
Figure 1.1. U.D33 Subsystem Configuration

The U.D33 supports up to four physical or eight logical disk drives. A Regulator
(data storage capacities are limited only by the capacities of the peripherals).

The U.D33 is contained on a single hex-wide printed circuit board assembly
that plugs directly into a UNIBUS backplane slot.

The UNIBUS backplane supports up to four physical or eight logical disk drives. A Regulator
microprocessor architecture ensures excellent reliability and compactness.

The U.D33 Disk Controller is a modular, microprocessor-based disk controller
host. Because the host operating system does not need to have detailed knowledge of

Physical Organization Overview

Physical Organization Overview
Table 1-1. Basic Contents

<table>
<thead>
<tr>
<th>Part Number</th>
<th>Description</th>
<th>Qty.</th>
</tr>
</thead>
<tbody>
<tr>
<td>00</td>
<td>UD33 Technical Manual</td>
<td>1</td>
</tr>
<tr>
<td>02</td>
<td>UD33 Disk Controller</td>
<td>1</td>
</tr>
</tbody>
</table>

UD33. In Table 1-1, along with the part numbers, the item is identified by a 10 level assembly level that is fixed to the 8031 microprocessor. The UD33 is designed for a DMSCP compatible mass storage subsystem. The UD33 is pictured in Figure 1-2, The UD33 disk controller, with appropriate peripherals, provides a DMSCP.
The UD33 disk controller firmware incorporates a self-contained set of disk

Firmware-Resident Diagnostics

implemented without expensive, dedicated hardware.

Microprocessor Design

The following features enhance the usefulness of the UD33 Disk Controller.

Features

<table>
<thead>
<tr>
<th>Description</th>
<th>Option</th>
</tr>
</thead>
<tbody>
<tr>
<td>Peripheral Cable Adapter Panel Kit</td>
<td>SJ78131400</td>
</tr>
<tr>
<td>Front-Mount Panel</td>
<td>C227020-10</td>
</tr>
<tr>
<td>Cable/IO Adapter Panel</td>
<td>SY111120-00</td>
</tr>
<tr>
<td>SMDB-Cable, extension</td>
<td>SJ78112180</td>
</tr>
<tr>
<td>SMDB-Cable, shielded</td>
<td>SJ78112130</td>
</tr>
<tr>
<td>SMDB-A-Cable, extension</td>
<td>SJ78112190</td>
</tr>
<tr>
<td>SMDB-A-Cable, shielded</td>
<td>SJ78112200</td>
</tr>
<tr>
<td>SMDB-Cable, unshielded</td>
<td>SJ111210</td>
</tr>
<tr>
<td>SMDB-A-Cable, unshielded</td>
<td>SJ111210</td>
</tr>
</tbody>
</table>

Table 1-2, UD33 Options

particular application, cables are required but must be ordered separately.

Table 1-2 lists the options that can be ordered to tailor your UD33 to your

System Options

Features
4.5.6

Corracting soft errors and retiring operations without intervention by the host.

The disk controller presents error-free media to the operating system by

Error Control

4.5.5

Self-Test

4.5.4

An onboard NOVRAM can be programmed for your independent physical drive

Custom Configuration Capability

4.5.3

Perform reliability testing of the attached disk subsystem.

Test the disk surface and replace defective blocks, and

Configure the controller NOVRAM

---

Including the ability to:

diagnose (F. R.D.'s) provide several important disk preparation functions,

devices connected to a LINUX console port. These firmware-resident terminal drivers that is compatible with either CRT or hardcopy

These utilities allow the user to communicate directly with the UDD3 via a
have RPS disabled.

Two or more drives are used simultaneously. Simple-drive subsystems should
not be programmed via the F.R. D. The performance gain is seen only when
the controller increases the overall throughput to the subsystem.

For a particular drive to find the sector necessary to begin the operation, the
controller increases the overall throughput to the subsystem. By not waiting
when two or more drives are active, RPS allows the controller to determine
when two or more drives are active. RPS increases the performance of the disk
subsystem during data transfer.

Rotational Position Sensing (RPS)

Excessive periods of time by high-speed disk transfers.

That CPU functions, including interrupt servicing, are not locked out for
a delay to avoid data loss conditions on other slower devices that may be on a
delay in the host processor program. The MSCP initialization sequence on the UDD30
delay.

In addition, the UDD30 buffer is designed to handle a stream-selectable DMA burst
transfer to collect the host processor programs the DMA burst length during
transfers. DMA requests and suspends its own DMA activity to permit other DMA
requests. DMA data transfer burst the UDD30 monitors the UDD30 for other
features.

Adaptive DMA

Very efficient level.

The UDD30 contains a buffer that is able to store 16 MSCP commands. This large
Command Buffer

entire system more efficient.

Seek Optimization
Hardware

<table>
<thead>
<tr>
<th>Version</th>
<th>System</th>
<th>Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.1</td>
<td>Unix-32m</td>
<td></td>
</tr>
<tr>
<td>3.0</td>
<td>Unix-11</td>
<td></td>
</tr>
<tr>
<td>5.1</td>
<td>R1-11</td>
<td></td>
</tr>
<tr>
<td>2.1</td>
<td>R5X-IIM-PLUS</td>
<td></td>
</tr>
<tr>
<td>4.1</td>
<td>R5X-IIM</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>RISD/E</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>VMS</td>
<td></td>
</tr>
</tbody>
</table>

Beginning with the indicated version of the following DCC operating systems:

- The UDD3 implements MSCP. Emulex supports the implementation of MSCP compatible with the UDD3.

This section describes the operating systems and hardware components that are compatible with the UDD3.

Compatibility

1.6
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operating System</td>
<td>Embedded diagnostics (MSCP)</td>
</tr>
<tr>
<td>Diagnostics</td>
<td>Emulates DEC's Mass Storage Control Protocol (UNIPUS)</td>
</tr>
<tr>
<td>Logical CPU Interface</td>
<td>Provides mass data storage to digital equipment (DEC) computers that use the controller for the UD33 Disk Controller.</td>
</tr>
</tbody>
</table>

Table 2.1: UD33 General Specifications

This section contains the general, environmental, physical, and electrical specifications for the UD33 Disk Controller.
<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standard console terminal</td>
<td></td>
</tr>
<tr>
<td>Hard Sector</td>
<td>4</td>
</tr>
<tr>
<td>NOVRAM Programmable (norm. 10-124)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>760364x8</td>
</tr>
<tr>
<td></td>
<td>760360x8</td>
</tr>
<tr>
<td></td>
<td>760354x8</td>
</tr>
<tr>
<td></td>
<td>760310x8</td>
</tr>
<tr>
<td></td>
<td>760344x8</td>
</tr>
<tr>
<td></td>
<td>760400x8</td>
</tr>
<tr>
<td></td>
<td>760340x8</td>
</tr>
<tr>
<td></td>
<td>760334x8</td>
</tr>
<tr>
<td></td>
<td>760374x8</td>
</tr>
<tr>
<td></td>
<td>77225x8</td>
</tr>
<tr>
<td></td>
<td>7722150x8</td>
</tr>
</tbody>
</table>

Table 2-2. UDB3 General Specifications (continued)
<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Shipping Weight</td>
<td></td>
</tr>
<tr>
<td>(see Figure 2-1)</td>
<td></td>
</tr>
<tr>
<td>13.172 by 22.09 centimeters</td>
<td></td>
</tr>
<tr>
<td>13.7 by 8.40 inches</td>
<td></td>
</tr>
<tr>
<td>Single, hex-wide, four-layer PCB</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2-3, UDD3 Physical Specifications**

Table 2-3 contains the physical specifications for the UDD3 Disk Controller.

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.4 BTU per hour</td>
<td></td>
</tr>
<tr>
<td>6 cubic feet per minute</td>
<td></td>
</tr>
<tr>
<td>(88°F) and a minimum dewpoint of 2°C (36°F)</td>
<td></td>
</tr>
<tr>
<td>100% to 90% with a maximum wet bulb of 2°C</td>
<td></td>
</tr>
<tr>
<td>per 1000 feet (per 1000 meters)</td>
<td></td>
</tr>
</tbody>
</table>

**Table 2-2, UDD3 Environmental Specifications**

Table 2-2 contains the environmental specifications for the UDD3 Disk Controller.

**Environmental Specification**

**Physical Specification**
Table 2-4. UD33 Electrical Specification

<table>
<thead>
<tr>
<th>Description</th>
<th>Parameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>$-15 \text{Vdc} \pm 5%$, $1.7 \text{Amps (A)} \text{ MAX} + 5 \text{Vdc} + 5%$, $2.6 \text{ Ampers (A)} \text{ MAX}$</td>
<td>POWER</td>
</tr>
</tbody>
</table>
functions as the controller layer.

data-handling functions for the mass storage device. The UD33 message packets to and from the host MSCF class-driver and performs
host layer and the mass storage layer. The controller transmits MSCF
controller communicates with both the

Controller Layer. The MSCF

Host Layer. An MSCF class-driver in the host system receives requests

from the operating system and then forwards data and commands to the
MSCF is a protocol designed by DEC for mass storage subsystems using Digital

Architecture

architecture, until numbering, capacities and related concepts.

The following paragraphs describe MSCF Subsystem concepts, including:

MSCF Subsystem Configuration

Operating Systems, Device and Vector Addresses

The UD33 MSCF Subsystem

A DEC MSCF Subsystem

MSCF Subsystem Configuration

Overview

The configuration procedures, the subsections are listed in the following table:

system down-time. This section contains UD33 application examples and
before beginning this installation should result in a smoother installation with less
Controller, taking a few minutes to plan the configuration of your subsystem

This section is designed to help you plan the installation of your UD33 Disk

Overview

Planning The Installation

Section 3
A DEC MSFC Subsystem

MSFC controller (also known as the address space) is numbered D1.

MSFC controller (also known as the address space) is numbered D1.

Peripheral Capabilities

MSFC controller (also known as the address space) is numbered D1.

Peripheral Capabilities

Peripheral Numbering

MSFC controller (also known as the address space) is numbered D1.

Peripheral Numbering

MSFC Subsystem Logical and Physical Configuration
The U33 MSCP-Class Subsystem

Figure 3-2 illustrates a typical U33 MSCP-Class Subsystem, as with the DEC

MSCP Subsystem Logical and Physical Configuration
Drive logical unit number that is reported to the operating system.

2. Present a unit-number conflict between the UDISS's drives and the MSCP controllers' drives. The UDISS wallcan detect any unit-number drive address at its SMD interface - 0 to 255. Disk drives controlled by the UDISS do not have this flexibility. The UDISS can accept unit-identification numbers that define different base addresses. They may be controlled by separate MSCP controllers at different base addresses.

As noted in Subsection 3.2.2, most DEC operating systems do not allow any logical unit numbers to be accessed via the SMD interface.

The UDISS also performs all of the functions of the peripheral controller.

The command is complete, the controller sends a response to the host.

When the transfer has been received from the host, the MSCP controller the UDISS removes the data from the device.

The MSCP subsystem provided by the UDISS is essentially analogous to the DEC MSCP subsystem described in the DEC Subsystem.

**Figure 3.2. UDISS Subsystem Configuration**
The operating system then sees the two parts as separate disk drives, even though the data is actually stored on the same physical drive. The two parts are called logical disk drives, and the numbers that identify them are called MSCP numbers.

Each part is then assigned a separate unit number and the unit capacity of each part is presented to the operating system. Each part may have a different unit number and capacity, but each part is recognized as a separate disk drive. For example, a physical disk drive may be divided into more than one logical unit. Because the MSCP controller is responsible for establishing the relationship between unit number and capacity, it is possible for the controller to divide its own unit number and capacity into separate parts to present them to the operating system.

After initialization of the controller, the LUN3 MSCP class controller presents the information to the operating system. The LUN3 MSCP class controller contains information on the physical disk drives connected to the controller and maps logical MSCP devices to the physical disk drives. The logical MSCP devices are presented to the operating system as a single LUN (Logical Unit Number) and assigned a unique identifier (LUN). This identifier is used to identify the logical MSCP device to the operating system.

The logical MSCP device is presented to the controller as a single unit. The identifier is assigned to the logical unit based on the physical location of the device and the controller. The logical unit identifier is used to identify the logical unit to the controller and allows the controller to access the logical unit through the controller's internal bus. The logical unit identifier is also used to identify the logical unit to the operating system, allowing the operating system to access the logical unit through the controller's internal bus.
The use of head spill

For maximum effect on access time, simply recommends the use of head spill.

1. Reverse head spill.

2. Cylinder spill.

A drive configuration that supports multiple logical units is called the spill code. These are four types of spill codes:

- Single partition
- Single logical drive
- Multiple logical units
- Multiple logical units with the head spill code
### Table 3-1. Subsystem Configuration Example

<table>
<thead>
<tr>
<th>Drive Name</th>
<th>Drive Number</th>
<th>Physical MSCP Address</th>
<th>MSCP Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>D14</td>
<td>1</td>
<td>0932</td>
<td>MSCP 391</td>
</tr>
<tr>
<td>D13</td>
<td>0</td>
<td>7272</td>
<td>MSCP 237</td>
</tr>
<tr>
<td>D12</td>
<td>1</td>
<td>3772</td>
<td>MSCP 832</td>
</tr>
<tr>
<td>D11</td>
<td>0</td>
<td>3772</td>
<td>MSCP 832</td>
</tr>
<tr>
<td>D10</td>
<td>0</td>
<td>722150</td>
<td>MSCP 23614</td>
</tr>
</tbody>
</table>

Table 3-1 is an MSCP unit numbering example under the R-S1 IM operating

**Note:** The physical disk drive unit number refers to the actual physical address system which shows the MSCP number versus the actual physical address system. The second controller is split into two logical units, Note that two device names are associated with the same drive. Each device name is associated with an alternate MSCP controller which may be DPR 0 and a second controller which may be DPR 1. Each device name is associated with the alternate MSCP controller. The alternate MSCP controller is less restricted for example, no drives which are supported by an alternate MSCP controller are supported by a standard MSCP controller. The alternate MSCP controller is less restricted for example, no drives which are supported by a standard MSCP controller are supported by a standard MSCP controller. The alternate MSCP controller is less restricted for example, no drives which are supported by a standard MSCP controller are supported by a standard MSCP controller. The alternate MSCP controller is less restricted for example, no drives which are supported by a standard MSCP controller are supported by a standard MSCP controller.

### Notes

- **RSTS** Regulations that drive supported by a standard MSCP controller.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
- **MSFC** drives vary by operating system.
Operating Systems, Device and Vector Addresses

**NOTE**

Device identifiers are not available to the host.

Use the same device identifier - RVID, unique identifier.

All of the MSCP peripherals supported by the UD33.
appropriate hardware (unless you are using RT-1). You are generating a mapped version of the operating system on the
configuration algorithm (otherwise incorrect results are not feasible).
Your host system configuration conforms to the standard UNIBUS device
input saved answer file.
saved answer the exists. Answer N (no) to questions such as "use as
This is the first pass that is being made through SYSGEN; therefore, no
change. The following discussions are based on these assumptions:
The information regarding operating systems in these subsections is subject to

<table>
<thead>
<tr>
<th>By First Controller</th>
<th>By Second Controller</th>
<th>Operating System</th>
</tr>
</thead>
<tbody>
<tr>
<td>rad ral</td>
<td>udal udrl</td>
<td>Ultim-32</td>
</tr>
<tr>
<td>rad ral</td>
<td>udal udrl</td>
<td>Ultim-11</td>
</tr>
<tr>
<td>DUA'A DUA'B</td>
<td>PUA' PUA'B</td>
<td>VMS</td>
</tr>
<tr>
<td>DUA'A DUA'B</td>
<td>DUA'A DUA'B</td>
<td>R1-11</td>
</tr>
<tr>
<td>DUA'A DUA'B</td>
<td>DUA'A DUA'B</td>
<td>RXS-1M Plus</td>
</tr>
<tr>
<td>DUA'A DUA'B</td>
<td>DUA'A DUA'B</td>
<td>RXS-1M</td>
</tr>
<tr>
<td>R00, R11</td>
<td>R00, R11</td>
<td>RSTS/E</td>
</tr>
</tbody>
</table>

Table 3-2: Device Names

Scheme.

Controller names and drive names are given to indicate the numbering
device names assigned to MSCP devices under different operating systems. Two
operating systems. Some differences in detail. Table 3-2 lists and describes the
operating systems. Again, although DEC has attempted to standardize the relationship of

Fact.

Operating system requires manual input of the vector, the procedure notes that
process. Many operating systems select the vector address automatically. In an
controller, but are programmed into the controller during the initialization
vector addresses for MSCP controllers are not selected by using switches on the
standard UNIBUS address of 772150.8 for the first controller on the host system.
All of the operating systems described in the following subsections use the
CSR address, UNIBUS address and base address all refer to the same register.
Signals and addresses (SA) register (base address plus 2), the terms IP register,
page. They are the initialization and polling (IP) register (base address) and the
MSCP class controllers contain two registers that are visible to the UNIBUS I/O
Regardless of the number of controllers, is also discussed.

Controller: Disk partitioning & unique feature of RT-11. It is applicable
systems with only one MSCP controller and in those with more than one
controllers under RT-11 in host

The RT-11 Operating System supports up to four MSCP controllers with up to

3.5.2

RT-11 Operating Systems (V5.1 and above)

Successfully initialized with the DS README or INители program, and the table has been
INSTALLED. Suppion of the INI PROC (3) is successful. The following paragraphs discuss:

Support for an MSCP controller must be included in a monitor at SYSCP time,

3.5.4.1

Adding MSCP Support

and programmed into the device during initialization.

Interrupt vector addresses are assigned to the MSCP controllers by INI PROC.

"device":

MSCP controller must be located at the standard address to be a bootable

"device":

MSCP controller needs a VMS address of 7903E8 for an alternative VMS;

"device":

Preceding the MSCP controller in a VMS monitor, respond to the

"device":

MSCP controller must be included in a monitor at SYSCP time.

"device":

Systems:

Some hardware configuration options do not affect the system.

"device":

3.5.4
2. Return.

How many ports are to be supported (1)?

This question:

4. Indicate the number of MSCP controllers on your system in response to

Determine:

Enter the device name you want support for (dd):

Alerts:

3. Indicate that you want MSCP support when the Disk Options question

appears:

of questions appropriately.

Disk consistency when the system is bootstrapped. Answer the next set
controller. UNTIBUS does not address 0 to 38400 to partition the
The start-up command file is required to allow additional MSCP

Determine:

Do you want the start-up indirect file (Y)?

Warning:

2. Indicate that you want the system to use the start-up command file when

Answer the next group of questions appropriately:

IND SISGEN (Return):

1. Initialize SYSGEN:

Technique (user input is in PDUface print):

You may perform a SYSGEN. The following procedure describes the SYSGEN
process. You may also use one of the preregistered monitors that are provided with
SYSGEN. You may also use one of the preregistered monitors that are provided with
your system.

Installing Multiple MSCP Controllers:

Subsection 3.5.2.3.

Up command file, STARTX.COM, to properly partition the disk drives. See
up command file, STARTX.COM, to properly partition the disk drives. See
the RT-11 Distribution. Ensure that your application monitors that are provided with
SYSGEN. You may use one of the preregistered monitors that are provided with
your system.

If your system includes more than one MSCP controller, you may either
install multiple MSCP controllers:

3.5.2.1

Installing a Single MSCP Controller:

Operatng Systems, Device and Vector Addresses
Disk Partitioning

2. Complete SYSEN according to the DEC documentation.

   Statements are not required.
   Default address can be any unused address in the vector page. Default
   page which is supported by VD39, VT, 0, & 1 will be first.

   The UNIBUS for the second device can be any unused address in the I/O
   page.

   (default)
   SET DU VEC3=300
   SET DU VEC2=154
   SET DU CRS2=7634
   SET DU CRS=72150

3. Command line to include the following statements:
   FORTRAN, BCP, or EXTENDED MEMORY polyIb. This is
   monitor that is defined used, where x is 5, 6, or x for single-job.
   The x stands for the
   system start-up command line, STARTX.COM. The x stands for the
   command line that is defined used. To ensure that this is considered
   the
   SET CSR KEYBOARD command. To ensure this is considered
   necessary
   you must specify the addresses of all MSCP controllers (ports) within the

   \"Continue\"

   Enter the device name you want support for [dd]:

   Well, indicating that there are no more devices by entering a period:

   Specify support for all other devices in your host system configuration as
   port.

   RT-11 refers to individual MSCP controllers or controllers as ports. Each
You assign logical names to the partitions beginning with DUL. For the previous example, the assignments are made as follows:

```
SET DU0 UNIT=0 PART=7
SET DU6 UNIT=0 PART=6
SET DU5 UNIT=0 PART=5
SET DU4 UNIT=0 PART=4
SET DU3 UNIT=0 PART=3
SET DU2 UNIT=0 PART=2
SET DU1 UNIT=0 PART=1
SET DU0 UNIT=0 PART=0
```

path騁oad

path騁oad

The number of logical units into which each should be divided is calculated by 65,535 and rounding the result up to the nearest multiple of 256:

\[
\text{Example: }\frac{65,535}{256} = 12.01 \text{ (13 logical units)}
\]

12.01 = 12

\[
\frac{12}{256} = 0.05
\]

128,156

128,156 blocks.

You have selected a Fujitsu M2351A drive that has a capacity of 128 MB.

Each diskette drive can hold only one partition. Partitioning each diskette drive must do this for each partition on each drive, including drives that are not connected to your controller if present. If your controller has drives which you do not wish to partition, you may delete the port when only one controller is present or specify the partition number when two or more controllers are present. Do not specify the partition number when only one controller is present.

partition

partition

Each statement has the following format:

```
SET DU0 UNI = 0 PART = x
```

where u is the logical unit name, 4 is the physical MSC

You must then include a series of statements in the system start-up:

```
SET DU0 UNI = 0 PART = x
```

2. Divide the capacity of each MSC by 65,535.

3. You must then include a series of statements in the system start-up:

```
SET DU0 UNI = 0 PART = x
```

Each logical unit on a disk drive may be smaller than a multiple of 65,535 blocks. That logical unit should be partitioned into a number greater than 1. Then that MSC unit should be partitioned into a multiple of 65,535 blocks.

For each partition, you must specify an MSC.

- If you use the same MSC on all drives, you can specify the same logical unit name.
- If you use different MSCs, you must specify a different logical unit name.

You need to determine the drive configuration(s) that you intend to use. You need to

Operating Systems, Device and Vector Addresses
Planing the Installation

1. To indicate that you want to use autoconfigure, answer Y (yes) to the following question:

Y/N [Y][RETURN]

Autoconfigure the host system hardware?

2. To indicate that you do not want to override autoconfigure results, answer N (no) to this question:

Y/N [N][RETURN]

Autoconfigure the host system hardware?

3. To indicate that you do not want to override autoconfigure results, answer N (no) to the following question:

Y/N [Y][RETURN]

Autoconfigure the host system hardware?

3.5.2 Installing Multiple MSCF Controllers

3.5.3 Installing a Single MSCF Controller

3.5.3.1

MSCF supports autoconfigure, however, only the MSCF-class controller is installed at the standard address. Additional MSCF-class controllers are detected by the MSCF controller and a NDB2. If you have two MSCF controllers, say a DEC MSCF controller and a NDB2, you must perform a complete manual initialization. We recommend that the DEC MSCF controller be installed at the standard NDB2 address. Locate the MSCF controller to be installed at the alternate NDB2 address. Selecting the alternate NDB2 address does not prevent the MSCF being used in the operating system, but it is recommended to use the standard NDB2 address. Locate the MSCF controller to be installed at the standard NDB2 address. Selecting the standard NDB2 address does not prevent the MSCF being used in the operating system, but it is recommended to use the alternate NDB2 address.

System Configuration and Configuration Guide is adequate for this purpose.

11M System Configuration and Configuration Guide is adequate for this purpose.

If you have only one NDB3, install it at the standard address (72150H) and use manually. At least one NDB3 address must be attached to the operating system. Additional MSCF-class controllers are detected by the NDB3 controller. Additionally, the alternate NDB2 address is located at the standard NDB2 address.

3.5.3.2

RXX-IIM Operating Systems (V4.0 and Above)

Partioning statement.

Modifying the System Start-up command file to include the disk.
The standard vector address for MSCP controllers is 134. The vector for

```
134,172150,3,4:return
```

don't return 0.[134, 172150, 3, 4][4, 4] * 

Indicate controller.

Two DU-type controllers. The dialogue uses two controller, one for controller 0 and once for controller 1. Because we have specified

```
indicate controller.
```

one for controller 0 and once for controller 1, the group is asked twice. You

```
the first question requires information about the controller's interrupt
```

those devices.

When you respond to the device question, SYSCEN asks questions on

```
when you reach the PERIPHERAL OPTIONS section, SYSCEN asks you
```

questions that pertain only to the MSCP devices on your system. Unless

```
you indicated that you have two
```

MSCP-class controllers. In response to the question regarding device, indicate that you have two

```
if you want to override autocofiguration results [Y/N]:
```

Operating Systems, Device and Vector Addresses
6. SYSCON then asks you to specify the type of disk drive(s) on each controller.

Information is not required to install the UDD.

<table>
<thead>
<tr>
<th>RA series</th>
<th>R/C25</th>
<th>R/D3</th>
<th>R/D2</th>
<th>R/D1</th>
<th>RX50</th>
</tr>
</thead>
</table>

The RX52 has both fixed and removable hard media; count an RX52 as two drives.

The following types of disk drives can be attached to DEC MSCP:

- RAID-7, RAID-8, and RAID-9.
- SOME CONFIGURATIONS SPECIFY ONE PHYSICAL DRIVE INTO TWO LOGICAL DRIVES.
- SPECIFY A LOGICAL ARRANGEMENT FOR THE UDD33 MSCP-CLASS SUBSYSTEM.

When you select a configuration, you are also selecting an interface. When you select a configuration, you are also selecting the number of physical disk drives that you are attaching to the UDD33. You are taking into account the number of physical disk drives that you have selected for the UDD33, or on the number of drives that are already attached to a DEC MSCP controller.

The number of DU-type disk drives depends on the configuration that is used to assign logical addresses. See Appendix A for a description of the DU algorithm.

The standard NUBUS bus address for MSCP controllers is 72150.
Installing Multiple MSCP Controllers

If you have only one UDP3, install it at the standard address (772150) and use the alternate MSCP controller to configure the system. During the installation process, connect the first controller at the alternate address. When you have completed the installation, use the alternate controller to configure the system.

3.5.4.2

Installing a Single MSCP Controller

If your initial system configuration includes two MSCP controllers, connect the

3.5.4.3

RSX-11M PLUS Operating Systems (v2.2 and above)

7. Complete the SYSCEN procedure according to DEC documentation.

For the UDP3, indicate that you have one RAS1 for each logical disk.

For the DEC MSCP controller, indicate the appropriate peripherals.

Operating Systems, Device and Vector Addresses
5. When you are asked to specify the number of MSCP-type devices, the system asks:

```
6. Give the total number of MSCP disk drives (on all controllers) installed on your system.
```

6. Answer appropriately:

```
7. When you are asked to specify the number of MSCP-type devices, the system asks:
```

7. Answer appropriately.

8. Select the add a device section of SYSCON:

```
4. Select the add a device section of SYSCON:
```

4. Select the add a device section of SYSCON.

9. Do you want to do any individual sections:

```
3. To indicate that you want to execute a specific module of the SYSCON procedure, answer Y (yes) to this question:
```

3. To indicate that you want to execute a specific module of the SYSCON procedure, answer Y (yes) to this question.

10. Do you want to continue a previous SYSCON:

```
2. To indicate that you want to do a subset of the SYSCON procedure, answer N (no) to the following question:
```

2. To indicate that you want to do a subset of the SYSCON procedure, answer N (no) to the following question.

11. Do you want to do a complete SYSCON:

```
1. Invoke SYSCON.
```

1. Invoke SYSCON.

Procedure describes the add a device process (user input is in boldface print).

If you are adding the second MSCP controller to the system configuration, use the following option of SYSCON or a complete SYSCON. The following is one question for each type of controller that is installed on your system. There is one question for each type of controller that is installed on your system.

The questions that SYSCON asks pertain to the type and number of devices. You must answer each question with a number that specifies the number of devices of the appropriate type. You must answer each question with a number that specifies the number of devices of the appropriate type.

You all of the questions in the Choosing Peripheral Configuration section. You must answer each question with a number that specifies the number of devices of the appropriate type. You must answer each question with a number that specifies the number of devices of the appropriate type.

Which sections would you like to do?

Which sections would you like to do?
6. Enter the vector address for each MSCP controller.

Enter the vector address of DU:

- Enter the vector address for each MSCP controller.

Primary controller and for the alternate controller.

As those reported by the controller during initialization. Use a for the
numbers specified for each controller must be the same.

Additionally, the MSCP until numbers must be convictions. In
strings, in sequence the MSCP until numbers do not tolerate

This question is asked as many times as the number of MSCP drives that

... [ R:1-1 ]: Arent

To which DU controller is D0: connected?

SYSCEN then asks you to specify controllers per disk drives.

as two drives.

The RSC2 drive has both fixed and transportable hard media; count an RSC2

RA series
- RSC2
- RDC2
- RDC3
- RDC1
- RDC0

controllers.

The following types of disk drives can be attached to DEC MSCP

and 4;)

where when you program the UD33's MSCP (see subsections 4.7, 4.8

management easier. You determine the configuration of each SMD disk

configuration split the physical drive into two logical drives to make the

speaking a logical arrangement for the UD33 MSCP subsystem. Some

UD33's spindle interface. When you select a configuration, you are also

account the number of physical disk drives that you are attaching to the

When you select a configuration for the UD33, you are taking into

any DEC MSCP controllers.

The answer to this question depends on the configuration that you have

Operating Systems, Device and Vector Addresses
VMS supports VSCP controllers at the standard address, 772150H, and in systems (V3.2 and above).

VMS Operating Systems (V3.2 and above)

and adequate for most applications. For response times are reasonable
RSM-IIM-PLUS supports up to eight response time. The value you

[d 1:1.8 d 1:4] [receive]
* Enter the number of response times for each RSC controller.

10. Specify the number of response times for each VSCP controller.

Reasonable and adequate for most applications. For command times are reasonable
RSM-IIM-PLUS supports up to eight command times. The value you

[d 1:1.8 d 1:4] [receive]
* Enter the number of command times for each RSC controller.

10. Specify the number of command times for each VSCP controller.

assigning loading addresses.
Space. See Appendix A for a description of the DFC algorithms for
Recommend that the second unit be located in loading CSR address

10 R:16000-177700 D:712150
What is its CSR address?
* Enter the CSR address for each VSCP controller.

9. Enter the CSR address for each VSCP controller.

Appendix A for a description of DFC's algorithms for assigning loading
Any unused vector between 300H and 74H can be allocated. See
A second unit should be allocated from loading vector address space.
The standard vector address for VSCP controllers is 154H. The vector for
DEVI(s) DEVICE
DEVI(s) M0.2 RETURN
DEVI(s) M0.2 RETURN

MSCP class controllers under VMS is UDPA.
LUNBus name at the DEVI prompt for the device name for
Specify the LUNBus devices to be installed by typing their

DEVI(s)

CONFIGURE RETURN

Expect for a particular device type, execute the CONFIGURE command:

3. To determine the LUNBus addresses and vectors that autoconfigure

To re-install with your UD33,

(assuming the address vectors (assuming vectors (greater than 300)) that you plan
LUNBus. Make a note of these other devices with houting addresses
SYSCEN Iss by logical name the devices already installed on the

Figure 3-3. Sample SHOW CONFIGURATION

Note: All addresses and vectors are expressed in octal notation.

Position address of vector

<table>
<thead>
<tr>
<th>Name</th>
<th>User</th>
<th>LUNBus</th>
<th>CSRs:</th>
<th>Vectors:</th>
</tr>
</thead>
<tbody>
<tr>
<td>CSR: 760400</td>
<td>Vector: 3</td>
<td>000</td>
<td>Vectors: 200</td>
<td></td>
</tr>
<tr>
<td>CSR: 760100</td>
<td>Vector: 3</td>
<td>000</td>
<td>Vectors: 300</td>
<td></td>
</tr>
<tr>
<td>CSR: 721200</td>
<td>Vector: 15</td>
<td>000</td>
<td>Vectors: 0</td>
<td></td>
</tr>
</tbody>
</table>

SHOW/CONFIGURATION RETURN

2. Obtain a list of devices already installed on the VAX LUNBus by typing:

SYSCEN > PROMPT indicates that the utility is ready to accept

SYSCEN

RUN SYSCEN:SYSCEN RETURN

1. Log in to the system manager's account. Run SYSCEN utility:

The following procedure tells how to use VMS SYSCEN to determine LUNBus
addresses and interrupt vectors.

Appendix A for a description of the algorithm used by SYSCEN to determine
If you do not have access to a running system, you must determine the LUNBus
addresses, Device and Vector Addresses
SYSGEN.

CONNECT statements as described in the DEC documentation on VMS.

If you want to select a nonstandard address for the UD33, that is, one

that differs from the address selected by the CONFIGURE command, you

must enter this address on the CONNECT statement in the SYSCONFIG.COM file that is in

USERLIB. For example, you can enter:

CONNECT 1234567890123 3

After entering this statement, write a configuration program that

installs the device with the specified address.

6. Complete SYSGEN according to the DEC documentation.

as described in sub-section 4.3.1.

The address given for the UD33 (lowest numerical address) into the board

is assigned by the manufacturer's documentation. For the UD33, program

space. Program the highest addresses into non-normal devices as

specified in the diagram.

Figure 3-4. CONFIGURE command listing.

* Placing address or vector

<table>
<thead>
<tr>
<th>Device</th>
<th>Name</th>
<th>Address</th>
<th>Vector</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACC0</td>
<td>PRI</td>
<td>76000</td>
<td>314</td>
</tr>
<tr>
<td>ACC1</td>
<td>PRI</td>
<td>76001</td>
<td>310</td>
</tr>
<tr>
<td>ACC2</td>
<td>PRI</td>
<td>76002</td>
<td>000</td>
</tr>
<tr>
<td>ACC3</td>
<td>PRI</td>
<td>76003</td>
<td>000</td>
</tr>
</tbody>
</table>

Note: All addresses and vectors are expressed in octal notation.

SYSGEN lists the addresses and vectors of the devices

entered in the format shown in Figure 3-4.

SYSGEN lists the addresses and vectors of the devices

specified in decimal.

Operating Systems, Device and Vector Addresses.
UD339
controller type for each MSCP controller on your system, even if they are all
asks for the specification of a disk controller. You must choose a different

vnda50 vxada50 vxada2 vxada3 disk=0
vnx1 fxn70 fxn1 fxn71 fxn1 fxn1

Disk controller type:

A dialog mode is used to enter various system parameters. The question:
configure the file and then "make" the kernel from this configuration file.
and make a new kernel. Creating a kernel involves the creation of a
Sysexen
a new device to an Ulithx-II kernel, the system program must be run to create

3.5.6.1

controller, and vice versa.
program will not allow specifying an RX1X
RXD2X, RXD3, or RXD3 is specified, the system
will force more than four controllers. When an

A bug exists in version 3.0 that prevents actually

NOTE

rxix
rx1
rx2
rx3
disk name
device
name
controller
name
RXD1
RXD2
RXD3
RXF1
RXF2
ULH30

choices are:
there is, for example, one UDA50 controller and one RXD1 controller. The
for two MSCP controllers, the system generation procedure must be told that
controllers, but only one of each type of controller. Therefore, 2 is also supported
The Ulithx-II version 3.0 system supports up to a total of four MSCP disk

3.5.6

 NOTE

Ulithx-I1 Operating Systems (V3.0 and above)

Operating Systems, Device and Vector Addresses
Special Files

These special files exist in the account "dev".

Block mode. These special files exist in the account "dev". One is associated with a device, one for use with character mode, and the other for communication with that device. Some devices will have two special files. Each device (and each partition for disks) on the system in order for Linux to recognize a corresponding driver for that device. These must be a special file for each device. These files contain pointers into a system table that lists the entry for each device. Linux operating system communicates with devices on the system by use of these files.

3.5.2

The default for the CSR and vector address will always be 172150 and 172150.

CSR address 172150

Vector address 172150

The next two questions refer to the controller's CSR and vector addresses:

Supplied names for each drive you have connected to each controller.

Drive 0 type
Drive 0 type
Drive 0 type
Drive 0 type

峡dxl/2/3 or nuxl
Nexx ystem Questxon

Disk Controller Type

Next System Question

Depending on the controller name specified previously, the next question will be:

Third MSCP Controller Type:
Second MSCP Controller Type:
First MSCP Controller Type:

For each MSCP controller specified, one of the following statements will be printed:

Creating the special files (see below).

number. The same order must also be used when important. The order becomes the controller.

The order in which you enter each controller is very

NOTE

Operating Systems, Device and Vector Addresses
You should always answer "all".

Create partitions < 7 or 31?

If you answer "no", the next question will be asked:

Assume standard disk partitions? [y] or [n]?

For ra, rc, and rd type devices, the next question will be asked:

or assume alternate address.

be booted from must be 0. In addition, the drive to

with the drive's special file in the configuration file. In addition, the drive to

The unit number for each drive (as it is identified by SW1-2 through SW1-4) must

number for the first controller is 0.

The MSCS controller number assigned to each controller is determined by the

The next two questions are:

previously with the syggen program.

each controller. It is suggested that you use the same device names used

e.g., d/j/2/j would be "fd", therefore, you must enter a unique device name for

the special files. For example, the special files for /dev/fd, /dev/rd, and /dev/rd would be

type. Instead, it uses the device name and controller number in order to create

the "ms" program does not understand the notation for different controller

device name ( ? for help) (e.g., /dev/rd/0 or /dev/rd/1)

Use the "c" command to create the special files.

Command "create ext2 remove table":

The "ms" program will issue the prompt:

/etc/mfst

The special files for Linux-11 are created with the "ms" program (make special

"Planning the installation"

See the Linux-11 system manager's Guide for more information on new facilities.

The "ms" program is used to create the systems on specified partitions. The

"ms" program always answers "all".

Create partitions < 7 or 31?

If you answer "no", the next question will be asked:

Assume standard disk partitions? [y] or [n]?

For ra, rc, and rd type devices, the next question will be asked:

or assume alternate address.

be booted from must be 0. In addition, the drive to

with the drive's special file in the configuration file. In addition, the drive to

The unit number for each drive (as it is identified by SW1-2 through SW1-4) must

number for the first controller is 0.

The MSCS controller number assigned to each controller is determined by the

The next two questions are:

previously with the syggen program.

each controller. It is suggested that you use the same device names used

e.g., d/j/2/j would be "fd", therefore, you must enter a unique device name for

the special files. For example, the special files for /dev/fd, /dev/rd, and /dev/rd would be

type. Instead, it uses the device name and controller number in order to create

the "ms" program does not understand the notation for different controller

device name ( ? for help) (e.g., /dev/rd/0 or /dev/rd/1)

Use the "c" command to create the special files.

Command "create ext2 remove table":

The "ms" program will issue the prompt:

/etc/mfst

The special files for Linux-11 are created with the "ms" program (make special
The following example of a configuration file shows two controllers, the first with two drives, the second with one:

```
DevName       Device       DevType  BusNum  Slot    Vendor  Model  Size     Status  Rank    DevType  BusNum  Slot    Vendor  Model  Size     Status  Rank
S2E1          0             0        0       0       0       0       0         0       0       0       0       0       0       0         0       0
S1E1          0             0        0       1       0       0       0         0       0       0       0       0       0       0         0       0
```

The following example shows the device's specifications in the configuration file:

```
DevName       Device       DevType  BusNum  Slot    Vendor  Model  Size     Status  Rank    DevType  BusNum  Slot    Vendor  Model  Size     Status  Rank
S2E1          0             0        0       0       0       0       0         0       0       0       0       0       0       0         0       0
S1E1          0             0        0       1       0       0       0         0       0       0       0       0       0       0         0       0
```

**NOTE:**

```
# dd if=/dev/sda1 of=/dev/zero
```

A new boot strap can be copied onto a new system disk with the `dd` program.

**Copying a Boot strap**

Once a device is configured into your current kernel, you can copy an existing volcopy.
When Linux-2.4 finds a device at autoloopdir that prints a message as

follows:

device is not present. Linux will skip it.

If the configuration file, if not be configured into the running system. If the
booted module, configuration file. If the device was not included in the
autoloopdir. Linux-2.4 attempts to autoloopdir the devices included in the

At boot time, Linux-2.4 attempts to autoloopdir the devices included in the

Autoconfigure

configuration file, and you choose the logical name raq and raf for your disks.

This example assumes that you have already added the device into the

```
% /dev/MAXEDF raq raf
```

with the command to the system. An example for two disks is:

you should use this command to create the special files. You can pass your input to the program "mkfs" to create the special files.

```
% /dev/MAXEDF device
```

There is a small script called "MAXEDF" (uppercase important) on the Linux-32

To help build these special files, The format of this command is:

There are special files that exist in the account /dev/

These special files exist in the account /dev/

block mode. These special files exist in the account /dev/

These special files exist in the account /dev/

The Linux operating system communicates with devices on the system by the use

The Linux operating system communicates with devices on the system by the use

Special Files

number two regardless of the units on the first controller.

In this example, the first unit on the second controller must be MSCD device

```
disk at /dev/dvdr 2

vector:

controller udev at udev ctrl 0, dev 0
```

```
disk at /dev/dvdr 1

vector:

controller udev at udev ctrl 1, dev 0
```

```
disk at /dev/dvdr 0

vector:

controller udev at udev ctrl 0, dev 0
```

Operating Systems, Device and Vector Addresses
Planning the Installation

3.5.6

Default Partition Modifications

When DEC reconfigured the Berkeley 4.2 Unix system to create Unix-25(m) they

Each time the disk is initialized,

In the default driver, this would eliminate the need for editing the partition table.

It is also possible to modify the default PAAG partition size table, which is stored

3.5.7.6

Disk Partition Modifications

The operating system initializes the disk's partition table with the first PAAG

When a disk is initialized or reinitialized, the "chip" command allows a system

3.5.7.5

Disk Partitions

This allows the partitioning system to use entire disks.

Several Unix systems reside on the same disk. One-like partitioning lets

Disk partitions were created because the first Unix operating systems could

3.5.7.4

Disk Partitions: Device and Vector Addresses

Each disk has a partition table that defines the starting location and size (both in

This allows a user to logically subdivide a disk into sections called "partitions",

Disk Partitions were created because the first Unix operating systems could

Disk partitions were created because the first Unix operating systems could not

To access any a limited amount of space on large disks. Disk partitioning lets

Disk partitions were created because the first Unix operating systems could not

Disk partitions were created because the first Unix operating systems could not

Disk partitions were created because the first Unix operating systems could not

Disk partitions were created because the first Unix operating systems could not

Disk partitions were created because the first Unix operating systems could not
For more information on disk partitioning and modifications to the partition
system disk for a swap file.
If you plan to use your own partition values, be sure to allocate an area on your
swapped in the disk. The Unix-2.2.x systems use partition "p" for the swap file.
Partition important data can not be overwritten when data from memory is
operating system. By mounting the swap space, for example, on its own
There are certain areas of the disk which, by default, are reserved for the

suggested warnings:

3.5.7.8

The above indicates the end of the disk.

The program looks up information in the file "etc/diskid" on the disk specified by the system.
It

NEWS

The program receives the creation of a file system on a partition. It


Operating Systems, Device and Vector Addresses
The "diskpart" program was not included on the
Unix-32m V1.1 distribution kit.

The Unix-32m V1.0 did not support self-sizing disks.

NOTE

Partitions

The following is a table defining the Berkeley defaults:

- "diskid" file creates a template based on the default rules used at Berkeley.
- The program "diskpart" is used to create entries for the disk driver for the
  Operating Systems, Device and Vector Addresses

<table>
<thead>
<tr>
<th>Partition</th>
<th>20-60 MB</th>
<th>61-205 MB</th>
<th>206-355 MB</th>
<th>356+ MB</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>end</td>
<td>end</td>
<td>end</td>
<td>end</td>
</tr>
<tr>
<td>307200</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>55936</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>15884</td>
<td>7</td>
<td>8</td>
<td>9</td>
<td></td>
</tr>
</tbody>
</table>

Partitions occupying whatever space remains after allocation of the fixed sized
total. The "e", "f", and "g" partitions are variable sized.

The "f" partition is by convention, used to access the entire disk. In

normal operation, either the "g" or "h" partition is used, or the "c", "d", 
and "e" partitions are unused.
Subsystem Configuration

This section recommends reading the Installation Section before beginning. If you are unfamiliar with the subsystem installation procedure, follow the lectures below to serve as an outline of the procedure.

<table>
<thead>
<tr>
<th>Operation</th>
<th>Subsection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Drive Configuration Parameters</td>
<td>4.10</td>
</tr>
<tr>
<td>F. R. D. Option</td>
<td>4.9</td>
</tr>
<tr>
<td>NOVRAM Loading, Disk Formatting, and Testing</td>
<td>4.8</td>
</tr>
<tr>
<td>Cable Preparation</td>
<td>4.7</td>
</tr>
<tr>
<td>Physical Installation</td>
<td>4.6</td>
</tr>
<tr>
<td>Disk Controller Setup</td>
<td>4.5</td>
</tr>
<tr>
<td>Inspection</td>
<td>4.4</td>
</tr>
<tr>
<td>Overview</td>
<td>4.1</td>
</tr>
</tbody>
</table>

The subsection titles are listed below to serve as an outline of the procedure.
### Figure 4-1: U3D3 Configuration Reference Sheet

#### U3D3 Configuration

<table>
<thead>
<tr>
<th>Drive 1</th>
<th>Drive 2</th>
<th>Drive 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>16: Serial Offset</td>
<td>16: Serial Offset</td>
<td>16: Serial Offset</td>
</tr>
<tr>
<td>15: Cylinder Offset</td>
<td>15: Cylinder Offset</td>
<td>15: Cylinder Offset</td>
</tr>
<tr>
<td>14: Cylinders 2</td>
<td>14: Cylinders 2</td>
<td>14: Cylinders 2</td>
</tr>
<tr>
<td>13: Cylinders 1</td>
<td>13: Cylinders 1</td>
<td>13: Cylinders 1</td>
</tr>
<tr>
<td>12: Cylinders 0</td>
<td>12: Cylinders 0</td>
<td>12: Cylinders 0</td>
</tr>
<tr>
<td>11: Removable Media</td>
<td>11: Removable Media</td>
<td>11: Removable Media</td>
</tr>
<tr>
<td>9: Configuration Bits</td>
<td>9: Configuration Bits</td>
<td>9: Configuration Bits</td>
</tr>
<tr>
<td>8: Arrayed Cylinders</td>
<td>8: Arrayed Cylinders</td>
<td>8: Arrayed Cylinders</td>
</tr>
<tr>
<td>7: Spare Sections</td>
<td>7: Spare Sections</td>
<td>7: Spare Sections</td>
</tr>
<tr>
<td>6: Cylinders Heads</td>
<td>6: Cylinders Heads</td>
<td>6: Cylinders Heads</td>
</tr>
<tr>
<td>5: Section/Track</td>
<td>5: Section/Track</td>
<td>5: Section/Track</td>
</tr>
<tr>
<td>4: Head Cylinders</td>
<td>4: Head Cylinders</td>
<td>4: Head Cylinders</td>
</tr>
<tr>
<td>3: Type Code</td>
<td>3: Type Code</td>
<td>3: Type Code</td>
</tr>
<tr>
<td>2: Number Units</td>
<td>2: Number Units</td>
<td>2: Number Units</td>
</tr>
</tbody>
</table>

#### Drive Parameters:
- Model:  
- Manufacturer: (3)  
- Drive Manufacturer: (2)  
- Drive Manufacturer: (1)  
- Drive Manufacturer: (0)  

#### Other MSCP Parameters:
- Type:  
- Version:  
- Host computer operating system:  
- Host computer type:  

#### General Information
RFI to escape can be allowed.

When the UDDS installation is complete, no gap in the shield that would allow nothing must be done that would reduce this shield's effectiveness. That is, with a grounded metal shield (earth ground), during installation of the UDDS, components that generate RF could conduct radio-frequency interference (RFI) to limit radiated interference. DEC completely encloses the components of its

Mounted in a separate cabinet:

With the UDDS mounted in the CPU cabinet and the SMU drives

With both the UDDS and the SMU disk drives mounted in

Peripheral can be installed:

The are two possible configurations in which the UDDS and its associated SMU

Class A limits:

When properly installed, the UDDS does not cause compliant computers to exceed the limits set for shielded and conducted interference. When computers with RF Class A limits for shielded and conducted interference meet DEC intelligent Disk Controller with DEC computers that

including FCC Class A Compliance

Figure 4.2: Switch Setting Example

<table>
<thead>
<tr>
<th>1</th>
<th>1</th>
<th>1</th>
<th>0</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Switch Setting Table

Set to the code shown in the switch setting example. The two DIP switch types used in this product are shown in Figure 4.2. Each is

closed (0) to indicate the OFF (open) position.

dedicated (1) to indicate the ON position.

DIP Switch Types

Overview
Disk Controller Setup

4.3

Sealed.

Follow the instructions on the configuration switches referenced in the following paragraph.

SWS.

In settings into the chassis, these steps are made by option switches SW1 and SW2.

Several configuration setups must be made on the UDD3 Disk Controller before.

ND33 Disk Controller Inspection

Sealed.

Examine all socketed components carefully to ensure that they are properly seated.

or physical damage.

as part of broken connector pins, damaged components, or any other evidence of physical damage. Check for such items.

Sealed.

Examine all socketed components carefully to ensure that they are properly seated.

or physical damage.

as part of broken connector pins, damaged components, or any other evidence of physical damage. Check for such items.

Unpack the UDD33 subsystem and, using the shipping invoice, verify that all items are included in the container.

Accordingly with instructions on the form included in the container, any obvious damage to the container, or indications of actual or probable equipment damage, should be reported to the carrier company to avoid any potential damage. Immediate action should be taken for evidence of possible damage incurred during shipping. Container should be inspected for evidence of possible damage incurred during shipping. Container should be inspected for evidence of possible damage incurred during shipping.

EMC products are shipped in special containers designed to provide full protection under normal transport conditions. Immediately upon receipt, the equipment must be returned to the customer."
<table>
<thead>
<tr>
<th>Section</th>
<th>Function</th>
<th>Switch</th>
<th>Fact</th>
<th>ON(1)</th>
<th>OFF(0)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.3.4</td>
<td>Reserve</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Index and Sector</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-10</td>
</tr>
<tr>
<td></td>
<td>Adapter DMA</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4.3.3.2</td>
<td>DMA burst delay</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-9</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-8</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-7</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-6</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-5</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-4</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-3</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-2</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>NUBUS address</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>S2-1</td>
</tr>
<tr>
<td>4.3.1.1</td>
<td>Loop on Self-Test Error</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4.3.3.1</td>
<td>MSCP Device Number (MSB)</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4.3.3.1</td>
<td>MSCP Device Number (LSB)</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
<tr>
<td>4.3.3.1</td>
<td>MSCP Device Number (LSB)</td>
<td>OFF(0)</td>
<td>-</td>
<td>-</td>
<td>0</td>
</tr>
</tbody>
</table>

**Table 4-1. UD33 Switch Definitions and Factory Configuration**

Most UD33 disk controller applications use the factory configuration switch settings as representative of the UD33 controller. The factory configuration switch settings are representative of the system running is likely to crash the system. Restoring the controller with the system running is likely to crash the system. If you toggle SW1, be sure the system is offline. Restoring the controller with the system running is likely to crash the system. To reset the UD33, either toggle switch SW1. ON indicates that the controller is active. System initialization sequence reads the codes established in the switch settings and NOVRAM. If you change configuration values in NOVRAM, you must also reset the UD33 so that the new configuration is loaded in NOVRAM.

**NOTE**
### Table 4-3. Controller Address Switch Settings

<table>
<thead>
<tr>
<th></th>
<th>760320</th>
<th>760314</th>
<th>760410</th>
<th>760414</th>
<th>760420</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4-3 is an Appendix A.

Section 3 and Appendix A.

For more information on determining the UNIBUS addresses, see switches SW2-3 through SW2-6. See Table 4-3 for Register address switch settings. The address for the first of the UDD3 and two UNIBUS registers is selected by dip switches.

MSCP-class disk controllers.

Sequentially from a starting address assigned to that controller, in this case an UNIBUS bus. Every UNIBUS I/O device has a block of several registers through which the device communicates and monitors the disk drive. The registers are addressed via the UNIBUS address bus.

### Disk Controller Bus Address

<table>
<thead>
<tr>
<th>Disk Controller Bus Address</th>
</tr>
</thead>
</table>

### Table 4-2. Jumpers Definitions and Factory Configuration

<table>
<thead>
<tr>
<th>Must be In</th>
<th>OUT</th>
<th>IN</th>
<th>Enable Clock</th>
<th>Factory Test (Test)</th>
<th>32K PROM Select</th>
<th>FACT</th>
</tr>
</thead>
<tbody>
<tr>
<td>FACT</td>
<td>IN</td>
<td>OUT</td>
<td>Disable Clock</td>
<td>Normal Operation</td>
<td>IOK PROM Select</td>
<td>JUMPER</td>
</tr>
</tbody>
</table>

Table 4-2 lists the function and factory configuration of all jumpers on the

Disk Controller Setup.
Example 4.1:

Your system operates under R5X-MP PLUS and has two U333 disk controllers. Table 4.3.1.1 contains an alternative base for U333.

First logical unit number for an alternative U333

If your U333 is installed at an alternative address, check with your operating system.

 Functions of these switches are dependent on the option you select for your system. See subsection 4.3.3.4.4 for a discussion of byte addresses.

4.3.2

4.3.3

4.3.4

4.3.1.1

Address may be drive 0 through 7.

The Interrupt vector address for the U333 is programmed into the device by the user. These U333 switches SW1-2 through SW1-4 specify MSCP device numbers, SW1-5 through SW1-8 have no alternate U333. The MSCP device number identifies the MSCP device number of the first drive supported by the U333, MSCP device number may vary by DE operating system. Table 4-4.

Alternate U333: The first drive supported by the U333 at an alternative address

USB: D33:

Features are selected by physically installing the option on the P5CA or by enabling the option using a switch.

There are other U333 options that can be implemented by the user. These options are described in subsection 3.5.

For a discussion of byte addresses, see subsection 4.3.3.4.4.
Reenable the bus, then perform another DMA burst transfer.

Adaptive DMA is disabled, the UD33 is enabled, and the UD33 is not configured to use DMA. If the UD33 is not configured to use DMA, the UD33 aborts the DMA request and sends the host an abort request. When adaptive DMA is enabled, the UD33 monitors the PDP-11 bus for other pending DMA transfers and suspends its own DMA activity to

4.3.3.3

Adaptive DMA Mode

<table>
<thead>
<tr>
<th>SW2.1</th>
<th>SW2.0</th>
<th>SW2.7</th>
<th>SW2.6</th>
<th>SW2.5</th>
<th>SW2.4</th>
<th>SW2.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Depending on the other devices on the bus and their priority, the UD33 may use an

4.3.3.2

DMA Burst Delay

<table>
<thead>
<tr>
<th>Device Number</th>
<th>Starting MSCP</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>

UD33 at an Alternate Address

MSCP Device Number for the First Drive Supported by a

This example would also apply if the first MSCP controller were a DEC MSCP

Disk Controller Setup
Slot Selection

4.4.2

System Preparation

4.4.1

Physical Installation

4.4

Performance of the controller:

SW2.9 in the OFF position will aid optimal
sector signal is on the A cable, therefore, leaving
SW2.9 in the OFF position will not function correctly unless the index and

NOTE

<table>
<thead>
<tr>
<th>Off</th>
<th>A cable</th>
<th>B cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Factory Switch SW2.9

The index and sector pulses on the A cable or B cable.
The UD33 uses switch SW2.9 to determine whether the controller will look for

Index and Sector

4.3.3.4

Physical Installation

Switch

<table>
<thead>
<tr>
<th>Off</th>
<th>A disable DMA</th>
<th>B disable DMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>ON</td>
<td>OFF</td>
<td>OFF</td>
</tr>
</tbody>
</table>

Switch SW2.9
4. Find the appropriate row of pins. As the enlargement shows, each number corresponds to the desired pin.

3. Offset from the row on either side. Is labeled A through Y, excluding C, O, and Q. Also, each row of pins is wider, as the enlargement shows.

2. Find the appropriate card slot. In Figure 4-4, the card slots are numbered 1 through 9 from right to left. The column of pins shown in the socket is listed to left. The column of pins shown in the socket corresponds to card slot 7. Note that each card slot is four pins wide, as the enlargement shows.

1. Find the appropriate socket (in this case C). The sections of pins are lettered sequentially, beginning with A and proceeding to F.

To find the NPC Signal Jumper on the DDI-12 card, use the following procedure:

- Jumpers are located in about the center of the card backplane. Locations are defined by a series of numbers and letters that show pin numbers (indicated by binary numbers). The NPC signal jumper is visible for each of the sockets on the backplane. The binary numbers on the backplane are used to identify pin locations. Figure 4-4 shows a DDI-12 card backplane.

The NPC signal jumps through the DDP module. The Nonprocessor Grant (NPC) jumper on the DDP card slot must be removed to allow the controller to trip the cards in which the controller is being initialized.

The Nonprocessor Grant (NPC) Jumper

NOTE

Physical Installation
Grains: It can be ordered from Emplex using part number ZU1110812.
Number (71773) jumper all front signals (interrupt base and no processor) vacated by the module. The dual-width front continuity module (DEG part) insert a dual-width front continuity module into connectors C and D of the slot.
If the UDD is removed from the backplane, either reconnect the NGP jumper or
over the end of the pin fascinated. Later location.
Once you have located the jumper, cut it. Spill a small piece of insulation
The wire-wrap jumper between CA4-CB1 is the bottom-most wrap on the pair.
In summary: For the seventh card slot, pin CA1 refers to the fourth socket from

**Figure 4-4. NGP Jumper Location**
Sectioning

Example (by using the drive start switch): the drives can be powered up and down individually (to change disk media, for example) by using the drive start switch. When the CPU is powered up, all the drives are powered up at once. When the CPU is powered down, the drives become ready. When the CPU is powered up, the drive spin up sequentially.

The local/remote switch controls whether the disk drive can be powered up from the drive (local) or from the controller (remote). Press the switch in the REMOTE position. With the CPU powered down, press the switch in the REMOTE position. Without the CPU powered up, the start LED will light but the drive will not spin up and the disk drive is in the ready state.

Local/Remote

To be accurately judged, installation of the UDD33 drives must be configured according to the manufacturer’s instructions.

Drive Placement

In plug or address selection switches property configured.

SMD Disk Drive Preparation

The extractor handle is part of the board’s guides before attempting to seat the board by means of the extractor handle. Ensure that the board is properly positioned in the card edge connector in the correct direction per the CPU and other modules.

The UDD33 disk controller should be plugged into the PDP-11 backplane with the extractor handle.

Mounting

SMD Drive Preparation
If both the controller and the peripheral are installed in the same cabinet, then

you need only replace the shields that you have removed to keep the computer

built into FCC-compliant DEC cabinets.

As noted in subsection 4.1.3, cabling has a direct effect on the moment of

Tables 4.5 and 4.6 list cables offered by Bimux for the UD33. Figure 4.5 shows

(7.5 meters). In each supported disk drive, Maximum cable length for the B cable is 25 feet

UD33 and its drives. You must take steps to preserve the integrity of the shield
electromagnetic interference radiated by a computer system. When installing the

basic cable installation. To prevent excessive EMI, DEC surrounds its computers

with a grounded metal shield. These shields are built into the computer cabinet.

The UD33 Disk Controller Interfaces with each SMU disk drive that it controls via

4.6

Cabling

B Cable.

Wire the UD33 supports SMU drives that provide the index and sector pulses on

Index and Sector Signals

Cards. Consult the appropriate drive manual for the exact procedure.

DEC drive addresses are selected by means of an ID plug. Drives from other

The address given to the drive.

An address from 0 to 3 must be selected for each drive. Be careful that no two

Drive Numbering
Table 4-5. Unshielded Cables

Available cables:
- Shielded makes unshielded A and B cables in several lengths. Table 4-5 lists the necessary to shield the A and B cables that connect the subsystems. When the UD33 and its UD3 drives are installed in the same cabinet, it is possible that the cabinet itself provides sufficient shielding. In such cases, it is not necessary to shield the A and B cables that connect the subsystems.

NOTE

Installing the UD3 drives described in Subsection 4.6.7,):
- Ensure that the cables comply with the requirements for installation of UL and IEC/PURF cables.
- Ensure that the cables comply with the requirements for installation of UL and IEC/PURF cables.
- Ensure that the cables comply with the requirements for installation of UL and IEC/PURF cables.

The following paragraphs describe the installation of the UD3 drives.

In all cases, it is necessary to keep RF interference:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.

If the controller and disk drives are contained in separate cabinets, then keep the following:
- Install the UD33 and its UD3 drives in separate cabinets, then install the UD34 and its UD4 drives in separate cabinets.
1. Look at the header at either end of the B cable. Find the molded-in arrow that identifies pin 1 of the connector.

2. Find the arrow that is molded into connector 1 on the UD33. Align the arrow on the cable header with the connector arrow and press the header into the connector. Make sure that the locking tabs on the connector are flush with the sides of the cable header. Align the arrow in the cable header with the molded-in arrow on the connector. Most SMD drives have two plug-in interfaces to allow easy clamplike use either. Align the drives.

3. Find the molded-in arrow on the cable header at the other end of the B cable. Align the arrow on the cable header with the connector arrow and press the header into the connector.

4. Fully flush with the sides of the cable header.

5. Insert the A cable terminator (supplied with the drive) on the second A-cable connector of the last drive.


To cable the subsystem, see Figure 4-5 and use the following procedures:

(714) 662-5600 1WM X 910-595-2521
Costa Mesa, CA 92626
345 Harbor Boulevard
Emulex Customer Service

The items listed in Table 4-5 can be ordered from your Emulex sales representative or directly from the factory. The factory address is:
NOTE

Error conditions generally result in marginal operation with random failure to observe proper signal grounding methods.

Because each subsystem is unique, it is impossible to predict which method will work best for each. Be aware that some experimentation may be required.

Because each subsystem is unique, it is impossible to predict which method will work best for each. Be aware that some experimentation may be required.

For most applications, connect the drive chassis and logic grounds (ac and dc) between the drive, then connect it to the CPU.

Another option, though a less desirable one, is to daisy-chain a ground wire.
ordered from your Fiduem sales representative or directly from the factory. Accessories and describes their application. The items listed in Table 4-6 can be
accessories and describe their application. The items listed in Table 4-6 can be
of cable I/O adapter panels. Table 4-6 gives the part numbers of these
The cables are available in various lengths, and there are several different types

Cabinets. shielded cables are run between mainline and ground, the shield of the cabinet shield. Shielded cables are run between
Cable I/O adapter panels. Extension cables connect the controller (or drive) with the cabinet adapter.
Extension cables connect the controller (or drive) with the cabinet adapter.
Extrude makes extension cables, cable I/O adapter panels, and shielded cables
Shielded because they run outside the shielded cabinet environment.
Controller, then the A and B cables that connect the drives to the UDD3 must be
If the disk drives are mounted in a separate cabinet from the UDD3 disk

Separate Cabinets

Cabins
The rack-mount panel is shown in Figure 4-7.

Holds two cables, I/O adapter, and mounts in any standard 19-inch rack.

If there is no I/O bulkhead in the cabinet, Item 6, the rack-mount panel is built into most ECE-compatible DEC CPU expansion cabinets. See Figure 4-7.

The cable I/O adapter panels are designed to fit directly into the I/O bulkhead.

<table>
<thead>
<tr>
<th>Freestanding adapter (optional)</th>
<th>2-3</th>
<th>NA</th>
<th>NA</th>
<th>Adapter Panel Kit</th>
<th>7</th>
</tr>
</thead>
<tbody>
<tr>
<td>2-4 SM-B-Cable</td>
<td>12</td>
<td>10</td>
<td>8</td>
<td>Cable, Extension</td>
<td>5</td>
</tr>
<tr>
<td>2-4 SM-B-Cable</td>
<td>6</td>
<td>4</td>
<td>2</td>
<td>Cable, Extension</td>
<td>3</td>
</tr>
<tr>
<td>2-4 SM-B-Cable</td>
<td>3</td>
<td>1</td>
<td>2</td>
<td>Cable, Shielded</td>
<td>1</td>
</tr>
</tbody>
</table>

Table 4-6. Shielded Cables and Cable I/O Adapter Panels
Expansion cabinet to the RETMA rack or the first free-standing drive.

Select a shielded cable that is long enough to reach from the CPU or drives.

9.

Those parts are to have a drives attached to them.

and press the header into the connector. Repeat this step for J2, J3, and J4.

and point the arrow with the corresponding arrow in connector J1.

Find the arrow that is molded into the female cable header of the extension.

8.

to the cable I/O adapter panel in the CPU or expansion cabinet.

and point the header into the connector.

Select an extension B cable that is long enough to reach from J1 of the UDB3.

7.

Select an extension A cable that is long enough to reach from J2 of the UDB3.

6.

Cable adapter kit in each of the drive cabinets (Figure 4-9).

Install a rack-mount panel in the RETMA rack (Figure 4-8) or peripheral.

5.

Present above or below the cable I/O adapter panel.

Tighten the screws finger-tight. Make sure that no gaps are

Install a cable I/O adapter panel in a central opening in the rear.

3.

Install the UDB3 disk controller in an appropriate CPU bus slot.

2.

Open the rear bulkhead door of panel or the equipment cabinet.

1.

Consult the illustrations for details.

Cabling procedure that follows is identical to that for use with either

These two configurations are shown in Figures 4-8 and 4-9. The

The other configuration, the drives have their own cabinets and are free-standing. 

Cabinet would not concern on a separate cabinet installation at all. In the

There are two possible separate cabinet configurations. In one, the drives are
Figure 4-8. Rack-Mount Drive Cabling Configuration

1. Disk Controller PCB A Enclosure
2. Nonshielded Extension Cable
3. Cable Connector, Extension Cable to Shielded Cable
4. Clamp - Shield of Shielded Cable, Clamp to Shielded Cable
5. Shielded/Unshielded Cable, External to Equipment Cabinets
6. Cable I/O Adapter Panel
7. Cable Connectors, Shielded Cable to Extension Cable
8. Nonshielded Extension Cable
9. Peripherals Device
13. Repeat steps 12 through 12 for each D cable, substituting D cable for A cable.

12. Repeat steps 12 through 12 for each D cable, substitute D cable for A cable.

11. Route one end of the prepared cable through the widest slot in the cable I/O adapter panel.

10. Remove (or loosen) the camming bars on the widest slot of the cable I/O adapter panel.

9.8. In the RETMA rack to the first (lowest) disk drive.

9. Select an expansion D cable that will reach from the cable I/O adapter panel to the farthest disk drive.

8. Select an expansion D cable that will reach from the cable I/O adapter panel to the farthest disk drive.

7. Make sure that the latches on the connector fully engage the cable header.

6. Align the cable arrow with the corresponding arrow on the disk drive.

5. Find the arrow that is molded into the female cable header of the expansion panel.

4. Repeat steps 10 and 11 at the disk end of the cable.

3. Use the following steps for each-Mount configurations.

2. As appropriate and using the narrow slots in the cable I/O adapter panel, insert the shielded cables and press the headers together.

1. After this arrow with the corresponding arrow on the female header cable. Find the arrow that is molded into the male cable header of the expansion bar.

Cabling

Install the cables described in step 5 of subsection 4.6.1. You can use the unshielded cables listed in Table 4-5 to interconnect the drives. Before connecting the first disk drive to the remaining drives as described in step 5 of subsection 4.6.1. You can use the unshielded cables listed in Table 4-5 to interconnect the drives.
End of Procedure

1. Terminiate the cable at the last drive in the daisy chain by inserting a terminator (included with the drive) on the drive's unused A cable.
2. Repeat steps 21 through 29 for the other drives in the subsystem.
3. Connect the extension cable and the shielded cable as described in step 17.
4. Connect the shielded B cable from the controller to the peripheral adapter.
5. Rack to the drive's B cable connector.
6. Connect the extension cables to the shielded cables as described in step 17.
7. Clamp both shielded A cables in the wide section of the peripheral cable adapter.
8. Select an extension B cable that will reach each from the peripheral cable adapter.
9. Select a shielded A cable that is long enough to reach the next drive in the daisy chain.
10. Connect both a cables to the drive's cable connector by matching pin 1 (marked in arrow on cable header) and pressing the header onto the connector.

The Following Steps for Freestanding Drive Configurations

1. Ground of the disk drives.
2. Connect a ground cable from the logic ground of the CPU to the logic ground of the drive.
3. Terminiate the cable at the last drive in the daisy chain by inserting a terminator (included with the drive) on the drive's unused A cable.
4. Repeat step 17 of this procedure for the other disk drives in the rack.
replacement occurs, the BFT values are no longer valid.

BFT replacement must be done before any LBN replacement. Once LBN no longer exists on the drive.

Replacing blocks identified as bad in the LBN format detected when the LBN is read, such as blocks in the file system index (FTI) format or in the LBN format. The LBN format is used in

Identify specific bad blocks to be replaced. In addition, you can identify the

Manual bad block replacement is a separate option. This option allows you to

blocks are replaced automatically.

Blocks are replaced automatically.

Automatic replacement of blanked bad block replacement is a feature of several

protocols enabling blocks.

Manual block replacement operation allows for replacing defective and

Verifying that each logical block is good. F.R.D. supports both automatic and

The steps involved in disk preparation are formatting the drive and then

Your drive parameter values.

The basic application of F.R.D. is in preparing MS-DOS disk drives for use in your

After copy devices connected to a console port.

these utilities allow you to communicate directly with either CR or

supervisor. These utilities allow you to communicate the selected disk

replace defective blocks; and performs initialization of the entire disk

controller the Novell NovRAXM. From the drive, reset the disk surface and

provides several important disk preparation functions, including

The U33 disk controller firmware incorporates a self-contained set of disk

Testing the subsystem.

Formattting and verifying the media.

Loading the drive configuration into the NovRAXM.

After physically installing the U333, several steps are required to prepare the

4.7

NOVRA M Loading. Disk Formattin g, and Testing
In this section, operator responses to F.R.'D.' Prompts appear in bold print. The case, a screen message informs you of the delay.

A delay of 10 seconds may occur between the [CTRL] C and the next display.

A delay occurs during the current operation and returns to the main menu. Required to terminate operator inputs.

Use the following keyboard conventions:

**F.R.'D. CONVENTIONS**

- Option 4. Read Only Test (with replacement disabled)
- Option 3. Verify (with replacement enabled)
- Option 2. Format (using BFT format)
- Option 1. Format

**Section 4.8.**

- Use them in the order they are listed. (F.R.'D. options are described in mean. Each method is described below. The options listed are on the F.R.'D. main

There are several ways you can use F.R.'D. options to format and verify your

NOVRAM loading, Disk Formatting and Testing

5. Deposit UD33 F.R.D. code in the SA register.

   <<<<E/V/f ppl64A 44xxxCX
   UD33 Base Address + UD33 SA Register
   = PPE464


   <<<<E/V/f ppl64A 44xxxCX
   UD33 Base Address + UD33 F.R.D. code + 2
   = PPE464

   Table 4-11

   <<<<E/V/f ppl64A 3003CX
   UD33 Base Address + UD33 F.R.D. code + 2
   = PPE464

   Table 4-10

7. Enable the map registers for two pages (must be longword aligned):

   <<<<D/P/I f ppl64A 80000000000010CF

   Table 4-8

8. Deposit the UD33 "backdoor enable" code in the SA register.

   <<<<D/P/I f ppl64A 80000000000000CF

   Table 4-7

9. Initialize the VAX by applying power to the system and entering the
   console I/O mode. To initialize the UNIBUS:

   <<<<D/P/I f 37 1CXD

   Table 4-7

console I/O (hex),

with UNIBUS adapter (UBA) #0 and a UD33 Base address of 772150 (decimal) or
the example peripherals to a VAX 7200 contained in the tables noted in parentheses. The example peripherals are
sequence to use is illustrated by the following example: specific commands are
F.R.D. is started by issuing a special command sequence via the console ODT. The

Signaling F.R.D. on a VAX

NOVRAM Loading, Disk Formatting and Testing
<table>
<thead>
<tr>
<th>Initialization Command(s)</th>
<th>VAX Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>D I 37 1 CCR</td>
<td>VAX 7504</td>
</tr>
<tr>
<td>I CCR</td>
<td>VAX 7300</td>
</tr>
<tr>
<td>VAX 8200</td>
<td>VAX 8650</td>
</tr>
<tr>
<td>VAXWACK</td>
<td>VAX 7800</td>
</tr>
<tr>
<td>20000000+720 2000016 CCR</td>
<td>VAX 8200</td>
</tr>
</tbody>
</table>

Table 4-7. VAX Initialization Command Sequences

7. Start the F.R.D.

NOVRAM Loading, Disk Formatting and Testing
Depending on your configuration, Z80/860/8650 are standard but may vary.

**NOTE**

Table 4-8, VAX and UBA Memory Map Register Addresses

<table>
<thead>
<tr>
<th>Validity Bit</th>
<th>Data Address</th>
<th>VAX Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 at UBA #1</td>
<td>10000008</td>
<td>0</td>
</tr>
<tr>
<td>0 at UBA #1</td>
<td>00000008</td>
<td>1</td>
</tr>
<tr>
<td>1 at UBA #0</td>
<td>10000008</td>
<td>1</td>
</tr>
<tr>
<td>0 at UBA #0</td>
<td>00000008</td>
<td>1</td>
</tr>
</tbody>
</table>

780 and

<table>
<thead>
<tr>
<th>Validity Bit</th>
<th>Data Address</th>
<th>VAX Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 at UBA #1</td>
<td>10000008</td>
<td>1</td>
</tr>
<tr>
<td>0 at UBA #1</td>
<td>00000008</td>
<td>1</td>
</tr>
<tr>
<td>1 at UBA #0</td>
<td>10000008</td>
<td>1</td>
</tr>
<tr>
<td>0 at UBA #0</td>
<td>00000008</td>
<td>1</td>
</tr>
</tbody>
</table>

730

<table>
<thead>
<tr>
<th>Validity Bit</th>
<th>Data Address</th>
<th>VAX Model</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>10000008</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>00000008</td>
<td>1</td>
</tr>
</tbody>
</table>

730
<table>
<thead>
<tr>
<th>Bus #3</th>
<th>Bus #2</th>
<th>Bus #1</th>
<th>Bus #0</th>
<th># Node</th>
</tr>
</thead>
<tbody>
<tr>
<td>2601E000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>2601C000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>2601A4000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26018000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26016000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26014000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26012000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26010000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>2600E000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>2600C000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>2600A4000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26008000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26006000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26004000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26002000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
<tr>
<td>26000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
<td>00000000</td>
</tr>
</tbody>
</table>

Bus #3: Validity, DDP', PFN = 1
Bus #2: Validity, DDP', PFN = 0

Data to be deposited in selected Node and Map Register:

- Offsets
- Data

VAX Model 8200

Table 4-8. VAX and ULBA Memory Map Register Addresses (continued)

---

NOVRAM Loading, Disk Formatting and Testing
| Node # | 0 | 12 | 11 | 10 | 9  | 8  | 7  | 6  | 5  | 4  | 3  | 2  | 1  | 0  |
|--------|---|----|----|----|----|----|----|----|----|----|----|----|----|
| Bus #0 | 26 | 0  | 24 | 0  | 22 | 0  | 20 | 0  | 18 | 0  | 16 | 0  | 14 | 0  |
| Bus #1 | 26 | 0  | 24 | 0  | 22 | 0  | 20 | 0  | 18 | 0  | 16 | 0  | 14 | 0  |
| Bus #2 | 26 | 0  | 24 | 0  | 22 | 0  | 20 | 0  | 18 | 0  | 16 | 0  | 14 | 0  |
| Bus #3 | 26 | 0  | 24 | 0  | 22 | 0  | 20 | 0  | 18 | 0  | 16 | 0  | 14 | 0  |

| (Window space offset values are through 386/286) |
| VAX Mode 8200 I/O Address Window Space Assignments |

# UBA Base Address
VAX Models 8600/8650 I/O Address on SBA #1

| # UBA Address |
| VAX Models 780 and 8600/8650 I/O Address |

| # UBA Address |
| VAX Model 730 I/O Address |

Table 4-9, VAX and UBA I/O Base Addresses

NOVRAM Loading, Disk Formatting and Testing
<table>
<thead>
<tr>
<th>VAX and UBA Number</th>
<th>xx value</th>
<th>Octal</th>
<th>Hex</th>
</tr>
</thead>
<tbody>
<tr>
<td>780 UBA #0 and 8600/650 UBA #0 on SBA #0</td>
<td>07 0A</td>
<td>772150</td>
<td>3E4D8</td>
</tr>
<tr>
<td>8600/650 UBA #0 on SBA #1</td>
<td>08 0A</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>8600/650 UBA #1 on SBA #1</td>
<td>04 06</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>780 UBA #1 and 8600/650 UBA #1 on SBA #0</td>
<td>03 0A</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>8600/650 UBA #2 on SBA #1</td>
<td>05 06</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>780 UBA #2 and 8600/650 UBA #2 on SBA #0</td>
<td>03 0A</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>8600/650 UBA #3 on SBA #1</td>
<td>05 06</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
<tr>
<td>780 UBA #3 and 8600/650 UBA #3 on SBA #0</td>
<td>03 0A</td>
<td>760334</td>
<td>3ED0A</td>
</tr>
</tbody>
</table>

Table 4-11: Available F.R.D. Upload Codes

Table 4-10: UDI3 Base Address Offsets (IP Register)
<table>
<thead>
<tr>
<th>VAX and UBA Number</th>
<th>xx Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>8200 Node 0 #0 VAXBI Bus 0</td>
<td>44</td>
</tr>
<tr>
<td>8200 Node 0 #1 VAXBI Bus 0</td>
<td>44</td>
</tr>
<tr>
<td>8200 Node 0 #2 VAXBI Bus 0</td>
<td>43</td>
</tr>
<tr>
<td>8200 Node 0 #3 VAXBI Bus 0</td>
<td>43</td>
</tr>
<tr>
<td>8200 Node 0 #4 VAXBI Bus 0</td>
<td>43</td>
</tr>
<tr>
<td>8200 Node 0 #5 VAXBI Bus 0</td>
<td>43</td>
</tr>
<tr>
<td>8200 Node 0 #6 VAXBI Bus 0</td>
<td>42</td>
</tr>
<tr>
<td>8200 Node 0 #7 VAXBI Bus 0</td>
<td>42</td>
</tr>
<tr>
<td>8200 Node 0 #8 VAXBI Bus 0</td>
<td>42</td>
</tr>
<tr>
<td>8200 Node 0 #9 VAXBI Bus 0</td>
<td>42</td>
</tr>
<tr>
<td>8200 Node 0 #10 VAXBI Bus 0</td>
<td>41</td>
</tr>
<tr>
<td>8200 Node 0 #11 VAXBI Bus 0</td>
<td>41</td>
</tr>
<tr>
<td>8200 Node 0 #12 VAXBI Bus 0</td>
<td>40</td>
</tr>
<tr>
<td>8200 Node 0 #13 VAXBI Bus 0</td>
<td>40</td>
</tr>
<tr>
<td>8200 Node 0 #14 VAXBI Bus 0</td>
<td>40</td>
</tr>
<tr>
<td>8200 Node 0 #15 VAXBI Bus 0</td>
<td>40</td>
</tr>
<tr>
<td>8200 Node 0 #16 VAXBI Bus 0</td>
<td>3F</td>
</tr>
<tr>
<td>8200 Node 0 #17 VAXBI Bus 0</td>
<td>3E</td>
</tr>
<tr>
<td>8200 Node 0 #18 VAXBI Bus 0</td>
<td>3D</td>
</tr>
<tr>
<td>8200 Node 0 #19 VAXBI Bus 0</td>
<td>3C</td>
</tr>
<tr>
<td>8200 Node 0 #20 VAXBI Bus 0</td>
<td>3B</td>
</tr>
<tr>
<td>8200 Node 0 #21 VAXBI Bus 0</td>
<td>3A</td>
</tr>
<tr>
<td>8200 Node 0 #22 VAXBI Bus 0</td>
<td>39</td>
</tr>
<tr>
<td>8200 Node 0 #23 VAXBI Bus 0</td>
<td>38</td>
</tr>
<tr>
<td>8200 Node 0 #24 VAXBI Bus 0</td>
<td>37</td>
</tr>
<tr>
<td>8200 Node 0 #25 VAXBI Bus 0</td>
<td>36</td>
</tr>
<tr>
<td>8200 Node 0 #26 VAXBI Bus 0</td>
<td>35</td>
</tr>
<tr>
<td>8200 Node 0 #27 VAXBI Bus 0</td>
<td>34</td>
</tr>
<tr>
<td>8200 Node 0 #28 VAXBI Bus 0</td>
<td>33</td>
</tr>
<tr>
<td>8200 Node 0 #29 VAXBI Bus 0</td>
<td>32</td>
</tr>
<tr>
<td>8200 Node 0 #30 VAXBI Bus 0</td>
<td>31</td>
</tr>
<tr>
<td>8200 Node 0 #31 VAXBI Bus 0</td>
<td>30</td>
</tr>
</tbody>
</table>

Table 4-11: Available F.R.D. Upload Codes (continued)
You can restart the diagnostics from a halted condition if you have not changed
the memory contents. On a PDP-11 system, enter 200C at the ODT prompt. On
a VAX system, enter S 80.

- Halt the CPU.
- Reinitialize the system, or
- Press the BREAK key, or

To terminate F.R.D., choose one of the following:

**4.7.4**

**4.7.4 F.R.D. Options**

See subsection 4.5 for more information on F.R.D. options.

When the appropriate start procedure is complete, F.R.D. identifies itself by

### Table 4-12. PDP-11 Offsets

<table>
<thead>
<tr>
<th>ADDRESS</th>
<th>BUS ADDRESS</th>
</tr>
</thead>
<tbody>
<tr>
<td>760360</td>
<td>60360</td>
</tr>
<tr>
<td>760359</td>
<td>60359</td>
</tr>
<tr>
<td>760358</td>
<td>60358</td>
</tr>
<tr>
<td>760357</td>
<td>60357</td>
</tr>
<tr>
<td>760344</td>
<td>60344</td>
</tr>
<tr>
<td>760343</td>
<td>60343</td>
</tr>
<tr>
<td>760342</td>
<td>60342</td>
</tr>
<tr>
<td>760341</td>
<td>60341</td>
</tr>
<tr>
<td>72156</td>
<td>72156</td>
</tr>
<tr>
<td>72155</td>
<td>72155</td>
</tr>
<tr>
<td>72154</td>
<td>72154</td>
</tr>
<tr>
<td>72153</td>
<td>72153</td>
</tr>
<tr>
<td>72152</td>
<td>72152</td>
</tr>
</tbody>
</table>

NOTE: XXXXX and YYYY are offsets dependent on the address of the UDF.

**NOTE**

- TEST FOR 2000
  - <CR>
  - 00000000
  - 00000000
  - 00000000
  - 00000000

following commands in response to the ODT prompt (②):

To start F.R.D. on a PDP-11 system, first halt the processor. Then enter the

**4.7.3**

Starting F.R.D. on a PDP-11 system

**F.R.D. Options**
When an option is finished, P.R.D. displays the prompt, "Hit any key to continue" and waits for you to do so before returning to the main menu.

A delay is approximately 30 seconds. This delay is to simulate the delay that occurs when performing an operation on a previously unformatted disk. The nature of the MSCP emulation being performed, some operations may produce an observable delay when performed on previously unformatted media.

When you make an invalid entry, P.R.D. rejects it, displays an error message, and returns to the next menu. If you select a valid selection, the next menu displays or P.R.D. performs the selected option.

The main menu and each submenu prompt for required input. When you enter an option number, P.R.D. displays the program option menu.

Enter option number:
11 - Edit/Load Norm
10 - Display Norm
 9 - Replace block
 8 - List known units
 7 - Read only test
 6 - Format, verify, and data reliability test
 5 - Data reliability test
 4 - Format and verify
 3 - Verify
 2 - Format
 1 - Self-test loop

Program Option Menu

The menu appears as follows:

If you make an invalid entry, P.R.D. displays an error message and returns to the next menu. If you select a valid selection, the next menu displays or P.R.D. performs the selected option.
When a block is encountered that cannot be accessed because of header or data

blocks are also verified.

clear pattern is run until error-free for a single pass, ensuring that replacement

capabilities so that a sector is replaced for any identifiable single bit errors. Each

During verify operations, F.R.D. disables all controller error recovery

verify operations are performed on 128 logical blocks at a time. Logical blocks

are referenced by logical block number (LBN). 

Even if the LUN, F.R.D. prompts for the number of write/ready passes.

asks for the logical unit number (LUN) of the drive to be verified. After you

four work-case data patterns to find and replace pattern-sensitive blocks. If

The verify option Write/Read checks all user-available blocks. F.R.D. uses

4.8.3 Option 3 - Verify

After formatting, the drive contains a valid RCT with a serial number you

performed that is important to use with a particular controller.

a drive that has been determined to contain usable data, or a drive with a

headers and initializes the drive's RCT labels. It is used to format a virgin drive.

The format option is used to initially format a drive. The Operation Wipes Sector

Option 2 - Format

error code. A description of the error code is displayed on the host console.

loop option stops and reports an error. The LEDs on the front panel display the

panel will blink when a pass has completed. If an error occurs, the self-test

already passed through the first self-test. The LED indicators on the UDD3 front

The self-test loop option detects intermittent hardware failures that have

4.8.4 Option 1 - Self-test Loop
Option 6 - Format, Verify, and Data Reliability Test

Messages are for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages. These messages are for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages. These messages are for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages.

This option combines options 2 (Format), 3 (Verify), and 5 (Data Reliability Test).

Option 5 - Data Reliability Test

This option allows you to bootstrap your subsystem. The Reliability Test

Option 4 - Format and Verify

This option formats a drive, then tests the surface to replace pattern-sensitive blocks. The Verify option also offers a block replacement feature which, when faulty, replaces any bad blocks using the appropriate technique.

Option 3 - Format, Verify, and Data Reliability Test

This option is for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages. These messages are for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages. These messages are for use by simple technical support personnel. If the test encounters errors, F.R.D. displays text error messages.

This option combines options 2 (Format), 3 (Verify), and 5 (Data Reliability Test).
ETC.

The difference is the number of LBPs used for ECC, diagnostic cylinders, etc.

determined from this data, the number entered is the displayed size of the disk. If the device size is not correct, the displayed size is.

In addition, this option displays the attached drive’s physical geometry. This

Option 8 - List Known Units

Certain errors are reported using Option 7 with Replace enabled.

This option is usually used after the drive is formatted. However, if you plan to

This option with the replacement feature enabled.

You should check & ensure data is backed up.

When enabled, replaces any bad blocks. Because F.R.D. runs with ECC disabled

This may cause problems if the replaced blocks

CAUTION

and no forced error flag is set in the replacement sector, the data is not rewritable.

Replacement block. This means that even though the defective block is replaced

and does not cache any read data, no corrected data is available to put in the

When enabled, replaces any bad blocks. Because F.R.D. runs with ECC disabled

This option causes all the user-available blocks on the selected drive to be read-

Option 7 - Read Only Test

FRD Options
Parameters are described in section 3.9.

This option allows you to enter the drive configuration parameters into the NOVRAM.

**Option 14 - ED!H/locd NOVRAM**

This option displays the current contents of the NOVRAM.

**Option 10 - Display NOVRAM**

If you are using both types of replacement BFI replacement must be complete before LBN replacement is begun. Further, BFI replacement must be complete before the blanket bad block replacement feature is enabled. The VERIFY option runs test patterns that may detect any patterns.

Emulex recommends that you run the VERIFY option after the replacement option is complete. The VERIFY option runs test patterns that may detect any pattern.

DEC operating systems which do not support host-initiated replacement.

LBN replacement allows you to replace blocks identified as bad during the scanning process.

Replacing blocks:

- For each BFI entity, when you initiate the LBN form an LBN form is created from the defect.
- FF replacement eliminates the calculation required to translate the LBN.
- Manufactured sectors detected (BFI) are not created when the LBN is created from the defect.

This option allows you to replace a specific bad block or group of blocks with another.
This parameter specifies the total number of physical sectors per track, including spares. The valid range is from 1 through 255.

**Number of Sectors per Track**

Some parameter values are used for that number of drives. If you enter 2 or more, the prompts for parameter values for the other drives. If you enter 2 or more, the utility uses a separate set of parameter values for each drive. In this case, if you enter 2, the NOVRAM parameters that follow Valid values 5 to 4. If you enter 1, the NOVRAM parameters specify the quantity of attached physical disk drives that use the Type Code.

**Number of Units of This Type**

This parameter indicates the type of disk drive. The only valid value is 1.

**Type Code**

This prompt does not appear for each drive that you are configuring. You are prompted for this parameter when you select the edit/load NOVRAM through 8; the recommended value for the MICROVAX 3300/3600 is 8.

This parameter specifies the number of words the UDBS will transfer before it looks for another device that wants to use the Q-Bus. The valid range is from 1 through 8; the default value is 64.

**Adaptive DMA Threshold**

The next parameter allows you to specify the default value (the last value entered). The next parameter allows you to specify the default value of each parameter. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value. Enter the default value with a range of valid entries and a default value.

**Drive Configuration Parameters**

When you edit or load NOVRAM configuration parameters, you are asked to
The parameters define additional configuration characteristics of the drive.

**Configuration Bits, High Limit and Low Limit**

The minimum of alternate cylinders must be specified if block replacement is to occur. If Cylinder 0 is specified as an alternate, the sector replacement algorithm needs to be specified. The valid range is from 0 to 1. Cylinder 0 and Cylinder 1 must be specified as an alternate. Cylinder 1 is used as the normal number of alternate cylinders.

**Number of Alternate Cylinders**

This parameter specifies the number of spare cylinders per physical drive.

**Number of Spare Sectors per Track**

Including spares, the valid range is from 1 through 4,095. This parameter specifies the number of sectors per track. The valid range is from 0 through 127. The number plus the sum of logical sectors per track equals the total number of sectors per track.

**Number of Cylinders**

This parameter specifies the number of cylinders per physical drive. The valid range is from 1 through 64. This parameter specifies the number of data heads per physical drive. The valid range is from 1 through 64.

**Drive Configuration Parameters**
that is executing a seek undergos the same process.
on that drive. If the sector is not found in the RPS window, the next drive
in the RPS High and Low Limits the read/write operation begins immediately.
If the RPS is exceeded, the controller looks at the drive’s current sector number
in the RPS window.

The High and Low Limit parameters on the menu are defined.

Therefore increasing throughput of the subsystem,
rotationally closest to that command, the rotational latency is reduced.
BPS and a minimum value of 12 is obtainable. These values correspond
to the controller command buffer. By matching a data transfer with the drive
you need to calculate the decimal value for each drive, a minimum value of
0 is given in the Drive Configuration Parameter Value Table in Appendix D. If
the drive will perform BPS, recommended values are
determined by the drive manufacturer’s table or the drive
file on the menu.

The BPS can be set to 0 or 1.

Positional Position Sensing increases the performance of the disk subsystem.

Positional Position Sensing: Capable of performing head offset operations.

This bit specifies whether or not the drive is capable of head offset
operations. The valid range for this bit is 0 or 1. If this bit is 0, the drive
is not capable of performing head offset operations. The valid range for this bit is 0 or 1. If this bit is 1, the drive
is capable of performing head offset operations. If this bit is 0, the drive
cannot perform head offset operations. If this bit is 1, the drive
cannot perform head offset operations.

Configuration Parameters:

Configuration Bits:
Installation

---

A dual port drive that does not require multiple-access paths.

This is the default setting. Multiple port access is not supported under any
application or dual port mode should be selected on drives that do not support
porting with NIC cards.

If your firmware (version 1 and above) support dual

Dual Port Options

RPS to function. See Subsection 3.3.3.
Index and Sector signals must be on the cable for

NOTE

Limit parameters. If your device is not a RAID, simply place a zero in the RPS High and Low
fields. If you are unfamiliar with the geometry of each disk,
should also disable RPS if you are uncertain with the geometry of each disk or
system. This will result in more efficient subsystem performance.

compacted I/O operations will even out the I/O load. A evenly loaded
Write the drive 3 RPS value to a high upper limit, the number of
Drive 1. By setting the drive 0 RPS value to a low upper limit, and by
Do see output twice as many I/O operations completed on Drive 0 as on
example, if you have a two-drive system with a 2.1M drive/selected drive (let

Drive 0

Performance.

It is possible that small adjustments could increase system

application. Though the recommended value is the optimal one for most
RP's depend heavily on system load. Each of the RPS and Overhead
reduces the time it is required. The optimal RPS limit for
controller response. Lowering this value will decrease performance by

The recommended lower RPS limit ensures adequate time for proper

Driver Configuration Parameters
Support logical splitting of any dual-ported drive.

Since the drive’s port is controlled by physical addresses, firmware cannot

disk and allows multiple read/write access to host the drive.
Reliability portion of P.R.D. supports multiport firmware controllers on the shared
port. Only one port enabled. To ensure that dual porting is functioning, the data
presented while either the controller is idle on the other port of the drive must be
The drive formal surface verification and manual block reapplicability must be

Firmware Resident Diagnostics (F.R.D.) Support

In LAVC systems failover operations are fully software dependent, and many
controller released the drive. To properly support failover, the drive must have
If no commands are processed within 5ms in systems that require failover, the

Failure Requirements

Estimated and made available to the other controller. The VMS software is then
should failover occur in a LAVC system that has registered the drive, the port is
then deemed to use either a local access path or DMS for communication.
The server

The static dual port option is typically used for local area wks cluster (LAVC)

Dynamic Dual Port Mode (config type 2)

To overcome these limitations,
other must be mounted read only (not write), unless you provide special software
from two different systems. Only one system may have read/write abilities, the
controllers. The drive is available to both controllers and will seize and release
This is used for systems that must share the drive between two different

Drive Configuration Parameters
is specified. If a spill code 0, 2, or 3 is specified, this parameter must be 0.

This parameter specifies the physical cylinder that is to be used as the first cylinder of the second logical drive. This field has meaning only if a spill code 1

Cylinder Offset

specified. This value must be 0.

If a spill code 0 or 1 is specified, the valid range is from 0 through 31, if a spill code 2 or 3 is specified, the valid range is from 1 through 31.

This field sets the starting head for the second logical drive. This field must be set to 0 if a spill code is not specified.

Starting Head Offset

This parameter specifies the physical drive head that is to be used as the first head of the second logical drive. Use of the spill option disables seek-optimizing and overlapped seek processing in the MSCP controller, which reduces performance, particularly when both logical drives are active.

Higher numbered heads are drive 1, and the lower numbered heads are drive 2, and the drive's data heads are assigned for the physical drives as shown.

Code 2: The drive's data heads are divided between the two logical drives. A logical drive uses the first cylinder of the second logical drive.

Code 1: The cylinders are divided between the two logical drives. A starting cylinder offset value specifies the first cylinder of the second logical drive.

Code 0: No spill.

The spill codes are:

Two logical disk units (two each), if more than one drive is defined by this block.

This parameter allows the drive(s) defined by this parameter block to be spill into spill code

Drive Configuration Parameters
The valid range is from 0 through 3.

encountering sector 0.

efficient because the drive has time to seek from track to track before
the previous track. When this is done, spanned write and read operations are more
of a track is offset a certain number of sectors from the position of sector 0 on
track. When the drive crosses a track boundary, read operations will execute
offset from sector 0 of the previous track. Once the sector(s) from one track to

This parameter specifies the number of sectors by which sector 0 of a track is

Special Offset

D4.9.46

parameters are altered, the LDISK may not support the disk drive.
and are to be used with Emulex quadHed drives. If any of these factory
B. Disk Drive Configuration Parameters. These values are factory
parameters are altered the LDISK may not support the disk drive.

The values Emulex recommends for quadHed drives are contained in Appendix
read/write transfers while maximizing data capacity.

These gaps are based on a formula intended to allow the drive time for
recording/erasing all of the reads and writes, for example, between header and data fields.
The values Emulex recommends for quadHed drives are contained in Appendix

These parameters specify the recording format for each sector on the drive. The

Gaps, 0, 1, and 2 Parameters

4.9.45

Table

LUN and LUN 0 are both removable.
LUN 0 is fixed, LUN 1 is removable.
LUN 0 is removable, LUN 1 is fixed.
LUN 0 and LUN 1 are both fixed.

Decimal

Definition

With a valid range from 0 through 3.

If you are defining a drive with a logical spindle, this parameter uses a 2-bit field

Removable Media

4.9.44

This parameter indicates whether the disk media is fixed or removable. If you

This parameter indicates whether the disk media is fixed or removable. If you
media.

values of 0 and 1, where 0 indicates fixed media and 1 indicates removable
are defining multiple physical/logical drives, this parameter uses a 2-bit field with valid
values of 0 and 1, where 0 indicates fixed media and 1 indicates removable
media.
Indicators

4.10.4

Operation

4.10
Troubleshooting

In the continental United States, Alaska, and Hawaii contact:

Emulex Technical Support

In the continental United States, call (800) 638-7243. When answered, you will be prompted to key in 3712, followed by a # symbol, then a message.

After 5 p.m., Pacific Time, call (800) 638-7243. When answered, you will be prompted to key in 3711, followed by a # symbol, then a message.

DO not return a component to EMULEX WITHOUT AUTHORIZATION.

A component returned for service without an authorization will be returned to the owner at the owner's expense.

Instructions and a Return Materials Authorization (RMA) number:

Before returning the product to Emulex, where the product is under warranty or not, you must contact the factory or the factory's representative for a Return Materials Authorization (RMA) number. A return without proper authorization will not be accepted for credit.

Your Emulex UD33 disk controller was designed to give years of trouble-free service, and it was thoroughly tested before leaving the factory.

Service

<table>
<thead>
<tr>
<th>Fail Error Codes</th>
<th>5.5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Power-Up Self-Description</td>
<td>5.4</td>
</tr>
<tr>
<td>Fail Isolation Procedure</td>
<td>5.3</td>
</tr>
<tr>
<td>Service</td>
<td>5.2</td>
</tr>
<tr>
<td>Overview</td>
<td>5.1</td>
</tr>
</tbody>
</table>

Diagnostic Features

This section describes the several diagnostic features that use these diagnostic features.

Overview

Troubleshooting Section 5
### Table 5-1. Flow Chart Symbol Definitions

- **Process**: Connector, go to same-numbered symbol on another sheet.
- **Decision**: Go ahead according with YES or NO.
- **Start Point, ending point**: Diamond.

If the Fault Isolation Procedure indicates that a component needs to be removed, in Table 5-1, the Fault Isolation Procedure is shown in Figure 5-1. The chart symbols are defined.

The Fault Isolation Procedure is provided in flow chart format. The procedure is based on the self-diagnostic incorporated into the UI/ID3. The procedure is also used to use the product's self-diagnostic table or if many errors are observed in the system during normal operation. If neither of these errors are evidenced, or if the error is not confirmed, the system must be rechecked.

### Fault Isolation Procedure

1. Insure the package is sealed as instructed by the enclosed representative. The installer must recheck the original package material and send the component to a qualified service technician.

2. After you have completed the above, the Switch should have been made on the main control panel, and the control panel should be checked.

3. This sheet is contained in the Installation, a record of the switch settings should be made on the installation, as well as all repairs and adjustments made.

4. To help you effectively, follow the rules of indication for certain information.
Figure 5-1: Fault Isolation Chart

1. Determine fault and attempt to correct.
   - Yes
   - No
   - See Section 5.5
     - S4 BIT 19 = 1
     - SA BIT 18 = 1?
     - Yes
     - No
     - See Section 4.7.4.7.3
       - Load F.R.D.
       - Successful
   - No
   - Examine THE.

2. Memory map, see section 4.7.4.7.3.
   - Upload F.R.D.
   - Yes
   - No
   - See Section 4.7.2.4.7.3

3. Check controller switches for correct.
   - Check controller for another backplane slot.
   - Yes
   - No
   - Register

4. Read Register.

5. Do not boot system.
   - Power up U832.

<table>
<thead>
<tr>
<th>Error Description</th>
<th>LED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Error 3</td>
<td>2</td>
</tr>
</tbody>
</table>

Table 5-2. LED Error Codes

If the UD33 controller error occurs, the self-diagnostic module without error. All three LEDs are OFF. Set switch SW2-1 in the OFF position and reset the UD33 controller before an error occurs. The error codes are listed and described in Table 5-2.

To help determine the location of the problem, the operator can select a special diagnostic mode that causes the LEDs to display an error code. To enable this diagnostic mode, place the CPU hall switch in the ON position and set UD33 powered down or UD33 switch SW2-1, must be OFF. (Number ON and then switch SW3-1 ON. After setting SW3-1 ON, the host controller must be OFF) to cause the UD33 to again perform its self-test.

Table 5-3.

- The UD33 executes an extensive self-diagnostic to ensure that the disk controller is good working order. The self-diagnostic is divided into several parts. The first two tests are executed immediately after power-up, a reset, or a write to the IP register (base address). The other tests are executed in the background. The UD33 executes an extensive self-diagnostic to ensure that the disk controller is good working order. The self-diagnostic is divided into several parts. The first two tests are executed immediately after power-up, a reset, or a write to the IP register (base address). The other tests are executed in the background.

- The UD33 executes an extensive self-diagnostic to ensure that the disk controller is good working order. The self-diagnostic is divided into several parts. The first two tests are executed immediately after power-up, a reset, or a write to the IP register (base address). The other tests are executed in the background.
<table>
<thead>
<tr>
<th>Description</th>
<th>Code</th>
<th>Hex</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Information in message packet.</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Possible party or timeout error when the UD33 attempted to read data from a message packet.</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Impossible party or timeout error when the UD33 attempted to read data from a message packet.</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Write data to a message packet.</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>UD33 diagnostic self-test indicated a controller RAM error.</td>
<td>5</td>
<td>5</td>
</tr>
<tr>
<td>UD33 diagnostic self-test indicated a controller RAM error.</td>
<td>6</td>
<td>6</td>
</tr>
<tr>
<td>Possible party or timeout error when the UD33 attempted to read an envelope address to a command line.</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Host did not communicate with UD33 within the time frame.</td>
<td>9</td>
<td>9</td>
</tr>
<tr>
<td>Establishes while bringing the controller online.</td>
<td>11</td>
<td>11</td>
</tr>
<tr>
<td>Operating system sent more commands to the UD33 than the controller can accept.</td>
<td>12</td>
<td>12</td>
</tr>
<tr>
<td>Controller unable to perform DMA transfer operation.</td>
<td>13</td>
<td>13</td>
</tr>
<tr>
<td>UD33 diagnostic self-test indicated controller failure error.</td>
<td>14</td>
<td>14</td>
</tr>
<tr>
<td>The MSCP connection identifier is invalid.</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>An error occurred during the MSCP initialization sequence.</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>

Table 5-3. MSCP Fail Error Codes used by the UD33.
<table>
<thead>
<tr>
<th>Description</th>
<th>Hex Code</th>
<th>Octal Code</th>
</tr>
</thead>
<tbody>
<tr>
<td>F.R.D. Load to memory failed</td>
<td>3 1</td>
<td>121</td>
</tr>
<tr>
<td>Autoboot timeout</td>
<td>4 9</td>
<td>111</td>
</tr>
<tr>
<td>Fatal error during self-test</td>
<td>0 C</td>
<td>014</td>
</tr>
<tr>
<td>Firmware checksum error</td>
<td>0 5</td>
<td>005</td>
</tr>
<tr>
<td>RAM Error</td>
<td>0 4</td>
<td>004</td>
</tr>
</tbody>
</table>

Table 5-4: Fatal Error Codes

Additional fatal error messages may appear. These error codes are listed in
Point of view.

Characteristics of all MSCP subsystems are the same from the operating system's
viewpoint. The MSCP subsystems provide a high-level interface to the host with an "error-free" media. Second, if provided for exceptional operating
conditions, they are several advantages to this type of architecture. First, it provides the

efficient.

Knowledge of the media is important to allow error control to be done
reliably in case of responsibility for error detection and correction because is
considerably increased. On the other part of the subsystem, finally, the host is
dependent of knowledge of the peripheral's capability, geometry, and status. Second,
detailed knowledge of the peripheral's input, output, and status must have

understand.

Logical block numbers into physical addresses that the peripheral device can
scheme gives the MSCP subsystem the responsibility for converting MSCP
physical description of the data's location (i.e., cylinder, track, and sector). This
defines the logical blocks in terms of sequential, logical blocks, not in terms of a

device's location in terms of sequential, logical blocks. Not in terms of a

configuration, MSCP allows a host system to be connected to subsystems with a

Mass Storage Control Protocol (MSCP) is the protocol used by a family of mass

storage controllers and devices described in detail by Digital Equipment

sections. The following table outlines the contents of this section.

<table>
<thead>
<tr>
<th>Overview of MSCP Subsystem</th>
<th>6.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booting Command</td>
<td>6.5</td>
</tr>
<tr>
<td>Registers</td>
<td>6.4</td>
</tr>
<tr>
<td>Programming</td>
<td>6.3</td>
</tr>
<tr>
<td>Overview of MSCP Subsystem</td>
<td>6.2</td>
</tr>
<tr>
<td>Overview</td>
<td>6.1</td>
</tr>
<tr>
<td>Subsection</td>
<td></td>
</tr>
</tbody>
</table>

The following table outlines the contents of this section of the

MSCP controllers. The registers are functionally compatible with DEC implementations

of the U330 and that are used to monitor and control the MSCP disk.

This section contains an overview of the U330 device registers that are accessible
The UD33 disk controller does not support any of the DUP commands.

6.3.4.2

Diagnostic and Utility Protocol (DUP)

The UD33 disk controller supports the entire minimal disk subset of MSCP.

6.3.1.4

Minimal Disk Subset

The following subsections describe the extent of MSCP commands supported by the UD33.

No currently available MSCP command is beyond the scope of this manual.

6.3.4

Command Support

A complete description of MSCP commands and the corresponding status

6.3

Programming

By host independence from a specific bus, controller, or device type.

In summary, an MSCP subsystem is characterized by an intelligent controller.

A commissioned command is transferred to the MSCP controller.

The host computer runs corresponding software processes which take calls from

Controller has all of the responsibilities outlined above.

In terms of implementation, this protocol requires a high degree of intelligence.
Register (base address) has two functions as detailed below:

The 595 register (base address plus 2) has four functions as listed below:

* When read while the port is operating, it causes the controller to initiate polling.
* When written with any value, it causes a hard initialization of the MSCP controller.

The 61 register (base address) is supported by the UDD3.

(595) Register (base address plus 2) Register (base address and the status and address initialization and polling (IP) register is always read as words. The register pair begins on a longword boundary. Table 6-1 lists the odd and evenworded values for the subsystems. These registers are used only to initialize polling or to reset the PD-P1 I/O page that are used primarily in the subsystem. During normal operation, the registers are used primarily to exchange data with the controller. The UDD3 has two 16-bit registers.

During normal operation, the UDD3 disk controller is controlled and monitored.
For more information on the VAX 8600/8650/8200 addresses, refer to Table 4-9.

<table>
<thead>
<tr>
<th>UBA #3</th>
<th>UBA #2</th>
<th>UBA #1</th>
<th>Hex Address With Offset</th>
<th>VAX-11/780</th>
<th>VAX-11/730</th>
</tr>
</thead>
<tbody>
<tr>
<td>UBA 3</td>
<td>UBA 2</td>
<td>UBA 1</td>
<td>Hex Address With Offset</td>
<td>VAX-11/780</td>
<td>VAX-11/730</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6-1. UDD3 IP and SA Registers
Device Registers and Programming

6.5

Bootstrapping Command

Bootsrap Command

Bootstrapping Command

The ROM would not be located on the UDD33 PWD, but on a bootstrapping ROM. The ROM would not be located on the UDD33 PWD, but on

The bootstrapping command can be issued from the console after the system is

supported on the VAX.

controller. This feature is not part of the standard MS/CP command set nor is it

UD33 disk controller. Example has incorporated a bootstrapping command attached to the

To allow the system to be easily bootstrapped from peripherals attached to the

at location 00000.
To issue the Bootstrap Command to the UDC3:

1. Initialize the UDC3 by writing any value into the IP Register (base address) of the UDC3. The UDC3 responds with any value into the IF Register (base address). The UDC3 performs self-test and begins the initialization.

2. The UDC3 indicates that initialization step 1 has begun by setting bit 11 in the IF Register.

3. When the controller indicates that step 1 of the initialization diagnosis begins, load the SA Register (base address plus 2) with the special initialization code, 004400. Read the SA Register (base address plus 2) with the "read" register addressing. This value (the interrupt is generated) should also be set.

4. The controller acknowledges the initialization code with 004400.

5. Load the SA register (base address plus 2) with 040000 or 040009, where n is the MSCP logical unit number of the unit to bootstrapping from. In this example, the unit is 0.

6. Load Register 0 (RO) with the unit number. Load Register 1 (R1) with the UDC3 base address, then enter OC to begin.

7. To issue the Bootstrap Command, then enter OC to begin.
UD33 buffer controller to transfer large blocks of data directly between host and memory. The UD33’s RAM, which is used for data buffering and working storage, consists of a 16-block bidirectional set of data lines and an address space (RAM) which contains the control program and 256 bytes of random access memory (EEPROM).

The UD33 uses a 27128 erasable programmable read-only memory (EPROM).

Figure 7.1. The disk controller is organized around the eight-bit 8017 microprocessor. The board has an eight-bit internal data bus with 16-bit addressing capability. The Host Adapter Controller is responsible for transferring data to and from the Host. The UD33 is a microprocessor-based controller that is contained on a single hex-wide PCB. The UD33’s memory functional blocks are shown in Figure 7.1.

This section contains a description of the UD33 Disk Controller’s architecture.
The buffer controller II is a single chip. This multichannel DMA controller is

UD33 Disk Controller Architecture
CPUs and the UD33 disk controller communicate with each other.

These signals provide the means by which the address transfer and for becoming bus master. UINBUS interface pins and terminating and lines and 16 bidirectional data lines plus control signals for data and interrupt vectors.

### UINBUS Interface

<table>
<thead>
<tr>
<th>UD33 SMD Drive Interface</th>
<th>8.3</th>
</tr>
</thead>
<tbody>
<tr>
<td>UD33 UINBUS Interface</td>
<td>8.2</td>
</tr>
<tr>
<td>Overview</td>
<td>8.1</td>
</tr>
</tbody>
</table>

### Table

<table>
<thead>
<tr>
<th>Title</th>
<th>Subsection</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

This section describes the interfaces that the UD33 disk controller incorporates.

---

**Interfaces**

Section 8
<table>
<thead>
<tr>
<th></th>
<th>SACK</th>
<th>ivent</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>A</td>
<td>B</td>
<td>C</td>
<td>D</td>
<td>E</td>
<td>F</td>
<td>G</td>
<td>H</td>
</tr>
<tr>
<td></td>
<td>V</td>
<td>T</td>
<td>S</td>
<td>R</td>
<td>P</td>
<td>N</td>
<td>M</td>
<td>L</td>
</tr>
<tr>
<td></td>
<td>INTL</td>
<td>NTRL</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Side 2</th>
<th>Pin</th>
<th></th>
<th>Side 1</th>
<th>Component</th>
<th>Side 2</th>
<th>Pin</th>
<th></th>
<th>Side 1</th>
<th>Component</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Solder</td>
<td></td>
<td></td>
<td>Solder</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

|  | Connector A |  |  | Connector B |  |  |  |  | Connector C |  |  |  | Connector D |  |  |  | Connector E |  |  |  | Connector F |  |  |  | Connector G |  |  |  | Connector H |  |  |  | Connector I |  |  |  | Connector J |  |  |  | Connector K |  |  |  | Connector L |  |  |  | Connector M |  |  |  | Connector N |  |  |  | Connector O |  |  |  | Connector P |  |  |  | Connector Q |  |  |  | Connector R |  |  |  | Connector S |  |  |  | Connector T |  |  |  | Connector U |  |  |  | Connector V |  |  |  | Connector W |  |  |  | Connector X |  |  |  | Connector Y |  |  |  | Connector Z |  |  |  | Connector AA |  |  |  | Connector AB |  |  |  | Connector AC |  |  |  | Connector AD |  |  |  | Connector AE |  |  |  | Connector AF |  |  |  | Connector AG |  |  |  | Connector AH |  |  |  | Connector AI |  |  |  | Connector AJ |  |  |  | Connector AK |  |  |  | Connector AL |  |  |  | Connector AM |  |  |  | Connector AN |  |  |  | Connector AO |  |  |  | Connector AP |  |  |  | Connector AQ |  |  |  | Connector AR |  |  |  | Connector AS |  |  |  | Connector AT |  |  |  | Connector AU |  |  |  | Connector AV |  |  |  | Connector AW |  |  |  | Connector AX |  |  |  | Connector AY |  |  |  | Connector AZ |  |  |  | Connector BA |  |  |  | Connector BB |  |  |  | Connector BC |  |  |  | Connector BD |  |  |  | Connector BE |  |  |  | Connector BF |  |  |  | Connector BG |  |  |  | Connector BH |  |  |  | Connector BI |  |  |  | Connector BJ |  |  |  | Connector BK |  |  |  | Connector BL |  |  |  | Connector BM |  |  |  | Connector BN |  |  |  | Connector BO |  |  |  | Connector BP |  |  |  | Connector BQ |  |  |  | Connector BR |  |  |  | Connector BS |  |  |  | Connector BT |  |  |  | Connector BU |  |  |  | Connector BV |  |  |  | Connector BW |  |  |  | Connector AX |  |  |  | Connector AY |  |  |  | Connector AZ |  |  |  | Connector BA |  |  |  | Connector BB |  |  |  | Connector BC |  |  |  | Connector BD |  |  |  | Connector BE |  |  |  | Connector BF |  |  |  | Connector BG |  |  |  | Connector BH |  |  |  | Connector BI |  |  |  | Connector BJ |  |  |  | Connector BK |  |  |  | Connector BL |  |  |  | Connector BM |  |  |  | Connector BN |  |  |  | Connector BO |  |  |  | Connector BP |  |  |  | Connector BQ |  |  |  | Connector BR |  |  |  | Connector BS |  |  |  | Connector BT |  |  |  | Connector BU |  |  |  | Connector BV |  |  |  | Connector BW | | **Table 8-1.** UNIBUS Interface Pin Assignments
The following subsection describes both the I/O cables and I/O signals processing:

and read/write data transmitted and received by the controller.

All communications between the UD33 controller and its drives pass through the


compatible with the electrical and timing characteristics of disk drives up to 2.4

methods described in the standard USB-IF Specification for USB and 2.4 MHz Devices (CDC Document No. 6472402).

The UD33 controller's disk interface conforms to the USB interface

connector is plugged into the data cable for the first disk drive.

disk drive control cable. If another disk drive is configured, an unused 26-pin

port can interface up to a maximum of four physical (eight

UD33 controller can interconnect up to four physical

each at 26-pin connectors. [1, 13, 14 and 15]

UD33 controller. The UD33 controller controls four 26-pin male connectors, one

UD33 controller plugs directly into the SMD drive
cable and one of the four 26-pin data cables. A 60-pin male connector at interface.

The UD33 controller interfaces with each SMD disk drive via a 60-pin control

UD33 SMD Disk Drive Interface

MSCS Status error is returned.

NPR Status error is returned.

NPR Operations

For detailed address and switch setting information, addresses are determined by switches SW2-2 through SW2-4. See Section 4.

Register Address

The UD33 disk controller has two registers visible to the MPU's.

Interrupt Priority level
Cable B

The B cable should be a 26-conductor flat cable with ground plane and drain wire. The impedance should be 120 ohms and the length not greater than 50 feet. The functions of the signals in this cable are listed in Table 8.4.

The 26-conductor B cable is radial to all drives and contains the data and clock signals. The B cable should be a 30-twisted pair flat cable with an impedance of 100 ohms and a cumulative length not greater than 50 feet.

Table 8.3.2

When the control tag (Tag 3) is asserted, the signals listed in Table 8.3 are driven. The purpose of the signals in this cable, along with their function, is described in Table 8.3.2. The 60-conductor A cable is daisy-chained to all disk drives and terminated at the I/O cables. Those not used in both cables are listed in Table 8.3.1. Table 8.2 lists all lines (except I/O cables). All the signals between the controller and drives are contained in two I/O cables.
<table>
<thead>
<tr>
<th>From</th>
<th>To</th>
<th>Selector</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.2</td>
<td>9</td>
<td>Unit Selected</td>
</tr>
<tr>
<td>22.4</td>
<td>2</td>
<td>End</td>
</tr>
<tr>
<td>31.3</td>
<td>5</td>
<td>Seek</td>
</tr>
<tr>
<td>31.6</td>
<td>3</td>
<td>Read Clock</td>
</tr>
<tr>
<td>21.4</td>
<td>2</td>
<td>Servo Clock</td>
</tr>
<tr>
<td>61.9</td>
<td>6</td>
<td>Write Clock</td>
</tr>
<tr>
<td>82.0</td>
<td>8</td>
<td>Write Data</td>
</tr>
</tbody>
</table>

**Table 8-2. SMD-F Interface Connections**

- **Signal 1**: [Description]
- **Signal 2**: [Description]
- **Signal 3**: [Description]

**Signal 4**: [Description]

**Signal 5**: [Description]
Explained in Tables 8-3 and 8-4, the function of each of the discrete lines is also read/write data signals. The function of each of the discrete lines is also
between drive and controller. These lines carry drive, status, control and
in addition to the I/O signals there are various discrete signals going

**Discrete Signals**

Table 8-3 explains all the I/O and bus commands recognized by the drive.

Supply the parameters for the operation.

Lines, the I/O lines define the basic operation to be performed and the bus lines
All commands (excepted until select) are sent to the drive via the I/O and bus signals

**I/O and Bus Signals**

Subsection:
Performing a specific function. Both lines are described in the following
variety of functions while generally the discrete signals work independently each
lines differ in that the I/O and bus signals work in conjunction to perform a
There are two basic types of I/O signals: (1) I/O lines and (2) discrete. The two

I/O lines control the appropriate drive logic. The drive in turn sends information,
I/O signals from the controller initiate and control all drive operations except

**I/O Signal Processing**
<table>
<thead>
<tr>
<th>Function</th>
<th>Bus Bit</th>
<th>Function</th>
<th>Bus Bit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cylinder</td>
<td>7</td>
<td>Drive</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Drive</td>
<td>0</td>
</tr>
</tbody>
</table>

Table 8-3. A Cable Signal Line Functions

 Ud33 and Disk Interface
In order to perform various functions, a 'signal line function' is defined as follows:

<table>
<thead>
<tr>
<th>Function</th>
<th>Bus Bit</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not Used</td>
<td>6</td>
<td>Head Adr 2</td>
</tr>
<tr>
<td>CI/Adr 21</td>
<td>7</td>
<td>Head Adr 2</td>
</tr>
<tr>
<td>Not Used</td>
<td>6</td>
<td>Head Adr 2</td>
</tr>
<tr>
<td>Not Used</td>
<td>5</td>
<td>Head Adr 2</td>
</tr>
</tbody>
</table>

The extended cylinder address bits are strobed with the head select.

Table 8-3. A Signal Line Functions (continued)
<table>
<thead>
<tr>
<th>Function</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>UDC3.</td>
<td>Tag 5 (Extended Status)</td>
</tr>
<tr>
<td>Line is terminated but function not used by single channel drives.</td>
<td></td>
</tr>
<tr>
<td>Release - Releasing dual channel drives from to discussion on Unit Selection.</td>
<td>9</td>
</tr>
<tr>
<td>Reserved and/or Priority selected condition (Refer Data)</td>
<td></td>
</tr>
<tr>
<td>Data Strobe Late - Enables the PlO data</td>
<td>8</td>
</tr>
<tr>
<td>Release - Releasing single channel drives.</td>
<td></td>
</tr>
<tr>
<td>Either than optimum Data Strobe Early - Enables the PlO data</td>
<td>7</td>
</tr>
<tr>
<td>6</td>
<td></td>
</tr>
<tr>
<td>RTZ - Pulse sent to drive to cause actuator to seek to track zero.</td>
<td>6</td>
</tr>
<tr>
<td>Address Mark Enable - Not used.</td>
<td>5</td>
</tr>
<tr>
<td>Summarize Jump Stop.</td>
<td>4</td>
</tr>
<tr>
<td>spindle</td>
<td></td>
</tr>
<tr>
<td>The nominal on Spindle position away from the servo offset Minus. - Offset the actuator from</td>
<td>3</td>
</tr>
<tr>
<td>Bus bit</td>
<td></td>
</tr>
</tbody>
</table>

Table 8.3. A Cable Signal Line Functions (continued)
<table>
<thead>
<tr>
<th>Function</th>
<th>Signal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit Selected</td>
<td></td>
</tr>
<tr>
<td>DC power fault, head select fault, write fault</td>
<td>Fault</td>
</tr>
<tr>
<td>Indications that one or more of these faults exists:</td>
<td></td>
</tr>
<tr>
<td>Indications that drive's write circuits are disabled.</td>
<td>Write Permit</td>
</tr>
<tr>
<td>Not used.</td>
<td></td>
</tr>
<tr>
<td>Indications that unit was unable to complete a read.</td>
<td>Seek Error</td>
</tr>
<tr>
<td>Indications drive has positioned the heads over a cylinder</td>
<td>On Cylinder</td>
</tr>
<tr>
<td>Indications that drive is selected, up to speed, heads are located and no fault exists.</td>
<td>Unit Ready</td>
</tr>
<tr>
<td>Indications that drive is selected, up to speed, controller is master, heads are located and no fault exists.</td>
<td>Unit 1/0</td>
</tr>
<tr>
<td>Used in conjunction with Task 1, 2, and 3 (also used with Unit Select feature).</td>
<td>Bus Bits (0-9)</td>
</tr>
</tbody>
</table>

Table 8-3. A Cable Sense Line Functions (continued)
<table>
<thead>
<tr>
<th>Function</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seek End</td>
<td>Indicates that a seek operation has completed.</td>
</tr>
<tr>
<td>Read Clock</td>
<td>Clock signal derived from NRZ Read Data.</td>
</tr>
<tr>
<td>Read Data</td>
<td>Clock signal derived from the drive's servo.</td>
</tr>
<tr>
<td>Drive</td>
<td>Drive signal depends on the configuration of the disk.</td>
</tr>
<tr>
<td>Sector</td>
<td>Number of sector pulses / revolution of disk pack / drive surface.</td>
</tr>
<tr>
<td>Index</td>
<td>Leading edge of sector is considered leading edge of sector.</td>
</tr>
<tr>
<td>Write Clock</td>
<td>Synchronized to NRZ Write Data, it is a return of the servo signal.</td>
</tr>
<tr>
<td>Write Data</td>
<td>Clock signal derived from the drive's servo.</td>
</tr>
</tbody>
</table>

Table 8-4: Cable Signal Line Functions
applicable boundary) for the next device in the list.
no more devices of that type. Then the utility checks the CSR address (at the
no response at the next address, that space is reserved to indicate that there are
same type as the one before it, and a block is reserved for that device. If there is
CSR for that device type. If there is a device there, it is assumed to be of the
corresponds to the number of devices it employs. The utility then looks at the next
When a device is detected, a block of addresses is reserved for the device
valid address for the next device on the list.
utilized in the system. Each empty block tells Autoconfiguration to look at the next
installed in the system. Each empty block tells Autoconfiguration to look at the next
utilized in the system to be in the order specified by the Device Table. Also, the
address space for the presence of a device. Autoconfiguration expects any devices
address space for the presence of a device. Autoconfiguration expects any devices

A.1

The CSR address for a checking-address device is selected according to the
one type of device will affect the correct assignment of vectors for other devices.
standard, vectors must be assigned in a specific sequence and the presence of
standard, vectors must be assigned in a specific sequence and the presence of
addresses have local interrupts assigned to them. Many of the many
addresses have local interrupts assigned to them. Many of the many
addresses assigned by checking devices or other checking devices. Usually, many
addresses assigned by checking devices or other checking devices. Usually, many
addresses are usually the first register of the block is reserved.
usually the first register of the block is reserved.

A.2

The following discussion presents the algorithm for assignment of checking
The following discussion presents the algorithm for assignment of checking

Determination of the CSR Address for use with Autoconfiguration

A.3

Addresses and vectors for all DEC operating systems. Thus addresses are
Addresses and vectors for all DEC operating systems. Thus addresses are

A.4

Overview

A.5

Appendix A

Autoconfiguration, CSR and Vector Addresses
The first two devices of this type have a fixed address. Any extra devices have a loathing address.

The first device of this type has a fixed address. Any extra devices have a loathing address.

### Table A-1. SYSGEN Device Table

<table>
<thead>
<tr>
<th>Device</th>
<th>Modulus</th>
<th>Registers</th>
<th>Number of</th>
<th>Modulus</th>
<th>Registers</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Device</th>
<th>Modulus</th>
<th>Registers</th>
<th>Number of</th>
<th>Modulus</th>
<th>Registers</th>
<th>Number of</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
<td>Rank</td>
</tr>
</tbody>
</table>

Determining the CSR Address for use with Autocoupling
Autoconfigure

Determining the Vector Address for use with Autoconfigure

A.3

1. Devices with Autoconfiguring address space:

   In summary, there are four rules that pertain to the assignment of device
   addresses in Autoconfiguring address space:

   1. The CSR address for a given device type is assigned on word boundaries.
   2. The following table relates the number of device registers to possible
      word boundaries:

      | Device Registers | Possible Boundaries |
      |-------------------|--------------------|
      | 1                 | Any Word           |
      | 2                 | XXXXXXXxXXXXXX4    |
      | 3                 | XXXXXXXxXXXXXX0    |
      | 4                 | XXXXXXXxXXXXXX00   |
      | 8                 | XXXXXXXX'0'XXXXX40 |

   3. An 8-byte gap must follow the register block of any installed device.
   4. On 8-byte gap must be reserved in Autoconfigure address space for each device.

   4. The Autoconfigure utility inspects for a given device type only the one of
      the possible boundaries for that device. That is, the utility does not look
      for a DNET (16 registers) on address that ends in 20.

   2. The CSR address for a given device type is assigned on word boundaries.

   1. The following table relates the number of device registers to possible
      word boundaries:

      | Device Registers | Possible Boundaries |
      |-------------------|--------------------|
      | 1                 | Any Word           |
      | 2                 | XXXXXXXxXXXXXX4    |
      | 3                 | XXXXXXXxXXXXXX0    |
      | 4                 | XXXXXXXxXXXXXX00   |
      | 8                 | XXXXXXXX'0'XXXXX40 |

   2. The following table relates the number of device registers to possible
      word boundaries:

      | Device Registers | Possible Boundaries |
      |-------------------|--------------------|
      | 1                 | Any Word           |
      | 2                 | XXXXXXXxXXXXXX4    |
      | 3                 | XXXXXXXxXXXXXX0    |
      | 4                 | XXXXXXXxXXXXXX00   |
      | 8                 | XXXXXXXX'0'XXXXX40 |

   3. An 8-byte gap must follow the register block of any installed device.

   4. An 8-byte gap must be reserved in Autoconfigure address space for each device.

   Determining the Vector Address for use with Autoconfigure
<table>
<thead>
<tr>
<th>Module Numer</th>
<th>Modulus Octal</th>
<th>Vectors</th>
<th>Device</th>
<th>Bank</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>2</td>
<td>LPII</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>KMCII</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DZ3</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DZ1II/DZ1II</td>
<td>27</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DMRII</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DMCII</td>
<td>26</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DWN</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>TKI-A</td>
<td>24</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>+ Modern control</td>
<td>23</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DTII</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DTII-DTII</td>
<td>22</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>KWI11-M, KWI11</td>
<td>20</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>LSII</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>4</td>
<td>VSI1</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>4</td>
<td>V140</td>
<td>17</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DHII</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1-C to DII1-F</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1</td>
<td>13</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1</td>
<td>12</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DII1</td>
<td>11</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>2</td>
<td>PAGII (reader + punch)</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DRII-C, DRII</td>
<td>9</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DRII-A, DRII-B</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DHI11 modern control</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DMM1-B/BBA</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DMM1-A</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DPII</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>1</td>
<td>DPL1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DLI11-DLI11-P1</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DLI11-P1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>KLI1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>TUS5</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>2</td>
<td>DCC1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Determine the Vectors for use with Autocounter.

Table A-2. Priority Ranking for Placing Vector...
Table A.2: Priority Ranking for Floating Vectors Addresses

Determining the Vector Address for use with Autoconfigure
Table A.3 contains an example of a system configuration that includes devices with fixed addresses and tables. Table A.4 shows how the device addresses for the hosted devices deviate from the base address of each. Therefore, the table indicates the header and byte for each device. The device address for each device is relative to the base address. The table indicates the header and byte for each device. The device address for each device is relative to the base address.
<table>
<thead>
<tr>
<th>Address</th>
<th>Device</th>
<th>Installed</th>
</tr>
</thead>
<tbody>
<tr>
<td>0x7c0600</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0700</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0800</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0900</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0a00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0b00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0c00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0d00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0e00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c0f00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1000</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1100</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1200</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1300</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1400</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1500</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1600</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1700</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1800</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1900</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1a00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1b00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1c00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1d00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1e00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c1f00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2000</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2100</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2200</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2300</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2400</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2500</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2600</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2700</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2800</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2900</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2a00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2b00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2c00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2d00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2e00</td>
<td>cap</td>
<td></td>
</tr>
<tr>
<td>0x7c2f00</td>
<td>cap</td>
<td></td>
</tr>
</tbody>
</table>

Table A-4. Floating CSR Address Assignment Example
<table>
<thead>
<tr>
<th>PROM Location</th>
<th>PROM Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>U59</td>
<td>E93</td>
</tr>
</tbody>
</table>

The surface of the PROM has two rows of pins. To release the PROM from its socket, press the PROM at its ends using your thumb and forefinger and bend one of the pins inward. If the two rows of PROM pins are too far apart, no pins are bent or misaligned. Make certain that the PROM is firmly seated and that the UDMA PROM is located in the socket at U59. Remove the existing PROM.

The UDMA PROM is located in the socket at U59. Remove the existing PROM.

Exchanging PROMs

B.2

This appendix provides instructions for replacing the UDMA PROM.

B.4

Overview
Parameter Values

If you are looking for a specific parameter value, find the parameter value shown in the table below. Then read the section on the appropriate drive. To use the table, locate the name of your drive along the top of the table. Then read down the column beneath the drive name for the parameter values.

Values are listed in decimal and entered in hexadecimal. Parameter values are based on one spare sector per track with no logical spils. Values are entered in each drive control card. Parameters values in these examples are displayed by the diagnostic.

C.4

<table>
<thead>
<tr>
<th>Disk Drive Configuration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix C</td>
</tr>
<tr>
<td>PARAMETER</td>
</tr>
<tr>
<td>-------------------------</td>
</tr>
<tr>
<td>Type Code</td>
</tr>
<tr>
<td>Number of Units</td>
</tr>
<tr>
<td>Physical Sectors</td>
</tr>
<tr>
<td>per Track</td>
</tr>
<tr>
<td>Physical Heads</td>
</tr>
<tr>
<td>Physical Cylinders</td>
</tr>
<tr>
<td>Spare Sectors</td>
</tr>
<tr>
<td>per Track</td>
</tr>
<tr>
<td>Spare Cylinders</td>
</tr>
<tr>
<td>Configuration Bits</td>
</tr>
<tr>
<td>Lower Limit (RPS)</td>
</tr>
<tr>
<td>Upper Limit (RPS)</td>
</tr>
<tr>
<td>Split Code&lt;sup&gt;1&lt;/sup&gt;</td>
</tr>
<tr>
<td>Head Offset&lt;sup&gt;2&lt;/sup&gt;</td>
</tr>
<tr>
<td>Removable Media Flag</td>
</tr>
<tr>
<td>Gap 0 Parameter&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Gap 1 Parameter</td>
</tr>
<tr>
<td>Gap 2 Parameter&lt;sup&gt;3&lt;/sup&gt;</td>
</tr>
<tr>
<td>Spiral Offset</td>
</tr>
<tr>
<td>Bytes/Sector</td>
</tr>
</tbody>
</table>

1. Single logical/Split logical (see Appendix D)
2. Required only when Split Code is not 0.
3. Value has changed from previous manuals but still compatible with old values and does not require reformatting disk.

NOVRAM setting/Drive setting

(continued on next page)
<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>CDC 9720-1230</th>
<th>CDC 9771 XMD</th>
<th>CDC 9772 XMD</th>
<th>CDC 9772-13 XMD</th>
<th>CDC 315</th>
<th>FUJITSU 2298</th>
<th>FUJITSU 2321/22</th>
<th>FUJITSU M2333</th>
<th>FUJITSU M2351A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Code</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of Units</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physical Sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per Track</td>
<td>86</td>
<td>85</td>
<td>85</td>
<td>85</td>
<td>35</td>
<td>69</td>
<td>34</td>
<td>68</td>
<td>48</td>
</tr>
<tr>
<td>Physical Heads</td>
<td>15</td>
<td>16</td>
<td>16</td>
<td>19</td>
<td>19</td>
<td>16</td>
<td>16</td>
<td>5/10</td>
<td>10</td>
</tr>
<tr>
<td>Physical Cylinders</td>
<td>1635</td>
<td>1024</td>
<td>1064</td>
<td>1420/1248*</td>
<td>821/823*</td>
<td>1024</td>
<td>823</td>
<td>823</td>
<td>842</td>
</tr>
<tr>
<td>Spare Sectors</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>per Track</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Spare Cylinders</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Configuration Bits</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
</tr>
<tr>
<td>Lower Limit (RPS)</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>4</td>
<td>1</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Upper Limit (RPS)</td>
<td>8</td>
<td>7</td>
<td>10</td>
<td>10</td>
<td>4</td>
<td>7</td>
<td>4</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>Split Code(^1)</td>
<td>0</td>
<td>0/2</td>
<td>0/2</td>
<td>0/2</td>
<td>0</td>
<td>0/2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Head Offset(^2)</td>
<td>0</td>
<td>–/8</td>
<td>–/8</td>
<td>–/9</td>
<td>–</td>
<td>–/8</td>
<td>–</td>
<td>–</td>
<td>–</td>
</tr>
<tr>
<td>Removable Media Flag</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gap 0 Parameter(^3)</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>259</td>
<td>259</td>
<td>259</td>
<td>259</td>
<td>259</td>
</tr>
<tr>
<td>Gap 1 Parameter</td>
<td>2827</td>
<td>2827</td>
<td>2827</td>
<td>2827</td>
<td>4112</td>
<td>4112</td>
<td>4112</td>
<td>4112</td>
<td>4112</td>
</tr>
<tr>
<td>Gap 2 Parameter(^3)</td>
<td>777</td>
<td>777</td>
<td>777</td>
<td>777</td>
<td>780</td>
<td>780</td>
<td>780</td>
<td>780</td>
<td>780</td>
</tr>
<tr>
<td>Spiral Offset</td>
<td>1</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>Bytes/Sector</td>
<td>585</td>
<td>587</td>
<td>587</td>
<td>587</td>
<td>576</td>
<td>593</td>
<td>586</td>
<td>587</td>
<td>594</td>
</tr>
</tbody>
</table>

1 Single logical/Split logical (see Appendix D)
2 Required only when Split Code is not 0.
3 Value has changed from previous manuals but still compatible with old values and does not require reformatting disk.
4 This drive has a modified 85-sector setting. Sector switches should be set as follows: SW-556 - 3 ON, all others OFF; SW-563 - 3 ON, all others OFF.

* Depends on drive model.

(continued on next page)
<table>
<thead>
<tr>
<th>PARAMETER</th>
<th>FUJITSU M2361A</th>
<th>NEC 2352</th>
<th>NEC 2362</th>
<th>NEC 2363</th>
<th>TOSHIBA MK-186FB</th>
<th>TOSHIBA MK-286FC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type Code</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Number of Units</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Physical Sectors per Track</td>
<td>68</td>
<td>63</td>
<td>71</td>
<td>71</td>
<td>32</td>
<td>69</td>
</tr>
<tr>
<td>Physical Heads</td>
<td>20</td>
<td>19</td>
<td>23</td>
<td>27</td>
<td>5</td>
<td>11</td>
</tr>
<tr>
<td>Physical Cylinders</td>
<td>842</td>
<td>760</td>
<td>850</td>
<td>1024</td>
<td>823</td>
<td>823</td>
</tr>
<tr>
<td>Spare Sectors per Track</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Spare Cylinders</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td>Configuration Bits</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
<td>06</td>
</tr>
<tr>
<td>Lower Limit (RPS)</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>4</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Upper Limit (RPS)</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>10</td>
<td>7</td>
<td>7</td>
</tr>
<tr>
<td>Split Code&lt;sup&gt;1&lt;/sup&gt;</td>
<td>0/2</td>
<td>0</td>
<td>0/2</td>
<td>0/2</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Head Offset&lt;sup&gt;2&lt;/sup&gt;</td>
<td>~110</td>
<td>~12</td>
<td>~12</td>
<td>~14</td>
<td>~</td>
<td>~</td>
</tr>
<tr>
<td>Removable Media Flag</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gap 0 Parameter&lt;sup&gt;3&lt;/sup&gt;</td>
<td>259</td>
<td>261</td>
<td>261</td>
<td>261</td>
<td>259</td>
<td>259</td>
</tr>
<tr>
<td>Gap 1 Parameter</td>
<td>4112</td>
<td>2827</td>
<td>2827</td>
<td>2827</td>
<td>4112</td>
<td>4112</td>
</tr>
<tr>
<td>Gap 2 Parameter&lt;sup&gt;3&lt;/sup&gt;</td>
<td>780</td>
<td>777</td>
<td>777</td>
<td>777</td>
<td>780</td>
<td>780</td>
</tr>
<tr>
<td>Spiral Offset</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bytes/Sector</td>
<td>594</td>
<td>576</td>
<td>576</td>
<td>576</td>
<td>630</td>
<td>599</td>
</tr>
</tbody>
</table>

<sup>1</sup> Single logical/Split logical (see Appendix D)

<sup>2</sup> Required only when Split Code is not 0.

<sup>3</sup> Value has changed from previous manuals but still compatible with old values and does not require reformatting disk.
Special Considerations for Large Capacity Drives

Appendix D

Special Considerations for Large Capacity Drives
4. If the number of usable blocks is less than the limit for your operating system, the number of usable blocks for a CDC 3771 exceeds the limit for the RSM-11M, RSM-11M-PLUS, and RSM/EP operating systems.

3. If the number of usable blocks is greater than the limit for your operating system, you may either limit the drive capability of split drives into logical units that do not exceed the operating system limits.
Please send me the current copy of the Controller Handbook which contains the information on the remainder of EMULEX.

What features are most useful?

Is it easy to use?

What is your general reaction to this manual? In your judgment is it complete, accurate, well organized, well written, etc.?

Re: Manual Part Number

Your comments and suggestions will help us in our continuous effort to improve the quality and usefulness of EMULEX controllers products.

Attention: Customer Services
Costa Mesa, CA 92626
P.O. Box 6527
3355 Harbor Boulevard
Emulex Corporation

Additional copies of this document are available from:

__________________________
Department

__________________________
Company

__________________________
Title

__________________________
Name

__________________________
City

__________________________
State/County

__________________________
Zip

Please send me the current copy of the Controller Handbook which contains the information on the remainder of EMULEX.

What faults or errors have you found in the manual?

Why?

Does it satisfy your needs?

Does this manual satisfy the need you think it was intended to satisfy?