

EY-1170E-SG-01P1

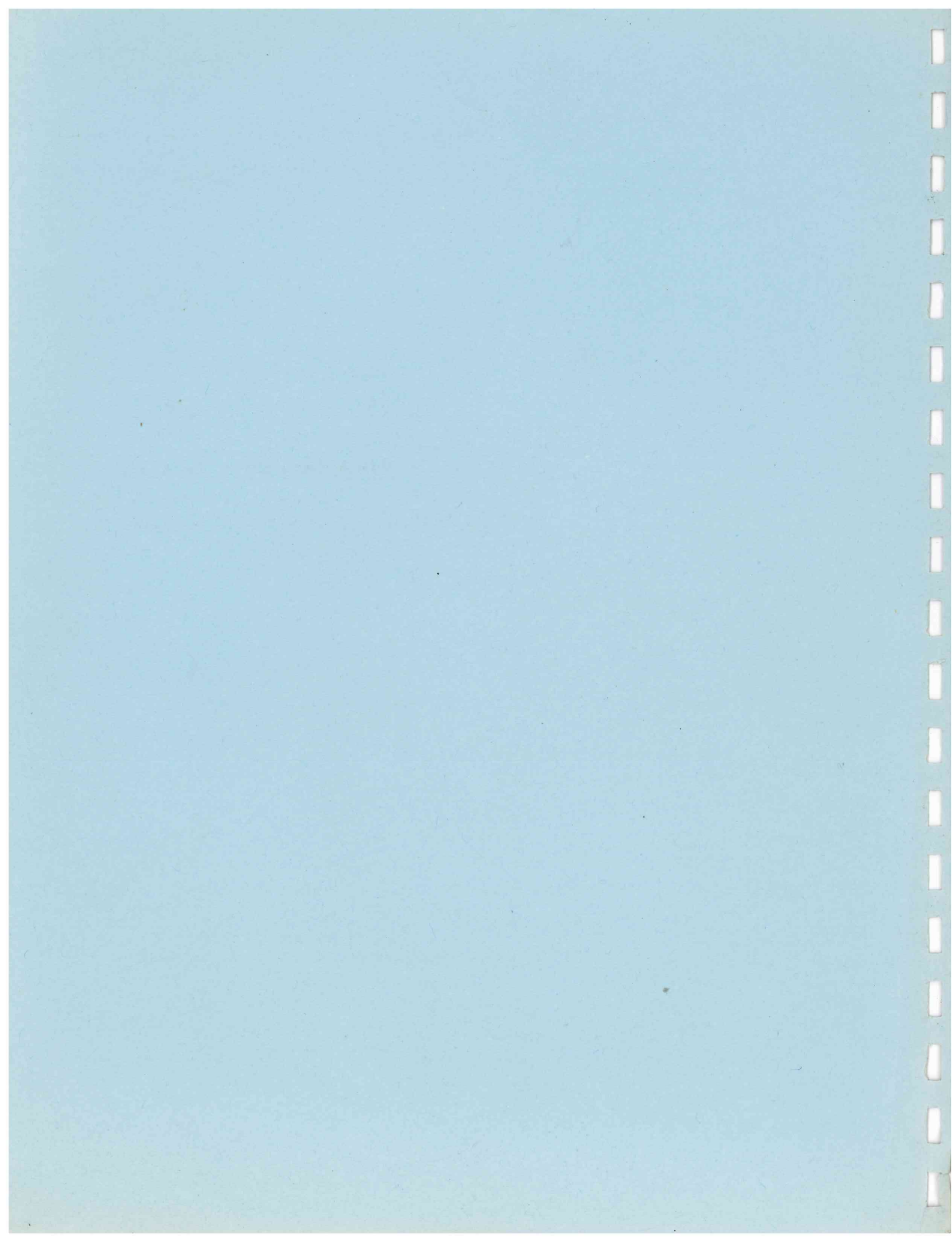
HSC50

LEVEL I MAINTENANCE COURSE WORKBOOK
VOLUME I

A Part of Course EY-1170E-V0-VUP1

PRELIMINARY COPY

digital



EY-1170E-SG-01P1

HSC50 LEVEL I MAINTENANCE

COURSE WORKBOOK VOLUME I

A Part of Course EY-1170E-V0-VUPl

PRELIMINARY COPY

Prepared by Educational Services

Digital Equipment Corporation

First Edition, June 1983

Copyright (c) 1983 by Digital Equipment Corporation

All Rights Reserved

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

Digital Equipment Corporation assumes no responsibility for any errors which may appear in this manual.

Printed in U.S.A.

Class A Computing Devices

Notice: This equipment generates, uses, and may emit radio frequency energy. The equipment has been type tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules which are designed to provide reasonable protection against such radio frequency interference when operated in a commercial environment. Operation of this equipment in a residential area may cause interference in which case the user, at his own expense, may be required to take measures to correct interference.

The following are trademarks of Digital Equipment Corporation, Maynard, Massachusetts:

Dec	DECnet	OMNIBUS
DECUS	DECsystem-10	OS/8
DIGITAL	DECSYSTEM-20	PDT
Digital Logo	DECwriter	RSTS
PDP	DIBOL	RSX
UNIBUS	EduSystem	VMS
VAX	IAS	VT
UDA50	MASSBUS	HSC50
RA80	RA80	RA60

CONTENTS

Page

COURSE GUIDE

Introduction	1
Course Description	1
Prerequisites	3
Course Resources	3
Personal Progress Plotter	4

HSC50 GLOSSARY

Analytical Diagnostics	7
Attention	7
Automatic Diagnostics	7
Auxiliary Terminal	7
Available	7
CI20	8
CI780	8
Class Driver	8
Cluster	8
Communications Server	9
Compute Server	9
Computer Interconnect	9
Control Bus	10
Control Memory	10
Control Program	10
Cronic	10
Cyclic Redundancy Check	11
Data Channel	11
Data Bus	11
Data Memory	12
Disk Backup	12
Disk Data Channel Module	12
Disk Shadowing	12
Digital Storage Architecture	13
Error Correction Code	13
Error Detection Code	14
Ethernet	14
Hand-Held Terminal	14
HSC50	14
In-Line Diagnostics	15
Input/Output Control Processor Module	15
I/O Server	15
K	15
K.ci	15

K.pli Module	15
K.sdi Module	16
K.sti Module	16
Local Area Network	16
Local Terminal	16
Maintenance Terminal	16
Mass Storage Server	16
Mass Storage Control Protocol	17
Modularity Connectors	17
Network Interconnect	17
Nodes	17
Off-Line	18
Off-Line Diagnostics	18
On-Line	18
Periodic Diagnostics	18
P.ioc Module	18
PILA	18
Port	18
Port Buffer Module	19
Port Driver	19
Port Link Module	19
Port Processor Module	19
Program Memory	20
Pseudo Terminal	20
Read/Write Ready	20
Receiver Ready	21
Requestor	21
Restore	21
Server	21
Standard Disk Interface	22
Standard Tape Interface	22
SDI/STI Connectors	22
Star Coupler	22
System Communications Architecture	23
System Interconnect	23
System Tape	23
Tape Data Channel Module	23
UDA50	24
Unavailable	24
Utilities	24

COURSE GUIDE

INTRODUCTION

The HSC50 Level I Maintenance Course is a self-paced instruction (SPI) course which contains a videotape and a student workbook.

This course is designed to give you the necessary knowledge to maintain the HSC50 mass-storage controller. It is also designed to familiarize you with the HSC50 Maintenance Guide.

If you have never taken a SPI course, you can get valuable information from the pamphlet How to Take A Self-Paced Course (EY-DX037-ID-001). This pamphlet may be ordered from the Educational Services Distribution Center, Brookside Industrial Park, 12A Esquire Road, North Billerica, Massachusetts 01821.

This course only covers the theory of operation of the HSC50 to a basic block diagram level. No prints are used, nor are any ROM listings consulted. The course also has no laboratory exercises or projects. Working at your own speed, it should take you less than five hours to complete it.

This course is a preliminary version designed to cover early training needs. At some time in the near future, the course will be converted into an Interactive Video Information System (IVIS) format.

COURSE DESCRIPTION

This course is divided into eight modules. You should work through each module by performing the following functions.

- Reading the module introduction and objectives
- Watching a videotape lesson and/or reading the module text
- Reading the module summaries
- Completing the lesson exercises

Course Guide

The following paragraphs describe the eight modules found in this course.

Module 1

Key Features/Physical Description - describes what the HSC50 looks like, how to gain access to the field replaceable units (FRUs), and what each FRU does. This video module should take approximately 20 minutes to complete.

Module 2

HSC50 Block Diagram Description - describes the overall concepts of HSC50 operation. A block diagram is used as the vehicle for showing an entire subsystem. This written module should take approximately 30 minutes to complete.

Module 3

HSC50 Switches and Indicators - describes the function of each switch on the operator control panel as well as those found inside the HSC50. This video module should take approximately 30 minutes to complete.

Module 4

TU58 Operation - describes how to use the TU58 tape drive in the HSC50. Cartridge handling, loading, and care are also described. This video module should take approximately 15 minutes to complete.

Module 5

HSC50 Installation - covers the major points of installing an HSC50 on a system. This written module should take approximately 20 minutes to complete.

Module 6

Removal and Replacement Procedures - describes the procedures for the removal and replacement of HSC50 FRUs. This video module should take approximately 35 minutes to complete.

Module 7

HSC50 Diagnostic and Utility Programs - describes how to run the HSC50 diagnostics using a local terminal. This written module should take approximately 45 minutes to complete.

Module 8

HSC50 Troubleshooting - describes how to troubleshoot the HSC50 using a flowchart found in the workbook. This written module should take approximately 30 minutes to complete.

PREREQUISITES

The HSC50 Level I Maintenance Course student should have completed the VAX Concepts Course (JA035-A), the Intro to VMS Course (J5193-A), and the CI Concepts Course. In addition, the student should take an SDI disk and/or SDI tape transport course. The tape or disk course(s) should be taken just prior to or following the HSC50 course.

If you do not meet these prerequisites, contact your course administrator.

COURSE RESOURCES

The following resources are required for you to successfully complete this course.

- HSC50 User Guide EK-HSC50-UG
- HSC50 Installation Manual EK-HSC50-IN
- HSC50 Service Manual EK-HSC50-SV
- HSC50 Maintenance Guide AA-P672A-TK
- SC008 Star Coupler User Guide EK-SC008-UG

Course Guide

HSC50 Level I Maintenance Course

PERSONAL PROGRESS PLOTTER

MODULES	DATE ACHIEVED	INITIALS
Key Features/ Physical Description		
Block Diagram		
Switches/Indicators		
TU58 Operation		
Installation		
Removal/Replacement		
Diagnostics/Utilities		
Troubleshooting		

HSC50 GLOSSARY

ANALYTICAL DIAGNOSTICS

These diagnostics are part of the HSC50 diagnostic organization. These diagnostics interpret error conditions in the HSC50 as they arise and make decisions whether to run any of the in-line continuous diagnostics for failure analysis.

ATTENTION

The ATTENTION message originates from a storage device to its controller or from the controller to the host CPU. These messages serve as an indication of some condition that should be brought to the attention of the higher ranking authority (the mass-storage controller or host CPU).

AUTOMATIC DIAGNOSTICS

Automatic diagnostics are part of the HSC50 in-line diagnostic selection. Automatic diagnostics are executed when the analytical diagnostics have detected an unacceptable level of errors.

Periodic diagnostics are also automatic diagnostics. Periodic diagnostics run as a result of logic timers monitoring the use of different logic areas. See periodic diagnostics.

AUXILIARY TERMINAL

This is a type of maintenance terminal used on the HSC50. The auxiliary terminal is generally dedicated to the use of the HSC50 and connects to an EIA plug at the rear of the cabinet. The auxiliary terminal may be any EIA-compatible terminal set at 9600 baud. This terminal is used to enter or display operating parameters for the HSC50 and to call in various diagnostics.

AVAILABLE

AVAILABLE is one of the states of a mass-storage device used on the SDI/STI bus. The device is considered AVAILABLE to both controllers when powered on but not on line to either of the controllers in a dual-controller configuration. The device is incapable of executing any on-line command until brought on line by one of the controllers.

CI20

The CI20 is the hardware that interfaces the DECsystem 2060 CPU to the computer interconnect (CI) bus. This enables the 2060 to communicate with other CI nodes (I/O, computing and communication servers).

CI780

The CI780 is the hardware that interfaces the VAX 11/780 CPU to the computer interconnect (CI) bus. This enables the 11/780 to communicate with other CI nodes (I/O, computing and communication servers).

CLASS DRIVER

A class driver is an operating system software package (or program) that takes the place of several individual device-dependent driver packages. These packages handle a generic class of devices such as all disks or all tapes. Systems using Mass Storage Control Protocol (MSCP) do not need the operating system software upgraded each time a new mass storage device is added to the system.

Class drivers are responsible for generating the MSCP command messages sent to the various types of servers. The class drivers also interpret the MSCP responses from the servers. The term class driver then refers to the software that handles random access disks (disk class driver) or serial access tapes (tape class driver).

CLUSTER

A cluster is a group of related nodes that make up a distributed data processing configuration. A node can be a CPU or an I/O server. In the case of a CI cluster, it is an arrangement of nodes using the SC008 Star Coupler as a common connection point.

COMMUNICATIONS SERVER

This term is part of the system interconnect architecture. It is a hardware/software combination that performs the function of managing the communications side of a computer system. Communications servers can be:

- Terminal and unit record servers that connect to multiple DECnet systems on the Network Interconnect (NI, also known as ETHERNET).
- Routers that connect remote DECnet systems or other local area networks.
- Gateways that connect DECnet-based local area networks to foreign networks.

There are three types of servers in the system interconnect scheme: computing, I/O, and communications.

Communications servers offload functions from the central computer/software combination. The communications duties and the capabilities they provide can be shared by the host systems on the Local Area Network.

COMPUTE SERVER

This term is part of the system interconnect architecture. It is a hardware/software combination that manages the computation side of a computer configuration. There are three types of servers: I/O, communications, and computing.

COMPUTER INTERCONNECT (CI)

The Computer Interconnect is one of two standard interconnects used with the system interconnect architecture. The Network Interconnect (NI, also known as ETHERNET) is the other.

The Computer Interconnect is a serial bus used by Digital Equipment Corporation to interconnect various types of computing, communications and I/O servers. Physically, the bus contains one transmit line and one receive line. The CI is usually configured as a dual bus; that is, two transmit and two receive lines. This is to assure dependability.

HSC50 Glossary

The CI bus transmits Mass Storage Control Protocol (MSCP) messages to I/O servers. DECnet and DUP are two other examples of protocol used on the CI bus.

CONTROL BUS

Control bus is a path used by the various HSC50 modules to communicate with control memory. The bus is a 6-2/3 MB per second pathway that is multiplexed between the various memory requestors.

CONTROL MEMORY

Control memory is a part of the L0106 memory module used in the HSC50. This section of memory is accessed by way of the control bus. Control memory is a portion (128kb) of the available storage space on the module and is used to store the parameters of the data transfer to be accomplished. These parameters include such things as:

- The data transfer command (read or write)
- The disk or tape that is to be accessed
- The location on the disk to be accessed
- The amount of data to be transferred

Control memory has byte parity protection. Those sections of control memory containing errors are not used. There are two other sections to the HSC50 memory module: data memory and program memory.

CONTROL PROGRAM

This is a software package written for the HSC50. This program is stored on the system tape and is loaded into program memory by a TU58. This program is responsible for governing all HSC50 operations. Another name for this program is CRONIC.

CRONIC

CRONIC is the name for the HSC50 control program. The control program is found on the HSC50 system tape. CRONIC contains the programming instructions that enable the HSC50 to operate.

CYCLIC REDUNDANCY CHECK (CRC)

Cyclic redundancy check refers to a checkword that is generally appended to a group of data. This type of checkword is used to validate the data after it has been transferred to the receiving device. Each MSCP message, for example, contains a CRC checkword to assist the receiving device in determining that the transferred MSCP message is accurate.

Another example is that of a CRC word being appended to the end of a disk sector to detect errors in reading. The code is created using an algorithm such that each combination of bits in a sector creates a unique code. The code is written at the end of the sector during a data write operation. The code is regenerated during the read process and compared to the code that is found at the end of the sector. If the read process is found to be accurate, then the two codes are equal.

EDC and ECC are two examples of a CRC checkword. These two checkwords are used by the DSA disks.

DATA CHANNEL

This is a term representing the data path to a mass-storage device in the HSC50. It consists of the module, the SDI or STI bus, and the device. The module is either a disk data channel module or a tape data channel module. These modules have microprocessor-based intelligence built in and can handle up to four ports each.

Four TA78 magtape formatters may be cabled to one tape data channel module in the HSC50. Each TA78 formatter in turn may handle up to four TU78 transports.

The disk data channel may handle up to four SDI disk drives, such as the RA81 and RA60.

DATA BUS

The data bus is a pathway between modules to the data memory in the HSC50. It is a 13-1/3 MB per second time-multiplexed bus that permits reading, writing, and non-memory access (NMA) cycles.

DATA MEMORY

Data memory is a portion of the L0106 memory module used on the HSC50. This portion contains 128kb of memory space to accommodate data during a data transfer command. All data going to or coming from the peripheral devices pass through the data memory. There are two other sections to the memory module: control memory and program memory. Data memory has byte parity protection and EDC. Those sections of data memory containing errors are not used.

DISK BACKUP

Disk backup is the copying of information from disk to tape or disk to disk to prevent loss in the event of a fatal disk failure. In the HSC50, backup is done at a low-level priority so as not to interfere with the operation of the HSC50. In the HSC50, backup can be done off-line to the cluster; e.g., neither the CI bus nor the host memory gets involved with the backup. The HSC50 handles the entire operation between the disk and the tape.

DISK DATA CHANNEL MODULE

This module is also known as a K.sdi module in the HSC50. It represents part of a complete data path (data channel) to the mass-storage device. Numerically, it is an L0108-YA module. The backplane position of this module depends upon the system configuration. Refer to the label on the HSC50 for a correlation between the backplane position, requestor value, and bulkhead connector location.

This module has the responsibility of controlling the data transfers between HSC50 memory and the selected disk drive. It also interfaces the HSC50 to the SDI bus through four discrete ports.

DISK SHADOWING

Disk shadowing is the writing of real-time data to two or more disks simultaneously. These disks are physically distinct but logically identical. This provides redundancy to protect the user data base in the event of a failure in one of the disks. Reading can occur from any of the disks in the shadow set.

DIGITAL STORAGE ARCHITECTURE (DSA)

DSA is the name of Digital Equipment Corporation's family of peripheral controllers and mass storage devices that exhibit the characteristics described in the following list:

- Physical I/O management is handled by an intelligent controller instead of the host CPU.
- A system can be reconfigured or newer devices added without having to change the host software.
- The communications protocol used between the host CPU and the controller is standard across all device types. These commands and their responses are part of the Mass Storage Control Protocol (MSCP). The communication mechanism that delivers the MSCP messages is not a limiting factor. As an example, the UDA50 controller connects with a UNIBUS while the HSC50 controller is used with the CI bus.
- The communications protocol between the controller and the mass storage devices is also standard. These commands and their responses are part of the standard disk interface (SDI) for all disk drive types. These commands and responses are part of the standard tape interface (STI) for all tape subsystems.

ERROR CORRECTION CODE (ECC)

ECC is a cyclic code appended to the end of a data field used to detect and assist in correcting bad data. The code is generated using an algorithm and is written on the media following the data to be checked (as in the CRC). During the read process, the logic regenerates the code and compares it to the code on the media. Codes that do not match trigger logic to calculate the location of the errors and, in some cases, actually correct them. In non-DSA disks the host software must gather the information and do the correction.

In DSA disk drives, the ECC is 170 bits long. This error correction code has the capability to correct up to eight independent error bursts. Each of these bursts may be up to ten bits in length and occur anywhere within a disk sector.

ERROR DETECTION CODE (EDC)

An error detection code is a class of code appended to the data on the media for the purpose of detecting read errors. CRC and ECC codes are two examples of error detection codes. In one case, the code is only capable of detecting errors (CRC). In the other, the code not only can detect, but is capable of correcting errors as well (ECC).

In the HSC50 and UDA50 controllers, an EDC code is calculated and appended to the data as soon as it arrives from the host. This EDC travels with the data throughout all the HSC50 buffers and is written on the disk with the data. Conversely, during read operations, the EDC is read from the disk and checked by the data channel. When the host obtains the data from data memory, the EDC is checked again.

ETHERNET

ETHERNET is the industry standard term for DIGITAL's Network Interconnect. (NI).

HAND-HELD TERMINAL (HHT)

The HHT is a 300-baud terminal used by field service for maintenance on the RA81, RA60, and HSC50. The HHT is called the maintenance terminal in the HSC50. The terminal is used to input diagnostic commands or change the operating parameters of the HSC50. This terminal may be found in the CD kit and connects to the HSC50 through the maintenance access panel.

HSC50

The HSC50 is an intelligent mass-storage controller used on the Computer Interconnect (CI) bus. The controller is capable of handling both tapes and disks simultaneously. The HSC50 is a part of the System Interconnect Architecture and DIGITAL Storage Architecture. The controller is characterized by removing the burden of I/O management from the CPU to itself. By performing as an I/O manager, the HSC50 can be classified as an I/O server.

IN-LINE DIAGNOSTICS

In-line diagnostics are a class of diagnostics that can be run while the HSC50 is operating in an on-line capacity to the cluster. Some of these diagnostics are run as automatic diagnostics. Some of the in-line diagnostics are called in with the maintenance terminal.

INPUT/OUTPUT CONTROL PROCESSOR MODULE

This is a module used on the HSC50. It is sometimes referred to as the P.ioc module. This module has the primary responsibility for controlling the internal operations of the HSC50. The module logic contains a PDP-11 processor that operates from a control program located in program memory of the HSC50 memory module. This program is loaded from a TU58 cartridge.

I/O SERVER

I/O server is also known as mass storage server. It represents the hardware/software that manages I/O operations for a host computing system. The HSC50 is an example of an I/O Server.

K

This is an HSC50 term used to denote any module designated with a K; for example, K.sdi. This is PMS computer notation indicating an interface or controller.

K.CI

This is an HSC50 engineering term used to denote the three module set known as the CI Host Interface. The three modules are:

1. Port processor module
2. Port buffer module
3. Port link module

K.PLI MODULE

This is an HSC50 module used in the CI host interface set (K.ci). The K.pli is also known as the port processor module.

HSC50 Glossary

K.SDI MODULE

This is also known as the disk data channel module in the HSC50.

K.STI MODULE

This is also known as the tape data channel module in the HSC50.

LOCAL AREA NETWORK

A local area network is a cluster of servers communicating over the Network Interconnect.

LOCAL TERMINAL

This is a term used to differentiate between two classes of terminals used on the HSC50: the terminal serving one of the hosts on the cluster (see pseudo terminal) and the terminal connected directly to the HSC50 (local). The local terminal may be a maintenance (hand-held) terminal or an auxiliary terminal.

MAINTENANCE TERMINAL

The maintenance terminal is another word representing the auxiliary terminal or the hand-held terminal (HHT). This terminal is used to input diagnostic commands or to change operating parameters. The auxiliary terminal may be any EIA-compatible terminal set at a 9600 baud rate. A connector is found at the rear of the HSC50 cabinet for the use of an auxiliary maintenance terminal.

The maintenance terminal may also be a field service hand-held terminal that is normally found in the controlled distribution (CD) kit. This terminal is set for 300 baud only and cables to the HSC50 at the maintenance access panel.

MASS STORAGE SERVER

Mass storage server is a type of I/O server. It represents a hardware/software combination that performs the function of managing I/O operations for a host computer system. The HSC50 is an example of an I/O server for mass storage.

MASS STORAGE CONTROL PROTOCOL (MSCP)

MSCP is a type of communications protocol used primarily by Digital Storage Architecture devices. Two such examples are the UDA50 and HSC50 mass-storage controllers. This protocol enables communication to take place between an I/O server and a compute server.

MODULARITY CONNECTORS

These connectors are found in the SC008 Star Coupler. Their purpose is to jumper Star Coupler panels together. By jumpering the panels together, parallel, redundant paths for the CI can be created.

NETWORK INTERCONNECT (NI)

The NI is one of the two standard interconnects used in the System Interconnect Architecture. The Computer Interconnect (CI) is the other. The CI bus connects mass storage and compute servers for high-speed interprocessor communications and data transfer. The NI connects communications servers and compute servers creating a local area network. The Network Interconnect is also known as ETHERNET.

NODES

Nodes are entities within a computing configuration. Nodes may be individual processors, intelligent data communications equipment, or intelligent controllers (such as the HSC50). The total system may have multiple host processors.

With the System Interconnect Architecture, CPUs are called compute servers. The intelligent controllers are called mass-storage servers, and the data communications equipment are called communications servers.

A system configuration using the CI bus structure can contain up to sixteen nodes. The SC008 Star Coupler is used as the connecting device.

HSC50 Glossary

OFF-LINE

This term represents one of the possible status conditions of the mass storage device. When a device is off-line to its controller, it is not capable of any communications to the controller. When the controller is off-line, it may not be accessed by any of the nodes in the configuration.

OFF-LINE DIAGNOSTICS

These are HSC50 diagnostics that must be executed with the controller in an off-line state. For example, the TEST MEMORY diagnostic should be used off line because it would be impossible to check all memory while the HSC50 is processing data.

ON-LINE

This term represents one of the possible status conditions of a mass storage device. When the device is on line, it is capable of communicating with its controller. Likewise, when a controller is on line, it is capable of being accessed by any of the nodes in the configuration.

PERIODIC DIAGNOSTICS

Periodic diagnostics are run automatically on selected areas of logic while the HSC50 is on line to the cluster. These diagnostics are initiated as the result of internal timers and do not disrupt HSC50 operations.

P.ioc Module

This module is also called the input/output control processor module.

PILA

This is also known as the port buffer module in the HSC50.

PORT

The port is the hardware and software used to connect a host or controller to a communication bus (e.g., the CI bus or SDI bus).

PORT BUFFER MODULE

This is an HSC50 module used in the CI host interface set (K.ci). There are two other modules that communicate with the CI bus: the port processor module and the port link module. The port buffer module is also known as the PILA module.

This module does not request HSC50 memory so it does not have a requestor number. Numerically, the port buffer module is an L0109 module. Look at the HSC50 module utilization label inside the front door to find its slot location.

The primary function of this module is to compensate for the differences between the timing of the CI bus and the timing within the HSC50. It accomplishes this by buffering the data either coming in or leaving the HSC50.

PORT DRIVER

The port driver is the software used to transmit and receive messages to or from the communication bus. The port driver does not comprehend the meaning of messages; it only serves as the delivery service.

PORT LINK MODULE

This is an HSC50 module used in the CI host interface set (K.ci). There are two other modules that communicate with the CI bus: the port buffer module and the port processor module. The port link module does not request HSC50 memory so it does not have a requestor number. Consult the module utilization label inside the front door of the HSC50 for its backplane position.

This module functions as the direct interface to the CI bus.

PORT PROCESSOR MODULE

This is an HSC50 module used in the CI host interface set (K.ci). There are two other modules that communicate with the CI bus: the port link module and the port buffer module. Consult the module utilization label inside the front door of the HSC50 for its backplane position.

HSC50 Glossary

This module controls all accesses to or from HSC50 memory for the CI interface. Any data coming from a host is routed to HSC50 memory by the port processor module. Any data coming from HSC50 memory going to a host is controlled by the port processor module.

PROGRAM MEMORY

Program memory is a portion of the L0106 memory module used on the HSC50. This portion (256kb) stores the control program executed by the I/O control processor. Program memory is protected by byte parity checking, and bad sections of memory are excluded from use.

There are two other sections to the HSC50 memory module: data memory and control memory.

PSEUDO TERMINAL

The pseudo terminal is physically attached to the host computer in a cluster. It is used to execute HSC50 diagnostics or utility programs. The DUP software is used to communicate across the CI bus to the HSC50. Normally, the HSC50 diagnostics are executed by connecting a terminal directly to the HSC50. (See maintenance or auxiliary terminal.)

Under certain circumstances (such as no other terminal available), the system terminal (pseudo terminal) may be used. Under these circumstances, system resources are used to execute the diagnostics (CPU cycles, bus time, memory space etc.). Using the pseudo terminal requires that the HSC50 host interface be functioning perfectly.

Connecting an auxiliary or maintenance terminal to the HSC50 means that diagnostics can be run on the HSC50 without affecting the systems in the cluster.

READ/WRITE READY

This is one of the four status bits obtained in the real-time drive state message on the SDI/STI bus. When read/write ready is asserted, it indicates that the mass-storage device is capable of handling a data transfer to or from the media. Any disk positioner or tape motion negates this signal.

RECEIVER READY

This is one of the status bits used on a DSA device. When receiver ready is active, the device is ready to receive a command from the controller. The bit negates while the device processes the command. The same is true of the controller (e.g., UDA50, HSC50). The controller is ready to receive messages from the host when receiver ready is active.

REQUESTOR

Requestor is an HSC50 term used to denote those entities that access memory. In the HSC50, those entities are:

- I/O control processor
- All data channels
- Port processor

Requestors have a certain memory priority. By consulting the module utilization label inside the front of the HSC50, the requestor number may be correlated with the backplane position and the module name.

The following modules are not requestors of memory access:

- Port link module
- Port buffer module
- Memory

RESTORE

Restore returns the data from tape back to disk using the normal priority. Backup is used to preserve information in the event of a disk failure. Restore is used to recover the information.

SERVER

This is a term that refers to the hardware/software combination that communicates with another hardware/software combination in the System Interconnect Architecture. There are three types of servers: I/O (mass-storage), communications, and computing.

STANDARD DISK INTERFACE (SDI)

SDI is the protocol and bus that connects the HSC50 and UDA50 controllers to the disk mass storage devices. SDI is the interconnect used with the DSA family of mass-storage devices.

STANDARD TAPE INTERFACE (STI)

STI is the protocol and bus that connects the HSC50 controller to the tape mass storage devices. The UDA50 controller does not handle STI.

SDI/STI CONNECTORS

These connectors are found on both the UDA50 and HSC50 controllers. In the UDA50, only four disks can be cabled to the controller. No priority is assigned to any disk.

In the HSC50, however, up to 24 mass-storage devices can be cabled in groups of four. The cabling bulkhead on the HSC50 is divided into six such groups. The groups are labeled from A through F on the bulkhead. Each group is controlled by one data channel module.

Each module is a requestor of HSC50 memory. Requestors are assigned a priority value. The priority is determined by backplane location in the HSC50.

The requestor number that each module has may be found on a module utilization label. This label is inside the front of the HSC50 cabinet. The label correlates the backplane position of each module with the requestor number and the bulkhead cabling group.

STAR COUPLER

This is a device used to couple Computer Interconnect (CI) cables to each other in a distributed data processing configuration (cluster). The Star Coupler is part of the CI bus structure. This bus structure is supported by the System Interconnect Architecture.

The SC008 Star Coupler is a passive signal transformer mounted in a small box that has eight sets of TNC connectors. Eight of these connectors are for transmit cables while the remaining eight are for the receive cables. Two of the coupler boxes may be jumpered together for a 16-node cluster.

The coupler boxes are normally mounted in an H9542-type cabinet.

SYSTEM COMMUNICATION ARCHITECTURE (SCA)

The term System Communication Architecture defines the hardware and protocol necessary to communicate between systems in a CI cluster. These protocols include MSCP, DUP and DECnet.

The protocols establish "virtual circuits" between nodes in the cluster as well as "connections" between remote processes. The protocol manages flow control while guaranteeing reliable transmissions.

SYSTEM INTERCONNECT

Digital Equipment Corporation's system interconnect strategy represents the integration of various new corporate products, protocols, and architecture into a unified whole. The interconnect consists of:

- Servers
- High bandwidth interconnections among the servers
- Protocols for inter-server communication

SYSTEM TAPE

This is a TU58 tape cartridge that contains the control program that governs HSC50 operation. The program is known as CRONIC.

TAPE DATA CHANNEL MODULE

This is also known as the K.sti module. Numerically, it is an L0108-YB module. Its placement in the HSC50 backplane can be determined by referring to the module utilization label found inside the front of the HSC50.

HSC50 Glossary

This module has the responsibility for controlling the data transfers between the selected tape unit and HSC50 memory. It also interfaces the HSC50 to the STI bus. The tape data channel module contains four STI ports for connecting magtape formatters.

UDA50

The UDA50 is an SDI controller that operates on the UNIBUS under MSCP protocol. The controller handles many of the I/O management chores that were previously performed by the CPU, freeing the CPU to perform more computational chores. The UDA50 can support up to four disks that communicate over the SDI bus.

UNAVAILABLE

UNAVAILABLE is one of the status bits found on an SDI mass-storage device. To determine what unavailable is, we must examine the two conditions that exist for an on-line device in a dual-controller configuration.

The drive is physically being used by one of the controllers (on-line). This device is therefore AVAILABLE to that controller. In a dual-controller configuration, the device is UNAVAILABLE to the other controller.

The device may be powered down. In this case it is UNAVAILABLE to either controller.

A drive that is UNAVAILABLE is capable of communicating with, but not be fully utilized by, the controller on this port. Drive status is an example of the communication that can take place between an unavailable drive and its controller.

UTILITIES

The HSC50 system tape contains a control program, in-line diagnostics, and utility programs. The utility programs enable the user to change HSC50 characteristics, obtain status, and perform several off-line functions. The off-line functions include such things as disk backup and restore, copy, and disk formatting.



