21. MULTIPLATFORM SECTION

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21 MULTIPLATFORM

21.1 GENERAL

21.1.1 Product Outline and Features

The multiplatform optional feature can assign a partial or full of disk volume area of the DKC disk subsystem for the Open system hosts by installing one or two pairs of SCSI channel adapter (CHS) packages to the disk controller (hereinafter called DKC). This function enables a use of high reliable and high performance disk subsystem realized by the DKC for a multiplatform or all SCSI system environment. This also provides the customers with a flexible and optimized system construction capability for their system expansion and migration.

Some of the major features of this SCSI attachment option are listed below.

(1) HMRS (Hitachi Multiplatform Resource Sharing) function

In addition to the conventional Channel interface (synchronous (METAL) or asynchronous (ESCON) channels), the SCSI-2, standard interface in the open systems, can be mounted in one controller. This enables multiplatform system users to share the high reliable and high performance resource realized by the DKC disk subsystem.

The SCSI interface is complied with ANSI SCSI-2, a standard interface for various peripheral devices for open systems. Thus, the DKC can be easily connected to various open-market SCSI host systems (e.g. Work station servers and PC servers).

(2) Fast and concurrent data transmission

Data can be read and written at a maximum speed of 20M bytes/second with use of a WIDE SCSI and the Synchronous transfer. All of the SCSI ports can transfer data concurrently between the host.

(3) All SCSI configuration

All SCSI configuration is also allowed either with one CHS pair or full of two CHS pairs configuration. This will provide more flexible use of the subsystem for open system environment.

(4) HMDE (Hitachi Multiplatform Data Exchange) support
By installing HMDE optional feature, data in the mainframe volumes can be read from open systems and write it into the open system volumes. This enables faster data transmission of data base files between mainframe and open systems than currently used means such as network transfer.

(5) HMBR (Hitachi Multiplatform Backup/Restore) support

By using HMBR optional feature, data in the open system can be managed by the backup systems and utilities provided in the mainframe systems. This enables a use of rich and high reliable and high performance backup systems of mainframe world to the open system environment.

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(6) Customer assets guarantee (Upgrading paths)

The SCSI attachment option allows on-site upgrading of already installed channel-type DKC systems owned by customers.

(7) High performance

The DKC has two independent areas of nonvolatile cache memory and this mechanism also applies to the SCSI attachment option. Thus, compared with a conventional disk array controller used for open systems and not having a cache, this disk subsystem has the following outstanding characteristics:

① Cache data management by LRU control
② Adoption of DFW (DASD Fast Write)
③ Write data duplexing
④ Nonvolatile cache

(8) High availability

The DKC is fault-tolerant against even single point of failure in its components and can successively read and write data without stopping the system. This concept is also taken over to the SCSI attachment option, which ensures fault-tolerance against even single point of failure in its components, except the CHS. Fault-tolerance against CHS and SCSI bus failures depends on the multi-path configuration support of the host system.

(9) High data reliability

The SCSI attachment option automatically creates and adds to host data a unique data guarantee code of eight bytes, which is then written together with the data onto the disk. The data guarantee code is checked automatically on the internal data bus of the DKC to prevent the occurrence of data errors due to array-specific data distribution or integration control. Thus, the reliability of the data improves.

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21.1.2 Basic Specifications

The basic specifications of the SCSI attachment are shown in Table 21-1-1.

Table 21-1-1 Basic specifications

Item			Specification	
			Multiplatform	ALL SCSI
Installable DKC		DKC equipment model	DKC210I-5E (SRAM)	
HOST connection	Mainframe	Number of CHAs	2	0
		Channel type	Parallel / Serial	-
		Number of channels (Max.)	8 (Parallel) / 8 (Serial)	-
	SCSI	Number of CHSs	2	4
		Number of SCSI ports per CHS	4	4
		Number of SCSI channels	1 - 8	1 - 16
Data partitioning/ All SCSI	Mainframe	Number of DKAs	2 - 6	-
		DKU supported	DK308-90 / DK306-45	-
		Mainframe capacity	45GB - 540GB / 45GB - 270GB	-
	SCSI	Number of DKAs	2 - 6	2 - 8
		DKU supported	DK308-90	DK308-90
		SCSI capacity	48GB - 1.2TB	48GB - 1.6TB
		Intermix unit	DKA pair	-
SCSI interface		SCSI level	SCSI-2 (Fast-Wide, Differential)	
		External cable length	Max. 20m	
		Data transfer rate	Max. 20MB/s	
SCSI addressing		Number of Hosts per SCSI channel	1 (Single Initiator)	
		Number of Target IDs per port	Max.15 (Multi-Target ID)	
		LUN size	2.4 GB (OPEN-3) / 7.3 GB (OPEN-9)	
		Data block size	512 Byte	
		Number of LUNs per Host	Max.120 (8LUNx15ID)	
		Number of LUNs per subsystem	20 - 240 (OPEN-3) 7 - 168 (OPEN-9)	20 - 240 (OPEN-3) 7 - 224 (OPEN-9)
Maintenance functions for SCSI volume		Online upgrade	Yes	
		Automatic failure report	Yes (to Mainframe Host & SVP)	
		Remote maintenance	Yes (via SVP (Hi-Track))	
		Remote console	Yes (SCSI path setting & SIM report)	
System connectivity			SUN (Solaris), HP (HP-UX), IBM (AIX)	
Data Share		HMDE	Yes (M/F to Open)	-
		HMBR	Yes	-

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21.1.3 Terminology

(1) CHA

CHannel Adapter. A hardware package to connect with a channel interface.

(2) CHS

CHannel adapter for SCSI. A hardware package to connect with SCSI interface.

(3) Command descriptor block (CDB)

A command block in SCSI interface used to send requests from the initiator to a target.

(4) Connect

A function that selects and connects the SCSI target device to be activated by the initiator.

(5) Disconnect

A function that causes the SCSI target device to release its SCSI bus. Execution of this function enters the SCSI bus into a BUS FREE phase.

(6) DKA

DisK Adapter. A hardware package which controls disk drives within a DKC.

(7) DKC

DisK Controller. A disk controller unit consisting of CHA, CHS, DKA, Cache and other components except DKU.

(8) DKU

DisK Unit. Disk drives units.

(9) FAL

File Access Library: A program package and provided as a program product for HMDE.

(10) FCU

File Conversion Utility: A program package and provided together with FAL for HMDE.

(11) HMBR

Hitachi Multiplatform Backup/Restore.

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(12) HMDE

Hitachi Multiplatform Data Exchange.

(13) HMRS

Hitachi Multiplatform Resource Sharing.

(14) HA configuration

High Availability configuration

(15) Initiator

The SCSI device (usually, a host computer) that requests another SCSI device to operate.

(16) Logical unit (LU)

The logical unit of division of the subsystem data area accessible from SCSI interface.

(17) Logical unit number (LUN)

A three-bit code identifier for a logical unit. LUN0-7 can be assigned.

(18) Logical volume or logical device (LDEV)

The disk pack image, formed on an array disk, that is compatible with that of a 3390-3 in terms of cylinder and track quantities and the track capacity.

(19) Reconnect

A function that the SCSI target device selects an initiator to continue operating after execution of the disconnect function.

(20) SCP

SCSI Control Processor. A SCSI interface protocol controller. Four SCPs are mounted on a CHS.

(21) SCSI device

Collectively refers to the host computer, peripheral control units, and intelligent peripherals that are connected to one SCSI bus.

(22) SCSI address

A unique address assigned to an SCSI device. Eight addresses 0 to 7 (for a WIDE SCSI, 0 to 15) can be assigned.

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(23) SCSI ID

A bit definition address for an SCSI address. This bit address is keyed to a data bus bit number.

(24) SCSI port

Means the hardware (connector) used to connect an SCSI bus to the DKC. The SCSI ports and SCPs mounted in the DKC will provided, one for one, and the quantity will be four per CHA-S.

(25) Target

An SCSI device (usually, the DKC) that operates at the request of the initiator.

(26) VENDOR UNIQUE or VU

A manufacturer- or device-unique definable bit, byte, field, or code value.

21.1.4 Notice about MULTIPLATFORM Maintenance operations

There are some notices about MULTIPLATFORM Maintenance operations.

(1) When SCSI path configuration will be changed, SCSI I/O on the related SCSI port must be stopped before.
(2) When SCSI channel adapter or LDEV will be de-installed, the related SCSI path must be de-installed before.
(3) When SCSI channel adapter will be replaced, the related SCSI I/O must be stopped before.
(4) When micro-program will be changed, all SCSI I/O on the DKC must be stopped before.

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21.2 Hardware Configuration

21.2.1 SCSI Channel Adapter (CHS)

The SCSI attachment is composed of a pair of SCSI adapter (CHS) packages. The SCSI connection can be available by installing them in the DKC slots where the channel adapters (CHA) are to be mounted.

The hardware configuration of the CHS is shown in Figure 21-2-1. No other hardware design has been changed for the SCSI attachment except for CHS.

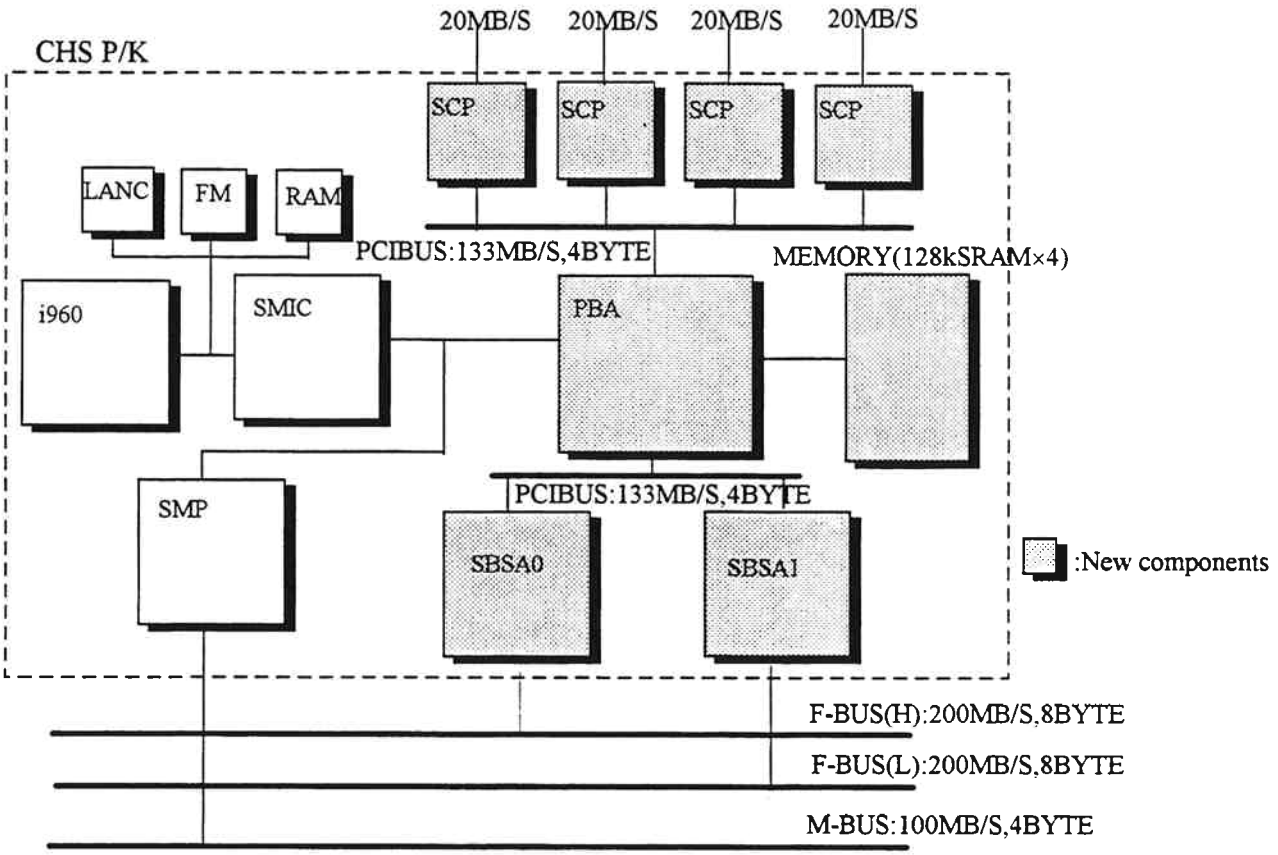

Figure 21-2-1 CHS Hardware Block Diagram

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Table 21-2-1 Changed parts from the current CHA P/K

No	Parts name	Function
1	SCP (SCSI Control Processor)	- Host SCSI I/F control LSI. - SCS I-2 (FAST/WIDE), PCI-BUS support.
2	PBA (PCI BUS Adapter)	- PCI I/F control, MEMORY control. - 4 paths concurrent data transfer control.
3	SBSA (SCSI BUS Adapter)	- 4 paths control addition to the current BSA.
4	MEMORY	- 128k x 9 bit SRAM. - Stored memory for SCRIPT program.

Table 21-2-2 Characteristics of SCP

Item	Function	Features
Support I/F	SCSI-2	- Supporting SCSI-2 (FAST/ WIDE).
SCSI ID	Multi-Target ID	- Multiple Target IDs expanding Host access addresses.
Internal BUS I/F	PCI BUS	- Considering the future expansion to Fibre Channel by employing the standard PCI-BUS for internal BUS.
Control processor	Embedded SCRIPT processor	- SCRIPT processor with enriched instruction set for Calculation/Call/Jump, which can realize performance improvement by expanding the control power including data transfer control.

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21.2.2 SCSI Physical Interface Specification

The physical interface specification supported for SCSI is shown in Table 21-2-3.

Table 21-2-3 SCSI Physical specification

No	Item	Specification
1	Interface type	- SCSI-2
2	Mode	- FAST/WIDE SCSI, Differential mode (Single-end is not supported)
3	External cable length *1	- Max. 20 m
4	Data transfer rate	- Max. 20 MB/s
5	Number of SCSI ports	- 4 ports per CHS *2
6	Parallel transfer	- Concurrent transfer for all SCSI ports

*1: From the SCSI I/F connector on the DKC to other SCSI devices. Internal cable length within DKC (5 m) is excluded.

*2: CHS pair packages must be installed regardless of an actually using number of SCSI ports.

21.2.3 Hardware Components

The major hardware components contained in the SCSI attachment are shown in Table 21-2-4.

Table 21-2-4 Hardware components

Model name	Definition	Major parts	Contents
DKC-F210I-8C	SCSI 8-Port Adapter (8 Ports/ DKC)	- WP040-Ax2	- CHS
		- SCSI I/F Connector Panel	- I/F Connector Panel
		- Internal I/F Cables	- Connection between I/F - Connector and CHS
DKC-F210I-8CD	SCSI 8-Port Adapter (Dual Processor) (8 Ports/ DKC)	- WP041-Ax2, WP042-Ax2	- CHS (Dual Processor)
		- SCSI I/F Connector Panel	- I/F Connector Panel
		- Internal I/F Cables	- Connection between I/F Connector and CHS

Note: No hardware operation panel is added for the SCSI attachment.
DKC-F210I-8CD is SCSI 8-Port Adapter which has two micro-processors. See subsection 21.10 (MULTI10-10 to 10-20) for its specifications.

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21.3 CONFIGURATION

21.3.1 System Configurations

21.3.1.1 Multiplatform Configuration

The DKC can be connected to the SCSI bus as one of the target SCSI devices and can exchange data with a host via the SCSI bus. The conventional Channel host systems can also be connected simultaneously with an SCSI bus. The possible system configurations with the SCSI attachment are shown below.

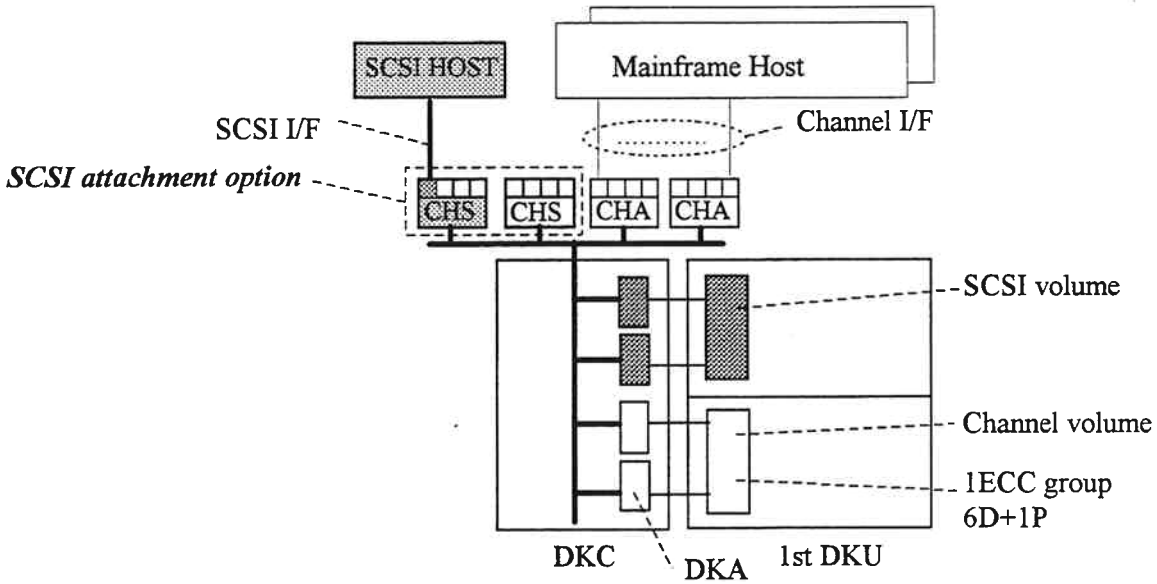

Figure 21-3-1 Minimum system configuration example for SCSI

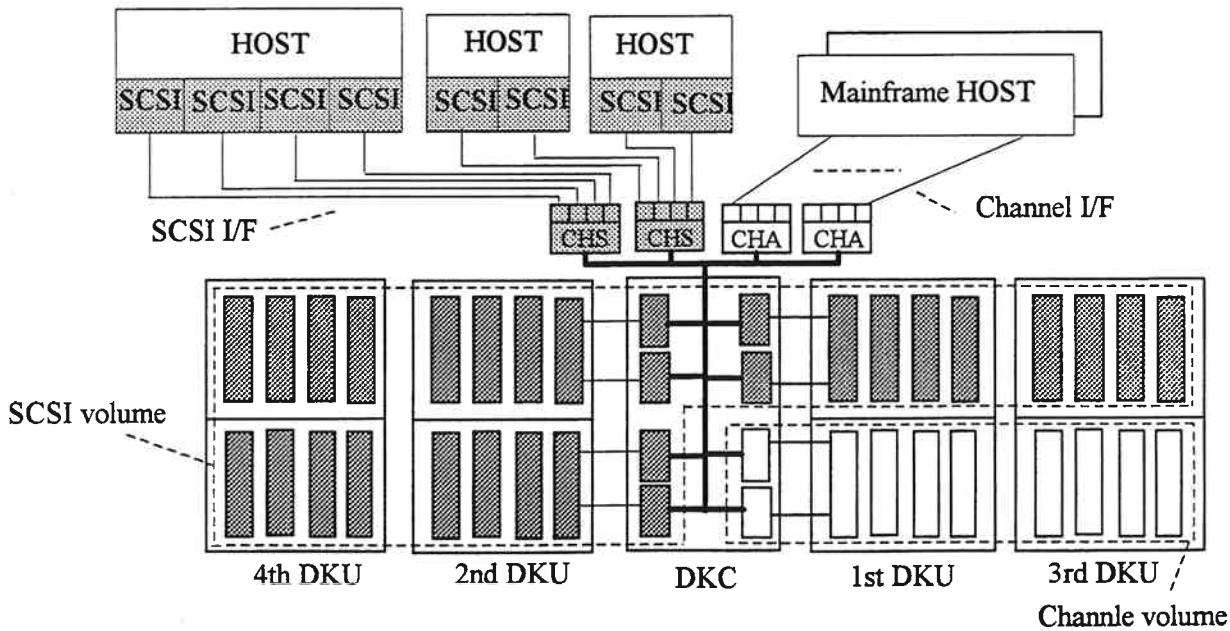

Figure 21-3-2 Maximum system configuration example for SCSI

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21.3.1.2 All SCSI Configuration

The DKC can also be configured as the all SCSI interface equipment by installing only CHS adapters on it. The possible system configurations for the all SCSI configuration are shown below.

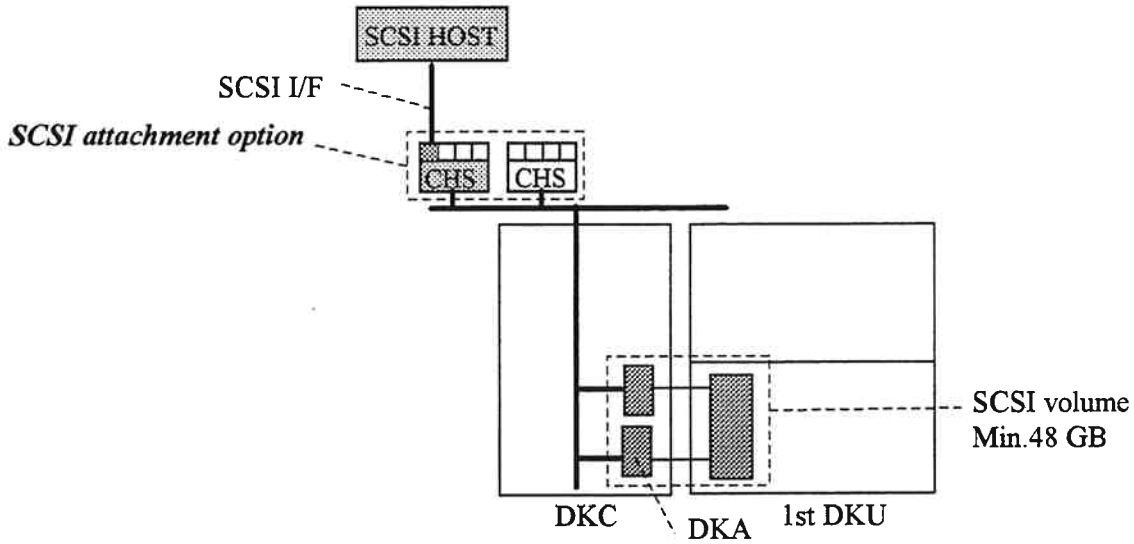

Figure 21-3-3 Minimum system configuration for All SCSI

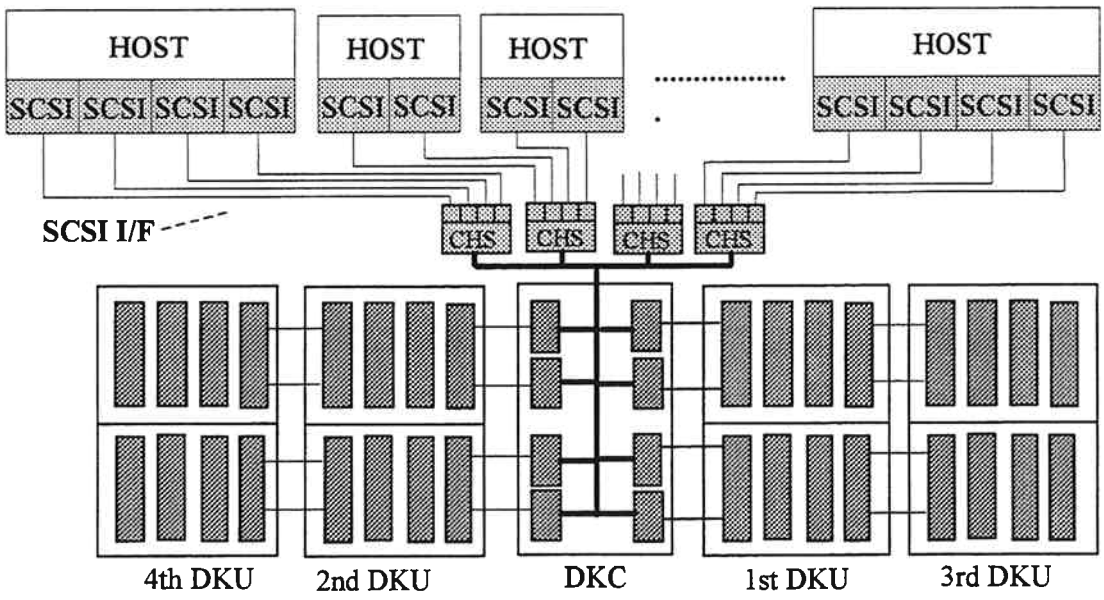

Figure 21-3-4 Maximum system configuration example for All SCSI

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21.3.2 Installable DKC Configuration

(1) Multiplatform Configuration

The SCSI attachment option for the Multiplatform configuration can be added to the following Mainframe DKC configuration.

Table 21-3-1 Installable mainframe DKC configuration

No	Item	Specification
1	DKC model	- DKC210I-5 (DRAM, RAID5) - DKC210I-5E (SRAM, RAID5)

Note 1: Only HA model (either DRAM or SRAM) can apply the SCSI attachment option.

Note 2: For ALL SCSI model configuration, configuration change from ALL SCSI to Multiplatform configuration is not allowed.

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21.3.3 Host Connecting Channel Configuration

The SCSI attachment adapter (CHS) package must be mounted in two-package unit so as to monitor the processor condition each other. A maximum four packages including CHA and CHS can be installed in the DKC.

All CHS (i.e. all SCSI) configuration is also allowed.

For a mainframe channel connection, ESCON and/or Metal channel can be connected as same as the current DKC.

Four SCSI ports are mounted on a single CHS package.

The possible combination of Channel and SCSI within a DKC is shown in Table 21-3-2.

Table 21-3-2 The possible combination of CHA and CHS

No	CHA		CHS		Remarks
	# of CHAs	# of Channels	# of CHSs	# of SCSI ports	
1	4	Max. 16	0	0	Channel only
2	2	Max. 8	2	Max. 8	Multiplatform
3	0	0	4	Max. 16	All SCSI

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21.3.4 SCSI Addressing

Each SCSI device connected to a SCSI BUS can set a unique SCSI-ID number within the range from 0 to 15 because a WIDE SCSI is supported in the DKC.

An addressing from the SCSI host to the SCSI volume in the DKC can be uniquely defined with a nexus between them. The nexus through the Initiator (host) SCSI-ID, the Target (CHS port) SCSI-ID, and LUN (Logical Unit Number) define the addressing and access path. Although the maximum number of LUNs assigned to a single Target SCSI-ID is limited to maximum eight in the SCSI, the DKC supports Multi-Target SCSI IDs in each CHS port so that the host can expand its addressing space by using its function.

The addressing configuration using the Multi-Target ID function is shown in the Figure 21-3-3.

21.3.4.1 Number of Hosts

The number of SCSI hosts (Initiator), i.e. a command issuing host per SCSI port, is limited to one in the DKC. When the multiple hosts need to be connected to the DKC, they can use the multiple SCSI ports on the DKC.

21.3.4.2 Multi-Target ID

Each SCSI port on each CHS can independently set the Target SCSI-ID number. And, each SCSI port can have multiple SCSI ID numbers within the range from 0 to 15. It is also allowed that the different SCSI ports assign the same SCSI ID number, if not on the same SCSI cable.

21.3.4.3 LUN (Logical Unit Number)

Maximum eight LUNs from LUN0 to LUN7 can be assigned to each Target ID.

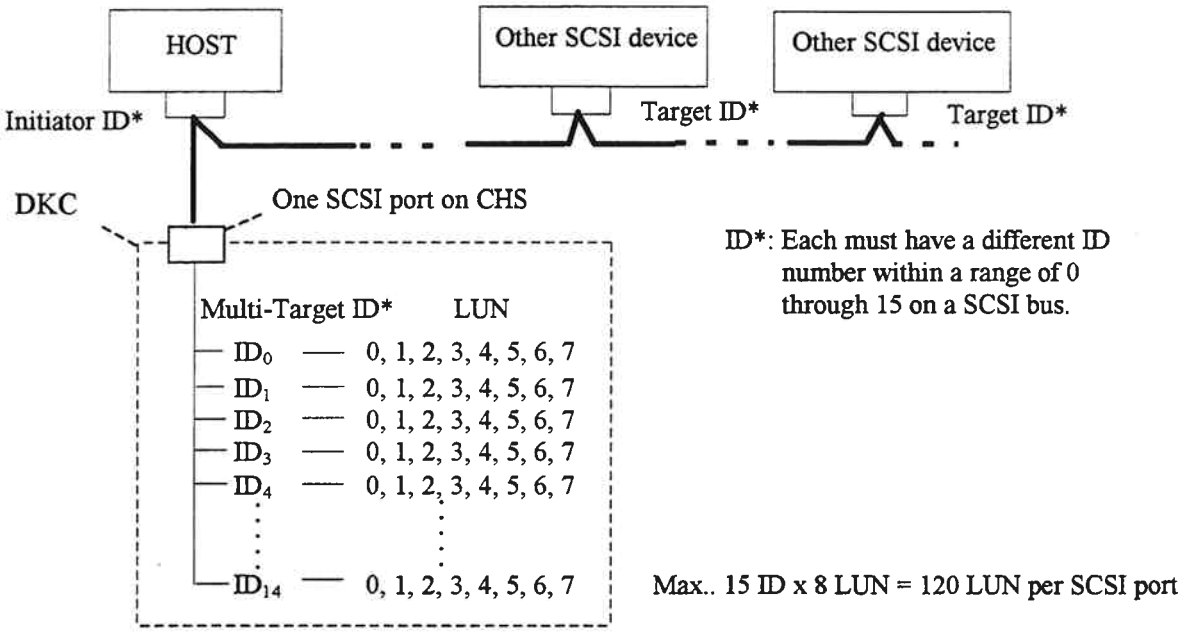

Figure 21-3-5 Addressing configuration from Host

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21.3.5 Logical Unit

21.3.5.1 Logical Unit Specification

The specifications of Logical Units supported and accessible from Open system hosts are defined in the Table 21-3-3.

Table 21-3-3 LUN sizes supported

No	Item		Specification		
1	Volume name		OPEN-3	OPEN-9	3390-3B
2	Volume attribute		- SCSI volume - HMBR volume	- SCSI volume - HMBR volume	- Mainframe volume - HMDE volume
3	Access right	SCSI host	Read / Write	Read / Write	Read only (need HMDE option)
		M/F host	Read / Write (need HMBR option)	Read / Write (need HMBR option)	Read / Write
4	Logical Unit (LU) size	GB (10^9)	2.4 GB	7.3 GB	-
		GB ($1{,}024^3$)	2.29 GB	6.88 GB	-
5	Block size		512 Bytes	512 Bytes	512 Bytes
6	Max. LBA		4,806,719	14,423,040	5,822,040
7	LDEV emulation name		OPEN-3	OPEN-9	3390-3B
8	LDEV size : LUN size		1 : 1	1 : 1	1 : 1
9	Number of LUs per ECC group	DK308-90	20	7	16
		DK306-45 DK308-45	9 (Enhance support)	-	8 (Enhance support)

Additional Shared Memory (DKC-F210I-32) required for OPEN-9

Additional Shared Memory (DKC-F210I-32) is required to install OPEN-9. OPEN-9 should be treated just same as 3390-9 about shared memory capacity.

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21.3.5.2 Logical Unit Mapping

Each volume name, such as OPEN-3, OPEN-9 or 3390-3B, is also used as an emulation type name to be specified for each ECC group. When the emulation type is defined on an ECC group, Logical volumes (LDEVs) are automatically allocated on the ECC group from the specified LDEV#. After creating LDEVs, each SCSI address consisting of SCSI port address, SCSI ID# and LUNs can be mapped on any location of LDEV within DKC. This setting is performed by SVP operation or Remote Console operation (option).

This flexible LUN and LDEV mapping scheme enables multiple paths setting to the same logical volume, so that the host system can configure a shared volume configuration such as a High Availability (HA) configuration. In the shared volume environment, however, some lock mechanism need to be provided by the host systems.

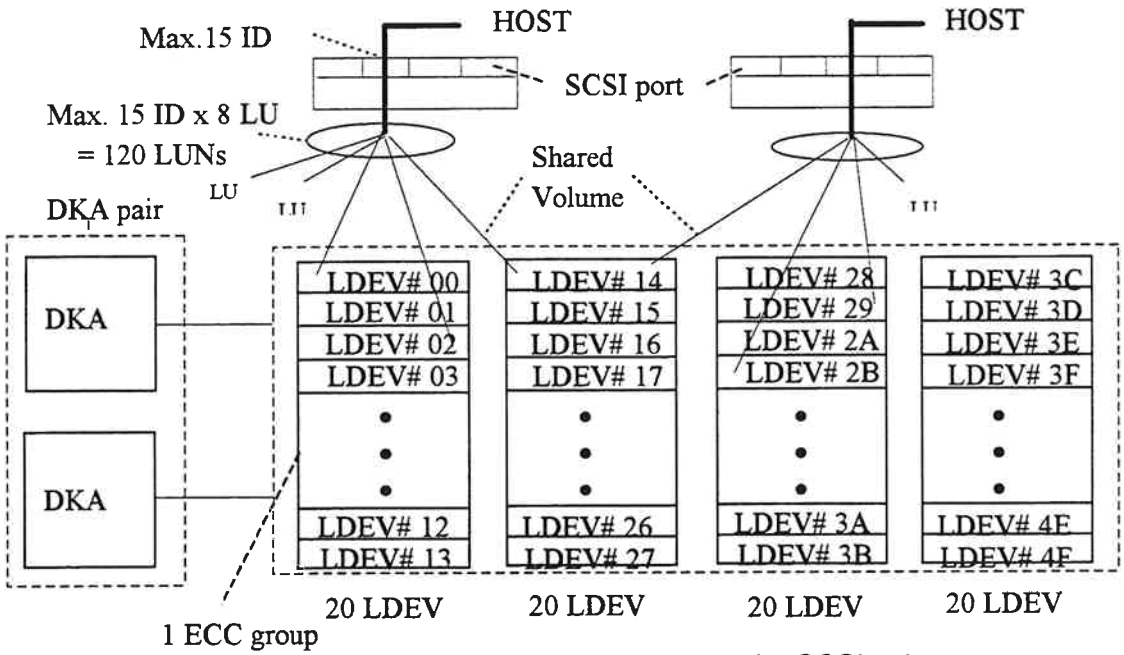

Figure 21-3-6 LDEV and LUN mapping for SCSI volume

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21.3.6 Volume specification

21.3.6.1 Volume specification summary

The SCSI volume and mainframe volume specification is summarized in Table 21-3-4. This reference manual is applied to the specifications defined in the Phase 2 in the Table 21-3-4.

Table 21-3-4 Volume Specification summary

#	Category	Item	Phase 1 DKCMAIN:02-12-XX	Phase 2 DKCMAIN:03-14-XX	Enhancement DKCMAIN:Undecided
1	Mainframe VOL	Emulation Type	3390-3 (Restriction)	← *3380-K* *3390-2/9/3R*	← ← ←
2		Disk Drive	DK308-90 (Restriction)	← *DK306-45 (DK308-45)*	← ←
3		RAID Level	RAID-5 (Restriction)	*RAID-5/1*	←
4		Allocation Area	to Multiple DKA pairs	←	←
5		HMDE Vol.	—	***3390-3B*** **(Restriction: only to DK308-90 & RAID-5)**	3390-3A/3B 3380-KA/KB (no restriction)
6	OPEN VOL	Emulation Type	OPEN-3	← ***OPEN-9***	← ←
7		Disk Drive	DK308-90 (Guard)	← **(Restriction)**	← **DK306-45, DK308-45 (see Note 1)**
8		RAID Level	RAID-5 (Guard)	←	←
9		Allocation Area	only to one DKA pair (Restriction)	***to Multiple DKA pairs***	←
10		HMBR Vol.	—	OPEN-3 ***OPEN-9*** (possible to both of them)	←
11	Intermix Spec.	MF / OPEN Intermix	DKA pair unit	←	←
12		Emulation Type Intermix	MF: N/A (Restriction) OP: N/A (Guard)	MF: ECC group unit OP: ***ECC group unit*** **(for OPEN-3/9)**	← ←
13		Drive Intermix	MF: N/A (Restriction) OP: N/A (Guard)	MF: ECC group unit OP: N/A **(Restriction)**	← **OP: ECC group unit**
14		RAID Intermix	MF: N/A (Restriction) OP: N/A (Guard)	MF: DKA pair unit ←	← ←
15		HMDE Vol.	—	***ECC group unit within MF vol.***	←
16	Remarks		MF: Restrictions are not guarded for features supported in Phase 2.	MF: Same to the current intermix spec. OP: Restrictions are not guarded for features to be enhanced.	

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Note 1: DK306-45/ DK308-45 is applied only to Multiplatform. For ALL SCSI model, only DK308-90 is supported.

Note 2: "←" : Same to the left.

Note 3: Restriction: Restriction on usage. Guard: Guarded by Config file.

Note 4: In Phase 2, the same specifications are applied to All SCSI configuration (e.g., OPEN-9 and intermix with OPEN-3).

Note 5: OPEN-3 has 20 LUNs for DK308-90 and 9 LUNs for DK306-45.

Note 6: OPEN-9 has 7 LUNs for DK308-90 and not supported for DK306-45.

Note 7: The volume type of xxxx-xA (e.g., 3390-3A) is used for HMDE volume for both direction (i.e. Mainframe to Open and Open to Mainframe (enhanced)).

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21.3.6.2 Mainframe Volume

The same specification as currently applied to mainframe volumes is supported, except for the 3390-3B volume. For the detail specification, refer to an appropriate manuals or documents for the mainframe volumes.

(1) 3390-3B volume
The 3390-3B volume is newly added as a member of mainframe volumes. This volume is used for HMDE volume. This volume can be defined by the SVP setting and can be accessed as an ordinary 3390-3 volume from mainframe hosts, even if HMDE option (i.e. File Access Library) is not installed on the open system hosts..

The 3390-3B volume can be allocated only to the DK308-90 disk drives, and only RAID 5 is allowed.

21.3.6.3 SCSI Volume

(1) Emulation Type
The OPEN-3 and OPEN-9 are supported. For the detail specification, refer to the section 21.3.4. Additional Shared Memory (DKC-F210I-32) is required to install OPEN-9. OPEN-9 is able to be treated just same as 3390-9 about shared memory capacity.

(2) Disk Drive
Only DK308-90 (9 GB) disk drives are supported for SCSI volumes. For those customers who have already installed the equipment with DK306-45 or DK308-45 disk drives, and want to install Multiplatform function, it is recommended to add 9 GB disk drives for SCSI volumes. If the customer must have Multiplatform on it without adding DK308-90 drives, SCSI volume for DK306-45 or DK308-45 is planned to be supported as an enhancement.

(3) RAID Level
Only RAID-5 is allowed.

(4) Allocation Area
Multiple DKA pairs are allowed for Multiplatform and ALL SCSI configuration.

(5) HMBR Volume
Both OPEN-3 and OPEN-9 volumes can be used for HMBR functions. It is necessary to install the HMBR option prior to using the function.

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21.3.6.4 Intermix Specification

(1) M/F and SCSI volume intermix
It is not allowed to allocate the mainframe volumes and SCSI volumes together within a same DKA pair. Those two kind of volumes must be allocated separately in the different DKA pair.

(2) Emulation type intermix
For mainframe volumes, the same specification as currently used is allowed. That is, the different types of drive emulation can be intermixed in the different ECC groups.
For SCSI volumes, OPEN-3 and OPEN-9 can be allocated in the different ECC groups, as same as the mainframe volumes.

(3) Drive intermix
For mainframe volumes, the same specification as currently used is allowed. That is, the different drive types must be in the different ECC groups.
For SCSI volumes, only DK308-90 is allowed. When the DK306-45 is supported for SCSI volumes in future, the different disk type of disk drives is to be allowed in the different ECC group.

(4) RAID intermix
For mainframe volumes, the same specification as currently used is allowed. That is, RAID 5 and RAID 1 must not be in the same DKA pair.
For SCSI volumes, only RAID 5 is allowed.

(5) HMDE volume
The HMDE volumes must be allocated within mainframe volumes and must follow the same volume specification described above. That is, 3390-3B volumes and other emulation types (e.g. 3390-3, 3390-9, 3380-K, 3390-1, 3390-2, 3380-J, 3390-3R) can not coexist within the same ECC group.

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21.3.7 Volume Configuration

21.3.7.1 HMRS Volume Configuration

(1) Minimum Configuration

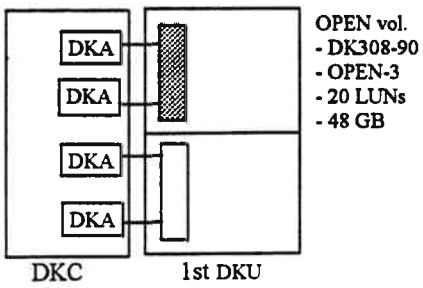

Figure 21-3-7 Minimum configuration in Phase 2

(2) Maximum Configuration for OPEN-3

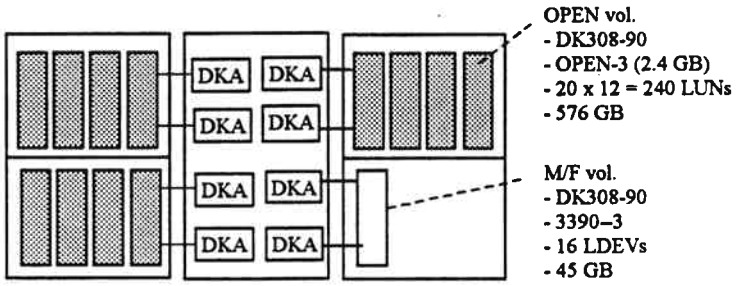

Figure 21-3-8 Maximum configuration in Phase 2 (for OPEN-3)

(3) Maximum Configuration for OPEN-9

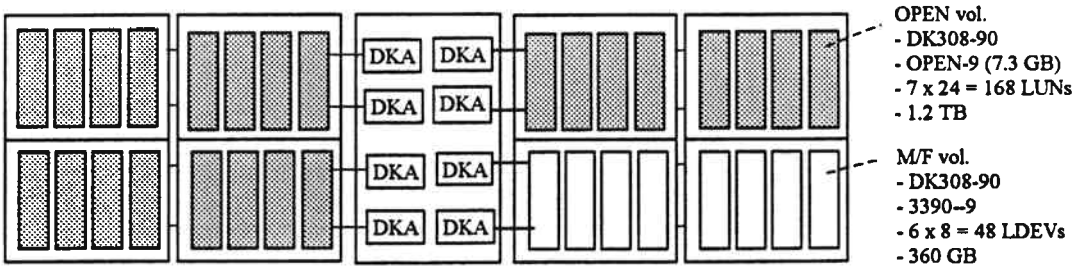

Figure 21-3-9 Maximum configuration in Phase 2 (for OPEN-9)

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21.3.7.2 ALL SCSI Volume Configuration

(1) Minimum Configuration

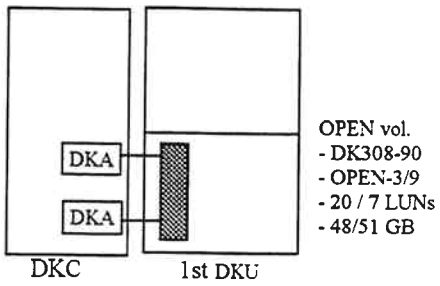

Figure 21-3-10 Minimum configuration for OPEN-3/9

(2) Maximum configuration for OPEN-3 Logical Units

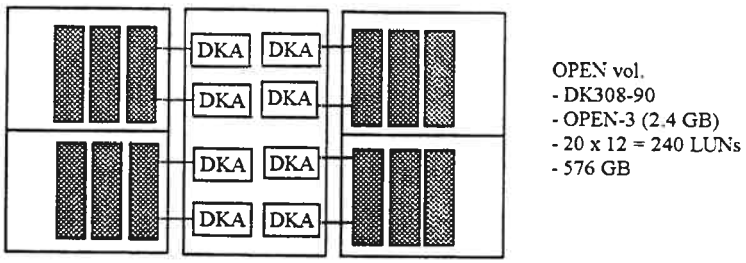

Figure 21-3-11 Maximum configuration for OPEN-3

(3) Maximum configuration for OPEN-9 Logical Units

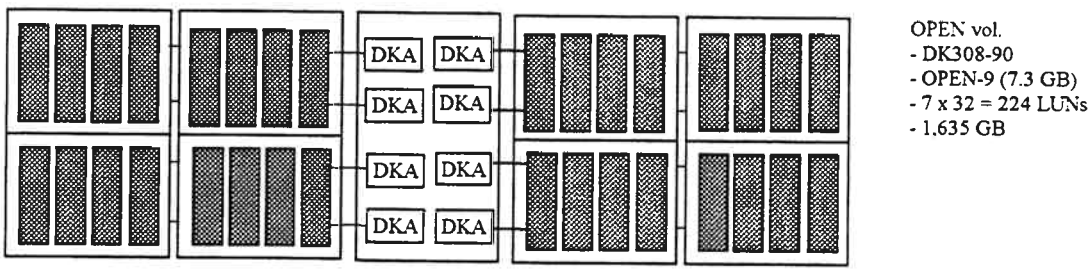

Figure 21-3-12 Maximum configuration for OPEN-9

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21.3.7.3 Intermix Volume Configuration

(1) Typical Volume Configuration

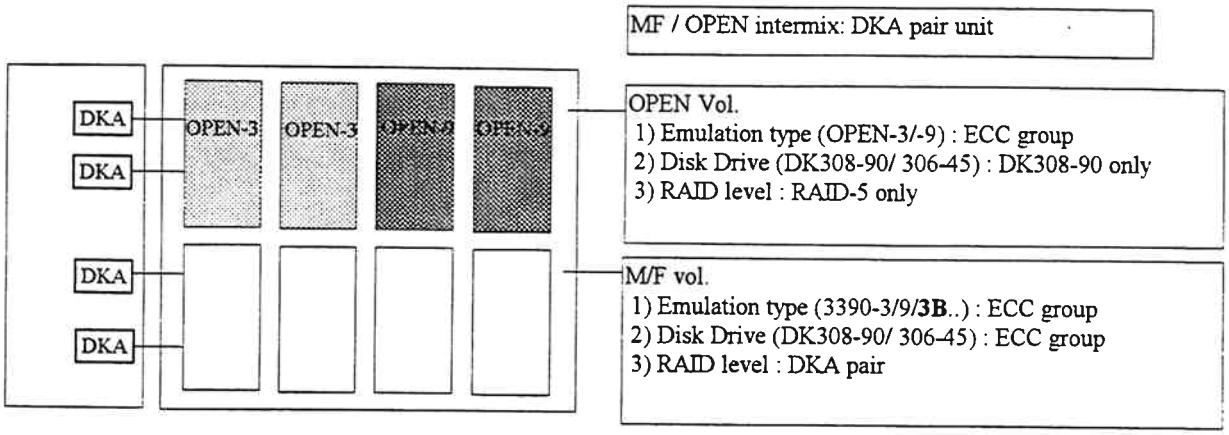

Figure 21-3-13 Typical Volume Intermix configuration

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21.3.7.4 HMDE Volume Configuration

(1) Typical volume configuration for HMDE

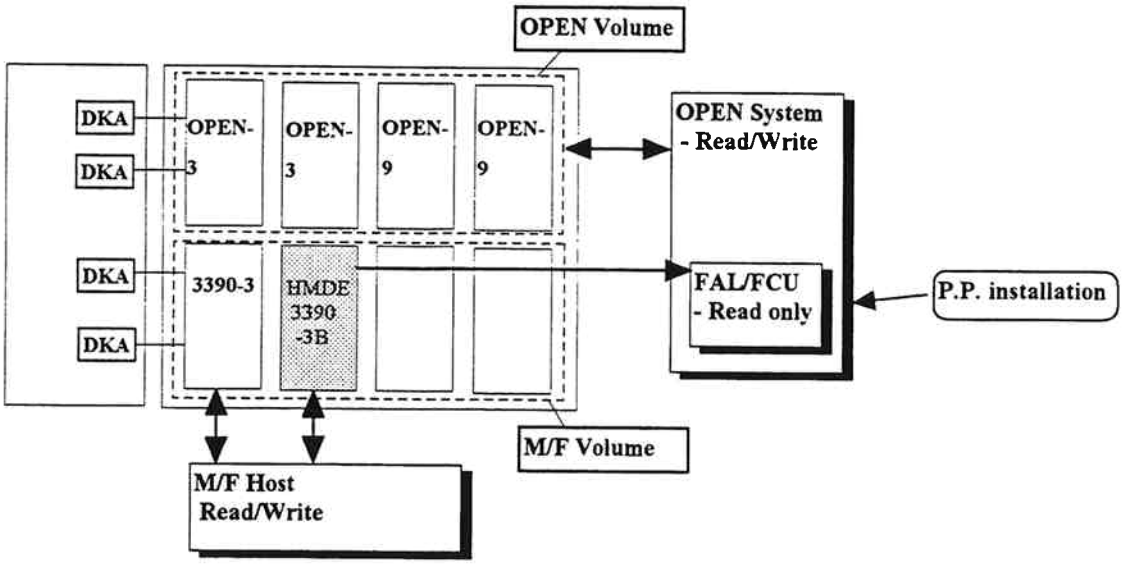

Figure 21-3-14 Typical volume configuration for HMDE

(2) Valid volume configuration

The configuration shown in Fig.21-3-15 is valid.

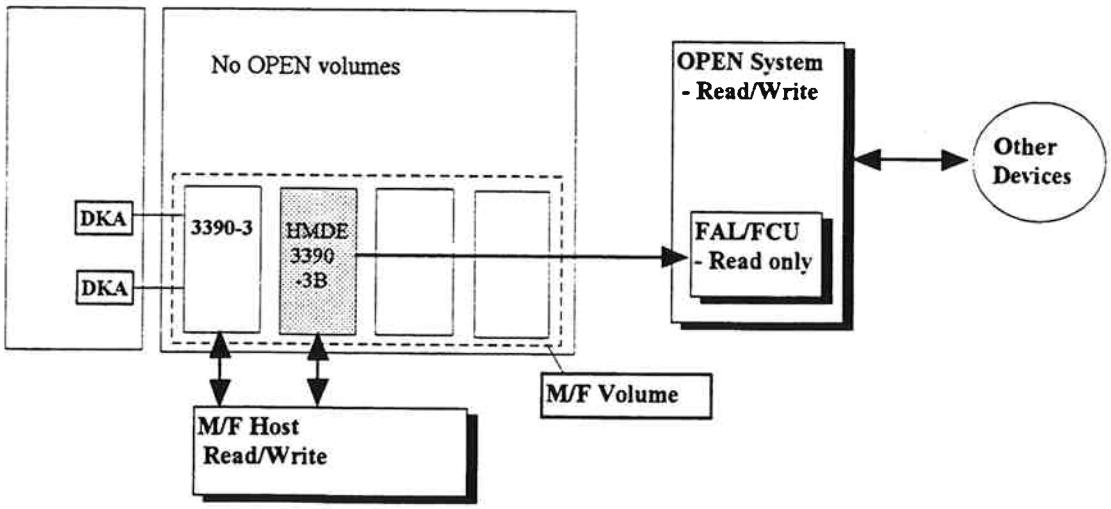

Figure 21-3-15 Valid volume configuration for HMDE

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21.3.7.5 HMBR Volume Configuration

(1) Typical volume configuration example for HMBR

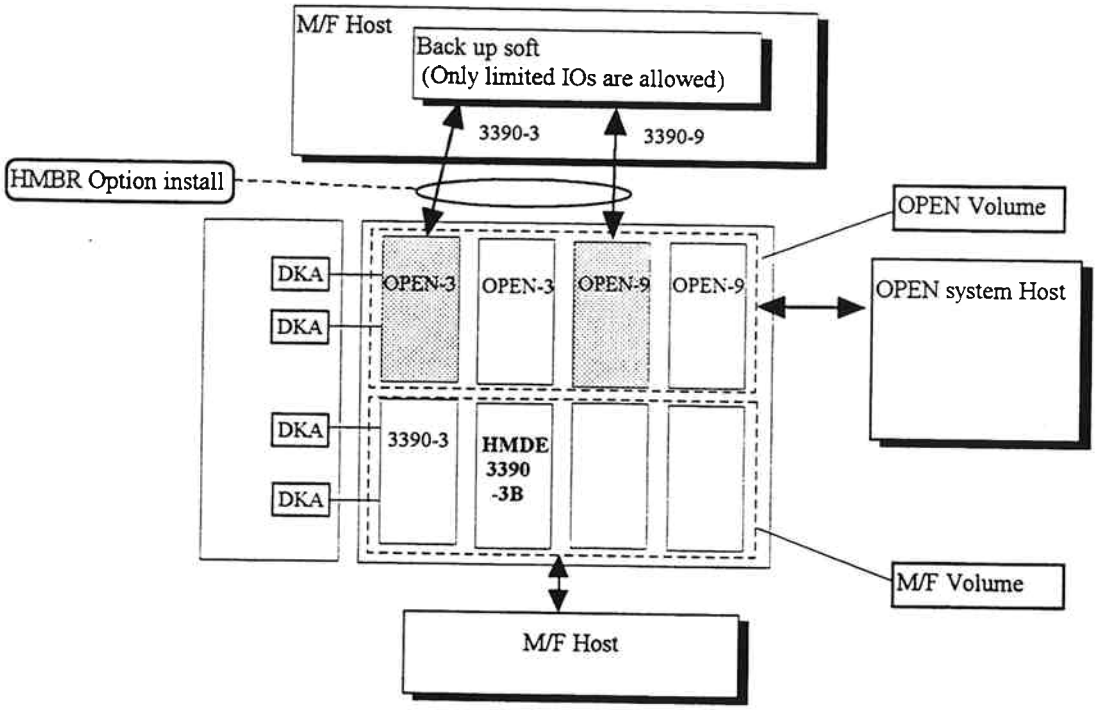

Figure 21-3-16 Typical volume configuration for HMBR

(2) Valid volume configuration example for HMBR

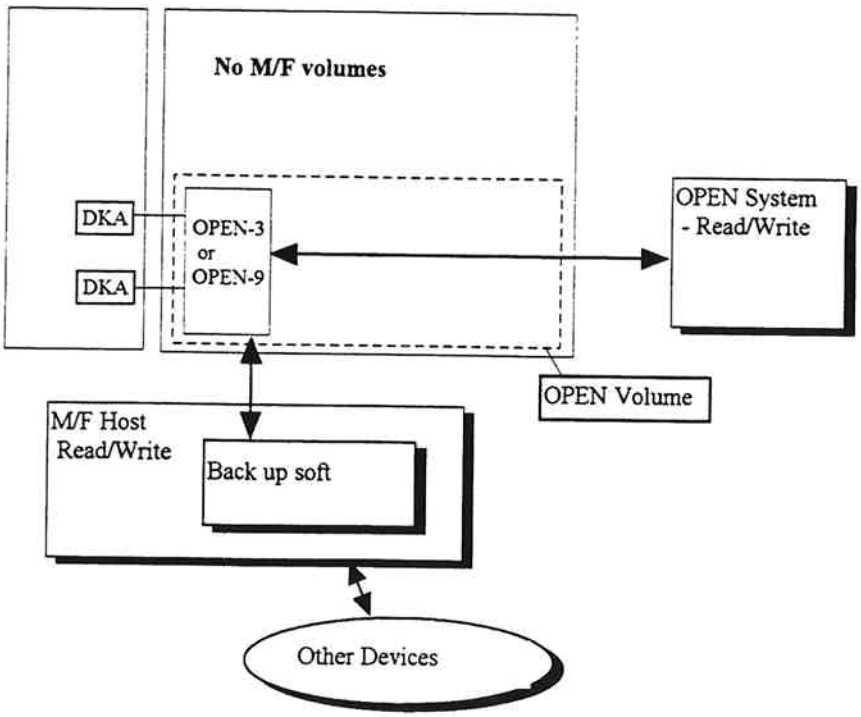

Figure 21-3-17 Valid volume configuration for HMBR

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21.3.8 SCSI Volume Setting

21.3.8.1 Setting of SCSI volume space

The SCSI volume setting is performed according to the following procedure either by using the SVP or Remote Console function (optional feature).

- SCSI logical volume (LDEV) space setting:

- Specify the disk area for the SCSI volume.
- Select the LDEV type and RAID level.
- LDEVs are assigned automatically.

21.3.8.2 SCSI ID and LUN setting

The SCSI IDs and LUNs can be set with the following procedure by using the SVP.

Refer to the INSTALLATION SECTION for more detailed procedures.

- SCSI ID and LUN setting:

- Select the CHS and SCSI port, and select the target SCSI ID to the port.
- Select the LUN for the selected ID, and select the LDEV to be assigned to the LUN.
- Repeat the above procedure as needed.

Note 1 : It is possible to refer to the setting contents of already being set on the SVP display.
Note 2 : The above setting can be done during on-line.
Note 3 : Duplicated access paths' setting from the different hosts to the same LDEV is allowed. This will provide a means to share the same volume among host computers. It is, however, the host responsibility to manage an exclusive control on the shared volume.

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21.4 CONTROL FUNCTION

21.4.1 Cache Usage

The DKC has two independent areas of non-volatile cache memory for the mainframe volumes. This mechanism also commonly applies to the SCSI volumes without any distinction. Thus, the high reliability and high performance realized by the following features can be commonly applied to the SCSI volumes.

① Cache data management by LRU control

Data that has been read out is stored into the cache and managed under LRU control. For upright transaction processing, therefore, a high cache hit ratio can be anticipated and a data-writing time reduced for improved system throughput.

② Adoption of DFW (DASD Fast Write)

At the same time that it writes data into the cache, the normal write command reports the end of the write operations to a host. Disk writing of the data is asynchronous with host access. The host, therefore, can execute the next process without waiting for the end of disk writing.

③ Write data duplexing

The same write data is stored into the two areas of cache provided in the DKC. Thus, loss of DFW data due to even one failure in the cache can be avoided.

④ Nonvolatile cache

The cache in the DKC is non-volatiled by battery backup. Once data has been written into the cache, its non-volatility will maintain the data, even if a power interruption occurs. Under a standard system configuration having a fully charged battery pack, data is guaranteed for at least 48 hours.

21.4.2 Command Multi-processing

21.4.2.1 Command Tag Queuing

The Command Tag Queuing function defined in SCSI specification is supported. This function allows each SCSI port on CHS to accept a multiple SCSI commands even for the same LUN. The DKC can process those queued commands in parallel because a LUN is composed of a multiple physical disk drives.

21.4.2.2 Concurrent data transfer

The four SCSI ports on a CHS can perform the host I/Os and data transfer with maximum 20 MB/s concurrently. This is also applied among the different CHSs.

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21.5 Commands

The DASD commands defined under the SCSI-2 standards and those supported by the DKC are listed in Table 21-5-1.

Table 21-5-1 SCSI-2 DASD commands and DKC-supported commands

Group	Op Code	Name of Command	Type	×:Supported	Remarks
0 (00_H -$1F_H$)	00_H	Test Unit Ready	CTL/SNS	×	
	01_H	Rezero Unit	CTL/SNS	Nop	
	03_H	Request Sense	CTL/SNS	×	
	04_H	Format Unit	DIAG	Nop	
	07_H	Reassign Blocks	DIAG	×	For RAID5, Nop
	08_H	Read	RD/WR	×	
	$0A_H$	Write	RD/WR	×	
	$0B_H$	Seek	CTL/SNS	Nop	
	12_H	Inquiry	CTL/SNS	×	
	15_H	Mode Select	CTL/SNS	×	
	16_H	Reserve	CTL/SNS	×	
	17_H	Release	CTL/SNS	×	
	18_H	Copy	–	–	
	$1A_H$	Mode Sense	CTL/SNS	×	
	$1B_H$	Start/Stop Unit	CTL/SNS	Nop	
	$1C_H$	Receive Diagnostic Results	DIAG	–	
	$1D_H$	Send Diagnostic	DIAG	Nop	Only self-test supported.
	$1E_H$	Prevent Allow Medium Removal	–	–	
	$1F_H$	Reserved code	–	–	
	Other	Vendor–unique	–	–	
1 (20_H -$3F_H$)	25_H	Read Capacity	CTL/SNS	×	
	28_H	Read (Extend)	RD/WR	×	
	$2A_H$	Write (Extend)	RD/WR	×	
	$2B_H$	Seek (Extend)	CTL/SNS	Nop	
	$2E_H$	Write And Verify	RD/WR	×	DKC210I supports only Write.
	$2F_H$	Verify	RD/WR	×	
	30_H	Search Data High	–	–	
	31_H	Search Data Equal	–	–	
	32_H	Search Data Low	–	–	
	33_H	Set Limits	–	–	
	34_H	Pre-Fetch	–	–	
	35_H	Synchronize Cache	CTL/SNS	×	
	36_H	Lock-Unlock Cache	–	–	
	37_H	Read Defect Data	DIAG	×	No defect always reported.
	38_H	Reserved code	–	–	
	39_H	Compare	–	–	
	$3A_H$	Copy And Verify	–	–	
	$3B_H$	Write Buffer	DIAG	×	
	$3C_H$	Read Buffer	DIAG	×	
	$3D_H$	Reserved code	–	–	
	$3E_H$	Read Long	–	–	

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Table 21-5-1 SCSI-2 DASD commands and DKC-supported commands (Continued)

Group	Op Code	Name of Command	Type	×: Supported	Remarks
1 (20_H -$3F_H$)	$3F_H$	Write Long	–	–	
	Other	Vendor-unique	–	–	
2	40_H	Change Definition	–	–	
	41_H	Write Same	–	–	
	$4C_H$	Log Select	–	–	
	$4D_H$	Log Sense	–	–	
	55_H	Mode Select (10)	CTL/SNS	×	
	$5A_H$	Mode Sense (10)	CTL/SNS	×	
	Other	Reserved code	–	–	
3, 4, 5	60_H~BF_H	Reserved code	–	–	
6	$C0_H$~$D0_H$	Vendor-unique	–	–	
7 ($E0_H$ -FF_H)	$E8_H$	Read With Skip Mask ((IBM-unique)	CTL/SNS	×	
	EA_H	Write With Skip Mask (IBM-unique)	CTL/SNS	×	
	Other	Vendor-unique	–	–	

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21.6 HMDE (Hitachi Multiplatform Data Exchange)

21.6.1 Overview

The Hitachi Multiplatform Data Exchange (HMDE) optional feature provides a function to enable the SAM files produced by the mainframe to be read out by the open system host by executing the File Access Library (FAL) program or File Conversion Utility (FCU) program installed in the open system host. Main frame files which can be read are limited to the SAM files only. The FCU program can convert read data from the EBCDIC code to the ASCII code and output it to UNIX files by using the FAL program. Users can incorporate the FAL program directly into a user program.

This optional feature is supplied as a program product (P.P.) that consists of the following programs:

1) File Access Library program
   - C language functions and a Header file for incorporation into a user program

2) File Conversion Utility program
   - An execution-format utility program that contains the access library

The program product is supplied separately for each platform of the open system. Table 21.6.1 lists platforms supported for using the HMDE.

Table 21.6.1 Platforms supported

#	Platform supported	OS	Window System
1	SUN	Solaris 2.5 or above	Motif
2	HP	HP-UX 10.x or above	Motif
3	IBM	AIX 4.1.4 or above	Motif

21.6.2 Installation

(1) Installation of P.P.
For the method of installing the P.P. (containing FAL and FCU) and its detailed specifications, refer to the manual attached to the P.P.

(2) HMDE volume setting
Volumes whose emulation type is 3390-3B can be used for the HMDE operations (reading from the mainframe by the open system). In addition to being accessible as 3390-3 type volumes from the mainframe host in the same manner as before, the 3390-3B type volumes permit read-only access from the open system host.

Table 21.6.2 HMDE volume specifications

#	Volume attribute	Emulation Type	Drive used	Capacity (GB)	Number of LDEVs /ECC group	Access right		Remarks
						Mainframe	Open system	
1	Mainframe volume	3390-3	DK308-90	2.8	16	R/W	—	
2		3390-3	DK306-45	2.8	8	R/W	—	
3		3390-3B	DK308-90	2.8	16	R/W	R	HMDE volume
4	SCSI volume	OPEN-3	DK308-90	2.4	20	—	R/W	

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The 3390-3B type HMDE volumes can be set during initial installation or LDEV addition. To use volumes used by the mainframe and/or SCSI as the HMDE volumes they must be set as the HMDE volumes by removing the corresponding ECC group once and then adding them again. This procedure is the same as the ordinary one for setting emulation type of another drive.

(3) Unit of volume mixing
- The 3390-3B falls under the type for the mainframe volumes.
- Since the 3390-3 and the 3390-3B are both types for mainframe volume types, they can be mixed in units of ECC groups.
- SCSI volumes and mainframe volumes (3390-3B included) can be mixed only in units of DKA pairs.

(4) Disk drives used
The model of disk drives for which the HMDE volumes can be set is limited to the DK308-90. Therefore, to add the HMDE volumes in the subsystem which uses the DK306-45 for the mainframe, the DKA pair that uses the DK308-90 must be newly added.

(5) Setting from the open system host
- To access the HMDE volumes from the open system host, it is necessary to define connection to the open system host and to set an SCSI path. The method of defining the SCSI path for the open system host is the same as that of the ordinary SCSI path definition with the SVP.
- Refer to the manual attached to the P.P. for the method of setting the open system host to enable it to access the HMDE volumes. This setting operation requires labeling of the HMDE volumes, for example.

21.6.3 Notes on Use

Alike the ordinary 3390-3 type volumes, the 3390-3B type HMDE volumes can be accessed from the mainframe. This means that even if a specific ECC group is defined as that of the 3390-3B type volumes, such volumes contained in the ECC group not defined the connection from the open system host can be used intact the ordinary 3390-3 type volumes. That is, the ordinary mainframe volumes and the HMDE volumes can be mixed in one ECC group.

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21.7 HMBR (Hitachi Multiplatform Backup/Restore)

21.7.1 Overview

The Hitachi Multiplatform Backup/Restore (HMBR) optional feature provides a function to enable a mainframe host to backup a open system volume on the DKC disk subsystem by reading it by a volume unit. It also enables a mainframe host to restore the backup data onto the open system volume.

Any special additional software packages are not required to perform these functions on both mainframe host and open system host. Because, the DKC disk subsystem can convert the different data block format between open system (fixed block length data) and mainframe system (CKD format data).
The HMBR has the following features:

(1) Enabling mainframe host to backup open system data under the DKC Multiplatform disk subsystem by utilizing backup/restore programs, such as "DFHSM and DFDSS" or "DFSMShsm and DFSMSdss", with a Logical Unit volume unit, and to restore it from the mainframe to the Logical Unit.

(2) Performing backup and restore with high data transfer rate of ESCON 17 MB/s between mainframe host and the DKC disk subsystem.

(3) Providing the open systems with powerful backup functions being used on mainframe systems, such as backup generation management, primary/secondary duplication management, and automatic backup control.

(4) Offering various backup media to the system, such as disk drives, magnetic tapes, or magnetic tape libraries.

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21.7.2 System Configuration

A system configuration example and functional overview are shown in the Fig. 21.7.1.

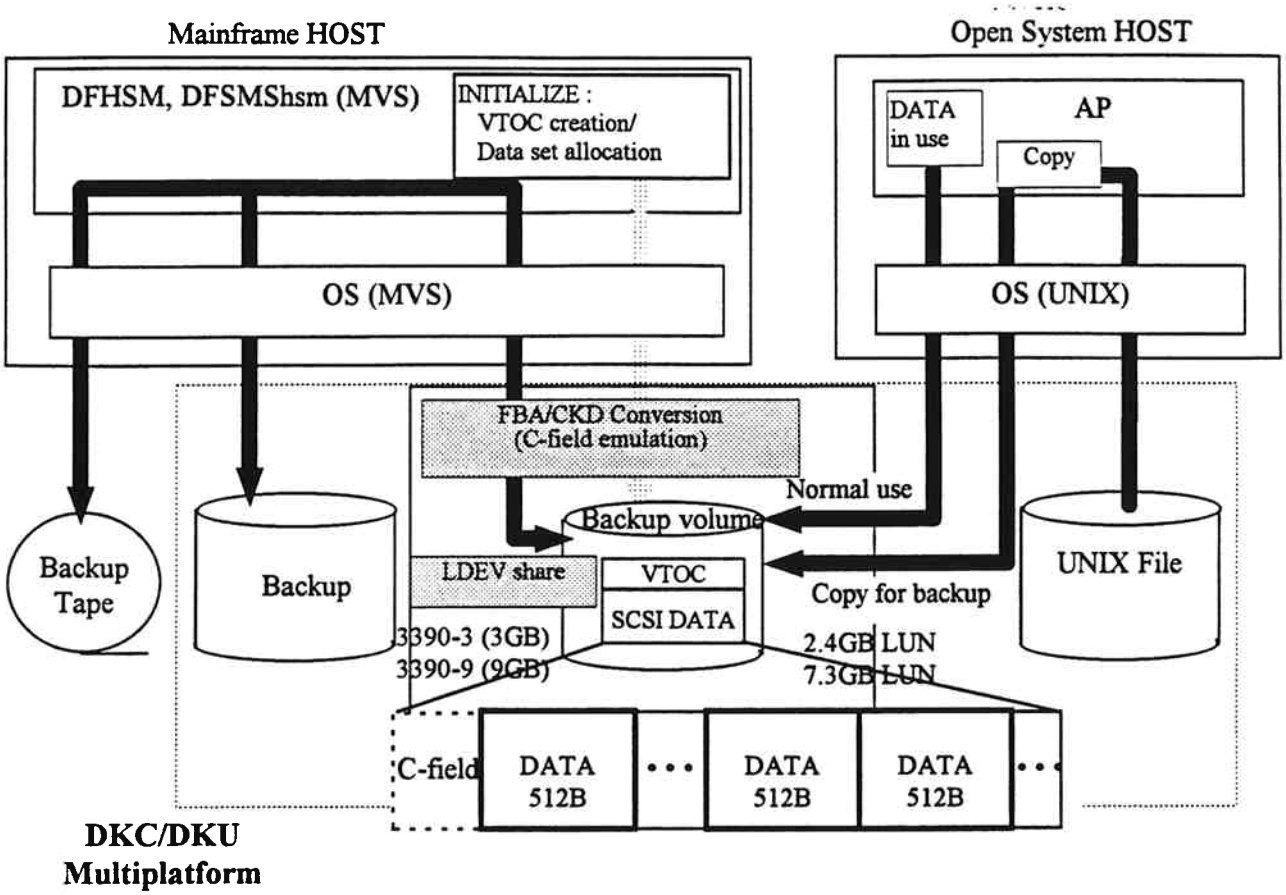

Fig. 21.7.1 System configuration example

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21.7.3 Basic Specification

The basic specification of HMBR is shown in the Table 21.7.1.

Table 21.7.1 Basic specification of HMBR

No	Item		Specification		Remarks
1	Attached system	Mainframe	MVS/ESA		
2		Open system	SUN (Solaris 2.5) or above HP (HP-UX 10.x) or above IBM (AIX 4.1.4) or above		
3	Backup software	Mainframe	DFHSM, DFDSS DFSMShsm, DFSMSdss		
4	Device type	Mainframe	3390-3	3390-9	
5		Open system	OPEN-3 (LUN=2.4GB)	OPEN-9 (LUN=7.3GB)	
6	Maximum number of volumes for backup/restore		- As many Logical Units as specified for OPEN-3/9 for Open system.		
7	Setup for backup volume		- By installing HMBR option (on SVP), all Logical Units defined as OPEN-3/9 can be accessed from MVS - Refer to item #16 for restrictions to the access from MVS.		
8	Preparation before taking backup	VSN, VTOC creation	- DSF (INIT)		
9		Dataset allocation	- IEFBR14		
10	Backup method		- Volume full tracks dump by using DFDSS and DFSMSdss.		
11	VTOC format		- Standard VTOC. Note: Do not use SMS for backup volumes since Index VTOC is used in SMS.		
12	VTOC allocation		- Cylinder 0, Head 1 to 14 (fixed location)		
13	Data set allocated	# of data sets	- One/VOL	- Three/VOL	
14		Extent	- Cylinder 1, Head 0 to User cylinder MAX.		
15	Restrictions for mainframe side utility programs		- Other utility programs than listed above are not allowed. - For Write type commands, other than those used by the above listed utility programs are rejected. (Only FORMAT WR with 16KB data length is allowed for write type command.) Read or Control type commands can be used.		
16	Exclusive control	In case of backup or restore execution by mainframe	- Need to be managed by administration. - Reserve is issued from mainframe prior to starting backup/restore. An access from open host will deprive the reservation of mainframe.		
17		In case of being used by open system	- Need to make the concerned volumes off-line from mainframe when not used for backup/restore (for a guard from illegal data access from mainframe.) .		

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21.7.4 Backup Volume Specification

1) Setup for Backup Volume

Step-1 : Install the HMBR option to the DKC by using SVP. Refer to the option install procedure described in SVP section. (SVP03-10)

Step-2 : By installing the option above, all the SCSI Logical Units (OPEN-3 and OPEN-9 type), already installed or newly installed, will be ready to be used for backup/ restore from the mainframe host.

Note-1 Immediately after the HMBR option is de-installed, an access from the mainframe to OPEN-3 or OPEN-9 will be rejected.

Note-2 The Logical Unit and data stored on it, which has been used before installing HMBR option, can be used continuously for its original use and/or for backup/restore purpose.

2) Access to Backup Volume

The specification applied to accessing the backup volume is shown in the Table 21.7.2.

Table 21.7.2 Specification of accessing the backup volume

No	Items	Specification
1	Volume type	- OPEN-3 (2.4GB), OPEN-9 (7.3GB)
2	Access from Open system	- No restriction.
3	Access from mainframe host	- Possible to Read/Write as 3390-3 for OPEN-3, and as 3390-9 for OPEN-9. - For Write type commands, only the following command is allowed: - Format Write with data length of 16 KB. - Other write type commands are rejected.
4	Exclusive control	- Simultaneous access from mainframe and open system is not allowed as operational restriction. However, if it should happen by mistake, the subsystem will react as follows; A) Mainframe access under open system use An access from the mainframe will be rejected while the LUN is being accessed or was accessed within 60 seconds in the past. B) Open system access under mainframe use An access from open system will wait until the volume becomes free and will be executed after that. When the mainframe has reserved the volume (this is a normal case), an access from the open system will deprive the reservation and execute its operation. Then a succeeding mainframe access will usually retry to reserve the volume. But, if it repeats, mainframe may detect reservation lost status on the volume and lead to the device boxed condition. - The reason why the failure is reported to the mainframe is to prevent system failure of open system caused by its less capability of exclusive control.

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21.8 Remote Console

The remote console function is supported for defining an SCSI configuration when constructing an HMRS/ALL SCSI configuration, and for displaying failure/maintenance information. This function can be realized by a service processor (SVP) and a remote console control program (RCCP/MPR) that operates on a personal computer (PC) connected to the SVP via the Ethernet.

21.8.1 Configuration

The system configuration of the remote console function is shown in Figure 21.8.1. This function is implemented in the configuration in which a PC and a SVP in a DKC are connected through the local LAN. One PC can be used as a common remote console for multiple DKCs. The user must provide a PC (PC/AT-compatible machine containing Window 95) in which the RCCP/MPR is to be installed, and the LAN interface.

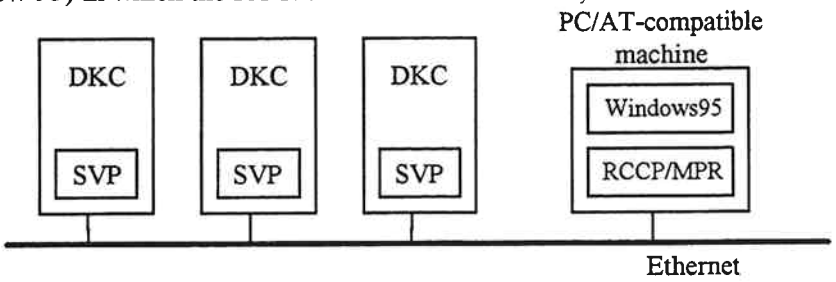

Figure 21.8.1 System configuration of the remote console function

21.8.2 Overview of functions

(1) Configuration definition function
The SCSI-ID, LUN, and LDEV numbers, etc. for each SCSI port can be set and displayed on the GUI screen. When the remote console function is not used, on-site setting and modification of configuration definition information are possible by using the SVP.

(2) Maintenance information notification function
The DKC hardware service information message (SIM) from the SVP is displayed. The maintenance information above is displayed as the SIM on the mainframe console, however, if the remote console function is not used. The same information is also notified to the Technical Support Center by the automatic remote maintenance function of the SVP.

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21.9 HA Software Linkage Configuration in a Cluster Server Environment

When this subsystem is linked to High-Availability software (HA software) which implements dual-system operation for improved total system fault-tolerance and availability, the open system side can also achieve higher reliability on the system scale.

21.9.1 Example of System Configurations

(1) Hot-standby system configuration

The HA software minimizes system down time in the event of hardware or software failures and allows processing to be restarted or continued. The basic system takes a hot-standby (asymmetric) configuration, in which, as shown in the figure below, two hosts (an active host and a standby host) are connected via a monitoring communication line. In the hot-standby configuration, a complete dual system can be built by connecting the SCSI buses of the active and standby hosts to different CHS SCSI ports.

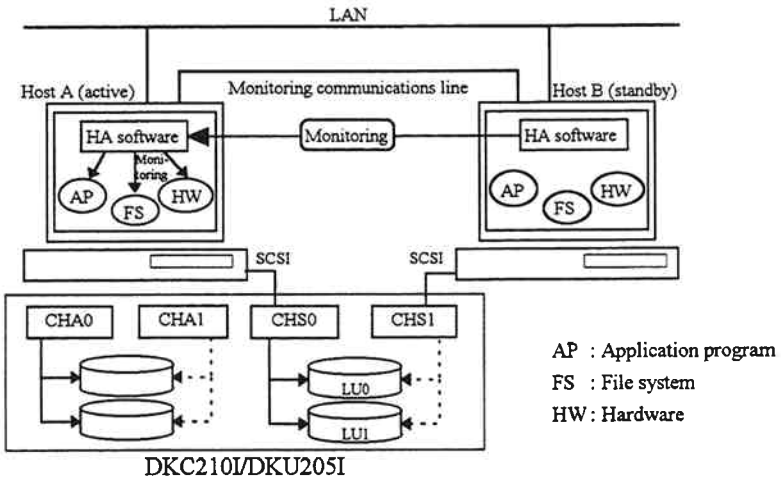

Figure 21.9.1 Hot-standby configuration

- The HA software under the hot-standby configuration operates in the following sequence:

a. The HA software within the active host monitors the operational status of own system by using a monitoring agent and sends the results to the standby host through the monitoring communication line (this process is referred to as "heart beat transmission"). The HA software within the standby host monitors the operational status of the active host based on the received information.

b. If an error message is received from the active host or no message is received, the HA software of the standby host judges that a failure has occurred in the active host. As a result, it transfers management of the IP addresses, disks, and other common resources, to the standby host (this process is referred to as "fail-over").

c. The HA software starts the application program concerned within the standby host to take over the processing on behalf of the active host.

- Use of the HA software allows a processing request from a client to be taken over. In the case of some specific application programs, however, it appears to the client as if the host that was processing the task has been rebooted due to the host switching. To ensure continued processing, therefore, a login to the application program within the host or sending of the processing request may need to be executed once again.

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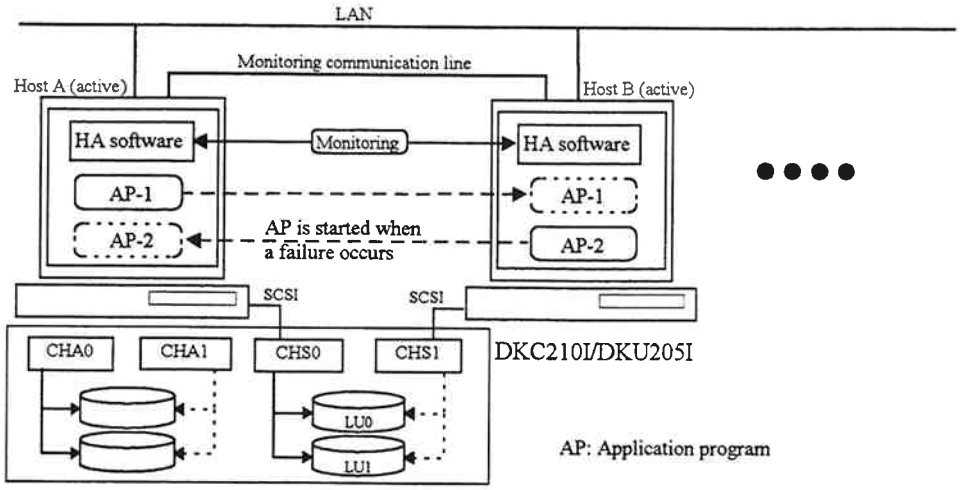
(2) Mutual standby system configuration

In addition to the hot-standby configuration described above, a mutual standby (symmetric) configuration can be used to allow two or more hosts to monitor each other. Since this subsystem has eight SCSI ports, it can, in particular, be applied to a large-scale cluster environment in which more than two hosts exist.



- In the mutual standby configuration, since both hosts operate as the active hosts, no resources exist that become unnecessary during normal processing. On the other hand, however, during a backup operation the disadvantages are caused that performance deteriorated and that the software configuration becomes complex.
- This subsystem is scheduled to support VERITAS Software FirstWatch, Hewlett-Packard MC/ServiceGuard, and IBM HACMP.

21.9.2 HA Software

The following list shows alternate link and HA software for each hosts. It is necessary to set Host Mode by using SVP, when changing a host system.

The meaning of each mode are follows.

MODE 00 : standard mode
MODE 01 : I-7135 host mode
MODE 02 : NCR host mode
MODE 03 : Sequent host mode
others : Reserved

MODE 01 ~ 03 are available at version 03-16-xx or later of micro program.

Please see "Change of the definition of host identification data" (INST05-80W, INST05-200W). Also see the operational manual for more detailed information about the alternate link and HA software.

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Table 21.9.1 Alternate Link and HA software

Host system	Sun	HP	IBM
OS	Solaris 2.5.1	HP-UX 10.2	AIX 4.2
Server	SPARC station Family SPARC server Family	HO9000 server HITACHI9000V server	RS/6000
Maximum LUNs without I/O Path Switch	120LUN/path 240LUN/RAID	120LUN/path 240LUN/RAID	120LUN/path 240LUN/RAID
Maximum LUNs with I/O Path Switch	120LUN/path 240LUN/RAID	120LUN/path 240LUN/RAID	21LUN/path 168LUN/RAID 21LUN/server
Concurrent active LUNs	50LUN/CHS 128LUN/new CHS	50LUN/CHS 128LUN/new CHS	50LUN/CHS 128LUN/new CHS
Alternate Link (Host Mode)	Safe Path *1 (MODE : 00)	Alternate-Link (MODE : 00)	I-7135 emulation (MODE : 01)
HA software	First Watch *1	MC/Service Guard *1	HACMP *1

NCR	Sequent	PC server
SVR4	Dynix PTX	Windows NT 4.0
World Mark server	NUMA-Q	PC server
120LUN/path 240LUN/RAID	120LUN/path 240LUN/RAID	120LUN/path 240LUN/RAID
56LUN/path 168LUN/RAID 21LUN/server	56LUN/path 168LUN/RAID 21LUN/server	120LUN/path 240LUN/RAID
50LUN/CHS 128LUN/new CHS	50LUN/CHS 128LUN/new CHS	50LUN/CHS 128LUN/new CHS
RDAC *1 (MODE : 02)	TERSSPASS (MODE : 03)	Safe Path *1 (MODE : 00)
Life Keeper *1	Cluster Control S/W *1	Wolfpack *1

*1 It is necessary to purchase these software in addition to the operating system.

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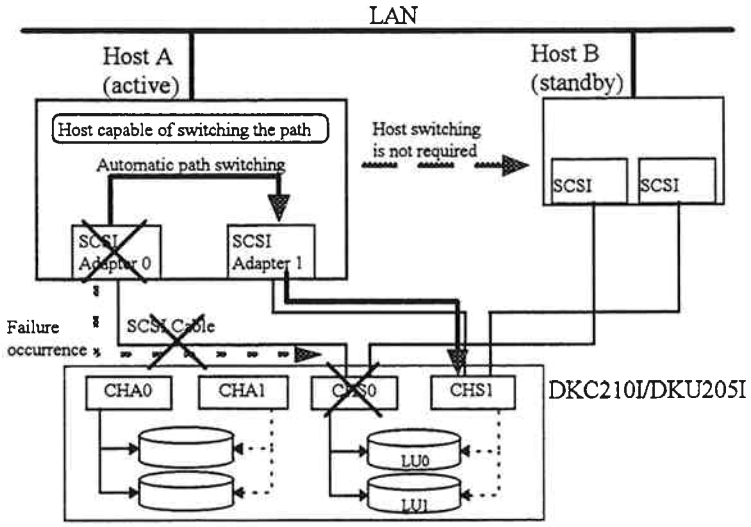
21.9.3 Configuration Using Host Path Switching Function

When the host is interlocked with the HA software and has a path switching capability, if a failure occurs in the SCSI adapter, SCSI cable, or DKC (SCSI ports and the CHS) that is being used, automatic path switching will take place as shown below.



The path switching function enables processing to be continued without host switching in the event of a failure in the SCSI adapter, SCSI cable, array controller, or other components.

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21.10 CHS performance PCB (DKC-F210I-8CD)

21.10.1 Specification

(1) Summary

RAID200 provides the new CHS PCBs (DKC-F210I-8CD) that has two processors per four SCSI ports. The purpose of providing this PCBs is improvement of performance. The condition of installation of the new PCBs (DKC-F210I-8CD) is described below.

Old CHS PCBs (DKC-F210I-8C) New CHS PCBs (DKC-F210I-8CD)

(2) Major specification

(a) This function is available under 03-15-xx or later version.

(b) CHS PCB mix is allowed as the unit of Basic or Option side.

Table 21.10-1 CHS PCB mix specification

Basic side		Option side		OK/NG
2MP	2MP	1MP	1MP	OK
1MP	1MP	2MP	2MP	OK
1MP	2MP	1MP	2MP	NG

1MP : DKC-F210I-8C 2MP : DKC-F210I-8CD

(c) Replace between DKC-F210I-8C and DKC-F210I-8CD by Replace operation is not supported.

(3) Installation procedure

The first step is to install the micro-program version 03-15-xx or later. Secondly, de-install DKC-F210I-8C by SVP online change subsystem. Then, install DKC-F210I-8CD by SVP online change subsystem.

[Procedure]

(a) Install the micro-program 03-15-xx or later version.

(b) De-Install the DKC-F210I-8C PCBs(Basic or Option side).

(c) Install the DKC-F210I-8CD PCBs(Basic or Option side).

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(4) Prevention of Install fault

(a) If the DKC-F210I-8CD are installed, micro-program version down to 03-14-xx or before can not be executeds. SVP checks the program version and refuses the request.

Table 21.10-2 CHS performance PCB supported microprogram version

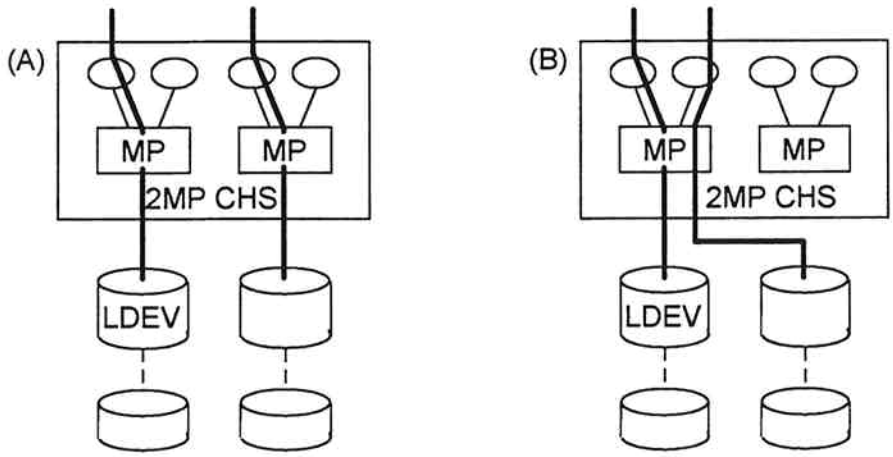
PCBs / Micro version	DKC-F210I-8C	DKC-F210I-8CD
03-14-xx or before (Not Support New CHS)	OK	NG
03-15-xx or later (Support New CHS)	OK	OK

(b) Replace between DKC-F210I-8C and DKC-F210I-8CD by Replace operation can not be executed. SVP checks the kind of CHS and refuses the replace operation.

(c) In case of PS/ON sequence , if the CHS that is different from DKC configuration would be installed, the PCB will be blocked. The SVP STATUS displays "failed" status for the PCB.

21.10.2 Recommended SCSI path configuration

SCSI port 1A and 1B, 1C and 1D, 1E and 1F, 1G and 1H, 2A and 2B, 2C and 2D, 2E and 2F, 2G and 2H are processed by one MP respectively for DKC-F210I-8CD.
By performance point of view, SCSI path definition should be decided to use more MP.
(A) is better than (B) in below configuration.



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21.11 HRC/SCSI concurrent use

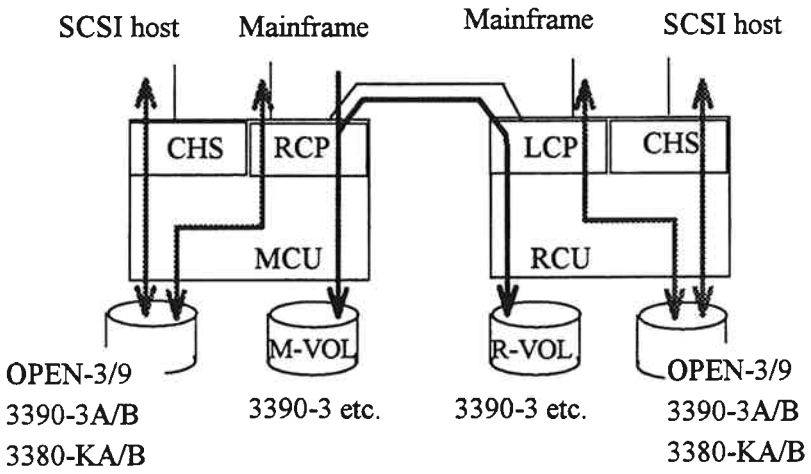
21.11.1 Overview

Both of HRC/HODM and Multiplatform function concurrently work on the same DKC210 over exclusive LDEV.
HRC/HODM and Multiplatform function do not work on the same LDEV.
The function is supported with DKCMAIN 03-16-xx-xx/xx or higher.
XRC and Multiplatform are still exclusive function on the same DKC210.

21.11.2 Specification

HRC and HMRS/HMDE/HMBR concurrently work on the same DKC210 on DKCMAIN 03-16-xx or higher.
HODM and HMRS/HMDE/HMBR concurrently work on the same DKC210 on DKCMAIN 03-16-xx or higher.
XRC and HMRS/HMDE/HMBR do not work on the same DKC210.
OPEN type LDEV OPEN-3, OPEN-9, 3390-3A, 3390-3B, 3380-KA and 3380-KB can not be used for HRC/HODM volume neither M-VOL nor R-VOL.
DKCMAIN 03-16-xx or higher must be installed to both MCU and RCU.
Remote console function for HRC/HODM and SCSI are available on same PC.

21.11.3 System configuration example



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21.11.4 HRC/HODM out of specification MVOL/RVOL pair and error codes

HRC/HODM out of specification MVOL/RVOL pair and error codes

HRC/HODM	Device type (MVOL)	Device type (RVOL)	SVP EC	SSB EC	Message ID
HRC	OPEN-3	3390-3	1208	C3A0	HRC2014I
	OPEN-9	3390-9	1208	C3A0	HRC2014I
	3390-3A	3390-3	1208	C3A0	HRC2014I
	3390-3B	3390-3	1208	C3A0	HRC2014I
	3380-KA	3380-K	1208	C3A0	HRC2014I
	3380-KB	3380-K	1208	C3A0	HRC2014I
	3390-3	OPEN-3	121C	C398	HRC2105W
	3390-9	OPEN-9	121C	C398	HRC2105W
	3390-3	3390-3A	121C	C398	HRC2105W
	3390-3	3390-3B	121C	C398	HRC2105W
	3380-K	3380-KA	121C	C398	HRC2105W
	3380-K	3380-KB	121C	C398	HRC2105W
HODM	OPEN-3	3390-3	121B	C3A0	HRC2104W
	OPEN-9	3390-9	121B	C3A0	HRC2104W
	3390-3A	3390-3	121B	C3A0	HRC2104W
	3390-3B	3390-3	121B	C3A0	HRC2104W
	3380-KA	3380-K	121B	C3A0	HRC2104W
	3380-KB	3380-K	121B	C3A0	HRC2104W
	3390-3	OPEN-3	121D	C3A1	HRC2106W
	3390-9	OPEN-9	121D	C3A1	HRC2106W
	3390-3	3390-3A	121D	C3A1	HRC2106W
	3390-3	3390-3B	121D	C3A1	HRC2106W
	3380-K	3380-KA	121D	C3A1	HRC2106W
	3380-K	3380-KB	121D	C3A1	HRC2106W

Meaning of SVP EC

1208 : HRC is not supported under the Device emulation type of the M-VOL.

121B : HODM is not supported under the Device emulation type of the M-VOL.

121C : HRC is not supported under the Device emulation type of the R-VOL.

121D : HODM is not supported under the Device emulation type of the R-VOL.

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21.11.5 Specification about microprogram

21.11.5.1 Function supported program version

DKCMAIN

#	version	HRC	SCSI	HRC/SCSI concurrent use
1	02-08-xx or lower	not supported	not supported	**not supported**
2	02-10-xx	supported	not supported	**not supported**
3	02-11-xx ~ 03-15-xx	supported	supported	**not supported**
4	03-16-03 or higher	supported	supported	**supported**

SVP

#	version	HRC	SCSI
1	01-05 or lower	not supported	not supported
2	01-06 or higher	supported	supported

21.11.5.2 How to construct HRC/SCSI concurrent use DKC210

(1) DKC210 without HRC/HODM and Multiplatform
1) update DKCMAIN of MCU and RCU to 03-16-03-00/00 or higher version and update other programs to correct version if necessary.
2) install HRC/HODM
3) install Multiplatform

(2) DKC210 with HRC/HODM and no Multiplatform
1) update DKCMAIN of MCU and RCU to 03-16-03-00/00 or higher version and update other programs to correct version if necessary.
2) install Multiplatform to MCU or RCU or both of MCU and RCU

(3) DKC210 with Multiplatform and no HRC/HODM
1) update DKCMAIN of MCU and RCU to 03-16-03-00/00 or higher version and update other programs to correct version if necessary.
2) install HRC/HODM

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21.11.5.3 Version down guard

When HRC/HODM and SCSI concurrently work on a same DKC, microprogram exchanging from current one that is 03-16-xx or higher to 03-15-xx or lower is rejected by SVP.
HRC/HODM function de-installation or SCSI function de-installation must be done before the version down.

Version down procedure of HRC/SCSI intermix DKC210 from 03-16-xx ~ to ~ 03-15-xx

Method-1

1) de-install HRC/HODM from the target DKC
2) version down

Method-2

1) de-install SCSI from the target DKC
2) version down

HRC/HODM de-installation procedure (please refer the right parts of M.M.)

A) The target DKC is MCU case

1) cancel M-VOL/R-VOL pair
2) release path between MCU and RCU
3) change RCP to LCP

B) The target DKC is RCU case

1) cancel M-VOL/R-VOL pair from MCU
2) release path between MCU and RCU from MCU

SCSI function de-installation procedure

1) de-install HMBR option if it installed
2) delete all SCSI path on the target DKC
3) de-install all OPEN type LDEV such as OPEN-3, OPEN-9, 3390-3A, 3390-3B, 3380-KA and 3380-KB.
4) de-install CHS PK.

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