F7-GA-1C02

F-7C AND F-7E PROCESSOR GROUP INSTALLATION PLANNING GUIDE

HITACHI

Statement on EN55022 Compliance

WARNING: This is a class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

Statement on Federal Communications Commission (FCC) Compliance

NOTE: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is cautioned that changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

Statement on Compliance with Local Laws and Standards

The equipment and the computer room must comply with local laws and standards. The user is required to take adequate measures so that the equipment and the computer room comply with applicable laws and standards before installing the equipment.

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F7-GA-1C02 Third Edition (April 1999)

This edition obsoletes F7-GA-1C02 original edition. Although this second edition provides the latest information available, such information is subject to change without prior notice. The reader is responsible for maintaining up-to-date editions.

Change Record

Revision No.	*Date*	*Description*	*Affected Pages*
0	September 1998	Original edition	—
1	October 1998	• Changes associated with addition of 31CD, 52CD, and B2C Base Models, and 0XC (B2C) CF Model. • Addition of acoustic noise data. • Addition of notes on channel configuration. • Correction to Power Consumptions and Heat Dissipations of PSTR and RPC, and those resulting in typical configurations. • Addition of internal airflow requirements for CD. • Correction to plug face drawings for input power cable. • Correction to masses of System Unit with CD-PCI. • Addition of triangle image on external view. • Addition of missing figure title to illustration of metal I/O cable requirements.	II, IV, V, 1-1 thru 1-4, 2-1, 3-1, 3-3, 4-1, 4-2, 5-3, 6-1
2	December 1998	Second Edition • Additions and changes associated with introduction of F-7C Turbo Models. • Correction to room air temperature and humidity requirements (deletion of specific conditions for CD). • Addition of harmonic distortion on output power. • Changes in external views of F-7C models. • Editorial changes.	All

(Continued on next page)

Change Record (Cont.)

Revision No.	*Date*	*Description*	*Affected Pages*
3	April 1999	Third Edition • Additions and changes associated with introduction of F-7E Turbo Models. • Additions and changes of Integrated Disk and Extended Frame.	All

PREFACE

This document serves as a physical planning manual draft for the end users of the F-7C and F-7E Processor Group.

For the purpose of generating an end user's physical planning manual, the breakdown models given herein do not necessarily match the models defined for ordering in the OEM Sales Agreement. For example, models transparent to the end users are herein omitted, renamed, or treated as included in appropriate host features. Hitachi, Ltd. allows the OEM customers to reproduce, rewrite, modify and edit all or part of this document while retaining copyright and all rights associated with copyright.

Information contained in this document is subject to change without notice.

Reference manuals

- *IBM System/360 and System/370 I/O Interface Channel to Control Unit Original Equipment Manufacturer's Information* (GA22-6974)
- *Planning for Fiber Optic Channel Links* (GA23-0367)
- *IBM Enterprise Systems Architecture/390 ESCON I/O Interface Physical Layer* (SA23-0394)

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LIST OF ABBREVIATIONS

AC, ac	alternate current
AC-DC	alternate current to direct current converter
AC CTL	AC controller
ANSI	American National Standard Institution
AP	Alternate Processor
APS	Assistant Power Source
BNC	bayonet lock type N connector
BPU	Basic Processing Unit
BTA	1,2,3-Benzotriazole
CB	circuit breaker
CD	Console Device
CDU	Coolant Distribution Unit
CF	Coupling Facility
CFC	chlorofluorocarbon
CHP	Channel Processor
DAS	Dual Attachment Station
DC	direct current
DC-DC	direct current to direct current converter
DIF	Dual Input Feature
DIN	Deutsche Institut fuer Normung
DSP	Disk System Processor
EMC	electromagnetic compatibility
EN	European Norm
ES	expanded storage
ESCD	ESCON Director
ESCH	Extended Serial Channel
ESCON	Enterprise Systems Connection
ETAF	External Timer Attachment Feature
Ex-1	Expansion Frame
FBCH	Fibre Channel
FCC	Federal Communications Commission
FDDI	Fiber Distributed Data Interface
GND	ground
HFC	hydrofluorocarbon
HDM	High-Density Module
HVCNV	high voltage converter
IBM	International Business Machines Corporation
IDK	Integrated Disk
IEC	International Electrotechnical Commission
IEEE	Institute of Electrical & Electronic Engineers
IntCF	Integrated Coupling Facility
I/O	input/output (device)
IOP	Input Output Processor
IP	Instruction Processor
ISCH2	Inter-System Coupling Channel 2
ISO	International Organization for Standardization
KS1	Key Storage 1
KS2	Key Storage 2
KS2H	Key Storage 2H
KS3	Key Storage 3
LAN	local area network

MB	megabyte(s)
Mbps	megabit(s) per second
MIC	media interface connector
MS	main storage
MVS	Multiple Virtual Storage
NA	not applicable
NEMA	National Electrical Manufacturers Association
OCF	Open Systems Connection Feature
OEM	original equipment manufacturer; original equipment manufacturing
OSCH	Open Systems Connection Channel
OSCH-E	Open Systems Connection Channel for Ethernet LAN
OSCH-FD	Open Systems Connection Channel for FDDI-DAS LAN
OSCH-FS	Open Systems Connection Channel for FDDI-SAS LAN
PCH	Parallel Channel
PCI	power control interface
PK	package
PSTR	Processor Storage
PSTR2G	Processor Storage Expansion 2G
PSTR2GE	Processor Storage Expansion 2GE
PSTR2GH	Processor Storage Expansion 2GH
PSTR4G	Processor Storage Expansion 4G
PSTR4GE	Processor Storage Expansion 4GE
PSTR8G	Processor Storage Expansion 8G
PSTR8GE	Processor Storage Expansion 8GE
PSTRALT1	Processor Storage Alternate 1
PSTRALT1E	Processor Storage Alternate 1E
PSTRALT2	Processor Storage Alternate 2
PSTRALT2E	Processor Storage Alternate 2E
PSTRALT3	Processor Storage Alternate 3
PSTRCTL1	Processor Storage Size Controller 1
PSTRCTL2	Processor Storage Size Controller 2
PSTRCTL3	Processor Storage Size Controller 3
RFU	Refrigeration Unit
RPC	Remote PCI Controller
RS	RUSSELLSTOLL
SAS	Single Attachment Station
SC	System Controller; station connector
SMT	System Management
SVP	Service Processor
SWR	switching regulator
Sysplex	System Complex
UL	Underwriters Laboratories Inc.
UPS	uninterruptible power supply

Note: Common abbreviations are excluded.

⚠ SAFETY SUMMARY

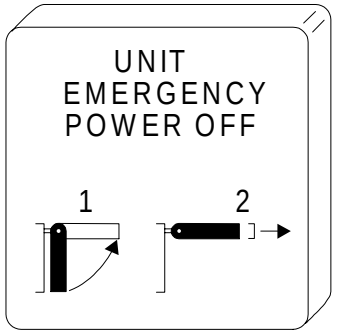
1. ⚠ General Safety Guidelines

Before starting your work, read the following instructions carefully:

- Any work including checkout and maintenance must be done only by trained and qualified personnel.
- Pay special attention to and follow all the hazard warnings on the machine and in the manual. Failure to do so can cause injury to yourself or damage to the machine.
- The hazard warnings which appear on the warning labels on the machine or in the manual have one of the alert headings consisting of an alert symbol and a signal word, DANGER, WARNING, or CAUTION as tabulated below. The signal word "NOTICE" is used to present warnings which are not directly related to personal injury hazards.
- If any physical accident such as abnormal noise, smell, smoke or falling down occurs on the processor complex while running, immediately power off the processor complex by pulling the UNIT EMERGENCY POWER OFF switch on the Processor Unit. See 2. below for details.
- Clearly identify each destination equipment of primary power sources with proper indication, e.g., a label on the switch on the power distribution panel or board.
- Do not perform any operation or action in any way other than as provided in this manual. When in doubt, call the designated field engineer.
- Keep in mind that the hazard warnings in this manual or on the machine cannot cover every possible case, as it is impossible to predict and evaluate all circumstances beforehand. Be alert and use your common sense.

⚠ DANGER	indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.
⚠ WARNING	indicates a potentially hazardous situation which, if not avoided, can result in death or serious injury.
⚠ CAUTION	indicates a hazardous situation which, if not avoided, will or can result in minor or moderate injury, or serious damage of product.
⚠	The alert symbol shown left precedes every signal word for hazard warnings, and appears in safety related descriptions in the manual.

2. ⚠ UNIT EMERGENCY POWER OFF Switch



- For the purpose of powering off in an emergency, a UNIT EMERGENCY POWER OFF switch (illustrated right) is provided on the Processor Unit.
- In using the UNIT EMERGENCY POWER OFF switch, first pull it up and then pull it toward you as illustrated.
- Pulling the UNIT EMERGENCY POWER OFF switch instantly shuts down the processor complex other than the Console Devices, ignoring the system's power off sequence. Jobs in progress are aborted and their integrity after recovery is not guaranteed. Hence, this method should be used only in an emergency.
- The UNIT EMERGENCY POWER OFF switch cannot turn off any I/O device.
- When pulled, the UNIT EMERGENCY POWER OFF switch locks itself to prevent further powering on and requires trained and qualified personnel for recovery. Contact the designated field engineer at once.

3. ⚠ Hazard Warning Statements

The following are the hazard warning statements contained in this manual. No DANGER statement is contained in this manual.

⚠ WARNING Statement

The power line has high voltage current. The input power supplied from the power distribution panel must be turned off before the input power cable is connected with the power line. Failure to do so can result in personal death or severe injury. After the input source is turned off, using a tester ensure that the supply power is shut off.

(section 3.5, page 3-4)

⚠ CAUTION Statements

Some floor treatment processes contain corrosive materials that can damage the system. Ensure that the waterproof sheet or the waterproof coating does not contain corrosive materials.

(section 4.4, page 4-4)

The internal-loop water contains toxic material (200 ppm BTA solution) that can cause harm to health and environment. Do not drink water, and do not waste water without proper treatment.

(section 4.5, page 4-5)

CHAPTER 1 CONFIGURATION AND EXTERNAL VIEW

1.1 Processor Models

Depending on the physical implementation, the F-7C and F-7E Processor Group provides a total of 44 processor models as lined up in figure 1-1 and tables 1-1 through 1-4.

Depending on the purpose and the hardware implementation represented by the number of System Controllers (SCs), the F-7C Processor Group provides 1SC Base Models, 2SC Base Models, 2SC Turbo Models, 1SC CF Models, and 2SC CF Models.

The F-7E Processor Group further extends the said scalability with performance-boosted 2SC Turbo Models.

Each F-7C Base Model uses a three- or four-character model ID, where the first character shows the number of [regular] Instruction Processors (IPs), the second character shows the number of SCs, the third character identifies the processor series "C" (fixed), and the fourth character indicates degraded or full performance: D degraded, blank full. Similarly, each F-7C Turbo Model and each F-7E Turbo Model uses three- or four-character model ID, where the first character shows the number of [regular] IPs, the second character "2" (fixed) shows the number of SCs, the third character "C" or "E" identifies the processor series, and, where applicable, the fourth character "H" (fixed) indicates the processor module hardware type of boosted performance. For the F-7C CF Models, "0XC" is fixed to identify the CF Model, followed by three characters in parenthesis: the first character shows the number of Integrated Coupling Facility (IntCF) IPs, the second character shows the number of SCs, and the third character identifies the processor series "C" (fixed).

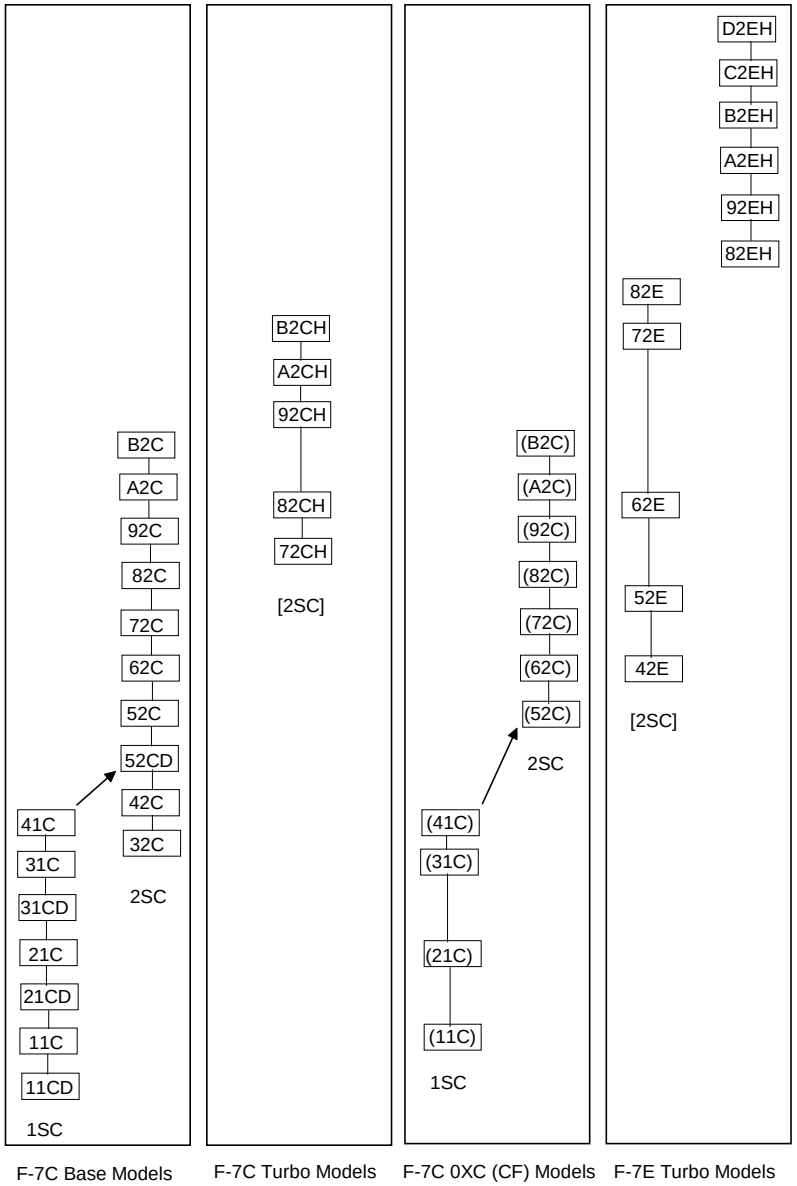


Figure 1-1 F-7C and F-7E Model Lineup

Table 1-1 Determination of F-7C Base Models

Model		*No. of [Regular] IPs*	*No. of SCs*	*No. of APs*				*HDM Type*
				Total	*IntCF IPs*	*DSPs*	*Standby APs*	
1SC Base	11CD	1	1	1	0–1	0–1	Δ	HDM11C
				4*	0–4*	0–2*	Δ*	HDM41C
	11C	1	1	1	0–1	0–1	Δ	HDM11C
				4*	0–4*	0–2*	Δ*	HDM41C
	21CD	2	1	3	0–3	0–2	Δ	HDM41C
	21C	2	1	3	0–3	0–2	Δ	HDM41C
	31CD	3	1	2	0–2	0–2	Δ	HDM41C
	31C	3	1	2	0–2	0–2	Δ	HDM41C
	41C	4	1	1	0–1	0–1	Δ	HDM41C
2SC Base	32C	3	2	2	0–2	0–2	Δ	HDM42C
				5*	0–5*	0–2*	Δ*	HDM72C
				8*	0–8*	0–2*	Δ*	HDMA2C
	42C	4	2	1	0–1	0–1	Δ	HDM42C
				4*	0–4*	0–2*	Δ*	HDM72C
				7*	0–7*	0–2*	Δ*	HDMA2C
	52CD	5	2	3	0–3	0–2	Δ	HDM72C
				6*	0–6*	0–2*	Δ*	HDMA2C
	52C	5	2	3	0–3	0–2	Δ	HDM72C
				6*	0–6*	0–2*	Δ*	HDMA2C
	62C	6	2	2	0–2	0–2	Δ	HDM72C
				5*	0–5*	0–2*	Δ*	HDMA2C
	72C	7	2	1	0–1	0–1	Δ	HDM72C
				4*	0–4*	0–2*	Δ*	HDMA2C
	82C	8	2	3	0–3	0–2	Δ	HDMA2C
	92C	9	2	2	0–2	0–2	Δ	HDMA2C
	A2C	10	2	1	0–1	0–1	Δ	HDMA2C
	B2C	11	2	0	0	NA	Δ	HDMA2C

Δ Total minus IntCF IPs and DSPs. * Optional configuration.

Table 1-2 Determination of F-7C Turbo Models

Model		*No. of [Regular] IPs*	*No. of SCs*	*No. of APs*			*HDM Type*
				Total	*IntCF IPs*	*Standby APs*	
[2SC] Turbo	72CH	7	2	4	0–4	Δ	HDMA2CH
	82CH	8	2	3	0–3	Δ	HDMA2CH
	92CH	9	2	2	0–2	Δ	HDMA2CH
	A2CH	10	2	1	0–1	Δ	HDMA2CH
	B2CH	11	2	0	0	0	HDMA2CH

Δ Total minus IntCF IPs.

Table 1-3 Determination of F-7C CF Models

Model		*No. of [Regular] IPs*	*No. of SCs*	*No. of APs*			*HDM Type*
				Total	*IntCF IPs*	*Standby APs*	
1SC CF	0XC (11C)	0	1	2	1	1	HDM11C
	0XC (21C)	0	1	5	2	3	HDM41C
	0XC (31C)	0	1	5	3	2	HDM41C
	0XC (41C)	0	1	5	4	1	HDM41C
2SC CF	0XC (52C)	0	2	8	5	3	HDM72C
	0XC (62C)	0	2	8	6	2	HDM72C
	0XC (72C)	0	2	8	7	1	HDM72C
	0XC (82C)	0	2	11	8	3	HDMA2C
	0XC (92C)	0	2	11	9	2	HDMA2C
	0XC (A2C)	0	2	11	10	1	HDMA2C
	0XC (B2C)	0	2	11	11	0	HDMA2C

Table 1-4 Determination of F-7E Turbo Models

Model		*No. of [Regular] IPs*	*No. of SCs*	*No. of APs*				*HDM Type*
				Total	*IntCF IPs*	*DSPs*	*Standby APs*	
[2SC] Turbo	42E	4	2	2	0–2	0–2	Δ	HDM52E
	52E	5	2	1	0–1	0–1	Δ	HDM52E
	62E	6	2	3	0–3	0–2	Δ	HDM82E
	72E	7	2	2	0–2	0–2	Δ	HDM82E
	82E	8	2	1	0–1	NA	Δ	HDM82E
	82EH	8	2	3	0–3	0–2	Δ	HDMA2EH
	92EH	9	2	2	0–2	0–2	Δ	HDMA2EH
	A2EH	10	2	1	0–1	0–1	Δ	HDMA2EH
	B2EH	11	2	2	0–2	0–2	Δ	HDMC2EH
	C2EH	12	2	1	0–1	0–1	Δ	HDMC2EH
	D2EH	13	2	0	0	NA	Δ	HDMC2EH

Δ Total minus IntCF IPs and DSPs.

1.2 Configurations

1.2.1 Major Host Features and Option Models

Table 1-5 shows major host features and option models of the F-7C and F-7E Processor Group. A target processor model is obtained by combining an appropriate selection of these features and models.

Table 1-5 Application of Major Host Features and Option Models

Frame or Component		*Q'ty on F-7C*					*Q'ty on F-7E*
		1SC Base	*2SC Base*	*[2SC] Turbo*	*1SC CF*	*2SC CF*	*[2SC] Turbo*
Basic Frame		1	1	1	1	1	1
	BPU	1	1	1	1	1	1
	IOP	1–2	1–2	1–2	1–2	1–2	1–2
	SVP	1	1	1	1	1	1
	Processor Storage (option)	*	*	*	*	*	*
	Channels (option)	**	**	**	**	**	**
	ETAF (option)	0–1	0–1	0–1	NA	NA	0–1
Ex-1 (option)		0–1	0–1	0–1	0–1	0–1	0–1
	IOP (option)	0–2	0–2	0–2	0–2	0–2	0–2
Extended Frame (option)		0–4	0–4	NA	NA	NA	0–4
	IDK (option)	0–8	0–8	NA	NA	NA	0–8
CDU Frame		NA	NA	1	NA	NA	1
CD		1–3	1–3	1–3	1–3	1–3	1–3
RPC (option)		0–4	0–4	0–4	NA	NA	0–4

* See subsection 1.2.2 Processor Storage Configuration Details.
** See subsection 1.2.3 Channel Configuration Details.

1.2.2 Processor Storage Configuration Details

A target Processor Storage (PSTR) capacity is realized by combining an appropriate selection of PSTR-related models as shown in table 1-6 through table 1-8. The PSTR can be used entirely as main storage (MS), or partitioned into MS and expanded storage (ES). Selection is provided through the Console Device.

Table 1-6 Processor Storage Configuration on 1SC Models of F-7C

PSTR Capacity in MB		*Required Number of Breakdown Models*										
Physical	*Marketing**	*PSTR 2G*	*PSTR 4G*	*PSTR 8G*	*PSTR CTL1*	*PSTR CTL2*	*PSTR CTL3*	*PSTR ALT1*	*PSTR ALT2*	*PSTR ALT3*	*KS1*	*KS2*
2048	256	1					1	1			1	
	512	1			1		1	1			1	
	768	1				1	1	1			1	
	1024	1			1	1	1	1			1	
	1280	1				2	1	1			1	
	1536	1			1	2	1	1			1	
	1792	1				3	1	1			1	
	2048	1			1	3	1	1			1	
4096	2304	2					1	1			1	
	2560	2			1		1	1			1	
	2816	2				1	1	1			1	
	3072	2			1	1	1	1			1	
	3584	2			1	2	1	1			1	
	4096	2			1	3	1	1			1	
6144†	4608	1	1		1		1		1		2	
	5120	1	1		1	1	1		1		2	
	5632	1	1		1	2	1		1		2	
	6144	1	1		1	3	1		1		2	
8192†	6656		2		1		1		1		2	
	7168		2		1	1	1		1		2	
	7680		2		1	2	1		1		2	
	8192		2		1	3	1		1		2	
12288††	10240		1	1	1	3				1	1	1
	12288		1	1	1	3	1			1	1	1
16384††	14336			2	1	3				1		2
	16384			2	1	3	1			1		2

* Marketing PSTR capacities are calculated using the following formula:
Physical capacities = Sum of the capacities of PSTR2G, PSTR4G, and PSTR8G
Enabled capacities = Enable capacities of PSTRCTL1 (256MB), PSTRCTL2 (512MB), or PSTRCTL3 (2048MB)
Marketing PSTR capacities = Physical capacities - 3840MB + Enabled capacities
† Available from 12/98 shipment.
†† Available from CY1H99 shipment.

Table 1-7 Processor Storage Configuration on 2SC Models of F-7C

PSTR Capacity in MB		*Required Number of Breakdown Models*										
Physical	*Marketing**	*PSTR 2G/ 2GH***	*PSTR 4G*	*PSTR 8G*	*PSTR CTL1*	*PSTR CTL2*	*PSTR CTL3*	*PSTR ALT1*	*PSTR ALT2*	*PSTR ALT3*	*KS2*	*KS3*
4096	256	2						2			2	
	512	2			1			2			2	
	768	2				1		2			2	
	1024	2			1	1		2			2	
	1280	2				2		2			2	
	1536	2			1	2		2			2	
	1792	2				3		2			2	
	2048	2			1	3		2			2	
	2304	2					1	2			2	
	2560	2			1		1	2			2	
	2816	2				1	1	2			2	
	3072	2			1	1	1	2			2	
	3584	2			1	2	1	2			2	
	4096	2			1	3	1	2			2	
8192	4608	4			1			2			2	
	5120	4			1	1		2			2	
	5632	4			1	2		2			2	
	6144	4			1	3		2			2	
	6656	4			1		1	2			2	
	7168	4			1	1	1	2			2	
	7680	4			1	2	1	2			2	
	8192	4			1	3	1	2			2	
12288†	10240	2	2		1	3			2		4	
	12288	2	2		1	3	1		2		4	
16384†	14336		4		1	3			2		4	
	16384		4		1	3	1		2		4	
24576††	24576		2	2	1	3	1			2		4
32768††	32768			4	1	3	1			2		4

* Marketing PSTR capacities are calculated using the following formula:
Physical capacities = Sum of the capacities of PSTR2G/PSTR2GH, PSTR4G, and PSTR8G
Enabled capacities = Enable capacities of PSTRCTL1 (256MB), PSTRCTL2 (512MB), or PSTRCTL3 (2048MB)
Marketing PSTR capacities = Physical capacities - 3840MB + Enabled capacities
** PSTR2G for F-7C Base Models and F-7C CF Models, PSTR2GH for F-7C Turbo Models.
† Available from 12/98 shipment.
†† Available from CY1H99 shipment.

Table 1-8 Processor Storage Configuration on F-7E

PSTR Capacity in MB		*Required Number of Breakdown Models*										
Physical	*Marketing**	*PSTR 2GE*	*PSTR 4GE*	*PSTR 8GE*	*PSTR CTL1*	*PSTR CTL2*	*PSTR CTL3*	*PSTR ALT1E*	*PSTR ALT2E*	*PSTR ALT3*	*KS2H*	*KS3*
4096	256	2						2			2	
	512	2			1			2			2	
	768	2				1		2			2	
	1024	2			1	1		2			2	
	1280	2				2		2			2	
	1536	2			1	2		2			2	
	1792	2				3		2			2	
	2048	2			1	3		2			2	
	2304	2					1	2			2	
	2560	2			1		1	2			2	
	2816	2				1	1	2			2	
	3072	2			1	1	1	2			2	
	3584	2			1	2	1	2			2	
	4096	2			1	3	1	2			2	
8192	4608	4			1			2			2	
	5120	4			1	1		2			2	
	5632	4			1	2		2			2	
	6144	4			1	3		2			2	
	6656	4			1		1	2			2	
	7168	4			1	1	1	2			2	
	7680	4			1	2	1	2			2	
	8192	4			1	3	1	2			2	
12288	10240	2	2		1	3			2		4	
	12288	2	2		1	3	1		2		4	
16384	14336		4		1	3			2		4	
	16384		4		1	3	1		2		4	
24576	24576		2	2	1	3	1			2		4
32768	32768			4	1	3	1			2		4

* Marketing PSTR capacities are calculated using the following formula:
Physical capacities = Sum of the capacities of PSTR2GE, PSTR4GE, and PSTR8GE
Enabled capacities = Enable capacities of PSTRCTL1 (256MB), PSTRCTL2 (512MB), or PSTRCTL3 (2048MB)
Marketing PSTR capacities = Physical capacities - 3840MB + Enabled capacities

1.2.3 Channel Configuration Details

No channel is included in Basic Frame or Ex-1 of the F-7C and F-7E Processor Group as standard. Table 1-9 shows the number of channels available depending on the physical frame configuration, where every increment denotes one CH-PK and each IOP accommodates 16 CH-PKs. Figure 1-2 shows installation recommendation for parallel channels.

Table 1-9 Channel Configuration on F-7C and F-7E

Processor Model	*Channel Type*	*No. of Channels Min–Max [Increment]*			
		Basic Frame, 1 IOP	*Basic Frame, 2 IOPs*	*Basic Frame + Ex-1, 3 IOPs*	*Basic Frame + Ex-1, 4 IOPs*
Base Model and Turbo Model	Parallel	0–32* [4]	0–64* [4]	0–96* [4]	0–96 [4]
	Recommended	0–24 [4]	0–48 [4]	0–72 [4]	0–96 [4]
	ESCH	0–64 [4]	0–128 [4]	0–192 [4]	0–256 [4]
	ISCH2	0–12 [2]	0–24 [2]	0–32 [2]	0–32 [2]
	OSCH-E/FD/FS	0–12 [1]	0–12 [1]	0–12 [1]	0–12 [1]
	FBCH	0–16 [2]	0–16 [2]	0–16 [2]	0–16 [2]
	Total	8–64	8–128	8–192	8–256
CF Model	ISCH2	2–16 [2]	2–32 [2]	2–32 [2]	2–32 [2]

* When this maximum number of parallel channels (8 CH-PKs per IOP) are installed, the resulting I/O connector layout blocks the field engineer's concurrent maintenance services. To avoid such situations, it is recommended not to let more than two parallel CH-PKs neighbor each other as shown in figure 1-2.

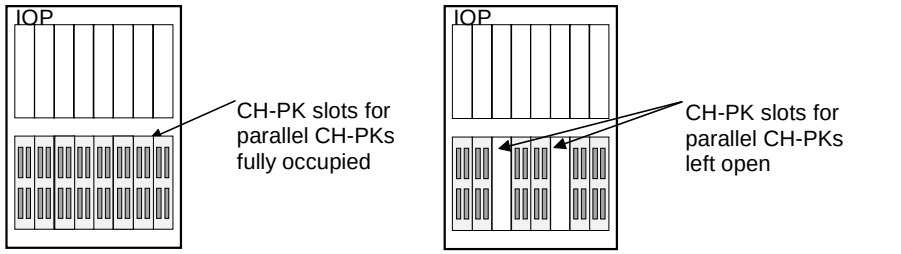
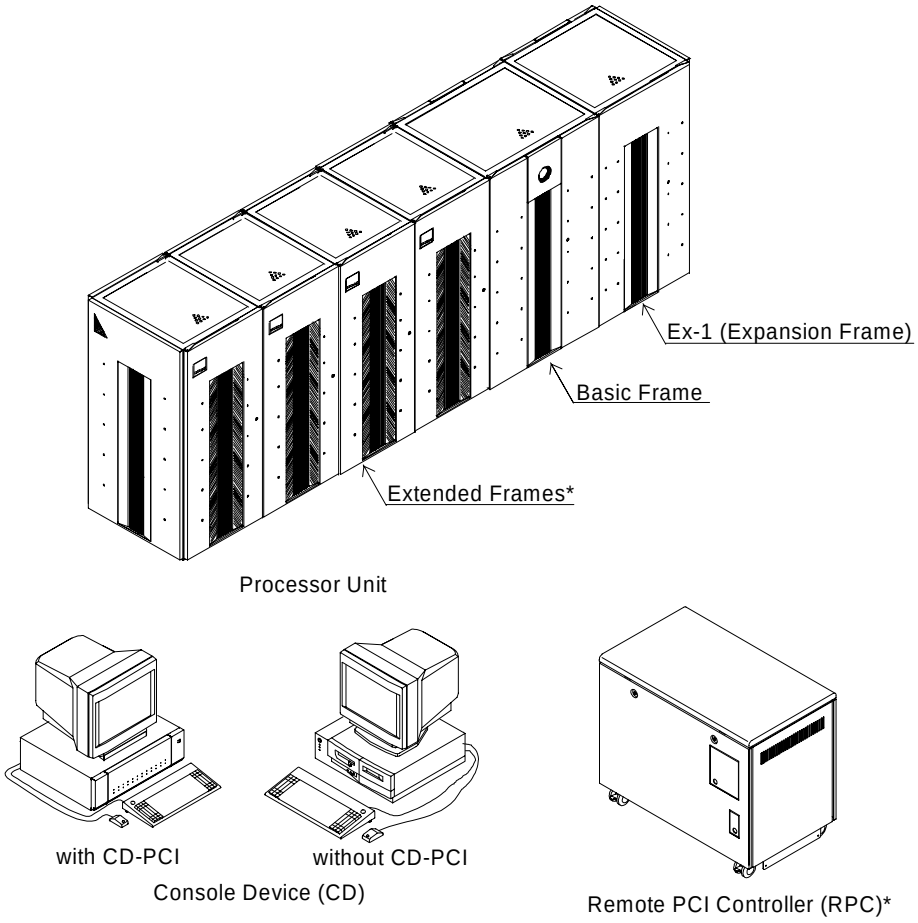


Figure 1-2 Installation Recommendation for Parallel Channels

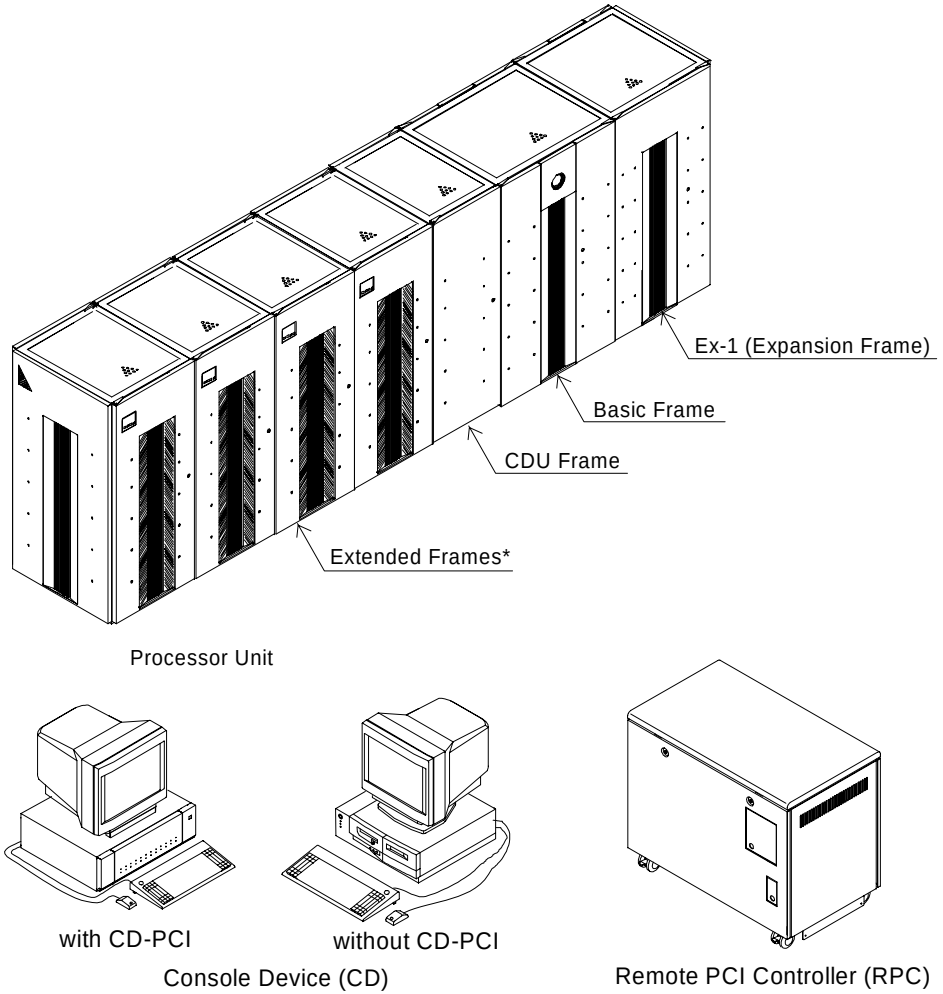
1.3 External View and Frame Identifications

Figures 1-3 and 1-4 illustrate the external views and frame identifications of the F-7C and F-7E Processor Group.



* Not applicable to F-7C CF.

Figure 1-3 External View and Frame Identifications of F-7C Base and F-7C CF



* Not applicable to F-7C Turbo.

Figure 1-4 External View and Frame Identifications of F-7C Turbo and F-7E Turbo

CHAPTER 2 ENVIRONMENTAL REQUIREMENTS

2.1 Room Air Temperature and Humidity

The room air surrounding the F-7C and F-7E processor complexes must meet the temperature and humidity requirements defined in table 2-1. For the underfloor air requirements, see chapter 4.

Table 2-1 Room Air Temperature and Humidity Requirements

Item		*Installed*		*Shipped*
		*Operating**	*Non-Operating*	
Temperature °C (°F)	Range	16–32 (60–90)	4–43 (40–110)	4–43 (40–110)
	Recommended	21–28 (70–82)	–	–
Max. Wet Bulb Temperature °C (°F)		23 (76)	27 (80)	27 (80)
Relative Humidity %	Range	20–80	8–90	8–90
	Recommended	45–55	–	–

* When the CD is not equipped with the PCI capability (model name: CD-PCI), the Service Processor (SVP) in Basic Frame remains powered as long as the corresponding circuit breaker on the customer's power distribution panel is turned on. Therefore, the room air temperature and humidity conditions under the "Operating" environment apply while the corresponding circuit breaker on the customer's power distribution panel is turned on, even though the machine appears to be non-operating.

2.2 Physical Shock

Table 2-2 specifies the physical shock limits for the F-7C and F-7E Processor Group.

Table 2-2 Physical Shock Limits

Condition		*Maximum Shock m/s^2 (G)*	
		Continuous	*Momentary*
Installed	Operating	2.45 (0.25)	2.45 (0.25)
	Non-Operating	2.45 (0.25)	2.45 (0.25)
Shipped/handled		2.45 (0.25)	29.4 (3.0)

2.3 Acoustic Noise

Table 2-3 provides acoustic noise emission levels by the processor unit configuration of the F-7C and F-7E Processor Group.

Table 2-3 Acoustic Noise Emission Levels

Processor Model	*Processor Unit Configuration*	*<LpA>m (dB)*		*LwAd (dB)*	
		Operating	*Idling*	*Operating*	*Idling*
Base or CF	Basic Frame	57.7	57.7	77.5	77.5
	Basic Frame + Ex-1	57.8	57.8	78.9	78.9
Turbo	Basic Frame + CDU	57.7	57.7	77.5	77.5
	Basic Frame + CDU+ Ex-1	57.8	57.8	78.9	78.9

Legend:
- <LpA>m: Mean value of A-weighted sound pressure levels at one-meter (bystander) positions for a random sample of machines.
- LwAd: Declared (upper limit) sound power level for a random sample of machines.

2.4 Electromagnetic Interference

The F-7C and F-7E Processor Group has been tested and found to comply with the limits for a Class A digital device, pursuant to EN55022 and Part 15 of the FCC Rules. Thus, every F-7C and F-7E processor complex provides reasonable protection against harmful interference when the processor complex is operated in a commercial or industrial area.

2.5 Electromagnetic Immunity

The electromagnetic immunity of the F-7C and F-7E processor complexes to external sources such as peripheral devices, cordless phones, cellular phones, commercial broadcasting radio frequencies, industrial heaters and arc welding equipment has been tested and found to comply with the EN50082-1 *Electromagnetic Compatibility—Generic Immunity Standard Part 1. Residential, Commercial and Light Industry.* Compliance with the said standard guarantees immunity in moderate electromagnetic radiation environment (a typical commercial environment). Low power portable transceivers (typically less than 1 W rating) are in use, but with restrictions on use in close proximity to the equipment.

Along with the recent popularization of communication equipment such as cordless phones, cellular phones and transceivers, troubles with electromagnetic radiation from such equipment are also increasing. Use of such equipment in close proximity to the F-7C and F-7E processor complexes should be avoided, especially when any door or panel of the processor complex is opened. In order to prevent an unintended trouble, use of the said equipment within 2 meters (6.5 feet) of the surface of the F-7C and F-7E processor complexes should be prohibited. The user is recommended, for example, to register an itemized list of allowable communication equipment based on measurement, and prohibit the use of any unregistered equipment in the computer room.

Reference only information regarding use of portable transceivers (walkie-talkies) in the computer room is available in Annex A of IEC1000-4-3 *Electromagnetic Compatibility (EMC)—Part 4. Testing and Measurement Techniques—Section 3. Radiated, Radio-Frequency, Electromagnetic Field Immunity Test.*

CHAPTER 3 POWER REQUIREMENTS

3.1 Power Consumption

Power consumptions of individual features and option models and those for typical configurations are shown in table 3-1 and table 3-2 respectively. To reach a total power consumption for any given configuration, calculate the relevant numbers for the individual features and models in the configuration. Note that these figures are rated at maximum, and hence actual measurements may show smaller values.

Table 3-1 Power Consumptions of Individual Features and Models

Feature or Model					*Power Consumption (VA)*
Basic Frame with standard IOP (2 CHPs) and SVP	Basic consumption	Basic Frame			551
		Standard IOP (2 CHP)			211
		SVP			247
	Additional consumption by HDM type	F-7C	1SC	BPU PK	123
				HDM11C	395
				HDM41C	557
			2SC	BPU PK	196
				HDM42C	780
				HDM72C	943
				HDMA2C	1106
				HDMA2CH	1296
		F-7E	BPU PK	42E–82E	205
				82EH–D2EH	222
			HDM52E		1214
			HDM82E		1438
			HDMA2EH		1789
			HDMC2EH		1960
Ex-1 (Expansion Frame)					346
CDU					3200
Extended Frame					0
IDK					2600

(Continued on next column)

Table 3-1 Power Consumptions of Individual Features and Models (Cont.)

Feature or Model				*Power Consumption (VA)*
PSTR (MB)	F-7C	1SC	256–2048	158
			2304–4096	290
			4608–8192	292
			10240–12288	295
			14336–16384	298
		2SC	256–4096	321
			4608–8192	585
			10240–16384	596
			24576–32768	617
	F-7E	256–4096		260
		4608–8192		474
		10240–16384		474
		24576–32768		474
Optional IOP (2 CHPs)				211
Channels	PCH (4 channels)			65
	ESCH (4 channels)			53
	ISCH2 (2 channels)			53
	OSCH-E (1 channel)			43
	OSCH-FD (1 channel)			45
	OSCH-FS (1 channel)			45
	FBCH (2 channels)			53
ETAF				50
CD				200
RPC				60

Table 3-2 Power Consumptions in Typical Configurations of F-7C and F-7E

Processor Model			*HDM Type*	*Additions to Minimum Configuration**						*Total kVA*
				Ex-1	*PSTR (MB)*	*IOP (opt.)*	*No. of Channels*			
							PCH	*ESCH*	*ISCH2*	
F-7C	1SC Base	11CD or 11C	11C	0	1024	1	16	48	0	3.00
			41C	0	2048	1	16	80	0	3.58
		21CD–41C	41C	0	2048	1	16	80	0	3.58
	2SC Base	32C or 42C	42C	1	4096	2	16	112	0	5.02
			72C	1	4096	2	16	112	0	5.18
			A2C	1	8192	3	16	224	0	7.30
		52CD–72C	72C	1	4096	2	16	112	0	5.18
			A2C	1	8192	3	16	224	0	7.30
		82C–B2C	A2C	1	8192	3	16	224	0	7.30
	[2SC] Turbo	72CH–B2CH	A2CH	1	8192	3	16	224	0	10.69
	1SC CF	0XC (11C)	11C	0	1024	0	0	0	8	2.10
		0XC (21C–41C)	41C	0	2048	0	0	0	16	2.48
	2SC CF	0XC (52C–72C)	72C	0	4096	1	0	0	24	3.52
		0XC (82C–B2C)	A2C	0	8192	1	0	0	32	4.16
F-7E	Turbo	42E or 52E	52E	1	8192	6	4	56	0	9.61
		62E–82E	82E	1	8192	6	4	56	0	9.84
		82EH–A2EH	A2EH	1	8192	6	4	56	0	10.21
		B2EH–D2EH	C2EH	1	8192	6	4	56	0	10.38

* In addition to an applicable type of HDM, the minimum configuration of each processor model consists of one Basic Frame with standard IOP and SVP, no Ex-1, no PSTR, no Extended Frame, no IDK, no optional IOP, no channel, no ETAF, one CD, no RPC, and, for Turbo, one CDU.

3.2 Power Feeding

Figure 3-1 illustrates power feeding of the F-7C and F-7E Processor Group.

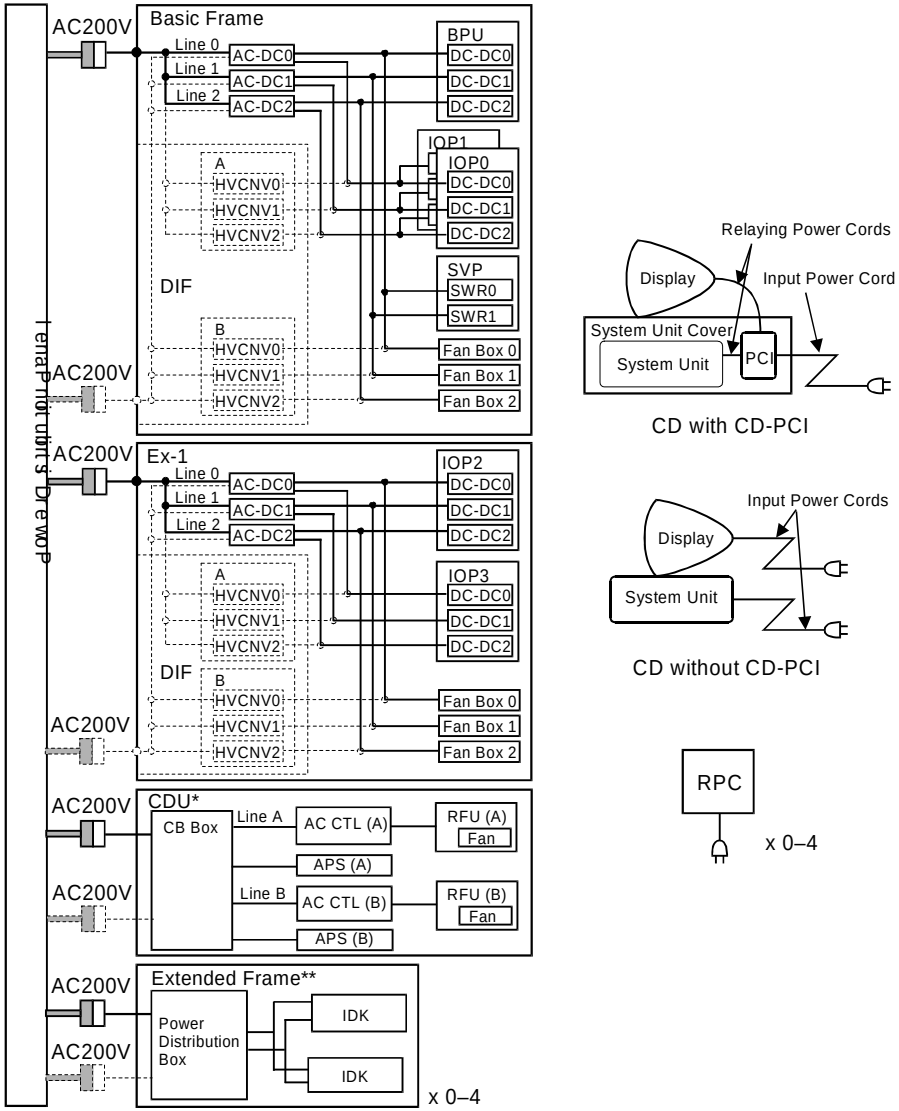


Figure 3-1 Power Feeding of F-7C and F-7E

3.3 Input Voltage and Frequency

Table 3-3 shows the input voltage and frequency specifications for the F-7C and F-7E Processor Group.

Table 3-3 Input Voltage and Frequency Specifications

Input to	*Input Voltage V ac 50/60 Hz*	*Conditions*	*Tolerance*
Basic Frame	200–240	1 phase, 2 wire, 1 ground	+6%, –8%
Ex-1	200–240	1 phase, 2 wire, 1 ground	+6%, –8%
CDU*	200–240	1 phase, 2 wire, 1 ground	+6%, –8%
Extended Frame**	200–240	1 phase, 2 wire, 1 ground	+6%, –8%
System Unit of CD	100–120 or 200–240	1 phase, 2 wire, 1 ground	+6%, –8%
Display of CD***	100–120 or 200–240	1 phase, 2 wire, 1 ground	+6%, –8%
RPC	100–120 or 200–240	1 phase, 2 wire, 1 ground	+6%, –8%

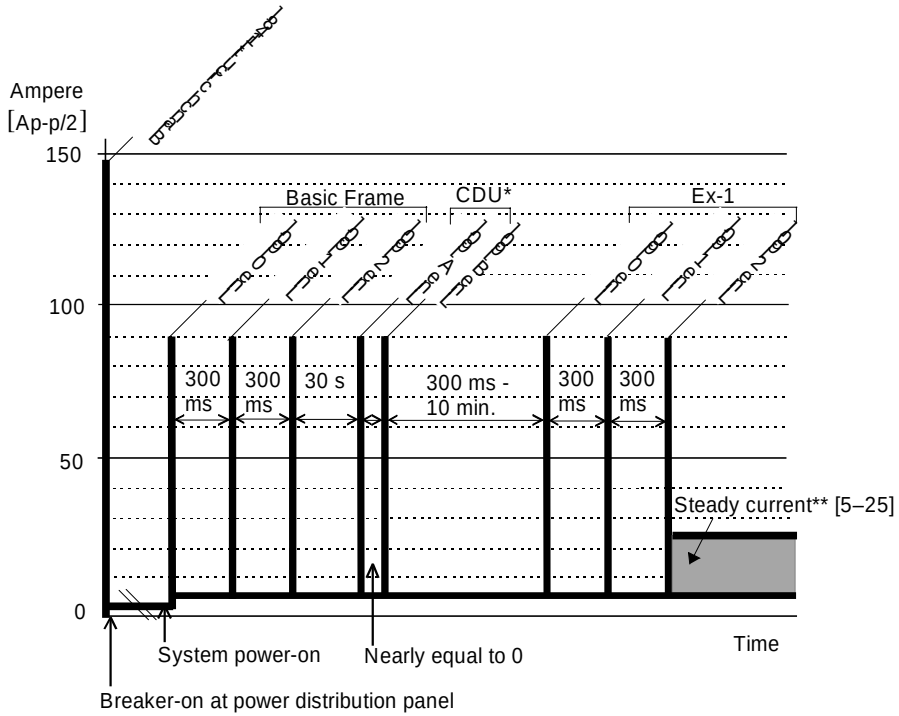
* Applicable to F-7C Turbo and F-7E Turbo Models only.
** Applicable to F-7C Base and F-7E Turbo Models only.
*** Applicable when CD is not equipped with CD-PCI.

Note: All the 50 Hz and 60 Hz input voltages to Basic Frame, Ex-1, CDU, Extended Frame, CD, and RPC are approved by UL. These units also carry CE-MARK.

3.4 Input Power Tolerance

The input power must meet the following tolerances:

- Both 50 and 60 Hz input frequencies have the tolerances of plus 0.5 Hz and minus 0.5 Hz.
- A transient voltage must return to within a steady-state tolerance within plus 15% and minus 18 % of the nominal rated voltage within 0.5 second.
- Non-operating harmonic contents must not exceed 5%.
- The startup rush currents present during power on of the processor complex must be taken into account when preparing branch circuit and power protection system in the customer's facility. Figure 3-2 illustrates the inrush current time delay. Wave forms will slightly vary depending on the input voltage. Extended Frames have no impact on the inrrush current time delay.



* Applicable only to Turbo Models.
** Steady current varies with system configuration and input voltage.

Figure 3-2 Inrush Current Time Delay

3.5 Input Power Cable Connection

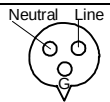
3.5.1 Processor Unit Frames

Basic Frame, Ex-1 (Expansion Frame), CDU (Coolant Distribution Unit), and Extended Frame of the F-7C and F-7E Processor Group as applicable provide either of two types of input power cables. One is with an IEC-type connector and the other is with an RUSSELLSTOLL-type (RS-type) connector. Each customer must procure an appropriate power cable with a mating receptacle to complete the power line to the power distribution panel. See table 3-4.

⚠ WARNING

The power line has high voltage current. The input power supplied from the power distribution panel must be turned off before the input power cable is connected with the power line. Failure to do so can result in personal death or severe injury. After the input source is turned off, using a tester ensure that the supply power is shut off.

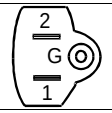
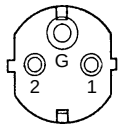
Table 3-4 Input Power Plug and Receptacle for Processor Unit Frames

Plug Type	*Length of Input Power Cable with Plug*	*Terminal Wires*	*Plug Face*	*Plug Attached to Input Power Cable*	*Mating Receptacle (Customer Responsibilities)*
IEC	4 meters	3 x 10AWG		Approved by IEC 309, 32A 240VAC	Approved by IEC 309, 32A 240VAC
RS	4 meters	3 x 10AWG		Industrial Electrical Products, Russellstoll. Type FS, No. 3750.	Industrial Electrical Products, Russellstoll. Type FS, No. 3933.

3.5.2 CD and RPC

Table 3-5 shows the input power plugs and receptacles for the CD and the RPC.

Table 3-5 Input Power Plug and Receptacle for CD and RPC

Application	*Length of Input Power Cable with Plug*	*Terminal Wires*	*Plug Face*	*Plug Attached to Input Power Cable*	*Mating Receptacle (Customer Responsibilities)*
CD and RPC for 100–120 V input	4.3 meters	3 x 18AWG		5-15P* (125 V, 10 A)	5-15R* (125 V, 10 A)
CD and RPC for 200–240 V input	4.3 meters	CENELEC OC 3 x 1.0 mm^2		VM0309B** 250 V, 10 A	VM0310B** 250 V, 10 A

* Plug or receptacle of NEMA (National Electrical Manufacturers Association) standard or equivalent.

** In compliance with EN60320; where a mating receptacle is not available, a conversion plug in compliance with the local standards must be procured by the customer.

3.5.3 Special Note on Dual Input Power Connection

The input voltage of each power line to the CDU frame receiving two input powers must be fixed to the same value within the specified range of 200–240 V. A voltage difference between the two input powers to the CDU frame will cause the same frame to be damaged. On the other hand, a frequency difference between the two input powers to the CDU frame is acceptable.

This special note is applicable only to the CDU frame of the F-7C Turbo and F-7E Turbo Models.

3.6 Guide to Primary Power Protection

An appropriate primary power protector must be installed on each branch circuit in compliance with rated input current to each equipment as shown in table 3-6.

Table 3-6 Primary Power Protector Rating

Primary-Power Supplied Unit	*Input Voltage V ac 50/60 Hz*	*Recommended Primary-Power Protector Rating in Amperes**
Basic Frame	200–240	30
Ex-1	200–240	30
CDU**	200–240	30
Extended Frame***	200–240	30
System Unit of CD	100–120 or 200–240	15
Display of CD****	100–120 or 200–240	15
RPC	100–120 or 200–240	15

* Calculate input current in amperes using the formula below and procure an appropriate protector in accordance with applicable laws and standards.

$$\text{Input current (A)} = \frac{\text{kVA x 1000}}{\text{V}}$$

- kVA: Total power consumption in target configuration except CD and RPC. Recommended to include margin for future increase.
- V: Input voltage.

** Applicable only to F-7C Turbo and F-7E Turbo Models.

*** Applicable only to F-7C Base and F-7E Turbo Models.

**** Applicable when CD is not equipped with CD-PCI.

3.7 Convenience Outlet

No convenience outlet is provided in any model of the F-7C and F-7E Processor Group.

3.8 Harmonic Distortion on Output Power

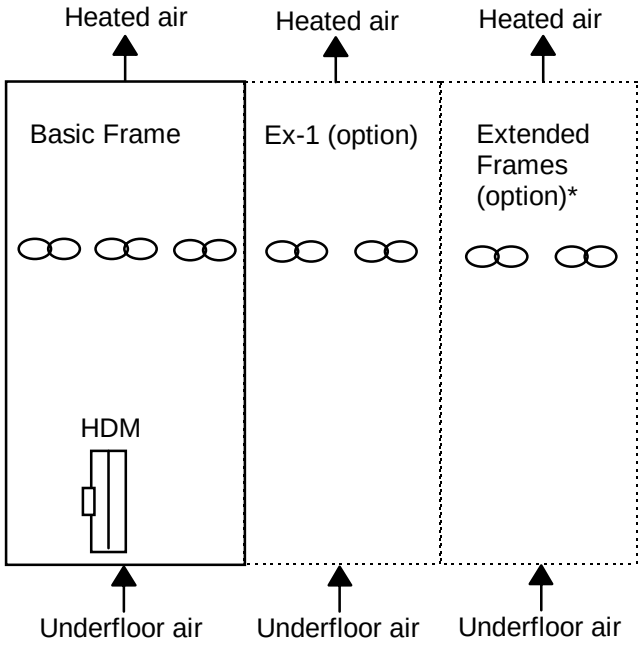
Harmonic distortion on the output power is discussed in appendix A.

CHAPTER 4 COOLING REQUIREMENTS

4.1 Cooling Method

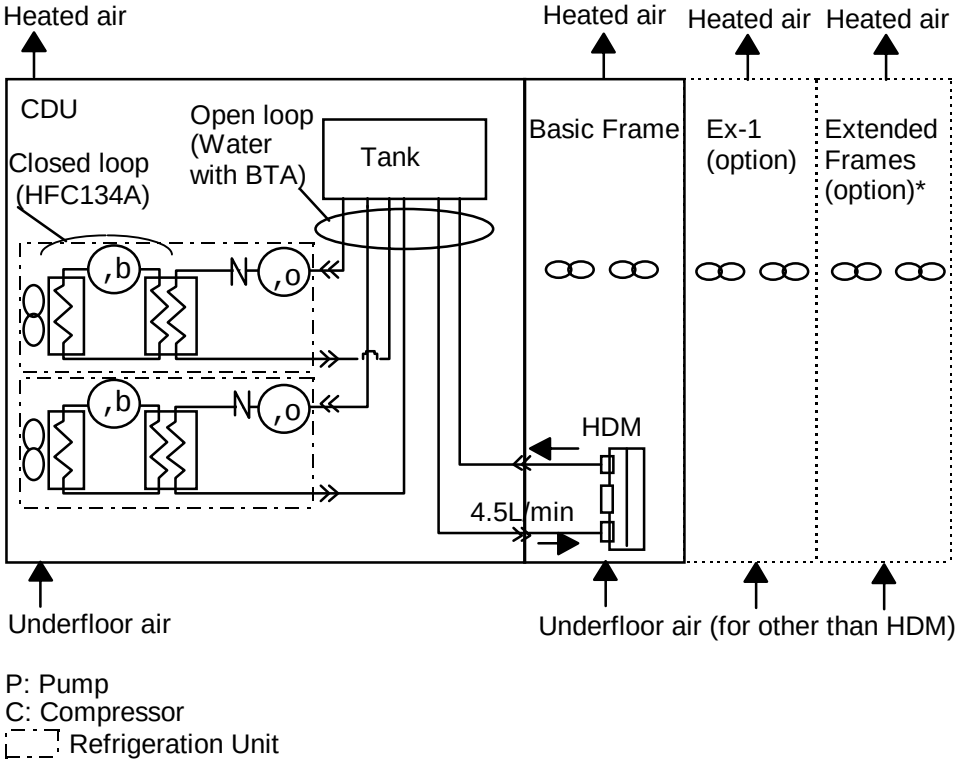
The F-7C Base Models and CF Models use air-cooling technology only. The F-7C Turbo Models and the F-7E Turbo Models use water for cooling on the HDM and air for cooling on the other components.

Figures 4-1 and 4-2 illustrate the cooling schematics of the F-7C and F-7E Processor Group.



* Not applicable to F-7C CF.

Figure 4-1 Cooling of F-7C Base and F-7C CF



* Not applicable to F-7C Turbo.

Figure 4-2 Cooling of F-7C Turbo and F-7E Turbo

4.2 Heat Dissipation

Heat dissipations of individual features and option models and those for typical configurations are shown in table 4-1 and table 4-2, respectively. To reach a total heat dissipation for any given configuration, calculate the relevant numbers for the individual features and option models in the configuration. Note that these figures are rated at maximum, and hence actual measurements may show smaller values.

Table 4-1 Heat Dissipations of Individual Features and Models

Feature or Model					*Heat Dissipation (W)*
Basic Frame with standard IOP (2 CHPs) and SVP	Basic dissipation	Basic Frame			523
		Standard IOP (2 CHP)			201
		SVP			235
	Additional dissipation by HDM type	F-7C	1SC	BPU PK	117
				HDM11C	375
				HDM41C	529
			2SC	BPU PK	186
				HDM42C	742
				HDM72C	896
				HDMA2C	1051
				HDMA2CH	1231*
		F-7E	BPU PK	42E–82E	195
				82EH–D2EH	211
			HDM52E		1153*
			HDM82E		1366*
			HDMA2EH		1700*
			HDMC2EH		1862*
Ex-1 (Expansion Frame)					329
CDU					2720
Extended Frame					0
IDK					2600

(Continued on next column)

* Of the output heat, 600 W dissipates to internal-loop water and finally goes to air at the CDU.

Table 4-1 Heat Dissipations of Individual Features and Models (Cont.)

Feature or Model				*Heat Dissipation (W)*
PSTR (MB)	F-7C	1SC	256–2048	150
			2304–4096	275
			4608–8192	278
			10240–12288	281
			14336–16384	283
		2SC	256–4096	305
			4608–8192	556
			10240–16384	556
			24576–32768	586
	F-7E	256–4096		247
		4608–8192		450
		10240–16384		450
		24576–32768		450
Optional IOP (2 CHPs)				201
Channels	PCH (4 channels)			62
	ESCH (4 channels)			50
	ISCH2 (2 channels)			51
	OSCH-E (1 channel)			41
	OSCH-FD (1 channel)			43
	OSCH-FS (1 channel)			43
	FBCH (2 channels)			50
ETAF				50
CD				40
RPC				40

Table 4-2 Heat Dissipations of F-7C and F-7E in Typical Configurations

Processor Model			*HDM Type*	*Additions to Minimum Configuration**						*Total kW*
				Ex-1	*PSTR (MB)*	*IOP (opt.)*	*No. of Channels*			
							PCH	*ESCH*	*ISCH2*	
F-7C	1SC Base	11CD or 11C	11C	0	1024	1	16	48	0	2.80
			41C	0	2048	1	16	80	0	3.36
		21CD–41C	41C	0	2048	1	16	80	0	3.36
	2SC Base	32C or 42C	42C	1	4096	2	16	112	0	4.73
			72C	1	4096	2	16	112	0	4.88
			A2C	1	8192	3	16	224	0	6.89
		52CD–72C	72C	1	4096	2	16	112	0	4.88
			A2C	1	8192	3	16	224	0	6.89
		82C–B2C	A2C	1	8192	3	16	224	0	6.89
	[2SC] Turbo	72CH–B2CH	A2CH	1	8192	3	16	224	0	9.79
	1SC CF	0XC (11C)	11C	0	1024	0	0	0	8	1.95
		0XC (21C–41C)	41C	0	2048	0	0	0	16	2.31
	2SC CF	0XC (52C–72C)	72C	0	4096	1	0	0	24	3.31
		0XC (82C–B2C)	A2C	0	8192	1	0	0	32	3.92
F-7E	Turbo	42E or 52E	52E	1	8192	6	4	56	0	8.73
		62E–82E	82E	1	8192	6	4	56	0	8.94
		82EH–A2EH	A2EH	1	8192	6	4	56	0	9.29
		B2EH–D2EH	C2EH	1	8192	6	4	56	0	9.45

* In addition to an applicable type of HDM, the minimum configuration of each processor model consists of one Basic Frame with standard IOP and SVP, no Ex-1, no PSTR, no Extended Frame, no IDK, no optional IOP, no channel, no ETAF, one CD, no RPC, and, for Turbo, one CDU.

4.3 Underfloor Air and Internal Airflow

The Processor Unit of each F-7C or F-7E processor model requires underfloor air cooling. Be sure that the heated air at the top of the Processor Unit meets environmental specifications given in chapter 2. The air at the floor intakes must have a positive pressure and meet the requirements given in table 4-3. For altitudes from 900 to 2100 meters (3000 to 7000 feet), decrease the maximum and minimum air temperatures by 2 °C for each 300-meter (1000-foot) elevation. Table 4-4 shows the internal airflow requirements. Floor cutouts to secure this airflow (with the exception of the CD that does not require underfoor air) are illustrated in chapter 5.

Table 4-3 Underfloor Air Requirements

Item	*Requirements*		
	F-7C Base and F-7C CF	*F-7C Turbo*	*F-7E Turbo*
Temperature °C (°F)	16–32 (60–90)	16–22 (60–71)	16–22 (60–72)
Humidity %	20–80	60–75	60-75
Pressure	0–900 meters (0–3000 feet) altitude equivalent		

Table 4-4 Internal Airflow Requirements

Processor Frame or Unit		*Total Internal Airflow m^3/min at 50 or 60 Hz*
Basic Frame		36
Ex-1		24
CDU*	F-7C	9
	F-7E	10
CD		0.6
Extended Frame**		14

* Applicable only to Turbo Models.
** Applicable only to F-7C Base and F-7E Turbo Models.

4.4 Cooling Recommendations (Turbo Models Only)

The CDU circulates internal-loop water to/from the Basic Frame. Customer water leakage or system water leakage could occur during normal operation (including maintenance), or in an unpredictable accident or natural disaster. For prevention of water damage, it is recommended that the customer prepare underfloor waterproofing and water leakage detection prior to the system installation.

4.4.1 Underfloor Waterproofing

It is recommended that the system underfloor be adequately waterproofed before system installation. Use of waterproof sheet or waterproof coating is acceptable.

⚠ CAUTION

Some floor treatment processes contain corrosive materials that can damage the system. Ensure that the waterproof sheet or the waterproof coating does not contain corrosive materials.

In addition, it is recommended that a barrier to hold back water be constructed surrounding the waterproofed floor. Figure 4-3 illustrates recommended waterproofing schematics.

4.4.2 Water Leakage Detection

During site preparation, it is recommended that the customer install the following devices to detect initial water leakage:

- Water leakage sensing tape or detectors
- Water leakage sensing monitor

Figure 4-3 illustrates recommended water leakage sensing tape and water leakage sensing monitor.

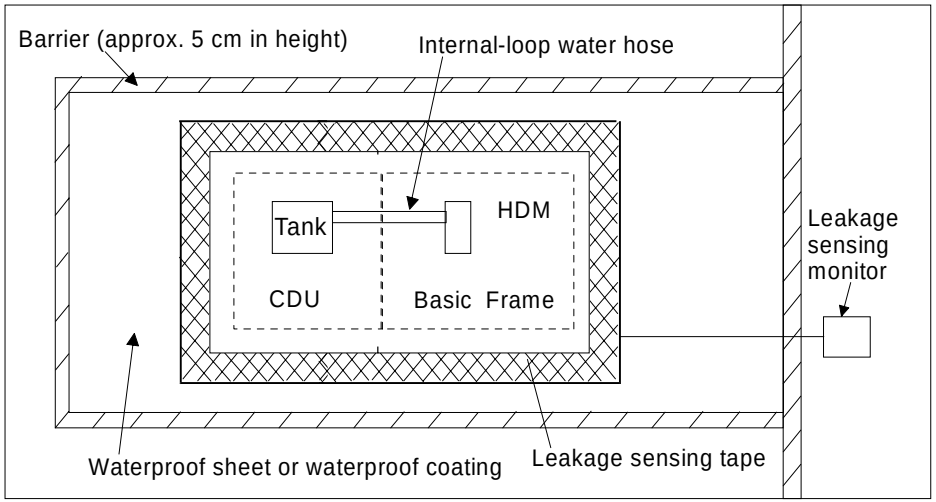


Figure 4-3 Underfloor Waterproofing Schematics for Turbo Models

4.5 Requirements for Coolant (Turbo Models Only)

4.5.1 Refrigerant

Table 4-5 shows requirements for the refrigerant which is factory-filled and should be treated in accordance with local laws and regulations.

Table 4-5 Refrigerant Requirements for Turbo Models

Item		*Requirements*
Material		R134a [HFC134A] (CFC alternative)
Amount	F-7C Turbo	250 g per RFU (500 g per CDU)
	F-7E Turbo	665 g per RFU (1330 g per CDU)
Max. pressure in ordinary use		14 kg/cm^2

4.5.2 Internal-Loop Water

Table 4-6 shows requirements for the internal-loop water which should be filled, refilled and disposed by the OEM customer. In the internal-loop water, addition of corrosion inhibitor is mandatory to prevent possible HDM corrosion with high flow rate and large flow quantity.

⚠ CAUTION

The internal-loop water contains toxic material (200 ppm BTA solution) that can cause harm to health and environment. Do not drink water, and do not waste water without proper treatment.

Table 4-6 Internal-Loop Water Requirements for Turbo Models

Item	*Requirements*
Approx. quantity	With 2.4 m hose pair: 5 liters per CDU
Electric conductivity	< 10.0 µS/cm
Ionic strength	• Cl^- < 2.4 mg/l • SO_4^{2-} < 3.0 mg/l • F^- < 1.0 mg/l • S^{2-} < 1.0 mg/l • NH_4^+ < 1.0 mg/l
Residual chlorine concentration	< 0.5 mg/l
Total organic carbon	< 50 mg/l
Corrosion inhibitor	BTA (1,2,3-Benzotriazole: $C_6H_5N_3$) solution at density of 200 ± 20 ppm (2 ± 0.2 grams per 10 liters), at least 98% quality

CHAPTER 5 DIMENSIONS, MASS, AND FLOOR LAYOUT

5.1 Processor Units

Table 5-1 shows the dimensions and masses of the F-7C and F-7E Processor Units when installed; table 5-2, when packed. Figures 5-1 through 5-10 show the floor plans including floor cutouts and minimum service clearances. Figures 5-11 through 5-14 show the frame-base openings.

Table 5-1 Installed Dimensions and Masses of F-7C and F-7E Processor Units

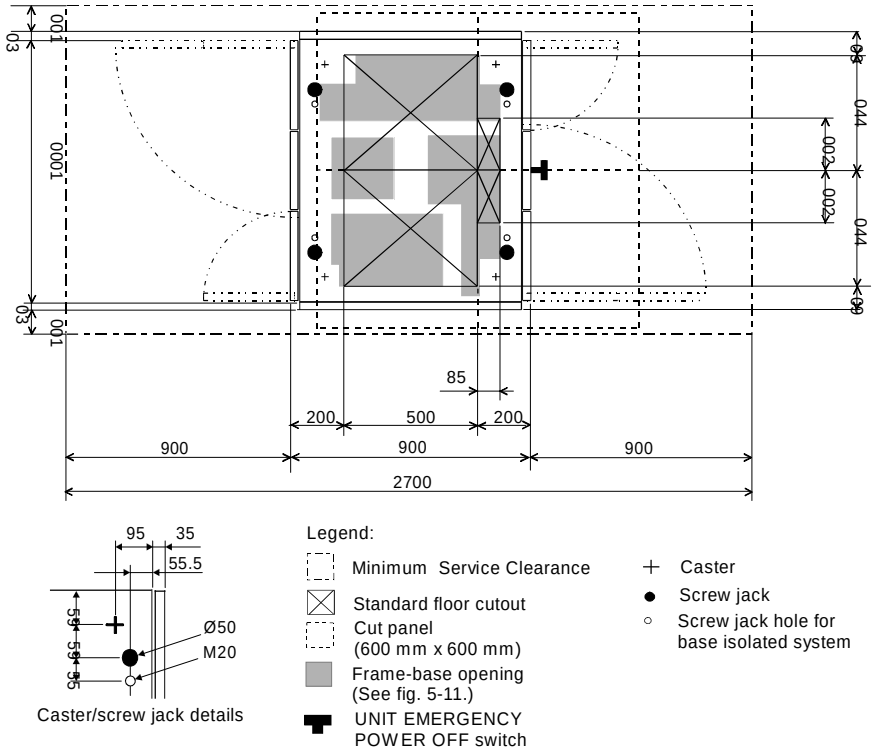
Model		*Dimensions mm*			*Mass kg*	*Mass per Footprint kg/m²*			
		H	*D*	*W*		*Without Option Frames*	*With Option Frames*		
							Ex-1 Only	*Extended Frame Only*	*Both*
Basic Frame*	End panel (BPU side)	1720	900	30	30	–	–	–	–
	Basic Frame (no end panel) of Base	1720	900	1000	620	755.6	722.2	722.2	688.9
	Basic Frame (no end panel) of Turbo	1720	900	1000	620	722.2	688.9	688.9	688.9
	End panel (IOP side)	1720	900	30	30	–	–	–	–
Ex-1**		1720	900	832	460	–	654.4	–	654.4
CDU of F-7C Turbo***		1720	900	502	345	830.0	830.0	–	–
CDU of F-7E Turbo***		1720	900	552	425†	TBD	TBD	TBD	TBD
Extended Frame****		1720	900	702	535	–	–	894.3	894.3

* Dimensions and masses include two end panels and maximum numbers of IPs, channels, PSTRs, ETAF, and DIF. Application to F-7C Base, F-7C Turbo, and F-7E Turbo Models is assumed.
** Dimensions and masses include no end panel but include maximum numbers of channels and DIF. Application to F-7C Base, F-7C Turbo, and F-7E Turbo Models is assumed.
*** Dimensions and masses include no end panel but include internal-loop water.
**** Applicable to F-7C Base and F-7E Turbo. The masses include two IDKs.
† Theoretical.

Table 5-2 Packed Dimensions and Masses of F-7C and F-7E Processor Units

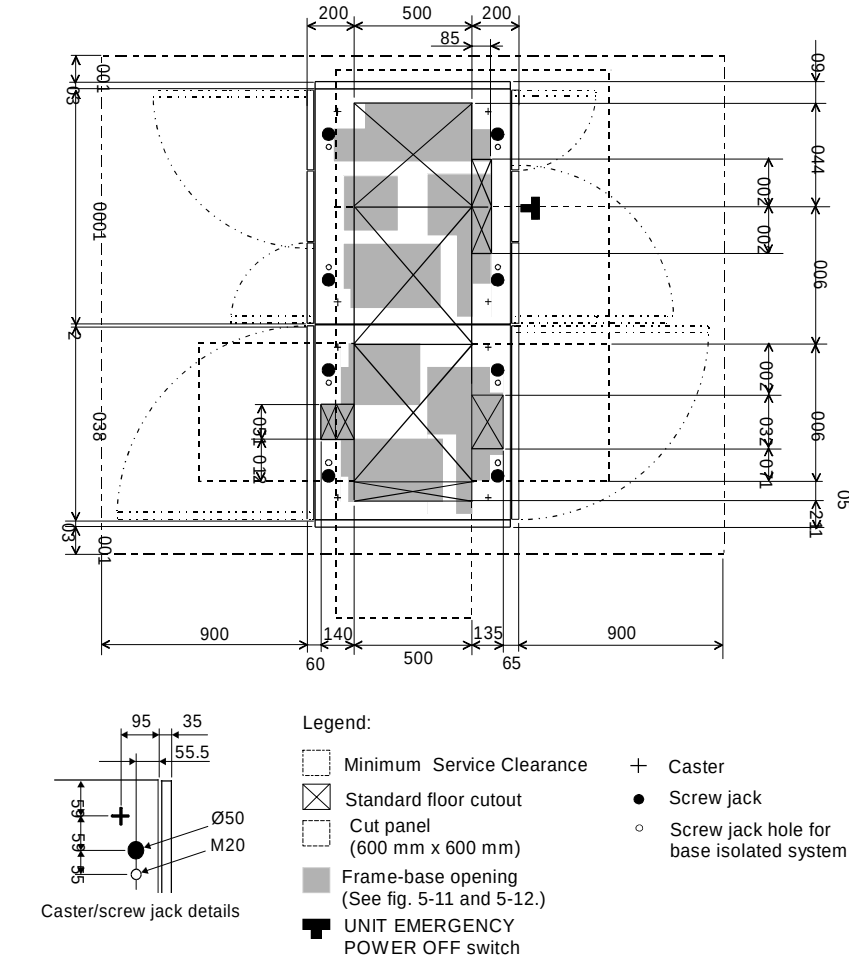
Contents of Each Cargo			*Dimensions mm per Cargo*			*Max. Mass kg per Cargo*
			H	*D*	*W*	
Basic Frame (+ two end panels)			2095	1080	1220	780*
Basic Frame + Ex-1	Jointed (+ two end panels)		2095	1080	2050	1280*
	Separated (option)	Basic Frame (+ one end panel)	2095	1080	1220	750*
		Ex-1 (+ one end panel)	2095	1080	1020	585*
Ex-1 (no end panel)			2095	1080	1020	555*
CDU (no end panel) of F-7C Turbo**			2060	1130	800	440
CDU (no end panel) of F-7E Turbo**			2060	1130	800	520†
Extended Frame***			2070	1030	800	590
Accessory			***	***	***	***

* Fully equipped with IPs, channels, PSTRs, ETAF, and DIF on Basic Frame, and with channels and DIF on Ex-1. Application to F-7C Base Models and Turbo Models is assumed. The mass decreases as the number of the said features becomes fewer.
** Internal-loop water is not included.
*** Applicable to F-7C Base and F-7E Turbo. The mass includes two IDKs.
**** The quantity, dimensions, and masses of cargos vary with actual shipping configuration.
† Theoretical.



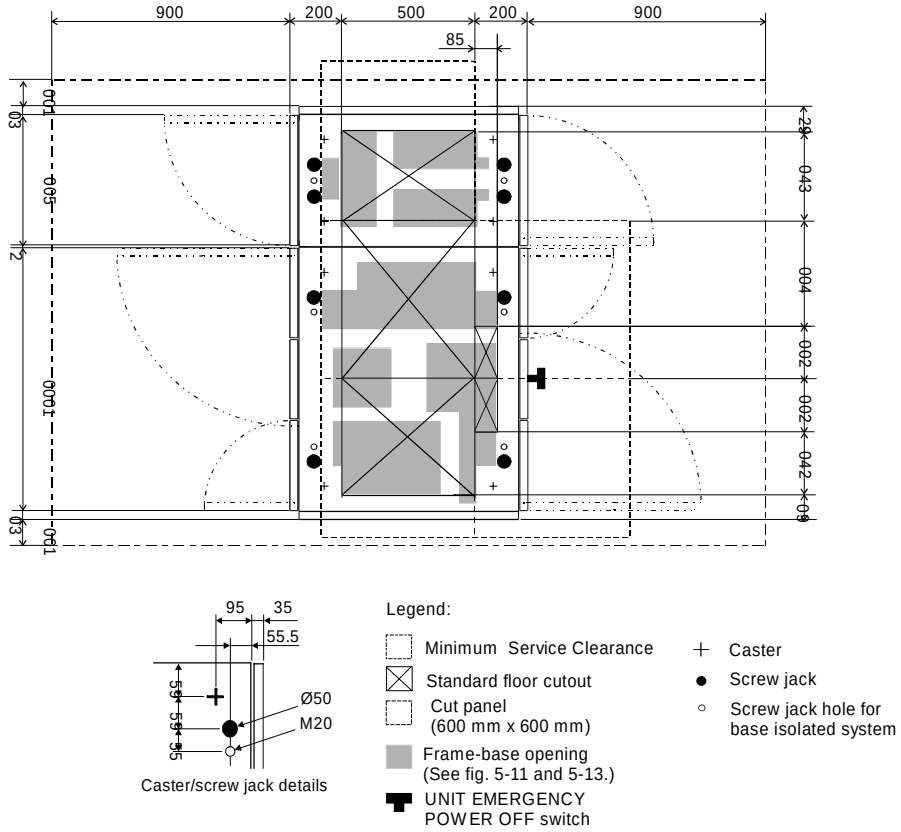
Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-1 Processor Unit Floor Plan, F-7C Base or F-7C CF—Basic Frame Only



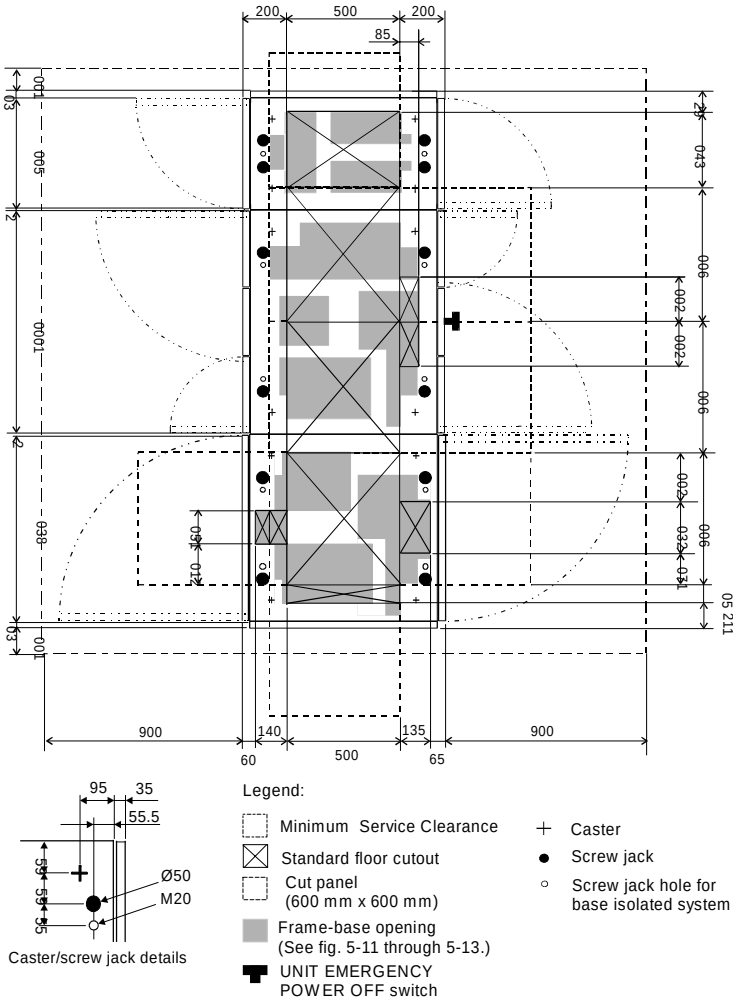
Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-2 Processor Unit Floor Plan, F-7C Base or F-7C CF—Basic Frame and Ex-1



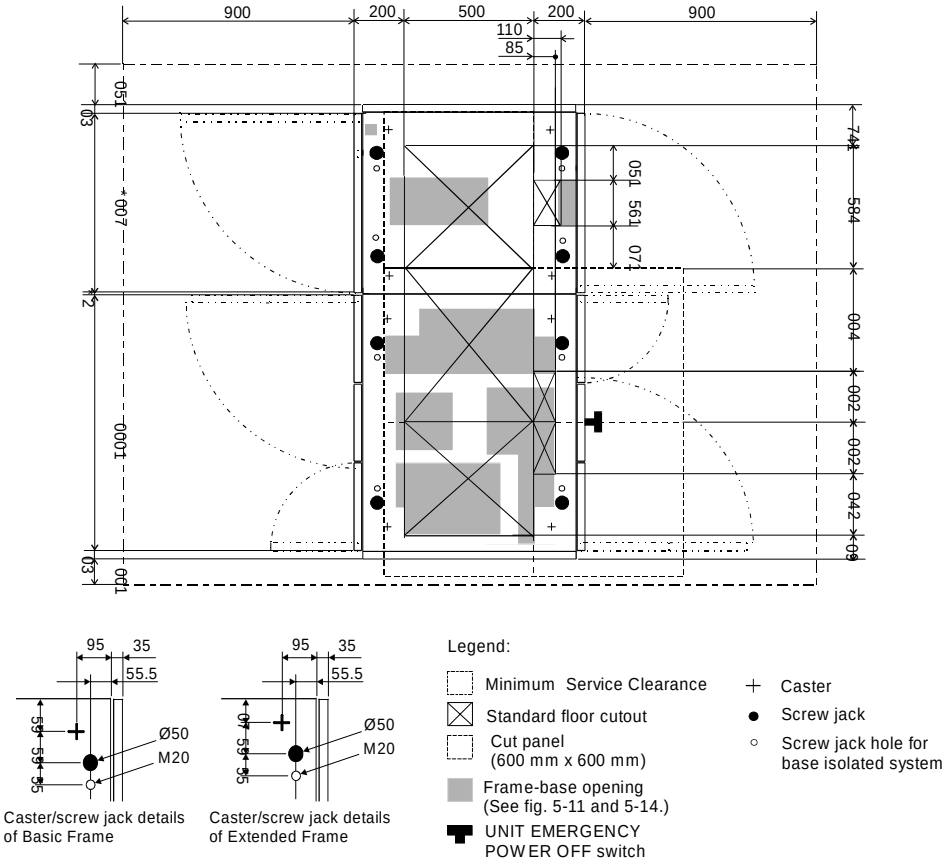
Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-3 Processor Unit Floor Plan, F-7C Turbo—Basic and CDU Frames



Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

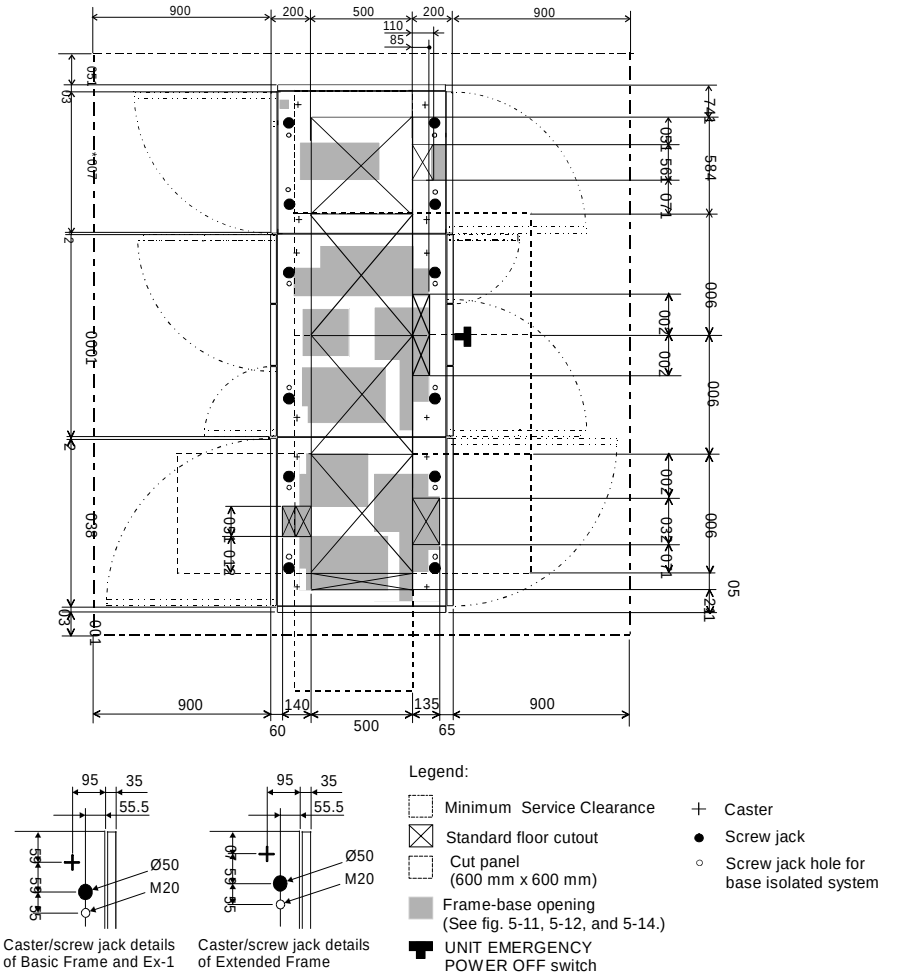
Figure 5-4 Processor Unit Floor Plan, F-7C Turbo—Basic and CDU Frames and Ex-1



Notes:

- This figure illustrates a sample floor plan with one Extended Frame. With two to four Extended Frames, the lengths with an asterisk (*) are repeated by the number of Extended Frames.
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

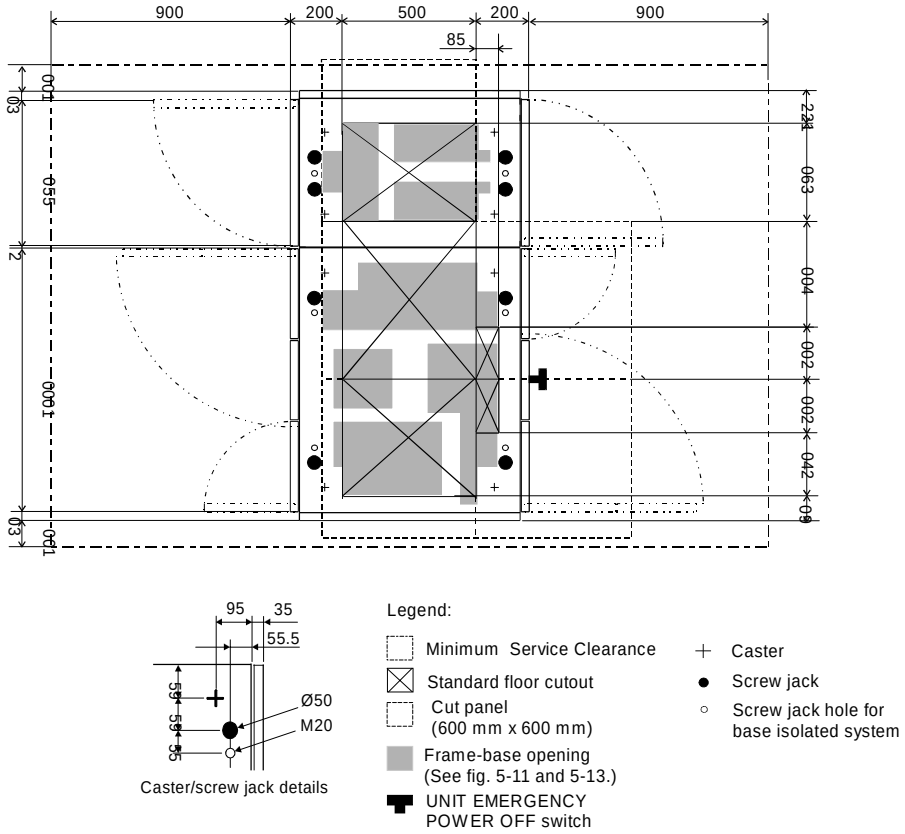
Figure 5-5 Processor Unit Floor Plan, F-7C Base—Basic and Extended Frames



Notes:

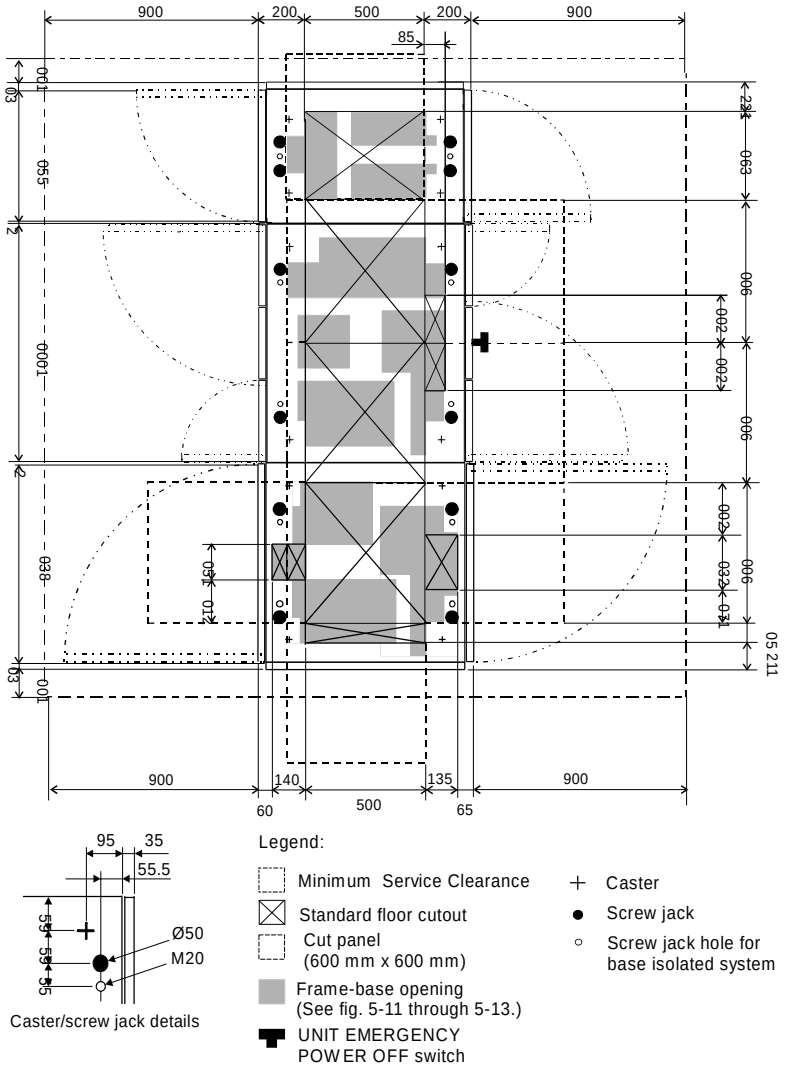
- This figure illustrates a sample floor plan with one Extended Frame. With two to four Extended Frames, the lengths with an asterisk (*) are repeated by the number of Extended Frames.
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-6 Processor Unit Floor Plan, F-7C Base—Basic and Extended Frames and Ex-1



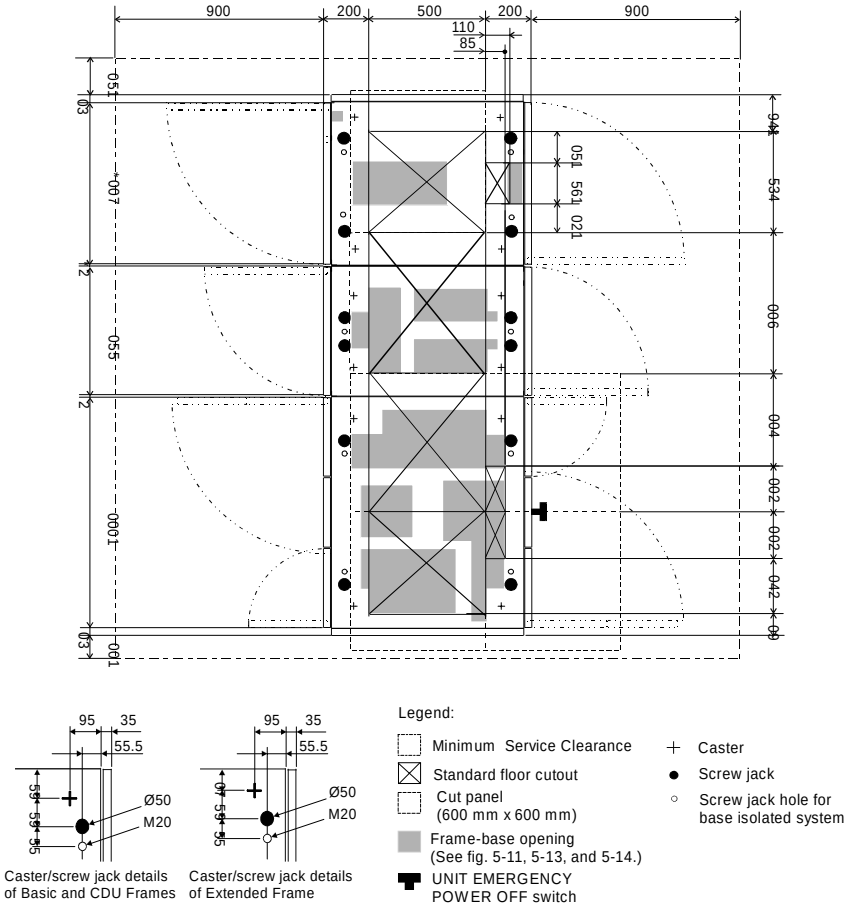
Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-7 Processor Unit Floor Plan, F-7E Turbo—Basic and CDU Frames



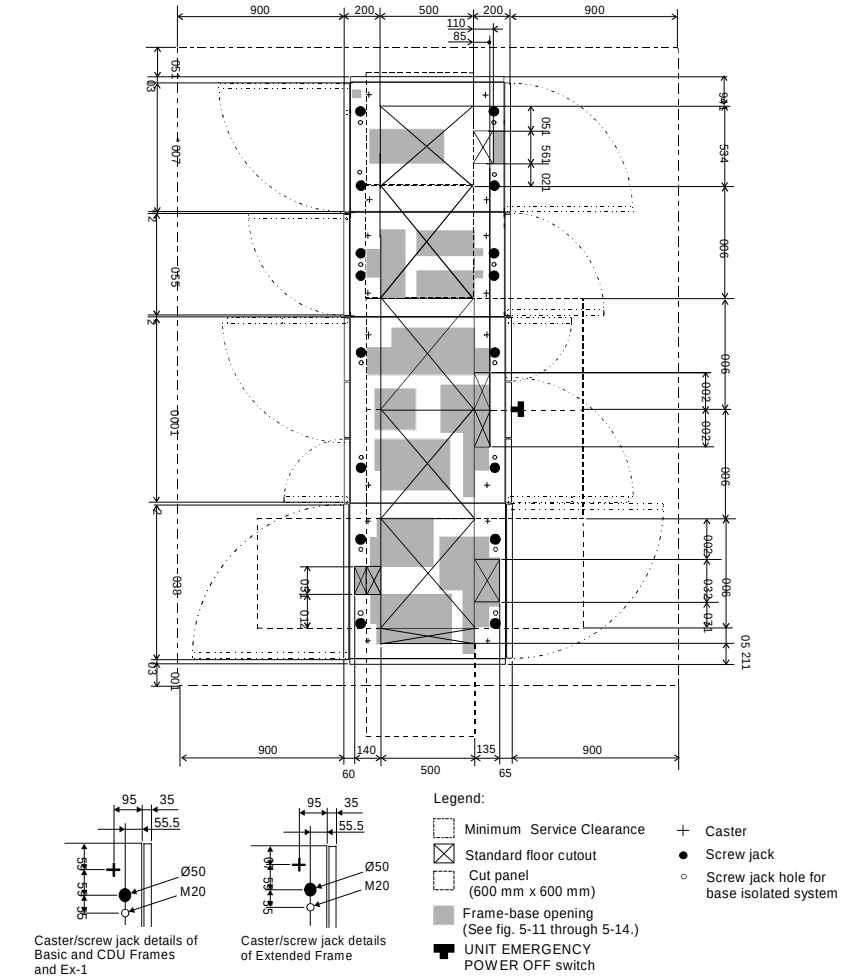
Notes:
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-8 Processor Unit Floor Plan, F-7E Turbo—Basic and CDU Frames and Ex-1



Notes:
- This figure illustrates a sample floor plan with one Extended Frame. With two to four Extended Frames, the lengths with an asterisk (*) are repeated by the number of Extended Frames.
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-9 Processor Unit Floor Plan, F-7E Turbo—Basic, CDU and Extended Frames



Notes:
- This figure illustrates a sample floor plan with one Extended Frame. With two to four Extended Frames, the lengths with an asterisk (*) are repeated by the number of Extended Frames.
- The floor cutout is based on 600 mm × 600 mm cut panels.
- Units are in mm.
- Not drawn to scale.

Figure 5-10 Processor Unit Floor Plan, F-7E Turbo—Basic, CDU and Extended Frames and Ex-1

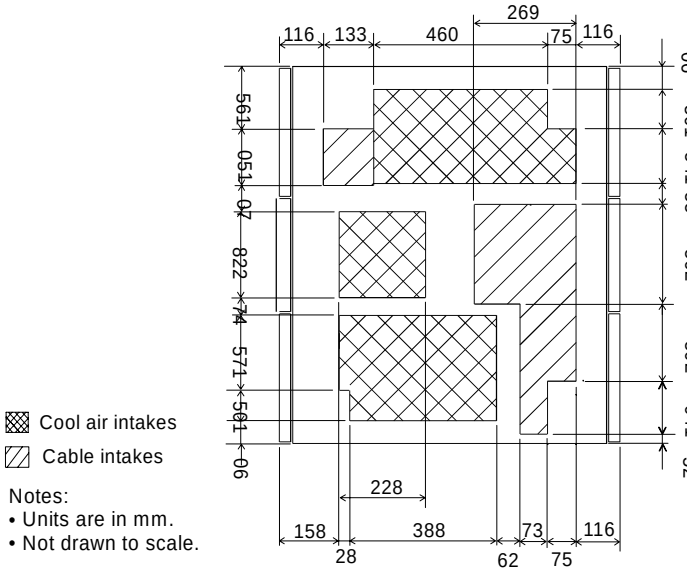


Figure 5-11 Frame-Base Openings of Basic Frame

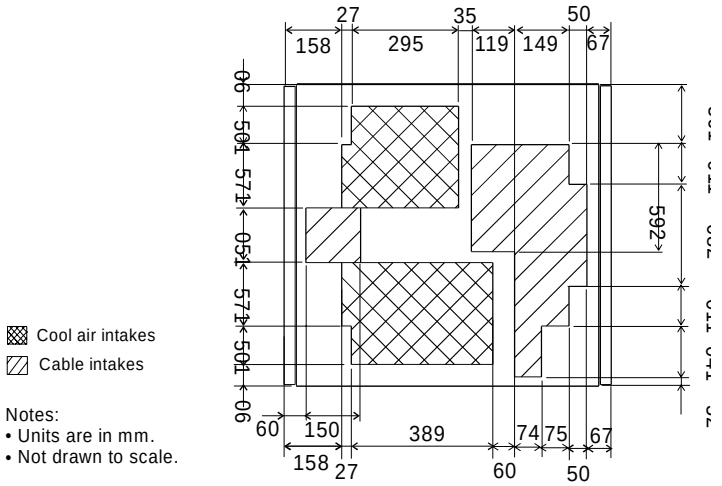


Figure 5-12 Frame-Base Openings of Ex-1

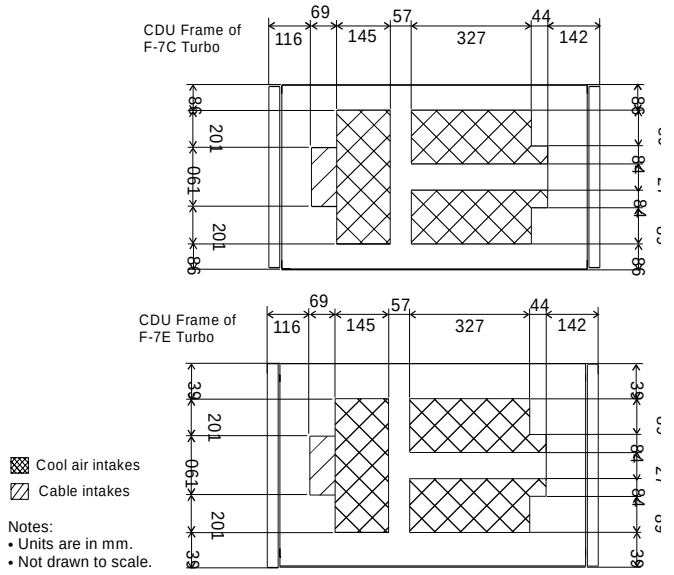


Figure 5-13 Frame-Base Openings of CDU Frame

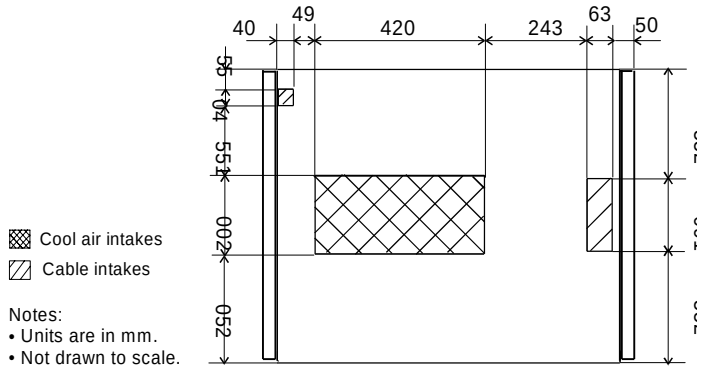


Figure 5-14 Frame-Base Openings of Extended Frame

5.2 Console Device

Table 5-3 shows the dimensions and masses of the Console Device (CD) when installed; table 5-4, when packed. Figure 5-15 illustrates the floor plan of the CD. Figure 5-16 illustrates how the monitor height and direction are variable with the CD.

Table 5-3 Installed Dimensions and Masses of CD

Model		*Dimensions mm*			*Mass*	*Mass per Footprint*
		H	*D*	*W*	*Kg*	*kg/m²*
CD	System Unit without CD-PCI	128	450	450	11	54.3* or 191.0**
	System Unit with CD-PCI	180	530	570	27	89.4* or 283.0**
	17-inch Color Monitor	426–446	450	403	20	110.3
	Keyboard	45	210	490	2.2	21.4
	Mouse	35	112	60	0.2	29.8
Cables for CD		–***	–***	–***	–***	–***

* When horizontally laid out.
** When vertically laid out.
*** Included in CD.

Table 5-4 Packed Dimensions and Masses of CD

Contents of Each Cargo		*Dimensions mm per Cargo*			*Mass kg per Cargo*
		H	*D*	*W*	
CD	2 in 1	1465	620	1050	160
	1 in 1	765	720	1120	80

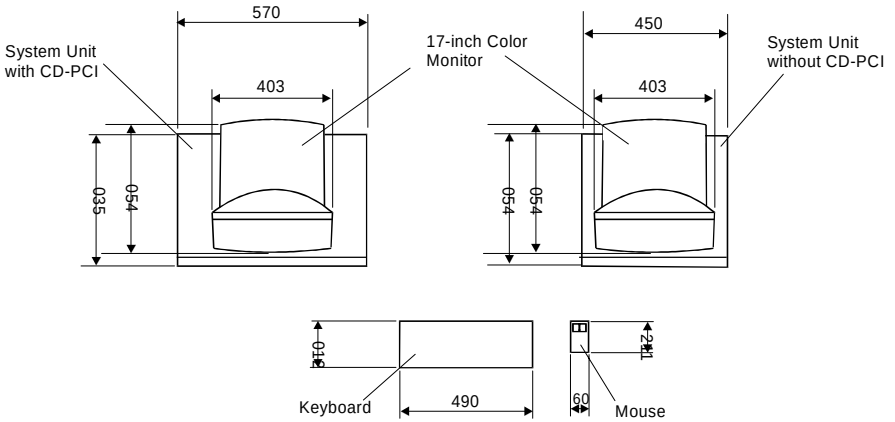


Figure 5-15 Floor Plan of Console Device

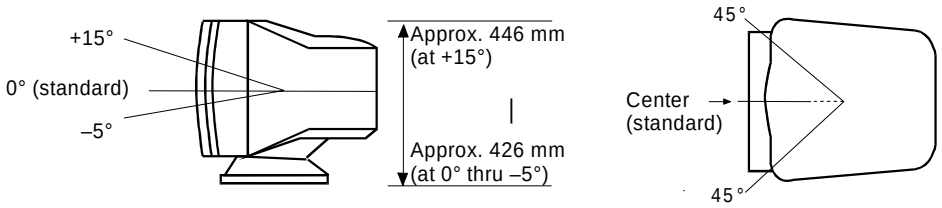


Figure 5-16 Monitor Height and Direction

5.3 Remote PCI Controller

Table 5-5 shows the dimensions and masses of the Remote PCI Controller (RPC) when installed; table 5-6, when packed. Figure 5-17 illustrates the floor plan of the RPC. Figure 5-18 illustrates the frame-base openings.

Table 5-5 Installed Dimensions and Masses of RPC

Model	*Dimensions mm*			*Mass kg*	*Mass per Footprint kg/m²*
	H	*D*	*W*		
RPC	500	350	600	37	176.2

Table 5-6 Packed Dimensions and Masses of RPC

Contents of Each Cargo	*Dimensions mm per Cargo*			*Mass kg per Cargo*
	H	*D*	*W*	
RPC	725	460	710	75

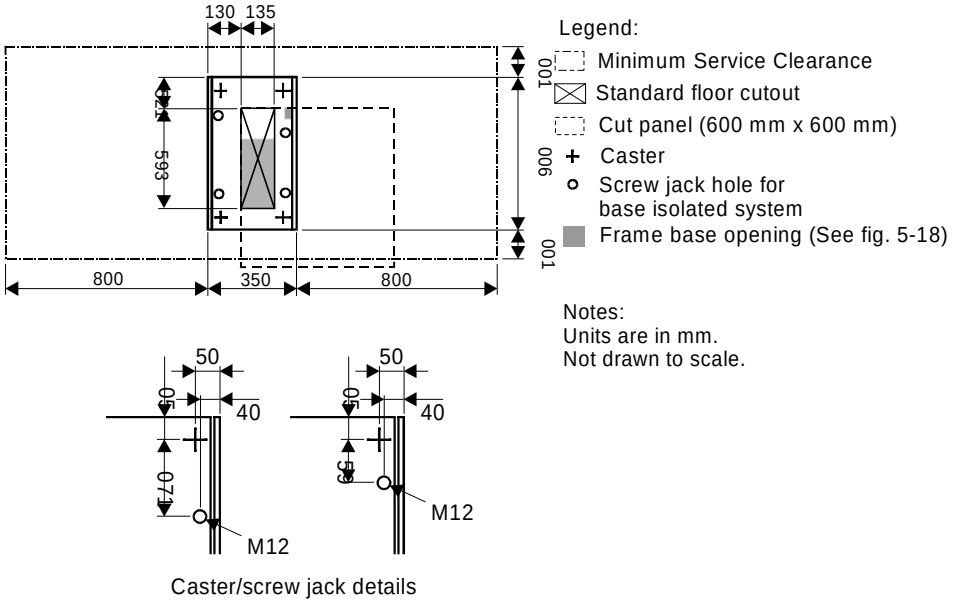
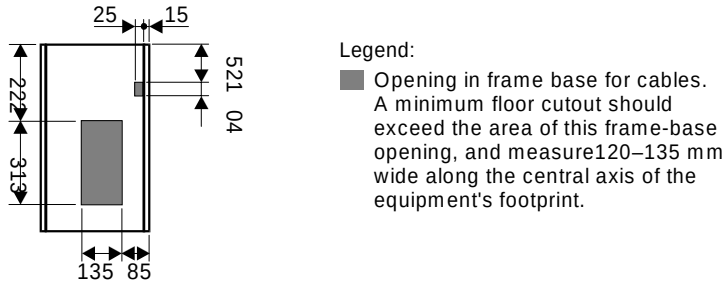


Figure 5-17 Floor Plan of RPC



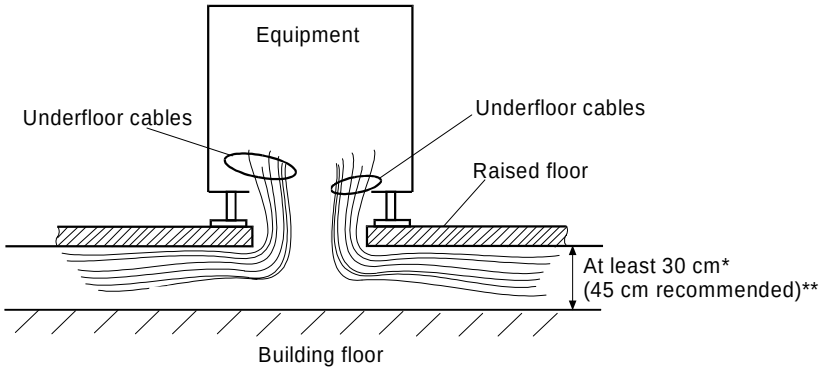
Notes:
- Units are in mm.
- Not drawn to scale.

Figure 5-18 Frame-Base Openings of RPC

CHAPTER 6 SYSTEM CABLING AND PLUMBING

6.1 Raised Floor Requirements for Underfloor Cables

The F-7C Processor Group and F-7E Processor Group use a number of interframe cables and I/O interface cables under the floor. To accommodate such cables, the space between the regular building floor and the raised floor must be secured as shown in figure 6-1. These cables must be routed in such a manner that their effect on underfloor airflow is minimized. Internal-loop water hoses for the F-7C Turbo and F-7E Turbo Models are routed through the frames and not routed under the floor.



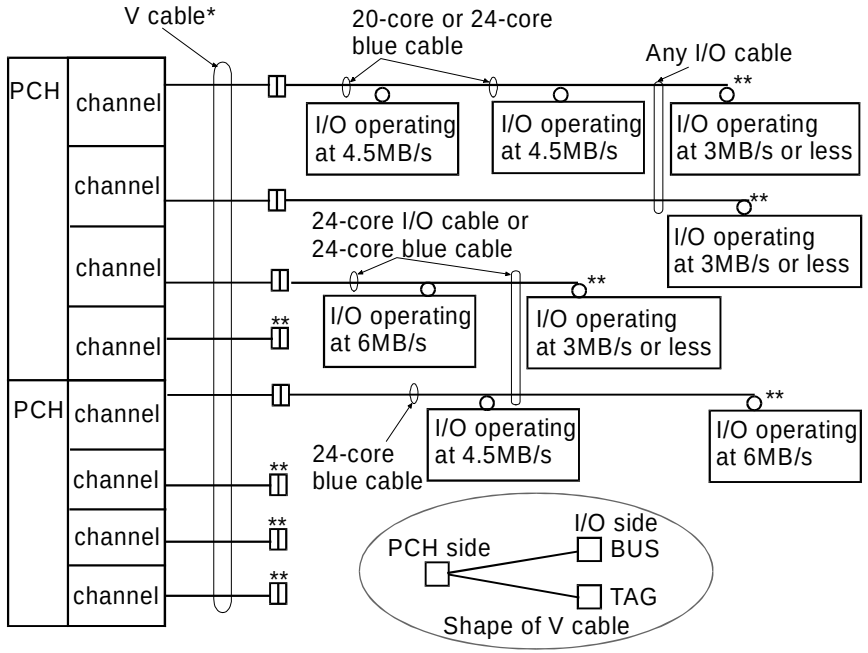
* There is no upper limit, but a wide space may cause the cables to hang from the equipment, imposing excessive forces on the connection points. In such a case, properly fix the cables to prevent excessive forces.

** When more than 80 metal channels are installed, 30 cm may not be sufficient. If so, secure 45 cm.

Figure 6-1 Required Space between Regular Building Floor and Raised Floor

6.2 Metal I/O Cable Requirements

Figure 6-2 illustrates the metal I/O cable requirements. Each metal I/O cable should be connected with each channel via V cable (named after the shape of the cable). An I/O cable between a channel and an I/O device, or between I/O devices, operating at a data transfer rate of 4.5 M bytes per second must comply with IBM-specified I/O cable requirements (so-called “blue cable” usually of 20 cores). When an I/O device connected operates at a data transfer rate of 6 M bytes per second, all the I/O cable in the chain must comply with Hitachi-specified I/O cable requirements (24-core I/O cable). Any I/O device operating at a data transfer rate of 4.5 M bytes per second must precede other I/O devices on the I/O interface.



* One end of the V cable connects to the channel port inside the connector box while the other end attaches underneath the raised floor to the IBM-standard serpentine connector of a metal I/O cable. The standard length of the V cable is 5 m, while the optional V cable length is selectable among 3.5, 6.5, 12, 18, 22, 32, 42, 52, and 62 m. For the optionally selectable V cable lengths of 42, 52, and 62 m, daisy-chaining of I/O devices is prohibited.

** BUS and TAG terminator pair is needed at the end of the chain.

Figure 6-2 Metal I/O Cable Requirements

6.3 I/O Cable Requirements for ESCH

Figure 6-3 illustrates the I/O cable requirements for the Extended Serial Channels (ESCHs).

- An I/O cable between the ESCH and an I/O device, between the ESCH and the 9032/9033 ESCON Director (ESCD), or between the ESCD and an I/O device, must comply with IBM-specified ESCON fiber cable requirements.

- When an I/O device is connected via the 9034 ESCON Converter Model 1, an I/O cable between the ESCH and the 9034, between the ESCH and the 9032/9033 ESCD, or between the ESCD and the 9034 must comply with IBM-specified ESCON fiber cable requirements, and an I/O cable between the 9034 and an I/O device, or between further I/O devices, must comply with IBM-specified parallel I/O cable requirements.

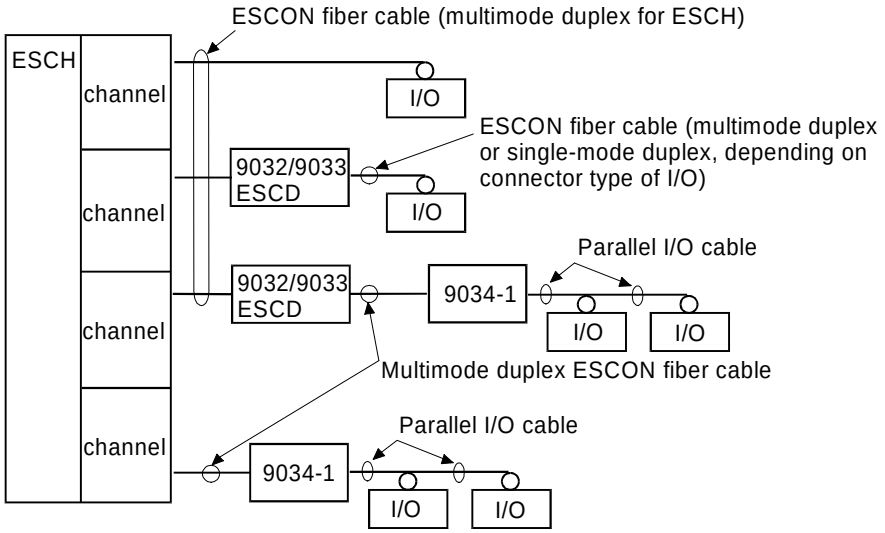


Figure 6-3 I/O Cable Requirements for ESCHs

6.4 Cable Requirements for ISCH2 and ETAF

The system-interconnecting optical cable is not included in the Inter-System Coupling Channel 2 (ISCH2) and has to be procured by the OEM customer. An optical cable used for IBM's Coupling Link is also connectable to Hitachi's ISCH2, with the connector type of single-mode duplex as defined in the IBM publication GA23-0367-03 *Planning for Fiber Optic Channel Links.*

The optical cable for connection with IBM's Sysplex Timer is not included in the External Timer Attachment Feature (ETAF). The same cable as used by IBM has to be procured by the OEM customer.

6.5 Cable Requirements for OCF

Networking units (e.g., switching hub, router, concentrator, and splicing box) and cables to build a network system for the OCF are the customer responsibilities to be prepared in advance.

6.5.1 LAN Interface Cables

See table 6-1. The cable connection work must be done by the qualified service personnel.

Table 6-1 Specifications of LAN Cards and Their Applicable Cables

Model of LAN Card	*No. of Ports*	*Supported LAN*	*Relevant Defacto Standards*		
				Connector Type of Port	*Applicable Cables**
OSCH-E	2	10 Mbps Ethernet	IEEE802.3 or Ethernet V.2	RJ-45	Category 3 or category 5 twist-pair cable for 10BASE-T**
		100 Mbps Ethernet	IEEE802.3u	RJ-45	Category 5 twist-pair cable for 100BASE-TX
OSCH-FS	1	100 Mbps FDDI SAS†	ANSI X3T9.5 or ISO SMT ver. 7.3	SC	Optical fiber cable in compliance with: • Diameter of core: 50/62.5 µm • Diameter of clad: 125 µm • Material: Graded Index Multi-mode Fiber
OSCH-FD	1	100 Mbps FDDI DAS††	ANSI X3T9.5 or ISO SMT ver. 7.3	SC	Optical fiber cable in compliance with: • Diameter of core: 50/62.5 µm • Diameter of clad: 125 µm • Material: Graded Index Multi-mode Fiber

* The cable length applicable to each LAN card must comply with relevant defacto standards.
** Strongly recommended is the category 5 twist-pair cable for 10BASE-T.
† Can indirectly connect to a dual-ring of the FDDI LAN through a commercially-available concentrator.
†† Can directly connect to a dual-ring of the FDDI LAN.

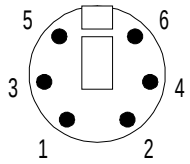
6.5.2 Optical Bypass Switch Control Interface Cable

The OCF for FDDI-DAS supports the Optical Bypass Switch having some optical path switches, and controlled via optical bypass switch control interface cable. This switch works as a kind of gateway to trunk ring. It is useful for the purpose of keeping the ring topology when, for example, LAN card is powered off, which would often cause ring wrap conditions.

OCF replacement for maintenance or power off for some reason may bring a critical moment on the trunk ring. The reason is because, when no switch is installed, another getting out from the ring during the OCF absence causes the ring fragmentation. Optical Bypass Switch can avoid such situation. Table 6-2 shows the specifications of the Optical Bypass Switch; figure 6-4 shows the pin assignment of the station connector for the Optical Bypass Switch. The Optical Bypass Switch is provided on the OSCH PK for FDDI-DAS. The cable connection work must be done by the qualified service personnel.

Table 6-2 Specifications of Optical Bypass Switch

Item	*Requirement*
Media interface connector (MIC)	SC duplex
Station connector	6-pin shielded miniature circular DIN plug. Cable length is up to 12 m including extension cable.
Optical fiber	• Diameter of core: 50/62.5 µm • Diameter of clad: 125 µm • Material: Graded Index Multi-mode Fiber



1: Secondary Switch/+5 V
2: Primary Switch/+5 V
3: Primary Switch/GND
4: Secondary Switch/GND
5: GND
6: Sense Switch Presence

Figure 6-4 Pin Assignment of Station Connector for Optical Bypass Switch

6.6 Cable Routing

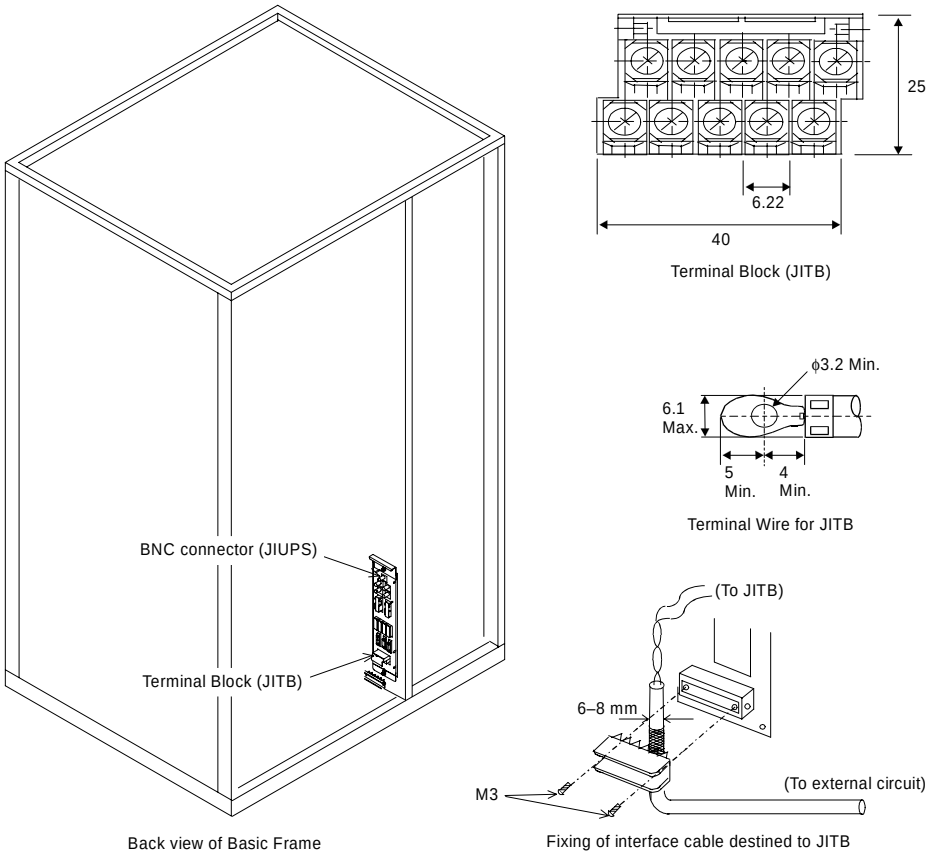
For system cable routing of the F-7C processor models and the F-7E processor models, contact the OEM customer's service representative.

6.7 Plumbing

Internal-loop water hoses for the F-7C Turbo Models and the F-7E Turbo Models are routed through the frames and not routed under the floor. No particular preparation or action for plumbing may be required on the customer site.

CHAPTER 7 EXTERNAL INTERFACES

The F-7C and F-7E Processor Group provides terminals for external interfaces on the back of the Basic Frame as illustrated in figure 7-1. Tables 7-1 and 7-2 show the types of interfaces, circuit diagrams of respective terminals, and their specifications. Be noted that the cable connection work must be done by the qualified service personnel.



Notes:
- Units are in mm.
- Not drawn to scale.

Figure 7-1 Locations of Terminals for External Interfaces

Table 7-1 Types of Interfaces and Circuit Diagrams of Interface Terminals

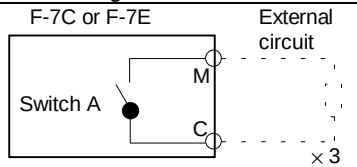
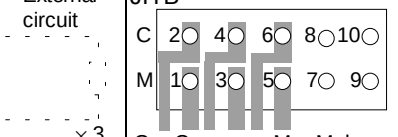
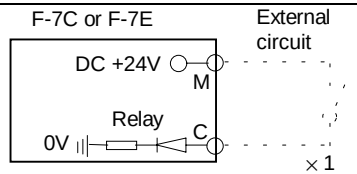
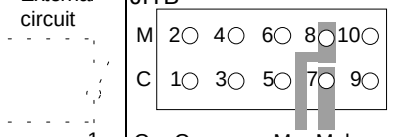
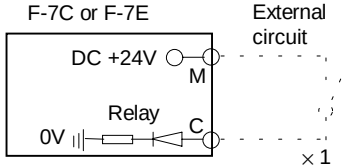
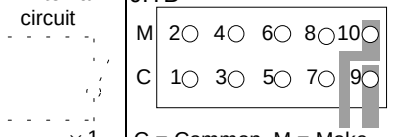
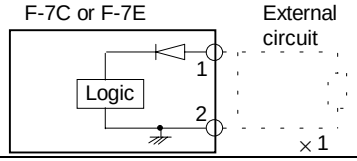
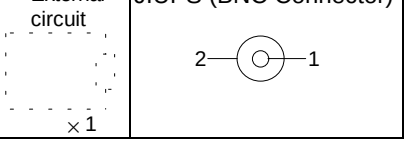
Type of Interface	*Circuit Diagram*	*Terminal Connection*
External buzzer activation		
External buzzer resetting		
External sensor		
UPS		

Table 7-2 Specifications of Terminals for External Interfaces

Type of Interface	*Specifications*		
	Trigger	*Action on F-7C or F-7E*	*Terminal Rating*
External buzzer activation	System down	Closes (turns on) Switch A.	DC 30V or less, 10–165 mA
External buzzer resetting	DC 5mA or more between M and C	Resets (turns off) every Switch A.	DC 23V–27V, 10Ω or less. Non-lock circuit required to avoid incessant resetting of Switch A.
External sensor	DC 5mA or more between M and C	Detects abnormal status of temperature or humidity.	DC 23V–27V, 10Ω or less
UPS	Outage of regular input power source	Requests, via IP, UPS interruption to MVS. MVS handles further process.	DC 3.9V–10V, 10Ω or less

APPENDIX A HARMONIC DISTORTION ON OUTPUT POWER

This appendix A provides the harmonic distortion figures on the output power of the F-7C processor models. The harmonic distortion figures on the output power of the F-7E processor models are yet to be determined. Such figures are based on measurements of each processor frame under the conditions shown in table A-1. Table A-2 and figure A-1 show the maximum line current readings and derived intensities (harmonic distortion percentages) obtained through the measurements.

Using the measurement results, the harmonic distortion figures are estimated in accordance with the following steps:

1. Estimate the power consumption of each processor model by frame under the given conditions at measurements. Sum the relevant numbers of individual power consumption figures provided in chapter 3.
2. Calculate the theoretical line current in the power line by the following formula:

$$LineCurrent[A] = \frac{Power[VA]}{InputVoltage[V]}$$

3. Calculate the harmonic current by multiplying the theoretical line current by the harmonic distortion percentage.

Table A-3 shows measurement-based calculated figures of the maximum harmonic current on the output power of the F-7C by frame.

Table A-1 Conditions at Measurements

Criteria		*Conditions by Frame*		
		Basic Frame (Base, Turbo)	*Ex-1 (Base, Turbo)*	*CDU Frame (Turbo)*
Model type		B2C or B2CH	—	—
PSTR capacity		8 GB	—	—
No. of channels	Metal	4	16	—
	ESCH	8	16	—
	ISCH	0	0	—
Input voltage (V)		200	200	200
Frequency (Hz)		60	60	60

Table A-2 Maximum Line Current Readings and Derived Intensities

Dimension	*Basic Frame*		*Ex-1*		*CDU Frame*	
	Ampere	*%*	*Ampere*	*%*	*Ampere*	*%*
1	12.89	97.21	6.20	96.27	3.55	95.17
2	0.01	0.08	0.01	0.16	0.17	4.56
3	2.86	21.57	1.56	24.22	0.66	17.69
4	0.01	0.08	0.00	0.00	0.08	2.14
5	1.02	7.69	0.65	10.09	0.57	15.28
6	0.01	0.08	0.00	0.00	0.02	0.54
7	0.21	1.58	0.26	4.04	0.44	11.80
8	0.00	0.00	0.01	0.16	0.03	0.80
9	0.06	0.45	0.18	2.80	0.38	10.19
10	0.01	0.08	0.00	0.00	0.01	0.27
11	0.37	2.79	0.05	0.78	0.28	7.51
12	0.00	0.00	0.00	0.00	0.01	0.27
13	0.19	1.43	0.04	0.62	0.18	4.83
14	0.00	0.00	0.00	0.00	0.01	0.27
15	0.17	1.28	0.05	0.78	0.12	3.22
16	0.00	0.00	0.00	0.00	0.00	0.00
17	0.09	0.68	0.05	0.78	0.07	1.88
18	0.01	0.08	0.01	0.16	0.01	0.27
19	0.09	0.68	0.09	1.40	0.05	1.34
20	0.00	0.00	0.00	0.00	0.01	0.27
21	0.12	0.90	0.09	1.40	0.05	1.34
22	0.00	0.00	0.00	0.00	0.01	0.27
23	0.07	0.53	0.02	0.31	0.06	1.61
24	0.00	0.00	0.00	0.00	0.01	0.27
25	0.02	0.15	0.02	0.31	0.05	1.34
26	0.00	0.00	0.00	0.00	0.00	0.00
27	0.02	0.15	0.01	0.16	0.04	1.07
28	0.00	0.00	0.00	0.00	0.00	0.00
29	0.02	0.15	0.01	0.16	0.03	0.80
30	0.00	0.00	0.00	0.00	0.01	0.27
31	0.02	0.08	0.00	0.00	0.03	0.00
32	0.00	0.01	0.00	0.00	0.01	0.00
33	0.00	0.08	0.00	0.00	0.03	0.00
34	0.00	0.02	0.00	0.00	0.01	0.00
35	0.00	0.08	0.00	0.00	0.03	0.00
36	0.00	0.01	0.00	0.00	0.01	0.00
37	0.01	0.05	0.00	0.00	0.03	0.00
38	0.00	0.01	0.00	0.00	0.00	0.00
39	0.00	0.05	0.00	0.00	0.03	0.00
40	0.00	0.01	0.00	0.00	0.01	0.00

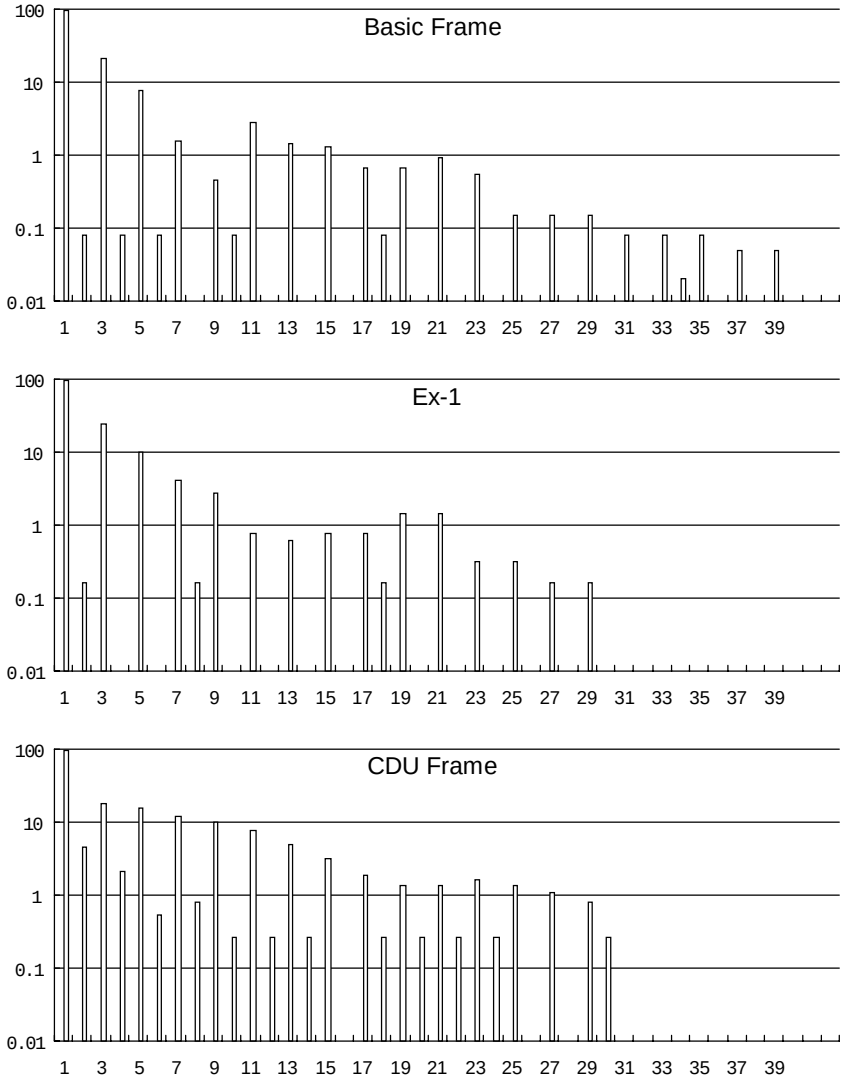


Figure A-1 Maximum Intensities Derived from Measurements

Table A-3 Calculated Harmonic Distortion

Dimension	*Base Model*		*Turbo Model*		
	Basic Frame [VA = 3067]	*Ex-1 [VA = 1029]*	*Basic Frame [VA = 3257]*	*Ex-1 [VA = 1029]*	*CDU Frame [VA = 3200]*
1	14.91	4.95	15.83	4.95	15.23
2	0.01	0.01	0.01	0.01	0.73
3	3.31	1.25	3.51	1.25	2.83
4	0.01	0.00	0.01	0.00	0.34
5	1.18	0.52	1.25	0.52	2.44
6	0.01	0.00	0.01	0.00	0.09
7	0.24	0.21	0.26	0.21	1.89
8	0.00	0.01	0.00	0.01	0.13
9	0.07	0.14	0.07	0.14	1.63
10	0.01	0.00	0.01	0.00	0.04
11	0.43	0.04	0.45	0.04	1.20
12	0.00	0.00	0.00	0.00	0.04
13	0.22	0.03	0.23	0.03	0.77
14	0.00	0.00	0.00	0.00	0.04
15	0.20	0.04	0.21	0.04	0.52
16	0.00	0.00	0.00	0.00	0.00
17	0.10	0.04	0.11	0.04	0.30
18	0.01	0.01	0.01	0.01	0.04
19	0.10	0.07	0.11	0.07	0.21
20	0.00	0.00	0.00	0.00	0.04
21	0.14	0.07	0.15	0.07	0.21
22	0.00	0.00	0.00	0.00	0.04
23	0.08	0.02	0.09	0.02	0.26
24	0.00	0.00	0.00	0.00	0.04
25	0.02	0.02	0.02	0.02	0.21
26	0.00	0.00	0.00	0.00	0.00
27	0.02	0.01	0.02	0.01	0.17
28	0.00	0.00	0.00	0.00	0.00
29	0.02	0.01	0.02	0.01	0.13
30	0.00	0.00	0.00	0.00	0.04
31	0.01	0.00	0.01	0.00	0.00
32	0.00	0.00	0.00	0.00	0.00
33	0.01	0.00	0.01	0.00	0.00
34	0.00	0.00	0.00	0.00	0.00
35	0.01	0.00	0.01	0.00	0.00
36	0.00	0.00	0.00	0.00	0.00
37	0.01	0.00	0.01	0.00	0.00
38	0.00	0.00	0.00	0.00	0.00
39	0.01	0.00	0.01	0.00	0.00
40	0.00	0.00	0.00	0.00	0.00