Panasonic®

ICX
Integrated Communication eXchange

Section 300

Installation Manual

(For UK)

Contents

Chapter 7. Specifications 7-1

List of Tables

List of Figures

About This Manual

Overview
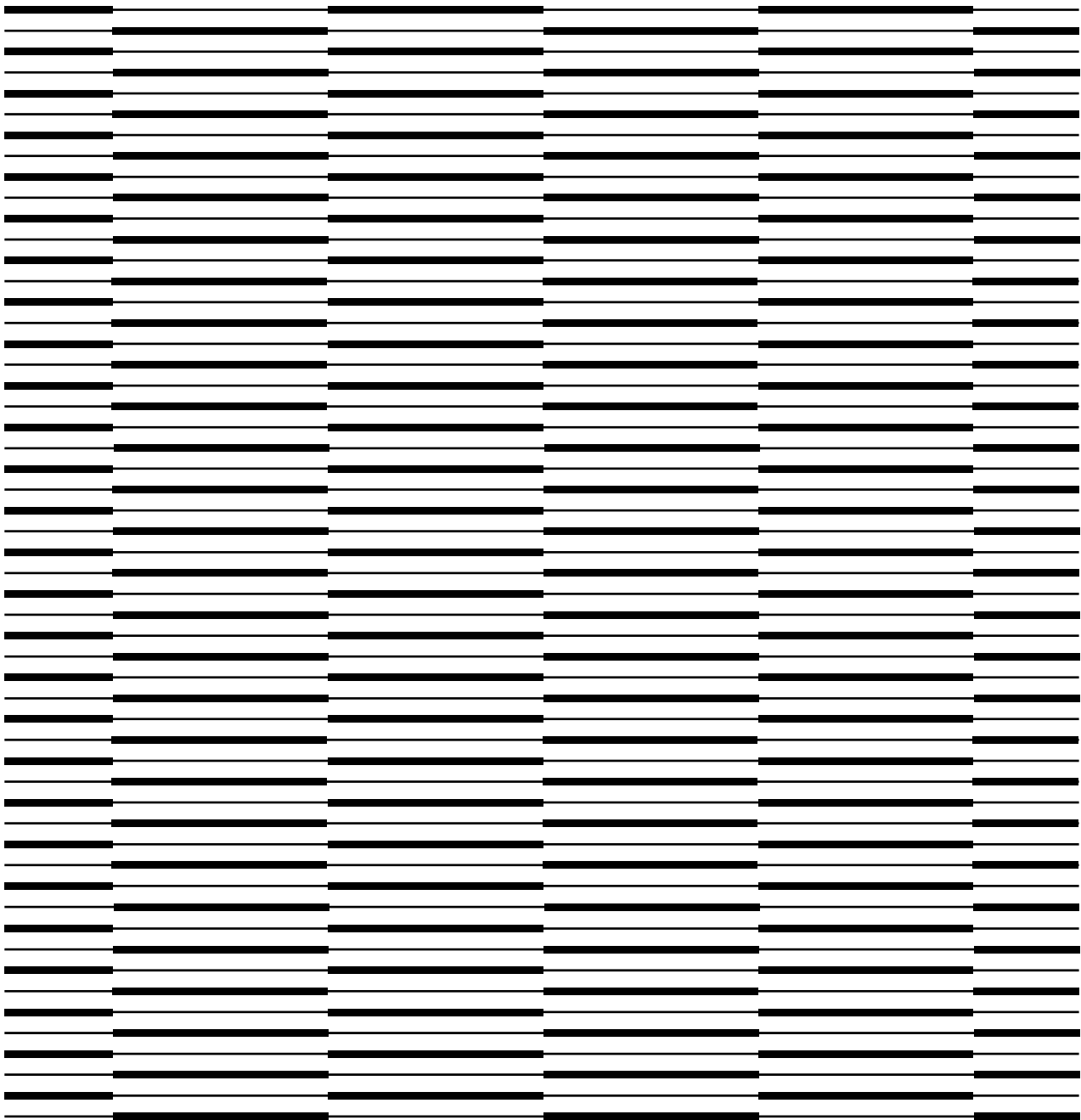
This manual provides installation instructions for the Integrated Communication eXchange (ICX). Please carefully observe the contents of this manual.

The following table summarises the purpose of each chapter.

Chapter No.	Title	Purpose
1	Requirements	Includes ICX model Nos, information on the installation environment, and how to clean the ICX.
2	System Overview	Provides an overview of the ICX. This overview includes descriptions of the CCU, system configurations, and unit cards.
3	CCU Installation	Explains how to prepare for CAB40 and CAB96 installation, how to remove and replace the respective CCU covers, install the battery and install cards.
4	Installing Additional CCU	Explains how to prepare for additional CCUs, how to install them, and how to link the respective systems, how to set the expansion CCU ID No., and how to connect to the DBS-90.
5	Exchange Lines and Internal Lines	Explains how to connect exchange lines and dedicated, and how to connect different types of digital and analog internal lines, and how to mount telephones on the wall.
6	Peripheral Equipment	Describes how to install and connect DSS, doorphone adaptors, other peripheral equipment, and replacing the back up battery of CPC card.
7	Specifications	Lists the specifications of the equipment constituting the ICX.

Related Documents

- For instructions on ICX programming, see the Programming Manual (Section 400).

- For detailed descriptions of ICX operations, see the Operating Instruction (Section 700).

About Marks Used in This Manual

XXXXX card ⊗

Card names shown at the side of function titles indicate cards that must be mounted to enable connections.

Cards marked with an ⊗ at the side of the card name indicate that the card must not be removed or inserted while the power is ON.

For details on removing and inserting cards, refer to "Maintenance Switches" on page 5-3.

Ver.2

These marks have been added on or modified as a result of the version upgrade.

Chapter 1. Requirements

This chapter describes ICX model Nos, information on the installation environment, and how to clean the ICX.

Model Numbers

Table 1-1.   ICX model numbers

Designation	Product Name	Product Number
40 ports CCU	CAB40	VB-44010UK
96 ports CCU	CAB96	VB-44020UK
96 ports Expand CCU	CAB96B	VB-44021UK

Environmental Requirements

Temperature: The environment should be free from excessive temperatures in order to avoid component damage. Room temperatures should be 32° to 104°F (0° to 40°C).

Humidity: The environment should be free from excessive humidity, which may rust metallic parts and degrade performance. Do not install the system where humidity could condense on its surfaces. Relative humidity should range between 30 and 90 percent.

Ventilation: Adequate ventilation must be provided to allow upward air circulation through the cabinet grille.

Gas and airborne particles: To avoid corrosion or oxidation of electrical contacts, the environment should be free from airborne particles and corrosive gas.

Electrical noise: The environment should be free from excessive electrical noise, which could disturb the operation of digital circuits. The system should be located at least 10ft. (3m) away from welders, dimmers, or other high-current machines. Phones connected to the system should not be located near fluorescent lamps, air conditioners, washing machines, TVs, or radios.

Vibration: The environment should be free from excessive vibration, which could loosen components.

Water exposure: Because the ICX is an electrical device, exposure to water is dangerous. Do not place anything containing water on the system. Do not install under overhead plumbing, sprinkler system valves, or in areas that are susceptible to flooding.

Lighting: Sufficient lighting is required for testing and maintenance.

Lightning protection/grounding: The system must be properly grounded to protect it from lightning damage.

- Supplemental and independent equipment grounding conductors are to be installed between the system and the wiring system ground.

- One of the equipment grounding conductors must be a wire that is as thick or thicker than the ungrounded branch-circuit supply conductors. The equipment grounding conductor is to be installed as part of the circuit that supplies the system and is to be connected to a ground terminal at the service equipment. Bare, covered, or insulated grounding conductors should have a continuous outer finish that is either green or green with one or more yellow stripes. The equipment grounding conductor should be connected to a ground terminal at the service equipment.

- The Attachment-plug receptacles of the same type as that used by the systems that are in the vicinity of the ICX are all to be of a grounding type, and the equipment grounding conductors serving these receptacles are to be connected to earth ground at the service equipment.

- A marking adjacent to the telecommunications jacks must instruct the user to connect grounding conductors for peripheral equipment before any telecommunication lines are connected to the product or system.

Cleaning

- Use a slightly damp cloth to clean the phones. The phones should never be cleaned with benzene, paint thinner, or other solvents.

Chapter 2. System Overview

This chapter provides an overview of the ICX. This overview includes descriptions of system configurations and unit cards.

⚠

IMPORTANT:

- When turn off the main power switch, please wait 30 seconds to turn it on in order to keep the memory correctly.

CCU Description

Panasonic's Integrated Communication eXchange (ICX) is a hybrid telephone system that can be used as a CCU or private branch exchange line (PBX).

The ICX CCU can include the following:

- Power unit
- Card slots
- Unit cards (optional)
- Backup battery (VB-44025) (optional)
- Switch box (VB-44023UK) (optional) (when using building block configuration)

Figure 2-1. The ICX CCU (CAB96)
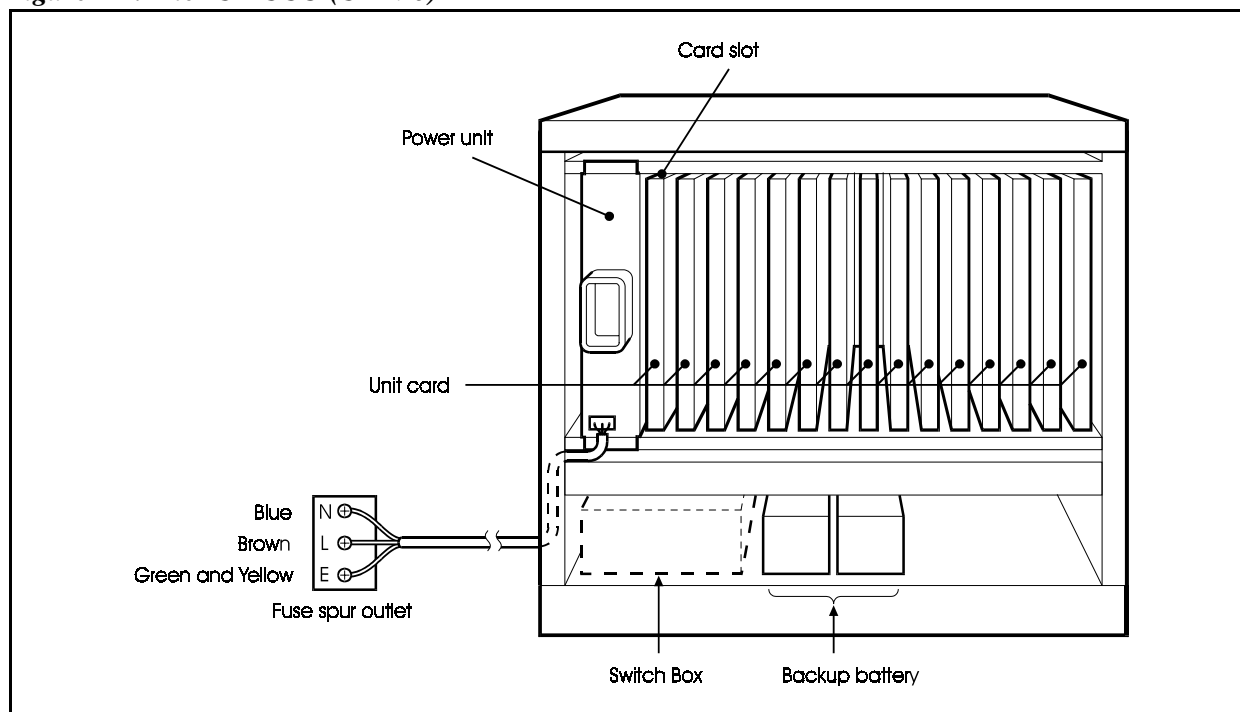
Peripherals such as paging speakers, external music-on-hold sources, background music sources, PCs, printers, and call logging recorder can be connected to the unit cards.

Figure 2-2 shows the exchange line and extension onnections as well as some peripheral connections. Exchange line and extension connections are covered in detail in Chapter 5. Peripheral connections are covered in detail in Chapter 6.

Figure 2-3 and 2-4 show the cable arrangement examples inside each CCU. See Chapter 3 and 4 for details on each cable connection.

Figure 2-2. System Connections

Personal Computer or Serial Printer
(See page 6-10, 6-13)

S-point ISDN (PRI) (See page 5-25)

S-point ISDN (SBRI) (See page 5-23)

SLT1

Power failure Unit
(See page 6-33)

(Max.8/T card)
(See page 5-21)

SLT8

Soft Key phone

or

(See page 6-22)

Key phone   Voice Recognition Adaptor

(Max.8/T card)
(See page 5-18)

Key phone

Headset
(See page 6-21)

DSS (See page 6-25)

EM/24 (See page 6-27)

NOTE
▨ : Master Socket (LJU)
☐ : Secondary Socket (LJU)

Figure 2-3. System Wiring (CAB40/CAB40+CAB40)
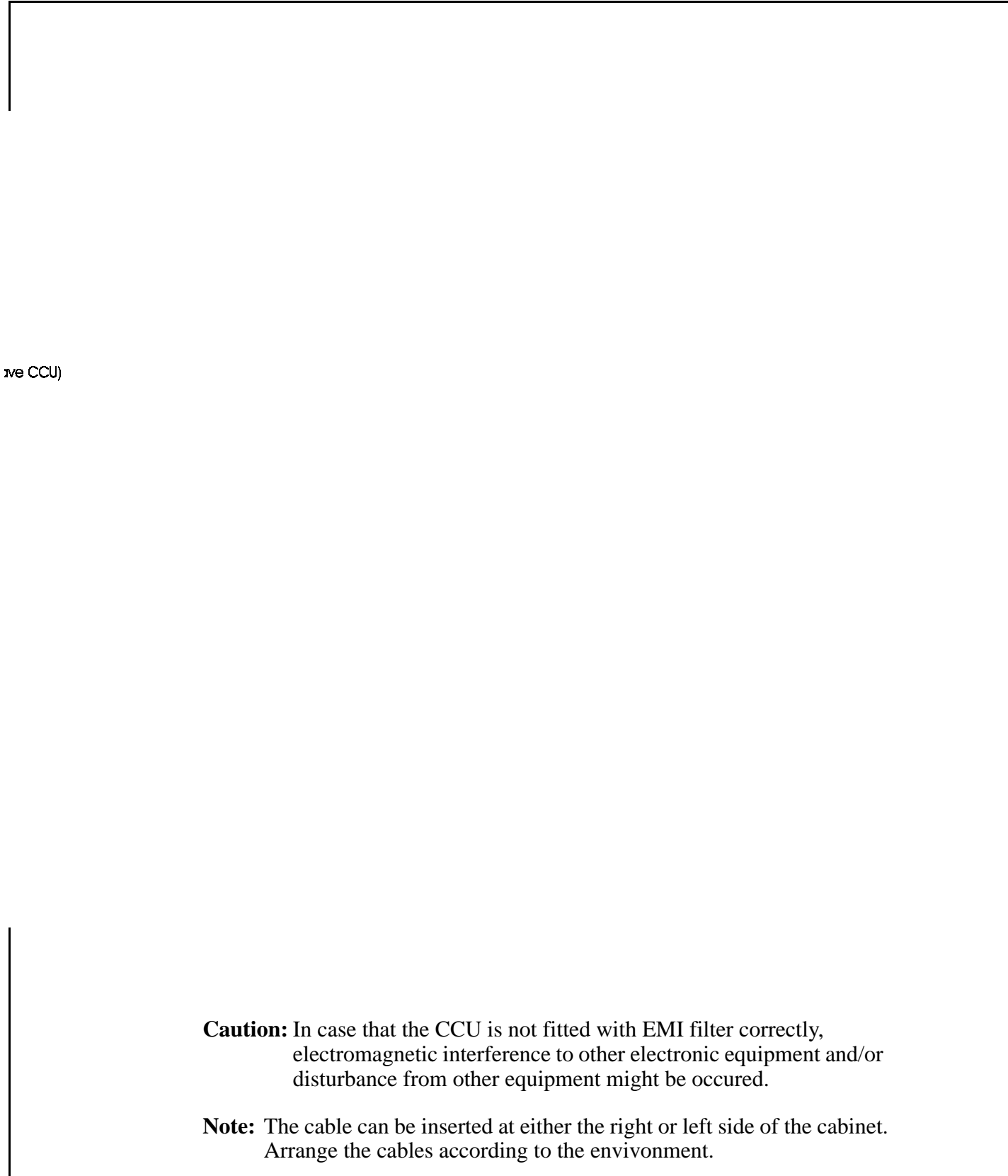
ive CCU)

Caution: In case that the CCU is not fitted with EMI filter correctly, electromagnetic interference to other electronic equipment and/or disturbance from other equipment might be occured.

Note: The cable can be inserted at either the right or left side of the cabinet. Arrange the cables according to the envivonment.

Figure 2-4. System Wiring (CAB96/CAB96+CAB96B+...)

[Left Side]

Blue   N ⊕
Brown   L ⊕
Green and E ⊕
Yellow   Fuse
          spur outlet

EMI Filter

Exchange line, Internal line,
ISDN etc.

Grounding
(See page 3-9)

Switch Box
(See page 4-18)

Battery
(See page 3-11)

Caution: In case that the CCU is not fitted with EMI filter correctly,
electromagnetic interference to other electronic equipment and/or
disturbance from other equipment might be occured.

Note: The cable can be inserted at either the right or left side of the cabinet.
Arrange the cables according to the envivonment.

Building Block
Connection Cable
(See page 4-23)

[Right Side]

CCU Configurations

The ICX comes in two models: the CAB40 with 40 ports and the CAB96 with 96 ports. These models can be combined with expansion CCUs (CAB96B) to configure systems with up to 576 ports. They can also be combined with an existing DBS-90 (VB-3657UK) to increase the number of digital internal line ports. For details, see Chapter 4, "Connection to DBS-90" (page 4-29).

Figure 2-5. Example CCU combinations

Unit Cards

Unit Card Configuration

Table 2-1 shows the unit cards and packages that can be used with the ICX.

Table 2-1.   Unit card configuration

Card Type	Card Designation	Product Name	Product No.	Card Description	Remarks
Analog Exchange Line	Loop Start Exchange Line Card	LTRK/8	VB-44510UK	8-port loop-start Line	
	AC-15 Card	AC15/4	VB-44570UK	Interface card for connecting AC-15 private line (4W) × 4	
Digital Exchange Line	BRI Card	TBRI/4	VB-44530	T-point ISDN interface ports	
	PRI Card	PRI/30	VB-44540UK	T-point ISDN primary interface port and S-point primary interface port	
Digital Extension	Digital Extension Card	DEC/8	VB-44610UK	8-port digital extension card	
	BRI Unit (S-Point)	SBRI/4	VB-44630	S-point ISDN interface ports	
	PRI Card	PRI/30	VB-44540UK	T-point ISDN primary interface port and S-point primary interface port	
Analog Extension	Analog Extension Card	AEC/8	VB-44620UK	8-port analog extension card Including Ringer circuit	
Service Circuit	Service Control Card	SCC	VB-44181UK	Service circuit card (high level) RS232C port × 2, BGM I/F External paging I/F	
Processor Cards	CPC-M Card	CPC96	VB-44410UK	Call processor card M	40-96 ports 16bit
	CPC-L Card	CPC288	VB-444201UK	Call processor card L	96-288 ports 16bit
	CPC-LL Card	CPC576	VB-444301UK	Call processor card LL	288-576 ports 32bit
DTMF Circuits	8 DTMF Receiver Card	MFR/8	VB-44110UK	8-circuit DTMF receiver	
Interface Cards	Connection Cable Kit	CBLKIT	VB-44450	Interface card for CAB40 Double structure	Including MST card and SLV card.
	Connection Cable Card-M	CBLMST	VB-444501		Mounts on master (Base) CCU of CAB40 VB-44450 CBLKIT
	Connection Cable Card-S	CBLSLV	VB-444502		Mounts on slave (Expand) CCU of CAB40 VB-44450 CBLKIT
	Building Block Card	CBL	VB-44451	Interface card for CAB96 Building Block	Mounts on slave (Expand) CCU of CAB96
	Connection Cable Card-DBS	CBLDBS	VB-44452	ICX-to-DBS interface card	Install in AUX1 slot of DBS.
	Conference Card	CONF	VB-44120UK	Interface card for 8-party conference	
Time-Switch Circuits	Time Switch Card/L	TSW288	VB-444202UK	Time-switch circuit card (standard)	Use with CPC288 card
	Time Switch Card/LL	TSW576	VB-444302UK	Time-switch circuit card (high-level)	Use with CPC576 card
Audio applications	Voice Storage Service Card	VSSC	VB-44170UK	Voice storage card	
	4 Voice Processing Card	VPU/4	VB-44160UK	Voice processing card Built-in ACD voice × 4 processing card (4ch)	
	8 Voice Processing Card	VPU/8	VB-44150UK	Voice processing cards × 8	
	ACD Card	ACD	VB-44140UK	Built-in ACD unit	
Daughter packages	Remote Administration Unit	RAI	VB-44182UK	Remote maintenance unit	Mount on SCC card.
	Sync. Pacage/Network Unit	SYNC	VB-44460UK	Network sync circuit unit (standard)	Mount on CPC96, TSW288, or TSW576 card.
	PC Card	PCCM1	VB-44410UKA	PC card for CPC96	For software Enhancement

Card Type	Card Designation	Product Name	Product No.	Card Description	Remarks
Daughter packages	PC Card	PCCL1	VB444201UKA	PC card for CPC288	For software Enhancement
	PC Card	PCLL1	VB-44431UK	PC Card for CPC576	Mount on CPC576 Card

Unit Card Description

This section provides an overview of each card to be installed in the CCU.

CPC96 card (VB-44410UK): CPU card

The CPC96 card is a high-level CPU card for a 40 to 96 port system. A 16-bit CPU is used.

The CPC96 card provides a time switch (4 HW x 4 HW), a 4-circuit MFR (DTMF receiver circuit), a 3-party conference circuit, service tone, a DTMF transmitter, an input terminal for Music-On-Hold (external hold tone source RCA jack), a connecting terminal for synchronisation package (VB-44460UK), an interface connector for external PC card and modem (300 bps) functions. The system control programme is downloaded to the internal memory of the system through the PC card.

For details on connections, see page 6-3.

Figure 2-6. CPC96 card
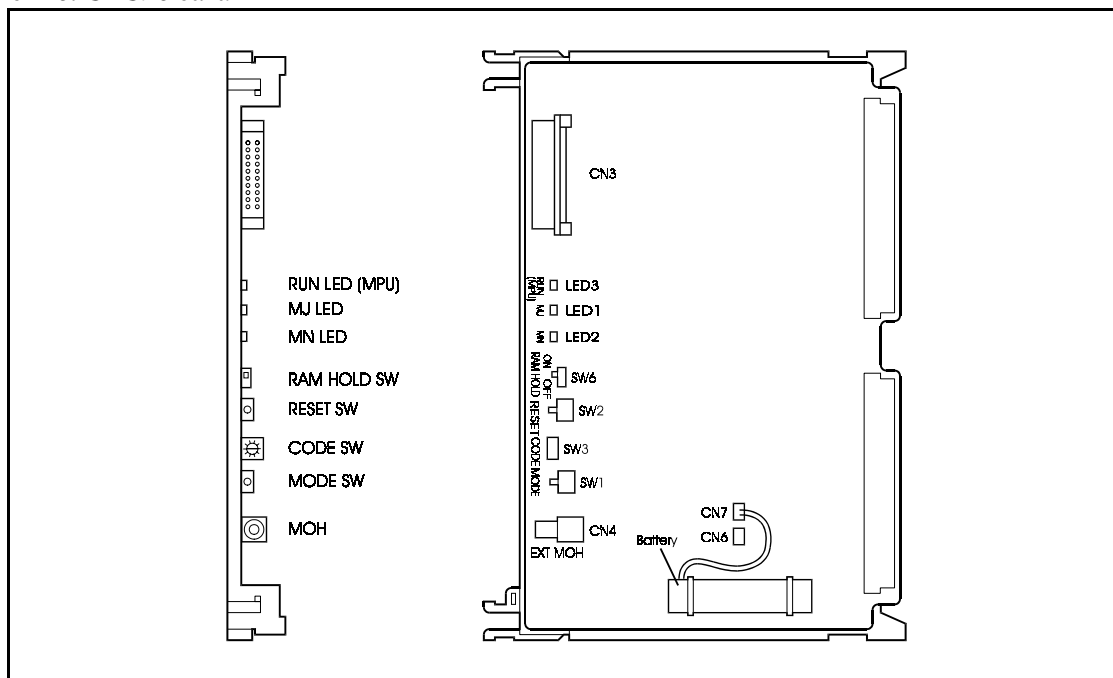
Table 2-2 and Table 2-3 show the switch settings and LED indicators.

Table 2-2.   *Switch settings of CPU card*

SW No.	Description
SW1 : Black (MODE)	Push switch for setting modes of system.
SW2 : (CPC 96, 288) SW3 (CPC 576) (RESET)	Push switch for resetting.
SW3 (CPC 96, 288) SW2 (CPC 576) (CODE)	Rotary switch for setting startup mode of system.
SW6 (CPC 96, 288) SW4 (CPC 576) (RAM HOLD)	Switch for selecting battery backup of memory.

Table 2-3.   *LED indication of CPC96 card*

LED indication	Description
LED3 (RUN : MPU)	Flashes when MPU is operating.
LED1 (MJ)	Turns ON when MJ alarm is detected.
LED2 (MN)	Turns ON when MN alarm is detected.

CPC288 card (VB-444201UK): CPU card

The CPC288 card is a standard CPU unit for a 96 to 288 port system. A 16-bit CPU is used.

The CPC288 card provides a 4-circuit MFR (DTMF receiver circuit), an input terminal for Music-On-Hold (external hold tone source : RCA jack), an interface connector for external PC card and modem (300 bps) functions.

For details on connections, see page 6-3.

This card is used with the TSW288 card (VB-444202UK) for 96 to 288 port system.

The system control programme is downloaded to the internal memory of the system through the PC card.

Table 2-4 shows the LED indications. Switch settings are the same as for the CPC96 card (VB-44410UK). See Table 2-2.

Table 2-4.   LED indications of CPC288 card

LED indication	Description
LED4 (RUN : FPU)	Flashes when FPU is operating.
LED3 (RUN : MPU)	Flashes when MPU is operating.
LED1 (MJ)	Turns ON when MJ alarm is detected.
LED2 (MN)	Turns ON when MN alarm is detected.

Figure 2-7. CPC288 card
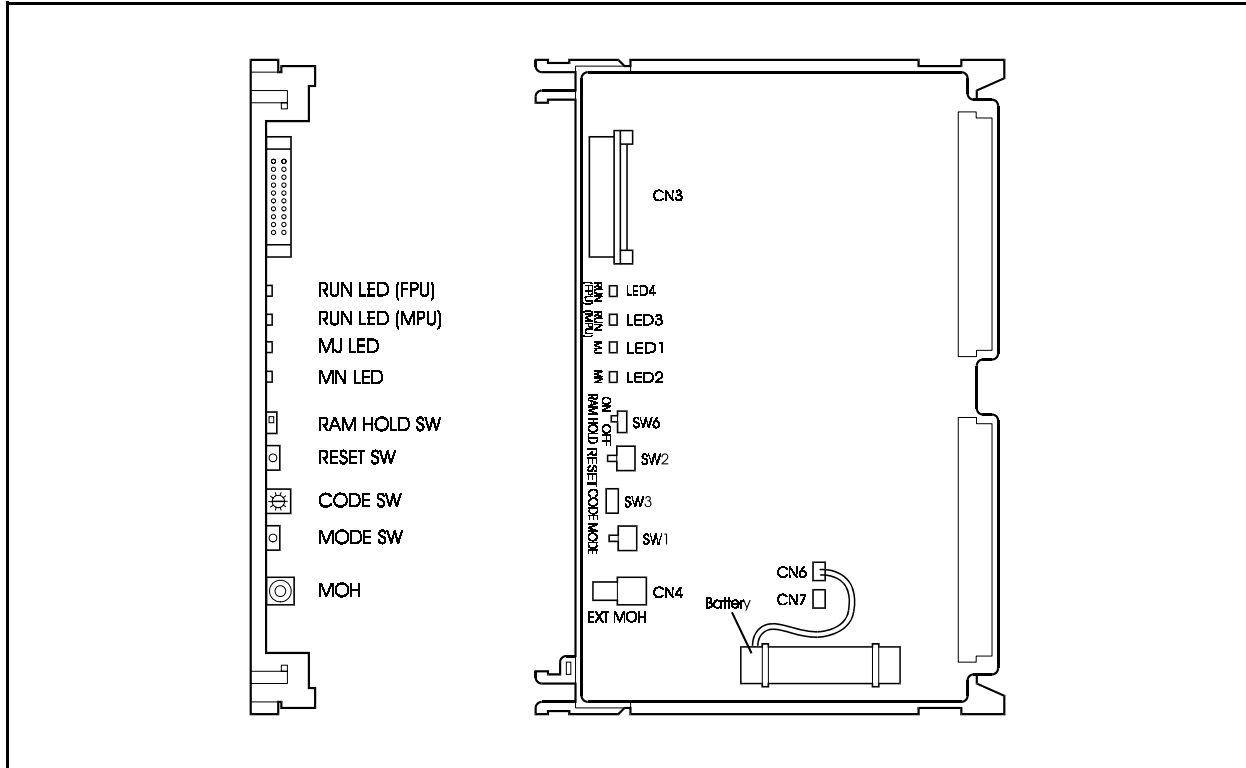
CPC576 card (VB-444301UK): CPU card

The CPC576 card is a high-performance CPU unit for a 96 to 576 port system. A 32-bit CPU data bus is used.

The CPC576 card provides a 4-circuit MFR (DTMF receiver circuit), an input terminal for Music-On-Hold (external hold tone source : RCA jack), an interface connector for PCM-CIA (PC card interface connector) and modem (300 bps) functions.

For details on connections, see page 6-3.

This card is used with the TSW576 card (VB-444302UK) for a 96 to 576 port system.

The system control programme is downloaded to the internal memory of the system through the PC card. The PC card is also necessary during normal operating time (do not remove the PC card).

Switch settings are the same as for the CPC96 card (VB-44410UK). See Table 2-2.
LED indicators are the same as for the CPC288 card (VB-444201UK). See Table 2-4.

⚠ **CAUTION:**
  • Single Inline Memory Module (SIMM) is provided through service parts route. Manufactuer does not take any responsibility if SIMM, other than this service parts, or PC card, other than VB-44431UK, is connected to CPC576 card.

Figure 2-8. CPC576 card
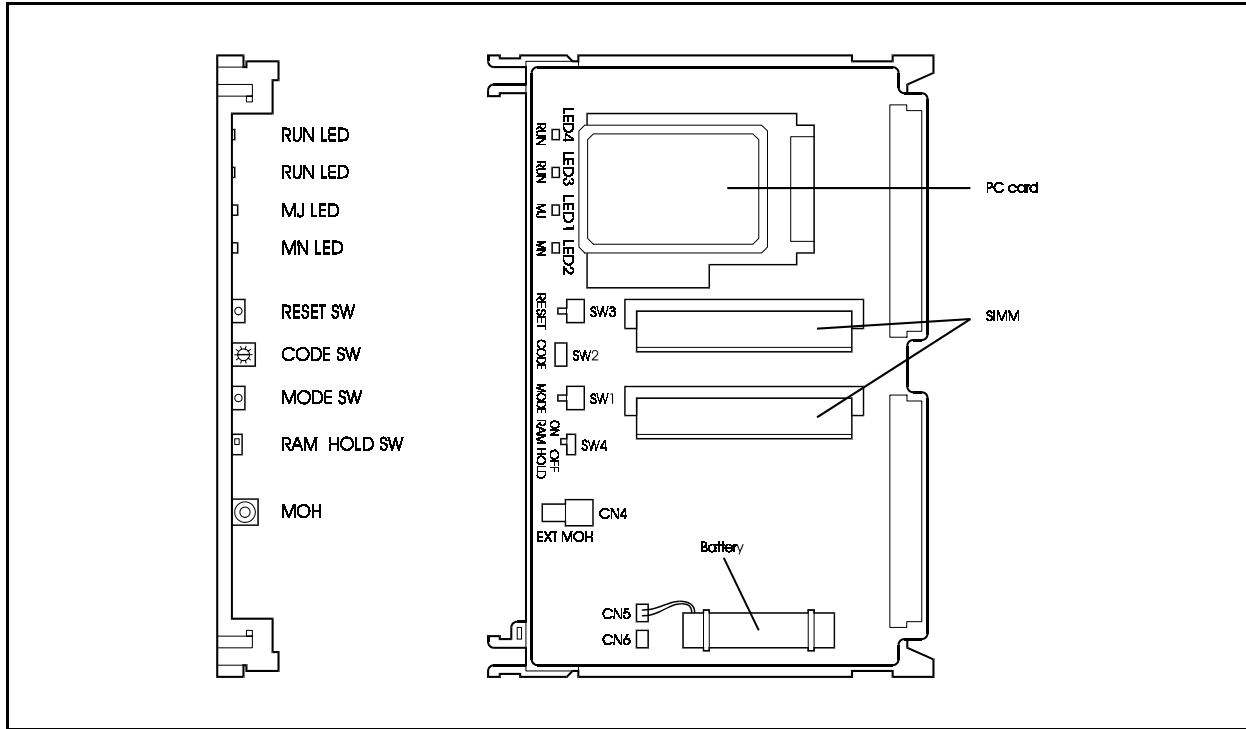
TSW288 card (VB-444202UK): Time Switch card

The TSW288 card is the time switch card for the CPC288 card that is used for a 96 to 288 port system. This card is used paired with the CPC288 card. The TSW288 card is mounted on the option slot of the CAB96 CCU. Only one TSW288 card is necessary for each system (maximum 288 ports).

When Building Block connecting, this card and CBL card (VB-44451) installed into CPC card slot of CAB96B (Expand CCU) are connected.

For details on connections, see pages 4-23 and 4-33.

The TSW288 card provides functions for a time switch (14 HW x 14 HW), service tone, a DTMF transmitter, a connecting terminal for synchronisation package (VB-44460UK) and a 3-party conference circuit.

Figure 2-9. TSW288 card
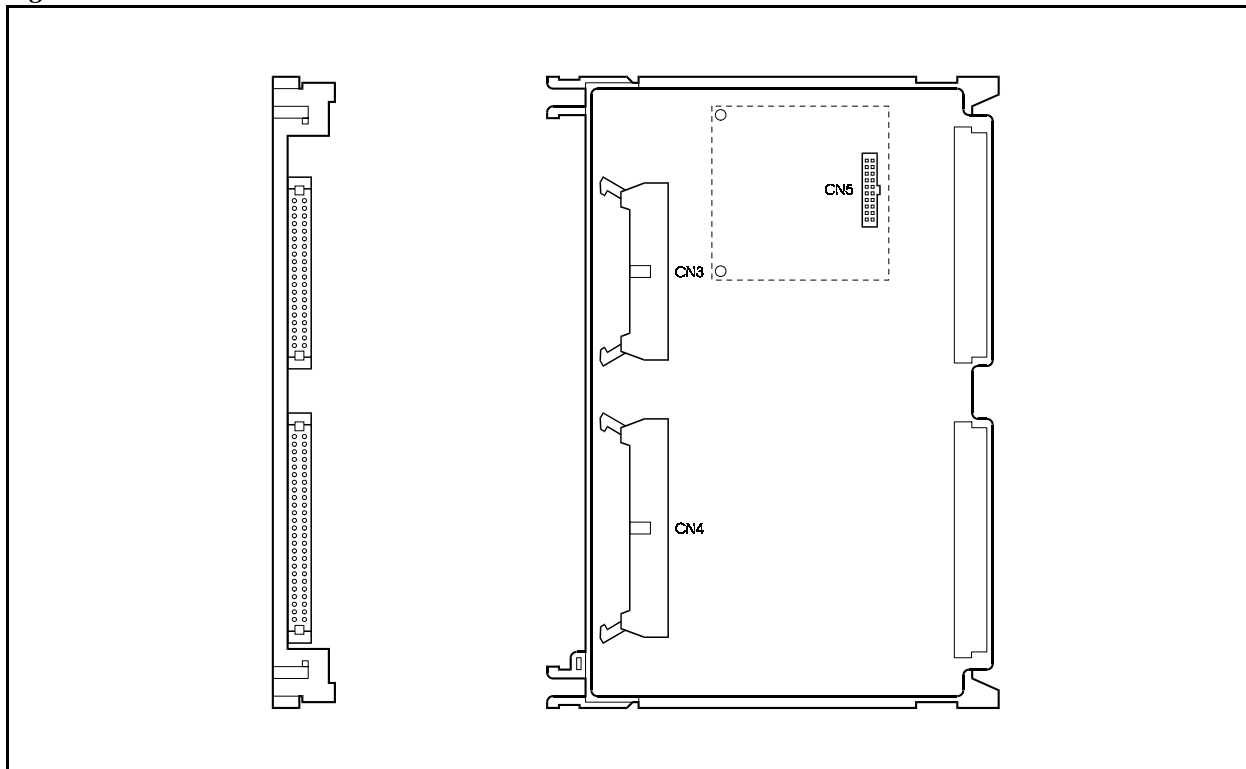
TSW576 card (VB-444302UK): Time Switch card

The TSW576 card is the time switch card for the CPC-576 card that is used for a 96 to 576 port system. This card, used for a system with a maximum 576 ports, is paired with the CPC576 card (VB-444301UK) for a 576-port system.

The TSW576 card is mounted on the option slot of the CAB96 CCU. Only one TSW576 card is necessary for each system.

When Building Block connecting, this card and CBL card (VB-44451) installed into CPC card slot of CAB96B (Expand CCU) are connected.

For details on connections, see pages 4-23 and 4-33.

The TSW576 card provides functions for a time switch (24 HW $\times$ 24 HW), service tone, a DTMF transmitter, a connecting terminal for synchronisation package (VB-44460UK), and a 3-party conference circuit.

Figure 2-10. TSW576 card
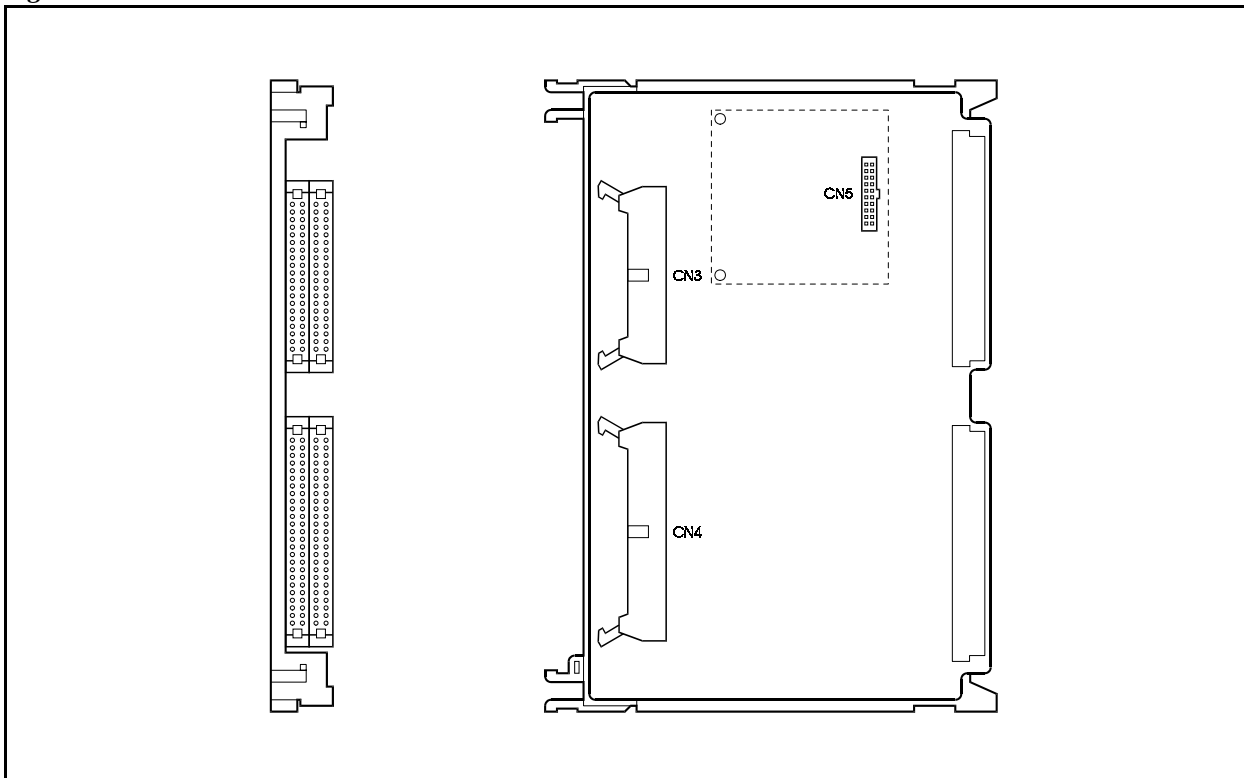
CBLKIT (VB-44450): Connection Cable Kit (Including card-Master and card-Slave)

The CBLKIT is required for connecting two CAB40s in a 2-frame connection (CAB40 + CAB40).

The CBLMST card is mounted on the FS5 slot of the master cabinet, and the CBLSLV card is mounted on the CPC slot of the slave cabinet. A dedicated cable, which connects the connector on each card, connects two CAB40 systems (2-frame connection) to make 72 ports system.

For details on connections, see pages 4-6, 4-23 and 4-33.

Figure 2-11. CBLMST card and CBLSLV card
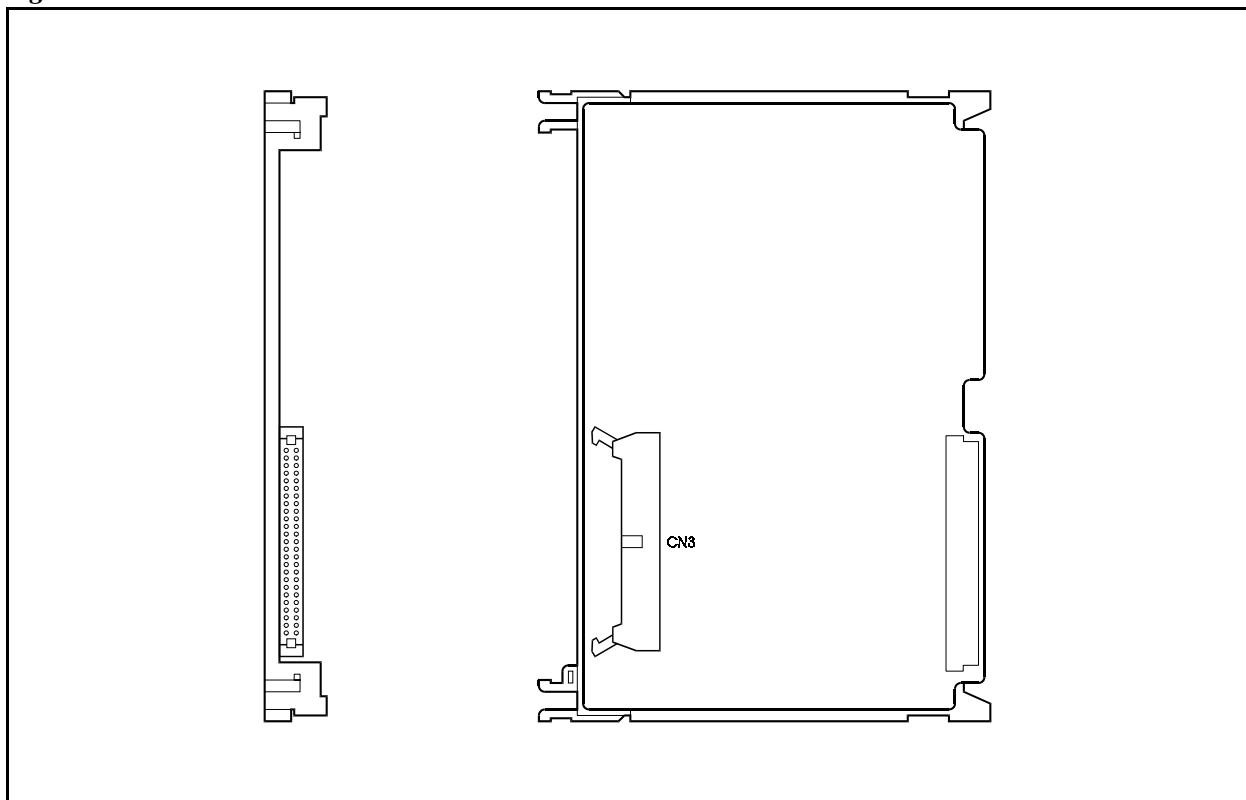
CBL card (VB-44451): Building Block card

The CBL card is required for the building block connection of CAB96 and CAB96B (CAB96 + CAB96B ·········+ CAB96 B). The TSW288 / TSW576 card is also necessary for a building block connection.

The CBL card is mounted on the CPC slot of the Expand cabinet, and a dedicated cable connects the connector on this card and the connector on the TSW288/TSW576 card, which is mounted on the OP1 slot of the Base cabinet. This makes it possible to connect multiple (maximum 6) systems (building block connection).

Figure 2-12. CBL card
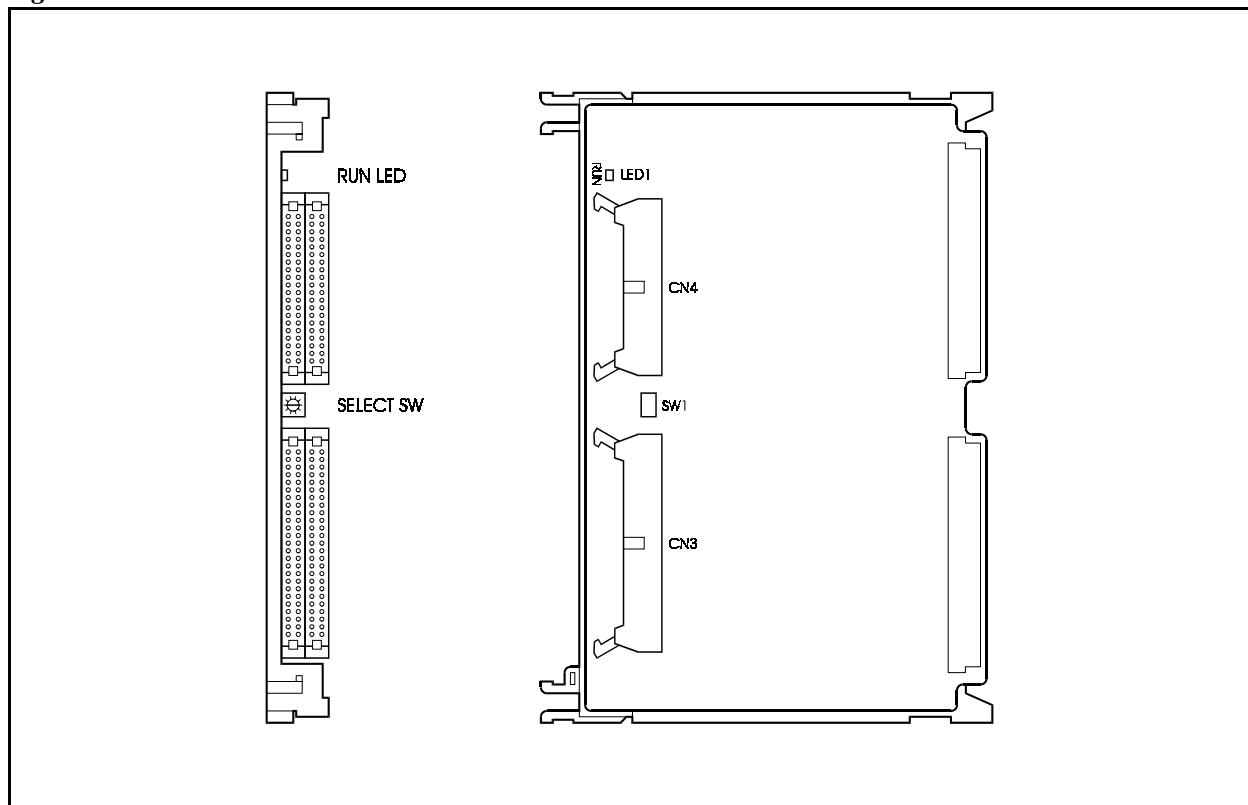
Table 2-5 shows the LED indications.

Table 2-5.   LED indications of CBL card

LED indication	Description
LED1 (RUN)	Flashes when operating.

CBLDBS card (VB-44452): Connection Cable card-DBS

The CBLDBS card is required for connecting the CAB96 and DBS-90 (VB-3657UK) systems. The TSW288 / TSW576 card is also necessary to connect the CAB90 and DBS-90 systems.

The CBLDBS card is mounted on the AUX1 slot of the DBS-90, and a dedicated cable connects the connector on this card and the connector on the TSW288 / TSW576 card, which is mounted on the OP1 slot of the CAB90. This makes it possible to connect the CAB96 and DBS-90 systems.

Note: In this case, AUX2 slot can not be used.

For details on connections, see page 4-33.

In this case, only DEC cards can be installed into DBS-90 system.

Figure 2-13. CBLDBS card
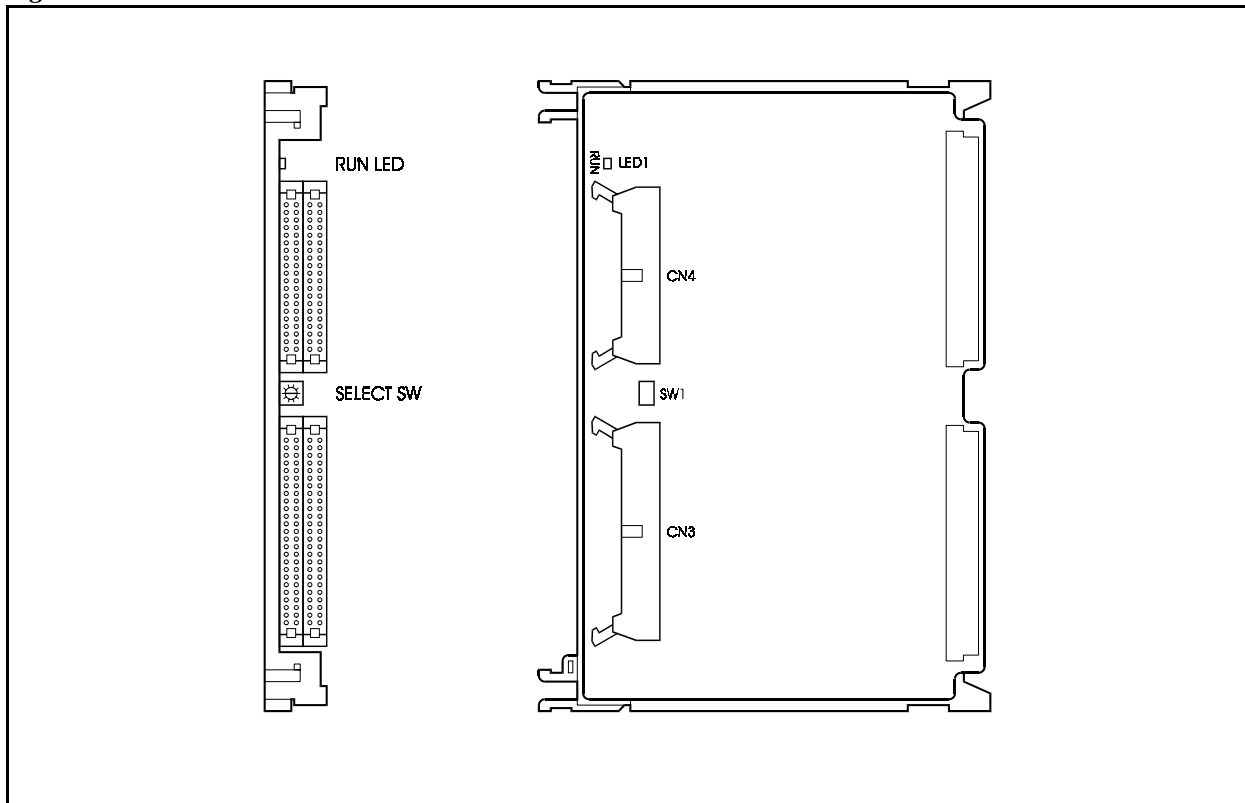
Table 2-6 shows the LED indications.

Table 2-6.   LED indications of CBLDBS card

LED indication	Description
LED1 (RUN)	Flashes when FPU is operating.

SYNC Package (VB-44460UK):
SYNC Package/Network Unit

The SYNC package supplies a network synchronising circuit, and is required when a digital circuit, such as ISDN, is mounted.

The SYNC package generates a PCM clock that is synchronised with a digital network by the PLL circuit, supplying the PCM clock to the TSW288 / TSW576 card or CPC96 card.

The SYNC package is mounted on either the CPC96 card or the TSW288/ TSW576 card.

For details on how to mount the SYNC package, see page 5-10.

Figure 2-14. SYNC Package
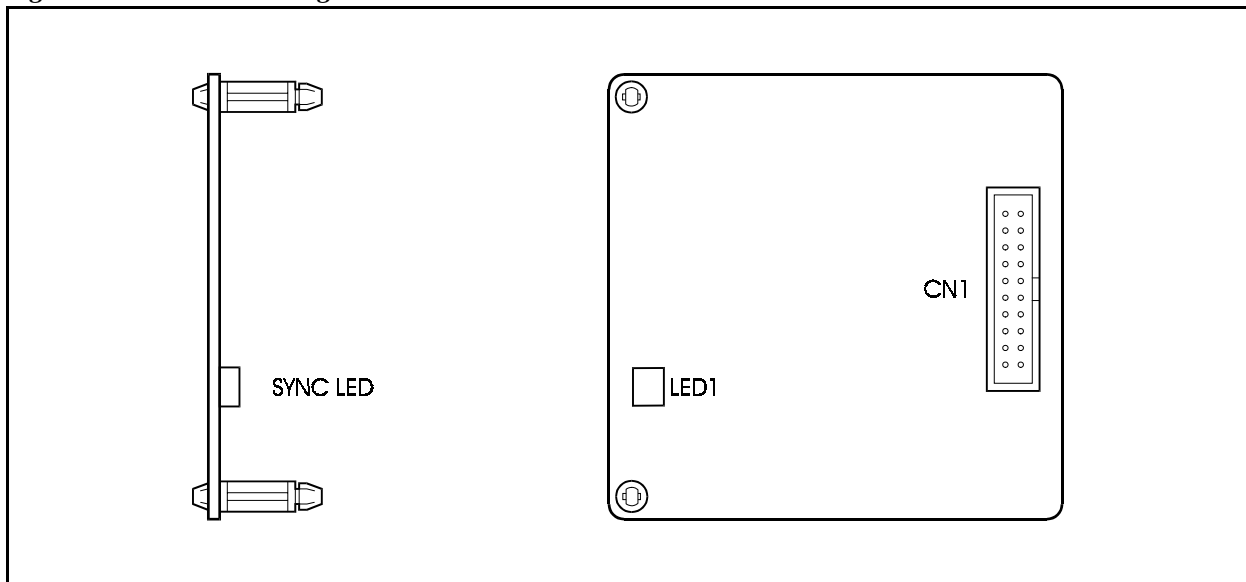
Table 2-7 shows the LED indications.

Table 2-7.   LED indications of SYNC package

LED indication	Description
LED1 (SYNC)	Turns on when synchronising the clock.

SCC card (VB-44181UK): Service Control card

The SCC card is used to extend service functions. This card is mounted on the option slot to support RS-232C port control, background music (BGM) input and external paging (external paging with talkback) control.

Only one SCC card can be mounted for each system.

The major specifications of this card follow:

- RS-232C port: 2 ports (max. 9600 bps)
  CN5: Call Logging or customised tool
  CN6: Bus monitor
- BGM input terminal: 1 port (with RCA jack)
- External paging input terminal
- External amplifier ON/OFF control: 1 contact
- Number of contacts for external equipment ON/OFF control: 5 contacts
- Maximum drive current controlling ports for external equipment control board: 25mA (Total)

For details on connections, see pages 6-5 to 6-17.

Figure 2-15. SCC card
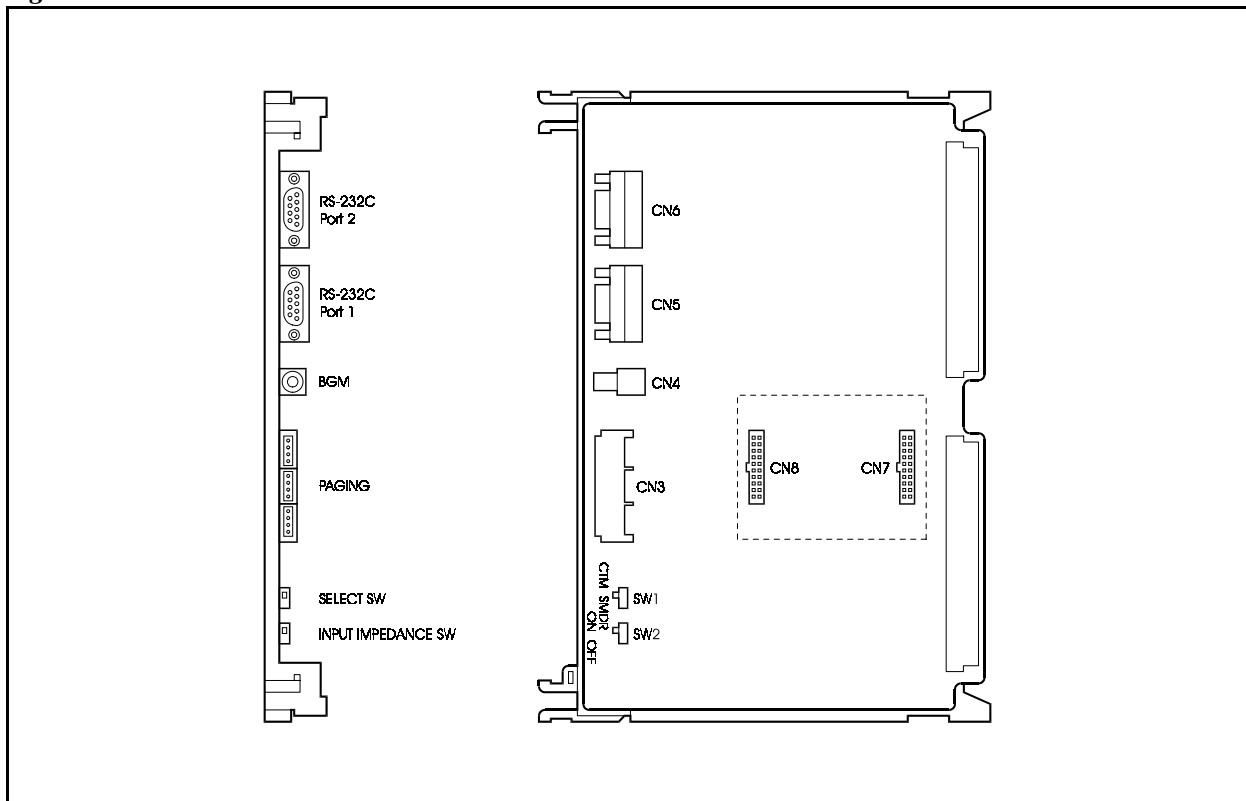
Table 2-8 shows the switch settings.

Table 2-8.   SCC card switch settings.

Switch No.	Setting	Description
SW1	CTM	Connects customised tool to RS-232C port (CN5).
	SMDR	Connects call logging device to RS-232C port (CN5). (This is set before shipping.)
SW2	ON	Sets input impedance of external paging device to 600 ohms.
	OFF	Sets input impedance of external paging device to high impedance. (This is set before shipping.)

LTRK / 8 card (VB-44510UK): Loop Start Exchange Line Card

The LTRK/8 card is an interface that accommodates cards for a loop start type analog exchange line. This card is mounted on a flexible slot to connect general analog telephone lines.

The LTRK/8 card provides an 8 exchange line interface and can serve the functions of detection and answering of call signals from the exchange line, sending call signals to the exchange line, dialling and speech.

The LTRK/8 card provides a lightning protector and a safety circuit to directly connect with general telephone lines.

For details on connections, see page 5-5.

Figure 2-16. LTRK/8 card
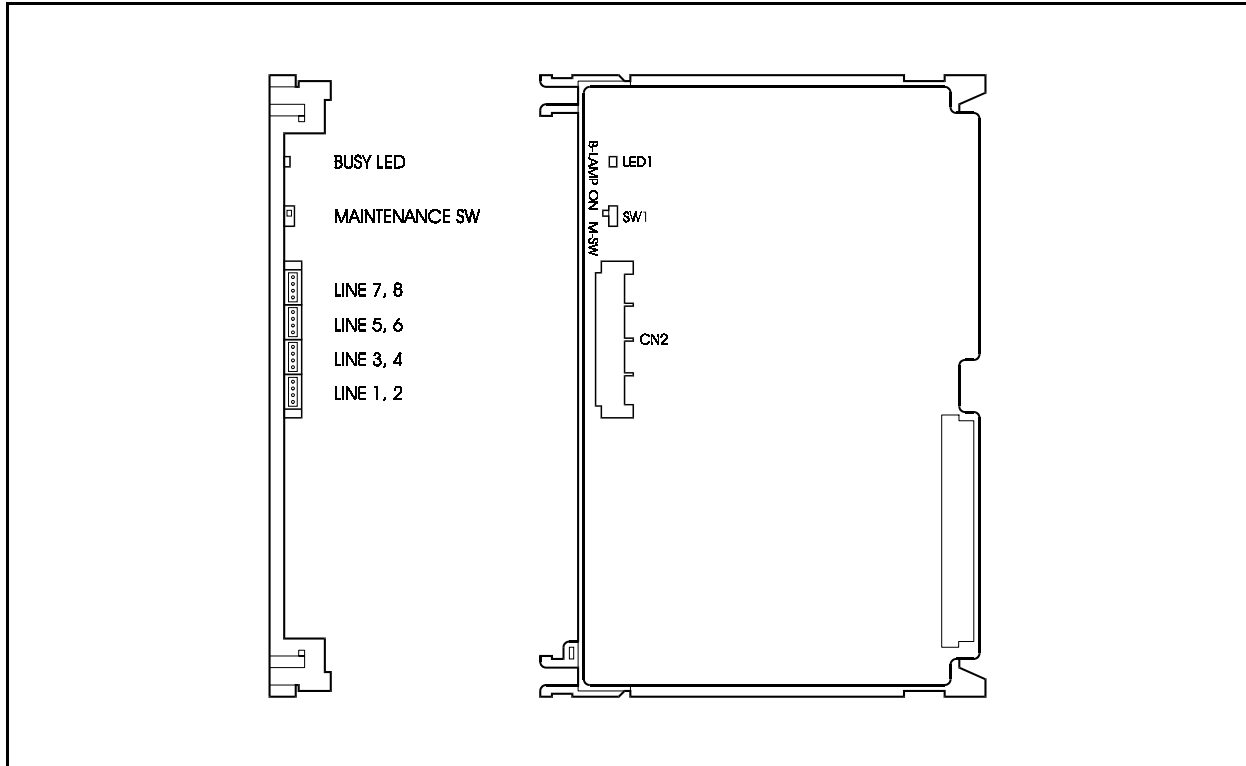
Tables 2-9 and 2-10 show the switch settings and LED indications.

Table 2-9.   Maintenance switch (SW1) settings of LTRK/8 card

Setting	Description
ON	Card is in closed status, and can be mounted and removed when power is ON. (Sending/receiving of calls is disabled. If this is set during speech, sending/receiving of calls is disabled after speech ends.)
OFF	Normal operation (This switch is set to OFF for normal operation.)

Table 2-10. LED indications of LTRK/8 card

LED indication	Description
LED1 (LINE BUSY)	Turns ON when exchange line is in use. Turns ON when at least 1 of 8 circuits is in use.

TBRI/4 card (VB-44530): BRI Card (T-point)

The TBRI/4 card is a T-point ISDN basic rate interface (2 B + D: 144 kbps) accommodation card.

The TBRI/4 card is mounted on a flexible slot to control the basic user network interface of ISDN.

The TBRI/4 card is connected through DSU (Digital Service Unit) to the ISDN exchange line which supports the T-point ISDN basic interface.

This card has an on-board, 4-circuit T-point ISDN basic interface, and a lightning protector built-in, and also provides a network clock synchronising function.

For details on connections, see page 5-8.

Figure 2-17. TBRI/4 card
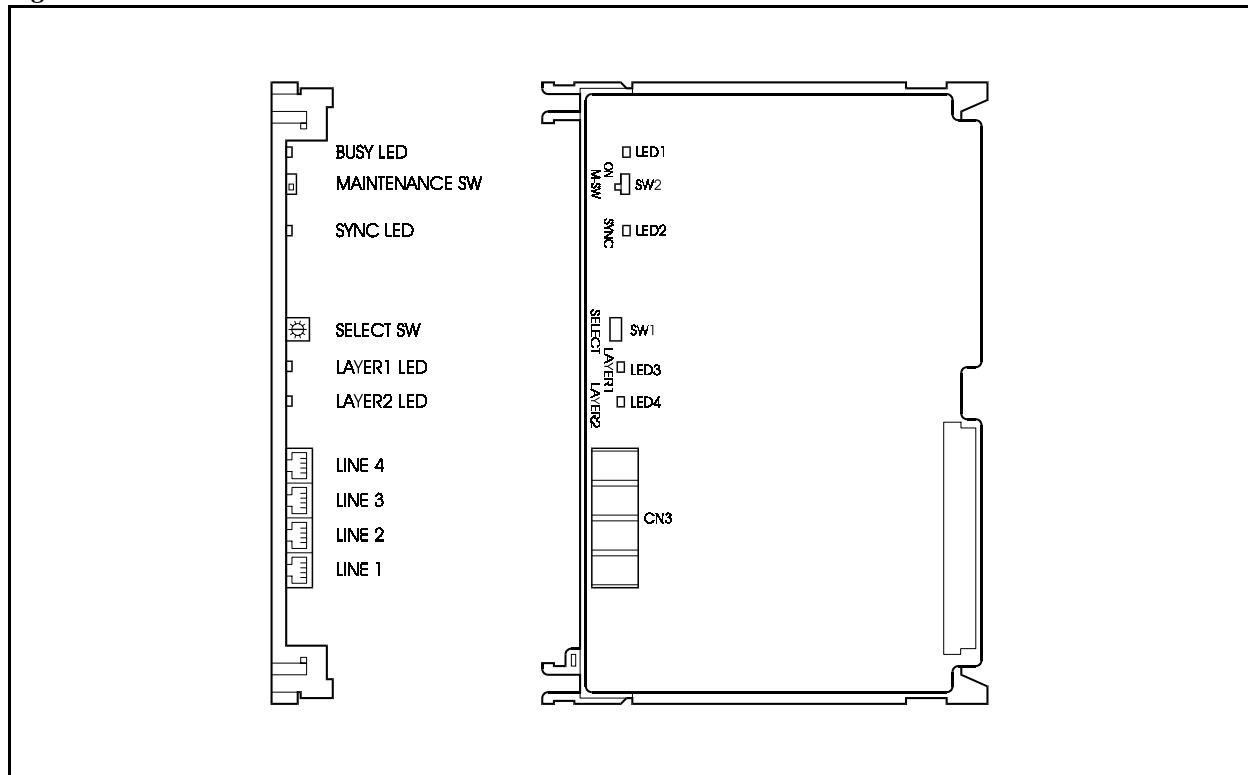
Tables 2-11, 2-12 and 2-13 show the switch settings and LED indications.

Table 2-11. Maintenance switch (SW2) settings of TBRI/4 card

Setting	Description
ON	Card is in closed status, and can be mounted and removed when the power is ON. (Sending/receiving of calls is disabled. If this is set during speech, sending/receiving of calls is disabled after speech ends.)
OFF	Normal operation (This switch is set to OFF for normal operation.)

Table 2-12. Circuit select switch (SW1) settings of TBRI/4 card

Switch position	LED indication
0	OFF (default setting when unit is shipped)
1	1st interface condition displayed by LAYER1 LED and LAYER2 LED
2	2nd interface condition displayed by LAYER1 LED and LAYER2 LED
3	3rd interface condition displayed by LAYER1 LED and LAYER2 LED
4	4th interface condition displayed by LAYER1 LED and LAYER2 LED
5 to 9	Not available

Table 2-13. LED indication of TBRI/4 card

LED indication	Description
LED1 (LINE BUSY)	Turns ON when exchange line is in use.
LED2 (SYNC)	Turns ON when network synchronisation clock is sent.
LED3 (LAYER1)	Turns ON when synchronisation is established.
LED4 (LAYER2)	Turns ON when data link (DL) is established.

PRI/30 card (VB-44540UK): PRI Card

The PRI/30 card is a T-point ISDN primary rate interface (30B + D: 1984 kbps) and also an S-point ISDN primary rate interface accommodation card.

The PRI/30 card is mounted on a flexible slot to connect the system to ISDN (to access ISDN services). It is possible to use either the T- or S-point ISDN primary rate interface by setting a switch on the card or by a programme setting. By selecting the mode switch on the card, 8/16/24/30 channel modes can be selected, however, there are restrictions to the position of the slot to which the card is mounted. This depends on the number of accommodating channels. For details on the restrictions of the slot position, see page 4-41.

A maximum of two cards for CAB40, or three cards can be mounted for CAB90. When there are six CCUs, a maximum of 18 cards can be mounted.

The PRI/30 card has an on-board lightening arrester, so that the card can be connected to the carrier exchange line corresponding to the T-point primary rate interface through DSU (Digital Service Unit).

For details on connections, see page 5-12.

Figure 2-18. PRI/30 card
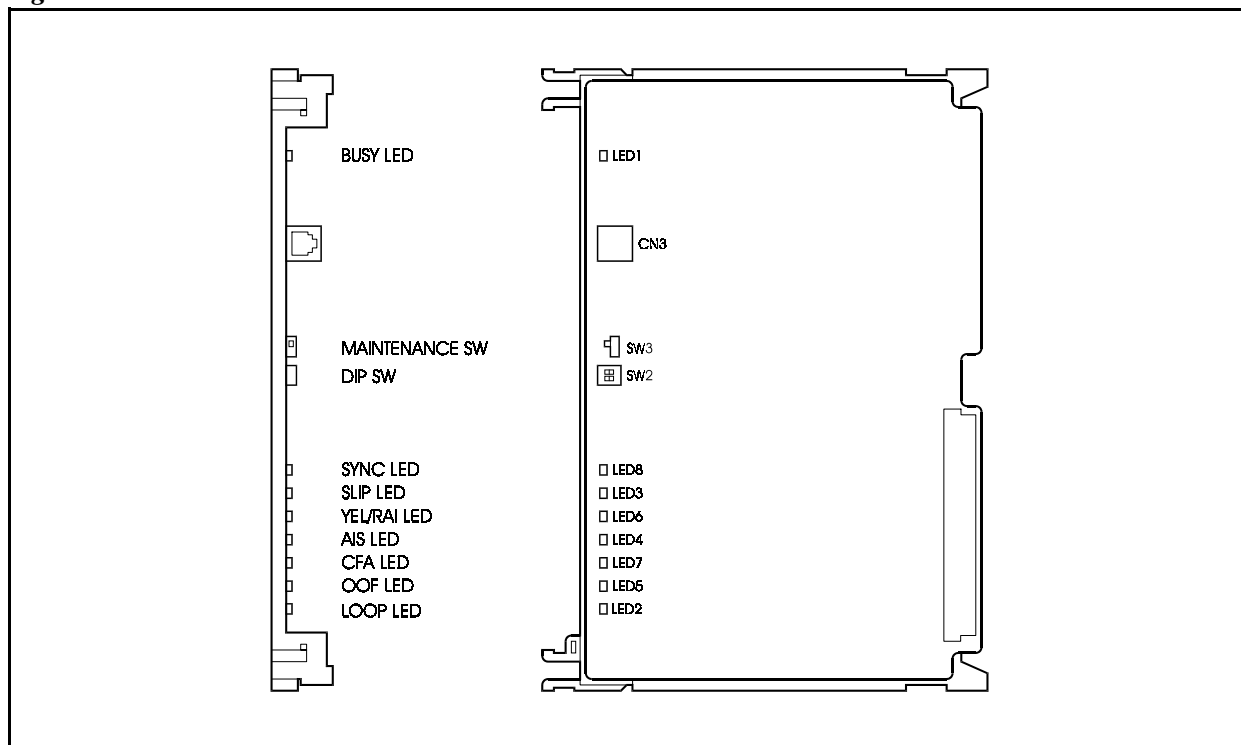
Tables 2-14 to 2-16 show the switch settings and LED indications.

Table 2-14. Maintenance switch (SW3) settings of PRI/30 card

Setting	Description
ON	Card is in closed status, and can be mounted and removed when power is ON. (Sending/receiving of calls is disabled. If this is set during speech, sending/receiving of calls is disabled after speech ends.)
OFF	Normal operation (This switch is set to OFF for normal operation.)

Table 2-15. Dip switch (SW2) settings of PRI/30 card

Switch No.	Description	
SW2-1	ON	Sets to "exchange line" for T-point.
	OFF	Sets to "internal line" for S-point.
SW2-2	ON	Sets to "other mode" where 1 to 16B+D, 1 to 24B+D or 1 to 30B+D channels set by programme can be used.
	OFF	Sets to "8ch mode" where 1 to 8B+D channels can be used.

Table 2-16. LED indications of PRI/30 card

LED indication	Description
LED1 (LINE BUSY)	Turns ON when B channel is in use.
LED8 (SYNC)	Turns ON when set to abstracting Network synchronising clock.
LED3 (SLIP)	Turns ON when SLIP abnormality is detected.
LED6 (YEL/RAI)	Turns ON when receiving YELLOW alarm signal.
LED4 (AIS)	Turns ON when receiving AIS signal.
LED7 (CFA)	Turns ON during RED alarm.
LED5 (OOF)	Turns ON when frame failure is detected.
LED2 (LOOP)	Turns ON when loop back. (Connect TA, TB to RA, RB for test purpose.)

AC15/4 card (VB-44570UK) : AC-15 Card

The AC15/4 card is the AC-15 private line interface card. By mounting the AC15/4 in the flexible slot, you can connect to other PBXs using the AC-15 private line .

The AC15/4 card has four AC-15 private line interfaces, and handles the following:

- detection and response to call signals from other PBXs
- outgoing calls to the AC-15 private line
- dial transmission
- conversations

As the AC15/4 card has a built-in lightning protector, it can be connected directly to the AC-15 circuit.

For details on connections, see page 5-15.

Figure 2-19. AC15/4 card
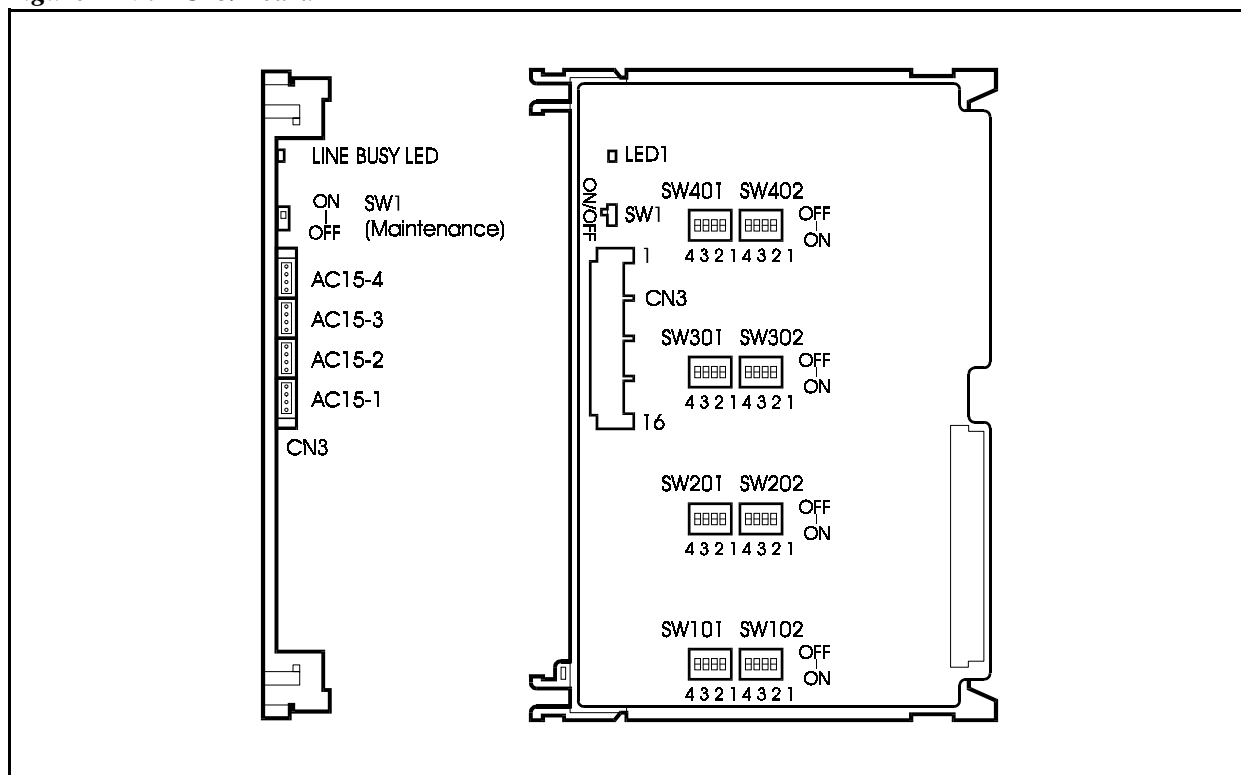
Tables 2-18, 2-19 and 2-20 show the switch settings and LED indications.

Table 2-17. Maintenance switch (SW1) settings of AC15/4 card

Setting	Description
ON	Card is in closed status, and can be mounted and removed when the power is ON. (Sending/receiving of calls is disabled. If this is set during speech, sending/receiving of calls is disabled after speech ends.)
OFF	Normal operation (This switch is set to OFF for normal operation.)

Table 2-18. AC15/4 Card Dip Switch settings

Switch No.	Setting
SW101, SW201, SW301, SW401	For incoming calls loss plan <table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>Loss plan with in card</td><td>Remarks</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>+1dB</td><td>Initial value</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>-1dB</td><td></td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>-3dB</td><td></td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>-5dB</td><td></td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>-7dB</td><td></td></tr></table> **Note:** Gain is obtained in a card only for the amount of wiring loss.
SW102, SW202, SW302, SW402	For outgoing calls loss plan <table><tr><td>1</td><td>2</td><td>3</td><td>4</td><td>Loss plan with in card</td><td>Remarks</td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>OFF</td><td>+4dB</td><td>Initial value</td></tr><tr><td>ON</td><td>OFF</td><td>OFF</td><td>OFF</td><td>+2dB</td><td></td></tr><tr><td>OFF</td><td>ON</td><td>OFF</td><td>OFF</td><td>0dB</td><td></td></tr><tr><td>OFF</td><td>OFF</td><td>ON</td><td>OFF</td><td>-2dB</td><td></td></tr><tr><td>OFF</td><td>OFF</td><td>OFF</td><td>ON</td><td>-4dB</td><td></td></tr></table> **Note:** Gain is obtained in a card only for the amount of wiring loss.

Table 2-19. LED indications of AC15/4 card

LED indication	Description
LED1 (LINE BUSY)	Turns ON when AC-15 private line is in use. Turns ON when at least 1 of 4 circuits is in use.

DEC/8 card (VB-44610UK): Digital Extension Card

The DEC/8 card is an interface accommodating card for digital key telephones (1B+D: 64 kbps + 16 kbps).

The DEC/8 card is mounted on a flexible slot to connect digital extensions (1B+D: digital key telephones and DSS). This card accommodates an on-board 8-extension interface. The connection format is 2-wire nonpolarised star wiring.

The major specifications on wiring are as follows:

• Supply voltage and current to telephone terminal: maximum +24V/150mA
• Allowable wiring distance: Maximum loop resistance 40 ohms to digital key telephone Maximum loop resistance 20 ohms to DSS and Voice Recognition telephone, EM24

For details on connections, see page 5-19.

Figure 2-20. DEC/8 card
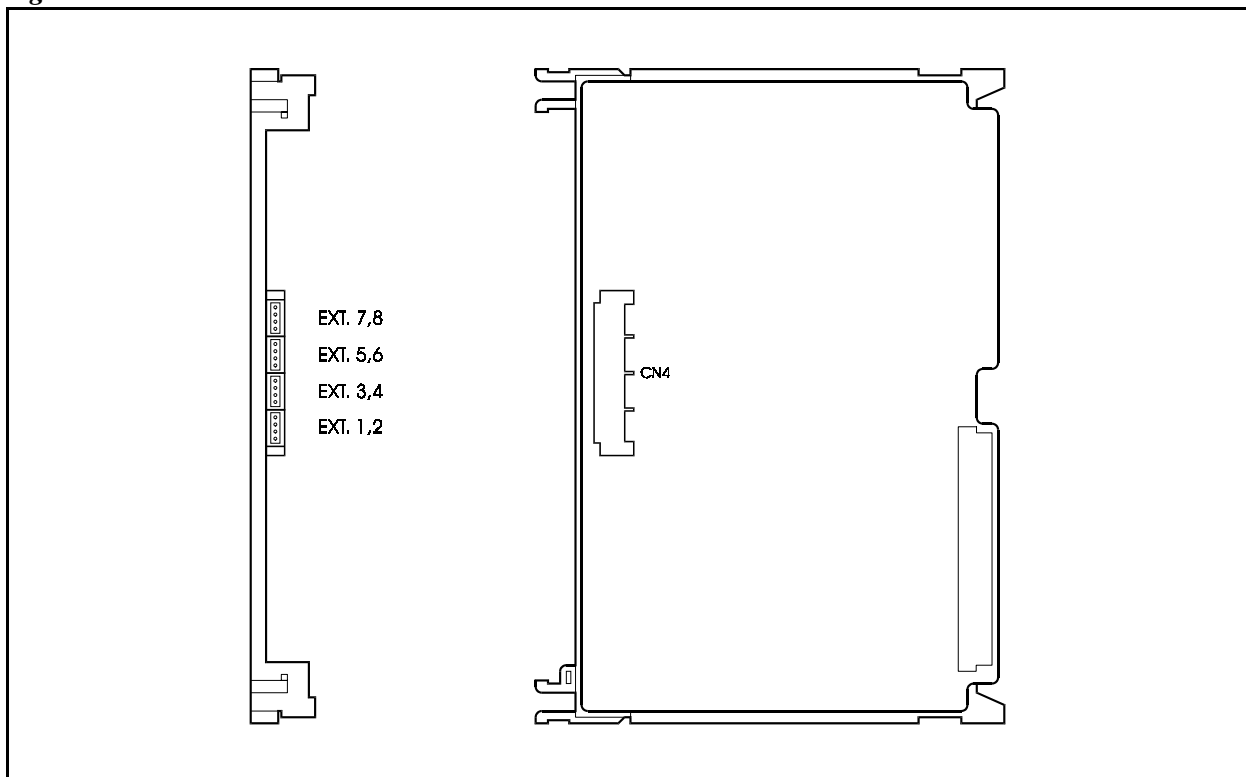
AEC/8 card (VB-44620UK): Analog Extension Card

The AEC/8 card is a SLT interface accommodating unit. The AEC/8 card is mounted on a flexible slot to connect a standard telephone (SLT) to the system.

The AEC/8 card has an 8-SLT extension interface, and provides such functions as call signals from a SLT, detection of dialling (10 pps/DTMF) and speech.

The supply voltage to a SLT is +24V, and a ringer circuit is built-in.

The duration of one callup signal from the built-in ringer circuit is a maximum one second. When eight exchange lines are simultaneously called up, control is in three phases: the first phase for the first to third circuits, the second phase for the fourth to sixth circuit, and the third phase for the seventh and eighth circuits.

The major specifications on wiring are as follows:

- Supply voltage/current for speech path: +24 V/25mA or more
- Loop resistance: 1.6km (In case: Wire-Diameter 0.5mm, Telephone resistance 120 ohms)
- Ringer signal frequency: 25Hz rectangular wave
- REN: 2
- Ring trip detection possible

For details on connections, see page 5-22.

Figure 2-21. AEC/8 card
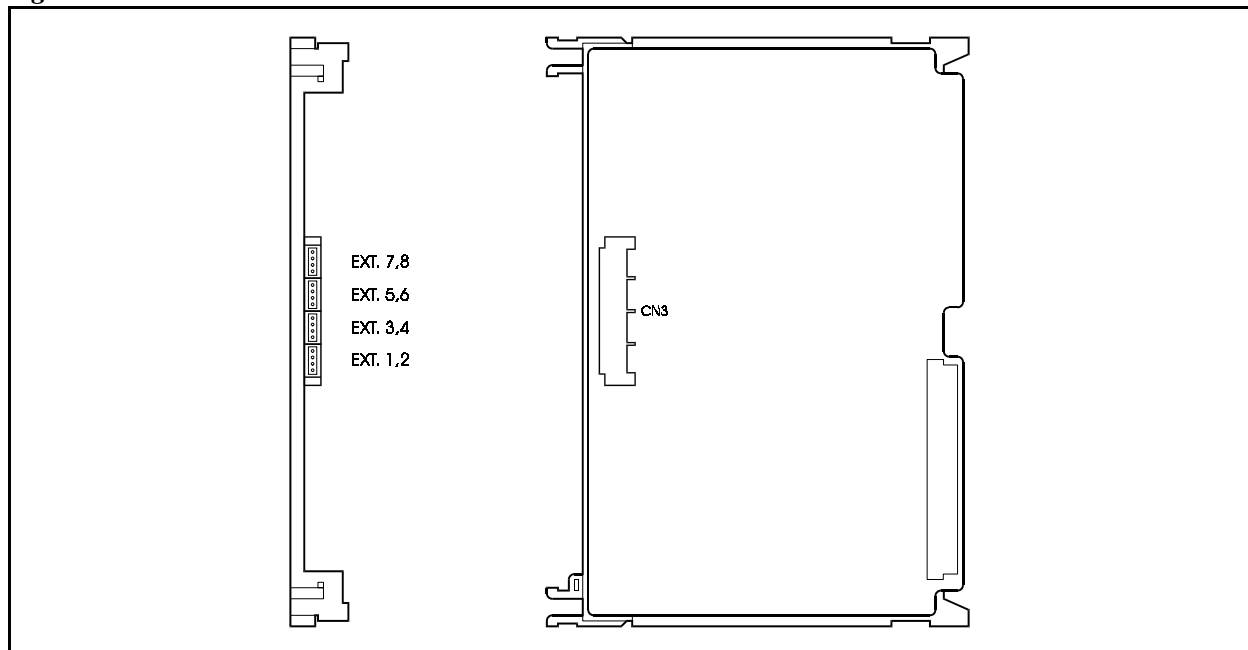
SBRI/4 card (VB-44630): BRI Card (S-point)

The SBRI/4 card is a basic rate interface (2B+D: 144Kbps) accommodating card for S-point ISDN.

The SBRI/4 card is mounted on a flexible slot to accommodate terminal internal lines of the basic user network interface of an ISDN terminal.

The system supplies +40V to the ISDN terminal which is connected to S-point interface card.

The SBRI/4 card has an on-board 4-circuit S-point ISDN basic interface.

For details on connections, see page 5-24.

Figure 2-22. SBRI/4 card
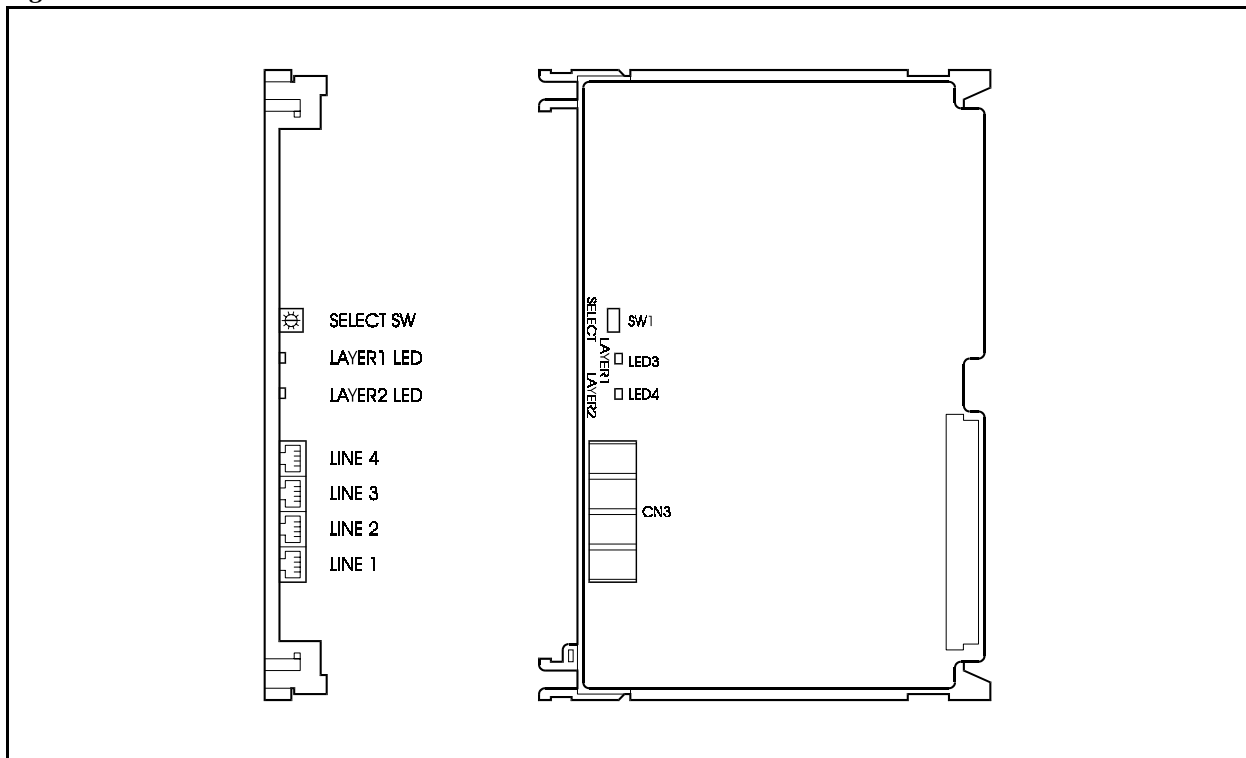
Tables 2-20 and 2-21 show the switch settings and LED indications.

Table 2-20. Settings of circuit selection switch of SBRI/4 card

Switch position	LED indication
0	OFF (default setting when unit is shipped)
1	1st interface condition displayed by LAYER1 LED and LAYER2 LED
2	2nd interface condition displayed by LAYER1 LED and LAYER2 LED
3	3rd interface condition displayed by LAYER1 LED and LAYER2 LED
4	4th interface condition displayed by LAYER1 LED and LAYER2 LED
5 to 9	Not available

Table 2-21. LED indications of SBRI/4 card

LED indication	Description
LED3 (LAYER1)	Turns ON when synchronisation is established
LED4 (LAYER2)	Turns ON when DL is established

MFR/8 card (VB-44110UK): 8 DTMF Receiver Card

The MFR/8 card is a receiving circuit accommodating card for DTMF signals.

The MFR/8 card is mounted on an option slot or flexible slot to receive DTMF signals which are sent from a SLT to an internal line. The MFR/8 card also has a function to receive DTMF signals sent from a exchange line.

The MFR/8 card provides an on-board 8-circuit DTMF receiver. One card can be mounted for each CCU. Table 2-22 shows the relationship between the number of system ports and Mounting restriction.

Table 2-22. Mounting restriction of MFR/8 card

Port number	40 to 96	96 to 192	192 to 288	288 to 384	384 to 480	480 to 576
Mounting restriction	1	2	3	4	5	6

Figure 2-23. MFR/8 card
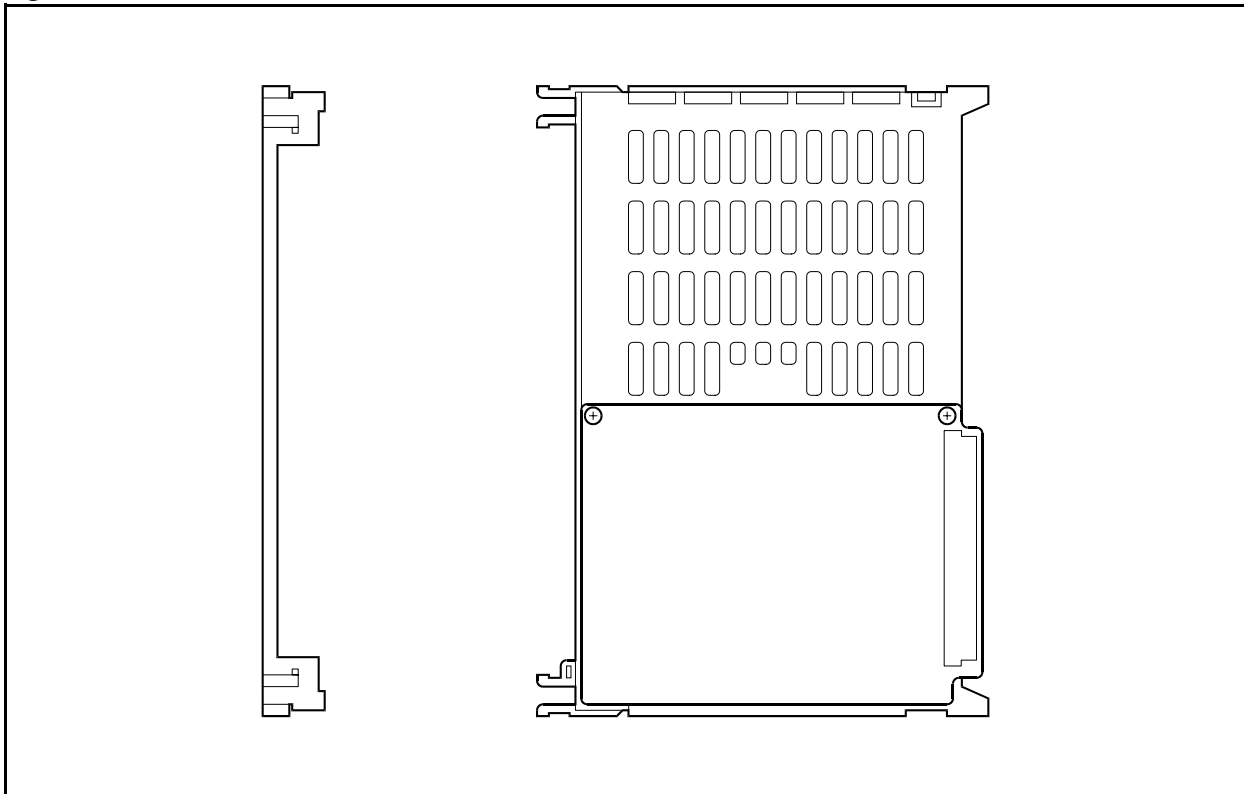
CONF card (VB-44120UK): Conference Card Ver.2

The CONF card is a conference speech card.

The CONF card is mounted on a flexible slot to support four groups of a maximum eight party conferences.

The mounting slot position of the CONF card is restricted. For details on restrictions of the mounting slot position, see page 4-42.

Figure 2-24. CONF card
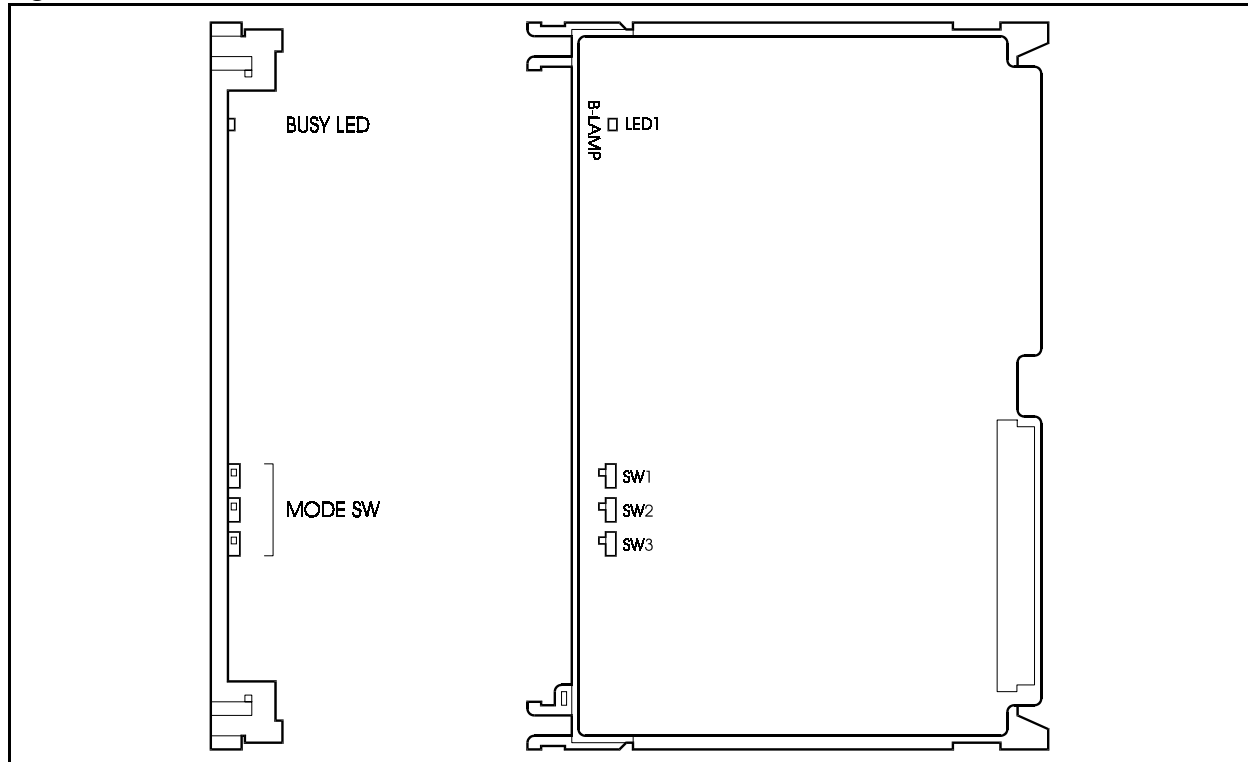
Table 2-23 shows the switch settings.

Table 2-23. Conference mode setting of CONF card switches (SW1 to SW3)

SW1	SW2	SW3	Usage	Conference mode
OFF	OFF	OFF	8-party Conferencing	8-party× 1 circut (initial value)
OFF	ON	OFF		8-party× 2 circuts
OFF	OFF	ON		8-party× 3 circuts
OFF	ON	ON		8-party× 4 circuts
ON	OFF	OFF	Setting disabled	
ON	ON	OFF		
ON	OFF	ON		
ON	ON	ON		

ACD card (VB-44140UK): ACD card

The ACD card is an Automatic Call Distribution (ACD) card which is mounted in the CCU.

By using one ACD card with one VPU/4 card (VB-44160UK), such simplified ACD functions as the incoming call distributing function and processed call number information for each terminal can be supported. The result of total processed calls can be output from a personal computer which is connected through an RS-232C port. This port is mounted in the ACD unit. The result can be printed out by connecting a printer to the same RS-232C port. However the PC and printer cannot be connected at the same time, and only a dedicated RS-232C cable can be used for the connection.

Only one ACD card can be mounted for each CCU.

For a multiple-cabinet configuration (maximum 6-cabinet configuration) based on a building block connection, a maximum of two cards can be mounted.

For details on connections, see page 6-19.

The ACD card and VSSC card (VB-44170UK) cannot be used together on the same cabinet.

Figure 2-25. ACD card
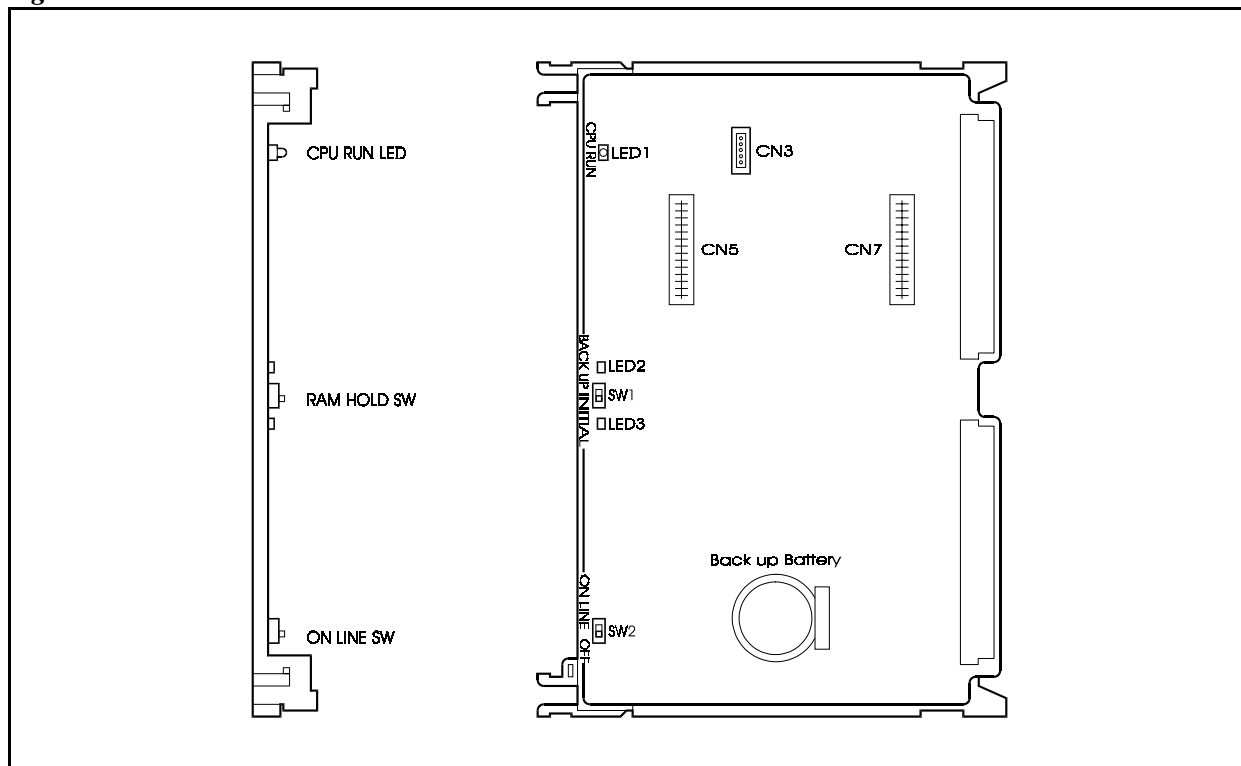
Table 2-24 and 2-25 show the switch settings and LED indications.

Table 2-24. ACD Card Switch Settings

Switch No.	Setting	Description
SW1	BACK UP	Set when retaining RAM data.
	INITIAL	Set when clearing RAM data.
SW2	ON LINE	Normal operation (set to ON LINE during regular operation)
	OFF LINE	Not Used

Table 2-25. ACD Card LED Indications

LED Display	Description
LED1 (CPU RUN)	Blinks when the CPU is in operation.

VPU/8 card (VB-44150UK): 8-voice Processing card

The VPU/8 card is a voice processing card for voice mail, and is mounted in the CCU.

The VPU/8 card controls the operations of voice mail, and can support simplified voice mail functions by using this card with the VSSC card (VB-44170UK).

Maximum two VPU/8 cards can be mounted on each CCU.

For a multiple-cabinet configuration (maximum 6-cabinet configuration) based on a building block connection, a maximum of eight cards can be connected. (VPU/8 cards + VPU/4 cards ≤ 8)

The VPU/8 card and ACD card (VB-44140UK) cannot be used together.

Figure 2-26. VPU/8 card
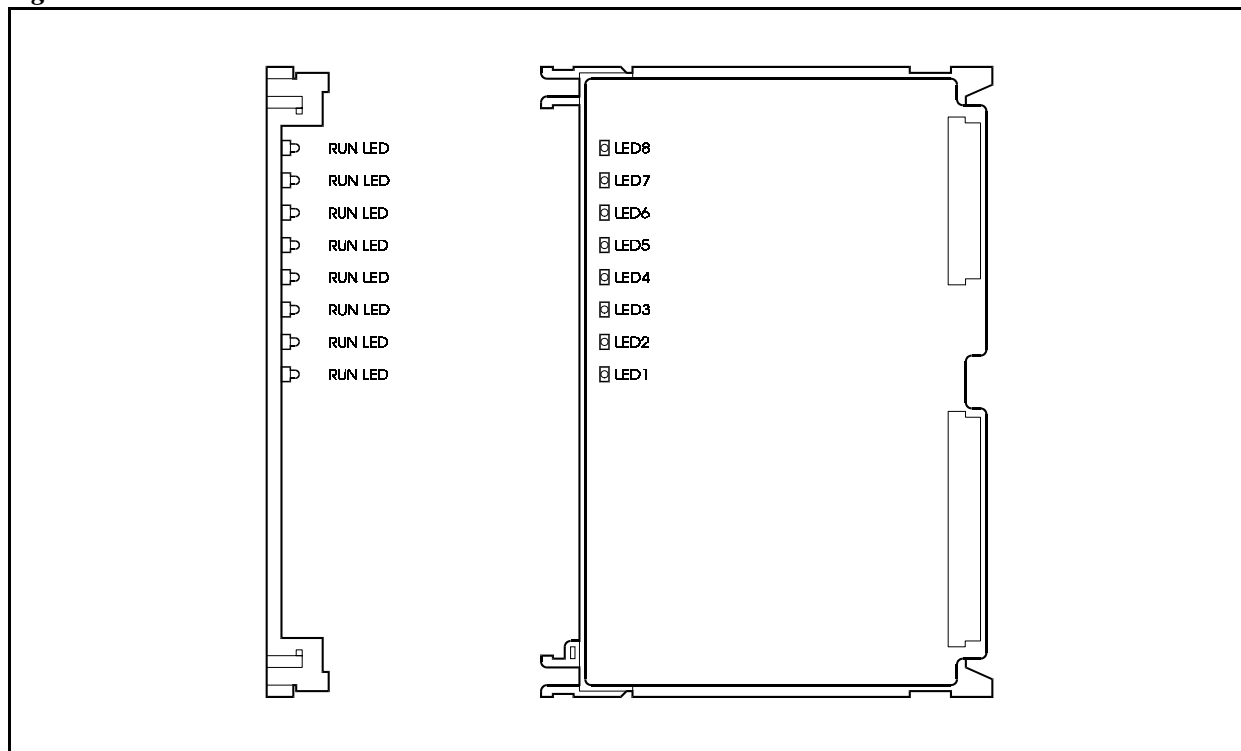
Table 2-26 shows the LED indications.

Table 2-26. VPU/8 Card LED Indication

LED Display	Description
LED1-LED8 (RUN)	Blinks when the CPU is in operation.

VPU/4 card (VB-44160UK): 4-voice Processing card

The VPU/4 card is a voice processing card for voice mail, and is mounted in the CCU.

The VPU/4 card controls the operations of voice mail, and can support simplified voice mail functions by using this card with the VSSC card (VB-44170UK). This card can also be used as a voice processing card for ACD.

In case of ACD, only one VPU/4 card can be mounted in each CCU, In case of Voice Mail, maximum 2 cards in can be mounted each CCU.

For a multiple cabinet configuration (maximum 6-cabinet configuration) based on a building block connection, a maximum of eight cards can be mounted.

Voice Mail: Maximum 8 ≥ VPU/8 + VPU/4
ACD: Maximum 2 cards

Figure 2-27. VPU/4 card
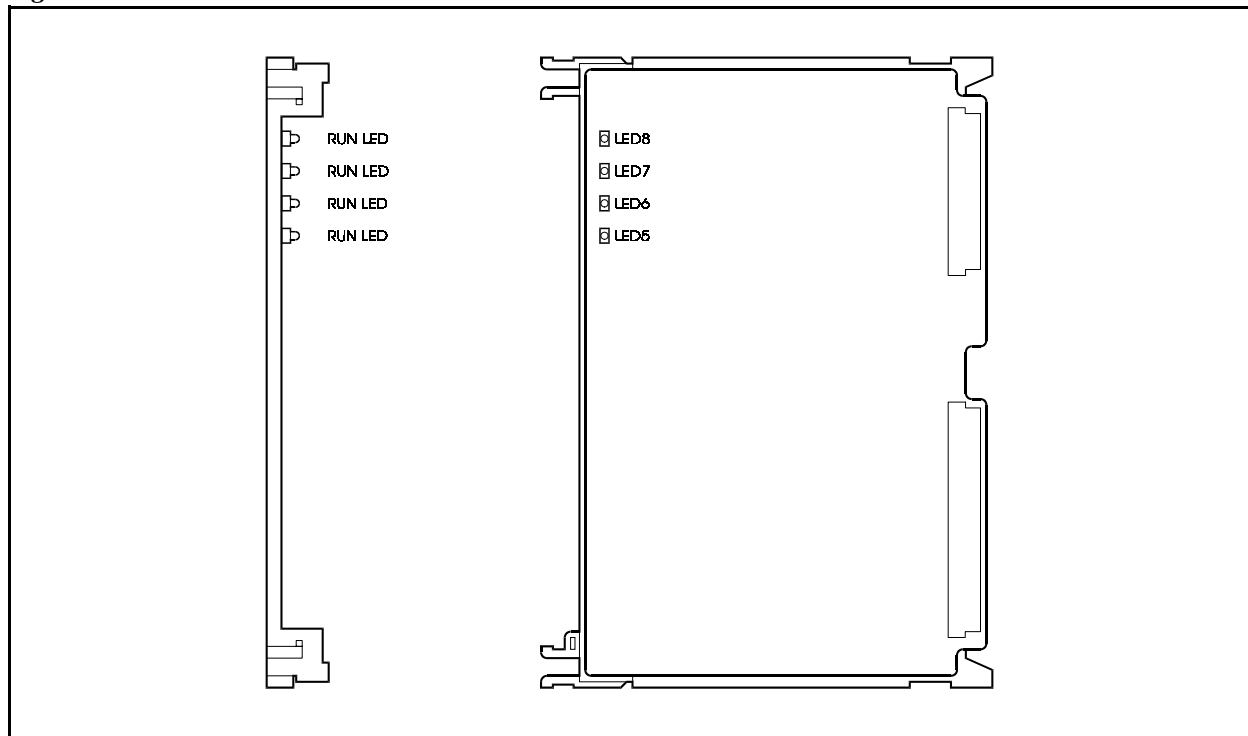
Table 2-27 shows the LED indications.

Table 2-27. VPU/4 Card LED Indication

LED Display	Description
LED5-LED8 (RUN)	Blinks when the CPU is in operation.

VSSC card (VB-44170UK): Voice Storage Service card

The VSSC card is a voice storage card for voice mail, and is mounted in the CCU.

The VSSC card provides a hard disk to store voice data of voice mail, and can support simplified voice mail functions by using this card with the VPU/8 card (VB-44150UK) or the VPU/4 card (VB-44160UK).

In case of CAB40, this card must be installed into FS5 and in case of CAB96 this card must be installed into FS11. In case of CAB40-CAB40 connection, this card must be installed into FS9 (FS5 of slaveccu).

Only one VSSC card can be mounted in each cabinet. But for a multiple-CCU configuration (maximum 6-CCU configuration) based on a building block connection, a maximum of four cards can be mounted.
In this case, don't install this card into the top CCU to avoid the damage caused by the heat inside the stuffy CCU.

The VSSC card and the ACD card (VB-44140UK) cannot be used together.

Figure 2-28. VSSC card
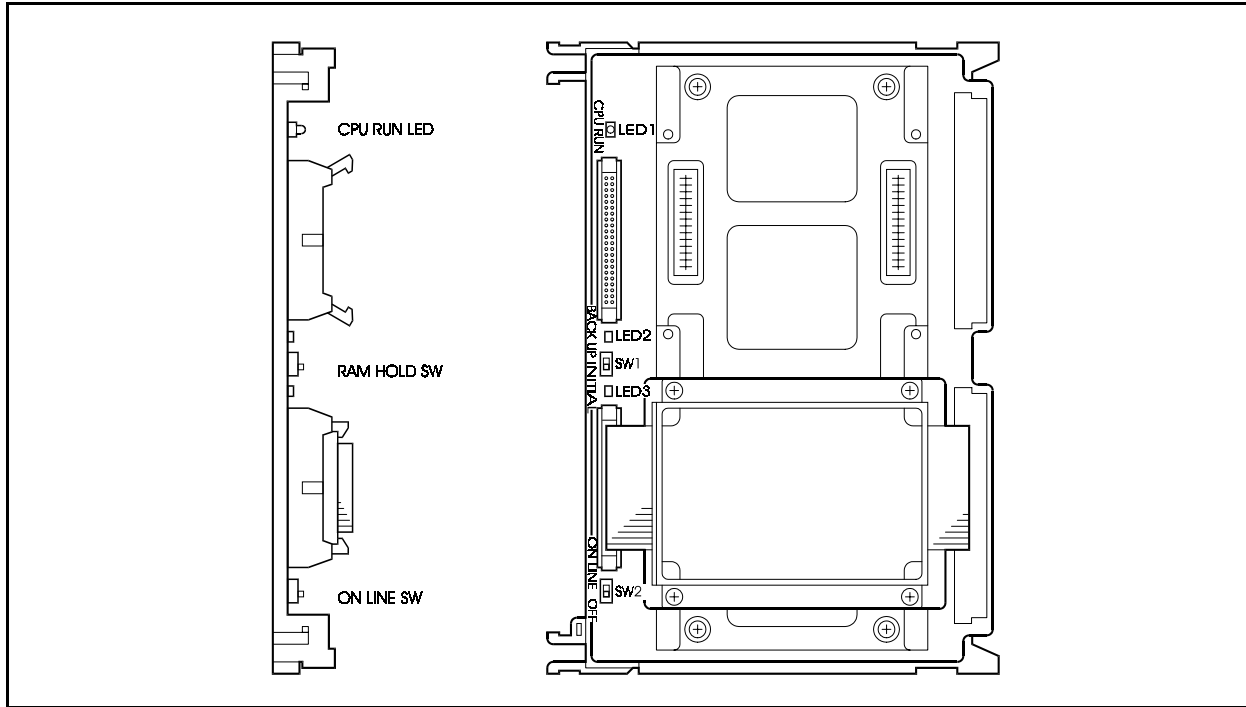
Table 2-28 and 2-29 shows the switch settings and LED indications.

⚠ **CAUTION:**
HDD and back up battery must be replaced every three years.
Consult wiht the dealer where you purchased for replacement.

Table 2-28. VSSC Card Switch Settings

Switch No.	Setting	Description
SW1	BACK UP	Set when retaining RAM data.
	INITIAL	Set when clearing RAM data.
SW2	ON LINE	Normal operation (set to ON LINE during regular operation)
	OFF LINE	Set when replacing the HDD system.

Table 2-29. VSSC Card LED Indications

LED Display	Description
LED1 (CPU RUN)	Blinks when the CPU is in operation.
LED2	Not Used
LED3	Not Used

RAI Unit (VB-44182UK): Remote Administration Unit

By mounting the RAI Unit on the SCC card, RS-232C (port 1) can be used as a maximum 2400 bps modem interface. The RAI unit provides such remote maintenance as programming through a exchange line by connecting a personal computer to the exchange line port through the modem in a remote place.

The RAI Unit supports the following ITU-T protocols: V.21, V.22 and V.22 bis

For the mounting method of the RAI Unit, see page 6-17.

Figure 2-29. RAI Unit
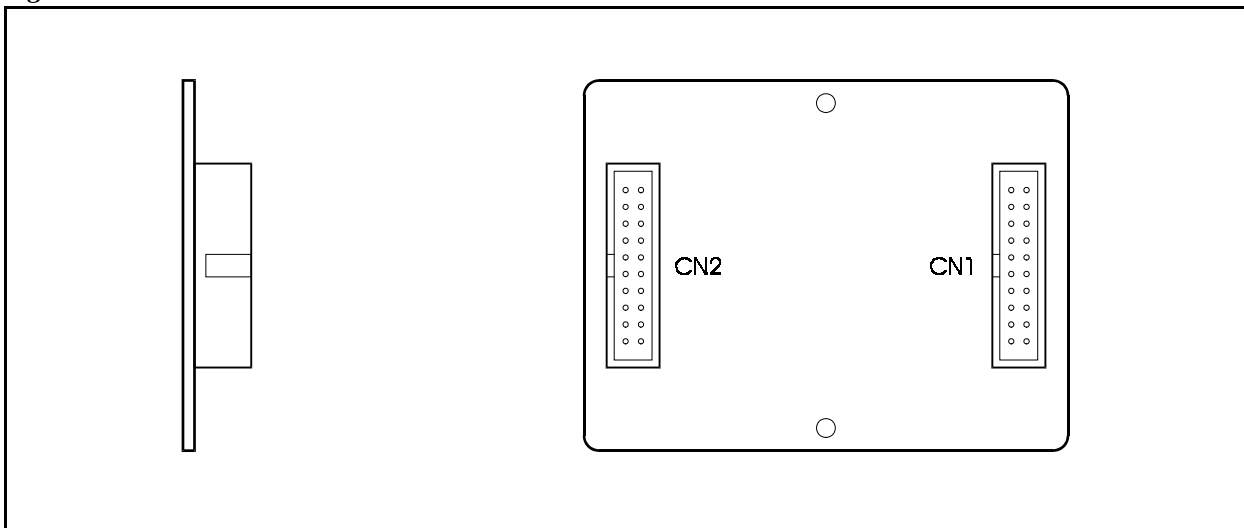
Chapter 3. CCU Installation

This chapter explains how to prepare for CAB40 and CAB96 installation, how to remove and replace the respective CCU covers, install the battery and install cards.

Installation Location

Guidelines

- Before deciding where to install the CAB40 or CAB96, check the external dimensions shown below, the area required for maintenance, and the "Environmental Requirements" described in Chapter 1 (page 1-3).

Figure 3-1. CAB40 and CAB96 dimensions and maintenance area

Notes: S Hatched area ▮▮ indicates the area that should be provided for maintenance.

S The dimensions shown in parenthesis indicate the dimensions required when the AC cable is wired from the right of the CCU.

Item	Dimensions (mm)											
	A	B	C	D	E	F	G	H	I	J	K	L
CAB40	405	260	17	50	40	57	41	199	35	50	40	495
CAB96	680	260	16	50	40	56	41	199	35	50	40	515
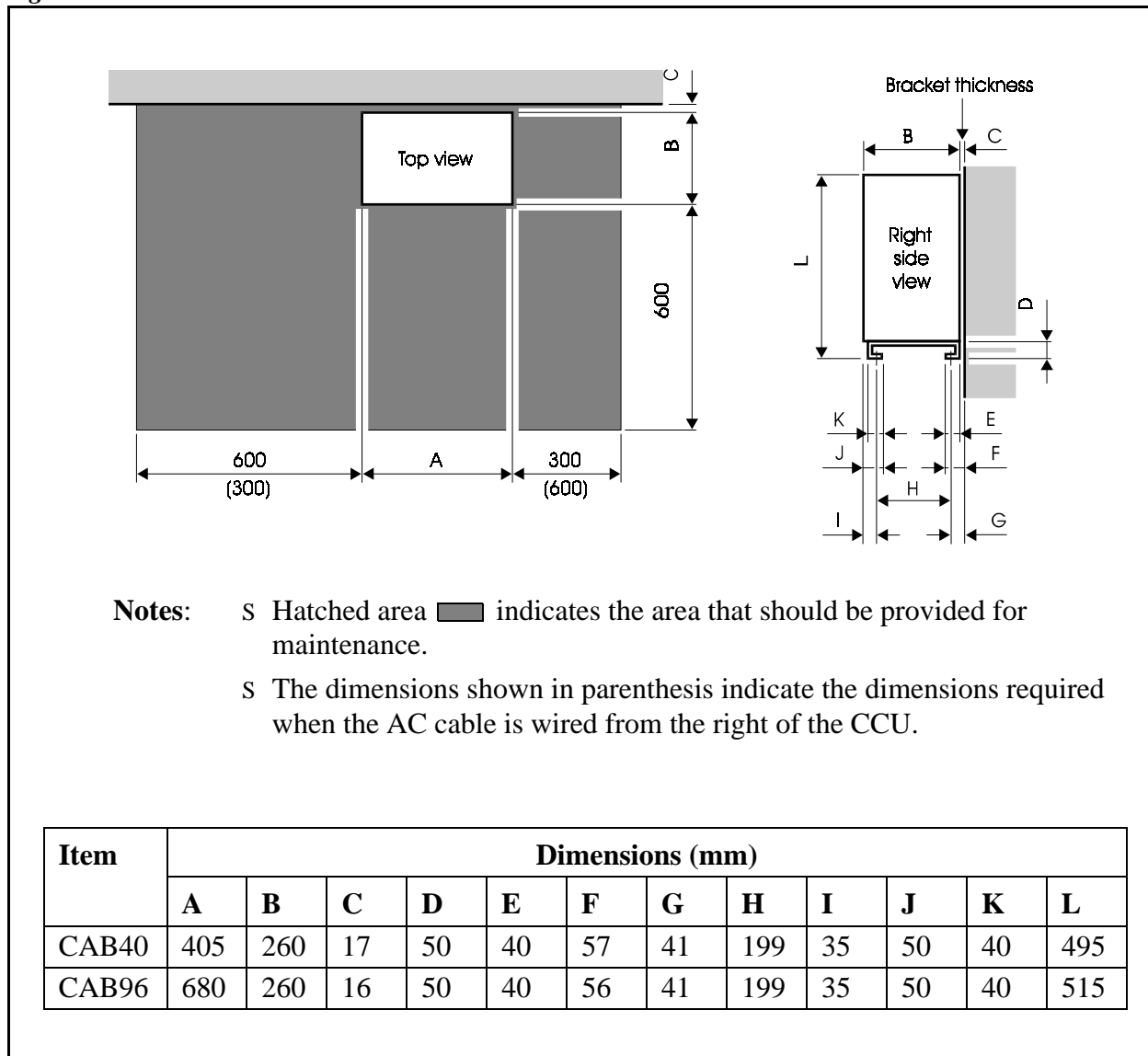
Removing and Replacing Covers

Guidelines

⚠️

CAUTION:
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before removing any covers.

- Both left and right side covers can be removed. The following describes how to install and remove the left side cover. The same procedure can be used for the right side cover.

- Replace the respective covers after the installation work has been completed.

Front Cover

Installation

Removing the front cover

1. Remove the four screws from the front cover.

2. Pull the bottom of the front cover out by about 10cm.

Note: Do not exert excessive force when pulling out the bottom of the front cover as doing so may distort the claw slots.

3. Gently lift the cover off by sliding it up and away.

Replacing the front cover

1. Hook the front cover onto the front cover mounting claws of the CCU.

2. Secure the four screws.

Figure 3-2. Removing and replacing front cover of CAB40
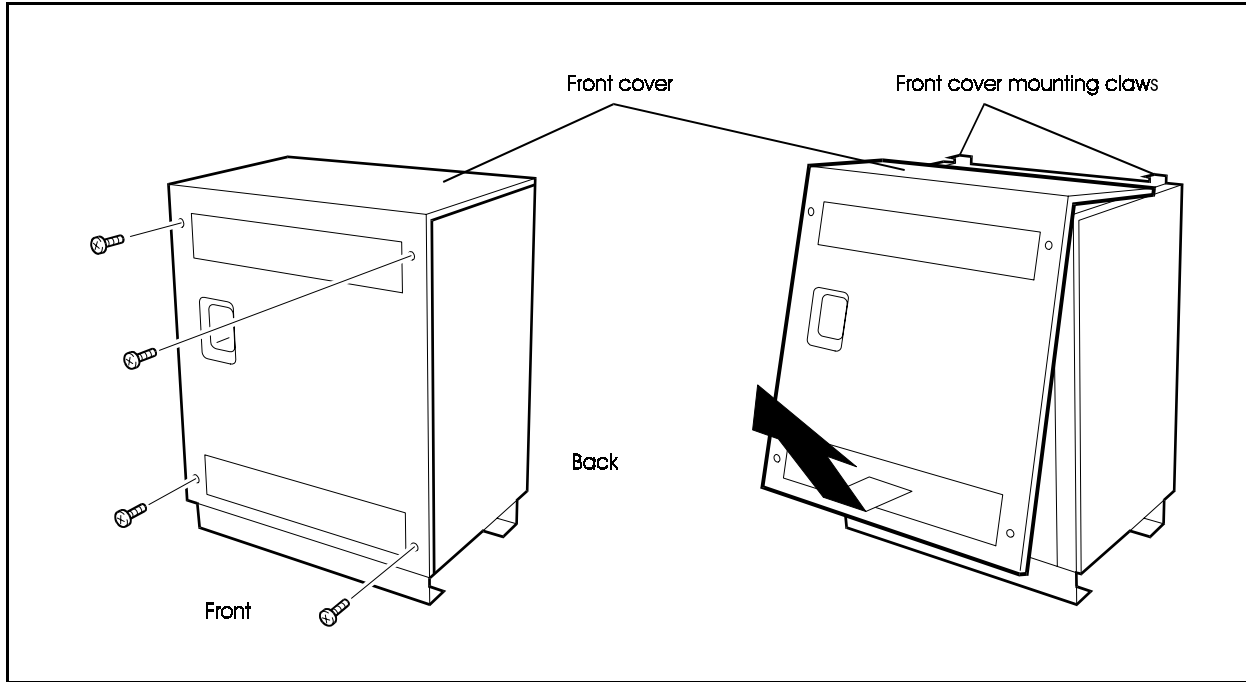
Figure 3-3. Removing and replacing front cover of CAB96
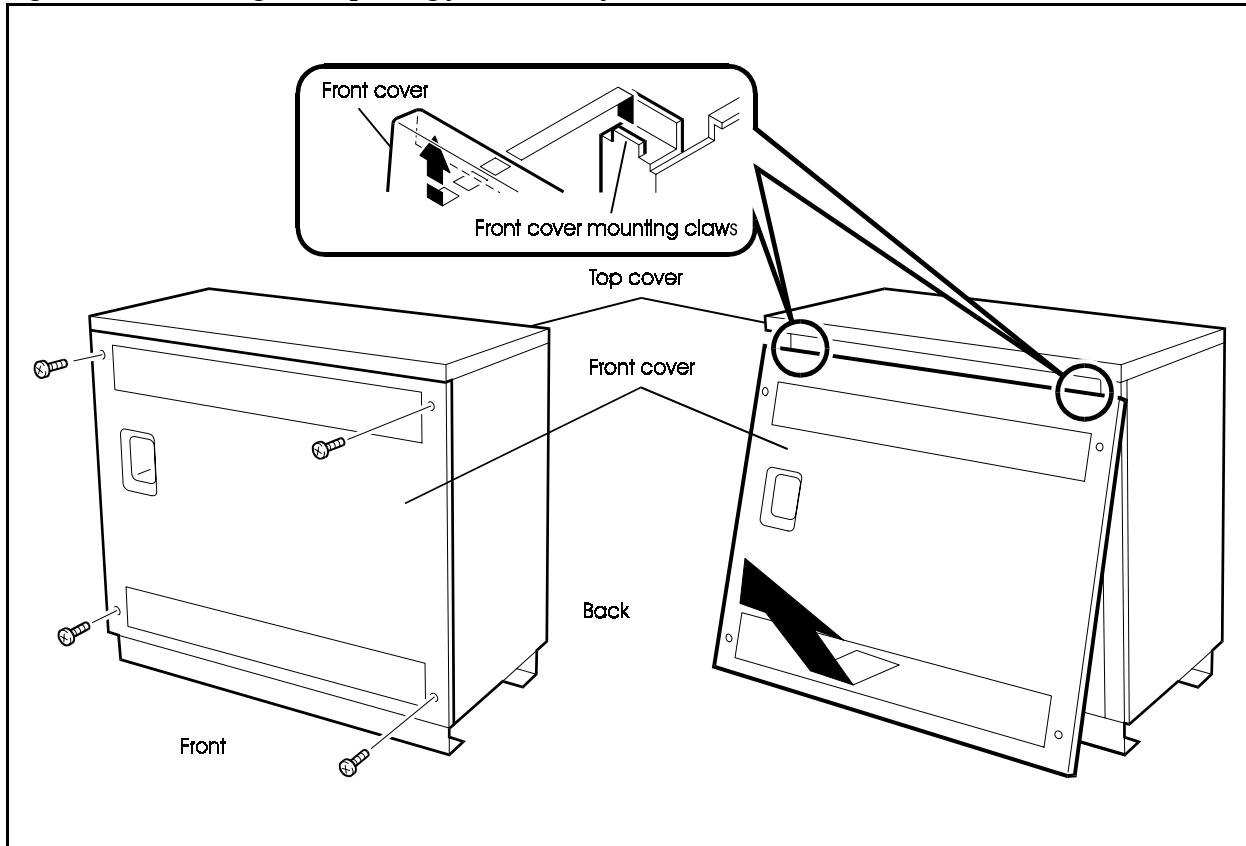
Side cover

Installation

Removing the side cover

1. Remove the two screws from the side cover.

2. Open the edge (with the screws) of the cover about 2cm.

Note: Do not exert excessive force when pulling out the side cover as doing so may distort the claw slots.

3. Gently lift the cover off by sliding it forwards.

Replacing the side cover

1. Hook the side cover onto the top and bottom side cover mounting claws of the CCU.

2. Secure the two screws.

Figure 3-4. Removing and replacing side cover of CAB96
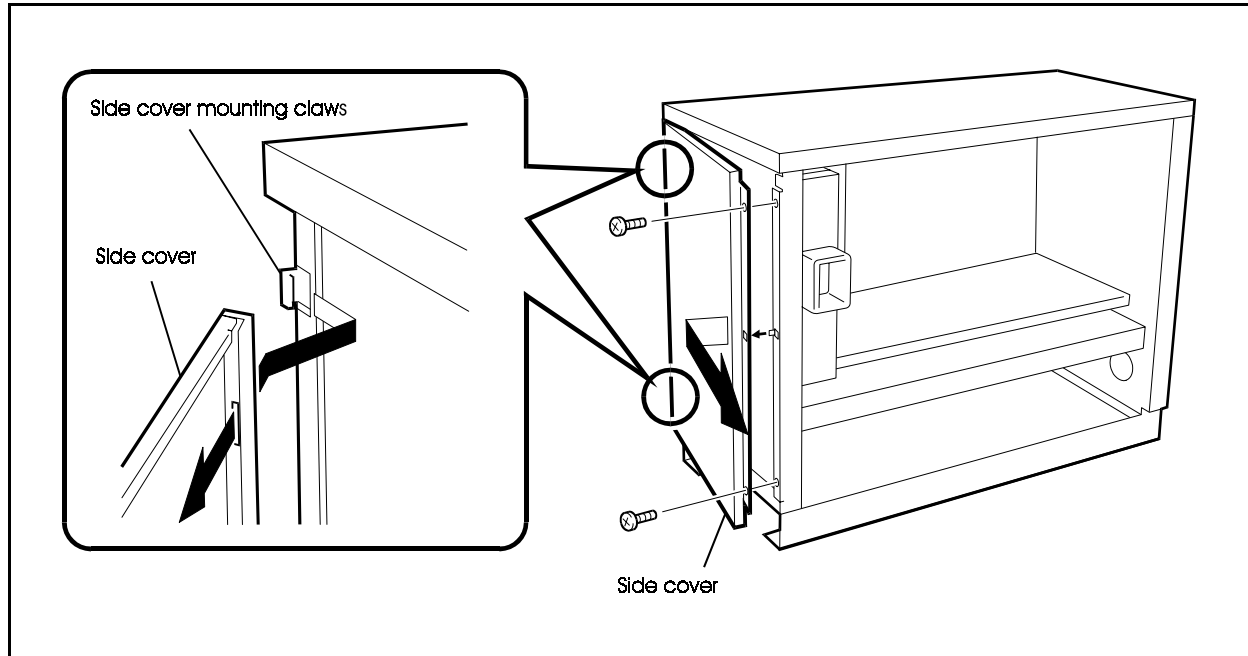
Top Cover (CAB96 only)

Installation

Removing the top cover

1. Remove the two screws from the top cover.

2. Pull the top cover out about 5cm.

Note: Do not exert excessive force when pulling the top cover as doing so may distort the claw slots.

3. Gently lift the top cover off by sliding it up and forwards.

Replacing the top cover

1. Hook the top cover onto the top cover mounting claws of the CCU.

2. Secure the two screws.

Figure 3-5. Removing and replacing top cover of CAB96
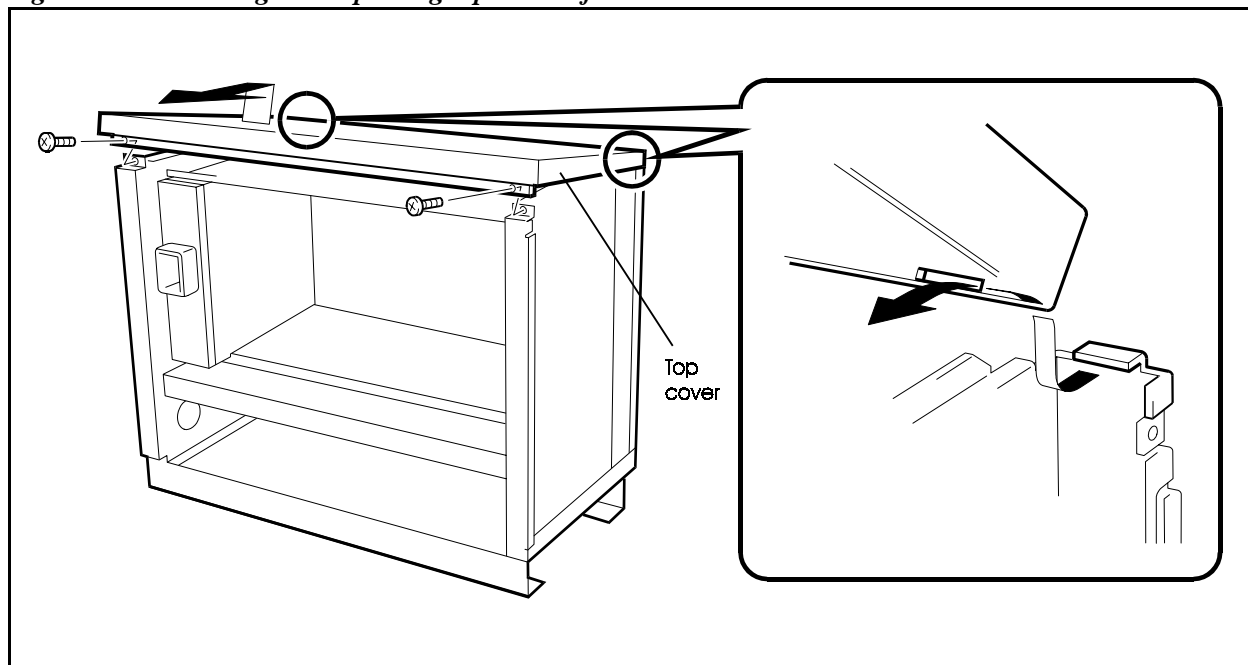
Installation

Guidelines

⚠ **CAUTION:**
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing the CCU.
- Handle the CCU carefully to avoid damage.
- Do not attempt to move the CCU without assistance.
- The CCU is heavy and should be secured to a wall so that it does not topple in the event of earthquake, etc.
- Remove all CCU covers before installation (see page 3-4).

- If you are installing two or more CCUs, refer to Chapter 4, "Installing Additional CCUs" (page 4-1).

Installation

1. Drill 4 holes in the floor to take the bolt anchors.

Note: Check the positions of the 4 bolt holes in the bottom of the CCU, shown in Figure3-1, before drilling the holes.

2. Bolt the CCU to the anchors in the floor through the bolt holes in the bottom frame.

Figure 3-6. Securing the CCU to the floor (CAB96)
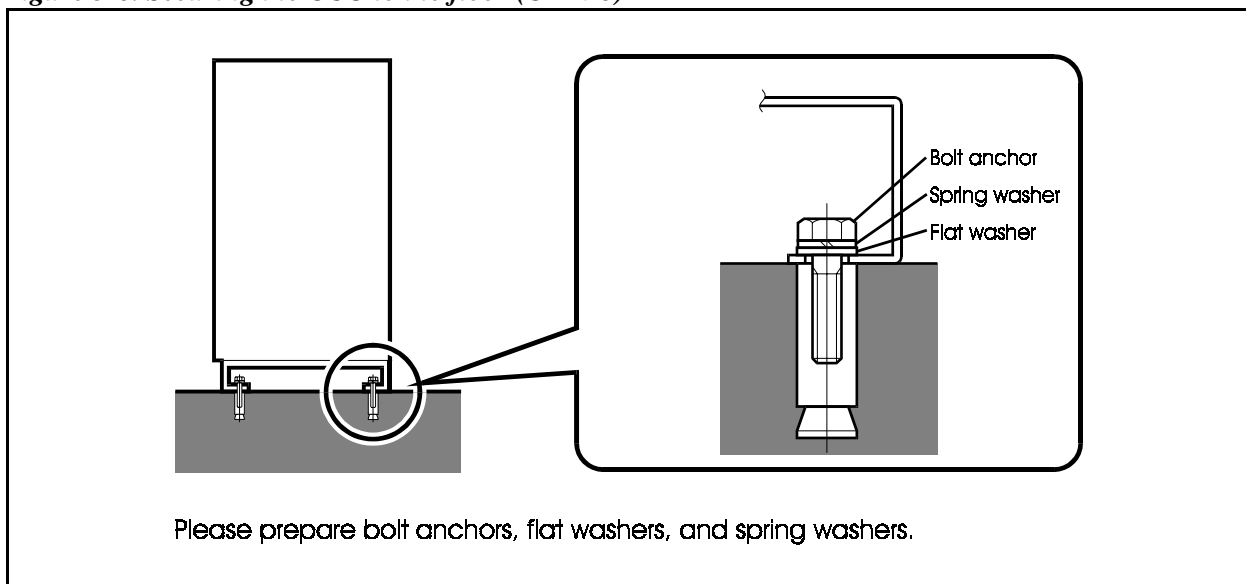
Grounding

Guidelines

⚠️ **CAUTION:**
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before grounding the CCU.
- Be sure to attach an EMI filter to the AC cable as a noise countermeasure.

- The ground cable must be at least AWG 18 (Mode than 1.1mm conductor in diameter).

- Resistance to ground must be 10 ohms or less.

Installation

1. Connect the FG terminal on the top of the front panel of the power supply unit to the CCU chassis using a grounding wire.

2. Connect the CCU chassis to the building ground using a grounding wire.

3. Connect the AC cable or Ground cable to the CCU chassis.

4. Install an EMI filter in the AC cable.

Figure 3-7. Grounding (CAB96)

FG terminal

From Ground Cable of AC cable

To Ground

Blue — N
Brown — L
Green and Yellow — E

Fuse spur outlet

EMI Filter

Caution: In case that the CCU is not fitted with EMI filter correctly, electromagnetic interference to other electronic equipment and/or disturbance from other equipment might be occured.
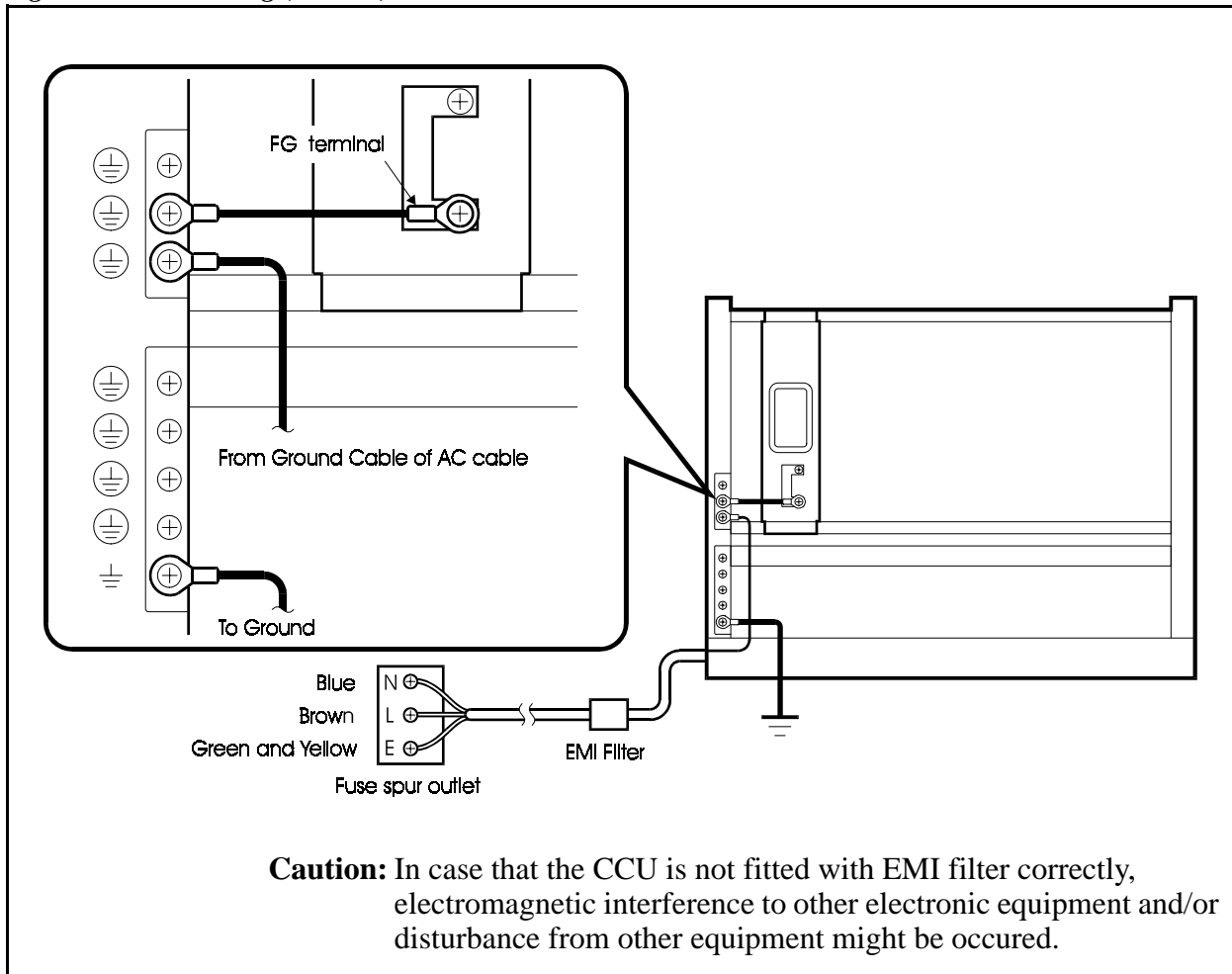
Battery Backup (VB-44025UK)

Guidelines

⚠ **CAUTION:**
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing the backup battery.
- Carefully note the polarity of the batteries to prevent from short circuit.
- Before installing battery, connect the cable to the battery first.
- Cable connecting terminal should NOT touch CCU Frame.

- The battery cable must be at least AWG 18 (Mode than 1.1mm conductor in diameter).

- With normal condition, the backup batteries last for about 30 minutes for one CAB40, and about 20 minutes for one CAB96.

- The backup batteries should be replaced about every 3 years.

- 1 pair of the same batteries are included in 1 VB-44025UK.

Installation

1. Connect the supplied cable to the battery terminals of the power supply unit and the +24V cable to the + terminal of battery B.

2. Similarly, connect the GND cable to the - terminal of battery A.

3. Connect the + terminal of battery A to the - terminal of battery B.

4. Slot the batteries into the guides in the CCU.

Figure 3-8. Installation of CAB40 backup batteries (VB-44025UK)
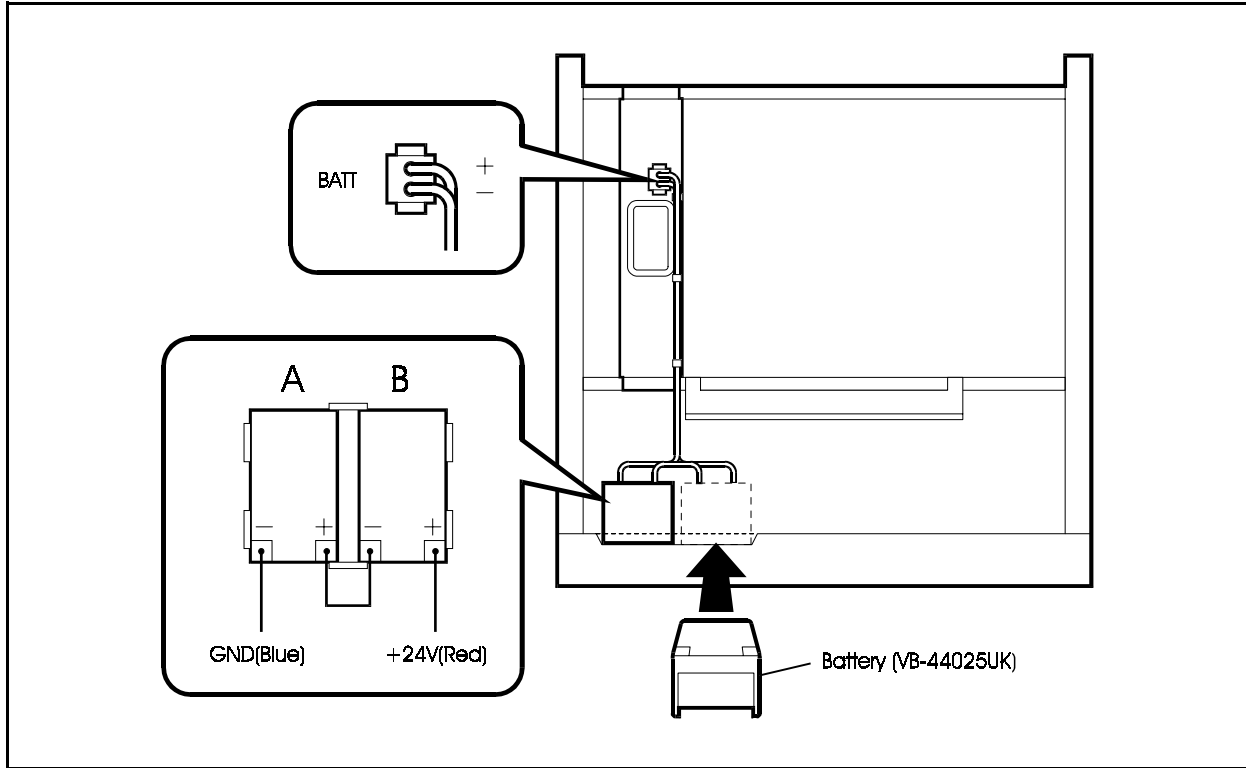
Figure 3-9. Installation of CAB96 (or CAB96B) backup batteries (VB-44025UK)
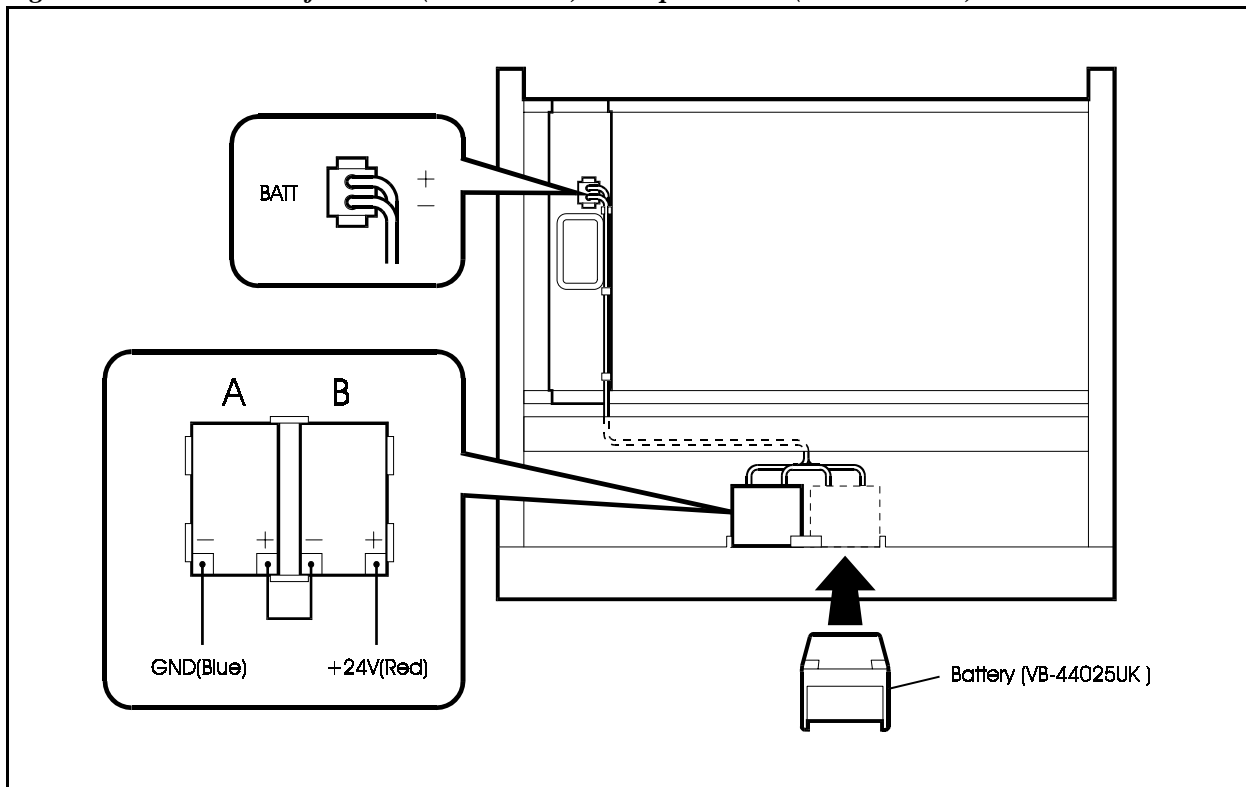
Card Installation

Guidelines

- Install the cards in the slots indicated under "Card Installation Position" in Chapter 4 (page 4-36).

  Note that cards may be damaged if installed in other than the specified slots.

- There is a limit to the number of PRI/30 and CONF cards that can be installed in the flexible slots. Please observe the restrictions described under "Card Installation Position" in Chapter 4 (page 4-41).

- Group the cards installed in the flexible slots as described under "Optimisation of Card Installation" in Chapter 4 (page 4-44).

- When the system is to be automatically initialised, install the specified cards in the positions where they are automatically set. (See the Programming Manual: Section 400.)

Figure 3-10. Initial configuration for automatic starting of CAB40 system

Figure 3-11. Initial configuration for automatic starting of CAB96 system

PW	CPC	OP1	OP2	FS1	FS2	FS3	FS4	FS5	FS6	FS7	FS8	FS9	FS10	FS11	FS12
				LTRK/8	LTRK/8	LTRK/8	DEC/8	DEC/8	DEC/8	DEC/8	DEC/8	DEC/8	DEC/8	DEC/8	DEC/8

- Programming telephone should be connected to the first port of the first DEC/8 card slot.

- Refer to "Installing Additional CCUs" in Chapter 4 (page 4-1) if using two or more CCUs.

Installation

⚠

CAUTION:
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing cards.
- Push the cards in so that they are securely seated. Failure to do so may result in the card being damaged.
  The card circuits include CMOS-ICs, which are susceptible to damage by static electricity.
- To avoid damaging the CMOS-ICs, observe the following precautions when handling the cards:
  1) Touch an earth or the CCU to discharge any static that may have built up on your body.
  2) Do not directly touch the CMOS-ICs or electrical conductors.

1. With the lettering on the card pointing up, slide the card into the guide of the card slot in the CCU.

2. Hold the card on the top and bottom edges with both hands and carefully push it into the slot.

3. When the connector row at the far end of the card touches the corresponding connector on the unit, press the card in somewhat more firmly until it is seated.

4. Repeat steps 1 through 3 for all other cards.

Figure 3-12. Unit card installation in CCU
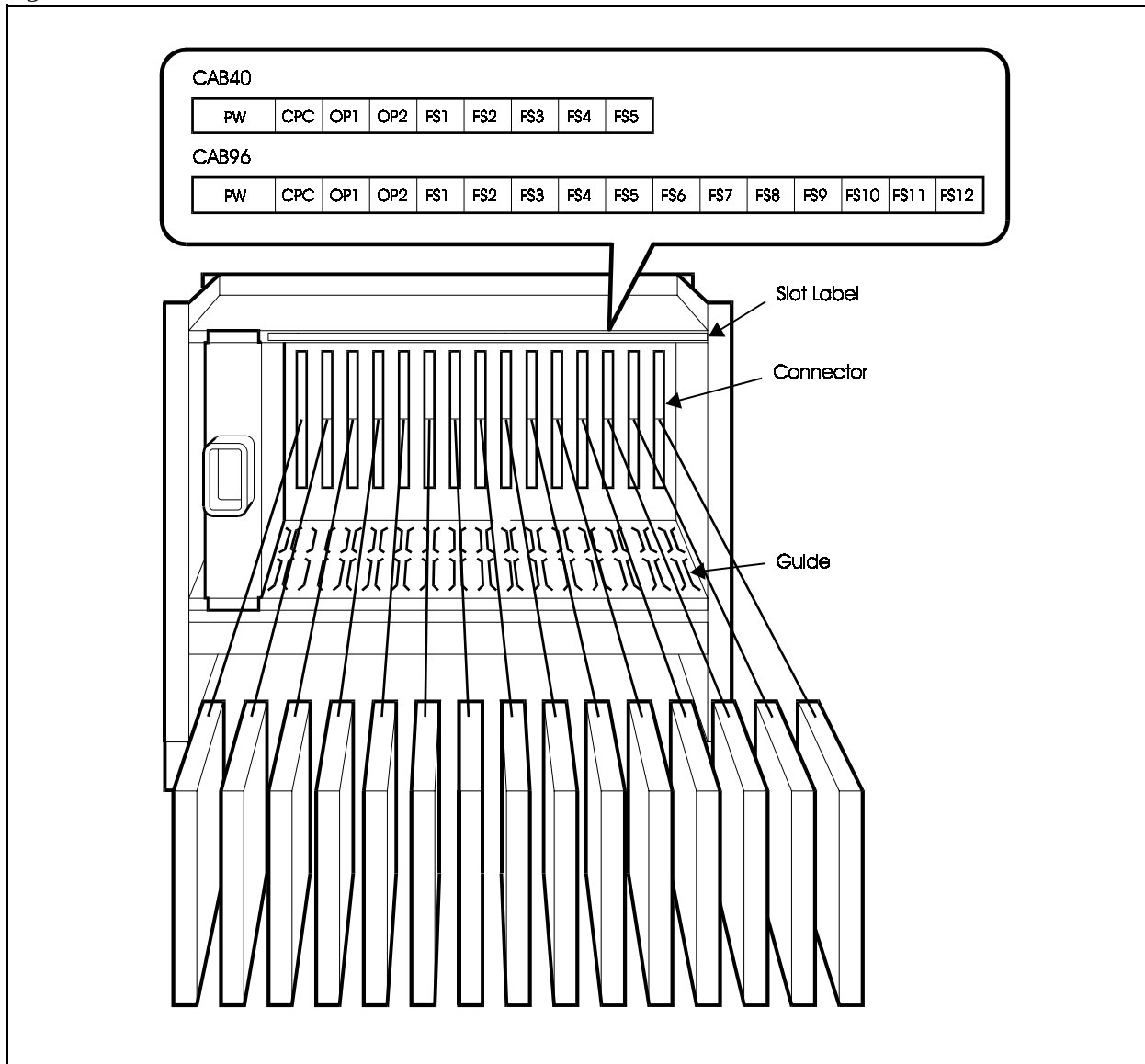
Chapter 4. Installing Additional Main CCUs

The ICX system can be expanded using two methods: dual systems and building block systems. It is also possible to increase the number of extension ports by linking the ICX to a DBS-90 (VB-3657).

This chapter explains how to prepare for additional CCUs, how to install them, and how to link the respective systems, how to set the expansion CCU ID No., install the switch box, install card position and how to connect to the DBS-90.

Installing a Dual System

Installation Location

Guidelines

- Before deciding where to install the dual system, check the external dimensions and maintenance area shown below and the "Environmental Conditions" described in Chapter 1 (page 1-3).

Figure 4-1. Dual system dimensions and maintenance area
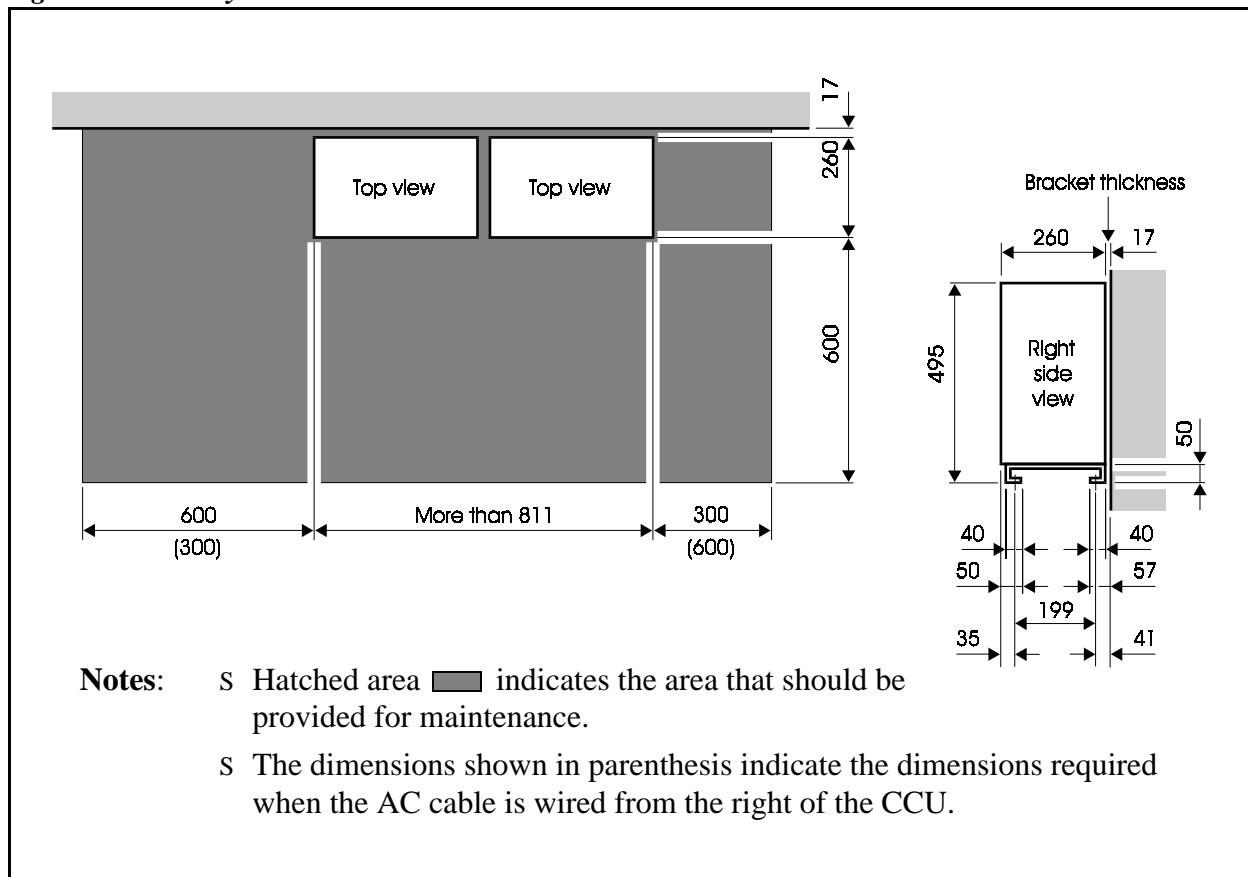
Notes: S Hatched area � indicates the area that should be provided for maintenance.

S The dimensions shown in parenthesis indicate the dimensions required when the AC cable is wired from the right of the CCU.

Installation

Guidelines

⚠️

CAUTION:
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing.
- Handle the CCU carefully to avoid damage.
- Do not attempt to move the CCU without assistance.
- The CCU is heavy and should be secured to a wall so that it does not topple in the event of earthquake, etc.

- Remove the CCU covers before installing the CCUs (see page 3-4).

- Refer to "Grounding" in Chapter 3 (page 3-9) for details of grounding.

Installation

1. Drill 8 holes in the floor to take the bolt anchors.

Note: Check the locations of the 8 bolt holes in the bottom of the CCUs, shown in Figure 4-1, before drilling the holes.

2. Bolt the CCUs to the anchors in the floor through the bolt holes in the bottom frame.

Figure 4-2. Securing the CCUs to the floor
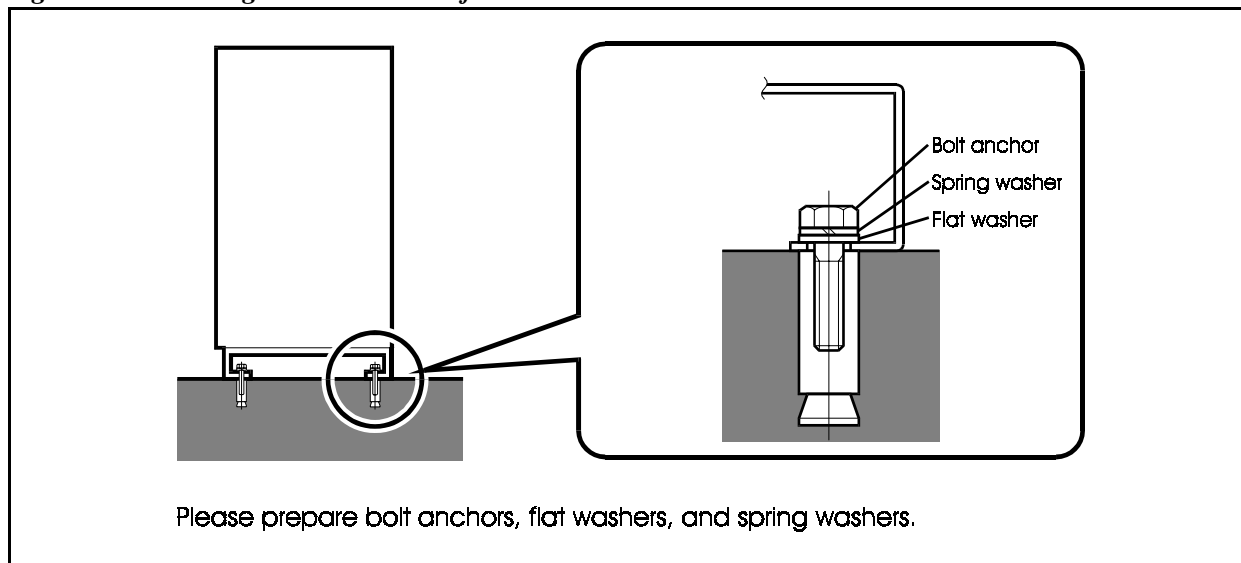
Card Installation

Guidelines

- Install the cards in the slots indicated under "Card Installation Position" in Chapter 4 (page 4-36).

  Note that cards may be damaged if installed in other than the specified slots.

- There is a limit to the number of PRI/30 and CONF cards that can be installed in the flexible slots. Please observe the restrictions described under "Card Installation Position" in Chapter 4 (page 4-41).

Installation

See "Card Installation" in Chapter 3 (page 3-13) for details of how to install the cards.

Connecting the Systems

Guidelines

- When setting up a dual CCU system, use the supplied cable to connect the CBLMST card in the master CCU to the CBLSLV card in the slave CCU.

Installation

1. Use the supplied cable when installing the CBLMST card in the FS5 slot of the Master CCU and the CBLSLV card in the CPC slot of the Slave CCU in order to connect two CCUs.

Figure 4-3. Connection of dual CCU system
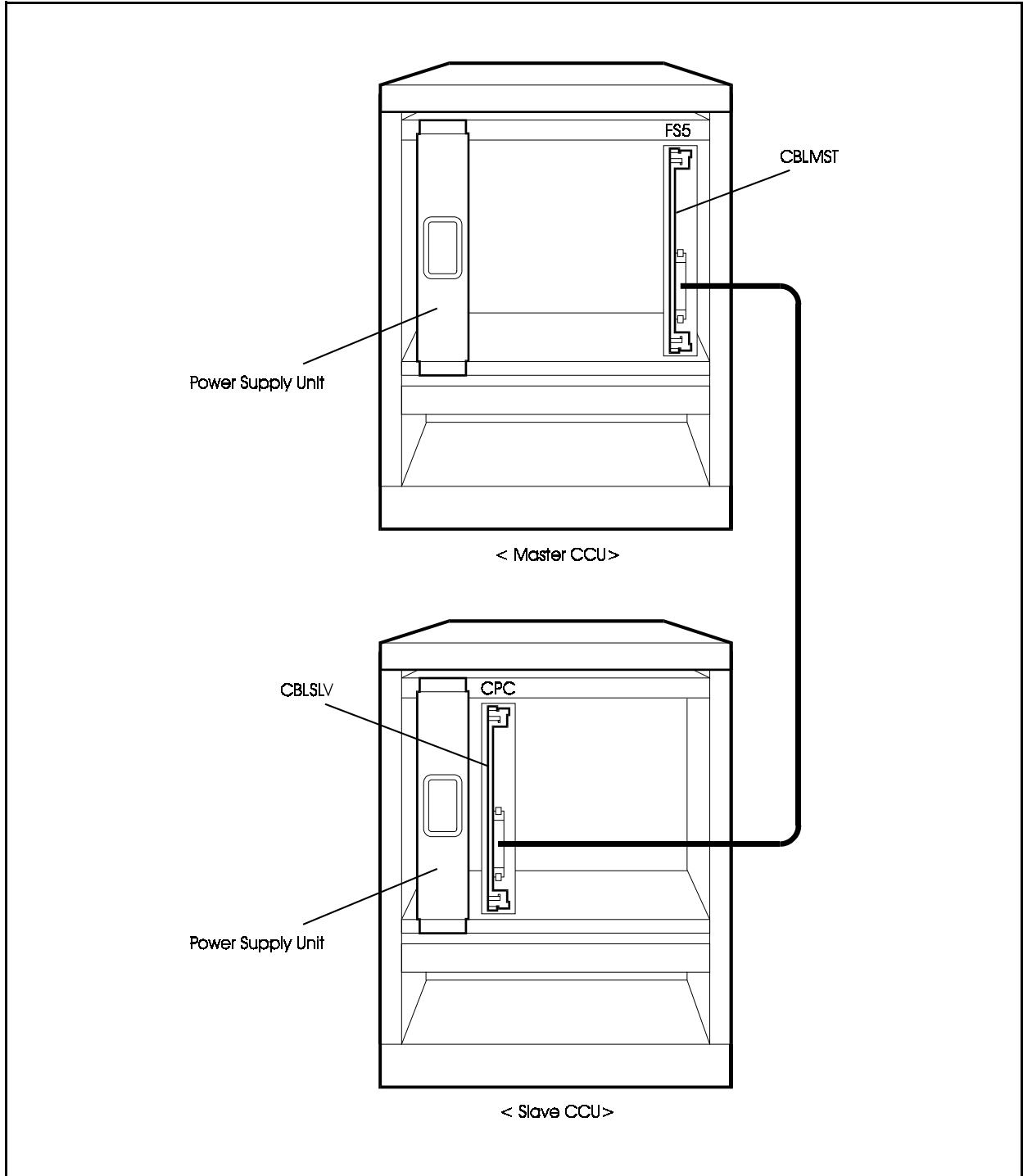
Installing Building Block System

Installation Location

Guidelines

Before deciding where to install the building block system, check the external dimensions and the maintenance area shown below and the "Environmental Conditions" described in Chapter 1 (page1-3).

Figure 4-4. Building block system dimensions and maintenance area
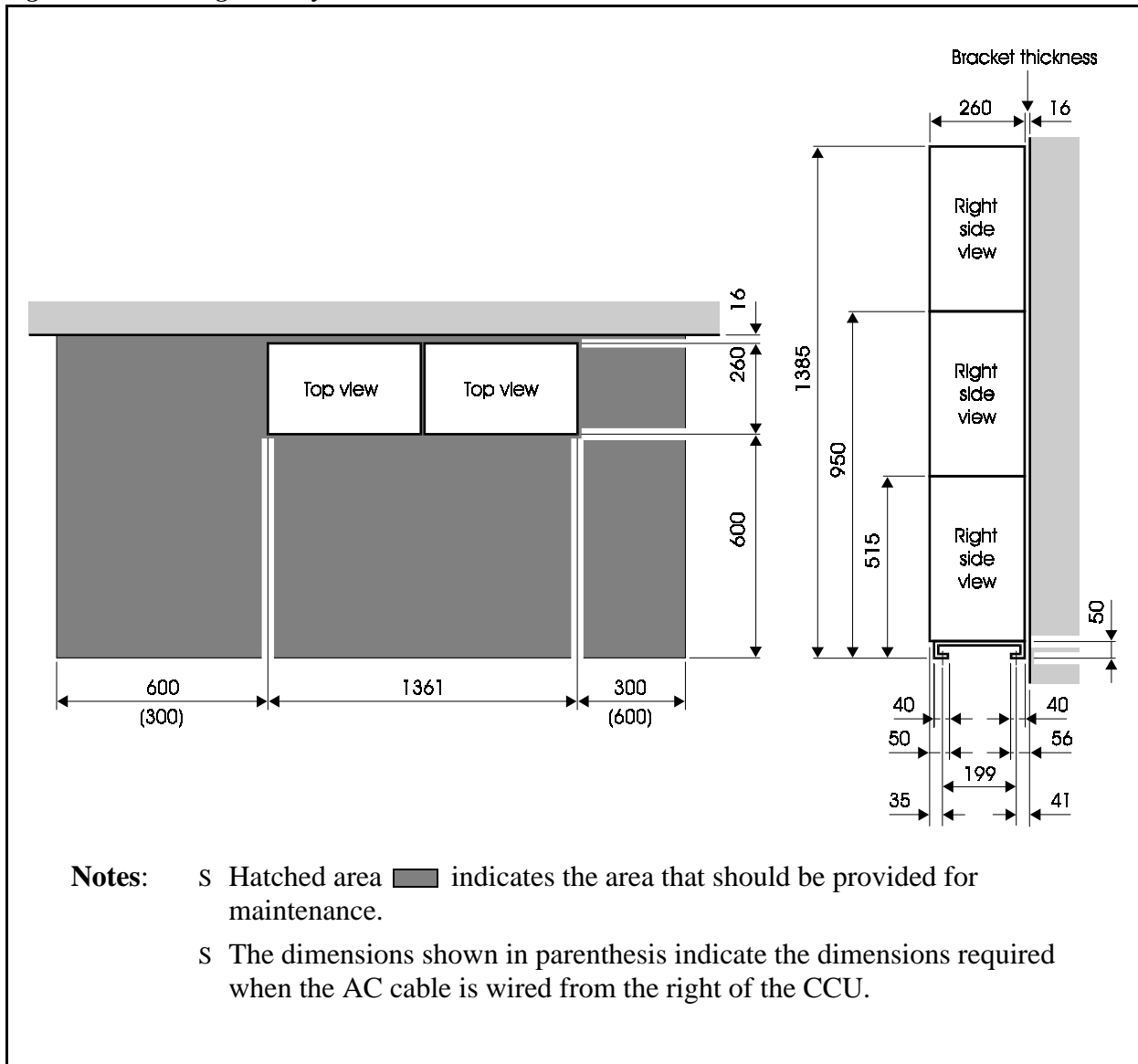
Notes: S   Hatched area ▨ indicates the area that should be provided for maintenance.

S   The dimensions shown in parenthesis indicate the dimensions required when the AC cable is wired from the right of the CCU.

Installation

Guidelines

⚠️

> **CAUTION:**
> - Turn off the power switch and the external breaker OFF, and disconnect the AC cable before installing.
> - Handle the CCU carefully to avoid damage.
> - Do not attempt to move the CCU without assistance.
> - The CCU is heavy and should be secured to a wall so that it does not topple in the event of earthquake, etc.

- Remove the CCU covers before installing the CCUs (see page 3-4).

- See Figure 4-4 for example combinations of CCUs using the building block method.

- The description of how to use the building block method to set up a system is based on an example of expanding the number of ports to 576. Please use this example as a basis for setting up systems with different numbers of ports.

Figure 4-5. Example CCU combinations using building block method
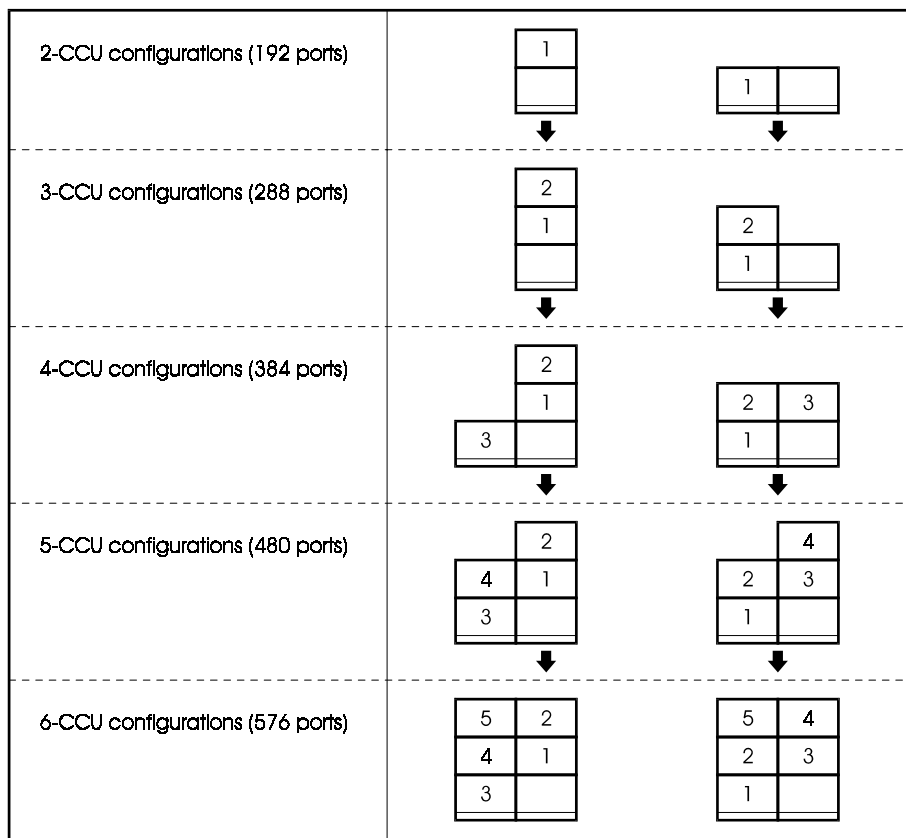
Notes: S 1 to 5 are the numbers of the expansion CCUs. If you are using the building block method to install two or more CCUs, each added CCU must have an expansion CCU ID No. (see page 4-28).

S If you are adding CCUs to an existing ICX system, add them using the layouts indicated by the arrow.

S If the base CCU is on the left, the expansion CCUs should be numbered vertically in the same order.
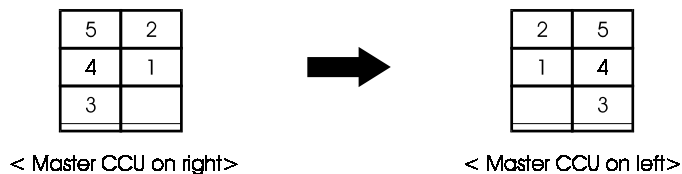
Building Block Method (floor-mounting) Installation (576-port example)

Installation

1. Attach wall-mounting brackets on the rear of all CCUs that are to be installed. The direction that the wall-mounting brackets are attached varies according to the position (bottom, middle or top rack) where the CCUs are installed. Attach the wall-mounting brackets according to the figures below.

Figure 4-6. Building Block Method (floor-mounting) Installation: Attaching the Wall-mounting Bracket

Note: Base CCU   : CAB96 (CCU installed on bottom rack)
        Expand CCU-1   : CAB96B (CCU installed on middle rack)
        Expand CCU-2   : CAB96B (CCU installed on top rack)
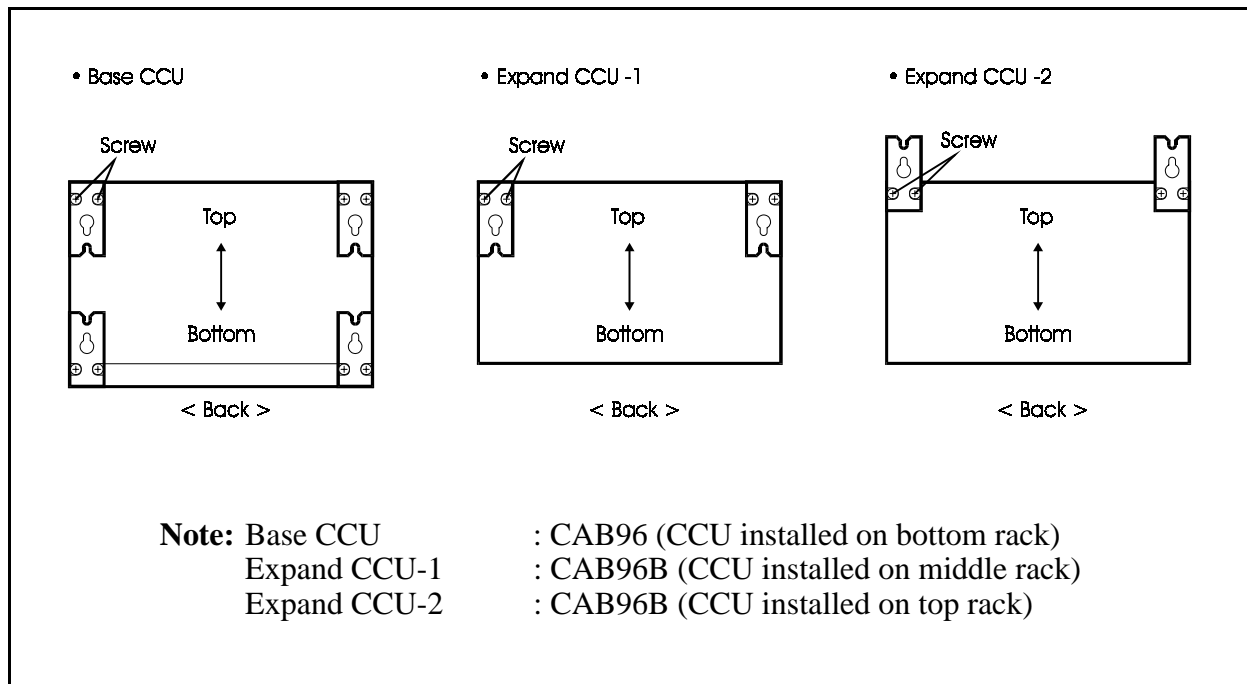
2. Place Expand CCU-1 on top of the Base CCU.

3. Fix the joining sections on the front sides of the Base CCU and Expand CCU-1 with 2 screws.

4. Fix the 2 Side Joint Plates onto the joining sections on the sides of the Base CCU and Expand CCU-1 with 8 screws.

5. Attach Expand CCU-2 following steps 2. to 4.

Figure 4-7. Building Block Method (floor-mounting) Installation: Vertical Joining
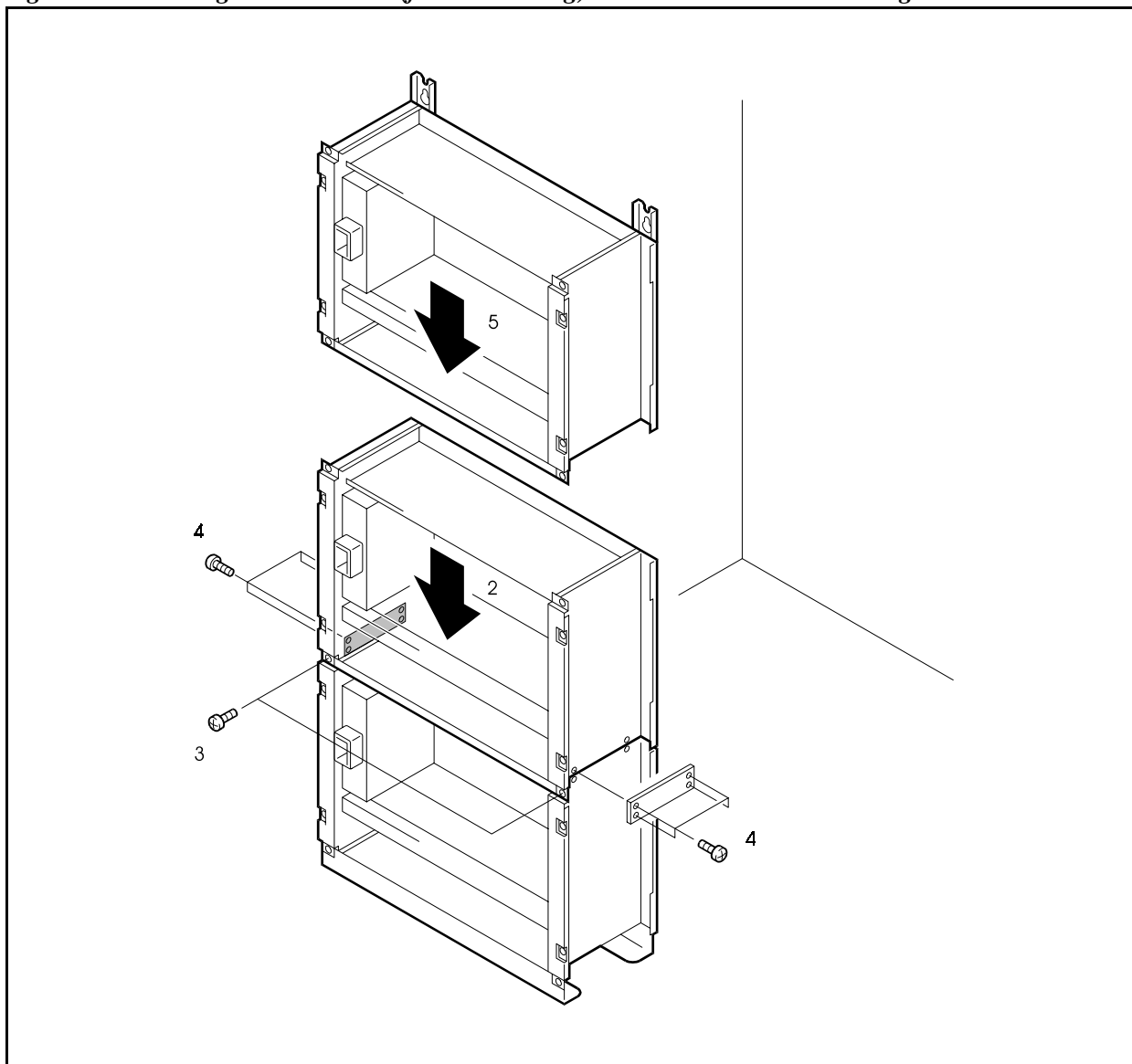
6. Attach the other Base CCU, Expand CCU-1 and Expand CCU-2 following steps 2. to 5.

7. Fix the 12 Horizontal Joint Plates (front: 6, rear: 6) onto the front and rear sides of each of the left and right CCUs with 24 screws.

8. Drill 4 four holes in the floor to fix the CCU to the floor, and drive in hole-in-anchors.

Note: 4 holes should be drilled in the floor on both sides of the joined left and right Base CCUs. Before drilling the holes check the drilling hole pitch referring to Figure 4-4.

9. Bring the CCU close to the wall.

10. Align the screw holes on the base plates of the joined left and right Base CCUs with the hole-in-anchors driven into the floor, and fix with bolts.

11. Fix the wall-mounting angle plates of the left and right Expand CCU-2 with 4 wall-mounting screws (nominal dia. 5 mm).

Figure 4-8. Building Block Method (floor-mounting) Installation: Vertical/Horizontal Joining
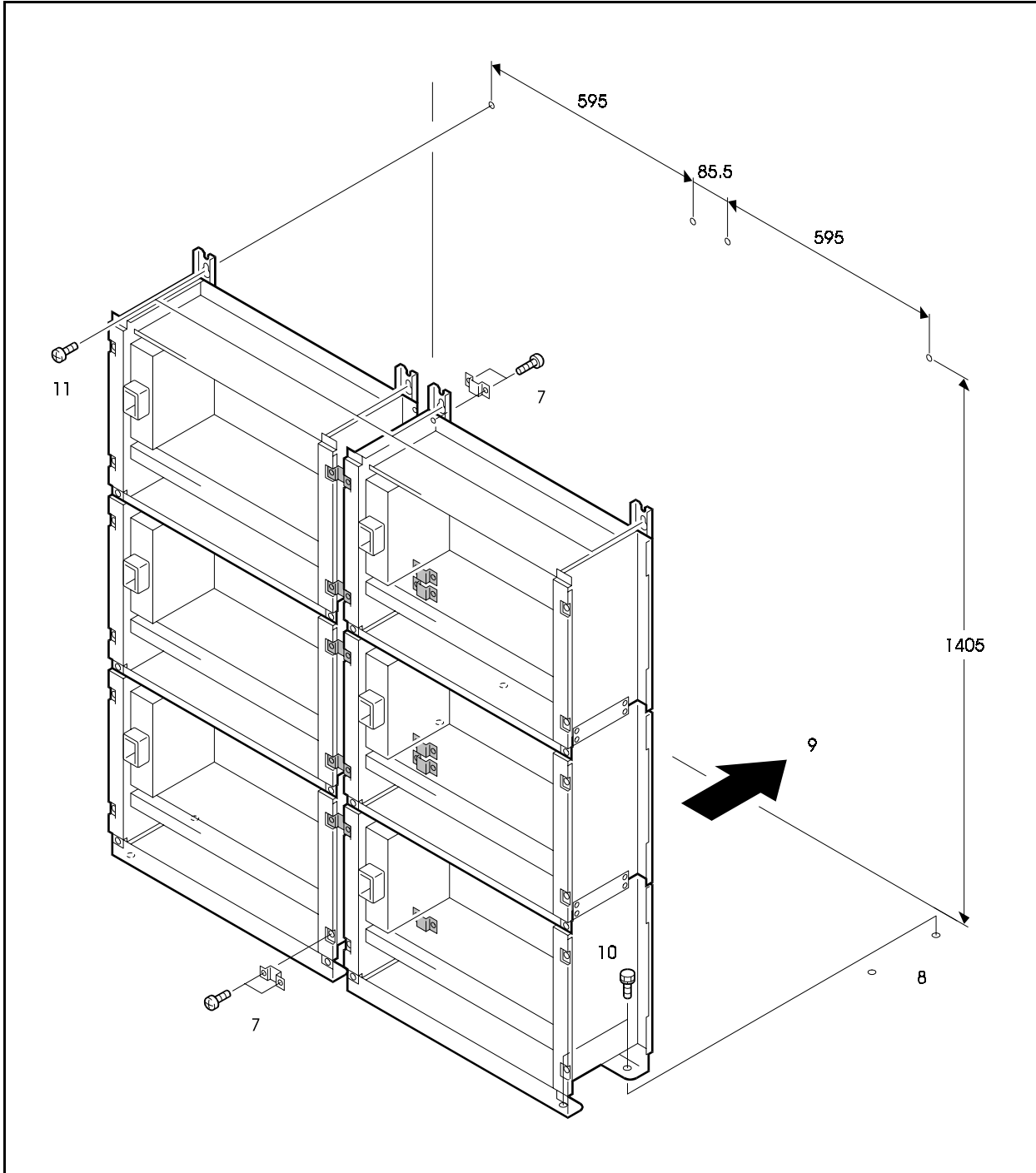
Building Block Method (wall-mounting) Installation (576-port example)

Guidelines

⚠️

CAUTION:
- When all 6 CCUs have been attached to the wall, the wall will be subjected to a load of about 200 kg. Before attaching the CCUs to the wall, check the strength of the wall to make sure that it can withstand this load.

Installation

1. Attach wall-mounting brackets on the rear of all CCUs that are to be installed. The direction that the wall-mounting brackets are attached varies according to the position (bottom, middle or top rack) where the CCUs are installed. Attach the wall-mounting brackets according to the figures below.

Figure 4-9. Building Block Method (wall-mounting) Installation: Attaching the Wall-mounting Bracket

Note: Base CCU   : CAB96 (CCU installed on bottom rack)
       Expand CCU-1   : CAB96B (CCU installed on middle rack)
       Expand CCU-2   : CAB96B (CCU installed on top rack)
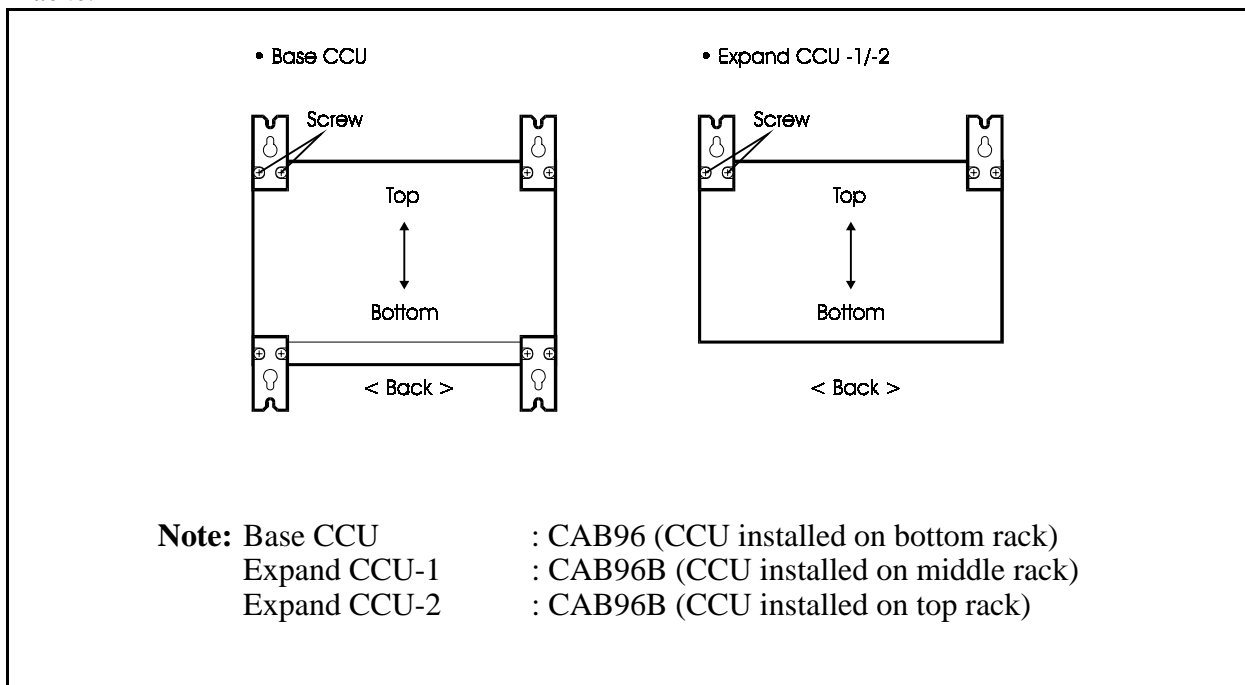
2. Temporarily fasten the 4 wall-mounting screws (nominal dia. 5 mm) to the wall.

3. Lift up the left Base CCU, and hook it onto the 8 screws that are temporarily fastening the wall-mounting angle.bracket.

4. Completely tighten the temporarily fastened screws.

5. Attach the right Base CCU following steps 3. and 4.

Figure 4-10. Building Block Method (wall-mounting) Installation: Attaching the Wall-mounting of CCU-1
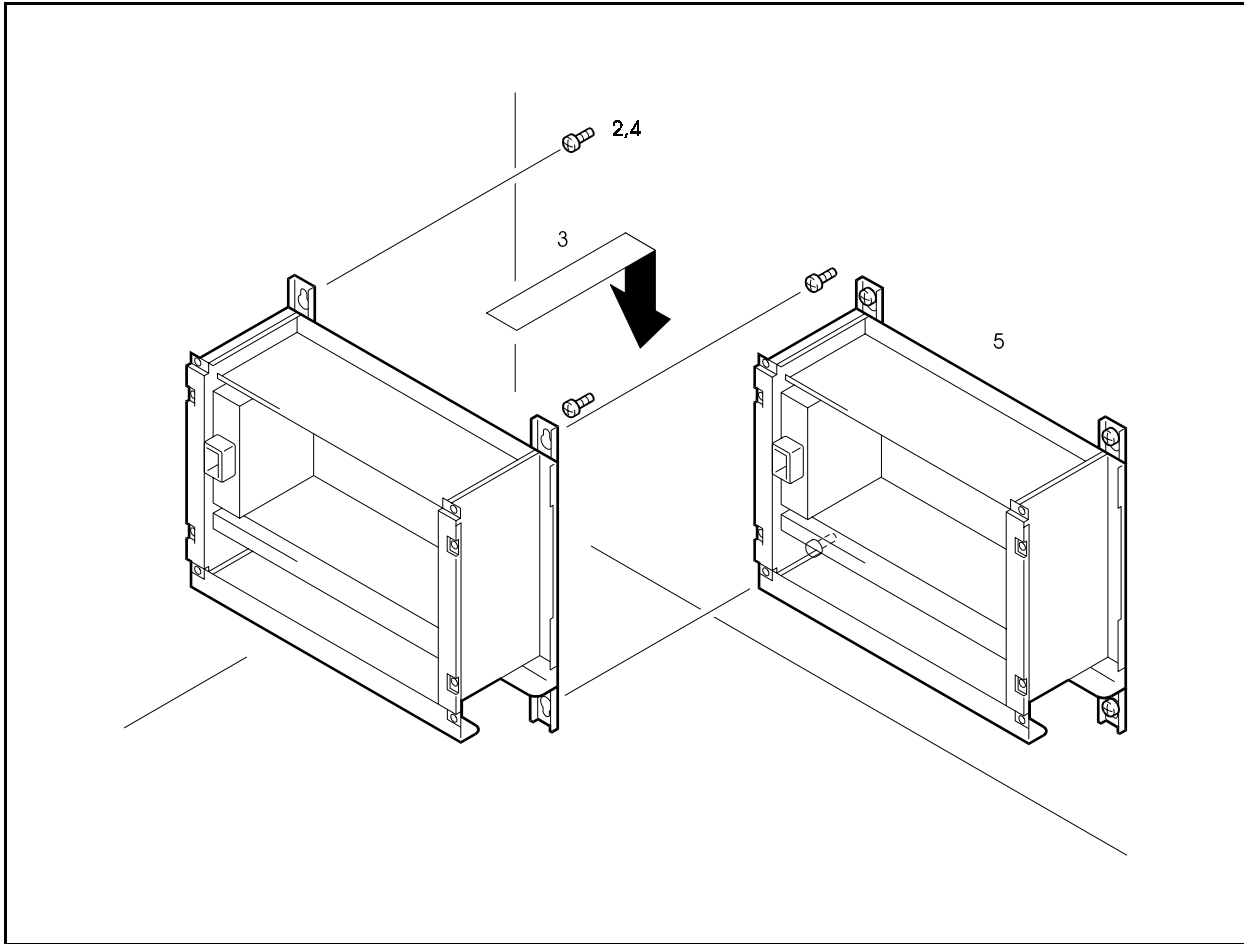
6. Fix the 2 Horizontal Joint Plates onto the joining sections on the front of the left and right Base CCUs with 4 screws.

7. Attach the left and right Expand CCU-1 onto the wall following steps 2. to 6.

8. Fix the joining sections on the front of the left and right Base CCU and Expand CCU-1 with 4 screws.

Figure 4-11. Building Block Method (wall-mounting) Installation: Attaching the Wall-mounting of CCU-2
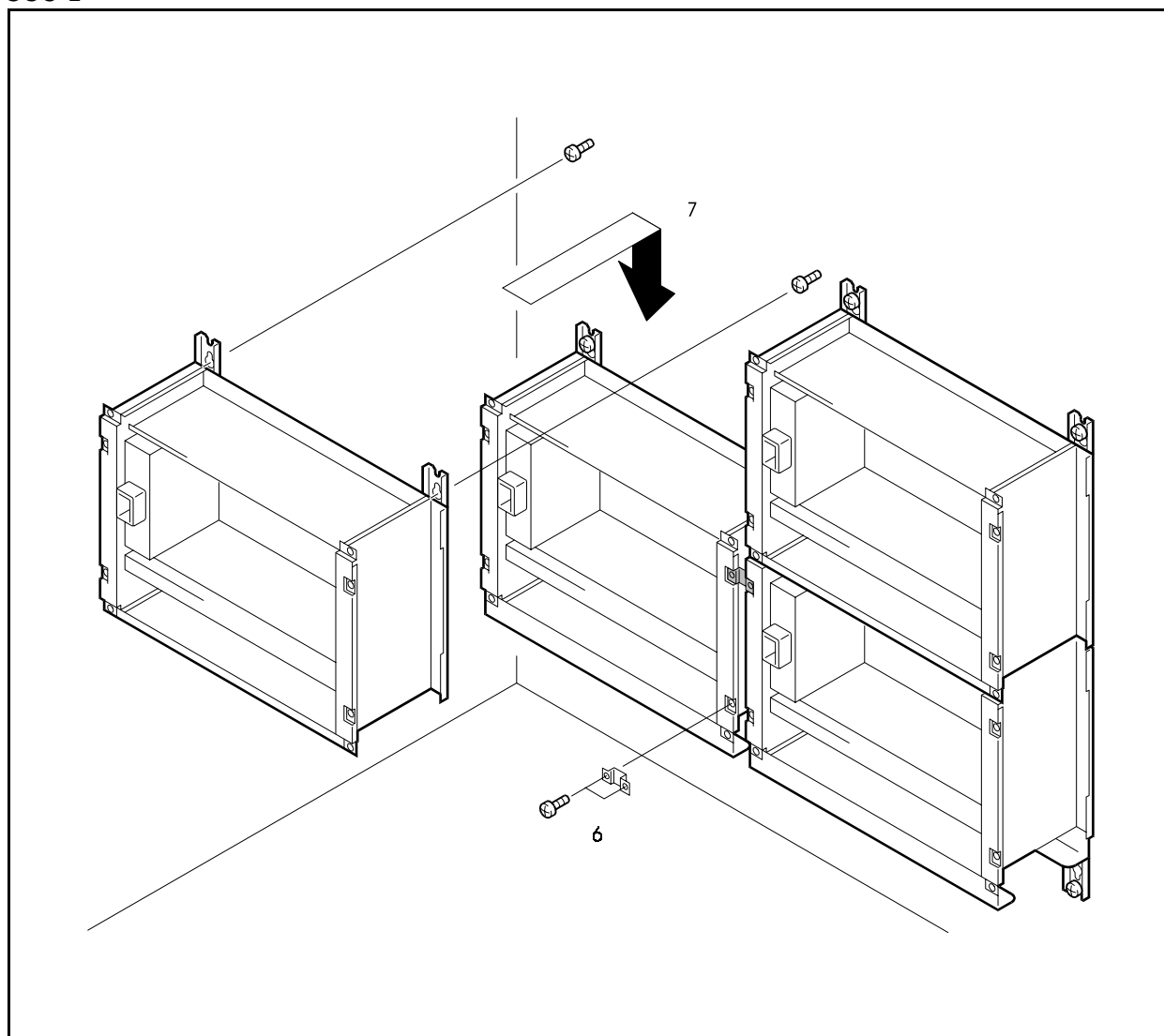
9. Fix the 2 Side Joint Plates onto the joining sections on the sides of the left and right Base CCU and Expand CCU-1 with 8 screws.

10. Attach the left and right Expand CCU-2 onto the wall following steps 2. to 3.

11. Fix the joining section on the fronts of the left and right Expand CCU-1 and Expand CCU-2 with 4 screws.

12. Fix the 2 Side Joint Plates onto the joining sections on the sides of the left and right Expand CCU-1 and Expand CCU-2 with 8 screws.

Figure 4-11. Building Block Method (wall-mounting) Installation: Attaching the Wall-mounting of CCU-3
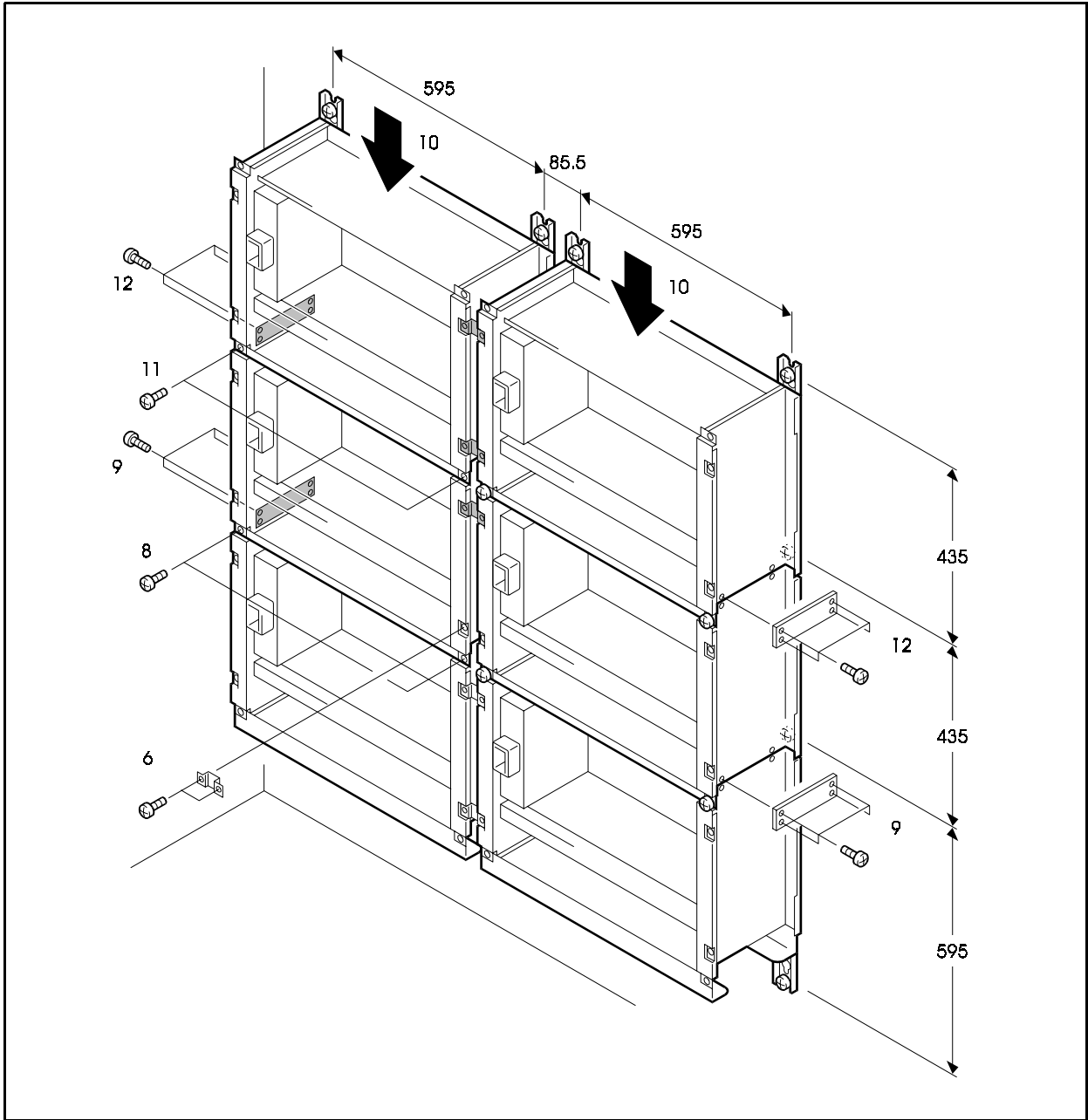
Installing Switch Boxes (VB-44023UK)

Guidelines

⚠

CAUTION:
- The switch box power will not be cut OFF even if the power switch on the Base CCU is turned OFF. An external breaker need to be attached.
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing the switch box.
- Carefully note the polarity when wiring to prevent from short-circuit.
- To suppress noise, be sure to install an EMI filter in the AC cable

- The following describes how to install the AC cables for the optional VB-44023UK switch box, which allows you to turn the power to one base CCU and two expansion CCUs on and off in one operation.

- The power to each of the CCUs is controlled by switching the power supply for the Base CCU. On completing installation and before replacing the covers of the CCUs, turn on the power switches of each expansion CCU.

Installation

Removing AC cables

1. Disconnect the AC cables from the power units and remove the ground wires.

Figure 4-12. Removing AC cable
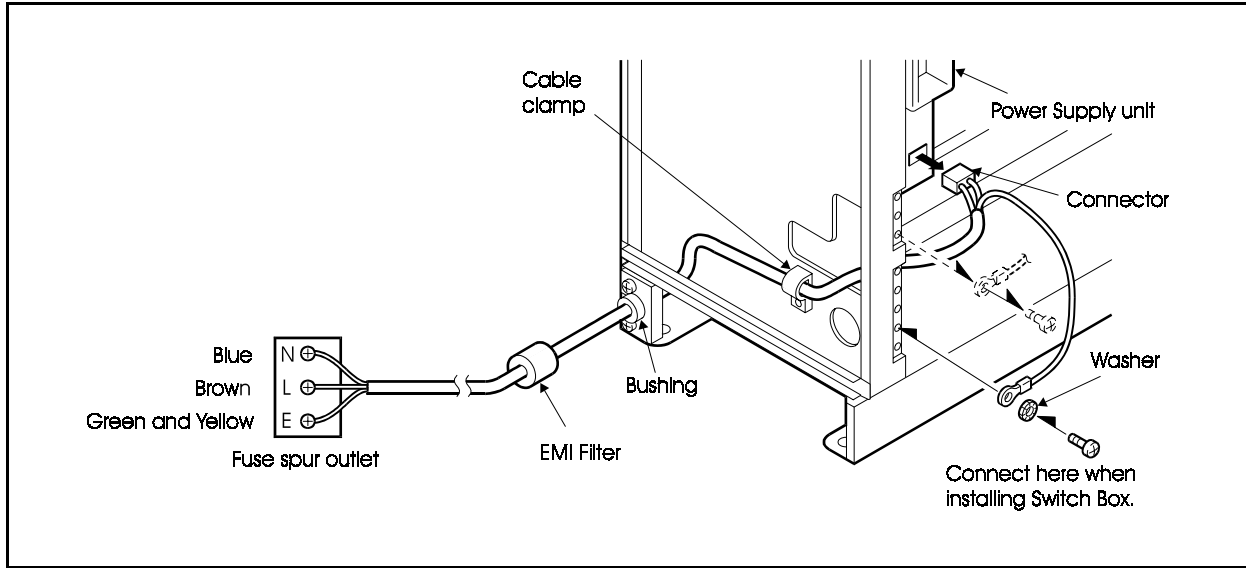
Installing Switch Box

1. Position the switch box on the guide lugs in the CCU (CAB96).

2. Secure the switch box with the screw.

Figure 4-13. Installing the Switch Box
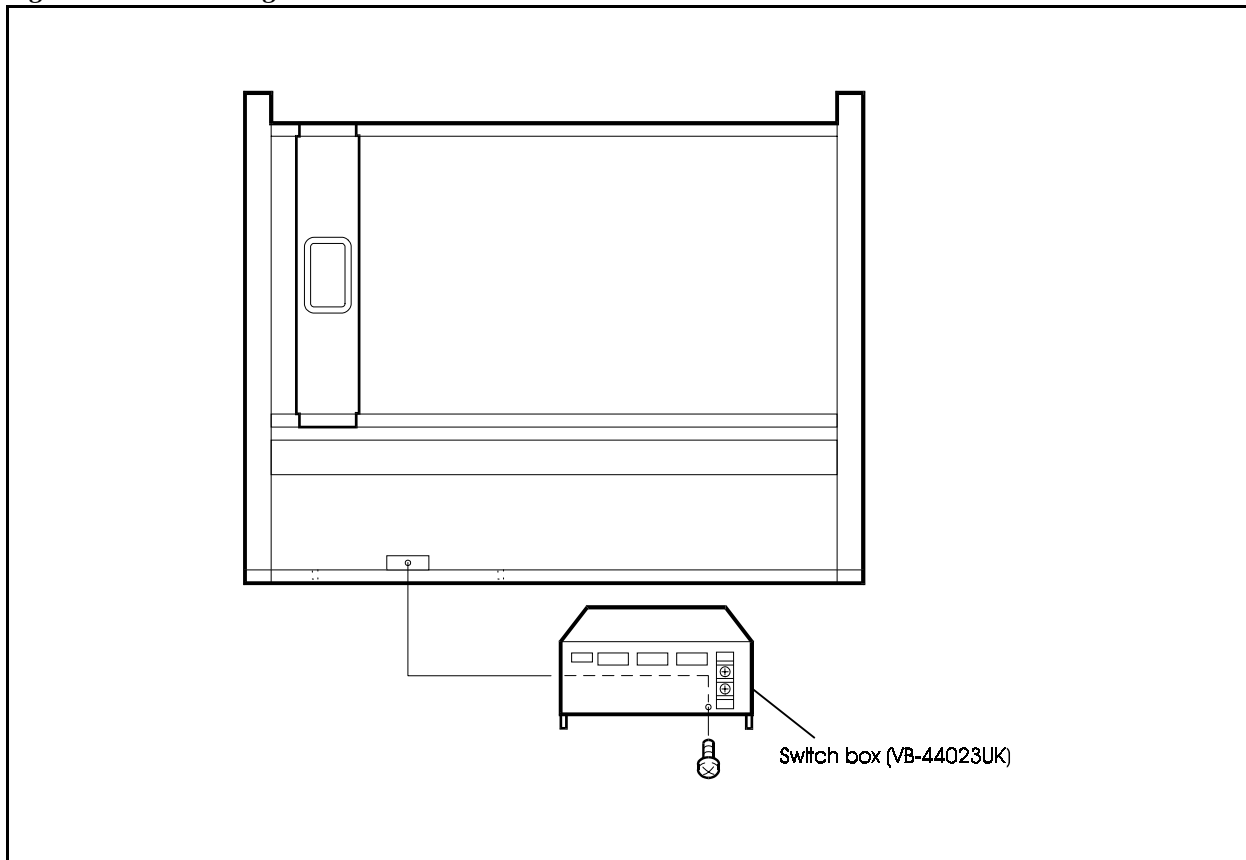
3. Connect the AC cable connectors to the power supply units of the top, middle and bottom CCUs.

4. Connect the ground wires of the expansion AC cables connected to the power units to the chassis.

5. Plug the expansion AC cables into the connector on the switch box. AC cable of top and middle CCU must be connected to EXP connector of the switch box, and AC cable of base CCU must be connected to BASE connector of the switch box.

6. Connect the BATT-CTRL connectors of the top, and middle power supply units to the BATT-CTRL connectors on the switch box using the supplied cables. Screw the +24V (white) and GND (black) cables to the bottom power supply unit in base CCU.

Figure 4-14. Wiring-1
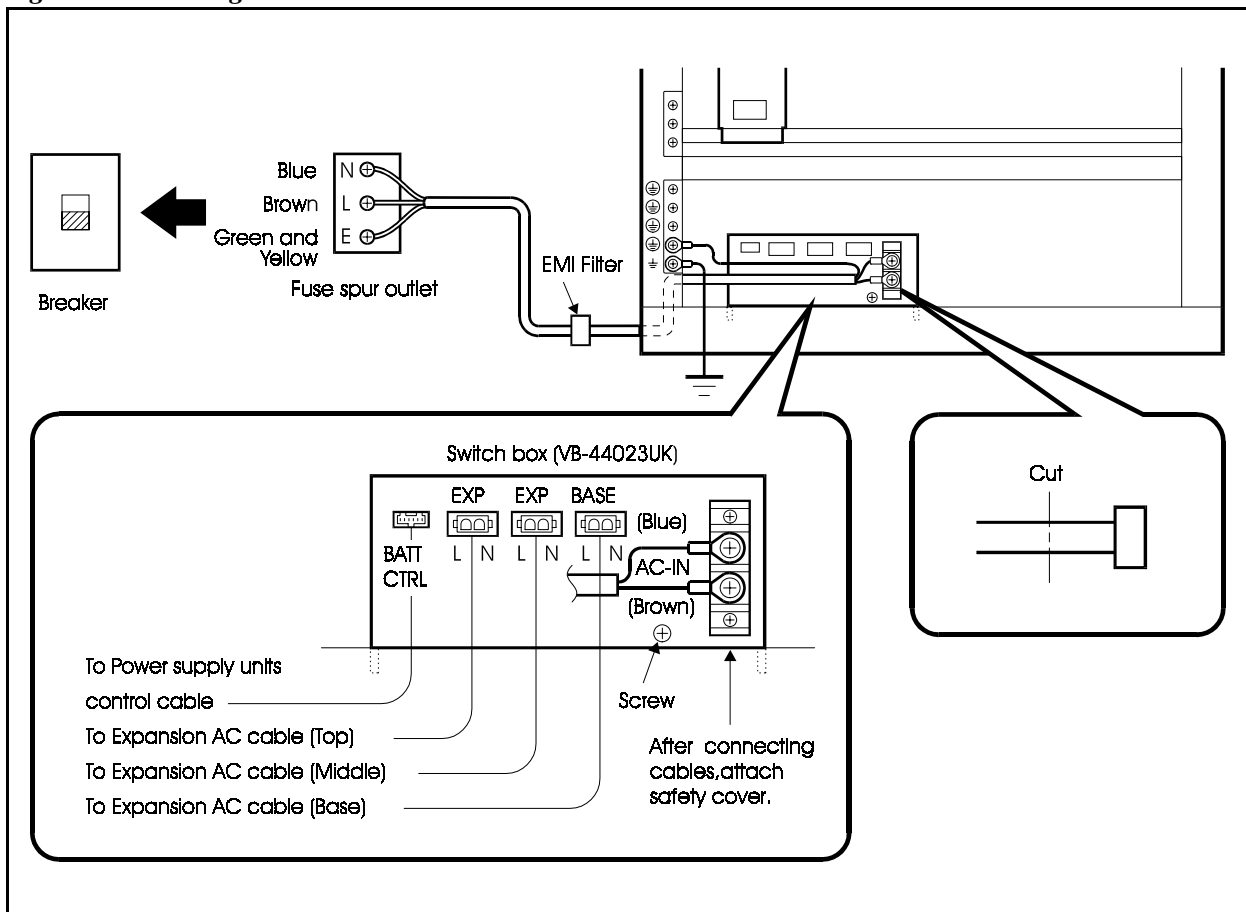
7. Cut the white connector of the AC cable at its neck, and connect the AC cable to the screw terminals of the switch box.Connect the AC cable to the screw terminals of the switch box. Live and Neutral of AC cable must be connected to L (Brown), and N (Blue) respectively and attach shielding cover against electric shock. Ground cable of AC must be fixed to chassis.

8. Plug the AC cable into an outlet that can be shut off by a breaker.

9. Power switch of upper and middle CCUs should be kept ON, so power switch of base CCU control power supply of all CCUs.

Note: Install an external circuit breaker.

Figure 4-15. Wiring-2
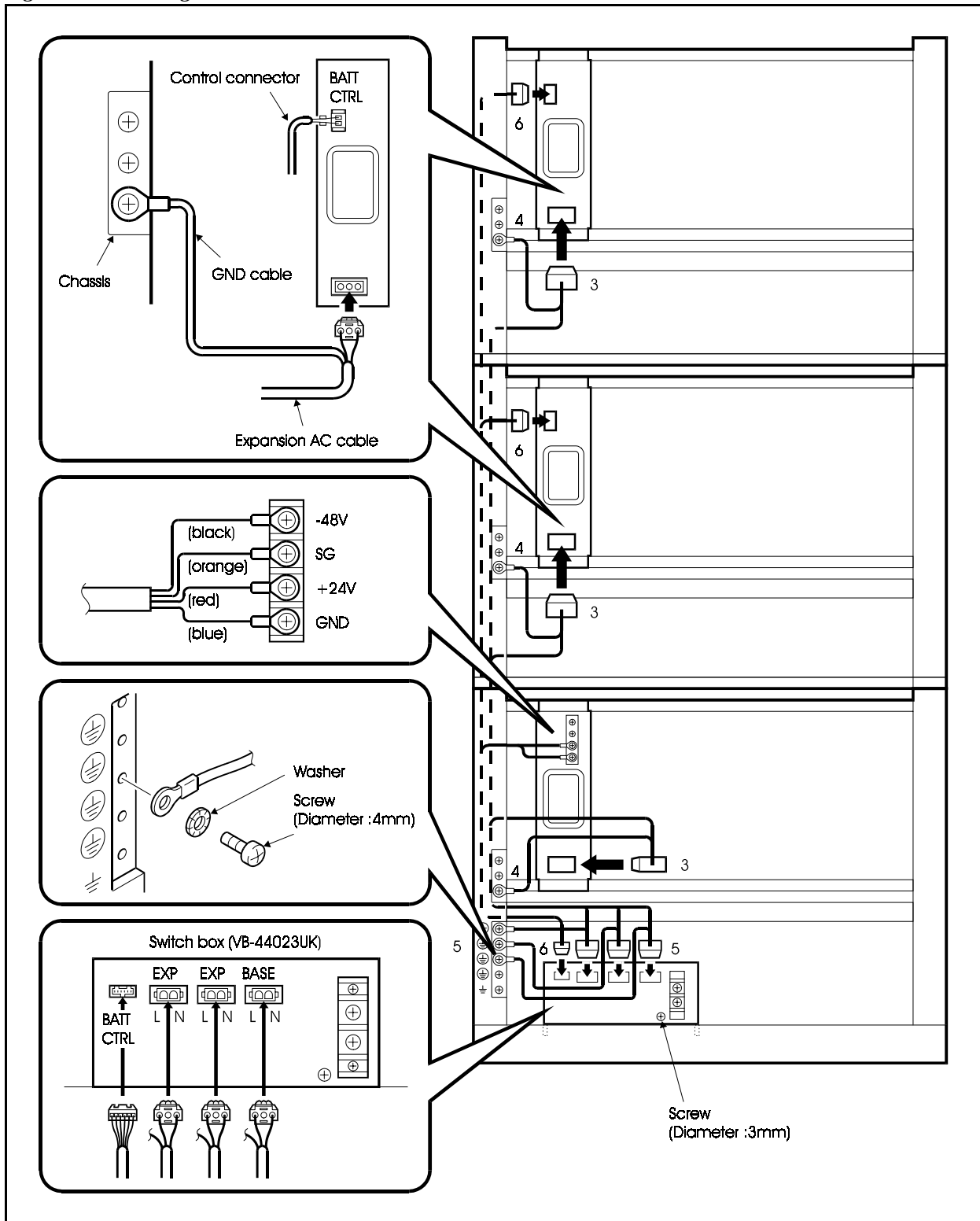
Connecting the Systems

Guidelines

⚠

CAUTION:
- Turn off the power switch and the external breaker OFF, and disconnect the AC cable before connecting the system.
- To prevent interference to TVs and radios, install an EMI filter.

- When expanding a system using the building block method, use the supplied cables to connect the TSW288/TSW576 card to the CBL card.

- Use the TSW288 card when the system has 288 or fewer ports. Use the TSW576 card when there are more than 288 ports.

- The description of how to connect systems when the building block method is based on an example of expanding the number of ports to 576. Please use the illustrations in Figures 4-16 to 4-20 to connect systems with different numbers of ports.

- When laying cables connected between systems, follow the instructions in Figure 4-21.

Installation

1. Use the supplied cable to connect the connector at the bottom left of the TSW576 card installed in the OP1 slot in the Base CCU (CAB96) on the right side to the connector at the bottom left of the CBL card installed in the CPC slot of the Expand-1 CCU (CAB96B).

2. Use the supplied cable to connect the connector at the top left of the TSW576 card installed in the OP1 slot in the Base CCU (CAB96) on the right side to the connector at the top left of the CBL card installed in the CPC slot of the Expand-1 CCU (CAB96B).

3. Use the supplied cable to connect the connector at the bottom right of the CBL card installed in the CPC slot of the Expand-1 CCU (CAB96B) to the connector at the bottom left of the CBL card installed in the CPC slot of the Expand-2 CCU (CAB96B).

4. Use the supplied cable to connect the connector at the top right of the CBL card installed in the CPC slot of the Expand-1 CCU (CAB96B) to the connector at the top left of the CBL card installed in the CPC slot of the Expand-2 CCU (CAB96B).

5. Use the supplied cable to connect the connector at the bottom right of the TSW576 card installed in the OP1 slot in the Base CCU (CAB96) on the right side to the connector at the bottom left of the CBL card installed in the CPC slot of the Base CCU (CAB96) on the left side.

6. Use the supplied cable to connect the connector at the top right of the TSW576 card installed in the OP1 slot in the Base CCU (CAB96) on the right side to the connector at the top left of the CBL card installed in the CPC slot of the Base CCU (CAB96) on the left side.

7. Use the supplied cable to connect the connector at the bottom right of the CBL card installed in the CPC slot in the Base CCU (CAB96) on the left side to the connector at the bottom left of the CBL card installed in the CPC slot of the Expand-3 CCU (CAB96B).

8. Use the supplied cable to connect the connector at the top right of the CBL card installed in the CPC slot in the Base CCU (CAB96) on the left side to the connector at the top left of the CBL card installed in the CPC slot of the Expand-3 CCU (CAB96B).

9. Use the supplied cable to connect the connector at the bottom right of the CBL card installed in the CPC slot of the Expand-3 CCU (CAB96B) to the connector at the bottom left of the CBL card installed in the CPC slot of the Expand-4 CCU (CAB96B).

10. Use the supplied cable to connect the connector at the top right of the CBL card installed in the CPC slot of the Expand-3 CCU (CAB96B) to the connector at the top left of the CBL card installed in the CPC slot of the Expand-4 CCU (CAB96B).

Figure 4-16. System connection using building block method (576 port example)
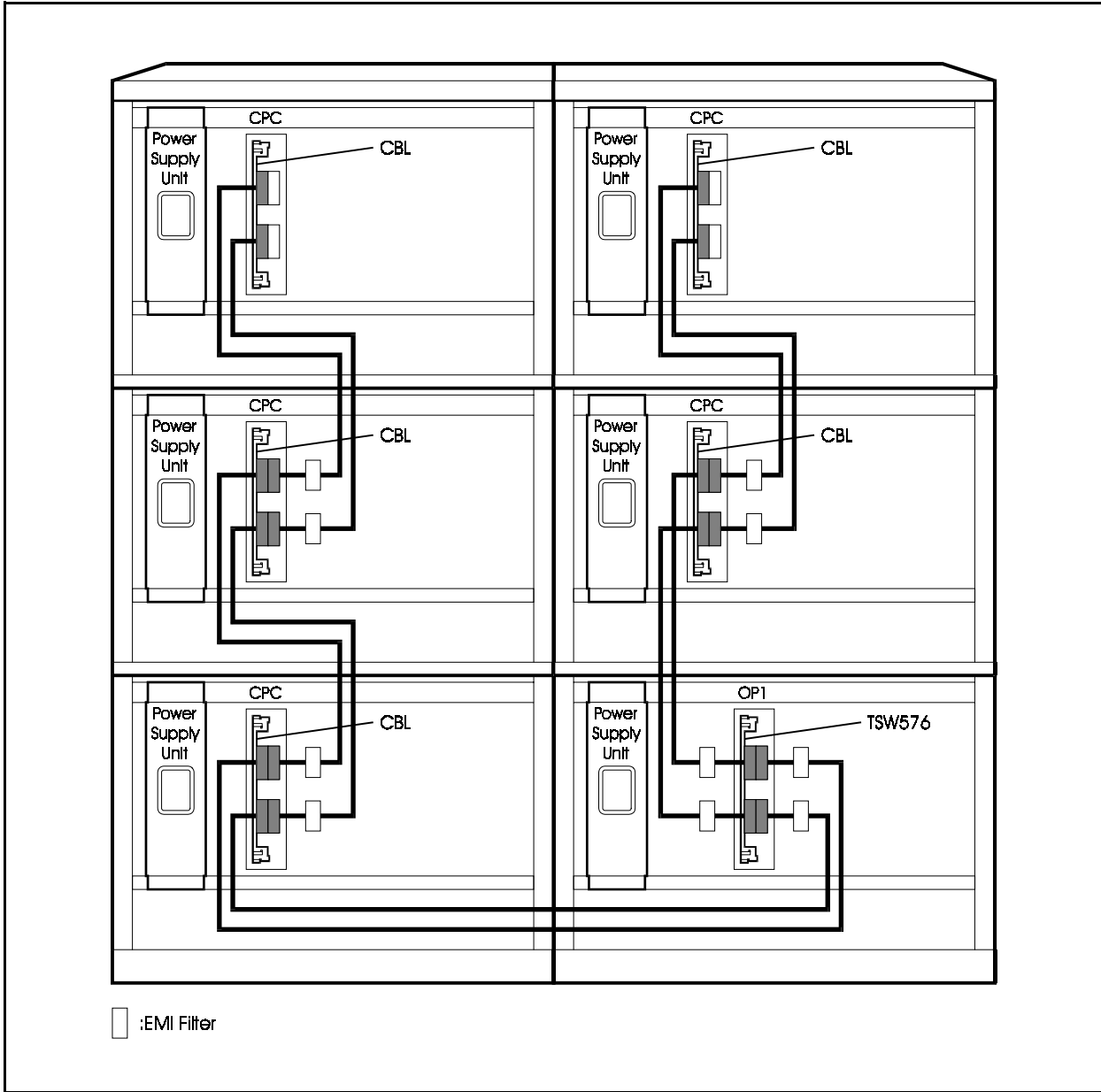
Figure 4-17. System connection using building block method (192 port example)
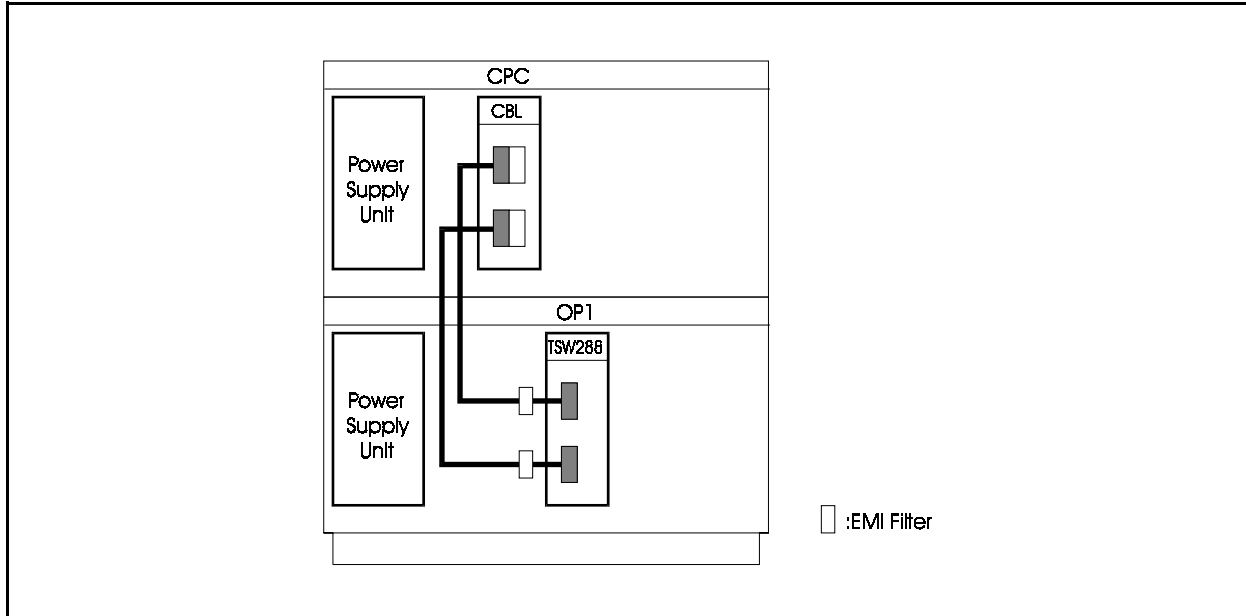
Figure 4-18. System connection using building block method (288 port example)
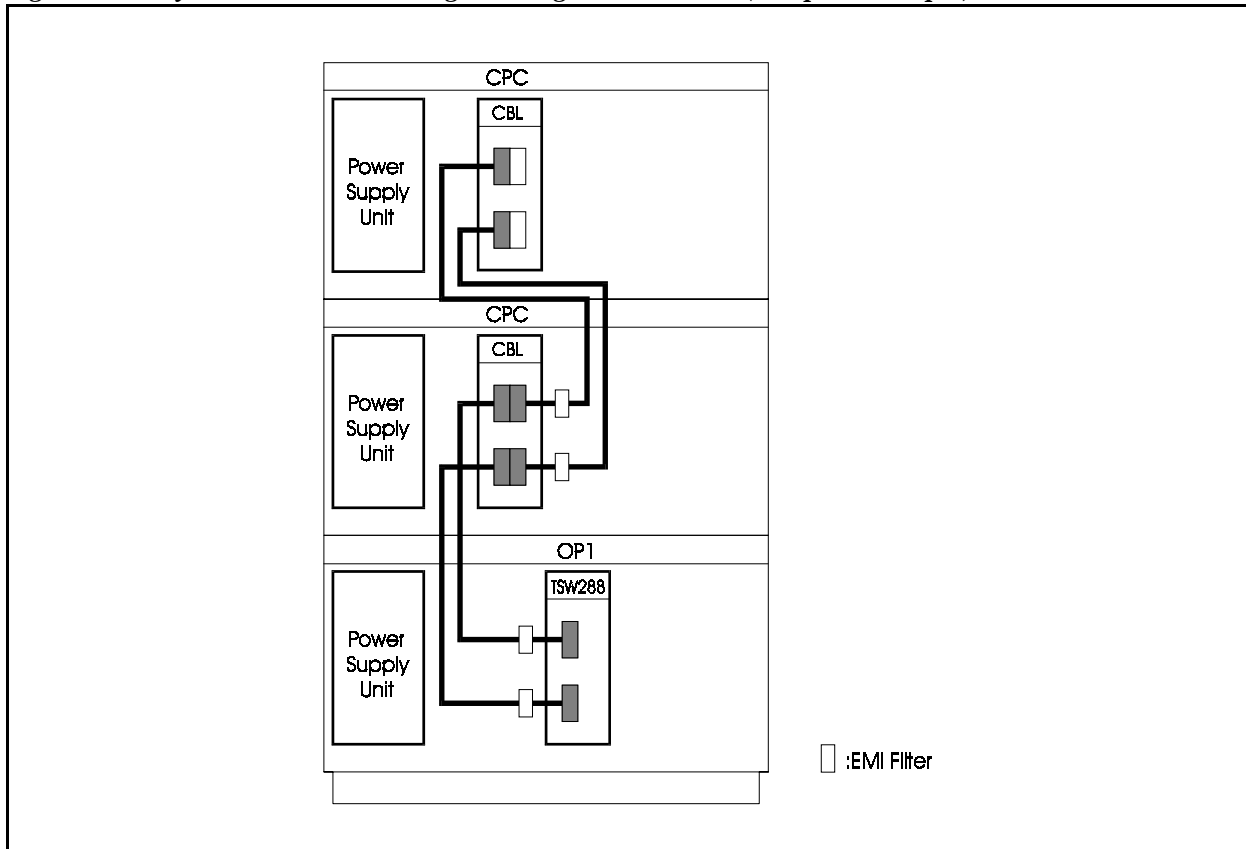
Figure 4-19. System connection using building block method (384 port example)
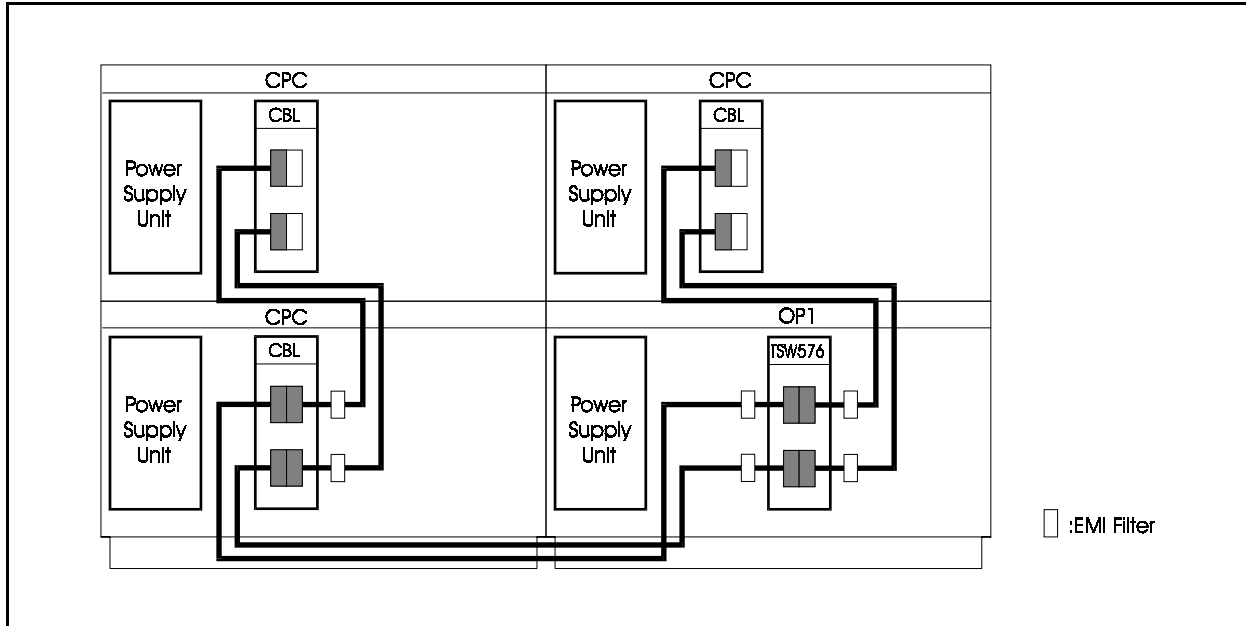
Figure 4-20. System connection using building block method (480 port example)
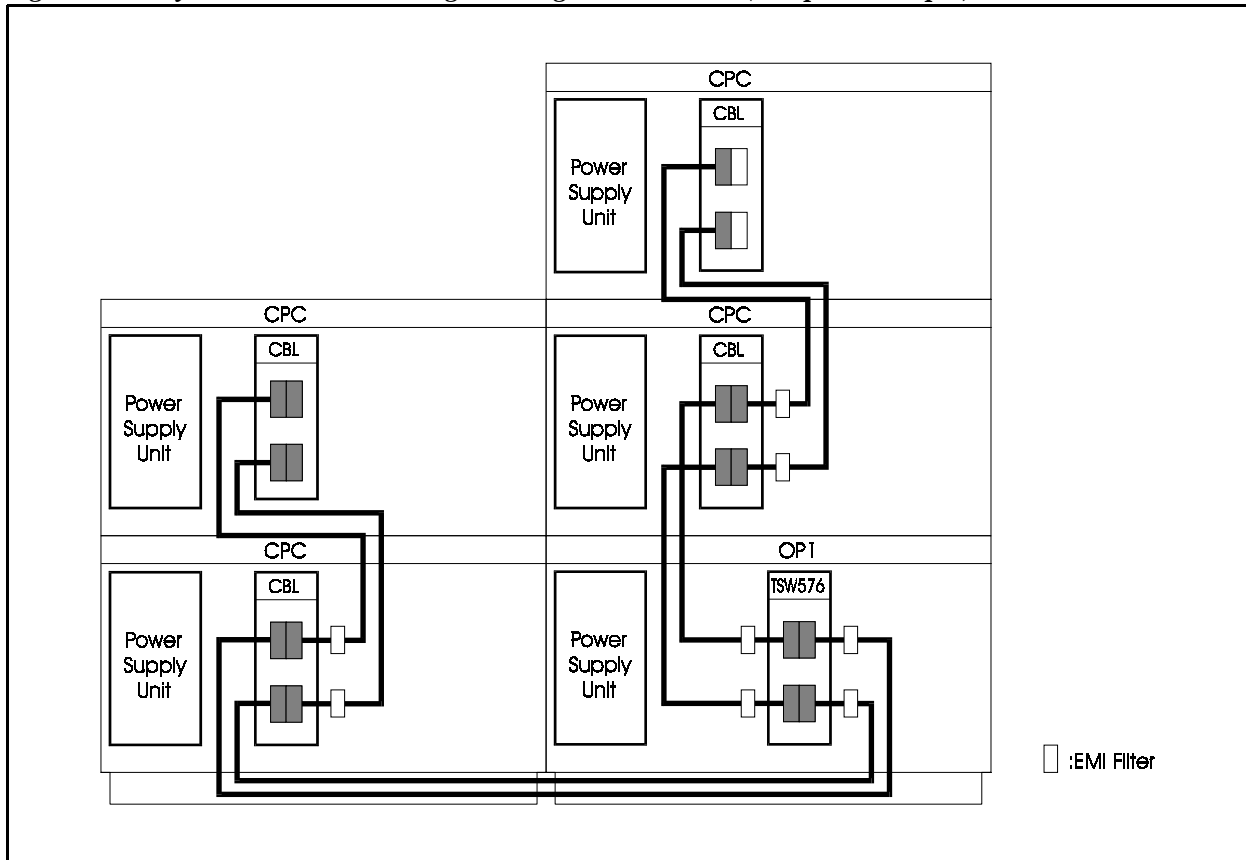
Setting ID No. of Expansion CCUs

Guidelines

- When you add a CCU to the system, it must be given an expansion CCU ID No. These expansion CCU ID Nos. are allocated as shown in Figure 4-5.

  Check that the expansion CCU Nos. match the size of system you are setting up.

- Use the rotary switch (SW1) on the CBL card to set the expansion CCU No.

  Refer to the following table, which shows the relationship between rotary switch position and expansion CCU ID No. when setting the ID No.

Figure 4-21. Relationship of rotary switch position and expansion CCU ID No.

Rotary switch position	Expansion CCU ID No.
1	Expansion CCU-1
2	Expansion CCU-2
3	Expansion CCU-3
4	Expansion CCU-4
5	Expansion CCU-5
0, 6 to 9	Not available
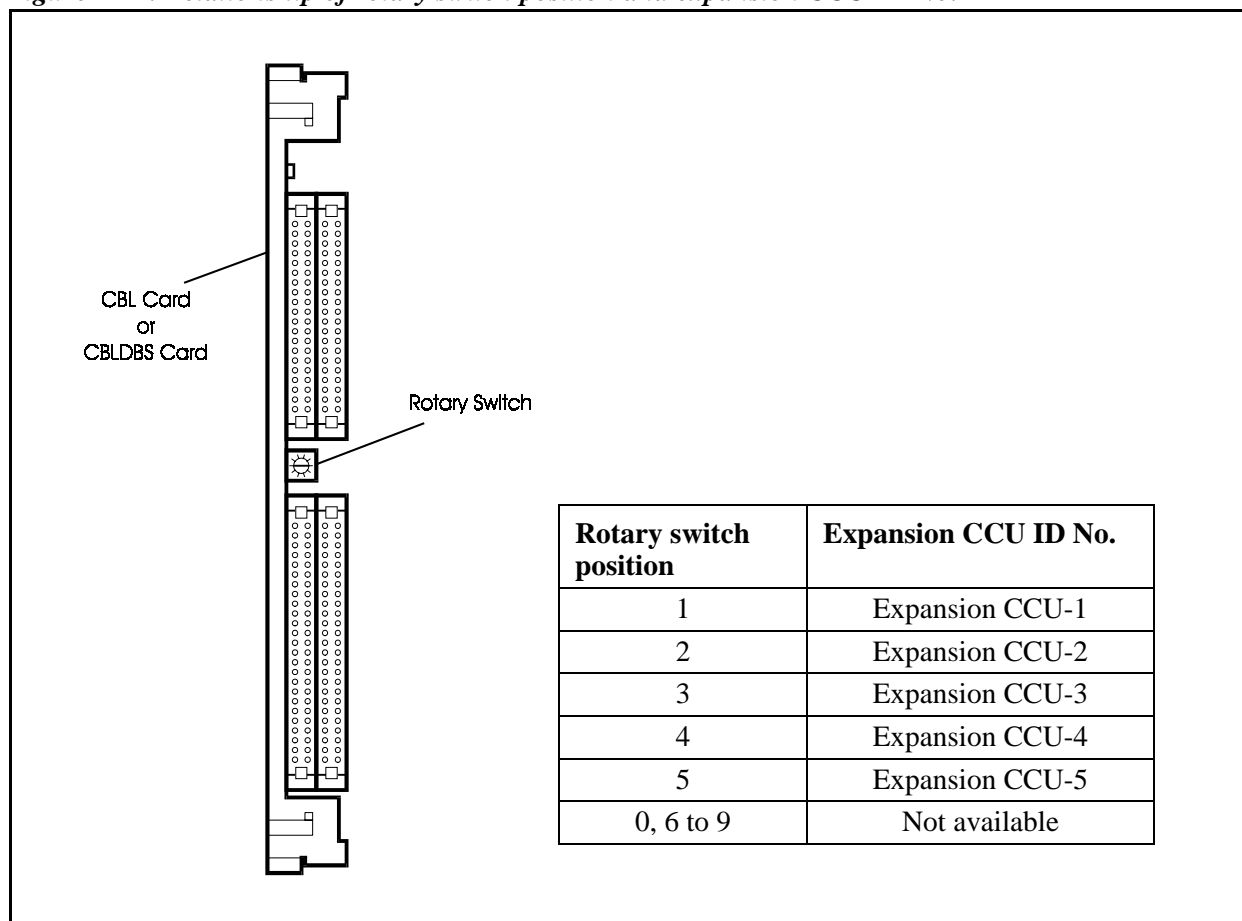
Connecting CAB96 and DBS-90 Systems

Installation

Guidelines

> ⚠ **CAUTION:**
> - Turn the power switch and the external breaker OFF, and disconnect the AC cable before connecting the systems.
> - Handle the CAB96 and DBS-90 carefully to avoid damage.
> - Do not attempt to move the CAB96 or DBS-90 without assistance.
> - Do not attempt to connect the CAB96 system and DBS-90 system using the building block method.

- Before deciding where to install the CAB96 and DBS-90, check the external dimensions shown for the CAB96 (page 3-3) and the external dimensions shown for the DBS-90 (DBS-90 Installation and Programming Manual) and the areas required for maintenance.

- See page for details of how to install the CAB96. See the DBS-90 Installation and Programming Manual for details of how to install the DBS-90.

- Remove the covers from the CAB96 and DBS-90 (see page 3-4) to connect the systems. See the DBS Installation and Programming Manual for details of how to remove the covers from the DBS-90.

- Figure 4-24 shows examples of combining CAB96 and DBS-90 systems.

- When connecting DBS-90 to ICX, the MDF board on DBS-90 need to be replaced with the MDF board of CBLDBS card.

Figure 4-22. Example combinations of CAB96 and DBS-90

	CCU configurations	Use cards
One additional DBS-90	1	• CPC288 or CPC576 • TSW288 • CBLDBS (DBS-90)
Two additional DBS-90s	2 1 4 3	• CPC576 • TSW576 • CBLDBS (DBS-90)
Three additional DBS-90s	2 1 5 4 3	• CPC576 • TSW576 • CBLDBS (DBS-90)

☐ : DBS-90   ☐ : CAB96   ☐ : CAB96B

Note: Nos. 1 to 5 are the numbers of the expansion CCUs. If you are adding two or more CCUs, each added CCU must have an expansion CCU ID No. (see page 4-28).
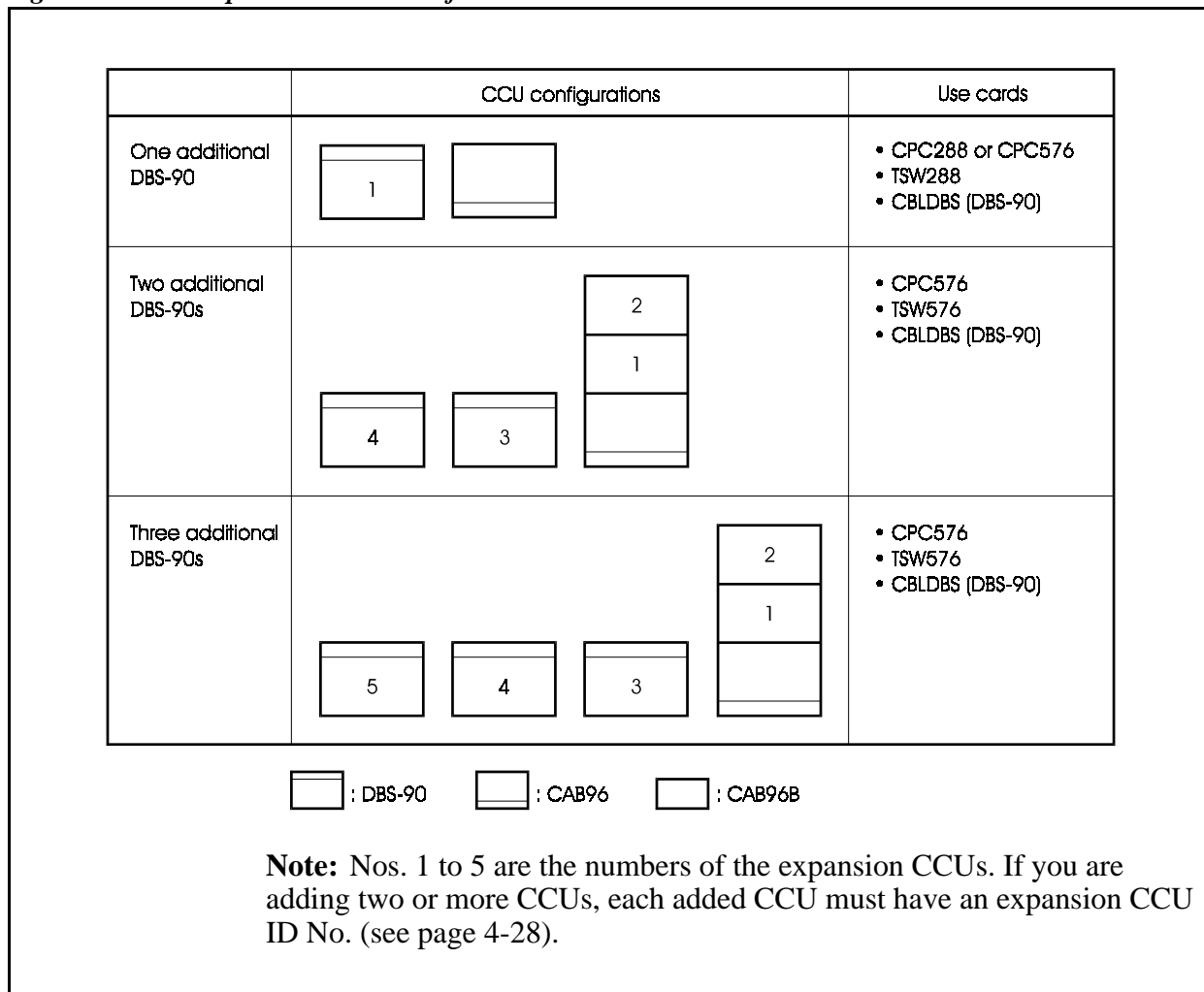
Replacing the MDF board

Installation

Replacing and connecting methods are as follows:

1. Disconnect the cables connected to the MDF board on DBS-90.

2. Remove the eight screws fixing the MDF board on DBS-90.

3. Replace the MDF board on DBS-90 with the MDF board of CBLDBS and fix it with eight screws.

4. Connect the cables which were originally connected to the MDF board again as they were before.

5. Attach an EMI filter on the ICX side of the card connecting cable.

6. Connect the TSW288 (or TSW576) card of ICX and the CBLDBS card on DBS-90 using two cables.

Figure 4-23. Replacing the MDF board
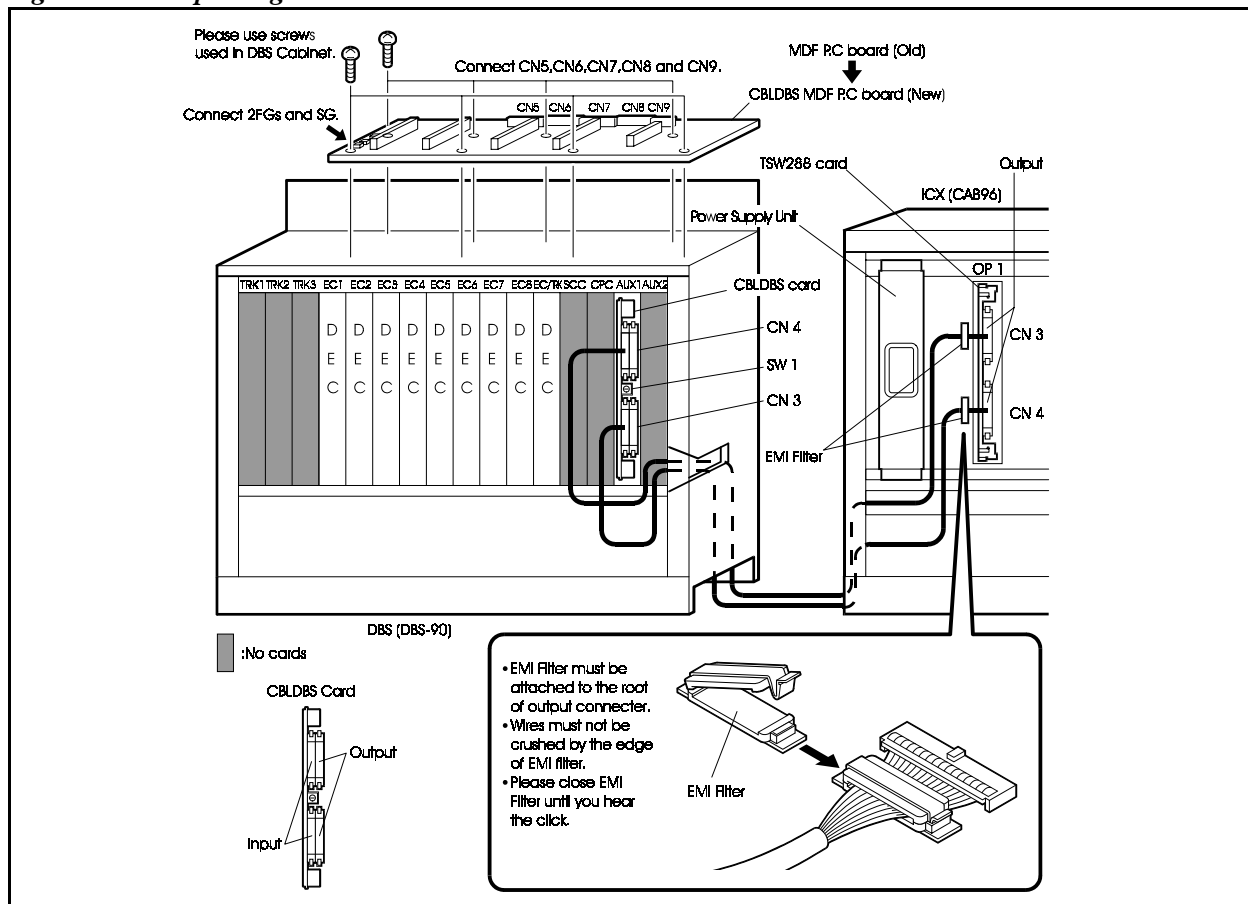
Card Installation

Guidelines

- Install the cards in the CAB96 and DBS-90 in the slots indicated under "Card Installation Position" in Chapter 4 (page 4-40).

- In the DBS-90, you can only install DEC cards. You cannot increase the number of Exchange Line ports.

- Each additional DBS-90 increases the number of extension ports by up to 72.

- There is a limit to the number of cards that can be extension in the flexible slots of the CAB96. See "Card Installation Position" in Chapter 4 (page 4-41) for details.

Installation

See "Card Installation" in Chapter 3 (page 3-13) for how to install cards in the CAB96.

See the DBS-90 Installation and Programming Manual for details of how to install cards in the DBS-90.

Connecting the Systems

Guidelines

⚠ **CAUTION:**
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing the backup battery.
- To prevent interference to TVs and radios, install an EMI filter.

- When expanding a system, use the supplied cables to connect the TSW288/TSW576 card to the CBLDBS card.

- Use the TSW288 card when the system has 288 or fewer ports. Use the TSW576 card when there are more than 288 ports.

Installation

1. Use the supplied cable to connect the connector at the bottom of the TSW288 card installed in the OP1 slot in the CAB96 to the connector at the bottom of the CBLDBS card installed in the AUX1 slot of the DBS-90.

2. Use the supplied cable to connect the connector at the top of the TSW288 card installed in the OP1 slot in the CAB96 to the connector at the top of the CBLDBS card installed in the AUX1 slot of the DBS-90.

Setting

- When you add a CCU to the system, it must be given an expansion CCU ID No. These expansion CCU ID Nos. are allocated as shown in Figure 4-24.

  Check that the expansion CCU Nos. match the size of system you are setting up.

- Use the rotary switch (SW1) on the CBL card and CBLDBS card to set the expansion CCU No.

  For details on how to set expansion CCU Nos., see "Setting ID No. of Expansion CCUs" on page 4-28.

Figure 4-24. System connection of CAB96 and DBS-90 (168 port example)
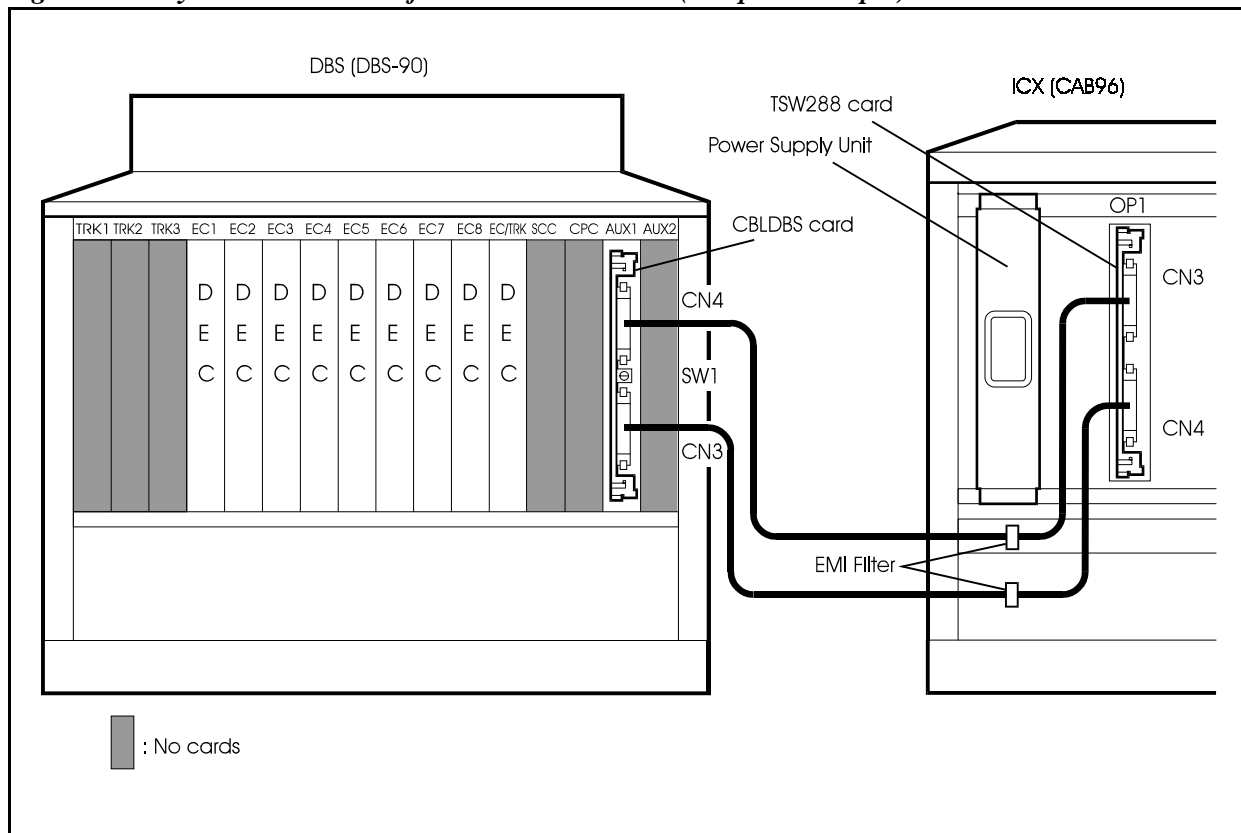
Figure 4-25. Addition of two DBS-90 systems
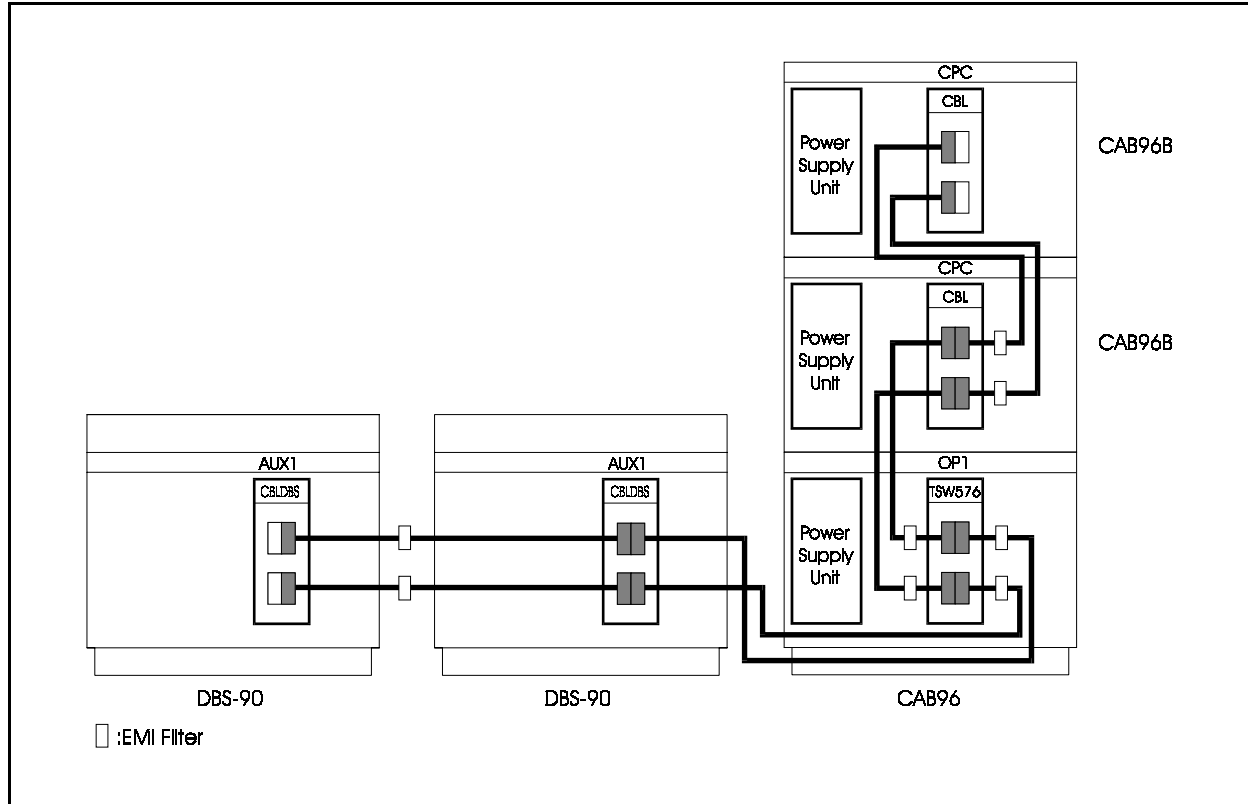
Card Installation Position

The unit cards are installed in the card slots in the ICX CCU. Figures 4-27 and 4-28 show the positions in which the cards are installed when the system comprises only one CCU. Figure 4-29 shows the positions when the system comprises dual CCUs, and Figure 4-30 shows the positions when the CCUs are combined in building-block fashion.

Figure 4-26. Card installation positions in single CCU system (CAB40)
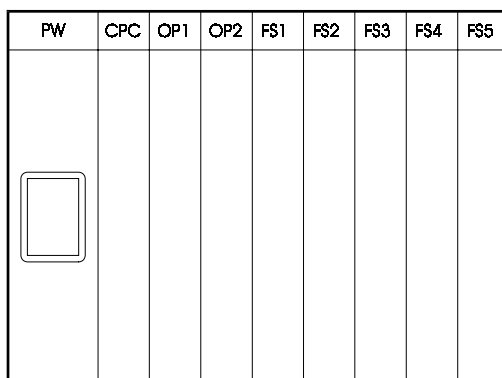
Slot			Card
CPC			CPC96
OP1 to OP2			SCC, MFR/8
FS1 to FS5	Exchange Lines	Digital	TBRI/4, PRI/30[1][2]
		Analog	LTRK/8, AC15/4
	Extensions	Digital	DEC/8, SBRI/4, PRI/30[1][2]
		Analog	AEC/8
	Options/Audio applications		MFR/8, CONF[1]
FS4			VPU/4, VPU/8
FS5			VSSC, ACD

[1] : Certain limitations apply (see page 4-41).

[2] : By setting the switch and reprogramming, the PRI/30 card can be set for S-point (extensions) or T-point (Exchange Lines) (see page 5-12, 5-27).

Figure 4-27. Card installation positions in single CCU system(CAB96)

PW	CPC	OP1	OP2	FS1	FS2	FS3	FS4	FS5	FS6	FS7	FS8	FS9	FS10	FS11	FS12
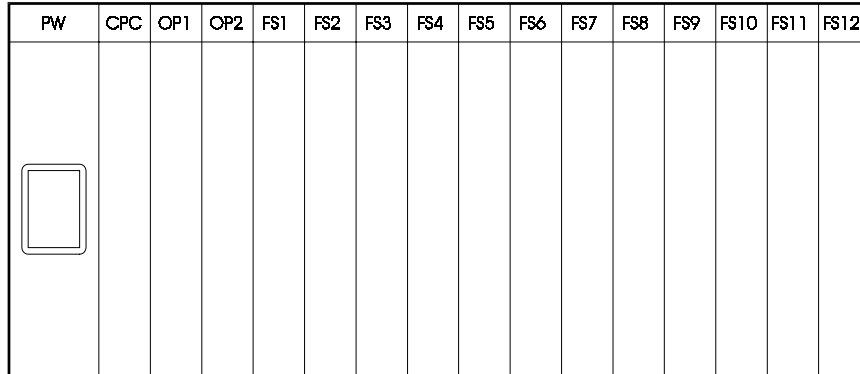
Slot			Card		
CPC			CPC96/CPC288/CPC576		
OP1 to OP2			SCC, MFR/8, TSW288/TSW576		
FS1 to FS12	Exchange Lines	Digital	TBRI/4, PRI/30^{*1*2}		
		Analog	LTRK/8, AC15/4		
	Extensions	Digital	DEC/8, SBRI/4, PRI/30^{*1*2}		
		Analog	AEC/8		
	Options/Audio applications		MFR/8, CONF^{*1}		
FS9					VPU/4, VPU/8
FS10					VPU/4, VPU/8
FS11				ACD	VSSC
FS12				VPU/4	^{*3}

^{*1} : Certain limitations apply (see page 4-41).
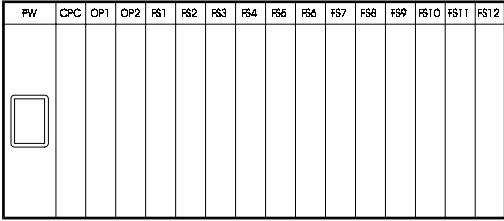
^{*2} : By setting the switch and reprogramming, the PRI/30 card can be set for S-point (extensions) or T-point (Exchange Lines) (see page 5-12, 5-27).

^{*3} : VSSC card must be installed into FS11 and keep FS12 free due to the thickness of HDD and to give off HDD's.
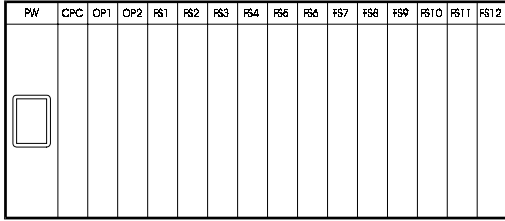
Figure 4-28. Card installation positions in dual CCU system (CAB40 + CAB40)

PW	CPC	OP1	OP2	FS1	FS2	FS3	FS4	FS5
								C B L

< Master >

PW	CPC	OP1	OP2	FS1	FS2	FS3	FS4	FS5
				FS5 *6	FS6	FS7	FS8	FS9

< Slave >

Slot			Card	
			Master	**Slave**
CPC			CPC96	CBLSLV[2]
OP1 to OP2			SCC, MFR/8	No cards
FS1 to FS5[4]	Exchange Line	Digital	TBRI/4, PRI/30[3][5]	
		Analog	LTRK/8, AC15/4	
	Extensions	Digital	DEC/8, SBRI/4, PRI/30[3][5]	
		Analog	AEC/8	
	Options/Audio applications		MFR/8, CONF[3]	
FS4				VPU/4, VPU/8
FS5			CBLMST[1]	VSSC, ACD

[1] : Always mount in FS5 of Master CCU.

[2] : Always mount in CPC slot of Slave CCU.

[3] : Certain limitations apply (see page 4-41)

[4] : Only the Slave CCU can be mounted in slot No. FS5.

[5] : By setting the switch and reprogramming, the PRI/30 card can be set for S-point (extensions) or T-point (Exchange Lines) (see page 5-12, 5-27).

[6] : When programming from FS1 to FS5 of slave CCU use programming address from FS5 to FS9 of lst CCU. (not 2nd CCU)

Figure 4-29. Card installation positions in building-block CCU system
     (CAB96 + CAB96, ···· +CAB96B)
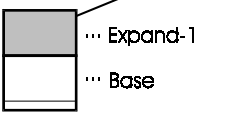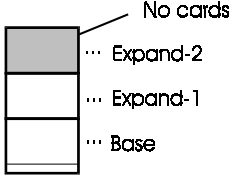
Slot			Card		
			Base	**Expand-1**	**Expand-2 to 6**
CPC			CPC288, CPC-576[*1]	CBL[*2]	CBL[*2]
OP1			TSW288[*6], TSW576[*6]	No cards	
OP2			SCC, MFR		
FS1 to FS12	Exchange Lines	Digital	TBRI/4, PRI/30[*3][*5]		
		Analog	LTRK/8, AC15/4		
	Extensions	Digital	DEC/8, SBRI/4, PRI/30[*3][*5]		
		Analog	AEC/8		
	Options/Audio applications		MFR/8, CONF[*3]		
FS10 to FS11			VPU/4[*4], VPU/8[*4], VSSC[*4][*7], ACD		
FS12			[*7]VPU/4[*8]		

[*1] : Always mount in CPC slot of Base CCU.

[*2] : Always mount in CPC slot of Expansion CCU.

[*3] : Certain limitations apply (see page 4-41).

[*4] : Cannot be installed in top CCU when used in two- or three-CCU configuration.

<2-CCU configuration>   <3-CCU configuration>

[*5] : By setting the switch and reprogramming, the PRI/30 card can be set for S-point (extensions) or T-point (Exchange Lines) (see page 5-12, 5-27).

[*6] : Use the TSW288 card when the system has 288 or fewer ports. Use the TSW576 card when there are more than 288 ports.

[*7] : VSSC card must be installed into FS11 and keep FS12 free due to the thickness of HDD and to give off HDD's heat.

[*8] : ACD card must be installed into FS11 and in this case, VPU/4 card must be installed into FS12.

Figure 4-30. Card installation positions in system comprising CAB96 and DBS-90 (CAB96+DBS-90)

< CAB96 >   < DBS-90 >

Slot				Card
ICX (Base)	CPC			CPC288, CPC-576[*1]
	OP1			TSW288[*6], TSW576[*6]
	OP2			SCC, MFR
	FS1 to FS12	Exchange Lines	Digital	TBRI/4, PRI/30[*3][*5]
			Analog	LTRK/8, AC15/4
		Extensions	Digital	DEC/8, SBRI/4, PRI/30[*3][*5]
			Analog	AEC/8
		Options/Audio applications		MFR/8, CONF[*3]
	FS10 to FS11			VPU/4[*4], VPU/8[*4], VSSC[*4][*7], ACD[*8]
	FS12			[*7], VPU/4[*8]
DBS Expand 1,2	TRK1 to TRK3			
	EXT1 to EXT8, EXT/TRK			DEC
	SCC			
	CPC			
	AUX1			CBLDBS
	AUX2			

[**1] : Always mount in CPC slot of Base CCU.

[*2] : Always mount in CPC slot of Expansion CCU.

[*3] : Certain limitations apply (see page 4-41)

[*4] : Cannot be installed in top CCU when used in two- or three-CCU configuration.

Example:.

<2-CCU configuration>   <3-CCU configuration>

[*5] : By setting the switch and reprogramming, the PRI/30 card can be set for S-point (extensions) or T-point (Exchange Lines) (see page 5-12, 5-27)

[*6] : Use the TSW288 card when the system has 288 or fewer ports. Use the TSW576 card when there are more than 288 ports.

[*7] : VSSC card must be installed into FS11 and keep FS12 free due to the thickness of HDD and to give off HDD's heat.

[*8] : ACD card must be in stalled into FS11 and in this case, VPU/4 card must be installed into FS12.

Restriction on Number of Cards

Note that only a limited number of PRI/30 and CONF cards can be installed in the flexible slots (FS). Do not attempt to install more than the prescribed maximums.

PRI/30 Card

The switches on the PRI/30 card (see page 2-30) and the settings described in the Programming Manual (Section 400) allow you to select 8, 16 or 24 communication channels.

Because each flexible slot can handle a maximum of 8 channels, two or more flexible slots are effectively occupied per card if you set 16 or more channels. In this case, certain slots must be left vacant.

The following table shows which slots cannot be used according to the number of set channels. Do not attempt to install any cards in the unusable slots.

Table 2-30. PRI/30 card limitations

Channels	Card installation position	Unusable slots		
		FS1 installed	**FS5 installed**	**FS9 installed**
8ch	FS1 to FS12	No limit		
16ch	FS1, FS5 or FS9	FS2	FS6	FS10
24ch		FS2 to FS3	FS6 to FS7	FS10 to FS11
30ch		FS2 to FS4	FS6 to FS8	FS10 to FS12

Note: The PRI/30 card can only be set for 8 channels or 30 channels when used for S-point (extension) connections.

Figure 4-31. Restriction on PRI/30 cards installed in flexible slots of CAB40
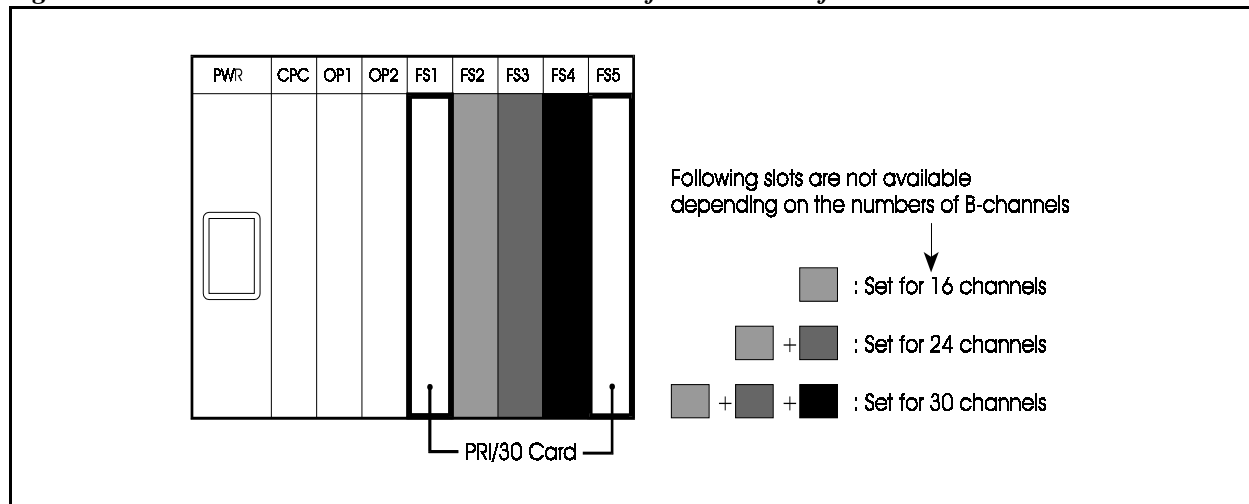
Figure 4-32. Restriction on PRI/30 cards installed in flexible slots of CAB96
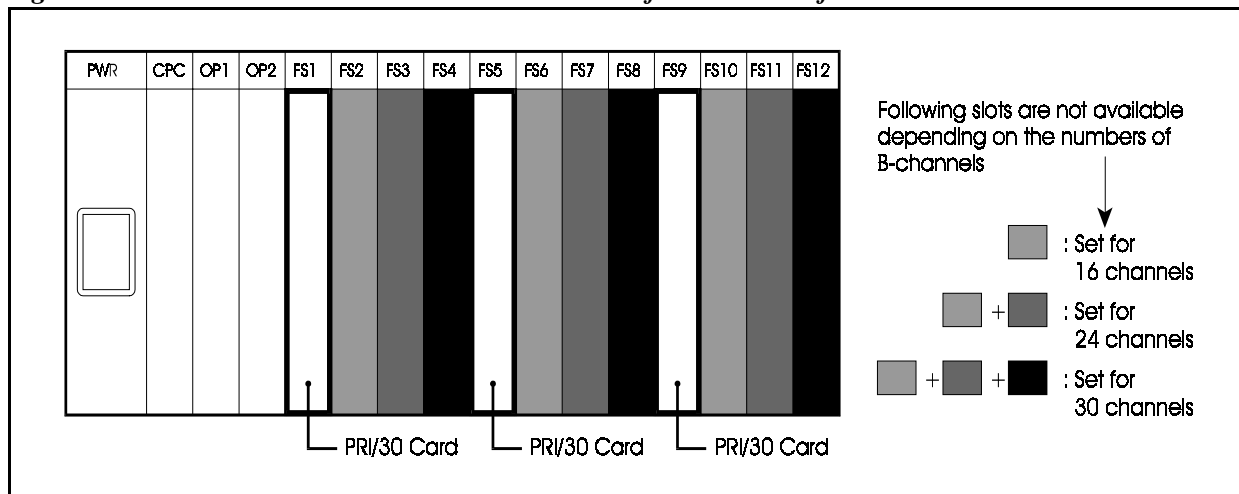
CONF Card Ver.2

The switches on the CONF card (see page 2-39) allow you to select 8-party conferencing or auto group conferencing/specified group conferencing, as follows:

8-party conferencing: 8 parties × 1 circut to 4 circuts

Because each flexible slot can handle a maximum of 8 channels, two or more flexible slots are essentially occupied per card if you select 8-party conferencing × 2 circuts or more. In this case, certain slots remain unusable.

The following table shows which slots cannot be used according to the number of set channels. Do not attempt to install any cards in the unusable slots.

Each CCU has max. one CONF card.
Max 6. CONF cards can be used in 6-CCUs system.

Table 2-31. CONF card limitations

Channels	Conferencing Mode	Card Position	Unusable slots		
			FS1 installed	FS5 installed	FS9 installed
8 Parties	8-party× 1 circuts	FS1 to FS12	No limit		
	8-party× 2 circuts	FS1, FS5 or FS9	FS2	FS6	FS10
	8-party× 3 circuts		FS2 to FS3	FS6 to FS7	FS10 to FS11
	8-party× 4 circuts		FS2 to FS4	FS6 to FS8	FS10 to FS12

Figure 4-33. Restriction on CONF cards installed in flexible slots of CAB40
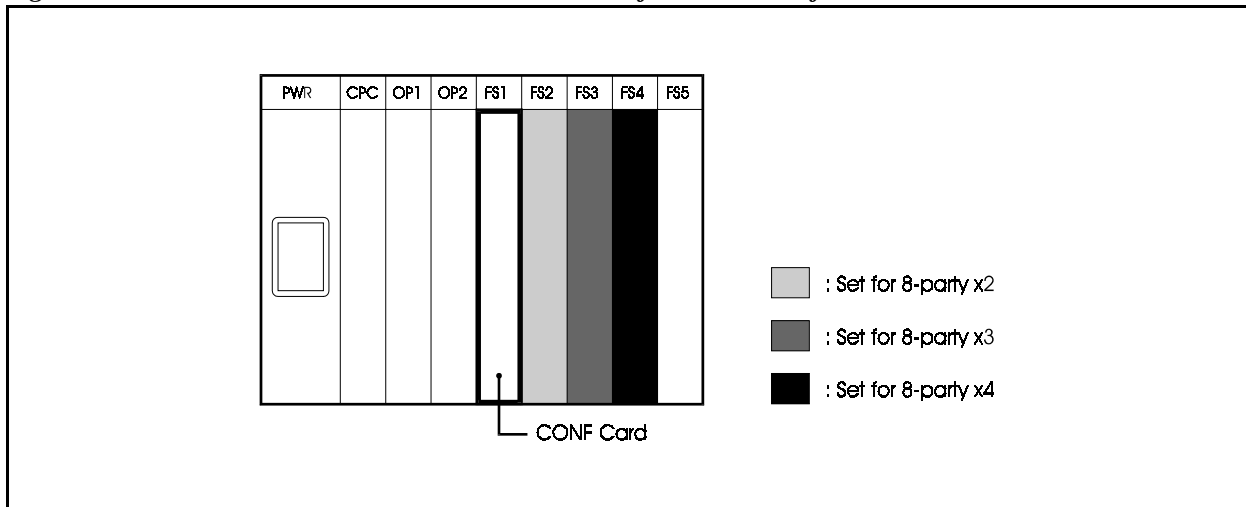
Figure 4-34. Restriction on CONF cards installed in flexible slots of CAB96
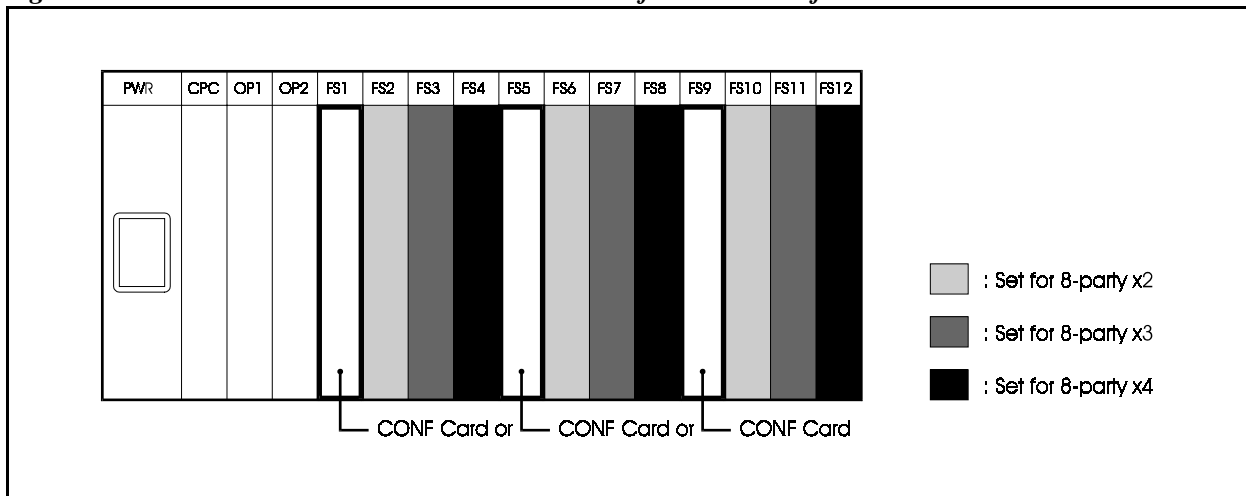
Optimization of Card Installation

As far as possible, group the cards installed in the flexible slots as shown below.

Ensure that any vacant slots are evenly distributed.

Figure 4-35. Optimization of card installation
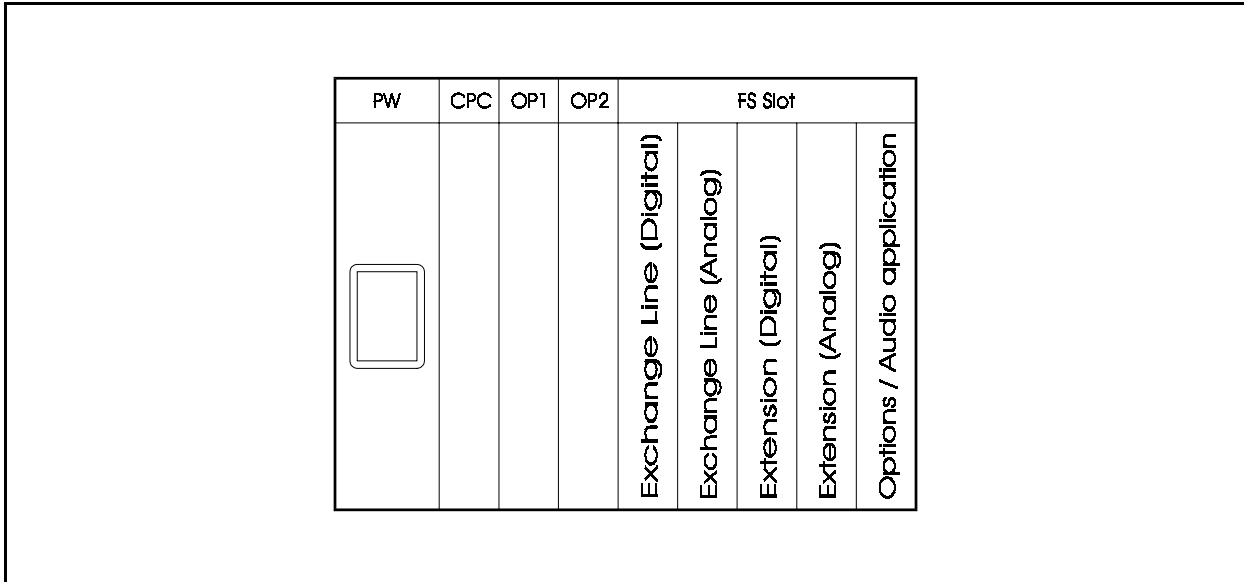
Chapter 5. Exchange Lines and Extensions

This chapter explains how to connect Exchange lines , how to connect different types of digital and analog extensions, and how to mount telephones on the wall.

Maintenance Switches

Guidelines

⚠ **CAUTION:**
- Check that the line busy lamp is off before removing the card. If the lamp is on, the line will be disconnected when the card is removed.
- Check that the maintenance switch is off. After replacing the card in its slot on completion of the maintenance work.
- Never attempt to remove any of the following cards while the system is operating:
  - CPC96 card
  - CPC576 card
  - TSW576 card
  - CBLSLV card
  - CBL card
  - ACD card
  - VPU/4 card
  - s CPC288 card
  - s TSW288 card
  - s CBLMST card
  - s CBLDBS card
  - s SCC card
  - s VPU/8 card
  - s VSSC card

- The following 4 cards can be removed from and replaced in their slots even when the system is operating (power is on) provided the maintenance switch is set to ON (up).

  s LTRK/8 card
  s AC15/4 card
  s TBRI/4 card
  s PRI/30 card

When the maintenance switch is on, the cards are in the following state:

  s Incoming calls are ignored;
  s Outgoing calls are prevented;
  s The line is disconnected on completion of any current call.

That is, further incoming calls are ignored and outgoing calls are prevented as soon as any current call is completed.

The cards can be removed as soon as all circuits on the card are idle and the busy lamps are off.

Note that the cards for extension lines (DEC/8, AEC/8, SBRI/4, MFR/8, and CONF Card) can be removed and replaced while the system is operating. However, because there are no busy lamps for calls on extension lines, you cannot check the status of these lines. We recommend using

paging, etc., before removing the cards, to warn users that the lines will be disconnected.

Figure 5-1. Maintenance switch positions (Example: LTRK/8 card)

< LTRK/8 Card shown >
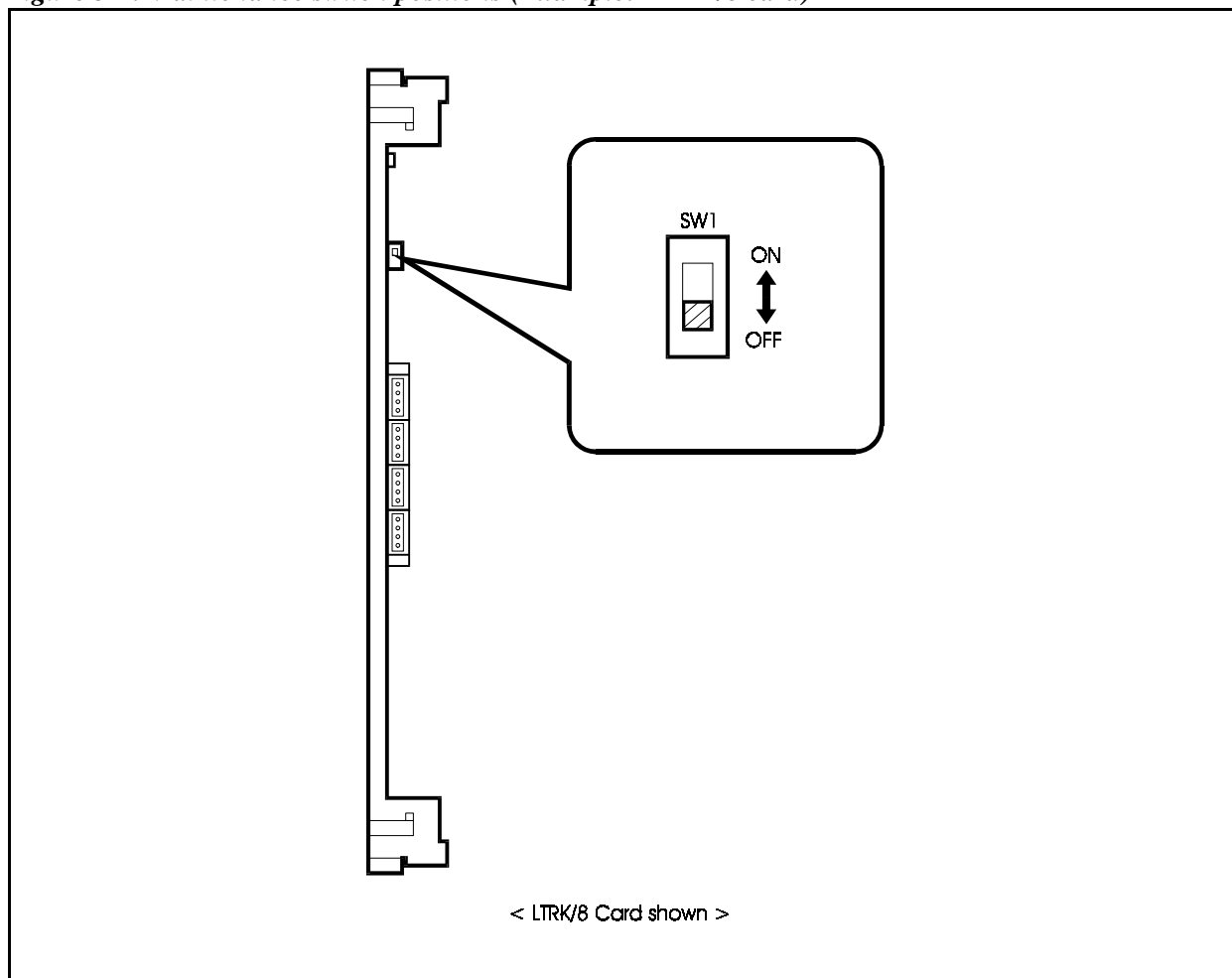
Exchange Lines

The following cards are used with exchange lines:

- LTRK/8: Loop start exchange line interface card (8 ports)

- TBRI/4: T-point ISDN basic interface card (4 ports)

- PRI/30: T-point and S-point ISDN primary rate interface card (1 port)

- AC15/4: AC-15 private line interface card (4 ports)

Install the correct type of cards in the CCU for the exchange lines that are to be connected, then connect the exchange lines.

The following describes how to connect the respective types of exchange lines.

Loop-Start Exchange Lines

LTRK/8 card

Guidelines

- Loop-start exchange lines are connected to an LTRK/8 card installed in a flexible slot of the CCU. A maximum of 8 exchange lines can be connected to each LTRK/8 card.

- The maintenance switch (SW1) on the LTRK/8 card can be set so that the card can be removed and installed while the system is operating. See page 5-3 for details.

- Table 5-1 shows the maximum numbers of cards and exchange lines per system type.

Table 5-1. Maximum loop-start exchange lines per system

System Type	Maximum number of cards	Maximum exchange line Nos.
40 ports (CAB40×1)	5	1-40
72 ports (CAB40×2)	9	1-72
96 ports (CAB96×1)	12	1-96
192 ports (CAB96 + CAB96B)	24	1-192
288 ports (CAB96 + CAB96B×2)	36	1-288
384 ports (CAB96×2 + CAB96B×2)	48	1-384
480 ports (CAB96×2 + CAB96B×3)	60	1-480
576 ports (CAB96×2 + CAB96B×4)	72	1-576

- Table 5-2 shows the pinout of the DDK connector (CN3) on the LTRK/8 card.

Table 5-2. Pinout of DDK connector (CN3) on LTRK/8 card

CN No.	Line No. (DDK No.)		Pin No.	Exchange Line No.	Signal
CN2	4	1	1	8	B
		2	2		A
		3	3	7	B
		4	4		A
	3	1	5	6	B
		2	6		A
		3	7	5	B
		4	8		A
	2	1	9	4	B
		2	10		A
		3	11	3	B
		4	12		A
	1	1	13	2	B
		2	14		A
		3	15	1	B
		4	16		A

Installation

1. Install the LTRK/8 card in any available flexible slot.

2. Connect one DDK connector per two exchange lines.

3. Pass the exchange lines with the DDK connectors through the wiring slot in the CCU and connect them to the DDK connector on the LTRK/8 card.

4. Connect FG (CCU) with LTRK/8 card using a screw though washer. (See Figure 5-2).

Figure 5-2. Connecting loop-start exchange lines
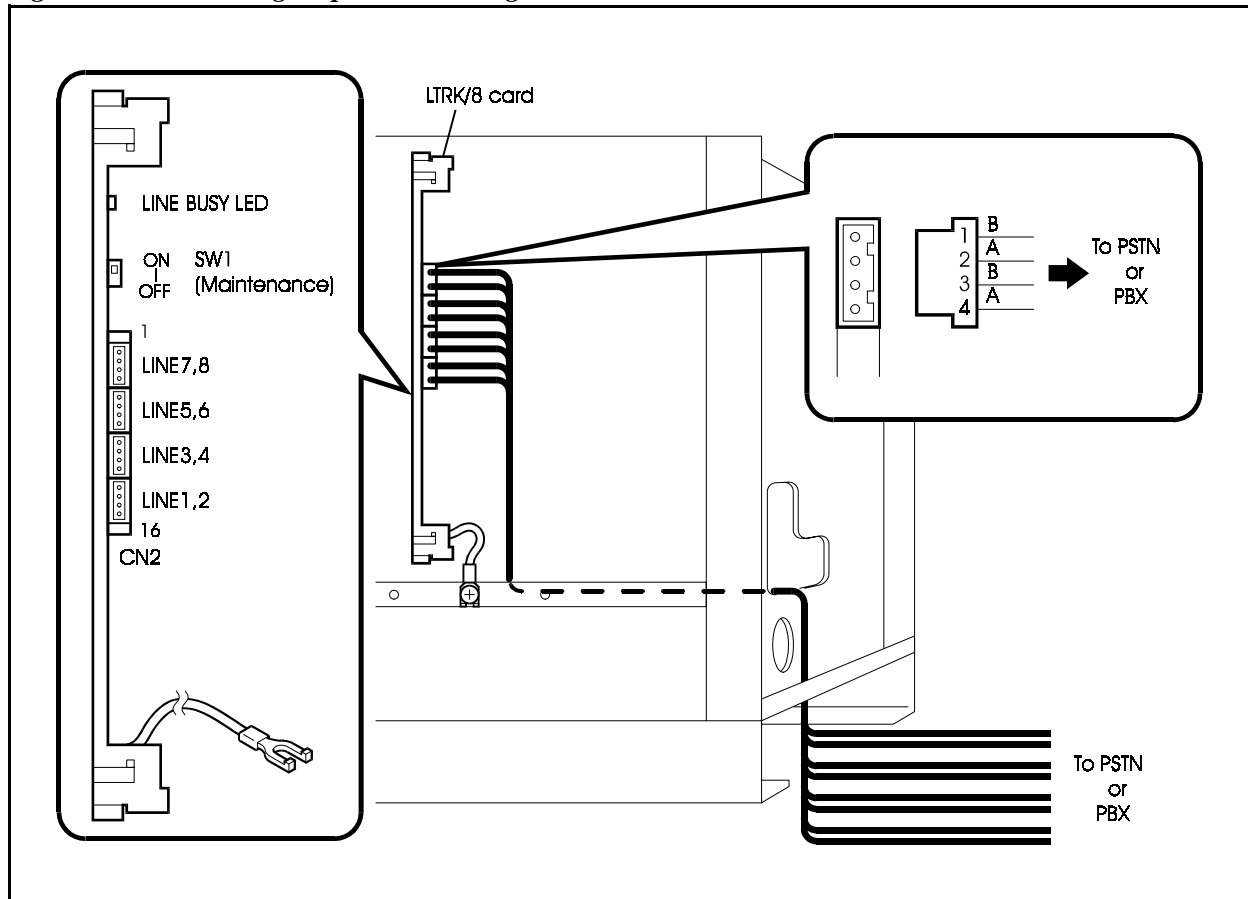
T-Point ISDN Interface (TBRI)

TBRI/4 card

Guidelines

- T-point ISDN is accommodated by the TBRI/4 card which is installed in the flexible slot. Four T-point ISDN lines can be connected to each TBRI/4 card.

- T-point ISDN is connected via DSU (Digital Service Unit).

- T-point ISDN is connected to the TBRI/4 card using 8-pin modular connectors. See Figure 5-4 for the pin configuration of the 8-pin modular connectors (RJ48).

- The TBRI/4 card can be attached or detached when the power is turned ON by setting the maintenance switch (SW2). See page 5-3 for details.

- When using T-point ISDN, you must install the synchronisation package (VB-44460UK) on a CPC96, TSW288 or TSW576 card.

- The CPC96, TSW288 or TSW576 card cannot be attached or detached when the power is turned ON . Always turn the power OFF when attaching or detaching.

- Table 5-3 shows the maximum number of cards that can be installed in each system size.

Table 5-3.   Maximum Number of T-Point ISDN Interfaces per System

System Type	Maximum Cards	Maximum Lines (No. of channels)
40 ports (CAB40×1)	5	20/(40ch)
72 ports (CAB40×2)	9	36/(72ch)
96 ports (CAB96×1)	12	48/(96ch)
192 ports (CAB96 + CAB96B)	24	96/(192ch)
288 ports (CAB96 + CAB96B×2)	36	144/(288ch)
384 ports (CAB96×2 + CAB96B×2)	48	192/(384ch)
480 ports (CAB96×2 + CAB96B×3)	60	240/(480ch)
576 ports (CAB96×2 + CAB96B×4)	72	288/(576ch)

• Setting the rotary switch SW1 of the TBRI/4 enables you to display the status of the each interface condition using LAYER1 LED (lights in red when synchronisation is completed) or LAYER2 LED (lights in red when DL (Data Link) is completed).

Four lines on one single card are connected to an ISDN of the same station. Therefore, the remaining synchronisations are automatically completed when synchronisation has been completed in any one of the lines.

Table 5-4 shows the settings of the line selection switch.

Table 5-4.   Line Selection Switch (SW1) on TBRI/4 Card

Switch Setting No.	Settings
0	OFF (default setting when unit is shipped)
1	1st interface condition displayed by LAYER1 LED and LAYER2 LED
2	2nd interface condition displayed by LAYER1 LED and LAYER2 LED
3	3rd interface condition displayed by LAYER1 LED and LAYER2 LED
4	4th interface condition displayed by LAYER1 LED and LAYER2 LED
5 to 9	Not available

Installation

1. Align the CN8 connector of the CPC96 card or the CN5 connector of the TSW288 or TSW576 card with the holes of spacers and connect the synchronisation package (VB-44460UK).

Figure 5-3. Installation of Synchronisation Package (Example: Installation on TSW288 Card)
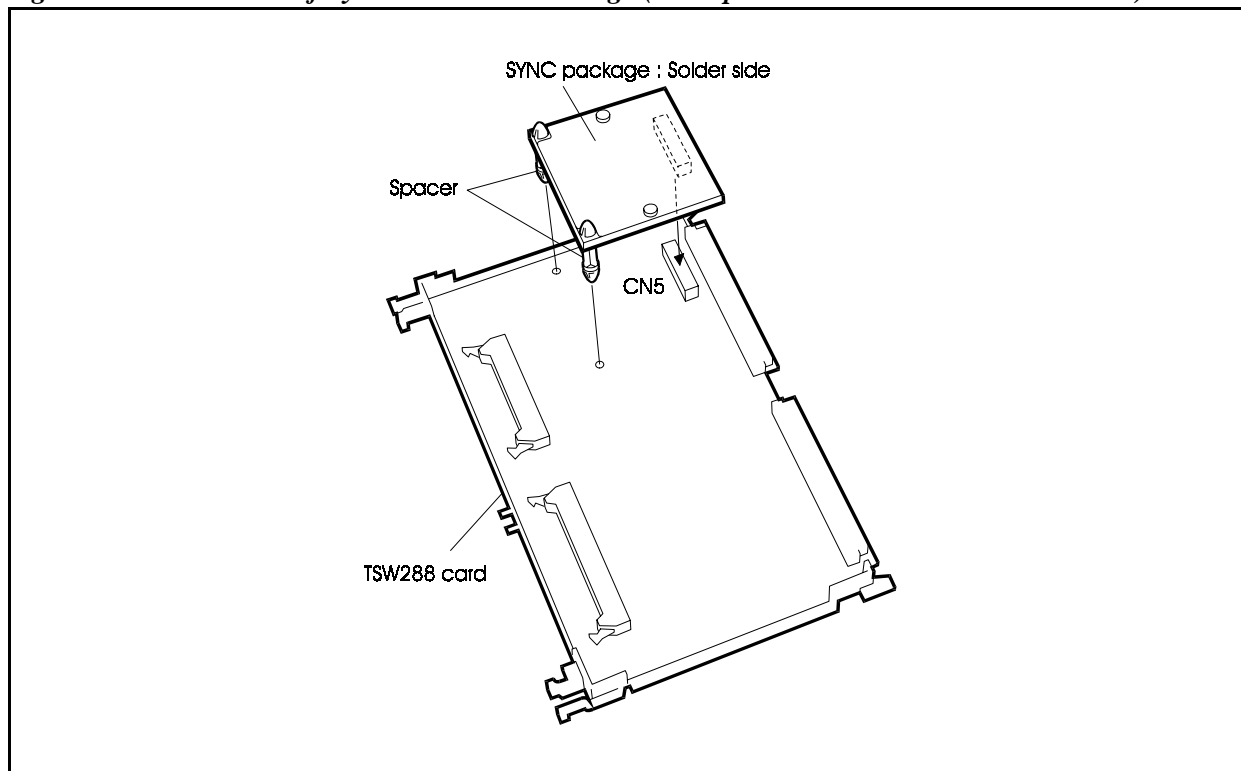
2. Insert the CPC96, TSW288, or TSW576 card in the specified slot.

3. Insert the TBRI/4 card in an available flexible slot.

4. Connect the 8-pin modular jack (RJ48) via the DSU to the T-point ISDN interface.

5. Pass the T-point ISDN wires with 8-pin modular jack through the wiring aperture in the main unit and connect it to the modular connector on the TBRI/4 card.

Figure 5-4. Connection of T-Point ISDN Interface (BRI)
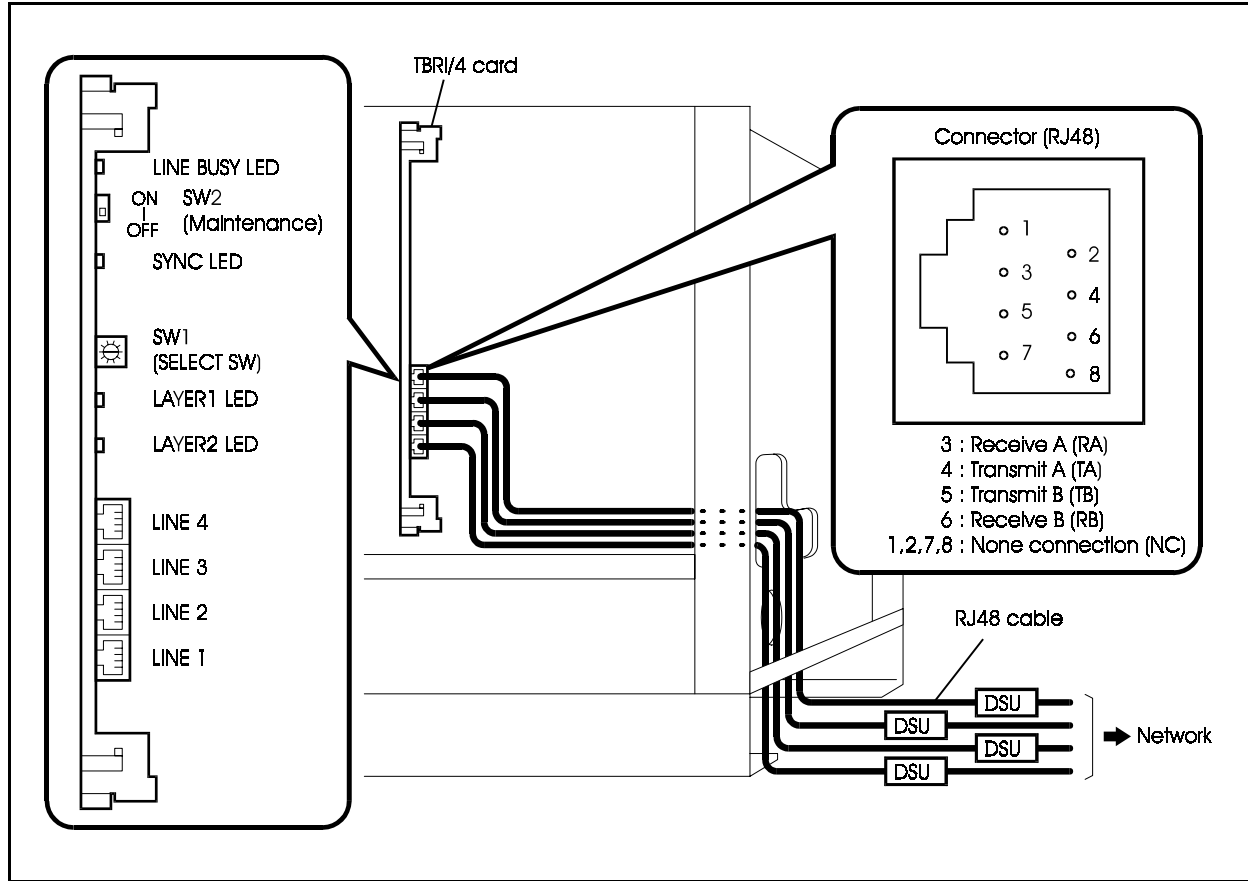
T-Point ISDN Primary Rate Interface (PRI)

PRI/30 card

Guidelines

- The T-point ISDN primary rate interface line is accommodated on the PRI/30 card which is installed in the flexible slot. You can connect one T-point ISDN primary rate interface line to each PRI/30 card.

- By setting the switch and reprogramming, the PRI/30 card can also be set up as an S-point ISDN primary rate interface (see page 5-27).

- Via the DSU (Digital Service Unit), the T-point ISDN primary rate interface carrier line can be accommodated.

- Depending on Dip switch SW2-2, the PRI/30 card can be set for "8-channel mode" or "Other mode". When set for "Other mode" you can also specify three channel classifications: "1 to 16B+D", "1 to 24B+D" or "1 to 30B+D" by programming.

    Table 5-5 shows the mode settings of the PRI/30 card.

Table 5-5.   Mode Settings of PRI/30 Card

Card Name	Switch Setting Mode	Card Assignment/ No. of Channels Used
PRI/30 card (Primary Rate Interface)	8ch mode	PRIT/8: 1 to 8B+D
	Other mode	PRIT/16: 1 to 16B+D
		PRIT/24: 1 to 24B+D
		PRIT/30: 1 to 30B+D

- The ICX can accommodate a maximum of 8 communication channels per flexible slot. If you set the number of channels to 9 or more, there is a limit of the number of cards that can be installed in other slots (see page 4-41).

- The T-point ISDN primary rate interface line uses an 8-pin modular connector, and is connected to the PRI/30 card. See Figure 5-4 for the pin configuration of the 8-pin modular connectors (RJ48).

- The PRI/30 card can be attached or detached when the power is turned ON by setting the maintenance switch (SW3). See page 5-3 for details.

- When installing a T-point ISDN primary rate interface, install the synchronisation package on the CPC96, TSW288, or TSW576 card.

- The CPC96, TSW288 or TSW576 card cannot be attached or detached when the power is turned ON . Always turn the power OFF when attaching or detaching.

- Table 5-6 shows the maximum number of T-point ISDN primary rate interfaces that can be installed in each system size.

Table 5-6.   Maximum Number of T-Point ISDN Primary Rate Interface Cards Per System

System Type	Maximum Cards (available flexible slot positions)	Maximum Lines (No. of channels)
40 ports (CAB40×1)	2/(1, 5)	2/(60ch)
72 ports (CAB40×2)	3/(1, 5, 9)	3/(90ch)
96 ports (CAB96×1)	3/(1, 5, 9)	3/(90ch)
192 ports (CAB96 + CAB96B)	6/(1, 5, 9×2)	6/(180ch)
288 ports (CAB96 + CAB96B×2)	9/(1, 5, 9×3)	9/(270ch)
384 ports (CAB96×2 + CAB96B×2)	12/(1, 5, 9×4)	12/(360ch)
480 ports (CAB96×2 + CAB96B×3)	15/(1, 5, 9×5)	15/(450ch)
576 ports (CAB96×2 + CAB96B×4)	18/(1, 5, 9×6)	18/(540ch)

Installation

1. Align the CN8 connector of the CPC96 card or the CN5 connector of the TSW288 or TSW576 card with the holes of spacers and connect the SYNC synchronisation package. See Figure 5-3 on page 5-10 for how to install the SYNC synchronisation package.

2. Insert the CPC96, TSW288, or TSW576 card in the specified slot.

3. Set the DIP switch (SW2-1) of the PRI/30 card ON (Exchange line).

4. Set the DIP switch (SW2-2) of the PRI/30 card as shown in Table 5-7.

Table 5-7.   Switch Setting for SW2 on PRI/30 Card

Switch No.	Function	
SW2-1	ON	Set to "Exchange line". for T-point.
	OFF	Set to "Extension". for S-point.
SW2-2	ON	Set to "Other mode". Can be used with the programmed number (1 to 16B+D, 1 to 24B+D or 1 to 30+D) of channels.
	OFF	Set to "8-channel mode". Can be used with 1 to 8B + D channels.

5. Insert the PRI/30 card into the specified flexible slot (see page 4-41)

6. Connect the 8-pin modular jack (RJ48) via the DSU to the T-point ISDN primary rate interface line.

7. Pass the T-point ISDN wires with 8-pin modular jack through the wiring aperture of the CCU and connect it to the modular connector on the PRI/ 30 card.

Figure 5-5. Connection of T-Point ISDN Primary Rate Interface (PR1)
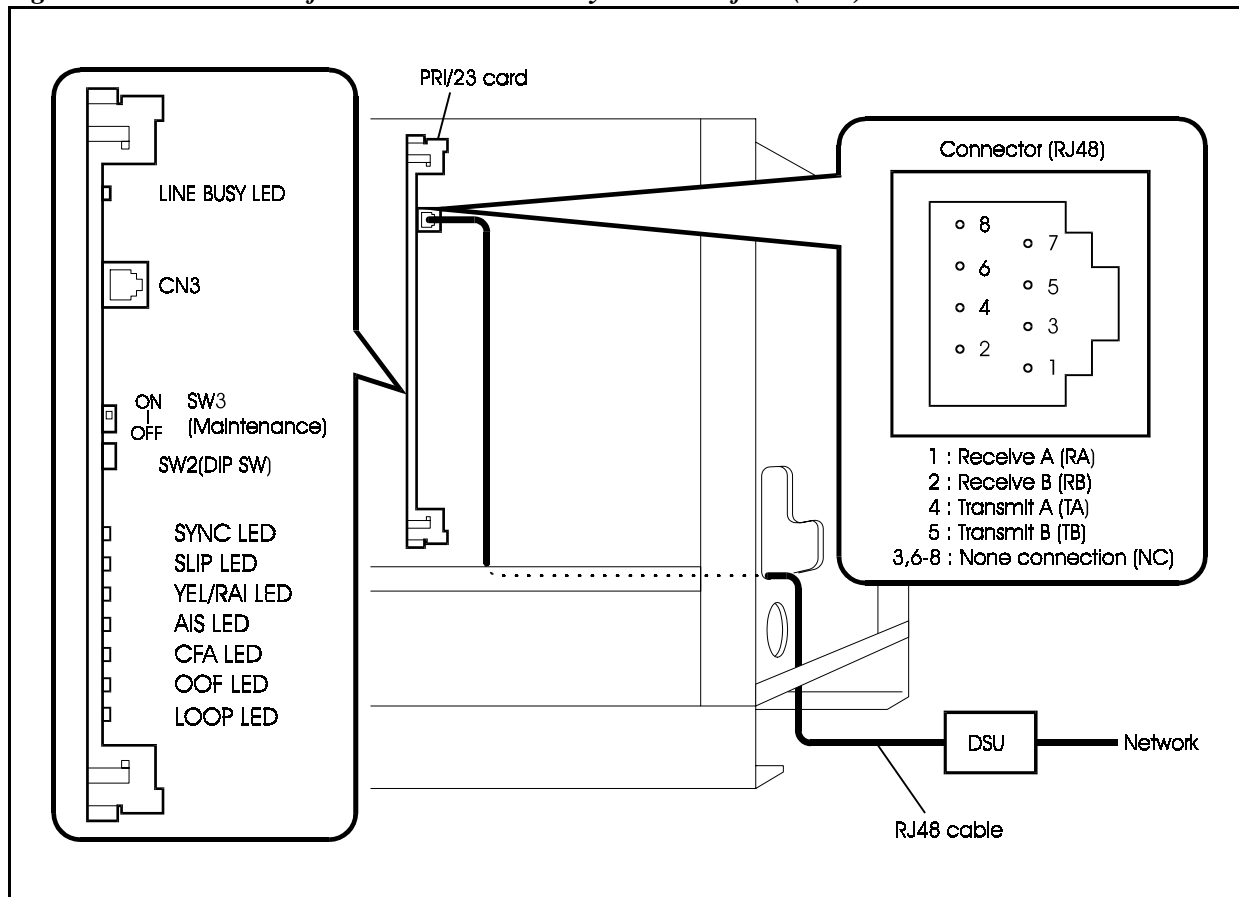
AC-15 Private Line Interface

AC15/4 card

Guidelines

- The AC-15 private line is connected to the AC15/4 card which is installed in the flexible slot. You can connect four AC-15 private lines to each AC15/4 card.

- Connect the AC-15 private lines to the AC15/4 card using the DDK connector.

- The AC15/4 card can be attached or detached when the power is turned ON by setting the maintenance switch (SW1). See page 5-3 for details.

- Table 5-8 shows the maximum number of cards and lines that can be installed in each system.

Table 5-8.   Maximum number of AC-15 private lines per system

System Type	Maximum Cards	Maximum Line No.
40 ports (CAB40×1)	5	1-20
72 ports (CAB40×2)	9	1-36
96 ports (CAB96×1)	12	1-48
192 ports (CAB96 + CAB96B)	24	1-96
288 ports (CAB96 + CAB96B×2)	36	1-144
384 ports (CAB96×2 + CAB96B×2)	48	1-192
480 ports (CAB96×2 + CAB96B×3)	60	1-240
576 ports (CAB96×2 + CAB96B×4)	72	1-288

- Table 5-9 shows the pin configuration of the DDK connector (CN3) on the AC15/4 card.

Table 5-9.   Pin Configuration of DDK Connector (CN3) on AC15/4 Card

CN No.	Circuit No. (DDK No.)		Terminal No.	Signal name
CN3	4	1	1	TX2
		2	2	TX1
		3	3	RX2
		4	4	RX1
	3	1	5	TX2
		2	6	TX1
		3	7	RX2
		4	8	RX1
	2	1	9	TX2
		2	10	TX1
		3	11	RX2
		4	12	RX1
	1	1	13	TX2
		2	14	TX1
		3	15	RX2
		4	16	RX1

Installation

1. Set the dip switches on the AC15/4 card as indicated in Table 5-10.

Table 5-10. AC15/4 Card Dip Switch Settings

Switch No.	Setting					
SW101, SW201, SW301, SW401	For incoming calls loss plan					
	1	2	3	4	Loss plan with in card	Remarks
	OFF	OFF	OFF	OFF	+1dB	Initial value
	ON	OFF	OFF	OFF	-1dB	
	OFF	ON	OFF	OFF	-3dB	
	OFF	OFF	ON	OFF	-5dB	
	OFF	OFF	OFF	ON	-7dB	
	Note: Gain is obtained in a card only for the amount of wiring loss.					
SW102, SW202, SW302, SW402	For outgoing calls loss plan					
	1	2	3	4	Loss plan with in card	Remarks
	OFF	OFF	OFF	OFF	+4dB	Initial value
	ON	OFF	OFF	OFF	+2dB	
	OFF	ON	OFF	OFF	0dB	
	OFF	OFF	ON	OFF	-2dB	
	OFF	OFF	OFF	ON	-4dB	
	Note: Gain is obtained in a card only for the amount of wiring loss.					

2. Install the AC15/4 card in any available flexible slot.

3. Attach the DDK connector to the AC-15 private line.

4. Connect the AC-15 private line with the DDK connector attached through the wiring aperture in the CCU to the DDK connector of the AC15/4 card (CN3 connector).

Figure 5-6. Connection of AC-15 private line
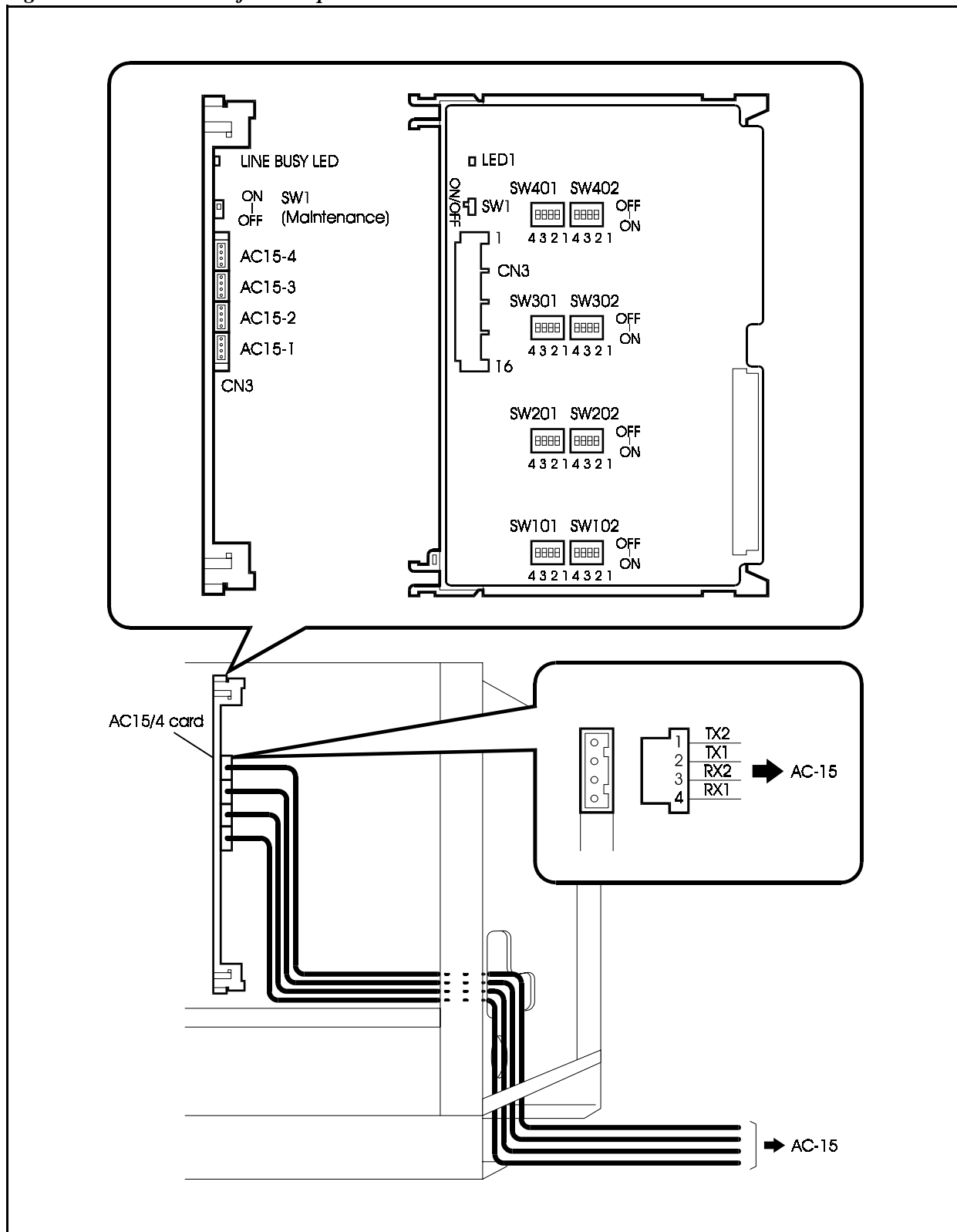
Extensions

The following cards are used with extensions:

- DEC/8: Digital key phone interface card (8 ports)

- AEC/8: SLT internal line interface card (8 ports)

- SBRI/4: S-point ISDN basic interface card (4 ports)

- PRI/30: T-point and S-point ISDN primary rate interface card (1 port)

Install the correct type of cards in the CCU for the extensions that are to be connected, then connect the extensions.

The following describes how to connect the respective types of extensions.

Digital Extensions   **DEC/8 card**

Guidelines

- Digital exensions are connected to a DEC/8 card installed in a flexible slot of the CCU. A maximum of 8 extensions can be connected to each DEC/8 card.

- Connect digital extension wires to digital key phones via secondary sockets (LJU).

- Locate digital key phones within 240m from the CCU. The maximum loop circuit resistance is 40 ohms.

- DEC/8 cards can be removed and replaced while the system is operating. However, because there are no busy lamps for calls on extensions, you cannot check the status of these extensions. We recommend using paging, etc., before removing the cards, to warn users that the lines will be disconnected (see page 5-3 for details).

- Table 5-11 shows the maximum numbers of cards and extensions per system type.

Table 5-11. Maximum cards and digital (and analog) extensions per system

System Type	Maximum number of cards	Maximum number of extensions.
40 ports (CAB40×1)	5	1-40
72 ports (CAB40×2)	9	1-72
96 ports (CAB96×1)	12	1-96
192 ports (CAB96 + CAB96B)	24	1-192
288 ports (CAB96 + CAB96B×2)	36	1-288
384 ports (CAB96×2 + CAB96B×2)	48	1-384
480 ports (CAB96×2 + CAB96B×3)	60	1-480
576 ports (CAB96×2 + CAB96B×4)	72	1-576

- Table 5-12 shows the pinout of the DDK connector (CN4) on the DEC/8 card.

Table 5-12. Pinout of DDK connector (CN3) on DEC/8 card

CN No.	Line No. (DDK No.)		Pin No.	Extension port	Signal
CN3	4	1	1	8	B
		2	2		A
		3	3	7	B
		4	4		A
	3	1	5	6	B
		2	6		A
		3	7	5	B
		4	8		A
	2	1	9	4	B
		2	10		A
		3	11	3	B
		4	12		A
	1	1	13	2	B
		2	14		A
		3	15	1	B
		4	16		A

- If you are installing a DSS or EM24, connect them to the digital extension cards. See "DSS" and "EM24" in Chapter 6 (pages 6-26 and 6-28) for details.

Installation

1. Install the DEC/8 card in any available flexible slot.

2. Connect one DDK connector per two extension wires.

3. Pass the extension wires with the DDK connectors through the wiring slot in the CCU and connect them to the DDK connector on the DEC/8 card.

4. Connect internal lines "B" and "A" to "pin 4" and "pin3" of the secondary socket (LJU).

5. Use the two-conductor cable to connect the digital key phone to the secondary socket (LJU).

Figure 5-7. Connecting digital extensions
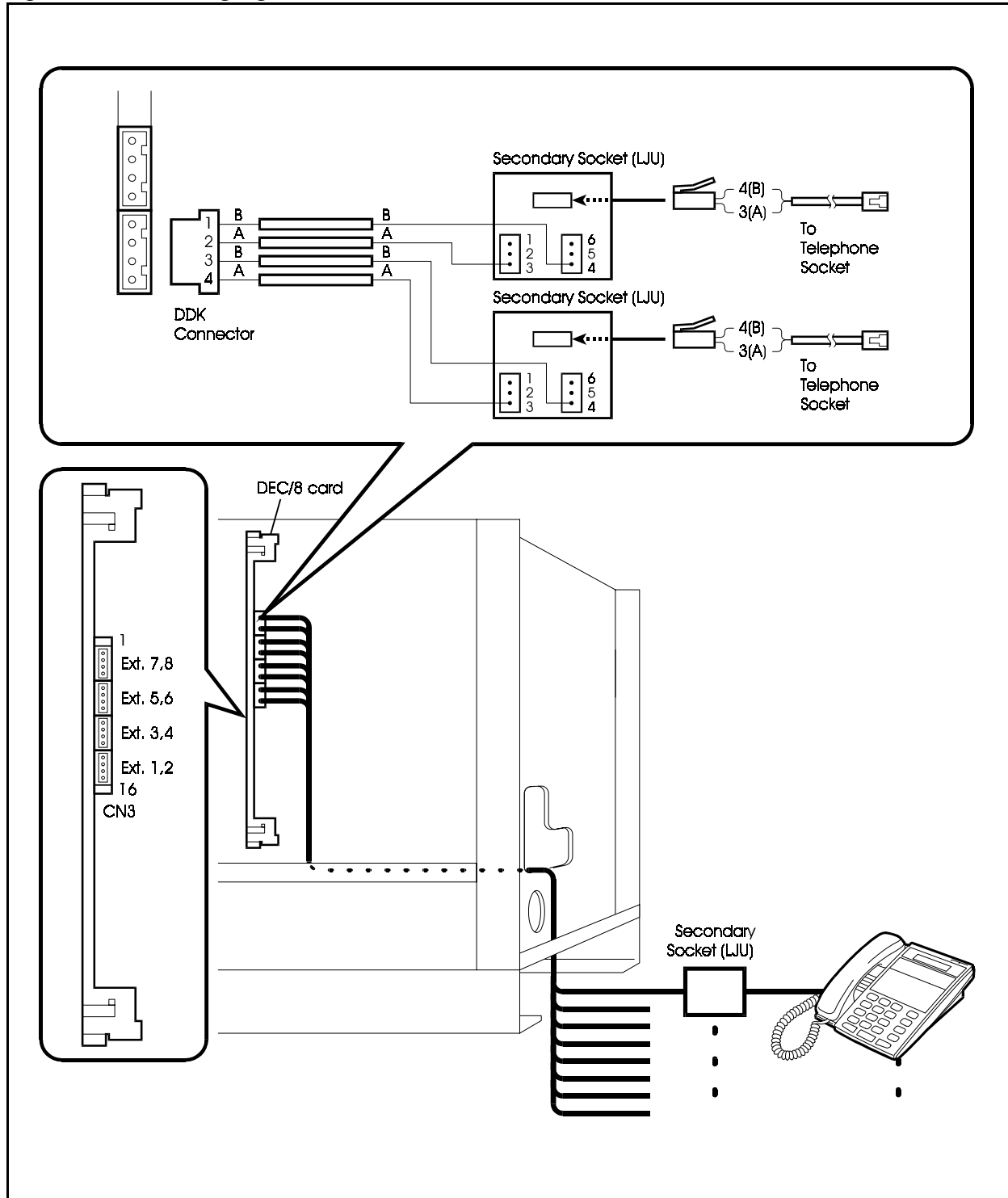
Analog Extensions   **AEC/8 card**

Guidelines

- Analog extensions are connected to an AEC/8 card installed in a flexible slot of the main unit. A maximum of 8 internal lines can be connected to each AEC/8 card.

- Connect analog internal lines to SLT via master sockets (LJU).

- Loop resistance:1.6km, Wire-Diameter 0.5mm, Telephone resisfance 120 ohms.

- Four DTMF signal reception circuits are mounted on the CPC96, CPC288 or CPC576 card. For this reason, the DTMF-telephone connection is possible. if more than the number of mounted circuits is required, add the MFR/8 card to the flexible slot OP1, or OP2 Slot.

- AEC/8 cards and MFR/8 cards can be removed and replaced while the system is operating. However, because there are no busy lamps for extensions, you cannot check the status of these lines. We recommend using paging, etc., before removing the cards, to warn users that the lines will be disconnected. See page 5-3 for details.

- Table 5-12 shows the maximum numbers of cards and extensions per system type. (The maximums are same for digital and analog extensions.)

- The pinout of the DDK connector on the AEC/8 card is identical to that of the DEC/8 card. See Table 5-13 for details.

Installation

1. Install the analog extension card in any available flexible slot.

2. Connect one DDK connector per two extension wires.

3. Pass the internal lines with the DDK connectors through the wiring slot in the CCU and connect them to the DDK connector on the AEC/8 card.

4. Connect extension wires "B" and "A" to "pin5" and "pin2" of the master socket (LJU).

5. Use the two-conductor cable to connect the SLT to the master socket (LJU).

Figure 5-8. Connecting analog extensions
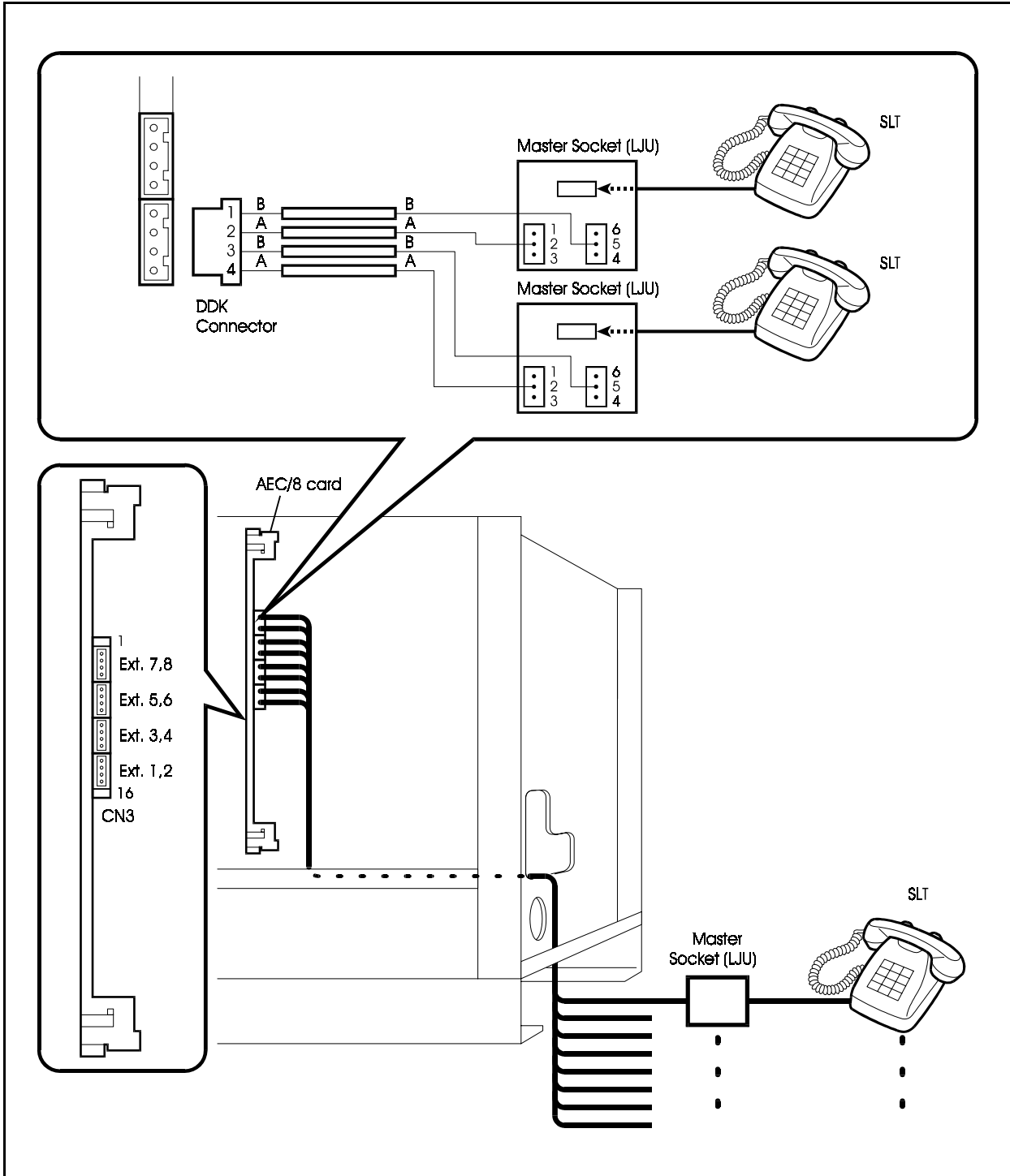
S-Point ISDN Interface (SBRI)

SBRI/4 card

Guidelines

- S-point ISDN is accommodated by the SBRI/4 card which is installed in the flexible slot. Four S-point ISDN lines can be connected to each SBRI/4 card.

- S-point ISDN is connected to the SBRI/4 card using 8-pin modular connectors. See Figure 5-7 for the pin configuration of the 8-pin modular connectors (RJ48).

- Setting the rotary switch SW1 of the SBRI/4 enables you to display the status of the selected circuits using LED. The way to set it is the same as that of the TBRI/4 card. See Table 5-4 on page 5-9 for details.

- The SBRI/4 card can be attached or detached when the power is turned ON. Confirmation during the extension busy conversation is not possible, therefore announcements using paging need to be made when attaching or detaching. See page 5-3 for details.

- Table 5-13 shows the maximum number of cards that can be installed in each system size.

- The system supplies -40V to the ISDN terminal which is connected to S-point interface card. Although output is limited so that the terminals which operate upon "Restricted Mode" (420mw) are available to operate by this power supply.
  This system cannot support the terminal which operate upon "Noumal Mode" (1W).

Table 5-13. Maximum Number of S-point ISDN Interfaces Per System

System Type	Maximum Cards	Maximum Lines (No. of channels)
40 ports (CAB40×1)	5	20/(40ch)
72 ports (CAB40×2)	9	36/(72ch)
96 ports (CAB96×1)	12	48/(96ch)
192 ports (CAB96 + CAB96B)	24	96/(192ch)
288 ports (CAB96 + CAB96B×2)	36	144/(288ch)
384 ports (CAB96×2 + CAB96B×2)	48	192/(384ch)

System Type	Maximum Cards	Maximum Lines (No. of channels)
480 ports (CAB96×2 + CAB96B×3)	60	240/(480ch)
576 ports (CAB96×2 + CAB96B×4)	72	288/(576ch)

Installation

1. Insert the SBRI/4 card in an available flexible slot.

2. Connect the 8-pin modular jack (RJ48) to the S-point ISDN wires from the ISDN terminal equipment.

3. Pass the S-point ISDN wires with 8-pin modular jack through the wiring aperture in the CCU and connect it to the modular connector on the SBRI/4 card.

Figure 5-9. Connection of S-point ISDN Interface (SBRI)
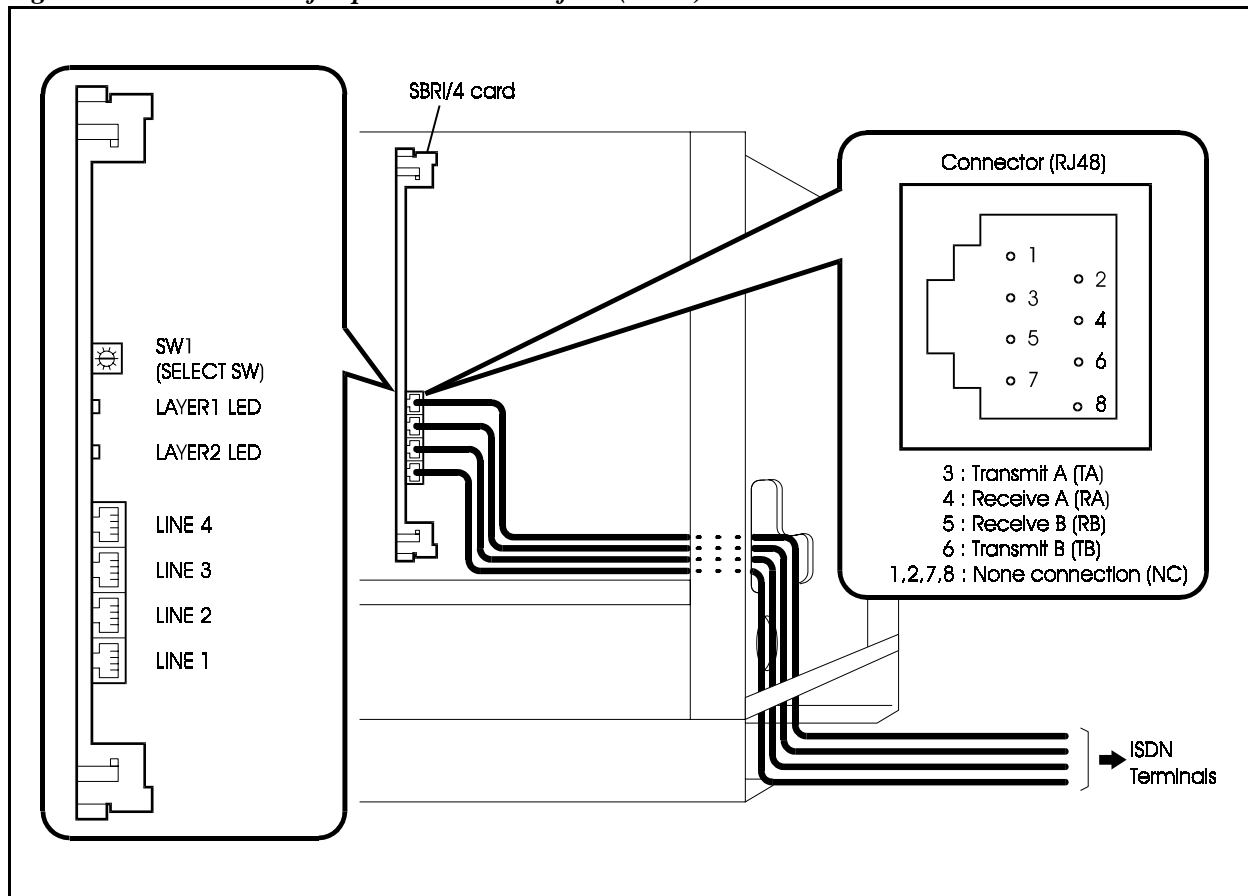
Point to MultiPoint connection

Point to MultiPoint connection is available in S-point BRI.

If you use Point to MultiPoint connection, wiring length limitation is different depending on the programme setting. (Passive Bus : FF31 BSSC 0202)

0:   Short Loop:

Wire	Wining
High Impedance wire (Zo = 150 ohms)	Maximum 200m
Low Impedance wire (Zo = 75 ohms)	Maximum 100m

1:   Long Loop:

Maximum 1km
The distance between terminal equipments must be connected within 25-50m in order to restrict delay of the signal.

Figure 5-10. Point to MultiPoint connection (Long Loop)
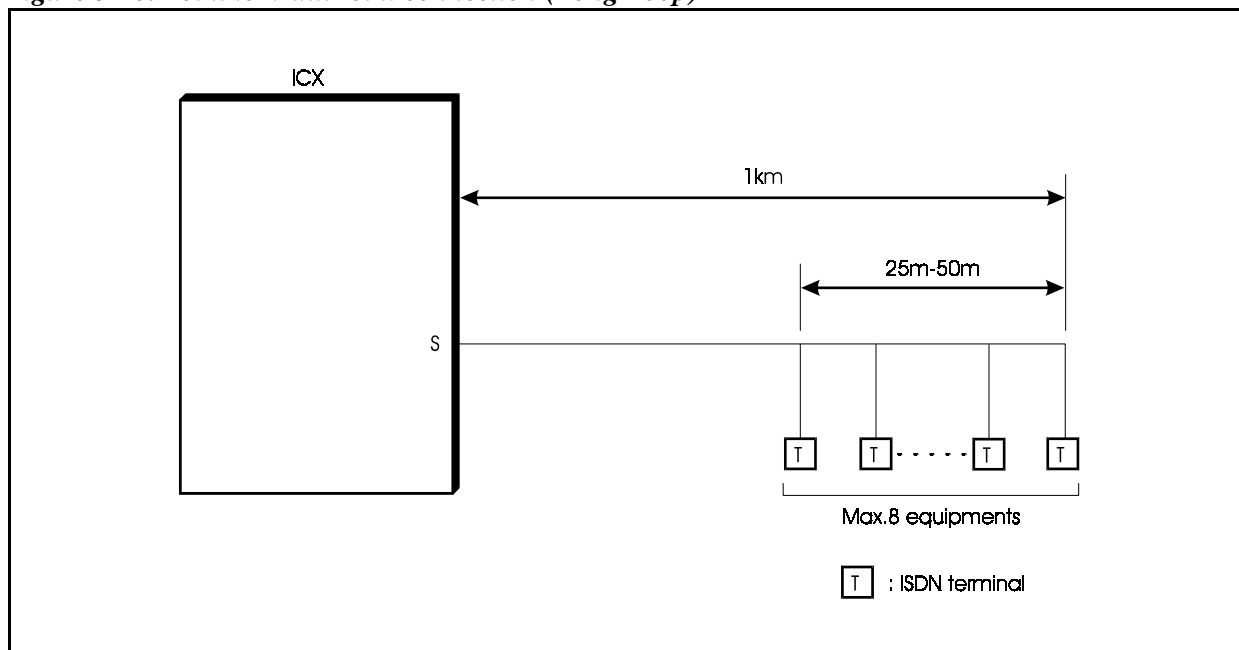
S-point ISDN Primary Rate Interface (PRI)

PRI/30 card

Guidelines

- The S-point ISDN primary rate interface is accommodated on the PRI/30 card which is installed in the flexible slot. You can connect one S-point ISDN primary rate interface line to each PRI/30 card.

- By setting the switch and reprogramming, the PRI/30 card can also be set up as an T-point ISDN primary rate interface (see page 5-12).

- The S-point ISDN primary rate interface is connected to the PRI/30 card using an 8-pin modular jack. See Figure 5-10 for the pin configuration of the 8-pin modular connectors (RJ48).

- The PRI/30 card can be set using Dip switch SW2-2 for "8-channel mode" or "Other mode".

  Table 5-14 shows the mode settings of the PRI/30 card.

Table 5-14. Mode Settings of PRI/30 Card

Card Name	Switch Setting Mode	Card Assignment/ No. of Channels Used
PRI/30 card (Primary Rate Interface)	8 ch mode	PRIS/8: 1 to 8B+D
	Other mode	PRIS/30: 1 to 30B+D

- The ICX can accommodate a maximum of 8 communication channels per flexible slot. If you select "Other mode", there is a limit of the number of cards that can be installed in other slots (see page 4-41.)

- The PRI/30 card can be attached or detached when the power is turned ON by setting the maintenance switch (SW3). See page 5-3 for details.

- Table 5-16 shows the maximum number of S-point ISDN primary rate interfaces that can be installed in each system size.

- The system supplies -40V to the ISDN terminal which is connected to S-point interface card. Although output is limited so that the terminals which operate upon "Restricted Mode" (420mw) are available to operate by this power supply.
  This system cannot support the terminal which operate upon "Noumal Mode" (1W).

Table 5-15. Maximum Number of S-point ISDN Primary Rate Interface Cards Per System

System Type	Maximum Cards (Available flexible slot positions)	Maximum Lines (No. of channels)
40 ports (CAB40×1)	2/(1,5)	2/(60ch)
72 ports (CAB40×2)	3/(1, 5, 9)	3/(90ch)
96 ports (CAB96×1)	3/(1, 5, 9)	3/(90ch)
192 ports (CAB96 + CAB96B)	6/(1, 5, 9×2)	6/(180ch)
288 ports (CAB96 + CAB96B×2)	9/(1, 5, 9×3)	9/(270ch)
384 ports (CAB96×2 + CAB96B×2)	12/(1, 5, 9×4)	12/(360ch)
480 ports (CAB96×2 + CAB96B×3)	15/(1, 5, 9×5)	15/(450ch)
576 ports (CAB96×2 + CAB96B×4)	18/(1, 5, 9×6)	18/(540ch)

Installation

1. Set the Dip switch (SW2-1) of the PRI/30 card OFF (extension).

2. Set the Dip switch (SW2-2) of the PRI/30 card as shown in Table 5-16.

Table 5-16. Switch Setting for SW2-2 on PRI/30 Card

Switch No.	Function	
SW2-1	ON	Set to "Exchange line". for T-point.
	OFF	Set to "Extensions". for S-point.
SW2-2	ON	Set to "Other mode". Can be used with 1 to 30B+D channels.
	OFF	Set to "8-channel mode". Can be used with 1 to 8B + D channels.

3. Insert the PRI/30 card into the specified flexible slot.

4. Connect the 8-pin modular jack (RJ48) to the S-point ISDN primary rate interface wires from the ISDN terminal equipment.

5. Pass the S-point ISDN wires with 8-pin modular jack through the wiring aperture in the CCU and connect it to the modular connector on the PRI/30 card.

Figure 5-11. Connection of S-point ISDN Primary Rate Interface (PRI)
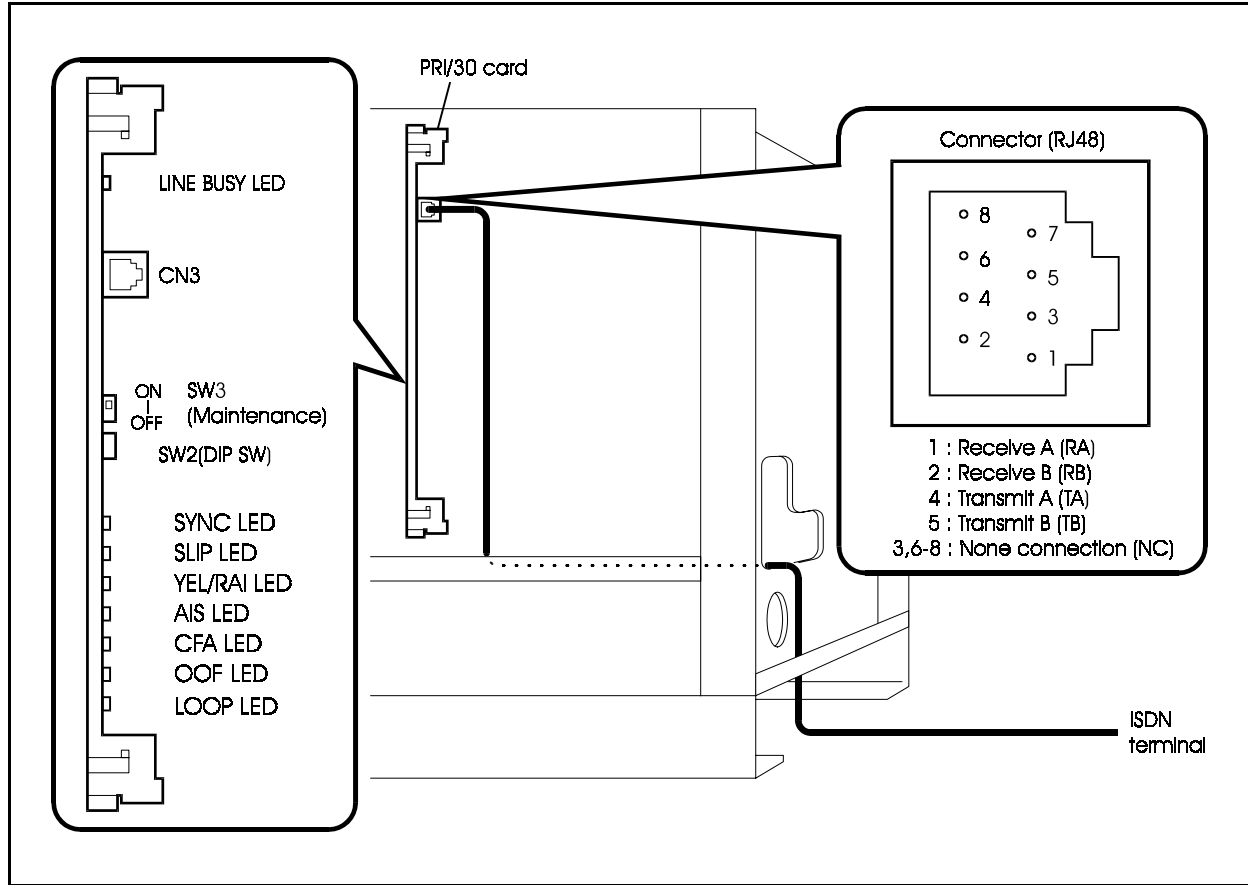
Key Phone Wall Mounting

Guidelines

- ICX key phones can be mounted on the wall using the wall mounting adapter on the bottom of the phone.

Installation

1. Remove the wall mounting adapter from the bottom of the phone taking care not to damage the adapter hooks.

2. Rotate the wall mounting adapter by 180 degrees, then slot it into the two guides.

3. Remove the handset guide, rotate it by 180 degrees, and replace it.

4. Insert two screws in the wall.

5. Hook the two mounting holes on the bottom of the phone onto the two screws in the wall.

Figure 5-12. Wall mounting of phone

Handset guide

100mm or 83mm
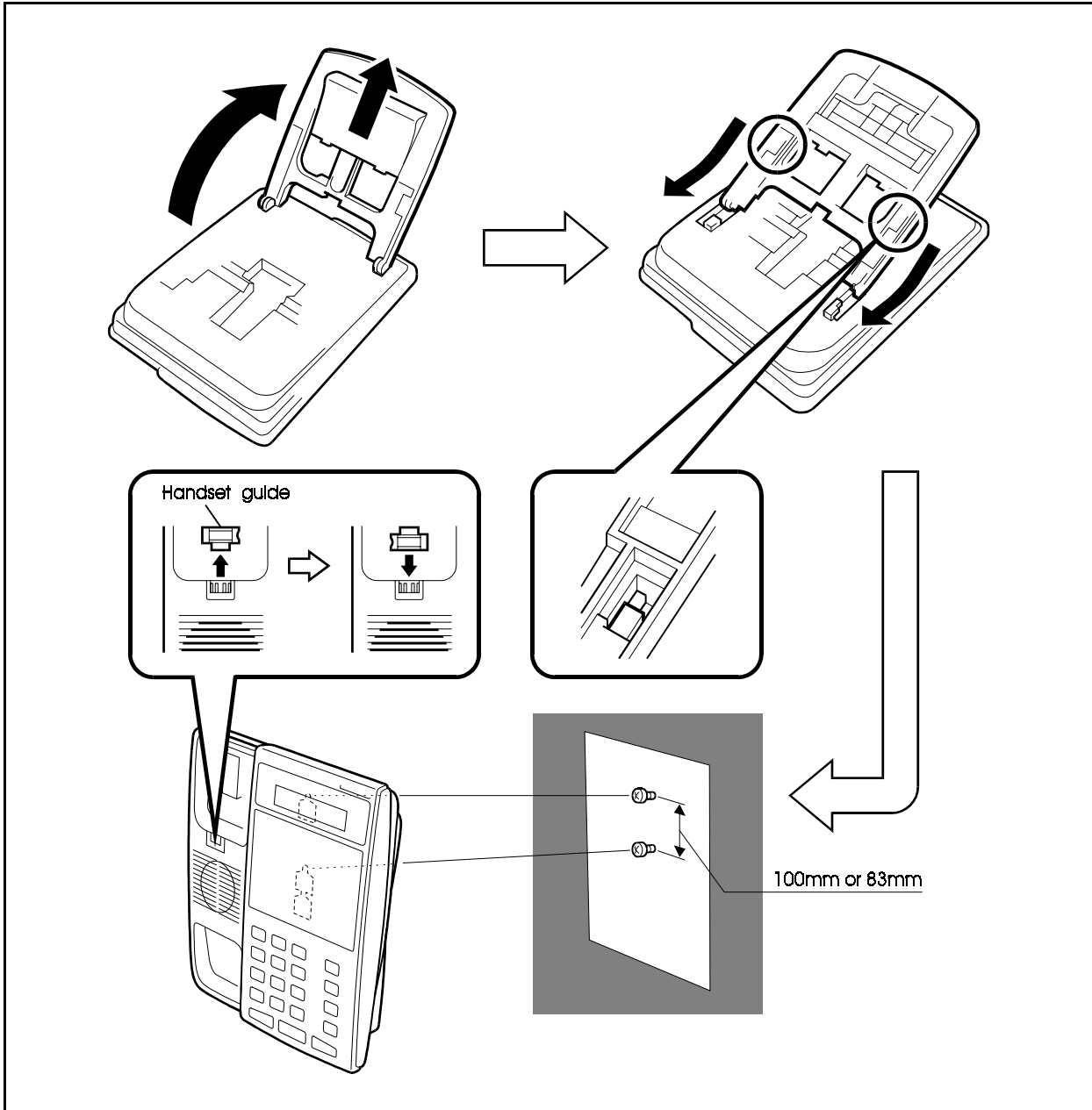
Chapter 6. Peripheral Equipment

This chapter describes how to install and connect DSS, doorphone adaptors, other peripheral equipment, and replecing the backup battery of CPC card.

Music-On-Hold (MOH)
CPC96, CPC288, CPC576 Card ⊗

Guidelines

- A music source such as a CD player or tape recorder can be connected to the MOH input of a CPC96, CPC288, or CPC576 card installed in the CPC slots of the CCU to provide music-on-hold (MOH).

- CPC96, CPC288, and CPC576 cards cannot be installed and removed while the CCU is operating. First, turn the power off.

- The maximum input impedance of the MOH input (CN4: RCA) is 10k ohms. The maximum input signal level is -10dB.

Installation

1. Connect one end of an RCA pin cable (2-wire shielded cable) to the CN4 (RCA) connector on the CPC96, CPC288, or CPC576 card.

2. Connect the other end of the RCA pin cable to the output (AUX) of a music source such as a CD player or tape recorder.

   Fit the appropriate connector (RCA or mini-plug, etc.) as required to the end of the RCA pin cable to suit your music source.

Figure 6-1. Installation of music-on-hold source
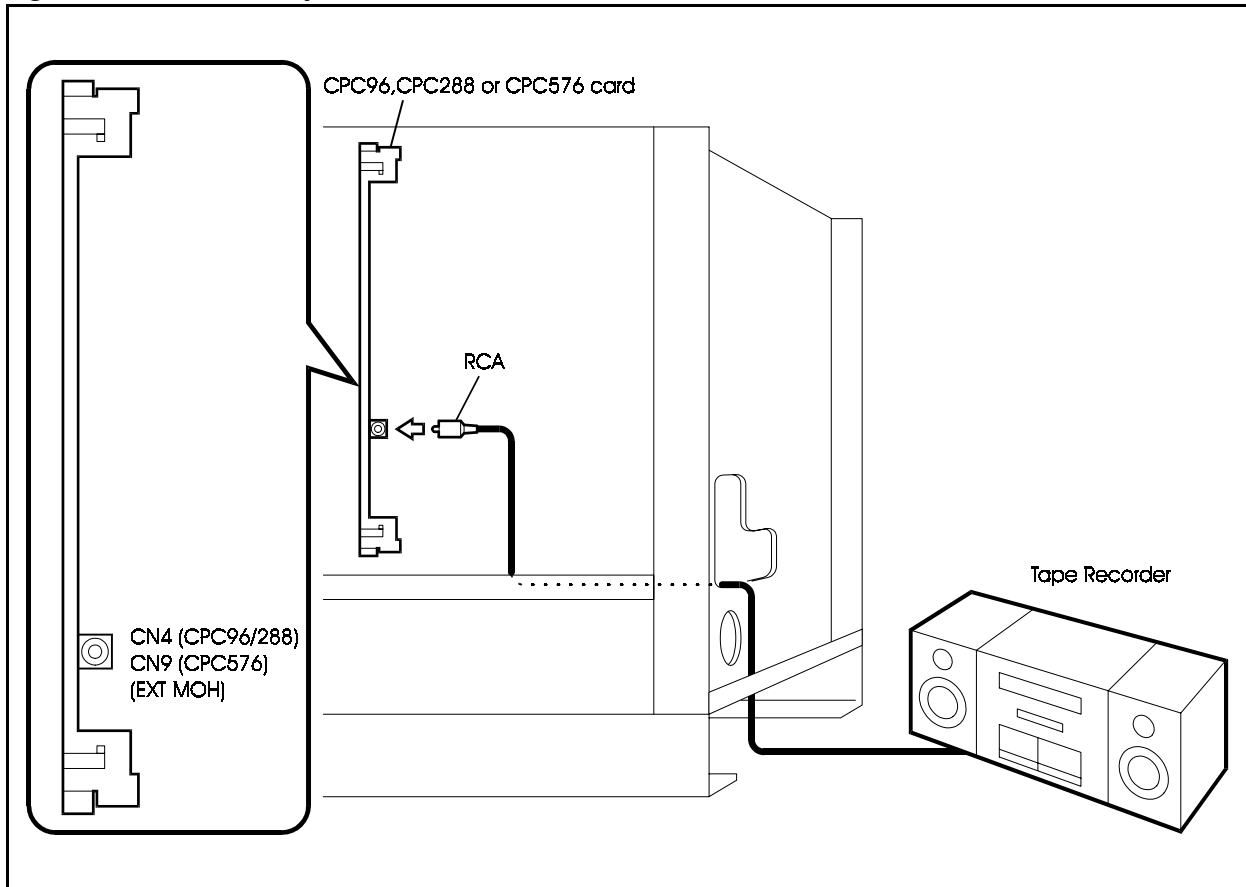
Background Music (BGM)   SCC card $\otimes$

Guidelines

- A music source such as a CD player or tape recorder can be connected to the BGM input (RCA) of an SCC card installed in one of the optional card slots of the CCU to provide background music (BGM).

- SCC cards cannot be installed and removed while the CCU is operating. First, turn the power off.

- If an FM radio is connected as a music source, it must be located at least 16.5 ft. (5m) from the CCU.

- The maximum input impedance of the BGM input (CN4: RCA) is 10kohms. The maximum input signal level is -10dB.

Installation

1. Install the SCC card in an available optional card slot.

2. Connect one end of an RCA pin cable (2-wire shielded cable) to the CN4 (RCA) connector on the SCC card.

3. Connect the other end of the RCA pin cable to the output (AUX) of a music source such as a CD player or tape recorder.

   Fit the appropriate connector (RCA or mini-plug, etc.) as required to the end of the RCA pin cable to suit your music source.

Figure 6-2. Installation of background music source
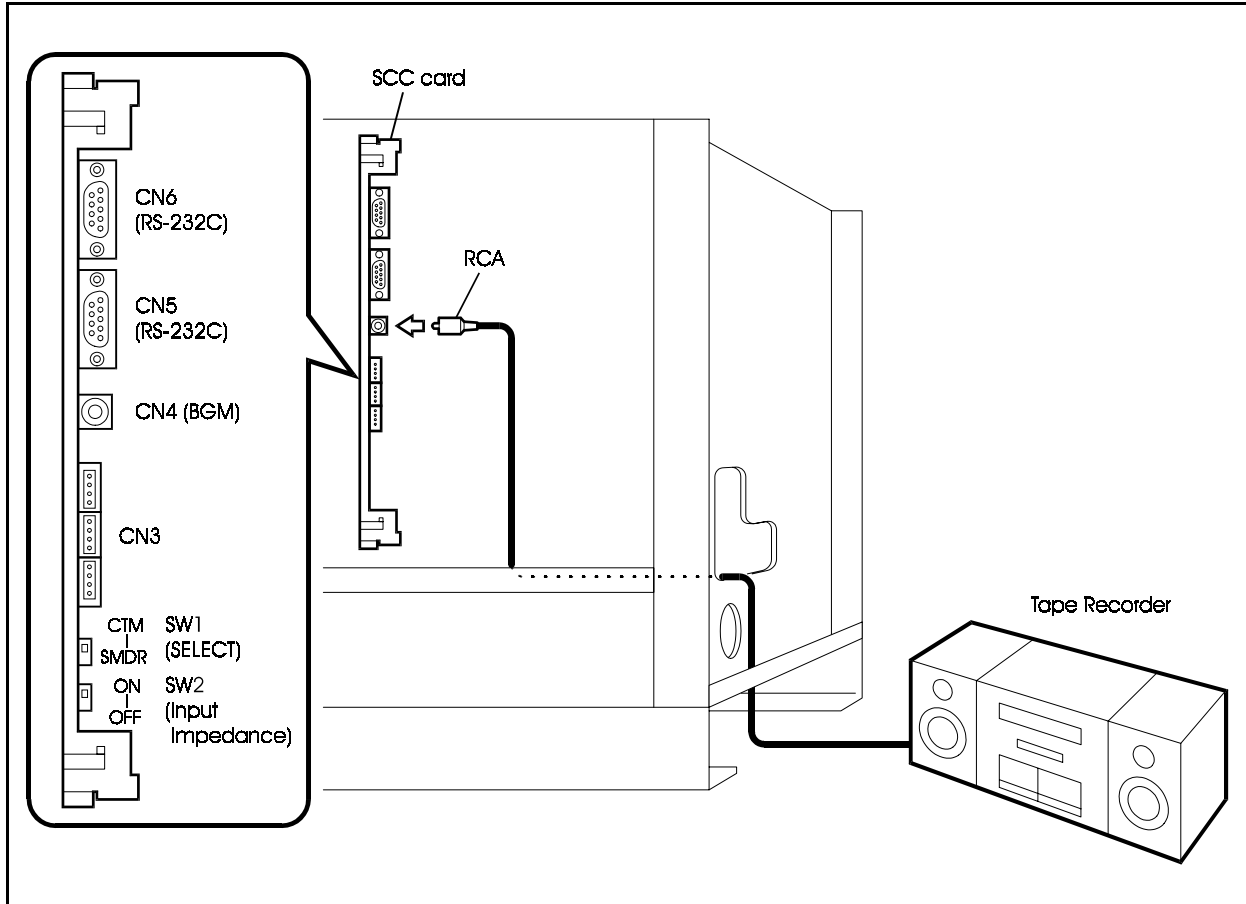
Paging

SCC card ⊗

⚠ **CAUTION:**
 • Turn the power switch and the external breaker OFF, and
   disconnect the AC cable before installing the Paging equipments.

Guidelines

• Paging can be performed by connecting a paging amplifier, relays, and
  speakers to an SCC card installed in one of the optional card slots.

• SCC cards cannot be installed and removed while the CCU is operating.
  First, turn the power off.

• The paging amplifier, relays, and speakers are not provided with the ICX
  and must therefore be purchased separately.

• Table 6-1 shows the pinout of the external connector (CN3) of the SCC
  card.

Table 6-1.   Pinout of external connector (CN3) of SCC card

Pin No.	Signal	Description
1	GND	Signal ground
2	-	
3	-	
4	S5	External paging control output 5 (withstand voltage: 30V)
5	S4	External paging control output 4 (withstand voltage: 30V)
6	S3	External paging control output 3 (withstand voltage: 30V)
7	S2	External paging control output 2 (withstand voltage: 30V)
8	S1	External paging control output 1 (withstand voltage: 30V)
9	MB	External paging control output B (relay loop make contact: maximum current: 2A)
10	MA	External paging control output A (relay loop make contact: maximum current: 2A)

Pin No.	Signal	Description
11	B	External paging I/O B
12	A	External paging I/O A

Installation

1. Set SW2 on the SCC card to match the input impedance of the connected device. See Table 6-2 for SW2 settings.

Table 6-2.   Settings of SW2 on SCC card

Switch No.	Position	Setting
SW2	ON	External paging device input impedance: 600 ohms
	OFF	External paging device input impedance: high impedance (default when shipped)

2. Install the SCC card in an available optional card slot.

3. Prepare a cable with a DDK connector and connect one end of it to CN3.

4. Connect the other end of the cable to the paging amplifier, relays, and speakers.

Figure 6-3. Connection of paging recorder
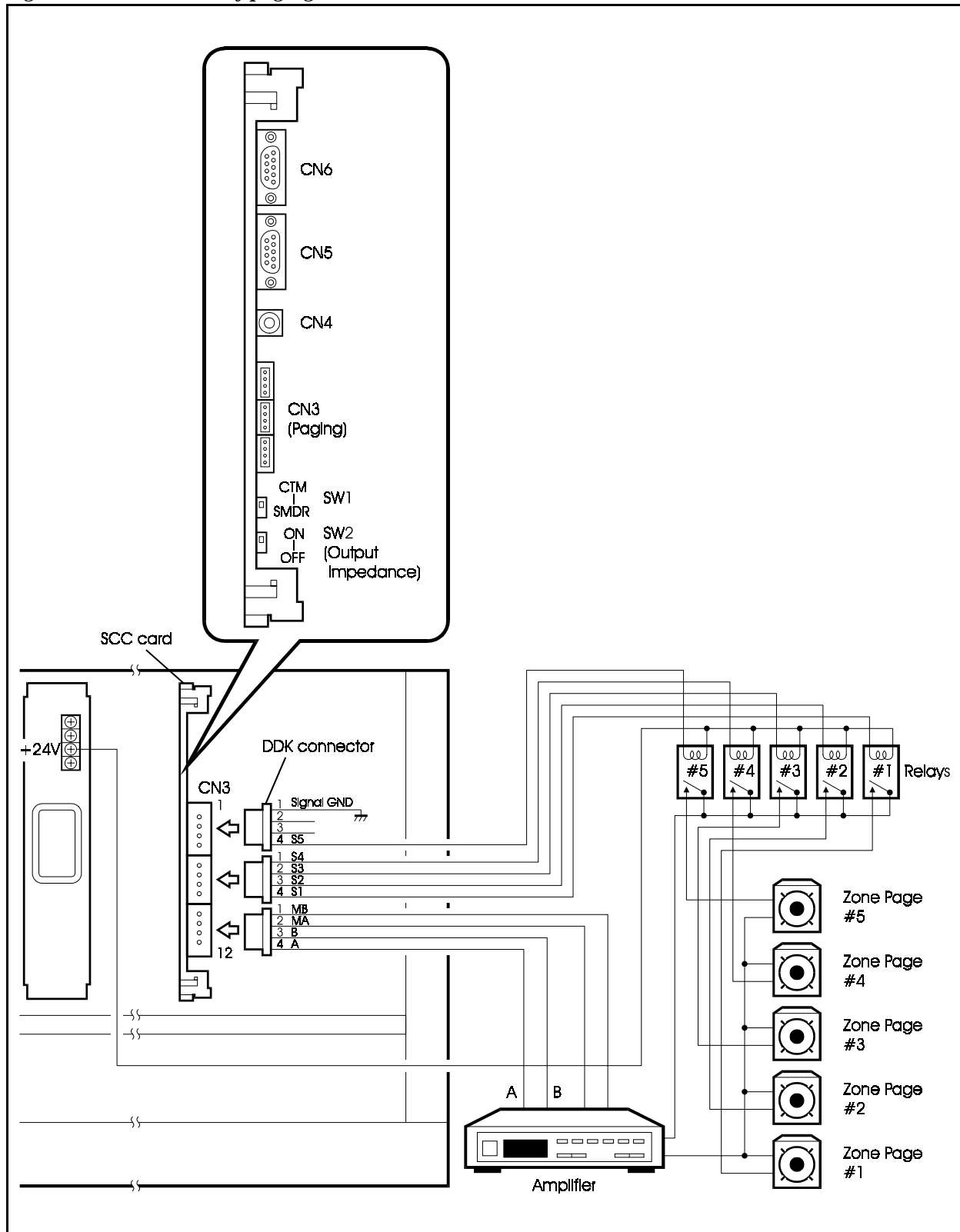
PC Customisation

SCC card ⊗

Guidelines

- You can connect a PC to an SCC card in an optional card slot to customise the setup without using a telephone for customisation.

- SCC cards cannot be installed and removed while the CCU is operating. First, turn the power off.

- If you are using a PC for customising the setup, Windows95 version is required:

- Prepare an RS-232C cable.

- To send data from a PC to the main unit, you will need not only the PC customisation software but also Windows and a 3.5-in. 2HD floppy disk (formatted for Windows) for saving the customisation data.

- Table 6-3 shows the pinout for the RS-232C port (CN5 and CN6) of the SCC card.

Table 6-3.   RS-232C port (CN5 and CN6) pinout of SCC card

Connector pin No.	Signal	IN/OUT	Description
1	-	-	Not used
2	RD	IN	Receive data
3	SD	OUT	Send data
4	ER	OUT	Ready signal from PBX
5	SG	-	Signal ground
6	DR	IN	Data set ready
7	RS	OUT	Request to send
8	CS	IN	Clear to send
9	-	-	Not used

Making an RS-232C Cable

Depending on the RS-232C connector on your PC, you will need to make one of the following RS-232C cables.

- D-SUB 9-pin to D-SUB 25-pin

If your PC is equipped with a 25-pin D-SUB RS-232C connector, make a cable as shown in Figure 6-4. The cable should be less than 15m long.

Figure 6-4. Connections for D-SUB 9-pin to D-SUB 25-pin cable
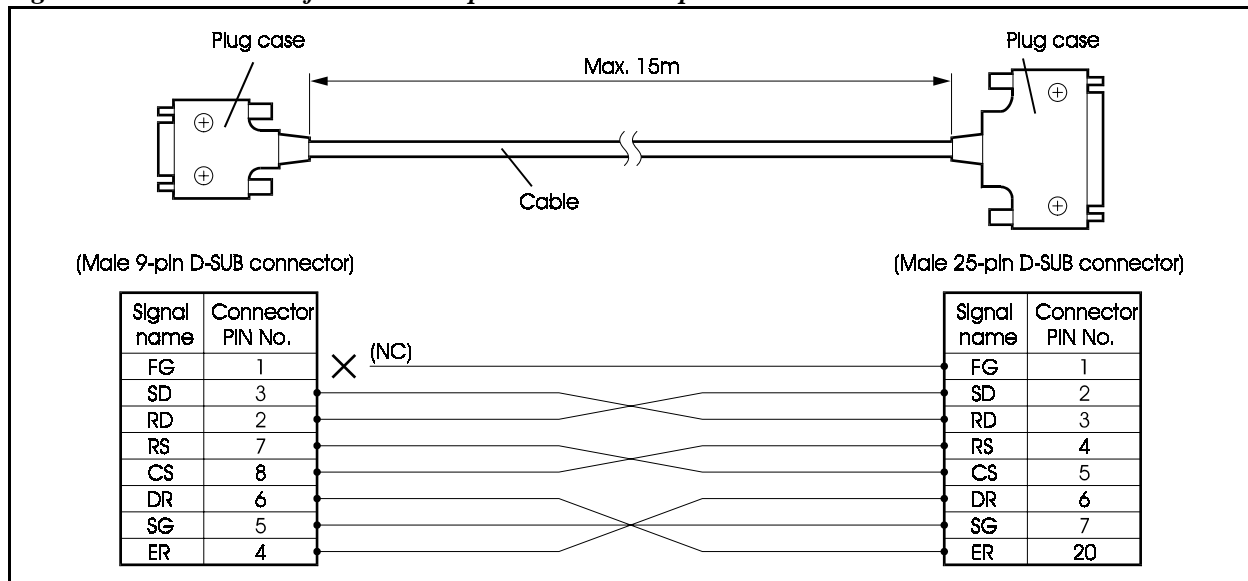
- D-SUB 9-pin to D-SUB 9-pin

If your PC is equipped with a 9-pin D-SUB RS-232C connector, make a cable as shown in Figure 6-5. The cable should be less than 15m long.

Figure 6-5. Connections for D-SUB 9-pin to D-SUB 9-pin cable

Installation

1. Set switch SW1 on the SCC card to the CTM position.

    See Table 6-4 for details of SW1 positions.

Table 6-4. Positions of SW1 on SCC card

Switch No.	Position	Setting
SW1	CTM	Customisation tool can be connected to RS-232C port (CN5)
	SMDR	Call logging device can be connected to RS-232C port (CN5) (default when shipped)

2. Install the SCC card in one of the optional card slots.

3. Connect the 9-pin D-SUB connector on the RS-232C cable to the CN5 connector (port 1) on the SCC card.

4. Pass the RS-232C cable through the wiring slot in the CCU, then connect the 9-pin or 25-pin D-SUB connector on the other end to the RS-232C connector of your PC.

Figure 6-6. Connection to PC
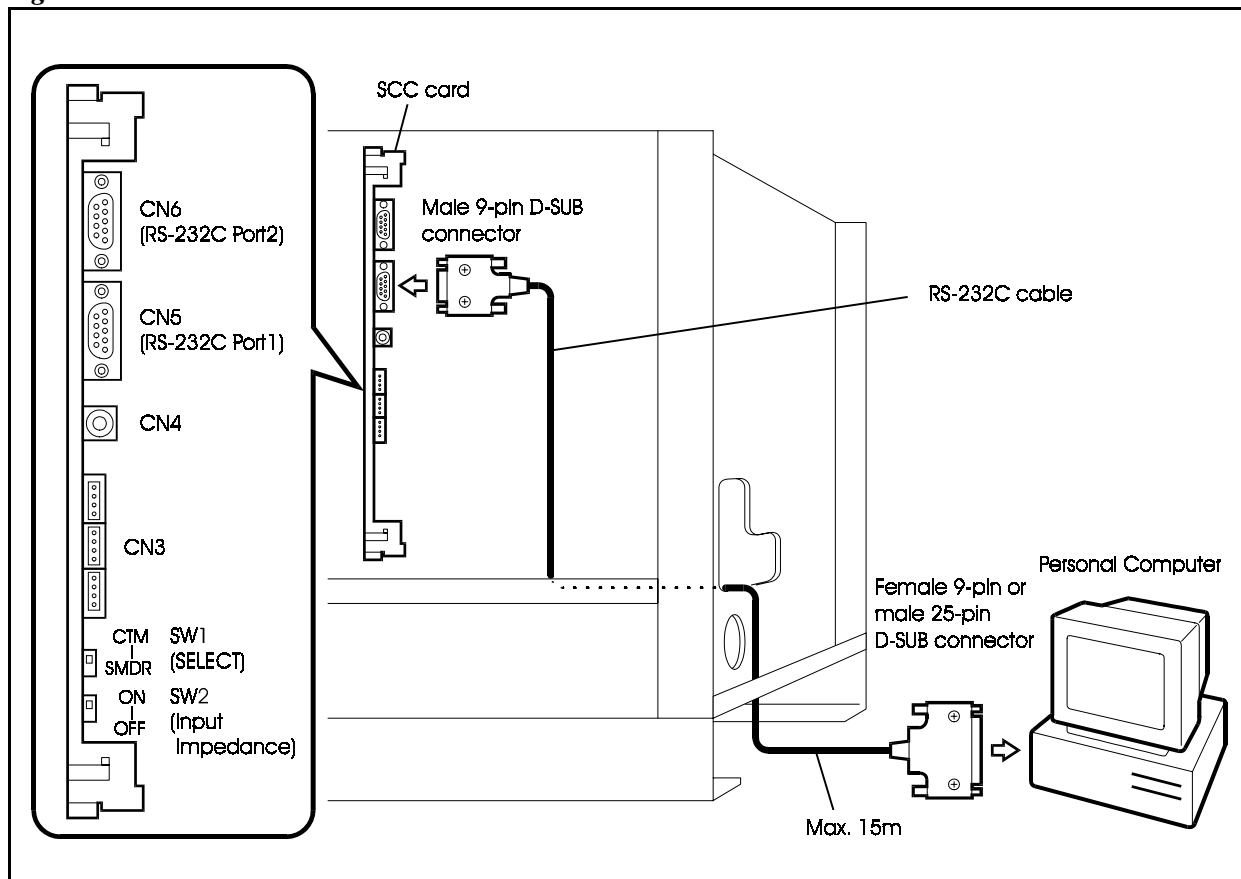
Call Logging   SCC card ⊗

Guidelines

- You can connect a call logging recorder such as a personal computer or a printer to an SCC card in an optional card slot.

- SCC cards cannot be installed and removed while the CCU is operating. First, turn the power off.

- A 9-pin to 25-pin or 9-pin to 9-pin RS-232C cable is required.

- Table 6-3 shows the pinout for the RS-232C ports (CN5 and CN6) of the SCC card.

## Making an RS-232C Cable

Depending on the RS-232C connector on your call logging recorder, you will need to make one of the following RS-232C cables.

- D-SUB 9-pin to D-SUB 25-pin

If your call logging recorder is equipped with a 25-pin D-SUB RS-232C connector, make a cable as shown in Figure 6-7. The cable should be less than 15m long.

Figure 6-7. Connections for D-SUB 9-pin to D-SUB 25-pin cable
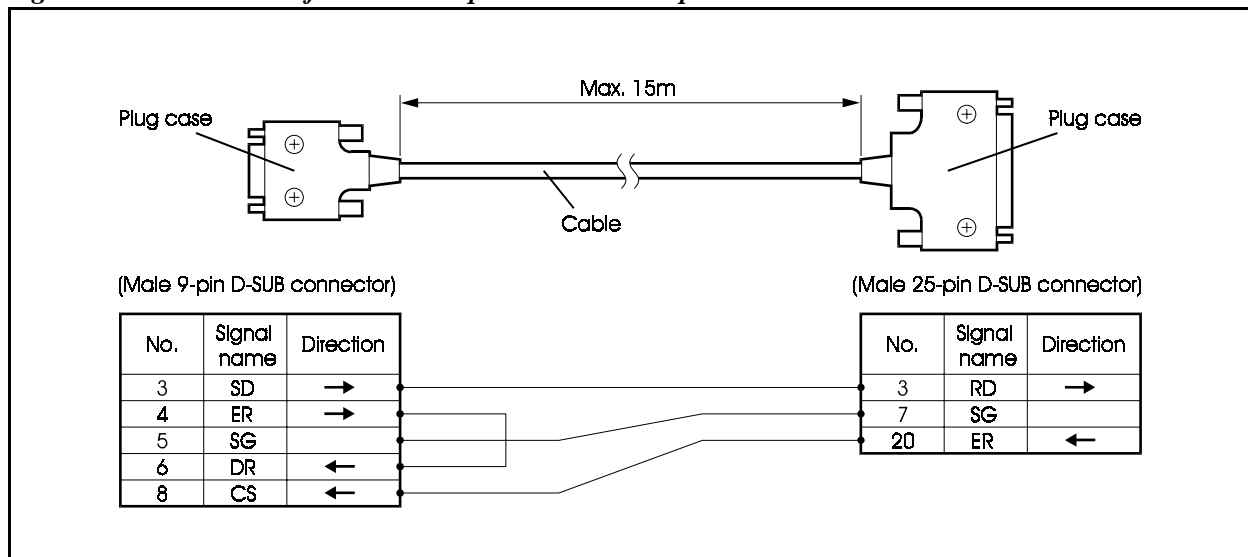
- D-SUB 9-pin to D-SUB 9-pin

  If your call logging recorder is equipped with a 9-pin D-SUB RS-232C connector, make a cable as shown in Figure 6-8. The cable should be less than 15m long.

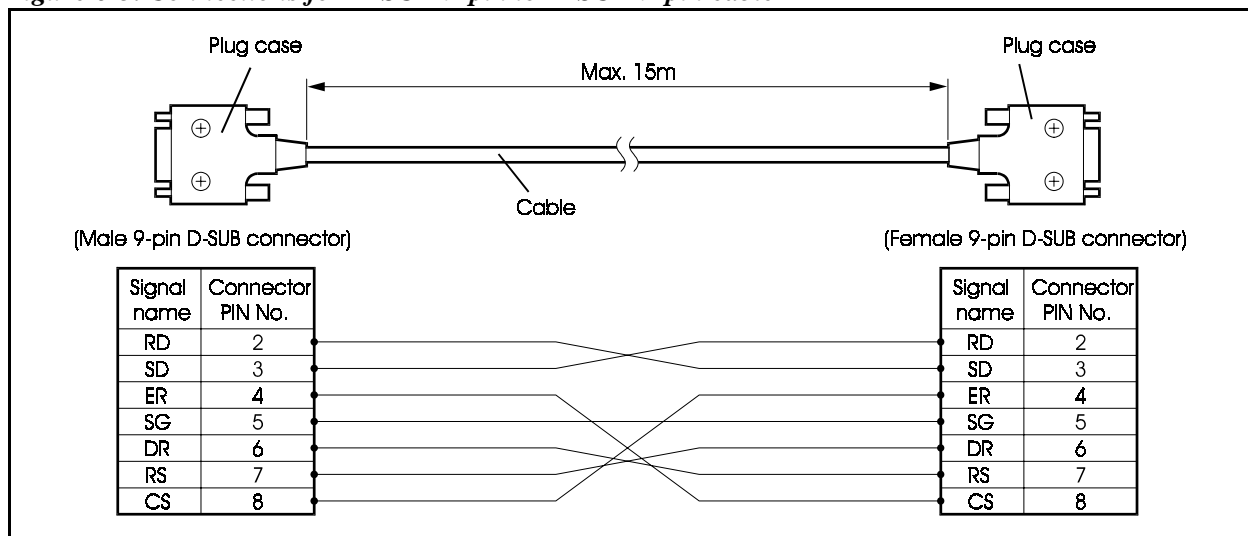*Figure 6-8. Connections for D-SUB 9-pin to D-SUB 9-pin cable*
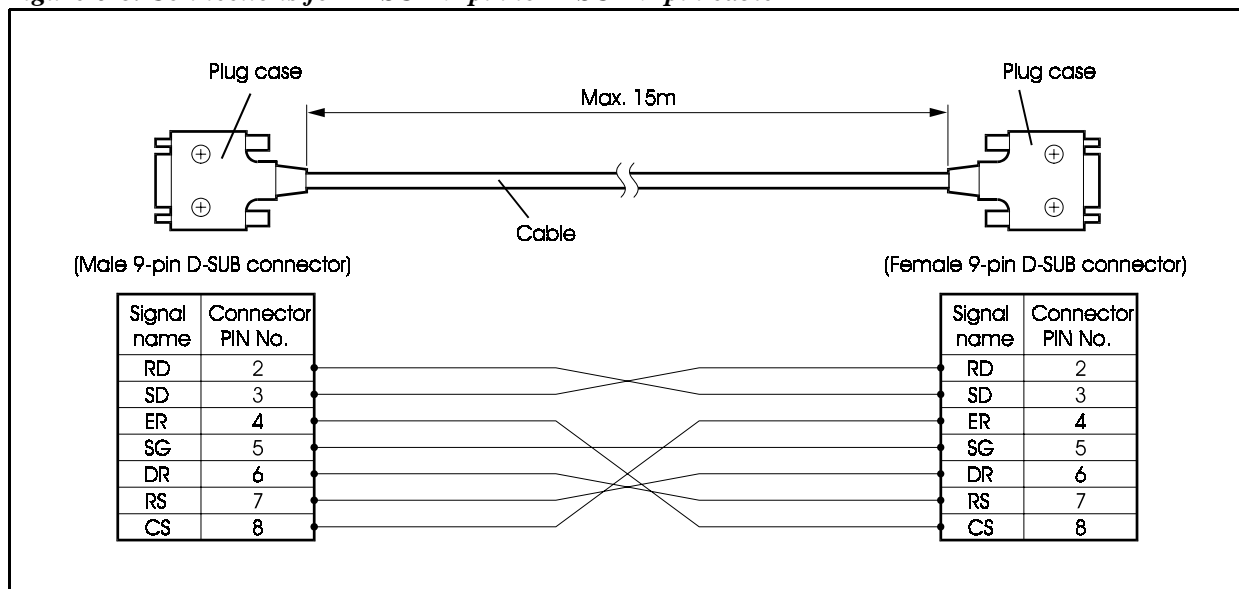
Installation

1. Set switch SW1 on the SCC card to the "SMDR" position (see Table 6-4 for details).

2. Install the SCC card in one of the optional card slots.

3. Connect the 9-pin D-SUB connector on the RS-232C cable to the CN5 connector (port 1) on the SCC card.

4. Pass the RS-232C cable through the wiring slot in the CCU, then connect the 9-pin or 25-pin D-SUB connector on the other end to the RS-232C connector of your call logging recorder.

Figure 6-9. Connection to call logging recorder
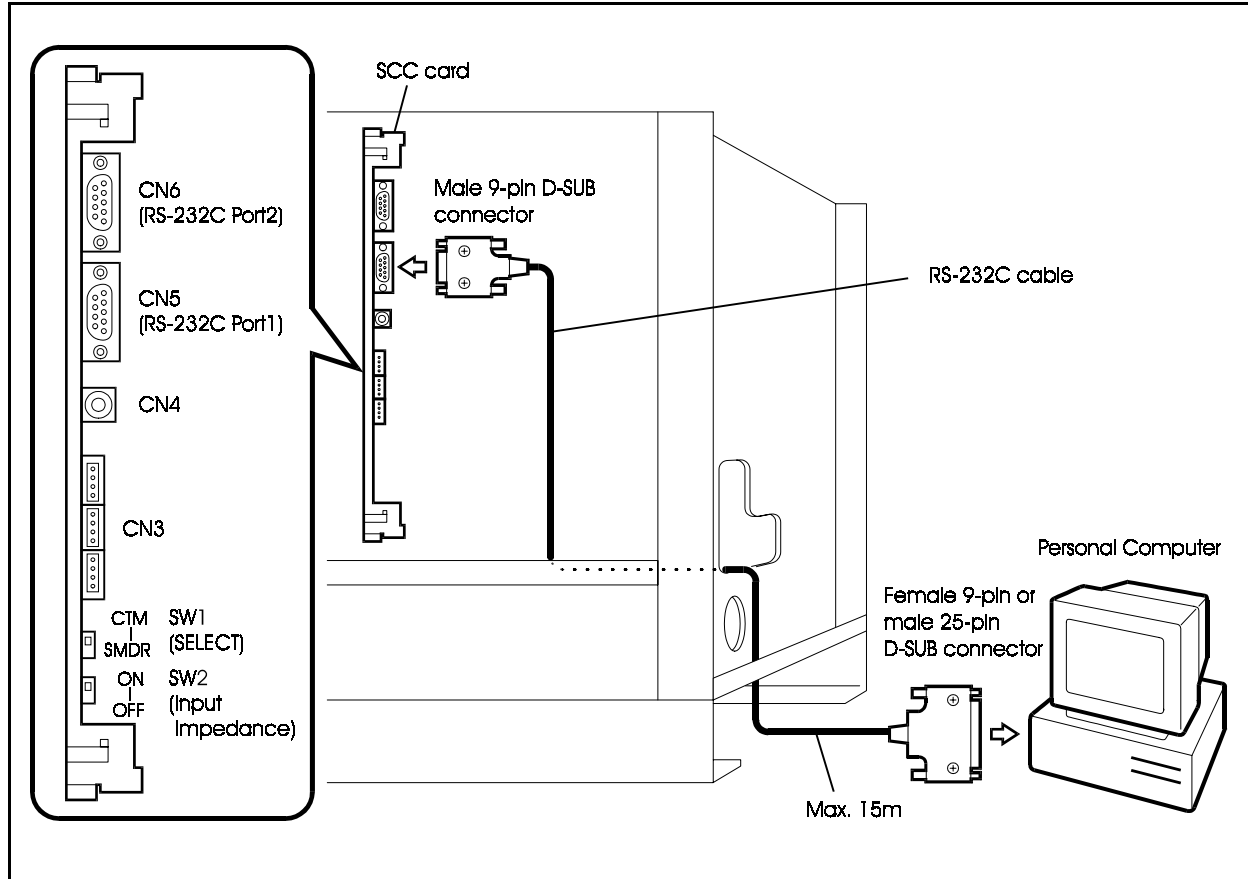
Output Format

- You can use the system programme to select format #1 or #2 for the call logging recorder.

- Figure 6-10 shows the output format and display contents for calls.

Figure 6-10. Output data format

Format #1

T MM/DD HH:MM:SS HH:MM:SS NNNN TTT dddddddddddddddddddddddd aaaaaaaaaa vvvvvH
① ② ③ ④ ⑤ ⑥ ⑦ ⑧

Format #2

T MM/DD HH:MM:SS HH:MM:SS NNNN TTT dddddddddddddddddddddddd ddddddddddddddddd
① ② ③ ④ ⑤ ⑥ ⑨ ⑦
aaaaaaaaaa v

vvvv H
⑧

①   Condition code (I: Incoming call / S:DISA incoming call / D: DDI incoming call / O: Outgoing call / L: LCR outgoing call / h: Hold / t: Transfer call / F: call forward outside call / W: Closed numbering call, Tandem connection call)

②   Call start time (MM=01 to 12 / DD=01 to 31 / HH=00 to 23 / MM=00 to 59 / SS=00 to 59)

③   Call time (HH=00 to 23 / MM=00 to 59 / SS=00 to 59)

④   Exchange line user No. (Extension No.: 0 to 9999 / Exchange line No.: C1 to C576)

⑤   Exchange line No. (Exchange line No.: 1 to 576 / When Exchange line is disconnected while the call is on hold: *1 to *576)

⑥   Dialled No. (24 digits max.)

⑦   Accounting code (10 digits max.)

⑧   ID code (V001 to V400)

⑨   Caller data (format #2 only)

Remote Administration Interface (RAI)
SCC card, RAI unit $\otimes$

Guidelines

- The RAI unit is installed on the SCC card. The addition of an RAI unit enables the RS-232C (port1) to be used as an interface for modems up to 2400bps.

- SCC cards cannot be installed and removed while the CCU is operating. First, turn the power off.

- The RAI unit is compatible with the following protocols:
  ITU-T, V.21, V.22, and V22bis.

- You can connect a PC via the modem to the exchange line port for remote maintenance such as programming via the phone lines.

Installation

1. Align the CN1 and CN2 connectors on the RAI unit with the CN7 and CN8 connectors on the SCC card, then press the RAI unit onto the card.

2. Install the SCC card in an available optional card slot in the CCU.

3. Connect a modem and PC to the exchange line port.

Figure 6-11. Installing an RAI unit, and connections for remote maintenance.
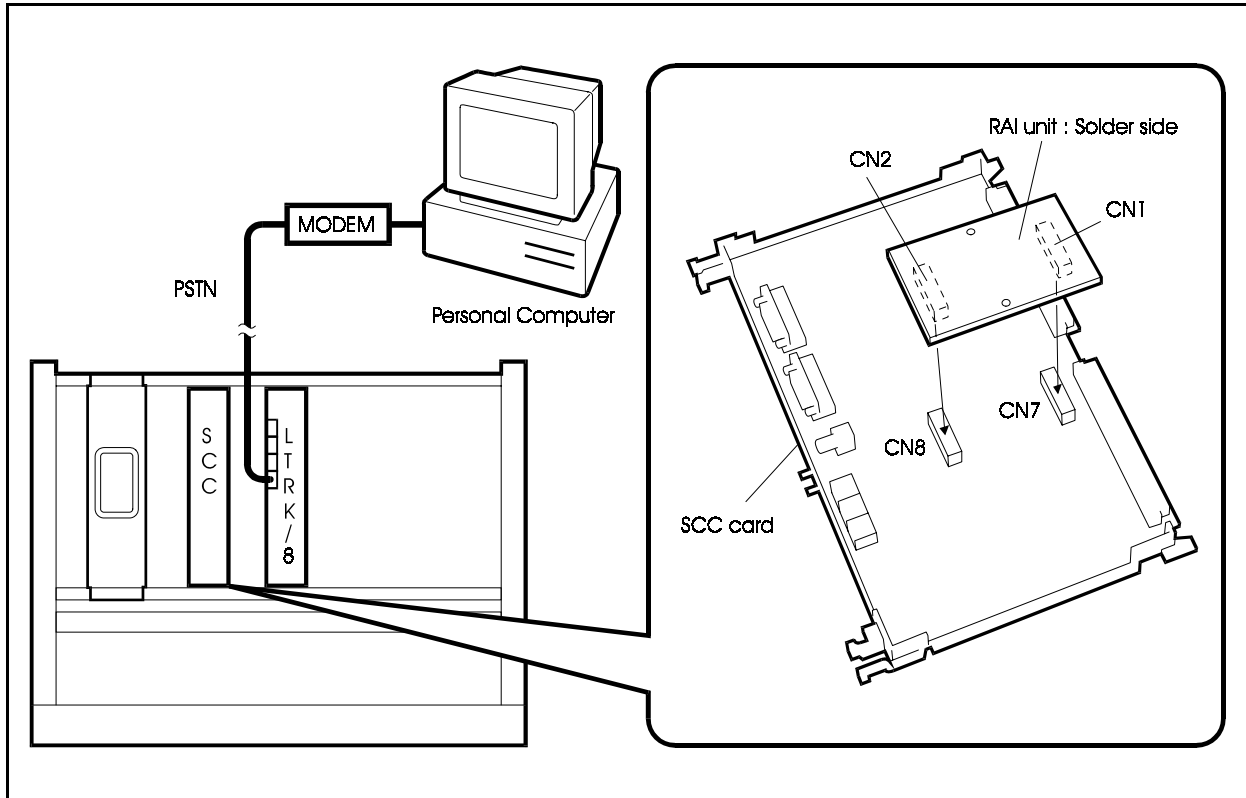
MIS Report Output

$$\boxed{\textbf{ACD card} \,\otimes}$$

Guidelines

⚠

CAUTION:
   • The back up battery will last about 5 years. Be sure to replace the battery before it is exhausted.

• Connecting a personal computer to the ACD card mounted on the flexible slot using the RS-232C cable (supplied) allows output of MIS Reports from the printer connected to the personal computer. (You cannot connect a printer directly from RS-232C port.)
This also allows the printer to be connected directly to the ACD card for output.

• The RS-232C cable (supplied) is a 9-pin D-Sub connector. If the connection port on the personal computer or printer is a 25-pin D-Sub connector, connect via a 9-pin/25-pin conversion adaptor.

• When connecting the ACD card to a personal computer, regular communications software must be installed on the personal computer.

• The ACD card cannot be removed or attached with the power turned ON. Be sure to turn the power OFF before removing or attaching the ACD card.

• The supplied RS-232C cable cannot be used for Call Logging or PC Customisation purpose.

• For details on ACD, refer to "Section 520 ACD Manual."

Installation

1. Set SW1 on the ACD card referring to the settings in Table 6-5.

Table 6-5.   ACD Card SW1 Settings

Switch No.	Setting	Description
SW1	BACK UP	Set when retaining RAM data.
	INITIAL	Set when clearing RAM data.

2. Slot the ACD card into flexible slots (FS5 on CAB40, FS11 on CAB96, FS9 (FS5 of Slave CCU) on CAB40-CAB40 connection).

3. Connect the 5-pin connector of the RS-232C cable (supplied) to CN3 on the ACD card.

4. Pass the RS-232 cable through the wiring hole on the CCU, and connect the D-Sub 9-pin connector to the RS-232 port of the personal computer or printer.
    If the connection port is a 25-pin D-Sub connector, connect via a 9-pin/ 25-pin conversion adaptor.

Figure 6-12. Connecting the ACD Card to Personal Computer with Printer
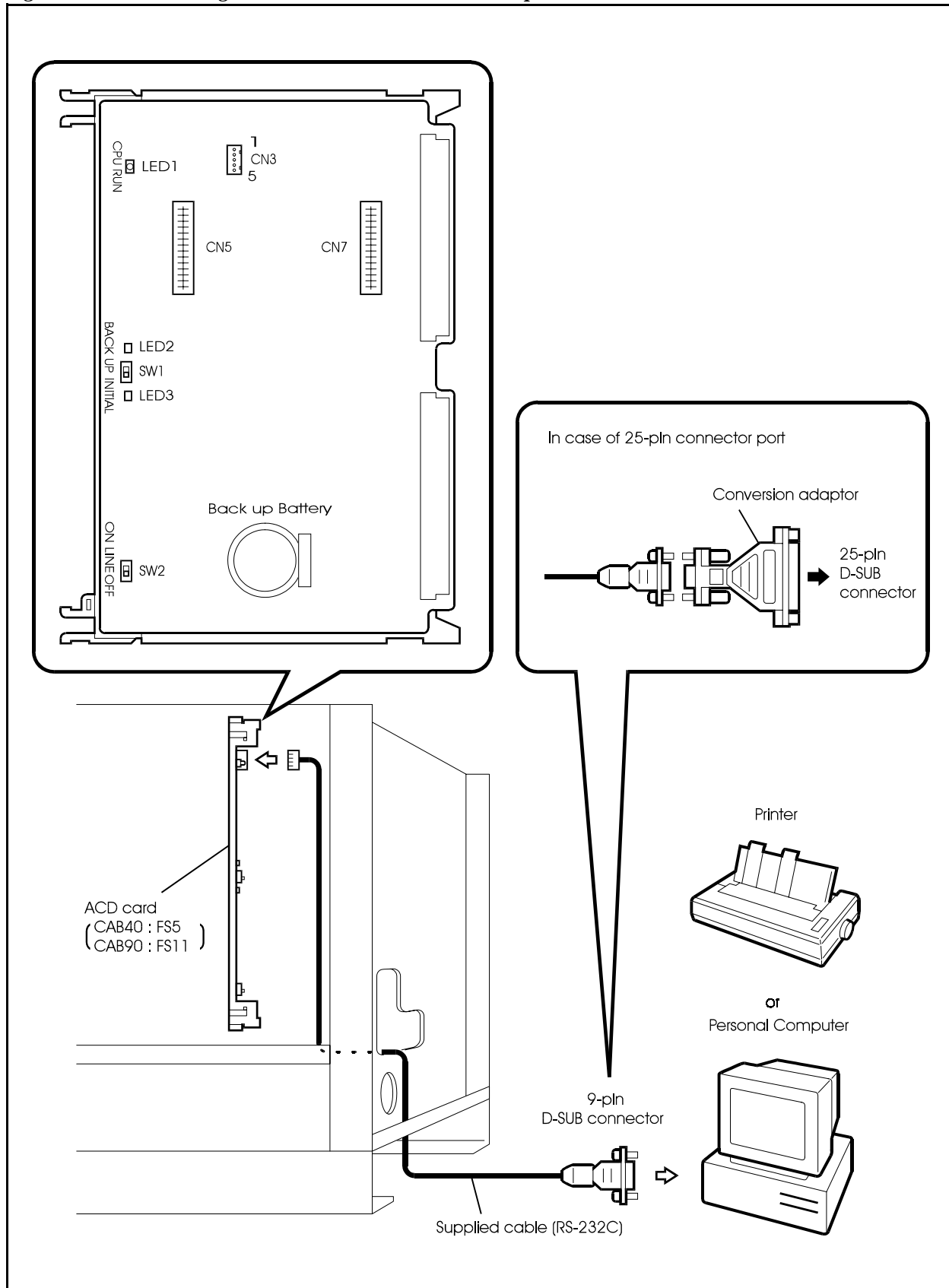
Headset

Guidelines

- A headset (VB-2394) can be connected in place of the telephone's handset.

- The headset adaptor (VB-3394) is not required.

- Place the telephone's handset in the cradle so that the phone is on-hook.

Installation

1. Remove the curl-cord from the handset.

2. Replace the curl-cord with the headset's modular connector.

Figure 6-13. Headset connection
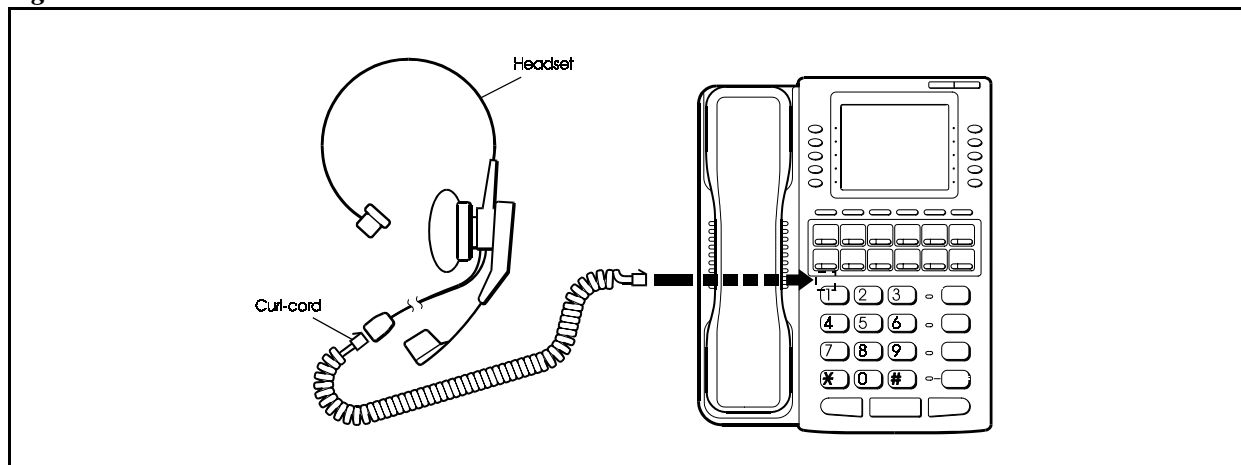
Operation

1. **Switching to headset mode**

   Switch the phone to headset mode.

   Press the following keys: ON/OFF → PROG 9 0 → ON/OFF

2. **Making and receiving calls**

   Press the following key to talk: ON/OFF

3. **Ending a call**

   Press the following key to end a call: ON/OFF
   (The phone is now ready to receive a call.)

Voice Recognition Adaptor

Guidelines

- A voice recognition adaptor can be installed in the VB-D411DSVUK key phone with two-digit display softkey compatible so that the phone can be used as a voice recognition phone.

- You can call. By Name or execute other functions by function names.

- Locate the Voice Recognition Adaptor within 120m of the CCU. The maximum loop circuit resistance to a Voice Recognition Adaptor is 20 ohms.

- In this case, wall mounting is not available.

- In this case, DSS or EM24 is not available to attach case.

Installation

1. Remove the wall-mount adaptor from the bottom of taking care not to damage the hooks.

Figure 6-14. Removing telephone wall-mount adaptor
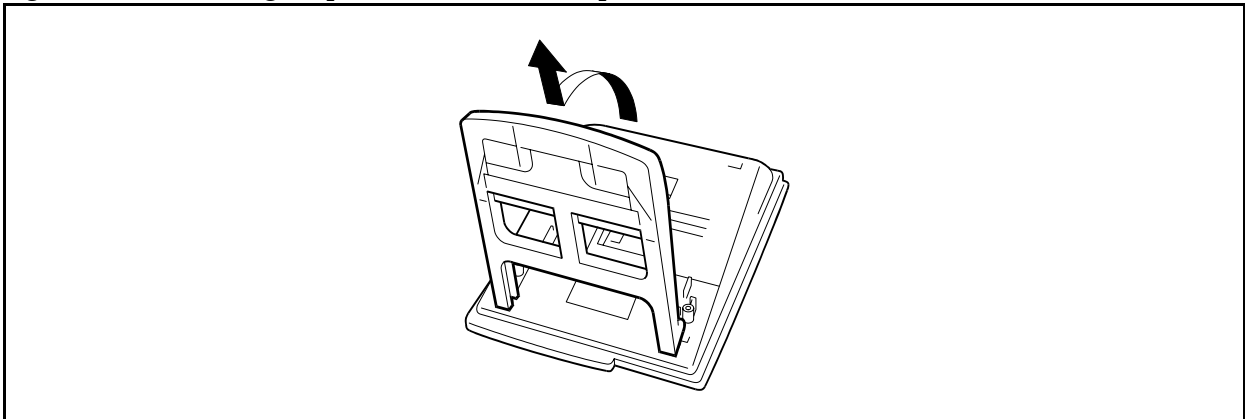
2. Cut the blind cover from the bottom of the phone to expose the connectors (CN11 and CN12).

Figure 6-15. Cutting the blind cover from bottom of phone
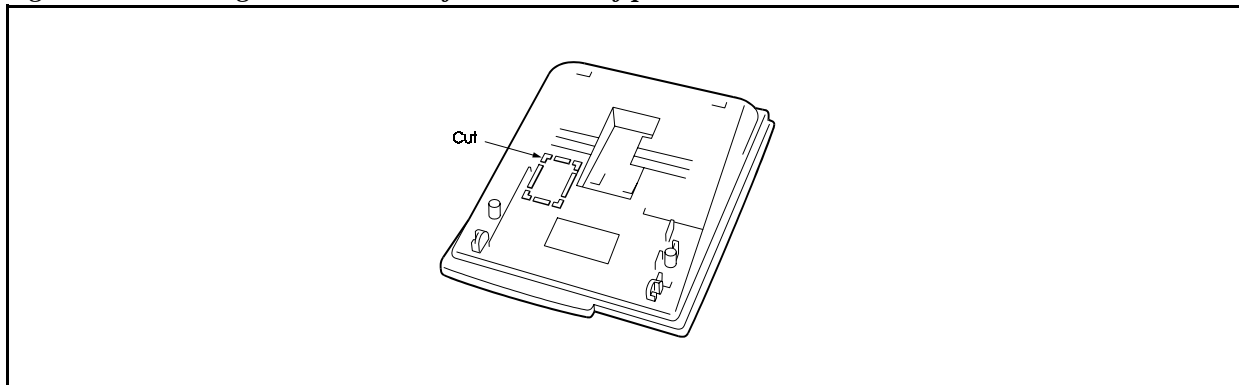
3. Connect one end of the CW11 and CW13 cables provided with the voice recognition adaptor to connectors CN11 and CN12 in the bottom of the phone.

4. Secure the voice recognition adaptor using the two screws.

Figure 6-16. Connecting voice recognition adaptor to key phone
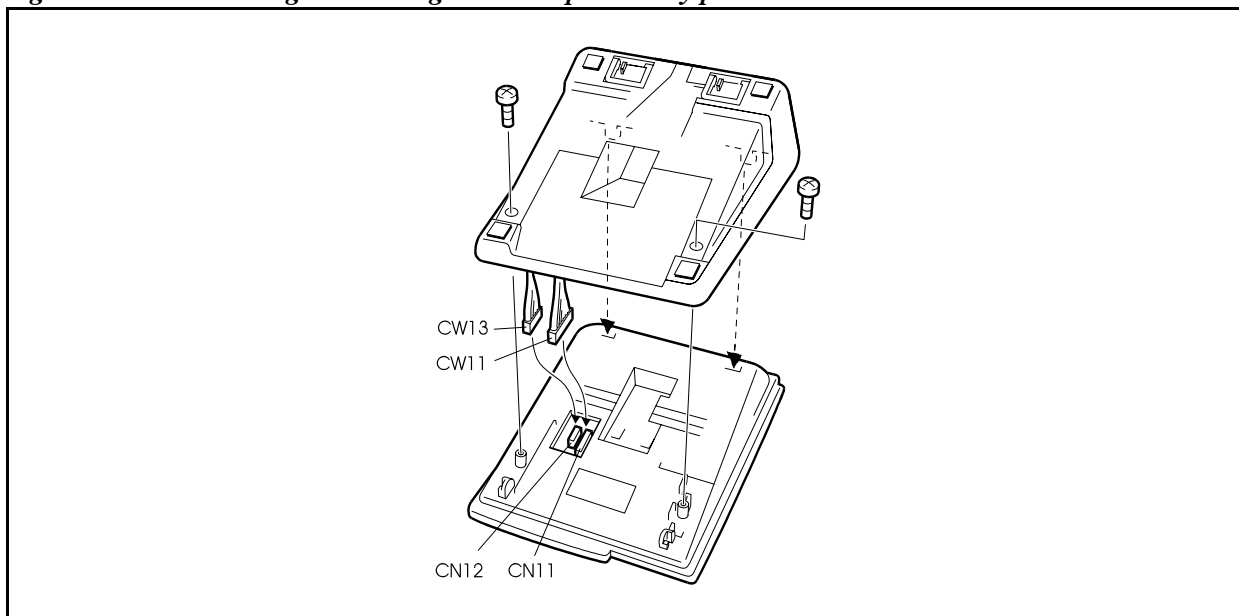
5. Connect the phone to the internal line port on a DEC/8 card via a secondary socket (see page 5-19).

Figure 6-17. Connecting phone to secondary socke
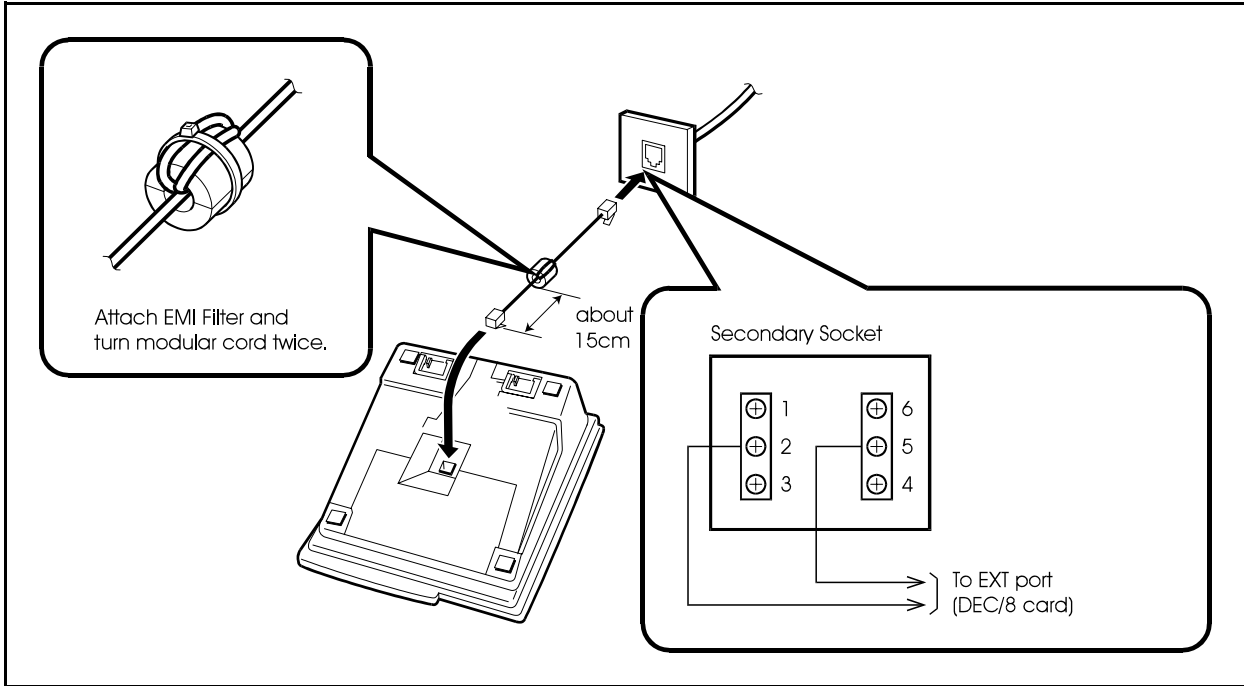
You can change the angle of telephone set by using angle adaptor.

Figure 6-18. Changing angle of voice vecognition telephone
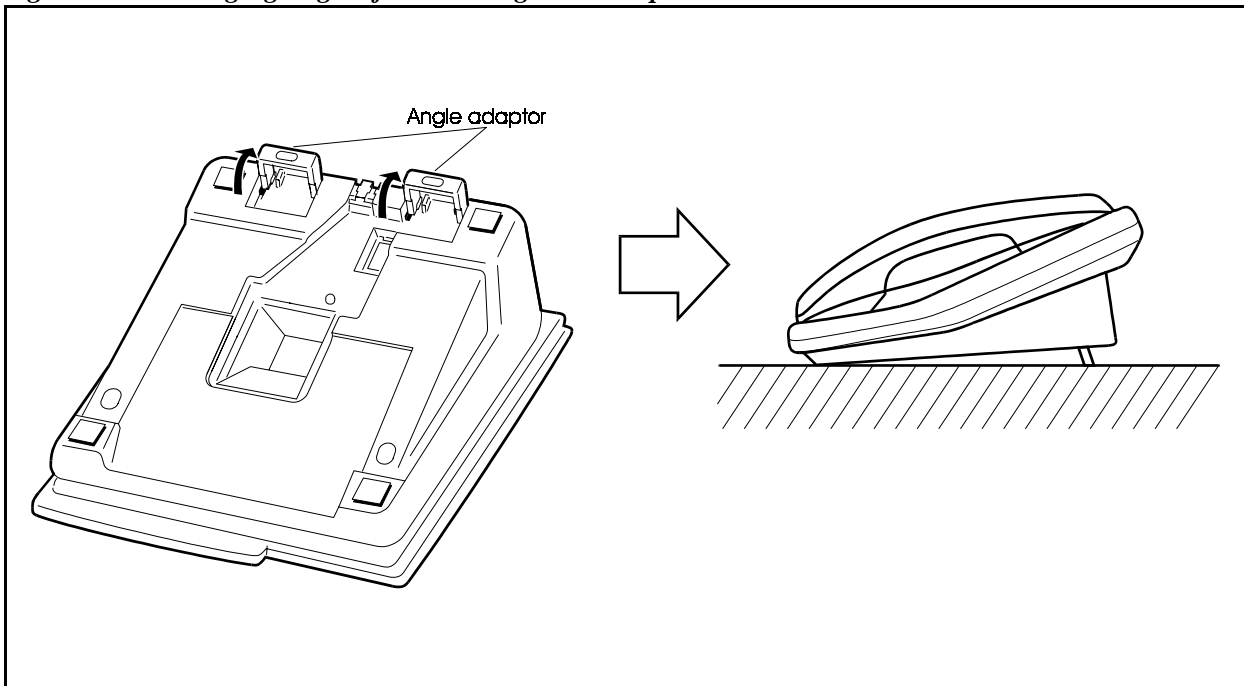
DSS

Guidelines

- The DSS (VB-D631UK) is a 72-key console that can be attached to the attendant phone. It provides direct station selector and busy lamp fields for extensions. The DSS can also be used for text assignment.

- The DSS comes with an angle adaptor, screws, and a two-conductor cable for connecting the DSS to the key phone.

- Locate the DSS within 120m of the CCU. The maximum loop circuit resistance to a DSS is 20 ohms.

- The DSS cannot be mounted on the wall.

Installation

1. Attach the DSS to the key phone using the mounting plate and the four screws.

2. Connect the DSS to the key phone using the two-conductor cable.

3. Connect the DSS to the secondary socket using a four-conductor cable.

Figure 6-19. DSS connection
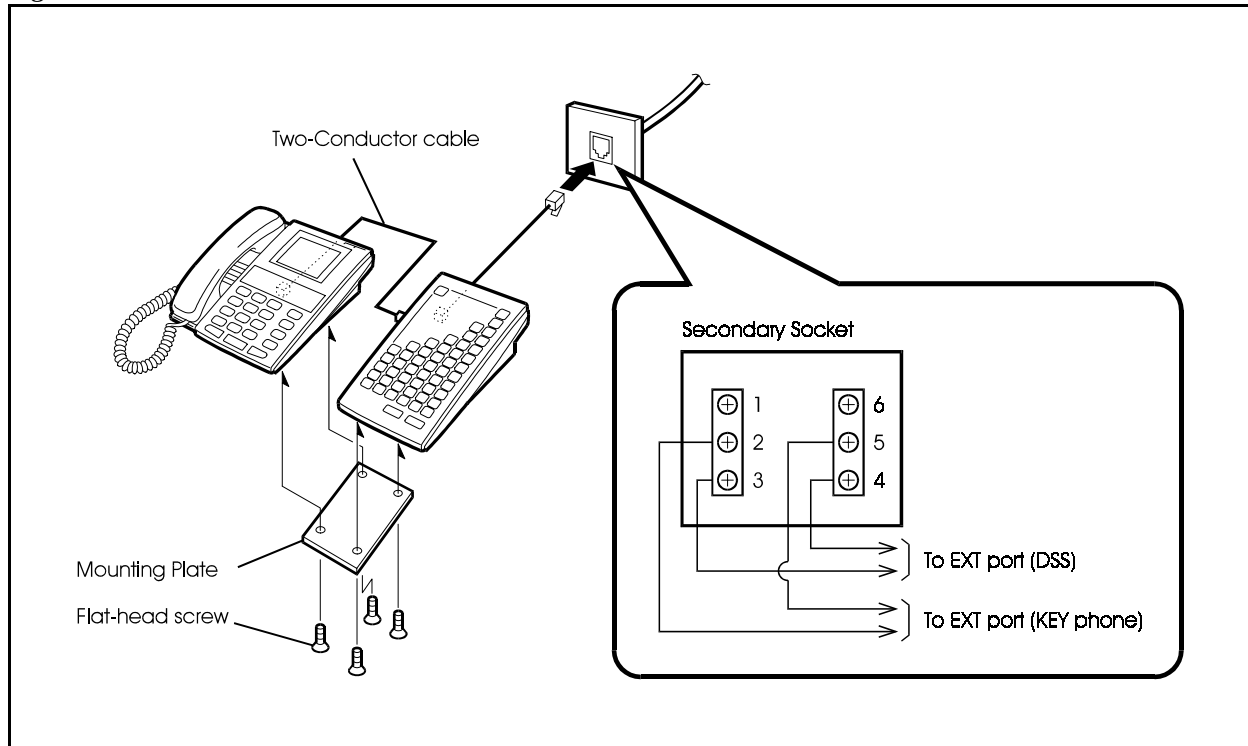
EM24

Guidelines

- The EM24 (VB-D331UK) provides 24 flexible function (FF) keys. It can be attached to any key phone.

- The EM24 comes with an angle adaptor, screws, and a two-conductor cable for connecting it to the key phone.

- Locate the EM24 within 120m of the CCU. The maximum loop resistance to a EM24 is 20 ohms.

- The EM24 cannot be mounted on the wall.

Installation

1. Attach the EM24 to the key phone using the mounting plate and the four screws, as shown in Figure 6-19.

2. Connect the EM24 to the key phone using the two-conductor cable.

3. Connect the EM24 to the secondary socket using a four-conductor cable.

Figure 6-20. EM24 connection
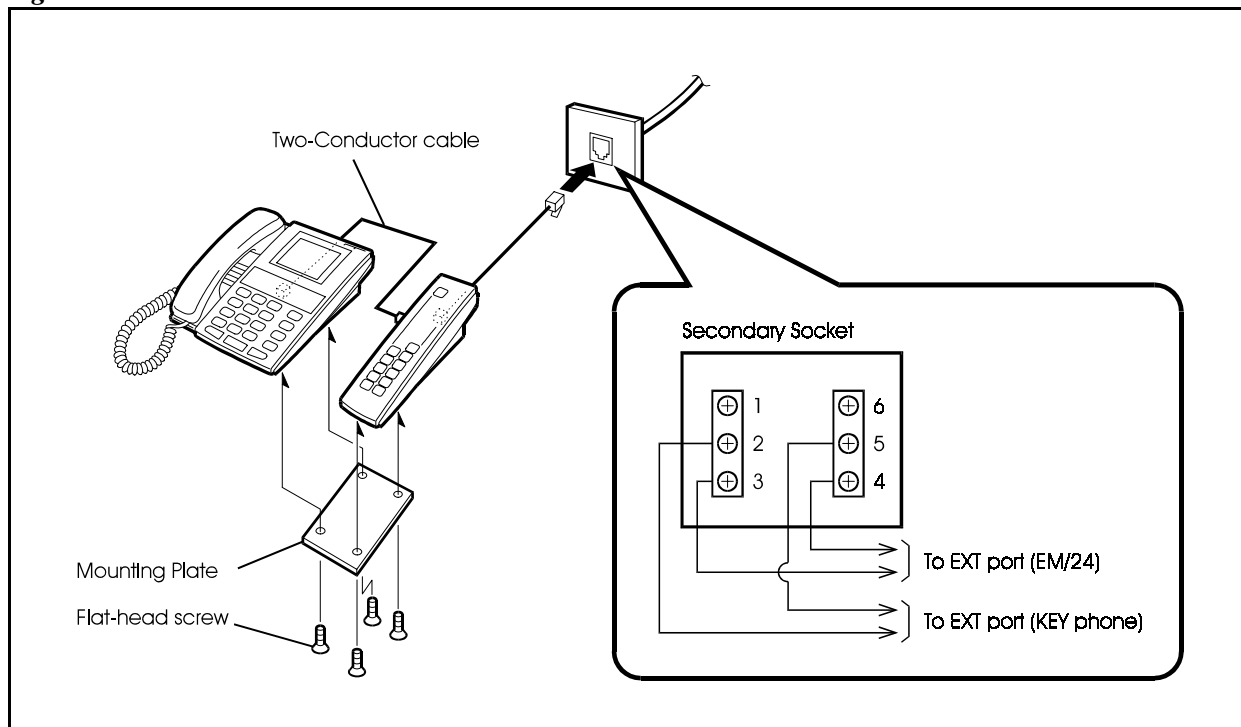
Doorphone Adaptor

⚠️ **CAUTION:**
- Turn the power switch and the external breaker OFF, and disconnect the AC cable befor installing the Doorphone Adaptor.

Guidelines

- The Doorphone Adaptor (VB-3473UK) can accommodate two doorphones (VL-568GPEX, VL-582APEX) and two door openers. Door openers are not sold by Panasonic, but can be purchased separately from an electronics dealer.

- Each Doorphone and door opener use one exchange line port.

- One or two door openers and two Doorphones can be connected to a Doorphone Adaptor.

- The Doorphone can be set to call time for 15 seconds, 30 seconds, or one minute.

- The Door opener can be set to open for one second, 3seconds, or 5 seconds.

- The maximum permissible wiring distance between the Doorphone Adaptor and a LTRK/8 card is limited to a maximum loop resistance of 2 ohms.

- The maximum permissible resistance of the wiring between the Doorphone Adaptor and Doorphone is 20 ohms.

- The following tools are required to install the Doorphone Adaptor:

  s Phillips screwdriver
  s Needle-nose pliers
  s Diagonal cutters

Installation

1. Remove the cover from the Doorphone Adaptor.

2. Set the switches in the Doorphone Adaptor according to Figure 6-21.

3. Remove the cable punch-out plate (Figure 6-20) in order to make an opening for the cables coming into the Doorphone Adaptor.

    To remove the plate, cut the groove with diagonal cutters, then bend the plate back and forth with needle-nose pliers to remove it.

4. Mount the Doorphone Adaptor on the wall using the three screws provided with the unit.

Figure 6-21. Doorphone Adaptor cable punch-out plate and wall mounting
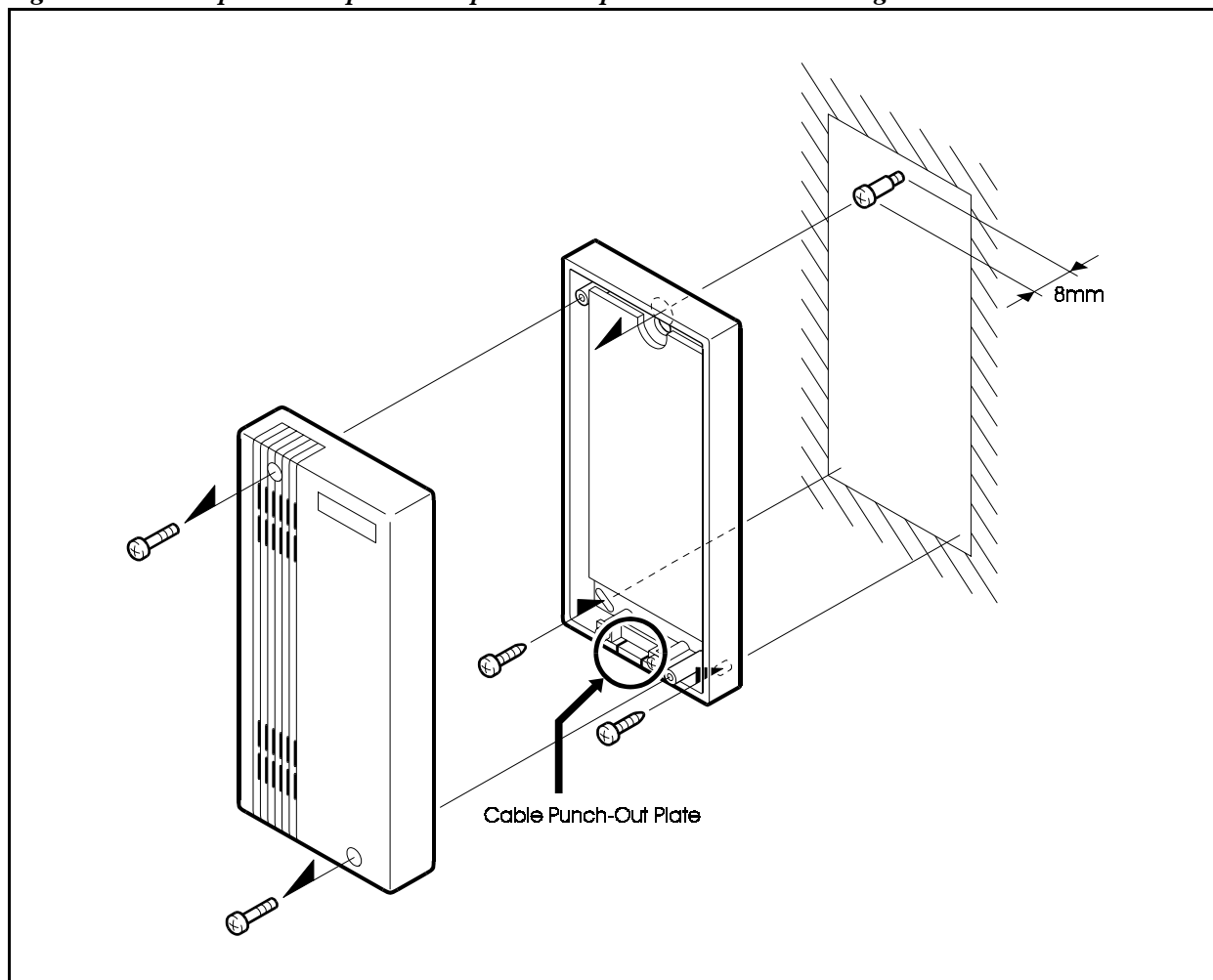
5. Connect the exchange line(s) to the Doorphone Adaptor, as shown in Figure 6-21.

The "CO.D" connector is used for the Doorphone and opener. The "CO.S" connector is used for the sensor.

6. Connect the Doorphone, door opener, and sensor to the Doorphone Adaptor.

Figure 6-22. Doorphone Adaptor connections
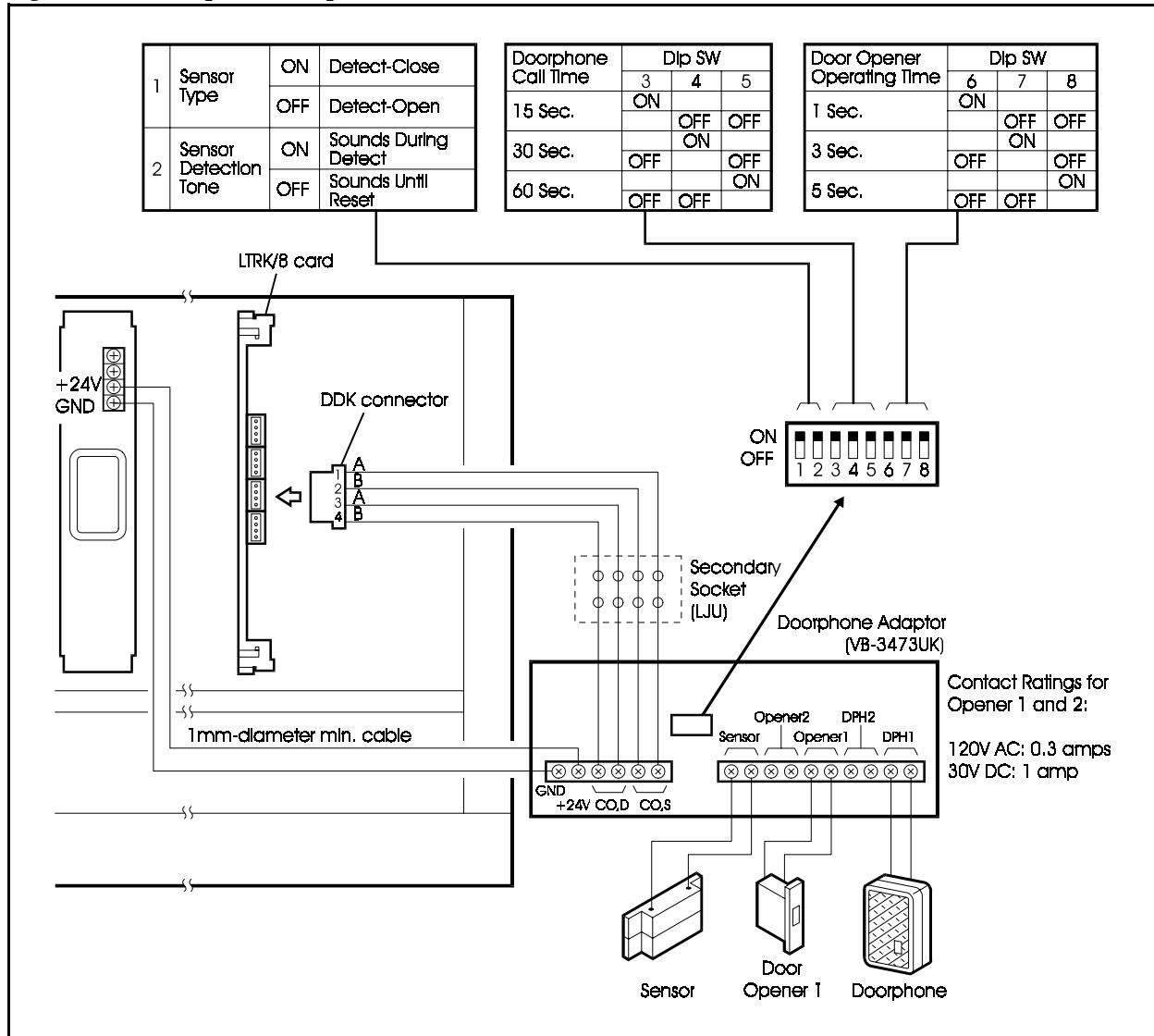
Power Failure Transfer

⚠️

CAUTION:
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before installing the Power Failure Transfer.

Guidelines

- Up to four SLTs can be connected to the Power Failure Unit (VB-43703UK). If a power failure occurs, the SLTs will automatically receive a dial tone from the exchange line. The ICX features and restrictions do not apply when SLTs are receiving a dial tone from the Exchange Line line.

- If a call is in progress through the Power Failure Unit (PFU) when the power is restored, the call will be disconnected.

- The following tools are required to install the PFU:

 - Phillips screwdriver
  - Needle-nose pliers
  - Diagonal cutters

Installation

1. Remove the cover from the Power Failure Unit (PFU)

2. Remove the cable punch-out plate (Figure 6-22) to make an opening for the cables coming in to the PFU.

   To remove the plate, cut the groove with diagonal cutters, then bend the plate back and forth with needle-nose pliers to remove it.

3. Mount the PFU on the wall using the three screws provided with the unit.

Figure 6-23. Power Failure Unit cable punch-out plate and wall mounting
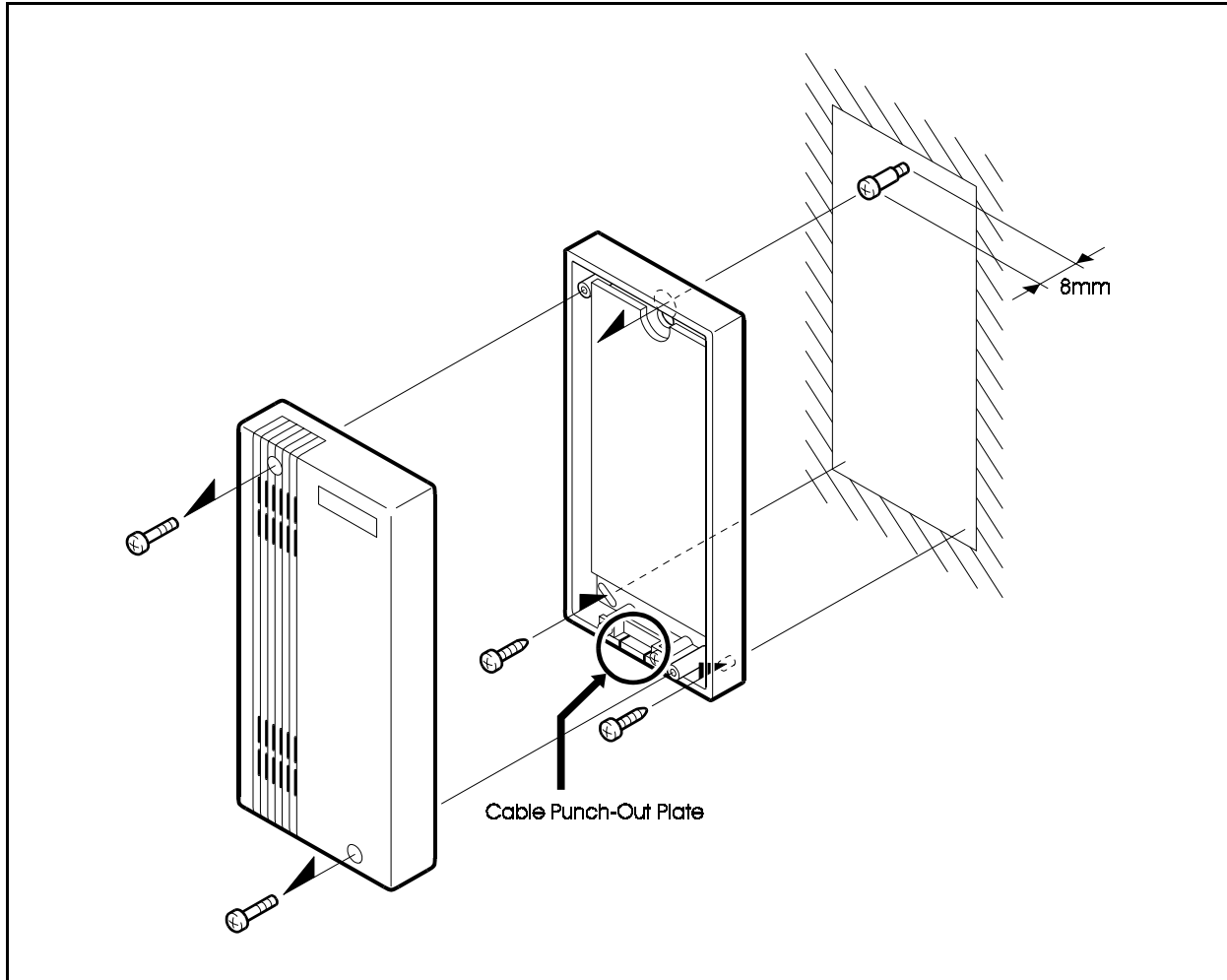
4. Connect the pin3 of CN5 (FG) to the earth.

5. Connect the SLTs to the AEC extension ports on the PFU.

6. Connect the exchange lines from the ICX to the PFU.

7. Connect the AEC ports from the ICX to the PFU.

    When a power failure occurs, AEC/8 card "A" line is switched to exchange line "A" line, AEC/8 card "B" line is switched to exchange line "B" line, and so on.

8. Connect the +24V and GND terminals from the ICX power unit to the PFU.

9. Install the cover on the PFU.

Figure 6-24. Power Failure Unit connections
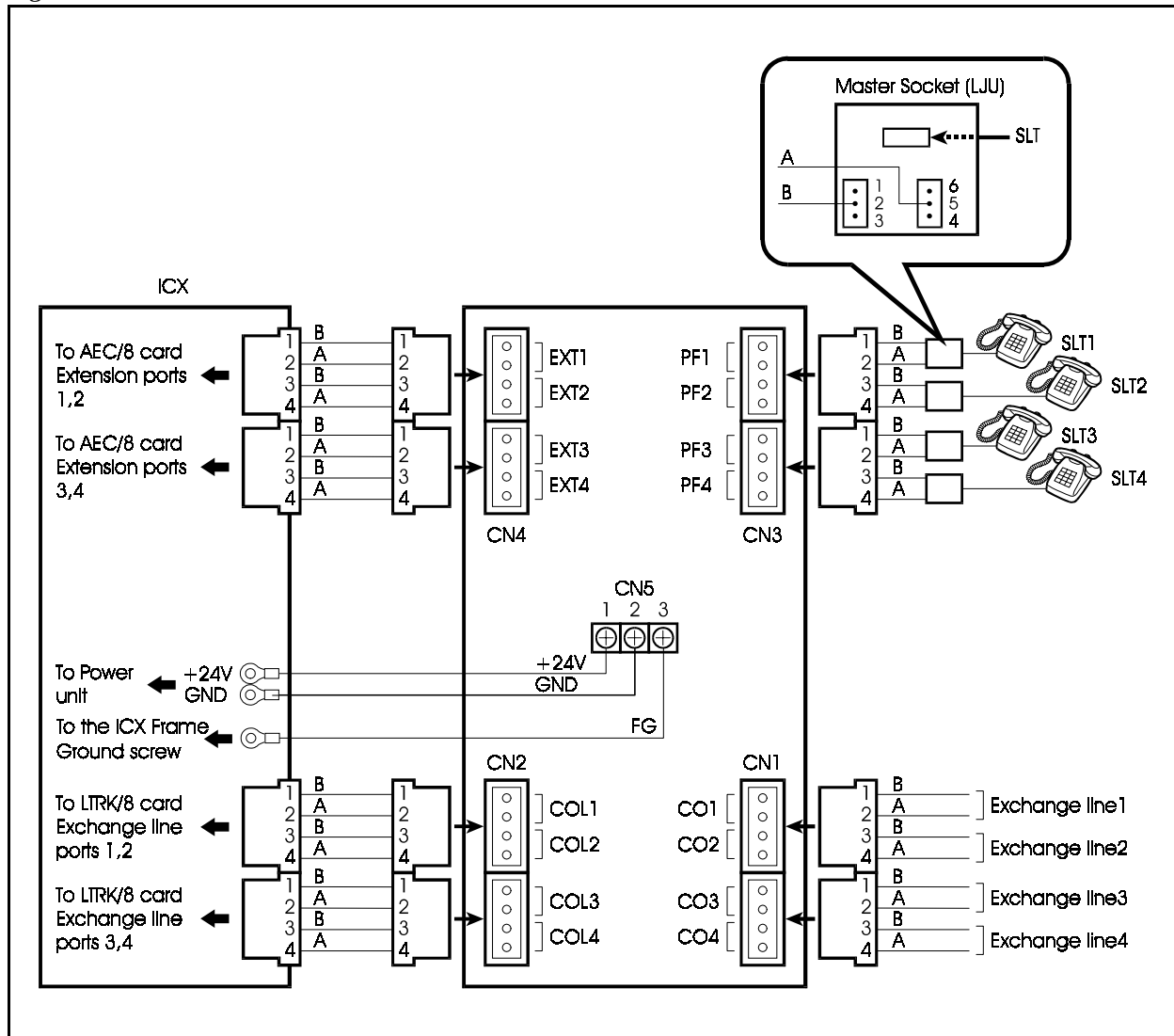
1 Line SLT Adaptor Ver.2

Guidelines

- By connecting the 1 line SLT Adaptor to the DEC/8 card, you can connect an SLT instead of an extension key phone.

- One SLT can be connected to 1 line SLT Adaptor unit.

- To facilitate maintenance, attach the 1 line SLT Adaptor near to the main cabinet.

- The following tools are required to install the 1 line SLT Adaptor:

    - Phillips screwdriver

    - Needle-nose pliers

    - Diagonal cutters

Installation

1. Remove the cover from the 1 line SLT Adaptor.

2. Remove the cable punch-out plate (Figure 6-24) in order to make an opening for the cables coming into the 1 line SLT Adaptor.

    To remove the plate, cut the groove with diagonal cutters, then bend the plate back and forth with needle-nose pliers to remove it.

3. Mount the 1 line SLT Adaptor on the wall using the three screws. (Screws are not provided with the unit.)

Figure 6-25. 1 line SLT Adaptor cable punch-out plate and wall mounting

Cable Punch-Out Plate
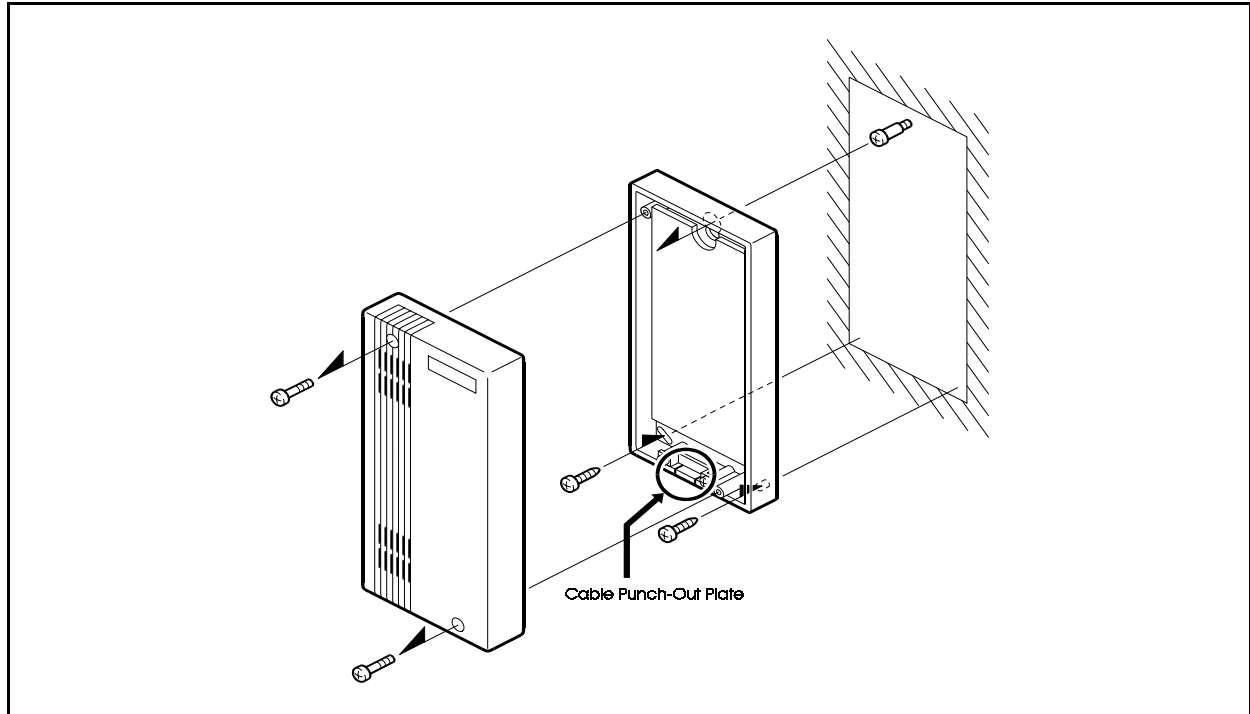
4. Use the DDK connector to connect the T and R terminals on the 1 line SLT Adaptor terminals to the A and B terminals on the DEC/8 card.

5. Connect the 5-pin and 2-pin terminals in the US type secondary Socket to terminals TT and TR on the 1 line SLT Adaptor.

6. Use the station cord to connect the SLT to the US type secondary Socket.

Figure 6-26. Connecting the 1 Line SLT Adaptor
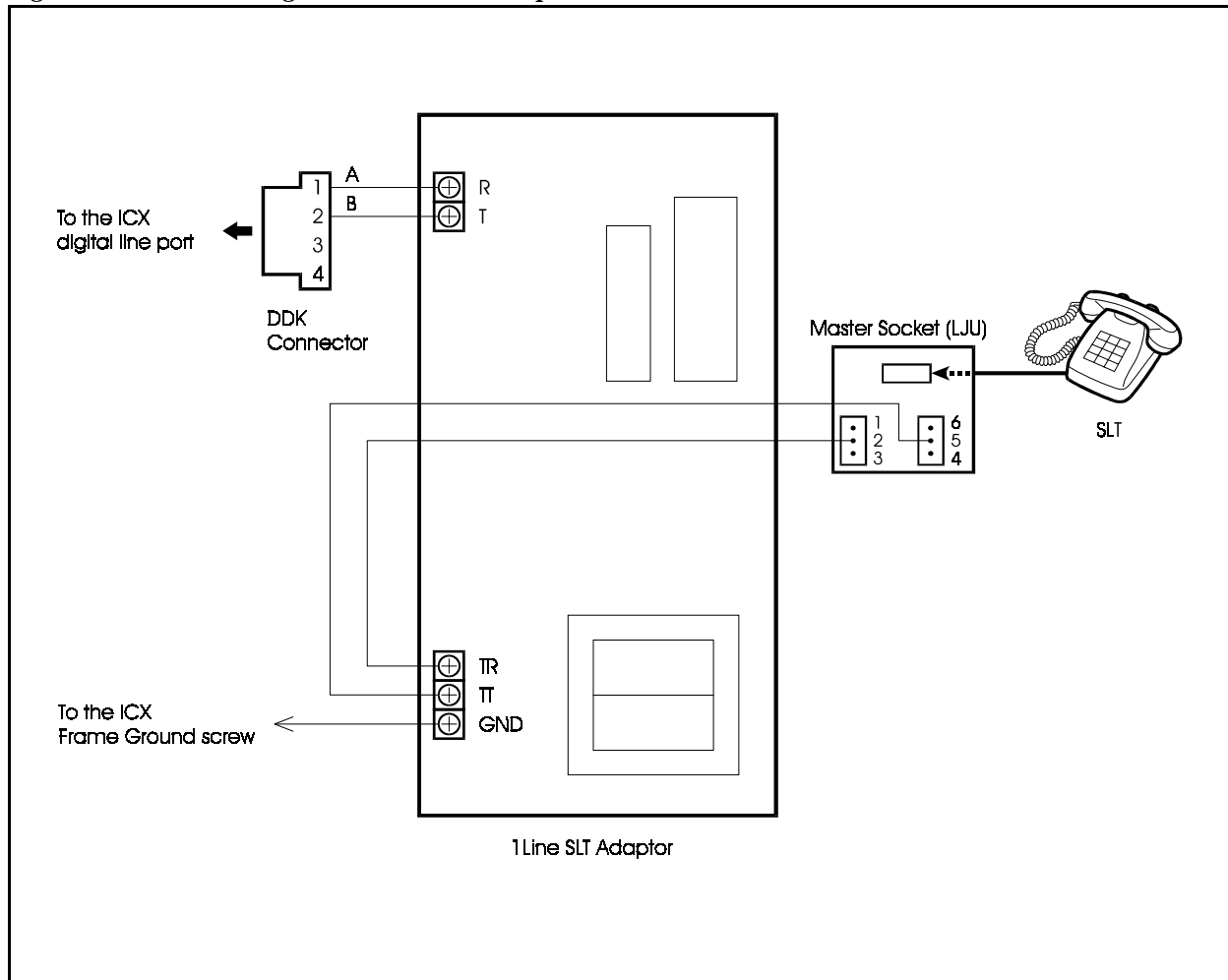
Replacing the Backup Battery of CPC card   CPC96, CPC288, CPC576 Card ⊗

Guidelines

⚠

CAUTION:
- Turn the power switch and the external breaker OFF, and disconnect the AC cable before replacing the backup battery.
- The backup battery will last about 5 years. Be sure to replace the battery before it is exhausted.

- The backup batteries on the CPC96, CPC288, and CPC576 cards backup data such as program settings, speed dialing data, and the date and time. Be sure to replace the backup batteries before they are exhausted.

Installation

1. Connect the new backup battery to the following connectors on the CPC96, CPC288, and CPC576 cards:

Card	Connector
CPC96	CN6 or CN7
CPC288	CN7 or CN6
CPC576	CN5 or CN6

Note: The two connectors on each of these cards are connected in parallel.

2. Cut the two tie-wraps using nippers to remove the old backup battery.

3. Secure the new backup battery using the two tie wraps.

Note: Secure the battery so that it cannot move.

Figure 6-27. Replacing the backup battery of CPC card

• CPC96 card and CPC288 card

• CPC576 card
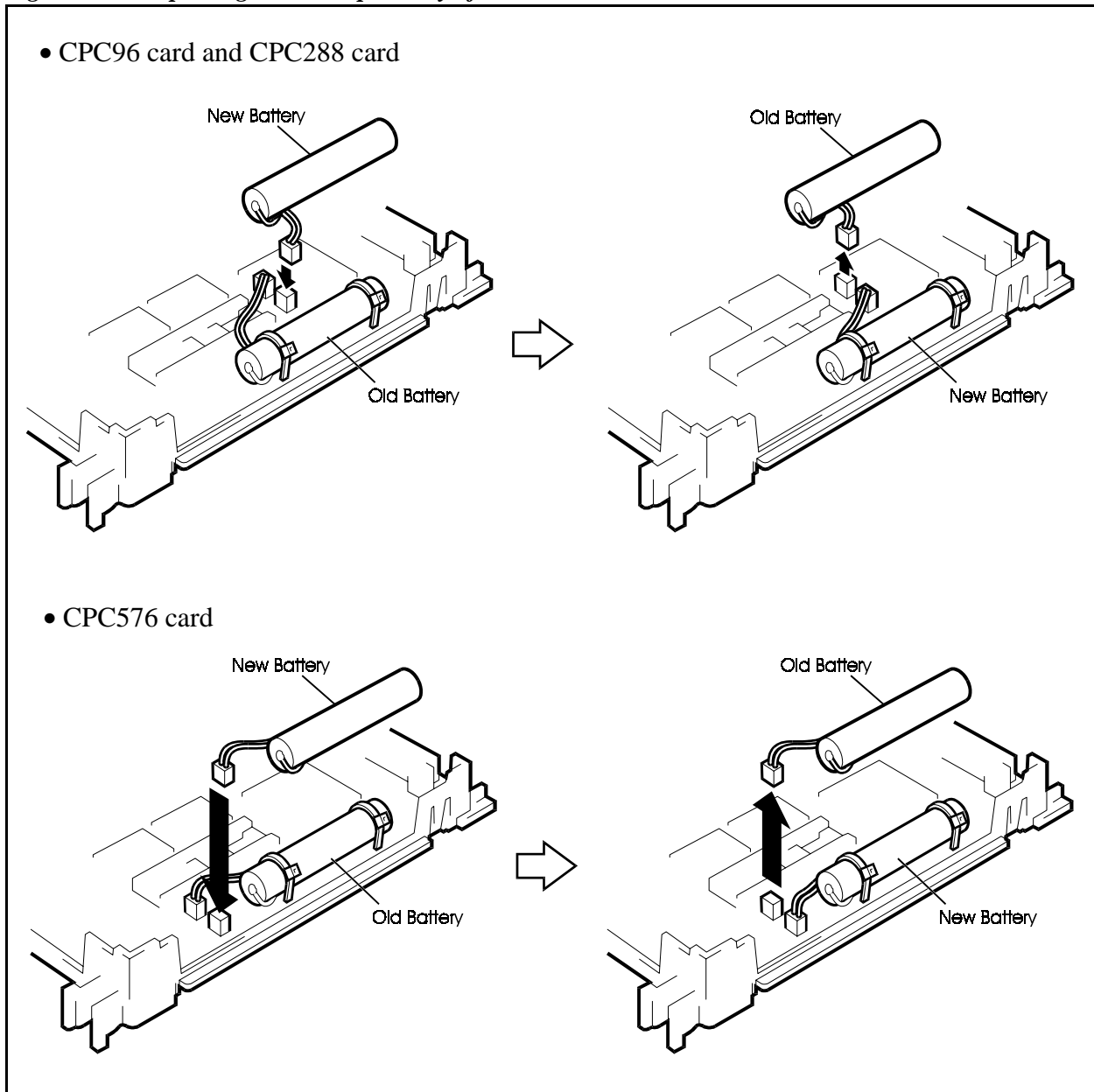
⚠ **CAUTION:**
   • Danger of explosion if battery is incorrectly replaced.
   • Replace only with the same or equivalent type recommended by
     the manufacturer. Dispose of used batteries according to the
     manufacturer's instructions.

Chapter 7. Specifications

This chapter lists the specifications of the equipment constituting the ICX.

Specifications

Table 7-1.   Specifications (1/3)

Type	Item	Name (Abbreviated name)	Model No.	External dimensions (approximate mm)			Weight (approximate kg)	Supply voltage (V)	Maximum power dissipation (W) Current (A)
				W	H	D			
Main Cabinet	40 ports CCU	CAB40	VB-44010UK	405	495	260	13		205W 2.3A
	96 ports CCU	CAB96	VB-44020UK	680	515	260	20		380W 4.3A
	96 ports Expand CCU	CAB96B	VB-44021UK	680	455	260	20		
Power supply	Switch Box	SWBOX	VB-44023UK	163	66	121	0.8		
Control	CPC-M Card	CPC96	VB-44410UK	26	250	178	0.5	+5 +24	600mA 10mA
	CPC-L Card	CPC288	VB-444201UK	26	250	178	0.5	+5 +24	800mA 10mA
	CPC-LL Card	CPC576	VB-444301UK	26	250	178	0.5	+5 +24	1500mA 10mA
	Connection Cable Card-M	CBLMST	VB-444501	26	250	178	0.5	+5	100mA
	Connection Cable Card-S	CBLSLV	VB-444502	26	250	178	0.5	+5	350mA
	Connection Cable Kit	CBLKIT	VB-44450				0.5	+5	350mA
	Building Block Card	CBL	VB-44451	26	250	178	0.5	+5	350mA
	Connection Cable Card-DBS	CBLDBS	VB-44452	26	250	178	0.5	+5	350mA
	Service Control Card	SCC	VB-44181UK	26	250	178	0.5	+5 +24	80mA 25mA
	Time Switch Card /L	TSW288	VB-444202UK	26	250	178	0.5	+5	885mA
	Time Switch Card /LL	TSW576	VB-444302UK	26	250	178	0.5	+5	910mA
Ex-change Lines	Loop Start Exchange Line Card	LTRK/8	VB-44510UK	26	250	178	0.5	+5 +24	0.5W 2W
	BRI Card	TBRI/4	VB-44530	26	250	178	0.5	+5 +24	150mA 130mA
	PRI Card	PRI/30	VB-44540UK	26	250	178	0.5	+5 +24	100mA 120mA
	AC-15 card	AC15/4	VB-44570UK						

Table 7-1 Specifications (2/3)

Type	Item	Name (Abbreviated name)	Model No.	External dimensions (approximate mm)			Weight (approximate kg)	Supply voltage (V)	Maximum power dissipation (W) Current (A)
				W	H	D			
Internal lines	Digital Extension Card	DEC/8	VB-44610UK	26	250	178	0.4	+5 +24	100mA 1.6mA
	Analog Extension Card	AEC/8	VB-44620UK	26	250	178		+5 +24	500W 12W
	BRI Unit (S-Point)	SBRI/4	VB-44630	26	250	178	0.5	+5 +24	150mA 130mA
	PRI Card	PRI/30	VB-44540UK	26	250	178	0.5	+5 +24	100mA 120mA
Options	8 DTMF Receiver Card	MFR/8	VB-44110UK	26	250	178	0.5	+5	110mA
	Conference Card	CONF	VB-44120UK	26	250	178	0.5	+5	100mA
Audio applications	ACD Card	ACD	VB-44140UK	26	250	178	0.5	+5	150mA
	8 Voice Processing Card	VPU/8	VB-44150UK	26	250	178	0.5	+5	700mA
	4 Voice Processing Card	VPU/4	VB-44160UK	26	250	178	0.5	+5	350mA
	Voice Storage Service Card	VSSC	VB-44170UK	47	250	178	1.0	+5	2.2A
	HDD for replacement	VSSCHD	VB-44171	90	122	23	0.2	+5	2.7W 1.3A
On-card packages	Sync Package/ Network Unit	SYNC	VB-44460UK	70	70	1.6	0.1	+5	50mA
	Remote Adomimistration Unit	RAI	VB-44182UK	70	70	1.6	0.1	+5	50mA
	PC Card 96	PCCM1	VB-44410UKA	55	85	3			
	PC Card 288	PCCL1	VB-444201UKA	55	85	3			
	PC Card 576	PCCLL1	VB-44431UK	55	85	3			

Table 7-1 Specifications (3/3)

Type	Item	Name (Abbreviated name)	Model No.	External dimensions (approximate mm)			Weight (approximate kg)	Supply voltage (V)	Maximum power dissipation (W) Current (A)
				W	H	D			
Phone systems	Key phone (12key)	12CO/ STD	VB-D411UK	186	90	233	1	+27	2.7W
	Key phone (12key-LCD/ SPU)	12CO/D/ SPU	VB-D411DSUK	186	90	233	1	+27	2.7W
	Key phone (12key-LLCD/ SPU)	12CO/LD/ SPU	VB-D411LDSUK	186	90	233	1	+27	2.7W
	Key phone (12key-LCD/ Soft key/Voice/ SLT/SPU)	12CO/D/ SK/VR/ SLT/SPU	VB-D411DSVUK	186	90	233	1	+27	2.7W
	Key phone (24key-LCD)	24CO/D	VB-D611DUK	186	90	233	1	+27	2.7W
	Key phone (24key-LCD/ SPU)	24CO/D/ SPU	VB-D611DSUK	186	90	233	1	+27	2.7W
	PC-ATT96P Adaptor	PCAT96	VB-44330UK	230	70	65	0.7		
	PC-ATT384P Adaptor	PCAT384	VB-44331UK	230	70	65	0.7		
	PC-TEL Adaptor	PC-TEL	VB-44332UK	230	70	65	0.7		
	DSS	DSS	VB-D631UK	123	74	233	0.5	+27	3.3W
	EM24	EM24	VB-D331UK	60	74	233	0.5	+27	1.1W
	Voice Recognition Adaptor	VRADP	VB-44101UK	163	73	178	0.5	+5 +27	3.6W 3.6W
External optional equipment	One Line SLT Adaptor	SLTADP	VB-43702UK						
	Doorphone Adaptor	DPH-ADP	VB-3473UK						
	Doorphone	DPH	VL-568GPEX, VL-582APEX						
	Power Failure Unit	PFU	VB-43703UK	120	240	45	0.4	+24	
Battery	Battery	BATT96	VB-44025UK						
Miscellaneous	Connection Metal Kit	MTLKIT	VB-44024						