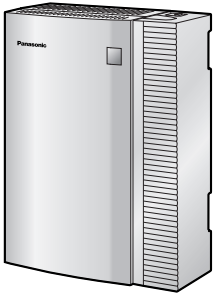


# Panasonic®



## Advanced Hybrid & Wireless PBX Installation Manual

Model No. **KX-TAW848**



Thank you for purchasing a Panasonic Advanced Hybrid & Wireless PBX.  
Please read this manual carefully before using this product and save this manual for future use.

**KX-TAW848: MPR Version 2.0**



SD Logo is  
a trademark.

# System Components

System Components Table

	Model	Description
<b>Main Unit</b>	KX-TAW848	Main Unit
<b>CO Line Cards</b>	KX-TAW84880	4-Port Analog Trunk Card (LCOT4)
	KX-TAW84893	4-Port Caller ID Card (CID4)
<b>Extension Cards</b>	KX-TAW84870	4-Port Hybrid Extension Card (HLC4)
	KX-TAW84874	8-Port Single Line Telephone Extension Card (SLC8)
	KX-TAW84875	4-Port Proprietary Extension Card (PLC4)
	KX-TAW84876	8-Port Proprietary Extension Card (PLC8)
<b>Other Cards</b>	KX-TAW84861	4-Port Doorphone Card (DPH4)
	KX-TAW84866	8-Channel Echo Canceller Card (ECHO8)
	KX-TAW84868	Extension Caller ID Card (EXT-CID)
	KX-TAW84891	2-Channel Message Card (MSG2)
	KX-TAW84896	Remote Card (RMT)
<b>Cell Station (CS)</b>	KX-T0141	2-Channel Cell Station Unit for 2.4 GHz Portable Station
<b>Proprietary Equipment</b>	KX-T30865	Doorphone

## Available Proprietary Telephones

The PBX supports Panasonic KX-T7000 and KX-TD7000 series telephones:

- Analog proprietary telephones (e.g., KX-T7730)
- Portable stations (e.g., KX-TD7690)
- DSS consoles (e.g., KX-T7740)

## Note

The PBX does not support the following telephones:

- Digital proprietary telephones
- KX-T30800 series Proprietary Telephones and DSS consoles
- KX-T61600 series Proprietary Telephones and DSS consoles
- KX-T123200 series Proprietary Telephones and DSS consoles

For the equipment (e.g., Headset<sup>\*1</sup>) that can be connected to a particular telephone, refer to the telephone's manual.

For other equipment that can be connected to the PBX, refer to "1.2.2 System Connection Diagram".

<sup>\*1</sup> The KX-T7090 headset can be connected to the KX-T7000 and KX-T7300 series telephones.

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**Abbreviations in this manual**

Analog proprietary telephone: APT

Portable station: PS

Single line telephone: SLT

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# Important Safety Instructions

## SAFETY REQUIREMENTS

When using your telephone equipment, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Read and understand all instructions.
2. Follow all warnings and instructions marked on the product.
3. Unplug this product from the wall outlet before cleaning. Do not use liquid cleaners or aerosol cleaners. Clean with a damp cloth.
4. Do not use this product near water, for example, near a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
5. Do not place the product on an unstable surface, as a fall may cause serious internal damage.
6. Slots and openings in the front, back and bottom of the cabinet are provided for ventilation; to protect it from overheating, these openings must not be blocked or covered. The openings should never be blocked by placing the product on a bed, sofa, rug, or other similar surface while in use. The product should never be placed near or over a radiator or other heat source. This product should not be placed in a sealed environment unless proper ventilation is provided.
7. The product should only be connected to the type of electrical power supply specified on the product label. If you are not sure of the type of power supply to your home, consult your dealer or local power company.
8. For safety purposes this unit is equipped with a grounded plug. If you do not have a grounded outlet, please have one installed. Do not bypass this safety feature by tampering with the plug.
9. Do not allow anything to rest on the power cord. Do not locate this product where the power cord may be stepped on or tripped on.
10. To reduce the risk of fire or electric shock, do not overload wall outlets and extension cords.
11. Do not insert objects of any kind into this product through its slots and openings, as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock. Never spill liquid of any kind on or in the product.
12. To reduce the risk of electric shock, do not disassemble this product. Only qualified personnel should service this product. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock.
13. Unplug this product from the wall outlet and have it serviced by qualified service personnel in the following cases:
  - a) When the power supply cord or plug is damaged or frayed.
  - b) If liquid has been spilled into the product.
  - c) If the product has been exposed to rain or water.
  - d) If the product does not operate according to the operating instructions. Adjust only the controls that are explained in the operating instructions. Improper adjustment of other controls may result in damage and may require service by a qualified technician to restore the product to normal operation.
  - e) If the product has been dropped or the cabinet has been damaged.
  - f) If product performance deteriorates.
14. Avoid using wired telephones during an electrical storm. There is a remote risk of electric shock from lightning.
15. Do not use a telephone in the vicinity of a gas leak to report the leak.

---

# SAVE THESE INSTRUCTIONS

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## ***Precaution***

### **WARNING**

**DO NOT REMOVE  
SD MEMORY CARD  
WHILE POWER IS  
SUPPLIED TO THE  
ADVANCED HYBRID &  
WIRELESS PBX**

Doing so may cause the PBX to fail to start when you restart the system.

- 
- Keep the unit away from heating appliances and devices that generate electrical noise such as fluorescent lamps, motors and televisions. These noise sources can interfere with the performance of the PBX.
  - This unit should be kept free of dust, moisture, high temperature (more than 40 °C [104 °F]) and vibration, and should not be exposed to direct sunlight.
  - If you are having problems making calls to outside destinations, follow this procedure to test the CO lines:
    1. Disconnect the PBX from all CO lines.
    2. Connect known working SLTs to those CO lines.
    3. Make a call to an external destination using those SLTs.If a call cannot be carried out correctly, there may be a problem with the CO line that the SLT is connected to. Contact your telephone company.  
If all SLTs operate properly, there may be a problem with your PBX. Do not reconnect the PBX to the CO lines until it has been serviced by an authorized Panasonic Factory Servicenter.
  - Wipe the unit with a soft cloth. Do not clean with abrasive powders or with chemical agents such as benzene or thinner.

### **WARNING**

- **THIS UNIT MAY ONLY BE INSTALLED AND SERVICED BY QUALIFIED SERVICE PERSONNEL.**
- **IF DAMAGE TO THE UNIT EXPOSES ANY INTERNAL PARTS, DISCONNECT THE POWER SUPPLY CORD IMMEDIATELY AND RETURN THE UNIT TO YOUR DEALER.**
- **UNPLUG THIS UNIT FROM THE AC OUTLET IF IT EMITS SMOKE, AN ABNORMAL SMELL OR MAKES UNUSUAL NOISE. THESE CONDITIONS CAN CAUSE FIRE OR ELECTRIC SHOCK. CONFIRM THAT SMOKE HAS STOPPED AND CONTACT AN AUTHORIZED PANASONIC FACTORY SERVICENTER.**
- **WHEN RELOCATING THE EQUIPMENT, FIRST DISCONNECT THE TELECOM CONNECTION BEFORE DISCONNECTING THE POWER CONNECTION. WHEN THE UNIT IS INSTALLED IN THE NEW LOCATION, RECONNECT THE POWER FIRST, AND THEN RECONNECT THE TELECOM CONNECTION.**
- **TO PREVENT POSSIBLE FIRE OR ELECTRIC SHOCK, DO NOT EXPOSE THIS PRODUCT TO RAIN OR MOISTURE.**
- **THE POWER SUPPLY CORD IS USED AS THE MAIN DISCONNECT DEVICE. ENSURE THAT THE AC OUTLET IS LOCATED NEAR THE EQUIPMENT AND IS EASILY ACCESSIBLE.**

### **CAUTION**

DANGER OF EXPLOSION EXISTS IF A BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE BATTERY MANUFACTURER. DISPOSE OF USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.

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**When you ship the product**

Carefully pack and send it prepaid, adequately insured and preferably in the original carton. Attach a postage-paid letter, detailing the symptom, to the outside of the carton. DO NOT send the product to the Executive or Regional Sales offices. They are NOT equipped to make repairs.

**Product Service**

Panasonic Factory Servicenters for this product are listed in the servicenter directory. Consult your dealer for detailed instructions.

**For Future Reference**

Please print, record, and retain the following information for future reference.

**Note**

The serial number of this product can be found on the label affixed to the unit. You should record the model number and the serial number of this unit as a permanent record of your purchase to aid in identification in the event of theft.

MODEL NO.	_____
SERIAL NO.	_____
DATE OF PURCHASE	_____
NAME OF DEALER	_____
DEALER'S ADDRESS	_____ _____ _____ _____
DEALER'S TEL. NO.	_____



---

# Introduction

This Installation Manual is designed to serve as an overall technical reference for the Panasonic Advanced Hybrid & Wireless PBX, KX-TAW848. It provides instructions for installing the hardware, and programming the PBX using the KX-TAW848 Maintenance Console.

## The Structure of this Manual

This manual contains the following sections:

### Section 1 System Outline

Provides general information on the PBX, including the system capacity and specifications.

### Section 2 Installation

Describes the procedures to install the PBX. Detailed instructions for planning the installation site, installing the optional service cards, and cabling of peripheral equipment are provided. Further information on system expansion and peripheral equipment installation is included.

### Section 3 Guide for the PC Programming Software

Explains the installation procedure, structure, and basic information of the KX-TAW848 Maintenance Console.

### Section 4 Troubleshooting

Provides information on the PBX and telephone troubleshooting.

## About the Other Manuals

Along with this Installation Manual, the following manuals are available:

### Feature Guide

Describes all basic, optional and programmable features of the PBX, and step-by-step instruction for performing system programming using a proprietary telephone or a personal computer (PC).

### User Manual

Provides operating instructions for end users using an APT, SLT, PS, or DSS Console.

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- All other trademarks identified herein are the property of their respective owners.
- Screen shots reprinted with permission from Microsoft Corporation.

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# **F.C.C. REQUIREMENTS AND RELEVANT INFORMATION**

## **1. Notification to the Telephone Company**

This equipment complies with Part 68 of the FCC rules and the requirements adopted by the ACTA. On the side of this equipment is a label that contains, among other information, a product identifier in the format US: ACJMF03AKX-TDA50. If requested, this number must be provided to the telephone company.

Installation must be performed by a qualified professional installer. If required, provide the telephone company with the following technical information:

- Telephone numbers to which the system will be connected
- Make: Panasonic
- Model: KX-TAW848
- Certification No.: found on the side of the unit
- Ringer Equivalence No.: 0.3A
- Facility Interface Code: 02LS2
- Service Order Code: 9.0F
- Required Network Interface Jack: RJ11

## **2. Ringer Equivalence Number (REN)**

The REN is used to determine the number of devices that may be connected to a telephone line. Excessive RENs on a telephone line may result in the devices not ringing in response to an incoming call. In most, but not all areas, the sum of RENs should not exceed five (5.0). To be certain of the number of devices that may be connected to a line, as determined by the total RENs, contact the local telephone company. The REN for this product is part of the product identifier that has the format US: ACJMF03AKX-TDA50. The digits represented by 03 are the REN without a decimal point (e.g., 03 is a REN of 0.3). For earlier products, the REN is separately shown on the label.

## **3. Incidence of Harm to the Telephone Lines**

If this equipment causes harm to the telephone network, the telephone company will notify you in advance that temporary discontinuance of service may be required. But if advance notice isn't practical, the telephone company will notify the customer as soon as possible. Also, you will be advised of your right to file a complaint with the FCC if you believe it is necessary.

## **4. Changes in Telephone Company Communications Facilities, Equipment, Operations and Procedures**

The telephone company may make changes in its facilities, equipment, operations or procedures that could affect the operation of the equipment. If this happens the telephone company will provide advance notice in order for you to make necessary modifications to maintain uninterrupted service.

## **5. Trouble with this equipment**

If trouble is experienced with this equipment, for repair or warranty information, please see the attached warranty, which includes the Servicenter Directory. If the equipment is causing harm to the telephone network, the telephone company may request that you disconnect the equipment until the problem is resolved.

## **6. Connection to Party Line**

Connection to party line service is subject to state tariffs. Contact the state public utility commission, public service commission or corporation commission for information.

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## 7. Combined Use with Alarm Equipment

If your home has specially wired alarm equipment connected to the telephone line, ensure the installation of this equipment does not disable your alarm equipment. If you have questions about what will disable alarm equipment, consult your telephone company or a qualified installer.

### **Note**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

### **CAUTION**

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this device.

When programming emergency numbers and/or making test calls to emergency numbers:

1. Remain on the line and briefly explain to the dispatcher the reason for the call before hanging up.
2. Perform such activities in the off-peak hours, such as early morning hours or late evenings.

---

## For Cell Station

### **CAUTION**

Any changes or modifications not expressly approved by the party responsible for compliance could void user's authority to operate this device.

### **Note**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Some wireless telephones operate at frequencies that may cause interference to nearby TVs and VCRs. To minimize or prevent such interference, the base of the wireless telephone should not be placed near or on top of a TV or VCR. If interference is experienced, move the wireless telephone further away from the TV or VCR. This will often reduce, or eliminate, interference.

Operating near 2.4 GHz electrical appliances may cause interference. Move away from the electrical appliances.

### **CAUTION**

To comply with FCC RF exposure requirements in uncontrolled environment:

- This equipment must be installed and operated in accordance with provided instructions and a minimum 20 cm (8 in) spacing must be provided between antenna and all person's body (excluding extremities of hands, wrist and feet) during wireless modes of operation.
- This transmitter must not be co-located or operated in conjunction with any other antenna or transmitter.

**Medical**—consult the manufacturer of any personal medical devices, such as pacemakers, to determine if they are adequately shielded from external RF (radio frequency) energy. (The unit operates in the frequency range of 2401 MHz to 2480 MHz, and the power output level can range from 0.004 W to 0.4 W.) Do not use the unit in health care facilities if any regulations posted in the area instruct you not to do so. Hospitals or health care facilities may be using equipment that could be sensitive to external RF (radio frequency) energy.

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# **Section 1**

## **System Outline**

*This section provides general information on the PBX, including the system capacity and specifications.*

# 1.1 System Highlights

## 1.1.1 System Highlights

### Voice Mail Features

A Voice Processing System (VPS) can be connected to the PBX to provide Voice Mail (VM) and Automated Attendant (AA) services. A Panasonic VPS which supports DPT (Digital) Integration can be connected to the PBX effortlessly and with minimal setup required. Conventional DTMF (analog) voice mail systems, including those from other manufacturers, are also supported.

### Paralleled Telephone Features

By connecting telephones in parallel, you can increase the number of telephones connected to the PBX without adding additional extension cards.

An SLT can be connected to an APT which is connected to a Hybrid Port of the PBX. The SLT shares the same extension number with the APT.

### Portable Station (PS) Features

A Panasonic PS can be used in place of an APT to provide wireless access to PBX features and call handling. When in Wireless XDP Parallel Mode, a PS can share an extension number with a wired telephone, allowing extension users to use their PSs when they are away from their desks to answer or make calls as if they were using their wired telephones.



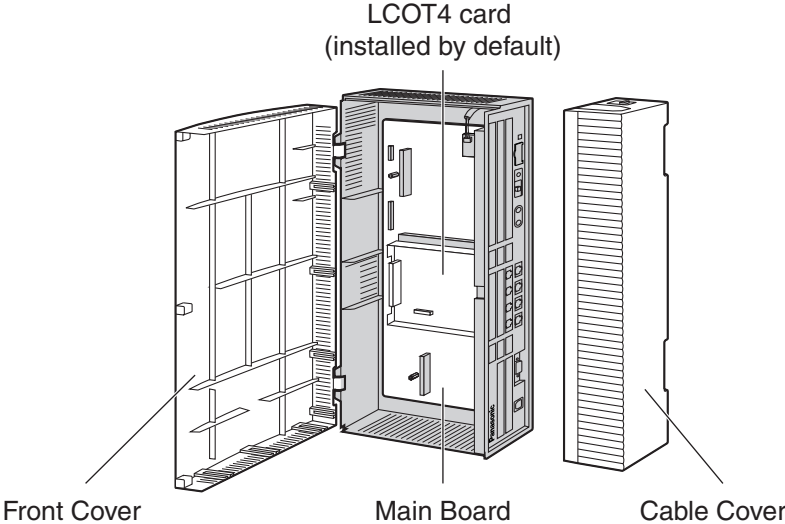
# 1.2 Basic System Construction

## 1.2.1 Main Unit

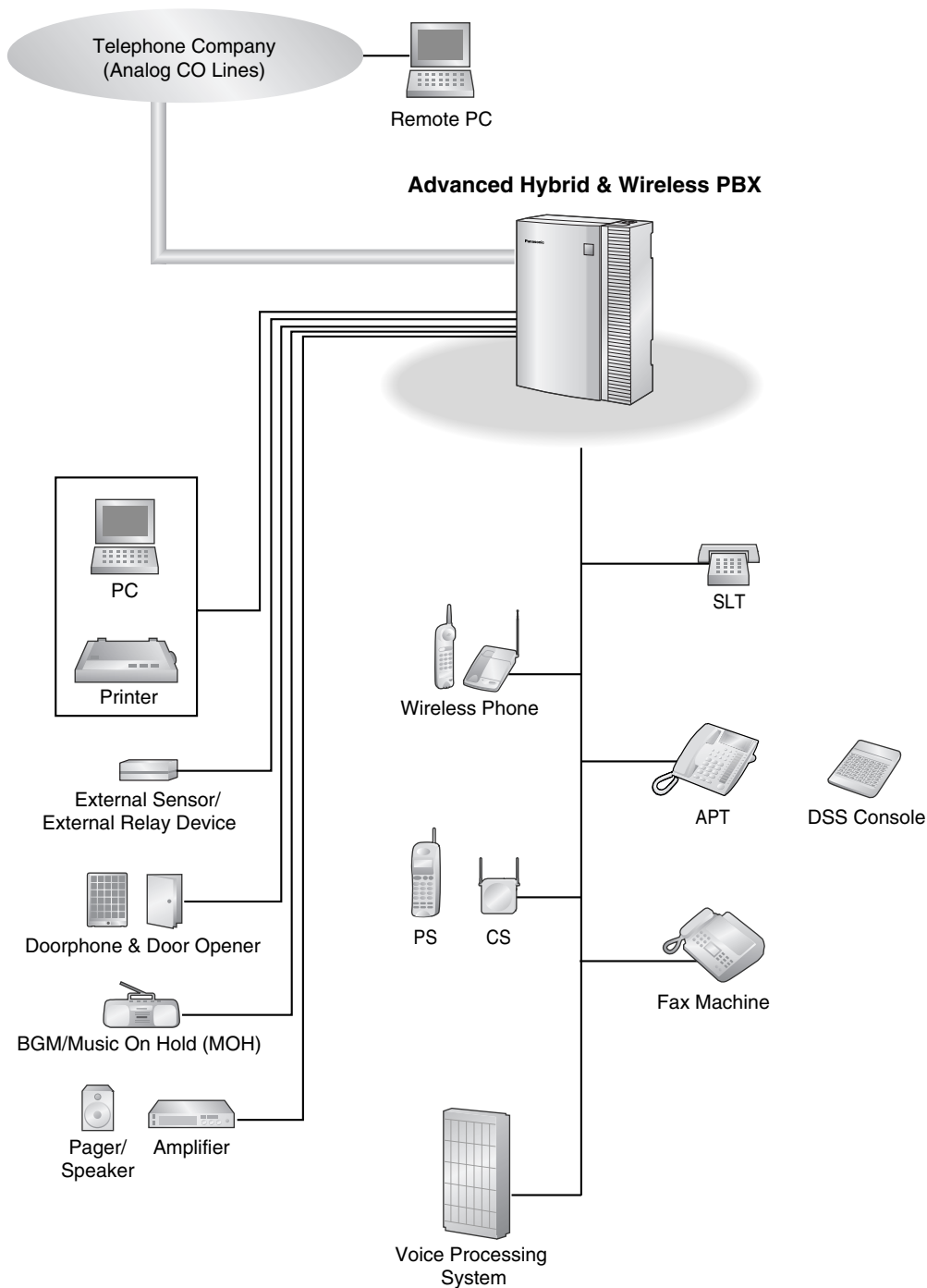
The main unit is equipped with 4 analog trunk ports (one LCOT4 card) and 4 extension ports (Hybrid Ports). For system expansion, optional service cards can be installed.

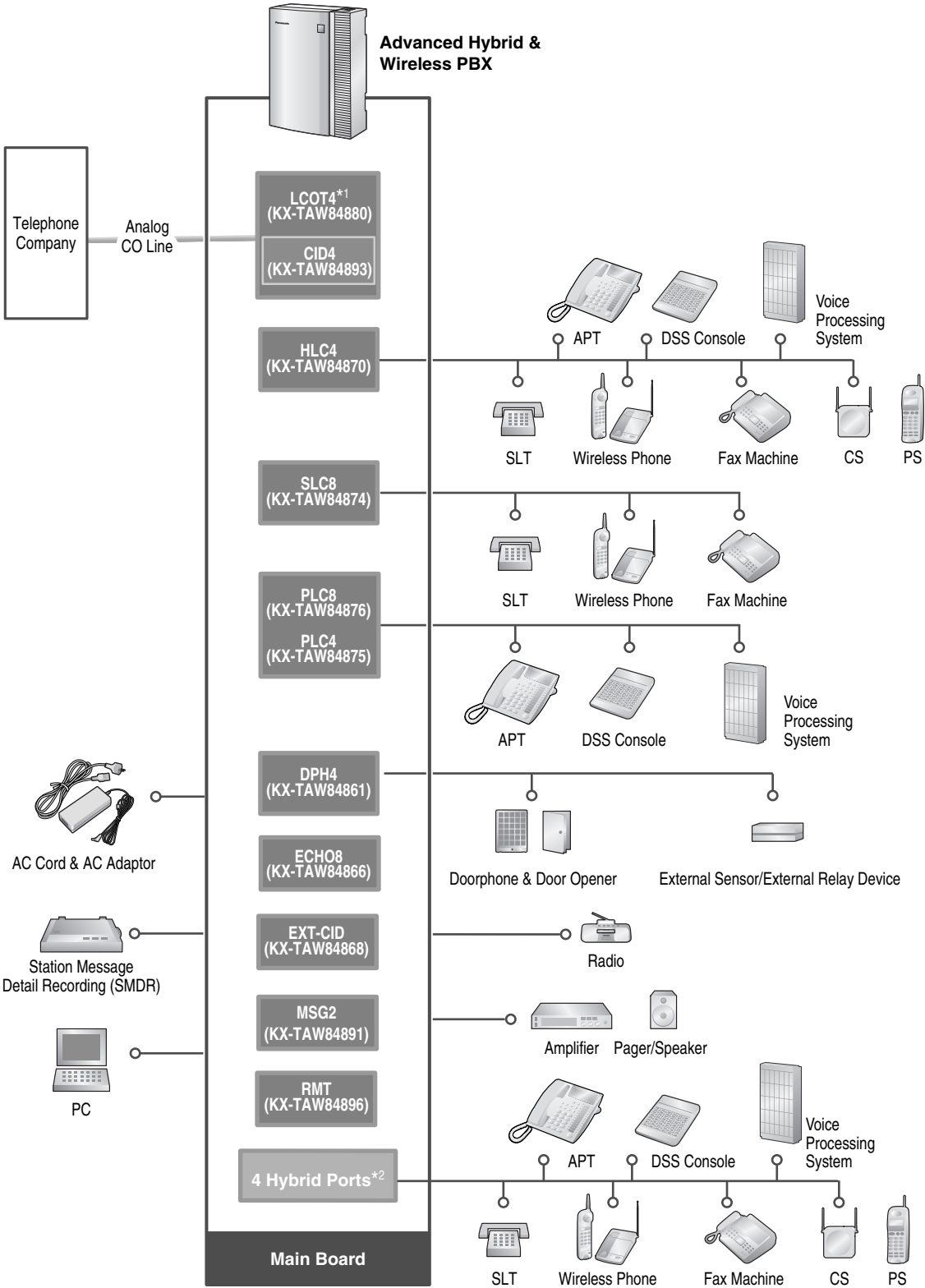


### Construction of Main Unit



## 1.2.2 System Connection Diagram





\*1 One LCOT4 card is installed by default.  
 \*2 The PBX has 4 Hybrid Ports pre-installed.

# 1.3 Options

## 1.3.1 Options

Model No.	Model Name	Description	Maximum Quantity
KX-TAW84861	4-Port Doorphone Card (DPH4)	4-port doorphone card for 4 doorphones, 4 door openers or external relays, and 4 external sensors.	1
KX-TAW84866	8-Channel Echo Canceller Card (ECHO8)	8-channel card for echo cancellation during conferences.	1
KX-TAW84868	Extension Caller ID Card (EXT-CID)	Sends Caller ID signals to extension ports.	1
KX-TAW84870	4-Port Hybrid Extension Card (HLC4)	4-port extension card for SLTs, APTs, DSS consoles, a Voice Processing System (VPS), and CSs.	1
KX-TAW84874	8-Port Single Line Telephone Extension Card (SLC8)	8-port extension card for SLTs.	2
KX-TAW84875	4-Port Proprietary Extension Card (PLC4)	4-port extension card for APTs, DSS consoles, and a VPS.	1
KX-TAW84876	8-Port Proprietary Extension Card (PLC8)	8-port extension card for APTs, DSS consoles, and a VPS.	2
KX-TAW84880	4-Port Analog Trunk Card (LCOT4)	4-port analog CO line card with 2 power failure transfer (PFT) ports.	1 <sup>*1</sup>
KX-TAW84891	2-Channel Message Card (MSG2)	2-channel message card.	2
KX-TAW84893	4-Port Caller ID Card (CID4)	4-port Caller ID signal type FSK/FSK (with Call Waiting Caller ID [Visual Caller ID])/DTMF. To be mounted on the LCOT4 card.	2
KX-TAW84896	Remote Card (RMT)	Analog modem card for remote communication with the PBX. ITU-T V.90 support.	1

\*1 One LCOT4 card is installed by default. One more LCOT4 card can be installed in the PBX as an option.

# 1.4 Specifications

## 1.4.1 General Description

<b>Switching</b>		Non-blocking	
<b>AC Adaptor</b>	<b>AC Input</b>	100 V AC to 240 V AC, 1.5 A, 50 Hz/60 Hz	
	<b>DC Output</b>	40 V, 1.38 A (55.2 W)	
<b>DC Input</b>		40 V, 1.38 A (55.2 W)	
<b>Maximum Power Failure Tolerance</b>		300 ms	
<b>Memory Backup Duration</b>		7 years	
<b>Dialing</b>	<b>CO Line</b>	Dial Pulse (DP) 10 pps, 20 pps Tone (DTMF) Dialing	
	<b>Extension</b>	Dial Pulse (DP) 10 pps, 20 pps Tone (DTMF) Dialing	
<b>Connectors</b>	<b>CO Line</b>	RJ11 (2 wire) × each CO ports	
	<b>Extension</b>	RJ11 (4 wire) × each extension ports	
	<b>Paging Output</b>	1 conductor jack	
	<b>External MOH (Music on Hold) Output</b>	1 conductor jack	
<b>Mode Conversion</b>		DP-DTMF, DTMF-DP	
<b>Ring Frequency</b>		20 Hz/25 Hz (selectable)	
<b>Central Office Loop Limit</b>		1600 Ω maximum	
<b>Operating Environment</b>	<b>Temperature</b>	0 °C to 40 °C (32 °F to 104 °F)	
	<b>Humidity</b>	10 % to 90 % (non-condensing)	
<b>Conference Call CO Line</b>		From 10 × 3-party conference call to 4 × 8-party conference call	
<b>Music on Hold</b>		1 port (Level Control: -11 dB to +11 dB in 1 dB steps) Selectable Tone/External Music Source port	
<b>Paging</b>	<b>Internal</b>	Level Control: -15 dB to +6 dB in 3 dB steps	
	<b>External</b>	1 port (Volume Control: -15 dB to +15 dB in 1 dB steps)	
<b>Serial Interface Port</b>	<b>RS-232C</b>	1 (maximum 115.2 kbps)	
	<b>USB</b>	1	
<b>Extension Connection Cable</b>		SLT	1-pair wire (T, R)
		APT	2-pair wire (T, R, D1, D2)
		DSS Console	1-pair wire (D1, D2)
		CS	1-pair wire (D1, D2)

## 1.4 Specifications

---

<b>Dimension</b>	275 mm (W) × 376 mm (H) × 117 mm (D) (10-4/5 in × 14-4/5 in × 4-3/5 in)
<b>Weight (when fully mounted)</b>	Under 3.5 kg (7.72 lb)

## 1.4.2 Characteristics

<b>Terminal Equipment Loop Limit</b>	<ul style="list-style-type: none"> <li>• APT: 40 <math>\Omega</math></li> <li>• SLT: 600 <math>\Omega</math> including set</li> <li>• Doorphone: 20 <math>\Omega</math></li> <li>• CS: 65 <math>\Omega</math></li> </ul>
<b>Minimum Leakage Resistance</b>	15 000 $\Omega$ minimum
<b>Maximum Number of Extension Instruments per Line</b>	<p>1 for APT or SLT</p> <p>2 by Parallel connection of an APT and an SLT</p>
<b>Ring Voltage</b>	75 Vrms at 20 Hz/25 Hz depending on the Ringing Load
<b>Central Office Loop Limit</b>	1600 $\Omega$ maximum
<b>Hookswitch Flash Timing Range</b>	24 ms to 2032 ms
<b>Door Opener Current Limit</b>	24 V DC/30 V AC, 1 A maximum
<b>External Relay Current Limit</b>	24 V DC/30 V AC, 1 A maximum
<b>External Sensor Current Limit</b>	Power to the external sensor is provided from the DPH4 card and must be grounded through the DPH4 card. For the connection diagram, refer to "2.5.1 DPH4 Card". The PBX detects input from the sensor when the signal is under 100 $\Omega$ .
<b>Paging Terminal Impedance</b>	600 $\Omega$
<b>MOH Terminal Impedance</b>	10 000 $\Omega$

## 1.4.3 System Capacity

### Maximum CO Line and Extension Cards

The following number of CO line and extension cards can be installed in the PBX for expansion.

Card Type	Maximum Number
CO Line Card	2
Extension Card	3

#### Notes

- For each card, the maximum number that can be installed in the PBX is listed in "1.3.1 Options".
- Any card that exceeds the capacity of the PBX will be ignored.
- When the PBX starts up with an invalid configuration, some cards will be ignored.

### Maximum Terminal Equipment

The following number of items of terminal equipment can be supported by the PBX.

Terminal Equipment Type	Maximum Number
SLT	24
APT	24
DSS console	4
CS	4
PS	28
VPS	4 ports (1 VPS)*1
SLT, PT, DSS console, and VPS	Total 28
Doorphone	4
Door Opener/External Relay	4
External Sensor	4

\*1 A maximum of 4 ports (8 channels) of a single VPS can be connected to the PBX.

#### Note

Devices connected to the PBX that exceed the system capacity will not function.



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## **Section 2**

# **Installation**

*This section describes the procedures to install the PBX. Detailed instructions for planning the installation site, installing the optional service cards, and cabling of peripheral equipment are provided. Further information on system expansion and peripheral equipment installation is included.*

## 2.1 Before Installation

### 2.1.1 Before Installation

Please read the following notes concerning installation and connection before installing the PBX and terminal equipment.

Be sure to comply with all applicable laws, regulations, and guidelines.

#### Safety Installation Instructions

When installing telephone wiring, basic safety precautions should always be followed to reduce the risk of fire, electric shock and injury to persons, including the following:

1. Never install telephone wiring during a lightning storm.
2. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations.
3. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
4. Use caution when installing or modifying telephone lines.

#### Installation Precautions

This PBX is designed for wall mounting only, and should be installed in a location where it is accessible for inspections and maintenance.

To prevent malfunction, noise, or discoloration, avoid installing the system in the following locations:

1. In direct sunlight and hot, cold, or humid places. (Temperature range: 0 °C to 40 °C [32 °F to 104 °F])
2. Areas where sulfuric gases may be present, such as near thermal springs.
3. Areas where shocks or vibrations are frequent or strong.
4. High-dust areas, or places the system may come into contact with water or oil.
5. Near devices that generate high frequencies, such as sewing machines or electric welders.
6. On or near computers, telexes, or other office equipment, as well as microwave ovens or air conditioners. (It is preferable not to install the system in the same room as the above equipment.)
7. Within 1.8 m (6 ft) of radios and televisions. (Both the PBX and PTs should be at least 1.8 m [6ft] away from such devices.)
8. Locations where other objects will obstruct the area around the PBX. Be especially careful to leave at least 20 cm (8 in) of space above and 10 cm (4 in) to the sides of the PBX for ventilation.
9. Do not stack up the optional service cards. To avoid damage to the optional service cards, always use the extension bolts.

#### Wiring Precautions

Be sure to follow these instructions when wiring the unit:

1. Do not run unshielded telephone cables near AC power cables, computer cables, AC power sources, etc. When running cables near other noise-generating devices or cables, use shielded telephone cables or shield the telephone cables with metal tubing.
2. If cables are run on the floor, use protectors to prevent the cables from being stepped on. Avoid running cables under carpets.
3. Avoid using the same AC outlet for computers, telexes, and other office equipment, as noise generated by such equipment may hamper system performance or interrupt the system.

- 4.** Use 2-pair telephone cables when connecting PTs.  
Use 1-pair telephone cables when connecting SLTs, data terminals, answering machines, computers, Voice Processing Systems, etc.
- 5.** Unplug the system from its power source when wiring, and plug the system back in only after all wiring is completed.
- 6.** Mis-wiring may cause the PBX to operate improperly. Refer to Section 2 "Installation" when wiring the system.
- 7.** If an extension does not operate properly, disconnect the telephone from the extension line and connect it again, or turn off the PBX using power switch then turn it on again.
- 8.** For safety purposes this unit is equipped with a grounded plug. If you do not have a grounded outlet, please have one installed. Do not bypass this safety feature by tampering with the plug.
- 9.** Use twisted pair cable for CO line connection.
- 10.** CO lines should be installed with surge protectors. For details, refer to "2.2.10 Surge Protector Installation".
- 11.** To assure good quality telephone connection, it is recommended new and modifications to existing installation of customer premise wiring shall use solid twisted pair copper conductors with minimum 24 gauge that comply with the electrical specifications for Category 3 wiring as detailed in ANSI/EIA/TIA-570A Building Wiring Standards.

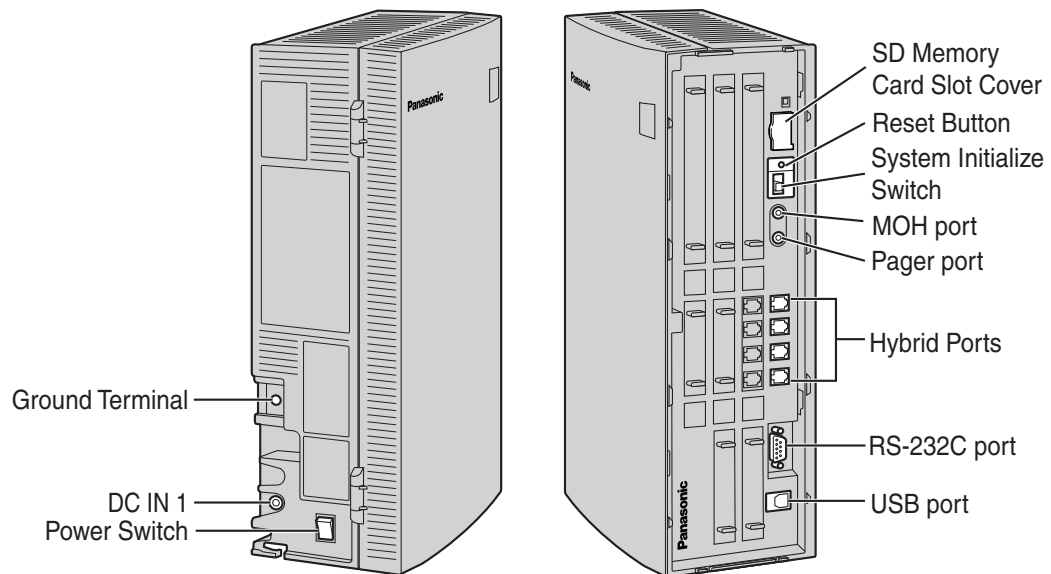
## 2.2 Installation of the PBX

### 2.2.1 Unpacking

Unpack the box and check the items below:

Main Unit	1
AC Cord	1
AC Adaptor	1
Screws for Wall Mounting	5
Washers for Wall Mounting	5
Mini Plug (for pager and music source)	2
SD Memory Card	1
Main Strap	1
Strap (for the pre-installed LCOT4 card)	1
Optional Card Label Sheet	1

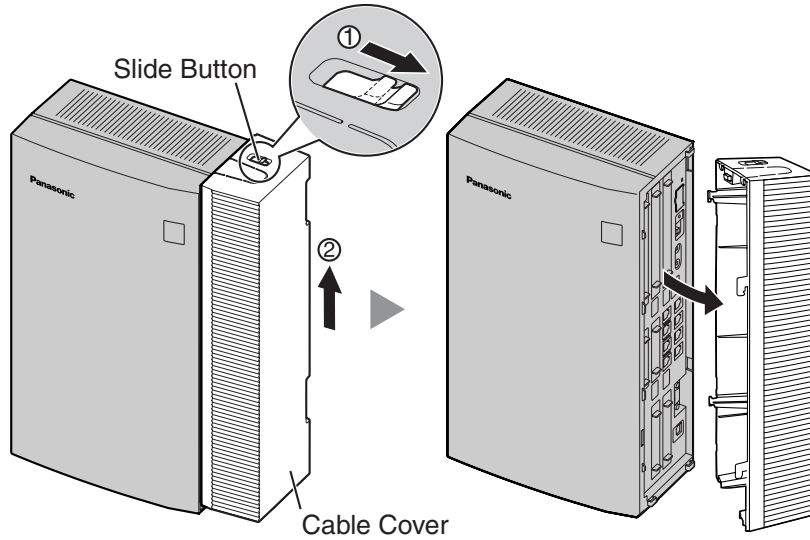
## 2.2.2 Names and Locations



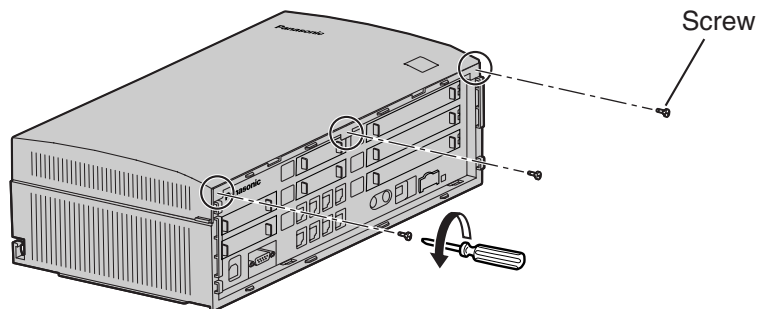
## 2.2.3 Opening/Closing the Covers

### Opening the Covers

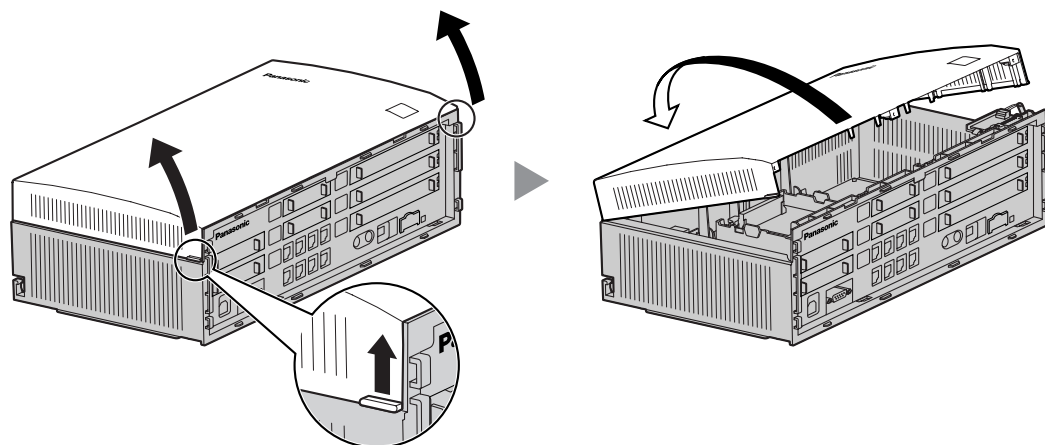
1. Pull the slide button to the right and, holding it, slide the cable cover upwards. Then turn the cable cover slightly to remove it.



2. Remove the three screws.



3. Holding the protrusions on both sides of the front cover, swing the cover open.

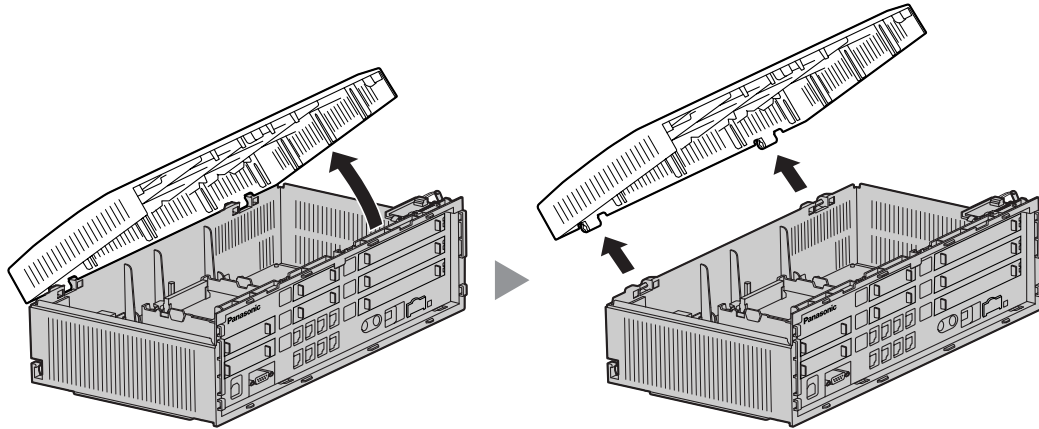


## Removing/Attaching the Front Cover

If you prefer, you can remove the front cover.

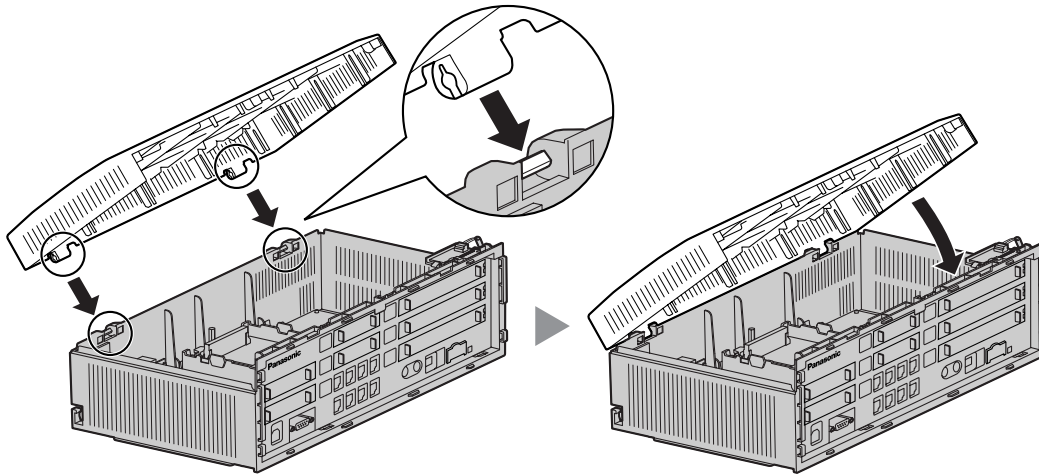
### Removing the Front Cover

Holding the front cover open at about a 45° angle, remove the front cover by pushing it in the direction of the arrow as shown below.



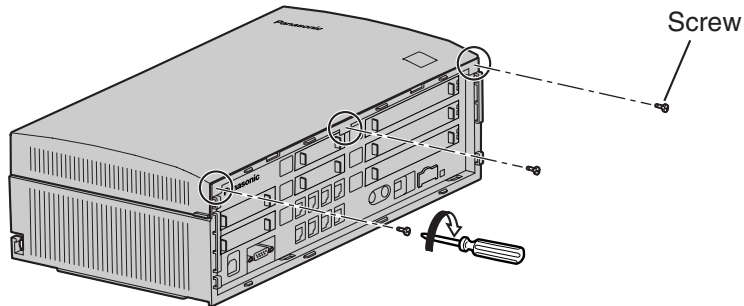
### Attaching the Front Cover

Fit the front cover to the main unit as shown below, and then close the front cover.

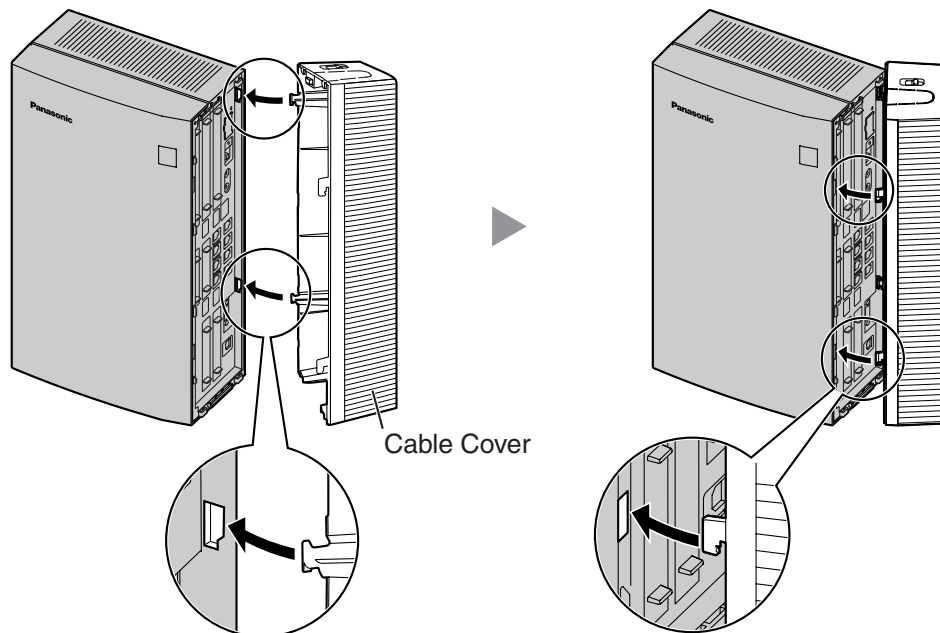


## Closing the Covers

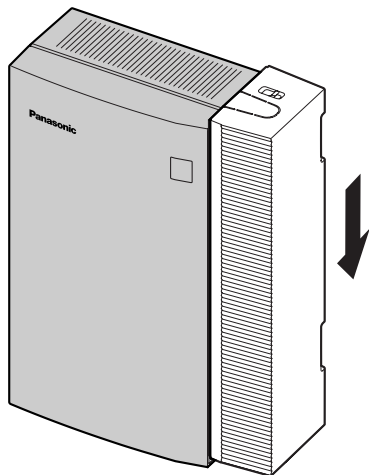
1. Close the front cover, then tighten the three screws.



2. Attach the rear hooks on the cable cover to the main unit, then swing the cable cover closed so that the front hooks fit in place.

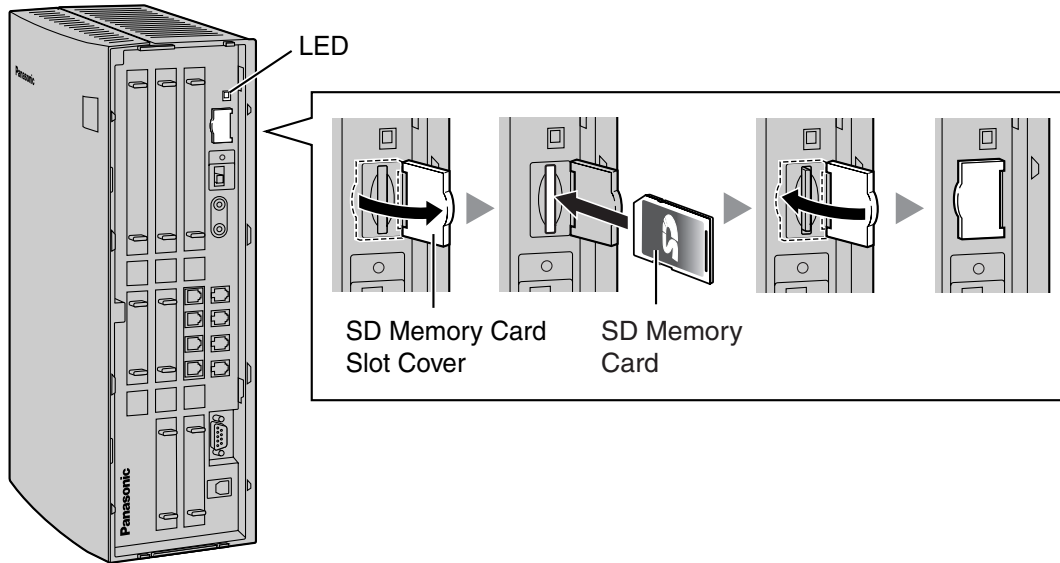


3. Slide the cable cover down until it locks.





## 2.2.4 Installation of the SD Memory Card

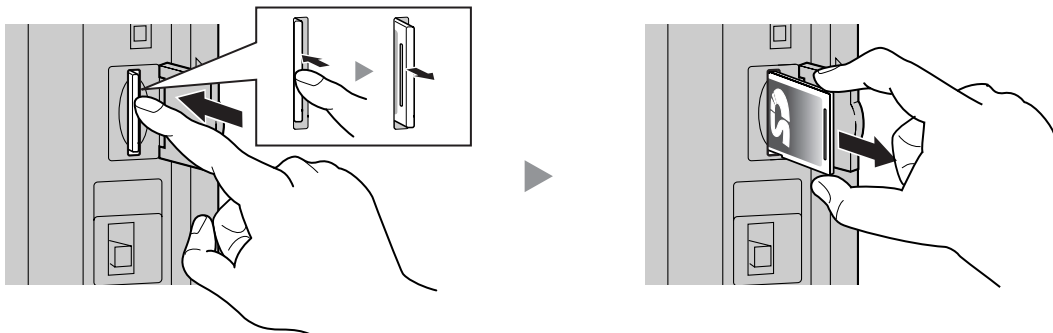


### CAUTION

- Use only the SD Memory Card included with the PBX.
- The SD Memory Card contains software for all the processes of the PBX and all the customer data. The SD Memory Card must be inserted before start up.
- Do not remove the SD Memory Card while power is supplied to the PBX. Doing so may cause the PBX to fail to start when you try to restart the system.

### Note

If you need to remove the SD Memory Card:



### LED Indications

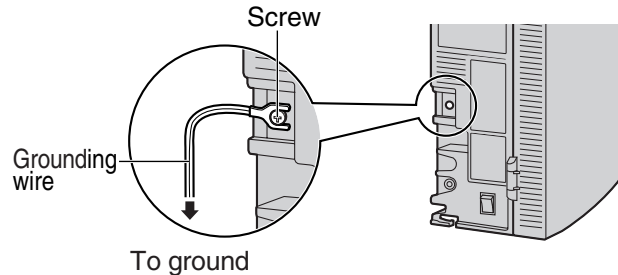
Indication	Color	Description
SD ACCESS	Green	SD memory card status <ul style="list-style-type: none"> <li>• ON: Accessing</li> </ul>

## 2.2.5 Frame Ground Connection

### **IMPORTANT**

**Connect the frame of the PBX to ground.**

1. Loosen the screw.
2. Insert a grounding wire (user-supplied)\*.
3. Tighten the screw.
4. Connect the grounding wire to ground.



\* For grounding wire, green-and-yellow insulation is required, and the cross-sectional area of the conductor must be more than 0.75 mm<sup>2</sup> or 18 AWG.

- Be sure to comply with applicable local regulations (e.g., law, guidelines).
- Proper grounding (connection to ground) is very important to protect the PBX from the bad effects of external noise or to reduce the risk to the user of electrocution in the case of a lightning strike.
- The ground wire of the AC cable has an effect against external noise and lightning strikes, but it may not be enough to protect the PBX. A permanent connection between ground and the ground terminal of the PBX must be made.

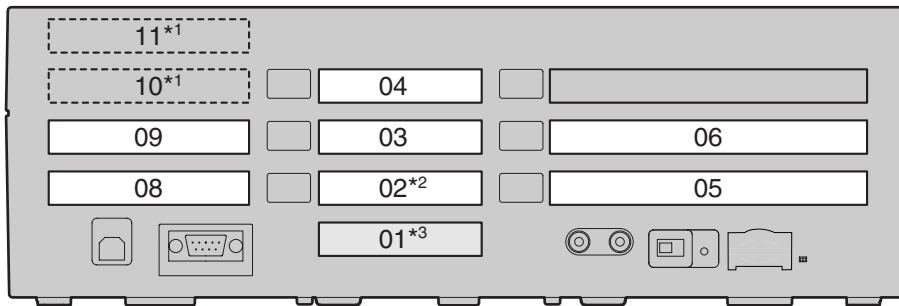
In most of the continental United States, the ground provided by the "Third wire ground" at the commercial power outlet will be satisfactory. However, in a small percentage of cases this ground may be installed incorrectly. Therefore, the following test procedure should be performed.

### **Test Procedure**

1. Obtain a suitable voltmeter and set it for a possible reading of up to 250 V AC.
2. Connect the meter probes between the 2 main AC voltage points on the wall outlet. The reading obtained should be 108 V AC to 132 V AC.
3. Move one of the meter probes to the 3rd prong terminal (GND). Either the same reading or a reading of 0 volt should be obtained.
4. If a reading of 0 volt at one terminal and a reading of 108 V AC to 132 V AC at the other terminal is not obtained, the outlet is not properly grounded. This condition should be corrected by a qualified electrician (per article 250 of the National Electrical Code).
5. If a reading of 0 volt at one terminal and a reading of 108 V AC to 132 V AC at the other terminal is obtained, then set the meter to the "OHMS/RX1" scale, place one probe at the GND Terminal and the other probe at the terminal which gave a reading of 0 volt. A reading of less than 1 ohm should be obtained. If the reading is not obtained, the outlet is not adequately grounded. See qualified electrician.

## 2.2.6 Installing/Removing the Optional Service Cards

### Slot Position



- \*1 Slots 10 and 11 accept only cards that do not have external ports. Therefore, these slots do not have removable cover plates.
- \*2 Slot 02 has an LCOT4 card pre-installed.
- \*3 Slot 01 contains the pre-installed Hybrid Ports. No optional service card can be installed.

### Slot Condition

The following table shows the slot condition. "✓" indicates that the slot supports the optional service card.

Card		Slot Number								
Type	Max	02	03	04	05	06	08	09	10	11
LCOT4	2 <sup>*1</sup>	✓	✓	✓						
HLC4	1 <sup>*2</sup>	✓	✓	✓						
PLC4		✓	✓	✓						
SLC8	2 <sup>*3</sup>				✓	✓				
PLC8					✓	✓				
DPH4	1						✓	✓		
ECHO8	1						✓	✓	✓	✓
EXT-CID	1						✓	✓	✓	✓
MSG2	2						✓	✓	✓	✓

- \*1 Including one LCOT4 card that is installed by default.
- \*2 Only one of HLC or PLC4 card can be installed.
- \*3 A maximum of two SLC8 and PLC8 cards can be installed.

### CAUTION

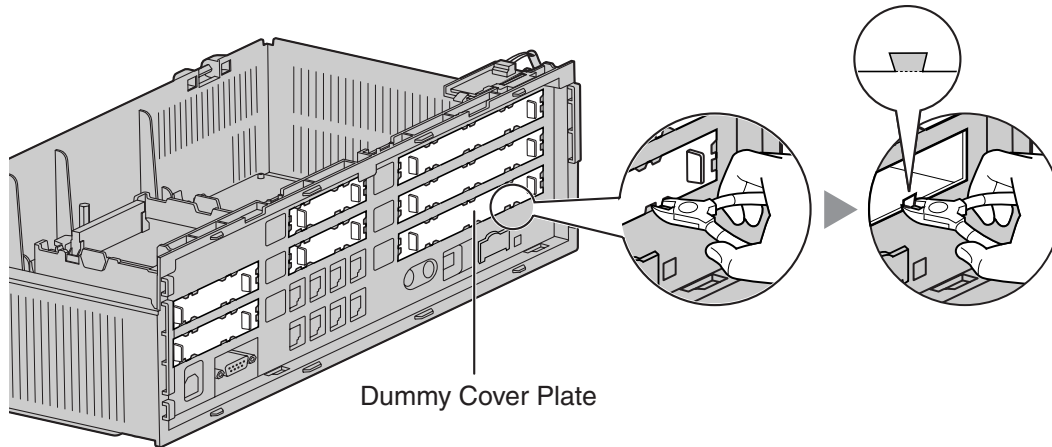
To protect the main board from static electricity, do not touch parts on the main board or on the optional service cards. To discharge static electricity, touch ground or wear an grounding strap.

### Note

When installing or removing the optional service cards, the power switch of the PBX must be in the off position.

## Installing Optional Service Cards

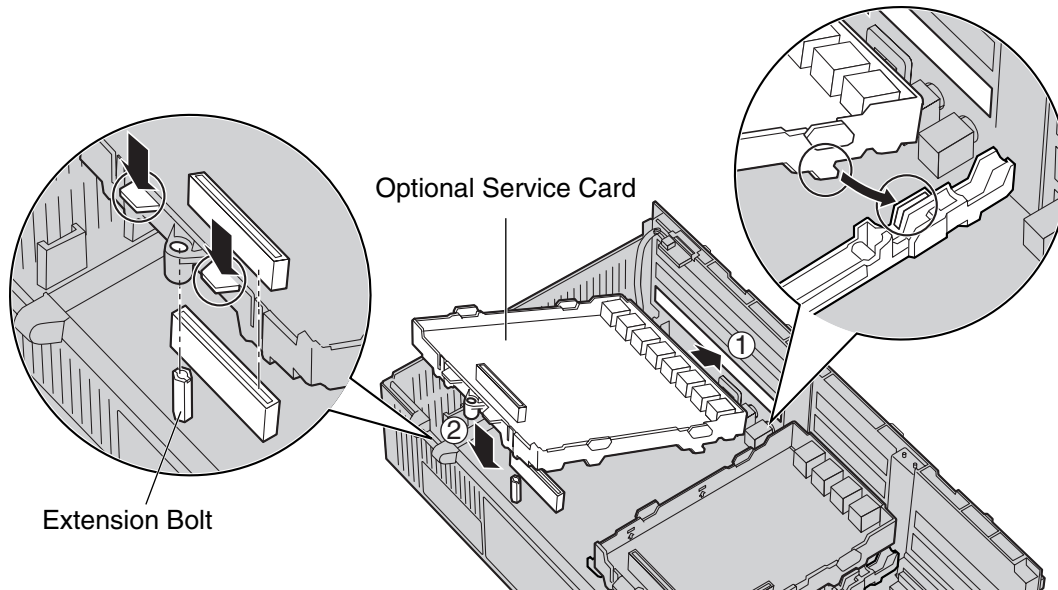
1. Before installing the optional service cards, cut and remove the appropriate dummy cover plates from the main unit.



### CAUTION

For safety reasons, smooth the cut edges after removing the dummy cover plates.

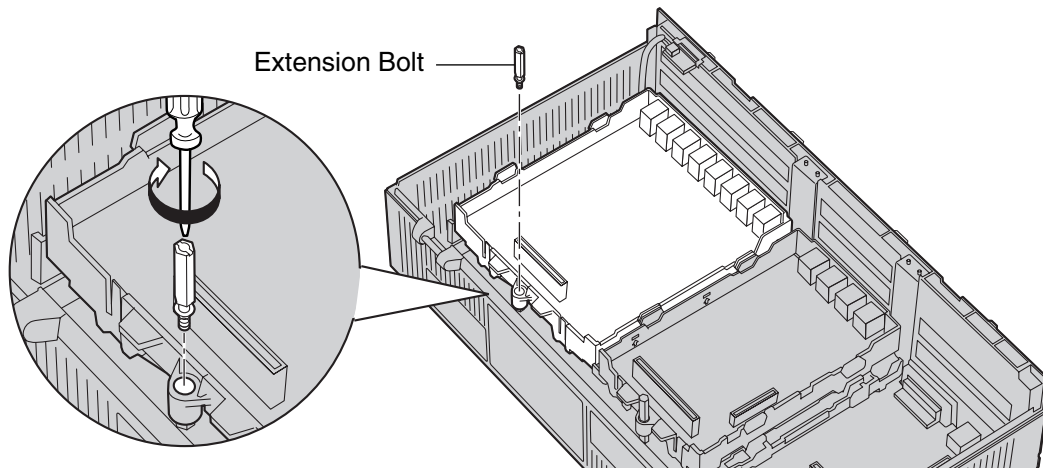
2. Position the card in the open slot, making sure that the tabs on the both sides of the card fit into place. Then, holding the card firmly in place, lower the rear end so that the hole of the card fits over the extension bolt.



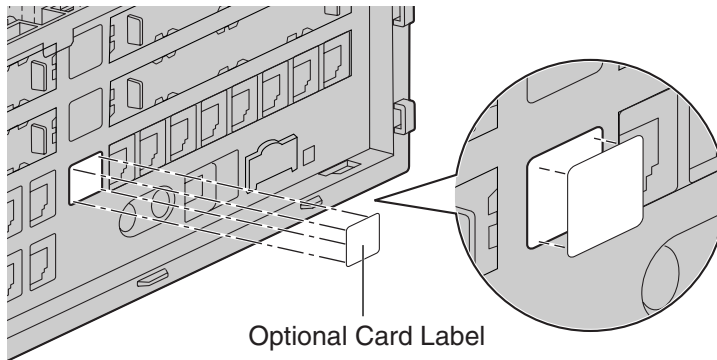
### CAUTION

When installing the optional service cards, do not put pressure on any parts of the main board. Doing so may result in damage.

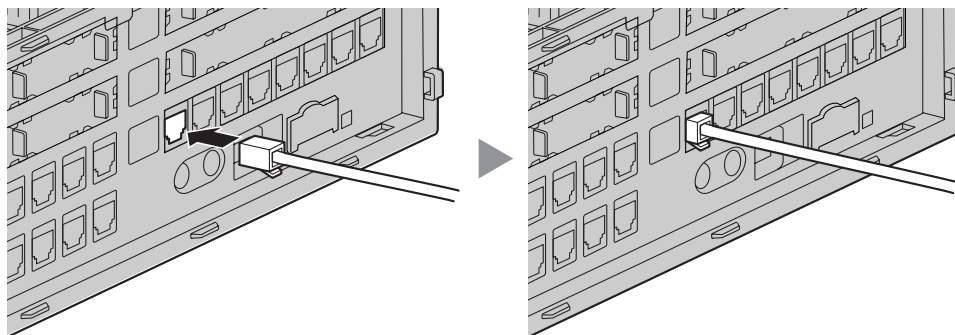
3. Insert the new extension bolt (included with the card) into the hole on the card, and tighten it to secure the card.



4. Stick an appropriate optional card label (included) to the left side of the corresponding card.



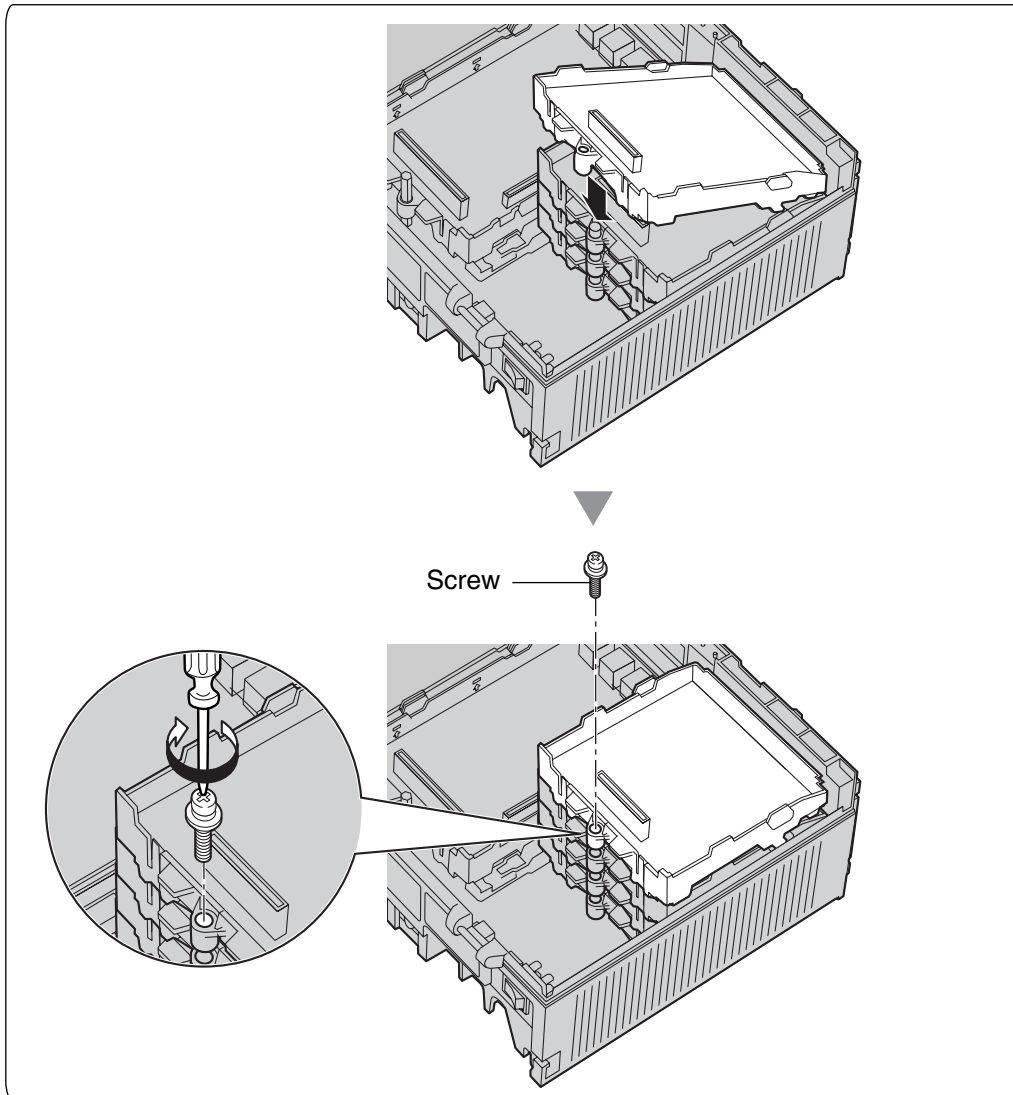
5. Connect a cable to an appropriate port of the card.  
For details about pin assignments, refer to the appropriate section in "2.3 Installation of the CO Line Cards" and "2.4 Installation of the Extension Cards".



**Note**

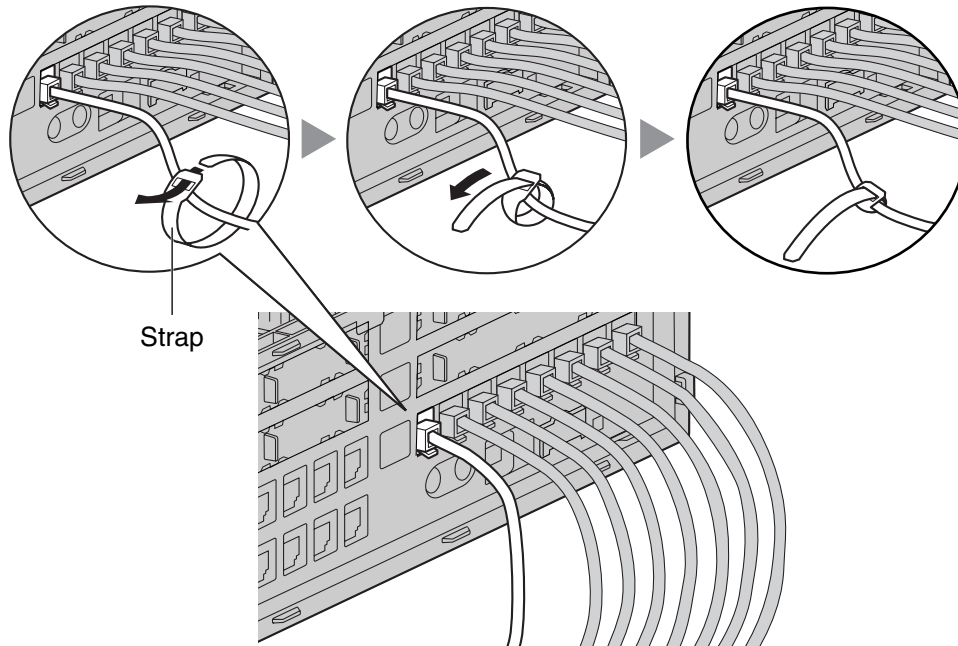
Make sure to connect cables after installing the card in the PBX, not before.

6. Repeat the procedure for other cards.
  - When installing a card in Slot 11, tighten the card using the screw included with the card, instead of the extension bolt.

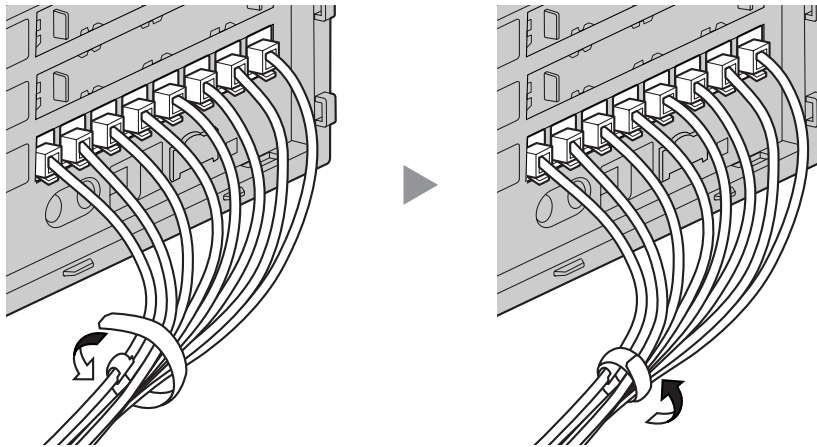


## Handling of the Cables

1. Attach the strap included with the card to one of the connected cables.

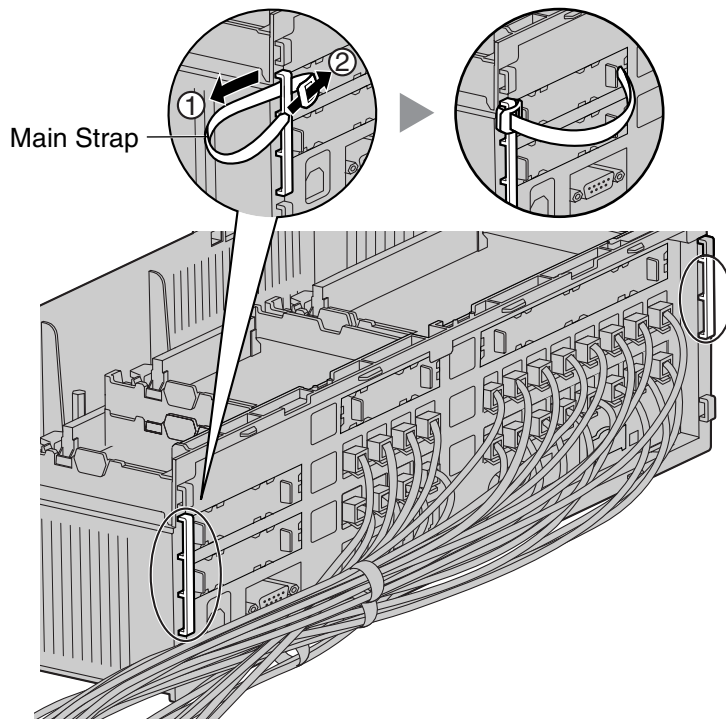


2. Bind all the connected cables together using the strap.



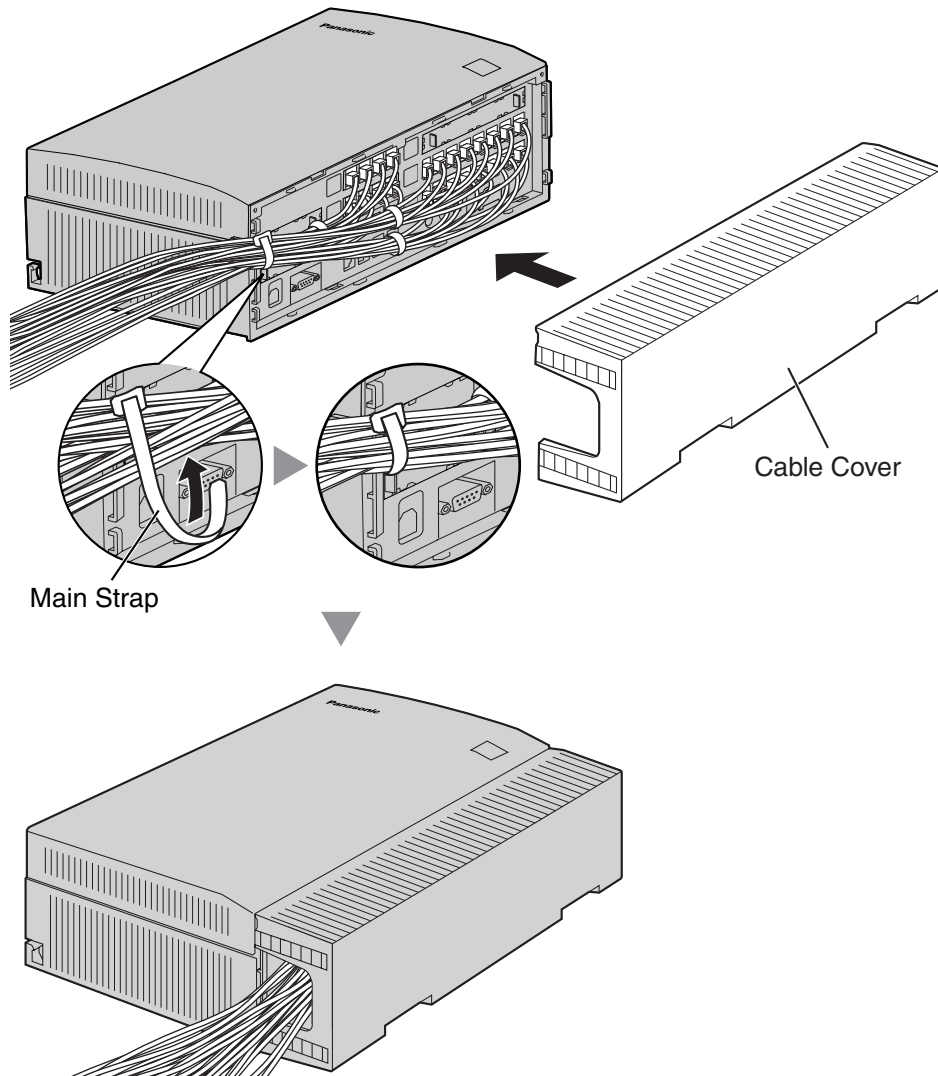
3. Repeat the procedure for other cards.

4. Attach the main strap (included with the PBX) to any of the 5 rails depending on your preference.



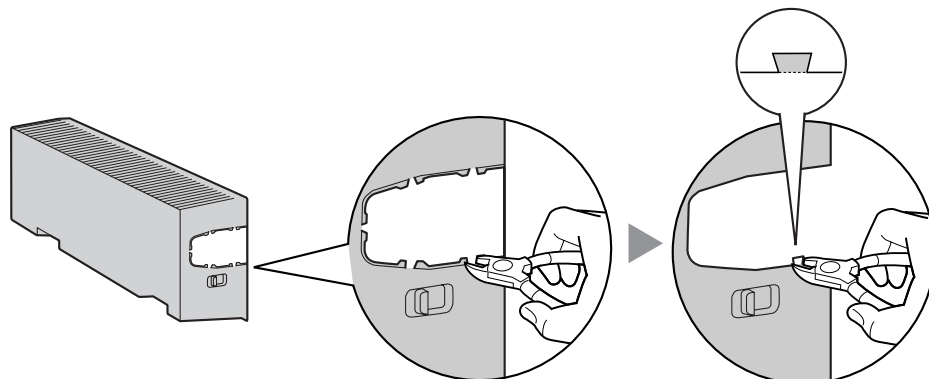


5. Bind all the connected cables together using the main strap, and then close the cable cover. For how to close the cable cover, refer to "2.2.3 Opening/Closing the Covers".



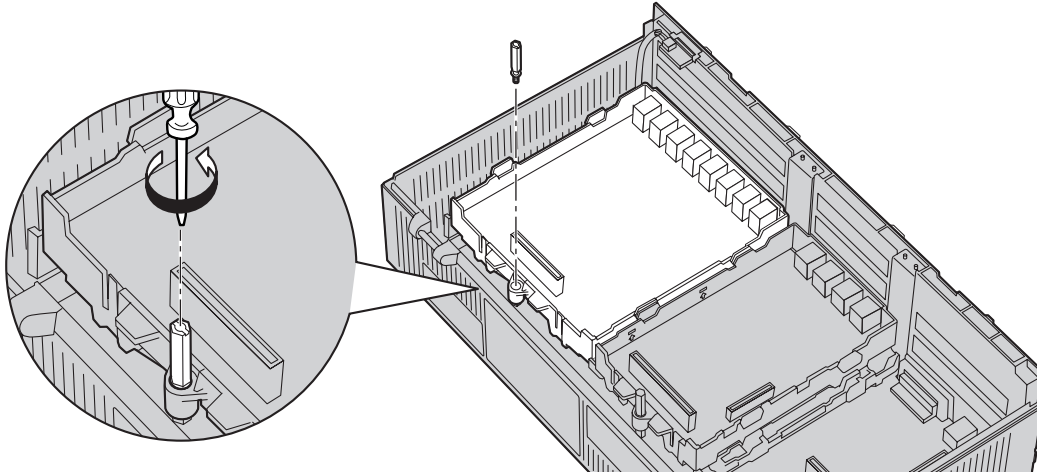
### Notes

- For safety reasons, do not stretch, bend, or pinch the cables.
- If you prefer, you can cut the other side of the cable cover and run the cables through that opening. For safety reasons, smooth the cut edges.

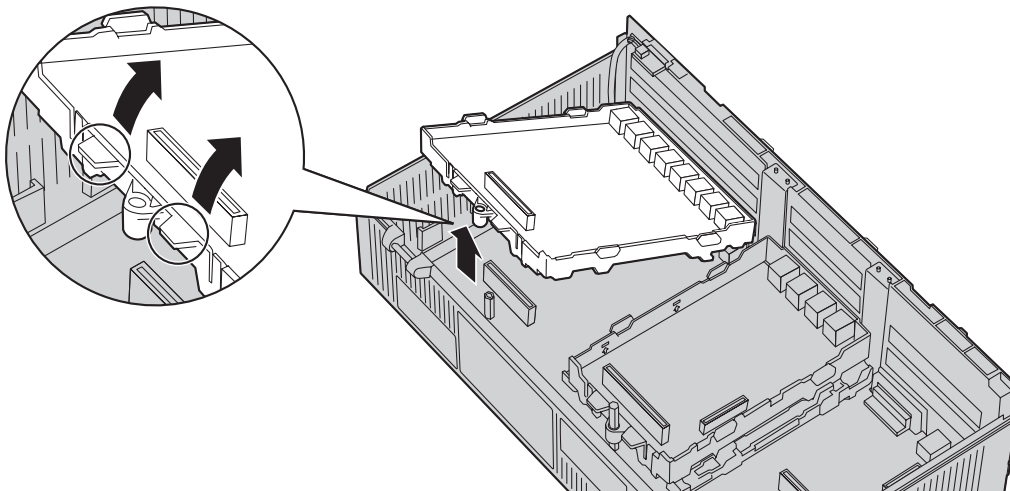


## Removing the Optional Service Cards

1. Loosen the extension bolt.



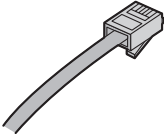
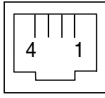
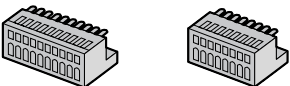
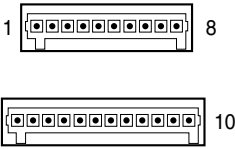
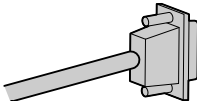
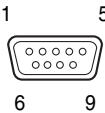
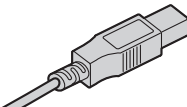

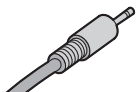
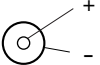
2. Holding the protrusions of the card, pull the card in the direction of the arrows.



### **CAUTION**

When removing the optional service cards, do not put pressure on any parts of the main board. Doing so may result in damage.

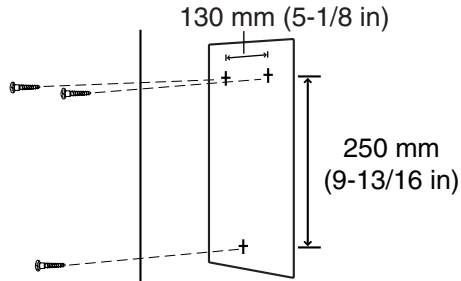
## 2.2.7 Types of Connectors

Connector Type	Pin Number	Used for
<p>RJ11</p>  <p>(Twisted pair cable)</p>		<ul style="list-style-type: none"> <li>• DPH4 (TAW84861)</li> <li>• HLC4 (TAW84871)</li> <li>• SLC8 (TAW84874)</li> <li>• PLC4 (TAW84875)</li> <li>• PLC8 (TAW84876)</li> <li>• LCOT4 (TAW84880)</li> <li>• Hybrid Ports (Main Board)</li> </ul>
<p>10-pin Terminal Block      8-pin Terminal Block</p> 		<ul style="list-style-type: none"> <li>• DPH4 (KX-TAW84861)</li> </ul>
<p>RS-232C</p> 		<ul style="list-style-type: none"> <li>• Main Board</li> </ul>
<p>USB</p> 		<ul style="list-style-type: none"> <li>• Main Board</li> </ul>
<p>Mini Plug</p> 		<ul style="list-style-type: none"> <li>• Main Board (Pager port, MOH port)</li> </ul>

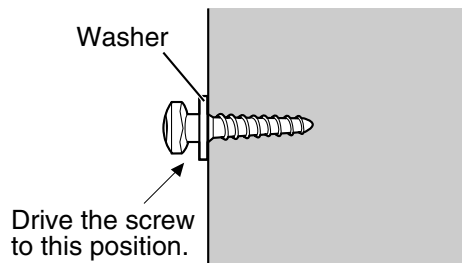
## 2.2.8 Wall Mounting (KX-TAW848)

### Mounting on Wooden Wall

1. Place the reference for wall mounting on the wall to mark the three screw positions.



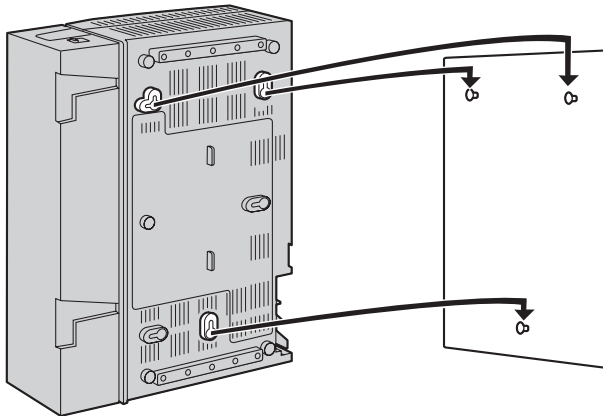
2. Install the screws and washers (included) in the wall.



#### Notes

- Make sure that the screw heads are at the same distance from the wall.
- Install the screws perpendicular to the wall.

3. Hook the main unit on the screw heads.



#### Notes

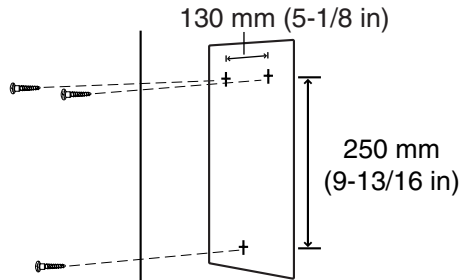
- Do not block the openings of the cabinet. Leave at least 20 cm (8 in) of space above and 10 cm (4 in) to the sides of the PBX for ventilation.
- Make sure that the wall behind the cabinet is flat and free of obstacles, so that the openings on the back of the cabinet will not be blocked.
- Be careful not to drop the cabinet.

## Mounting on Concrete or Mortar Wall

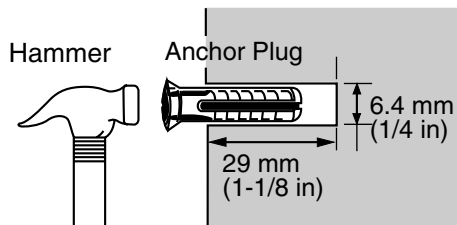
### CAUTION

Drive mounting screws into the wall. Be careful to avoid touching any metal laths, wire laths or metal plates in the wall.

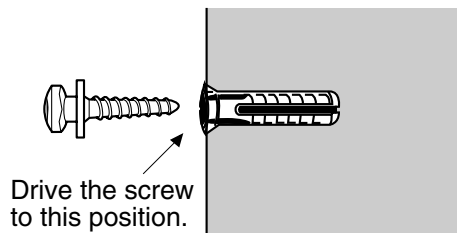
1. Place the reference for wall mounting on the wall to mark the three screw positions.



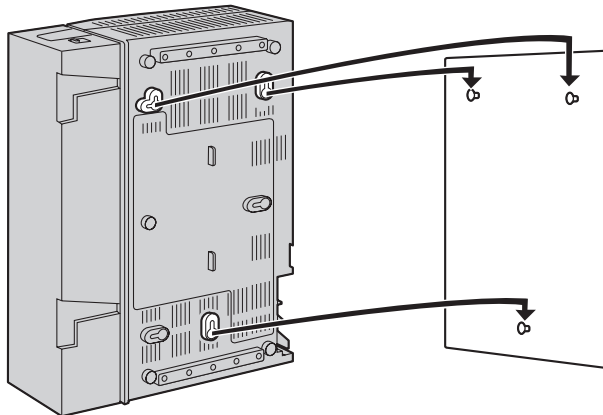
2. Install three anchor plugs (user-supplied) in the wall.



3. Install the screws (included) in the wall.



4. Hook the main unit on the screw heads.



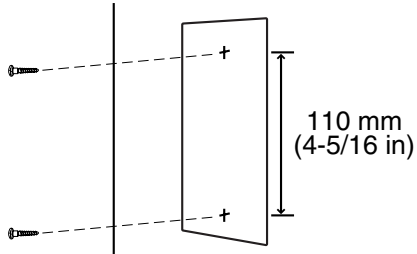
### **Notes**

- Do not block the openings of the cabinet. Leave at least 20 cm (8 in) of space above and 10 cm (4 in) to the sides of the PBX for ventilation.
- Make sure that the wall behind the cabinet is flat and free of obstacles, so that the openings on the back of the cabinet will not be blocked.
- Be careful not to drop the cabinet.

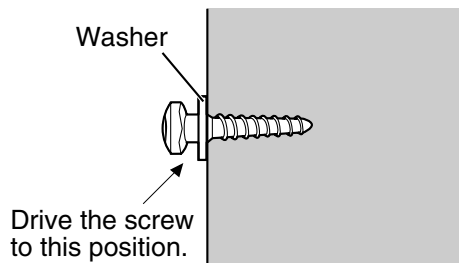
## 2.2.9 Wall Mounting (AC Adaptor)

### Mounting on Wooden Wall

1. Place the reference for wall mounting (on the following page) on the wall to mark the two screw positions.

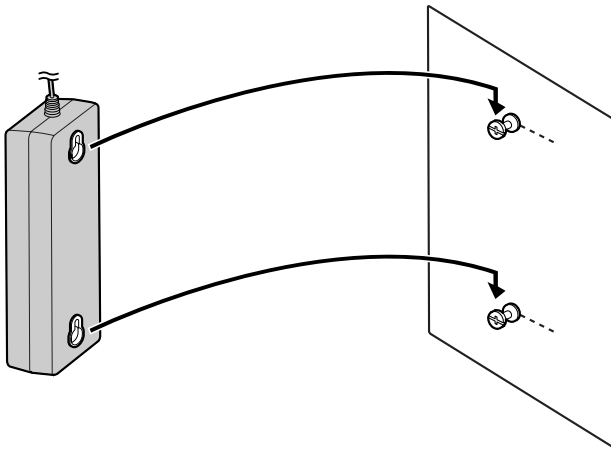


2. Install the screws and washers (included) in the wall.



#### Notes

- Make sure that the screw heads are at the same distance from the wall.
  - Install the screws perpendicular to the wall.
3. Hook the AC adaptor on the screw heads.



#### Note

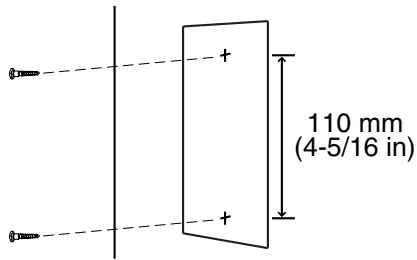
Be careful not to drop the AC adaptor.

## Mounting on Concrete or Mortar Wall

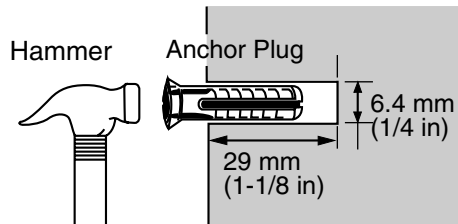
### CAUTION

Drive mounting screws into the wall. Be careful to avoid touching any metal laths, wire laths or metal plates in the wall.

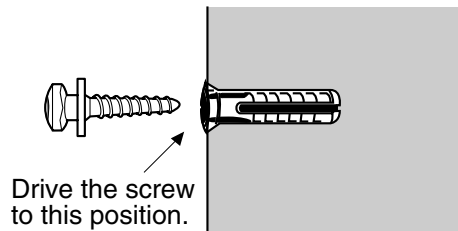
1. Place the reference for wall mounting (on the following page) on the wall to mark the two screw positions.



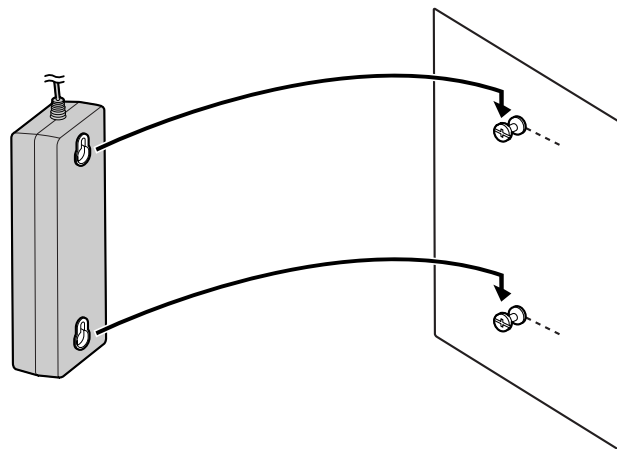
2. Install two anchor plugs (user-supplied) in the wall.



3. Install the screws (included) in the wall.



4. Hook the AC adaptor on the screw heads.



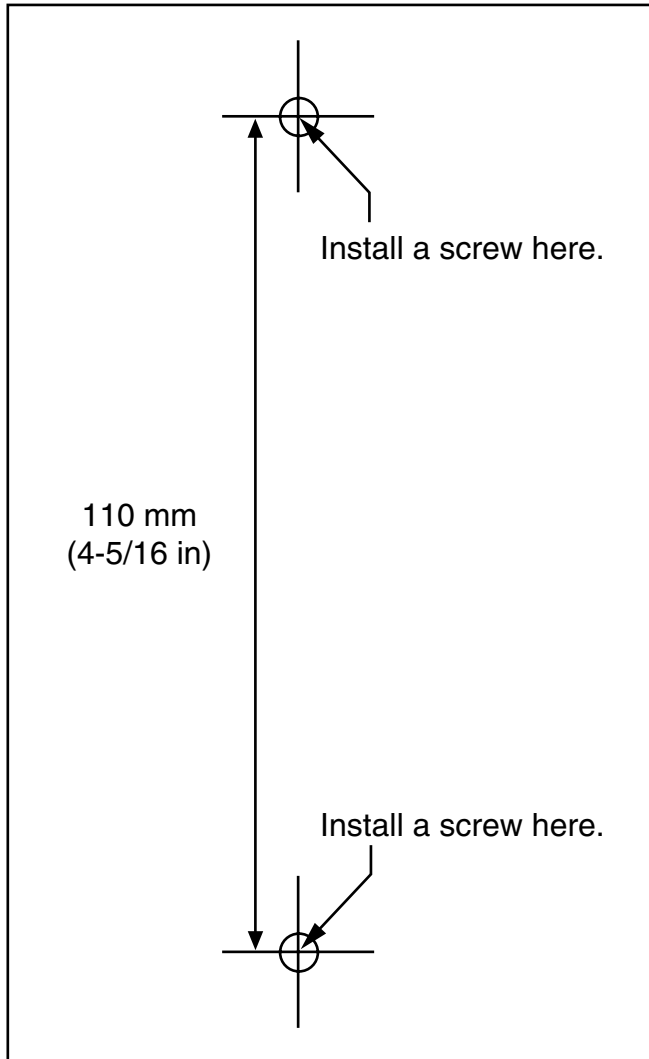
### Note

Be careful not to drop the AC adaptor.



## Reference for Wall Mounting

Please copy this page and use as a reference for wall mounting.



### **Note**

Make sure to set the print size to correspond with the size of this page. If the dimension of the paper output still deviates slightly from the measurement indicated here, use the measurement indicated here.

## 2.2.10 Surge Protector Installation

### Overview

A massive electrical surge can be caused if lightning strikes a telephone cable 10 m (33 ft) above ground, or if a telephone line comes into contact with a power line. A surge protector is a device that is connected to a CO line to prevent potentially dangerous electrical surges from entering the building via the CO line and damaging the PBX and connected equipment.

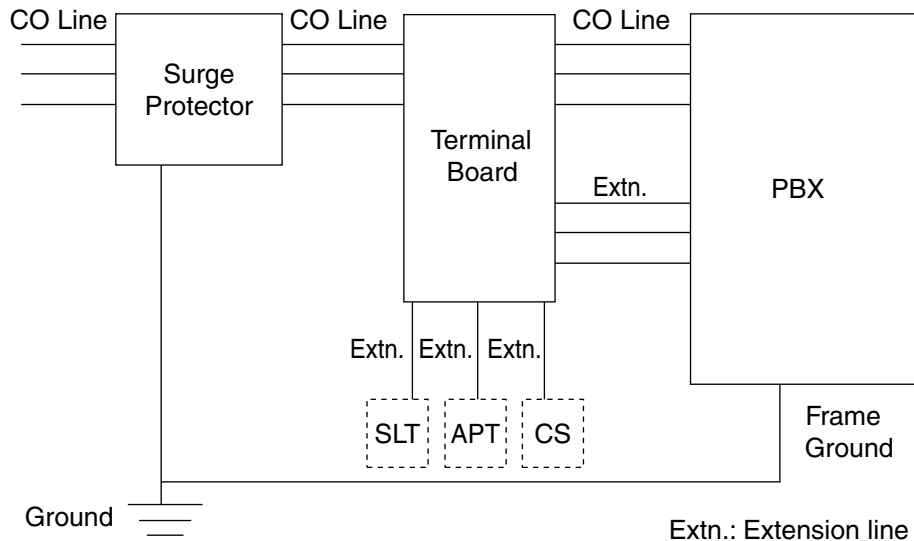
To protect the system from electrical surges, we strongly recommend connecting the system to a surge protector that meets the following specifications:

- Surge arrester type: 3-electrode arrester
- DC spark-over voltage: 230 V
- Maximum peak current: at least 10 kA

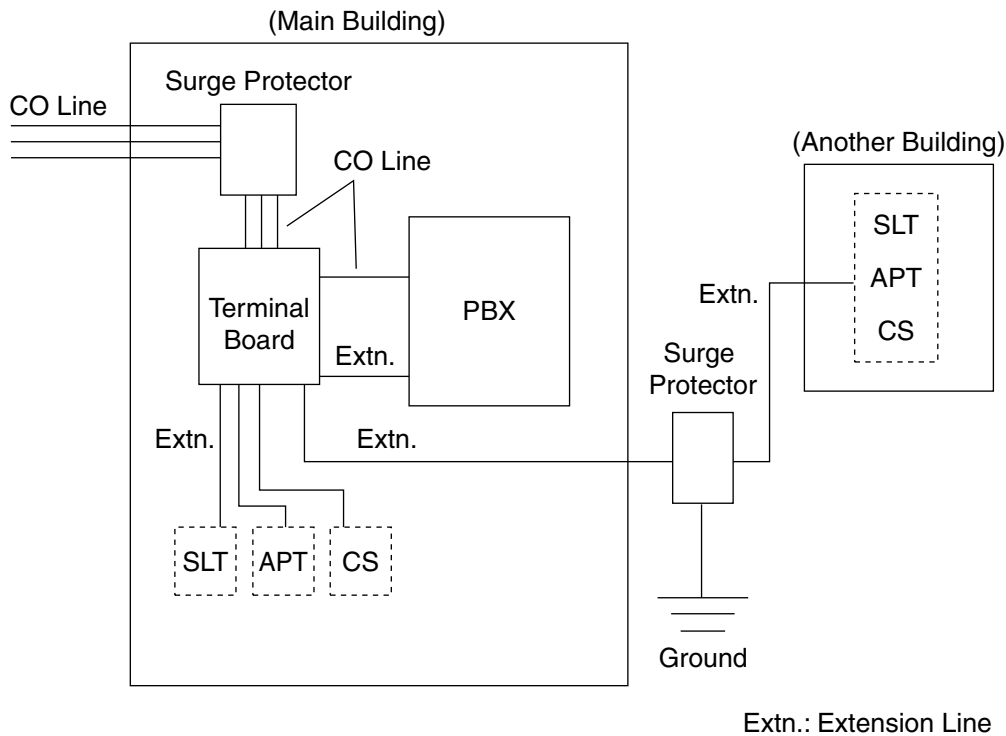
Additionally, proper grounding is very important for the protection of the system (refer to "2.2.5 Frame Ground Connection").

Many countries/areas have regulations requiring surge protection. Be sure to comply with all applicable laws, regulations, and guidelines.

### Installation



## Outside Installation



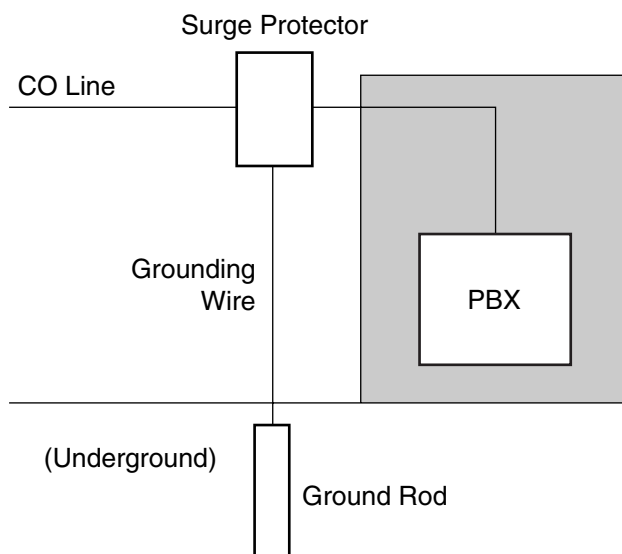
If you install an extension outside of the building, the following precautions are recommended:

- a. Install the extension wire underground.
- b. Use a conduit to protect the wire.

### **Note**

The surge protector for an extension and CS is different from that for a CO line.

## Installation of a Ground Rod



## 2.2 Installation of the PBX

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1. Connect the ground rod to the surge protector using a grounding wire with a cross-sectional area of at least 1.3 mm<sup>2</sup>.
2. Bury the ground rod near the protector. The grounding wire should be as short as possible.
3. The grounding wire should run straight to the ground rod. Do not run the wire around other objects.
4. Bury the ground rod at least 50 cm (20 in) underground.

### **Notes**

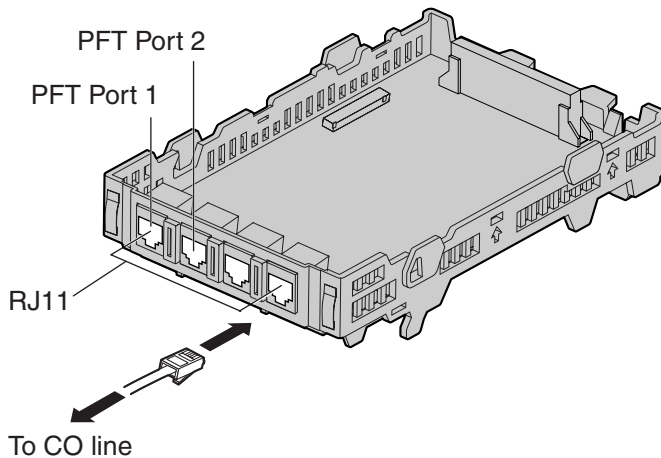
- The above figures are recommendations only.
- The length of ground rod and the required depth depend on the composition of the soil.

## 2.3 Installation of the CO Line Cards

### 2.3.1 LCOT4 Card

#### Function

4-port analog CO line card with 2 power failure transfer (PFT) ports. One CID4 card can be mounted on the LCOT4 card (refer to "2.3.2 CID4 Card").



#### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1

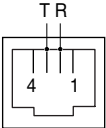
**User-supplied (not included):** RJ11 connector

#### Notes

- To confirm the CO line connection, refer to "Confirming the CO Line Connection" in "2.11.1 Starting the PBX".
- For details about power failure transfer, refer to "2.10.1 Power Failure Connections".

#### Pin Assignments

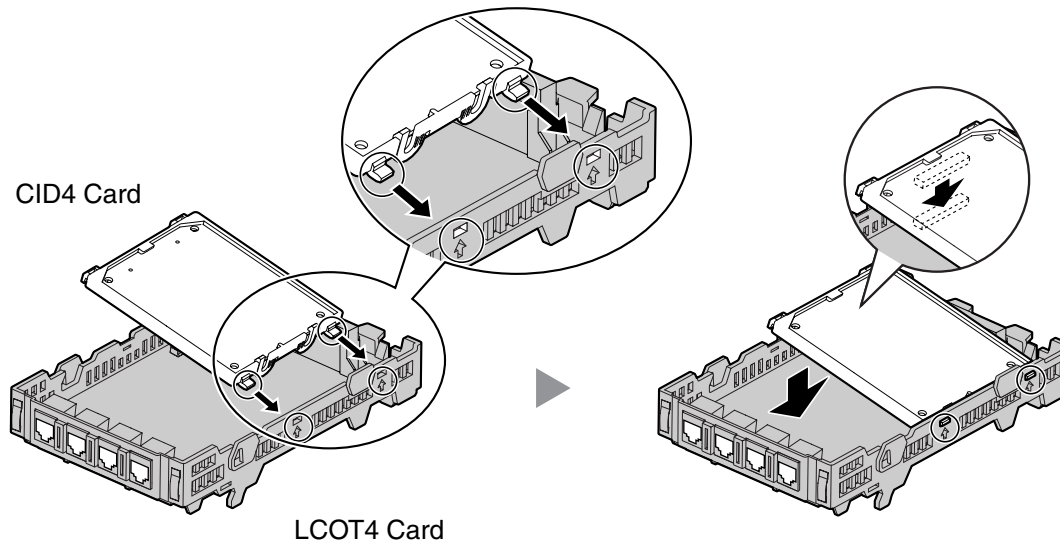
##### RJ11 Connector

	Signal Name	Function
	R	Ring
	T	Tip
	-	Reserved

## 2.3.2 CID4 Card

### Function

4-port Caller ID signal type FSK/FSK (with Call Waiting Caller ID [Visual Caller ID])/DTMF. To be mounted on the LCOT4 card.



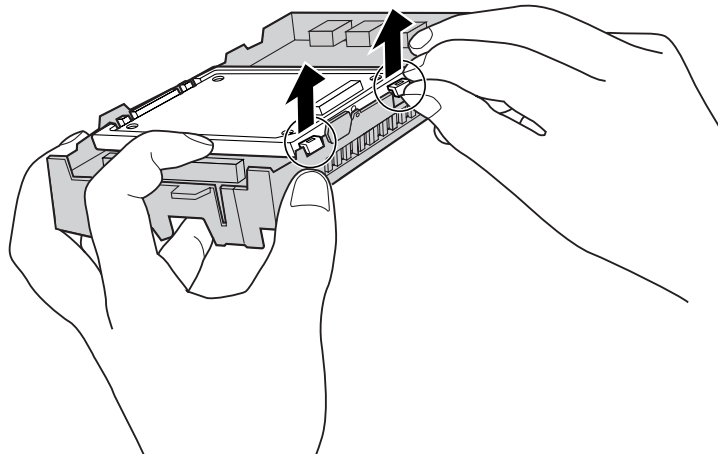
### Accessories and User-supplied Items

**Accessories (included):** none

**User-supplied (not included):** none

### Note

If you need to remove the CID4 card:

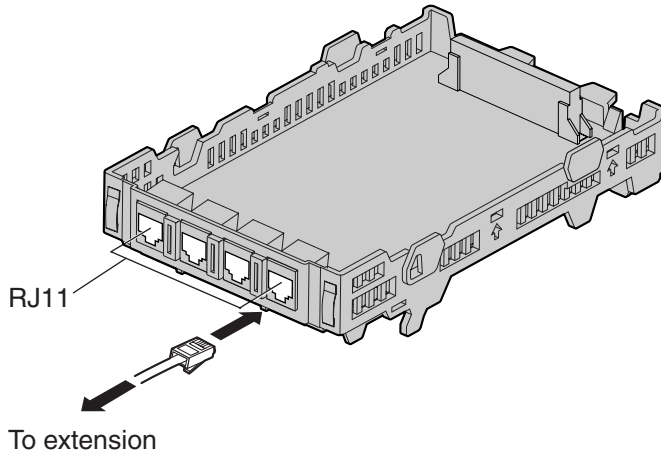


## 2.4 Installation of the Extension Cards

### 2.4.1 HLC4 Card

#### Function

4-port extension card for SLTs, APTs, DSS consoles, a Voice Processing System (VPS), and CSs.



#### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1

**User-supplied (not included):** RJ11 connector

#### Note

For details about connecting the CS, refer to "2.7.7 Connecting a Cell Station to the PBX".

### Pin Assignments

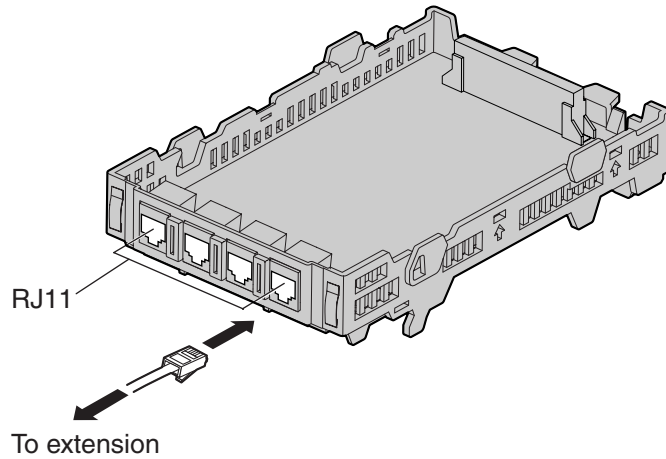
#### RJ11 Connector

	Signal Name	Function
	D1	Data port (High)
	T	Tip
	R	Ring
	D2	Data port (Low)

## 2.4.2 PLC4 Card

### Function

4-port extension card for APTs, DSS consoles, and a VPS.



### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1

**User-supplied (not included):** RJ11 connector

### Pin Assignments

#### RJ11 Connector

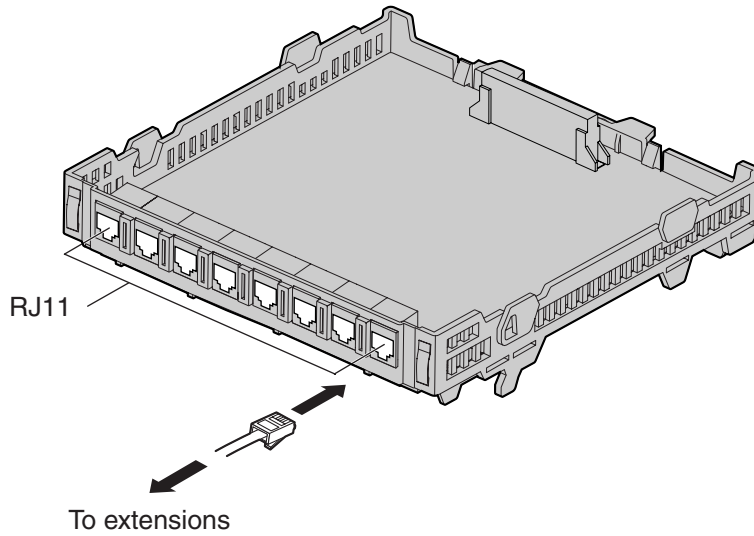
	Signal Name	Function
	D1	Data port (High)
	T	Tip
	R	Ring
	D2	Data port (Low)



## 2.4.3 SLC8 Card

### Function

8-port extension card for SLTs.



### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1

**User-supplied (not included):** RJ11 connector

### Pin Assignments

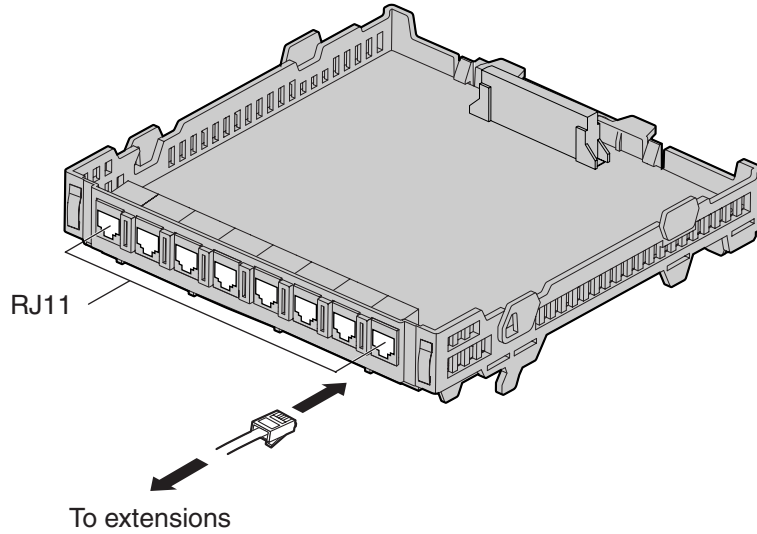
#### RJ11 Connector

<p>The diagram shows a top-down view of an RJ11 connector. It has four pins. The top two pins are labeled 'R' and 'T'. The bottom two pins are labeled '4' and '1'.</p>	Signal Name	Function
	T	Tip
	R	Ring
	—	Reserved

## 2.4.4 PLC8 Card

### Function

8-port extension card for APTs, DSS consoles, and a VPS.



### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1

**User-supplied (not included):** RJ11 connector

### Pin Assignments

#### RJ11 Connector

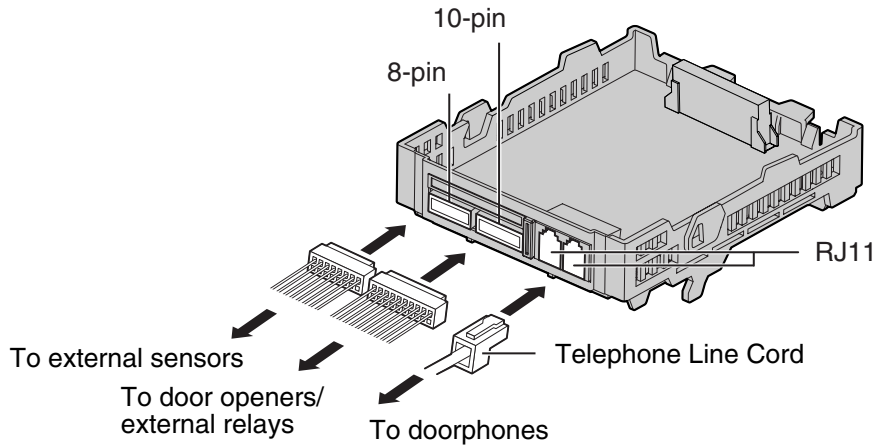
	Signal Name	Function
	D1	Data port (High)
	T	Tip
	R	Ring
	D2	Data port (Low)

## 2.5 Installation of the Other Cards

### 2.5.1 DPH4 Card

#### Function

4-port doorphone card for 4 doorphones, 4 door openers or external relays, and 4 external sensors.



#### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Strap × 1, 8-pin terminal block × 1, 10-pin terminal block × 1, Telephone Line Cord × 2, Terminal Box × 2

**User-supplied (not included):** Copper wire

#### Note

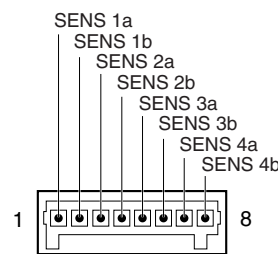
For details about connection to doorphones, door openers, external sensors, and external relays, refer to "2.8.1 Connection of Doorphones, Door Openers, External Sensors, and External Relays".

## Pin Assignments

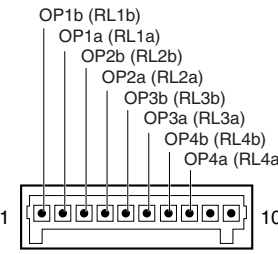
### RJ11 Connector

	Signal Name	Function
	DP2	Doorphone 2 transmit
	DP1	Doorphone 1 transmit
	com1	Doorphone 1 receive
	com2	Doorphone 2 receive
	DP4	Doorphone 4 transmit
	DP3	Doorphone 3 transmit
	com3	Doorphone 3 receive
	com4	Doorphone 4 receive

### 8-pin Terminal Block

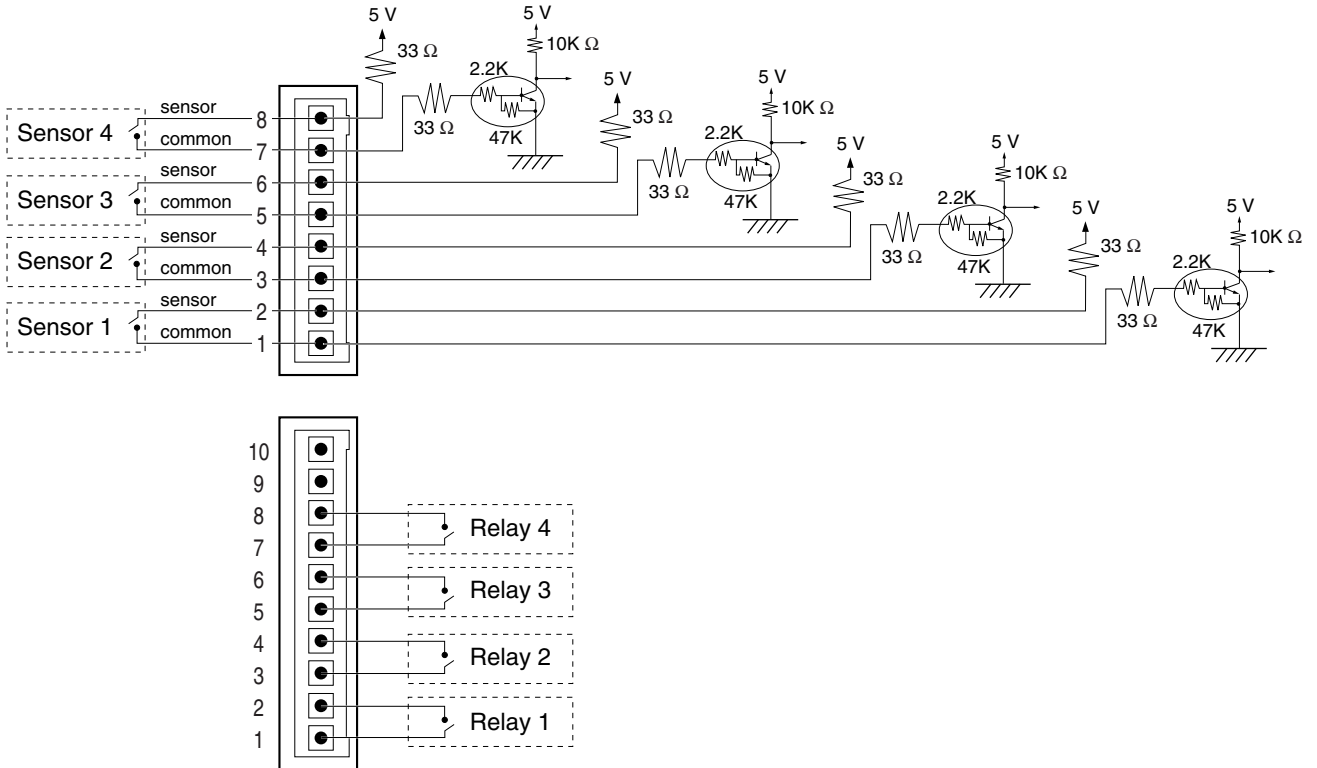
	Signal Name	Function
	SENS 1a	Sensor Input 1
	SENS 1b	com 1
	SENS 2a	Sensor Input 2
	SENS 2b	com 2
	SENS 3a	Sensor Input 3
	SENS 3b	com 3
	SENS 4a	Sensor Input 4
	SENS 4b	com 4

### 10-pin Terminal Block

	Signal Name	Function
	OP1b (RL1b)	Door opener 1 (Relay 1)
	OP1a (RL1a)	Door opener 1 com (Relay 1 com)
	OP2b (RL2b)	Door opener 2 (Relay 2)
	OP2a (RL2a)	Door opener 2 com (Relay 2 com)
	OP3b (RL3b)	Door opener 3 (Relay 3)
	OP3a (RL3a)	Door opener 3 com (Relay 3 com)
	OP4b (RL4b)	Door opener 4 (Relay 4)
	OP4a (RL4a)	Door opener 4 com (Relay 4 com)
	—	Reserved

### Connection Diagram for External Sensors and External Relays

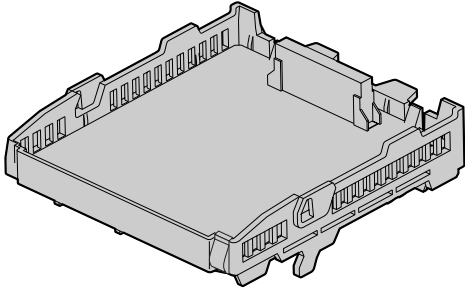
Power to the external sensor is provided from the DPH4 card and must be grounded through the DPH4 card as indicated in the diagram below. A pair of "sensor" and "common" lines must be connected to the DPH4 card for each external sensor. The PBX detects input from the sensor when the signal is under 100  $\Omega$ .



### 2.5.2 ECHO8 Card

#### Function

8-channel card for echo cancellation during conferences.



#### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Screw × 1

**User-supplied (not included):** none

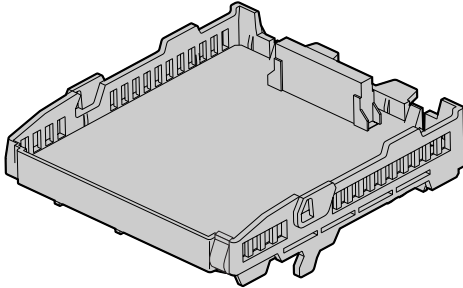
#### Note

To establish a conference call involving 6 to 8 parties, install an ECHO8 card and enable the echo cancellation for conference using the KX-TAW848 Maintenance Console. For details, refer to the on-line help of the KX-TAW848 Maintenance Console.

## 2.5.3 MSG2 Card

### Function

2-channel message card.



### Accessories and User-supplied Items

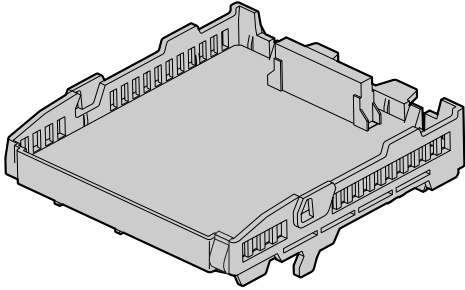
**Accessories (included):** Extension Bolt × 1, Screw × 1

**User-supplied (not included):** none

## 2.5.4 EXT-CID Card

### Function

Sends Caller ID signals to extension ports.



### Accessories and User-supplied Items

**Accessories (included):** Extension Bolt × 1, Screw × 1

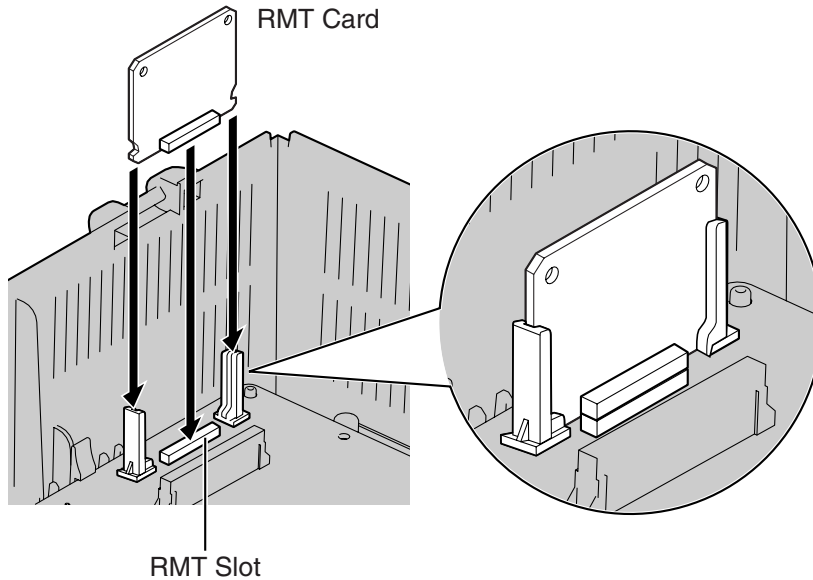
**User-supplied (not included):** none



## 2.5.5 RMT Card

### Function

Analog modem card for remote communication with the PBX. ITU-T V.90 support.



### Accessories and User-supplied Items

**Accessories (included):** none

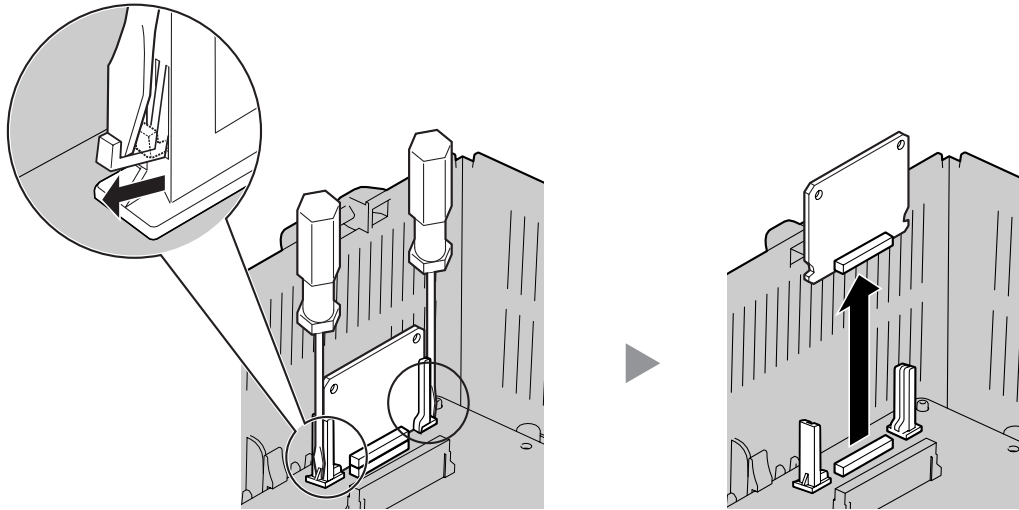
**User-supplied (not included):** none

### **CAUTION**

Make sure to insert the RMT card between the guide rails until it locks into the RMT slot. Push the card firmly into place until you hear a clicking sound.

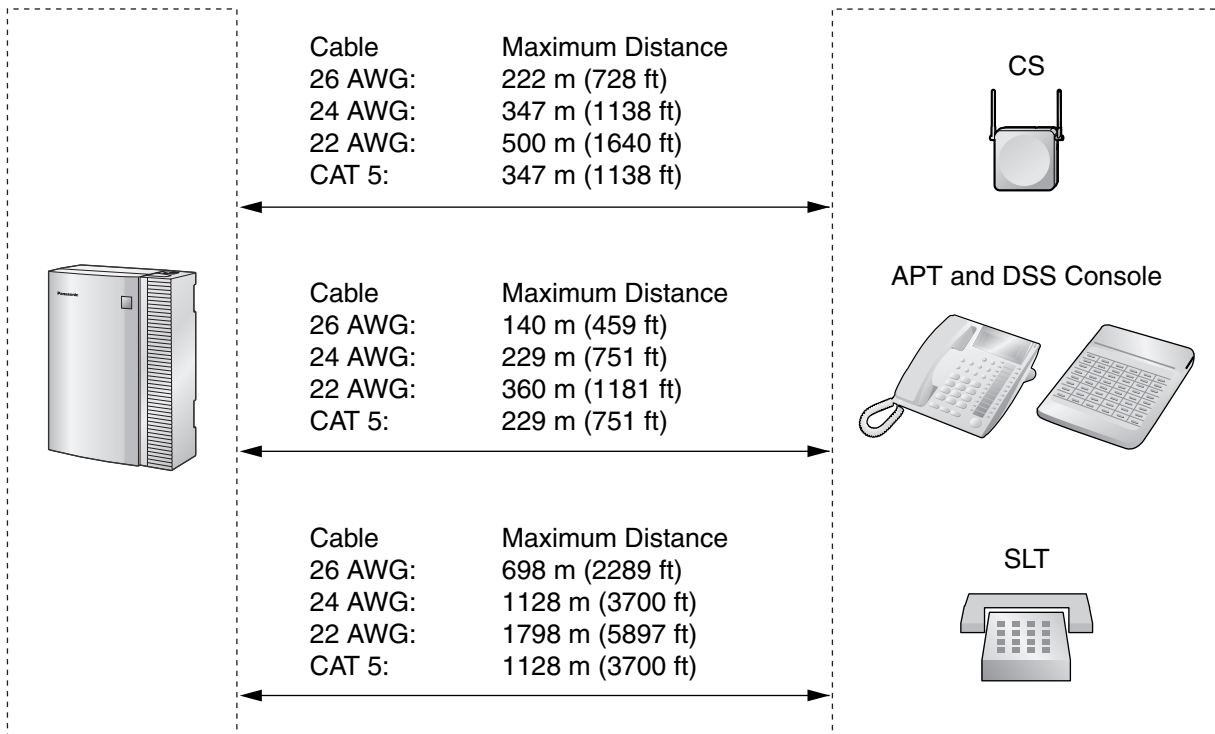
### Removing the RMT Card

Pull open the guide rails using a flathead screwdriver and, while holding them open, remove the RMT card.



## 2.6 Connection of Extensions

### 2.6.1 Maximum Cabling Distances of the Extension Wiring (Twisted Cable)



#### Notice

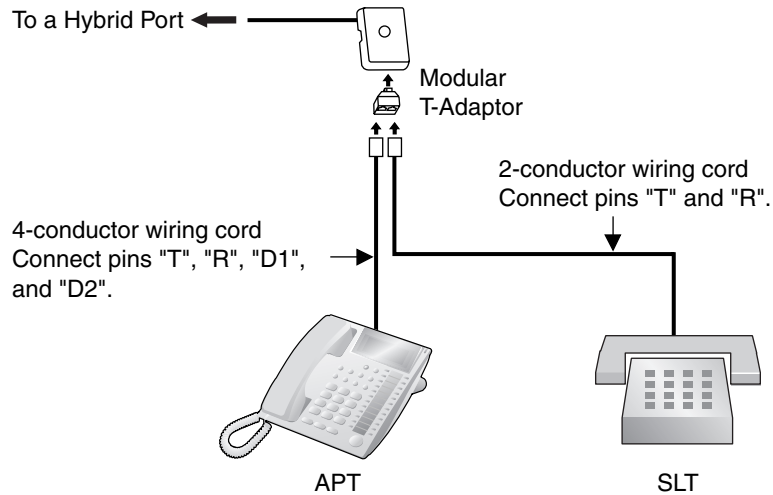
The maximum cabling distance may vary depending on the conditions.

	CS	APT	DSS Console	SLT
Hybrid Ports (Main Board)	✓	✓	✓	✓
SLC8 Card				✓
PLC4, PLC8 Cards		✓	✓	
HLC4 Card	✓	✓	✓	✓

"✓" indicates that the extension card or Hybrid Ports support the terminal.

## 2.6.2 Parallel Connection of the Extensions

Any SLT can be connected in parallel with an APT as follows:



**Note**

In addition to an SLT, an answering machine, a fax machine or a modem (PC) can be connected in parallel with APTs.

## 2.7 Connection of 2.4 GHz Portable Stations

### 2.7.1 Overview

The following equipment is required to connect the wireless system:

#### **CS: Cell Station (KX-T0141)**

This unit determines the area covered by the wireless system. Up to 2 calls can be made at the same time through each CS.

#### **PS: 2.4 GHz Portable Station (KX-TD7680/KX-TD7690)**

The KX-TAW848 can support up to 28 PSs. For more details about the PS, refer to the PS Operating Instructions.

#### **CAUTION**

- The CS should be kept free of dust, moisture, high temperature (more than 40 °C [104 °F]), low temperature (less than 0 °C [32 °F]), vibration, and should not be exposed to direct sunlight.
- The CS should not be placed outdoors (use indoors).
- The CS should not be placed near high voltage equipment.
- The CS should not be placed on a metal object.
- Systems using 2.4 GHz ISM (Industrial, Scientific and Medical) band may interfere with the wireless system. Examples of such systems are cordless telephones, wireless LAN, Home RF, microwave ovens and other ISM devices. These systems may cause minor noise.
- Keeping some distance between the equipment listed below may prevent interference. (The distance may vary depending on the environment.)

Equipment	Distance
CS and office equipment such as a computer, telex, fax machine, etc.	More than 2 m (6 ft 7 in)
CS and PS	More than 1 m (3 ft 3 in)
Each PS	More than 0.5 m (1 ft 8 in)
PBX and CS	More than 2 m (6 ft 7 in)
CS and CS	More than 15 m (49 ft)

Please take into consideration the distance between the CSs when site planning. Please consult your dealer for details.

However, the required distance between CSs may vary depending on the environment of the installation site and conditions in which the wireless system is used. Conduct the site survey to determine the appropriate distance.

## 2.7.2 Procedure Overview

When connecting the wireless system, use extreme care to conduct a site survey. Inadvertent site survey can result in poor service area, frequent noise, and disconnection of calls.

### 1. Investigate the installation site

Refer to "2.7.3 Site Planning".

- a. Obtain the map of the CS installation site.
- b. Consider the service area demanded by the user on the map.
- c. Plan the locations of each CS, taking account of distance, building materials and etc.

### 2. Prepare the CS for site survey

Refer to "2.7.4 Before Site Survey".

- a. Assign a CS number to each CS by setting the DIP switches on the back of the CS.
- b. Supply electricity to each CS using an AC adaptor or a battery box.
- c. Install each CS temporarily as planned.

#### Notes

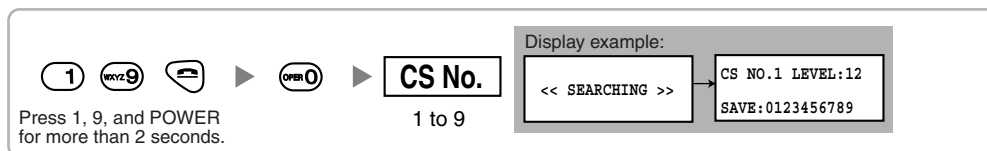
- Install at least 2 m (6 ft 7 in) above the floor.
- Keep the antennas in the upright position.

### 3. Conduct the site survey

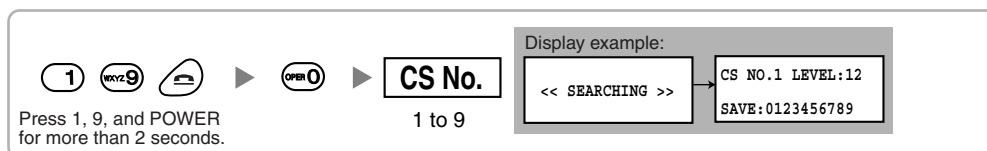
Refer to "2.7.5 Site Survey".

- a. Test the radio signal strength using the PS.  
Confirm that the radio signal strength level is "12" near the CS.

#### Using the KX-TD7680



#### Using the KX-TD7690



- b. By walking away from the CS with the PS, check the radio signal strength. The radio signal strength weakens as you walk away from the CS.
- c. Map the CS coverage area at radio signal strength levels "3" and "8".
- d. Make sure that adjacent CS coverage areas overlap where the radio signal strength level is "8" by at least 5 m (16 ft).
- e. Make sure that the radio signal strength level is greater than "3" at any location within the service area demanded by the user.

#### 4. Finish the site survey

Refer to "2.7.6 After Site Survey".

- a. Return all DIP switches of each CS to the OFF position, and stop supplying power.
- b. Turn off the PS.

#### 5. Connect the CS and PS to the PBX and test the operation

Refer to "2.7.7 Connecting a Cell Station to the PBX".

- a. Connect the CSs to the PBX.
- b. Register the PSs to the PBX.
- c. Walk around the service area while having a conversation using a registered PS. If noise is frequent or conversations disconnect, relocate the CSs or install an additional CS.

#### 6. Mount the CS on the wall

Refer to "2.7.8 Wall Mounting".

- a. Assuming everything goes as planned, mount the CS on the wall.

## 2.7.3 Site Planning

Choosing the best site for the CS requires careful planning and testing of essential areas. The best location may not always be convenient for installation. Read the following information before installing the unit.

### Understanding the Radio Waves

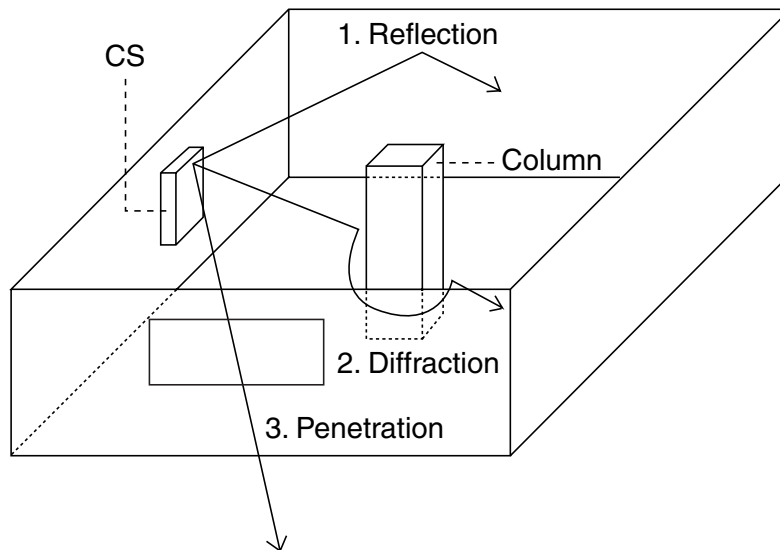
#### Characteristics of Radio Waves

The transmission of radio waves and the CS coverage area depend on the structure and materials of the building.

Office equipment, such as computers and fax machines, can interfere with radio waves. Such equipment may create noise or interfere with the performance of the PS.

The illustration below shows the special transmitting patterns of radio waves.

1. Radio waves are reflected by objects such as those made of metal.
2. Radio waves are diffracted by objects such as metallic columns.
3. Radio waves penetrate objects such as those made of glass.



#### Relationships Between Radio Waves and Building Structure and Materials

- The CS coverage area is affected more by the building materials and their thickness than the number of obstacles.
- Radio waves tend to be reflected or diffracted by conductive objects and rarely penetrate them.
- Radio waves tend to penetrate insulated objects and are rarely reflected by them.
- Radio waves penetrate thin objects more than thick objects.
- The table below shows the transmission tendency of radio waves when they reach objects made from various materials.



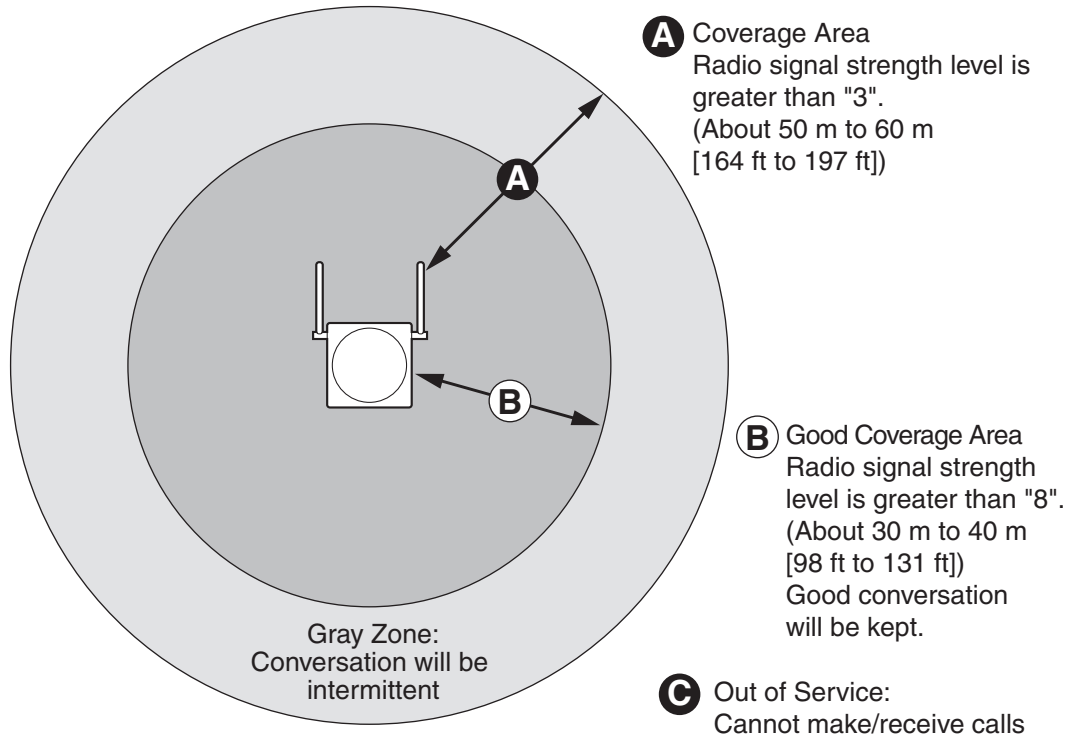
<b>Object</b>	<b>Material</b>	<b>Transmission Tendency</b>
Wall	Concrete	The thicker they are, the less radio waves penetrate them.
	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves are reflected.
Window	Glass	Radio waves usually penetrate them.
	Glass with wire nets	Radio waves can penetrate them, but tend to be reflected.
	Glass covered with heat-resistant film	Radio waves are weakened considerably when they penetrate windows.
Floor	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves are reflected.
Partition	Steel	Radio waves are reflected and rarely penetrate them.
	Plywood, Glass	Radio waves usually penetrate them.
Column	Ferroconcrete	Radio waves can penetrate them, but the more iron there is, the more radio waves tend to be reflected or diffracted.
	Metal	Radio waves tend to be reflected or diffracted.
Cabinet	Steel	Radio waves are usually reflected or diffracted, and rarely penetrate them.
	Wood	Radio waves can penetrate them, but they are weakened.

## CS Coverage Area

The example below shows the size of the coverage area of 1 CS if it is installed where there is no obstacle.

### Note

Radio signal strength levels are measured during the site survey (refer to "2.7.5 Site Survey").



### Radio Signal Strength Levels

Level: 00	↑	Out of range
Level: 01 to 02		Receives noise easily or disconnects
Level: 03 to 07		May receive noise
Level: 08 to 10		Good
Level: 11 to 12	↓	Better

## Site Survey Preparation

1. Obtain the map and investigate the installation site.
  - a. Check the obstacles (e.g., shelves, columns, and partitions).
  - b. Check the materials of the structures (e.g., metal, concrete, and plywood).
  - c. Check the layout and dimensions of the room, corridor, etc.
  - d. Write down the above information to the map.
2. Examine the service area demanded by the user on the map, referring to the following example.
  - a. Draw the coverage area around a CS. Extend the coverage area to 30 to 60 meters (98 to 197 feet) in one direction, depending on the materials of the building structures and obstacles in the installation site. Note that a CS cannot be installed outside a building.
  - b. If one CS cannot cover the entire service area, install additional CSs as required. Overlap the coverage areas of adjacent CSs.  
Where CS coverage areas overlap, the PS will start call handover to the next CS if the signal from

one CS becomes weak. However, if a PS moves away from a CS and there are no CSs available for handover, the PS may go out of range and the call could be lost.

If the signal from the CS fades, due to the structure of the building, there may be some handover delay. The user will hear a range warning before handover in this case. This also applies in the case of interference from 2.4 GHz apparatus.

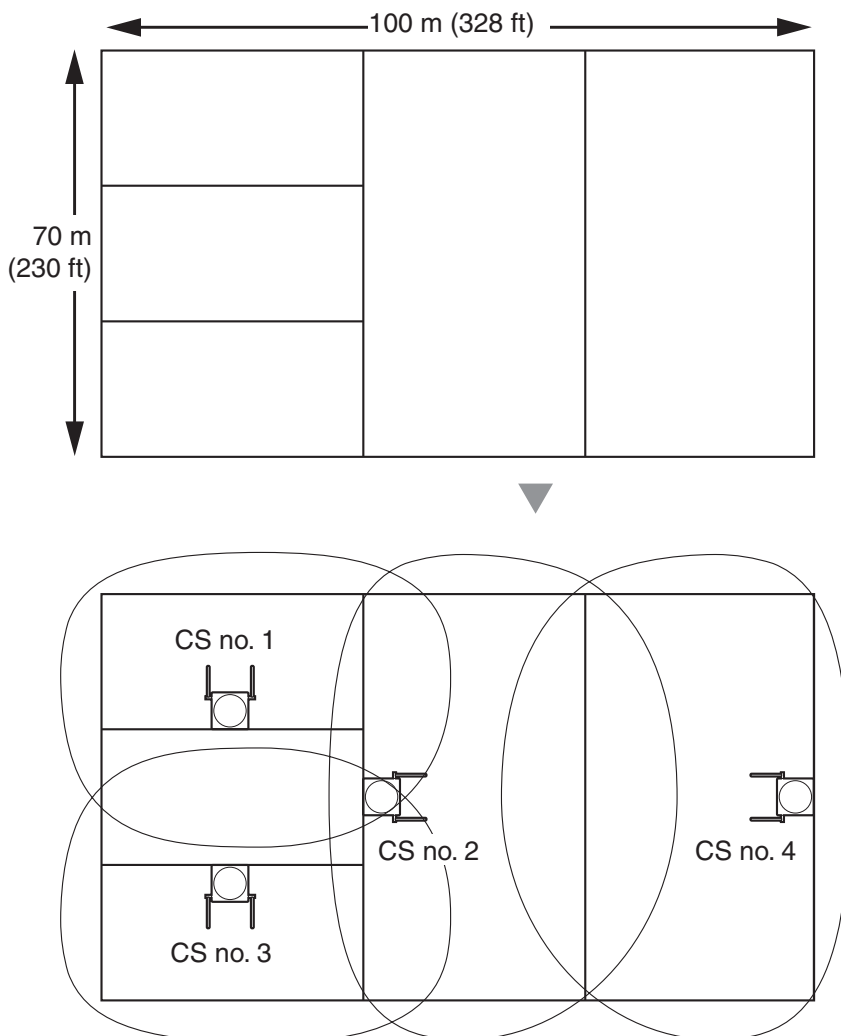
### Example: Installing in a Room Separated by Walls

#### Things to take note of:

- The room is separated by walls.
- The room is surrounded by concrete walls.

#### CS installation plan:

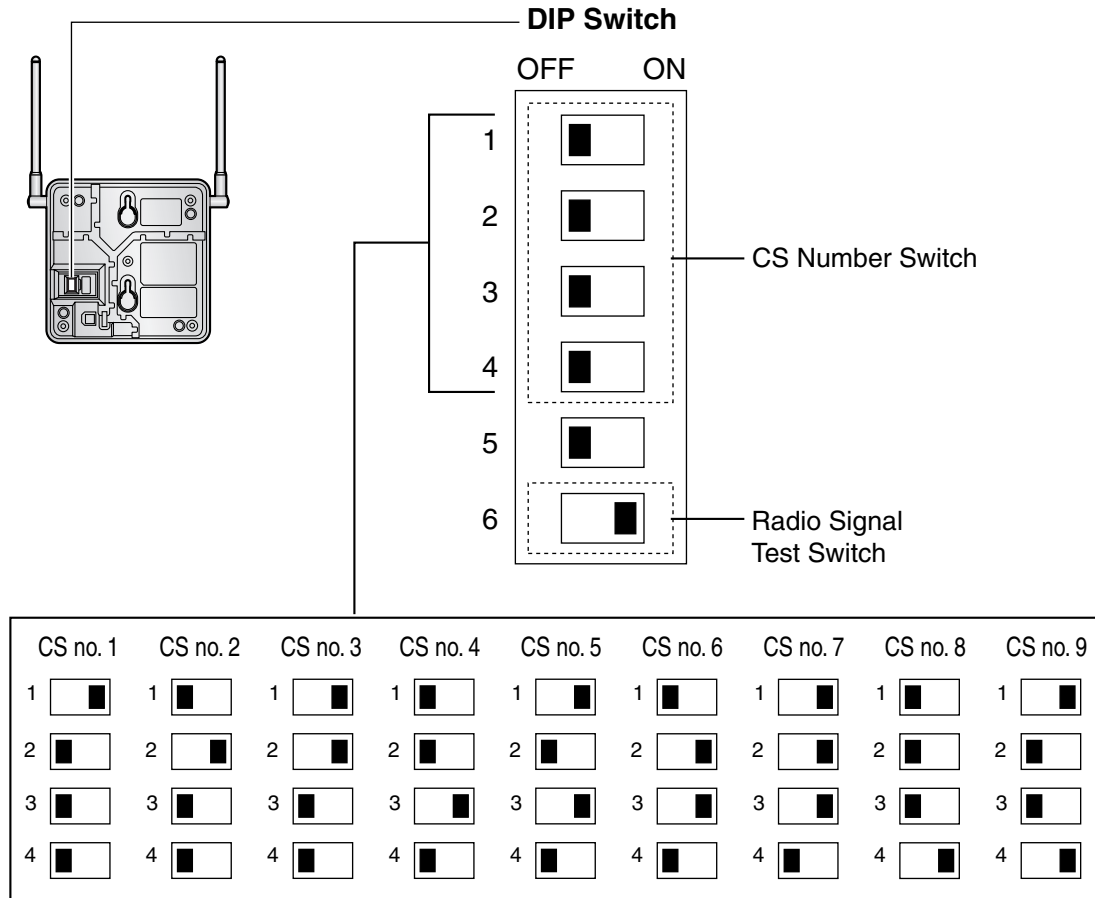
- The coverage area of each CS will not extend as far as when there is no obstacle, because the radio signals will be weakened by separating walls. Therefore, you will need 4 CSs to cover the entire room.



## 2.7.4 Before Site Survey

### Setting and Installing the CS Temporarily for Site Survey

1. Switch the Radio Signal Test switch from OFF to ON.
2. Set the CS number switches as desired.



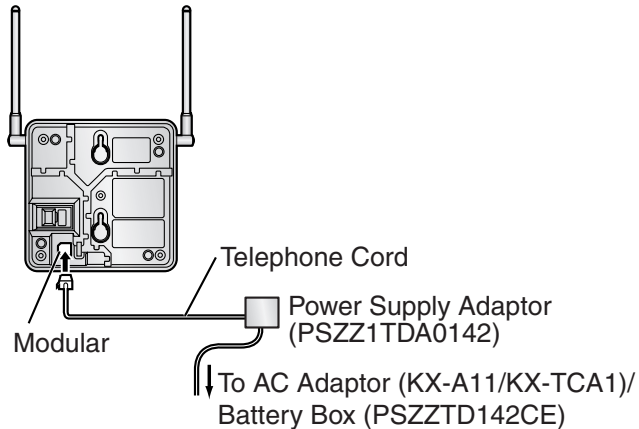
#### Notes

- To see the radio signal strength of more than 1 CS, a CS number must be set for each CS.
- If more than 1 CS is in Radio Signal Test mode, each CS must have a unique CS number.

3. After setting the DIP switch, connect an AC adaptor or battery box to the CS using a power supply adaptor.

**Note**

The AC adaptor should be connected to a vertically oriented or floor-mounted AC outlet. Do not connect the AC adaptor to a ceiling-mounted AC outlet, as the weight of the adaptor may cause it to become disconnected.



4. Install the CS temporarily for the site survey. Install the CS at least 2 m (6 ft 7 in) above the floor, keeping the antennas in the upright position.

## 2.7.5 Site Survey

The PS has a Radio Signal Test mode that monitors the state of the radio link to the CS. After installing the CSs temporarily, set the PS to the Radio Signal Test mode and measure each CS coverage area. Then, record the results on the map of the installation site.

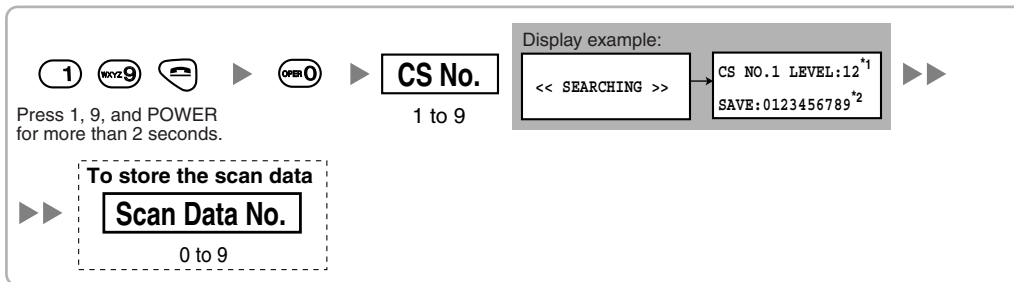
### Testing the Radio Signal Strength

**Note**

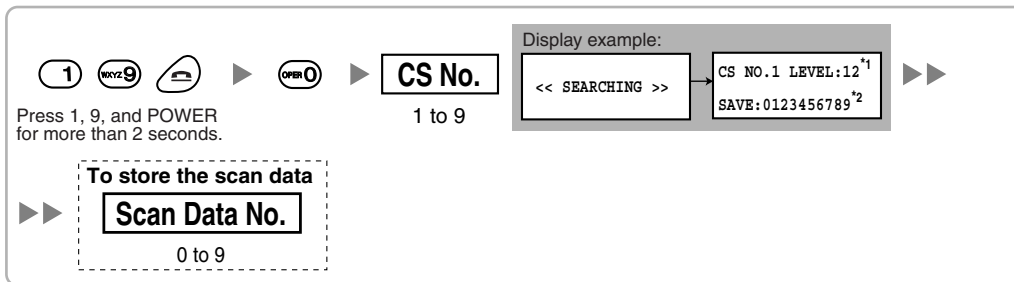
The display language for the site survey is only in English.

1. Enter the Radio Signal Test mode.

**Using the KX-TD7680**



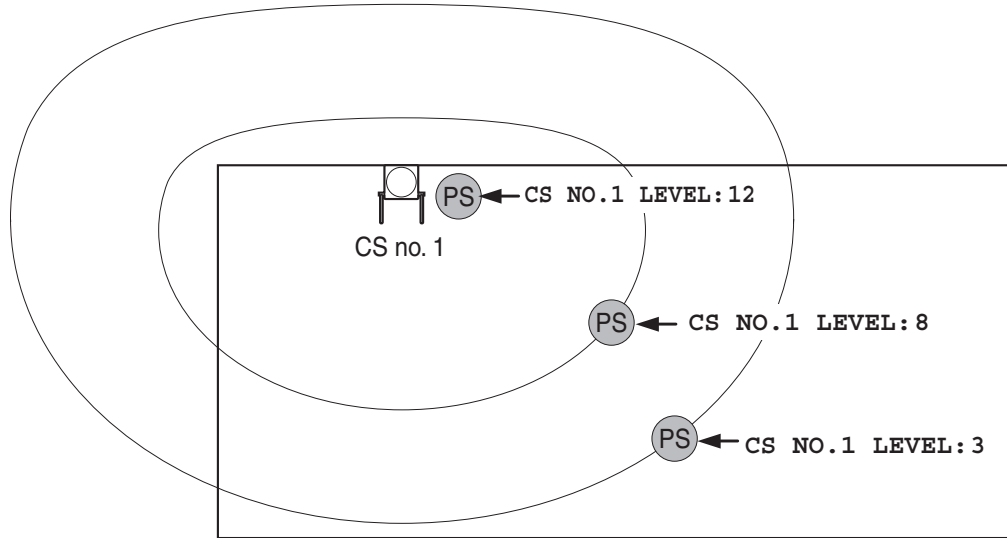
**Using the KX-TD7690**



**Notes**

- \*1: CS number and radio signal strength level.
- \*2: Scan data (test result) number. Empty memory space will be indicated by a "-"; stored memory space will be indicated by a "-".

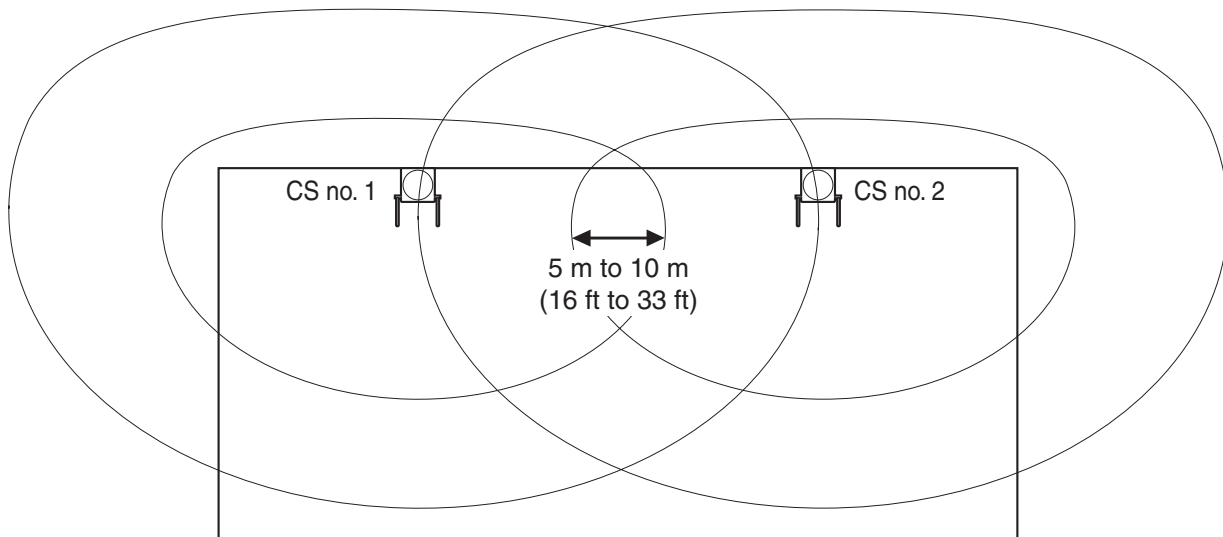
2. Measure the radio signal strength by moving to and away from the CS.
  - a. Move to the CS until the point the radio signal strength level becomes "12".
  - b. Move away from the CS and identify the CS coverage area within which the radio signal strength level is greater than "8". Draw the area on the map.
  - c. Move away from the CS and identify the CS coverage area within which the radio signal strength level is greater than "3". Draw the area on the map.



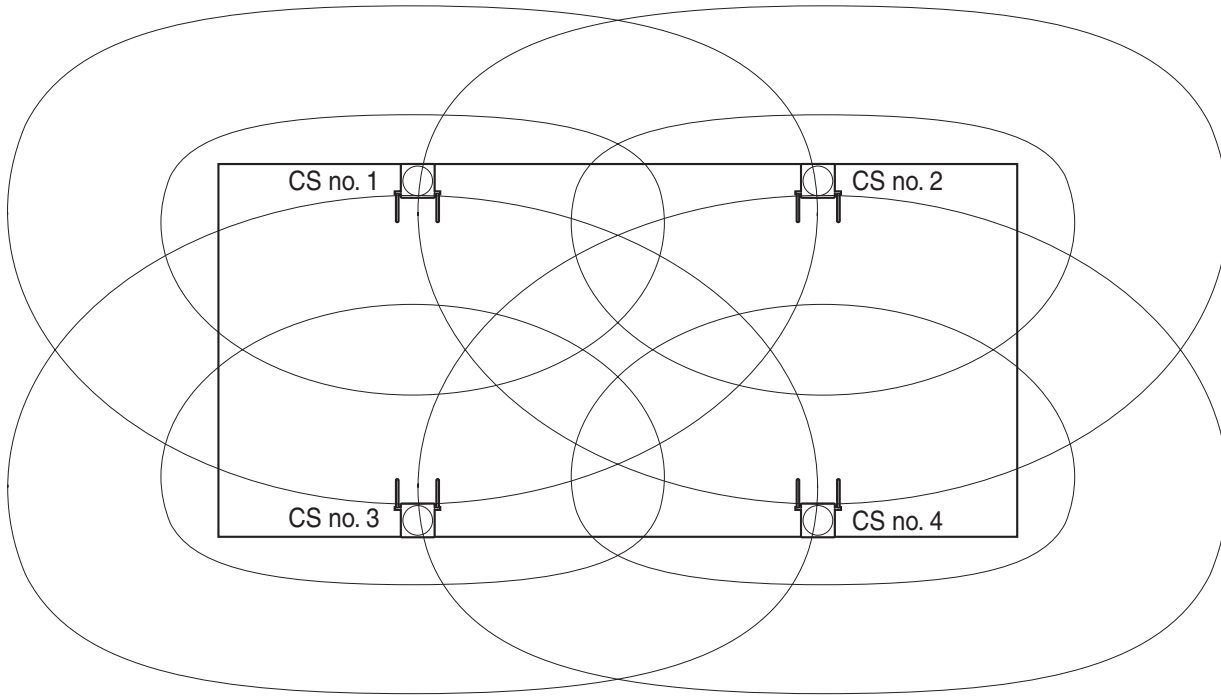
**Radio Signal Strength Levels**

Level: 00	↑	Out of range
Level: 01 to 02	↑	Receives noise easily or disconnects
Level: 03 to 07	↕	May receive noise
Level: 08 to 10	↓	Good
Level: 11 to 12	↓	Better

3. Repeat the steps 1 and 2 for other CSs, and relocate the CSs when necessary.
  - a. Overlap adjacent CS coverage areas where the radio signal strength level is "8" by 5 to 10 meters (16 to 33 feet).



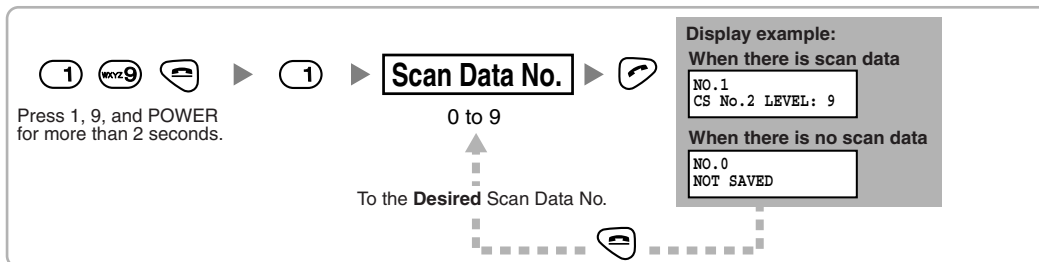
- b. Overlap the CS coverage areas of at least 2 CSs at any location in the installation site.



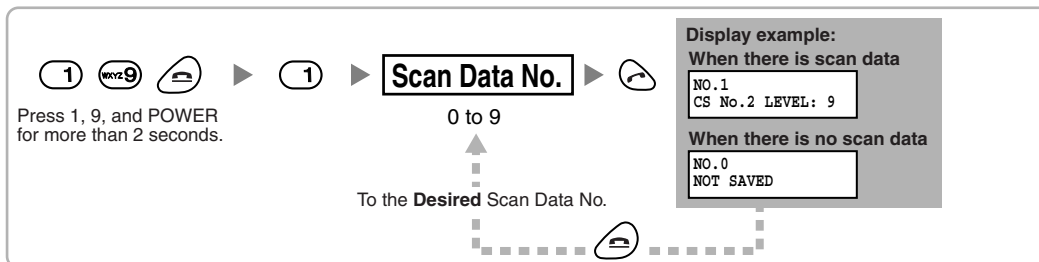
- c. Make sure that the radio signal strength level is greater than "3" at any location in the service area demanded by the user.

## Referring to the Stored Scan Data

### Using the KX-TD7680



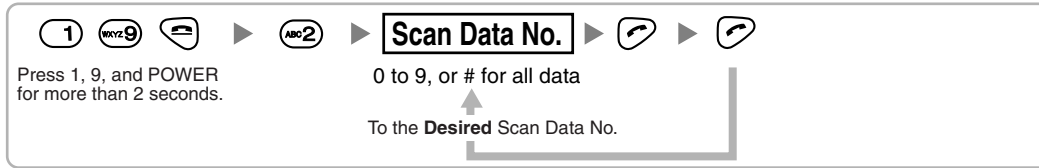
### Using the KX-TD7690



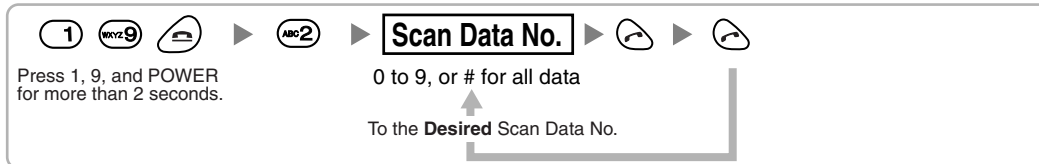


## Deleting the Stored Scan Data

### Using the KX-TD7680



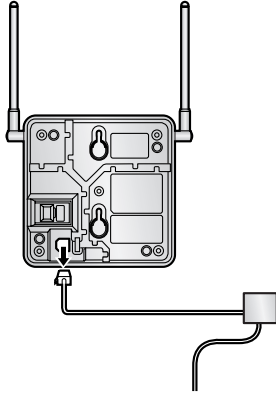
### Using the KX-TD7690



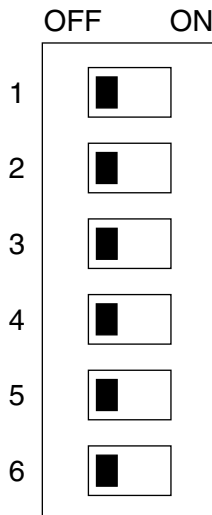
## 2.7.6 After Site Survey

After obtaining the proper measurement results, exit the Radio Signal Test mode before connecting the CS to the PBX.

1. Keep pressing POWER button on the PS until the PS is turned OFF.
2. Disconnect the AC adaptor or battery box from the CS and stop supplying electricity.

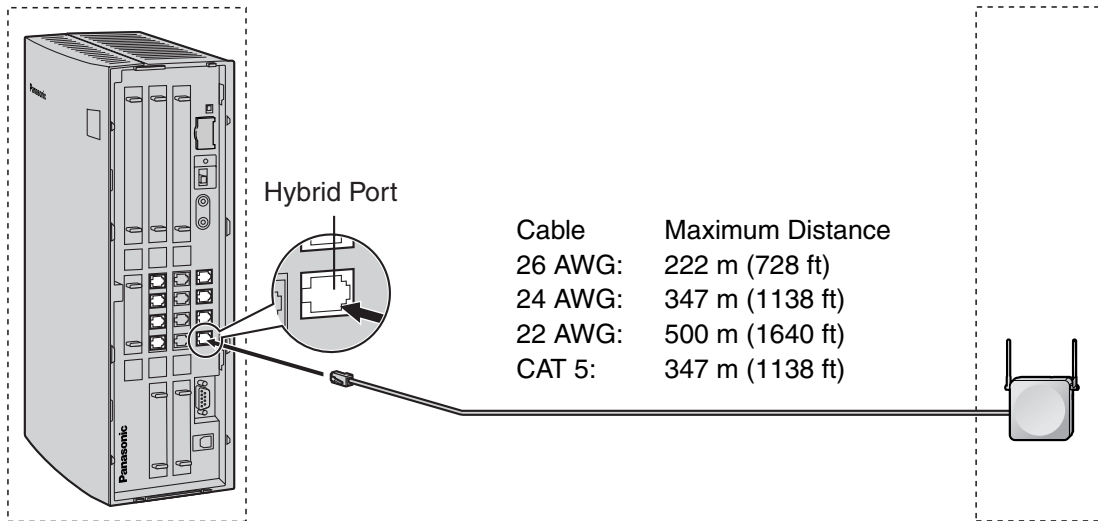


3. Switch all DIP switches on the CS from ON to OFF.



## 2.7.7 Connecting a Cell Station to the PBX

Refer to the following example to connect a CS to the PBX.



A Hybrid Port or HLC4 card (RJ11)

Signal Name	Pin No.
D1	1
	2
	3
D2	4

CS (RJ11)

Pin No.	Signal Name
1	D1
2	
3	
4	D2

### Accessories and User-supplied Items for the CS

**Accessories (included):** Screws × 2, Washers × 2

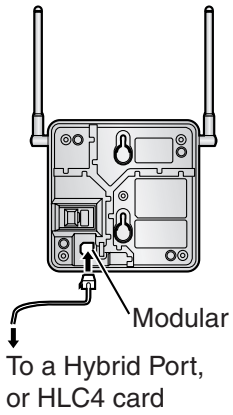
**User-supplied (not included):** RJ11 connector

#### Note

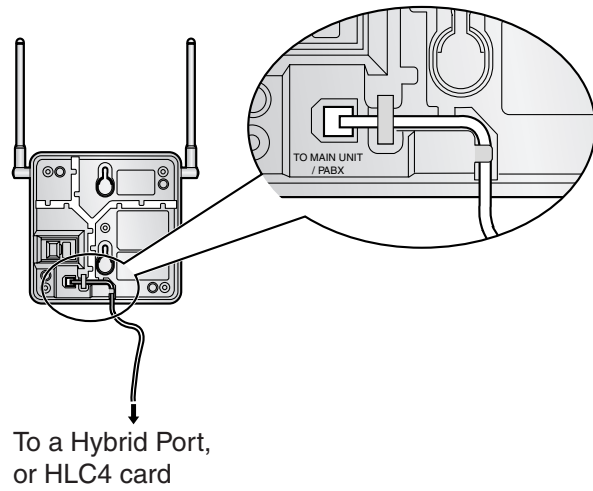
For details about HLC4 card, refer to "2.4.1 HLC4 Card".

## Connecting the CS

1. Connect the cable from a Hybrid Port or the HLC4card to the CS.



2. Pass the cable through the groove of the CS (in any direction depending on your preference).



## Registering the PS

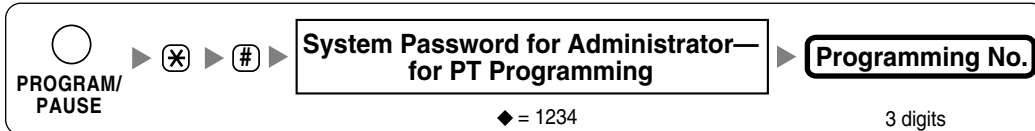
The PS must be registered to the PBX before it can be used. Programming of both the PS and PBX is required. An APT with multiline display (e.g., KX-T7735) is required for the PBX system programming.

### Note

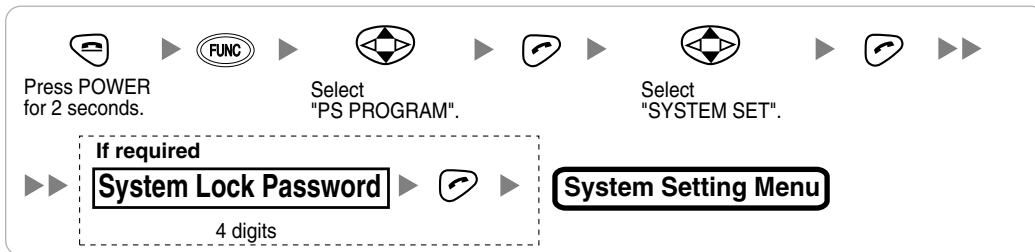
For details about system programming using an APT, refer to "2.3.2 PT Programming" and "3.3 PT Programming" in the Feature Guide.

## Entering the System Programming Mode

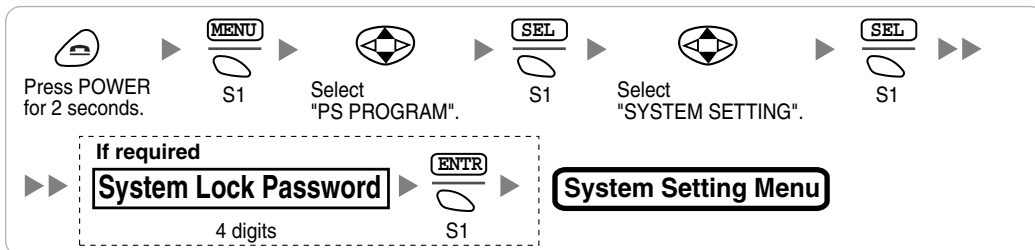
### APT (Administrator Level)



### PS (Using the KX-TD7680)



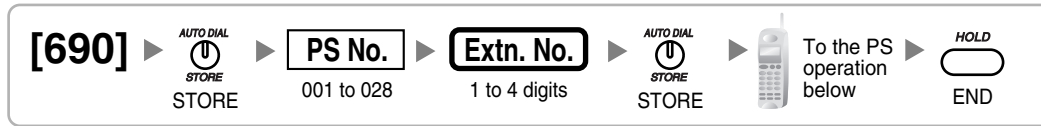
### PS (Using the KX-TD7690)



### Note

◆ means default value throughout this section.

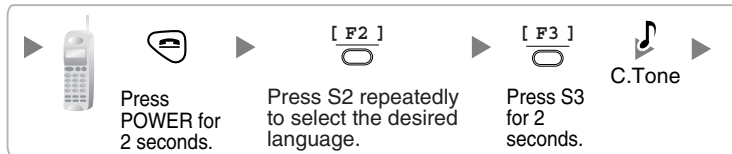
### PS Registration



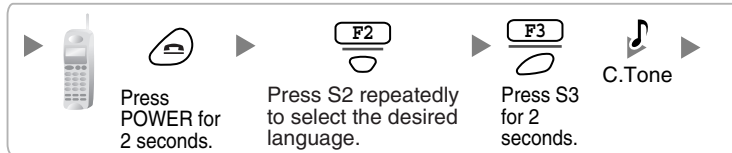
#### When the PS has not been registered yet

When registering the PS for the first time, it is possible to select the desired language for the display. (You do not need to enter the PS system programming mode when registering for the first time.)

#### Using the KX-TD7680



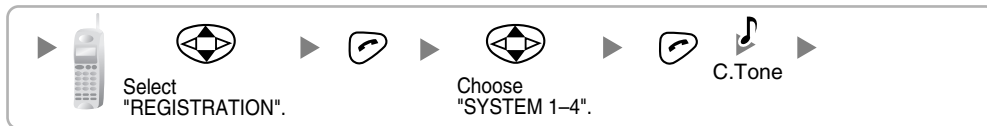
#### Using the KX-TD7690



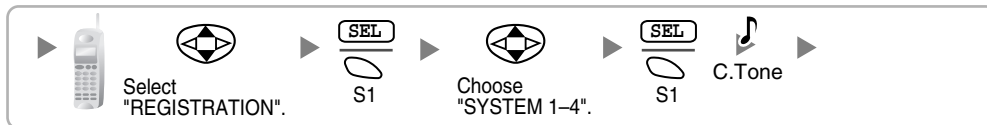
#### When the PS has already been registered to another PBX

One PS can be registered to a maximum of 4 different PBXs.

#### Using the KX-TD7680



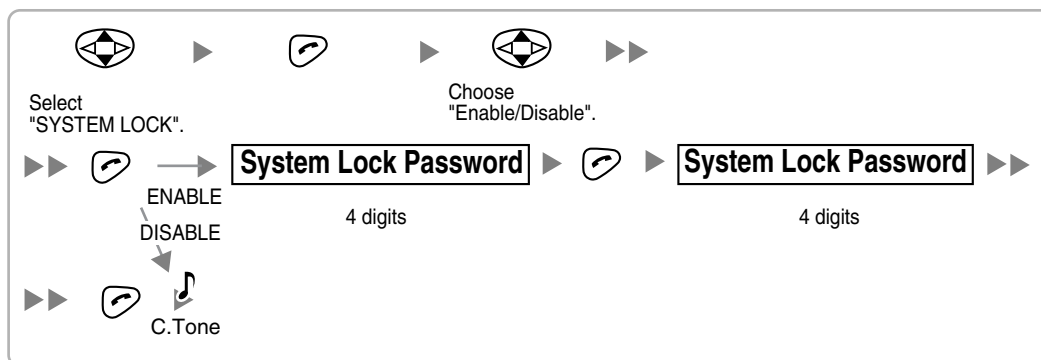
#### Using the KX-TD7690



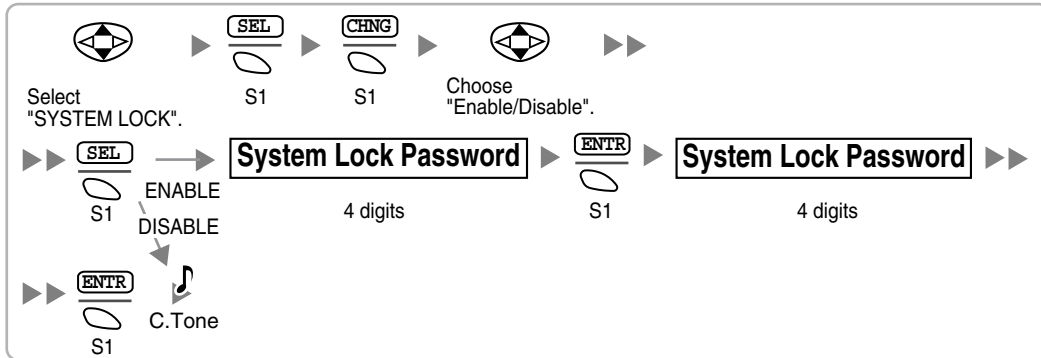
### Setting the System Lock

When a system lock has been set, the system lock password will be required for PS system setting.

#### Using the KX-TD7680



**Using the KX-TD7690**



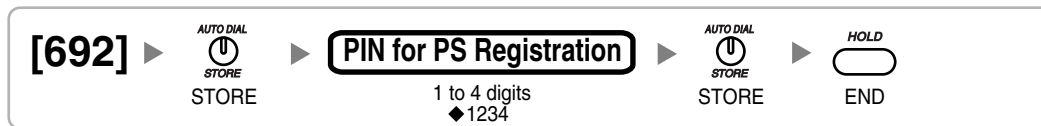
**Setting the Personal Identification Number (PIN) for PS Registration**

To prevent registering the PS to a wrong PBX, a PIN for PS registration can be set to the PBX. Before registering the PS to the PBX, register the PIN set to the PBX into the PS. By doing so, the PS will only be registered to the PBX with the matching PIN.

**Notes**

- By default, the PIN for PS registration is "1234" for both the PBX and PS. Therefore, the PS can be registered to the PBX without setting the PIN.
- The PIN for PS registration will only be used when registering the PS to the PBX. Therefore, even when there is more than 1 PBX with the same PIN near the PS, the PS will not be linked to a different PBX during normal operation after registration.

**Setting the PIN for PBX**

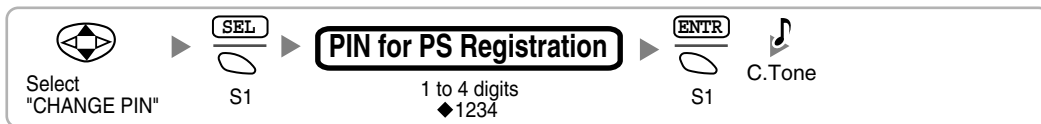


**Setting the PIN for PS**

**Using the KX-TD7680**



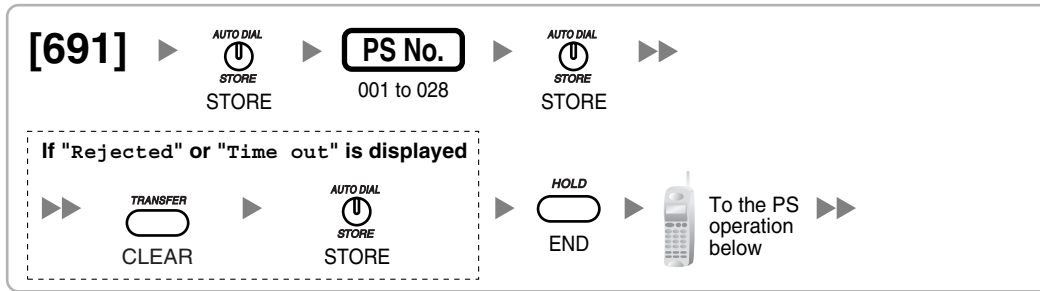
**Using the KX-TD7690**



### PS Termination

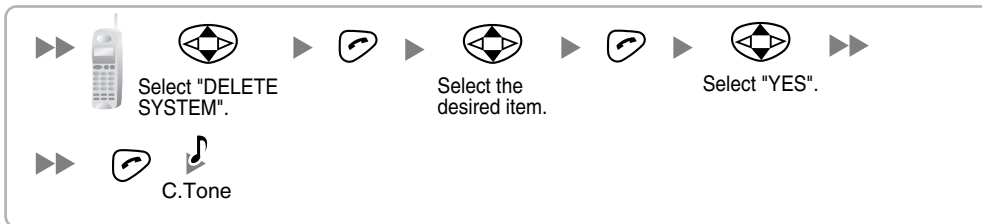
Confirm the following before canceling the PS registration:

- PS is turned on.
- PS is within the range.

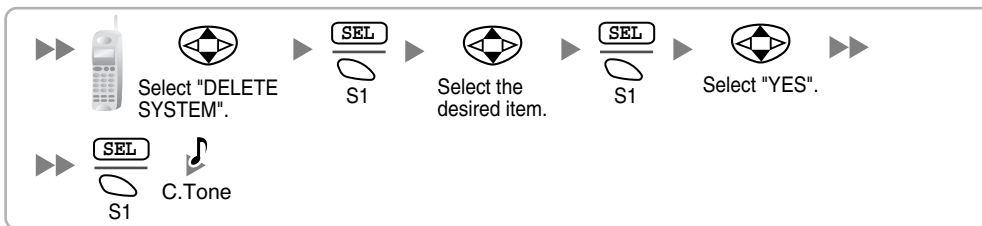


If the registration information is still stored in the PS

Using the KX-TD7680



Using the KX-TD7690



### Testing the Operation

Walk around the service area while having a conversation using a registered PS. If noise is frequent or conversations disconnect, relocate the CSs or install an additional CS.

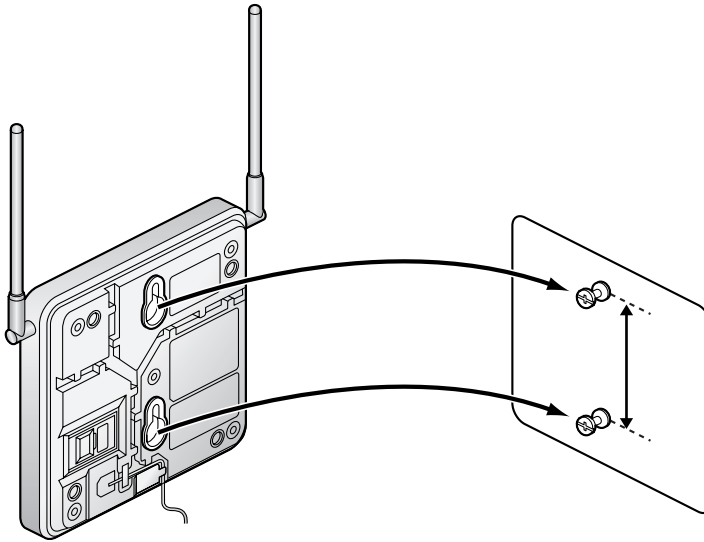


## 2.7.8 Wall Mounting

1. Place the reference for wall mounting (on the following page) on the wall to mark the 2 screw positions.
2. Install the 2 screws and washers (included) into the wall.

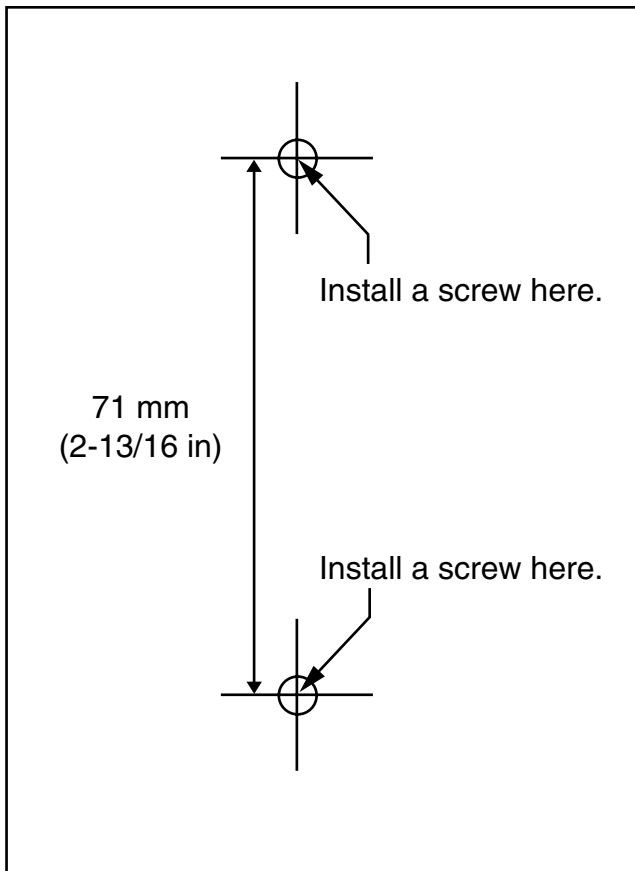
### Notes

- Make sure that the screw heads are at the same distance from the wall.
  - Install the screws perpendicular to the wall.
3. Hook the CS on the screw heads.



## Reference for Wall Mounting

Please copy this page and use as a reference for wall mounting.



### **Note**

Make sure to set the print size to correspond with the size of this page. If the dimension of the paper output still deviates slightly from the measurement indicated here, use the measurement indicated here.

## 2.8 Connection of Doorphones, Door Openers, External Sensors, and External Relays

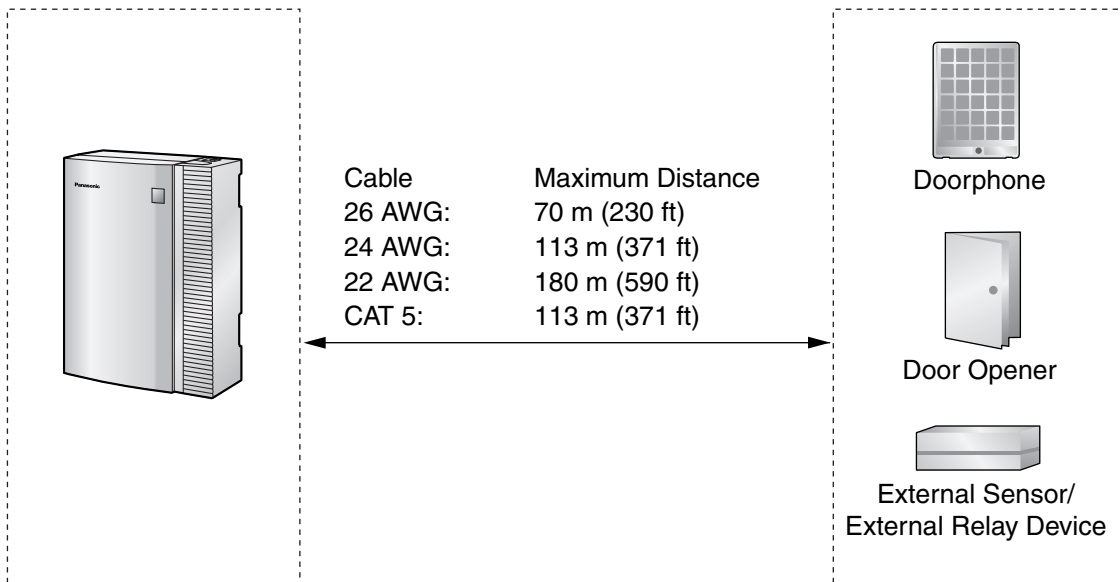
### 2.8.1 Connection of Doorphones, Door Openers, External Sensors, and External Relays

A maximum of 4 doorphones (KX-T30865), 4 door openers or external relays, and 4 external sensors can be connected to the PBX.

**Note**

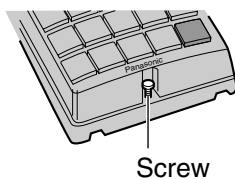
Doorphones, door openers, external sensors, and external relays are user-supplied.

#### Maximum Cabling Distance



#### Installing the Doorphone (KX-T30865)

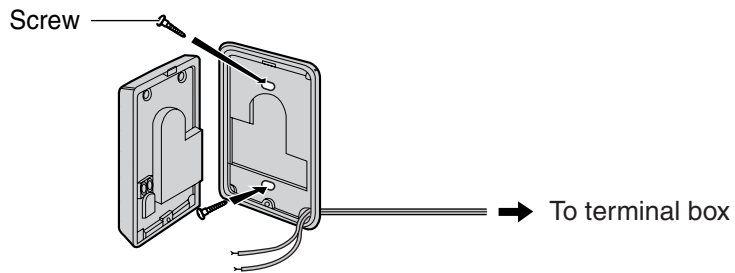
1. Loosen the screw to separate the doorphone into 2 halves.



## 2.8 Connection of Doorphones, Door Openers, External Sensors, and External Relays



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2. Pass the wires through the hole in the base cover, and attach the base cover to a wall using 2 screws.

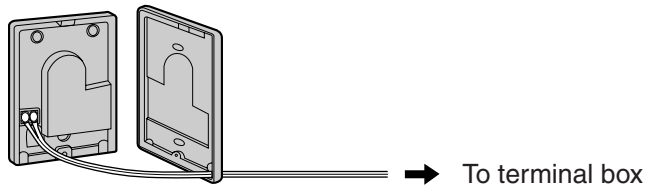


### Note

Two kinds of screws are included with KX-T30865. Please choose the appropriate kind for your wall type.

-  : when a doorphone plate has been fixed to the wall
-  : when you wish to install the doorphone directly to the wall

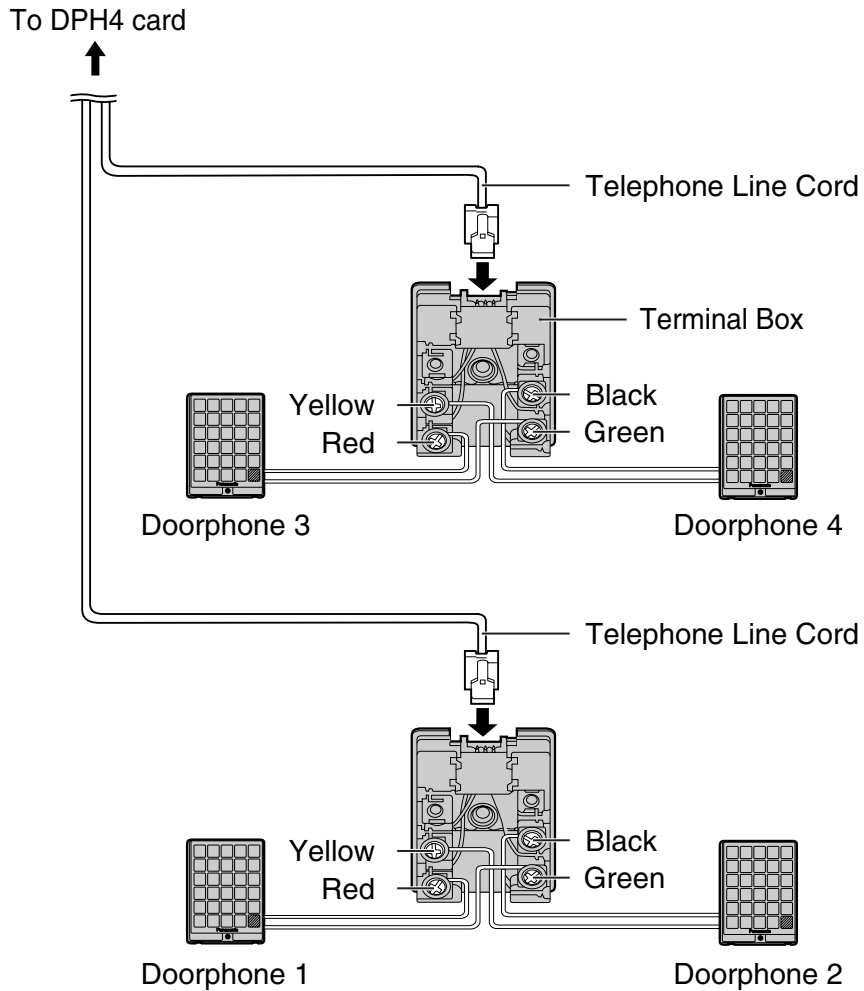
3. Connect the wires to the screws located in the front cover.



4. Re-attach the 2 halves and re-insert the screw.

## Connection of Doorphones

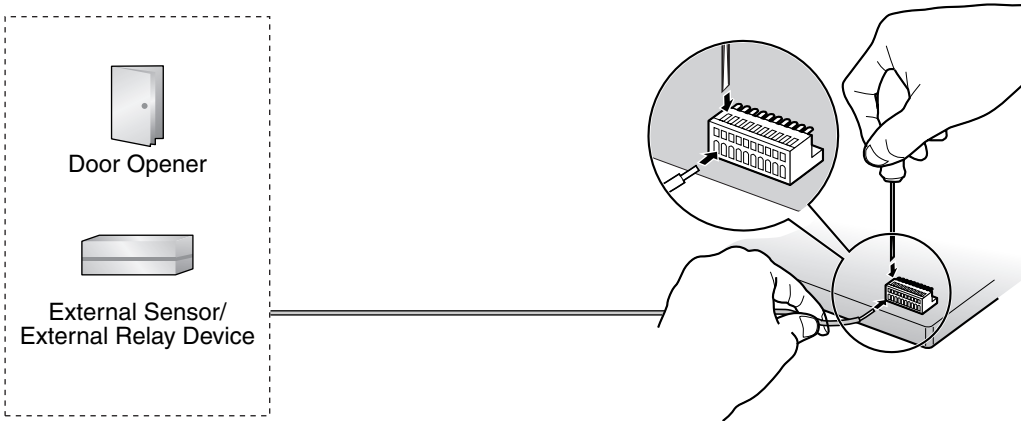
1. Connect DPH4 Card to the terminal boxes using telephone line cords. Refer to "2.5.1 DPH4 Card" for pin assignments.
2. Connect the wires of doorphones 1 and 3 to the red and green screws on the terminal box.
3. Connect the wires of doorphones 2 and 4 to the yellow and black screws on the terminal box.



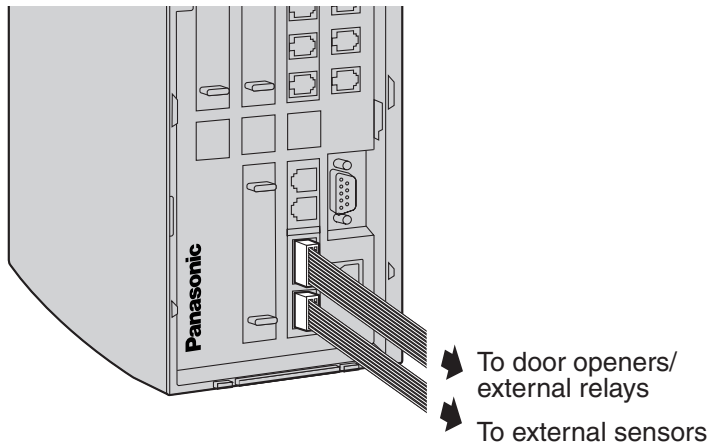
## Connection of Door Openers, External Sensors, and External Relays

Use 8-pin and 10-pin terminal block (included with the card) for connection.

1. While pressing down on the hole at the top of the terminal block using a screwdriver, insert the wire into the side hole as shown below. Repeat this procedure for other door openers, external sensors, and external relays.  
Refer to "2.5.1 DPH4 Card" for pin assignments.

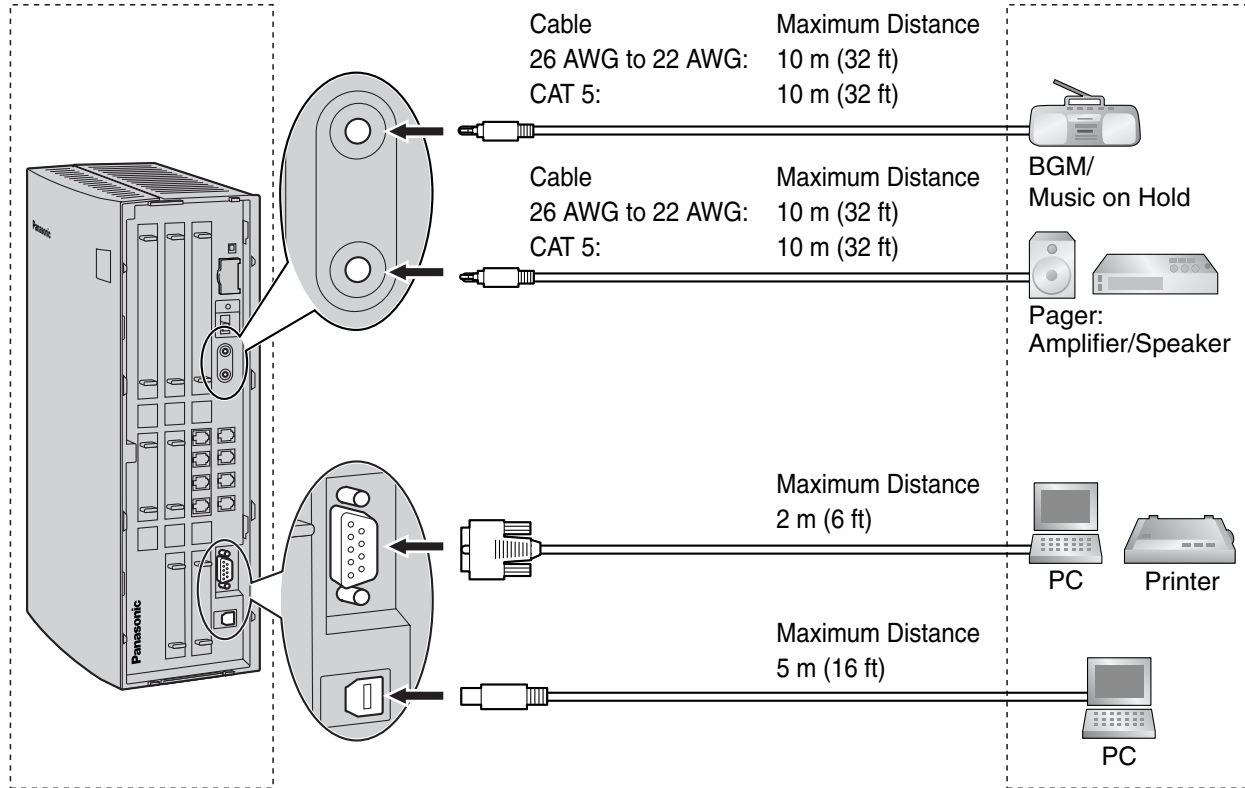


2. Attach the terminal blocks to the connectors of the DPH4 card in the PBX.



## 2.9 Connection of Peripherals

### 2.9.1 Connection of Peripherals



### BGM/MOH

The PBX provides Background Music and Music on Hold. Only 1 external music source (e.g., a user-supplied radio) can be connected to the PBX.

### CAUTION

- Wiring should be done carefully to prevent undue force being exerted on the plug. Otherwise, music may be intermittent.
- An External Music Jack is a SELV port and should only be connected to an approved SELV device.

### Note

When the PBX and external music sources are not connected to the same ground, hum noise may be induced into Background Music and Music on Hold.

## Pager

Only one paging device (user-supplied) can be connected to the PBX.

### CAUTION

An External Paging Jack is a SELV port and should only be connected to an approved SELV device.

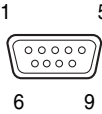
## PC/Printer (via RS-232C)

The PBX is equipped with an RS-232C interface. This interface provides communication between the PBX and the user-supplied devices such as PC or line printers. The RS-232C port is used for system programming, SMDR, diagnostics and external system database storage (save/load) functions. When using special accessories such as cable, the user should use those specified in this installation manual to comply with the limits for a Class B digital device pursuant to the FCC Rules.

### Note

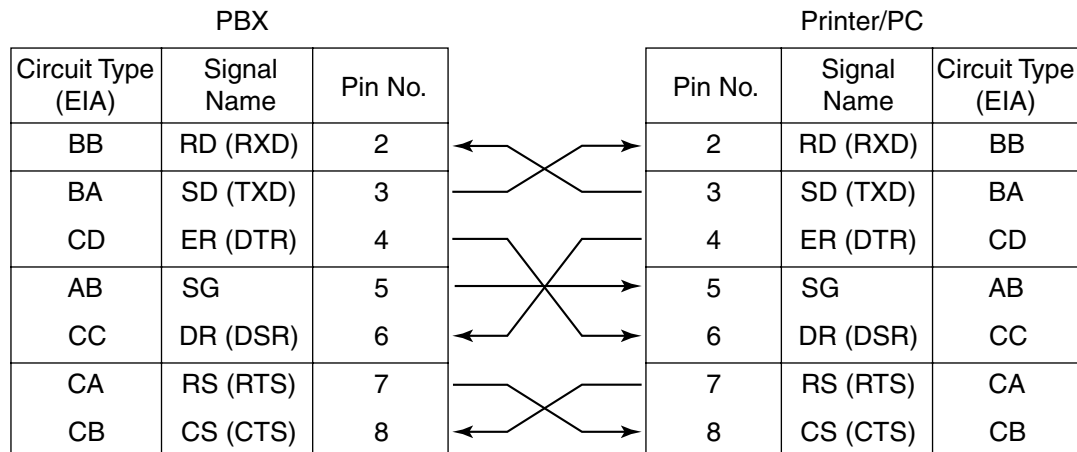
Use an RS-232C cross cable for connection between the PBX and PC.

## Pin Assignments

	No.	Signal Name	Function	Circuit Type	
				EIA	CCITT
	2	RD (RXD)	Receive Data	BB	104
	3	SD (TXD)	Transmit Data	BA	103
	4	ER (DTR)	Data Terminal Ready	CD	108.2
	5	SG	Signal Ground	AB	102
	6	DR (DSR)	Data Set Ready	CC	107
	7	RS (RTS)	Request To Send	CA	105
	8	CS (CTS)	Clear To Send	CB	106

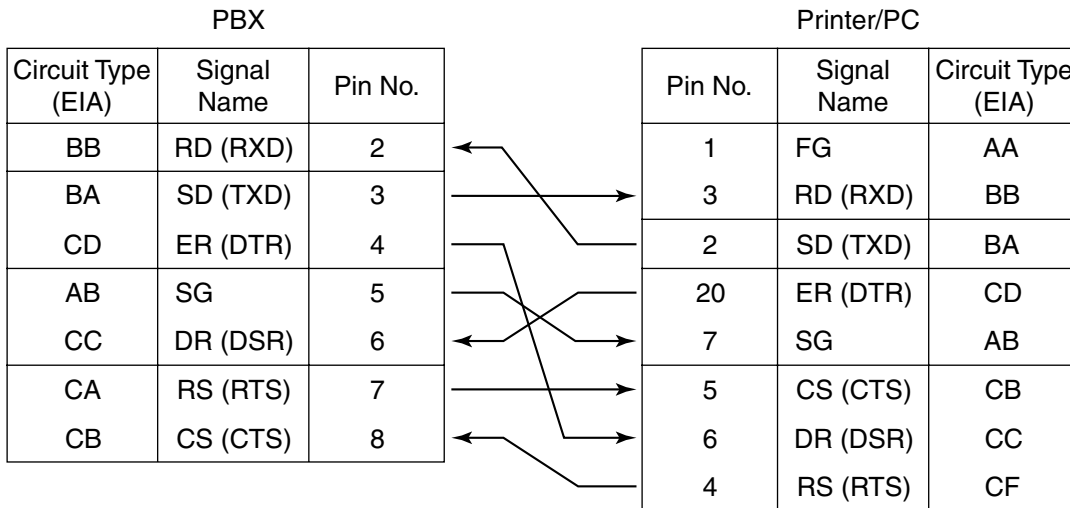
## Connection Charts

For connecting a printer/PC with a 9-pin RS-232C connector





### For connecting a printer/PC with a 25-pin RS-232C connector



### RS-232C Signals


- **Receive Data (RXD):...**(input)  
Conveys signals from the printer or the PC.
- **Transmit Data (TXD):...**(output)  
Conveys signals from the unit to the printer or the PC. A "Mark" condition is held unless data or BREAK signals are being transmitted.
- **Data Terminal Ready (DTR):...**(output)  
This signal line is turned ON by the unit to indicate that it is ON LINE. Circuit ER (DTR) ON does not indicate that communication has been established with the printer or the PC. It is switched OFF when the unit is OFF LINE.
- **Signal Ground (SG)**  
Connects to the DC ground of the unit for all interface signals.
- **Data Set Ready (DSR):...**(input)  
An ON condition of circuit DR (DSR) indicates the printer or the PC is ready. Circuit DR (DSR) ON does not indicate that communication has been established with the printer or the PC.
- **Request To Send (RTS):...**(output)  
This lead is held ON whenever DR (DSR) is ON.
- **Clear To Send (CTS):...**(input)  
An ON condition of circuit CS (CTS) indicates that the printer or the PC is ready to receive data from the unit. The unit does not attempt to transfer data or receive data when circuit CS (CTS) is OFF.
- **Frame Ground (FG)**  
Connects to the unit frame and the earth ground conductor of the AC power cord.

### PC (via USB version 1.1)

The PBX is equipped with a USB interface. This interface provides communication between the PBX and a PC.

The PC is used for system programming, diagnostics and external system database storage (save/load) functions.

#### Pin Assignments

	No.	Signal Name
	1	VBUS
	2	USB D-
	3	USB D+
	4	GND

---

## 2.10 Power Failure Connections

### 2.10.1 Power Failure Connections

When the power supply to the PBX fails, power failure transfer (PFT) will switch from the current connection to the Power Failure Connection. Refer to "2.4.1 Power Failure Transfer" in the Feature Guide for further information.

**Note**

If DC power is provided by backup batteries, the PBX will remain fully operational and the connection will not switch to the Power Failure Connection.

#### Using CO Line Card and Hybrid Ports

In the event of power failure, SLTs connected to Ports 1 and 2 of the Hybrid Ports (on the Main Board) are automatically connected to PFT ports 1 and 2 of the first LCOT4 card (installed in the least slot number).

**Note**

Even when the power returns, the conversation established during power failure will be maintained.

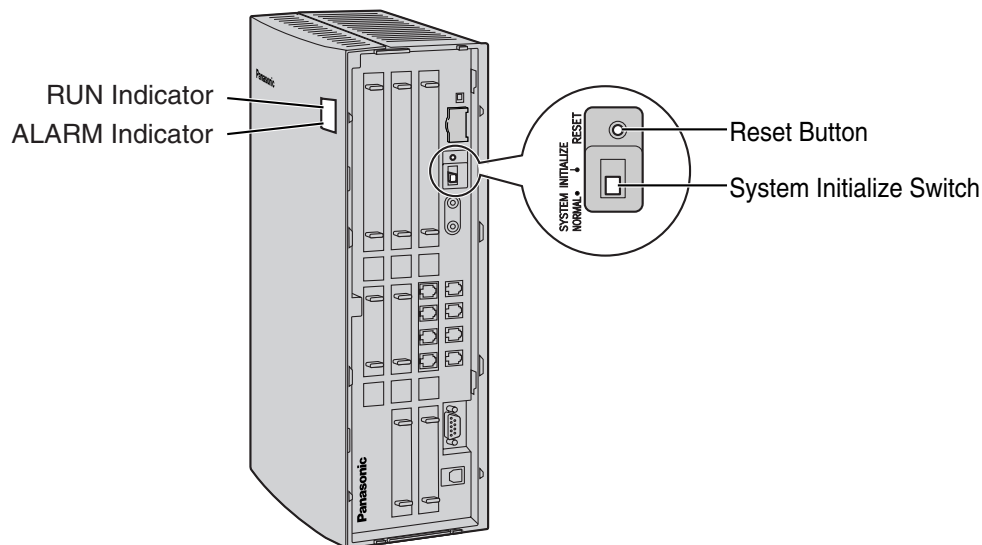
## 2.11 Starting the PBX

### 2.11.1 Starting the PBX

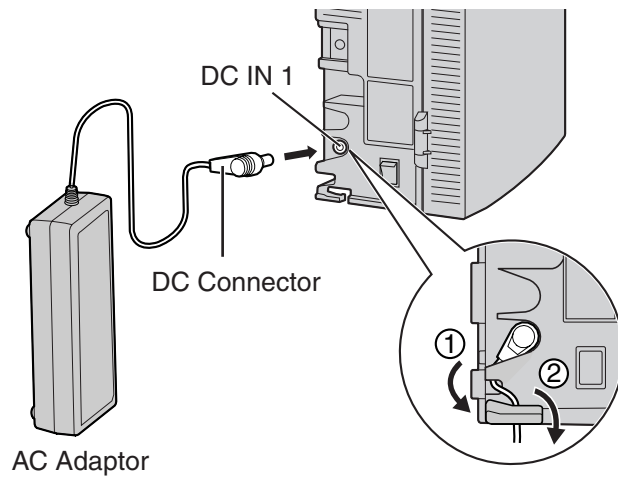
#### **CAUTION**

- SD Memory Card must be inserted in the SD Memory Card slot of the main board before start up.
- Before touching the System Initialize Switch, discharge static electricity by touching ground or wearing a grounding strap.
- Once you have started the PBX and if you unplug the PBX, do not perform the following procedures to start the PBX again. Otherwise, your programmed data is cleared. To restart the PBX, refer to "4.1.4 Using the Reset Button".
- The PBX will continue to be powered even if the power switch is turned "OFF".
- The power supply cord is used as the main disconnect device. Ensure that the AC outlet is located near the equipment and is easily accessible.

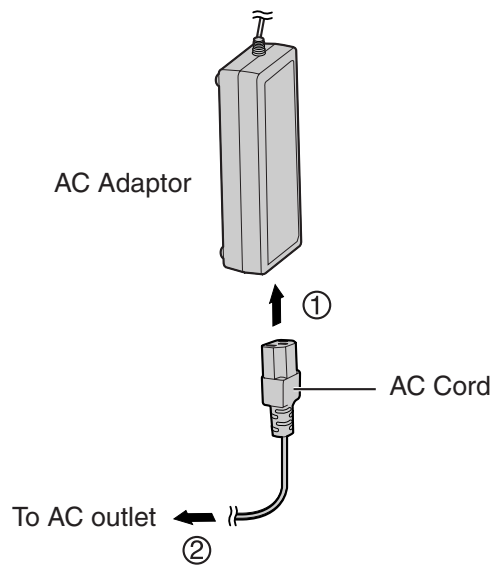
1. Set the System Initialize Switch to the "SYSTEM INITIALIZE" position.



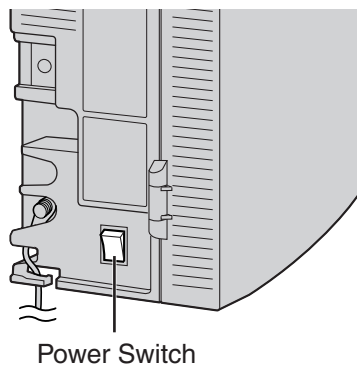
2. Plug the DC connector of the AC adaptor into DC IN 1.



3. Plug the AC cord into the AC adaptor, and then plug the other end into an AC outlet.



4. Turn on the power switch. The RUN indicator will flash.



#### Notes

- For safety reasons, follow the procedures as indicated when turning on the PBX.
- For safety reasons, do not stretch, bend, or pinch the AC cord and the DC cable of the AC adaptor.

5. While the RUN indicator is flashing, return the System Initialize Switch to the "NORMAL" position. Depending on the configuration, initialization takes about 1 min to 3 min. If successfully executed, the RUN indicator will stop flashing and be kept lit.

All data will be cleared, and the PBX as well as all optional service cards will be initialized to the default values.

**Note**

Use the same types of AC adaptor and AC cord that are supplied with the PBX only.

## LED Indications

Indication	Color	Description
RUN	Green	<p>PBX status indication</p> <ul style="list-style-type: none"><li>• OFF: Power off (includes normal reset)</li><li>• ON: Power on and running (on-line)</li><li>• Flashing (60 times per minute): Starting up</li><li>• Flashing (120 times per minute): Starting up or resetting with:<ul style="list-style-type: none"><li>• the System Initialize Switch in "SYSTEM INITIALIZE" position</li><li>• the SD Memory Card not inserted</li></ul></li></ul>
ALARM	Red	<p>Alarm detection status indication</p> <ul style="list-style-type: none"><li>• OFF: Normal</li><li>• ON: Alarm (CPU stop, alarm for each card)</li><li>• Flashing: Alarm (MPR file error in restarting)</li></ul>

## Confirming the CO Line Connection

After initialization, program the PBX and establish CO line connection, and then use an APT to confirm it.

To confirm, dial [\*] [3] [7] + CO line number (3 digits) or press an S-CO button. You will hear a dial tone if CO line is available and connected.

## Turning off the PBX

For safety reasons, make sure to turn off the power switch before unplugging the PBX. To unplug, follow the reverse steps to plug it in.

---

## **Section 3**

# ***Guide for the PC Programming Software***

*This section explains the installation and structure of the PC Programming Software.*

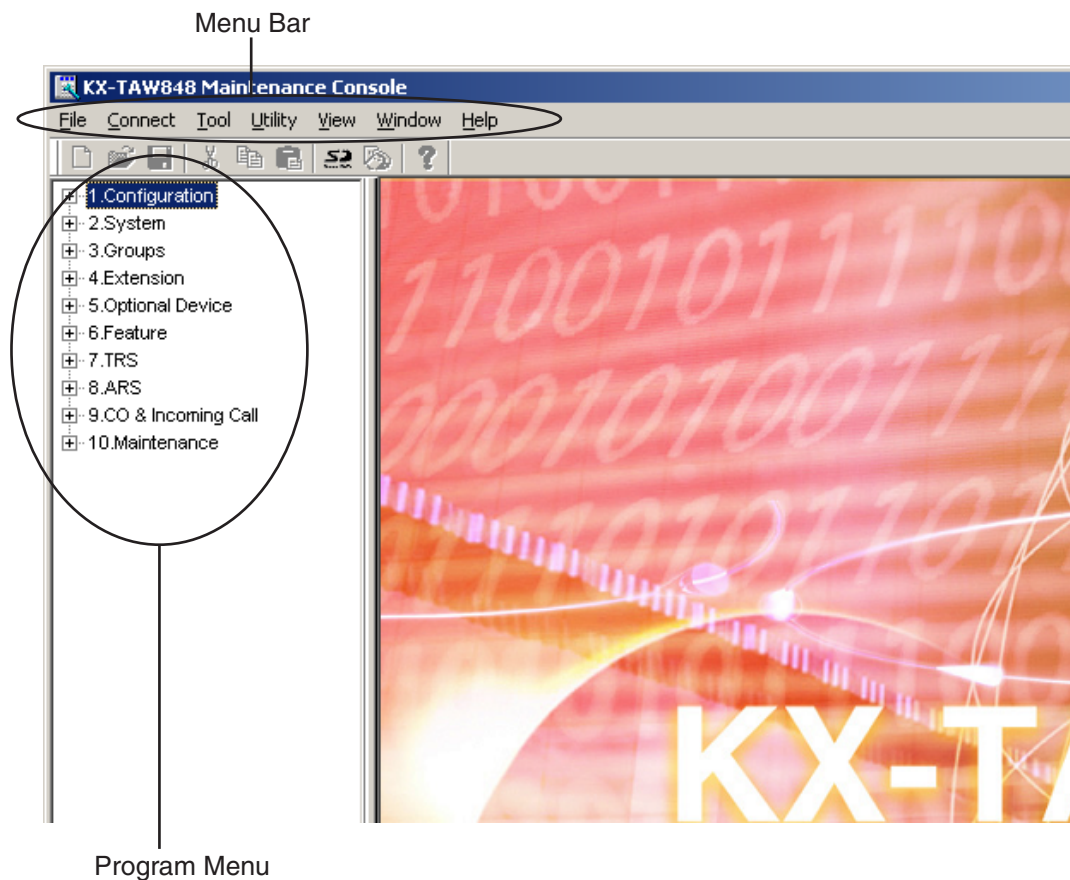
# 3.1 Overview

## 3.1.1 Overview

KX-TAW848 Maintenance Console is designed to serve as an overall system programming reference for the PBX. To program and administer the PBX by PC, you need to install the KX-TAW848 Maintenance Console onto the PC.

This manual describes overview and installation of the KX-TAW848 Maintenance Console only.

### KX-TAW848 Maintenance Console\*<sup>1</sup>



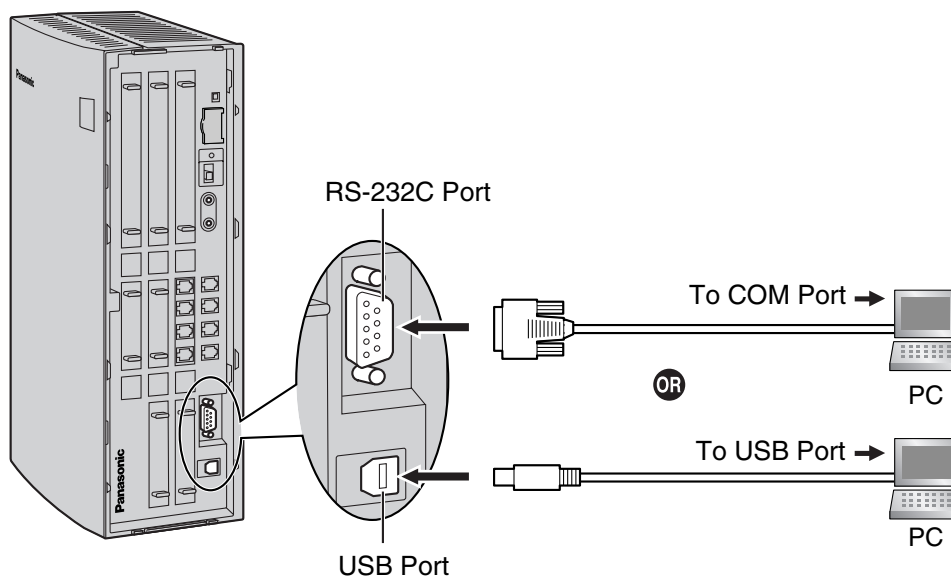
\*<sup>1</sup> The contents and design of the software are subject to change without notice.



## 3.2 Connection

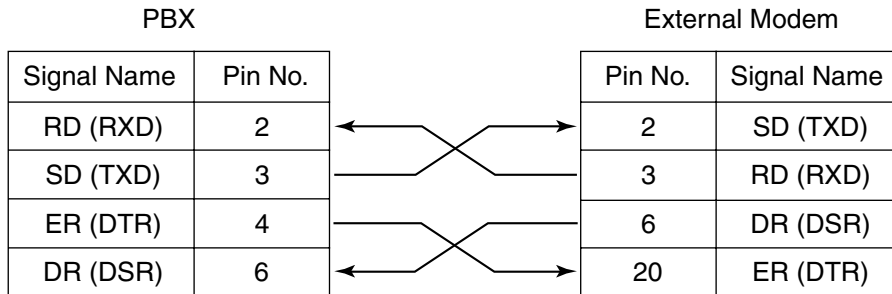
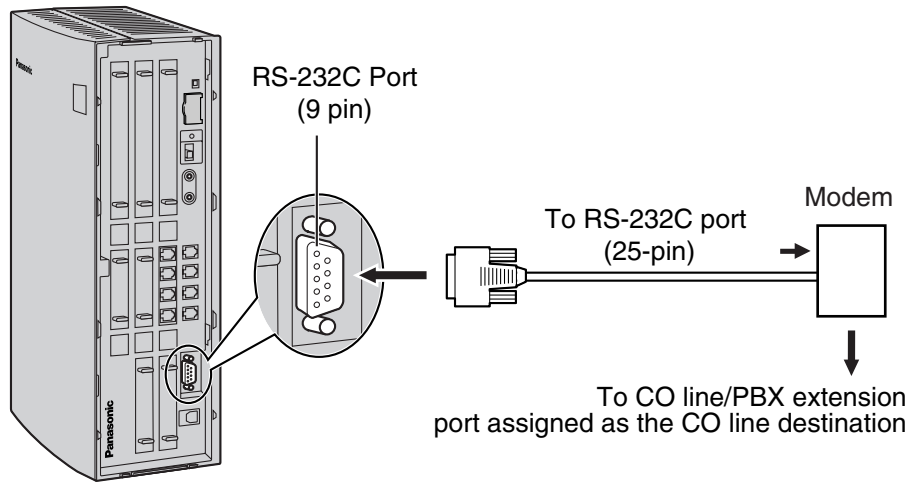
### 3.2.1 Connection

#### Serial Interface Connection

**Note**

For pin assignments and maximum cabling distance, refer to "2.9.1 Connection of Peripherals".

## External Modem Connection



After connecting the PBX and the external modem, set the power switch of the external modem to "ON", then the external modem will be initialized with the default values.

The following AT command settings may be required for the modem:

- The Data Terminal Ready (DTR) signal should be ignored.
- The Data Terminal Equipment (DTE)/Modem flow control should be turned off.
- The data compression should be disabled.
- Error Correction is not necessary.

### Notes

- Use an RS-232C straight cable for connection between the PBX and external modem.
- An AT command (for initialization, enabling automatic answer, etc.) can only be programmed by KX-TAW848 Maintenance Console. "AT&F0Q0E0V1S0=1X0&D0" is stored as the default value.
- For more information about the AT command, refer to the external modem's instructions.

## 3.3 Installation of the PC Programming Software

### 3.3.1 Installing and Starting the KX-TAW848 Maintenance Console

#### System Requirements

##### Operating System

- Microsoft® Windows® 98 SE, Windows Me, Windows 2000, or Windows XP

##### Hardware

- CPU: Intel® Pentium® 133 MHz or better microprocessor
- RAM: at least 64 megabytes (MB) of free RAM (128 MB recommended)
- HDD: at least 100 MB of hard disc space

### Password Security

#### *Warning to the Administrator or Installer regarding the system password*

1. Please provide all system passwords to the customer.
2. To avoid unauthorized access and possible abuse of the PBX, keep the passwords secret, and inform the customer of the importance of the passwords, and the possible dangers if they become known to others.
3. The PBX has default passwords preset. For security, change these passwords the first time that you program the PBX.
4. Change the passwords periodically.
5. It is strongly recommended that passwords of 10 numbers or characters be used for maximum protection against unauthorized access. For a list of numbers and characters that can be used in system passwords, refer to "3.1.3 Entering Characters" in the Feature Guide.
6. If a system password is forgotten, it can be found by loading a backup of the system data into a PC, and checking the password using the KX-TAW848 Maintenance Console software. If you do not have a backup of the system data, you must reset the PBX to its factory defaults and reprogram it. Therefore, we strongly recommend maintaining a backup of the system data. For more information on how to back up the system data, refer to the on-line help of the Maintenance Console.

However, as system passwords can be extracted from backup copies of the system data file, do not allow unauthorized access to these files.

## Installing the KX-TAW848 Maintenance Console

### Notes

- Make sure to install and use the KX-TAW848 Maintenance Console for MPR version 2.0.
- To install or uninstall the software into Windows 2000 Professional or Windows XP Professional, the user must be grouped either of "Administrators" or "Power Users".
- When the PBX is first connected to the PC via USB, a wizard should appear and ask you to select the appropriate USB driver. Browse for and select the KX-TDA USB driver, which is copied to the local drive during installation.



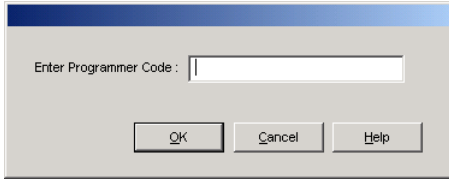
1. Copy the KX-TAW848 Maintenance Console setup file to a local drive on the PC. (Its icon is shown here, on the left.)
2. Double-click the setup file to run the installer.
3. Follow the on-screen instructions provided by the installation wizard.

## Starting the KX-TAW848 Maintenance Console and Assigning the Basic Items (Quick Setup)

When you start the KX-TAW848 Maintenance Console with the Installer Level Programmer Code and connect to the PBX for the first time after initialization (with the factory default setting), Quick Setup will launch automatically. During Quick Setup, you will setup the following basic items:

- Date and Time of the PBX. The date and time set on the PC will be used.
- System Password for installer for PC programming.
- Operator extension numbers. Operator extensions for all time modes (day/lunch/break/night) can be assigned.
- Flexible Numbering type to pattern 1 or pattern 2. If pattern 1 (with ✕) is selected, "✕" must prefix all feature numbers (except access numbers) when an extension user wants to use a feature.
- Operator call and Idle Line Access/ARS numbers (0 or 9). The feature numbers for operator call and Idle Line Access/ARS can be selected.
- Remote Maintenance Dial Number. Enter the complete telephone number of the PBX (including the country code). When necessary, this number will be used to access the PBX from a remote location for maintenance purposes.

1. Connect the PC to the PBX with a USB cable.
2. Start the "**KX-TAW848 Maintenance Console**" from the Start menu.

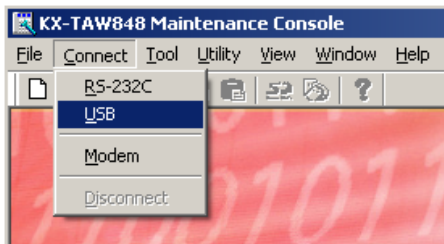


3. Type the Installer Level Programmer Code (**INSTALLER**), then click [OK].

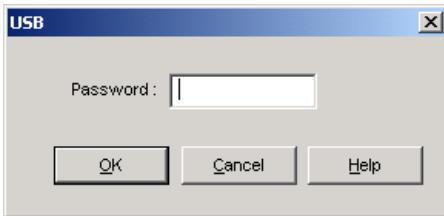
The Programmer Code authorizes different programming levels, and the Quick Setup is only available when you start the KX-TAW848 Maintenance Console with the Installer Level Programmer Code.

**Note**

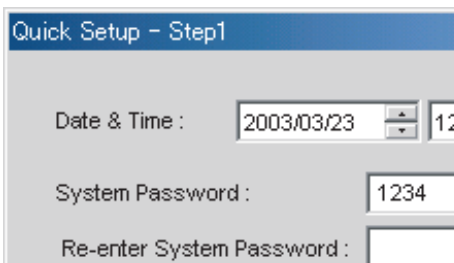
There are 2 other Programmer Codes with limited authorization: Administrator Level (**ADMIN**), and User Level (**USER**).



4. Click "**Connect**" → "**USB**" from the menu bar.

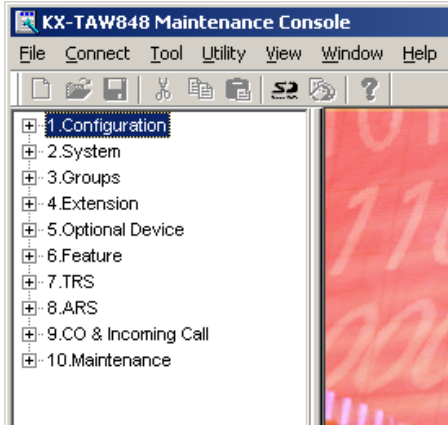


5. Type the system password for installer (default: **1234**), then click [OK] to log-in.



6. Follow the instructions of the wizard and assign the basic items (Quick Setup).

### 3.3 Installation of the PC Programming Software



7. The program menu appears. You may now begin programming the PBX.

#### Notes

- During long programming sessions, it is highly recommended that you periodically save the system data to the SD Memory Card. If the PBX suffers a sudden power failure or if the system is reset for some reason and all system data is lost, it can be restored from the SD Memory Card. To save the system data to the SD Memory Card, either click the **"SD Memory Backup"** icon, or exit KX-TAW848 Maintenance Console and click "Yes" to save when prompted.

	00	01	02	03	04	05	06	07	08	09	0a	0b	0c	0d	0e	0f
00																
10																
20		!	"	#	\$	%	&	'	(	)	*	+	,	-	.	/
30	0	1	2	3	4	5	6	7	8	9	:	;	<	=	>	?
40	@	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
50	P	Q	R	S	T	U	V	W	X	Y	Z	[	\	]	^	_
60	`	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o
70	p	q	r	s	t	u	v	w	x	y	z	{		}	~	
80	€		,	f	„	…	†	‡	^	‰	Š	<	Œ		Ž	
90		‘	’	“	”	•	—	~	™	š	>	œ		ž	ÿ	
a0		ı	¢	£	¤	¥	¦	§	¨	©	ª	«	¬		®	¯
b0	°	±	²	³	´	µ	¶	·	¸	¹	º	»	¼	½	¾	¿
c0	À	Á	Â	Ã	Ä	Å	Æ	Ç	È	É	Ê	Ë	Ì	Í	Î	Ï
d0	Ð	Ñ	Ò	Ó	Ô	Õ	Ö	×	Ø	Ù	Ú	Û	Ü	Ý	Þ	ß
e0	à	á	â	ã	ä	å	æ	ç	è	é	ê	ë	ì	í	î	ï
f0	ð	ñ	ò	ó	ô	õ	ö	÷	ø	ù	ú	û	ü	ý	þ	ÿ

- The PC will not perform any shutdown operation, or enter the power-saving system standby mode while the KX-TAW848 Maintenance Console is connected to the PBX. To perform either of the operations above, first close the connection to the PBX.

#### CAUTION

Do not remove the SD Memory Card while power is supplied to the PBX. Doing so may cause the PBX to fail to start when you try to restart the system.

---

# **Section 4**

## **Troubleshooting**

*This section provides information on the PBX and telephone troubleshooting.*

# 4.1 Troubleshooting

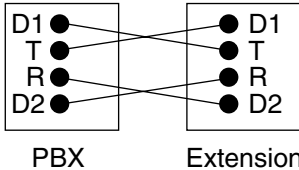
## 4.1.1 Installation

PROBLEM	PROBABLE CAUSE	SOLUTION
Extension does not operate.	Bad extension card.	<ul style="list-style-type: none"> <li>Exchange the card for a known working one.</li> </ul>
	Bad connection between the PBX and telephone.	<ul style="list-style-type: none"> <li>Take the telephone and plug it into the same extension port using a short telephone cord. If the telephone works, then the connection between the PBX and the telephone must be repaired.</li> </ul>
	A telephone with an A-A1 relay is connected.	<ul style="list-style-type: none"> <li>Use a 2-wire cord.</li> <li>Set the A-A1 relay switch of the telephone to the "OUT" or "OFF" position.</li> </ul>
	Bad telephone.	<ul style="list-style-type: none"> <li>Take the telephone and plug it into another extension port that is working. If the telephone does not work, replace the telephone.</li> </ul>
The PBX does not operate properly.		<ul style="list-style-type: none"> <li>Press the Reset Button (refer to "4.1.4 Using the Reset Button").</li> <li>Turn off the power switch, and then turn it back on.</li> <li>Turn off the power switch, and then unplug the PBX. After 5 minutes, plug the PBX back in and turn the power switch back on.</li> </ul>
Noise on external paging.	Induced noise on the wire between the PBX and the amplifier.	<ul style="list-style-type: none"> <li>Use a shielded cable as the connection wire between the PBX and amplifier. A short shielded cable is recommended.</li> </ul>
Distorted external music.	Excessive input level from external music source.	<ul style="list-style-type: none"> <li>Decrease the output level of the external music source by using the volume control on the music source.</li> </ul>
Alternate Calling—Ring/Voice and Live Call Screening (LCS) do not function as set when using a Wireless Phone (KX-T7880/KX-T7885/KX-TD7894/KX-TD7895).	Voice-calling mode and Hands-free mode with LCS are not available with Wireless Phones.	<ul style="list-style-type: none"> <li>Switch the calling mode to ring-calling.</li> <li>Set the LCS mode to "Private".</li> </ul>
The ALARM indicator on the front of the cabinet turns on red.	A major system error occurs in the PBX.	<ul style="list-style-type: none"> <li>See the error log using the KX-TAW848 Maintenance Console (refer to "4.1.5 Troubleshooting by Error Log").</li> </ul>

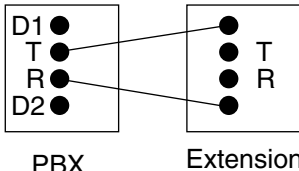


## 4.1.2 Connection

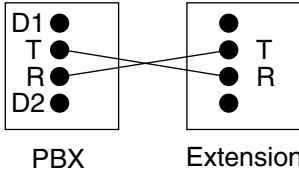
Connection between the PBX and an APT:

Can you dial an extension?	No	<b>CAUSE</b>	<b>SOLUTION</b>
		<p>The T/R is connected to the D1/D2.</p>  <p style="text-align: center;">PBX                  Extension</p>	<p>Use the correct cord (the inner 2 wires are for T/R and the outer 2 wires are for D1/D2).</p>

Connection between the PBX and an SLT:

	<b>CAUSE</b>	<b>SOLUTION</b>
	<p>The T/R is connected to the D1/D2.</p>  <p style="text-align: center;">PBX                  Extension</p>	<p>Use the correct cord (the inner 2 wires are for T/R).</p> <ul style="list-style-type: none"> <li>• If a telephone equipped with an A-A1 relay is connected to the PBX, set the A-A1 relay switch of the telephone to "OFF".</li> </ul>

Connection between the PBX and an SLT that is polarity-sensitive:

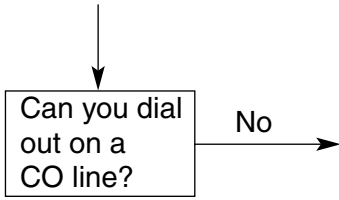
	<b>CAUSE</b>	<b>SOLUTION</b>
	<p>The "T" is connected to the "R".</p>  <p style="text-align: center;">PBX                  Extension</p>	<p>Reverse the connections of the T/R.</p>

Yes

(Continued on the next page.)

Connection between the central office and the PBX:

(Continued from the previous page.)



CAUSE	SOLUTION
<p>CO line is connected to the T2/T1.</p> <p>CO line PBX</p>	<p>Reconnect the CO line to the T1/R1 or T2/R2 of the telephone jack using 2-conductor wiring.</p>
<p>CO line is connected to the T2/R1.</p> <p>CO line PBX</p>	

### 4.1.3 Operation

PROBLEM	PROBABLE CAUSE	SOLUTION
<ul style="list-style-type: none"> <li>The APT does not ring.</li> </ul>	<ul style="list-style-type: none"> <li>The ringer volume is off.</li> </ul>	<ul style="list-style-type: none"> <li>Turn on the ringer volume.</li> </ul>
<ul style="list-style-type: none"> <li>During a power failure, extensions connected to ports 1 and 2 of Hybrid Ports do not operate.</li> </ul>	<ul style="list-style-type: none"> <li>An APT is connected to the extension port.</li> <li>The dialing mode (tone or pulse) is incorrect.</li> </ul>	<ul style="list-style-type: none"> <li>Disconnect the APT and connect an SLT.</li> <li>Set the Tone/Pulse switch to the other position.</li> </ul>
<ul style="list-style-type: none"> <li>Originating an outside call, call transfer, or conference cannot be performed.</li> </ul>	<ul style="list-style-type: none"> <li>The corresponding CO button does not exist on the APT.</li> </ul>	<ul style="list-style-type: none"> <li>Program the CO button. Refer to "1.18.2 Flexible Buttons" in the Feature Guide.</li> </ul>
<ul style="list-style-type: none"> <li>Cannot register the PS.</li> </ul>	<ul style="list-style-type: none"> <li>Wrong Personal Identification Number (PIN) is registered to the PS.</li> <li>CS is not connected properly.</li> </ul>	<ul style="list-style-type: none"> <li>Register the PIN set to the PBX into the PS.</li> <li>Make sure that the cable is connected properly with correct pin assignments. Also, make sure that the cable does not make short circuits.</li> <li>Switch all DIP switches off.</li> </ul>
<ul style="list-style-type: none"> <li>PS becomes out of range.</li> <li>Cannot make calls using the PS.</li> </ul>	<ul style="list-style-type: none"> <li>CS is not working.</li> <li>Location of CS is not good.</li> <li>Access system of the PS is not properly set.</li> </ul>	<ul style="list-style-type: none"> <li>Make sure that the cable is connected properly with correct pin assignments. Also, make sure that the cable does not make short circuits.</li> <li>Switch all DIP switches off.</li> <li>Locate the CS properly (refer to "2.7.5 Site Survey" ).</li> <li>Change the access system setting of the PS to the appropriate system or automatic.</li> </ul>
<ul style="list-style-type: none"> <li>Noise is frequent while using the PS.</li> <li>Conversations disconnect while using the PS.</li> </ul>	<ul style="list-style-type: none"> <li>Call handover is not working while using the PS.</li> <li>PS is out of CS coverage area.</li> </ul>	<ul style="list-style-type: none"> <li>Locate the CS properly (refer to "2.7.5 Site Survey" ).</li> </ul>
<ul style="list-style-type: none"> <li>PS stays out of service when the CS status is changed from Out of Service to In Service.</li> </ul>	<ul style="list-style-type: none"> <li>It may take about 10 s for CS to start up after the status has been changed to In Service.</li> </ul>	<ul style="list-style-type: none"> <li>Wait until the CS starts up.</li> </ul>

## 4.1.4 Using the Reset Button

If the PBX does not operate properly, use the Reset Button. Before using the Reset Button, try the system feature again to confirm whether there definitely is a problem or not.

### CAUTION

In order to avoid possible corruption of data on the SD Memory Card, please ensure that the "SD ACCESS" LED is off before pressing the Reset Button.

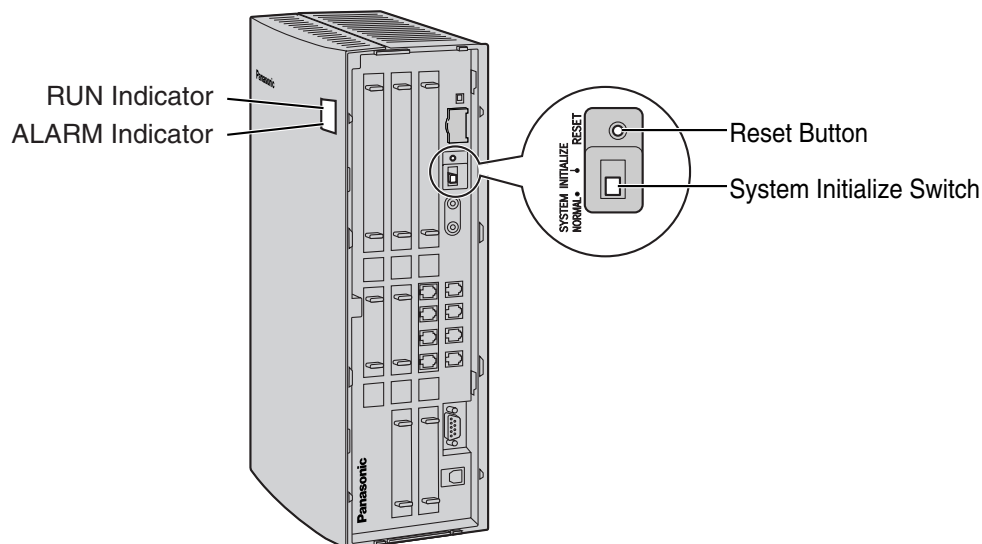
### Notes

- When the System Initialize Switch is set to the "NORMAL" position, pressing the Reset Button causes the following:
  - Camp-on is cleared.
  - Calls on hold are terminated.
  - Calls on exclusive hold are terminated.
  - Calls in progress are terminated.
  - Call park is cleared.Other data stored in memory, except the above, are not cleared.
- Be aware that pressing the Reset Button with the System Initialize Switch in the "SYSTEM INITIALIZE" position clears all data stored in the PBX. Do not perform this operation unless you intend to delete all data from the PBX.

## Operation

If the PBX does not operate properly:

1. Set the System Initialize Switch to the "NORMAL" position.
2. Press the Reset Button.



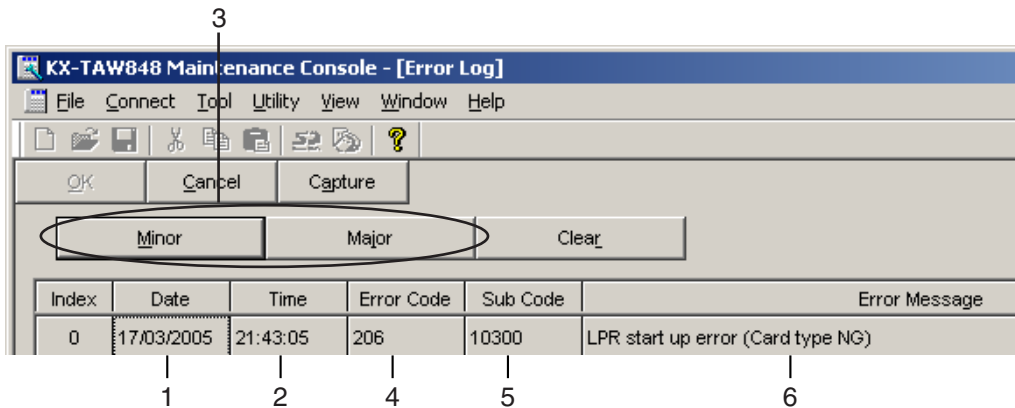
## 4.1.5 Troubleshooting by Error Log

When a major system error occurs in the PBX, the ALARM indicator on the front of the cabinet turns on red, and the system logs the error information.

### Error Log Display Format

Below is the display format of the error log. To see the error log using the KX-TAW848 Maintenance Console, refer to the on-line help of the KX-TAW848 Maintenance Console.

**Example: KX-TAW848 Maintenance Console**



**Example: Station Message Detail Recording (SMDR)**

```

04/01/01 10:37AM MJ ALM #000 10000 MPR WDT overflow
04/01/01 11:07AM MN ALM #010 10000 AC power down
04/01/01 03:55PM MN ALM #392 10401 Clock master card selected
    
```

Brackets below the SMDR lines label the columns as 1 through 6.

### Description

	Item	Description
1	Date	Date of the error detection
2	Time	Time of the error detection
3	Level	Major Alarm (MJ ALM): Errors that affect the whole system operation, or result in system failure  Minor Alarm (MN ALM): Errors that affect certain part of system operation
4	Error Code	Three-digit error code

	Item	Description
5	Sub Code	<p>Five-digit sub code (1XXYY)</p> <p>1: Cabinet number</p> <p>XX: Slot number (00 to 06, 08 to 11)</p> <p>00: MPR;</p> <p>01: Hybrid Ports;</p> <p>02 to 06, 08 to 11: Slots for optional service cards</p> <p>YY: Physical port number (01 to 16)</p> <p>For optional service cards that are installed in Slots 08 to 11, sub slot number + port number will be displayed.</p> <p>Sub slot 1: 11 to 14</p> <p><b>Note</b></p> <p>When there is no parameter for slot and physical port number, XX and YY will be displayed as "00".</p> <p>Example: Sub code for MPR = 10000</p>
6	Error Message	Error description

## List of Errors and Solutions

The tables below list the errors and their solutions.

When an error whose error code is indicated with "\*" occurs in the PBX, the ALARM indicator on the front of the cabinet turns on red, and the system logs the error information.

When the error conditions indicated by the error codes "021", "091", "092", and "510" are recovered, the ALARM indicator will turn off automatically, indicating successful troubleshooting. When other errors are logged, the ALARM indicator will turn off only when the log for major or minor errors is cleared from the KX-TAW848 Maintenance Console.

In other words, the ALARM indicator will turn off under the following conditions:

- **When the errors "021", "091", "092", and "510" are logged:** when the error conditions are recovered
- **When other errors are logged:** when the log for major or minor errors is cleared from the KX-TAW848 Maintenance Console

### Optional Service Card Initial Self Diagnosis

Error Code	Error Message	PROBABLE CAUSE	SOLUTION
212	Echo canceller access error	<ul style="list-style-type: none"> <li>• Optional service card malfunction: ECHO</li> </ul>	<ul style="list-style-type: none"> <li>• See if the corresponding optional service card is installed properly</li> </ul>
216	MSG card DSP error	<ul style="list-style-type: none"> <li>• Optional service card malfunction: MSG</li> </ul>	<ul style="list-style-type: none"> <li>• Pull out and re-insert the corresponding optional service card</li> <li>• Press the Reset Button</li> <li>• Replace the corresponding optional service card</li> </ul>
217	MSG card data error	<ul style="list-style-type: none"> <li>• Optional service card malfunction: MSG</li> <li>• Erroneous recording of messages</li> </ul>	<ul style="list-style-type: none"> <li>• See if the corresponding optional service card is installed properly</li> <li>• Pull out and re-insert the corresponding optional service card</li> <li>• Press the Reset Button</li> <li>• Re-record the messages</li> <li>• Replace the corresponding optional service card</li> </ul>

### System Start-up and On-line Operation

Error Code	Error Message	PROBABLE CAUSE	SOLUTION
000*	MPR WDT overflow	<ul style="list-style-type: none"> <li>• Main Board (MPR) malfunction</li> </ul>	<ul style="list-style-type: none"> <li>• Press the Reset Button</li> <li>• Reprogram the PBX</li> </ul>
001	SDRAM bit error	<ul style="list-style-type: none"> <li>• Erroneous processing of Main Board (MPR) software</li> <li>• Software error due to external factors</li> </ul>	<ul style="list-style-type: none"> <li>• Replace the PBX</li> </ul>

## 4.1 Troubleshooting

Error Code	Error Message	PROBABLE CAUSE	SOLUTION
002	System Reset	<ul style="list-style-type: none"> <li>Reset Button is pressed</li> <li>Power failure</li> <li>Main Board malfunction</li> <li>Erroneous processing of Main Board software</li> <li>Software error due to external factors</li> </ul>	<ul style="list-style-type: none"> <li>Ignore if not frequent</li> <li>Press the Reset Button</li> <li>Reprogram the PBX</li> <li>Replace the PBX</li> </ul>
010	AC power down	<ul style="list-style-type: none"> <li>AC power down</li> <li>Bad connection or breaking of AC cord</li> </ul>	<ul style="list-style-type: none"> <li>Check the power supply system</li> <li>See if the AC cord is connected properly</li> <li>Check the AC cord</li> <li>Replace the AC cord (be sure to turn off the PBX when replacing)</li> </ul>
011	DC power down	<ul style="list-style-type: none"> <li>AC power down</li> <li>Power supply circuit (Main Board) malfunction</li> <li>Detection of over current (short circuit on optional service cards)</li> </ul>	<ul style="list-style-type: none"> <li>Check the power supply system</li> <li>See if the AC cord is connected properly</li> <li>Check the AC cord</li> <li>Replace the AC cord (be sure to turn off the PBX when replacing)</li> <li>Replace the PBX</li> <li>Remove the optional service cards and restart the PBX</li> </ul>
012*	MPR RAM battery low	<ul style="list-style-type: none"> <li>Battery out</li> <li>Main Board (MPR) malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Replace the PBX</li> </ul>
020*	SD file access error	<ul style="list-style-type: none"> <li>SD Memory Card malfunction</li> <li>Bad connection of SD Memory Card</li> <li>Main Board malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Press the Reset Button</li> <li>Reprogram the PBX</li> <li>Replace the SD Memory Card</li> <li>Replace the PBX</li> </ul>
021*	SD Memory Card disconnected	<ul style="list-style-type: none"> <li>SD Memory Card not installed</li> <li>Bad connection of SD Memory Card</li> <li>SD Memory Card malfunction</li> <li>Main Board malfunction</li> </ul>	
022	Not enough free space on SD card	<ul style="list-style-type: none"> <li>Not enough memory space available to save the system data, or to upload system files from the KX-TAW848 Maintenance Console</li> </ul>	<ul style="list-style-type: none"> <li>Delete the files whose file names start with "\$" from SD Memory Card</li> </ul> <p><b>Note</b> Do not delete the "PSMPR" file; it is the program file of the Main Board (MPR).</p>



Error Code	Error Message	PROBABLE CAUSE	SOLUTION
023	System data file version error	<ul style="list-style-type: none"> <li>Old system files on SD Memory Card</li> <li>Defective system files on SD Memory Card</li> </ul>	<ul style="list-style-type: none"> <li>Restore the backup files</li> <li>Re-install the software</li> </ul>
024	System initialization file version error		
025	Card initialization file version error		
026	LCD file version error		
027	System data file checksum error		
028	System initialization file checksum error		
029	Card initialization file checksum error		
030	LCD file checksum error		
031*	System data file not found	<ul style="list-style-type: none"> <li>SD Memory Card not installed</li> <li>Bad connection of SD Memory Card</li> <li>SD Memory Card malfunction</li> <li>Main Board malfunction</li> </ul>	<ul style="list-style-type: none"> <li>Press the Reset Button</li> <li>Reprogram the PBX</li> <li>Replace the SD Memory Card</li> <li>Replace the PBX</li> </ul>
032*	System initialization file not found		
033*	Card initialization file not found		
034*	LCD file not found		
035	System data file access error		
036*	System initialization file access error		
037*	Card initialization file access error		
038*	LCD file access error		
039*	SD file access error		
090	Over Card Limitation	<ul style="list-style-type: none"> <li>Too many optional service cards installed</li> </ul>	<ul style="list-style-type: none"> <li>Reduce the number of optional service cards</li> </ul>
091*	PT connection over	<ul style="list-style-type: none"> <li>Too many APTs connected</li> </ul>	<ul style="list-style-type: none"> <li>Reduce the number of APTs</li> </ul>

## 4.1 Troubleshooting

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<b>Error Code</b>	<b>Error Message</b>	<b>PROBABLE CAUSE</b>	<b>SOLUTION</b>
092*	CS connection over	<ul style="list-style-type: none"><li>• Too many CSs connected</li></ul>	<ul style="list-style-type: none"><li>• Reduce the number of CSs</li></ul>
234	DPLL clock failure	<ul style="list-style-type: none"><li>• Main Board malfunction</li></ul>	<ul style="list-style-type: none"><li>• Replace the PBX</li></ul>
251	MSG DSP failure	<ul style="list-style-type: none"><li>• Optional service card malfunction: MSG</li></ul>	<ul style="list-style-type: none"><li>• See if the corresponding optional service card is installed properly</li><li>• Replace the corresponding optional service card</li></ul>
305*	Data Link failure	<ul style="list-style-type: none"><li>• Data link between the CS and PBX failed</li></ul>	<ul style="list-style-type: none"><li>• Check the connection between the CS and PBX</li></ul>
310*	Port Link Failure	<ul style="list-style-type: none"><li>• Voice Processing System malfunction</li></ul>	<ul style="list-style-type: none"><li>• Check the Voice Processing System</li></ul>
392	Clock master card selected	<ul style="list-style-type: none"><li>• Clock master card has been changed to the one indicated by the sub code</li></ul>	<ul style="list-style-type: none"><li>• Check if the proper card is selected as the new clock master card</li></ul>
510*	SMDR disconnect	<ul style="list-style-type: none"><li>• RS-232C cable not connected</li><li>• Breaking of RS-232C cable</li><li>• Printer (terminal equipment) malfunction</li></ul>	<ul style="list-style-type: none"><li>• Check the RS-232C cable</li><li>• Check the terminal equipment</li></ul>

---

# ***Section 5***

## ***Appendix***

## 5.1 Revision History

### 5.1.1 MPR Version 2.0

#### Changed Contents

- 2.8.1 Connection of Doorphones, Door Openers, External Sensors, and External Relays

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