

## Revision History

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ISSUE	DATE	CONTENTS OF CHANGES	REMARK
ISSUE 1.0	2005.3	Initial Release	
ISSUE 1.1	2005.6	Add Expansion Modules and VMIBE/AAFBE	Field test

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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 other personal injury, including the following:

- Please read and understand all instructions.
- Follow all warnings and instructions marked on the product.
- Unplug this product from the wall outlet before cleaning. Just a damp cloth should be used for cleaning; do not use liquid or aerosol cleaners.
- Do not use this product near water, such as in a bathtub, wash bowl, kitchen sink, or laundry tub, in a wet basement, or near a swimming pool.
- Do not place this product on an unstable cart, stand, or table. The product may fall, causing serious damage to the product or personal injury.
- Slots and openings in the KSU and the back or bottom 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. This product should never be placed near or over a radiator or other heat source. This product should not be placed in a built-in installation without proper ventilation.
- This product should be operated only from the type of power source indicated 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.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord could be abused by people walking on it.
- Do not overload wall outlets and extension cords as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through KSU slots or connectors 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 the product.
- To reduce the risk of electric shock, do not disassemble this product. Instead, take it to a qualified person when service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risk. Incorrect reassemble can cause electric shock when the appliance is subsequently used.
- Unplug this product from the wall outlet and refer servicing to qualified service personnel under the following conditions:
  - When the power supply cord or plug is damaged or frayed.
  - If liquid has been spilled into the product.
  - If the product has been exposed to rain or water.
  - If the product does not operate normally by following the operating instructions. Adjust only those controls that are covered by the operating instructions because improper adjustment of other controls may result in damage and will often require extensive work by a qualified technician to restore the product to normal operation.
  - If the product has been dropped or the KSU has been damaged.
  - If the product exhibits a distinct change in performance.
- Avoid using a telephone during an electrical storm. There may be a remote risk of electric shock from lightning.
- In the event of a gas leak, do not use the telephone near the leak.

## ■ Precaution

- Keep the system away from heating appliances and electrical noise generating devices such as fluorescent lamps, motors and televisions. These noise sources can interfere with the performance of the IP LDK-20 System.
- This system should be kept free of dust, moisture, high temperature (more than 40 degrees) and vibration, and should not be exposed to direct sunlight.
- Never attempt to insert wires, pins, etc. into the system. If the system does not operate properly, the trouble has been repaired by an authorized LG service center.
- Do not use benzene, paint thinner, or any abrasive powder to clean the KSU. Wipe it with a soft cloth.

## CAUTION

- This system should only be installed and serviced by qualified service personnel.
- When a failure occurs which exposes any internal parts, disconnect the power supply cord immediately and return this system to your dealer.
- To prevent the risk of fire, electric shock or energy hazard, do not expose this product to rain or any type of moisture.
- To protect PCB from static electricity, discharge body static before touching connectors and/or components by touching ground or wearing a ground strap.

## WARNING

*Danger of explosion if battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions.*

## ■ The Structure of Manual

This installation manual is designed to provide as general information for the IP LDK-20 System. It provides instructions for installing the hardware, and programming the IP LDK-20 System using keyset. This manual contains the following sections:

### **Section 1. Introduction**

Provides general information on the IP LDK-20 System, including the system specifications and capacity.

### **Section 2. KSU Installation**

Describes detailed instructions for planning the installation site and procedures to install the IP LDK-20 System.

### **Section 3. Board Installation**

Describes general information and detailed instructions for installing boards and add-on boards.

### **Section 4. Expansion Module Installation**

Describes general information and detailed instructions for installing expansion modules and add-on board.

### **Section 5. Terminal Connection**

Describes the kinds of terminals, maximum distance, and the other device connections for the terminal.

### **Section 6. Starting the IP LDK-20 System**

Provides general information for starting the system and basic preprogramming.

### **Section 7. Troubleshooting**

Provides information on the IP LDK-20 System and troubleshooting.

# SECTION 1. INTRODUCTION

## 1.1 The IP LDK-20 System highlights

Features of the IP LDK-20 System include:

- Flexible architecture
- Optional LAN Interface
- Stable & enhanced voice features
  - Remote admin through BRI connection
  - Remote admin through PSTN modem
  - Remote admin through LAN connection
- Value-added features
  - Distinctive voice mail
  - CID (CO & SLT)
  - VOIP Service

## 1.2 System Connection Diagram

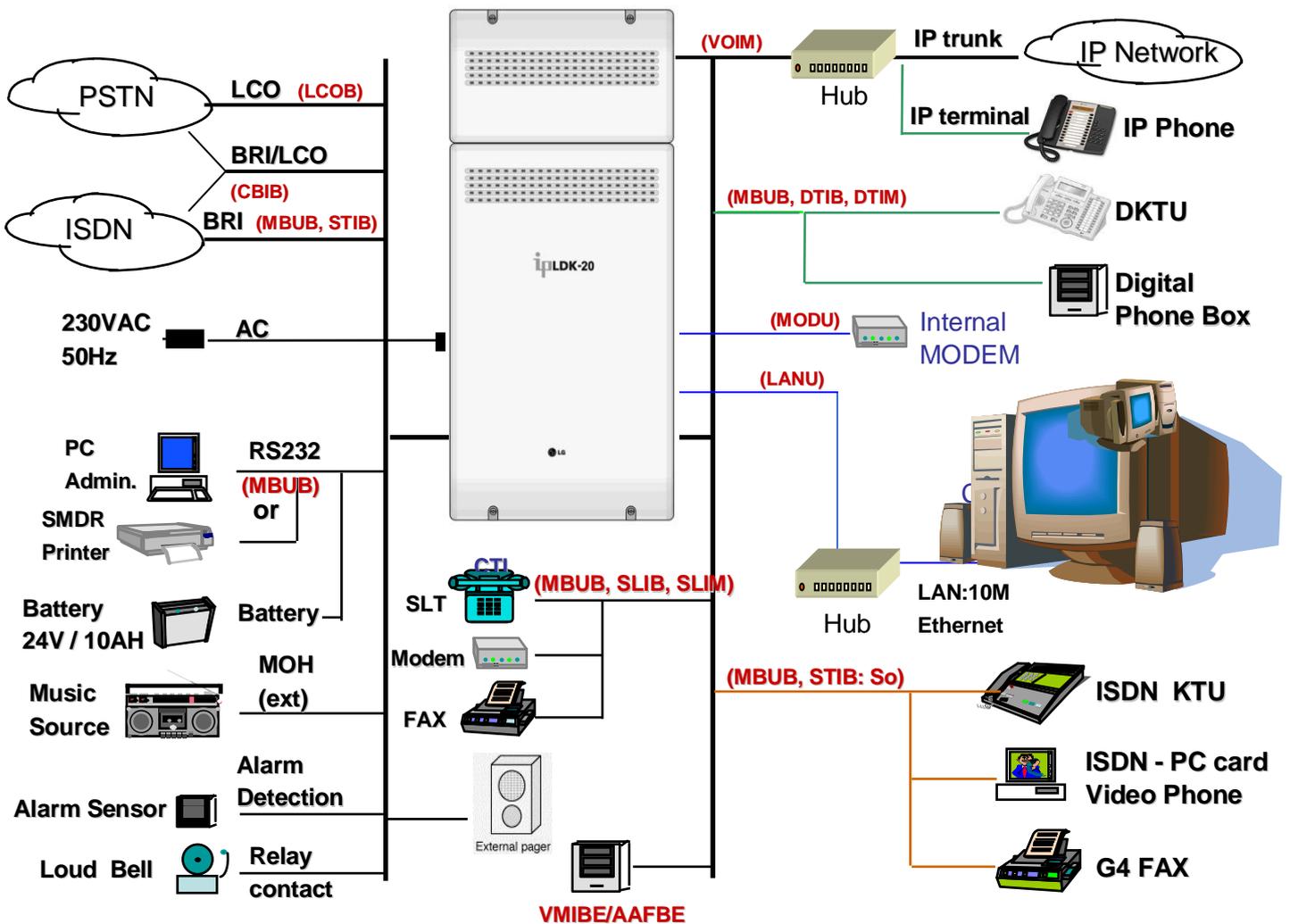


Figure 1.2 IP LDK System Connection Diagram

### 1.3 System Components

ITEM		OPTION BOARD	DESCRIPTION
<b>KSU</b>			Key Service Unit
<b>PSU</b>			Power Supply Unit, 90W
<b>Main Board</b>	<b>MBUB</b>		Main Board Unit (2BRI, 4DKT, 2DKT/SLT, and 2SLT)
		CO boards	Central Office Line interface boards (LCOB, STIB, CBIB)
		EXT boards	Extension boards (DTIB, SLIB)
<b>CO Line Boards</b>	<b>LCOB</b>		Loop Start CO Interface, 4 lines
		PRU4	Polarity Reversal detection Unit
		PRCPTU4	Polarity Reversal & Call Progress Tone detection Unit
		CPCU4	Caller-ID(FSK), Polarity Reversal & Call Progress Tone detection Unit
	<b>CBIB</b>		Loop Start CO Interface, 2 lines Basic Rate Interface Board (T mode only), 1 line (2 channels)
		PRU2	Polarity Reversal detection Unit
		PRCPTU2	Polarity Reversal & Call Progress Tone detection Unit
		CPCU2	Caller-ID(FSK), Polarity Reversal & Call Progress Tone detection Unit
	<b>STIB</b>		ISDN Basic Rate (S/T) Interface Board, 2 lines (4 channels)
<b>Extension Boards</b>	<b>DTIB4</b>		Digital Terminal Interface Board, 4 ports
	<b>DTIB8</b>		Digital Terminal Interface Board, 8 ports
	<b>SLIB4</b>		SLT Interface Board, 4ports
	<b>SLIB8</b>		SLT Interface Board, 8ports
<b>Other Boards</b>	<b>VMIB</b>		Voice Mail Interface Board, 3 channels
	<b>AAFB</b>		Auto Attendant Function Board, 2 channels
	<b>VMIBE</b>		Voice Mail Interface Board Enhanced, 4 channels
	<b>AAFBE</b>		Auto Attendant Function Board Enhanced, 3 channels
	<b>LANU</b>		LAN interface Unit (10Mbase-T only)
	<b>MODU</b>		MODEM unit (33Kbps)
<b>Expansion Modules</b>	<b>VOIM</b>		Voice over Internet protocol interface module (4 channels)
		VOIU	Voice over Internet protocol interface unit (4 channels)
	<b>SLIM</b>		SLT Interface module, 8 ports
	<b>DTIM</b>		Digital Terminal Interface module, 8 ports

## 1.4 Specifications

### 1.4.1 General specifications

ITEM	DESCRIPTION	SPECIFICATION
PSU	AC Voltage Input	230 +/-10% Volt AC @47-63Hz
	AC Power	90W
	AC Input Fuse	1.25A @ 250Volt AC
	DC Output Voltage	+5, -5, +30Volt DC
AC Adaptor for Expansion Module.	AC Voltage Input	230 +/-10% Volt AC @47-63Hz
	AC Input Fuse	1A @ 250Volt AC
	DC Output Voltage	48Volt DC
Battery Backup	Input Voltage	24 Volt DC
	Battery Fuse	5.0A @ 250Volt AC for basic KSU
		2.0A @ 250Volt AC for expansion module
	Charging Current	Max. 100mA
Battery Load Current	Max. 3A (with Analog CO or ISDN CO)	
External Relay Contact		1A @ 30 Volt DC
Music Source Input		0 dBm @ 600ohm
External Paging Port		0 dBm @ 600ohm
Ring Detect Sensitivity		30Vrms @ 16-55Hz
DTMF Dialing	Frequency Deviation	Less than +/-1.8%
	Signal Rise Time	Max.5ms
	Tone Duration, on time	Min.50ms
	Inter-digit Time	Min.30ms
Pulse Dialing	Pulse Rate	10 PPS
	Break/Make Ratio	60/40% or 66/33%
Operating Environment	Temperature	0(°C)-40(°C)
	Humidity	0-80%(non condensing)
Dimension	KSU	260mm(W)*410mm(H)*86mm(D)
	Expansion Module	260mm(W)*145mm(H)*86mm(D)
Weight	KSU	2.5Kg
	Expansion Module	DTIM/SLIM: 1.16Kg, VOIM: 0.58Kg
LANU	LAN Interface	10 Base -T Ethernet (IEEE 802.3)
	Speed	10 Mbps
	Duplex	Half duplex or Full duplex (Auto-Negotiation)
MODU	Analog modem	Bell, ITU-T, V.34, V.32BIS, V.90
		300bps up to 33Kbps speed rate
		Automatic rate negotiation
VOIM	LAN Interface	10 / 100 Base-T Ethernet (IEEE 802.3)
	Speed	10 Mbps or 100 Mbps (Auto-Negotiation)
	Duplex	Half Duplex or Full Duplex (Auto-Negotiation)
	VOIP Protocol	H.323 Revision 2
	Voice Compression	G.711/G.726/G729/G.723.1
	Voice/Fax Switching	T.38
	Echo cancellation	G.165

## 1.4.2 System Capacity

DESCRIPTION	CAPACITY/BOARD	TOTAL
Time Slots		96
CO Line Ports	4/MBUB(BRI) 4/LCOB or 4/STIB 8/VOIM	Max. 16 (Analog CO, ISDN BRI and/or IP trunk)
Max direct Station connections	8/MBUB 8/DTIB or 8/SLIB 8/DTIM, 8/SLIM, or 8/VOIM	Max. 24
Max LAN port	1/LANU	1
Max MODEM Channel	1/MODU	1
Attendant Positions	5/System	
Intercom Links	Non-blocking	
Paging - All Call - Internal		1 zone 5 zones
Station Speed Dial	100/station, 24 digits each	500
System Speed Dial	24 digits each	500
Last Number Redial	10	32 digits
CO Line Group	8	8
Station Group	10	10
Conference	3-Party	no limit
Music Source Input	1/MBUB	1
External Paging	1/MBUB	1
External Control Contact	2/MBUB	2
Alarm Input	1/MBUB	1
RS-232C Port	1/MBUB	1
DTMF Receiver	3/MBUB, 2/SLIB, 2/SLIM	7
Auto Fax detection	1/MBUB	1

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## SECTION 2. KSU INSTALLATION

### 2.1 Pre-Installation

Please read the following guidelines concerning installation and connection before installing the IP LDK-20 System. Be sure also to comply with applicable local regulations.

#### 2.1.1 Safety installation instructions

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

- Never install the telephone wiring during a lightning storm.
- Never install the telephone jack in wet locations unless the jack is specifically designed for wet locations.
- Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface.
- Use caution when installing or modifying telephone lines.
- Anti-static precautions should be taken during installation.

#### 2.1.2 Installation precautions

The IP LDK-20 System is designed for wall mounting or a free-standing rack. Avoid installing in the following places.

- In direct sunlight and hot, cold, or humid places. Temperature range : 0 to 40°C
- Places where shocks or vibrations are frequent or strong.
- Dusty places, or places where water or oil may come into contact with the system.
- Near high-frequency generating devices such as sewing machines or electric welders.
- On or near computers, fax machines, or other office equipment, as well as microwave ovens or air conditioners.
- Do not obstruct the area around the IP LDK-20 System (for reasons of maintenance and inspection)
- Do not block the openings on the top of the IP LDK-20 System.
- Do not stack up the optional service boards.

#### 2.1.3 Wiring precautions

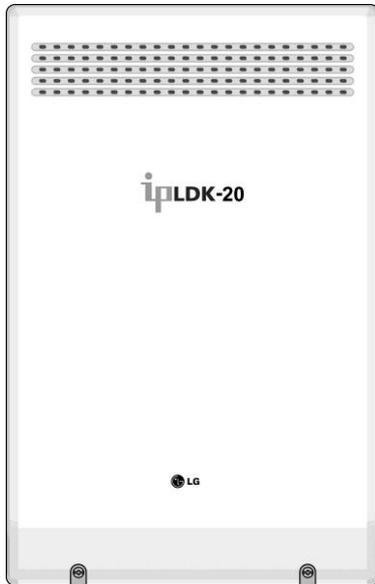
Be sure to follow these precautions when wiring.

- Do not wire the telephone cable in parallel with an AC power source, such as a computer, fax machine, etc. If the cables are run near those wires, shield the cables with metal tubing or use shielded cables and ground the shields.
- If the cables are run on the floor, use protectors to prevent the wires from being stepped on. Avoid wiring under carpets.
- Avoid using the same power supply outlet for computers, fax machines, and other office equipment to avoid induction noise interruption when using the IP LDK-20 near other machines.
- The power and battery switches of the IP LDK-20 System must be OFF during wiring. After the wiring is completed, the power switch may be turned ON.
- Incorrect wiring may cause the IP LDK-20 System to operate improperly.
- If an extension does not operate properly, disconnect the telephone from the extension line and then re-connect, or turn the power of the IP LDK-20 System OFF and ON again.
- Use twisted pair cable for CO line connection.

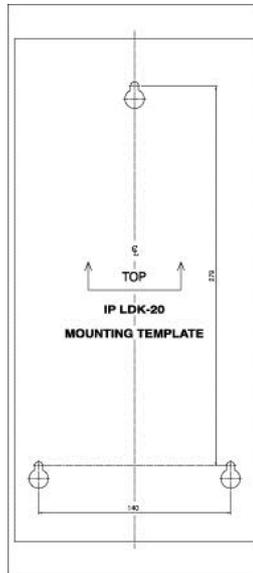
## 2.2 KSU Installation

### 2.2.1 Unpacking

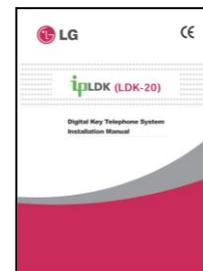
Open the box and verify the items shown in Figure 2.2.1 are included:



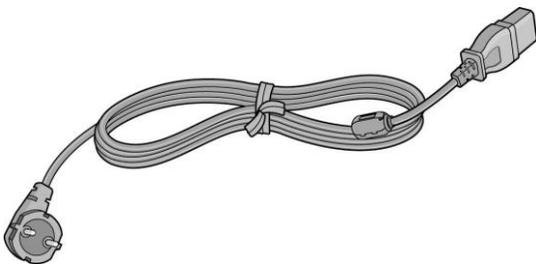
Key service unit



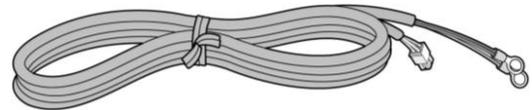
Mounting template



Manual



Power cord



Battery cable



Tie cable



Anchor plug



Fuse



Screw

Figure 2.2.1 Unpacking

### 2.2.2 KSU exterior and dimension

Figure 2.2.2 shows the exterior and dimensions of the KSU:

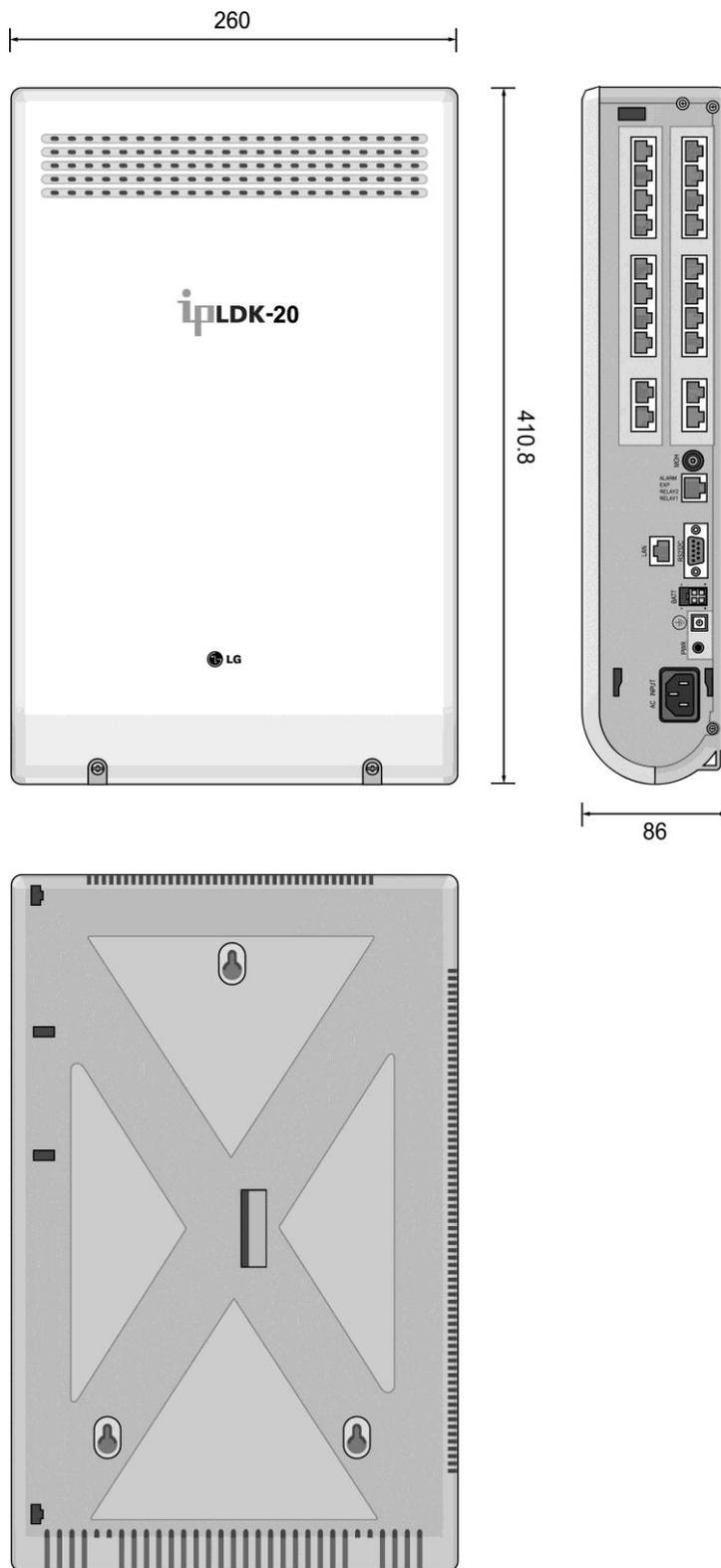


Figure 2.2.2 KSU exterior and dimension

### 2.2.3 KSU with expansion module exterior and dimension

Figure 2.2.3 shows the exterior and dimensions of the KSU:

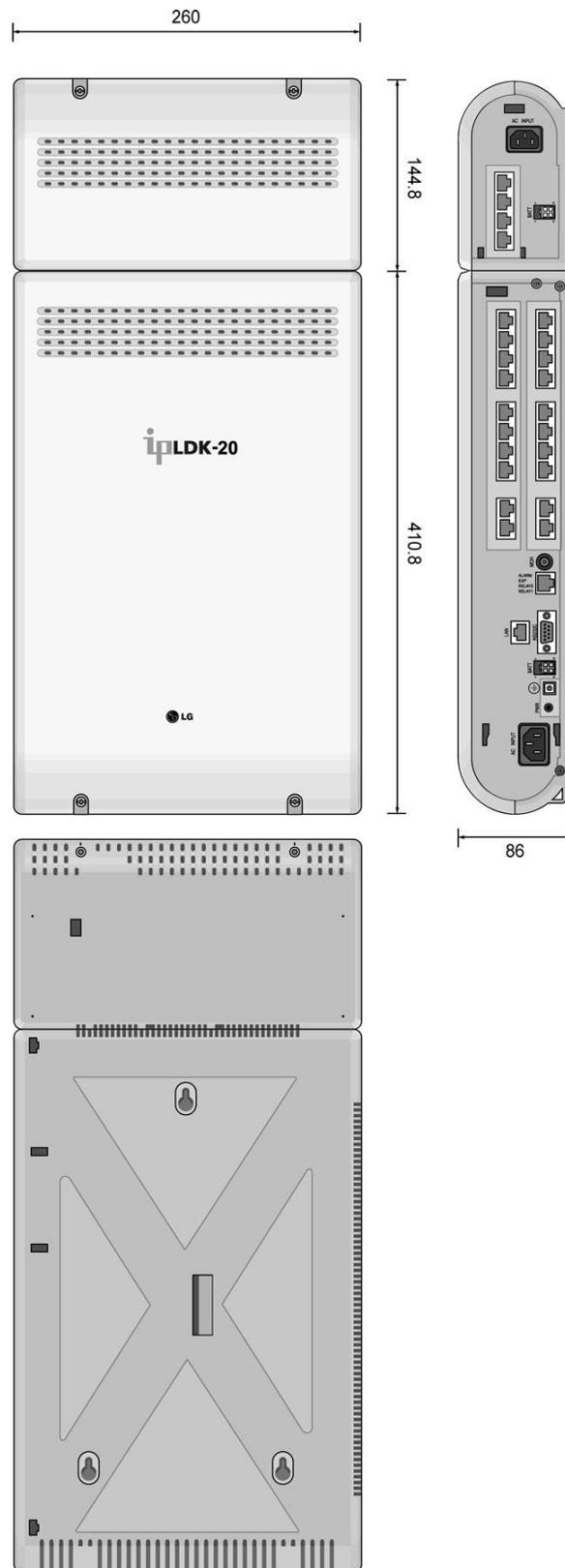


Figure 2.2.3 KSU with expansion module exterior and dimension

## 2.2.4 Opening and closing the front cover

### 2.2.4.1 Opening the front cover

1. Turn the screw counter-clockwise to loosen as shown in Figure 2.2.4.1.
2. Lift the front cover in the direction of the arrow as shown:

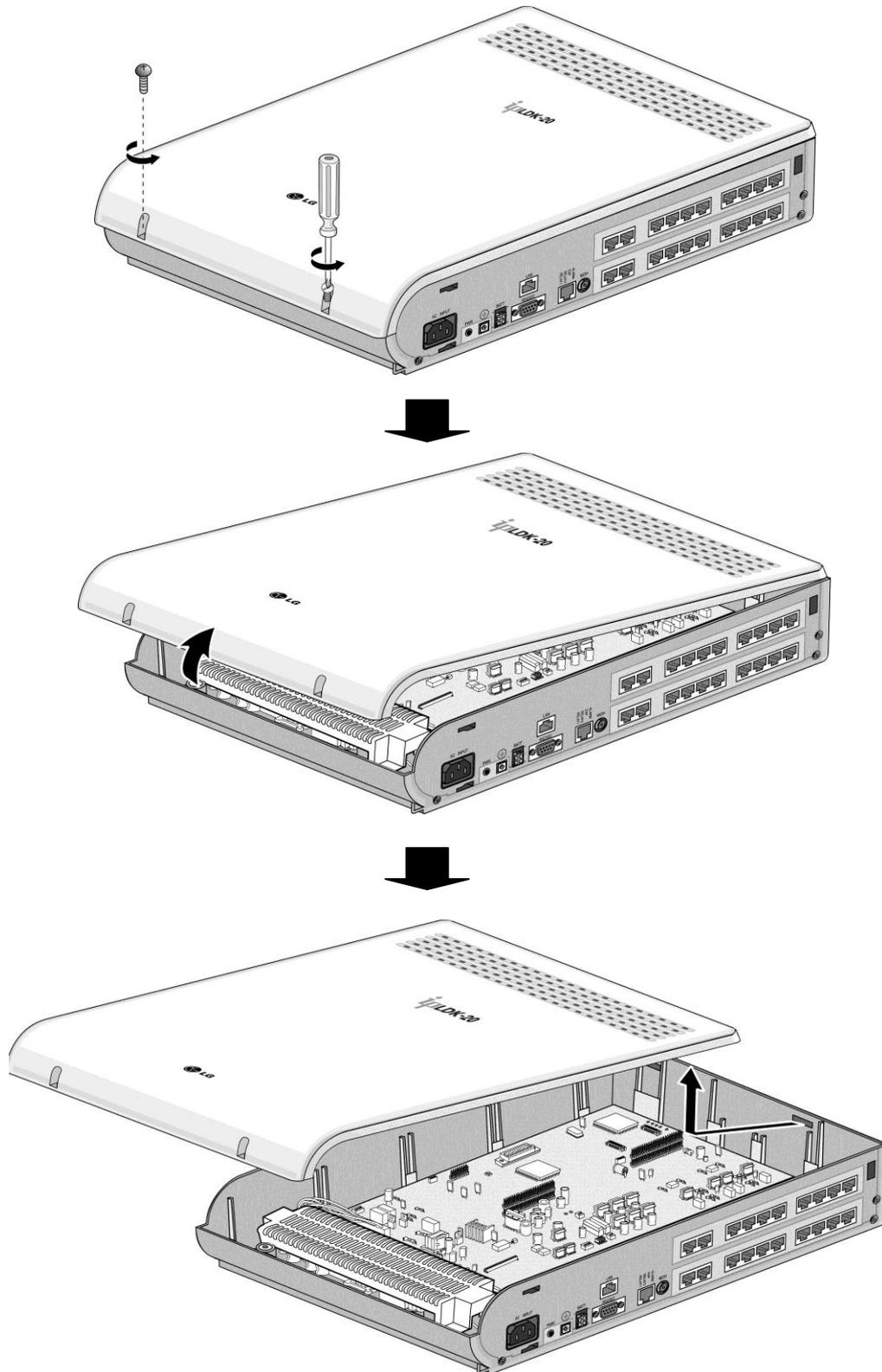


Figure 2.2.4.1 Opening the front cover

### 2.2.4.2 Closing the front cover

Insert the front cover into the slot on the KSU as show in Figure 2.2.4.2. Then put the front cover down on the KSU in the direction of the arrow, as shown. Turn the screws clockwise to tighten, as in the Figure.

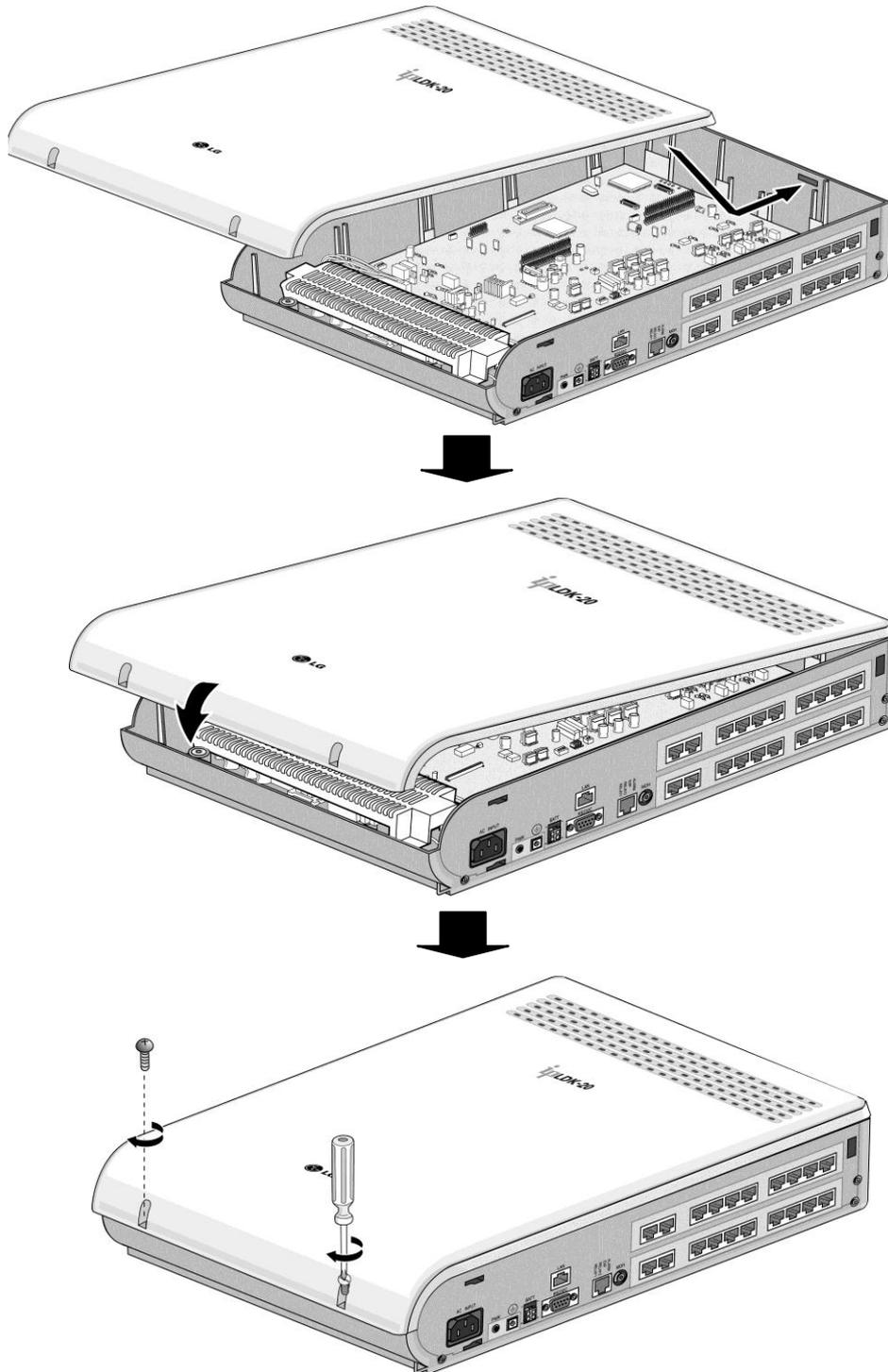


Figure 2.2.4.2 Closing the front cover

**\* NOTE**

For safety reasons, close the front cover and tighten the screws prior to operating the IP LDK-20 System.

## 2.2.5 Frame ground connection

It is very important the frame of the IP LDK-20 system is grounded:

1. Turn the screw counter-clockwise to loosen. Then insert the grounding wire.
2. Tighten the screw. Then connect the grounding wire to ground source as shown in Figure 2.2.5.

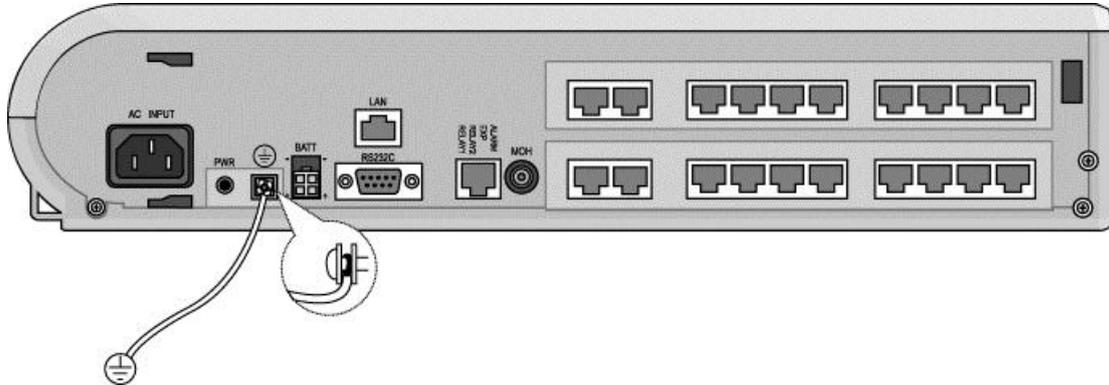


Figure 2.2.5 Grounding the KSU

### CAUTION

- The equipment should be connected to a socket-outlet with a protective ground connection.
- For ground wire, green-and-yellow insulation is required, and the cross-sectional area of the conductor must be more than UL 1015 AWG# 18 (1.0mm). It is recommended that the ground wire be shorter than 1 meter (3.28 feet).
- Proper grounding is very important to protect the IP LDK-20 system from external noise or to reduce the risk of electrocution in the event of lightning strike.
- Be sure to comply with applicable local regulations.

### 2.2.6 Power Supply Unit (PSU) installation

The PSU has been installed in the KSU as a default when shipped.

Before installation, make sure that the KSU not plugged into an outlet. The PSU is located at the left-most area of the KSU, and is capable of providing three kinds of power sources to MBUB through the 7PIN connector, CN19 (refer to the following table).

#### The AC Input Voltage and Fuse Rating

RANGE OF INPUT VOLTAGE	CONNECT TO	FUSE RATINGS
207V AC - 253V AC	CN19 on the MBUB	1.25A @250V

#### PSU Capacity

PSU TYPE	+5V DC	-5V DC	+30V DC
PSU (SMPS)	3.0A	100mA	1.9A

1. To secure the wire of PSU as shown in Figure 2.2.6a, tie the wire with the cable tie provided.

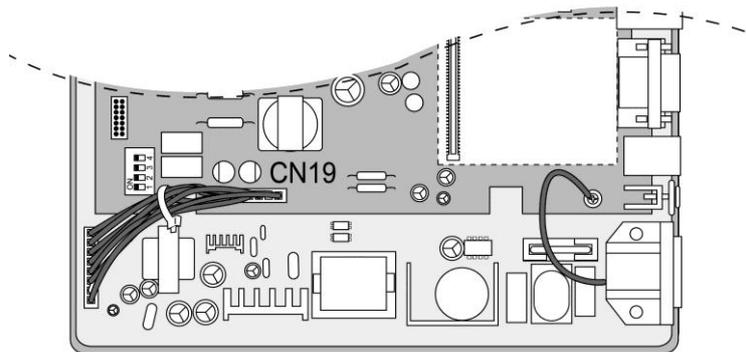


Figure 2.2.6a PSU Installation

2. Place the PSU cover on the PSU as shown in Figure 2.2.6b. Then turn the screws clockwise to tighten, and secure.

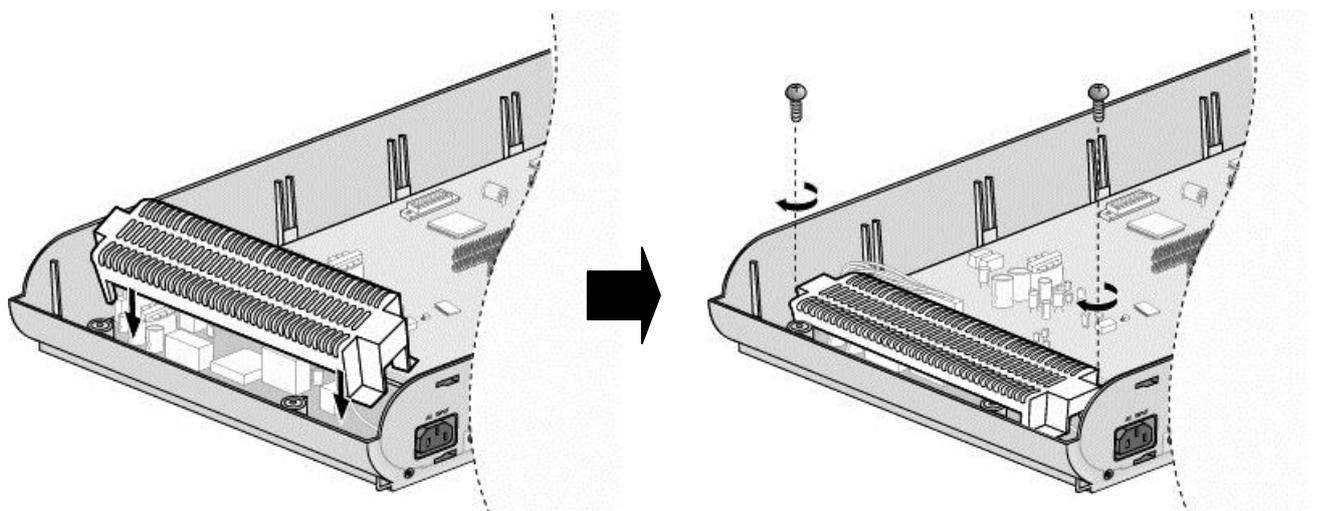
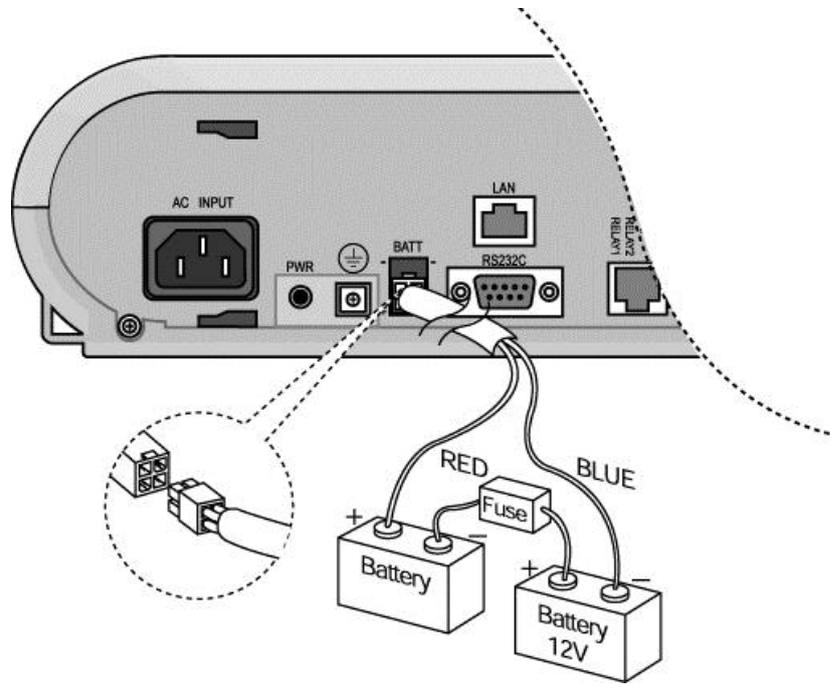


Figure 2.2.6b PSU Installation

### 2.2.7 External backup batteries installation

In case of power failure, the external backup batteries automatically maintain uninterrupted power for the IP LDK-20 system. The external batteries must provide 24 Volts DC. This is generally accomplished by connecting two 12 Volt batteries in a series arrangement.



**Figure 2.2.7 External Back Up Battery Installation**

**Note :** The cable for connecting the battery is supplied with the KSU.

Operation of the batteries is controlled by the MBUB. This IP LDK-20 MBUB will provide charging current to the batteries during normal AC power operation at a maximum of about 100mA. During battery operation, the battery operation of MBUB will be stopped if the AC power re-applied or the battery voltage is too low to maintain full-system operation.

The external batteries can maintain system operation as needed depending on several elements such as, battery charge status, condition and capacity of the batteries, and system configuration (number of station ports).

**! CAUTION**

- It is recommended to use a fuse (5A @250V) between battery and system.
- Recommended battery capacity is 24V/10AH MF battery; the IP LDK-20 system should operate more than 3 hours with batteries that are in good condition.
- Carefully check the battery polarity with cable colors (RED and BLUE) when connecting the battery to the system.
- Make sure that you do not short-out the external backup batteries or cables.
- There is a danger of explosion if external backup batteries are incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer’s instructions.

## 2.2.8 KSU mounting

### 2.2.8.1 Wall mounting

1. Install 3 anchor plugs in the wall using the mounting template included for accurate placement (Figure 2.2.8.1a).
2. Attach the mounting template with the included 3 screws.
3. Hook the KSU onto the screws, making sure that the system slides down securely (Figure 2.2.8.1b).

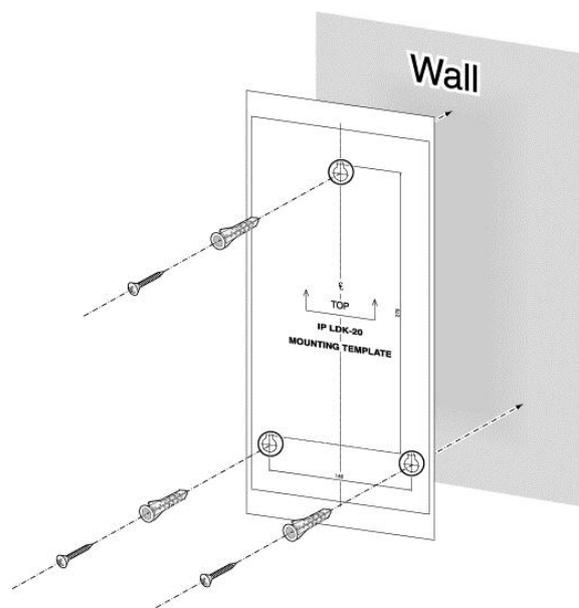
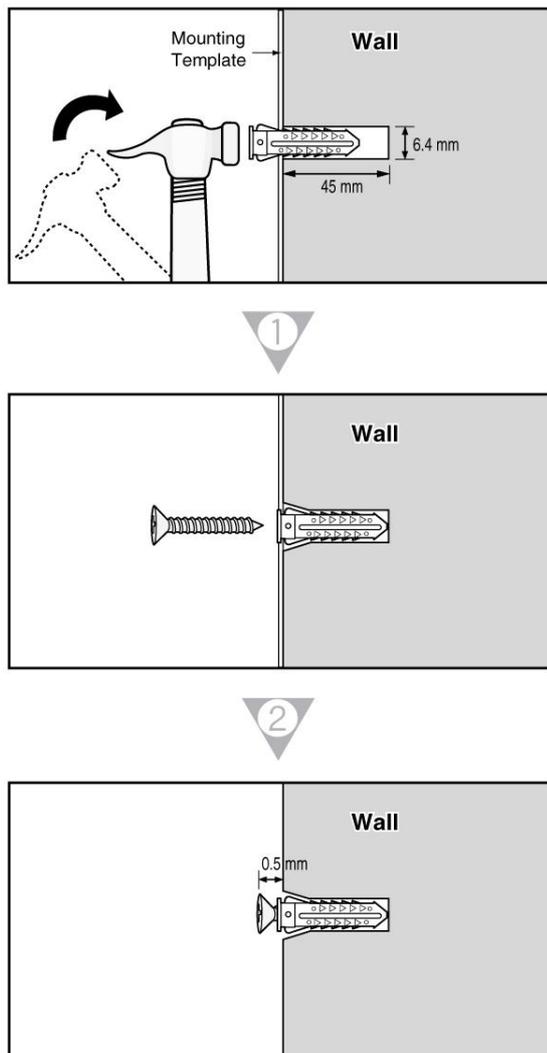


Figure 2.2.8.1a Mounting Template

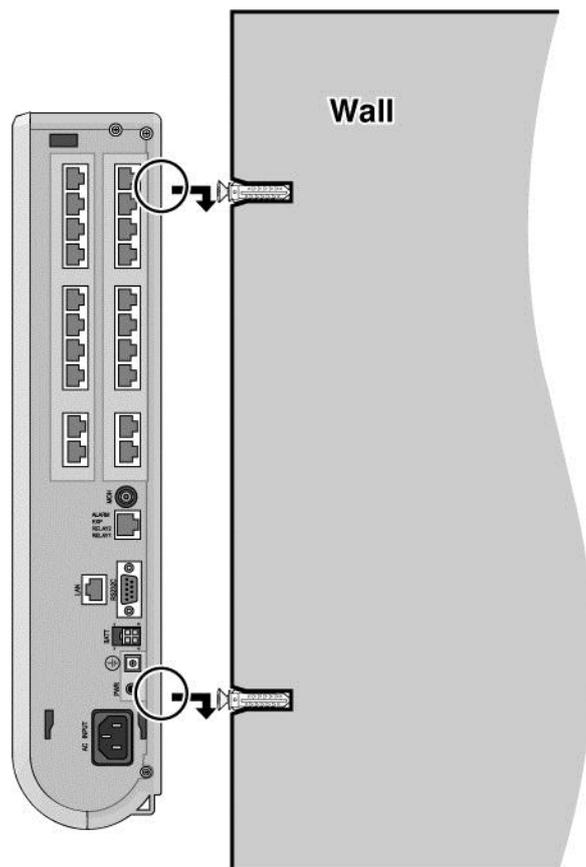
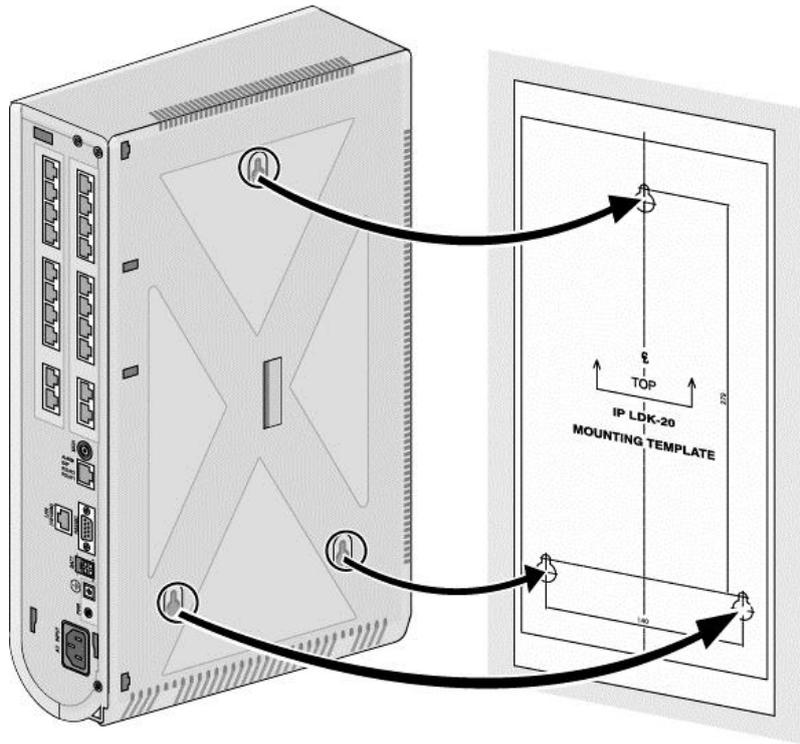


Figure 2.2.8.1b KSU Wall Mounting

※ Note : Be careful not to drop the KSU.

### 2.2.8.2 Rack mounting

1. Attach the rack bracket to the bottom of the IP LDK-20 system as shown in Figure 2.2.8.2a, and attach it to the system securely by tightening the screws clockwise.

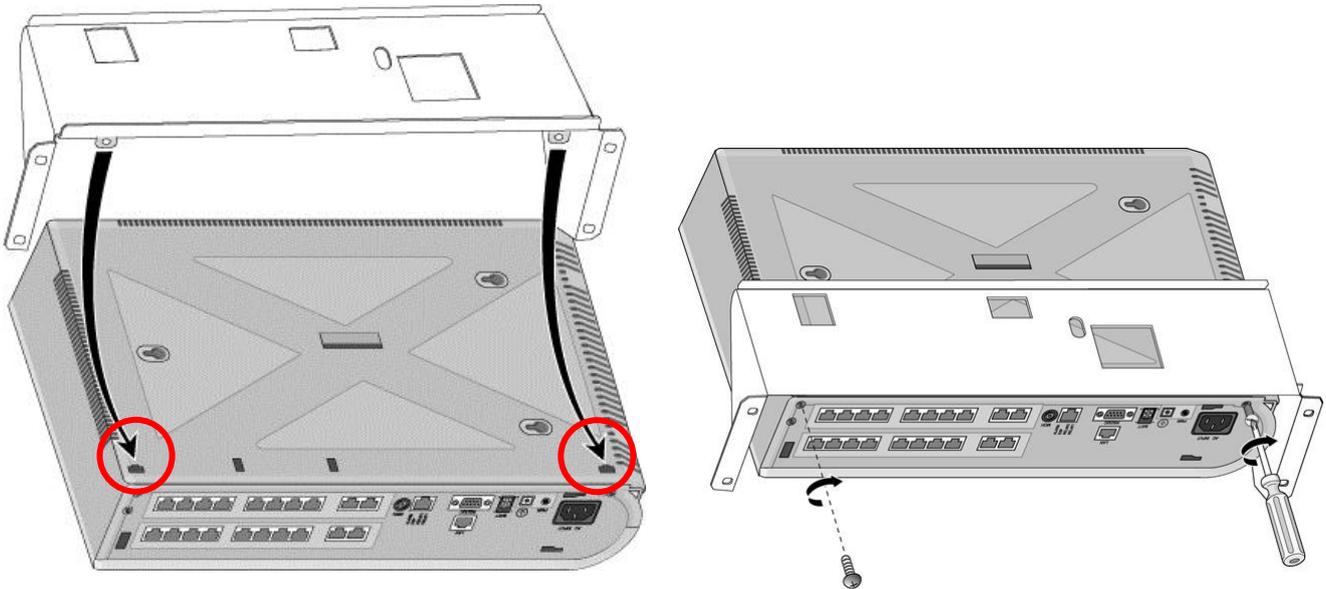


Figure 2.2.8.2a Rack Bracket

2. To attach the IP LDK-20 system to the rack, affix the bracket with the 4 screws provided (Figure 2.2.8.2b).

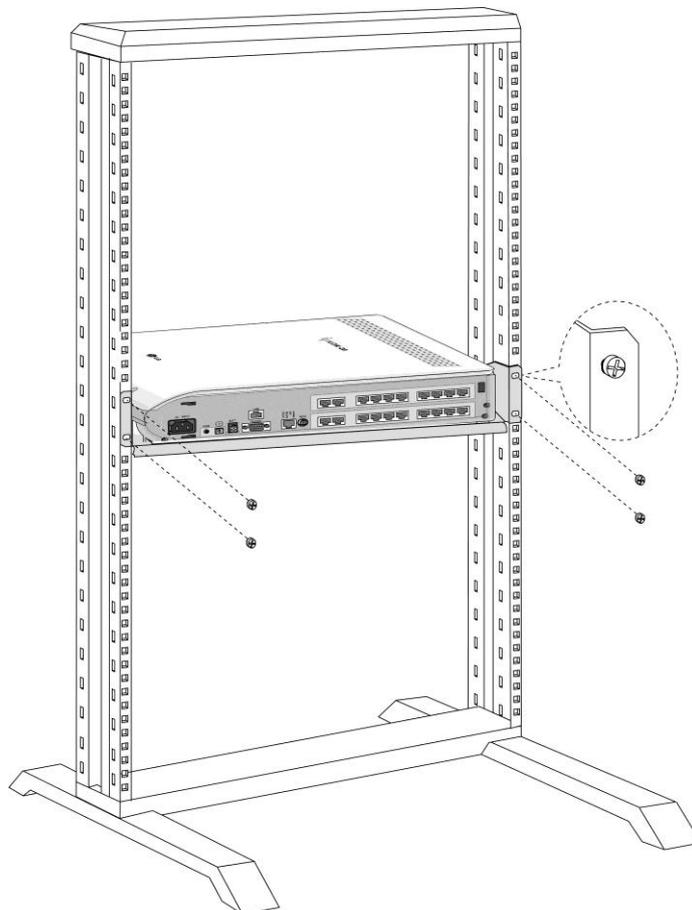


Figure 2.2.8.2b KSU Rack Mounting

## SECTION 3. BOARD INSTALLATION

### 3.1 Installation of the Boards

Prior to Board Installation, the following should be considered:

#### CAUTION

- Power must be turned OFF.
- To protect the system from static electricity, do not touch the boards. To discharge static, touch a grounded object, or wear a grounding strap.
- Insert boards carefully to avoid bending connector pins (male pins on MBUB).

To install the board, perform the following Steps:

1. Before inserting the board, remove the dummy, shown #1 in Figure 3.1.
2. Holding the board as shown in #2 of the diagram, insert the board in the direction of the arrow carefully so that the board securely engages with the connector on the main board (#3).

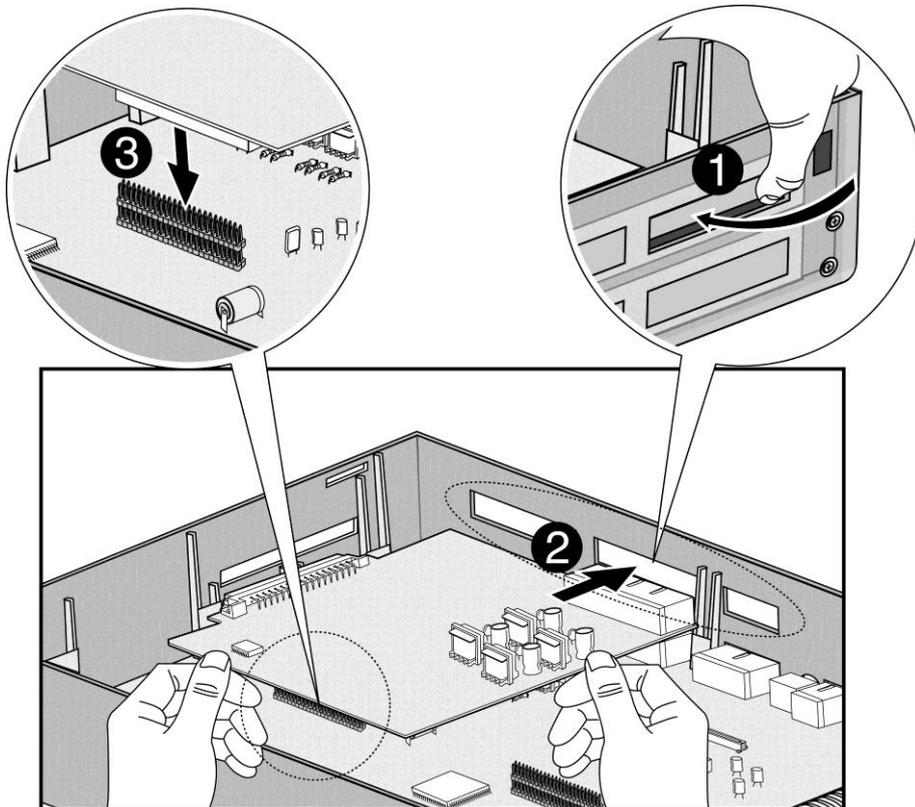
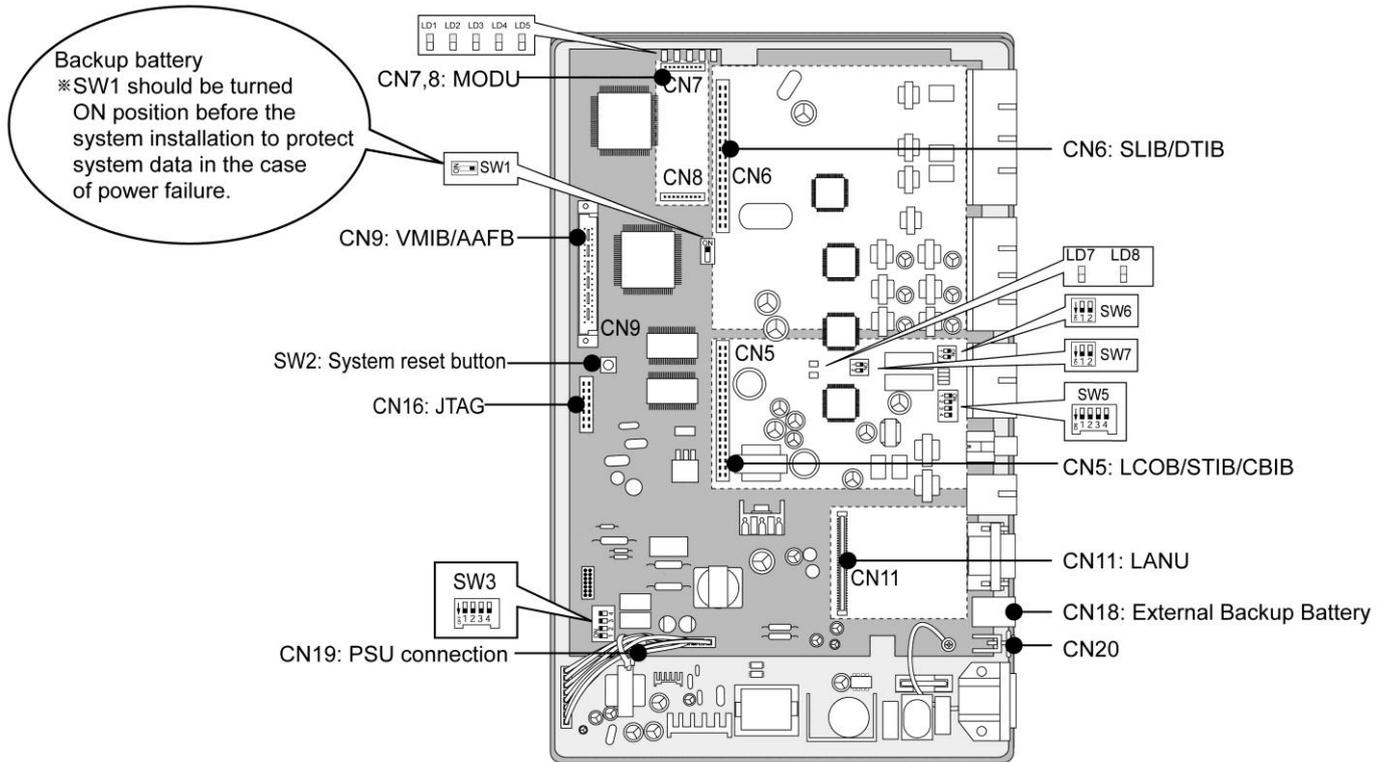


Figure 3.1 Board Installation

### 3.2 MBUB (Main Board Unit)

#### Description

The MBUB controls communication between the peripheral interfaces, supervises all resources in the system, controls the gain adjustment of the PCM signal, generates the system tones, and manages system call processing. The MBUB (Figure 3.2a) incorporates the main control of the system, and is composed of the main microprocessor (RAM and ROM), the PCM management (the CO/Extension interface circuits), and miscellaneous functional circuits.



**MBUB**

**Figure 3.2a MBUB**

Figure 3.2a shows the MBUB, which provides Basic Rate Interface (BRI) circuits, Digital keyset and SLT interface circuits, DTMF receivers, phase locked loop circuit (for 32Mhz clock synchronization), Ring Generation Unit, two external relay contacts, one alarm detection circuit, one external PAGE port, internal/external MOH circuit, the peripheral device decoding circuit, the master clock generation circuit, the RS-232C interface circuit, the system battery backup circuit, as well as the system's PCM voice processing circuit that has a flash memory for PCM tone generation and PCM Gain control.

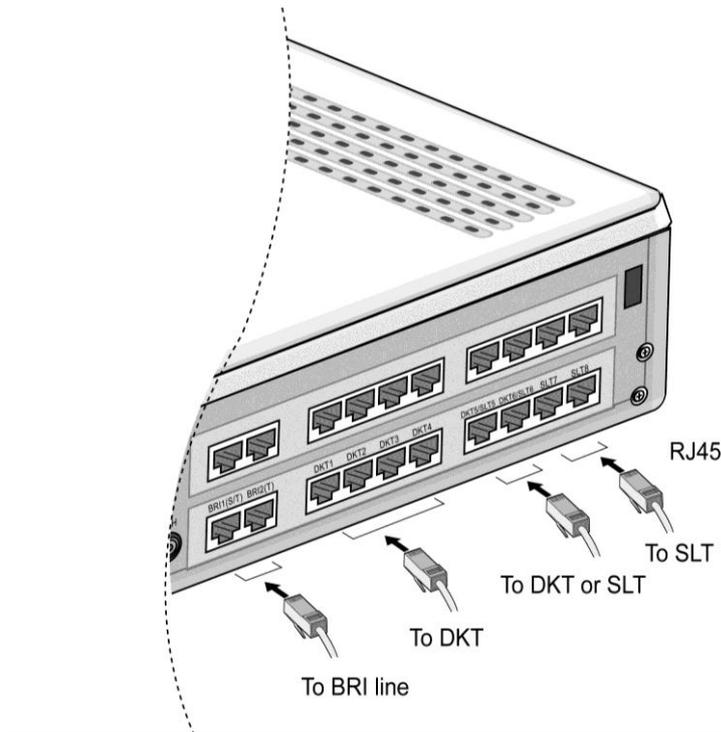


Figure 3.2b Connection

The MBUB is installed in the KSU and provides various kinds of connectors and RJ45 modular jacks for the connection of peripheral boards and miscellaneous functions (refer to the following Table).

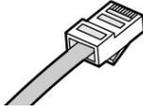
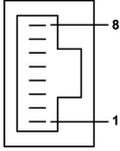
**Connector/Modular Jack/Switch Functions**

SWITCH/CONNECTOR	FUNCTIONS	REMARK
CN5	CO board (LCOB, STIB, CBIB) installation	
CN6	Extension board (DTIB, SLIB) installation	
CN7 & CN8	MODU installation	
CN9	VMIBE/AAFBE installation	
CN11	LANU installation	
CN16	JTAG Port for emulator	
CN18	System Backup Battery connection	
CN19	PSU connection (+5V, -5V, +30V)	
CN20	External GND Terminal	
CN22	RS-232C interface	
MJ1	2ISDN BRIs connection (port1:selectable S/T, port2:T only)	
MJ2	4DKTs	
MJ3	2DKT/SLTs connection and 2SLTs connection	
MJ4	External Relays, External Paging, and Alarm Sensor	
PJ1 (Red)	External MOH connection	
SW1	Lithium Battery ON/OFF switch for Memory and RTC	Default: OFF
SW2	System reset button	
SW3	4 poles DIP switch for software usage	Default: all ON
SW4	1 pole DIP switch for JTAG reset	Reserved

### 3.2.1 Modular Jack(MJ1~MJ3) Pin Assignment

#### 3.2.1.1 MBUB MJ1(CO)

**T Mode**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2,7,8	Reserved	
		3	TX+	Transmit Data
		4	RX+	Receive Data
		5	RX-	Receive Data
		6	TX-	Transmit Data

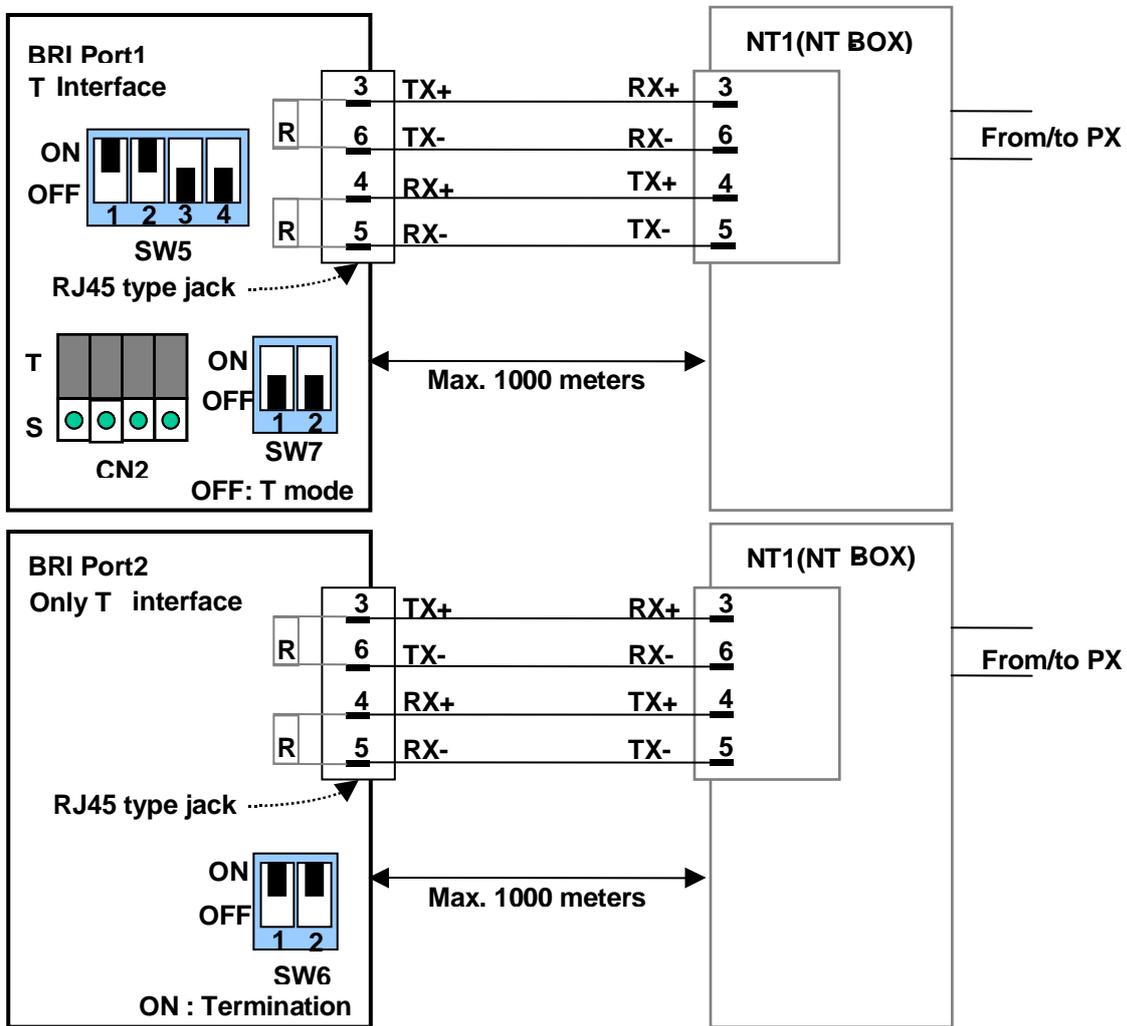
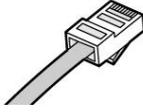
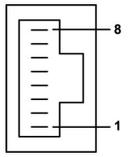


Figure 3.2.1.1a T Mode(Basic BRI Line Connector and Terminating Resistors)

**S Mode**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2,7,8	Reserved	
		3	RX+	Receive Data
		4	TX+	Transmit Data
		5	TX-	Transmit Data
		6	RX-	Receive Data

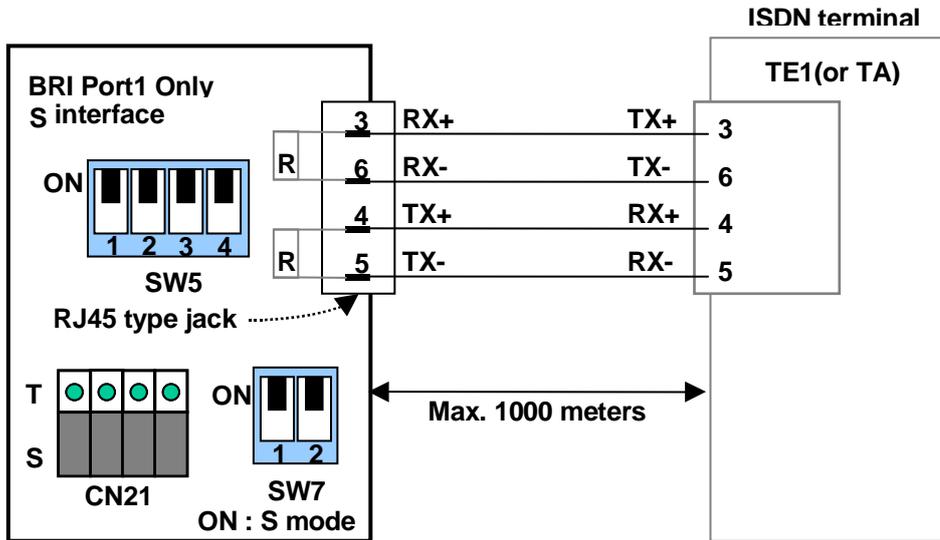
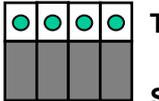


Figure 3.2.1.1b S Mode(Basic BRI Line Connector and Terminating Resistors)

**SW5 and SW6 : 1,2 Pin Setting(The Default = All On Position)**

LINE NO	RJ45 TYPE JACK	TERMINATING RESISTORS			REMARK
		SWITCH	PIN1, 2 ON	PIN1, 2 OFF	
Line 1	MJ1-1	SW5	Termination	Open	
Line 2	MJ1-2	SW6	Termination	Open	

**T or S Switch Setting of Basic BRI**

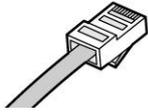
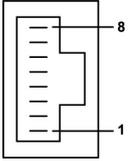
LINE NO	MODE	SWITCH AND CONNECTOR			REMARK
		SW5 PIN 3, 4	SW7	CN21	
Line 1	S	ON	ON	 T S	
	T	OFF	OFF	 T S	Default
Line 2	T Only				

**※ NOTE**

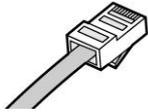
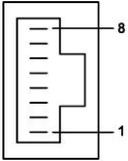
- SW5(PIN3, 4) : -40V POWER FEEDING.
- SW7: THE MODE CHANGE OF THE BRI TRANSCIEVER.
- CN21: SET FOUR 2PIN JUMPERS AS SHOWN IN THE ABOVE TABLE ACCORDING TO EACH MODE.

3.2.1.2 MBUB MJ2 & MJ3(Extension)

**MBUB MJ2**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2,3	Reserved
		4,5	DKT-R, DKT-T
		6,7,8	Reserved

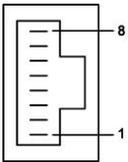
**MBUB MJ3-1, 2**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2	DKT-R, DKT-T
		3	Reserved
		4,5	SLT-R, SLT-T
		6,7,8	Reserved

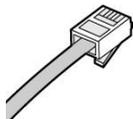
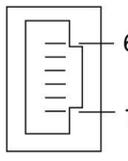
**! CAUTION**

When installing DKT or SLT on Hybrid Ports (MJ3-1,2), keep the above pin assignment. Otherwise, the DKT or SLT will not operate normally.

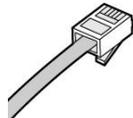
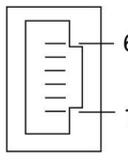
**MBUB MJ3-3, 4**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2,3	Reserved
		4,5	SLT-R, SLT-T
		6,7,8	Reserved

**TERMINAL DKT**

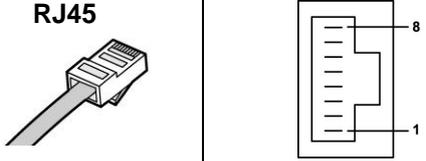
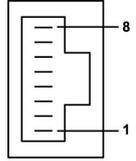
CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

**TERMINAL SLT**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

3.2.1.3 MJ4 Pin Assignment

**MBUB**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2	Relay1-R, Relay1-T
		3,4	Relay2-R, Relay2-T
		5,6	EXT_PAGE-R, EXT_PAGE-T
		7,8	Alarm-R, Alarm-T

3.2.1.4 SW3 Functions and LED Indications

SWITCH	FUNCTION	OFF	ON(DEFAULT)
3-1	Administration Programming Access	Disable	Enable
3-2	Command/Event Trace (The purpose of testing software)	Enable	Disable
3-3	SMDI (Simplified Message Desk Control –Voice Mail )	SMDI ON	SMDI OFF
3-4	Database default on power up	Disable	Enable

Before programming the system, switch 3-4 should be placed in the ON position and power cycled-OFF and –ON to initialize the system database to default. Once the database has been initialized, switch 3-4 should be placed in the OFF position to protect the database.

After putting the lithium battery switch (SW1) into ON to protect RAM/RTC data, install the option boards to the MBUB.

**! CAUTION**

- The DIP switch, SW1 should be turned ON to protect system data in case of a power failure.
- The system will not function properly if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer instructions.
- The 4th pole (switch 4) of SW3 should be OFF to protect the features being programmed in Admin programming after the system power up and initialization.

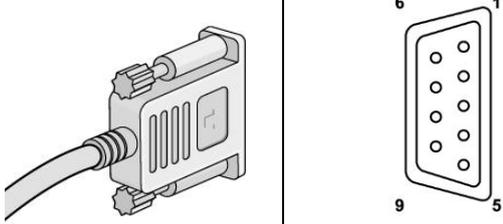
**LED INDICATIONS**

LED	MEANING
LD1 (RED)	Periodic toggle – ON: 2 sec., OFF: 100m sec.
LD2 (RED)	Periodic toggle – ON: 2 sec., OFF: 100m sec.
LD3 (RED)	Timer, Flashing every 100msec
LD4 (RED)	LCD active updating, Flashing every 300msec
LD5 (GREEN)	The status of PLL for 32Mhz clock synchronization (ON : ACT, OFF : INACT)
LD6 (RED)	The status of Main SYSTEM Power

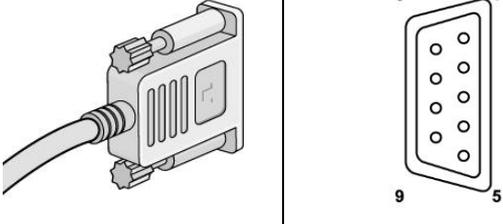
LED		STATUS		LINE NO.	REMARK
		ON	OFF		
LD7	RED	ERROR	IDLE	1	BRI
	GREEN	IN-USE			
LD8	RED	ERROR	IDLE	2	BRI
	GREEN	IN-USE			

3.2.1.5 CN22 Pin assignment

**MBUB**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1	Reserved	
		2	TD	Transmitted Data
		3	RD	Received Data
		4	DSR	Not used
		5	SG	Signal Ground
		6	DTR	Not used
		7	CTS	Not used
		8	RTS	Not used
		9	Reserved	

**PC**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1	Reserved	
		2	RD	Received Data
		3	TD	Transmitted Data
		4	DTR	Not used
		5	SG	Signal Ground
		6	DSR	Not used
		7	RTS	Not used
		8	CTS	Not used
		9	Reserved	

※ **NOTE** : The MBUB does not support hardware flow control.

### 3.3 Installation of the CO Line Board

BOARD	PORT	CONNECTOR TYPE	DESCRIPTION	CABLE	REMARK
LCOB	2 ports (4 LCO)	RJ45	Loop Start CO Line Interface	2 wire	
STIB	2 ports (2 BRI)	RJ45	ISDN Basic Rate Interface (2B+D)	4 wire	Switched T or S
CBIB	2 ports (1 BRI+2 LCO)	RJ45	ISDN Basic Rate Interface (2B+D) + Loop Start CO Line Interface	4 wire (Port 1) 2 wire (Port 2)	T mode only.

#### 3.3.1 LCOB (CID Loop Start CO line Interface Board)

##### Description

The LCOB can be installed on the LCOB/STIB/CBIB connector, and provides 4 CO/PBX Loop Start CO Line interfaces that support Pulse/DTMF signaling. Each Interface contains ring and loop current detection circuits, A/D and D/A conversions, and pulse signaling circuitry.

LCOB can be optionally equipped with add-on boards: CPCU4 (FSK CID, Polarity Reversal & Call Progress Tone detection Unit 4) to detect FSK signal for the incoming Caller-ID, polarity reversal and call progress tone; PRCPTU4 (Polarity Reversal & Call Progress Tone detection Unit 4) to monitor polarity reversal and call progress tone; or PRU4 (Polarity Reversal detection Unit 4) to monitor polarity reversal.

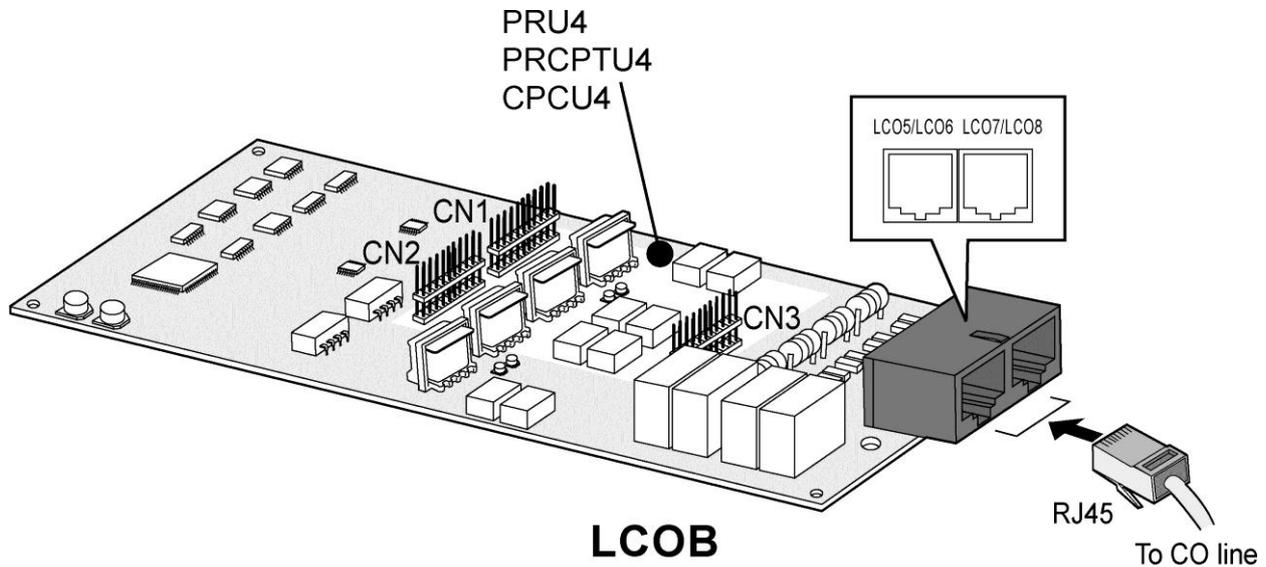


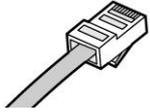
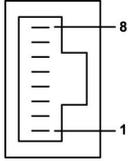
Figure 3.3.1 LCOB

※ NOTE

The PRU4, PRCPTU4 and CPCU4 cannot be mounted on the LCOB at the same time. Select the appropriate board for your application to install and use.

3.3.1.1 Pin Assignment

**LCOB**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2	CO1-R, CO1-T
		3	Reserved
		4,5	CO2-R, CO2-T
		6,7,8	Reserved

**CONNECTOR FUNCTIONS**

CONNECTOR	FUNCTION	REMARK
CN2 and CN3	PRCPTU4 or PRU4 connection	
CN1, CN2 and CN3	CPCU4 connection	
MJ1	RJ45 type CO line connection	

3.3.1.2 Add-On Boards

**PRU4 (Polarity Reversal detection Unit)**

*Description*

The PRU4 can be optionally mounted on LCOB, and provides 4 channels of Polarity Reversal detection for call metering.

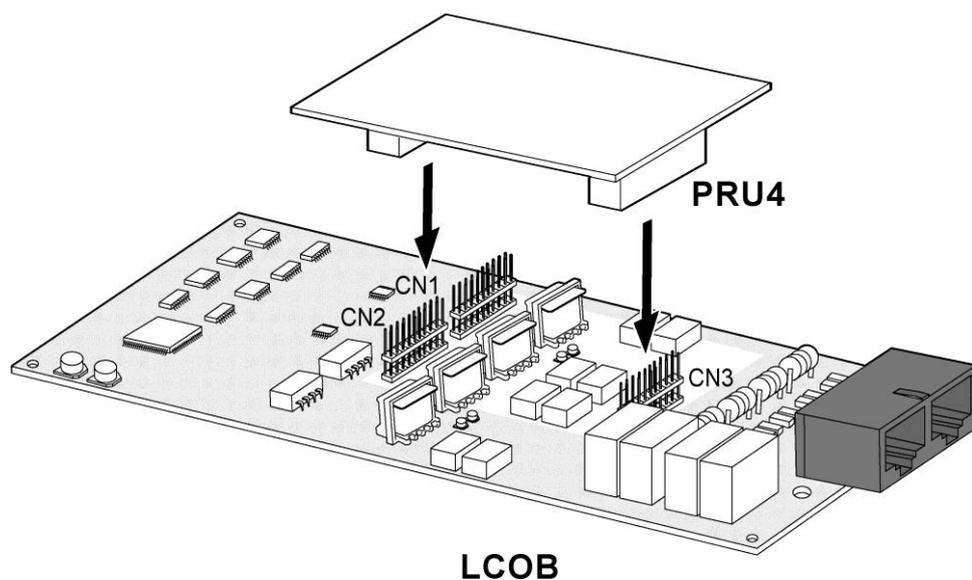


Figure 3.3.1.2a PRU4

**PRCPTU4 (PR and CPT detection Unit)**

***Description***

The PRCPTU4 can be optionally mounted on LCOB, and provides 4 channels of polarity reversal detection for call metering and call progress tone detection to support ACNR feature (Automatic Called Number Redial).

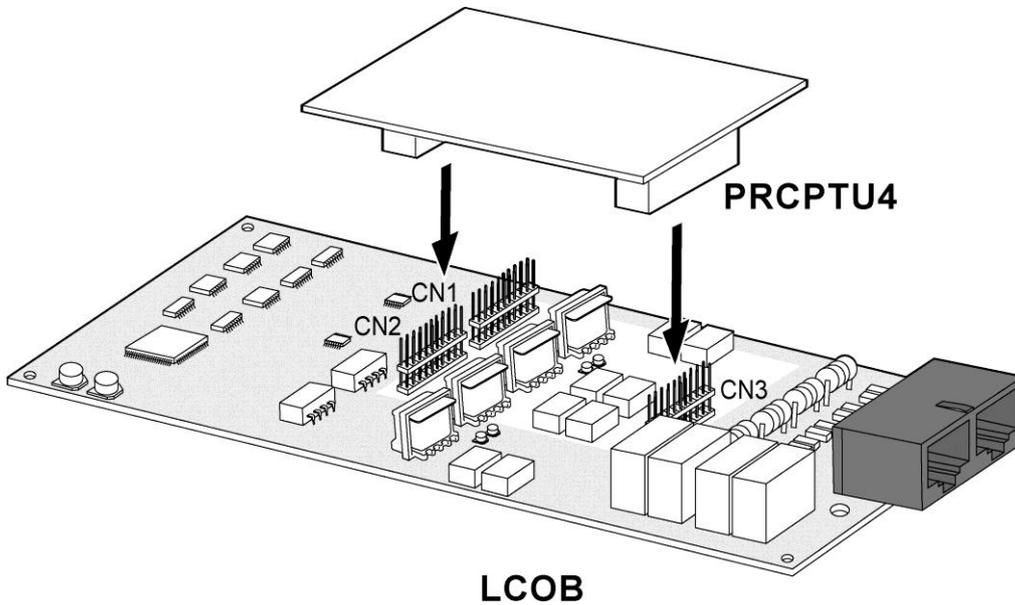


Figure 3.3.1.2b PRCPTU4

**CPCU4 (FSK CID, PR and CPT detection Unit)**

***Description***

The CPCU4 can be optionally mounted on LCOB, and provides 4 channels of Polarity Reversal detection for call metering, call progress tone detection to support the ACNR feature (Auto Called Number Redial) and FSK CID signal detection.

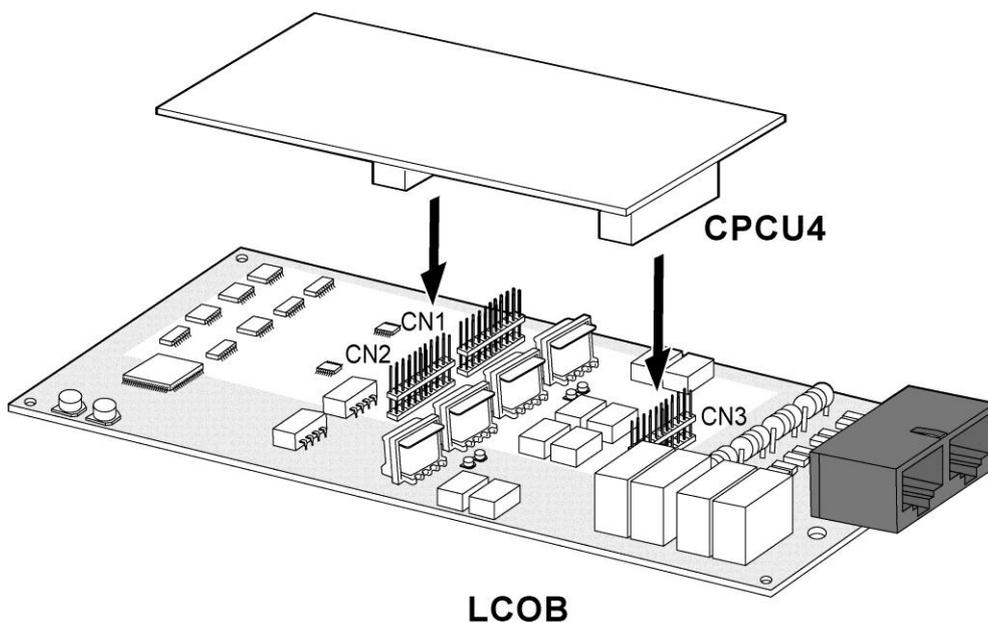


Figure 3.3.1.2c CPCU4

### 3.3.2 STIB (Basic Rate Interface Board: Selectable S/T interface)

#### Description

STIB should be installed on the LCOB/STIB/CBIB connector, and supports ISDN Basic Rate T-interface or S-interface. The 1st BRI port can be operated to T-mode or S-mode and the 2nd port can only be set to T-mode.

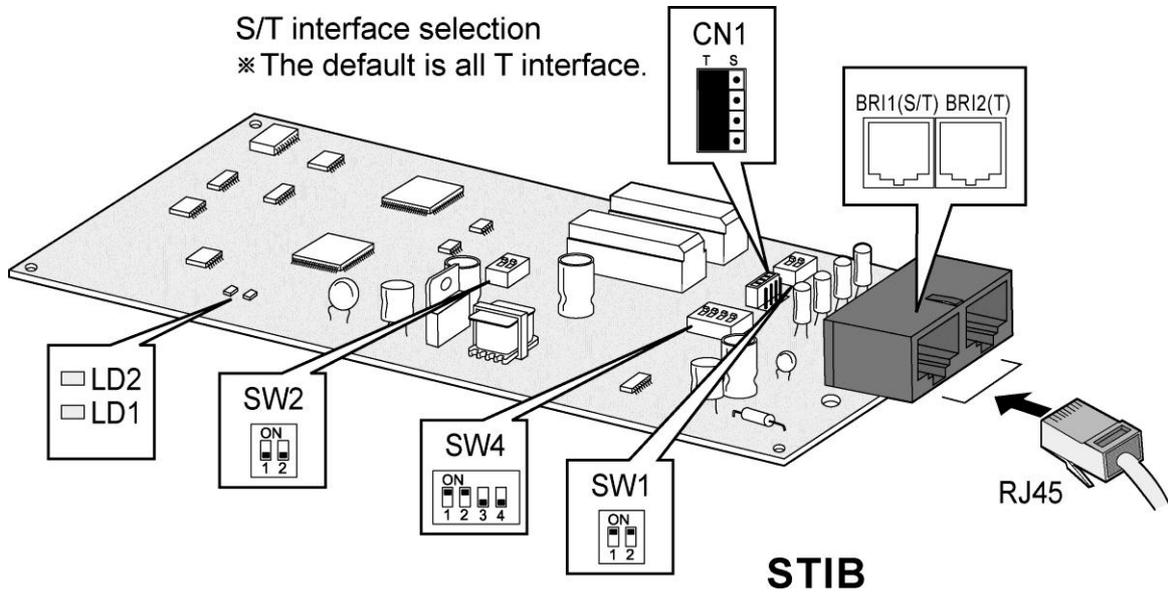


Figure 3.3.2 STIB

S/T Interface selection on BRI1 (Port 1): Default = T Interface

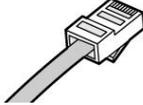
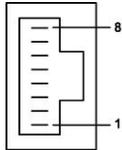
- SW2: Default = all OFF position
- SW4: Default = 1, 2 pins ON position and 3, 4 pins OFF position

BRI2 (Port 2): Default = T Interface only.

- SW1: Default = ON position

3.3.2.1 Pin assignment

T MODE

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2	Reserved	
		3	TX+	Transmit Data
		4	RX+	Receive Data
		5	RX-	Receive Data
		6	TX-	Transmit Data
		7,8	Reserved	

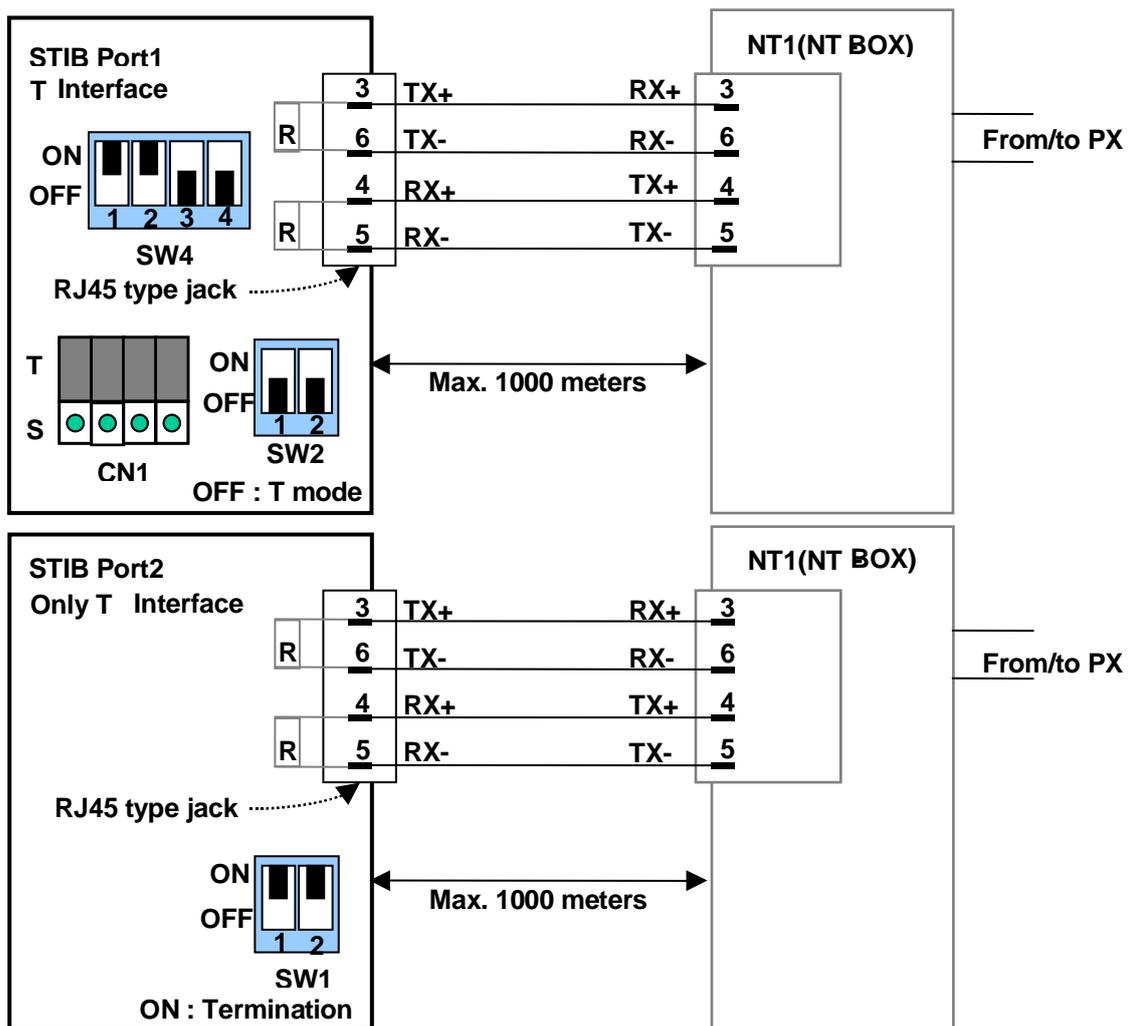
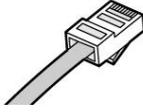
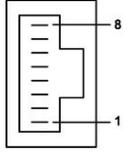


Figure 3.3.2.1a T Mode(STIB Line Connector and Terminating Resistors)

**S MODE**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2	Reserved	
		3	RX+	Receive Data
		4	TX+	Transmit Data
		5	TX-	Transmit Data
		6	RX-	Receive Data
		7,8	Reserved	

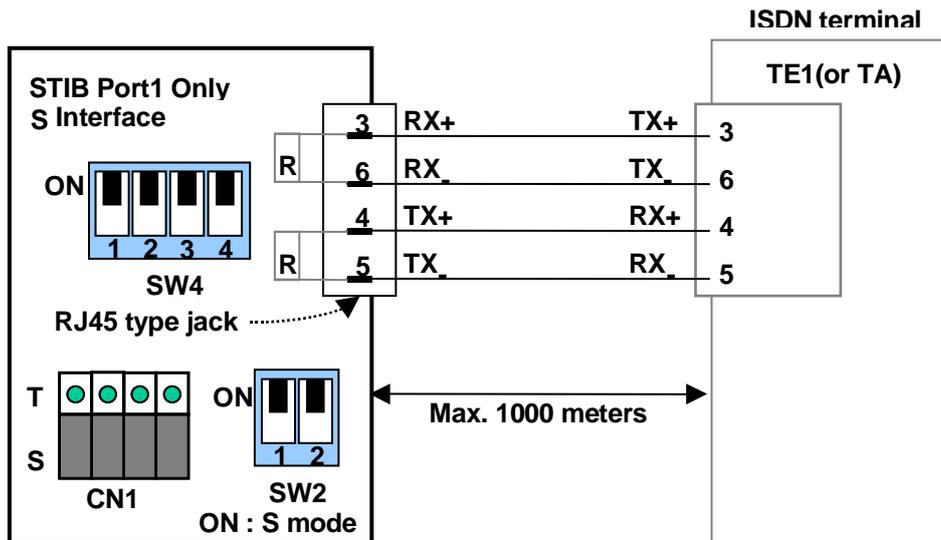


Figure 3.3.2.1b S Mode(STIB Line Connector and Terminating Resistors)

**LED INDICATIONS**

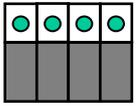
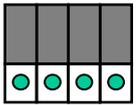
LED	STATUS		LINE NO.	REMARK
	ON	OFF		
LD1	RED	ERROR	1	BRI
	GREEN	IN-USE		
LD2	RED	ERROR	2	BRI
	GREEN	IN-USE		

3.3.2.2 Line Connector and Terminating Resistors

**SW 1 AND SW4'S 1, 2 PIN SETTING : DEFAULT = ALL ON POSITION**

LINE NO	RJ45 TYPE JACK	TERMINATING RESISTORS			REMARK
		SWITCH	PIN1, 2 ON	PIN1, 2 OFF	
Line 1	MJ1-1	SW4	Termination	Open	
Line 2	MJ1-2	SW1	Termination	Open	

**T OR S SWITCH SETTING**

LINE NO	MODE	SWITCH AND CONNECTOR			REMARK
		SW4 PIN 3, 4	SW2	CN1	
Line 1	S	ON	ON	 T S	
	T	OFF	OFF	 T S	Default
Line 2	T Only				

**※NOTE**

- SW4(Pin 3, 4 : -40V Power Feeding.
- SW2: The mode Change of the BRI transceiver.
- CN1: Set four 2pin jumpers like the above figure according to each mode.

### 3.3.3 CBIB (CID Loop Start CO line + Basic Rate Interface Board)

#### Description

The CBIB can be installed on the LCOB/STIB/CBIB connector, and provides 2 CO/PBX Loop Start CO Line interfaces that support pulse/DTMF signal and one port of ISDN Basic Rate Interface T-mode. CO Interface circuit contains ring and loop current detection circuits, A/D and D/A conversions, and pulse signaling circuit.

The analog LCO port of the CBIB can be optionally equipped with add-on boards (Figure 3.3.3): CPCU2 (FSK CID, Polarity Reversal & Call Progress Tone detection Unit 2) to detect FSK signal for the incoming Caller-ID, polarity reversal and call progress tone; PRCPTU2 (Polarity Reversal & Call Progress Tone detection Unit 2) to monitor polarity reversal and call progress tone; or PRU2 (Polarity Reversal detection Unit 2) to monitor polarity reversal and call progress tone.

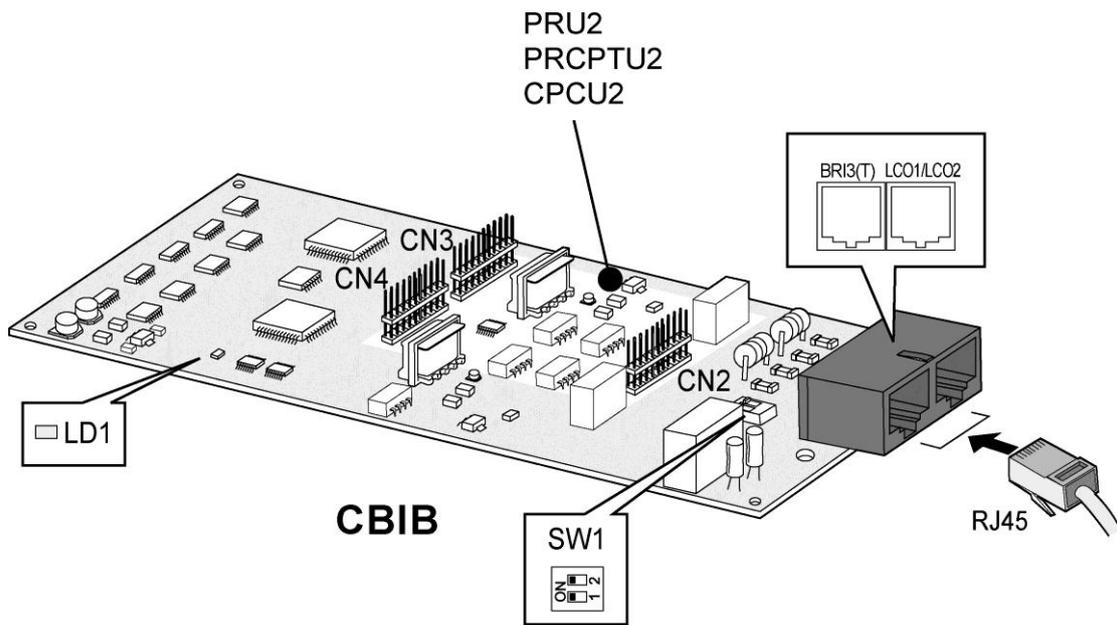


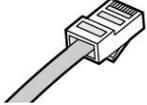
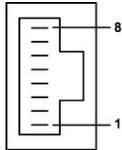
Figure 3.3.3 CBIB

#### ※NOTE

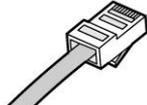
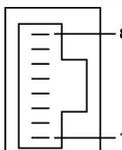
- SW1: The default is ON position.
- The PRU2, the PRCPTU2 and the CPCU2 can not be mounted on the CBIB at the same time. Select the board that is appropriate for your application to install and use.

3.3.3.1 Pin Assignment

**CBIB 1'ST PORT FOR BRI T-MODE**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2	Reserved	
		3	TX+	Transmit Data
		4	RX+	Receive Data
		5	RX-	Receive Data
		6	TX-	Transmit Data
		7,8	Reserved	

**CBIB 2'ND PORT FOR LCO**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2	CO1-R, CO1-T
		3	Reserved
		4,5	CO2-R, CO2-T
		6,7,8	Reserved

**VARIOUS CONNECTORS FUNCTIONS**

CONNECTOR	FUNCTION	REMARK
CN2 and CN3	PRCPTU2 or PRU2 connection	
CN1, CN2 and CN3	CPCU2 connection	
MJ1	RJ45 type CO line connection.	

3.3.3.2 Add-On Boards

**PRU2 (Polarity Reversal detection Unit)**

*Description*

The PRU2 can be optionally mounted on CBIB, and provides 2 channels of Polarity Reversal detection for call metering. It also provides four on-hook connection paths for SMS.

**PRCPTU2 (PR and CPT detection Unit)**

*Description*

The PRCPTU2 can be optionally mounted on CBIB, and provides 2 channels of Polarity Reversal detection for call metering and Call Progress Tone detection to support the ACNR feature (Automatic Called Number Redial). It also provides 2 on-hook connection paths for SMS.

**CPCU2 (FSK CID, PR and CPT detection Unit)**

*Description*

The CPCU2 can be optionally mounted on CBIB, and provides 2 channels of Polarity Reversal detection units for call metering, Call Progress Tone detection to support the ACNR feature (Auto Called Number Redial), and FSK CID signal detection. It also provides 2 on-hook connection paths for SMS.

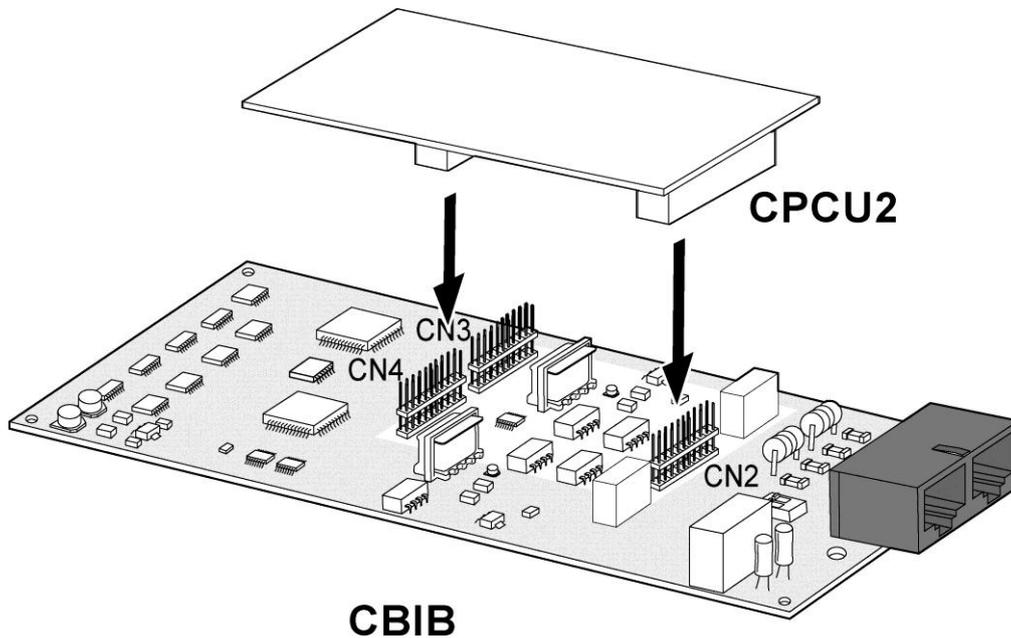


Figure 3.3.3.2 CPCU4

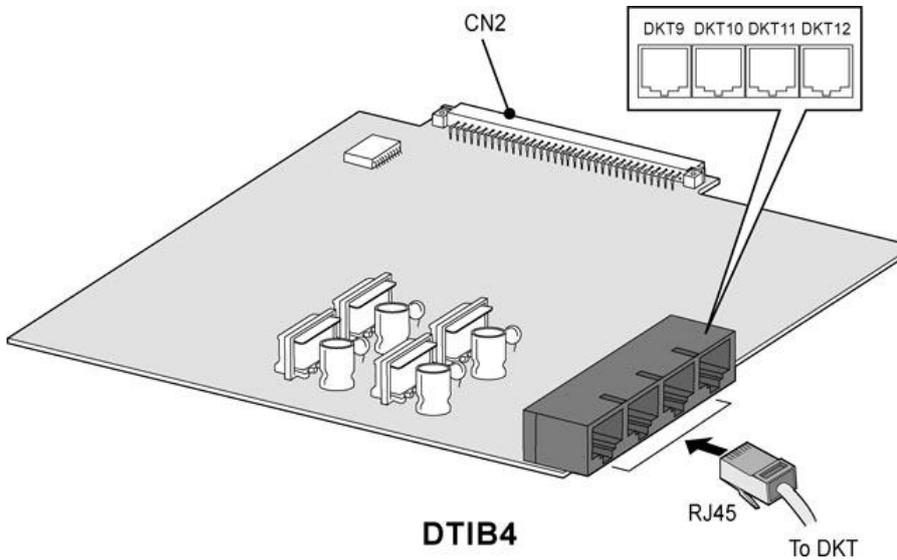
### 3.4 Installation of the Extension Board

BOARD	PORT	CONNECTOR TYPE	REMARK
DTIB4	4 DKT ports	RJ45	Digital Terminal Interface : 4 ports
DTIB8	8 DKT ports	RJ45	Digital Terminal Interface : 8 ports
SLIB4	4 SLT ports	RJ45	Single line telephone Interface : 4 ports
SLIB8	8 SLT ports	RJ45	Single line telephone Interface : 8 ports

#### 3.4.1 DTIB4 (Digital Terminal Interface Board)

*Description*

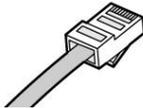
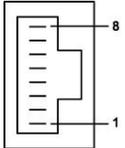
DTIB4 can be installed on the SLIB/DTIB connector, and provides 4 Digital Keypad ports that are used for 2-wire connections for Digital Keypads. It has a module connector, MJ1, which is used to connect Digital Keypad lines to the DTIB4 and a din connector, CN2, to connect expansion modules like VOIM, SLIM, and DTIM.



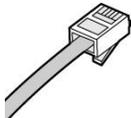
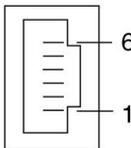
**DTIB4**  
Figure 3.4.1 DTIB4

##### 3.4.1.1 Pin assignment

**DTIB4**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2,3	Reserved	
		4	DKT_R	RING
		5	DKT_T	TIP
		6,7,8	Reserved	

**DKT**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

### 3.4.2 DTIB8 (Digital Terminal Interface Board)

*Description*

DTIB8 can be installed on the SLIB/DTIB connector, and provides 8 Digital Keypad ports that are used for 2-wire connections to Digital Keypads. It has module connectors, MJ1 and MJ2, that are used to connect Digital Keypad lines to the DTIB8 and a din connector, CN2, to connect expansion modules like VOIM, SLIM, and DTIM.

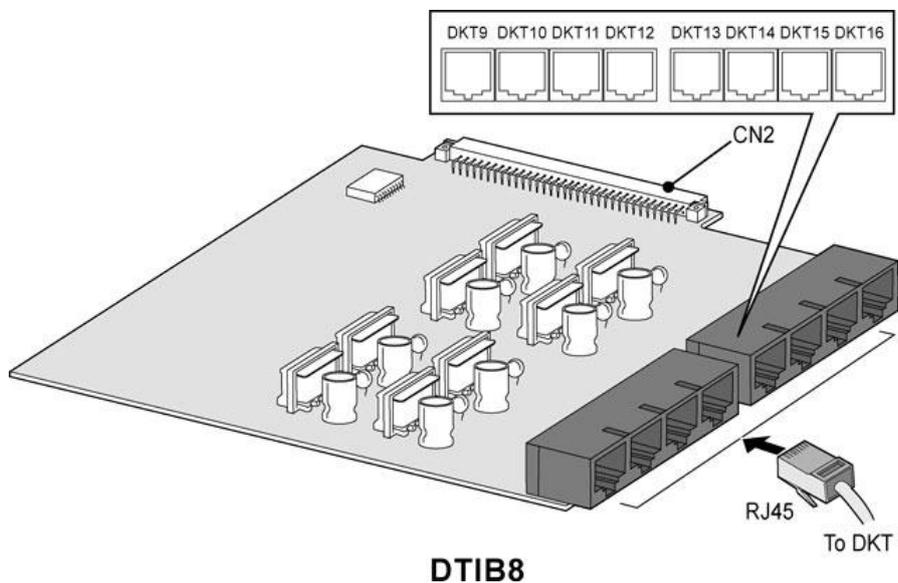
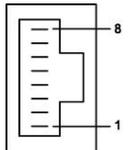


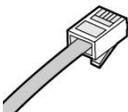
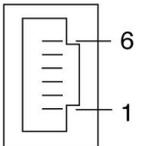
Figure 3.4.2 DTIB8

#### 3.4.2.1 Pin assignment

**DTIB8**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		1,2,3	Reserved	
		4	DKT_R	RING
		5	DKT_T	TIP
		6,7,8	Reserved	

**DKT**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

### 3.4.3 SLIB4 (Single Line Interface Board)

*Description*

SLIB4 can be installed on the SLIB/DTIB connector, and provides 4 SLT ports, and 2 DTMF receivers. The SLIB4 and SLT are connected with a RJ45 Modular Jack, MJ3 and SLIB4 has a din connector, CN3, to connect expansion modules like VOIM, SLIM, and DTIM.

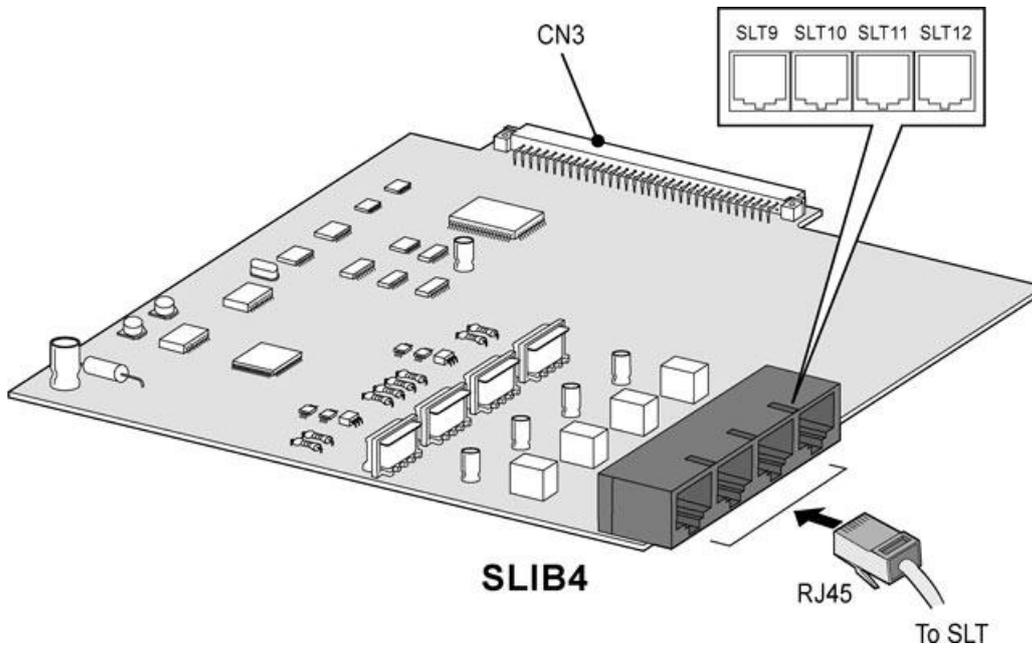
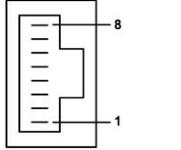


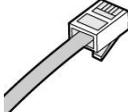
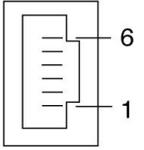
Figure 3.4.3 SLIB4

#### 3.4.3.1 Pin assignment

**SLIB4**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2,3	Reserved
		4	SLT_RING
		5	SLT-TIP
		6,7,8	Reserved

**SLT**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

### 3.4.4 SLIB8 (Single Line Interface Board)

*Description*

SLIB8 can be installed the SLIB/DTIB connector, and provides the 8 SLT ports and 2 DTMF receivers. The SLIB8 and SLT are connected with a RJ45 Modular Jack, MJ2 & MJ3 and SLIB8 has a din connector, CN3, to connect expansion modules like VOIM, SLIM, and DTIM.

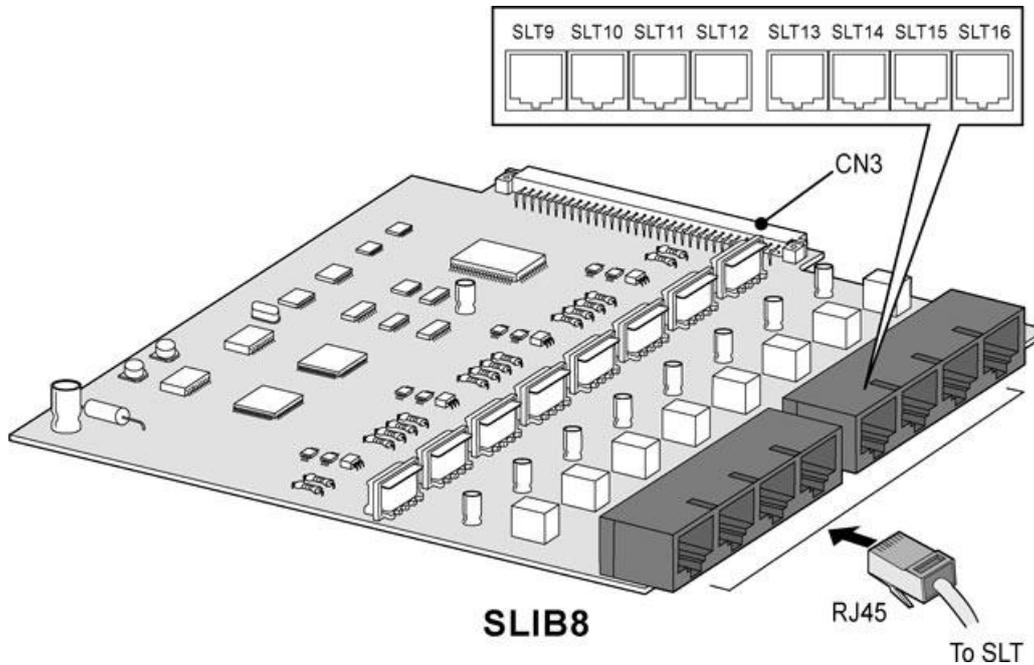
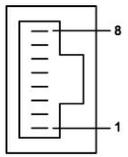


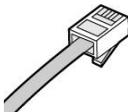
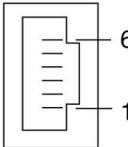
Figure 3.4.4 SLIB8

#### 3.4.4.1 Pin assignment

**SLIB8**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1,2,3	Reserved
		4	SLT_RING
		5	SLT-TIP
		6,7,8	Reserved

**SLT**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

### 3.5 Other Board Installations

#### 3.5.1 VMIB(Voice Mail Interface Board)

*Description*

The VMIB can be installed on the VMIB/AAFB connector, and provides system announcement, ACD/UCD announcement, and User Greeting.

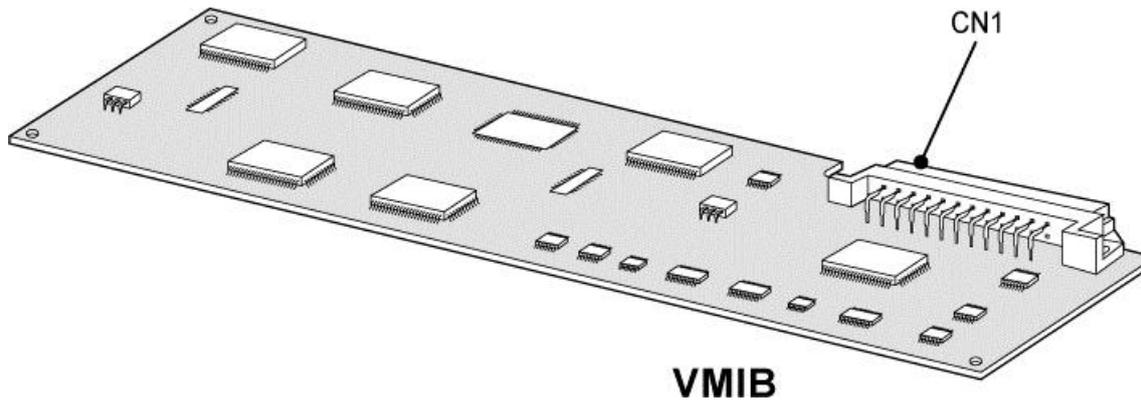


Figure 3.5.1 VMIB

ITEM	RECORD/PLAY	MOH
Channel	2 channels	1 channel
Max record time:	100 Min	60 Sec.
System/time stamp	28 Min	
User record time	72 Min	
Max. Number of User voice message	400 EA	

**※ NOTE**

- User Greeting is not lost by system power OFF or reset because the message is stored in FLASH memory.
- MBU SW3-4 controls the protection of recorded messages.
- LD1 gets turned on when any RECORD/PLAY channel is activated.

### 3.5.2 AAFB(Auto Attendant Function Board)

*Description*

The AAFB can be installed on the VMIB/AAFB connector, and provides system announcement and ACD/UCD announcement.

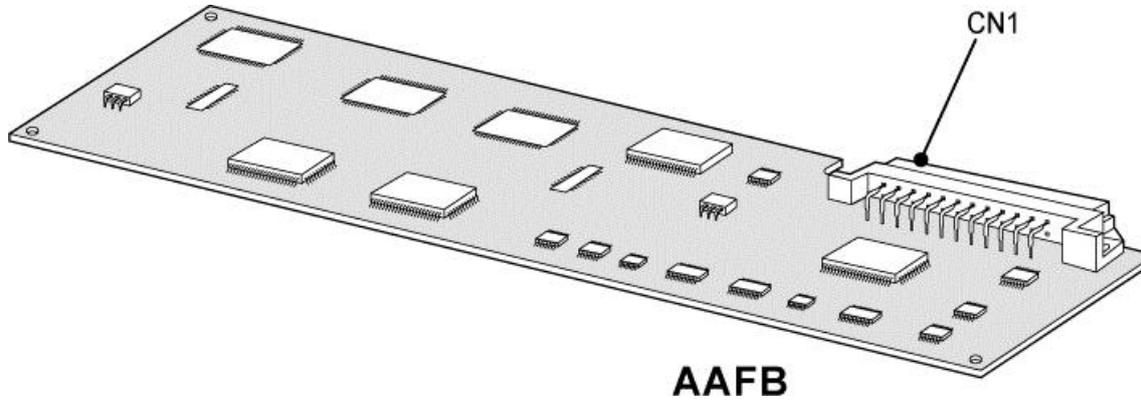


Figure 3.5.2 AAFB

ITEM	RECORD/PLAY	MOH
Channel	2 channels	-
Max record time:	28 Min	-
System/time stamp	28 Min	
User record time	Not Possible	

※ **NOTE**

- LD1 gets turned on when any RECORD/PLAY channel is activated.

### 3.5.3 VMIBE (Voice Mail Interface Board Enhanced)

*Description*

The VMIBE can be installed on the VMIB/AAFB connector, and provides system announcement, ACD/UCD announcement, and User Greeting.

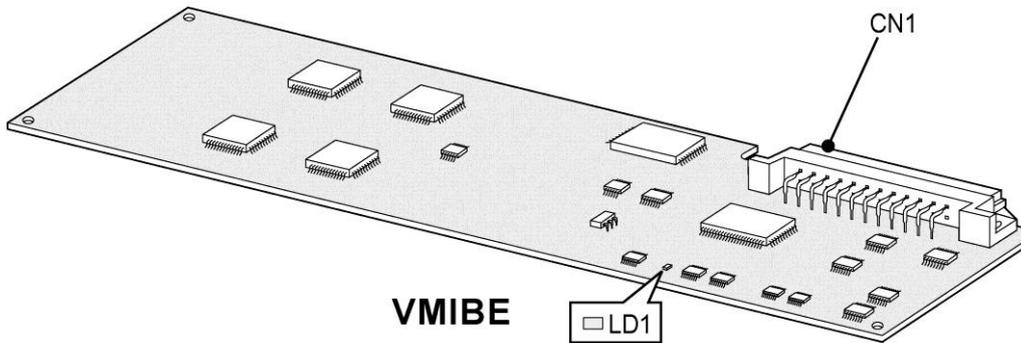


Figure 3.5.3 VMIBE

ITEM	RECORD/PLAY	MOH
Channel	3 channels	1 channel
Max record time:	200 Min	60 Sec.
System/time stamp	28 Min	
User record time	172 Min	
Max. Number of User voice message	800 EA	

※ **NOTE**

- VMIBE is supported from software **Version 2.1xx**.
- User Greeting is not lost by system power OFF or reset because the message is stored in FLASH memory.
- MBUB SW3-4 controls the protection of recorded messages.
- LD1 gets turned on when any RECORD/PLAY channel is activated.

### 3.5.4 AAFBE(Auto Attendant Function Board Enhanced)

*Description*

The AAFBE can be installed on the VMIB/AAFB connector, and provides system announcement and ACD/UCD announcement.

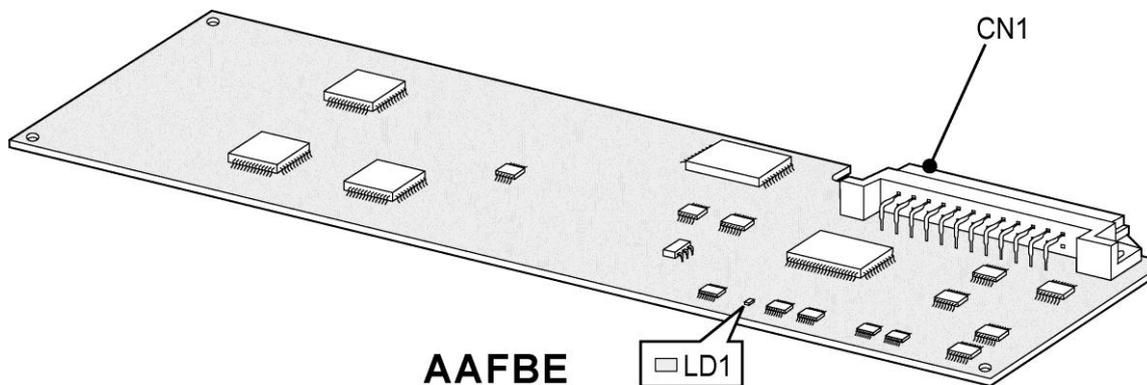


Figure 3.5.4 AAFBE

ITEM	RECORD/PLAY	MOH
Channel	3 channels	-
Max record time:	28 Min	-
System/time stamp	28 Min	
User record time	Not Possible	

※ **NOTE**

- AAFBE is supported from software **Version 2.1xx**.
- LD1 gets turned on when any RECORD/PLAY channel is activated.

### 3.5.5 LANU (LAN interface Unit)

*Description*

LANU should be installed on the LANU connector, and provides 1 LAN port of 10Base-T networking. RJ45 Modular Jack, MJ1, is used to interface with the Wide Area Network (WAN) or PC, and has 2 LEDs that indicate the operational state of the LAN port.

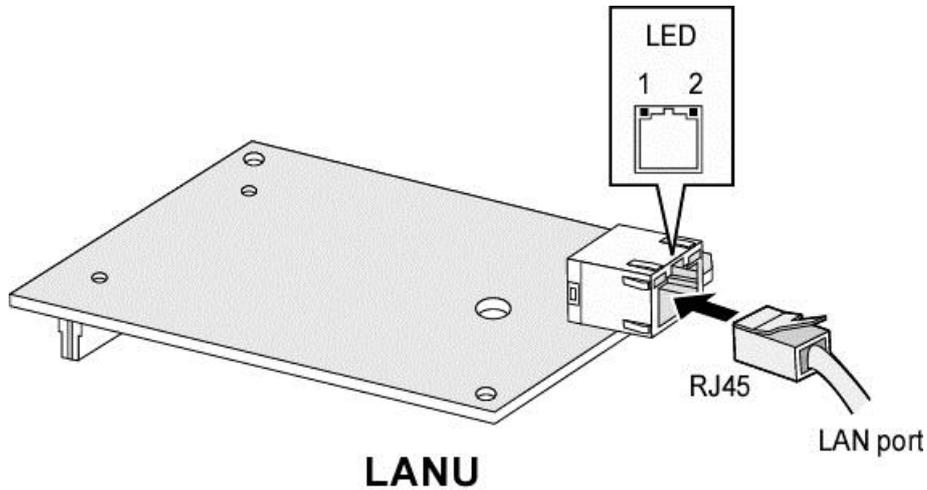
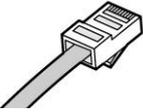
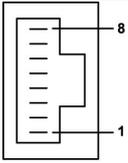


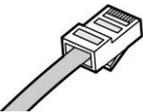
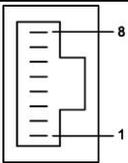
Figure 3.5.5 LANU

#### 3.5.5.1 Pin Assignment

**LANU**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		4,5,7,8	RESERVED	
		1	TX+	Transmit Data
		2	TX-	Transmit Data
		3	RX-	Receive Data
		6	RX+	Receive Data

**PC**

CONNECTOR	PIN NUMBER	NO	SIGNAL NAME	FUNCTION
		4,5,7,8	RESERVED	
		1	TX+	Transmit Data
		2	TX-	Transmit Data
		3	RX-	Receive Data
		6	RX+	Receive Data

**THE LED INDICATION OF MJ1**

LED	MEANING	
LED1 (Green)	OFF: No Link	ON: Link, Toggle: Data Transfer
LED2 (Orange)	OFF: Link and activity at 10MBps	ON: Link and activity at 100MBps

### 3.5.6 MODU (MODEM function Unit)

#### *Description*

MODU should be installed on the MODU connectors, and provides an analog modem connection. It supports Bell, ITU-T, V.34, V.32BIS, V.90 Protocol at 300bps, up to 33Kbps speed rate, and automatic rate negotiation.

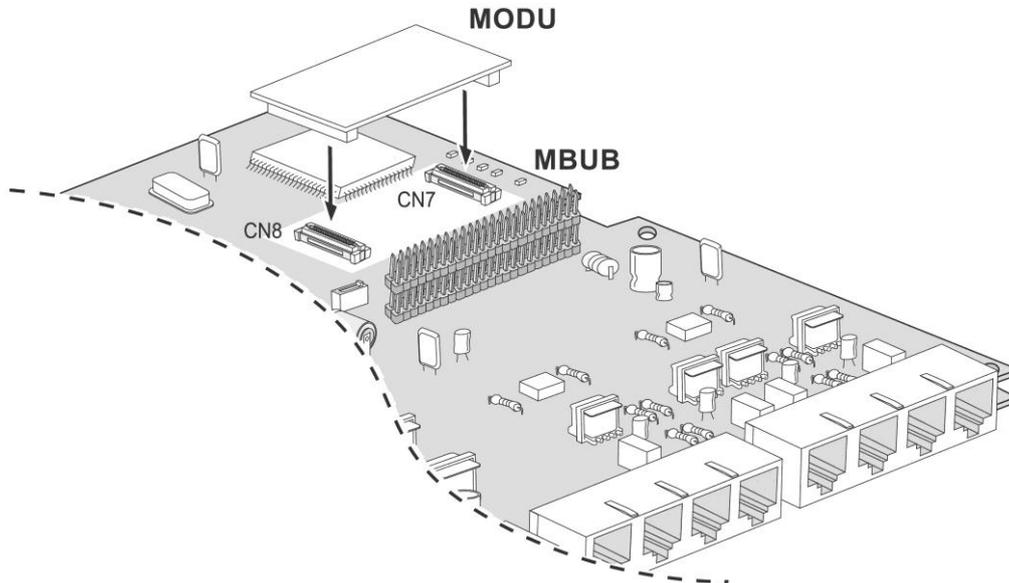


Figure 3.5.6 MODU

## SECTION 4. EXPANSION MODULE INSTALLATION

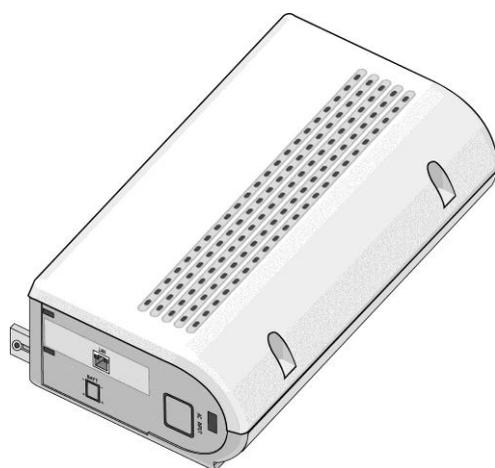
IPLDK-20 provides three kinds of expansion modules, VOIM, SLIM and DTIM.

MODULE	PORT	CONNECTOR TYPE	DESCRIPTION	CABLE	REMARK
VOIM	1 port	RJ45	Voice Over Internet Protocol interface	4 wire	
SLIM	4 ports	RJ45	Single Line Telephone interface: 8SLTs	2 wire	2SLTs/port
DTIM	4 ports	RJ45	Digital Terminal interface: 8DKTs	2 wire	2DKTs/port

### 4.1 Unpacking

Open the box and verify the items shown in Figure 4.1 are included:

#### VOIM



Module

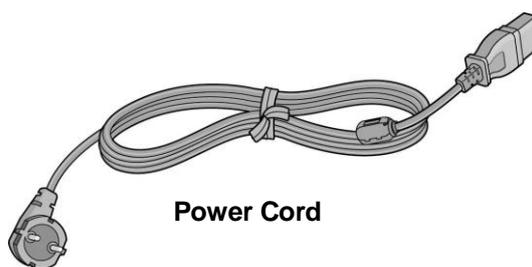


Screw

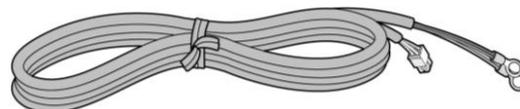
#### DTIM/SLIM



Module



Power Cord



Battery Cable



Fuse



Screw

Figure 4.1 Unpacking

## 4.2 Opening and closing the front cover

### 4.2.1 Opening the front cover

1. Turn the screw counter-clockwise to loosen as shown in Figure 4.2.1.
2. Lift the front cover in the direction of the arrow as shown:

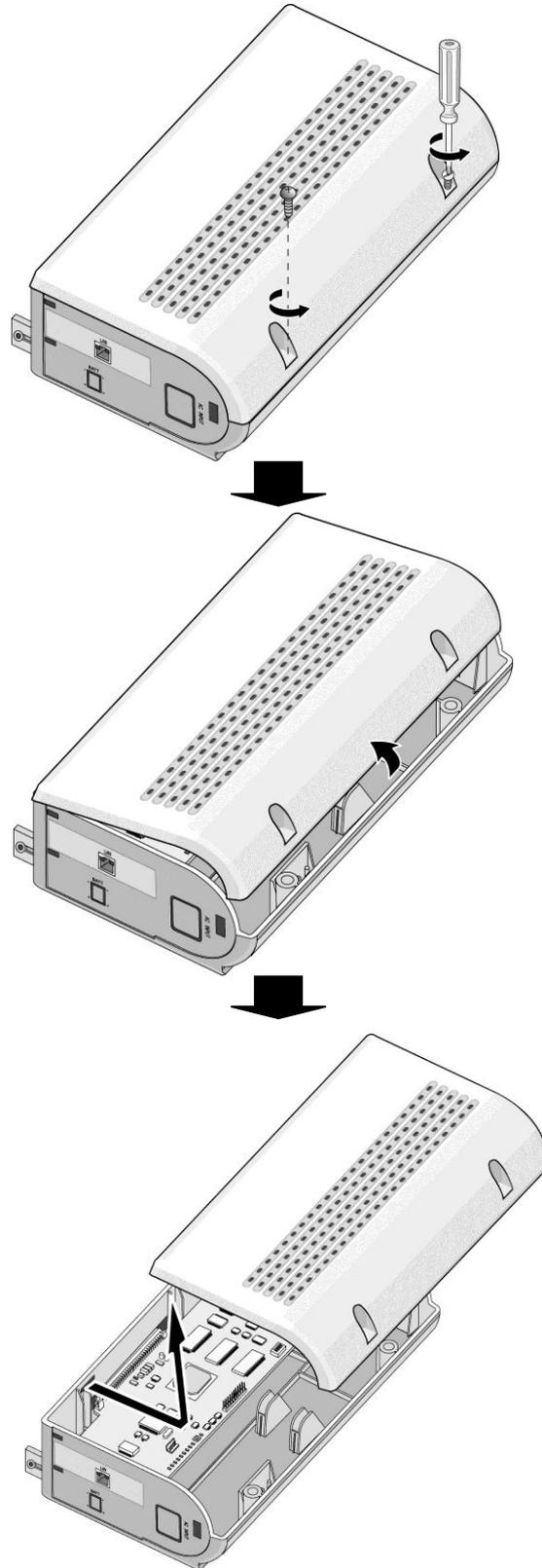


Figure 4.2.1 Opening the front cover

### 4.2.2 Closing the front cover

1. Insert the front cover into the slot on a module as show in Figure 4.2.2.
2. Then put the front cover down on a module in the direction of the arrow, as shown.
3. Turn the screws clockwise to tighten, as in the Figure.

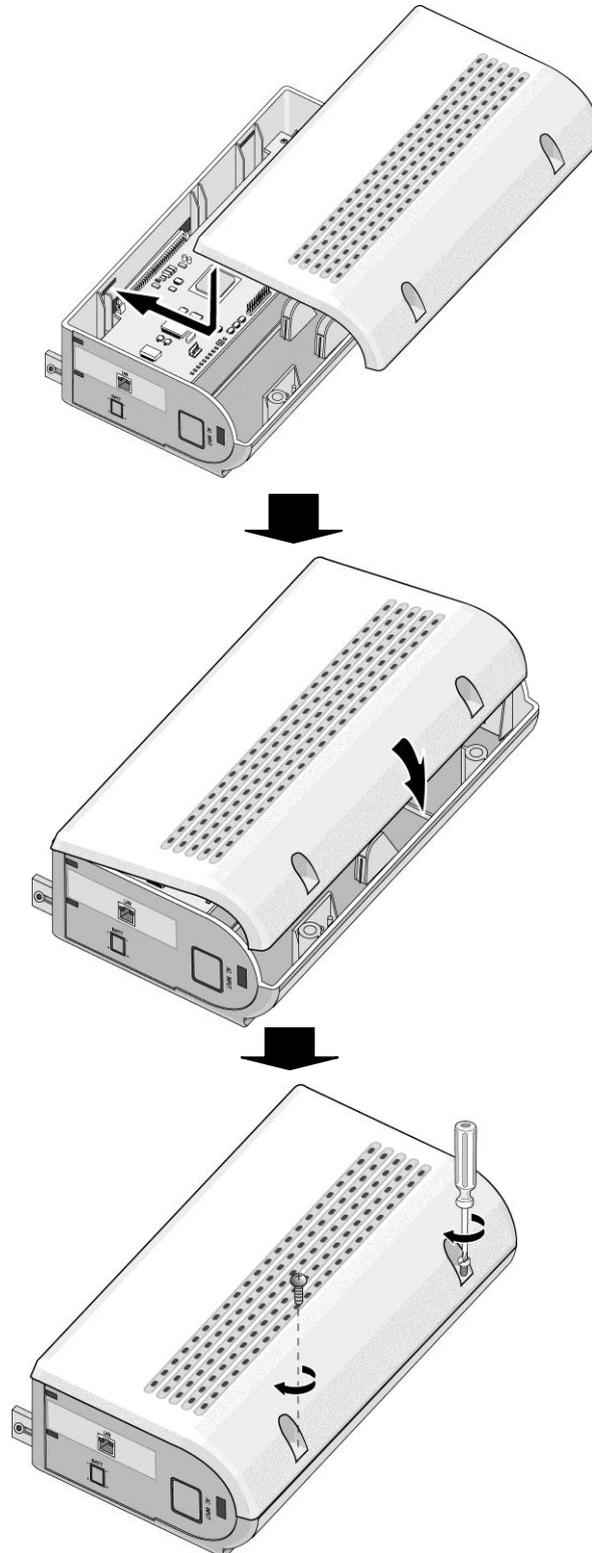


Figure 4.2.2 Closing the front cover

**\* NOTE**

For safety reasons, close the front cover and tighten the screws prior to operating the IP LDK-20 System.

## 4.3 Mounting Expansion Module

### 4.3.1 Connecting Expansion Module to KSU

1. Insert the expansion module into the slot of basic KSU as show in Figure 4.3.1.
2. Turn the screws clockwise to tighten, as in the Figure.

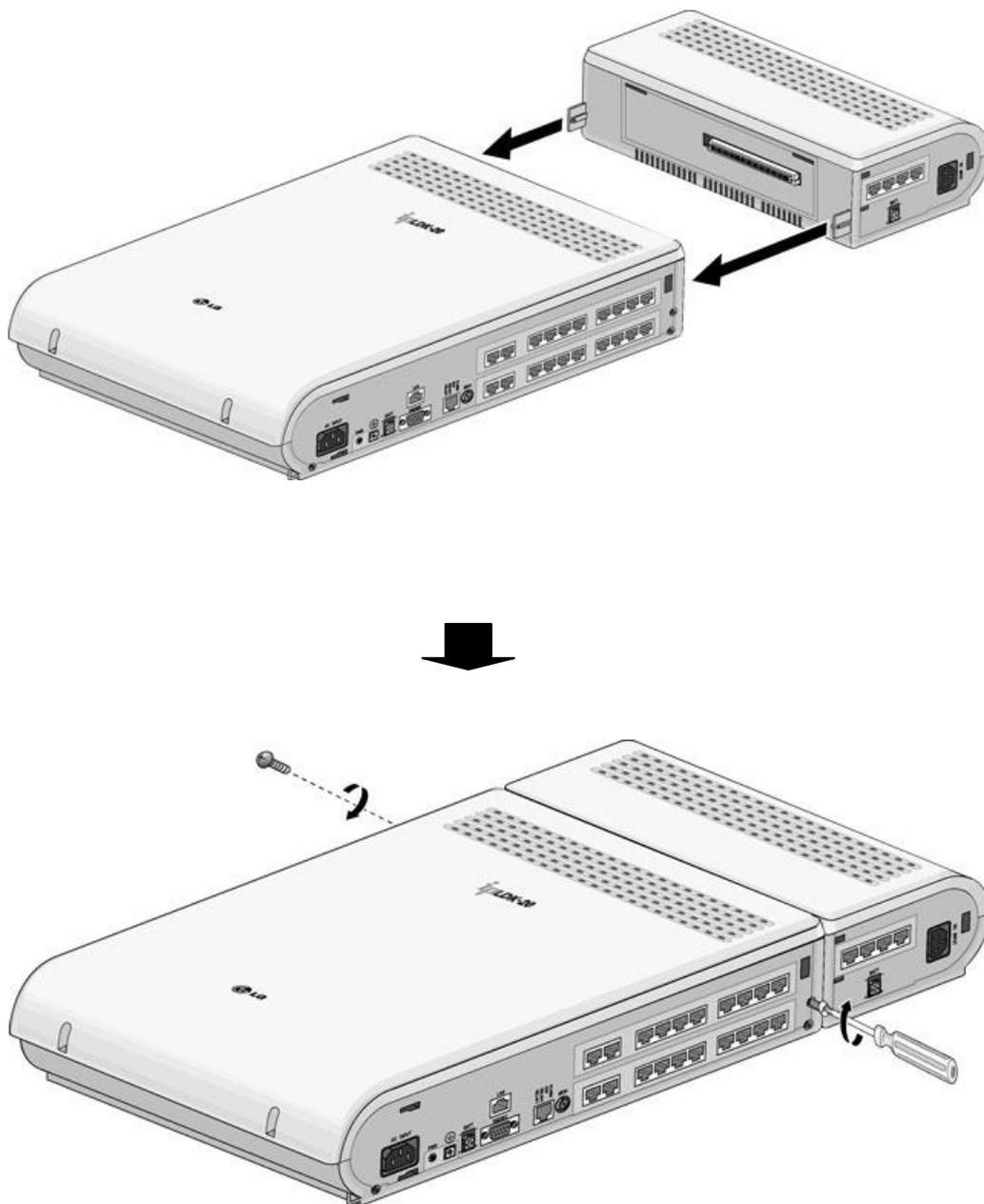


Figure 4.3.1 Connecting an expansion module

### 4.3.2 Wall mounting

The KSU with an expansion module is mounted on the wall in the same way with basic KSU and an expansion module itself is not mounted on the wall as shown in Figure 4.3.2.

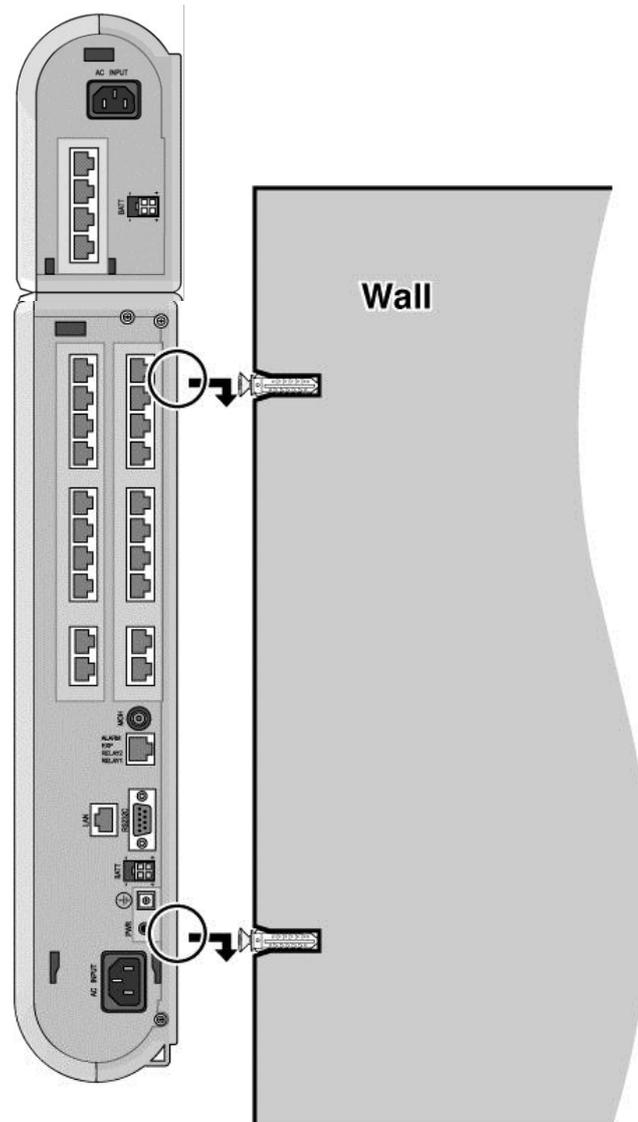
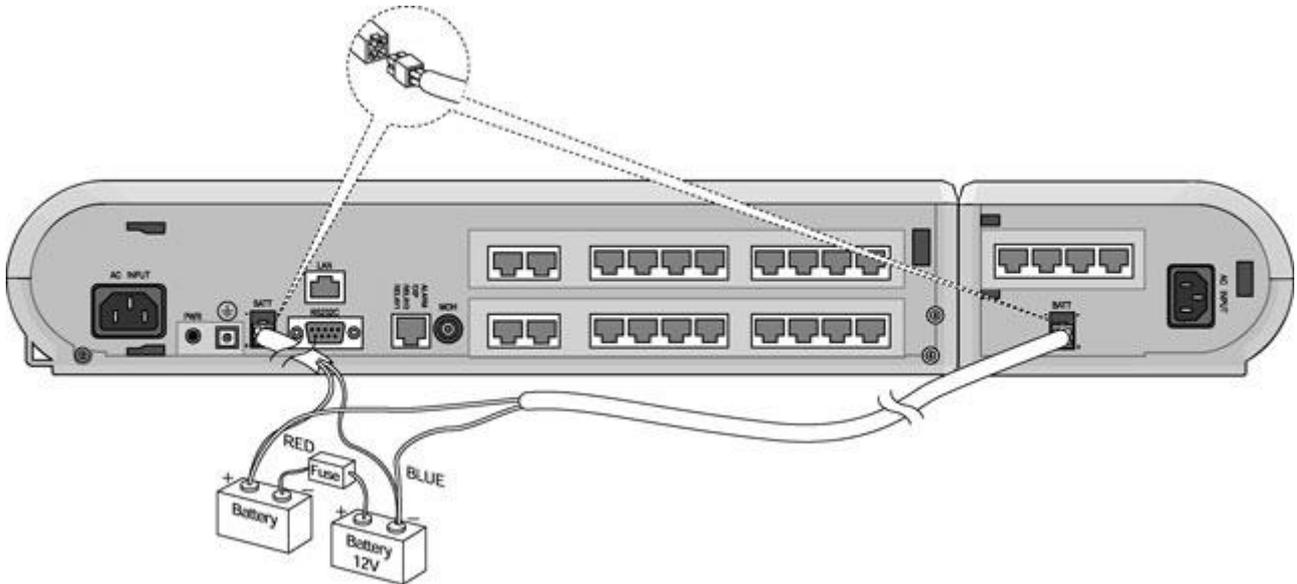


Figure 4.3.2 Wall mounting of KSU with an expansion module

※ Note : Be careful not to drop the KSU.

### 4.4 External backup batteries connection

In case of power failure, the external backup batteries automatically maintain uninterrupted power for the IP LDK-20 system. The external batteries must provide 24 Volts DC. This is generally accomplished by connecting two 12 Volt batteries in a series arrangement.



**Figure 4.4 External Back Up Battery Installation**

**※ Note :** *The cable for connecting the battery is supplied with an expansion module.  
Backup batteries for the basic KSU are used in parallel with an expansion module.*

The IP LDK-20 MBUB will provide charging current to the batteries during normal AC power operation at a maximum of about 100mA. During battery operation, the battery operation of MBUB and an Expansion Module will be stopped if the AC power re-applied or the battery voltage is too low to maintain full-system operation.

The external batteries can maintain system operation as needed depending on several elements such as, battery charge status, condition and capacity of the batteries, and system configuration (number of station ports).

**! CAUTION**

- There is not the battery charging circuit in an expansion module.
- It is recommended to use a fuse (5A @250V) between battery and system.
- Recommended battery capacity is 24V/10AH MF battery; the IP LDK-20 system should operate more than 3 hours with batteries that are in good condition.
- Carefully check the battery polarity with cable colors (RED and BLUE) when connecting the battery to the system.
- Make sure that you do not short-out the external backup batteries or cables.
- There is a danger of explosion if external backup batteries are incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer’s instructions.

## 4.5 VOIM (Voice over Internet Protocol Interface Module) Installation

### Description

The VOIM can be installed on the basic KSU and provides the Ethernet interface for SW applications and VoIP features with optional VoIP daughter board.

The VOIM has the capacity of maximum 8 channels with one VOIU, and VOIU provides 4 VoIP channels.

Item	Specification
LAN Interface	10 / 100 Base-T Ethernet (IEEE 802.3)
Speed	10 Mbps or 100 Mbps (Auto-Negotiation)
Duplex	Half Duplex or Full Duplex (Auto-Negotiation)
VoIP Protocol	H.323 Revision 2
Voice Compression	G.711/G.726/G.729/G.723.1
Voice/Fax Switching	T.38
Echo cancellation	G.165

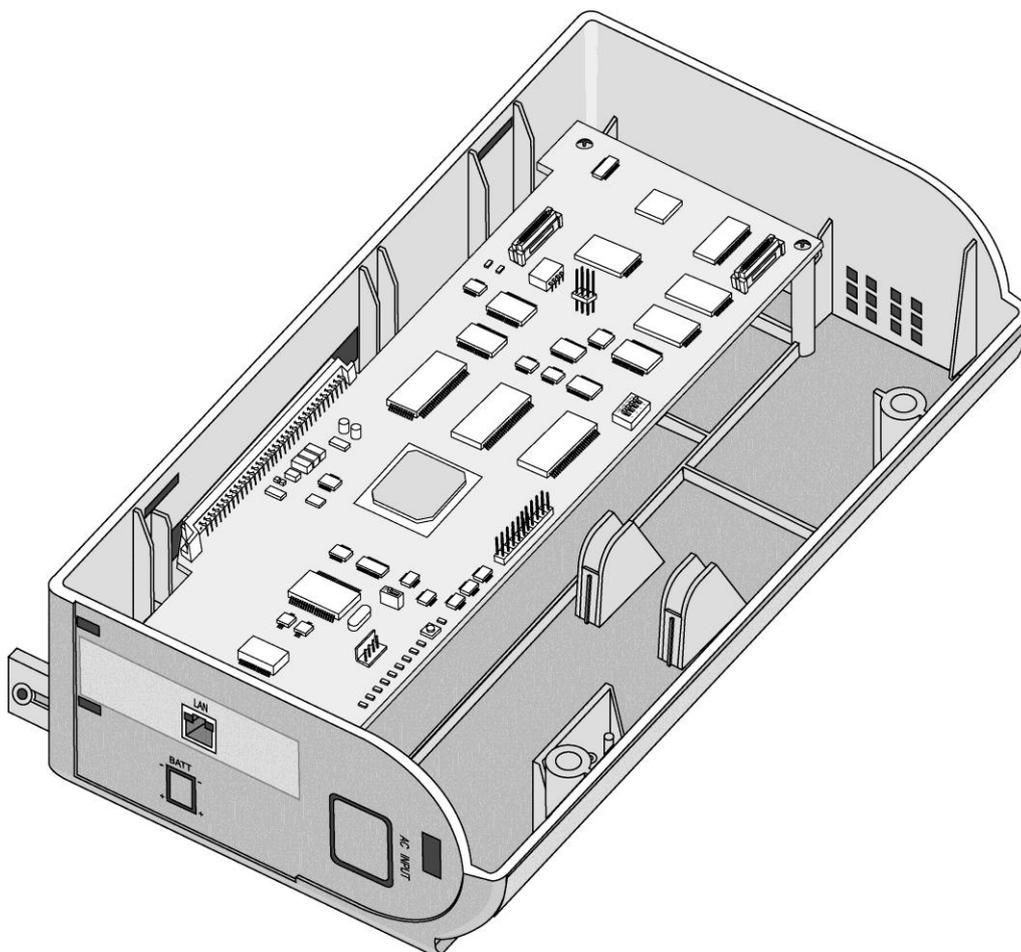


Figure 4.5.1 VOIM

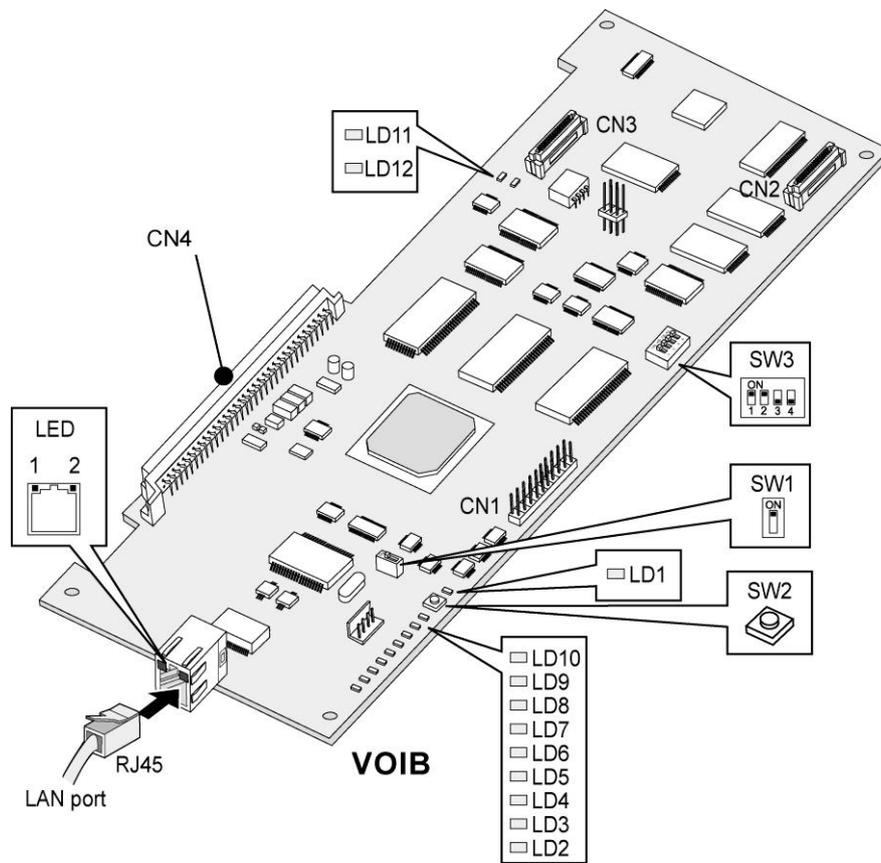


Figure 4.5.2 VOIB

The VOIB is installed in the VOIM and provides various kinds of connectors and RJ45 modular jack for the connection of peripheral boards and miscellaneous functions (refer to the following Table).

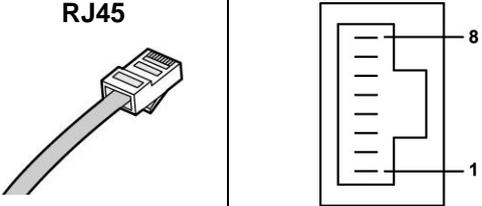
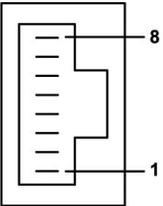
**Various switches and connectors functions**

Switch / Connector	Functions	Remark
SW1	Watch dog reset enable	Default: Off
SW2	VOIB Reset Switch for CPU (S32500C)	
SW3	Pole1: Trace function enable, others: reserved	Default: ON
CN1	JTAG(Joint Test Action Group) for debug	
CN2	VOIU Board Connection	
CN3	VOIU Board Connection	
CN4	Basic KSU Connection	
CN6	RS232C Trace Tool Connection	
MJ1	Network(RJ-45) Cable Connection	

**LED indications**

LED	Functions	Remark
LD1	DSP HINT interrupt LED (ON: Active, OFF: Idle)	
LD2	Periodic toggle – ON: 1 sec., OFF: 1 sec.	
LD3	Channel8 Seize indication LED (ON: Busy, OFF: Idle)	
LD4	Channel7 Seize indication LED (ON: Busy, OFF: Idle)	
LD5	Channel6 Seize indication LED (ON: Busy, OFF: Idle)	
LD6	Channel5 Seize indication LED (ON: Busy, OFF: Idle)	
LD7	Channel4 Seize indication LED (ON: Busy, OFF: Idle)	
LD8	Channel3 Seize indication LED (ON: Busy, OFF: Idle)	
LD9	Channel2 Seize indication LED (ON: Busy, OFF: Idle)	
LD10	Channel1 Seize indication LED (ON: Busy, OFF: Idle)	
LD11	VOIB DSP operation status LED (ON: Normal, OFF: Fail)	
LD12	VOIU DSP operation status LED (ON: Normal, OFF: Fail)	
MJ1-LD1	Link Status LED (ON: Link, Toggle: Data transfer, OFF: No Link)	
MJ1-LD2	Speed Status LED (ON: 100Mbps operation, OFF: 10Mbps)	

**4.5.1 Pin assignment**

Connector	Pin Number	NO	SIGNAL NAME	FUNCTION
<b>RJ45</b> 		4,5,7,8	Reserved	
		1	TX+	Transmit Data
		2	TX-	Transmit Data
		3	RX-	Receive Data
		6	RX+	Receive Data

**※ NOTE**

- 10BASE-T runs on Category 3 UTP or higher.
- 100BASE-TX runs only on Category 5 UTP cable.

## 4.5.2 VOIU(Voice over Internet Protocol Interface Unit)

### *Description*

The VOIU can be installed on the VOIB through CN2 and CN3 and provides the Ethernet interface for SW applications and 4 VoIP channels.

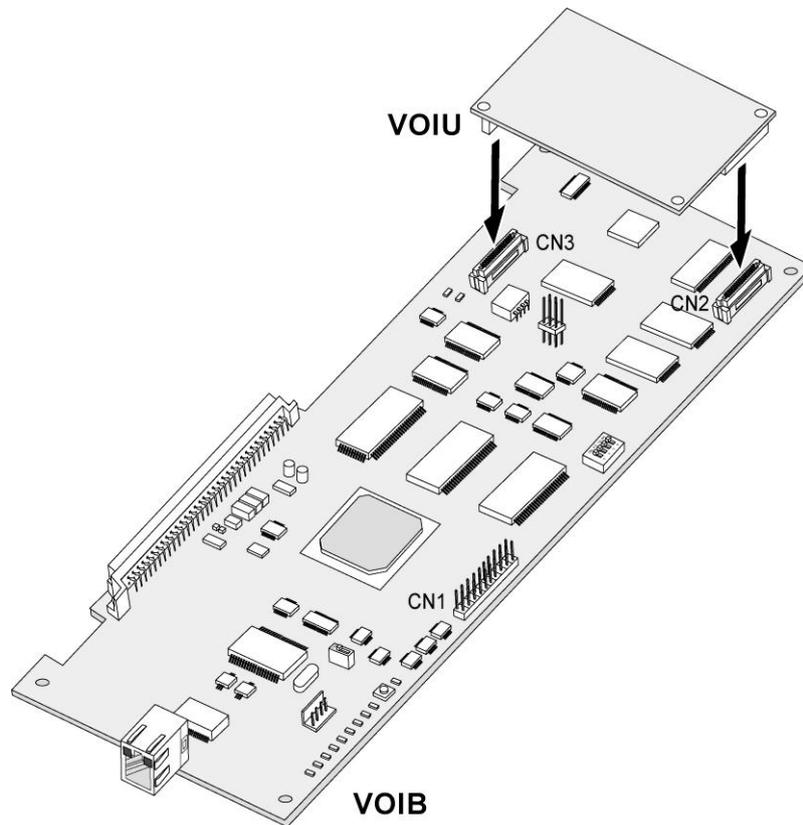


Figure 4.5.2.1 VOIU Installation

## 4.6 SLIM(SLT Interface Module) Installation

### Description

The SLIM provides the eight (8) ports of SLT interface circuits and two DTMF receivers. The connection between the SLIM and Single Line Telephone is performed through RJ45 Modular Jacks, MJ1.

SLIM can be installed on basic KSU.

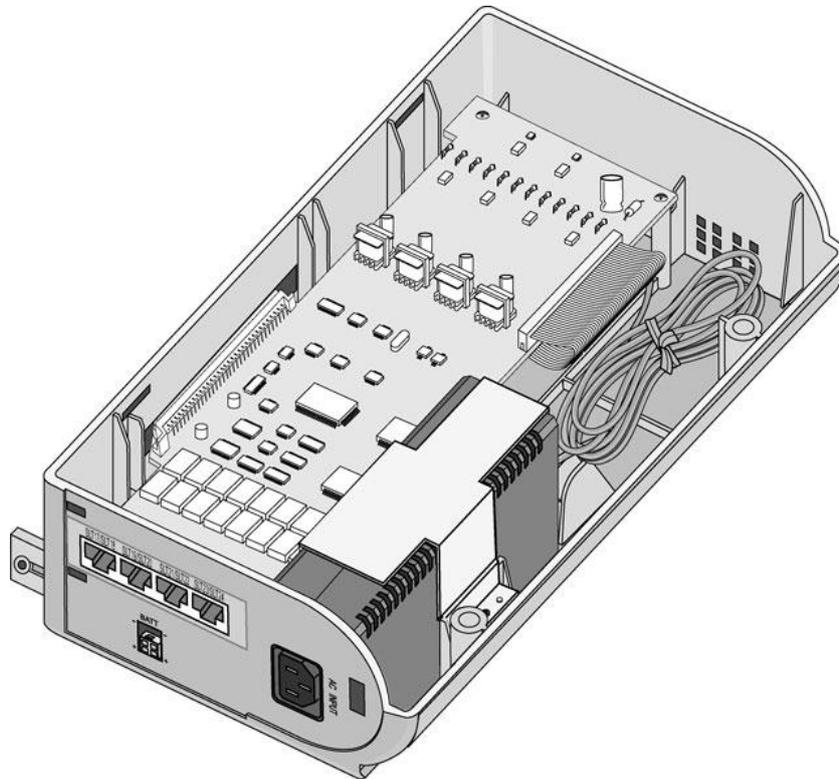
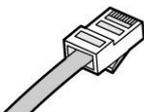
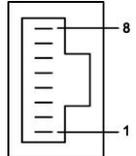


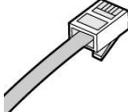
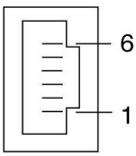
Figure 4.6.1 SLIM

### 4.6.1 Pin assignment

#### SLIM

Connector	Pin Number	NO	SIGNAL NAME
		1,2	SLT1-R, SLT1-T
		3	Reserved
		4,5	SLT2-R, SLT2-T
		6,7,8	Reserved

#### SLT

Connector	Pin Number	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

## 4.7 DTIM(Digital Terminal Interface Module)

### Description

The DTIM provides 8 ports of Digital terminal interface and provides 2-wire connection to Digital Keysets. It has module connector, MJ1, which is used to connect Digital Keypad lines to the DTIM.

DTIM can be installed on basic KSU.

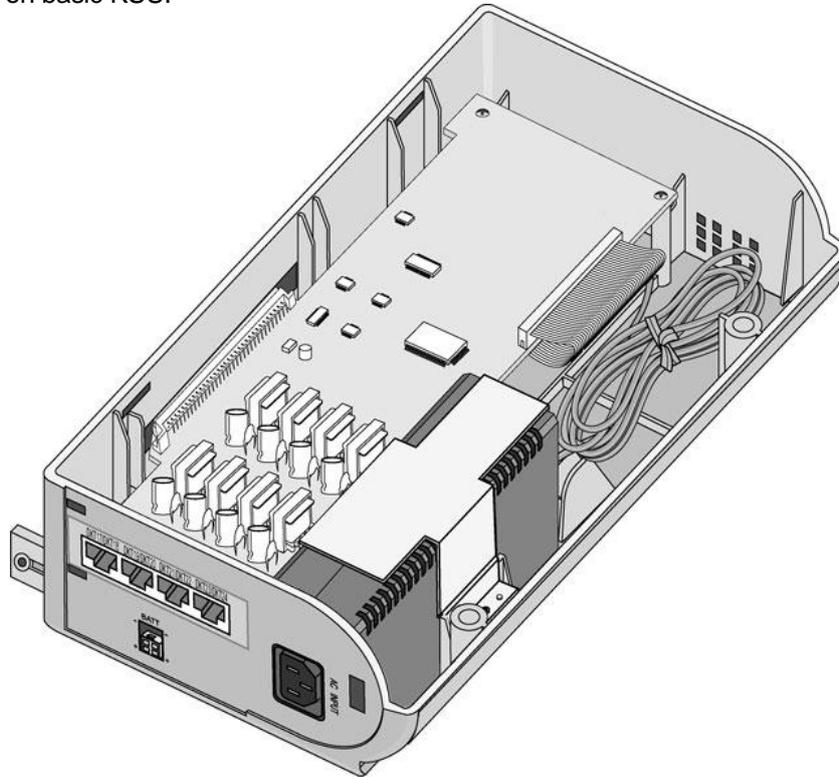
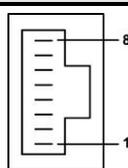


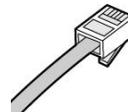
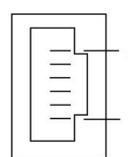
Figure 4.7.1 DTIM

### 4.7.1 Pin assignment

#### DTIM

Connector	Pin Number	NO	SIGNAL NAME
		1,2	DKT1-R, DKT1-T
		3	Reserved
		4,5	DKT2-R, DKT2-T
		6,7,8	Reserved

#### DKT

Connector Type	Pin Number	NO	SIGNAL NAME
		1-2	Reserved
		3	TIP
		4	RING
		5-6	Reserved

## SECTION 5. TERMINAL CONNECTION

### 5.1 Terminal Models

Various types of digital terminals are used with IP LDK-20 MBUB/DTIB4/DTIB8/DTIM as listed and shown below:

MODEL	DESCRIPTION
LDP-7004N	8 Flexible Button Normal
LDP-7004D	4 Flexible Button Display
LDP-7008D	8 Flexible Button Display
LDP-7016D	16 Flexible Button Display
LDP-7024D	24 Flexible Button Display
LDP-7024LD	24 Flexible Button Large Display
LDP-7048DSS	48 Button DSS Console



**LDP-7004N**



**LDP-7004D**



**LDP-7008D**



**LDP-7016D**



**LDP-7024D**



**LDP-7024LD**

### 5.2 Terminal Cabling Distance

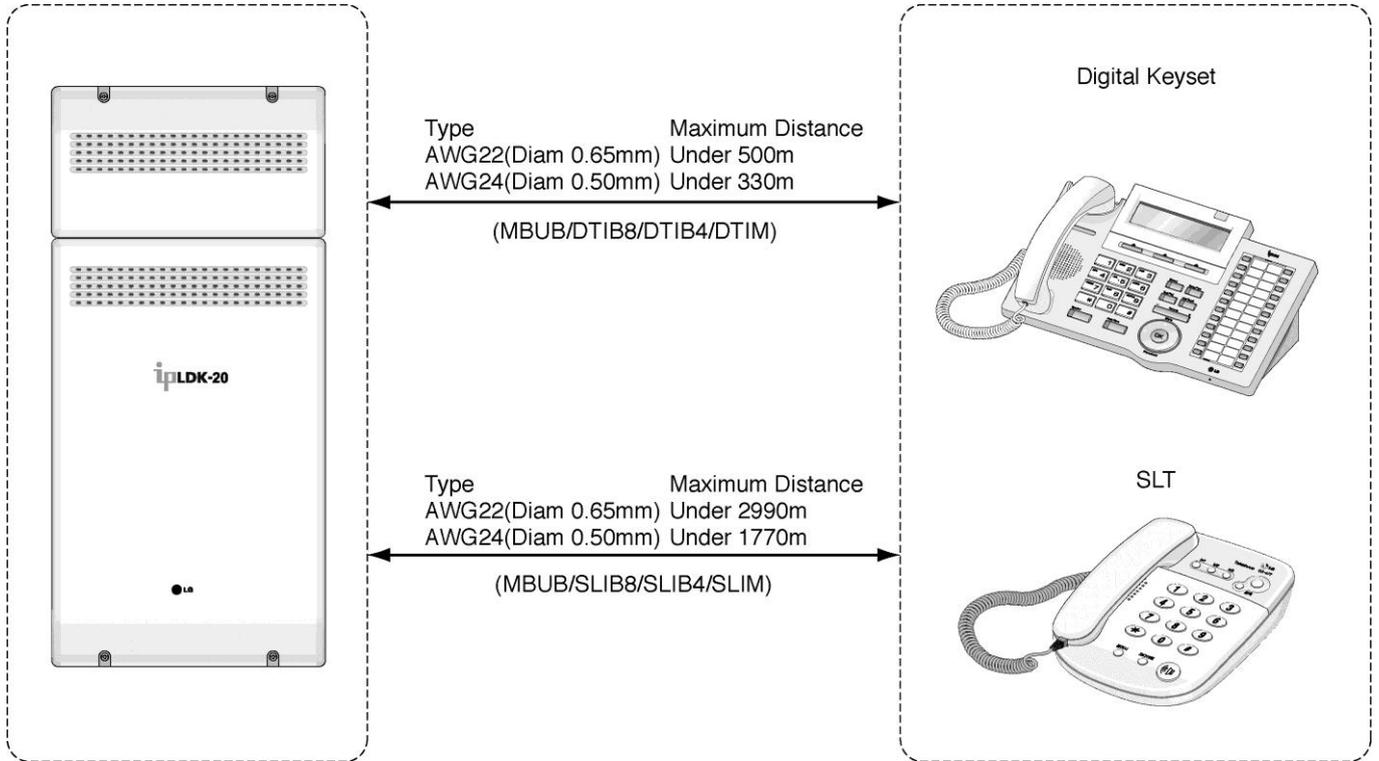


Figure 5.2 Terminal Cabling Distance

### 5.3 Keypad Connection

#### 5.3.1 Digital Keypad

The following illustrates how to connect the Digital Keypad to your system:

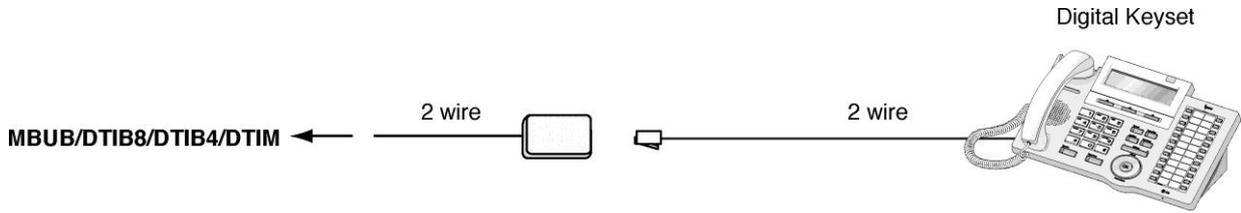
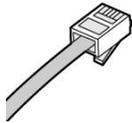
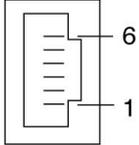


Figure 5.3.1 Digital Keypad Connection

##### 5.3.1.1 Pin Assignment

CONNECTOR TYPE	PIN NUMBER	NO	SIGNAL NAME
		1-2	RESERVED
		3	TIP
		4	RING
		5-6	RESERVED

#### 5.3.2 SLT

The following illustrates how to connect the SLT to your system:

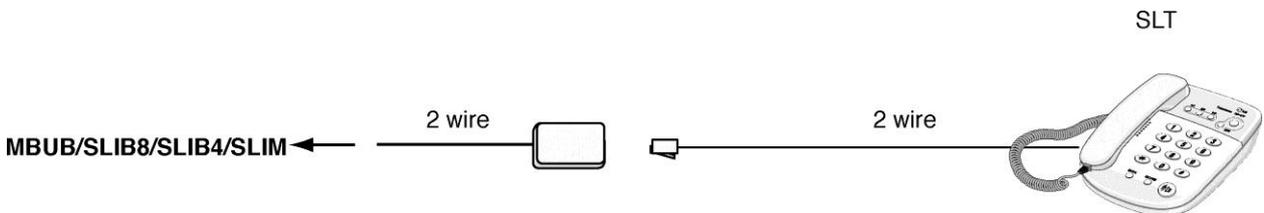
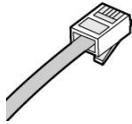
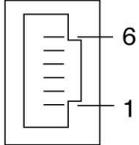


Figure 5.3.2 SLT Connection

##### 5.3.2.1 Pin Assignment

CONNECTOR TYPE	PIN NUMBER	NO	SIGNAL NAME
		1-2	RESERVED
		3	TIP
		4	RING
		5-6	RESERVED

### 5.4 Connecting Additional Terminals

MBUB provides connections for 1 external music source, 1 external page port, 2 relay contacts, and an alarm/doorbell input monitor through the PJ1 audio jack and a MJ4 RJ45 Modular Jack.

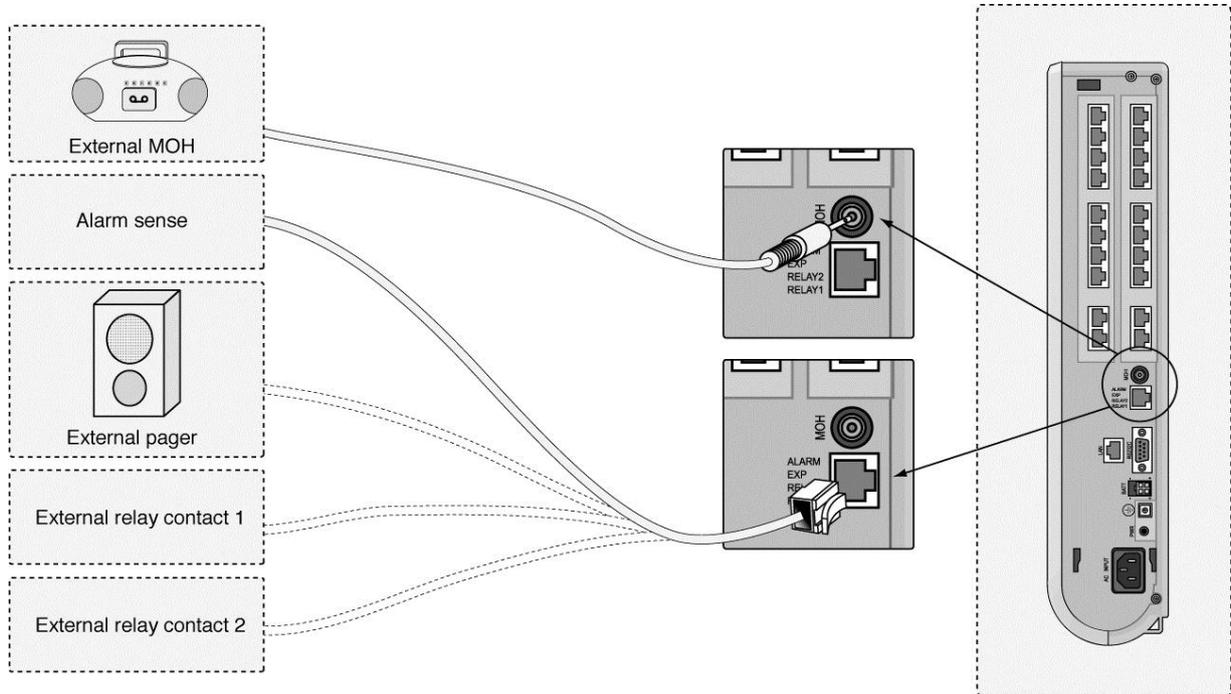


Figure 5.4.1 Additional Terminal Connection

#### 5.4.1 External Music Source wiring

MBUB accommodates 1 port of external music source through a PJ1 (RED) audio Jack.

#### 5.4.2 Relay Contacts

MBUB provides 2 relay contacts that are used for loud bell or external paging through pin No. 1-2 & 3-4 of MJ4.

#### 5.4.3 External Paging wiring

MBUB supports 1 external paging port through Pin No.5-6 (paging port) of MJ4.

#### 5.4.4 Alarm Detection wiring

MBUB provides an external alarm detection input, which can be used to transmit notification to extensions when the external switch is closed or opened (programmable through Admin Programming). This alarm detection input is provided through pin No.7-8 of MJ4.

## SECTION 6. STARTING THE IPLDK-20 SYSTEM

### 6.1 Before Starting the IP LDK-20 System

The DIP switch (SW1) of Memory Backup Battery should be turned ON before installing the MBUB, to protect system data in the case of a power failure. To prepare for preprogramming, perform the following Steps:

1. Set the DIP switch (SW3) on the MBUB to ON.
2. To initialize all the data in Admin Programming, the 4th pole of SW3 should be set to ON.
3. Plug the AC power cord into the IP LDK-20 System and AC outlet.
4. Program the Country Code as applicable.
5. Reset the IP LDK-20 System.
6. Set the 4th pole of SW3 on the MBUB to OFF when the system operates normally. The 4th pole of SW3 is set to OFF, to protect the various features addressed by Admin Programming after system power-up and initialization.

### 6.2 Basic Preprogramming

The IP LDK-20 System can be programmed to meet an individual customer's need. There are two ways to perform ADMIN Programming:

- PC ADMIN : Refer to the PC ADMIN Programming Manual.
- DKTU : In this manual we explain DKTU (Station 10) in ADMIN Programming.

#### 6.2.1 DKTU (Station 10) programming

All programming is done at Station 10 (Station port # 00) using the LDP-7024D digital key telephone.

Additional programming stations may be assigned (PGM 113 – FLEX 1), but only 1 DKTU can be active in the programming mode at any one time.

When in programming mode, Station 10 does not operate as a normal telephone, but instead works as a programming instrument with all of the buttons redefined. The keys of the dial pad are used to enter the various data fields and to enter numerical information:

- **Flexible Buttons**

The 24 buttons located at the top of the phone are used to indicate a specific data field and to enter information.

- **SPEED Button and \* Key**

Are sometimes used to delete data or to indicate the end of data input.

- **REDIAL Button**

Could be used to delete one digit or character from the end of entered digits or characters.

6.2.1.1 Button explanation

There are many kinds of DKTUs capable of connecting to the IP LDK-20 system. Figure 6.2.1 shows a model of the LDP-7024D and illustrates each button. Detailed DKTU information for this and other keysets is described in the DKTU User Guide and Installation Manual.

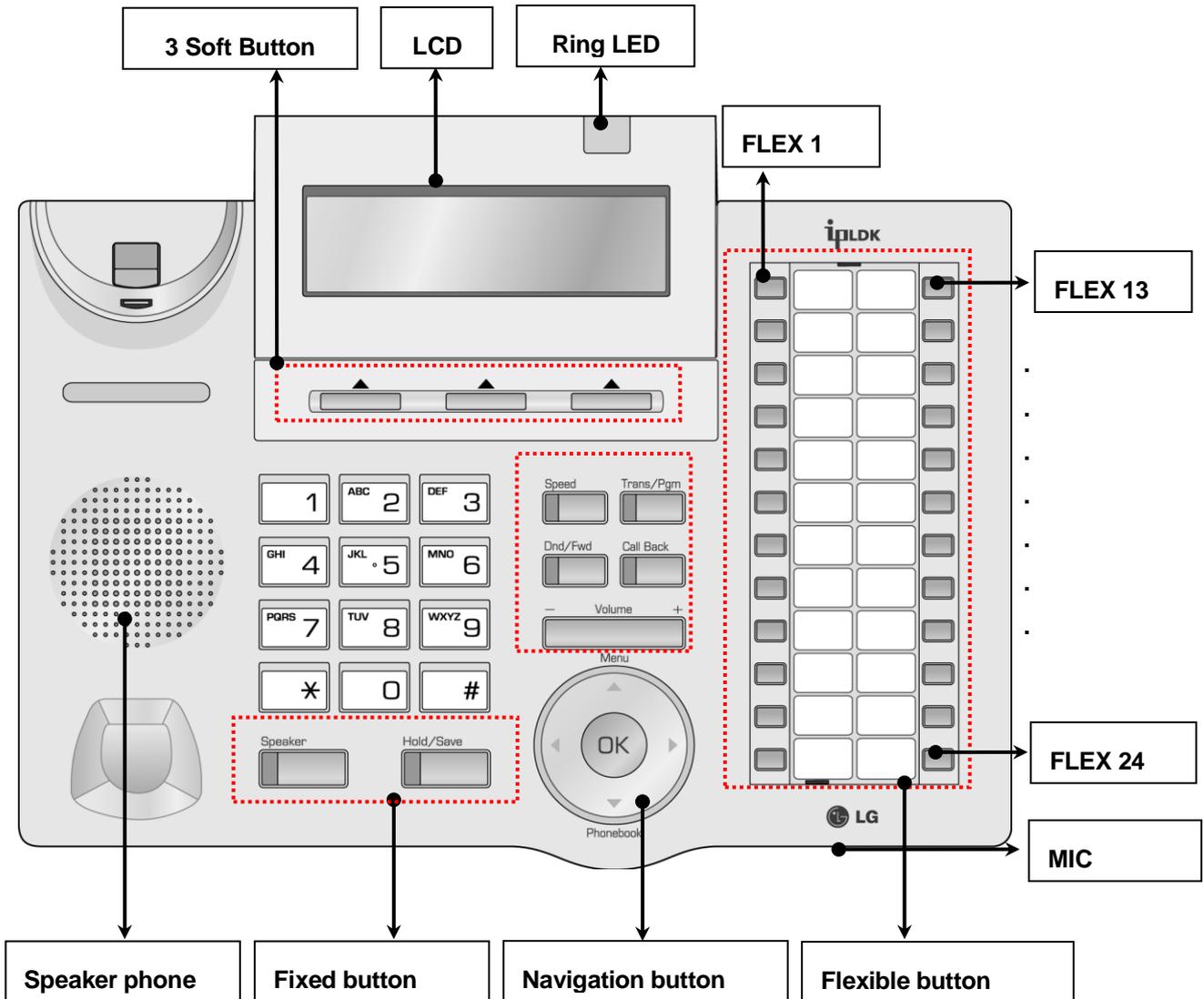


Figure 6.2.1 Description of LDP-7024D Buttons

## 6.2.2 Entering programming mode

To enter Programming Mode, perform the following Steps:

Lift the handset

OR

Press the **[MON]** button on the ADMIN station, and hear ICM dial tone.

1. Press the **[TRANS/PGM]** button and dial \* # .
2. Confirmation tone should be heard.
3. Enter the ADMIN password if the password has been set.
4. A confirmation tone should be heard indicating that the station is in ADMIN Programming mode.
5. Each program is accessed by pressing the **[TRANS/PGM]** button, the following should display:

**ENTER PGM NUMBER**

6. Dial the desired three-digit program number. If an error is made while entering data, the **[TRANS/PGM]** button will return to the previous status.

### ※ NOTE

To return to the parent state while ADMIN programming, press the **[CONF]** button. Pressing the **[CONF]** button clears temporary data fields.

### 6.2.2.1 Permanent Update Procedure

To accept changes while programming, perform the following Steps:

1. Press the **[HOLD/SAVE]** button when all changes have been entered to store the data permanently.
2. A confirmation tone should be heard when pressing the **[HOLD/SAVE]** button if all data was entered correctly. If there were any errors in the entry, then an error tone is presented and data is not stored in the permanent memory.

### 6.2.2.2 Resetting the System

To reset the system, perform the following Steps:

1. Enter **[PGM] + 450** then **[FLEX] + 15** and press the **[HOLD/SAVE]** button.  
OR
2. Press **[PGM] + 100** then **[FLEX] + 1** (Nation Code Assign) to automatically reset the system.

### 6.2.3 Pre-programming

Location PGM-Nation Code & Site Name (PGM100)

※ **NOTE** : The 4th pole of the DIP switch (SW 3) on the MPB must be turned ON.

*Procedure*

#### Nation Code

To program the Nation code, perform the following Steps:

1. Press **[Trans/PGM]** + *PGM Number(100)*, then **[Flex1]** + 7.
2. Press **[HOLD/SAVE]** to accept change.

※ **NOTE** : Press the reset button after setting the nation code to restart the system

#### Site Name

1. Press **[Trans/PGM]** + *Enter Site Name* (use the following Keyset Map, Max. 24 digits allowed), then **[Flex2]**.
2. Press **[HOLD/SAVE]** to accept change.

**[Keyset Map]**

Q - 11 Z - 12 . - 13 1 - 10	A - 21 B - 22 C - 23 2 - 20	D - 31 E - 32 F - 33 3 - 30
G - 41 H - 42 I - 43 4 - 40	J - 51 K - 52 L - 53 5 - 50	M - 61 N - 62 O - 63 6 - 60
P - 71 R - 72 S - 73 Q - 7* 7 - 70	T - 81 U - 82 V - 83 8 - 80	W - 91 X - 92 Y - 93 Z - 9# 9 - 90
*1 - Blank *2 - : *3 - ,	0-00	#

**International Calling Codes**

NATION	CODE	NATION	CODE	NATION	CODE
America	1	Argentina	54	Australia	61
Bahrain	973	Bangladesh	880	Belgium	32
Bolivia	591	Brazil	55	Brunei	673
Burma	95	Cameroon	237	Chile	56
China (Taiwan)	886	CIS	7	Colombia	57
Costa Rica	506	Cyprus	357	Czech	42
Denmark	45	Ecuador	593	Egypt	20
El Salvador	503	Ethiopia	251	Fiji	679
Finland	358	France	33	Gabon	241
Germany	49	Ghana	233	Greece	30
Guam	671	Guatemala	502	Guyana	592
Haiti	509	Honduras	504	Hong Kong	852
India	91	Indonesia	62	Iran	98
Iraq	964	Ireland	353	Israel	972
Italy	39	Japan	81	Jordan	962
Kenya	254	Korea	82	Kuwait	965
Liberia	231	Libya	218	Luxembourg	352
Malaysia	60	Malta	356	Mexico	52
Monaco	377	Morocco	212	Netherlands	31
New Zealand	64	Nigeria	234	Norway	47
Oman	968	Pakistan	92	Panama	507
P.N.G	675	Paraguay	595	Peru	51
Philippines	63	Portugal	351	Qatar	974
Saudi Arabia	966	Senegal	221	Singapore	65
South Africa	27	Spain	34	Sri Lanka	94
Swaziland	268	Sweden	46	Switzerland	41
TELKOM	*27	Thailand	66	Tunisia	216
Turkey	90	U.A.E.	971	United Kingdom	44
Uruguay	598	Venezuela	58	Y.A.R.	967
TELSTRA	*61				

### 6.2.3.1 Numbering Plan Type (PGM 104)

#### PROCEDURE

1. Press **[Trans/PGM] + 104**, then enter the *Number Plan Type* (Refer to following Table, press 1 digit).
2. Press **[HOLD/SAVE]** to accept change.

#### Number Plan Type

NUMBER SET TYPE / PRESS #	INTERCOM RANGE	DEFAULT	REMARK
1	10 – 37	Yes	As the basic type, the 1st digit of station number should be 1 – 4.
2	10 – 37	No	The station number can be changed within 79.
3	10 – 37	No	
4	700 – 727	No	
5	200 – 227	No	
6	10 – 37	No	
7	100 – 137	No	
8	10 – 37	No	The station number can be changed within 99.

**6.2.3.2 FLEXIBLE NUMBERING PLAN (PGM 105)**

*PROCEDURE*

**To set your flexible numbering plan, perform the following Steps:**

1. Press **[Trans/PGM] + 105**, then enter the *station range* (dial start and end station numbers).
2. Press **[HOLD/SAVE]** to accept change

**Numbering Plan Detail**

STATION NUMBERS	DESCRIPTION
000 001 002 003 100 101 102 103	<b>[TRANS/PGM] + 105</b>
000 001 002 003 100 101 102 103	<p>Station Number Assign. You will see the 4 station numbers corresponding to the 4 port numbers. Station number length is in the range of 2 digits through 4 digits. There are two methods for changing station number.</p> <p>Dial two station numbers - Range start station number &amp; range end station number, then LCD shows dialed range value. Press the <b>[HOLD/SAVE]</b> button, then station numbers changed from the first station number on current LCD to range end (All LEDs of BTN's are OFF.).</p> <p>Press one of FLEX 1-4 (Each FLEX 1-4 is assigned to station number 1- 4 on the current LCD), then LED of pressed Flexible button is steady on. Dial new station number and press the <b>[HOLD/SAVE]</b> button, or press other Flexible button to assign station number to other station without saving (The LED of pressed Flexible button is on.).</p> <p>If you want to delete all station numbers, press the <b>[SPEED]</b> button and press <b>[HOLD/SAVE]</b> button, then all station numbers are cleared.</p> <p>If you want to change next 4 station numbers then press <b>[▼]</b> button. If you want to change previous 4 station numbers, then press <b>[▲]</b> button.</p>
000 001 002 003 100 400 102 103	Press the <b>[HOLD/SAVE]</b> button for saving database permanently. (Ex: Press FLEX 2, dial 400 and press <b>[HOLD/SAVE]</b> button.)

### 6.2.3.3 Flexible Numbering Plan (PGM 106-107)

#### PROCEDURE

#### **Plan A (106)**

1. Press **[Trans/PGM] + 106**, then press the Flexible Button you wish to program (1-24).
2. Enter the code (refer to following Table).
3. Press **[HOLD/SAVE]** to accept change.

#### **Flex Numbering Plan A(PGM 106)**

FLEX	ITEM	DEFAULT VALUE (AT NUMBERING PLAN TYPE 1)
1	Station Group Pilot Number Range	620 – 629
2	Internal Page Zone Number Range	501 – 510
3	Internal All Call Page	543
4	Meet Me Page	544
5	External Page Zone	545
6	All Call Page (Internal/External)	549
7	SMDR Account Code	550
8	Flash Command to CO Line	551
9	Last Number Redial (LNR)	552
10	Do-Not-Disturb	553
11	Call Forward	554
12	Speed Dial Program	555
13	MSG Wait/Call-Back Enable	556
14	MSG Wait/Call-Back Answer	557
15	Speed Dial Access	558
16	Cancel DND/CFW/Pre-selected MSG Features	559
17	SLT Hold	560
18	Reserved	
19	Reserved	
20	SLT Program Mode Select	563
21	ACD Reroute	564

#### **Plan B (107)**

1. Press **[Trans/PGM] + 107**, then press the Flexible Button you wish to program (1-24).
2. Enter the code (refer to following Table).
3. Press **[HOLD/SAVE]** to accept change.

**Flex Numbering Plan B (PGM 107)**

<b>FLEX</b>	<b>ITEM</b>	<b>DEFAULT VALUE (AT NUMBERING PLAN TYPE 1)</b>
1	Alarm Reset	565
2	Group Call Pick-Up	566
3	UCD Group DND	568
4	Night Answer	569
5	Call Park Location Range	601 – 608
6	Direct Call Pick-Up	7
7	Access CO Line Group	801 – 808 (8 + CO Group Number)
8	Access Individual CO Line	8801 – 8812 (88 + CO Line Number)
9	Tie Routing Access	8901
10	Access Held CO Line Group	8*
11	Access Held Individual CO Line	8#01 – 8#12 (8# + CO Line Number)
12	Access to CO line in the 1st available CO Line Group	0
13	Attendant Call	9
14	Door Open – 1	*1
15	Door Open – 2	*2
16	VM MSG Wait Enable	*8
17	VM MSG Wait Cancel	*9

### 6.2.3.4 IP setting for System (PGM 108)

#### PROCEDURE

---

##### **IP Name (Use the # to skip)**

1. Press **[Trans/PGM] + 108**, then press **[FLEX1]**.
2. Enter the code (max. 16 characters).
3. Press **[HOLD/SAVE]** to accept change.

##### **Server IP Address**

1. Press **[Trans/PGM] + 108**, then press the **[FLEX2]** button.
2. Enter the Server IP Address (12 digits).
3. Press **[HOLD/SAVE]** to accept change.

##### **CLI IP Address**

1. Press **[Trans/PGM] + 108**, then press the **[FLEX3]** button.
2. Enter the CLI IP Address (12 digits).
3. Press **[HOLD/SAVE]** to accept change.

##### **Gateway Address (Use the # to skip)**

1. Press **[Trans/PGM] + 108**, then press the **[FLEX4]** button.
2. Enter the Gateway Address (12 digits).
3. Press **[HOLD/SAVE]** to accept change.

##### **Subnet Mask Address (Use the # to skip)**

1. Press **[Trans/PGM] + 108**, then press the **[FLEX5]** button.
2. Enter the Subnet Mask (12 digits).
3. Press **[HOLD/SAVE]** to accept change.

## SECTION 7. TROUBLESHOOTING

PROBLEM	CAUSE / SYMPTOM	SOLUTION
System power failure	Power short circuit in some board(s)	Exchange the malfunctioning board for one in good working condition.
	LD6 LED light on the MBUB is OFF or blinking	Dust each board. Check the PSU fuse. Replace the PSU with the appropriate type.
System does not operate	Power short circuit in some board(s)	Check the connection of each board with MBUB. Press the Reset button.
	Bad board connection	Check the PSU. Check the short circuit on MBUB or other boards.
	System database broken	Press the Reset button when the DIP switch (for database protection) is in the default position.
DKTU does not operate	Bad extension circuit	Exchange the malfunctioning board for one in good working condition.
	Bad connection between the MBUB/DTIB and keyset	The connection between the system and the keyset must be repaired. Check the connection between the line of SLT and DKT on the MDF, and fix any mismatching.
	The limit of installation distance	Check the distance between the MBUB/DTIB and keyset.
	Bad keyset	Plug the keyset into another extension port that has been verified as working. If the keyset does not work, replace the keyset.
SLT does not operate	Bad MBUB or SLIB board	Exchange the board for one in good working condition.
	Bad connection between the MBUB/SLIB and SLT	Check that the board connection between the lines of SLT and DKT on the MDF, and fix any mismatching.
CO line operation	ACNR Fail	Check the PRCPTU4, and CPCU4
	Bad connection	Check the connection.
ISDN board does not operate	The position of switch	Check the switch for term and So/To position
	Network problem	Check the Network.
Noise on External Paging port	Induced noise on the wire between the system and the amplifier	Use a shielded cable as the connection wire between the system and amplifier. A short shielded cable is recommended.
Distorted External MOH	Excessive input level from external music source	Decrease the output level of the external music source by using the volume control on the music source.