

# Karel MS26s

Telephone System

*Installation  
&  
Maintenance  
Guide*



Edition 3.1

**KAREL**



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# INTRODUCTION

*This Installation and Maintenance Guide provides an overall technical reference on the KAREL MS26s system and its accessories and includes descriptions, structures and capabilities as well as the installation and maintenance information.*

*This guide is formed up of three main chapters:*

- 1) Technical Reference: The system outline is given and all the accessories are described. Brief information about the software structure of the system is presented and finally the technical specifications of the system are listed.*
- 2) Installation Guide: The basic system installation and wiring instructions are presented. Following the system installation part, the installation and wiring of the accessories are explained.*
- 3) Maintenance Guide: The basic steps to solve the problems faced after the installation of the system are given.*



# *TECHNICAL REFERENCE*





# I. SYSTEM

MS26s system has a capacity of 2 lines and 6 extensions.

The system consists of the following parts :

- CBN26s Cabinet made of plastic,
- MB26s Motherboard,
- PS38 Power Adaptor, including a plastic cabinet (called PS38CB) and a power card (called PS38CR).

See the following figures to have a general idea about the outlook as well as the structure of the system.

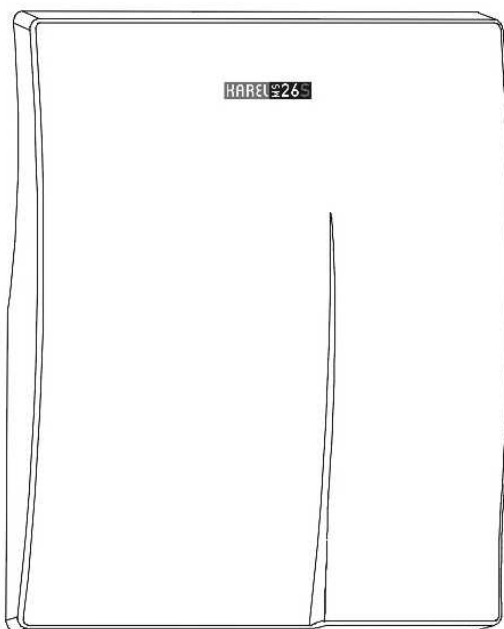


Figure A-1

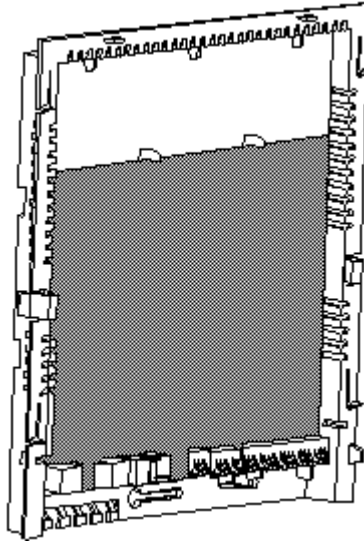


Figure A-2

## I.1. MB26s MOTHERBOARD

The MB26s motherboard consists of the microprocessor, utility, DTMF, switching, line and extension circuitries. See the following figures for the location of these circuitries and the operational flow diagram of MB26s motherboard.

CPU & Switching & Utility Circuitries	Extension 15	Extension 16
	Extension 14	Line 2
	Extension 13	
	Extension 12	Line 1
	Extension 11	

Figure A-3

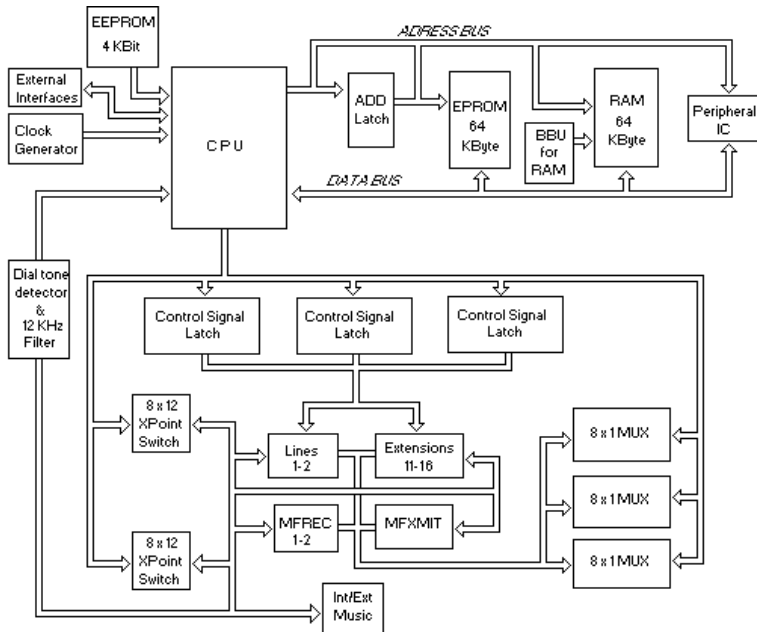


Figure A-4

The MS26s motherboard has 2 lines and 6 extensions. By default, the extensions have numbers 11 to 16 whereas the lines have numbers 1 or 2.

The dimensions of MB26s are 21 cm x 23 cm and the weight is 0.35 kg.

## I.2. POWER TO THE SYSTEM

MS26s system can operate for the mains input of 230 VAC 50 Hz, which is processed by the PS38 Power Adaptor.

Inside the fuse slot on the PS38CR card of the PS38 Power Adaptor, there exists a T-Type fuse of 0.63A / 250 VAC for the first step protection.

### I.2.A. PS38 POWER ADAPTOR

The outlook of PS38 Power Adaptor is illustrated in the following figure .

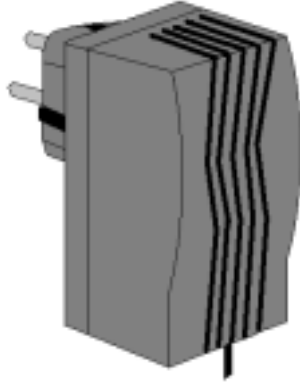


Figure A-5

PS38 Power Adaptor has the PS38CR Power Card surrounded by the PS38CB Cabinet, which is made of plastic.

PS38 Power Adaptor is a Switched Mode Power Supply (SMPS) operating at mains voltage. Receiving 220 VAC over the mains, PS38CR generates  $-24$  VDC and 8 VDC for the system and accessories as well as 64 Vrms ring signal. The output of 8 VDC is also regulated to 5 VDC by the MB26s motherboard.

PS38 Power Adaptor can be directly plugged in the mains socket on the wall. The connection to the system is established via the built-in cable that is directly connected to PS38CR. The 8-pin RJ plug at the end of this cable is to be attached to the 8-pin RJ socket (named POWER) on MB26s motherboard.

The pin-out of the POWER socket on MB26s motherboard is illustrated in the following table.

POWER Socket	
Pin	Signal
1	GND
2	GND
3	- 24 VDC
4	- 24 VDC
5	+ 8 VDC
6	+ 8 VDC
7	GND
8	64 Vrms (Ring)

The dimensions of PS38 are 11 cm x 6 cm x 8 cm and the weight is 0.25 kg.

## I.2.B. POWER FAILURE TRANSFER STATIONS

In case of power failure the stand-by battery backup allows the system resume operation without any interrupt.

In case there is no battery connected to the system when the power goes off, the lines 1 and 2 are automatically connected to extensions 11 and 12, respectively.

See the following figure illustrating the power failure transfer stations of MS26s system.

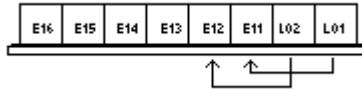


Figure A-6

## I.3. EXTERNAL MUSIC CONNECTOR

Any external music source (tape recorder, radio or CD player) can be connected to the system to be used for background music facility and to be transmitted to the parties parked or put on hold. This connection is established via the 2-pin MUS connector on the MB26s motherboard.

## I.4. EXTERNAL RELAY

An external relay which is rated for 250 VAC - 24 VDC at a maximum current of 2 A exists on the system motherboard to be used to activate either a door opener or an external ringer. The connection to the external relay is established through the 2-pin XREL connector on the MB26s motherboard. The selection among these devices is made by programming.



## II. ACCESSORIES

To offer you a full telecommunication system, MS26s is equipped with many accessories. These accessories are shown in the following figure and explained one by one in the following sections.

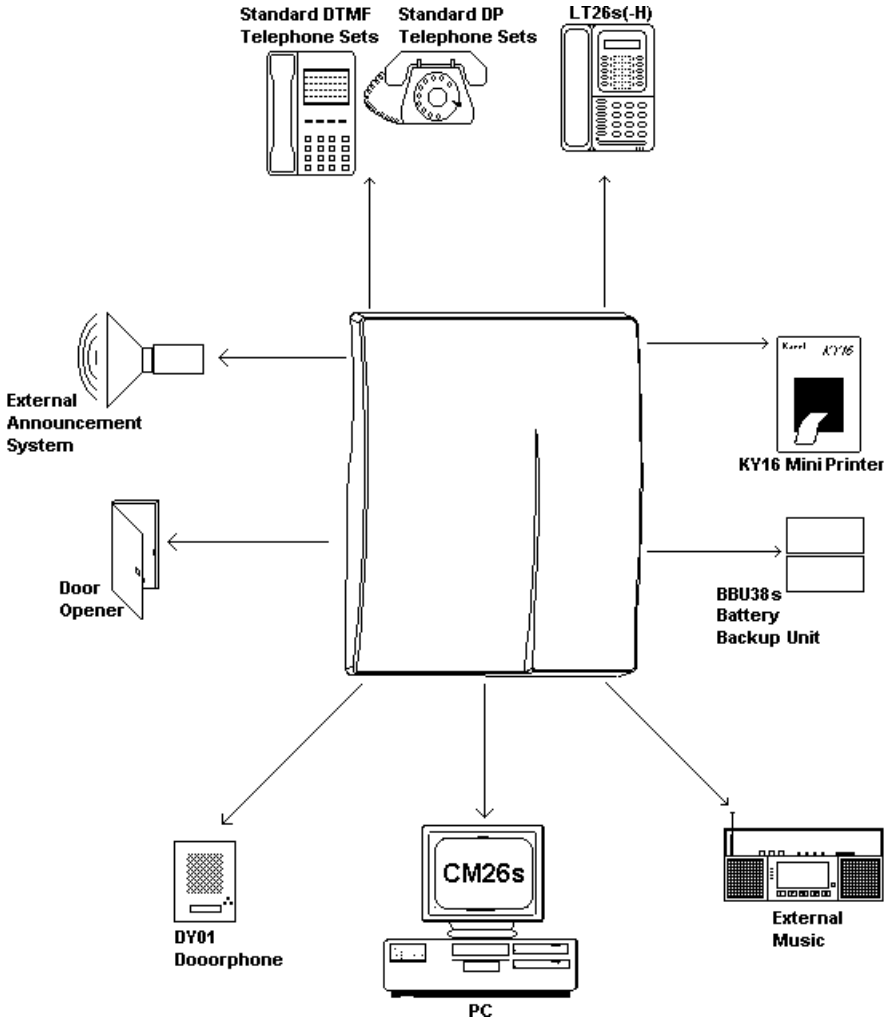
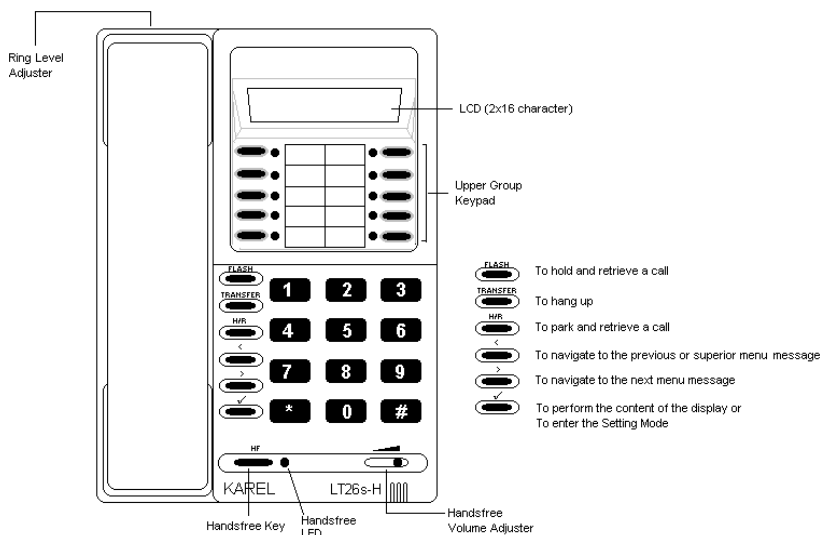


Figure A-7

## II.1. FEATURE PHONES - LT26s(-H)

There are two types of LT26s Feature Phones, LT26s Feature Phone and LT26s-H Handsfree Feature Phone, the second one being half-duplex. The LT26s(-H) Feature Phone is equipped with a 2 x 16 menu driven LCD, which offers self explanatory messages for the user to monitor the state of operation and access many system features. Also, it is possible to make one touch dialing for accessing any extension / line or calling a Private Pool number, by the help of the 10 programmable keys in the upper keypad.

The outlook of LT26s-H Handsfree Feature Phone is illustrated in the following figure.



Handsfree Key, Handsfree Volume Adjuster and Handsfree LED are available only on the handsfree versions.

Figure A-8

The data cabling of LT26s(-H) Feature Phones is made via the 6-pin RJ socket (named LT/OP) on the MB26s motherboard. The signaling between the system and consoles, feature phones is illustrated in the following table.

MB26s Motherboard LT/OP Socket Pin No	Signal	LT26s(-H) Feature Phone RJ Socket Pin No
1	+8 VDC	6
2	Busy	-
3	A (ext.11)	3 (ext. 11)
4	B (ext.11)	4 (ext. 11)
5	GND	2
6	Data	1



The input of +8 VDC is regulated to +5 VDC by LT26s(-H) telephone card.

The dimensions of LT26s(-H) are 22 cm x 6.5 cm x 16 cm and the weight is 0.9 kg.

## II.2. MINI PRINTER – KY16

MS26s system offers *Call Record Listing* facilities, by keeping the records of the external calls and storing them in its non-volatile memory against any power failure. You may obtain these records by way of some external devices.

One of these external devices is KY16 Mini Printer, which gives 16-column printout using an Epson type print head.

The following figure illustrates the outlook of KY16 Mini Printer.

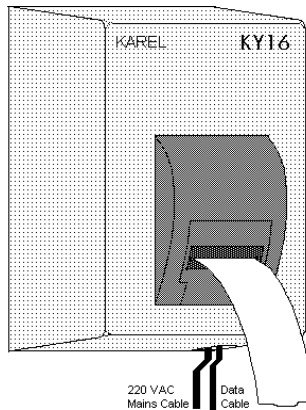


Figure A-9

The data cabling of KY16 is made via the 6-pin RJ socket (named LT/OP - the same socket used by Karel LT26s(-H) Feature Phones) on the MB26s motherboard. The signaling between the system and KY16 is illustrated in the following table.

MB26s Motherboard LT/OP Socket Pin No	Signal	KY16 Card Connector Pin No
1	+8 VDC	-
2	Busy	2
3	A (ext.11)	-
4	B (ext.11)	-
5	GND	1
6	Data	3

Below is a sample printout of a call record obtained from KY16.

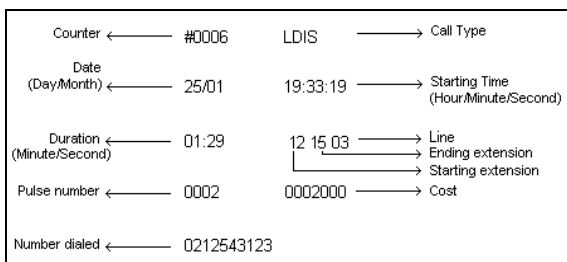


Figure A-10

The dimensions of KY16 are 15 cm x 20.5 cm x 9 cm and the weight is 1.3 kg.

- **NOTE**

Only one of the two CRL accessories - namely KY16 Mini Printer and CM26s CRL Interface - can be connected to the system at a time. The selection among these devices is made by programming.

## **II.3. PC INTERFACE – CM26s**

Using the serial communication port on MB26s motherboard, a PC can be connected to the system. KAREL provides the CM26s Call Record Listing (CRL) Interface for PC connection.

Call records, which are transferred to the PC via the serial communication port on MB26s motherboard, are processed by the CM26s CRL software. A 3.5" diskette with the necessary software, a 5 meter long cable for PC-Exchange connection and a security plug are provided. The cable has a 25-pin D-type plug at the PC end and a 4-pin RJ plug at the exchange end, to be attached to the 4-pin RJ socket (named CM) on MB26s motherboard.

The software operates under Windows.

- **PC REQUIREMENTS :**

The PC to be used with MS26s should have the following specifications:

- a) 640 KB RAM (at least)
- b) Windows (not older than 3.1)
- c) A harddisk
- d) A serial port

- **SIGNALING AND COMMUNICATION PARAMETERS :**

The signaling between the system and the PC is illustrated in the following table. Since the PC-Exchange cable has a 25-pin plug at the PC end, it is necessary to employ a 25-pin to 9-pin converter plug, in order to use the 9-pin connector of the PC:

MB26s Motherboard CM Socket Pin No	Signal	PC	
		25-pin Connector Pin No	9-pin Connector Pin No
1	PC GND	7	5
2	TXD	3	2
3	RXD	2	3
4	Busy	-	-

The signal names above are given with respect to MS26s system and these pin assignments are valid only for IBM compatible devices. If your device is not IBM compatible, then you must provide the requested pin connections to match the signaling parameters of the system.

The communication protocol for PC - Exchange connection is illustrated in the following table:

For PC	
Data Bits	8
Stop Bit	1
Parity	None
Baud Rate	4800 Bps

The CM26s interface is able to set the communication protocol to the appropriate values, automatically.

- **DATA FORMAT OF CM26s :**

Field No	Information
1	#; indicates start of record
2	4 digit counter value
3	Space
4	Call type
5	Space
6	Date in the format dd/mm/yy
7	Space
8	Starting time of the call in the format hh:mm:ss
9	Space
10	Call duration in the format hh:mm:ss
11	Space
12	Starting extension number
13	Space
14	Ending extension number
15	Space

16	Line number
17	Space
18	Common Pool information
19	Space
20	Number dialed
21	Space
22	Metering Pulse count
23	Space
24	Call cost

- Call type:

LDIS	Long Distance
INTL	International

Call type field and the preceding space are not sent to the PC for local calls.

- Common pool information field contains the character "O" for the calls made from the common pool.

● **NOTES:**

Only one of the two CRL accessories - namely KY16 Mini Printer and CM26s CRL Interface - can be connected to the system at a time. The selection among these devices is made by programming.

## II.4. DOORPHONE – DY01

MS26s system has a built-in circuitry, which can drive DY01 Doorphone. Any user of the system can access the doorphone and make a conversation with the party near the doorphone. The voice path is full duplex. The doorphone has a ring button on it. This ring button can be utilized to ring an external ringer or the operator. DY01 doorphone has a speech processor card inside the metal box.

The outlook and structure of DY01 is illustrated in the following figure.

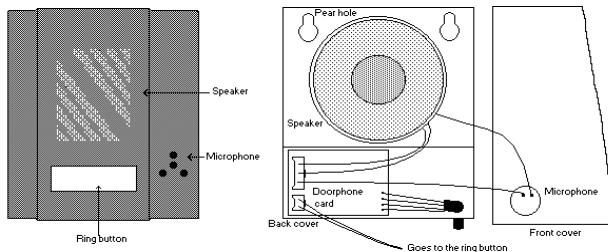


Figure A-11

The pin-out of the 4-pin RJ socket (called DIA) used to connect DY01 to MB26s motherboard is illustrated in the following table.

DIA Connector	
Pin no	Signal
1	SPEECH
2	GND
3	+ 5 VDC
4	BELL

The dimensions of the DY01 are 12 cm x 14 cm x 3 cm and the weight is 0.5 kg.

## **II.5. EXTERNAL ANNOUNCEMENT SYSTEM**

Any external announcement system can be connected to MS26s system through the 4-pin RJ socket (named DIA - the same socket used by DY01 doorphone) on MB26s motherboard.

## **II.6. BATTERY BACKUP UNIT - BBU38s**

BBU38s is a stand-alone power supply module enhanced with battery backup circuitries.

BBU38s contains two separate boxes, called as the main and battery boxes. The main box includes a transformer and a card, whereas the battery box is designed to cover the battery.

### **IMPORTANT**

PS38 Power Adaptor is not used when BBU38s is connected to the MS26s system.

The outlook of both boxes as well as the inner structure of the main box of BBU38s are illustrated in the following figure.

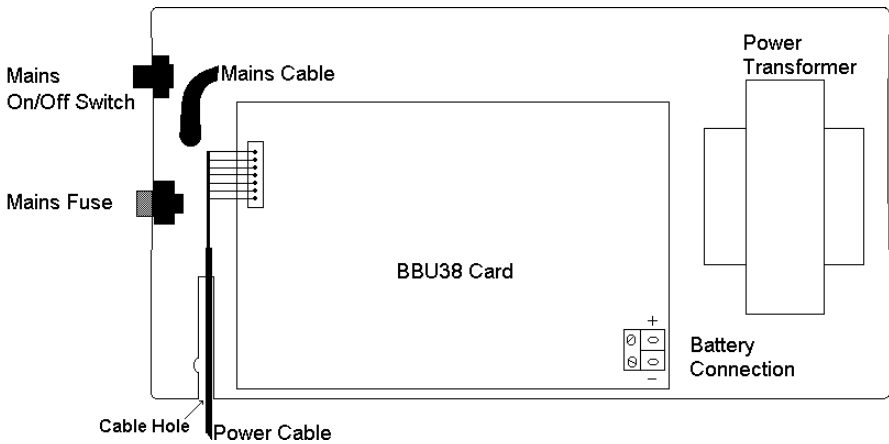
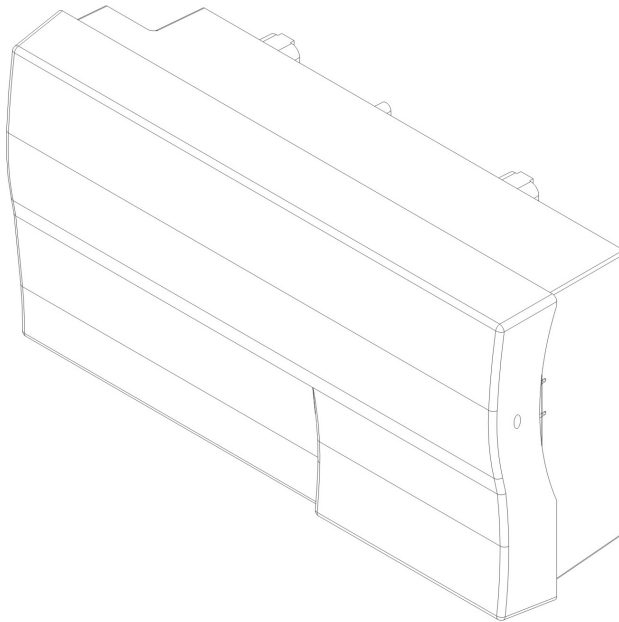


Figure A-12

BBU38s Battery Backup Module has a built-in mains cable which is to be attached to the mains socket. The module has another built-in cable with an 8-pin RJ plug at the end, which is to be connected to the corresponding socket (named POWER – the same socket used by PS38 Power Adaptor) on the MB26s motherboard.

Receiving 220 VAC over the mains, BBU38s generates –24 VDC and 8 VDC for the system and accessories as well as 64 Vrms ring signal. The output of 8 VDC is also regulated to 5 VDC by the MB26s motherboard.

By the help of BBU38s module, MS26s system can be backed up with a battery of 12 VDC in order to provide the continuity of the operation in case of mains failure. For the cases where a battery is to be connected to the system, it is strongly recommended to choose a dry battery for the proper operation.

The MS26s system that is equipped with a 12 V – 4 Ah battery can continue to run for 4 hours under an average traffic of 35%.

BBU38s is also capable of charging the battery while the system power is on and the system is running under low traffic. Besides, there exists a low voltage battery cut-off circuitry, which turns itself off when the battery voltage goes below 8.5 VDC and does not start until the battery voltage is above 11.5 VDC. So, preventing full discharge of the battery BBU38s make the lifetime of the battery longer.

BBU38s module is protected by an F-type fuse of 1 A / 250 VAC on the mains input and another F-Type fuse of 3.15 A / 12 VDC on the battery input.

The dimensions of the BBU38s are 24.5 cm x 13 cm x 8 cm and the weight is 1.5 kg.

## **II.7. STANDARD TELEPHONE SETS – LADIN, FULYA**

Any ordinary telephone set, may be DP or DTMF, can be connected to MS26s system including KAREL's own Ladin and Fulya telephone sets, which are both DP/DTMF switchable.

The following figure illustrates the outlook of Ladin.

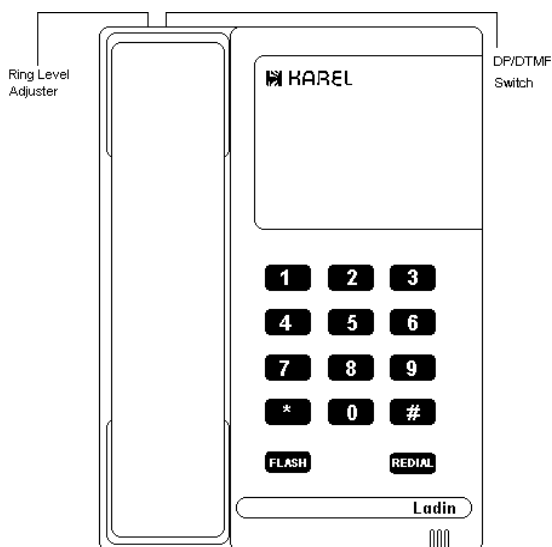


Figure A-13

The following figure illustrates the outlook of Fulya.

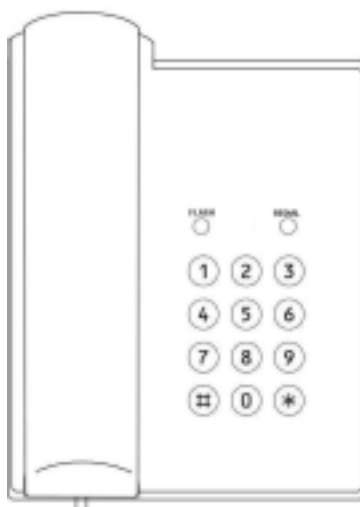


Figure A-14

The dimensions of the Ladin are 22 cm x 6.5 cm x 15.5 cm and the weight is 0.6 kg.

The dimensions of the Fulya are 16 cm x 8 cm x 22 cm and the weight is 0.5 kg.



## II.8.

## FILTER & PROTECTION UNIT – FPBASE, FPEXP

The external lines that are connected to the system and the extension lines coming from other buildings are open to any environmental effects like lightning or AM radio interference.

In order to protect the system against lightning and radio interference, KAREL has external units that can be connected to both extensions and lines. These units are presented in two different models:

- a) FPBASE Filter & Protection Base Unit
- b) FPEXP Filter & Protection Expansion Unit

Both units are capable of handling four lines. The difference between FPBASE and FPEXP is the base cover, which exists only on FPBASE unit. FPEXP units are installed on top of an FPBASE unit. So, if a Filter and Protection Unit is required for a system then an FPBASE unit must be used and depending on the capacity of the ports that must be filtered and protected, any number of FPEXP units can be added.

The outlook and structure of FPBASE and FPEXP units are illustrated in the following figure:

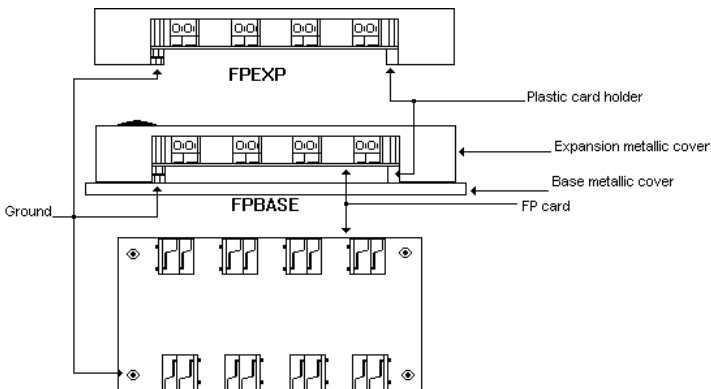


Figure A-15

The dimensions of the FPBASE are 18 cm x 12 cm x 3 cm and the weight is 0.4 kg.

The dimensions of the FPEXP are 17 cm x 12 cm x 2.5 cm and the weight is 0.3 kg.

### IMPORTANT

It is not recommended to connect FPBASE and FPEXP units to lines which have metering pulses, against the risk of metering pulses being suppressed by the filter elements. Instead, the SPBASE and SPEXP units can be connected to such lines for protection against high voltage.

## II.9.

## PROTECTION UNIT – SPBASE, SPEXP

The external lines that are connected to the system and the extension lines coming from other buildings are open to environmental effects like lightning. Also, in some instances there may be 220 VAC leakage to extensions and lines.

Although the 220 VAC leakage through lines is not risky due to the transformers employed for isolation, the leakage through extension ports may be quite destructive for the DS200 system.

In order to protect the system against lightning and 220 VAC leakage, KAREL has external units that can be connected to both extensions and lines. These units are presented in two different models:

- a) SPBASE Protection Base Unit
- b) SPEXP Protection Expansion Unit

Both units are capable of handling four lines or extensions. The difference between SPBASE and SPEXP is the base cover, which exists only on SPBASE. SPEXP units are installed on top of an SPBASE unit. So, if a Protection Unit is required for a system then an SPBASE unit must be used and depending on the capacity of the ports that must be filtered and protected, any number of SPEXP units can be added.

The outlook and structures of SPBASE and SPEXP units are the same as FPBASE and FPEXP units (see Figure A-15). SPBASE and SPEXP employ different circuitries than FPBASE and FPEXP, in the sense that SPBASE and SPEXP units have fuses instead of inductors and they have no filters on board.

### IMPORTANT

It is highly recommended to connect SPBASE and SPEXP units to extensions, which may be subject to 220 VAC leakage or to the extensions going out of the building.

The dimensions of the SPBASE are 18 cm x 12 cm x 3 cm and the weight is 0.4 kg.

The dimensions of the SPEXP are 17 cm x 12 cm x 2.5 cm and the weight is 0.3 kg.

## III. SOFTWARE

MS26s system is a Stored Program Controlled (SPC) system. It has a microprocessor, which controls the operation of the system and an EPROM, which stores the software of the system. All the default system and port parameters are stored in the EPROM.

Though MS26s is a small capacity system, the software is designed to provide a full feature system. There are three categories for the features of the system:

- 1) User features,
- 2) Operator features,
- 3) Programs.

User features are the software facilities, which may be activated by any user of the system.

Operator features are the software facilities, which may be activated only by the operator of the system. The operator is the first extension of the system, i.e. the extension who has the access code "11".

Programs are the codes, which may be entered only by the system supervisor, after the system is put in programming mode by the system supervisor. By default, the operator is the system supervisor. By programming, most of the parameters, which control the operation of the system, can be changed.

The software facilities are given in the relevant guides together with their details.



## IV. TECHNICAL SPECIFICATIONS

GENERAL SPECIFICATIONS		
1.	Capacity	2 lines / 6 extensions + 1 doorphone channel
2.	Control	SPC 80C32 Processor EPROM (512 Kbit) EEPROM (4 KBit) 256 Kbit Static RAM With NiCd Battery Backup
3.	Switching	Space Division CMOS Crosspoint Switch
4.	Power	230 VAC - 50 Hz. Stand-by power consumption: 5W Maximum power consumption: 15W Power failure: <ul style="list-style-type: none"> <li>• Optional Battery Backup with 12 VDC</li> <li>• Power failure transfer stations</li> </ul>
5.	Dialing	Dial Pulse (DP) 10 pps Dual Tone Multifrequency (DTMF) 140 msec
6.	Dialing conversions	DP - DTMF, DTMF - DP
7.	Speech paths	8 (Nonblocking)
8.	MF Receiver capacity	3 (2 + 1)
9.	Connectors	Lines and extensions: 623K4 (GEO4) type External relay and external music: 623K4 type Power and external interfaces: RJ type
10.	External connections	Standard Telephones: 2 wires KAREL Feature Phone (LT26s(-H)): 5 wires KAREL Mini Printer (KY16): 3 wires KAREL Doorphone (DY01): 4 wires PC: 3 wires Power: 8 wires
11.	CRL (Call Record Listing)	KAREL Mini Printer PC Interface
12.	CRL capacity	Approximately 600 calls

CHARACTERISTICS		
1.	Extension Interface	Station Loop: Max 1200 Ohms including the Telephone Set
2.	Max CO Line Loop Resistance	2.2 Kohms
3.	Line Interface	Loop Start With DP and DTMF Signalling 12/16 KHz Metering Pulse Detection Polarity Reversal Detection
4.	Extension Feed Voltage	-24 VDC
5.	Make-Break Ratio	33 msec make / 67 msec break
6.	Interdigit Pause For Automatic Dialer	720 ± 20 msec for DP 175 ± 5 msec for DTMF
7.	Cross-Talk Attenuation	Better than 70 dB
8.	Maximum Number of Telephone Sets Per Extension	2 telephone sets
9.	Ring Voltage Generated	64 Vrms, 25-30 Hz
10.	Minimum Ring Detected	30 Vrms, 25-30 Hz.
11.	Environmental Requirements	0 C <sup>o</sup> - +45 C <sup>o</sup> , 20% - 80% Humidity
12.	Hook-flash Duration Range	100 - 600 msec
13.	Dimensions	28 cm x 5 cm (h) x 25 cm
14.	Weight	0.8 kg
15.	Maintenance	Built-in Self-Diagnosis On Site / Remote Programming PC Console

TONE CADENCES & FREQUENCIES		
1.	Dial tone (500 Hz.)	150 msec on, 330 msec off, 150 msec on, 330 msec off, 150 msec on, 1100 msec off or continuous.
1.	Ring-back tone (500 Hz.)	1300 msec on, 3000 msec off
2.	Busy tone (500 Hz.)	660 msec on, 400 msec off.
3.	Special dial tone (500 Hz.)	790 msec on, 1800 msec off
4.	Overflow tone (500 Hz.)	260 msec on, 260 msec off, 260 msec on, 260 msec off, 260 msec on, 260 msec off, 660 msec on, 260 msec off
5.	Warning tone (500 Hz.)	40 msec on, 1000 msec off

RING CADENCES		
1.	External Call	1500 msec on, 3000 msec off
2.	Internal Call	400 msec on, 500 msec off, 400 msec on, 3000 msec off
3.	Reminder Call	1500 msec on, 770 msec off
4.	Call Back Call	400 msec on, 500 msec off, 400 msec on, 3000 msec off

DTMF tones:

		High frequency group (- 7 dBm)		
		1209 Hz	1336 Hz	1477 Hz
Low frequency group ( - 9 dBm)	697 Hz	<b>1</b>	<b>2</b>	<b>3</b>
	770 Hz	<b>4</b>	<b>5</b>	<b>6</b>
	852 Hz	<b>7</b>	<b>8</b>	<b>9</b>
	941 Hz	<b>*</b>	<b>0</b>	<b>#</b>

Nominal frequencies of MS26s may deviate  $\pm 2.5$  % from the values above.





# *INSTALLATION GUIDE*



# I. PRELIMINARY NOTICE

## I.1. DELIVERY CHECK

On the arrival at the stock or installation site, the first thing that should be done is to check all the items against the packing list. It is essential to report any missing elements immediately.

## I.2. INSPECTION

Before starting installation, it is necessary to make a visual inspection to ensure that :

- 1) The cabinets of the system as well as the covers of the accessories are not dented or scratched during the shipment.
- 2) The cards are not cracked.
- 3) There are no loose ends, damaged or loose components on the cards.

Existing damages should be reported immediately.

## I.3. ENVIRONMENTAL REQUIREMENTS

Before installation, the system should be stocked in a place where the temperature is in-between  $-40\text{ C}^{\circ}$  and  $+80\text{ C}^{\circ}$ .

At start up, you should make sure that the room where the system is to be installed is clean, well ventilated and well lit. In fact the following places must be avoided for installation:

- 1) Places exposed to direct sunlight,
- 2) Extremely hot, cold and humid places,  
Temperature must be in the range of  $0\text{ C}^{\circ}$  and  $45\text{ C}^{\circ}$  and the relative humidity must be in the range of 20% and 80%,
- 3) Places where vibrations or shocks are frequent or strong,
- 4) Places near radio broadcast antennas,
- 5) Dusty places, places where the system may be in contact with water or oil,
- 6) Sulfuric gases produced in areas where there are thermal springs, etc. that may damage the equipment,
- 7) Near high-frequency sewing machines or electric welders.



## II. SYSTEM INSTALLATION

The MS26s system is designed to be mounted on the wall. Hence, the system comes with a template and a pair of anchor plugs with screws.

The template has the same dimensions with the MS26s system, so that it can be used to choose the location of the system and to determine the points of the holes on the wall. The template also has the necessary information to hang the system on a proper location on the wall, that is the top drill hole must be 150 cm above the floor.

To install the system :

- 1) Place the template on the wall (see Figure B-1).
- 2) Drill 2 holes at the points marked on the template (see Figure B-1).
- 3) Drive the anchor plugs into the holes (see Figure B-1).
- 4) Insert the screws into the anchor plugs and fix the screws (see Figure B-1).

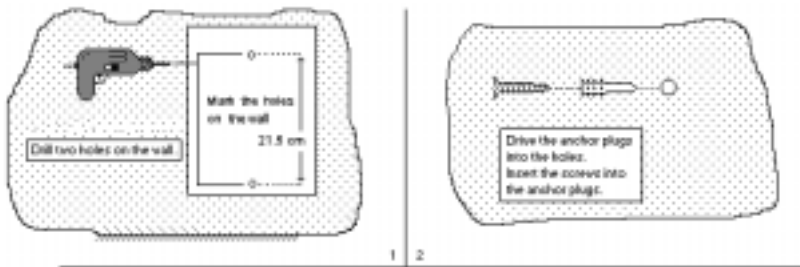


Figure B-1

- 5) Open the front cover by pressing the latches on the left and right sides (see Figure B-2) and pulling the front cover (see Figure B-3).

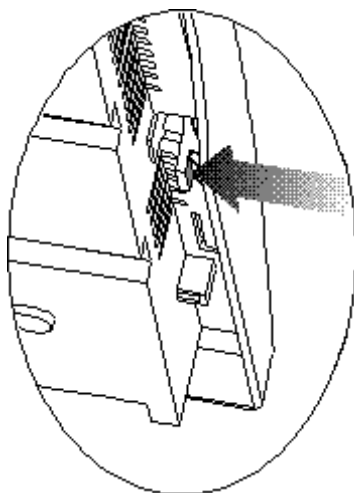


Figure B-2

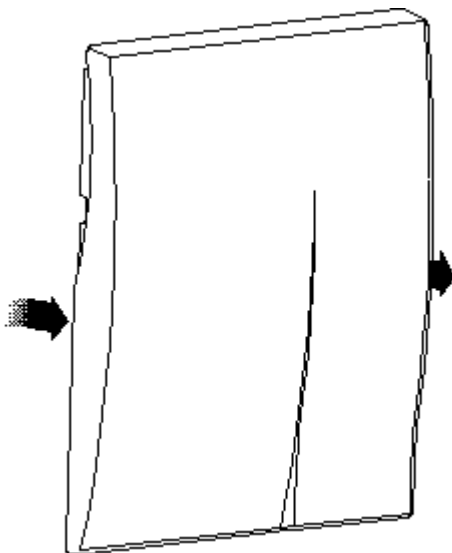


Figure B-3

- 6) Hang the cabinet on the wall by placing the two pear holes at the back of the cover over the screws (see Figure B-4).

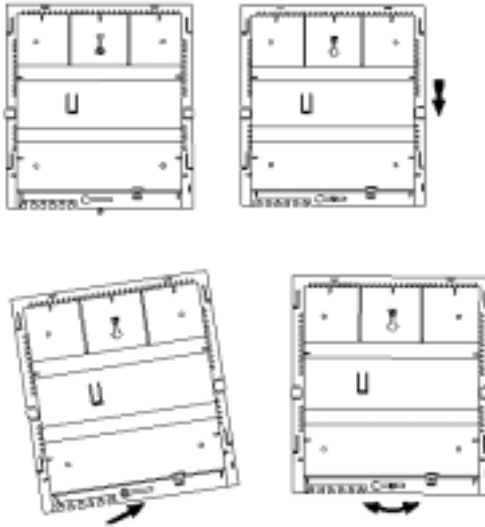


Figure B-4

It is recommended to close the front cover after the cabling of extensions / lines, accessories and power adaptor is completed.

**IMPORTANT**

1. The equipment can be installed only by the service personnel.
2. The area behind the front cover is not for operator access, hence the front cover can be opened only by the service personnel.
3. The mains socket should be installed near the equipment or should be easily accessible.

## II.1. GROUNDING

The grounding of the MS26s system has an utmost importance for the protection of the system against any lightning, or any high voltage coming through external lines, extensions or mains.

For grounding the MS26s system, the ground location at the down left corner of the MB26s motherboard (marked as M1) must be connected to a hot or cold water pipe, which may serve as the ground surface of your system. For such cases, it is of course better to construct an ideal ground, simply by inserting a metal bar (of at least 1.5 m length and 1.5 cm radius, copper is preferable) into the earth, as illustrated in the following figure.

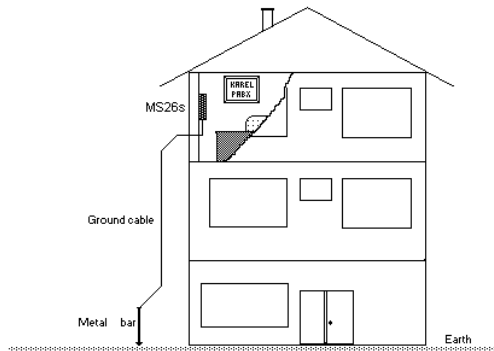


Figure B-5

## II.2. PS38 POWER ADAPTOR

The PS38 Power Adaptor has an embedded mains plug for direct connection to the mains outlet and a built-in cable (of 185 cm) for connection to the system.

For power connection :

- 1) The 8-pin RJ plug at the free end of the cable must be passed through the cable holes at the bottom part of the cabinet and connected to the POWER socket on the MB26s motherboard.
- 2) The adaptor must be plugged in the mains socket.

The following figure illustrates the connection of PS38 Power Adaptor.



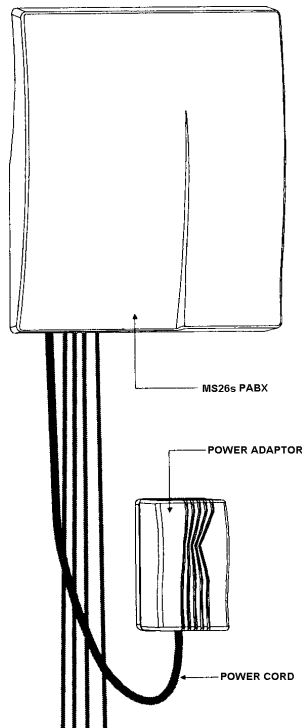


Figure B-6

## II.3. MB26s MOTHERBOARD

The MB26s motherboard comes installed in the cabinet. However, if it is necessary to take out the MB26s motherboard from the cabinet, the holder at the bottom must be pressed and the card must be removed (see Figure B-5). To insert MB26s back in the cabinet, the upper side of the card must be placed under the plastic clips at the top and then, the bottom side of the card must be pushed till the holder at the bottom fixes the card.

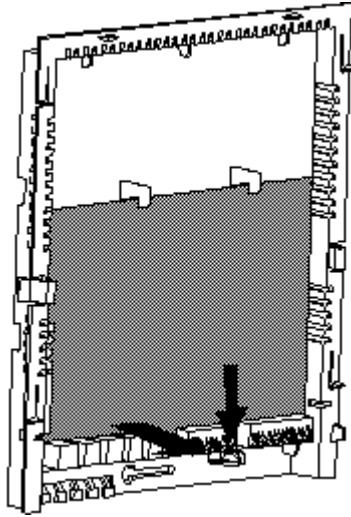


Figure B-7

### III. ACCESSORY INSTALLATION

The following figure is given as a reference for the connectors of extensions / lines, accessories and power adaptor, that are attached to the MB26s motherboard.

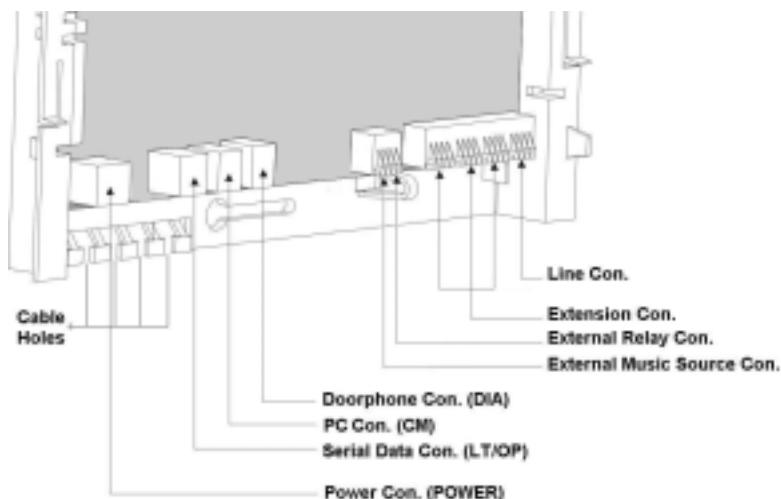


Figure B-8

#### III.1. FEATURE PHONES

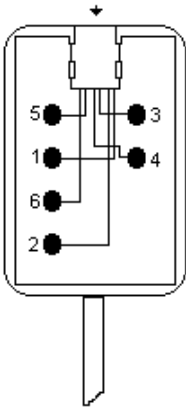
- **CABLING**

Each LT26s(-H) Feature Phone comes with a telephone data cable, which is a 2.5-meter long cable formed up of two parts. One is a cable with a 6-pin RJ plug at both ends and the other one is a connection box. The connection box has a 6-pin RJ socket at one side so that one of the free ends of the cable can be fixed to the connection box easily. The other free end of the cable has also the corresponding RJ socket at the backside of the telephone.

The system itself also comes with the system data cable, which is similar to telephone data cable. One end of the cable is fixed to the connection box. The other free end of the cable has a 6-pin RJ plug, which is to be inserted to the LT/OP socket on the MB26s motherboard, in order to carry data signals for the telephones.

The following signals are present on the connection box of system data cable.

Cable to the connection box of the telephone data cable



- 1- Data signal
- 2- Ground (GND)
- 3- A (ring) signal for extension 11
- 4- B (tip) signal for extension 11
- 5- Busy
- 6- + 8 VDC

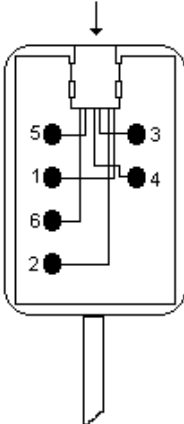
Note : Busy signal is for KY16 Mini Printer.

Cable from the system

Figure B-9

The following signals are present on the connection box of telephone data cable.

Cable to the telephone



- 1- Data Signal
- 2- Ground (GND)
- 3- A (ring) signal from the connector of the relevant extension port.
- 4- B (tip) signal from the connector of the relevant extension port.
- 5- No Connect
- 6- + 8 VDC

Cable to the connection box of the system data cable

Figure B-10

To make the cabling of each LT26s(-H) Feature Phone :

- 1) The RJ plug on the system data cable must be passed through the cable holes at the bottom part of the cabinet and connected to the LT/OP socket on the MB26s motherboard.
- 2) The Data / + 8 VDC / GND signals on the connection box of the system data cable must be wired in parallel to the corresponding pins of the connection box of the telephone data cable.
- 3) The RJ plug at the free end of the telephone data cable must be inserted into the female correspondant on the telephone.
- 4) For each LT26s(-H) telephone, the wiring of the A / B terminals must be made separately, by connecting the wires from the relevant extension connector to the A / B terminals in the connection box of the telephone data cable.

The following figure illustrates the cabling of LT26s(-H) Feature Phones.

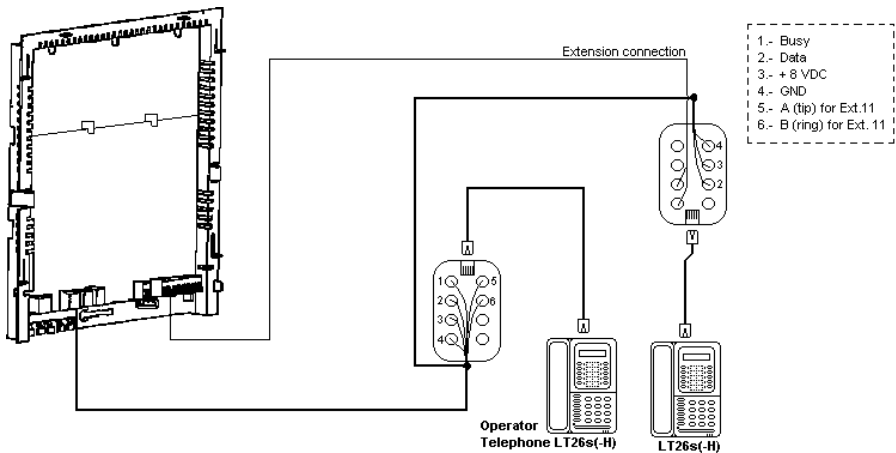


Figure B-11

In case the operator's LT26s(-H) Feature Phone is located near the system, the method of cabling may be simplified as follows :

- 1) The RJ plug on the system data cable must be passed through the cable holes at the bottom part of the cabinet and connected to the LT/OP socket on the MB26s motherboard.
- 2) The connection box must be removed from the telephone data cable.
- 3) One of the RJ plugs on the telephone data cable must be attached to the RJ socket on the connection box of the system data cable.
- 4) The other RJ plug at the free end of the telephone data cable must be inserted into the female correspondant on the telephone.
- 5) In such a case there is no need to make a separate wiring for the A / B terminals either, as the system data cable is designed to carry the A / B signals for the operator.

- **DISTANCE OF TELEPHONES TO THE SYSTEM:**

If the Data / 8 VDC / GND and A / B (ring / tip) wires of a feature phone are carried separately as described in the "Cabling" part above, the feature phone can be installed more than 5 meters away from the system.

In such a case, the maximum distance between a single feature phone and the system can be 250 meters, if the wiring is made with ordinary wires.

However, if more than one set will be installed to the system and if the Data / 8 VDC / GND wires of the sets are wired in parallel as described in the "Cabling" part above, the maximum distance of 250 meters decreases proportionally. For example, if 5 LT26s(-H) Feature Phones are connected to the system in this way, the distance between the system and the LT26s(-H) Feature Phones cannot exceed 50 meters.

In such a case, the performance can be further improved by connecting +8 VDC power supply, if the data voltage of the ultimate console is below 7.5 VDC, between 8 VDC and GND terminals.

- **EXTENSION NUMBER SETTING :**

After the wiring of LT26s(-H) Feature Phones, the extension setting of these sets should be made by the "H/R" key. Keep the key pressed till an extension number is shown on the display. Then, press the same key several times till the correct extension number appears on the display.

## III.2. MINI PRINTER

The KY16 Mini Printer has the built-in mains and data cables. Also it has a paper roll and a printer ribbon installed. A pair of anchor plugs with screws for the printer to be mounted on the wall as well as two spare paper rolls and a spare printer ribbon are also provided.

### • **INSTALLATION:**

- 1) Drill two holes 12.5 cm apart at a height of 150 cm.
- 2) Drive the anchor plugs into the holes.
- 3) Insert the screws into the anchor plugs.
- 4) Hang the printer on the screws.

The following figure illustrates the installation.

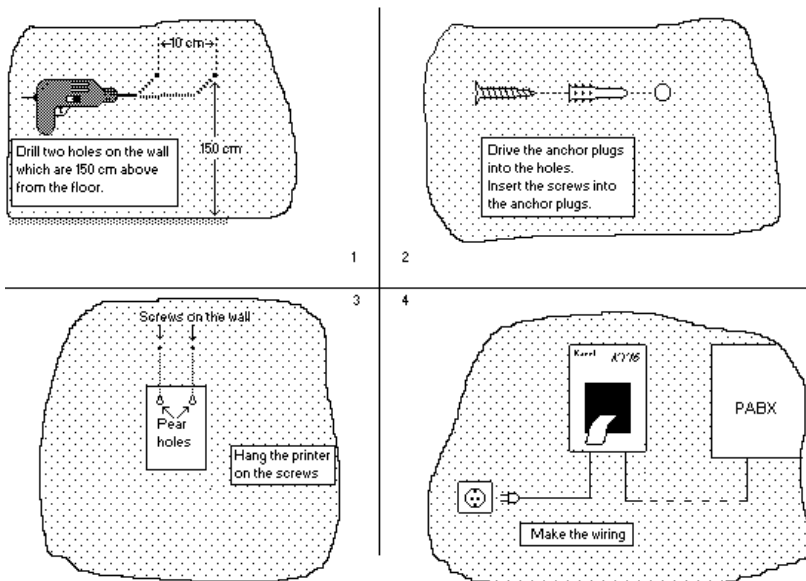


Figure B-12

### • **CABLING**

The power cabling can be established via the built-in mains cable.

The printer data cable that emerges from the bottom of the KY16 Mini Printer has a connection box (with a cable) at its free end. The printer end of the data cable is attached to the connection box through a 6-pin RJ plug. The cable that comes out of the connection box is not used for connecting KY16 to the MS26s system.

The following signals are present on the connection box of printer data cable .

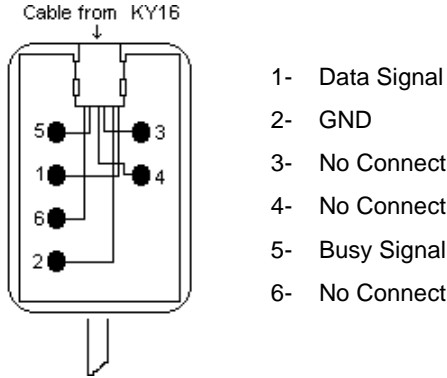


Figure B-13

For connecting KY16 to the system, the Data / Busy / GND signals on the connection box of the system data cable (used by LT26s(-H) Feature Phones as well) must be wired in parallel to the corresponding pins of the connection box of the printer data cable (see Figure B-13).

In the absence of LT26s(-H) Feature Phones connected to the system, the method of cabling for KY16 may be simplified as follows :

- 1) The RJ plug at the end of the cable that comes from the printer must be disconnected from the connection box.
- 2) This RJ plug must be then passed through the cable holes at the bottom part of the cabinet and then, connected to the LT/OP socket on the MB26s motherboard.

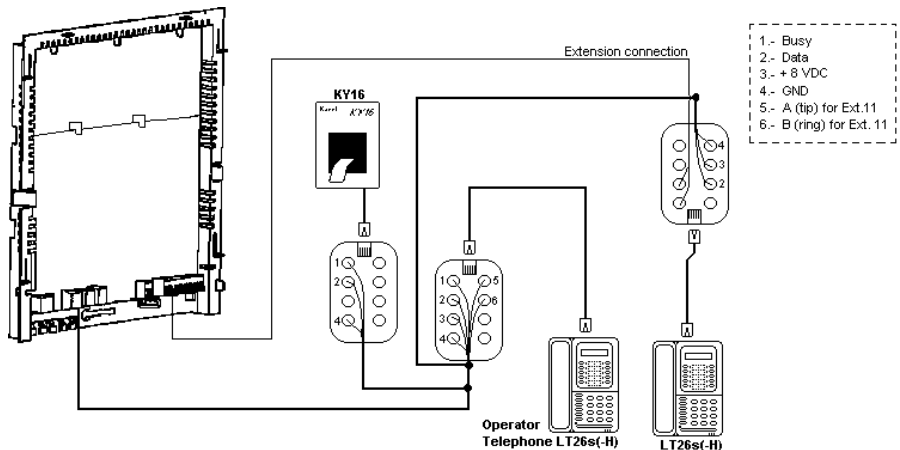


Figure B-14



After the installation and cabling of KY16 is completed, it is also necessary to enter the related programming code for selecting KY16 as the CRL (Call Record Listing) media. Refer MS26s Programming Guide.

- **DIP-SWITCH SETTING**

For KY16 to operate with MS26s system, the dip-switches that exist on the printer card inside the KY16 cabinet must be set as follows:

Dip-switch	Position
1	OFF
2	OFF
3	ON
4	ON

- **PAPER ROLL & PRINTER RIBBON**

Replacing the paper roll or the printer ribbon is very easy by way of the mobile front cover of the cabinet.

To replace the paper roll:

- 1) Pull out the black front cover from the upper side.
- 2) Take out the old paper roll with the cylindrical bar fixing it in the slot.
- 3) Place the new roll on the bar.
- 4) Place the bar into its slot.
- 5) Fix the free end of the paper to the print head.
- 6) Close the front cover.

Placing a new paper roll in KY16 is illustrated in the following figure.

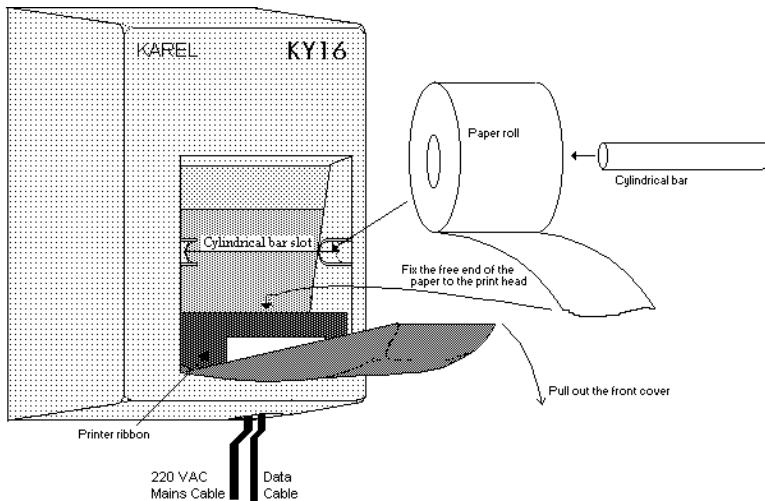


Figure B-15

To replace the printer ribbon :

- 1) Pull out the black front cover from the upper side.
- 2) Take out the old ribbon.
- 3) Place the new ribbon inside the print head.
- 4) Close the front cover.

### III.3. PC INTERFACE

#### • **CABLING**

- 1) The 4-pin RJ plug at one end of the PC-Exchange cable must be passed through the cable holes at the bottom part of the cabinet and connected to the CM socket on the MB26s motherboard.
- 2) The 25-pin D-type plug at the other end of the PC-Exchange cable must be attached to the security plug first and then the security plug must be attached to the 25-pin serial port of the PC. (It is necessary to employ a 25-pin to 9-pin converter plug, in order to use the 9-pin connector of the PC.)

The following figure illustrates the cabling.

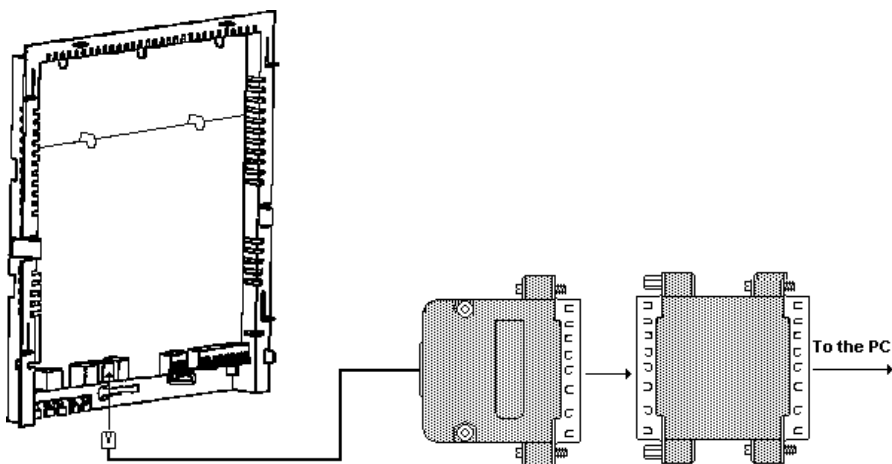


Figure B-16

After the cabling of the PC interface is completed, the necessary CM26s CRL software must be installed on the PC, as described in the CM26s Owner's Guide, respectively.

It is also necessary to enter the related programming code for selecting the PC as the CRL (Call Record Listing) media, as explained in the MS26s Programming Guide.

### III.4. DOORPHONE

#### • INSTALLATION

DY01 Doorphone is designed to be mounted on the wall with a couple of anchor plugs and screws. For this:

- 1) Drill two holes, which are 7.5 cm apart.
- 2) Drive the anchor plugs into the holes.
- 3) Insert the screws into the anchor plugs.
- 4) Hang the doorphone on the screws.

The following figure illustrates the installation.

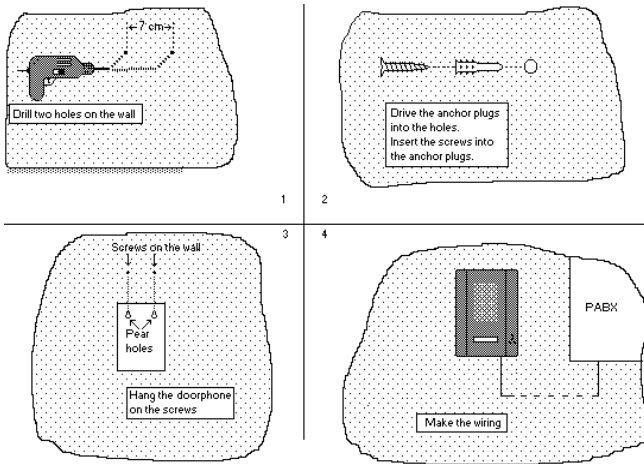


Figure B-17

- **CABLING**

The cable that emerges from the bottom of the DY01 doorphone has a 4-pin RJ plug at its free end. For connecting the doorphone to the system, this plug must be passed through the cable holes at the bottom part of the cabinet and connected to the DIA socket on the MB26s motherboard, as illustrated in the following figure.

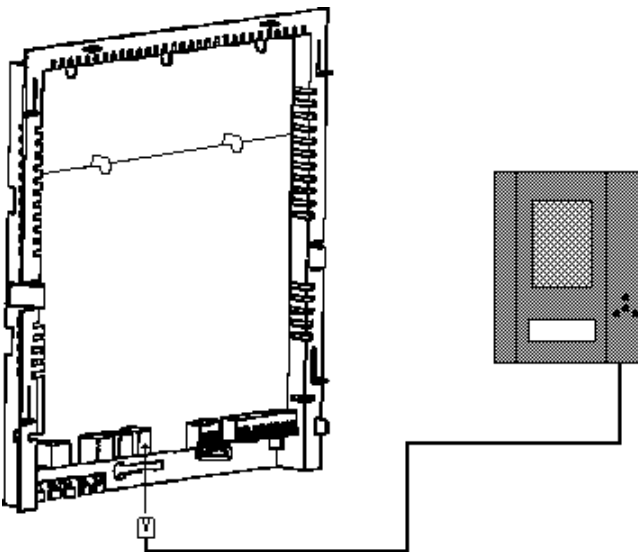


Figure B-18

DY01 doorphone has a ring button on it. When a doorphone user presses this button the telephone of the operator rings. But if desired this facility may be cancelled and an external ringer can be connected to the ring button. For this:

1. Loose the screws at the top and the bottom of the doorphone and open the front cover.
2. Loose the screws at the back of the ring button and disconnect the two-wire cable between the doorphone card and the ring button.
3. Pass the power cables of the ringer through the data cable hole at the back cover of the doorphone box.
4. Connect the power of the external ringer through the ring button.
5. Close the cover of the doorphone.

The following figure illustrates this connection.

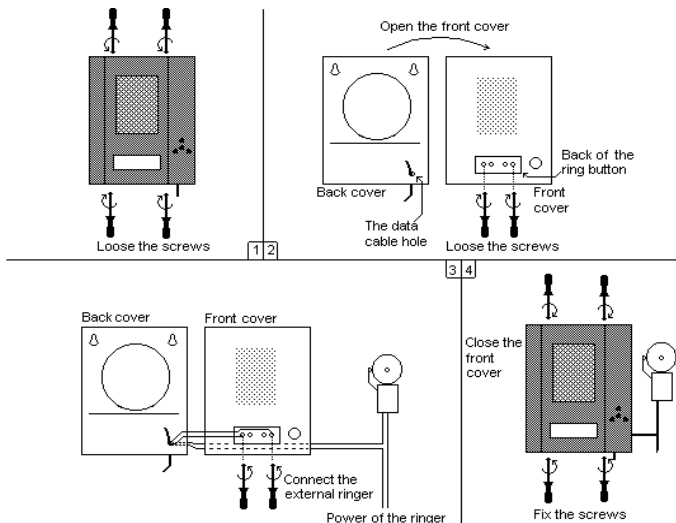


Figure B-19

## III.5. EXTERNAL ANNOUNCEMENT SYSTEM

### • CABLING

Any external announcement system can be connected to MS26s system through the doorphone (DIA) socket on MB26s motherboard. The following figure illustrates this installation.

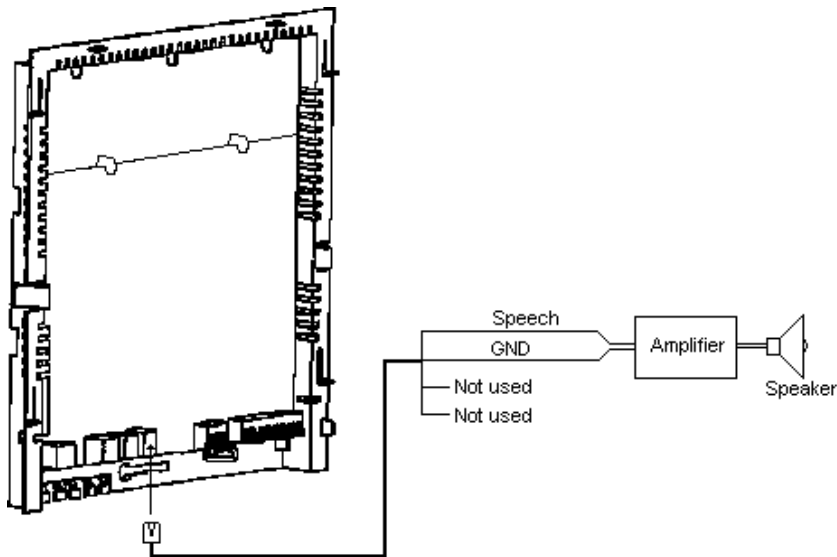


Figure B-20

## III.6. BATTERY BACKUP UNIT

### • INSTALLATION

BBU38s Battery Backup Unit is designed to be mounted on the wall. Hence BBU38s comes with a template and 4 anchor plugs with screws.

To install the main box of BBU38s:

- 1) Place the template on the wall.
- 2) Drill 2 holes at the points on the template.
- 3) Drive the anchor plugs into the holes.
- 4) Insert the screws into the anchor plugs.
- 5) Hang the main box of BBU38s on the screws.

These steps must be repeated to install the battery box of BBU38s on top of the main box.

The following figure illustrates this installation.

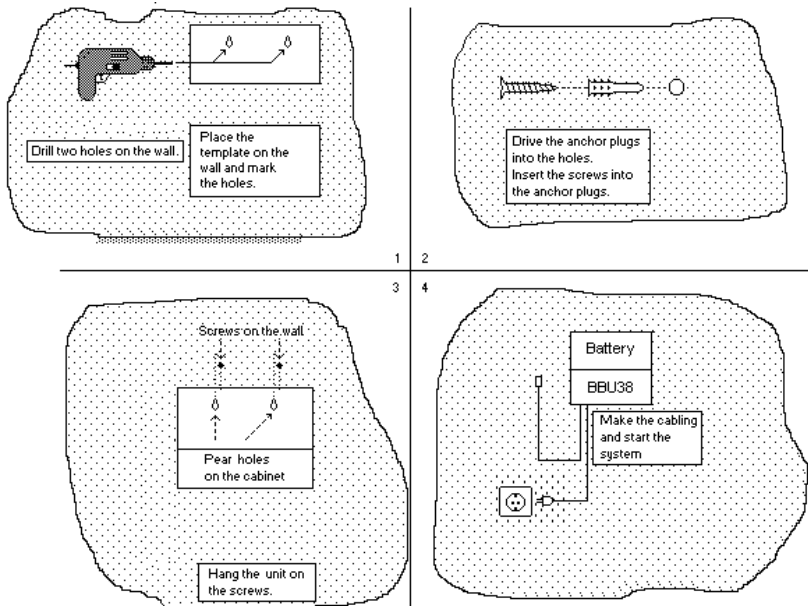


Figure B-21

- **BATTERY CONNECTION:**

- 1) Open the front cover of both boxes.
- 2) Place the 12V battery in the battery box below the special battery holder.
- 3) Connect the battery to the connector on BBU38s card paying special attention to the polarity (see Figure A-12). The cable for battery connection must go from the battery box to the main box, through the cable holes on the bottom part of the boxes (see Figure A-12).
- 4) Close the front covers.

- **CABLING:**

The BBU38s Battery Backup Unit has two built-in cables, one is the mains cable and the other one is the power cable (of 80 cm) for connection to the system.

**IMPORTANT**

PS38 Power Adaptor is not used when BBU38s Battery Backup Unit is available.

For the cabling of BBU38s :

- 1) The 8-pin RJ plug at the free end of the power cable for system connection must be passed through the cable holes at the bottom part of the cabinet and connected attached to the POWER socket on the MB26s motherboard (see Figure A-12).
- 2) The mains cable must be connected to the mains socket.

The cabling of BBU38 is illustrated in the following figure.

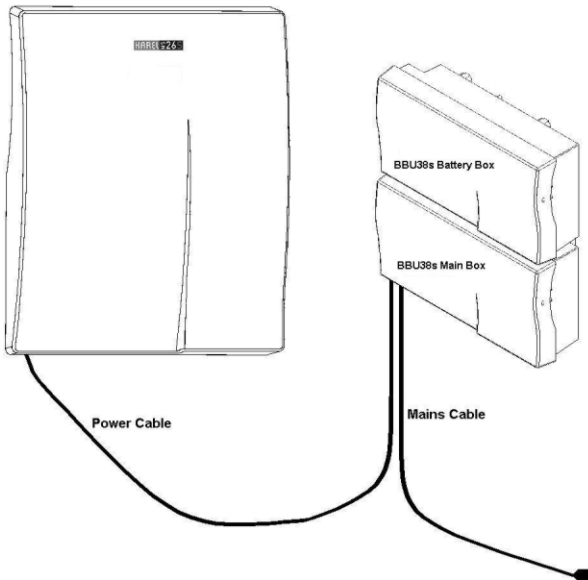


Figure B-22



## III.7. STANDARD TELEPHONE SETS, EXTERNAL LINES

### • CABLING :

For connecting a standard telephone set to the system the wires of the cable coming from the corresponding extension connector on MB26s motherboard must be attached to the A / B terminals of the telephone.

For connecting an external line to the system the wires of the cable coming from the corresponding line connector on MB26s motherboard must be attached to the external line.

The following figure illustrates the cabling of standard telephones:

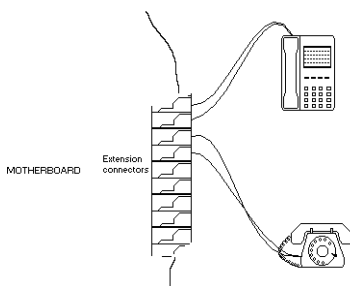


Figure B-23

Normally a standard telephone set can be connected as much as 2 km away from the system by using ordinary copper wires. Depending on the quality of the wires the distance changes proportionally.

## III.8. FILTER & PROTECTION / PROTECTION UNITS

### • INSTALLATION :

The FPBASE / SPBASE unit has a metal base part, which has two pear holes. Through these pear holes the FPBASE/SPBASE unit can be mounted on the wall.

On the top covers of FPBASE/SPBASE and FPEXP/SPEXP units there are four holes, one at each corner. These holes are used to fix each unit to the one underneath. Three holes on FPEXP/SPEXP are connected to FPBASE/SPBASE unit with plastic holders whereas the fourth one has a brass card holder with two washers to carry the chassis ground to the upper units.

The following figure illustrates the installation of an FPEXP/SPEXP on top of an FPBASE/SPBASE.

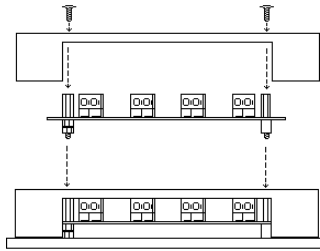


Figure B-24

● **CABLING :**

During the installation of the FPBASE/SPBASE and FPEXP/SPEXP units, it is very important to connect the grounds of all the units to the mains ground of the building. For that there is a special connector on the metal base of FPBASE/SPBASE, which is to be attached to the mains ground. This ground is carried to the FPEXP/SPEXP units by way of the two washers and a brass card holder (see Figure B-31).

It should be noted that the directions of the line / extension connections are also important. The system side of the card is marked with "PABX" and the external line (or far extensions) side is marked with "PTT" on the card (see the following figure).

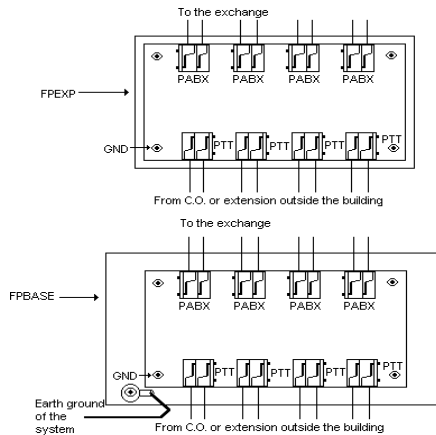


Figure B-25

To get the utmost benefit from FPBASE/SPBASE and FPEXP/SPEXP units against lightning, the units should be installed 20 meters away from the system. This need not be the physical distance but the length of the cables between the system and the units.

### III.9.

## EXTERNAL MUSIC SOURCE

- **CABLING :**

A music source (tape recorder, radio or CD player) can be connected to the system to be used for "Background Music" and "Music On Hold" facilities. For connection, the wires from the speaker outlet of the music source must be inserted into the 2-pin MUS connector on the MB26s motherboard, as illustrated in the following figure.

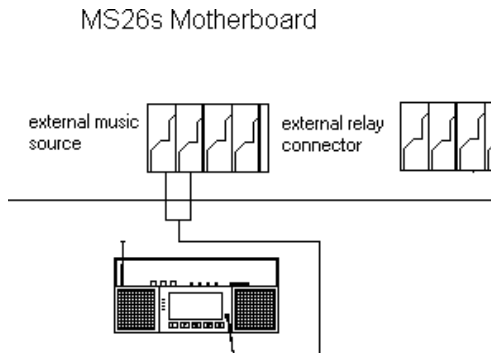


Figure B-26

### III.10.

## EXTERNAL RELAY

The relay on the MS26s motherboard can be used to switch one of the following equipments provided that the relay is programmed accordingly:

- 1) Door Opener.
- 2) External Ringer (to ring for the incoming line calls)

- **CABLING :**

The connection to the external relay should be made through the 2-pin XREL connector on the MB26s motherboard. The following figure illustrates the connection of the relay to an external device.

## MS26s Motherboard

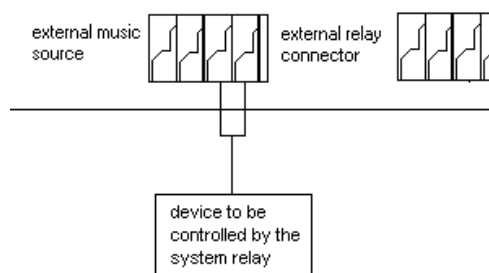


Figure B-27



Design and specifications subject to change without notice.