

Karel MS38s

Telephone System

Installation
&
Maintenance
Guide



Edition 3.1

KAREL

CONTENTS

<u>SECTION</u>		<u>PAGE</u>
	INTRODUCTION	1
	TECHNICAL REFERENCE	
I.	SYSTEM	3
I.1.	MB38s MOTHERBOARD	4
I.2.	POWER TO THE SYSTEM	5
I.2.A.	PS38 POWER ADAPTOR	5
I.2.B.	POWER FAILURE TRANSFER STATIONS	6
I.3.	EXTERNAL MUSIC CONNECTOR	6
I.4.	EXTERNAL RELAY	6
II.	ACCESSORIES	7
II.1.	CONSOLES, FEATURE PHONES – OP48(-H), LT48(-H)	8
II.1.A.	OP48(-H) CONSOLE	8
II.1.B.	LT48(-H) FEATURE PHONE	10
II.2.	MINI PRINTER - KY16	10
II.3.	SERIAL INTERFACE - CM38s, PK38s, CM38s+PK38s, SERIAL PRINTER INTERFACE	12
II.3.A.	CM38s CALL RECORD LISTING INTERFACE AND/OR PK38s PC-CONSOLE INTERFACE	12
II.3.B.	SERIAL PRINTER INTERFACE	15
II.4.	DOORPHONE – DY01	16
II.5.	EXTERNAL ANNOUNCEMENT SYSTEM	16
II.6.	BATTERY BACKUP UNIT -BBU38s	16
II.7.	AUTO ATTENDANT & VOICE MAIL - EVM38	18
II.8.	LOCAL PAGER – PG100	19
II.9.	STANDARD TELEPHONE SETS	21
II.10.	FILTER & PROTECTION UNIT – FPBASE, FPEXP	22
III.	SOFTWARE	25
IV.	TECHNICAL SPECIFICATIONS	27

SECTION**PAGE****INSTALLATION**

I.	PRELIMINARY NOTICE	29
I.1.	DELIVERY CHECK	29
I.2.	INSPECTION	29
I.3.	ENVIRONMENTAL REQUIREMENTS	29
II.	SYSTEM INSTALLATION	31
II.1.	PS38 POWER ADAPTOR	33
II.2.	MB38s MOTHERBOARD	34
III.	ACCESSORY INSTALLATION	37
III.1.	CONSOLES, FEATURE PHONES	37
III.2.	MINI PRINTER	41
III.3.	SERIAL INTERFACE	44
III.3.A.	PC INTERFACE	44
III.3.B.	SERIAL PRINTER INTERFACE	45
III.4.	DOORPHONE	46
III.5.	EXTERNAL ANNOUNCEMENT SYSTEM	49
III.6.	BATTERY BACKUP UNIT	50
III.7.	AUTO ATTENDANT & VOICE MAIL	52
III.8.	LOCAL PAGER	54
III.9.	STANDARD TELEPHONE SETS, EXTERNAL LINES	57
III.10.	FILTER & PROTECTION UNIT	57
III.11.	EXTERNAL MUSIC SOURCE	59
III.12.	EXTERNAL RELAY	59

MAINTENANCE

I.	MAINTAINING THE SYSTEM	61
----	------------------------	----

INTRODUCTION

This Installation and Maintenance Guide provides an overall technical reference on the KAREL MS38s 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.*

I. SYSTEM

MS38s system has a capacity of 4 lines and 8 extensions.

The system consists of the following parts :

- CBN38s Cabinet made of plastic,
- MB38s 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.

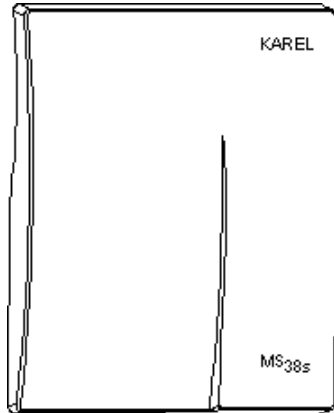


Figure A-1

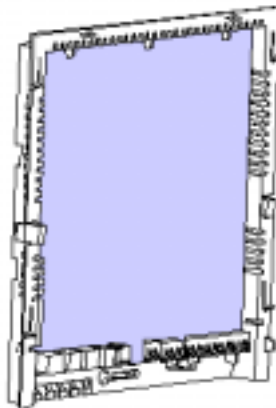


Figure A-2

I.1. MB38s MOTHERBOARD

The MB38s 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 MB38s motherboard.

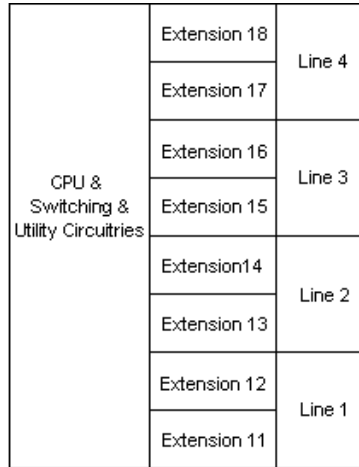


Figure A-3

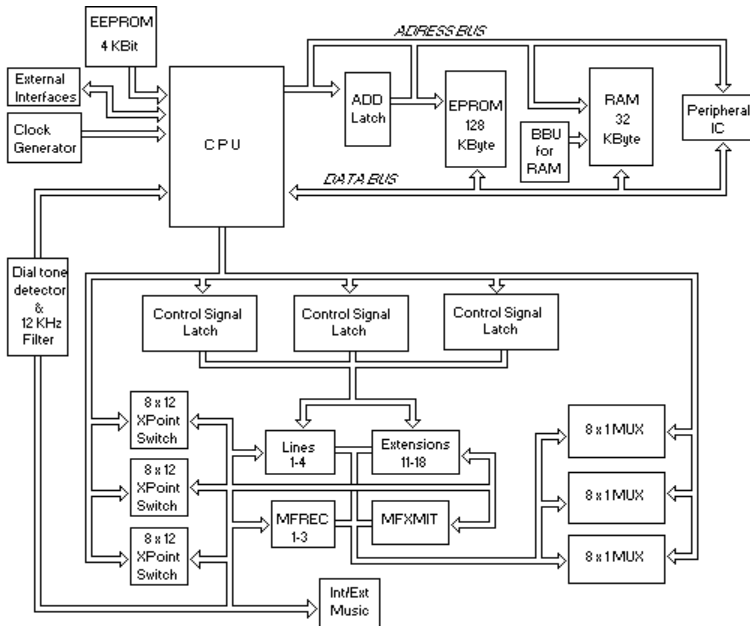


Figure A-4

The MS38s motherboard has 4 lines and 8 extensions. By default, the extensions have numbers 11 to 18 whereas the lines have numbers 01 to 04.

The dimensions of MB38s are 21 cm x 23 cm and the weight is 0.35 kg.

I.2. POWER TO THE SYSTEM

MS38s system can operate for the mains input of 180 - 260 VAC 50/60 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 .

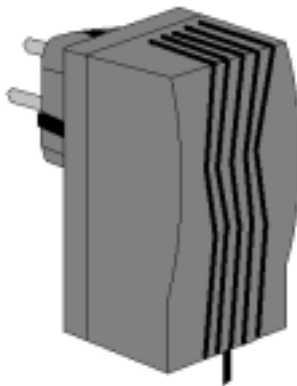


Figure A-5

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 MB38s 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 MB38s motherboard.

The pin-out of the POWER socket on MB38s 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 four lines (lines 01, 02, 03 and 04) are automatically connected to first 4 extensions (extensions 11, 12, 13 and 14), respectively.

See the following figure illustrating the power failure transfer stations of MS38 system.

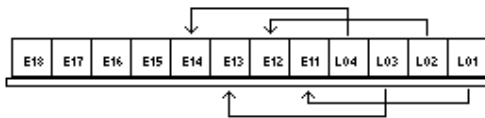


Figure A-6

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 MB38s 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, an external ringer, an external music source or an external announcement system. The connection to the external relay is established through the 2-pin XREL connector on the MB38s motherboard. The selection among these devices is made by programming.

II. ACCESSORIES

To offer you a full telecommunication system, MS38s is equipped with many accessories. These accessories are shown in the following figure and explained one by one in the following sections.

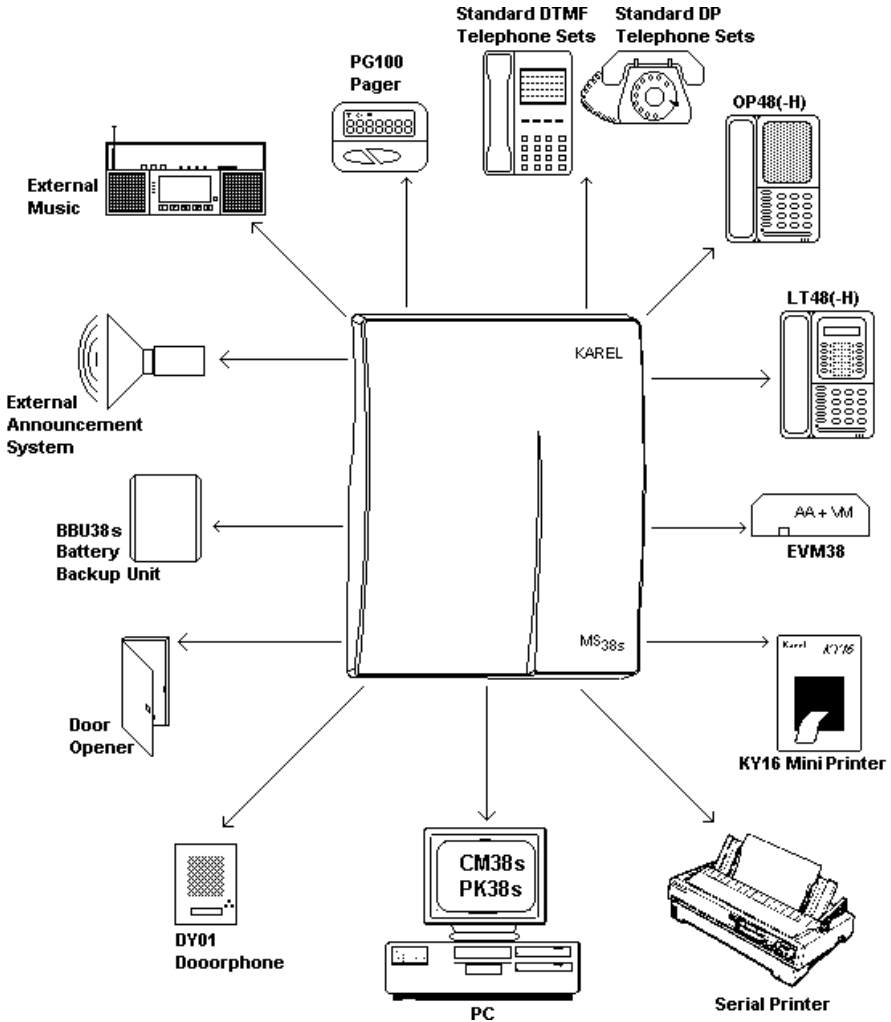


Figure A-7

II.1. CONSOLES, FEATURE PHONES - OP48(-H), LT48(-H)

OP48(-H) Consoles and LT48(-H) Feature Phones are the members of the same telephone family, hence they have similar cases.

The data cabling of these sets is made via the 6-pin RJ socket (named LT/OP) on the MB38s motherboard. The signaling between the system and consoles, feature phones is illustrated in the following table.

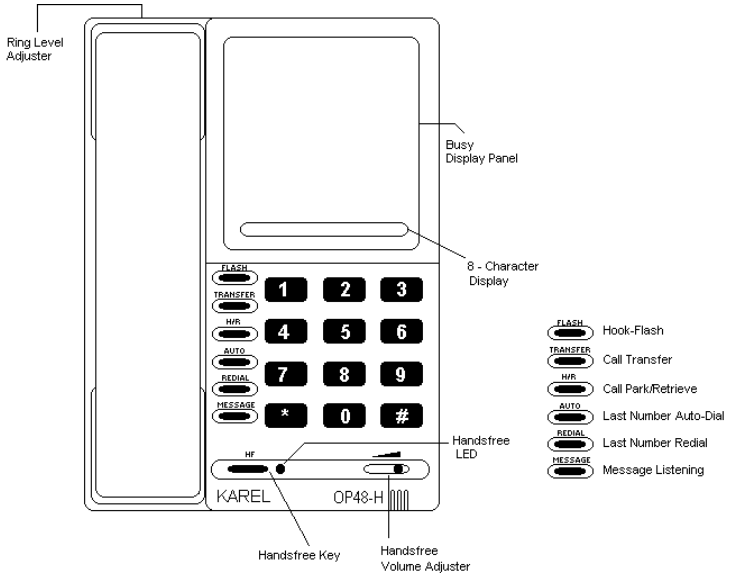
MB38s Motherboard LT/OP Socket Pin No	Signal	Telephone / DSS Card RJ Socket Pin No
1	+8 VDC	6
2	Busy	-
3	A (ext.11)	3 (ext. 11)
4	B (ext.11)	4 (ext. 11)
5	GND	2
6	Data	1

The input of +8 VDC is regulated to +5 VDC by telephone / DSS cards.

II.1.A. OP48(-H) CONSOLE

There are two types of OP48 Consoles, OP48 Console and OP48-H Handsfree Console, the second one being half-duplex. The OP48(-H) Console has a BDP (Busy Display Panel) that shows the states of all the extensions and lines as well as some system features. There is also an 8-Character Display that keeps the user informed about the calling / called extensions and dialed numbers as well as some system features.

The outlook and the BDP of OP48-H Handsfree Console are illustrated in the following figures.



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

Figure A-8

11	12	13	14	15	16	17	18	19	20
21	22	23	24	25	26	27	28	29	30
31	32	33	34	35	36	37	38	39	40
41	42	43	44	45	46	47	48	49	50
01	02	03	04	C	J	»	C1	C2	S
05	06	07	08	Ⓟ	☎	★	Lo	Pa	Er
09	10	11	12	✆	⚡	☎	Pr	Ro	Di

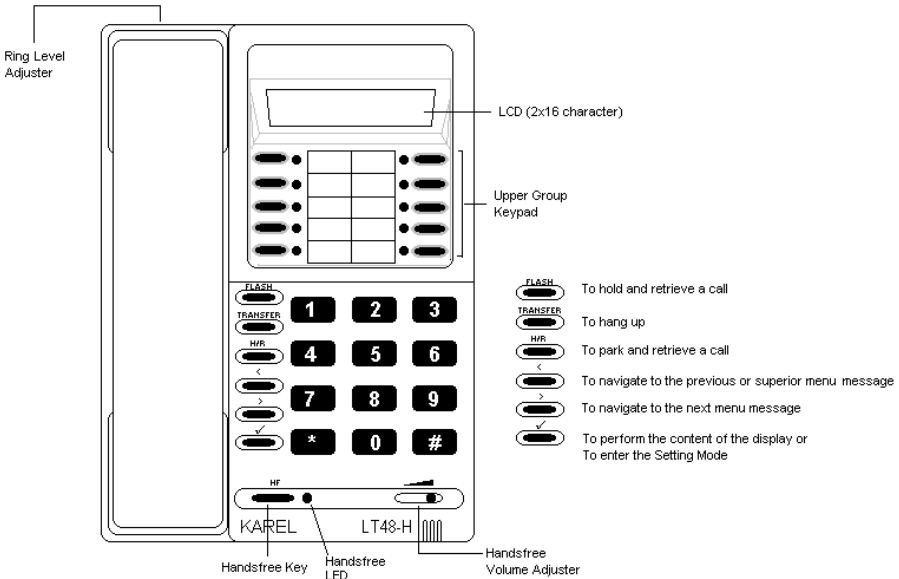
Figure A-9

The dimensions of OP48(-H) are 22 cm x 6.5 cm x 16 cm and the weight is 0.9 kg.

II.1.B. LT48(-H) FEATURE PHONE

There are two types of LT48 Feature Phones, LT48 Feature Phone and LT48-H Handsfree Feature Phone, the second one being half-duplex. The LT48(-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 activating most of the system features, by the help of the 10 programmable keys in the upper keypad.

The outlook of LT48-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-10

The dimensions of LT48(-H) are 22 cm x 6.5 cm x 16 cm and the weight is 0.9 kg.

II.2. MINI PRINTER – KY16

MS38s 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.

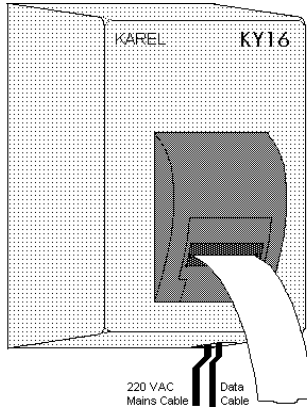


Figure A-11

The data cabling of KY16 is made via the 6-pin RJ socket (named LT/OP - the same socket used by Karel Consoles / Feature Phones) on the MB38s motherboard. The signaling between the system and KY16 is illustrated in the following table.

MB38s 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.

Counter ← #0006	LDIS	→ Call Type
Date (Day/Month) ← 25/01	19:33:19	→ Starting Time (Hour/Minute/Second)
Duration (Minute/Second) ← 01:29	12 15 03	→ Line
		→ Ending extension
		→ Starting extension
Pulse number ← 0002	0002000	→ Cost
Number dialed ← 0212543123		

Figure A-12

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 three CRL accessories - namely KY16 Mini Printer, CM38s CRL Interface and/or PK38s PC-Console Interface or the serial printer - can be connected to the system at a time. The selection among these devices is made by programming.

II.3. SERIAL INTERFACE - CM38s, PK38s, CM38s+PK38s, SERIAL PRINTER INTERFACE

II.3.A. CM38s CALL RECORD LISTING INTERFACE AND/OR PK38s PC-CONSOLE INTERFACE

Using the serial communication port on MB38s motherboard, a PC can be connected to the system. KAREL provides two modules for PC connection: CM38s and PK38s.

CM38s CALL RECORD LISTING INTERFACE

Call records, which are transferred to the PC via the serial communication port on MB38s motherboard, are processed by the CM38s 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 MB38s motherboard.

The software operates under Windows.

PK38s PC-CONSOLE INTERFACE:

PK38s PC-Console is the software, which enables you to supervise your system via your personal computer, by monitoring the states of extensions / lines or checking and editing all the system parameters. 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 MB38s motherboard.

The software operates under DOS.

CM38s+PK38s:

This is a combined unit of CM38s and PK38s modules. These programs are the same as the ones described above and they run independently, but cooperatively. Two 3.5" diskettes one with CM38s and the other with PK38s 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 MB38s motherboard.

- **PC REQUIREMENTS :**

The PC to be used with MS38s 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:

MB38s 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 MS38s 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 CM38s and PK38s modules are able to set the communication protocol to the appropriate values, automatically.

- **DATA FORMAT OF CM38s :**

A call record consists of two lines, each followed by Carriage return (0Dh) and Line Feed (0Ah) characters.

Structure of the first line:

Starting Character Position	Field Width	Information
1	1	#; indicates start of record
2	4	4 digit counter value
6	1	Space
7	4 or 2	Call type
11	1	Space
12	1	Common Pool information

- Call type:

LDIS	Long Distance
INTL	International
IC	Incoming

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

- Common pool information field contains the character "C" for the calls made from the common pool. If the call is not made from the common pool then this field and the preceding space are not sent to the PC.

Structure of the second line:

Starting Character Position	Field Width	Information
1	8	Date in the format dd/mm/yy
9	1	Space
10	8	Starting time of the call in the format hh:mm:ss
18	1	Space
19	8	Ending time of the call in the format hh:mm:ss
27	1	Space
28	5	Call duration in the format mm:ss
33	1	Space
34	4	Starting extension number, OPE for the operator and Dtt for the incoming calls coming from a DISA line where tt is the line number.
38	1	Space
39	4	Ending extension number, OPE for the operator.
43	1	Space
44	3	Call info
47	1	Space
48	2	Line number

50	1	Space
51	4	Metering Pulse count
55	1	Space
56	7	Call cost
63	1	Space
64	variable	Number dialed

- **NOTES:**

Only one of the three CRL accessories - namely KY16 Mini Printer, CM38s CRL Interface and/or PK38s PC-Console Interface or the serial printer - can be connected to the system at a time. The selection among these devices is made by programming.

II.3.B. SERIAL PRINTER INTERFACE

Using the serial communication port on MB38s motherboard, any serial printer can be connected to the system to have the reports of the call records and activated system features.

The signaling between the system and the printer is illustrated in the following table.

MB38s Motherboard CM Socket Pin No	Signal	Printer	
		25-pin Connector Pin No	9-pin Connector Pin No
1	PC GND	7	5
2	TXD	3	2
3	RXD	-	-
4	Busy	20	4

The signal names above are given with respect to MS38s 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 Printer - Exchange connection is illustrated in the following table.

For Printer	
Data Bits	8
Stop Bit	1
Parity	Even
Baud Rate	2400

You may need to configure the printer for these parameters by selecting appropriate settings on the printer.

- **NOTES:**

Only one of the three CRL accessories - namely KY16 Mini Printer, CM38s CRL Interface and/or PK38s PC-Console Interface or the serial printer - can be connected to the system at a time. The selection among these devices is made by programming.

II.4. DOORPHONE – DY01

MS38s 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 an extension telephone. DY01 doorphone has a speech processor card inside the metal box.

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

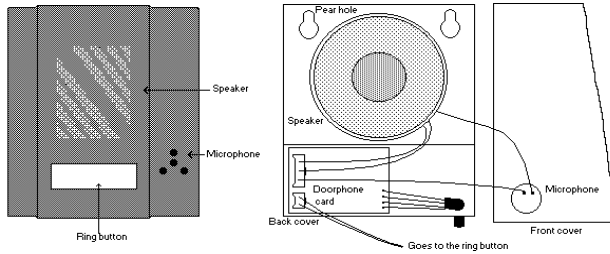


Figure A-13

The pin-out of the 4-pin RJ socket (called DIA) used to connect DY01 to MB38s motherboard is illustrated in the following table.

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

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 MS38s system through the 4-pin RJ socket (named DIA - the same socket used by DY01 doorphone) on MB38s motherboard.

II.6. BATTERY BACKUP UNIT - BBU38s

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

BBU38s contains a transformer and a card, surrounded by a metal box. Inside the metal box, there is also an empty space reserved for the battery.

IMPORTANT

PS38 Power Adaptor is not used when BBU38s is connected to the MS38s system.

The outlook and the structure of BBU38s are illustrated in the following figure.

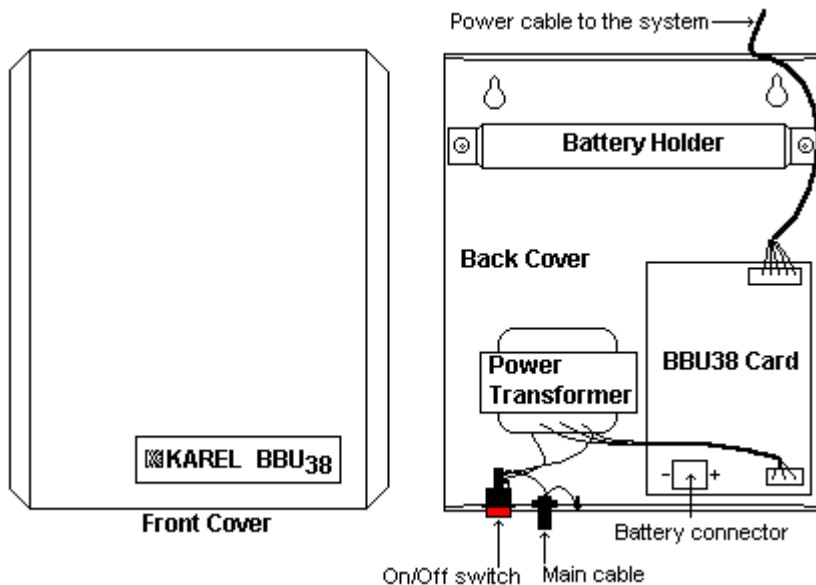


Figure A-14

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 MB38s motherboard.

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 MB38s motherboard.

By the help of BBU38s module, MS38s 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 MS38s 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 21 cm x 7.5 cm x 25 cm and the weight is 3 kg.

II.7. AUTO ATTENDANT & VOICE MAIL - EVM38

EVM38 Auto Attendant guides the external callers throughout their calls with pre-recorded messages, and hence enables the operator to work more efficiently, especially under high traffic. Optionally, Voice Mail facilities may be employed, and then the extensions can have private voice mail boxes to be used to leave / receive messages to / from other users.

EVM38 comes in a metal box, with a cable having 6-pin RJ plugs at both ends. The cable is used to connect the 6-pin RJ socket at the bottom of EVM38 to the 6-pin RJ socket (named VM) on the MB38s motherboard.

The outlook of EVM38 is illustrated in the following figure.

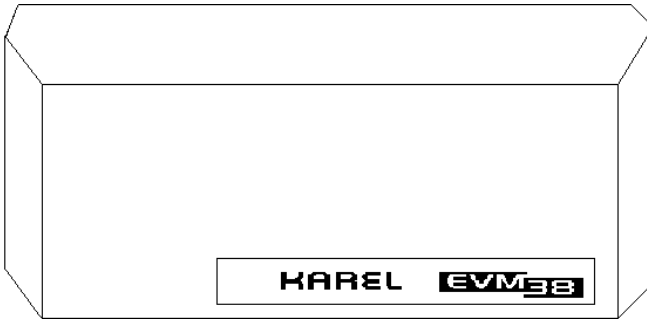


Figure A-15

The pin-out of VM socket on MB38s motherboard is illustrated in the following table.

VM Socket	
Pin no	Signal
1	GND
2	-24 VDC
3	TX
4	RX
5	Data
6	+ 5 VDC

EVM38 has 2 minutes Auto Attendant memory on board. Besides, EVM38 has two 36-pin connectors on the component side, which are used to install the optional EVM-FE (Auto Attendant Expansion) and three 24-pin connectors, which are used to install the optional EVM-DE (Voice Mail Expansion) cards.

The EVM-FE card with a Flash ROM memory chip preserves the special messages for Auto Attendant purposes. At most two EVM-FE cards can be installed on the EVM38 card in addition to the onboard one. Each EVM-FE card has a message capacity of 2 minutes. Thus, EVM38 can have a maximum Auto Attendant

message capacity of 6 minutes. 24 different messages to be used during different states of call handling of the Auto Attendant can be entered. These messages are retained even when the system power is off.

The EVM-DE card with two Dynamic RAM chips stores messages for the Voice Mail purposes. At most three EVM-DE cards can be installed on the EVM38 card. Each EVM-DE card can provide a total message capacity of 15 minutes. Thus, EVM38 can have a maximum Voice Mail message capacity of 45 minutes. The capacity per EVM-DE card may be also increased to 20 minutes by programming, in which case the voice quality is impaired to a certain extent, but the difference cannot be recognized by human ear. The Voice Mail messages are lost when the system power is off.

EVM38 supports one voice channel, used by both Auto Attendant and Voice Mail facilities. That is, EVM38 can serve one user at a time, to record and listen to the messages.

The external callers can make use of the EVM38 facilities, only if they have DTMF telephone sets in order to be able to key in numbers whenever required by EVM38.

The outlook of EVM38, EVM-FE and EVM-DE cards is illustrated in the following figure.

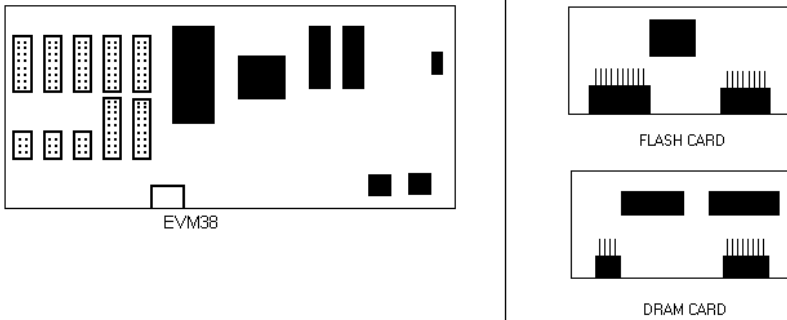


Figure A-16

The dimensions of EVM38 are 21 cm x 7 cm x 10 cm and the weight is 0.75 kg.

The dimensions of EVM-FE and EVM-DE are 6.5 cm x 3.5 cm.

II.8. LOCAL PAGER – PG100

PG100 Local Pager lets you page extensions that are equipped with receivers (beepers) so that they can pick up their calls or attend later. The outlook of PG100 is illustrated in the following figure:

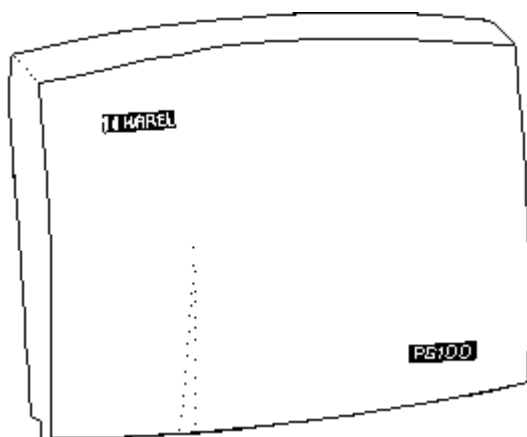


Figure A-17

KAREL also has its own beepers (receivers), which are adjusted to operate at the same frequency of PG100 and which are also programmable for the desired extension number as well as the PG100 Local Pager.

IMPORTANT

The operating frequency of PG100 Local Pager is 167.050 MHz. with a 25 KHz. Bandwidth.

The coverage area of PG100 is 200 m indoor and 2 km open air.

The data cabling of PG100 Local Pager is made via the 6-pin RJ socket (named LT/OP - the same socket used by Karel Consoles / Feature Phones) on the MB38s motherboard.

The signaling between the system and PG100 is illustrated in the following table:

MS38s Motherboard LT/OP Socket Pin No	Signal	PG100 Card RJ Socket Pin No
1	+8 VDC	6
2	Busy	-
3	A (ext.11)	-
4	B (ext.11)	-
5	GND	2
6	Data	1

The input of +8 VDC is regulated to +5 VDC by PG100.

PG100 can be also directly connected to mains voltage through a 12 VDC power adaptor. Normally, PG100 receives power over the data cable. However, if the data line of the system is overloaded due to the existence of many OP48(-H) and LT48(-H) telephones connected to the system, it is preferable to feed PG100 over the power adaptor that is to be procured locally.

The dimensions of PG100 are 24 cm x 19 cm x 4.5 cm and the weight is 0.5 kg.

II.9. STANDARD TELEPHONE SETS

Any ordinary telephone set, may be DP or DTMF, can be connected to MS48 system including KAREL's own Ladin and Fulya telephone sets, which are both DP/DTMF switchable.

The following figure illustrates the outlook of Ladin.

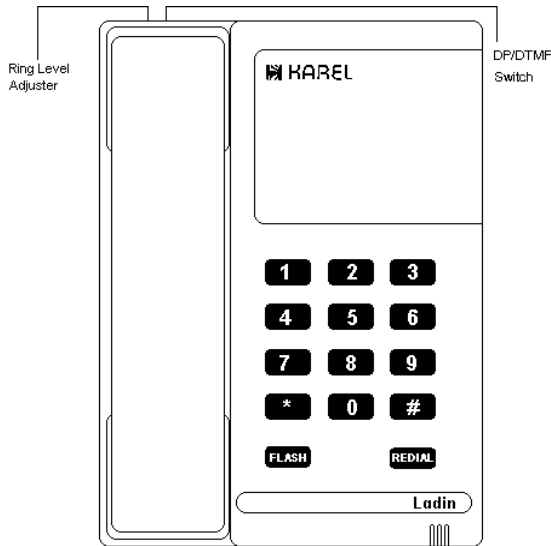


Figure A-18

The following figure illustrates the outlook of Fulya.

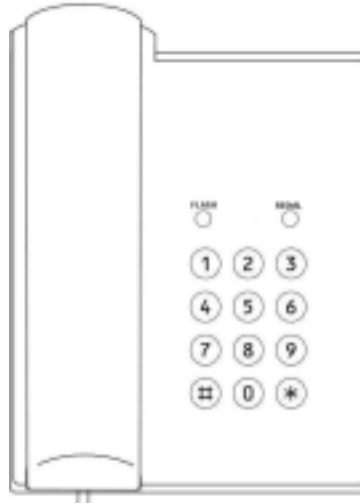


Figure A-19

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.10. 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 modules that can be connected to both extensions and lines. These modules 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 :

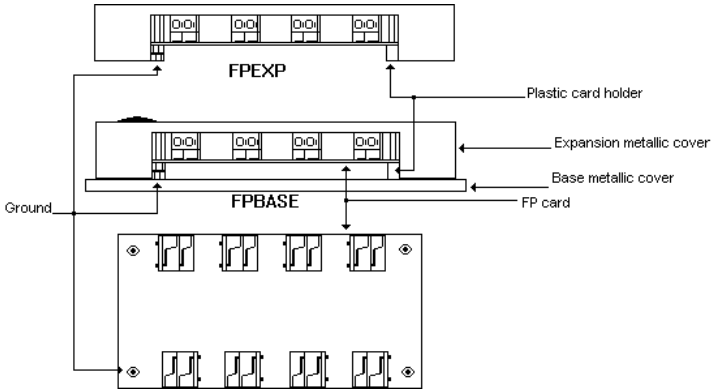


Figure A-20

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.

III. SOFTWARE

MS38s 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 MS38s 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, some of which may be entered only by the system supervisor and some of which may be entered only by the operator, 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	4 lines / 8 extensions + 1 doorphone channel
2.	Control	SPC 80C88 Processor EPROM (1 Mbit) EEPROM (4 KBit)?? 512 Kbit Static RAM With NiCd Battery Backup
3.	Switching	Space Division CMOS Crosspoint Switch
4.	Power	180 – 260 VAC - 50 / 60 Hz. Stand-by power consumption: 7W Maximum power consumption: 20W Power failure: <ul style="list-style-type: none"> • Optional Battery Backup with 12 VDC • Power failure transfer stations
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	6 (3 x 2)
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 (LT48(-H)): 5 wires KAREL Console (OP48(-H)): 5 wires KAREL Mini Printer (KY16): 3 wires KAREL Local Pager (PG100): 3 wires KAREL Doorphone (DY01): 4 wires KAREL Auto Attendant (EVM38): 6 wires PC: 3 wires Serial Printer: 3 wires Power: 8 wires
11.	CRL (Call Record Listing)	KAREL Mini Printer PC Interface Serial Printer Interface
12.	CRL capacity	Approximately 600 calls

CHARACTERISTICS		
1.	Extension Interface	Station Loop: Max 1200 Ohms including the Telephone Set
2.	Max C.O. 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 ⁰ - +45 C ⁰ , 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.)	Continuous
2.	Ring-back tone (500 Hz.)	1500 msec on, 3500 msec off
3.	Busy tone (500 Hz.)	500 msec on, 500 msec off
4.	DISA dial tone (500 Hz.)	300 msec on, 300 msec off, 300 msec on, 300 msec off, 300 msec on, 2000 msec off
5.	Message waiting dial tone (500 Hz.)	300 msec on, 300 msec off, 300 msec on, 300 msec off, 300 msec on, 2000 msec off
6.	Error tone (500 Hz.)	300 msec on, 300 msec off, 300 msec on, 300 msec off, 300 msec on, 300 msec off, 700 msec on, 300 msec off
7.	Reminder dial tone	1000 msec 500 Hz., 1000 msec 250 Hz.
8.	Special dial tone (250 Hz.)	Continuous
9.	Overflow tone (2000 Hz.)	700 msec on, 200 msec off
10.	Warning tone (250 Hz)	20 msec on, 1500 msec off

RING CADENCES

1.	External Call, Call Back, Reminder Call, Wake Up Call	1500 msec on, 3500 msec off
2.	Internal Call	400 msec on, 350 msec off, 400 msec on, 3500 msec off
3.	Doorphone Call	800 msec on, 350 msec off, 800 msec on 3500 msec off

DTMF tones:

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

Nominal frequencies of MS38s may deviate ± 2.5 % from the values above.

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 C° 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 C° and 45 C° 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 MS38s 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 MS38s 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).

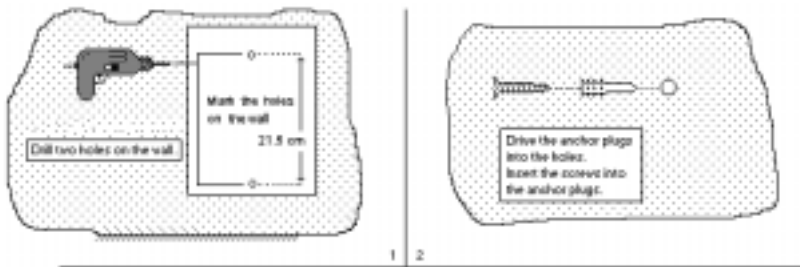


Figure B-1

- 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).

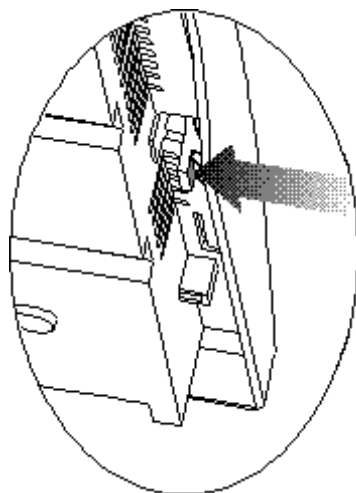


Figure B-2

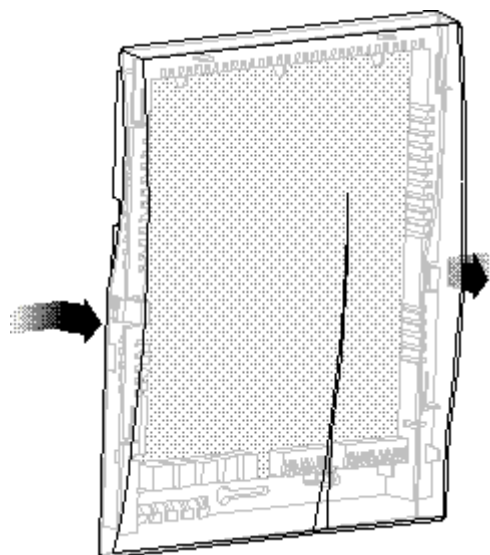


Figure B-3

- 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).

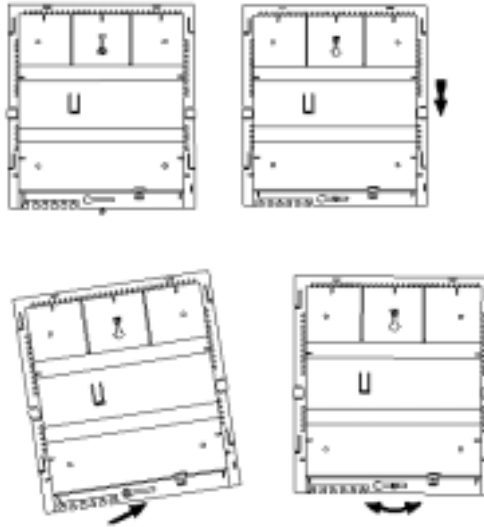


Figure B-4

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. 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 MB38s motherboard.
- 2) The adaptor must be plugged in the mains socket.

The following figure illustrates the connection of PS38 Power Adaptor.

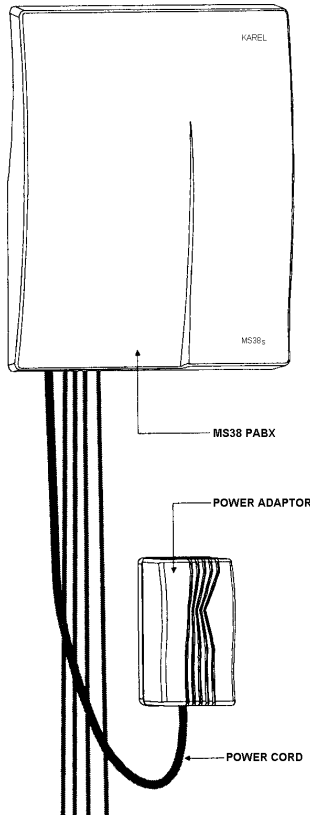


Figure B-5

IMPORTANT

The ventilation holes on the front cover of the PS38 Power Adaptor must not be closed for any reason, since it may cause PS38 to overheat and get damaged.

II.2. MB38s MOTHERBOARD

The MB38s motherboard comes installed in the cabinet. However, if it is necessary to take out the MB38s motherboard from the cabinet, the holder at the bottom must be pressed and the card must be removed (see Figure B-5). To insert MB38s 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.

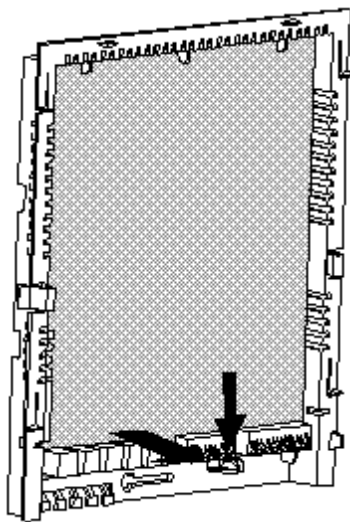


Figure B-6

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 MB38s motherboard.

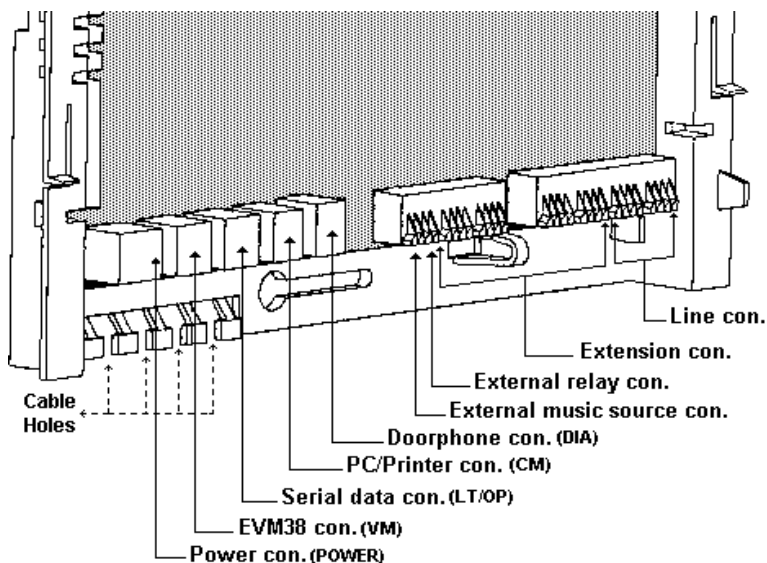


Figure B-7

III.1. CONSOLES, FEATURE PHONES

• CABLING

Each LT48(-H) Feature Phone and OP48(-H) Console 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 MB38s motherboard, in order to carry data signals for the telephones.

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

To make the cabling of each LT48(-H) Feature Phone and OP48(-H) Console :

- 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 MB38s 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 OP48(-H) and LT48(-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 OP48(-H) Consoles and LT48(-H) Feature Phones.

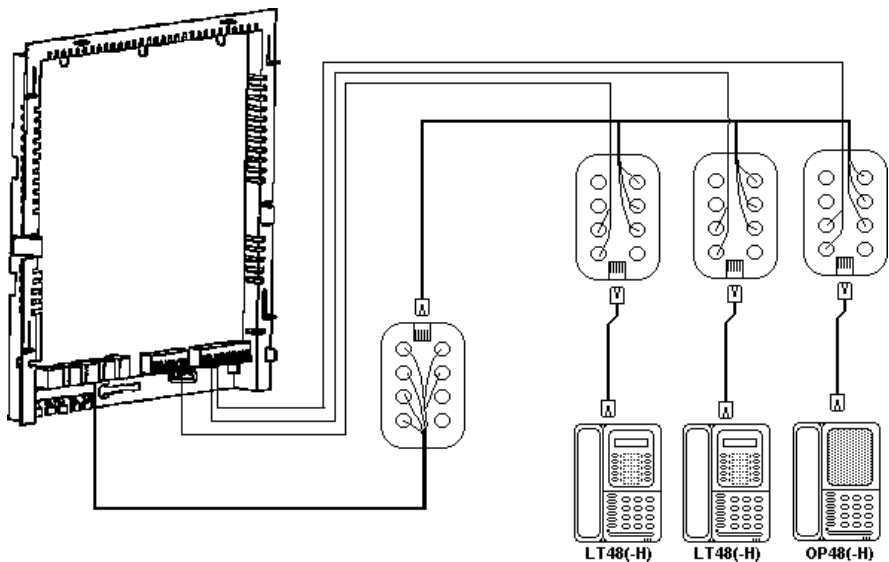


Figure B-10

In case the operator's LT48(-H) Feature Phone or OP48(-H) Console 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 MB38s 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 console or a feature phone are carried separately as described in the "Cabling" part above, the console or 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 or console 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 LT48 Feature Phones are connected to the system in this way, the distance between the system and the LT48 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 the OP48(-H) Consoles and LT48(-H) Feature Phones, the extension setting of these sets should be made as follows :

- a) OP48(-H): The setting is made by the "Message" key. Keep the key pressed till the extension number starts blinking on the display and "A" appears next to it. Then, press the same key several times till the correct extension number appears on the display.
- b) LT48(-H): The setting is 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.

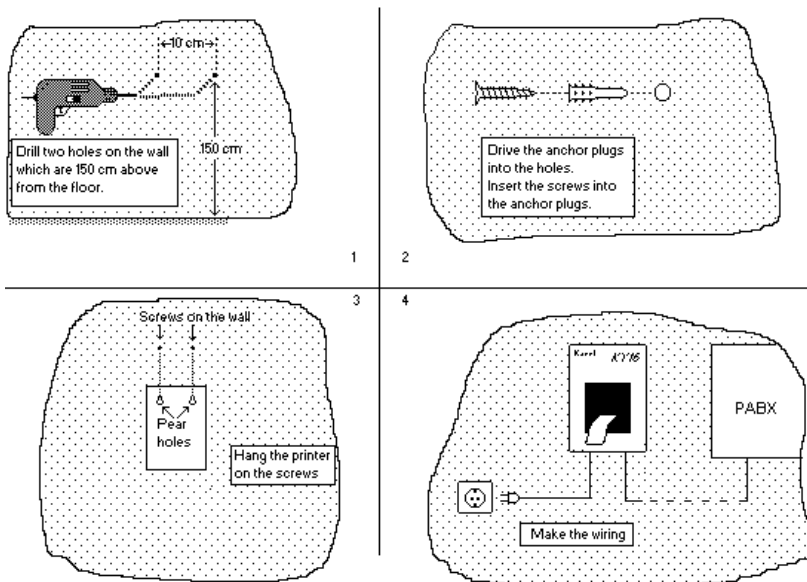


Figure B-11

• **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 MS38s system.

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 MS38s Programming Guide.

- **DIP-SWITCH SETTING**

For KY16 to operate with MS38s 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.

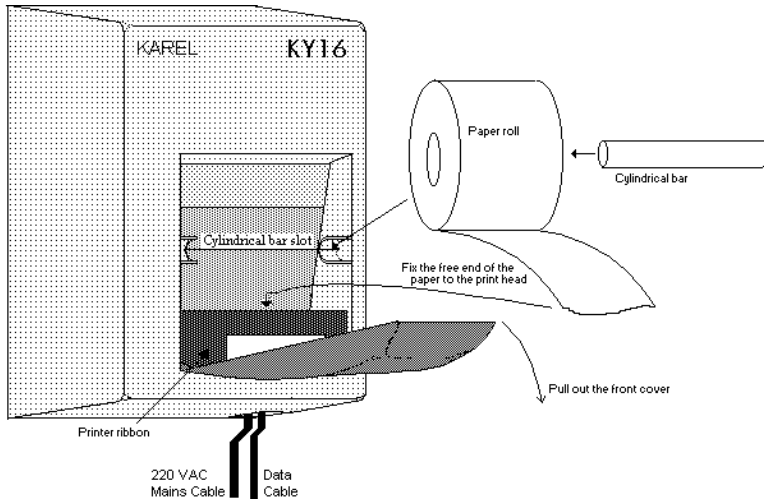


Figure B-14

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. SERIAL INTERFACE

Either a PC or a serial printer can be connected to the MS38s system. The selection among the two devices is made by programming.

III.3.A. 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 MB38s 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.

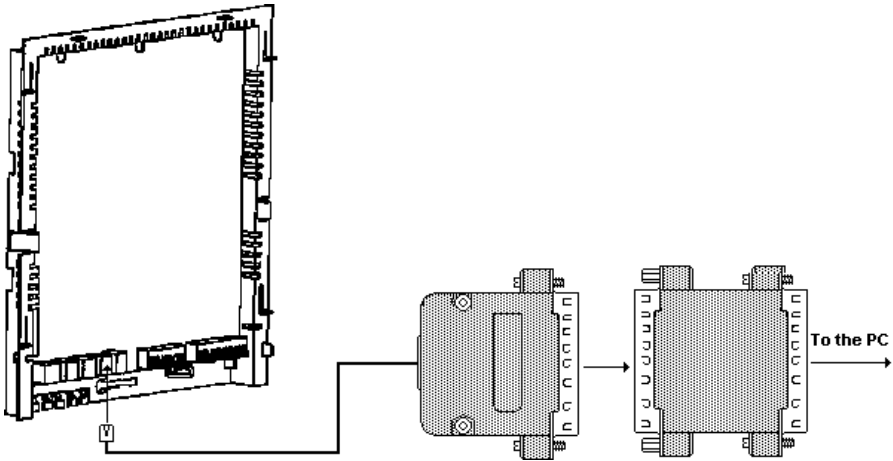


Figure B-15

After the cabling of the PC interface is completed, the necessary CM38s and / or PK38s software must be installed on the PC, as described in the CM38s and PK38s Owner's Guides, 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 MS38s Programming Guide.

III.3.B. SERIAL PRINTER INTERFACE

• **CABLING**

- 1) The 4-pin RJ plug at one end of the Printer-Exchange cable (which is to be procured locally) must be passed through the cable holes at the bottom part of the cabinet and connected to the CM socket on the MB38s motherboard.
- 2) The 25-pin or 9-pin D-type plug at the other end of the cable is to be attached to the serial port of the printer.

The following figure illustrates the cabling.

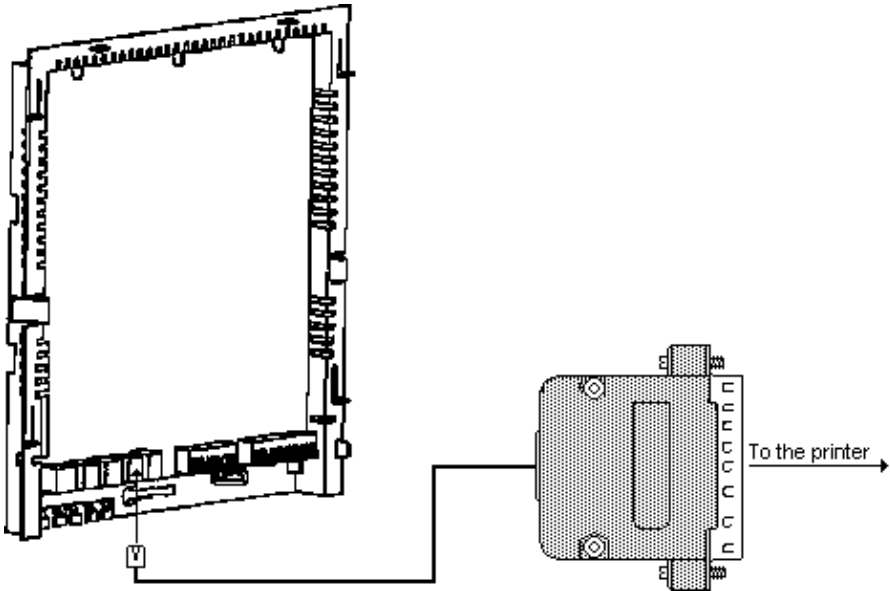


Figure B-16

It is also necessary to enter the related programming code for selecting the serial printer as the CRL (Call Record Listing) media, as explained in the MS38s 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.

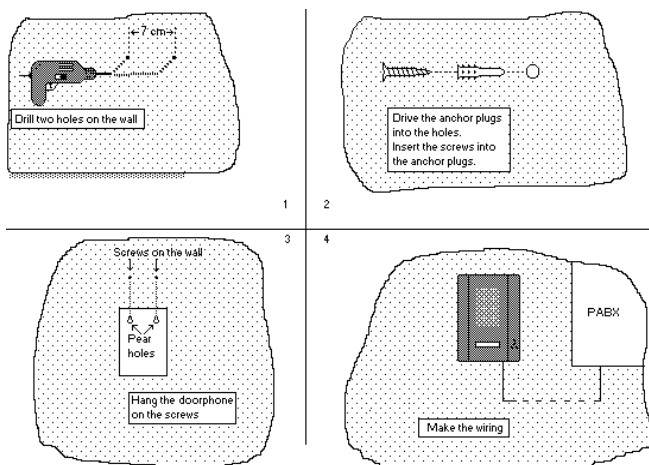


Figure B-17

- **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 MB38s motherboard, as illustrated in the following figure.

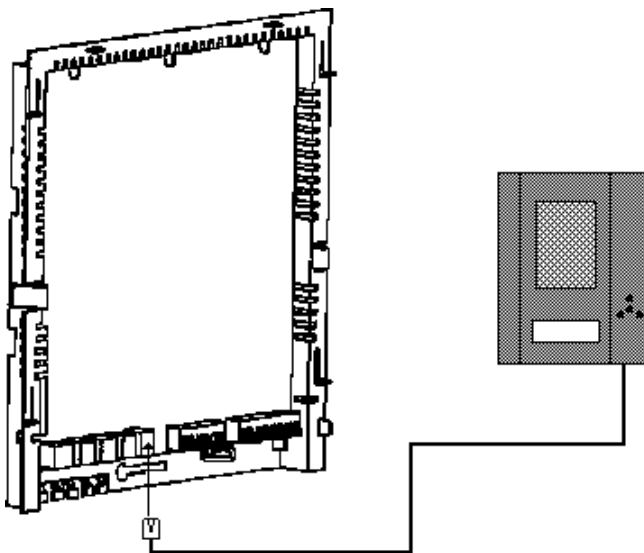


Figure B-18

DY01 doorphone has a ring button on it. When a doorphone user presses this button the telephone of the operator or the ringing extension 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.

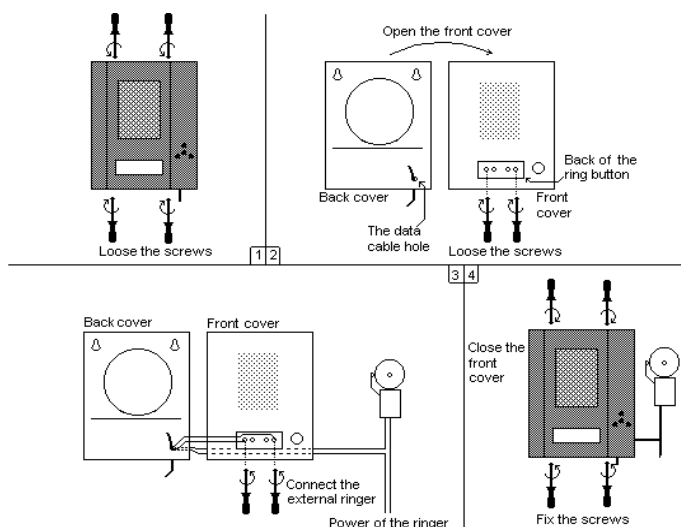


Figure B-19

III.5. EXTERNAL ANNOUNCEMENT SYSTEM

• CABLING

Any external announcement system can be connected to MS38s system through the doorphone (DIA) socket on MB38s motherboard. The following figure illustrates this installation.

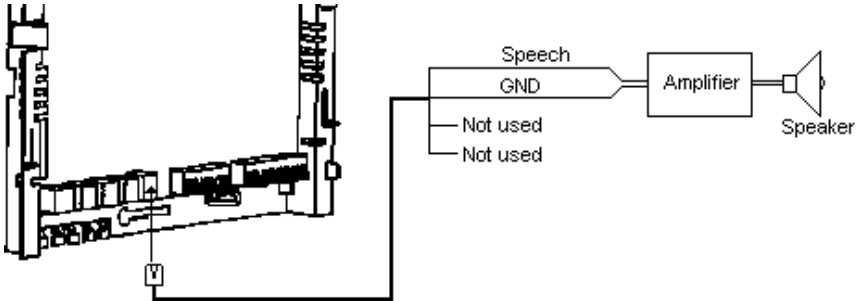


Figure B-20

MS38s systems are enhanced with a facility, which provides the efficient use of your amplifier by way of its external relay (see section III.12). The external relay of MS38s system can be used to switch the power of the amplifier of the announcement system. For this, the power of the amplifier must be connected through the external relay on the MB38s motherboard using the 2-pin XREL connector and the system must be programmed accordingly.

The following figure is to give an idea about these connections.

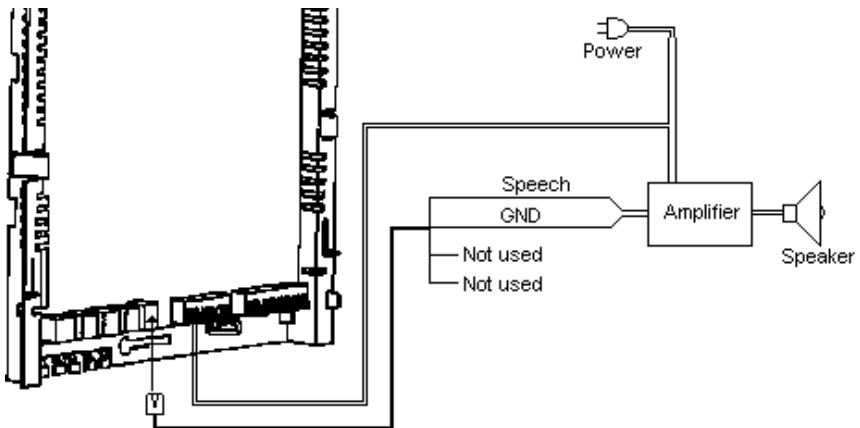


Figure B-21

III.6. BATTERY BACKUP UNIT

• **INSTALLATION**

BBU38s Battery Backup Unit is designed to be mounted on the wall with a couple of anchor plugs and screws. For this:

- 1) Drill two holes, which are 17.5 cm apart.
- 2) Drive the anchor plugs into the holes.
- 3) Insert the screws into the anchor plugs.
- 4) Hang the unit on the screws.

The following figure illustrates the installation.

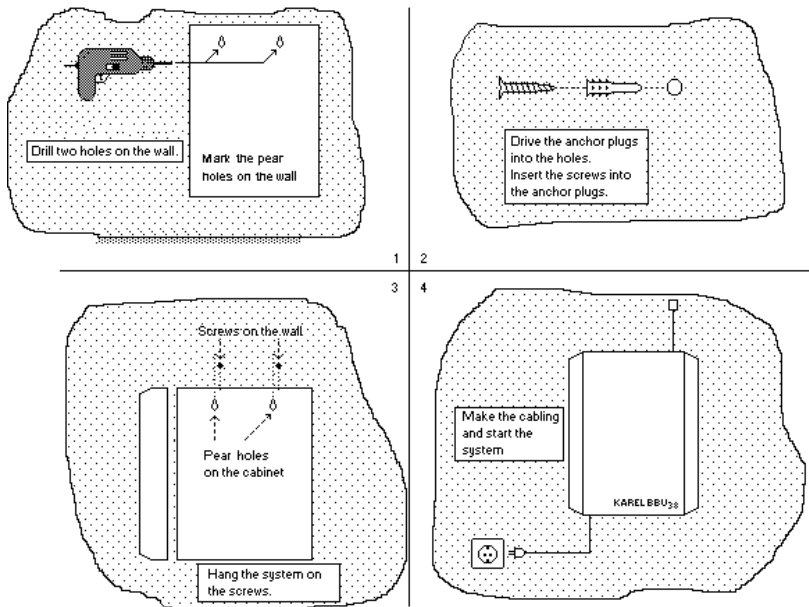


Figure B-22

• **BATTERY CONNECTION:**

- 1) Open the front cover.
- 2) Place the 12V battery on the empty space below the battery holder (see Figure A-14).
- 3) Connect the battery to the connector on BBU38s card paying special attention to the polarity (see Figure A-14).
- 4) Close the front cover.

- **CABLING:**

The BBU38s Battery Backup Unit has two built-in cables, one is the mains cable and the other one is the 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 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 MB38s motherboard.
- 2) The mains cable must be connected to the mains socket.

The cabling of BBU38 is illustrated in the following figure.

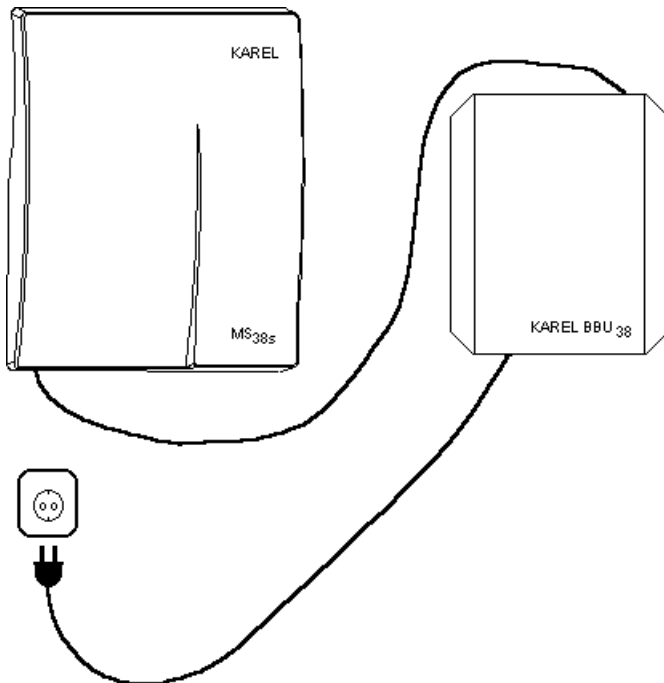


Figure B-23

III.7. AUTO ATTENDANT & VOICE MAIL

• INSTALLATION

EVM38 Auto Attendant & Voice Mail is designed to be mounted on the wall with a couple of anchor plugs and screws. For this:

- 1) Drill two holes, which are 17.5 cm apart.
- 2) Drive the anchor plugs into the holes.
- 3) Insert the screws into the anchor plugs.
- 4) Hang the unit on the screws.

The following figure illustrates the installation.

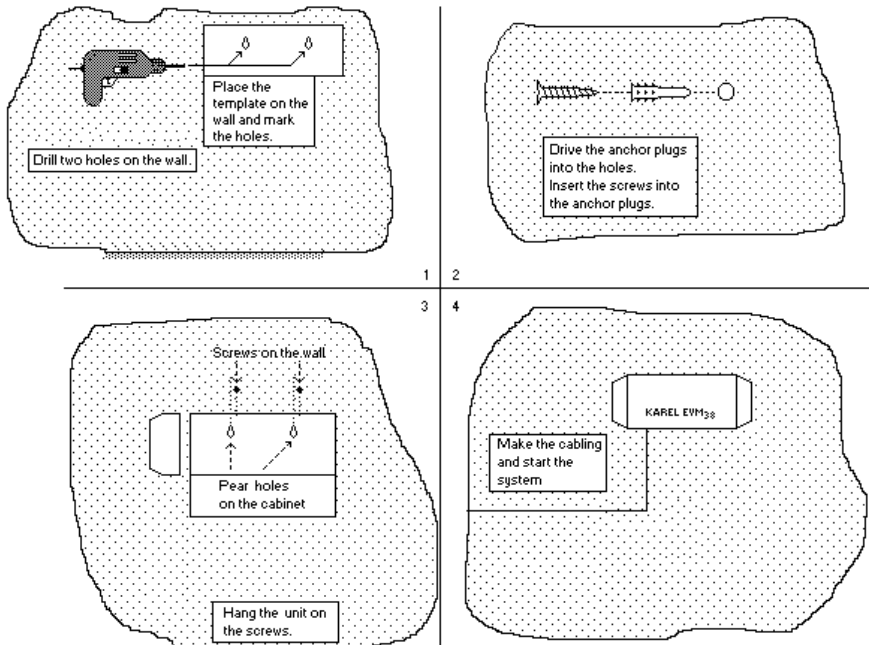


Figure B-24

• CABLING

EVM38 comes with a cable (of 40 cm) having 6-pin RJ plugs at both ends. For connecting EVM38 to the system, one of the RJ plugs must be connected to the corresponding socket on the bottom of EVM38 module whereas the other one must be passed through the cable holes at the bottom part of the cabinet and connected to the VM socket on the MB38s motherboard, as illustrated in the following figure.

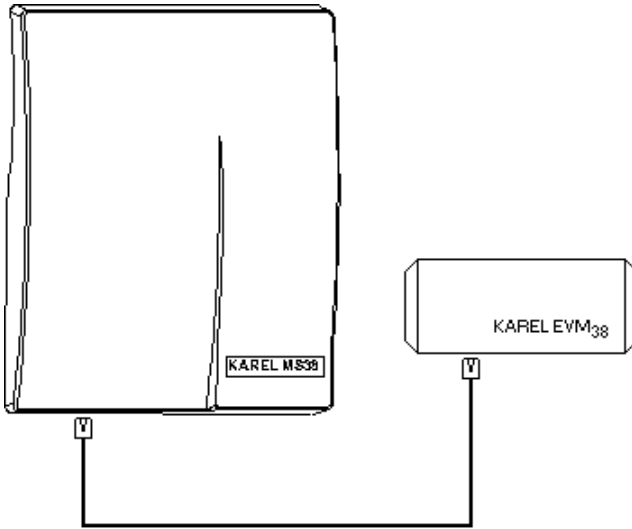


Figure B-25

Additional EVM-FE (Auto Attendant Expansion) and EVM-DE (Voice Mail Expansion) cards – if there exist any - must be installed on the EVM38 card through 36-pin F1/F2 and 24-pin D1/D2/D3 connectors, respectively. The first EVM-FE card must be installed to the Flash socket marked as F1, whereas the second EVM-FE card must be installed to the socket marked as F2. The first EVM-DE card must be installed on the DRAM socket marked as D1 and the second EVM-DE card must be installed to the socket marked as D2, whereas the third EVM-DE card must be installed to the socket marked as D3 (see Figure B-26).

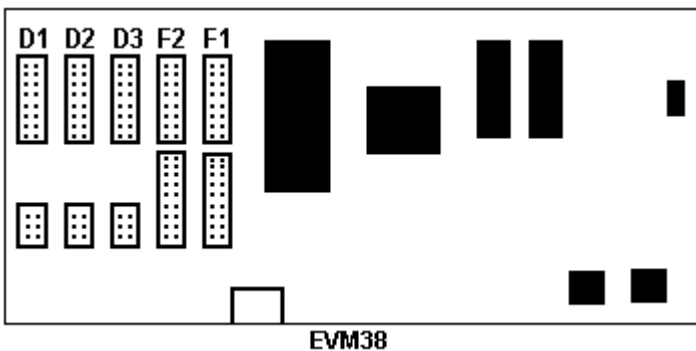


Figure B-26

III.8. LOCAL PAGER

• **INSTALLATION :**

The PG100 Local Pager is designed to be mounted on the wall. Hence, PG100 comes with a template and 2 anchor plugs with screws.

To install PG100:

- 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 pager on the screws.

The following figure illustrates this installation.

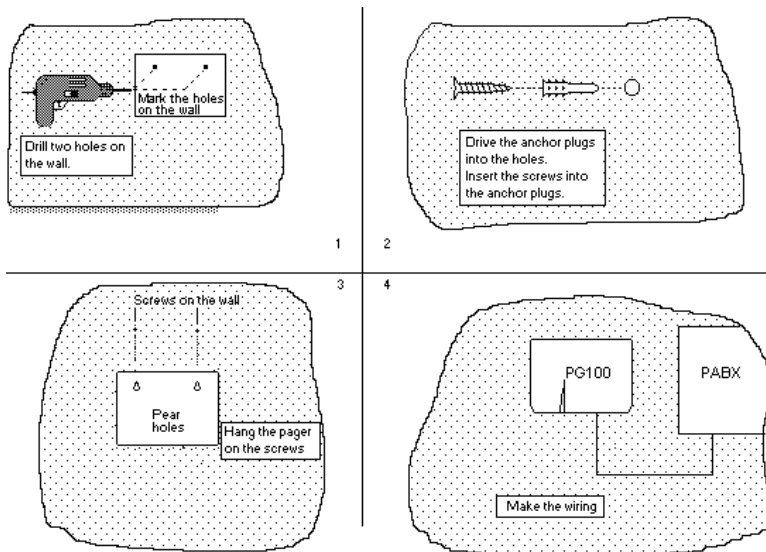


Figure B-27

• **CABLING :**

The PG100 Local Pager comes with the pager data cable. Like the telephone data cable of the consoles and feature phones, the pager data cable is 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 bottom part of the PG100 cabinet.

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

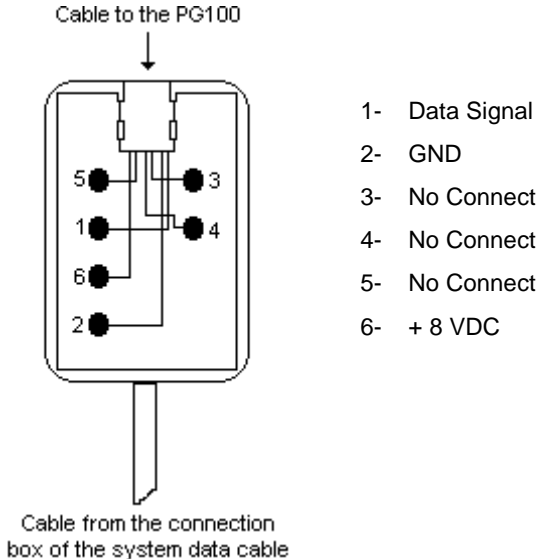


Figure B-28

PG100 shares the system data cable with OP48(-H) Consoles and LT48(-H) Feature Phones.

For connecting the PG100 pager to the system:

- 1) 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 PG100 data cable.
- 2) The RJ plug at the free end of the PG100 data cable must be attached to the corresponding RJ socket at the bottom part of the PG100 cabinet.

The following figure illustrates the cabling of PG100 Local Pager :

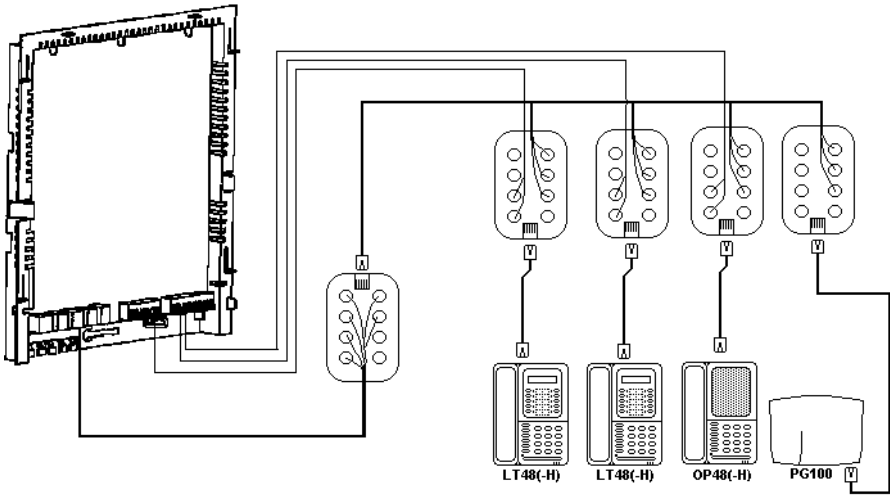


Figure B-29

The maximum distance between the PG100 Local Pager and the system can be 300 meters, if the wiring is made with ordinary wires.

However, the maximum distance of 300 meters decreases proportionally if there are KAREL telephones connected to the system. For example, if 2 LT48 Feature Phones are connected to the system in this way, the distance between the system and the PG100 Local Pager cannot exceed 100 meters.

- **POWER CONNECTION :**

PG100 can be also directly connected to mains voltage through a 12 VDC power adaptor. Normally, PG100 receives power over the system data cable. However, if the data line of the system is overloaded due to the existence of many OP48(-H) and LT48(-H) telephones connected to the system, it is preferable to feed PG100 over the power adaptor that is to be procured locally.

The power adaptor can be connected to the PG100 pager via the power socket at the bottom part of the PG100 cabinet.

III.9. 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 MB38s 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 MB38s motherboard must be attached to the external line.

The following figure illustrates the cabling of standard telephones:

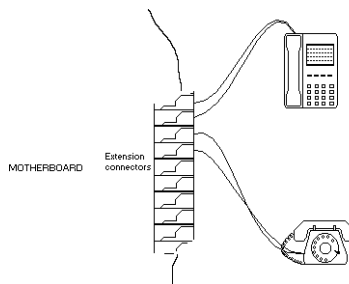


Figure B-30

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.10. FILTER & PROTECTION UNIT

- **INSTALLATION :**

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

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

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

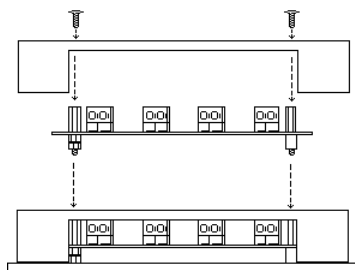


Figure B-31

- **CABLING :**

During the installation of the FPBASE and FPEXP 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, which is to be attached to the mains ground. This ground is carried to the FPEXP 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).

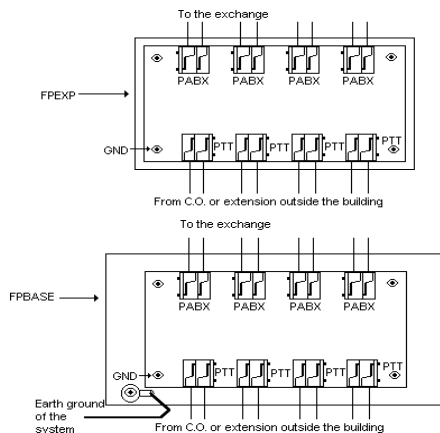


Figure B-32

To get the utmost benefit from FPBASE and FPEXP units against lighting, the modules 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 modules.

III.11. 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 MB38s motherboard, as illustrated in the following figure.

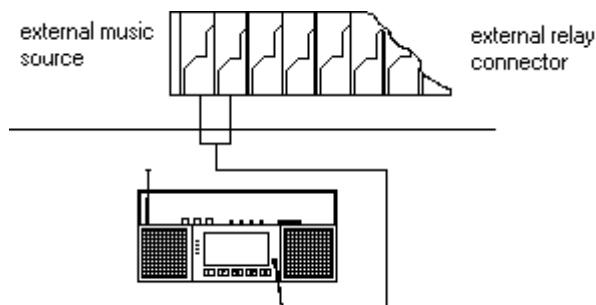


Figure B-33

MS38s is enhanced with a facility to provide the efficient use of the music source by way of its external relay (see section III.12). When the power switch of the music source is connected to the relay on the MB38s motherboard and the necessary programming is carried on, then the music source is automatically activated when a party is parked or put on hold or when an extension activates the Background Music facility. Hence, the music source is turned on only while a party is parked or put on hold or when a user is listening music on the handsfree telephone.

III.12. EXTERNAL RELAY

The relay on the MS38s 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)
- 3) External Announcement System (see sec.III.5)
- 4) External Music Source (see sec.III.11)

- **CABLING :**

The connection to the external relay should be made through the 2-pin XREL connector on the MB38s motherboard. The following figure illustrates the connection of the relay to an external device.

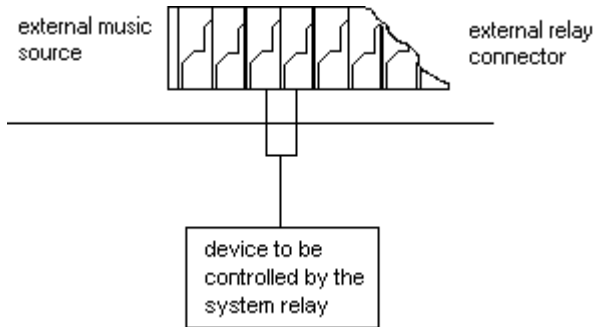


Figure B-34

I. MAINTAINING THE SYSTEM

After powering on the system, all the extensions, external lines and the accessories must be tested.

To help the installer and to ease his job, some basic problems and most probable solutions are listed below:

1) One or more ports do not operate properly:

a) Replace the MB38s motherboard.

2) No Auto Attendant message can be recorded:

a) Check the cable of the EVM38 module,

b) Check if the EVM-FE card, if any, is inserted to the correct connector properly,

c) Replace the EVM-FE card, if any,

d) Replace the EVM38 card,

e) Replace the MB38s motherboard.

3) No Voice Mail message can be recorded:

a) Check the cable of the EVM38 module,

b) Check if the EVM-DE card is inserted to the correct connector properly,

c) Replace the EVM-DE card,

d) Replace the EVM38 card.

e) Replace the MB38s motherboard.

4) The recorded Auto Attendant messages are very noisy:

a) Replace the EVM-FE cards, if any.

5) The recorded Voice Mail messages are very noisy:

a) Replace the EVM-DE cards.

6) CM38s or PK38s cannot communicate with the PC:

- a) Remove KY16 Mini Printer if it is already installed on the system,
- b) Make sure that you are using the correct security plug,
- c) Check the cable connections at both sides,
- d) Check if the communication port of the PC is working properly,
- e) Replace the cable,
- f) Reinstall the software.
- g) Replace the MB38s motherboard.

7) RS232 cannot communicate with the printer:

- a) Remove KY16 Mini Printer if it is already installed on the system.
- b) Check the cable connections at both sides,
- c) Check whether the communication parameters of the printer match to these of the system,
- d) Replace the cable,
- e) Replace the MB38s motherboard.

8) The DY01 doorphone does not function:

- a) Check the cabling of the doorphone,
- b) Replace the doorphone,
- c) Replace the MB38s motherboard.

9) LB or TE is displayed on the consoles and feature phones:

- a) Check the cabling of all the consoles and feature phones,
- b) Replace the MB38s motherboard.

10) One of the telephones has no dial tone:

- a) Check the cabling of the telephone,
- b) Replace the telephone.
- c) Check the related extension circuitry of the MB38s motherboard and replace the motherboard if no dial tone is received.