USER MANUAL FOR
MOVING SIGN
Series E2000

LED ELECTRONIC DISPLAY   Version: **1.3**

User manual of Multi-Line LED Electronic Message Center

Outline ─────────────────────────────── ⟨○○○○○○○○○○○⟩

Our Multi-line Electronic Message Centers (E200 Moving sign) offer an added level of flexibility to your information display system. They are excellent for detail and multi-tasking requirements. More specialized functions allow you to develop eye-catching messages that attract more customers and promote their organizations more effectively.

They are easy to operate and install, can stand-alone as a single electronic display or network as an enterprise wide system of message centers. Based on a modular construction, they allow for a variety of lengths.

They can apply to Corporate Communication, Event Listing, Retail Businesses, Medical Offices, Advertising, Waiting areas, Financial Information, Safety Awareness, Announcements and so on. And it brought more convenient for our life.

Features ─────────────────────────────── ⟨○○○○○○○○○○○⟩

We use the latest achievements in LED Electronic Message Centers.

♦ Display English or European characters as well as graphic symbols.

♦ 41 methods of displaying your message (Cyclic, Scroll up, Scroll down, Open to Center, Open from Right, Open from left, etc.)

♦ 9 Fonts, each with regular, bold and wide mode. User can add or modify the fonts. 67 pieces of other European characters

♦ Built-in timer to power on/off during the day

♦ Built-in real time clock. 4 kinds of time and 5 kinds of date formats. Customized time/date format are also available

♦ With memory capability of 16k bytes for text, 24k bytes for graphics, max. 250 text files and 250 graphic files.

♦ 8 programmable display speeds

♦ 8 pause periods from 0 to 60 seconds

♦ 3 different buzz sound can be added anywhere within the message.

♦ Count-down/count-up function

♦ Segmented display capability to allow separate control of sections of the display

♦ Sequencing multiple messages. Built-in scheduler for up to 30 tasks. 3 priority setting enables scheduling by week, month or year.

♦ Duplex function allows user read data from one sign by a PC and copy it to another sign

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- ♦ Up to 128 units can network via RS422 communication
- ♦ Interface of the managing software can be in multiple languages
- ♦ Password protection.
- ♦ Low consumption
- ♦ Fixing methods: desk, wall or ceiling
- ♦ Display Real Temperature (optional)
- ♦ TCP/IP network control (optional)

■ *Thank you very much that you purchase our product*

After opens the packing box, please first inspects the fitting according to the detailed parts list. If there are something has damaged or lack, please contact your dealer as soon as possible!

■ *Statement*

Changes

Besides lists fitting along with the product disposition, the content of this manual contains doesn't represent pledge of the company. Our company may improve and change this document at any time without notice.

This manual may contain technical inaccuracies or typographical errors. Changes are periodically made to the information in this manual; these changes are included in new revision of this manual.

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All rights reserved. No content of this document may be copied, reproduced or translated. It should not be recorded, transmitted or stored in a retrieval system with other form without approbation of our company. Our company retains the authority that we can revise related documents of this series product at any time and not beforehand informs.

Return and repair

Parts that are replaced by spare parts can be returned to us for repair. Please enclose your name, address, phone number, and a clear description of symptoms. When getting returned parts, we will inspect, test and repair it and send it back as soon as possible. The repairing work is free for a period of two years from the date of shipment. Each will pay the transportation charges. This means, user will pay charges for transporting goods to us and we will pay charges for return.

We retain the right to refuse part that has been damaged due to the acts of nature or causes other than normal wear and tear.

If you have any other question to ask or need any other service, feel free to contact with us.

■CATALOG

Foreword

In this part, described some information for this manual. Mainly includes:
- About this manual
- Reader for manual
- Content of manual

About This Manual

This Manual is about Multi-Line LED Electronic Message Centers (we often called it as Multi-Line Moving Sign or E2000). It explains the operation, electric connection, installation, maintenance and troubleshooting of the sign.

Reader of Manual

This manual is for the user and the Maintenance of equipment personnel as well as who needs to purchase our product to write. Hope it will bring some help for you!

Mainly content of Manual

This manual includes eight parts: Safety, Introduction, Remote Control Operation, Mechanical Installation, Electric Connection, Installing PC software, Maintenance, Appendix.
- Safety: give some safety indication.
- Introduction: Describes the basic information needed to use the system of Multi-Line Moving Sign.
- Remote Control Operation: Description of the remote control operation. User must read it before operation.
- Mechanical Installation: Gives guidance on installing for moving sign.
- Electric Connection: gives guidance on terminating power, signal cable of the sign and communication mode of system.
- Installing PC software: Describes installing the program on PC and setting of software.
- Maintenance: Introduces such things as troubleshooting the moving sign, performing general maintenance.
- Appendix: Lists additional thing about this system.

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Section 1: Safety

1.1 Safety guide

Personal protection

☺ Ensure you understand and follow all the safety guidelines, safety instructions, warnings and notes mentioned in this manual.

☺ Wear a hard hat to reduce the risk of personal injury.

☺ Be careful while working with heavy loads.

☺ Mind your fingers while working with heavy loads.

Installation personnel

The installation must be performed by authorized and qualified technical personnel only.

Accredited safety officers must ensure the safety of the site, construction, assembly, connection, use, dismantling, transport etc. of such safety critical systems.

Notes

Installation should be performed only after you are thoroughly familiar with all of the proper safety checks and installation instructions.

Do not modify and/or replace any component. We use specific materials and manufacturing processes in order to achieve part strength. Consult us for assistance with custom applications.

Always follow our installation manual. Contact us if you should have any question regarding the safety of an application.

Product care

Structural and mounting components should be kept clean and otherwise maintained in a manner consistent with part design. Our products must be used in a manner consistent with their design and inspected on a routine basis for security, wear, deformation, corrosion and any other circumstances that may affect the load handling capability of the part.

This product should be operated from the type of power source indicated on the marking label. If you are not sure of power available, consult your dealer or local power company.

We recommends inspections at regular intervals for all installations and increasing in frequency for more critical installations. If a part is found to have damage, which may cause a decrease in load capability, the part must be removed for service or replaced immediately.

1.2 Important Safety Precaution

- ➢ Read and understand these instructions.
- ➢ Heed all warnings.
- ➢ Follow all instructions.
- ➢ Personnel must be professional to installing and maintenance.
- ➢ Unplug this product from the electrical outlet before cleaning. Clean only with materials or chemicals that are inert, nonabrasive, noncorrosive and non-marking. Consult the manufacturer for further advice should any doubts exist regarding any cleaning procedure.
- ➢ Do not block ventilation openings.
- ➢ Avoid locations that are subject to excessive heat, moisture and dust such as radiators, heat registers, stoves, or other apparatus (including amplifiers) that produce heat.
- ➢ Don't defeat the safety purpose of the polarized or grounding type plugs/sockets. If the provided sockets/plugs are damaged then replacement of the defective parts must be undertaken immediately.
- ➢ Protect the power/data cables from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the apparatus. Replace damaged power/data cables immediately.
- ➢ Only use accessories specified by the manufacturer.
- ➢ Disconnect the power to this apparatus during lightning storms or provide suitable additional lightning protection. Unplug this apparatus when unused for long period of time.
- ➢ Refer all servicing to qualified service technicians/personnel. Servicing is required when the apparatus has been damaged in any way, such as power-supply cable or plug is damaged, the apparatus does not working normally, or has been dropped.
- ➢ Use only with systems or peripherals specified by the manufacturer. Use caution during lifting/moving or transporting to avoid damage by possible tipping.
- ➢ Please check truss installation when you mounting the Display.
- ➢ Must know the weight for this system before mounting.

1.3 Important Warning

Important warning:

1. **Danger of electric shock**

   Don't open or touch! To reduce the danger of electric shock, don't remove cover.

   The lightning flash with an arrowhead is intended to tell the user that parts inside the product may cause a danger of electrical shock to persons.

2. **Danger of fire**

   To protect against danger of fire by overloading of power cables. Power cable may be connected in parallel. Each power source cable supplying for Display should be protected by a circuit breaker or fuses rated.

3. **Working environment**

   Temperature: -20℃ to +60℃.

   Humidity: 15%~95% RH.

4. **Electro-Static protect**

   LED components used in display are Electro-Static discharge sensitive. To prevent the possibility of destroying LED components do not touch either in operation or while switched off. Servicing or maintaining must be with anti-static instrument (such as ESD hand/heel straps).

5. **The equipment must be earthed**

   In order to protect against danger of electric shock, the installation should be properly grounded. We recommend a resistance to ground less than 10 ohms.

6. **Power cables**

   The power cables delivered with this system have special properties for safety. They are not user serviceable. If the power cables are damaged, replace only with new ones. Never try to repair a power cable.

7. **Data cables**

   The data cables provided with this system have special properties for safety. They are not user serviceable. If the data cables are damaged, replace only with new ones. Never try to repair a data cable.

8. Keep flammable materials away from the equipment (such as curtains). A lot of heat emanated from sign while working. Proper ventilation must be provided.

Section 2: Introduction

This part will introduce some elementary knowledge and the technical specification of the system.

2.1 System overview

This system is a Multi-Line LED Electronic Center. It is capable of displaying text and graphics. Messages are stored as files. The system has 16,384 bytes of memory for text files and 24,576 bytes for graphics files. Maximum number of stored text and graphics files is 250 each. Maximum size of a file can reach the entire memory size of the system.

Following is something about the system:

- 16 color combinations:
    - 3 basic colors
    - 5 rainbow colors
    - 8 mixture colors
    - Automatic color rotation (ACL)
- 9 fonts: SS5, SS7, SF7, SF10, SS16, SF16, TM16, AR16, SMA. Plus all fonts may be BOLD and/or WIDE.
- 41 display modes:
    - 6 slide modes
    - 6 cover modes
    - 6 roll modes
    - 4 interlace-slide modes
    - 6 interlace-roll modes
    - 4 shutter modes
    - 9 special effect modes

    AUTO display randomly selects one of available display modes

    SCROLL display mode for **scrolling** of large continuous messages

    ROTATE display mode for **rotating** of a continuous message
- 8 message moving speeds
- 8 pause periods from 0 to 60 seconds
- 3 kinds of audible beeps during text display
- 61 special international characters.
- 4 time and 5 date formats. Custom time/date format also available.
- 8-characters length file name. Maximum 250 text files and maximum 250

graphic files.

- Text Memory: 16k bytes

- 24k bytes graphics memory for 38 colorful graphics (or more) at 160*16 pixels.   Flexible size of graphics files.

- INCLUDE function to call other text files from memory.

- Multi-WINDOW function allowing for different parts (windows) with different display modes. For example, freeze parts of the display while moving other parts.

- 30 schedule tasks with 3 priorities enable periodic tasks by week, month or year.

- User friendly interface and programming via infrared remote control.

- RS232 or RS422 interface. Modem is supported for long distance communication. Up to 255 signs in one network. Baud rates: 1200, 2400, 4800, 9600, 14400, 19200, 28800 and 57600.

- Duplex function allowing for reading stored data from the sign by PC and copying data from one sign to another

- Password security protects the sign from unauthorized access

- Automatic power ON / OFF schedule

- Memory Backup feature make the data storage more reliable

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2.2 Technical Specification

In this part, we give some general technical specification of Multi-line moving sign.

Table1: Technical Specification

Item	Technical Parameters
Display Color	Red, Amber, Blue, Yellow Green, Pure green, or RG Tri-color
Pixel pitch Choice(mm)	12, 14, 16, 20, 22, 25, or 31.25
Brightness	3000~7000cd/m²
Average LED lifetime	Over 100,000 hours
PC Communication	RS232, RS422, Modem, GSM Modem or Ethernet network.
Communication Distance	Max.15meters for RS232, 1200meters for RS422
Remote Control	IR remote, 62 keys
Viewing Angle	Horizontal: 70°, Vertical: 35° or customized
Working Temperature	-20°C to +60°C
Working Humidity	15%-95% RH
Power Input	110/220VAC , 60Hz/50Hz
Memory Retention	Over one year
Housing Material	Waterproof Black Powder Coated steel
Optional Fittings	RS232-RS422 adapter, Modem, RF Modem, GSM Modem, Ethernet adapter

Note: Above table list the technical specification is about Multi-line moving sign series. And the technical specification of different sign may have some difference, please refer to Specification.doc file for each sign.

Section 3: Remote control Operation

E2000 moving sign can be controlled by IR remote control. This section is described how to operate remote control. It includes five parts:

· Text program

· Graphics program

· Program schedule

· System setup

· Other functions

3.1 General Introduction

This part is descriptive some basal information of operation for the remote control.

3.1.1 Power-on Initialization

Upon power up the system initialization is performed as follows:

(1) Install fonts from the font chip, reports NO FONTS CHIP on failure.

(2) At initial startup, clear the memory, load default settings and set the real time clock to 1 Jan 2000, 00:00:00.

(3) Close unsaved files when abnormal shutdown. Abnormal shutdown will occur when power fails or system halts during remote control programming or serial communication access.

(4) Check the system data integrity. Despite the memory being backed up by a battery, it may become corrupted in some unusual circumstances. If the auto recover mode is off, the system will report VERIFY ERROR, and prompt for clearing of the affected data. If the auto recover mode is on, the memory will be recovered from the flash automatically without any prompt.

(5) Initialize the modem to automatic answer mode if modem detected.

3.1.2 Sign ON/OFF Switching

Switch the sign between ON and OFF States by pressing ⬚ON⬚ key. Power up the sign, it will perform the initialization and restore the conditions saved before the last power down. If the sign was in OFF State before last power down, the sign will still keep in OFF State and screen will be cleared; only one dot in the top-right corner

will flash slowly. If the sign was in ON State before last power down, the sign will still keep in ON State and it will begin running preprogrammed files.

Which file will run first?

a. A default file will run when no other task in the schedule meets the running condition. Default file can be set with the ⬚RUN⬚ key.

b. If enable auto running demo, the DEMO file will run if no default file has been set. Otherwise the screen is black.

c. Scheduled tasks of the highest priority will run when they meet the running condition.

The ⬚ON⬚ key can turns the sign ON or OFF. When the sign is at OFF, it consumes low idle power even if it is still connected to the power source.

3.1.3 Setting Default File

Presses ⬚RUN⬚ key, input the file name or use ⬚NEXT⬚ and ⬚PREV⬚ to select a file. It is possible to input first few characters and then use ⬚NEXT⬚ and ⬚PREV⬚ to find the file in the listing. Next presses ⬚ENT⬚ finished setting.

Uses ⬚DEL⬚ or ⬚←⬚ key to delete a character and ⬚ESC⬚ key to cancel the procedure.

NOTES: After setting the default file, it may not run immediately. The scheduled tasks will run first. Disable or clear all scheduled tasks if you want to run the default file only.

3.1.4 Display Text

Press ⬚ON⬚ key to turn OFF the sign. Press key⬚T⬚ ⬚E⬚ ⬚S⬚ ⬚T⬚ ⬚1⬚. The sign will display red, green and yellow on the entire screen.

3.1.5 Main Menu

Main Menu allows for easy programming of message files, arranging schedule tasks, configuring the sign etc..

Press ⬚PROG⬚ key to call up the Main Menu. The sign will show the menu items as follows:

PROGRAM TEXT

Performs all text file operations: NEW, EDIT, RUN, DELETE, RENAME and COPY, view PROPERTY.

PROGRAM GRAPHICS

Performs all graphics file operations: NEW, EDIT, DELELTE, RENAME and COPY, view PROPERTY.

PROGRAM SCHEDULE

Performs all schedule operations: NEW, EDIT, DELETE and DISABLE/ENABLE.

SETUP

Performs system configurations: DATE AND TIME, SERIAL ADDRESS, BAUD RATE, PASSWORD, AUTO ON/OFF SOUND ON/OFF.

OTHER

Performs all other operations such as: CLEAR MEMORY, CLEAR SCHEDULE, CLEAR GRAPHICS, CLEAR TEXTS, MEMORY info, SEND MEMORY.

Press key NEXT and PREV to select an item.

Available hot keys:

ON   Turn OFF the sign

PROG   Open text file (creates new text file if there's no existing file)

GRA   Open graphics file (creates new graphics file if there's no existing file)

RUN   Close the main menu and return to the running mode

3.2 Text Program

PROGRAM TEXT when selected, will list text files in the second line of the screen. The first item of the file list will be "- NEW -", which allows creating a new file. Use [→] and [←] to select a previously programmed text file. The file list is sorted by name, so by pressing the first character key of the name the selection may be faster. To select the first item ("NEW"), press [SPA] key.

3.2.1 Creating New Text Files

The following table shows how to create a new text file.

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press [PROG] key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ - NEW -
2	Press [ENT] key, the first item of file list "NEW" will be selected. The sign will create a new text file.	NEW TEXT [_]
3	Press [A] for file name, then press [ENT] to start editing text file (for details, see chapter:2.1.3 EDIT TEXT FILE)	CAP INS A>
4	Press [RUN] key finish the text editing and return to the running mode.	

3.2.2 Text File Commands

After selecting a text file from the file list press [ENT] key to display commands menu. Uses [→] or [←] key to select a command. Press [ENT] key to execute it.

Command and its meanings:

EDIT   Edit current text file

RUN   Set current text file as default and return to running mode

DELETE   Delete current text file. The screen will prompt: "DELETE TEXT A, ARE YOU SURE (Y/N)?". Press "Y" to confirm, "N" to cancel.

RENAME   Rename current text file

COPY   Make a copy of current text file

PROPERTY   View current text file's property such as size and modify time

Available hot keys:

[PROG]   Edit the text file

[RUN]   Set the text file as default and return to running mode

[DEL]   Delete the text file

The following table shows how to edit an existing text file "B" (the text file "B" has been already created):

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ ► – NEW –
2	Press B key to select the text file "B"	PROGRAM TEXT ▼ ◄► TEXT B
3	Press ENT key to display the command menu. The first command EDIT will be shown. *	TEXT B ► EDIT
4	Press ENT key to start editing the text file "B".	B>[SNOW]WELCOME CAP INS
5	Press RUN key to finish the text editing and return to the running mode.	

* Pressing the PROG key will cause the system to go to edit text file "B" immediately after step 2.

3.2.3 Edit Text Files

3.2.3.1 Text Editor Interface
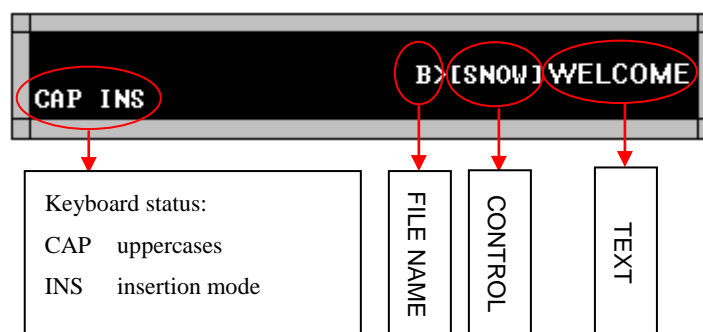
The contents of the text file will be displayed in a single line. The CURSOR is always located in the rightmost character of the screen. The file name will be displayed in the beginning of the text file and delimited by the character '>'. "CONTROLS" control display methods, fonts, colors and so on. They are often delimited by '[' and ']'. The text is displayed in its actual font and color.

The current keyboard status is shown in the bottom-left corner of the screen.

3.2.3.2 Text Editor Command Keys

ON   Close and save the file, and turn OFF the sign
RUN   Close and save the file and run it as default

[PROG]	Close and save the file and go to main menu
[CAP]	Toggle between uppercase and lowercase
[INS]	Toggle between insertion mode and overwriting mode
[ESC]	Hide / Show the keyboard status
[←]	Move cursor left
[→]	Move cursor right
[ALT][←]	Move cursor to the front page
[ALT][→]	Move cursor to the next page
[DEL]	Delete one text character or control character
[ALT][DEL]	Delete the current page

3.2.3.3 Changing Character Font

Press [FONT] key to insert the text FONT control character. Uses [NEXT] or [PREV] key to select one of the 9 fonts.

The following table list available fonts:

FONT	DESCRIPTION
[SS5]	SANS SERIF, 5 pixels height
[SS7]	SANS SERIF, 7 pixels height (Default)
[SF7]	SERIF, 7 pixels height
[SF10]	SERIF, 10 pixels height
[SS16]	SANS SERIF, 16 pixels height
[SF16]	SERIF, 16 pixels height
[TM16]	Times New Roman, 16 pixels height
[AR16]	Arial, 16 pixels height
[SMA]	Small Fonts, 8 pixels height

3.2.3.4 Changing Display Method

METHOD control is used to change the display methods.

Press ⬚MET⬚ key to insert the METHOD control character in the text. The sign has 41 display methods (including AUTO, SCROLL, ROTATE…etc). Press ⬚NEXT⬚ or ⬚PREV⬚ to select, or press ⬚ALT⬚⬚NEXT⬚ or press ⬚ALT⬚⬚PREV⬚ for faster selection.
The table below list available display methods:

METHOD	DESCRIPTION
[AUTO]	Randomly selects one of the available display modes. (Default)
[IMMED]	Immediate display mode
[SLIDE]	Slide display modes (6 directions)
[COVER]	Cover display modes (6 directions)
[ROLL]	Roll display modes (6 directions)
[INSLID]	Interlace-slide display modes (4 kinds)
[INROLL]	Interlace-roll display modes (6 kinds)
[SHUTT]	Shutter display modes (4 kinds)
[JUMP]	Jump display mode
[SNOW]	Snow display mode
[RANDOM]	Random display mode
[SHOOT]	Shoot display mode
[EXPLODE]	Explode display mode
[TWINKLE]	Twinkle display mode
[FLASH]	Flash display mode
[PACMAN]	Pac-Man display mode
[SCROLL]	Scroll display mode, use to scroll a large continuous message
[ROTATE]	Rotate display mode, use to rotate a large continuous message

3.2.3.5 Using Bold Wide and Blink Font

Press ⬚ALT⬚⬚0⬚ key to insert the BOLD/WIDE/BLINK control character for the text. Use ⬚NEXT⬚ or ⬚PREV⬚ to select between BOLD, WIDE and BLINK. All text between two BOLD/WIDE/BLINK control characters will be displayed as bold/wide/blink font.

3.2.3.6 Changing Character Color

Press ⬚COL⬚ key to insert the text COLOR control character. Uses ⬚NEXT⬚ or ⬚PREV⬚ key to select one of the color combinations.
The following table list available combinations:

COLOR	DESCRIPTION
[ACL]	Auto color, circularly change color when load a new page
[RED]	Red (Default)
[GRN]	Green
[YEL]	Yellow
[RB1]	Rainbow color 1
[RB2]	Rainbow color 2
[RB3]	Rainbow color 3
[RB4]	Rainbow color 4
[RB5]	Rainbow color 5
[MIX1]	Mixture color 1
[MIX2]	Mixture color 2
[MIX3]	Mixture color 3
[MIX4]	Mixture color 4
[MIX5]	Mixture color 5
[MIX6]	Mixture color 6
[MIX7]	Mixture color 7
[MIX8]	Mixture color 8

3.2.3.7 Changing Message Moving Speed

Press ⌑SPE⌑ key to insert the SPEED control character. The sign supports 8 speeds. Use ⌑NEXT⌑ and ⌑PREV⌑ to select one of them. [SPEED1] is the lowest speed, and [SPEED8] is the fastest. Default speed is [SPEED5].

3.2.3.8 Changing Message Pause Period

Press ⌑PAU⌑ key to insert PAUSE control character for the text. Uses ⌑NEXT⌑ or ⌑PREV⌑ key to select one of the available pause periods.

PAUSE	DESCRIPTION
[NO PAU]	No pause
[PAU 1S]	Pause 1 second
[PAU 2S]	Pause 2 seconds
[PAU 3S]	Pause 3 seconds
[PAU 5S]	Pause 5 seconds (Default)
[PAU 10S]	Pause 10 seconds
[PAU 30S]	Pause 30 seconds
[PAU 60S]	Pause 1 minute

3.2.3.9 Displaying Time and Date

Press ⌊TIME⌋ key while in the edit text file mode. The system will display the time insertion menu as in the following table:

MENU ITEM	DESCRIPTION
INSERT TIME	Insert time, 4 formats: 23:59 (Default); 23:59:59; 12:59 AM; 12:59:59 AM
INSERT DATE	Insert date, 5 formats: 1 Jan 2000 (Default); Jan 1, 2000; 10/1/2000; 1/10/2000; 2000.1.10
INSERT HOUR-24	Insert hour in 24-hour mode
INSERT HOUR-12	Insert hour in 12-hour mode
INSERT MINUTE	Insert minute
INSERT SECOND	Insert second
INSERT AM/PM	Insert AM/PM, 4 formats: e.g. AM (Default); A; am; a
INSERT WEEK	Insert day of week, 4 formats: e.g. Mon (Default); Monday; MON; MONDAY
INSERT DAY	Insert day of month
INSERT MONTH	Insert month, 5 formats: e.g. Jan (Default); January; 1; JAN; JANUARY
INSERT YEAR	Insert year, 2 formats: e.g. 2000; 00

Use ⌊NEXT⌋ or ⌊PREV⌋ key to select the time element, then press ⌊ENT⌋ key to insert it, or press ⌊ESC⌋ key to cancel.

After inserting the TIME control, uses ⌊NEXT⌋ or ⌊PREV⌋ key to change the time element format.

3.2.3.10 Displaying Graphics

Note: A graphics file must be created before it can be displayed. Please refer to Chapter 2.2 for details.

Press ⌊GRA⌋ key while in the editing mode. The system will prompt to input the graphics file name:

```
INSERT GRAPH
[_        ]
```

Input the file name or use ⌊NEXT⌋ or ⌊PREV⌋ keys to select a file. Then press ⌊ENT⌋ key to insert the selected graphics file, or press ⌊ESC⌋ key to cancel.

3.2.3.11 Starting New Line

In the text edit mode press ⌊ENT⌋ key to insert the NEWLINE control character (↵) in order to start a new line.

3.2.3.12 Starting New Page

In the text editing mode press ⌊ALT⌋⌊ENT⌋ key to insert the NEWPAGE control character (---PAGE---) in order to start a new page.

3.2.3.13 Multi-Window Function

This function allows to display a message in a selected screen area (window) and to align that message within the window by using WINDOW control functions.

Press [ALT][M] key while in the text edit mode. The screen will display a blinking box indicating the current window border. The coordinates for the top left corner, width and height of the window will be displayed in the center of the screen.
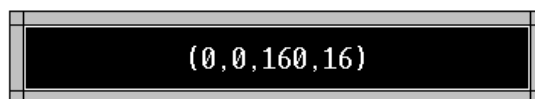
Use the direction keys: [↗] [▲] [↘] [◀] [▶] [↖] [▼] [↗] to move the left and the top border of the window. Hold the [ALT] key down while pressing one of the direction keys to move the right and the bottom border of the window. Keys [←] [→] or [NEXT] [PREV] in combination with [ALT] key may be used to modify the window box faster.

Presses [ENT] or [ESC] key to save the window size and position. The WINDOW control character will be automatically inserted in the text. Pressing [ALT][M] key will modify the window box again. Pressing [NEXT] and [PREV] key will select the text alignment mode of the window as listed below:

WINDOW	TEXT ALIGNMENT
[←L ↑T]	Left align and top align
[↔C ↑T]	Center align and top align
[→R ↑T]	Right align and top align
[←L ↕M]	Left align and middle align
[↔C ↕M]	Center align and middle align (Default)
[→R ↕M]	Right align and middle align
[←L ↓B]	Left align and bottom align
[↔C ↓B]	Center align and bottom align
[→R ↓B]	Right align and bottom align

3.2.3.14 Including Existing Text Files

Use this function to display a text file previously stored in the memory.

Press [ALT][N] key while in the text editing mode. The system will prompt for input of the filename of the text to be included:

USER MANUAL

Multi-line
LED Electronic Message Center

```
INCLUDE TEXT
[_        ]
```

Input the file name or use [NEXT] or [PREV] to select one from the list. Then press [ENT] key to insert, or press [ESC] key to cancel.

INCLUDE control character will be displayed as [I: filename].

NOTES: The maximum depth of INCLUDE function is limited to 20. Cross-Including is not allowed.

3.2.3.15 Changing Line Spacing

Press [ALT][Y] key to insert the VSPACE control character that allows control the line spacing. The default line spacing is [VS 0]. In this setting the system will leave 1 pixel space between two adjacent lines wherever possible. When [VS 1-15] is selected, the line space will be set from 1 to15 pixels.

The VSPACE control character must be inserted in the beginning of a text line. Press [ALT][Y] key to select line spacing from [VS 0] to [VS 15].

3.2.3.16 Fast Cursor Positioning

Press [ALT][SPA] key while in the text editing mode. The system will display the "GO TO" menu. Use [←][→] or [NEXT][PREV] keys to select a menu item as listed below. Press [ENT] to move the cursor to the selected position.

MENU ITEM	DESCRIPTION
GO TO FILE BEGINNING	Move cursor to the file beginning
GO TO END OF FILE	Move cursor to the end of file
GO TO PREV CONTROL	Move cursor to the previous control character
GO TO NEXT CONTROL	Move cursor to the next control character

3.2.3.17 Deleting Large Number of Characters

Press [CLR] key while in the text editing mode. The system will display the "CLEAR" menu. Use [←][→] or [NEXT][PREV] keys to select a menu item as listed below. Press [ENT] to execute the selected instruction.

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MENUITEM	DESCRIPTION
CLEAR ALL THIS FILE	Delete all characters in the file
CLEAR TO FILE BEGINNING	Delete all characters from the cursor position to the file beginning
CLEAR TO END OF FILE	Delete all characters from the cursor position to the file end
CLEAR TO PREV CONTROL	Delete characters from the cursor position to the previous control character (not including the control character).
CLEAR TO NEXT CONTROL	Delete characters from the cursor position to the next control character (not including the control character).

3.2.3.18 Sound with Text

Press BEEP key while in the text editing mode to insert the SOUND control character. Use NEXT and PREV to select one of the 3 beep sounds: [BEEP1], [BEEP2] or [BEEP3]. The selected sound will be integrated with the edited text.

3.2.3.19 Inserting International Character

While in the text editing mode, first input one of the characters from the left column as in the table below, then press NEXT or PREV key to select an international character. For example: to input the character '€', the character '$' must be input first, then press NEXT key six times or press PREV key once.

Remark: Appendix D list the international character.

3.2.3.20 Displaying Temperature

Press CPW key to insert the TEMPERATURE control character to display temperature in the text file. Three formats temperature are available: Centigrade (°C), Fahrenheit (°F) and Kelvin (K), use NEXT or PREV to select them.

NOTES: This feature is avalable only for the sign that has installed temperature sensor.

3.2.3.21 Create a Decounter or Incounter

We often use a decounter to wait for an important moment such as Year 2K, World Cup 2002, etc.

We often use an incounter to count the safty running days, etc.

You can create a decounter or incounter like this:

Press ALT TIME when editing text file, a menu will appear:

ADD DECOUNTER IN DAYS	the result number is days to the given time
ADD DECOUNTER IN HOURS	the result number is hours to the given time
ADD DECOUNTER IN MINUTES	the result number is minutes to the given time
ADD DECOUNTER IN SECONDS	the result number is seconds to the given time
ADD DECOUNTER IN hh:mm:ss	the result number is hh:mm:ss to the given time
ADD INCOUNTER IN DAYS	the result number is days from the given time
ADD INCOUNTER IN HOURS	the result number is hours from the given time
ADD INCOUNTER IN MINUTES	the result number is minutes from the given time
ADD INCOUNTER IN SECONDS	the result number is seconds from the given time

Choose the item you need, then press ENT to continue, the screen will display:

```
01 Jan 2000
23:59:59 Sat
```

Set the time that will be count down to or count up from and press ENT, a decounter or incounter now has been created.

The decounter or incounnter add in text will display in a number from 0 to 65535. Larger number will display as '------'. The decounter will stop at 0 when the given time passed, and the incounter will display 0 even the time has not started.

3.3 Graphics Program

Graphics programming is similar to that of text programming.

3.2.1 Creating New Graphics Files

Follow the table below to create a new graphics file. Example filename: "A":

STEP	PROCEDURE	DISLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ – NEW –
2	Press NEXT key to select the menu item "PROGRAM GRAPHICS".	PROGRAM GRAPHICS ⬍ – NEW –
3	Press ENT key, the first item of file list "NEW " will be created as a new graphics file.	NEW GRAPH [_]
4	Press A for file name, then press ENT to start editing. (For details, see chapter 3.3 EDIT THE TEXT FILE)	
5	Press RUN key to finish the graphics editing and return to the running mode.	

3.3.2 Graphics File Commands

After selecting a graphics file from the file list, press ENT key to display the command menu. Uses → or ← key to select a command. Press ENT key to execute it.

Command and its meanings:

    EDIT   Edit current graphics file

    DELETE   Delete current graphics file. The screen will prompt "DELETE GRAPH A,

ARE YOU SURE (Y/N)?", press "Y" to confirm, "N" to cancel.

RENAME   Rename current graphics file

COPY   Make a copy of current graphics file

PROPERTY   View current graphics file's property such as size and modification time.

Available hot keys:

PROG   Edit the graphics file

DEL   Delete the graphics file

The following table shows how to edit existing graphics file "B" (created previously):

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ – NEW –
2	Press NEXT key to select the menu item PROGRAM GRAPHICS.	PROGRAM GRAPHICS ⬍ – NEW –
3	Press B key to select graphics file "B".	PROGRAM GRAPHICS ⬍ GRAPH B
4	Press ENT key to display the command menu. The first command EDIT is shown.	GRAPH B EDIT
5	Press ENT key to start editing graphics file "B".	
6	Press RUN key to finish graphics editing and return to the running mode.	

* Press PROG key to go to edit graphics file "B" immediately after step 3.

3.3.3 Edit Graphics File

3.3.3.1 Graphics Editor Command Keys

ON   Close and save the file and turn OFF the sign

RUN   Close and save the file and return to running mode

PROG   Close and save the file and go to main menu

↖   Move cursor left and up

↑   Move cursor up

↗   Move cursor right and up

←   Move cursor left

→   Move cursor right

↙   Move cursor left and down

↓   Move cursor down

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◢	Move cursor right and down
•	Toggle paint mode
NEXT	Select pen color
PREV	Select pen color
SPA	Toggle one point drawing

3.3.3.2 Changing Graphics Size

In graphics editing mode, press ⟦ENT⟧ or ⟦ESC⟧ key to changes graphics size.

```
WIDTH : 160
HEIGHT : 16
```

Press key ⟦→⟧ or ⟦←⟧ to select "HEIGHT" or "WIDTH" for changing the size. Press key ⟦NEXT⟧ or ⟦PREV⟧ to modify the value or ⟦ALT⟧⟦NEXT⟧ or ⟦ALT⟧⟦PREV⟧ to modify fast. Finally press ⟦ENT⟧ or ⟦ESC⟧ to complete.

It is also possible to adjust the graphics size by using the combined keys: ⟦ALT⟧ key plus one of the cursor-moving keys ⟦◤⟧ ⟦▲⟧ ⟦◥⟧ ⟦◀⟧ ⟦▶⟧ ⟦◢⟧ ⟦▼⟧ ⟦◣⟧.

3.3.3.3 Draw and Erase

Press ⟦•⟧ key to toggle the paint mode on/off. Use ⟦NEXT⟧ or ⟦PREV⟧ key to select color, move the cursor, then you can draw a line, which follow the track of cursor. To erase the line move the cursor along the line once again (keep paint mode on, do not change cursor color). The line will be erased.

The ⟦SPA⟧ key is used to draw or erase one dot.

3.3.3.4 Clearing Entire Graphics File

In graphics editing mode, press ⟦CLR⟧ key to clear the entire graphic. The screen will prompt as shown below:

```
CLEAR THE GRAPH?
```

Press "Y" to confirm, "N" to cancel.

3.4 Program Schedule

PROGRAM SCHEDULE is the third item in the main menu. If no task exists in the schedule, the second line will display "- NEW -" prompting to create a new task. If there are some has programmed tasks already, use ⟶ and ⟵ key to select them.

3.4.1 Adding New Task To Schedule

The following table shows how to create a new schedule task:

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ ▶ – NEW –
2	Press NEXT key twice to select the "PROGRAM SCHEDULE".	PROGRAM SCHEDULE ↕ – NEW –
3	Press ENT key to start adding new task.	

The following 7 steps are needed to create a new schedule task:

Step 1 Input the text file name that will be run in task:

SCHEDULE RUN
[_   ]
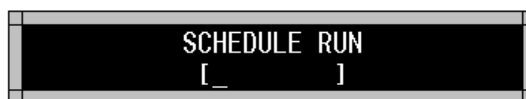
Uses NEXT or PREV key to select one, then press ENT key to continue.

Step 2 Set the START DATE of the task:

FROM [D-M-Y]
00-00-0000
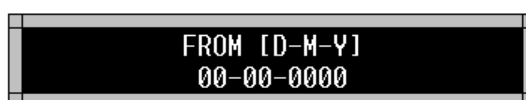
The date format must be D-M-Y (date-month-year). Uses ⟶ or ⟵ key to move the cursor, and press number keys from 0 to 9 to modify, then press ENT key to continue.

If the year is set to 0, the year will be ignored and the task will start each year. For example, if START DATE is set to 01-05-0000, the task will start on May 1st of

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each year.

If both, the year and the month are set to 0, the task will start each month. For example: START DATE 01-00-0000 means the task will start on the first day of each month.

If all of the year, month and day are set to 0, the task will be run always. This is also the default setting of the system.

Step 3   Set the END DATE of the task:

```
TO [D-M-Y]
00-00-0000
```

The date format must be D-M-Y (date-month-year). Use [→] or [←] to move the cursor, and press number keys from [0] to [9] to modify, then press [ENT] key to continue.

If the year is set to 0, the year will be ignored and the task will end each year. For example, if END DATE is set to 31-10-0000, the task will end after 31 Oct of each year.

If both the year and the month are set to 0, the task will end each month. For example, END DATE 10-00-0000 means the task will end after the 10th each month.

If all of the year, month and day are set to 0, the task will never stop. This is also the system default setting.

**Step 4**   Set the START TIME of the task:

```
FROM [hh:mm]
00:00
```

The time format must be hh: mm (hour: minute). Uses [→] or [←] key to move the cursor, and press number keys from [0] to [9] to modify, then press [ENT] key to continue. The default START TIME is 00:00.

Step 5   Set the END TIME of the task:

```
TO [hh:mm]
23:59
```

The time format must be hh: mm (hour: minute). Uses [→] or [←] key to

move the cursor, and press number keys from ⌈ 0 ⌉ to ⌈ 9 ⌉ to modify, then press ⌈ENT⌉ key to continue. The default END TIME is 23:59.

Stet 6   Set the running days of the week:

```
SET WEEKLY
Mon TO Sun
```

Uses ⌈ → ⌉ or ⌈ ← ⌉ key to move the cursor, and press ⌈NEXT⌉ or ⌈PREV⌉ key to modify, then press ⌈ENT⌉ key to continue. The default setting is run from Monday to Sunday (run on each day of the week).

Step 7   Set the priority of the task:

```
SET PRIORITY
TO NORMAL
```
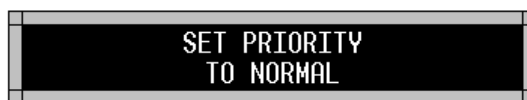
Uses ⌈NEXT⌉ or ⌈PREV⌉ key to modify, then press ⌈ENT⌉ key to finish adding new task. The three levels of priorities are: NORMAL, LOW and HIGH.

This procedure can be canceled by pressing ⌈ESC⌉ key at any time. The new task will be displayed on the task list immediately after these 7 steps (In the second line of the screen).

```
PROGRAM SCHEDULE    ⬍
◀          🕘1 A
```

3.4.2 Modifying Existing Schedule Task
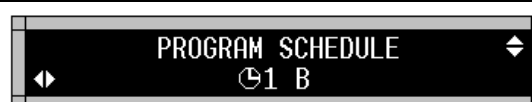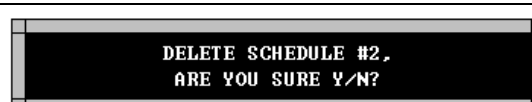
The following table shows how to modify an existing schedule task:

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ – NEW –
2	Pres NEXT key twice to select "PROGRAM SCHEDULE".	PROGRAM SCHEDULE ⬍ – NEW –
3	Use → and ← to choose the task to modify.	PROGRAM SCHEDULE ⬍ 🕐1 B
4	Press ENT key start to modify the task.	

✶ 7 steps are needed to modify the task, please refer to section **2.3.1 Adding New Task To Schedule**
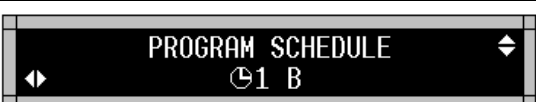
3.4.3 Deleting Task From Schedule

The following table shows how to delete a schedule task.

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ – NEW –
2	Press NEXT key twice to select "PROGRAM SCHEDULE".	PROGRAM SCHEDULE ⬍ – NEW –
3	Use → and ← to select the task to delete.	PROGRAM SCHEDULE ⬍ 🕐1 B
4	Press DEL key to delete the task.	DELETE SCHEDULE #2, ARE YOU SURE Y/N?
5	Press Y to confirm deletion.	

3.4.4 Enabling/Disabling Schedule Task

The following table shows how to enable or disable a schedule task:

STEP	PROCEDURE	DISPLAY ON THE SIGN
1	Press PROG key to enter the main menu. The first menu item PROGRAM TEXT will appear.	PROGRAM TEXT ▼ – NEW –
2	Press NEXT key twice to select "PROGRAM SCHEDULE".	PROGRAM SCHEDULE ↕ – NEW –
3	Use → and ← to select the task to enable/disable.	PROGRAM SCHEDULE ↕ ◔1 B
4	Press SPA key to disable the task. Symbol '⊘' indicates that the task has been disabled.	PROGRAM SCHEDULE ↕ ⊘1 B
5	Press SPA key again to enable the task. Symbol '◔' indicates that the task has been enabled.	PROGRAM SCHEDULE ↕ ◔1 B
6	Press RUN key then return to the running mode.	

3.5 System Setup

When selected, the setup menu command will be displayed in the second line of the screen.

The setup menu commands:

DATE & TIME	Set current date and time
SERIAL ADDRESS	Set serial address
BAUD RATE	Set baud rate
PASSWORD	Set password
AUTO ON/OFF	Set automatic power on/off
SOUND OFF/ON	Toggle off/on the sound function
AUTO BACKUP ON/OFF	Toggle on/off the automatic backup memory mode
AUTO RECOVER ON/OFF	Toggle on/off the automatic recover memory mode
BATTERY ON/OFF	Toggle on/off the battery backup function
AUTO DEMO ON/OFF	Toggle on/off the automatic running demo function
MAKE STARTUP	Make the graphic file name "STARTUP" as startup picture
CLEAR STARTUP	Clear the startup picture

Press key ⟶ and ⟵ to select the setup menu item, then press key ENT to perform the selected function.

Clearing memory or deleting graphic file "STARTUP" will not affect the system setup.

3.5.1 Date & Time

Select DATE & TIME from SETUP to adjust the real time clock. The screen will display:

```
01 Jan 2000
23:59:59 Sat
```

Press key ⟶ or ⟵ to move the cursor, press key NEXT and PREV to modify, then press key ENT or ESC to finish. The real time clock will be set to 01 Jan 2000, 00:00:00 when it runs for the first time.

3.5.2 Serial ID Address

The serial address is a number from 1 to 255 that is used to identify the sign in the network.

Select SERIAL ADDRESS from the SETUP to set the sign address. The screen will display:

```
SERIAL ADDRESS
(1-255):1_
```
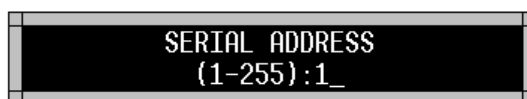
Press number keys from 0 to 9 for the serial address, or press key DEL to delete one character. Press key ENT or ESC when done.

The default serial address is set to 1.

3.5.3 Baud Rate

Select BAUD RATE from the SETUP to set the baud rate of the serial communication. The screen will display:

```
BAUDRATE:9600
```
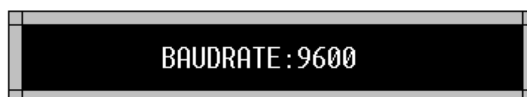
Press key NEXT and PREV key to changed. Then press key ENT or ESC to finished.

The default baud rate is 9600. Available baud rates are: 1200, 2400, 4800, 9600, 14400, 19200, 28800, and 57600.

3.5.4 Password

Select PASSWORD from the SETUP to set the password. The screen will display:

```
ENTER PASSWORD
[_          ]
```
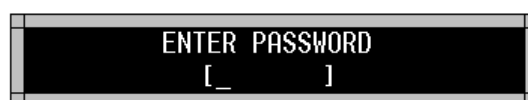
Enter the password and then press ENT key. The system will prompt to enter the password again:

```
CONFIRM PASSWORD
[********_]
```

Retype the password and press ENT key. Now the password has been changed, and password protection function will be enabled automatically. The password protection will be disabled when it is set to null. Password is needed when using PROG key to enter the main menu in password protection mode. Input the password and press ENT key.

NOTES: Remember or record the password! If the password gets lost, in order to regain access to the system, disconnect the sign and power supply, open the case and connect the SW2 on the main board to ground then power up the sign.

3.5.5 Auto Power ON/OFF

Select AUTO ON/OFF from SETUP to activate or deactivate automatic power ON feature. The default setting is: Manual ON/OFF.

Use key → or ← to choose the desired setting, press key NEXT or PREV to toggle MANUAL/AUTO. Set the Start time for the AUTO mode (default is 00:00, in HH:MM format). Use key → and ← to select between HH and MM. Use key NEXT and PREV to modify time, press key ENT to complete.

3.5.6 Sound ON/OF

Select SOUND ON/OFF from the SETUP to enable/disable the sound function. Default is ON.

3.5.7 Backup ON/OF

Turn on/off the auto backup mode. Under auto backup mode, memory will be backup automatically when the memory content has been changed. Auto backup occur when the memory has been changed and the sign has been running for 10 minutes. Manually backup is necessary if the sign is often moved such as which install on a bus. Default is OFF.

3.5.8 Recover ON/OF

Turn on/off the auto recover mode. Under auto backup mode, memory will be recovered automatically when the memory is found damaged. Otherwise, you must press ⬚Y or ⬚N to confirm the clearing of the affected data. Auto recover mode is the best choice when the sign connect to PC. Default is ON.

3.5.9 Battery ON/OF

Turn on/off the battery backup function. When the battery backup is on, memory content can keep for about 3 months without power supply. If you make sure that you don't need to keep the memory content, for example, you use a PC software to control the display at real-time, you can disable this function. Default is ON.

3.5.10 Auto Demo ON/OF

Turn on/off the auto running demo function. When auto running demo function is on, the system will run the DEMO file automatically when no scheduled task is running and no default file is set. The DEMO file is use to demonstrate the high preferment features of this product. Default is ON

3.5.11 Make Startup

Make the graphic file name "STARTUP" as startup picture. User must prepare a graphic file name with "STARTUP" first. This picture will be displayed on the next time the power is on.

3.5.12 Clear Startup

Clear the startup picture. Graphic file "STARTUP" will not be deleted by this function. Default startup screen will be displayed on the next time the power is on.

3.6 Other Functions

When selected, the OTHER commands will be displayed in the second line of the screen.

CLEAR MEMORY	Clear all memory
CLEAR SCHEDULE	Clear the schedule
CLEAR GRAPHICS	Clear all graphics files
CLEAR TEXTS	Clear all text files
MEMORY INFO	View memory information
SEND MEMORY	Send out all memory contents through serial communication to other signs. If you execute this command, the memory contents of all signs in the same net will become identical
BACKUP MEMORY	Backup the memory to the flash memory.
RECOVER MEMORY	Recover the memory from the flash memory

Note: To send memory contents to other signs, the baud rates of all signs must be the same.

Press key 〔→〕 and 〔←〕 to select a command, and press key 〔ENT〕 to execute it.

3.6.1 Clear Memory

All text and graphics files will be deleted, and the schedule will be cleared.
The setup will not be affected.

3.6.2 Clear Schedule

All tasks in the schedule will be deleted.

3.6.3 Clear Graphics Files

All graphics files will be deleted.

3.6.4 Clear Text Files

All text files will be deleted.

3.6.5 View Memory Information

The system will display the text memory information first:

```
TEXT USED:0
TEXT FREE:16384
```

Then the graphics memory information:

```
GRAPH USED:0
GRAPH FREE:16384
```

3.6.6 Send Memory

The SEND MEMORY command can perform the following functions:
1． Send out the "Clear Memory" command to other signs;
2． Send out all graphics files to other signs;
3． Send out all text files to other signs;
4． Send out the schedule to other signs;
5． Send out the "Set default Running File" command to other signs.

3.6.7 Backup Memory

You should often backup the memory to avoid unforeseen data lost. The memory is battery powered and can be kept for only three months without power. The shaking of the sign during transportation may also damage the memory data. You can setup the sign to automatic backup mode.

3.6.8 Recover Memory

The memory will be recovered automatically when it is damaged. You can recover the memory manually by this command too. You can setup the sign to automatic recover mode. Refer to Chapter 5 for auto recover mode.

Multi-line
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Section 4: Mechanical Installation

4.1 Overview

Because every installation site is unique, there is no standard method of mounting. As manufacture of LED sign, we don't supply support structure, we can only provide recommending for the support structure design. It is customer's responsibility to ensure that the structure and mounting hardware are able of supporting the LED sign, and according with local laws.

Support structure design depends on the mounting methods, sign's size and its weight. The structure design is critical and should be done only by a qualified individual and organization.

The following must be considered first before installation:

● Design support structure and groundwork; calculate carefully the needed strength according to local codes; especially note the wind load and the issue of Seismic Zone.

● For the reason of heat dissipation, the waterproof of the back of LED module is IP45; consider if any added shield needed for more protection. If LED Sign is enclosed in an enclosure or casing, air-conditions are needed for cooling when the environment temperature reach $30\,^{o}C$.

● Keep enough space for maintains.

● Prepare for routing power lines and fiber connection. If it is used in outdoor, it is best to route 4 fiber cables. Two are used for data transmitting and the other two are saved for spares. It is doubtless to route power lines and fiber cables in two separate conduits.

● Grounding consideration, we recommend grounding resistance must be less than 10 ohms.

● The relations of the LED sign size with the distance of installing. The LED sign size and the viewing distance should have the suitable proportion relations. The ordinary circumstances viewing distance may take the screen body opposite angle line length 2~20 double, and the effect is better when the viewing distance is in 6~10 doubles.

● The angle of installing: When the LED sign installs, we should pay attention to the direction of LED element's light. When the LED sign installs at highly, should make the screen body to maintain the certain inclination angle, that in order to causes the direction of shines direct to best viewing position.

- When the LED sign installs, we should pay attention to the influence of outside electromagnetic radiation to the signs.

4.2 Cabinet assemble

A LED sign is made up of one or many cabinets. A cabinet is also composed of small module elements, such as LED cluster module, power supply etc. Each cabinet has an exclusive label. All cabinets make up of the whole sign according as an arrangement rule. Following fig shows the arrangement rule.

Fig4.1 Cabinet arrangement

Note: "X" denote a discretional letter.

Assemble all cabinets into a whole display wall according as above arrangement rule.

Then fix them by bolt.

If the sign is for outdoor use, it needs to install waterproof connector between cabinets. Waterproof connector is made of 3 parts: waterproof rubber, hollow screw, and hollow screw cap.

Hollow screw
Waterproof rubber
Hollow screw cap
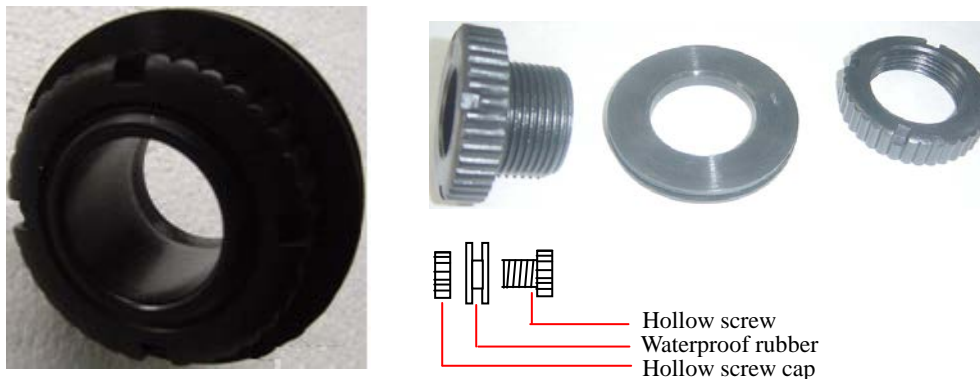
There are 4 steps for installing waterproof connector:

Step1: installing waterproof rubber. Plug the waterproof rubber into the connection hole of cabinet as fig4.2 shows.

Step2: installing hollow screw. Plug the hollow screw into the hole that has covered with waterproof as fig4.3 shows.

Cabinet N   Cabinet N+1

Fig4.2 Step1

Cabinet N   Cabinet N+1

Fig4.3 Step2

Cabinet N   Cabinet N+1

Fig4.4 Step3

Cables

Cabinet N   Cabinet N+1
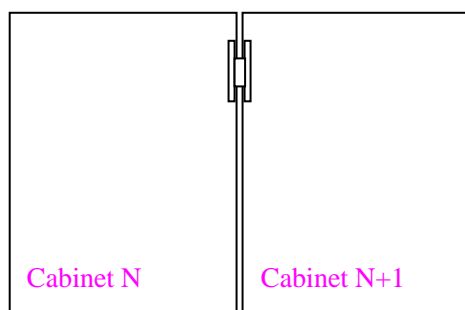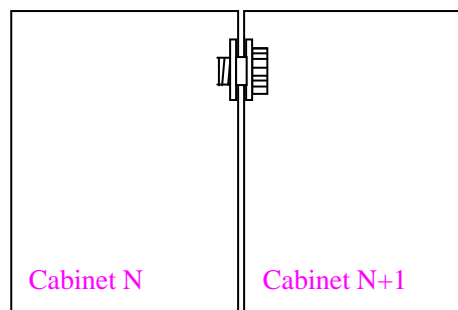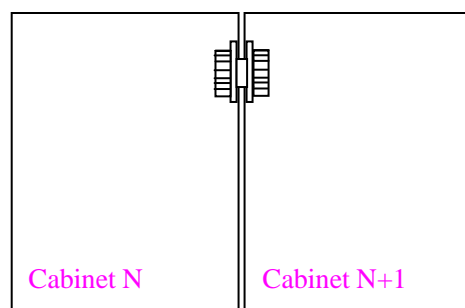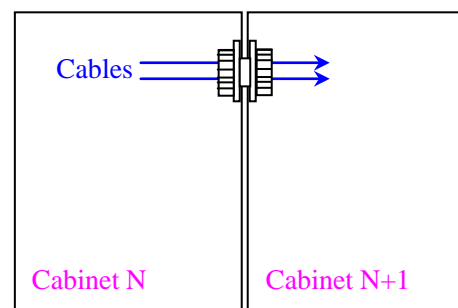
Fig4.5 Step4

Step3: installing hollow screw cap. Twist the hollow screw cap to the hollow screw as fig4.4 shows.

Step4: the cable need connect to other cabinet through the hole as fig4.5 shows.

LED ELECTRONIC DISPLAY   **V 1.3**

After the four steps, the waterproof connector has installed. And the installing of other waterproof connector is as same as above description.

4.3 Common mounting method

The shape and size of LED sign are different; the use of them is diverse and the method of mounting is most changeful. There isn't the unification standard of the mounting. Following we introduced several commonly used method of mounting.

1) **Hang type**

Hang type include two types. One is hanging up at the ceiling or other beam (fig4.6a shows). The LED Sign is hanging up at ceiling by the bracket. Another is hanging at wall (fig4.6b shows). The LED Sign is hanging at wall by the bracket.

2) **Swing type**

Swing type is an especial of hang type. This method is hanging sign at wall by a bracket too. But the bracket have a suspend arm for Swing. Fig4.9 shows it.

3) **Desktop installation**

This method must design a pedestal to support the LED sign. And the LED sign is installed on the pedestal. Fig4.7 shows it.

4) **Movable structure**

This method is base on desktop installation. It is different from desktop installation there are some wheels on the pedestal. So it can move easily. Fig4.8 shows it.

5) **Insert type**

Insert type is a method that the sign body is inserted in wall or other object. Fig4.10 shows it.
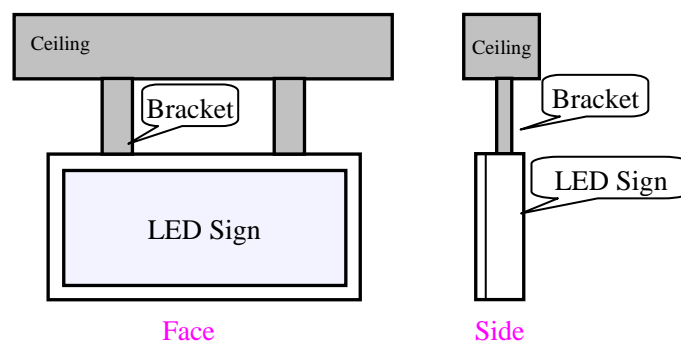
Fig4.6a Hang type I

Bracket Bracket

Wall

LED Sign

Face

Wall

LED Sign

Side

Fig4.6b Hang type II

LED Sign

Pedestal

Face

LED Sign

Pedestal

Side

Fig4.7 Desktop installation

LED Sign

Pedestal

Wheel

Face

LED Sign

Pedestal

Side

Fig4.8 Movable structure

Wall

LED Sign

Face

Suspend arm

Wall

Open

Wall

Close
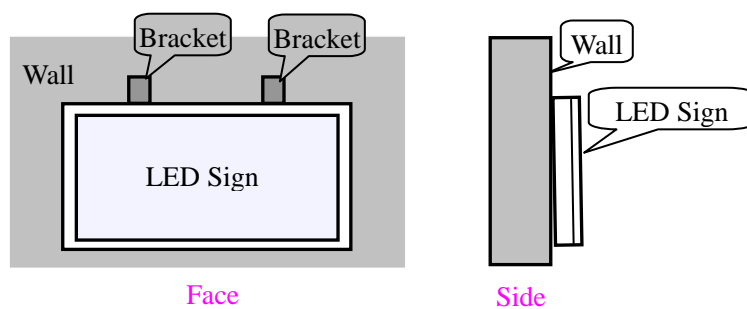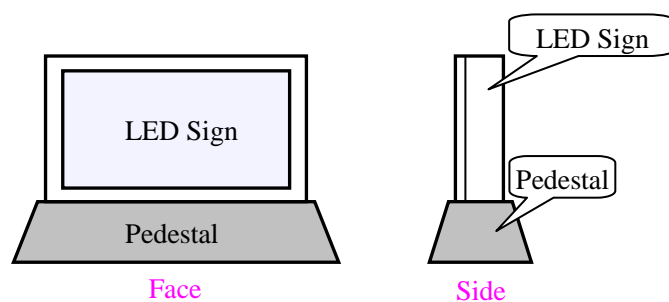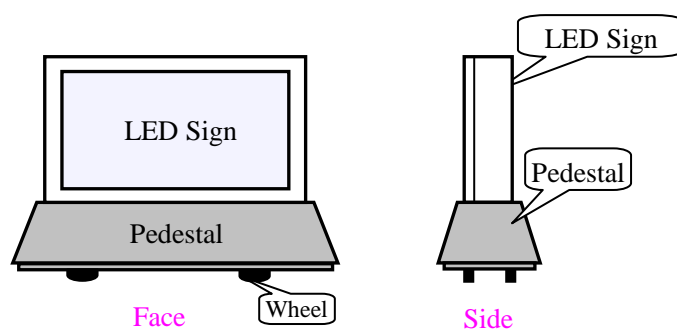
Side
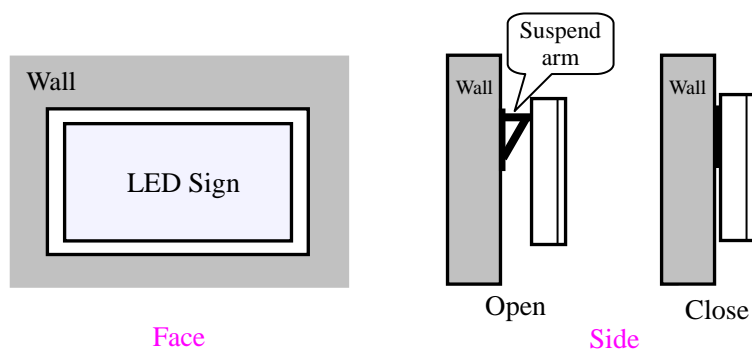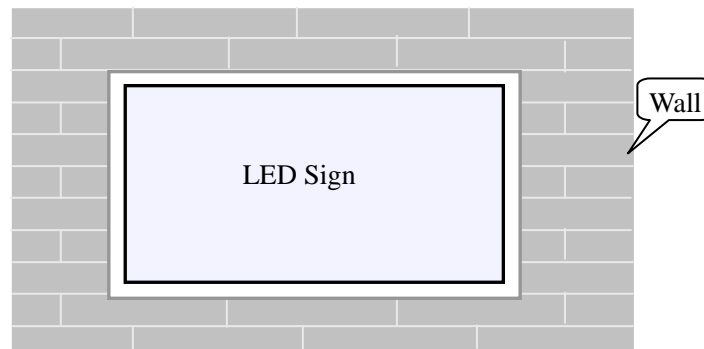
Fig4.9 Swing type

Fig4.10 Insert type

Above mentioned methods is several commonly used method of mounting. About the small LED sign, we commonly use hang type or swing type. About the large LED sign, we commonly use desktop installation or insert type. If the LED sign needs move frequently should use movable structure. Certainly, there are many other methods of mounting. We impossibility introduce all methods. User can choose an appropriate method of mounting according as your idiographic circs. And you can give your idea about mounting to us.

Warning:

All the mounting methods must be examined the backstop at first. And know the weight of whole sign and accessory. User must sure the backstop can support the weight of the LED sign while mounting.

4.4 Mounting Process of LED Sign

Above content described some common mounting method simply. In general, we only supply hanging mounting and(or) wall mounting if consumer doesn't have any especial requirement. Following content will introduce the two methods.

4.4.1 Hanging mounting method

Pothook   Stationary rings   Top of cabinet
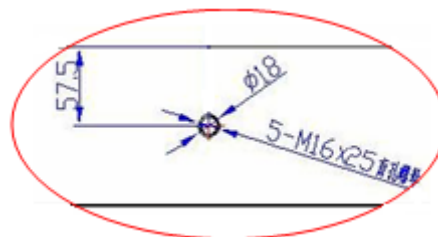
This mounting method is hanged the Sign on beam(ceiling) or truss. The general mounting process is as following example described. It may have some different from the factual operation.

Mounting process:

1. Build up the truss installation or installing pothook.
   Warning: Be sure that the truss installation complies with the local regulations regarding such installations and that the truss installation(or pothook) will be able to support the complete load of the sign.
2. Assemble cabinets into a whole LED sign.
3. Set up stationary rings on the top of cabinet.
   The stationary ring is an eyebolt. User only tweaks the stationary ring into the screw on top of cabinet.
4. Lift up the Sign to the desired height.
5. Place a hoist steel cable or chain around the truss installation or pothook above the sign, and through the stationary rings on the truss beam. Use one hoist steel cable or chain per stationary rings.

Following fig shows the view of this mounting method.
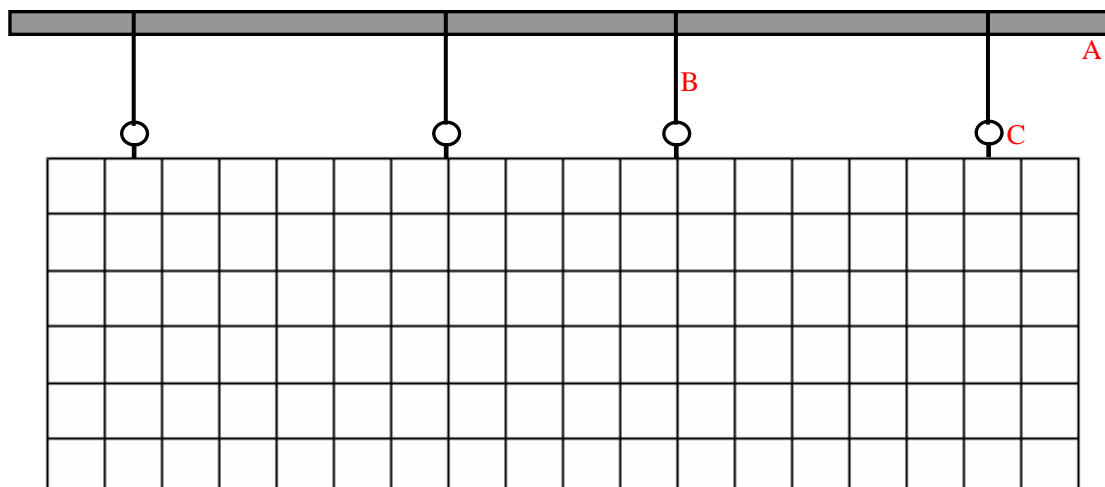
A: Truss installation   B: Hoist steel cable   C: Stationary rings

Fig4.11 Hang mounting I
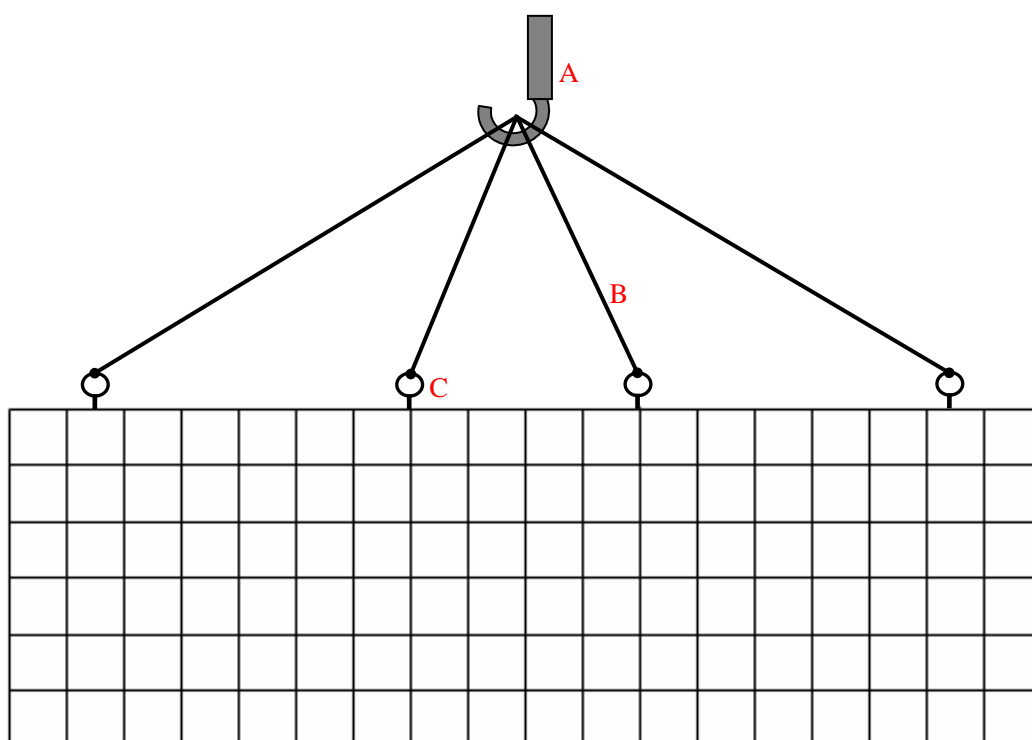
A: Pothook   B: Hoist steel cable   C: Stationary rings

Fig4.12 Hang mounting II

4.4.2 Wall mounting method

This mounting method is mount sign on wall. There are two kinds bracket for mounting sign on wall so that it has two mounting methods.

➢ **Wall mounting I**

This mounting method used rectangular bracket to hang sign on wall. Following fig shows the bracket for this mounting method.

Fig4.13 Rectangular bracket

Following we will introduce the general mounting process of this method by an example. It may have some different from the factual operation.

Mounting process:

1) Set up the truss installation(pegs) onto wall for hanging sign.
   Warning: Be sure that the truss installation complies with the local regulations regarding such installations and that the truss installation will be able to support the complete load of the Sign.
   Note: User must confirm the distance between each peg and the height before fixed it onto wall.

2) Assemble cabinets into a whole sign.

3) Installing the bracket on back of cabinet by bolts.
   On back of cabinet has designed screw for mounting as fig4.14 shows. User

only need use bolts to fix the bracket on sign as fig4.15 shows.

4) Lift up the sign to the appointed height.

5) Hanging sign onto wall by pegs as fig4.16 shows.
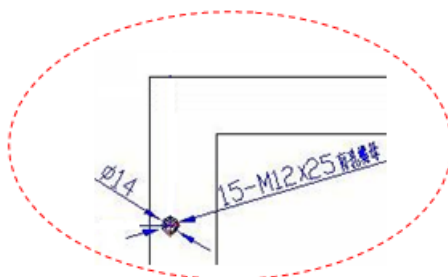
Fig4.14 Back of cabinet
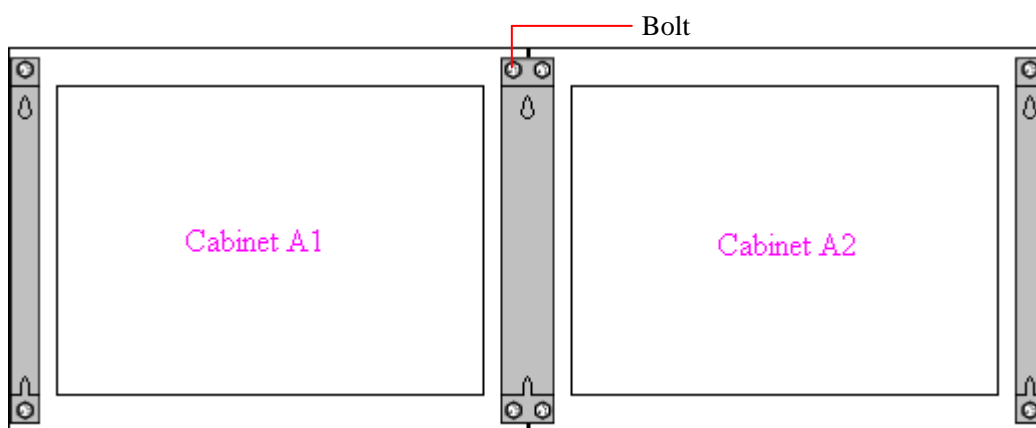
Fig4.15 Fixed bracket
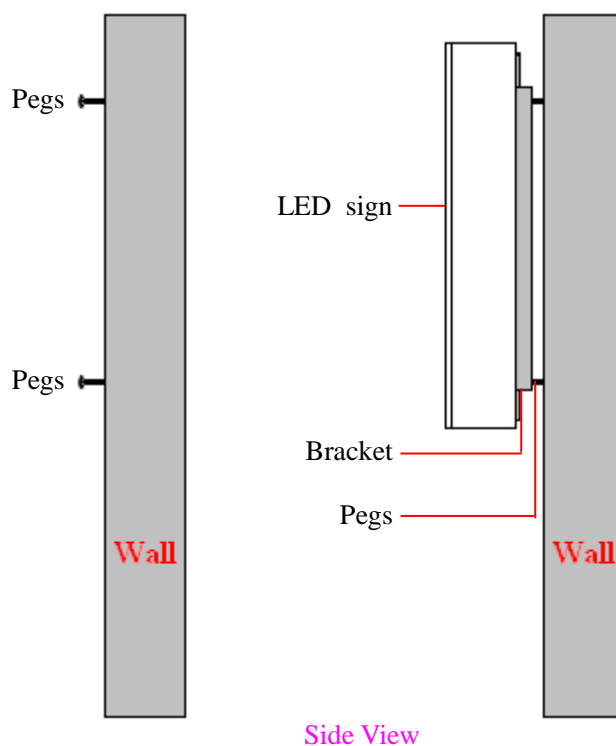
Fig4.16 Wall mounting I

➢ Wall mounting II

This mounting method used right-angle bracket to hang sign on wall. Fig4.17 shows the bracket. Following we will introduce the general mounting process of this method by an example. It may have some different from the factual operation.

1) Build up the truss installation.

   Set up hole that used for fixing bracket(wall part) on wall. Then use bolt fixed bracket onto wall as fig4.20 shows.

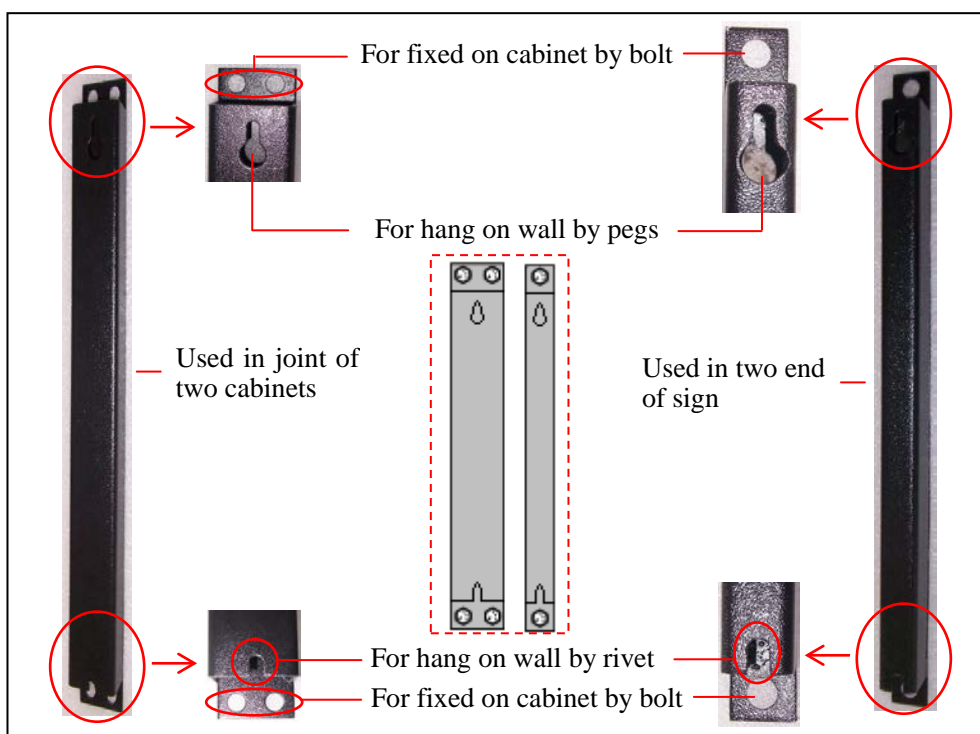   **Note:** User must confirm the distance between each bolt and the height before fixed bracket onto wall.

   Warning: Be sure that the truss installation complies with the local regulations regarding such installations and that the truss installation will be able to support the complete load of the LED sign.

2) Assemble cabinets into a whole sign according as arrangement rule.

3) Installing bracket(cabinet part) on cabinet.

   Use bolt fixed the cabinet part brackets onto cabinet as fig4.19 shows.

4) Lift up the sign to the appointed height.

5) Use bolt to fix the two parts bracket in together so that the sign is fixed on wall. Fig4.21 shows it.
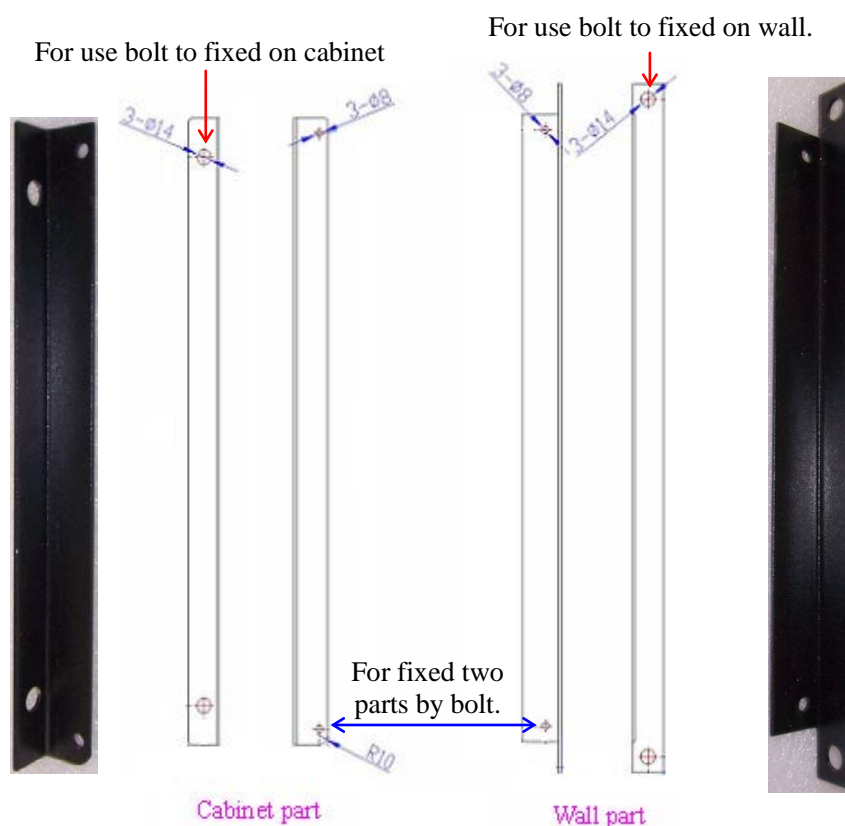
Fig4.17 Right-angle bracket

For fixed bracket by bolt

4-M12X25

Back of Cabinet

Fig4.18 Back of cabinet

Bolt

Cabinet

Back View

Side View
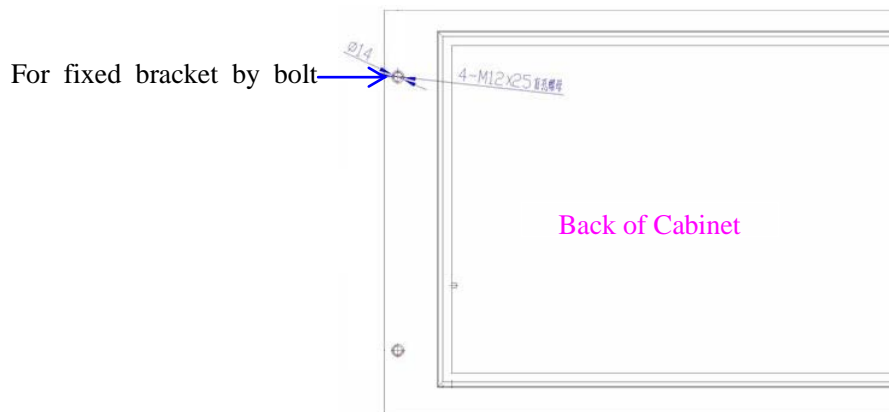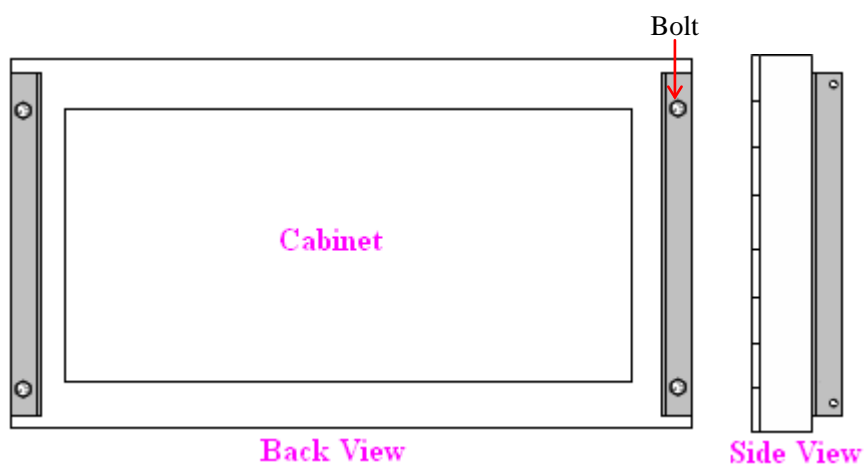
Fig4.19 Cabinet part installing

Bolt

Bracket

Wall

Front View

Side View
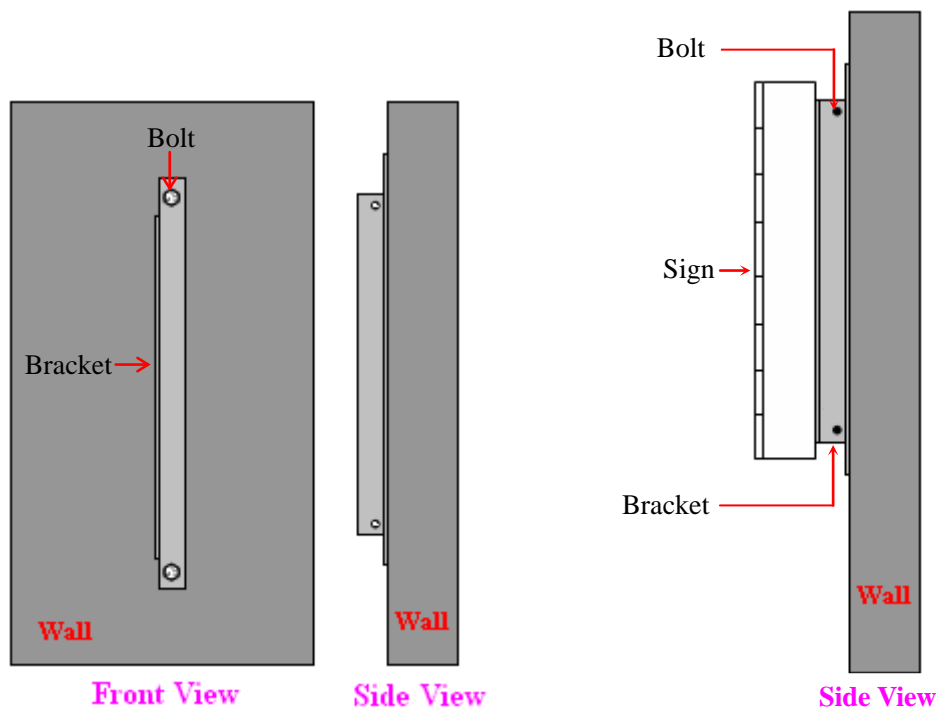
Fig4.20 Wall part installing

Bolt

Sign

Bracket

Wall

Side View

Fig4.21 Wall mounting II

➢ **Note:**

Before mounting, user must know the weight of whole sign and accessory. User must sure the backstop can support the weight of sign while mounting it.

In fact, the number and size of bracket may be different with every sign. So fig of example may has some different of actual situation. But the operating process is as similar as it.

In general, the wall mounting may not apply for double-face sign.

Section 5: Electric Connection

Electric connection includes power cable connection and data/signal cable connection. Safety firstly, please read the safety indication in section 1, and understands configuration of the system and the routing flow of power and signal.

5.1 Common Connector and Cables

The power and data/signal connections in the sign use many different types of connectors. Take special care when disengaging any connectors so as not to damage the connector, the cable, or the circuit board.

When pulling a connector plug from a jack, do not pull on the wire or cable; pull on the jack itself. Pulling on the wires may damage the connection.

The following information presents some common connectors encountered during sign installation and maintenance.

Termination Block:
Usually used for internal power wires to wires of the same type coming into the cabinet from an external source.

DB-9 connector:
Usually used for external data or signal cable connection for communication.
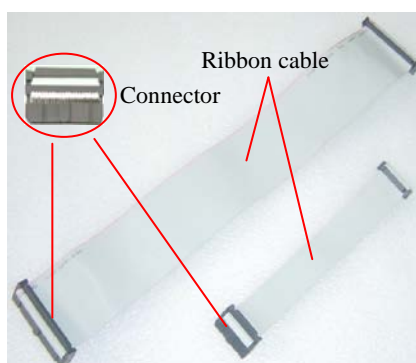
Ribbon cable:
Usually used for internal data or signal connection. For example, between LED modules connection is use ribbon cables.

Power cable:
Usually used for internal power cable connection. The power supply connects to cards or LED modules by this cable. It made up of four cables with two color; red cable is connect to "VCC", and black cable is connect to "GND".

Light signal cable:
Usually used for internal light signal connection that the light control card to receiver card or output to light sensor. It made up of five cables: 1-blue, 2-green, 3-white, 4-black, 5-red.
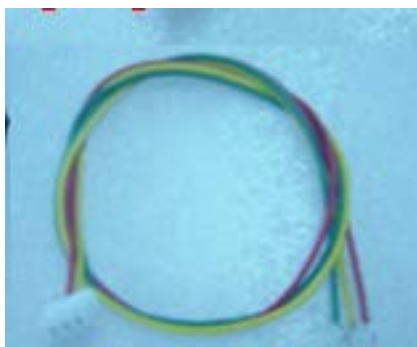
Temperature signal cable:
Usually used for internal temperature signal connection that the control card to receiver card or output to temperature sensor. It is made up of three cables: 1-yellow, 2-green, 3-red.

5.2 Parts introduction

In general, multi-line moving sign mainly includes LED cluster modules (LED modules), control card, scan card, light sensor, temperature sensor, power supply etc.. Following content will introduce these mainly parts simply.

➢ **LED modules**

LED cluster module is an aggregation of some LED clusters/pixels and driver circuits. It is a single functional unit that made up of a whole wall display. LED modules have many kinds. Their included parts, size may be different. Following fig shows several LED modules.

Fig5.1 LED module

➢ **Scan card (CST-TP-SCAN-C)**

Following fig shows scan card(CST-TP-SCAN-C).
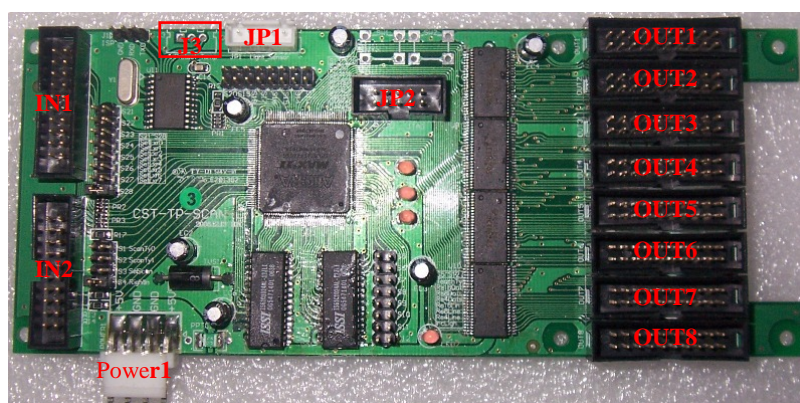
Fig5.2 Scan card (CST-TP-SCAN-C)

Mainly port information of scan card:

IN1&IN2: Input port, for connecting with control card.

JP1: Light_Sensor port, for connecting light sensor.

JP2: Download port, for download file (pof) into EPM570.

J3: Protect_Temp port, for connect to temperature sensor of inside cabinet. This temperature sensor is for check the temperature in cabinet. If it exceeds a defined temperature, it will turn off the display or debase brightness of display automatically.

OUT1~OUT8: Output port, for connect to LED modules. Output signal to LED modules.

POWER1: Power input port, for connect to power supply (+5V DC).

➢ **Control card (MTP_M04)**

Receive signal from control PC and process signal then output to display. Following fig show it.

Fig5.3 Control card (MTP_M04)

Mainly port information of control card:

JP1~JP4: Output port, output signal, for connect to LED modules or scan card.

JP5: IR_IN Port, For connect to IR (Infra-red) Receiver.

JP6: Download port.

JP7: RS422 port, for RS422 communication.

JP8: RS232 port, for RS232 communication.

JP10: Temp port, for connect to temperature sensor (used in outside).

POWER: Power input port, for connect to power supply (+5V DC).

➢ **Light sensor**

Light sensor is used for automatic brightness adjustment. Fig5.5 shows it.

➢ **Temperature sensor**

Temperature sensor is used for get temperature of environment or internal. It is needed when display temperature on sign. It is an optional element for system. So in some system, it may be no temperature sensor. Fig5.6 shows it.

➢ **Power supply**

It is AC/DC adapter. Convert AC line voltage from the load centre to low DC voltage for cards and LED cluster modules. All the power supplies are switching power supply. There are many kinds power supply. Fig5.4 shows a power supply.

Fig5.4 Power Supply
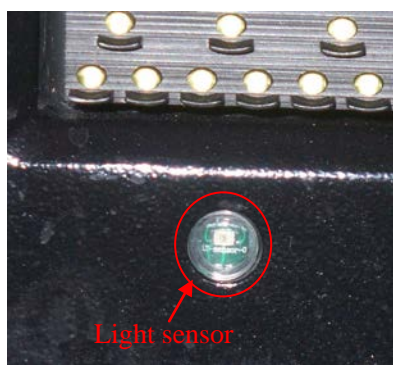
Fig5.5 Light sensor

Fig5.6 Temperature sensor

5.3 Power cable connection

All power come into LED moving sign through a power inlet, and connected with power supply to supply power for LED modules and cards.

Power cable connection includes two parts: outside power cable connection and in LED moving sign power cable connection.

5.3.1 External power cable connection

The power cable connection of external is very simply. It needs to have electrical outlet (a Plug AC female) near the moving sign installed.

We use special designed outdoor sockets for power, data connection. These sockets are designed with waterproof. And there is a special power cable with plug for connecting to power input socket.

User only needs to plug the plug male onto the electrical outlet (plug AC female). The plug male is connected with LED moving sign by power cable from the power input port on cabinet. The electrical outlet (plug AC female) is from power source. Following fig shows the power cable connection.

Fig5.7 External power cable connection

Warning: To protect against risk of fire by overloading of power cables, please know the load of power source cable and the power of sign. And must ensure the power source cable can load the power of LED sign. It is best never connects other

high-power equipment with a power source cable while it connects with LED sign.

5.3.2 Internal power cable connection

In LED sign, LED modules, control card, scan card and other element need to be provided power by power supply. All power comes int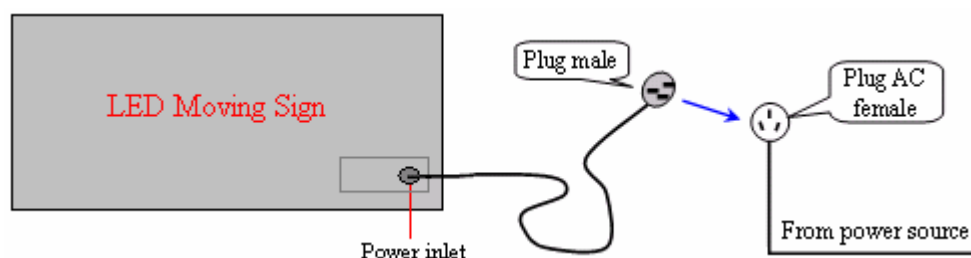o LED sign through power inlet on cabinet. After power input cabinet, it always connects with surge protective device for safe, and then connects to power supplies by power cable (Sometimes it connects to power supply without surge protective device). Power supply provides power for LED modules and cards so that it needs to connect power supply to LED modules or cards by power cable. One power supply may provide power for many LED modules. In general, each row's cabinets need one route power line.

Following, we will introduce how to connect power cable in LED moving sign. It may have some difference from fact such as in cable's color, number of power supply etc.. But their connection is similar to following described.

Power input guide

Power inlet on cabinet:

LED Sign

Power Inlet

Power input cabinet includes two states as following figs show.

N L G

To power supply

Termination Block

LGN

To power supply

Power inlet

Power inlet

AC Input

Surge Protective Device

Breaker

No Surge Protective Device

Include Surge Protective Device
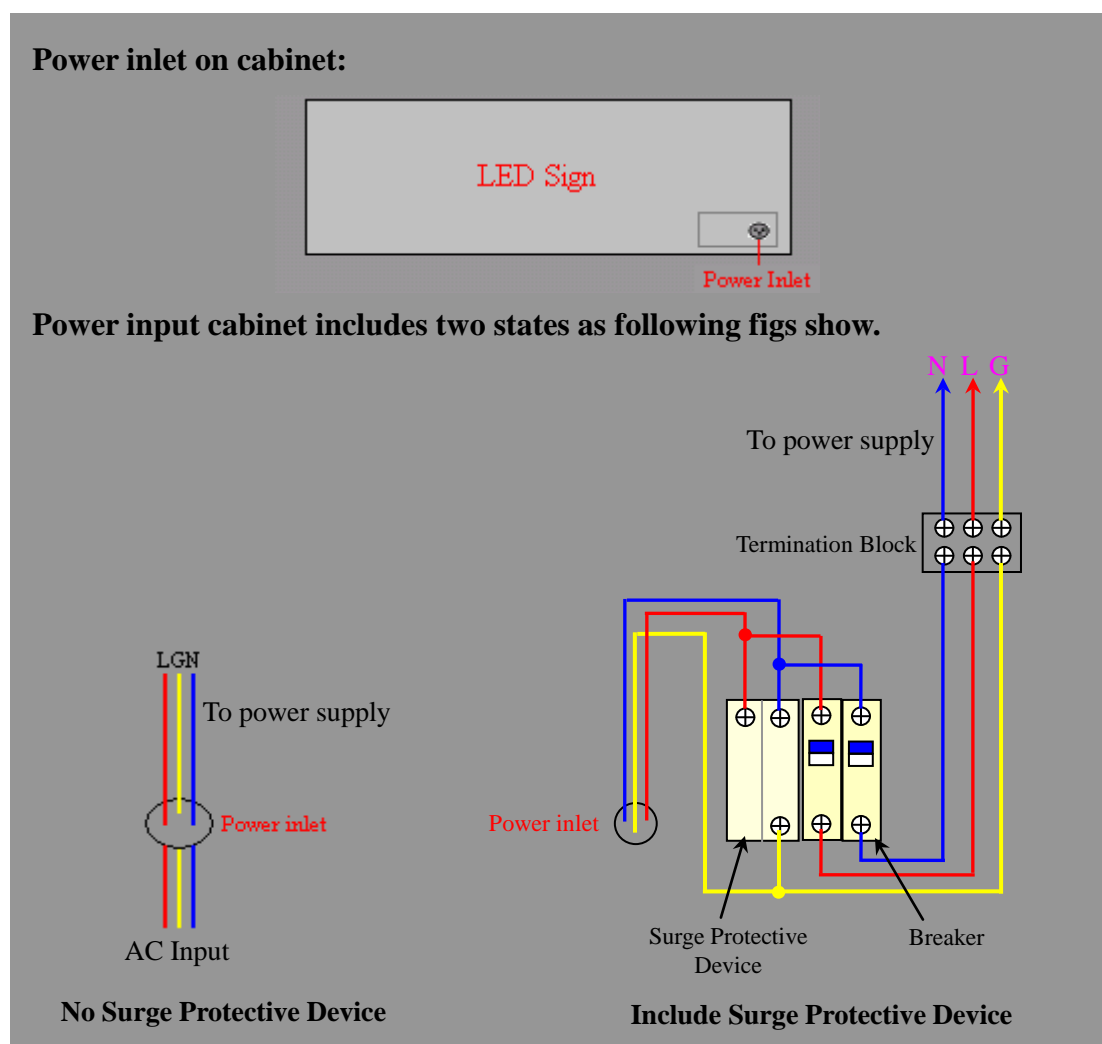
Power supply connecting guide

Cable connecting of power supplies may be different with different LED sign. One power supply may provide power for many LED modules and cards. In general, it may be divided three statuses.

1. **Only one power supply:** It only has one power supply to provide power when LED sign is small. In this status, cable connecting is very simply. Following fig is a schematic diagram of cable connecting of power supply.
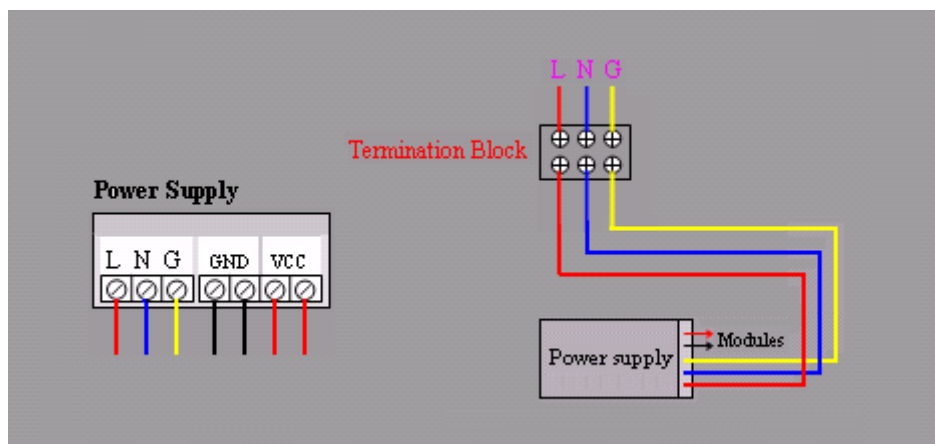
Remark: The color of cable may be different from fact.

2. **More than one power supply:** Some LED signs may need more than one power supply to provide power. In this status, all power supplies are connected in series. Following fig is a schematic diagram of cable connecting of power supply.
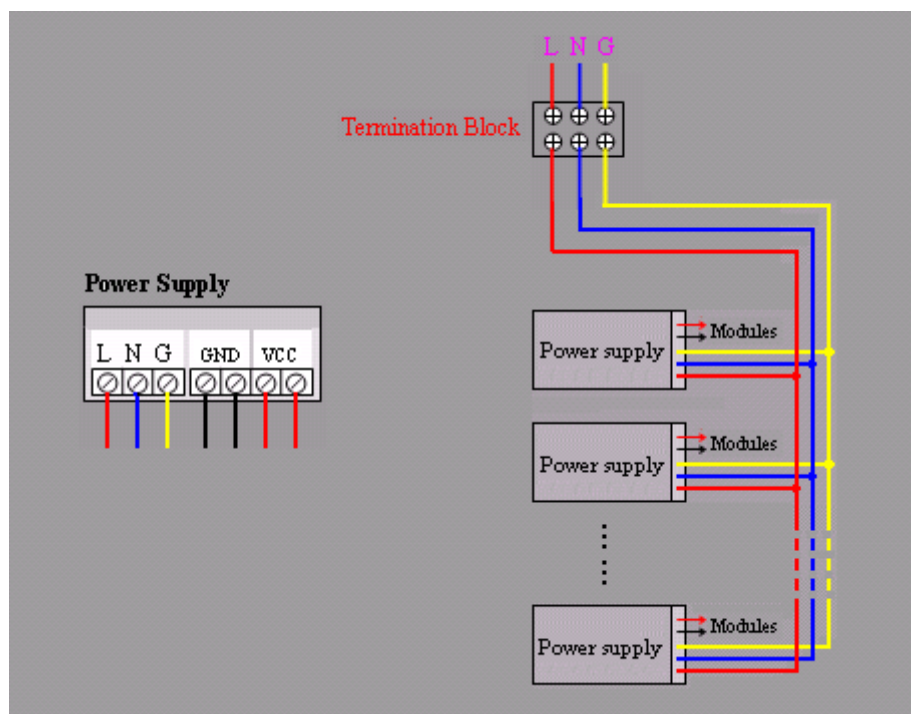
Remark: The color of cable may be different from fact.

3. **More than one LED cabinet:** Some LED sign is made up of many LED cabinets, and it may need one or more power supplies to provide power in each cabinet. Sometimes, the LED sign is so big that includes many rows cabinets. In general, each row's cabinets need one route power line. Power cable connecting of each row cabinets is all same. In this status, power supply connection is as similar as forecited two statuses. And the power supplies in adjacent cabi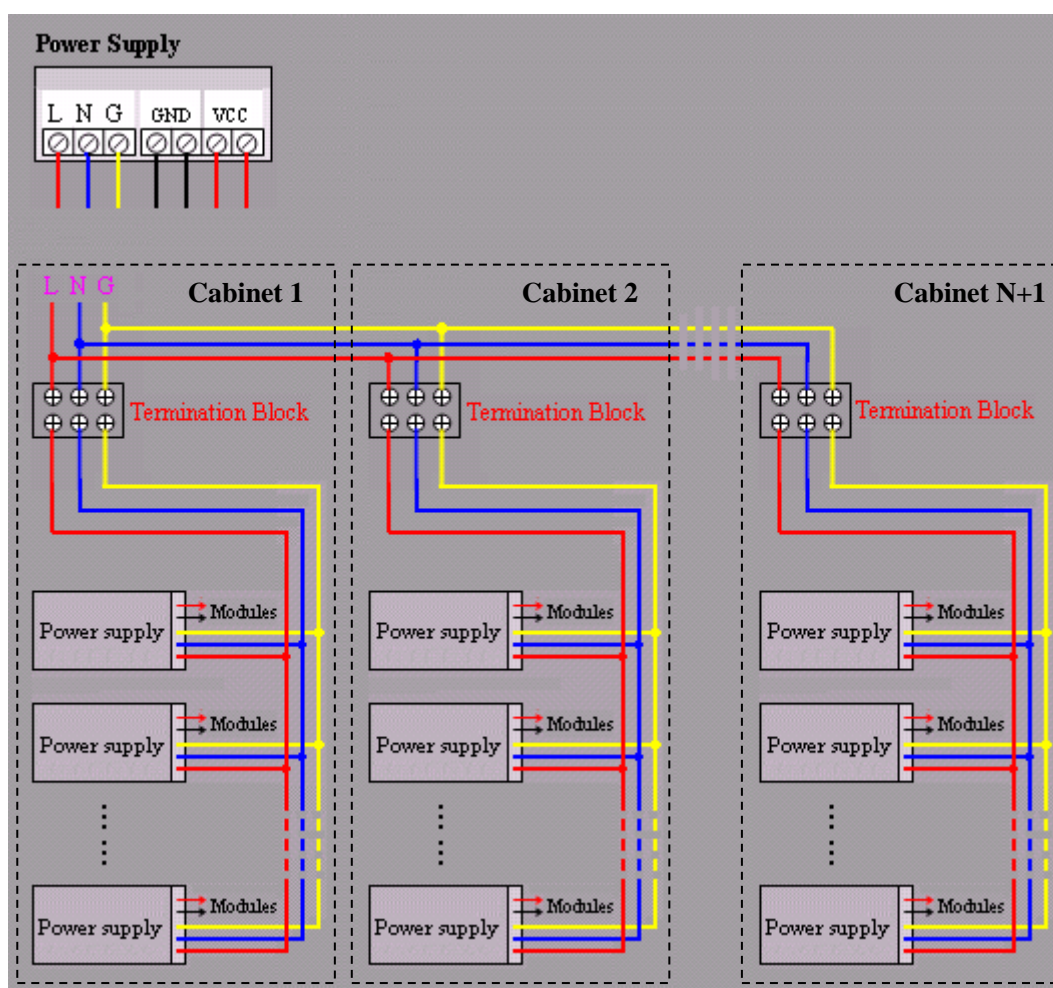nets of one row are connected by power cable. There are designed hole on cabinet in horizontal for through power and data cables. Following fig is a schematic diagram of cable connecting of power supply in one row cabinets.

Remark: The color of cable may be different from fact.

Note: In general, the control(and scan) card needs +5V DC power. If it doesn't have power supply that output voltage is +5V DC, a power transform card is needed between power supply and control cards.

Example for power supply connection

The example below shows a big moving sign. It includes many cabinets, each cabinet installed three power supplies.
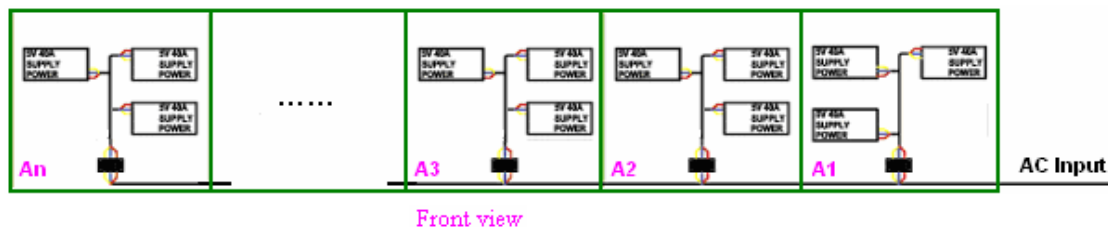
Fig5.8 Example for power supply connection

Note: "n" denote a discretional number.

In fact, the moving sign has some different from above example, but the connection is as similar as it.

5.4 Fan connection

The back door of cabinet has designed a space for installing fan. User only needs fixed the fan on that space by bolt. Then connect it with a thermal switch (KSD301) by power cable. The thermal switch is installing on the plate that has installed power supply. Following fig shows the connection diagram.

Fig5.9 Fans connection diagram

KSD301--- Thermal switch that control fans turn on/off. When temperature is more than a defined temperature, fans will work automatically.

Following fig is an example for fans connection.

5.5 Data/signal cable connection

Data/signal cable connection in moving sign includes LED modules, control cards, scan card, temperature sensor and so on.

First, we will describe data/signal cable connection between LED modules. Data cable from scan card or control card output port connect to the first module's input p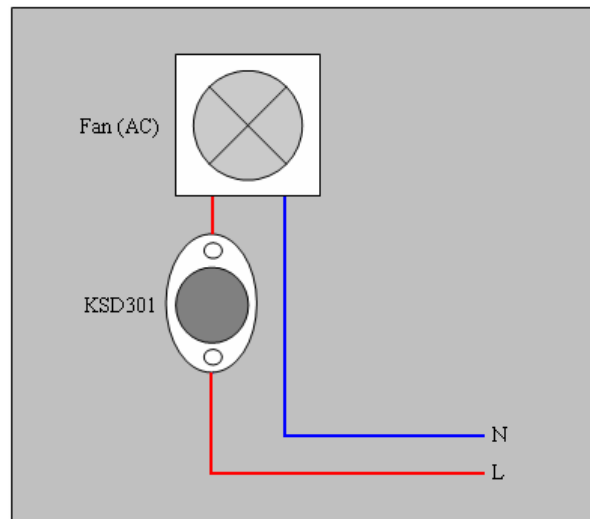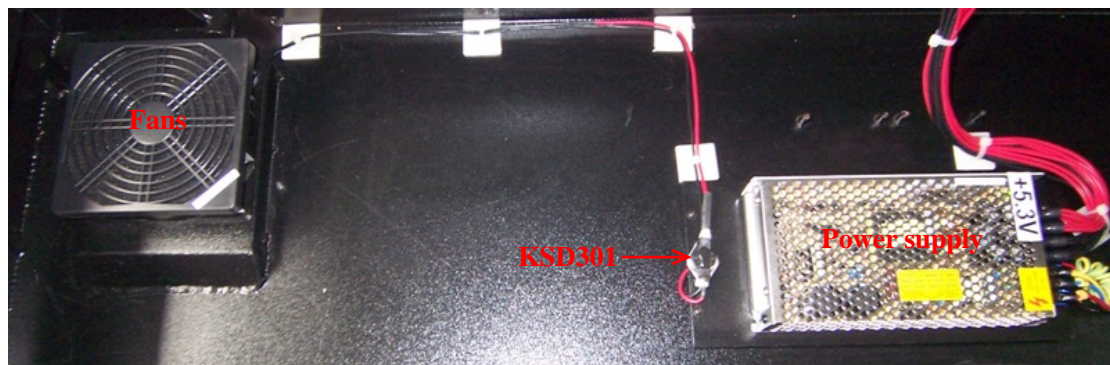ort by ribbon cable, then through output port connect with next LED modules that in one row. LED modules in one row are connected by ribbon cables. If there are many cabinets, between two adjacent cabinet has hole for through cables in horizontal and data cables may coming into next cabinet through the hole.

Example for LED modules connection

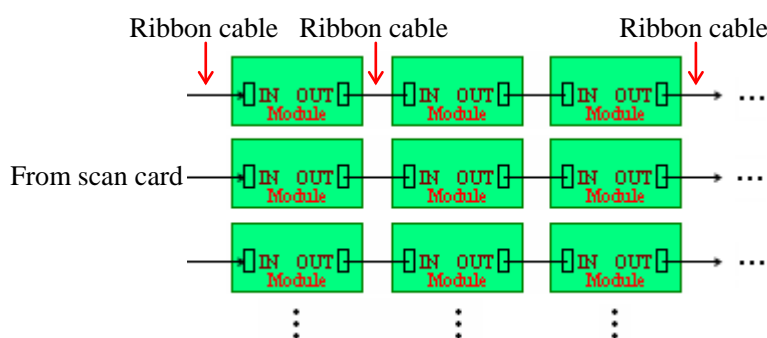The first cabinet (installed control cards) data cable connection:

Fig5.10 LED modules connection (I)

Between two cabinets data connection:
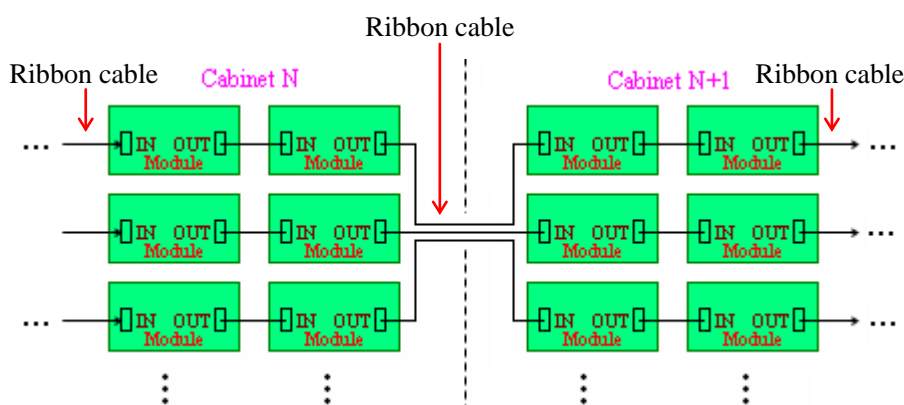
Fig5.11 LED modules connection (II)

This example shows how to connect data cables between LED modules. In fact, the size of moving sign may be different from the example, but the data cables connection is as similar as it.

Above contents has described data cables connection for LED modules. Following will introduce control system connection in moving sign. The control system connection has some difference with different communication mode and different moving sign. In general, system uses RS232 communication mode or RS422 communication mode. Following give an example for these two modes connection.

➢ **RS232 communication**
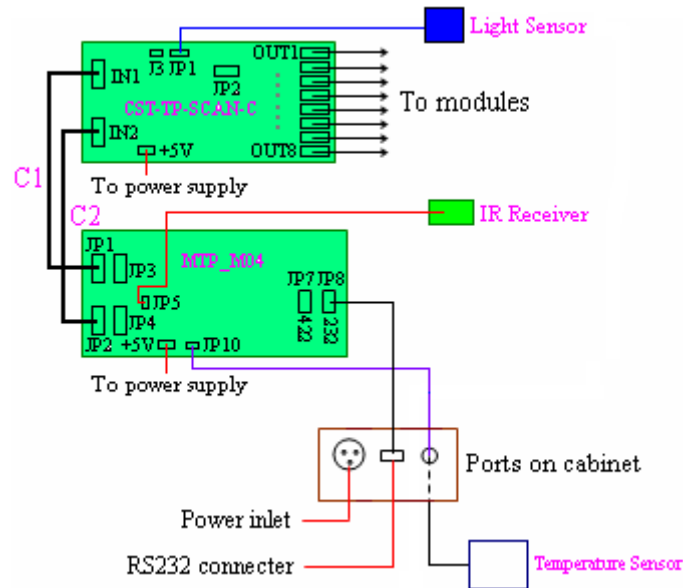
Fig5.12 Data cable connection of R232

Note: It may have some different from fact. For example, in fact, it may not have eight rows LED modules in height. And these output ports (OUT1 to OUT8) of scan card may not use up but only use someone of them. And some LED sign may not have temperature sensor.

When the size of sign is 16 pixels or less 16 pixels in height, between control card and scan card only needs to connect one cable (C1).

When the size of sign is more than 16 pixels in height, between control card and scan card needs to connect two cables (C1 and C2).

➢ **RS422 communication**
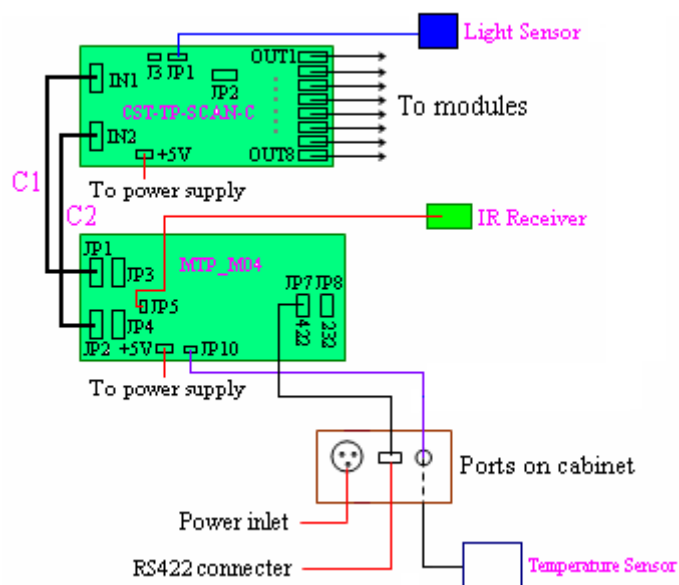
Fig5.13 Data cable connection of RS422

Note: It may have some different from fact. For example, in fact, it may not have eight rows LED modules in height. And these output ports (OUT1 to OUT8) of scan card may not use up but only use someone of them. And some moving sign may not have temperature sensor.

When the size of sign is 16 pixels or less 16 pixels in height, between control card and scan card only needs to connect one cable (C1).

When the size of sign is more than 16 pixels in height, between control card and scan card needs to connect two cables (C1 and C2).

5.6 Communication connection

The Multi-Line LED sign may communicate with control PC through RS232, RS422, Modem, GSM modem, or TCP/IP (LAN). In this part, we will describe how to connect cable for each communication mode.

5.6.1 RS232 communication

RS232 is a standard communication mode of Multi-line LED sign system. The sign has RS232 interface and may connect to PC simply by a RS232 cable. It requests the control PC must have a RS232 (COM) port. If there is no RS232 port, you may use a "USB to RS232" adapter to instead of RS232 port.

Following fig shown is the general connection of RS232 communication.

Fig5.14 RS232 communication

Note: RS232 cable had better not exceed 15 meter. And we don't recommend cascade LED signs to network by RS232 mode. You had better adopt RS422 communication mode while many LED signs need work in a network.

RS232 DB9 cable:

Fig5.15 RS232 DB9 Cable

Following give the circuit diagram of RS232 connection.
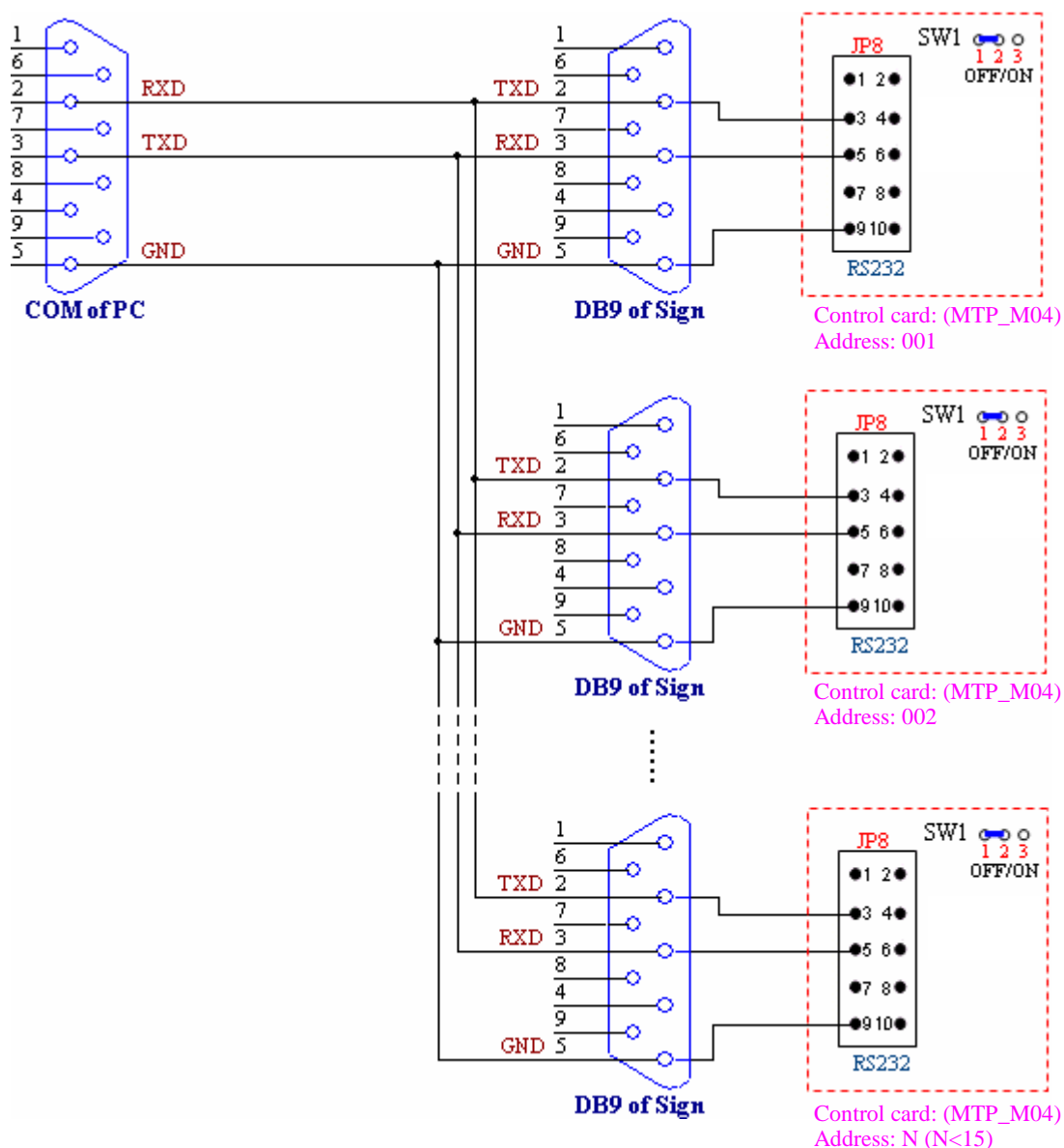
<p align="center">Fig5.16 Circuit diagram of RS232 connection</p>

Note:

1. Cable is twisted-pair.

2. Don't connect too many LED signs by RS232 mode.

3. Cable length must less 200 meter.

4. SW1: Jumper for connect Terminal resistance, and in this mode it must connect this jumper for off (1, 2).

5.6.2 RS422 communication

RS422 is a standard communication mode of Multi-line LED sign system too. The sign has RS422 interface and may connect to PC simply by a RS422 cable. In general, RS422 communication needs to have a "RS232 to RS422" adapter, for PC does not have RS422 port. It requests the control PC must have a RS232 (COM) port. If there is no RS232 port, you may use a "USB to RS232" adapter to instead of RS232 port, or use a "USB to RS422" adapter to instead of "RS232 to RS422" adapter. Following fig shown is the general connection of RS422 communication.
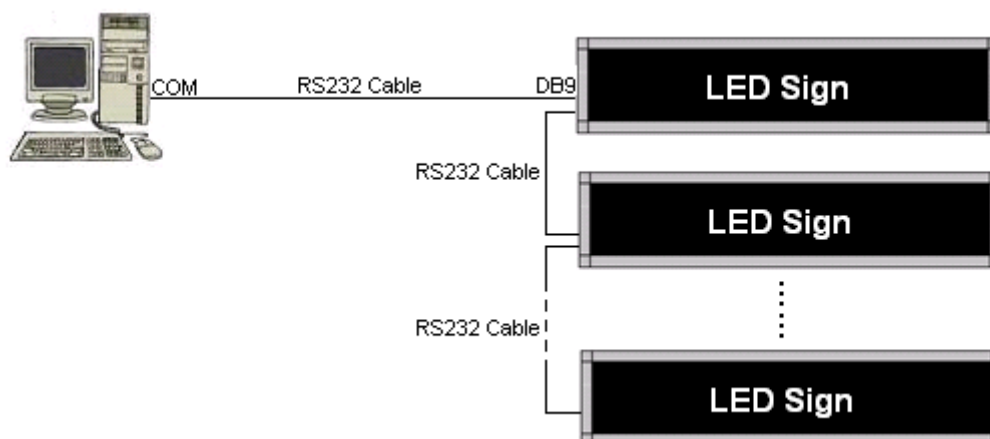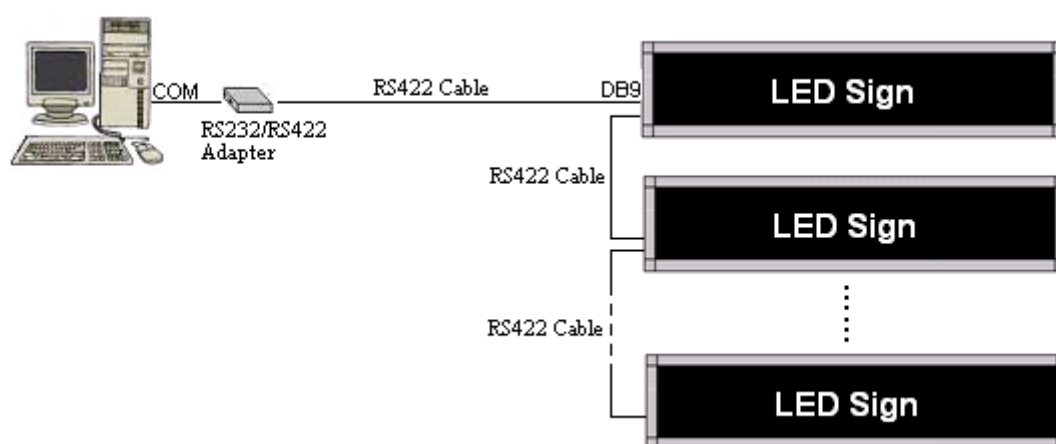

Fig5.17 RS422 communication

Note: RS422 cable had better not exceed 1200 meter. You must set terminal resistance for LED sign by jumper "SW1" on control card when system uses RS422 communication. If there are many LED signs cascaded to network, it only needs to set terminal resistance for the last LED sign.
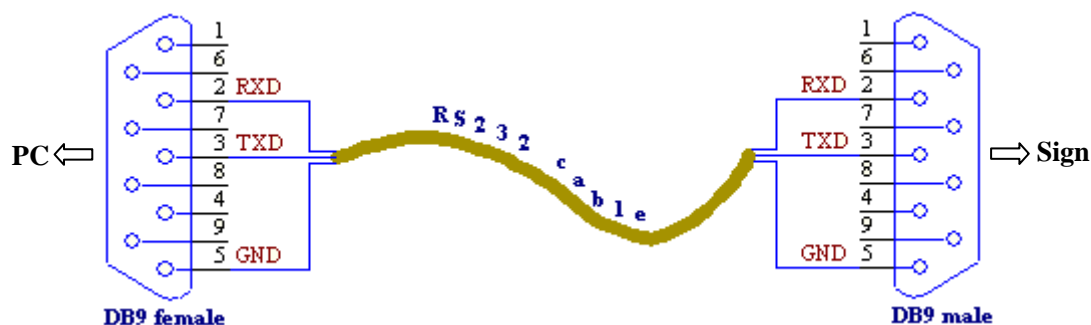
RS422 DB9 Cable:
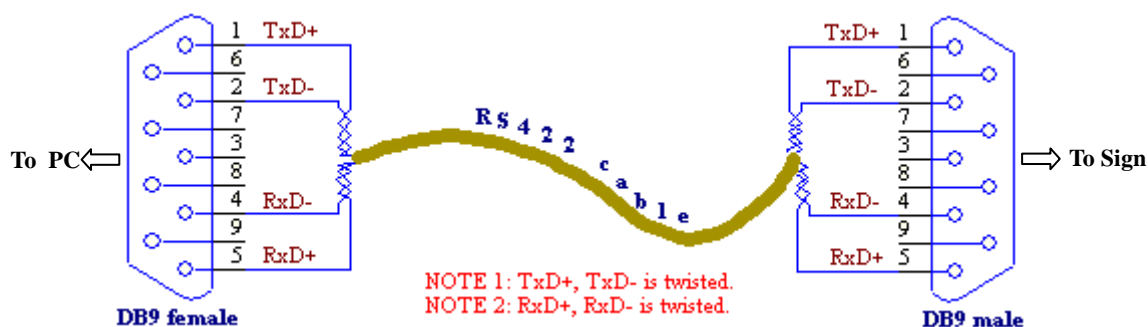
Fig5.18 RS422 DB9 cable

Following give the circuit diagram of RS422 connection.
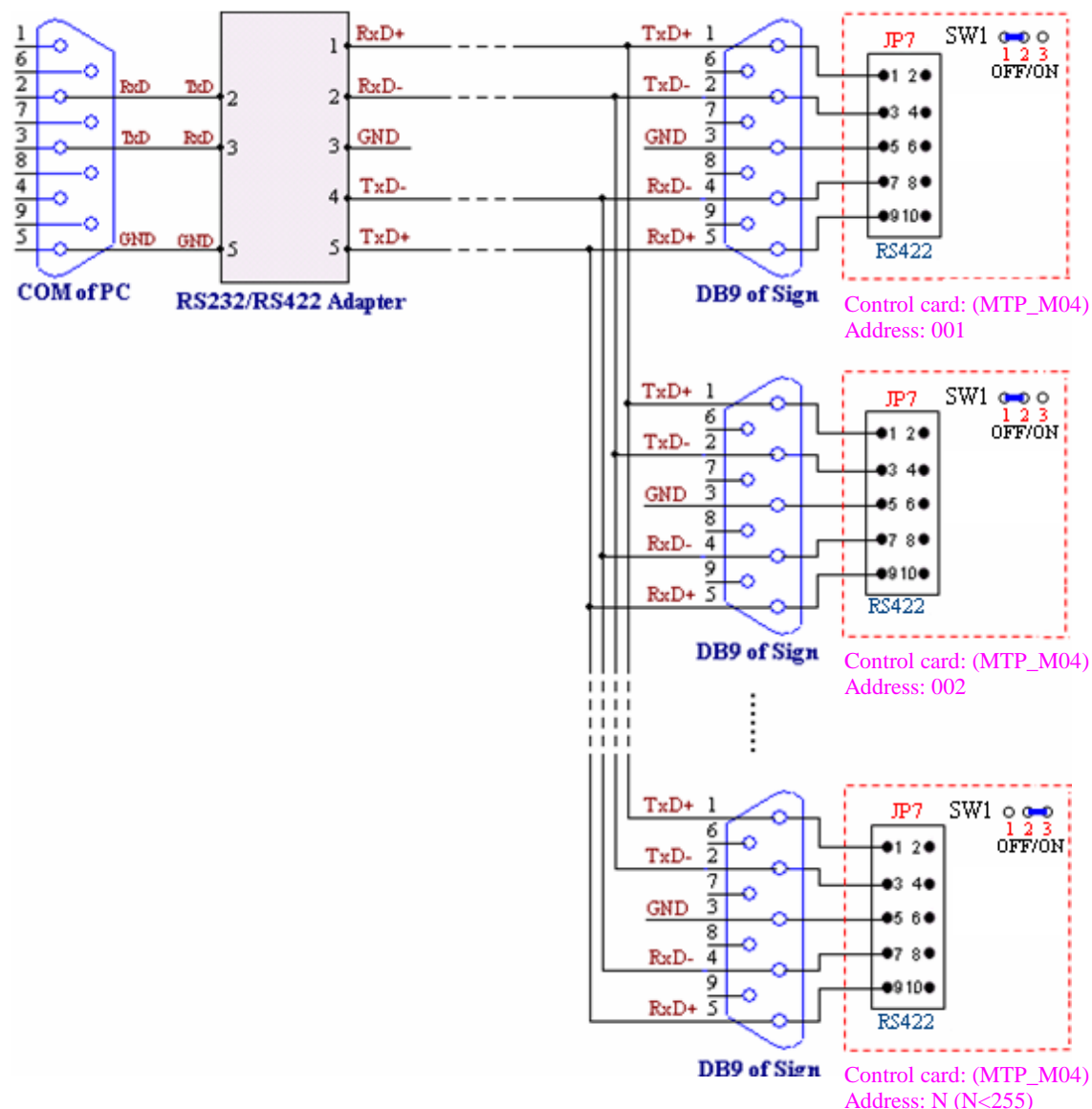
Fig5.19 Circuit diagram of RS422 connection

Note:

1. Cable is twisted-pair; TxD+ and TxD- is a pair, RxD+ and RxD- is a pair.

2. Cable length must be less than 1200 meter.

3. The number of LED signs can't exceed 255.

4. SW1: Terminal resistance, and the last sign must connect this jumper for on (2, 3).

5.6.3 Modem communication

General modem communication mode is an optional communication of Multi-line LED sign system. It is an expansion of RS232.

General modem mode is remote communication. It should use the telephone network so that the communication distance is not restricted.

This communication mode needs two general modems, one connects with control computer, and another connects with LED sign.

Following fig shown is the general connection of the general modem communication.

Fig5.20 Modem communication

Modem includes two types: one's port is DB9, another one's port is DB25. In PC end, the modem connecting is very simply. It only needs to connect to PC's COM port by the cable (standard RS232 cable) that provided with modem. In LED sign end, the cable used for connect modem with sign must make it special.

Modem DB9 cable:

Use this cable to connect modem with sign. Don't use this cable to connect modem with PC.

Fig5.21 Modem DB9 cable

Modem DB25 cable:

Use this cable to connect modem with sign. Don't use this cable to connect modem with PC.
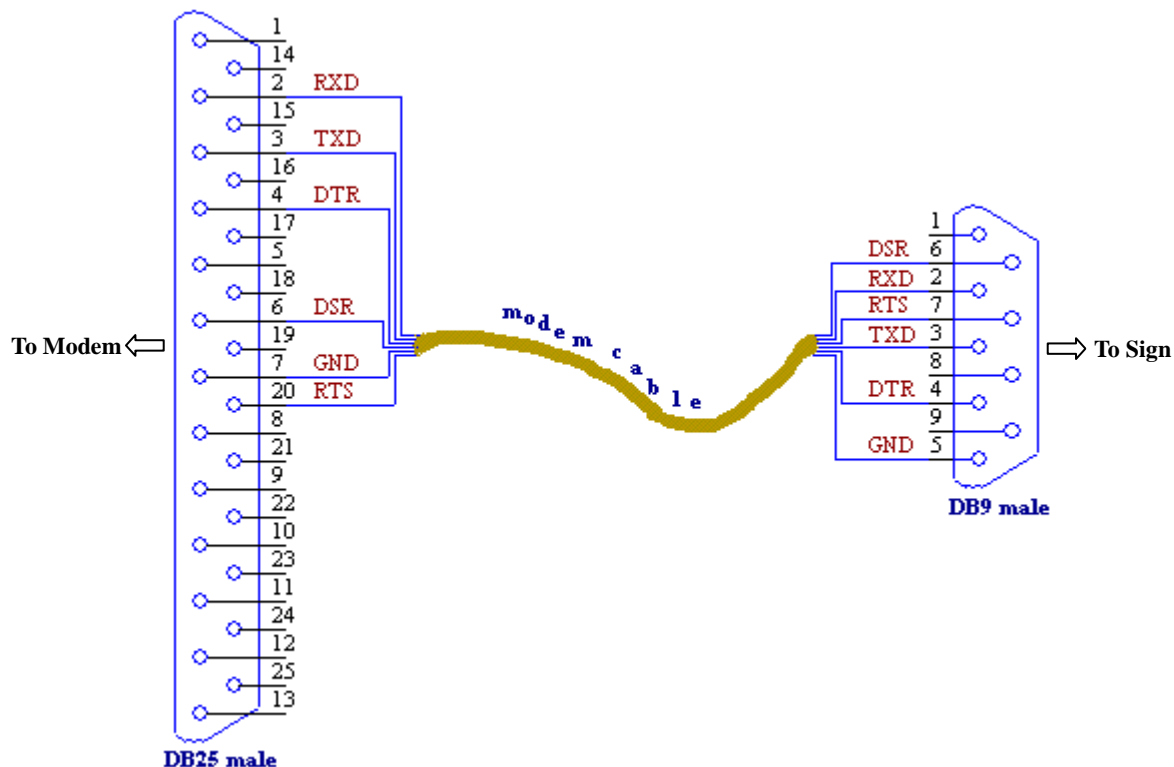
Fig5.22 Modem DB25 cable

Following give the circuit diagram of general modem connection.

DB9 port type modem
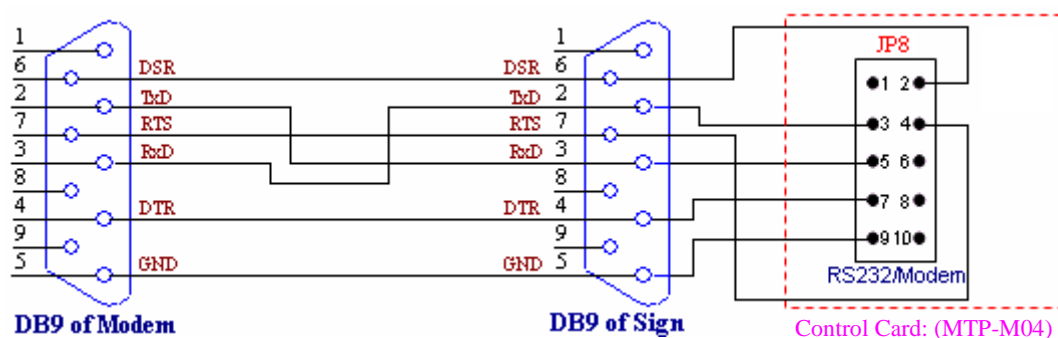
Fig5.23 Circuit diagram of DB9 modem connection

5.6.4 GSM modem communication

GSM modem communication mode is an optional communication of Multi-line LED sign system. It is an expansion of RS232.

GSM modem mode is remote communication. It should use the mobile telephone network so that the communication distance is not restricted.

This communication mode needs two GSM modems, one connects with control computer, and another connects with LED sign.

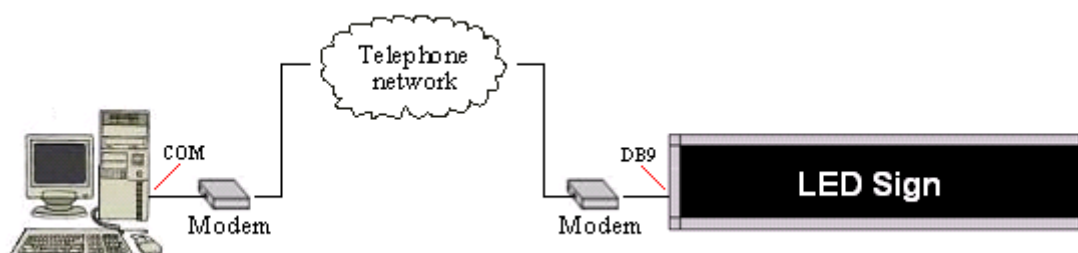Following fig shown is the general connection of the GSM modem communication.
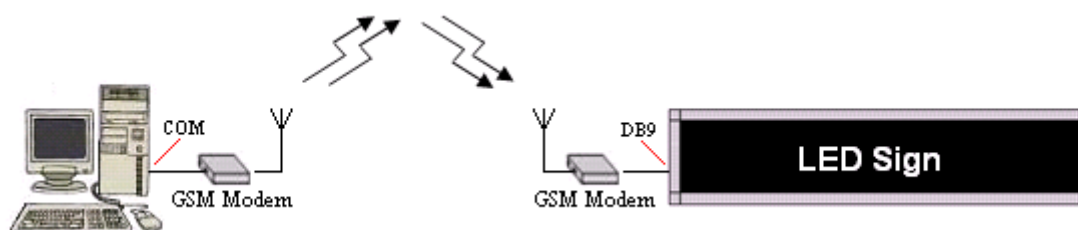
Fig5.24 GSM modem communication

In PC end, the modem connecting is very simply. It only needs to connect to PC's COM port by the cable (standard RS232 cable) that provided with modem. In LED sign end, the cable used for connect modem with sign must make it special.

GSM Modem DB9 cable:

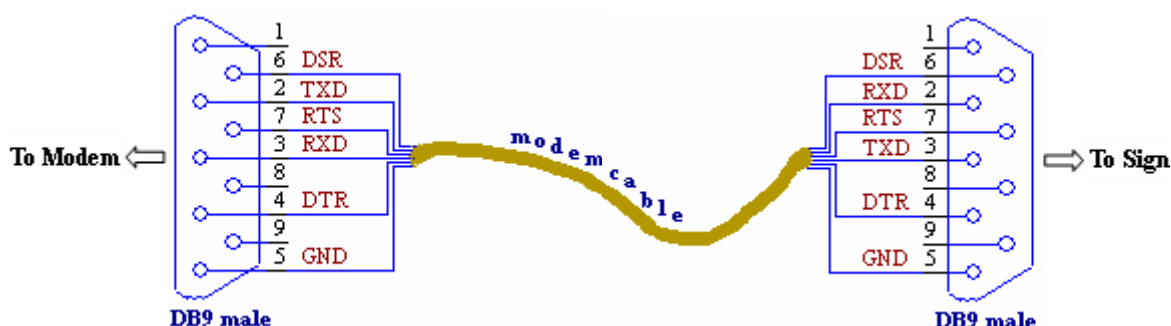Use this cable to connect modem with sign. Don't use this cable to connect modem with PC.

Fig5.25 GSM Modem DB9 cable

Following give the circuit diagram of GSM modem connection.
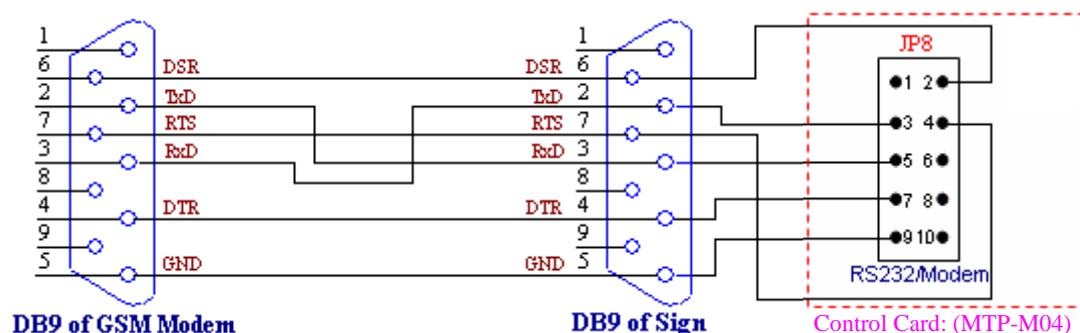
Fig5.26 Circuit diagram of GSM modem connection

In sometimes, the general modem and GSM modem may mix used in one system. In PC end, it uses general modem. In LED sign end, it uses GSM modem. In this status, the cable connection is as same as general modem and GSM modem. Following fig shown is the schematic connection diagram for this status.
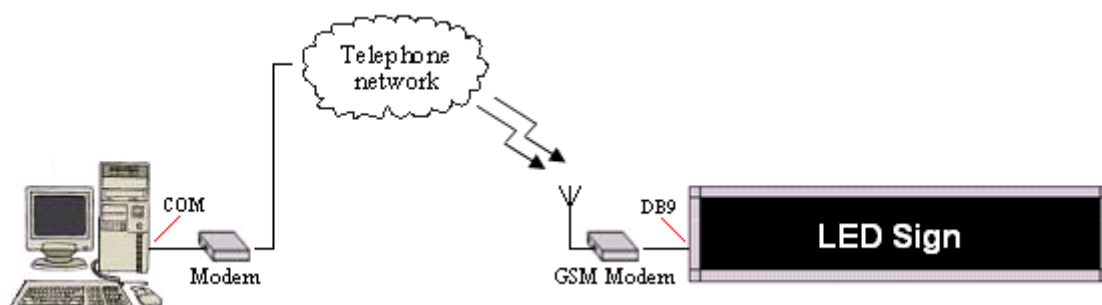
Fig5.27 Mixed modems connection

5.6.5 RF modem communication

RF modem communication mode is an optional communication of Multi-line LED sign system. It is an expansion of RS232.

In fact, RF modem is a RF connector. It includes two types: USB port type and DB9 port type. This communication mode needs two RF modem, one connects with PC and another one connects with LED sign. In PC end, user can select using USB port type or DB9 port type. But in LED sign end, we use the DB9 port type. Following fig shown is the schematic connection diagram for RF modem.
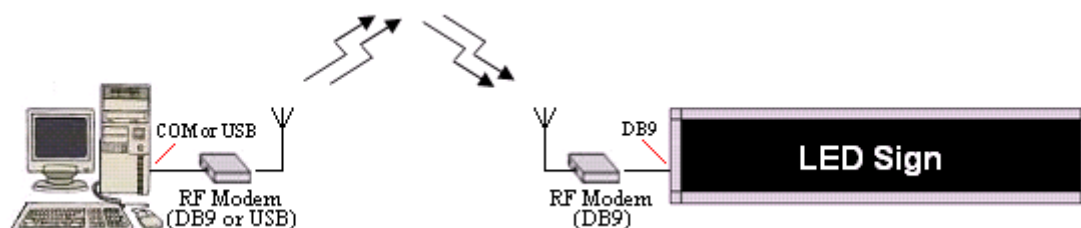
Fig5.28 RF modem communication

1. Cable connection of PC end

If use USB port type RF Modem, user only needs to plug it to PC's USB port through the cable (standard RS232 cable) that provided with RF modem. If use DB9 port type RF Modem, the cable used for connects RF modem with PC must make it special. Following content will describe how to connect DB9 port type RF Modem with PC.

RF modem DB9 cable 1:

Use this cable to connect modem with PC. Don't use this cable to connect modem with LED sign.
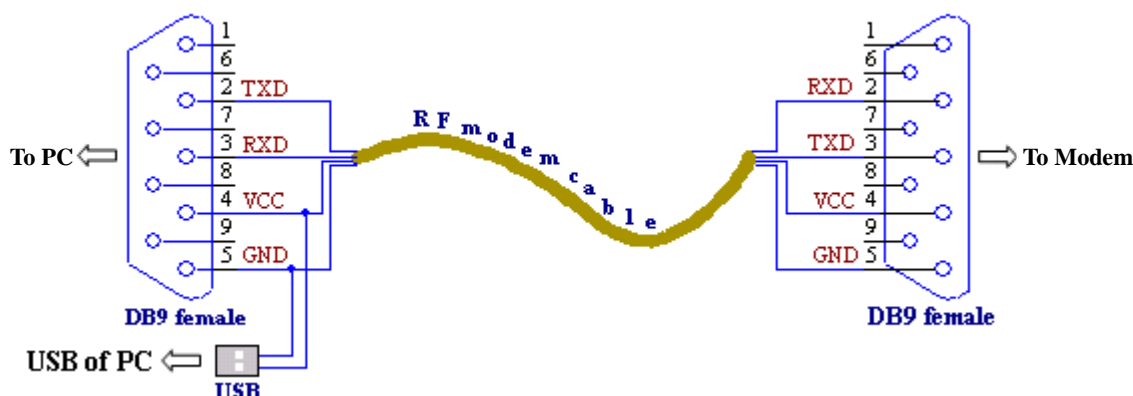
Fig5.29 RF modem DB9 cable 1

Following give the circuit diagram of RF modem connection in PC end.
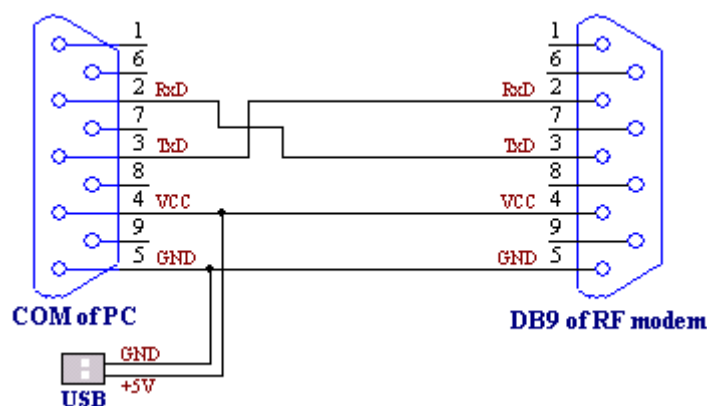
Fig5.30 DB9 RF modem connect with PC

2. Cable connection of LED sign end

In LED sign end, it must use DB9 port type RF Modem, and the cable used for connects RF modem with sign is a normal RS232 DB9 cable with power wire. Following content will describe how to connect DB9 port type RF Modem with LED sign.

RF modem DB9 cable 2:

Use this cable to connect modem with LED sign. Don't use this cable to connect modem with PC.
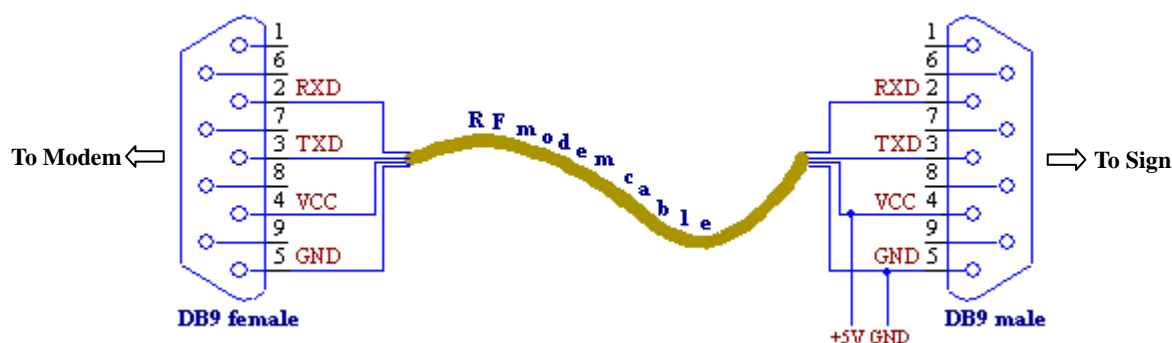
Fig5.31 RF modem DB9 cable 2

Following give the circuit diagram of RF modem connection in LED sign end.
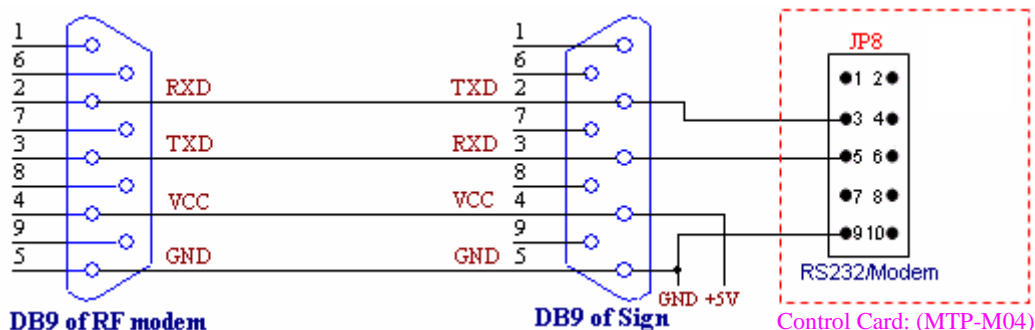
Fig5.32 DB9 RF modem connect with LED sign

5.6.6 TCP/IP network (LAN) communication

TCP/IP network communication mode is an optional communication of Multi-line LED sign system. It is an expansion of RS232 too.

In this communication mode, the LED sign is connected in LAN through a "TCP/IP to RS232" adapter. Each sign need a "TCP/IP to RS232" adapter when there are many LED signs connection. Following fig shown is the general schematic connection diagram for TCP/IP network communication.
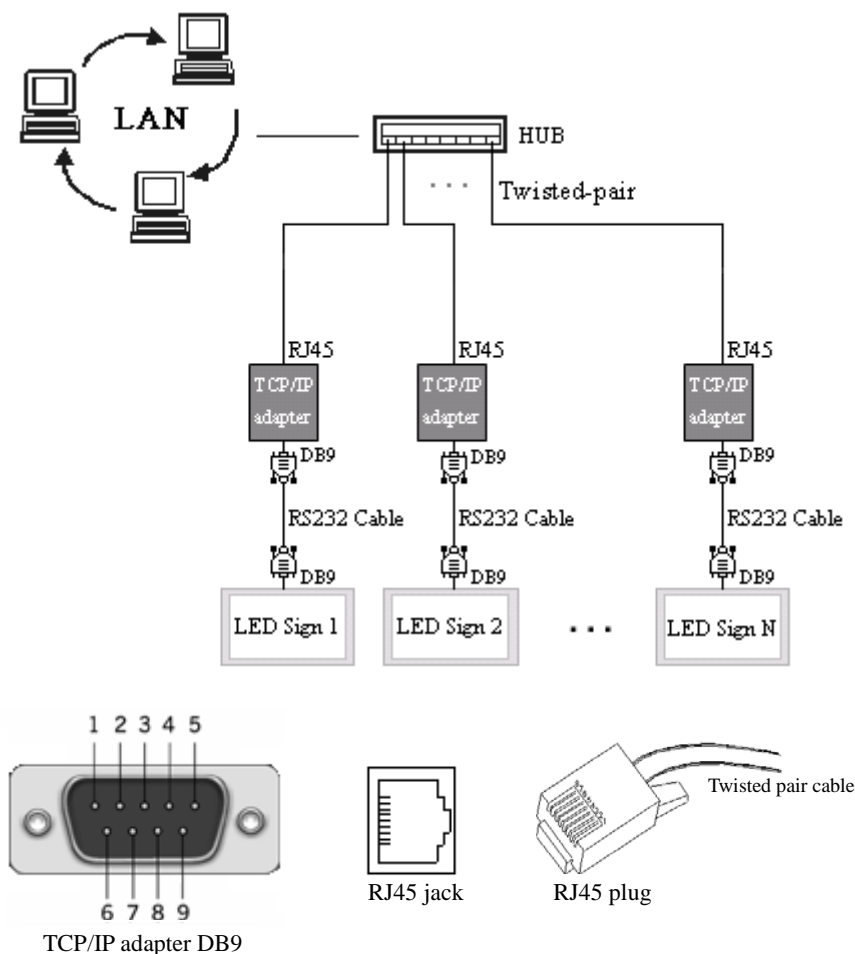
Fig5.33 TCP/IP network communication

Note: The cable used to connect HUB with TCP/IP adapter is the standard network cable (twisted-pair). And the cable used to connect TCP/IP adapter with LED sign is RS232 DB9 cable (fig5.15 shown). It must set the IP address before use "TCP/IP to RS232" adapter. User may set the IP address by NetJetSetting program. Please refer to NetJetSetting Manual for detailed operation.

Following give the circuit diagram of "TCP/IP to RS232" adapter and LED sign connection.
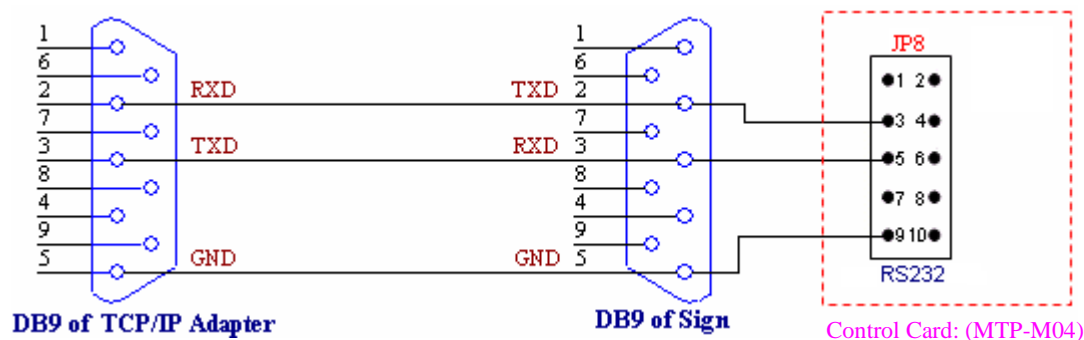
Fig5.34 TCP/IP adapter connect with LED sign

5.6.7 Optical modem communication

Optical modem is fiber optic modem that used to convert RS232/RS422/RS485 communication to fiber medium. In our system, we only use it as a converter of RS232 to fiber medium.

In general, we use optical modem communication mode when the environment is bad for communication. The connection of this communication mode has many types. This part will introduce a common connection.

Setting communication model for fiber optic modem

Panel switch (ModelSet) view:
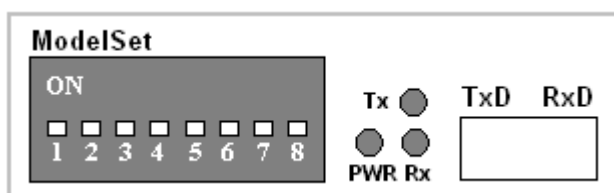
ModelSet switch to set communication mode:

Switch Model	1	2	3	4	5	6	7	8
RS232	OFF	OFF	OFF		OFF	OFF	OFF	NULL
RS422	ON	OFF	OFF	OFF	OFF	OFF	OFF	NULL
RS485	OFF	ON	OFF		ON	ON	OFF	NULL

Note:

1. Master model: set switch 4 is 'OFF';

   Slave model: set switch 4 is 'ON'.

2. Switch 8 is not need setting. It is 'NULL'.

Following fig is the schematic connection of this communication mode.
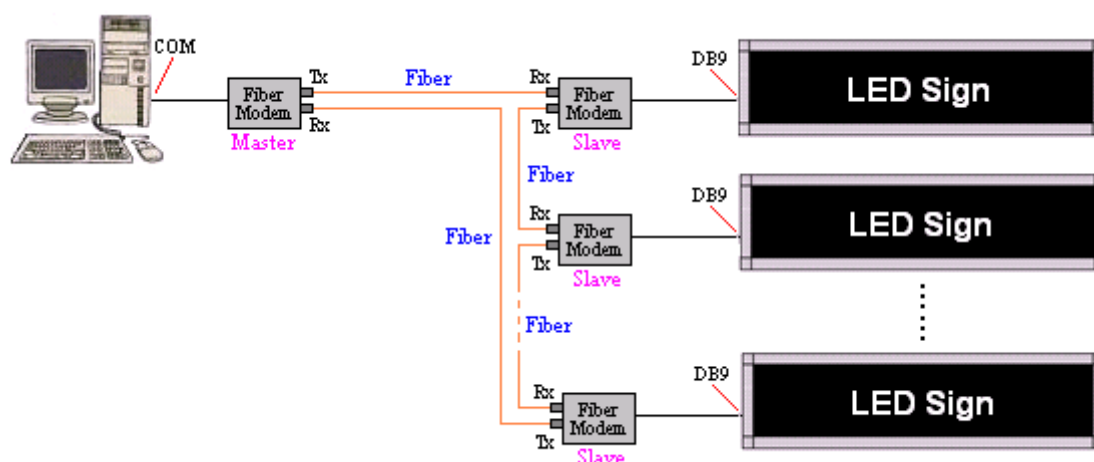
Fig5.35 Fiber optic modem communication

Note:

1. Set all fiber optic modem as RS232 communication mode by "Modelset" switch.

2. Set the fiber optic modem connected with PC as the master model; and set the fiber optic modem connected with LED sign as the slave model.

In PC end, the fiber optic modem connecting is very simply. It only needs to connect to PC's COM port by the cable (standard RS232 cable) that provided with modem. In LED sign end, the cable used for connect modem with sign must make it special.

Fiber optic Modem DB9 cable:

Use this cable to connect modem with sign. Don't use this cable to connect modem with PC.
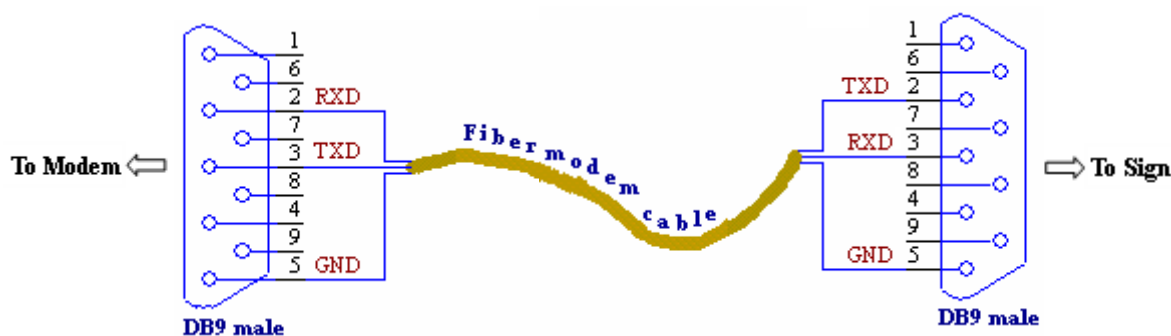
Fig5.36 Fiber optic Modem DB9 cable

Following give the circuit diagram of fiber optic modem connection with LED sign.
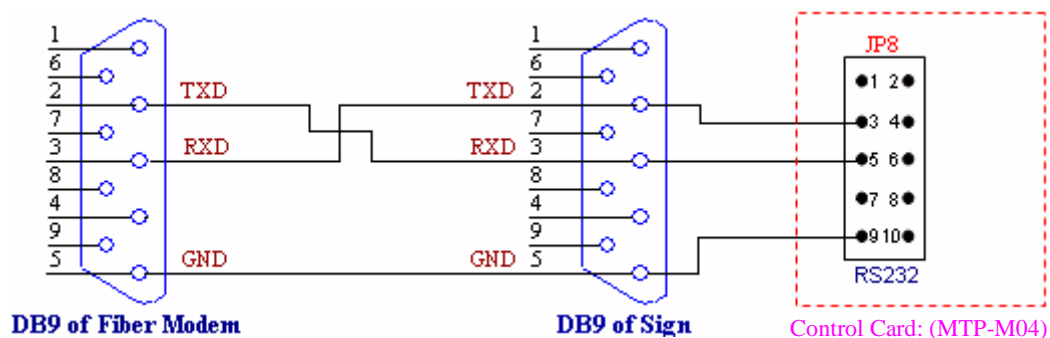
Fig5.37 Circuit diagram of fiber optic modem connection

Section 6: Installing PC software

6.1 Installing the management software

If you want to send the message to your moving sign when the message sign has connected with computer correctly, you need to install the message management software.

Insert the CD labeled "Multi-Line LED" into your CD disk drive. Double click the icon of your CD, and then copy the file named "E2000TP" to your computer's disk. This program is needn't to install. When you double click mouse left-key on the icon of the software on computer monitor desktop it will run. More information please refers to this management software's user manual.

Note:

Please ensure your computer adapt to running this program. The program running environment is depicted in user manual of the management software. Please refer to it.

6.2 Setting your Software

Open the program by double clicking on the "E2000TP" icon on the desktop.

When running the program, click ☐ button or select menu 'File > New' to create a new document. A dialog will be displayed as following.
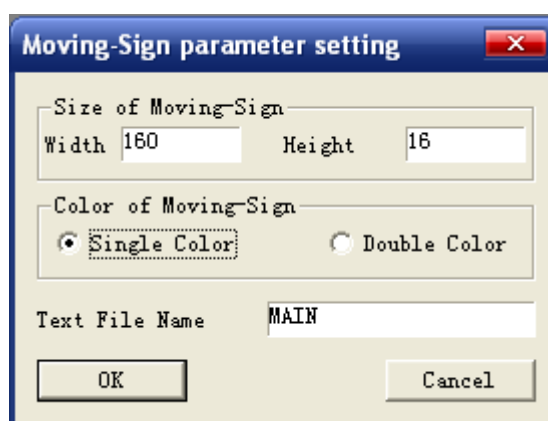
Set all parameter of the Sign, then click 'OK' button to confirm it. If user wants to know more information, please refer to the manual of this software.

Section 7: Maintenance

Important Notes:

- Power must be turned off before any repair or maintenance work is done on the sign.
- Qualified service personnel must make any access to internal sign electronics.
- Study foregoing sections to understand configuration of the sign and the routing flow of power and signal/data.
- Servicing or maintaining must be with anti-static instrument(such as ESD hand/heel straps).

7.1 Maintenance overview

A yearly inspection should be completed to maintain safe and dependable display operation. This inspection should address the following issues:

➢ **Loose hardware** Verify fasteners, such as bolts and rivets, have not come loose. Fasteners should be checked and tightened or replaced as required.

➢ **Excessive Dust Buildup** Occasionally it may be necessary to vacuum the inside of the LED cabinet to remove dust/dirt buildup that may interface with airflow.

➢ **Water Intrusion** Water can enter the sign where weather seal has come loose or deteriorated or where fasteners has come loose allowing gaps in the panels or where moisture may be entering around hardware. Be sure to check around the lift eyes and bolts to ensure that water has not entered there. If so, replace hardware immediately to prevent more water from entering the sign. Also, check electronic components for possible corrosion.

➢ **Corrosion** Check the paint, and look for possible corrosion especially at footings, structure tie points and ground rods.

➢ **Cables** Check power cables and signal/data cable of system. If power or data cables are damaged, replace only with new ones.

➢ **Fans Failure** Every fan installed on the backdoor of cabinet is controlled by a thermal switch and is turned on when the surface temperature of the cabinet reaches about 45°C. Fans should be checked more often if the sign is located in a dusty environment. Fan blades and filters must be kept clean.

7.2 LED Cabinet Cleaning

Due to outdoor use the LED sign are exposed to all kinds of weather conditions. Sand, dust, smog and other dirt adhere on the LED sign and because of that the performance of the sign is reduced. So we recommend cleaning LED cabinet at regular intervals.

Necessary tools

- Vaporizer with a non aggressive detergent.
- Soft hand brush with long hair.
- Garden hose with a spray nozzle.
- Compressed air.

Cleaning process

1. Seal up the data and power sockets of the cabinet with a power and data cable. Make sure that all plug holder clamps are locked firmly.
2. Ensure that the unused output ports of cabinet are sealed with a dummy plug.
3. Vaporize, through different directions, the non aggressive detergent on the shaders and LED's.
   Warning: Don't use industrial grease removers. Use only materials or chemicals that are inert, nonabrasive, noncorrosive and non-marking.
4. Brush down all dirt of the LED's and the shaders using a soft hand brush.
   Warning: Don't use a hard bristled brush.
5. Wash away the remaining soap with plenty of fresh water.
   Warning: Don't submerge the sign fully or partly in water or other liquids.
6. Repeat from step 3 until the cabinet is clean.
7. Blow the surface dry with compressed air.

7.3 Replacement

Replacing LED modules

1. Read follow the safety instruction in section 1.
2. Disconnect the power and data cables and all the cable strings from LED modules.
3. Loose these screws that fixed LED modules on grid of cabinet.
4. Pushing the LED modules forward out of the grid.
   Warning: Ensure you have a good grip on the LED module while releasing the module. We recommend there has one people hold the module in front at

the same time while pushing.

5. Hand over the released LED module in front of the sign.

   Note: It's possible to pull back the LED module through the grid opening if required.

6. Snap in a new LED module from the front of the sign.

   Warning: Ensure to orient the LED module correctly while snapping in. The louvers on LED cluster modules must be upwards. And the weather-stripping on the back edge of the module must be intact and implanted in the slot of plastic module box

7. Use screws fixed new LED modules onto grid.

   Warning: The module should be firmly seated against the grid of cabinet.

8. Connect the new LED modules with cables.

   Warning: Ensure to fasten the captive lock of the plug.

Replacing driver card

Sometimes driver card is regarded as one part of LED module, it is fixed at rear of LED module by socket. To remove a driver card from module, disconnect cables and wires attached, then plug out the driver card from socket.

When installing a driver card to module, reverse the previous steps.

Replacing control card or scan card

There is no special handwork to replace these card but loose screws for fixing and disconnect the cables and wires attached, then you can take out it easily.

When installing a new card, reverse the previous steps.

Replacing power supply

The power supply is fixed on a plate by bolt. And the plate is installed on cabinet. Loose these screws that fixed plate on cabinet, then you can take out the plate from cabinet. Now, you only need loose screws for fixing and disconnect the cables and wires attached of power supply, then you can take out the power supply easily. When installing a new power supply, reverse the previous steps.

7.4 Troubleshooting

For Multi-Line LED sign, we have a special indication for simple trouble. User can judge where those problems are and find way to solve the problems from the LED indicator on scan card.

LED indicators on Scan card(CST-TPSCAN-C)

Status of LED indicators information:

LED 1 --- Data scan output indicator

Flash – Normal; No flash – 50M Crystal oscillator is fault.

LED 2 --- 5V power supply indicator

ON – Normal; OFF – 5V power supply is fault.

LED 3 --- 3.3V power supply indicator

ON – Normal; OFF – 3.3V power supply is fault.

LED 4 --- switch RAM indicator

Flash slow– Normal; Flash quick – not checked data input.

Common symptom remedy

The below sub-section contains some symptoms that may be encountered in the sign. This list does not include every possible symptom, but does represent common situations that may occur.

Table2: Common symptom remedy

Symptom/Condition	Possible Cause/Remedy
No display	· Check if the power socket located at the back of the sign is connected. · Check if the AC power plug is plugged into the wall outlet. · Check if the main power of the AC outlet is normal. · Check if the auto on/auto off time setting is correct.
Not response to remote control	· Check if the batteries of the remote control still have enough energy. If user is not sure, please replace all the batteries. · Check if the batteries of the remote control are placed at right polarity. Please follow the markings in the battery compartment. · Check if there is anything between the remote and the sign blocking the remote signal.

Continue table2:

Two rows (included in one row cabinets) that extend from left to the right of the sign are not working.	· Check/replace the DC power supply installed in the cabinet. · Check the power wire connection. · Verify proper use of the software.
No display but response to the remote control	· Check if the auto on/auto off time setting is correct. · Check if the data in the files are valid. · If you are not sure, you can enter the edit mode and press 'CLR' key of the remote control, select 'DEL ALL' to erase all data, this will reset the sign to display the default demo messages.
One or few rows of LED sign do not update information.	· Check internal RS232/RS422 cable. · Replace control card.
One or more LEDs on a single display card fail to light or fail to turn off.	· Check/replace the driver card. · Check/replace the lamp card.
One or two neighbor rows of LED sign do not work or garbled.	· Check/replace power supply or power wires connected to the end LED modules that are not working. · Replace the end LED modules that is not working on the right side. · Replace the adjoining LED module that is on the right side of the end LED modules (may be it does not export data). · Replace the input ribbon cable connect to the end LED modules on the right.
One or few rows of sign do not update information.	· Check internal data cable. · Replace CPU board(control card).
Can not send or receive message	· Check if the ring communication path has broken node.
In one row LED cabinet can't work or not update information.	· Check the power route line for this row. · Check the data cable that input for this row.
Sign is stuck on bright or dim.	· Check/replace light sensor cable. · Check/replace light sensor/scan card.

7.5 Return and Repair

Parts that are replaced by spare parts can be returned to us for repair. Please enclose your name, address, phone number, and a clear description of symptoms. When getting returned parts, we will inspect, test and repair it and send it back as soon as possible. The repairing work is free for a period of two years from the date of shipment. Each will pay the transportation charges. This means, user will pay charges for transporting goods to us and we will pay charges for return.

We retain the right to refuse part that has been damaged due to the acts of nature or causes other than normal wear and tear.

If you have any other question to ask or need any other service, feel free to contact with us or your agent.

Section 8: Appendix

Appendix A: Jumper for card

➢ **Control card: MTP-M04**

SW1: Jumper 1, for setting terminal resistance of RS422 communication. Connected Pin2 and Pin3(•••) to set have terminal resistance. If there are many signs connected in network, the last sign must set has terminal resistance.

➢ **Scan card: CST-TPSCAN-C**

Jumper defined:

S1, S2: Setting scan type.

OFF, OFF = 1/16 Scan

OFF, ON = 1/4 Scan

ON, OFF = Static constant current

ON, ON = 1/8 Scan

S3: Select scan. ON = Scan; OFF = Count.

S4: Setting data input direction. ON = Right input; OFF = Left input.

Remark: The direction is view from the face of display.

S13, S14: Out 16 Line, Out 4 Line

OFF, OFF = Output 8 lines(One data control eight lines in height)

ON, OFF = Output 16 lines(One data control sixteen lines in height)

OFF, ON = Output 4 lines(One data control four lines in height)

ON, ON = Output 8 lines(One data control eight lines in height)

∗Remark: ON means jumper connected; OFF means jumper not connected.

Appendix B: Some cables define

➢ **Power cable**

The power cable used for external or input/output are mad up of three wires. This power cable connector has three pin. Wiring standard for power cable as following:

Pin1 --- L   Pin2 --- N   Pin3 --- GND

➢ **Light signal cable**

The light signal cable contains five colored wires: blue, green, white, black, and red. Wiring rule as following:

Pin1 --- Blue wire --- Turn off display(Sign is black when Vih)

Pin2 --- Green wire --- Brightness D3

Pin3 --- White wire --- Brightness D2

Pin4 --- Black wire --- Brightness D1

Pin5 --- Red wire --- Brightness D0

➢ **Temperature sensor cable**

The temperature sensor cable contains three colored wires: yellow, green, and red. Wiring rule as following:

Pin1 --- Red wire --- VCC

Pin2 --- Green wire --- Signal

Pin3 --- Yellow wire --- GND

Appendix C: PC software list

Multi-Line LED sign can be controlled by PC software.

PC Software: E2000TP

Software manual: User manual of LED Multi-Line software

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Appendix D: Additional programming tips

Function Code	Definition	Possibilities/ Description	Control
METHOD	Display Option	Randomly selects one of the available display modes. (Default)	[AUTO]
		Immediate display mode	[IMMED]
		Slide display modes (6 directions)	[SLIDE]
		Cover display modes (6 directions)	[COVER]
		Roll display modes (6 directions)	[ROLL]
		Interlace-slide display modes (4 kinds)	[INSLID]
		Interlace-roll display modes (6 kinds)	[INROLL]
		Shutter display modes (4 kinds)	[SHUTT]
		Jump display mode	[JUMP]
		Snow display mode	[SNOW]
		Random display mode	[RANDOM]
		Shoot display mode	[SHOOT]
		Explode display mode	[EXPLODE]
		Twinkle display mode	[TWINKLE]
		Flash display mode	[FLASH]
		Pac-Man display mode	[PACMAN]
		Scroll display mode, use to scroll a large continuous message	[SCROLL]
		Rotate display mode, use to rotate a large continuous message	[ROTATE]
COLOR	Alters the color of text	See Appendix B	
FONT	Changes the shape and size of characters	SANS SERIF, 5 pixels height	[SS5]
		SANS SERIF, 7 pixels height (Default)	[SS7]
		SERIF, 7 pixels height	[SF7]
		SERIF, 10 pixels height	[SF10]
		SANS SERIF, 16 pixels height	[SS16]
		SERIF, 16 pixels height	[SF16]
		Times New Roman, 16 pixels height	[TM16]
		Arial, 16 pixels height	[AR16]
		Small Fonts, 8 pixels height	[SMA]
SPEED	Changes the Speed of the display Scrolling	Speed 1 (Slowest)	[SPEED 1]
		Speed 2	[SPEED 2]
		Speed 3	[SPEED 3]
		Speed 4	[SPEED 4]
		Speed 5 (default)	[SPEED 5]
		Speed 6	[SPEED 6]
		Speed 7	[SPEED 7]
		Speed 8 (Fastest)	[SPEED 8]
PAUSE	Generates a pause within the programmed message	No pause	[NO PAU]
		Pause 1 second	[PAU 1S]
		Pause 2 seconds	[PAU 2S]
		Pause 3 seconds	[PAU 3S]
		Pause 5 seconds (Default)	[PAU 5S]
		Pause 10 seconds	[PAU 10S]
		Pause 30 seconds	[PAU 30S]
		Pause 1 minute	[PAU 60S]

Appendix E: Listing of color

COLOR	DESCRIPTION
[ACL]	Auto color, circularly change color when load a new page
[RED]	Red (Default)
[GRN]	Green
[YEL]	Yellow
[RB1]	Rainbow color 1
[RB2]	Rainbow color 2
[RB3]	Rainbow color 3
[RB4]	Rainbow color 4
[RB5]	Rainbow color 5
[MIX1]	Mixture color 1
[MIX2]	Mixture color 2
[MIX3]	Mixture color 3
[MIX4]	Mixture color 4
[MIX5]	Mixture color 5
[MIX6]	Mixture color 6
[MIX7]	Mixture color 7
[MIX8]	Mixture color 8

Appendix F: Listing of symbol characters

Note: The actual symbol appear in brackets ("[   ]") during the programming mode.

Sunny	Cloudy	Rainy	Clock	Phone
Glasses	Faucet	Rocket	Alien	Key
Sweater	Helicopter	Car	Tank	House
Teapot	Trees	Duck	Motorcycle	Bike
Crown	Hearts	Right Arrow	Left Arrow	Lower Left Arrow
Upper Left Arrow	Mug	Chair	Shoe	Martini Glass

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Appendix G: International characters

General Character	International Characters
A	Ä Å Æ Á À Ã
C	Ç Ć Č
D	Đ
E	É Ê
I	Í
N	Ñ
O	Ö Õ
S	Š
U	Ü
Z	Ž
A	â ä à å æ á ª ã
C	ç ć č
D	đ
E	é ê ë è
I	ï î ì í
N	ñ
O	ô ö ò ó º õ
S	š
U	ü û ù ú
Y	ÿ
Z	ž
?	¿
!	¡
$	¢ £ ¥ Pts ƒ €

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Appendix H: Remote keys description

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⬤	Turn power ON or OFF
PROG	Start text programming
RUN	Finish text programming
←	Move cursor left one character
→	Move cursor right one character
ALT ←	Move cursor left one word
ALT →	Move cursor right one word
NEXT	Change to next format
PREV	Change to previous format
CAP	Toggle between capital and lowercase
INS	Toggle between insert mode and overwrite mode
DEL	Delete the character after cursor
ALT DEL	Delete the character before cursor
CLR	Clear all text
SPA	Input a space character
ENT	Insert a new line
FONT	Select font
COL	Select color
TIME	Insert date and time
ALT TIME	Insert a counter
CPW	Insert temperature

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Appendix I: File Log

File No.	Descriptions