Nova LED Display Control System
User Manual

(for the N200 series)

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Content

1 Nova N200 Series Control System Features

Nova N200 Series LED Display Control System is professionally developed for high-class LED displays. It features in digital signal processing and optical fiber transmission, which guarantees excellent anti-interference capacity and information security.

Features

- Supper large screen control without jittering, frame-skipping and dark-out.
- Factory/field pixel-level brightness\chroma calibration ensuring superior image quality..
- Real-time failure monitoring of each main system component including controllers, dividers and scan-boards.
- Real-time cabinets status (including temperature, humidity, smoke, voltage and fans speeds of each cabinet) monitoring (monitoring boards required).
- Failure monitoring of each LED light (monitoring boards required).
- 16bits gray level processing and luminance build-up from gray level 1.
- LED display brightness self-adaptation according to environment brightness.
- Remote system power supply control and programming.
- Temperature-based LED display brightness adjustment extending display service life.
- Driver chip MBI5036 (with current gain function), PWM self-decode chip MBI5042/MBI5050 and Toshiba TC62D722 supported.
- Energy Saving design results in lower power consumption, lower heat and longer display service life.

2 Nova N200 Series Control System Hardware

2.1 System Components and Framework

2.1.1 Standard System Framework

Nova N200 series LED Display Control System consists of three parts, the controller, the divider and the scan-board. And the sketch of the system is as Fig.2-1-1.

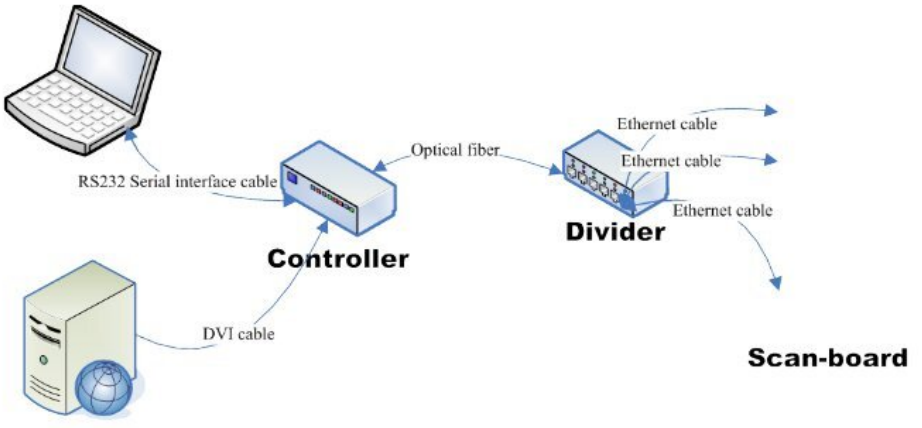


Fig. 2-1-1 the standard framework of the Nova N200 series Display Control System

Controller Divider Scan board

CAUTION:

	Optical fiber is used to connect Controller ADM-200 and Divider DIS-200. The fiber could be single mode or multimode. Transmission distance of the single mode optical fiber is about 2Km while that of the multimode fiber is about 300 meters. Usually, single mode optical modules are provided in the system. If multimode optical modules are required, please inform us in advance.

2.1.2 Data Flow Mode of the Scan-boards Array

For convenience and flexibility, the control system provides five different modes of the data flow within the scan-boards array, which are Top-To-Bottom, Bottom-To-Top, Left-To-Right, Right-To-Left and Double-Half.

1) Top-To-Bottom Mode

In this mode, the outputs of the divider are inputted into the first (top) row of the scan-boards array, and then the outputs of the first row scan-boards are inputted into the second row scan-boards, and then the second row to the third row…, cascade in turn. The sketch map is in Fig.2-1-2.

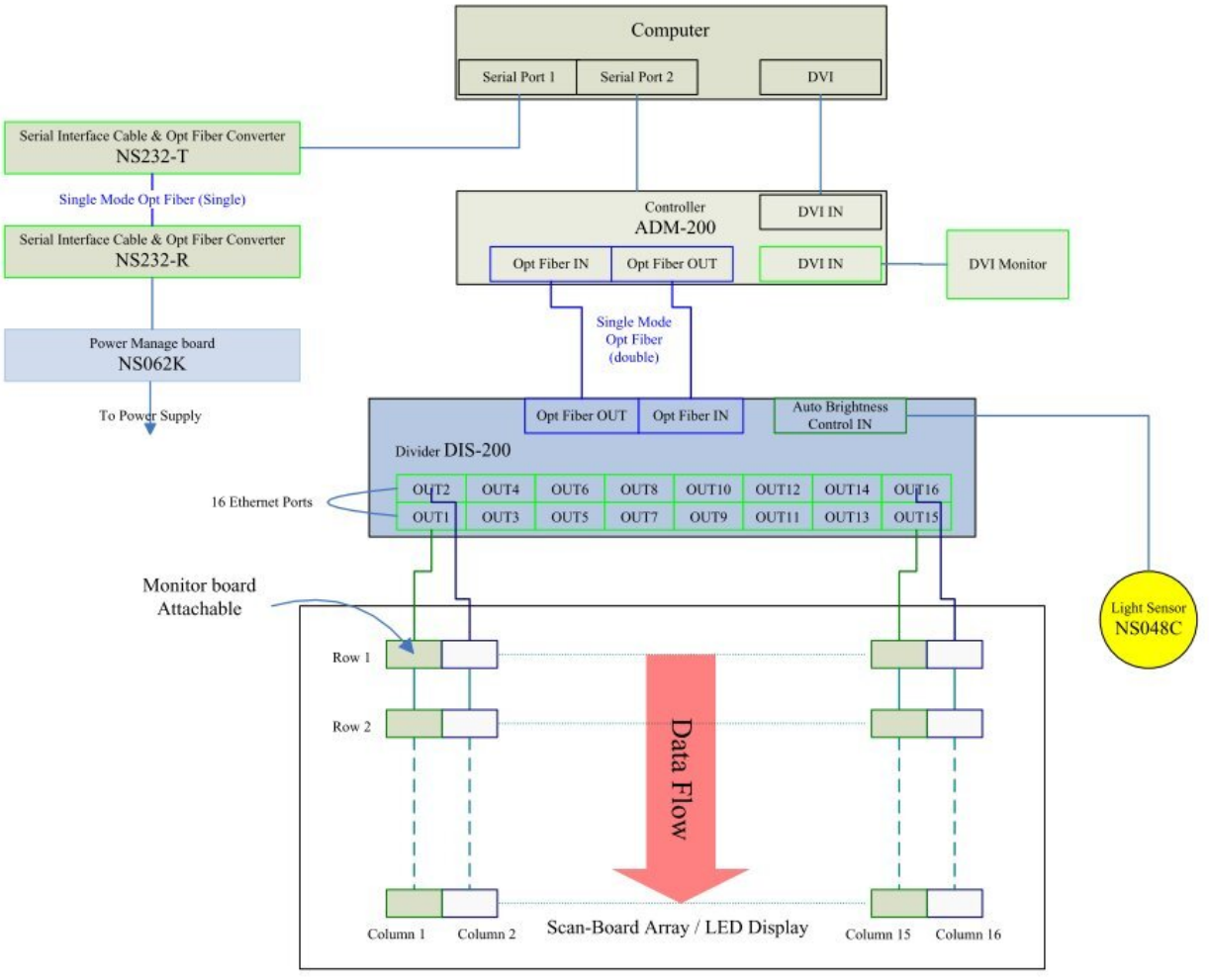


Fig.2-1-2 the system framework sketch map of the Top-To-Bottom Data Flow Mode

2) Bottom-To-Top Mode

In this mode, the outputs of the divider are inputted into the last (bottom) row of the scan-boards array, and then the outputs of the last row scan-boards are inputted into the scan-boards row next to the last row, and then…, cascade in turn. The sketch map is in Fig.2-1-3.

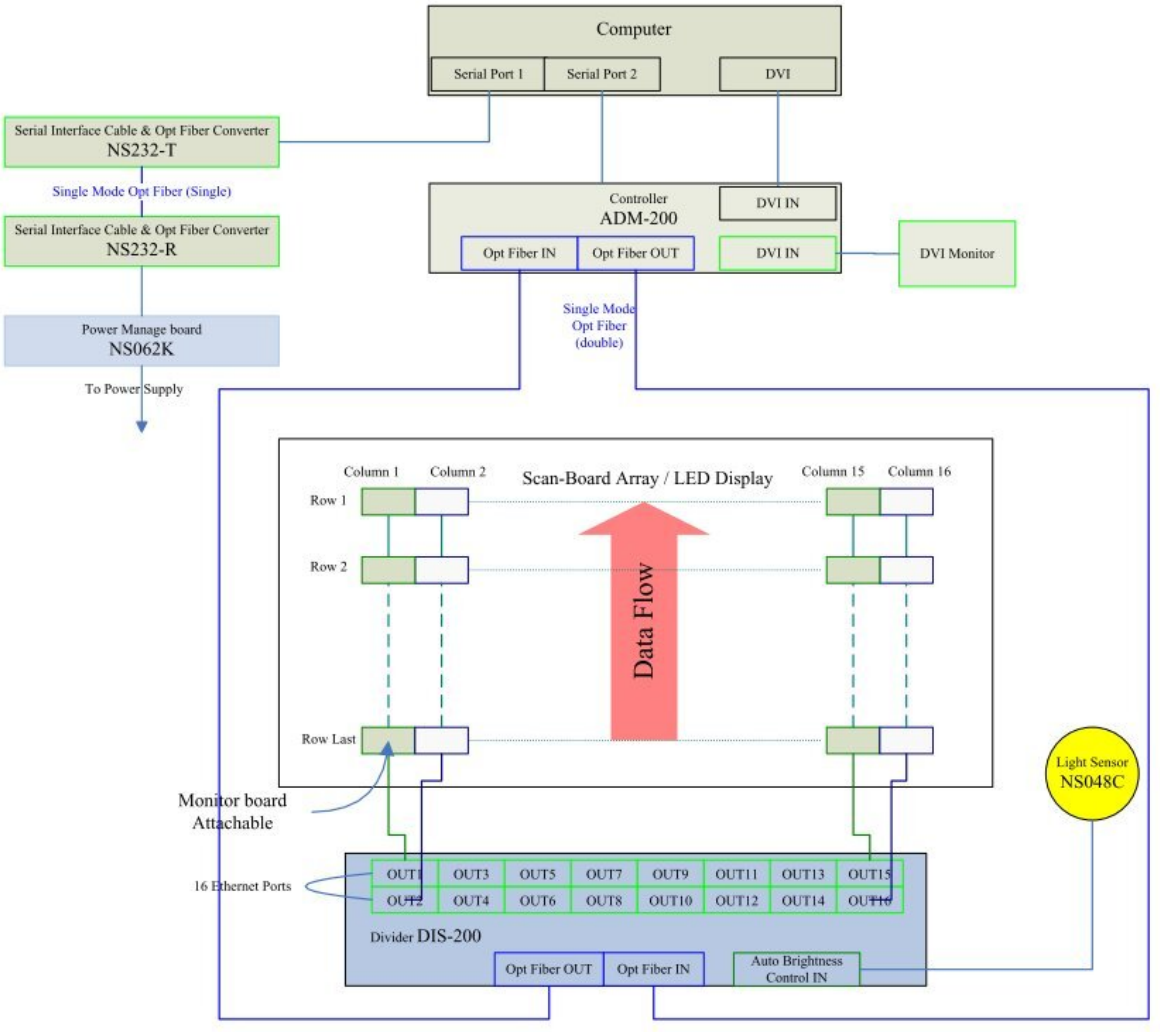


Fig.2-1-3 the system framework sketch map of the Bottom-To-Top Data Flow Mode

3) Left-To-Right Mode

In this mode, the outputs of the divider are inputted into the first (most left) column of the scan-boards array, and then the outputs of the first column scan-boards are inputted into the second column scan-boards, and then…, cascade in turn. The sketch map is in Fig.2-1-4.

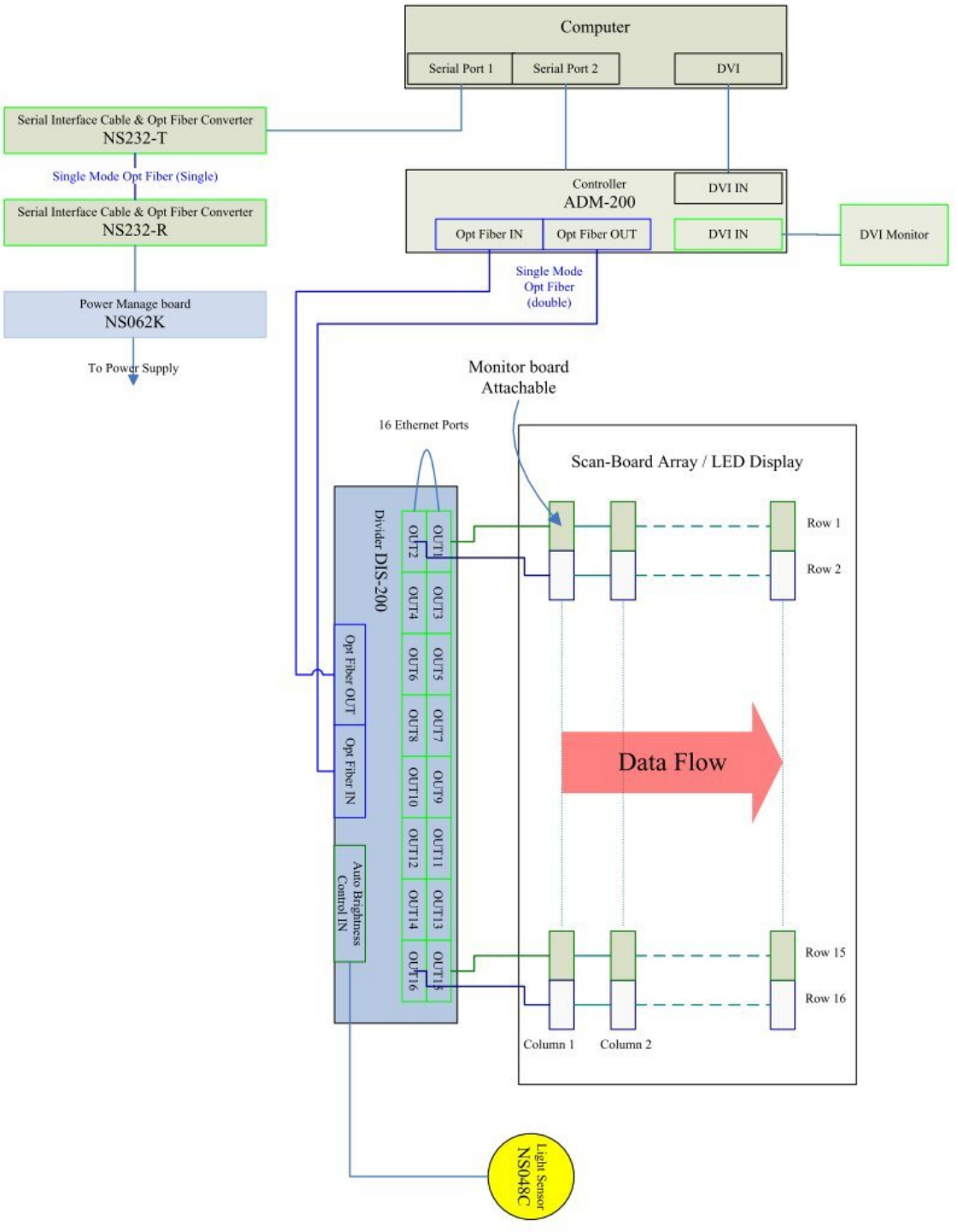


Fig.2-1-4 the system framework sketch map of the Left-To-Right Data Flow Mode

4) Right-To-Left Mode

In this mode, the outputs of the divider are inputted into the last (most right) column of the scan-boards array, and then the outputs of the last column scan-boards are inputted into the scan-boards column next to the last column, and then…, cascade in turn. The sketch map is in Fig.2-1-5.

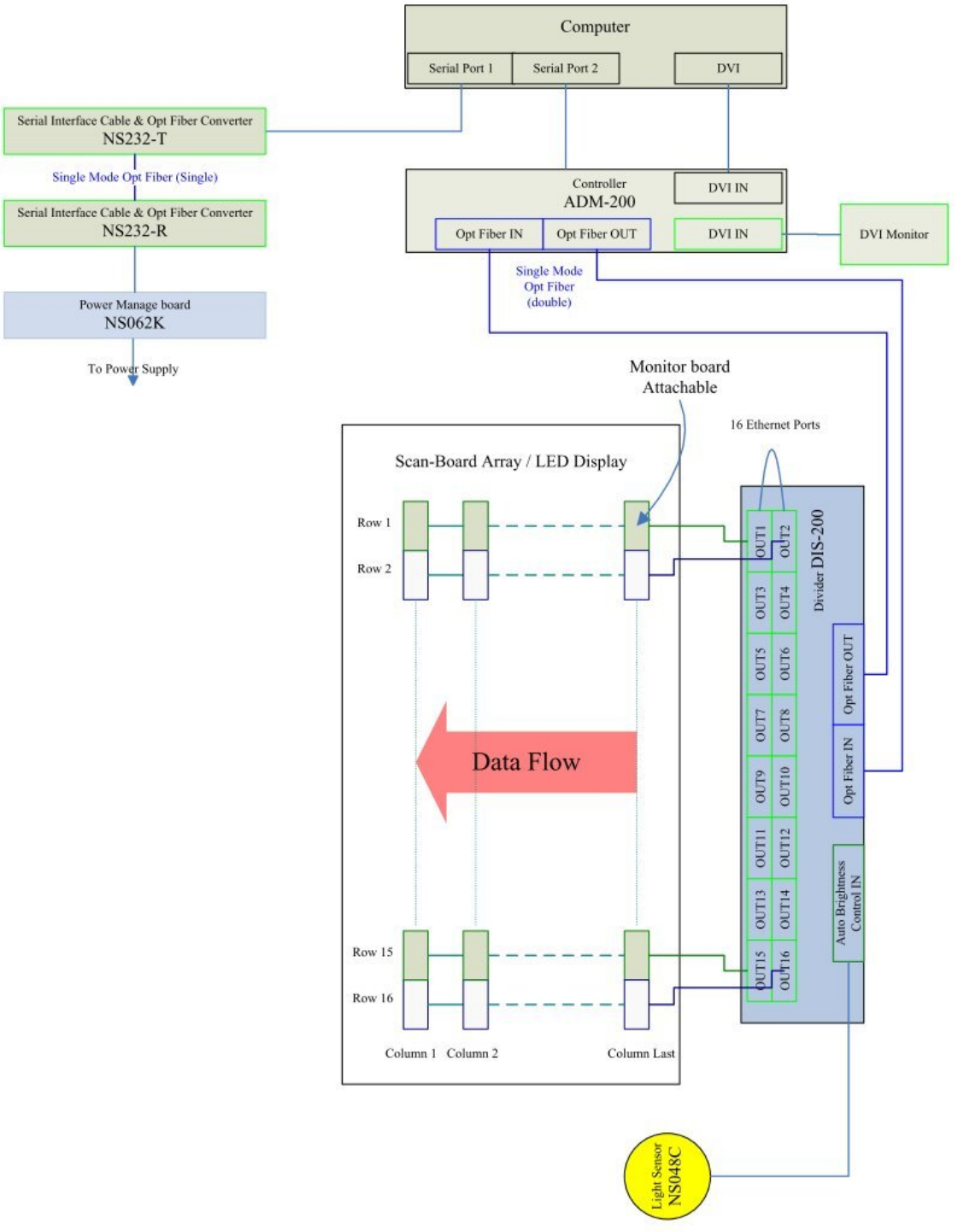


Fig.2-1-5 the system framework sketch map of the Right-To-Left Data Flow Mode

5) Double-Half Mode

In the case that the scan-boards array height is beyond that a divider can drive (suppose the maximum row number is N), while the array width is no more than 8 columns, the Double-Half Mode could be adopted. Fig.2-1-6 gives the sketch map of this mode by an example that the width of the scan-boards array width is 8. The 16 outputs of the divider are divided into two halves, Half1 and Half2. Half1 includes OUT1 to OUT8, and Half2 OUT9 to OUT16. The 8 outputs of Half1 are input into the first row of the scan-boards array, working in the Top-To-Bottom Mode. The 8 outputs of Half2 also work in the Top-To-Bottom Mode, but they are inputted into the scan-boards row just next to the last row that the divider can drive (Row N+1).

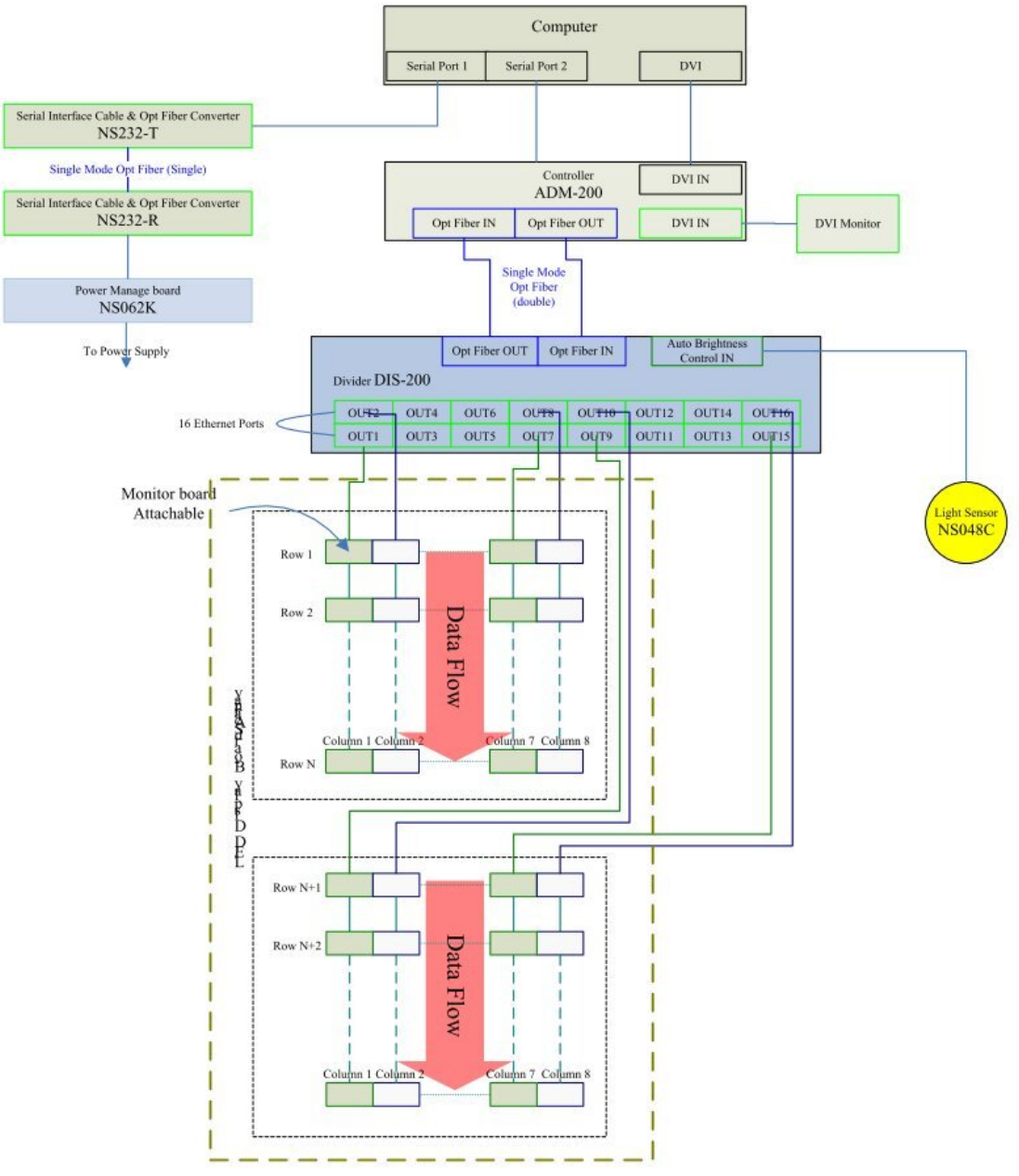


Fig.2-1-6 the system framework sketch map of the Double-Half Mode

2.1.3 Compact System Framework

The framework of a compact LED Display Control system is as Fig.2-1-7.

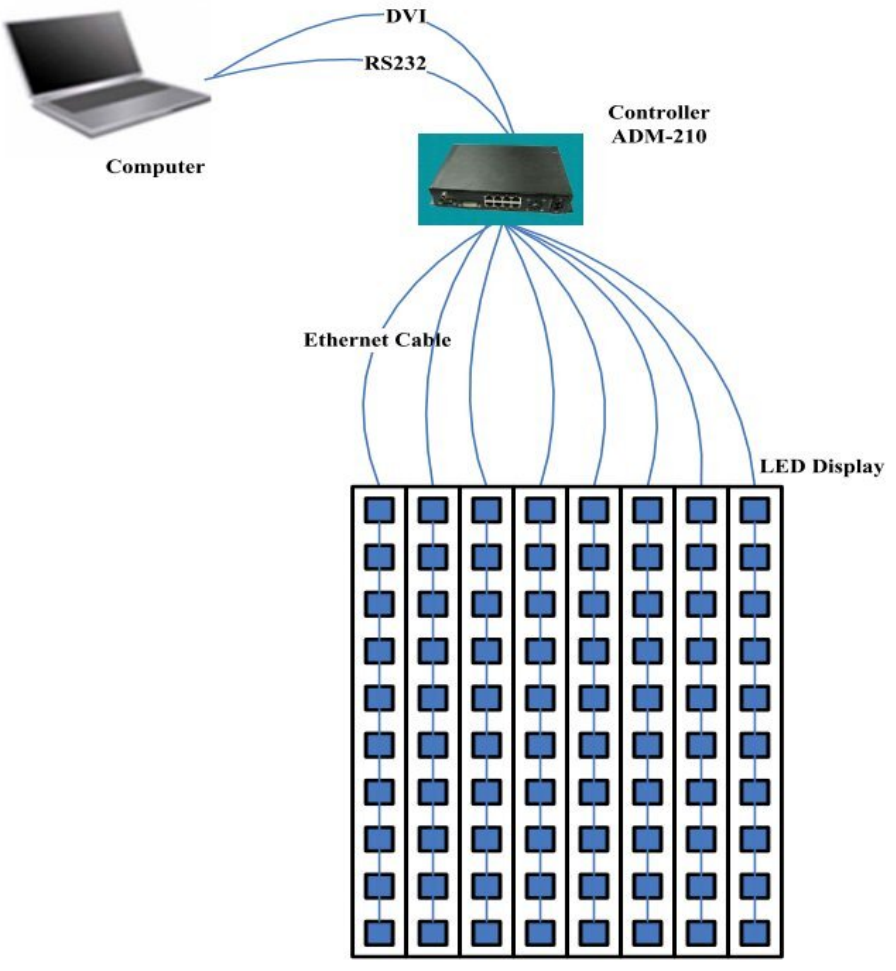


Fig.2-1-7 the compact system framework

2.2 Controller

The controller receives digital signals in DVI format and then transfers the signal to an assigned divider via optical fiber. At the same time, the controller fulfils other functions including receiving and executing instructions from the host computer, real-time returning screen status, advanced image processing and so on.

2.2.1 Standard Controller (ADM-200)

1) Specifications

Fig.2-2-1 is a picture of a standard controller ADM-200.

- Input Video in DVI format
- Control Via RS232 serial interfaces
- Output One optical fiber interface
  One DVI interface
- Power Supply 100V~240V AC
- Size Standard 2U cabinet, depth 230mm

Fig.2-2-1 Standard Controller ADM-200

2) Front Panel

The sketch of ADM-200 front panel is as Fig.2-2-2.

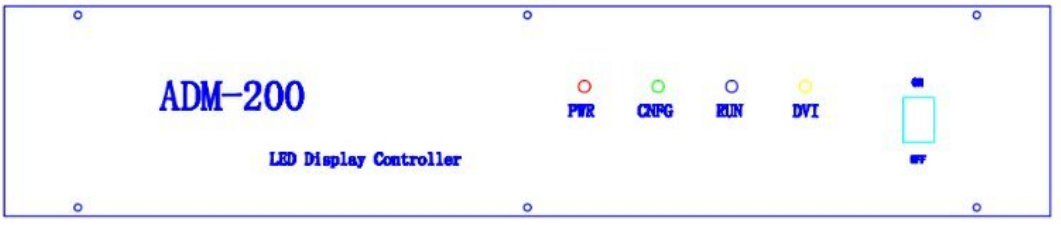


Fig.2-2-2 ADM-200 front panel layout

The four lights on the front panel from left to right indicate power supply, configuration, working and DVI signal respectively. When configuration finishes, the corresponding indicator will be turned off; if the input of the DVI signal is good, the corresponding indicator will be on. On the most right of the front panel is the power switch.

3) Rear Panel

The sketch of the rear panel of the controller ADM-200 is as Fig.2-2-3.

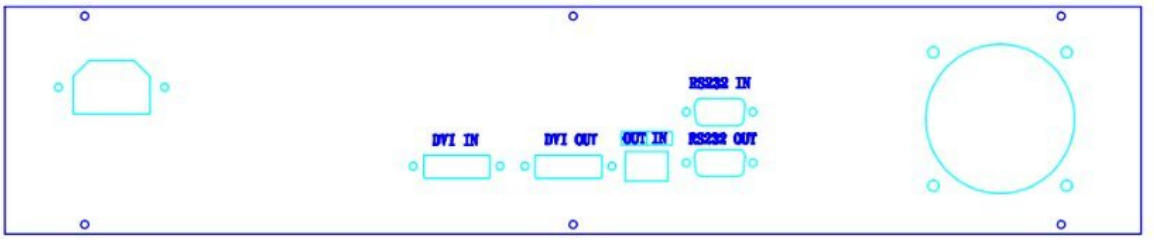


Fig.2-2-3 ADM-200 rear panel layout

On the rear panel are the interfaces of AC input, DVI signal input, DVI signal output, DB9 type of RS232 serial input, DB9 type of RS232 serial output and optical fiber output. The list and description of these external interfaces are in Table.2-1

Table.2-1 List and description of the Standard Controller ADM-200 external interfaces

Name	Type	Amount	Description
DVI IN	DVI-I connector	1	For video input
DVI OUT	DVI-I connector	1	For transferring video signal to the next controller for controller cascade. This interface can also be connected to a DVI monitor for watching.
OPT OUT	LC interface for single-mode optical fiber	1	For high-speed and long distant communication with the assigned divider. The communication is mutual. The controller transfers video to the divider for display and the divider returns status to the controller.
RS232 IN	DB9 serial interface	1	For instructions and parameters transmission between the controller and the LED display manage software.

RS232 OUT	DB9 serial interface	1	For instructions and parameters transmission between the next controller and the LED display manage software for controller cascade.

2.2.2 Compact Controller ADM-210

1) Specifications

Fig.2-2-4 is a picture of a standard controller ADM-200.

- Input Video in DVI format
- Control RS232 serial interfaces
- Dividers No need
- Output 8 Ethernet RJ-45 ports for data transmission to scan-boards
- Resolution per ADM-210 512×800
- With interface for Light Sensor
- Power 100V~240V AC
- Size 250×144×45mm

Fig.2-2-4 Compact Controller ADM-210

2) Geometric structure

The detail geometric structure of ADM-210 is in Fig.2-2-5.

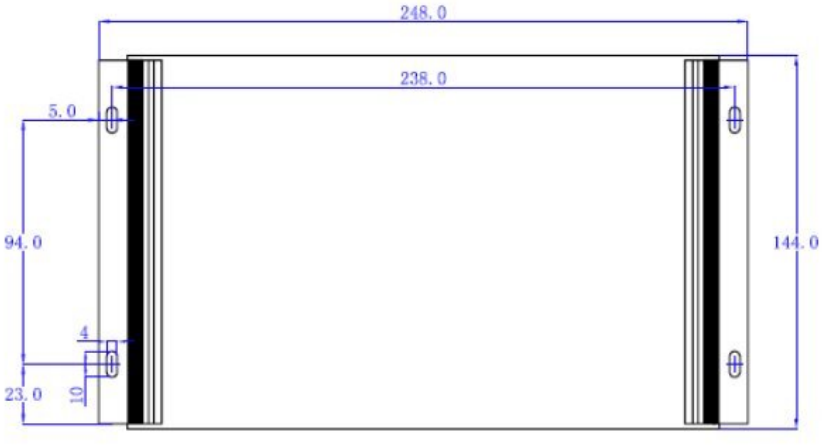


Fig.2-2-5 detail geometric structure of ADM-210 (unit mm)

2.3 Divider

The divider receives instructions and video from the corresponding controller via optical fiber and then distributes the data to the assigned columns of scan-boards by Ethernet cables.

1) Divider DIS-200 Specifications

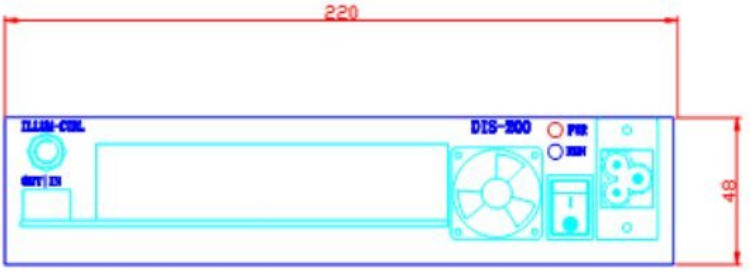
Fig.2-3-1 is a picture of a divider DIS-200.

- Input — One LC interface for single mode optical fiber
- Output — One LC interface for single mode optical fiber
  16 Ethernet RJ-45 ports
- Auto Bright Ctrl — RS422 serial interface
- Power — 100V~240V AC
- Size — 250×144×45mm

Fig.2-3-1 divider DIS-200

2) Divider DIS-200 Geometric structure

The detail geometric structure of DIS-200 is in Fig.2-3-2.



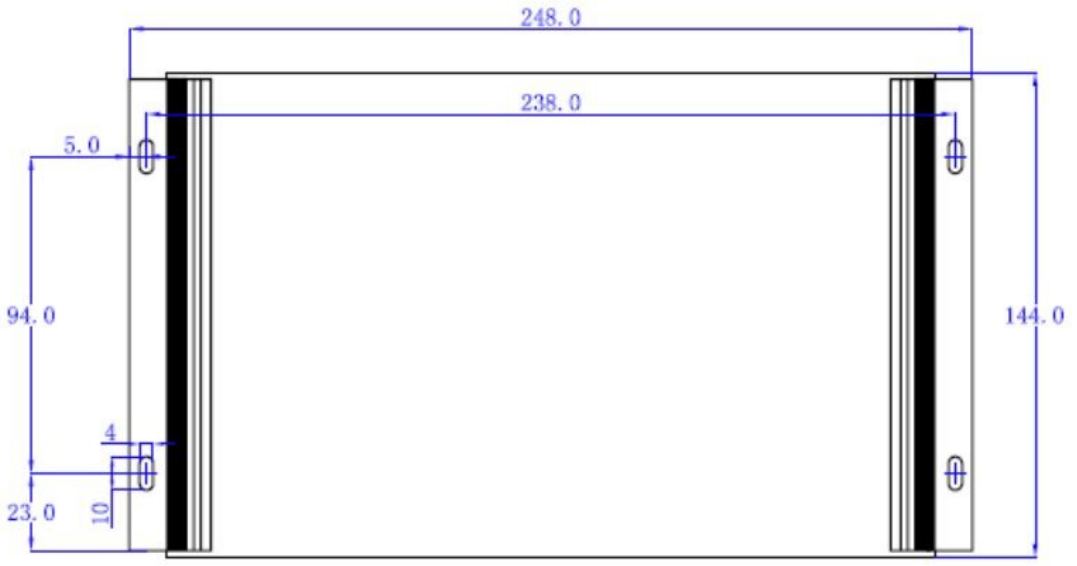


Fig.2-3-2 detail geometric structure of DIS-200 (unit mm)

2.4 Scan-board

The scan-boards are fixed in the cabinets and used to control the modules for image displaying.

1) Scan-board NS300-H Specifications

- Interfaces Ethernet RJ-45 ports for data input and outpur;
  Interface for Monitor Board
  Output interfaces on HUB board
- Power 4V~5V DC
- Load 64×64 for static mode and 128×128 for dynamic mode
- Cabinet temperature monitoring YES
- Cabinet humidity monitoring YES (humidity monitoring module H101 required)
- Connector for Monitor Board Equippted
- HUB board height 45mm

2) Scan-board NS300-H Geometric Structure

The detail geometric structure of NS300-H is in Fig.2-4.

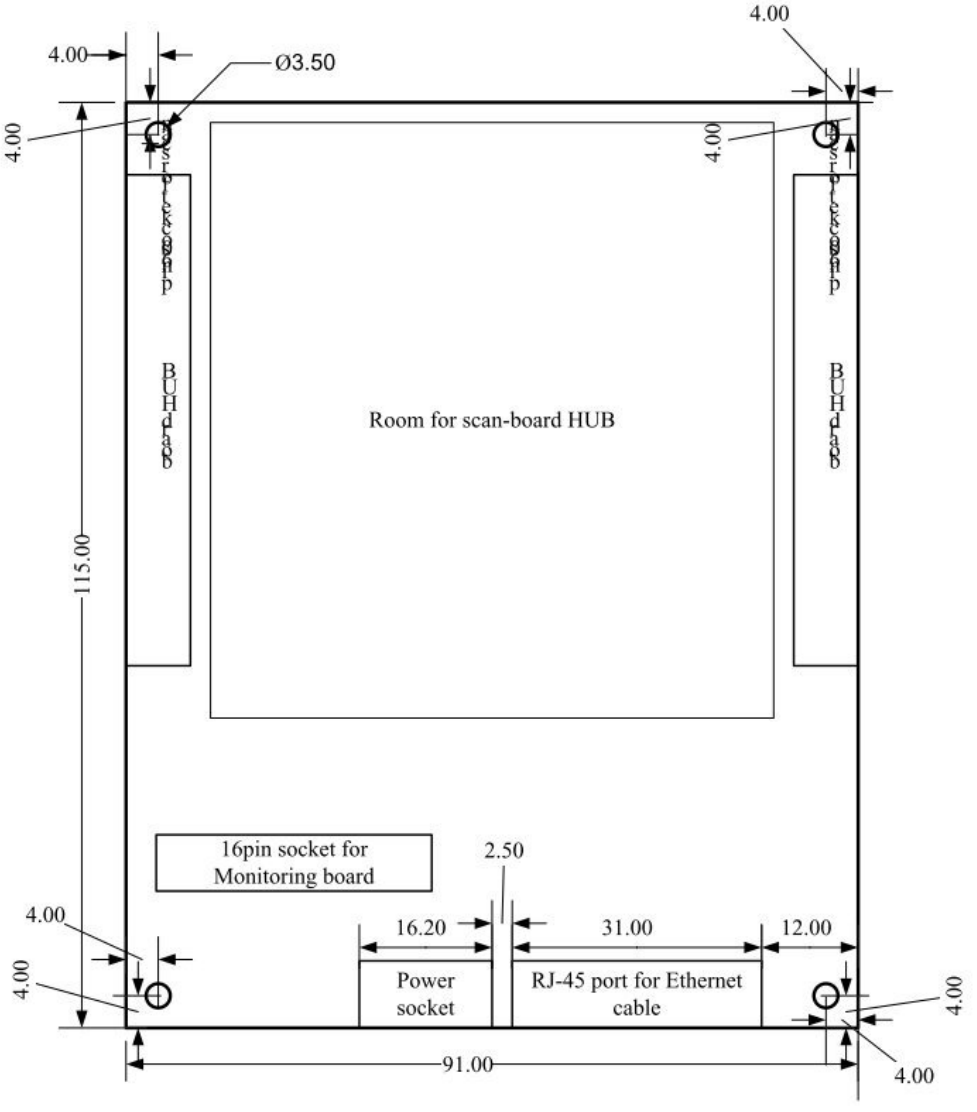


Fig.2-4 detail geometric structure of NS300-H (unit mm)

2.5 Monitor Board

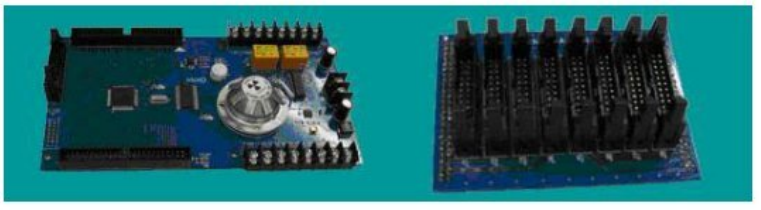
2.5.1 Types of Monitor Boards

1) NS060

Monitor Board NS060 is used for LED display working status monitoring. In Fig.2-5-1 are an NS060 and a mating HUB board. The functionalities of NS060 included

- Real-time cabinets status (including temperature, humidity, smoke, voltage and fans speeds of each cabinet) monitoring
- and Failure monitoring of each LED light.

The maximum height of NS060+HUB pair is 45 mm.



Monitor Board NS060 Mating HUB board

Fig.2-5-1 Monitor Board NS060 and a mating HUB board

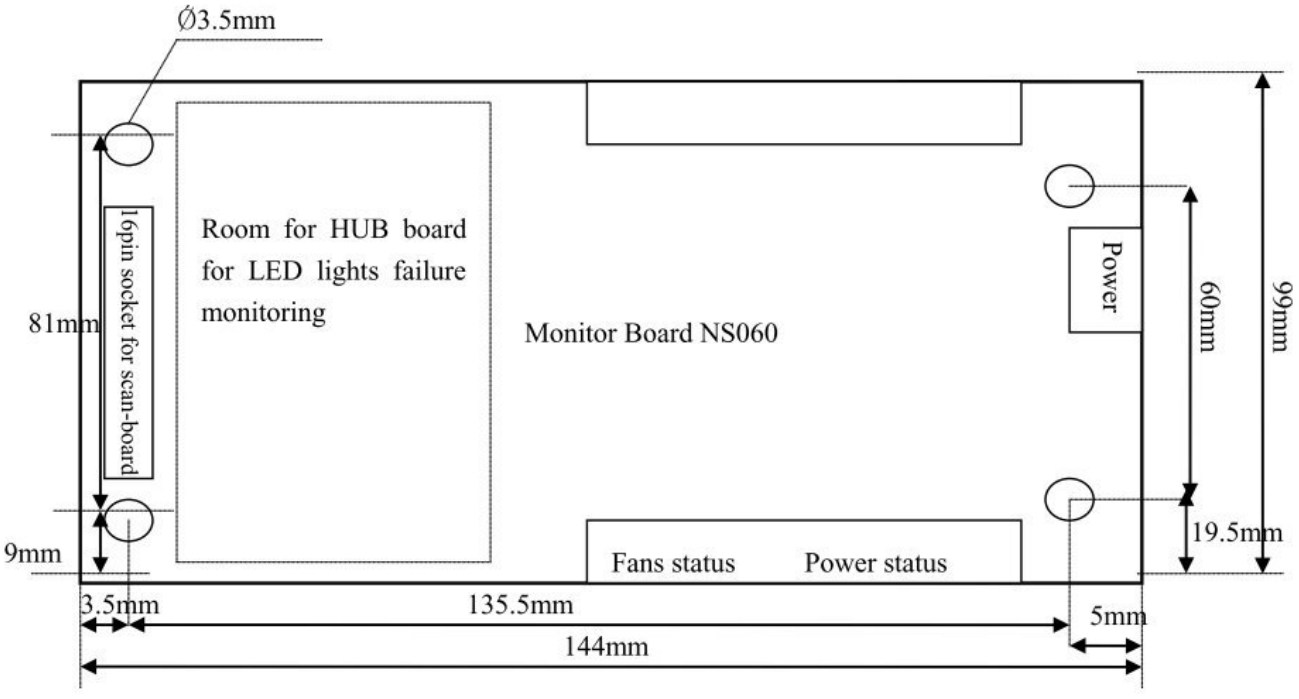


Fig.2-5-2 detail geometric structure of NS060

2) NS061

Monitor Board NS061 is used for failure monitoring of each LED light of a display. The detail geometric structure of NS061 is given in Fig.2-5-3.

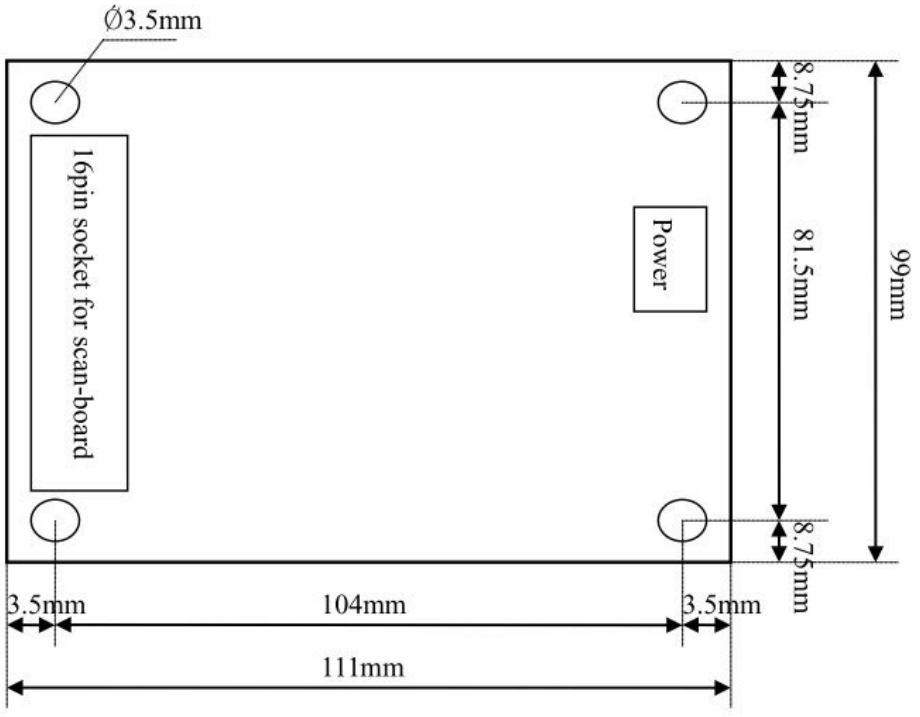


Fig.2-5-3 detail geometric structure of NS061

In Fig.2-5-4 is the picture of a NS061+HUB pair. The maximum height of this pair is 45mm.

Fig.2-5-4 Monitor Board NS061 + HUB

3) NS065

The picture of a NS065 is as Fig.2-5-5. It is used for real-time cabinets status (including temperature, humidity, smoke, voltage and fans speeds of each cabinet) monitoring.

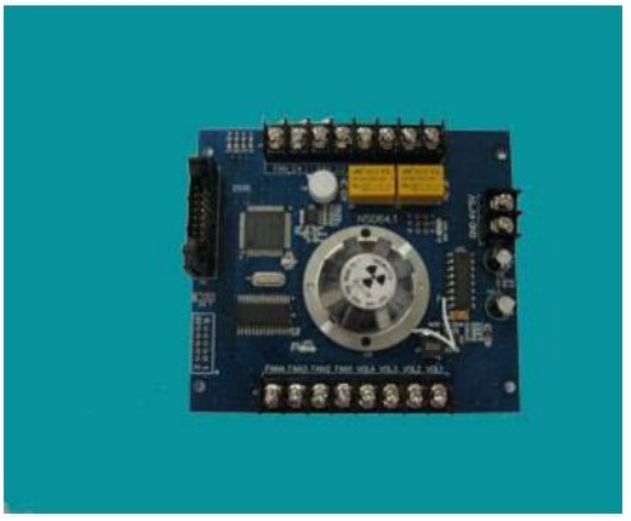


Fig.2-5-5 Monitor Board NS065

NS065 has the same size as NS061 and the detail geometric structure of NS065 is as Fig.2-5-6.

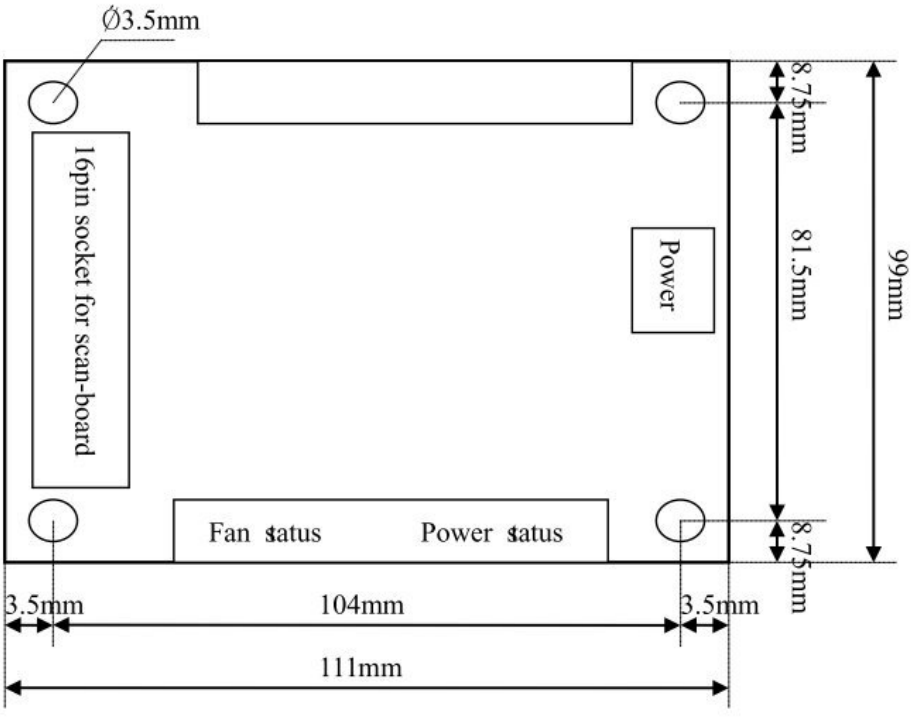


Fig.2-5-6 detail geometric structure of NS065

2.5.2 Monitor Board Connection

The sketch of Monitor Board connection is shown in Fig.2-5-7.

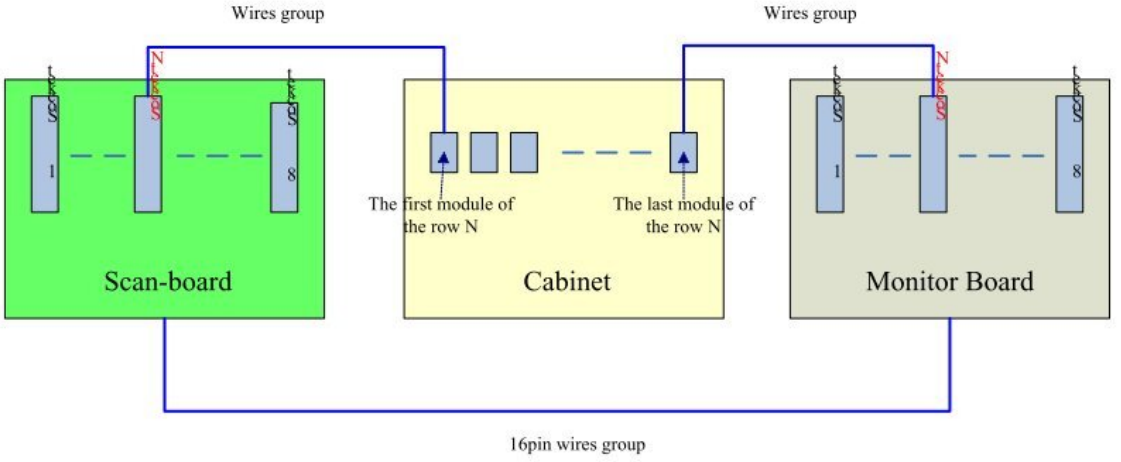


Fig.2-5-7 the sketch of Monitor Board connection

Notes,

- A 16pin-wires-group is used to connect the scan-board with the monitor board.
- In order to acquire data for LED lights failure monitoring, each of the socket on the mating HUB board should be connected to the output port of the last module of each module row.
- By now, the monitor boards can be used for failure monitoring of each single LED light and status monitoring of each single cabinet.

2.6 Power Manage Board

1) Power Manage Board NS062K

Fig.2-6-1 is a picture of NS062K. The specifications of NS062K are as follow.

- Two inputs and six outputs. The 6th output can provide a 16A current.
- RS232 serial interface for instruction input.
- Time schedule mode ready.
- 5V DC power supply
- Three seconds delay between two outputs
- Use F/F transposed serial interface cable for computer connection.

Fig.2-6-1 Power Manage Board NS062K

The detail geometric structure of NS062K is as Fig.2-6-2.

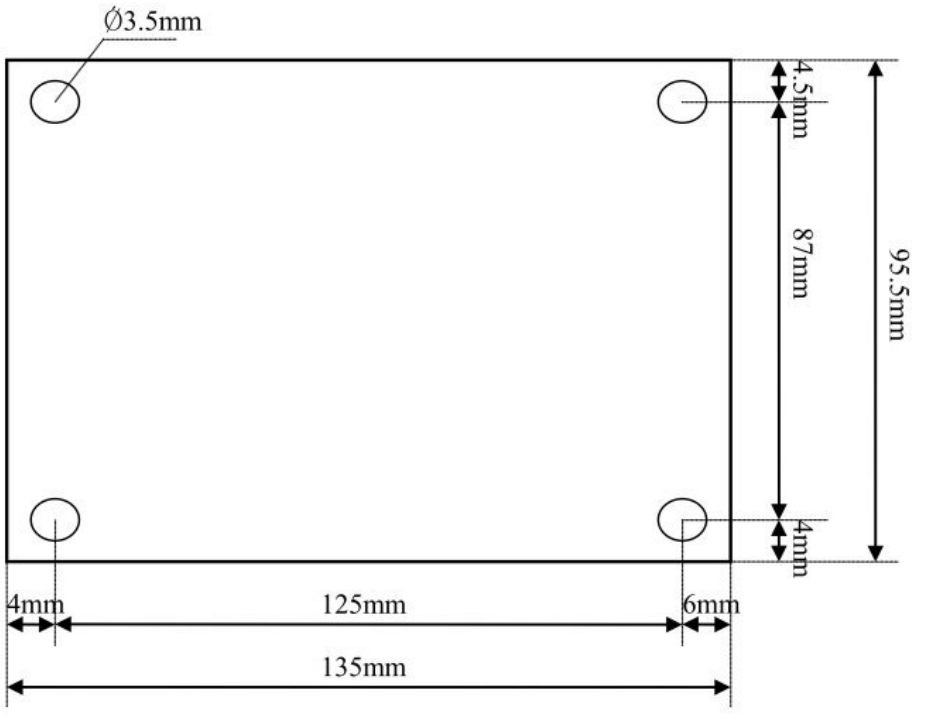


Fig.2-6-2 detail geometric structure of NS062K

2) Serial Interface Cable & Opt Fiber Converter NS232-R, NS232-T

NS232-R and NS232-T pair is used to extend the signal transmission distance between the computer and the power manage board by changing the wire cable to a optical fiber. The picture of a NS232-R is in Fig.2-6-3 and a NS232-T has almost the same appearance as a NS232-R. Specifications of NS232-R and NS232-T are as follow.

- Use one single mode optical fiber.
- Transmission distance 20Km.
- Data rate 0~2Mbps
- Wave length 1310nm (single mode)
- Optical fiber interface SC
- Power supply DC 5V

Fig.2-6-3 NS232-R

The detail geometric structures of NS232-R and NS232-T are as Fig.2-6-4.

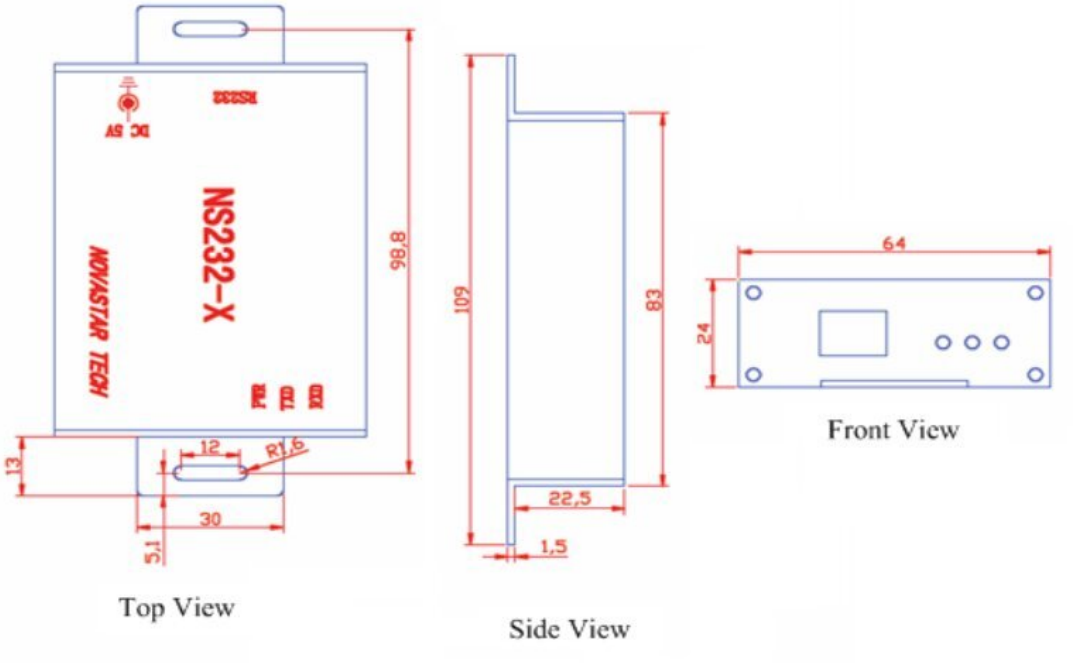


Fig.2-6-4 detail geometric structures of NS232-R and NS232-T (unit mm)

3) Connection

Fig.2-6-5 is a sketch of how to use a power manage board.

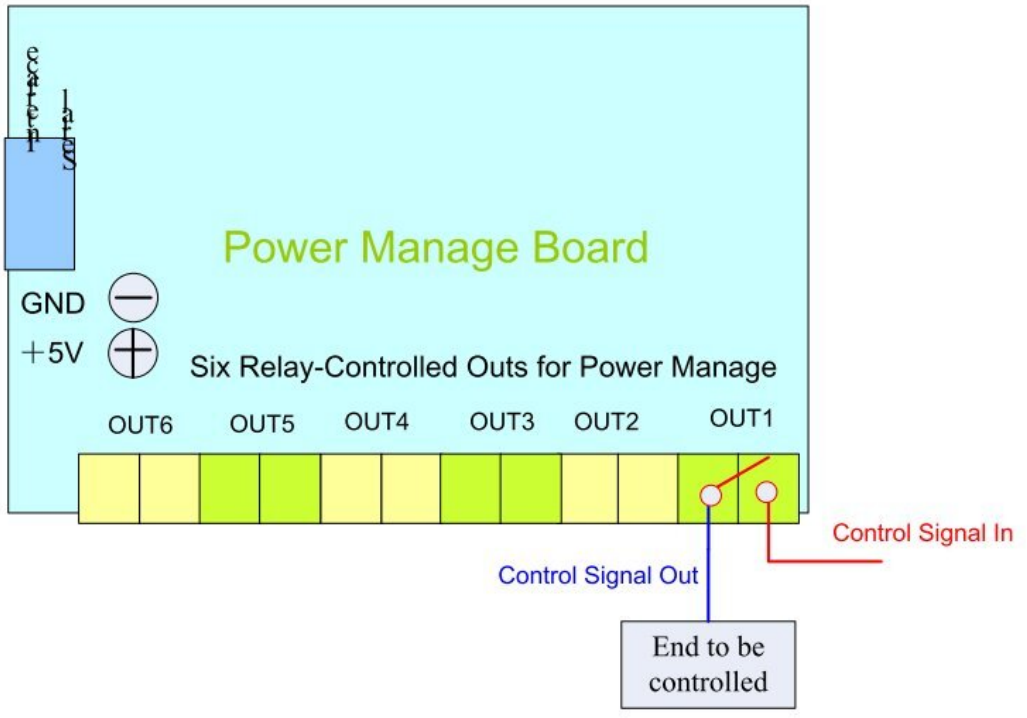


Fig.2-6-5 sketch of power manage board connection

2.7 Light Sensor

Light sensors (NS048C) are used to acquire environment brightness data for automatic brightness adjustment of a LED display. NS048Cs should be connected to dividers (DIS-200). Fig.2-7-1 is a picture of a NS048C.

1) Features

- 4pin aviatic plug for data output
- Three independent sensors inside at most
- Waterproof enclosure
- No external power supply
- Size: Ø 56MM×52

Fig.2-7-1 light sensor NS048C

3) Pin Definition

ID	Wire color
Pin1	Red
Pin2	Black
Pin3	Blue
Pin4	Yellow

3 LED Display Manage Software NovaLCT2009

3.1 Overview

NovaLCT (Nova LED Configuration Tool) is professionally developed for LED display configuration and control. Its features and functionalities are as follow.

1) Features

- Smart, simple and easy to use
- Flexible parameters adjustment guarantees good performance of LED displays.
- Cascaded controllers management and configuration.
- Flexible configuration files management (module configuration files, scan-board configuration files and system configuration files saving or loading).
- Real-time cabinets status (including temperature, humidity, smoke, voltage and fans speeds of each cabinet) monitoring.
- Colored indicator making monitoring clean and clear.
- Failure monitoring of each LED light.
- Provide two working modes, online mode and offline mode pixel level calibration for cooperating with LED display calibration software.
- Flexible calibration coefficients uploading (coefficients for the whole display, for one cabinet, for any area , module or scan-board of the display).
- Manually setting the calibration parameters of any area, module or pixel of a display.
- Calibration parameters adjustment of any area, module or pixel of a display.
- Providing three modes for flexible LED display brightness adjustment, Manual Brightness Adjustment, Auto Brightness Adjustment and Programmed Brightness Adjustment.
- Quick and multi-level color temperature adjustment through color temperature lists.
- PLC management and control.
- User editable schedules resulting in easy power supply management.

2) Functionalities

- Update the LED display control system software.
- Smart set of a display.
- Display parameters configuration, such as refresh frequency, gray levels, shift clock frequency.
- Data flow modes configuration.
- Controller mapping location and size configuration.
- Save or load system parameters.
- Periodically update the display status for monitoring, including temperature, humidity, smoke, voltage and fans speeds.
- Check each LED light for failure monitoring.
- Work with calibration software for LED display online or offline calibration.
- Read calibration parameters for adjustment.
- Upload calibration parameter
- Select and configure the brightness adjustment mode.
- Configure the color temperature list for LED display color temperature adjustment.
- Gamma adjustment
- Control system info checking and controllers' authorization.
- Play control, such as Kill (show all black on the display), Lock (stop refreshing and keep the display showing the same image) and Run (Set the display back to the normal status).
- Configure the saving path and number of validation days for the **scan-board failure log file** and the **scan-board self-recovery and PLC operation log file.**
- Language (Chinese and English) selection.
- Manually start or stop the independent 6 power supply outputs of the power manage board PLC.
- Set parameters for auto start or stop the independent 6 power supply outputs of the power manage board PLC.
- Edit the schedule for PLC.

3.2 NovaLCT2009 Software Interface

3.2.1 Main Menu

The Main Menu is shown in Fig.3-2-1.

Fig.3-2-1 Main Menu

Sub menus of each main menu item are as follow.

- System

Sub menus of System are shown in Fig.3-2-2.

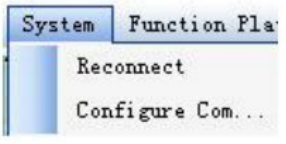


Fig.3-2-2 System

- Reconnect --- NovaLCT search the control system and then rebuilds the connection with it. All working parameters of the control system will be load into the software after the connection is successfully built.
- Configure Com… --- Set the IDs of the serial ports which are used for the computer to connect the control system and PLC. If the computer has many serial ports, this configuration will help the software to find the control system and PLC quicker; if the IDs are set to be Auto, the software will search all the serial ports for the control system and PLC.

- Function Plat

Sub menus of Function Plat are shown in Fig.3-2-3.

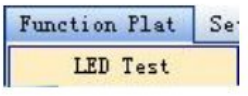


Fig.3-2-3 Function Plat

- LED Test --- This menu is use to access the tool for display testing. With the tool, related parameters can be set, such as location, size and color of the play window, grids, gray images for showing, module locating and self-test.

- Setting

Sub menus of Setting are shown in Fig.3-2-4.

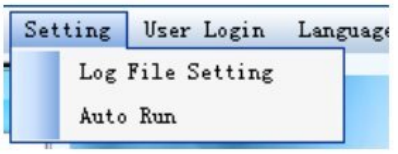


Fig.3-2-4 Setting

- Log File Setting --- Set the path and number of validate days for the scan-board failure log file and the scan-board self-recovery and PLC operation log file. If the files have been saved longer than the validation days, they will be automatically deleted.
- Auto Run --- Enable or disable Auto Run.

- User Login

The sub menus of Login are shown in Fig.3-2-5. With passwords, users can access different user interfaces through this menu.

Fig.3-2-5 Login

- Advanced user login --- This menu is for advanced user login. Users are required to do this if they want to activate Smart Wizard for configuration, configure the control system performance parameters, data flow modes or perform calibration.
- Debug user login --- This menu is for debug users who want to perform display self-test or reload system program.
- Maintenance User --- This menu is for maintenance users who want to shut down the display and fix the problem of scan-board failure.

- Language

This menu is used to switch software language to and from Chinese and English.

- Help

This menu is used to check software information like edition and copyright.

3.2.2 Navigator Menu

3.2.2.1 Common User

Navigator Menu for common users is as Fig.3-2-6.

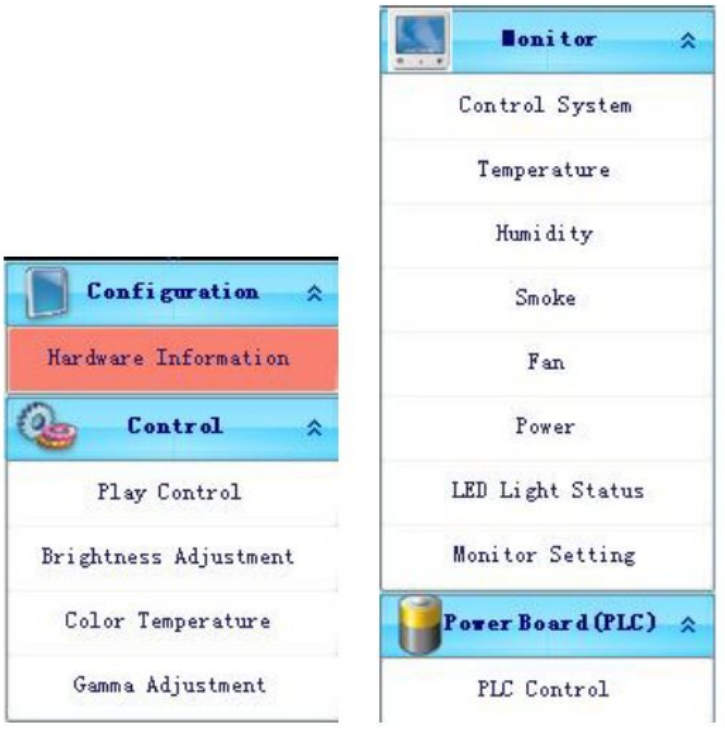


Fig.3-2-6 navigator menu for common users

- Configuration
  - Hardware Info
    - Position and size of the mapping area;
    - Module matrix size of the display;
    - Show or hind the mapping window;
    - Hardware editions of the MCU, controllers, dividers and scan-boards;
    - Controllers' authorization.
- Control
  - Play Control --- Set the LED display to be Kill (show all black on the display), Lock (stop refreshing and keep the display showing the same image) and Run (Set the display back to the normal status).
  - Brightness Adjustment --- Set the brightness control mode to be Manual Brightness Adjustment, Auto Brightness Adjustment and Programmed Brightness Adjustment.

- Color Temperature Adjustment --- Adjust the color temperature of the display according to a defined color temperature list.
- Gamma Adjustment --- Perform Gamma adjustment on red, green, blue color individually or all together.

- Monitor
  - Control System --- Status monitoring of the controllers, dividers and scan-boards. Different color represents different status.
  - Temperature --- Temperature monitoring of the dividers and scan-boards (cabinets). Different color represents different temperature.
  - Humidity --- Humidity monitoring of the scan-boards (cabinets). Different color represents different humidity level.
  - Smoke --- Smoke monitoring of the scan-boards (cabinets). Different color represents different smoke level.
  - Fan --- Speed monitoring of the fans in each cabinet. Different color represents different speed.
  - Power --- Voltages monitoring of the scan-board power supplies of each cabinet. Different color represents different voltage level.
  - Light Status --- Check the status of LED lights for failure (short circuit or open circuit) monitoring. The exact positions of the failure lights can be obtained.
  - Monitor Setting
    - Set the **Update Rate** and **Overtime Limitation of scan-board checking.** Prolong the overtime limitation if it is always exceeded.
    - Enable or disable **Auto Update** and assign the contents to be updated. The update contents can be Update Status (status of dividers and scan-boards), Update Temperature (according to the temperature sensors mounted on scan-boards), Update Humidity (according to the temperature sensors mounted on scan-boards) and Update Monitor Board (update all the information that the monitor board is watching, such as failure lights, temperature, humidity, fans speed and so on). If **Auto Update** is enabled, the software will automatically update the information according to the Update

Rate. Otherwise, users need to perform update operation manually for the current system status.

- Power Board (PLC)
  - PLC Control --- Manually start or stop the 6 independent power supplies or set the time schedule for the power supplies to start or stop automatically.

3.2.2.2 Advanced User

The Navigator Menu for the advanced users is as Fig.3-2-7. The circled menu items are special for advanced users.

Fig.3-2-7 navigator menu for advanced users

The special functionalities are as follow.

- Configuration
  - Configuration Wizard --- Configure the display, including system program update,

display configuration with Smart Wizard, scan-boards parameters, data flow modes, sizes of controllers' load areas, basic system parameters.

- System Parameters
  - Re-read all display control system parameters.
  - Load system configuration files.
  - Program the controller parameters.
  - Save system configuration information to files.

- Control
  - Color Temperature Adjustment --- Edit the color temperature list and use it for the display color temperature adjustment.
- Calibration
  - Online Calibration --- Install NovaLCT and NovaCLB (or PM-LED of Radiant Imaging) into two computers respectively, and build up the network between these two computers. Use NovaLCT to control the color and size of the display area to be calibrated. Calculate and send the calibration coefficients to NovaLCT with NovaCLB or PM-LED. Then send the calibration coefficients to LED display control system with NovaLCT and get the calibration operation done.
  - Offline Calibration --- If network communication is not available, input the information about the color and size of the calibration area into NovaCLB or PM-LED manually for calibration operation.
  - Coefficient Save：Save calibration coefficients of the whole display or any specified scan-boards or modules for backup or re-uploading in the next time.
  - Coefficient Upload --- Upload the existed calibration coefficients to the whole display or any specified scan-boards or modules.
  - Manual Calibration --- This function can be used to calibration any pixel or any rectangle pixel matrix of the display. It is also useful for recover calibration coefficients for the changed modules.
- Power Board (PLC)
  - PLC Schedule --- Set the schedule for any of the power manage board output to be started or stopped at any desired day and time. This function is of convenience if

real-time manual control of the power manage board outputs is not available. Note that only PLC Control is set to be Manual Control will PLC Schedule be available.

3.2.2.3 Debug User

Navigator Menu for debug users is as Fig.3-2-8. The circled item is special for debug users.

Fig.3-2-8 navigator menu for debug users

The special functionality is as follow.

- Configuration
  - Debug --- This menu is used to activate self-test of the control system, re-configure all the control system programs or scan-boards programs.

3.2.2.4 Maintenance User

Navigator Menu for maintenance users is as Fig.3-2-9. The circled item is special for maintenance users.

Fig.3-2-9 navigator menu for maintenance users

The special functionality is as follow.

- Configuration
  - Maintenance
    - Scan-board self-recovery settings (such as enable/disable auto-fixing; set scan-boards failure times limitation for power restart; clear the failure counter when scan-boards are good; and specify the PLC and set the time interval between power off and on for power restart.)
    - Enable or disable Auto Reload Program (automatically reload scan-boards program when their power supplies are turned on again).

3.3 Display Configuration

Advanced user login is required for this configuration operation. The flow process diagram of the configuration is shown in Fig.3-3-1.

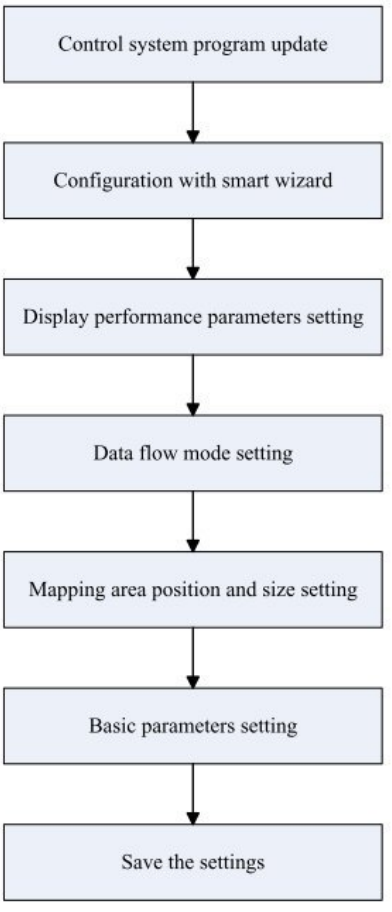


Fig.3-3-1 the flow process diagram of display configuration

3.3.1 Control System Program Update

This is the first step of display configuration operation. Make sure the software and the controllers are well connected with each other before updating. If the connection is well, the DVI indicators on controllers will be on and no **Demo Mode** is shown on the software main interface.

The dialog for control system program update is as Fig.3-3-2.

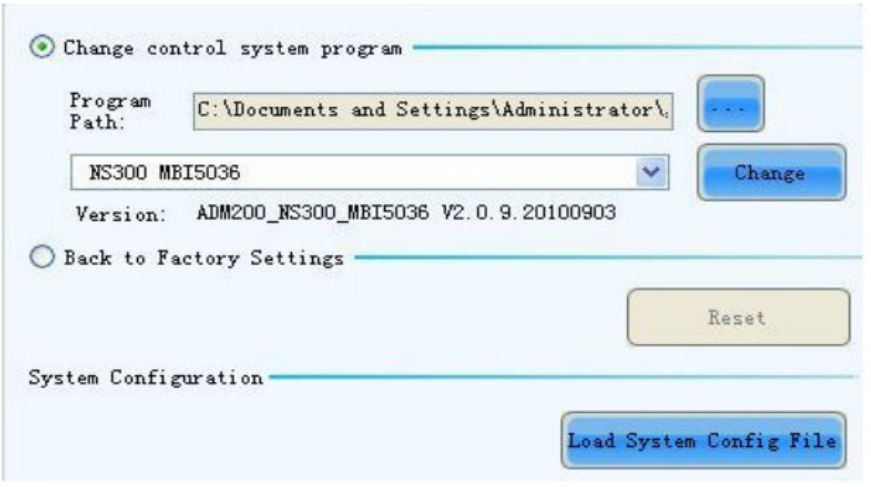


Fig.3-3-2 dialog for control system program update

1) Steps

Choose a new control system program files by input its path and then click **Change** to update the control system program. The update process will take some time, please wait. When the update process is over, the software will tell whether the update operation is succeed or failed.

2) Notes

- The file path need to be as accurate as to the last folder that containing the file. If the path is correctly set, there will be selectable items available in the combox in front of the **Change** button.
- The sketch of the indicators on the controller's front panel is as Fig.3-3-3. During the update process, the configuration indicator (CNFG), the DVI indicator and the RUN indicator will be on.

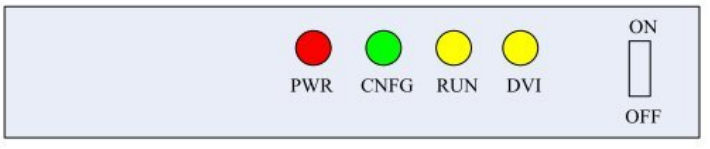


Fig.3-3-3 indicators on the controller's front panel

The information window of the software is as Fig.3-3-4. If the update operation is successfully done, the indicators of DVI and RUN will still be on but CNFG indicator will be out, and a message of update succeed will be shown in the information window.

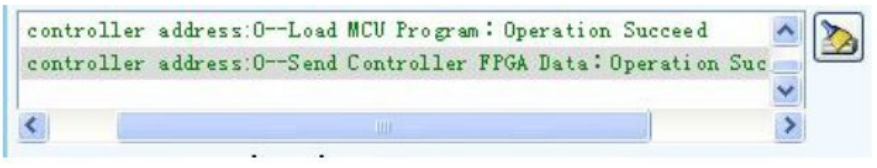


Fig.3-3-4 the information window

3) Load control system configure file

If there is a applicable configuration file (.cng), it can be load by **Load System Config File**. If the loading operation is successful and the display works well, no other configuration operation is needed. See **3.6 Save and Load of the Control System Parameters** for more information.

NOTE:

	Click **Reset** to reset all parameters and settings of the control system and the software to factory settings when they are in chaos. This operation should not be optionally performed since the default settings and parameters are not likely to be applicable and reconfiguration may be required.

3.3.2 Display Smart Set

Display Smart Set is the second step of display configuration. Click **Smart Set** on the dialog shown in Fig.3-3-5 to access the smart configuration process. Smart Wizard will help all the way.

Fig.3-3-5 display smart start dialog

NOTE:

	Once the smart configuration process begins, each step must be correctly completed or the configuration process will be failed and the display will not be able to work.

The smart configuration process is helped by Smart Wizard.

1) Smart Wizard 1

The dialog of Smart Wizard 1 is shown in Fig.3-3-6.

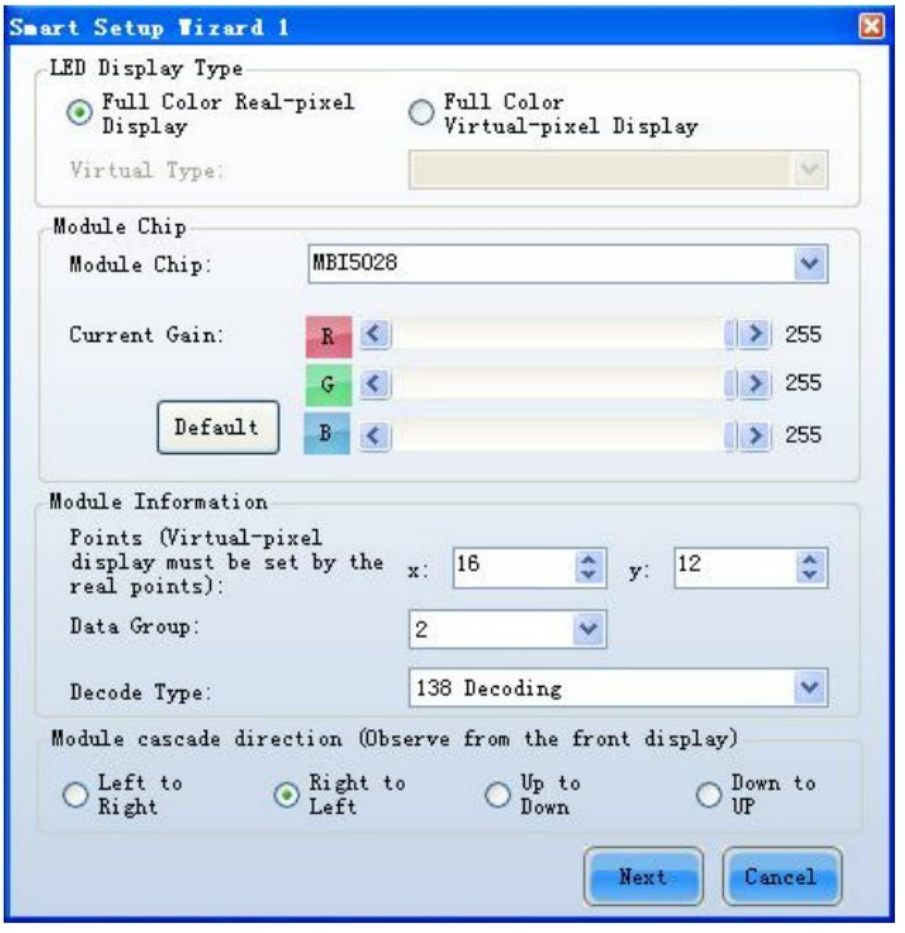


Fig.3-3-6 Smart Wizard 1

Current Gain will not be available if **Module Chip** is **Common Chip (MBI5024\TP62726\DM13A)**. In other cases, **Current Gain** parameters must be set (the default values are recommended).

NOTE:

	(1) All values must be set according to the modules restrictively or the display will not be able to work. (2) **138 Decode** for **Row Decode** supports scan modes of static, 1/2 scan, 1/3 scan, 1/4 scan, 1/5 scan, 1/6 scan, 1/7 scan, 1/8 scan, 1/9 scan, 1/10 scan, 1/11 scan, 1/12 scan, 1/13 scan, 1/14 scan, 1/15 scan and 1/16 scan. (3) **No Decode (Low Pass)** and **No Decode (High Pass)** for **Row Decode** supports scan modes of static, 1/2 scan, 1/3 scan, 1/4 scan.

2) Smart Wizard 2

NOTE:

	From this step on, **module** mentioned in the following steps of smart configuration with Smart Wizard references to the module connected to the J1 port of the first scan-board loaded by the first Ethernet port (RJ45) of a divider.

The dialog of Smart Wizard 2 is shown in Fig.3-3-7.

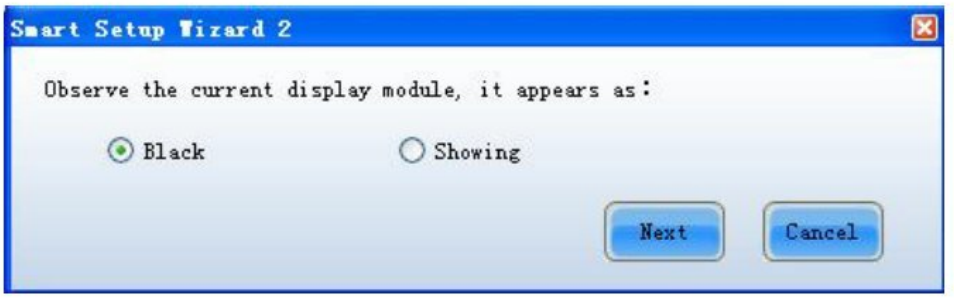


Fig.3-3-7 Smart Wizard 2

Choose **Black** or **Showing** according to the module states.

3) Smart Wizard 3

The dialog of Smart Wizard 3 is shown in Fig.3-3-8.

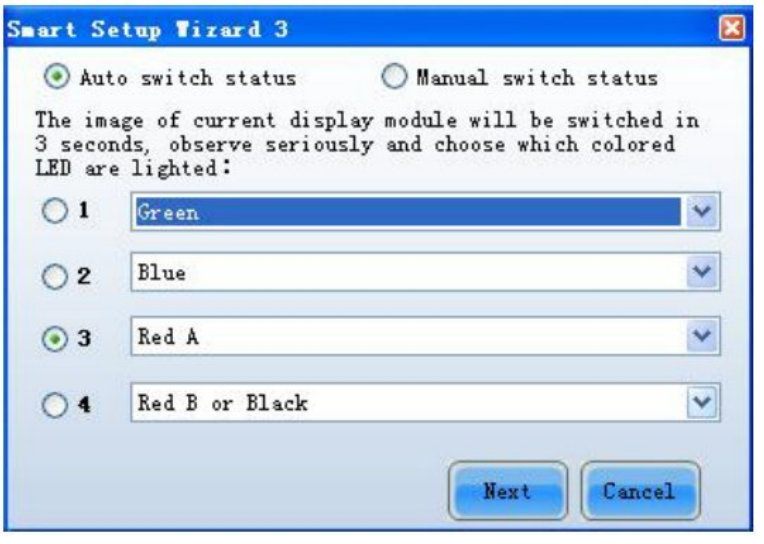


Fig.3-3-8 Smart Wizard 3

Choose the color for each module states (**1, 2, 3** and **4**). For example, if the module shows green in states 1, choose **Green** in the corresponding combox. The software will switch the module states automatically. The module states can also be switched manually.

4) Smart Wizard 4

The dialog of Smart Wizard 4 is shown in Fig.3-3-9.

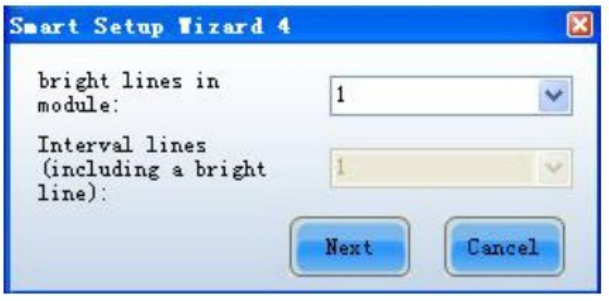


Fig.3-3-9 Smart Wizard 4

Choose the right numbers according to the lighten rows and the distance from one lighten row to the next.

Fig.3-3-10 shows an example for Smart Wizard 4. The **Lighten Rows** should be 2 and the **Interval in Rows** should be 4.

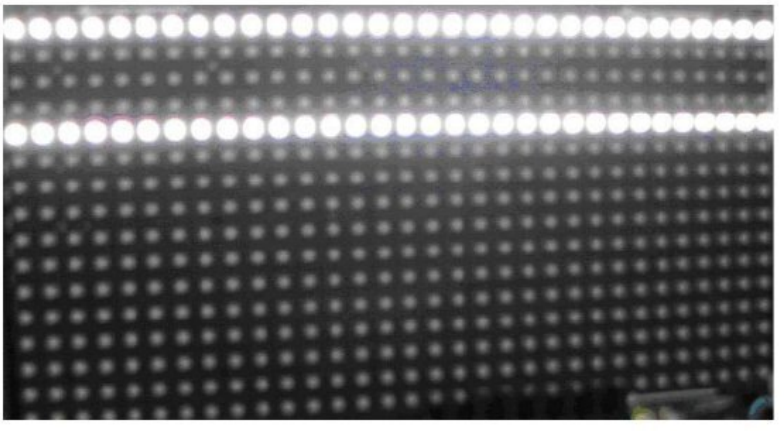


Fig.3-3-10 an example of Smart Wizard 4

5) Smart Wizard 5

The dialog of Smart Wizard 5 is shown in Fig.3-3-11.

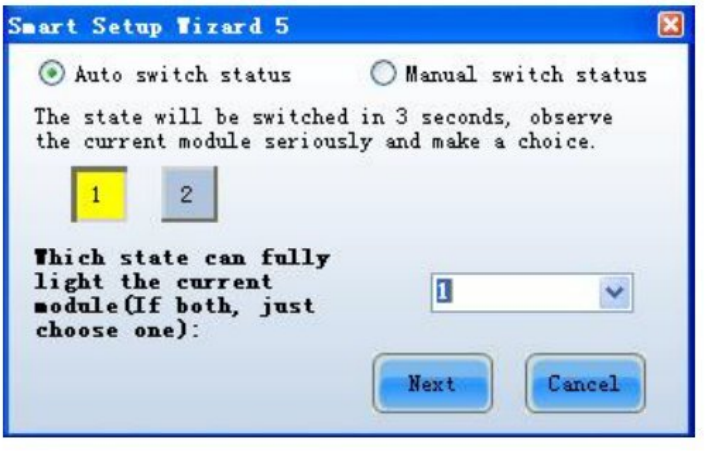


Fig.3-3-11 Smart Wizard 5

Choose the option corresponding to the module states (**1 or 2**) in which all lights are on. The software will switch the module states automatically. The module states can also be switched manually by clicking the corresponding buttons.

NOTE:

	This step will not be reached if the scan mode of the display is set to be static.

6) Smart Wizard 6

The dialog of Smart Wizard 6 is shown in Fig.3-3-12.

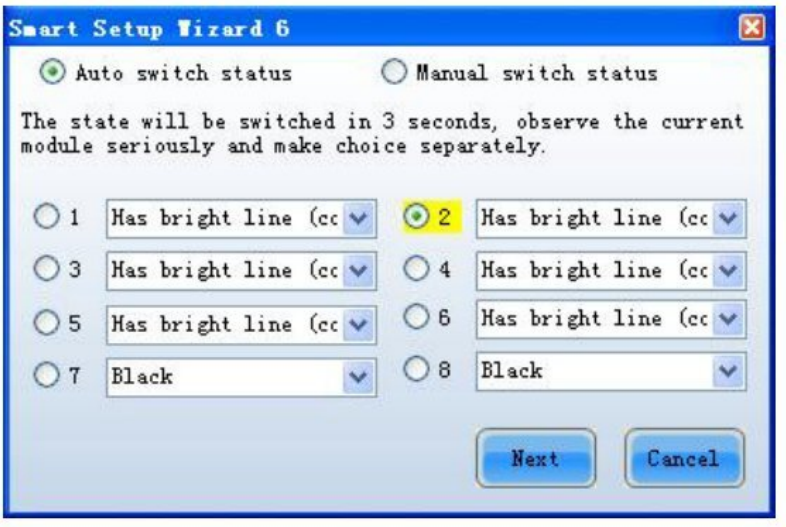


Fig.3-3-12 Smart Wizard 6

Choose the right options for each module states. The software will switch the module states automatically. The module states can also be switched manually by selecting the status indexes.

7) Smart Wizard 7

The dialog of Smart Wizard 7 is shown in Fig.3-3-13.

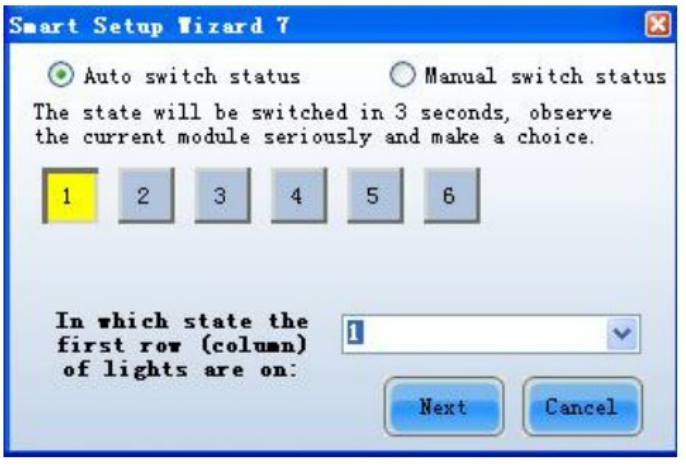


Fig.3-3-13 Smart Wizard 7

Choose the right option corresponding to the module states in which the lights of first row (column) are on. The software will switch the module states automatically. The module states can also be switched manually by clicking the corresponding buttons.

NOTE:

	This step will not be reached if the scan mode of the display is set to be static.

8) Smart Wizard 8

The dialog of Smart Wizard 8 is shown in Fig.3-3-14.

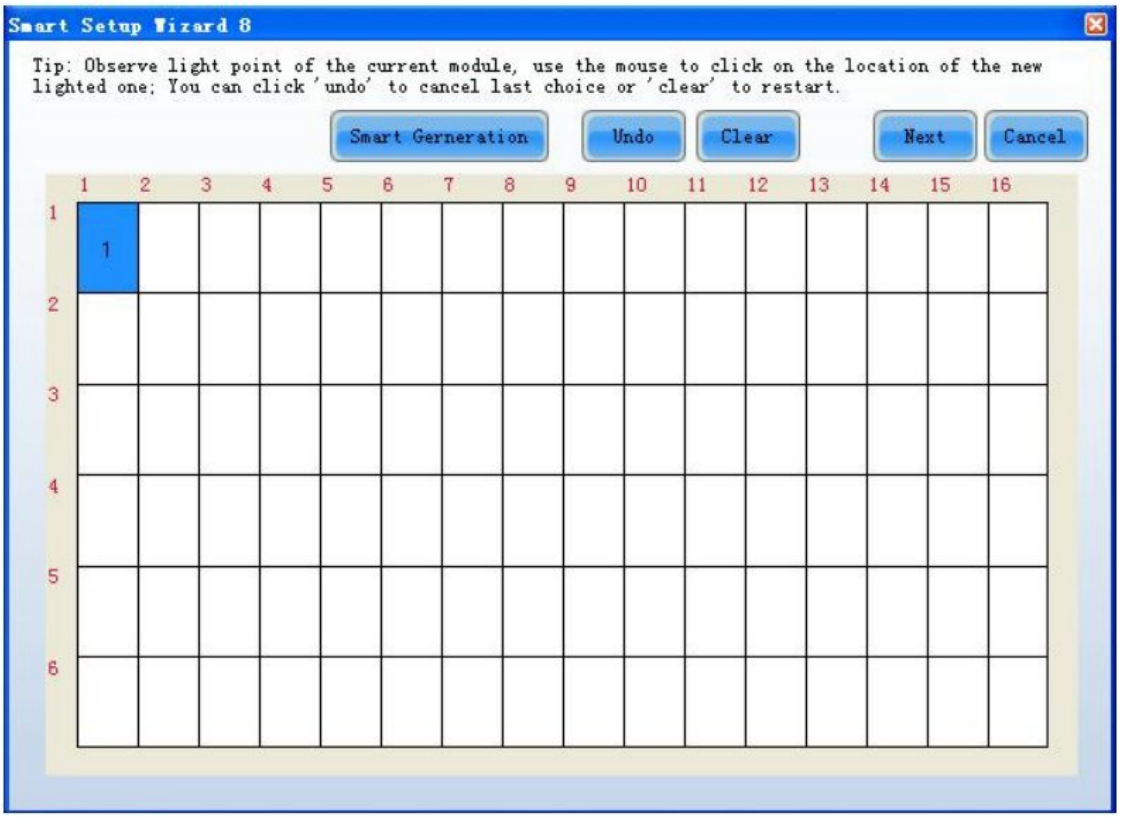


Fig.3-3-14 Smart Wizard 8

Click the corresponding grids according to the position of the lighten lights until no light is lighten any more.

Fig.3-3-15 shows an example for Smart Wizard 8. In this case, the grid at (Row 1, Col 1) should be clicked as the lighten light is at the top-left corner of the light matrix.

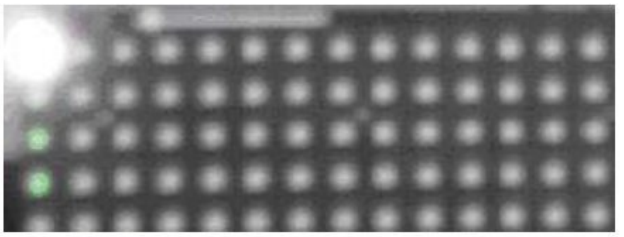


Fig.3-3-15 an example of Smart Wizard 8

NOTE:

	(1) The module will be able to work when the smart configuration led by Smart Wizard is done correctly. If the module does not work, perform the configuration again or contact the control system provider. (2) If there is a configuration file (.ast) which has been tested to be good, click **Load from File** to load it.

3.3.3 Display Performance Parameters Setting

Display Performance Parameters Setting is the third step of display configuration. The corresponding dialog is as Fig.3-3-16.

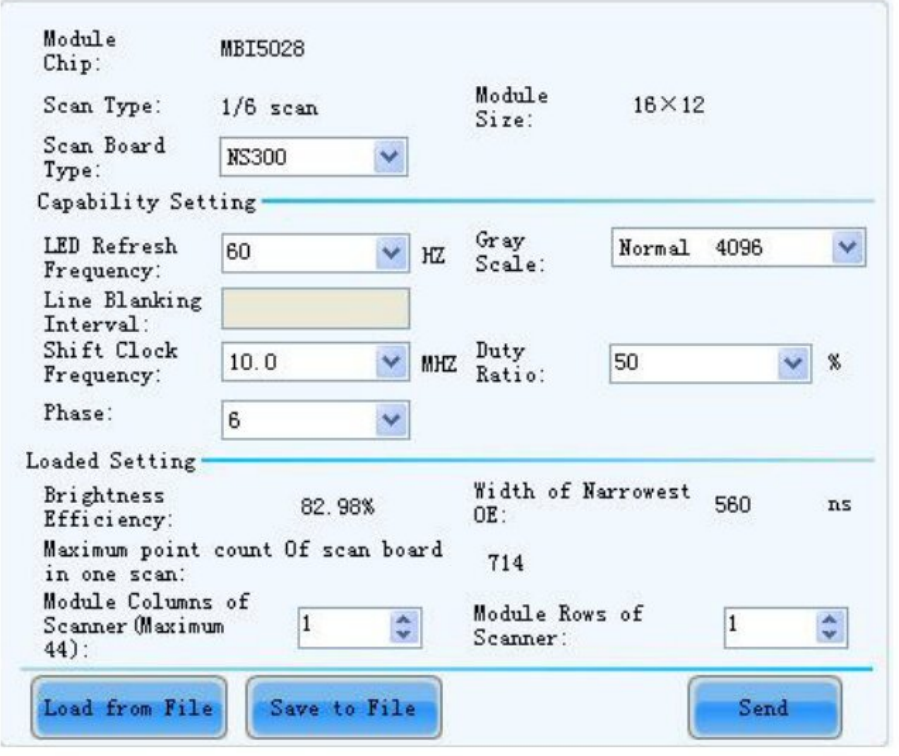


Fig.3-3-16 dialog for display performance parameters setting

1) LED Refresh Frequency

This parameter refers to the frequency that the images shown on a display are refreshed. The higher the frequency is, the more stable the shown images will be. LED refresh frequency is related to the load area size of the scan-board and the OE width. And when this parameter to is increased to get a higher row refresh frequency (with all other parameters fixed), the decoy will be strengthened.

2) Gray Scale

Choose the desire option for this parameter. There are three lightness levels for each gray scale, which are Low, Normal and High. Lightness efficiency will be shown on the software interface when an option is chosen. When gray level changes, Maximum **Module Columns of Scanner** and Minimum **OE Width** will change too.

3) Shift Clock Frequency

This parameter depends on the design and performance of the module. The higher the module performance is, the higher the shift clock frequency can be, resulting in more driven lights and higher refresh frequency.

4) Shift Clock Phase

This parameter refers to the phase between module data and shift clock.

5) Duty Ratio

Ratio of the high and low voltage level of shift clock.

6) Line Blanking Interval

This parameter can be used to weaken the decoy. The higher this parameter is, the weaker the decoy will be. Change of this parameter will affect the maximum refresh frequency. This parameter will not be accessible for static displays using self-scan chips like MBI5042.

7) GCLK Frequency (self-scan chips like MBI5042**)**

This parameter refers to the clock frequency that self-scan chips building up gray levels. It depends on the design and performance of the driven chips. The higher the driven chips performance is, the higher the GCLK frequency can be, resulting in a wider gray scale.

3.3.4 Data Flow Mode Setting

Data Flow Mode Setting is the forth step of display configuration. The corresponding dialog is as Fig.3-3-17.

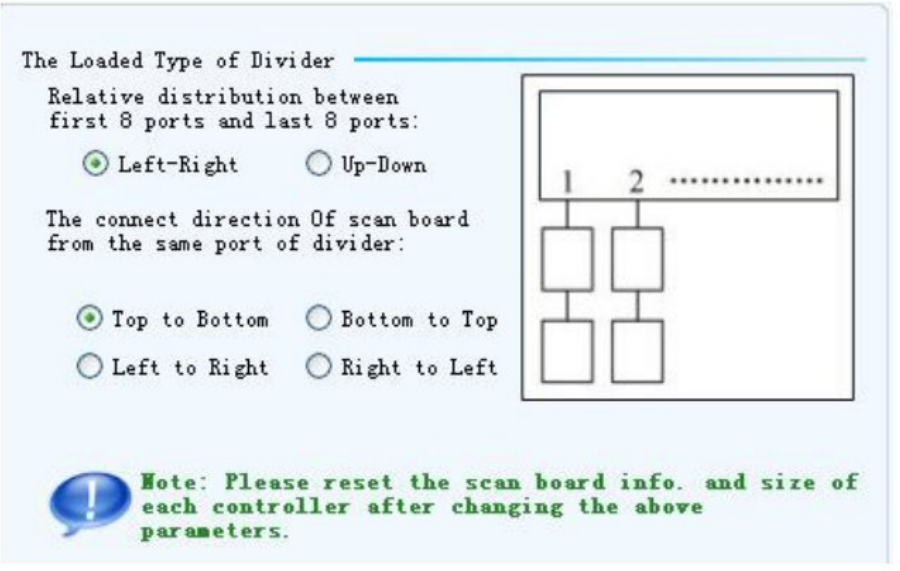


Fig.3-3-17 data flow mode setting dialog

For a “wide” display, it is recommended that layout of the load areas of the first half and last half of the divider output ports (8 RJ45 Ethernet ports respectively) set to be **Left-Right**. And for a “tall” display, the layout should be **Up-Down**.

Layout of the 16 output ports of a divider is as Fig.3-3-18. Each of these is a RJ45 Ethernet port.

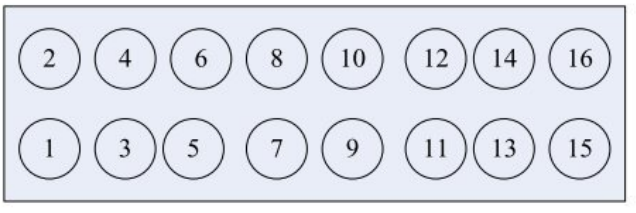


Fig.3-3-18 divider output ports layout

In the case of **Left-Right** layout, cascade directions of scan-boards could be one of the four shown in Fig.3-3-19.

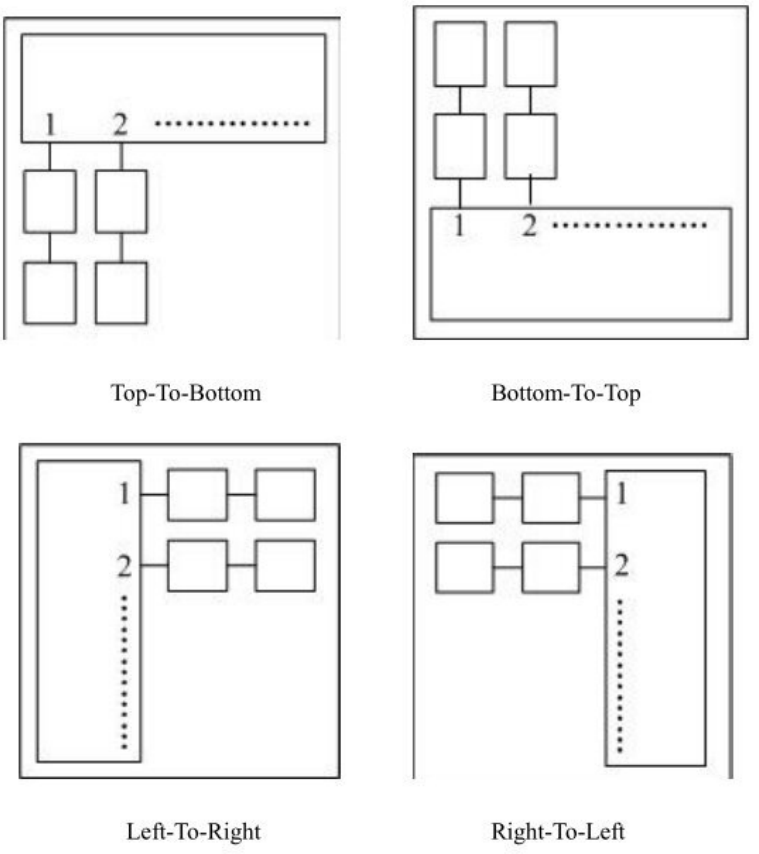


Fig.3-3-19 scan-boards cascade directions in case of **Left-Right** layout

In the case of **Up-Down** layout, cascade direction of scan-boards is as Fig.3-3-20.

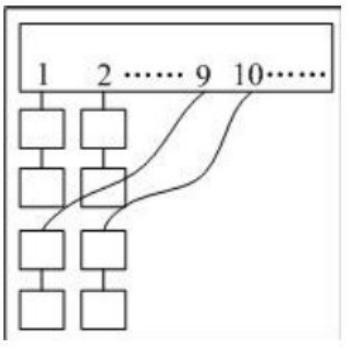


Fig.3-3-20 scan-boards cascade directions in case of **Up-Down** layout

3.3.5 Mapping Area Position and Size Setting

Mapping Area Position and Size Setting is the fifth step of the display configuration.

If the divider load area layout is set to be **Left-Right**, the **Divider Load Info** dialog would be as Fig.3-3-21.

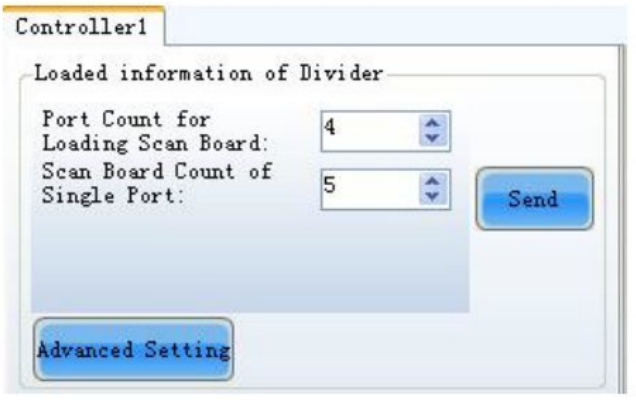


Fig.3-3-21 divider load info dialog for **Left-Right** layout

If the divider load area layout is set to be **Up-Down**, the **Divider Load Info** dialog would be as Fig.3-3-22.

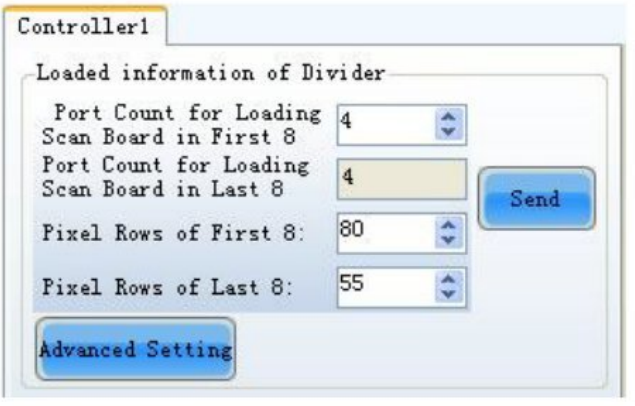


Fig.3-3-22 divider load info dialog for **Up-Down** layout

1) Note

In the case of **Up-Down** layout, numbers of the working ports among the first half and the last half of output ports should be equal.

2) Features

NovaLCT supports LED display control systems with multiple controllers. Each controller can be configured individually. Dialog for individual controller configuration is as Fig.3-3-23.

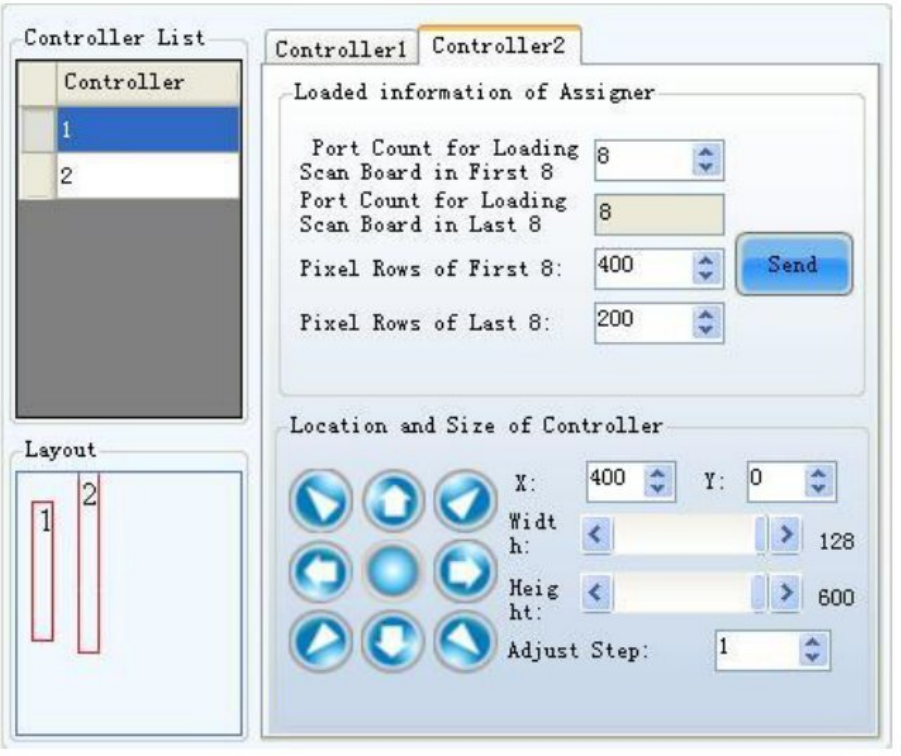


Fig.3-3-23 dialog for individual controller configuration

Once the controller configuration operation is finished, correspond information can be checked through **Hardware Info** page of the **Configuration Wizard** in Navigator Menu.

NOTE:

	Divider Load Info must be set according to the fact restrictively. Click **Send** to activate the settings.

3.3.6 Basic Parameters Setting

Basic Parameters Setting is the last step of display configuration. The corresponding dialog is as Fig.3-3-24.

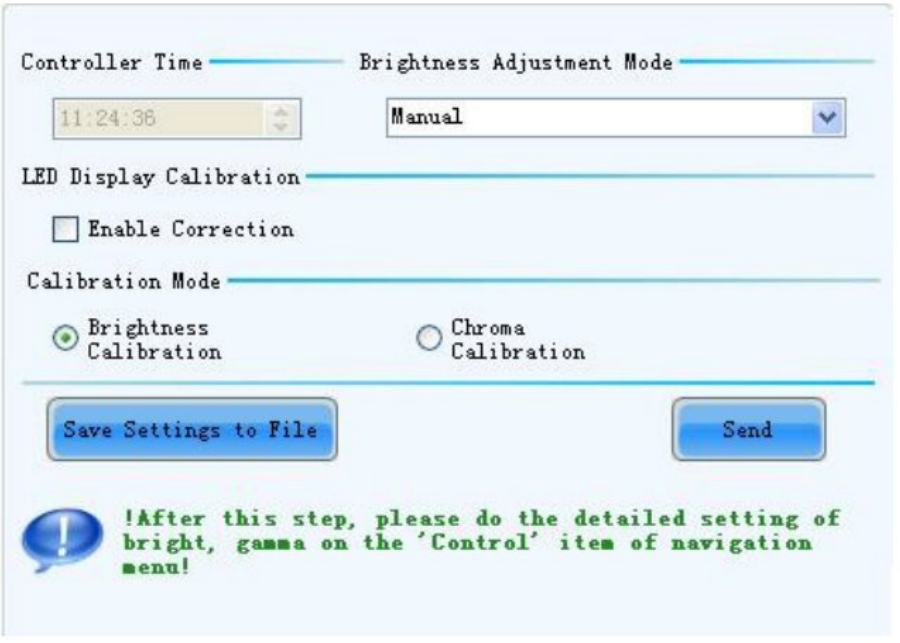


Fig.3-3-24 dialog for basic parameters setting

1) Brightness Adjustment Modes

There are three modes of brightness adjustment, Manual Brightness Adjustment, Auto Brightness Adjustment and Programmed Brightness Adjustment.

2) Calibration

Set **LED Display Calibration** and **Calibration Mode** according to the need and then click **Send** to active the settings. In the case of Brightness Calibration, maximum load of a scan-board is a 128×128 pixel array, while in the case of **Chroma Calibration**, it is 64×64.

3) Save Settings to File

If all the settings of the display are sure to be correct, click **Save Settings to File** button to save them to a file (.cng). See **3.6 Save and Load of the Control System Parameters** for more information.

Fig.3-3-25 Save button

NOTE:

	Save button must be clicked after display configuration completed. This button is used to save all settings to the control system.（Save button as Fig. 3-3-25）

3.4 Display Brightness and Gamma Adjustment

3.4.1 Brightness Adjustment

There are three modes of brightness adjustment, Manual Brightness Adjustment, Auto Brightness Adjustment and Programmed Brightness Adjustment

NOTE:

	Click **Send** to active the set mode, or the setting will not work.

3.4.1.1 Manual Brightness Adjustment

Dialog for Manual Brightness Adjustment is as Fig.3-4-1.

Fig.3-4-1 Manual Brightness Adjustment dialog

Manual Brightness Adjustment is used to set the display brightness to a fixed level. In this mode, real-time brightness adjustment can be achieved easily. Manual Brightness Adjustment is suitable for displays whose brightness is required to be fixed.

3.4.1.2 Programmed Brightness Adjustment

Programmed Brightness Adjustment is designed for displays whose brightness is required to change with time. Dialog for Programmed Brightness Adjustment is as Fig.3-4-2.

Fig.3-4-2 Programmed Brightness Adjustment dialog

Click **Read** in the control system time panel to get the current control system time before the parameters setting operation. If the control system time is not in accordance with the fact, click **Send** in the control system time panel to set the current control system time the same as that of the computer.

In the daytime, the environment light illumination is high, thus the display should work at a high brightness level to ensure good image quality. While at night, the display brightness can be lower as the environment is relatively dark. Programmed Brightness Adjustment enables the display to work at different brightness levels in different time intervals. Programmed brightness adjustment can save energy effectively and also be helpful of extending the display service life.

NOTE:

	It is important to adjust the display brightness according to the physical circumstance. Working at the highest brightness level all the time will reduce the display service life, while too low a brightness level results in poor display quality.

3.4.1.3 Auto Brightness Adjustment

Auto Brightness Adjustment enables the display to work at a proper brightness level

automatically according to the environment brightness. Automatic brightness adjustment is performed by the intelligent control program in the system, and no manual intervention is needed.

The execution of Auto Brightness Adjustment needs the cooperation of the Nova light sensor NS048C.

Dialog for Auto Brightness Adjustment is as Fig.3-4-3.

Fig.3-4-3 Auto brightness adjustment dialog

1) Fundamentals

As shown in Fig.3-4-4, relation between environment brightness and display brightness is pre-set. The horizontal axis represents the environment brightness and vertical axis the display brightness. Both of the brightness ranges are averagely divided into multiple segments (4 in Fig.3-4-4). For environment brightness in a certain segment, the display brightness will be set to be the maximum level of the corresponding segment.

Example

If the max and min environment brightness are 400lux and 0lux respectively, the max and min display brightness are 100% and 0%, and the segments number is 10, then each segment represents [(400-0) / 10] lux for the environment brightness and [(100% - 0%) / 10] for the display brightness. For environment brightness between 80lux and 120lux, the display brightness level will always be 30%.

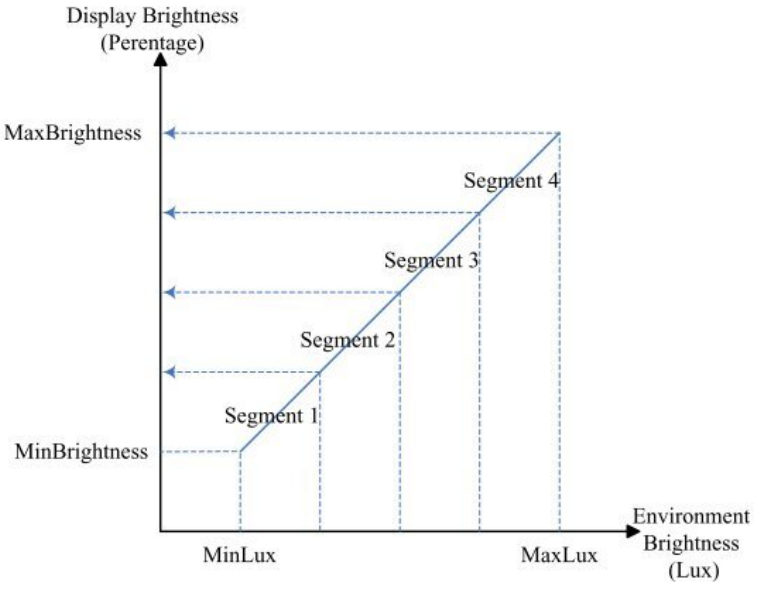


Fig.3-4-4 fundamentals for auto brightness adjustment

2) Notes

- Thresholds and number of segments are needed to be set for automatic brightness adjustment. When the environment brightness is higher than the high side threshold, a high brightness level will be set for the display, for example 100%. And while the environment brightness is lower than the low side threshold, a low brightness level is set. The interval between the high and low threshold of environment brightness is linearly and averagely divided into segments. So does the interval between the high and low display brightness level. The maximum number of segments is 20.
- Click **Read** to get the current settings for threads and number of segments.
- Click **Send** to activate the settings for Auto Brightness Adjustment.

NOTE:

	It is important to adjust the display brightness according to the physical circumstance. Working at the highest brightness level all the time will reduce the screen service life, while too low a brightness level may results in poor in display quality.

3.4.2 Gamma Adjustment

Gamma adjustment is used for gray stretch. Dialog of Gamma adjustment is shown in Fig.3-4-5.

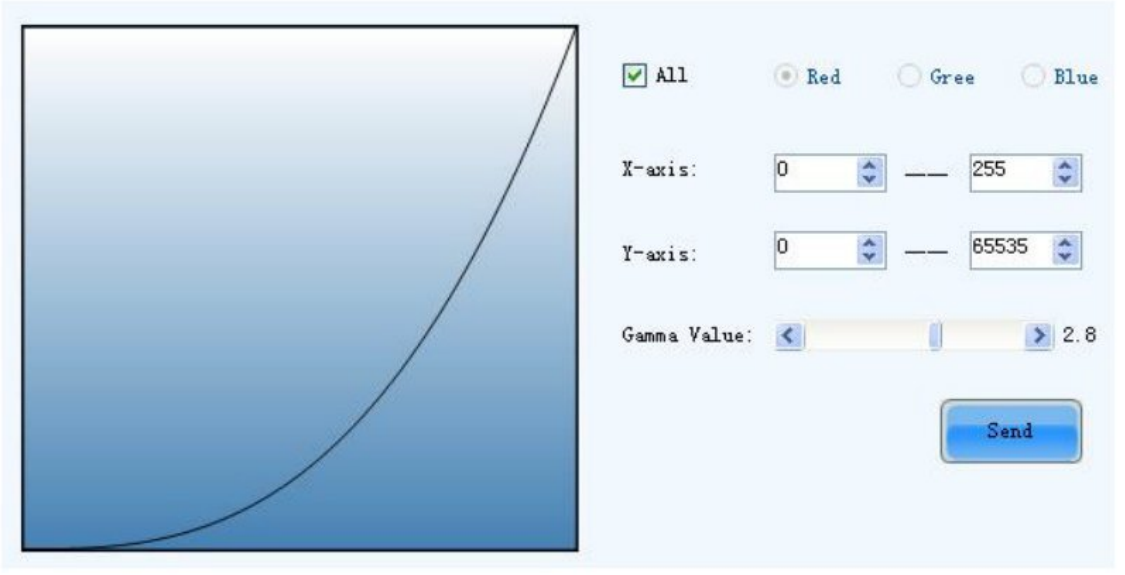


Fig.3-4-5 Gamma adjustment dialog

The Gamma values of the red, green and blue color can be set independently by selecting a single color or at one time by selecting **All**. Corresponding Gamma correction curve will be shown in the left panel.

Click **Send** to send the generated calibration table to hardware. This will take about 1 second.

NOTE:

	The Gamma values of red, green and blue color are usually set together and between 2.8 and 3.0.

3.5 Color Temperature Adjustment

Dialog for color temperature adjustment is as Fig.3-5.

Fig.3-5 dialog for color temperature adjustment

Brightness (gray level) and current gains for R, G and B can be set individually or together when performing color temperature calibration.

RGB Current Gain will not be available if **Module Chip** is set to be **Common Chip (MBI5024\TP62726\DM13A)** in smart configuration process.

NOTE:

	(1) Default values for RGB Current Gain are recommended. (2) Common users can only perform send operation of an existed color temperature calibration value to the control system. If color temperature list edit operation is required, please login advanced users.

3.6 Save and Load of the Control System Parameters

Once the settings for a LED display control system are tested to be good and suitable, they can be saved to corresponding configuration files. These configuration files can be load into display control systems if necessary. There are three kinds of configuration files, which are system configuration files (.cng), module configuration files (.ast) and scan-board configuration files (.scnr).

1) Save and Load of System Configuration Files

- Suffix indicator for system configuration files is .cng.
- Save and load operations of the system configuration are for all the system settings, including settings for modules, scan-boards, brightness, Gamma calibration and so on.
- There are 3 pages that the save and load operation of the system configuration files can be accessed

➢ **Page 1**

Advanced users --- **Navigator Menu** -> **Configuration** -> **System Parameter**. The page is as shown in Fig.3-6-1, in which the two circled buttons are for the saving option and load operation respectively.

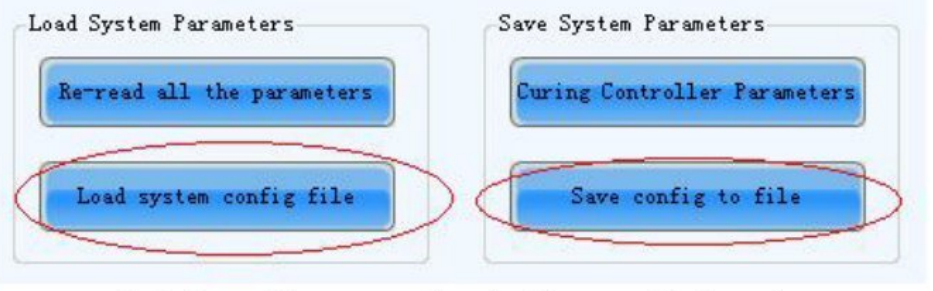


Fig.3-6-1 page 1 for system configuration files save and load operation

➢ **Page 2**

Advanced users --- **Navigator menu** -> **Configuration Wizard** -> **Basic Parameters Setting**. The page is as shown in Fig.3-6-2, in which the circled button is for save operation.

Fig.3-6-2 page 2 for system configuration files save operation

➢ **Page 3**

Advanced users --- **Navigator Menu** -> **Configuration** -> **Configuration Wizard** ->

Control System Program Update dialog. The page is as shown in Fig.3-6-3, in which the circled button is for load operation.

Fig.3-6-3 page 3 for system configuration files load operation

2) Save and load module configuration files

- The suffix indicator for module configuration files is .ast.
- Save and load operations of the module configuration are for the settings in the smart configuration process, including pixel matrix size for modules, data groups, scan modes, module driver chips, data flow modes and so on.
- Advanced user login is required for these operations. Page for save and load operations can be accessed through **Navigator Menu** -> **Configuration Wizard** -> **Display Smart Set**, which is shown in Fig.3-6-4. The two circled button are for save and load operation respectively.

Fig.3-6-4 page for module configuration files save and load operations

3) Save and Load Scan-board Configuration Files

- The suffix indicator for scan-boards configuration files is .ast.
- Save and load operations of the scan-boards configuration are for the settings in the **Display Performance Parameters Setting** dialog, including module matrix size for scan-boards, refresh frequency, gray levels, shift clock frequency, duty ratio and so on.
- Advanced user login is required for these operations. Page for save and load operations can be accessed through **Navigator Menu** -> **Configuration Wizard** -> **Scan-boards (performance parameters)**, which is shown in Fig.3-6-5. The two circled button are for save and load operation respectively.

Fig.3-6-5 page for scan-boards configuration files save and load operation

3.7 Display Calibration

After some time of working, a display will suffer from the weakening of LED lights in chroma and brightness. Weakening levels of the LED lights are different from each others. Light-weakening-caused nonuniformity greatly affects the image quality of the display. Pixel level brightness/chroma calibration can reduce the nonuniformity and help the display providing excellent image quality again.

Login advanced user and select the corresponding item from **Navigator Menu** -> **Calibration**.

3.7.1 Online Calibration

NovaLCT is required to help LED display calibration software, such as NovaCLB and PM-LED of Radiant, to perform online calibration.

In online calibration process, calibration software generates calibration coefficients by analyzing the pictures of the display captured by a camera, and then send them to NovaLCT through network. NovaLCT finishes the calibration process by sending the calibration coefficients to the control system and activates them.

1) Preparation of Online Calibration

- Connect the two computers in which NovaLCT and the calibration software are installed respectively.
- Configure the network and build up the connection between NovaLCT and the calibration software. The configuration dialogs for NovaLCT and NovaCLB are as Fig.3-7-1 and Fig.3-7-2. Note that the IPs and the communication port IDs set in NovaLCT and NovaCLB must be in concordance with each other.

Fig.3-7-1 network configuration dialog of NovaLCT

Fig.3-7-2 network configuration dialog of NovaCLB

- Check the module information. Input the information about the pixel matrix size of a module and the module matrix size of the display. Send this input information to NovaLCT for checking. Only the settings in the two software match each other can the calibration be performed. Dialog of NovaCLB for module information input and check is shown in Fig.3-7-3.

Fig.3-7-3 module information checking dialog of NovaCLB

2) Message Window of Online Calibration

- Interaction information between NovaLCt and the calibration software will be shown in the message window of NovaLCT, such as transmitted data or reasons of interaction failure. The message window is as shown in Fig.3-7-4.
- Interaction information will be updated according to the calibration progress. Click Save Information to save the messages to a file (.txt) if calibration operation fails. This would be very helpful for finding out the reason of the failure.

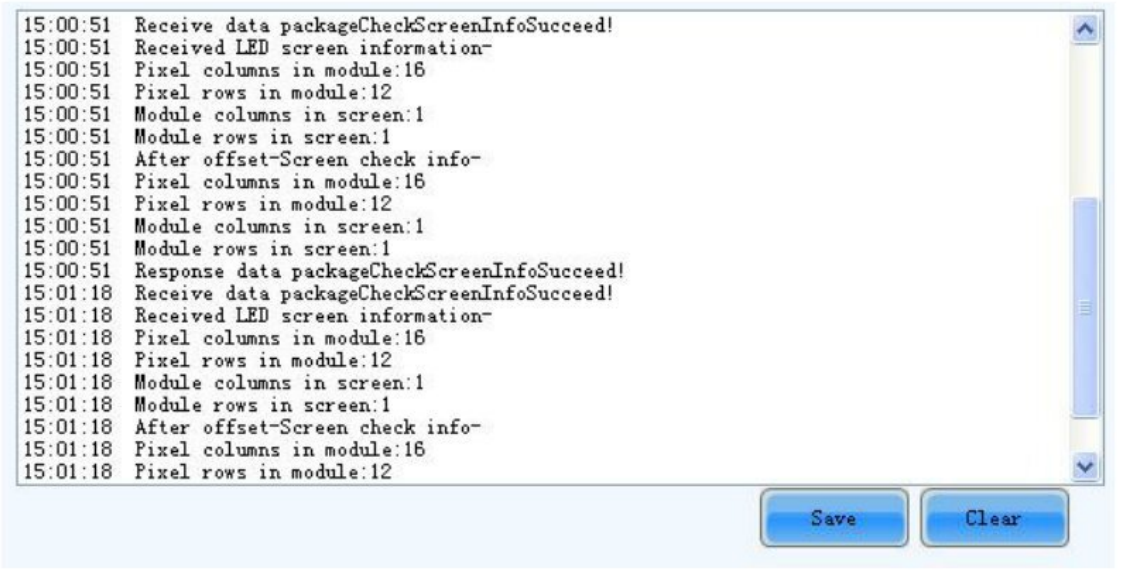


Fig.3-7-4 message window for online calibration

3) Offset Setting

In online calibration, if the scan-boards at the top row of the display or the first column at the very left of the display drive less modules than the other scan-boards, offset parameters are required to be set.

The follow is an example of how offsets are set.

The display structure is as follow. The display has a scan-board array of 2 columns and 3 rows. Each scan-board can load a module array of 2 columns and 3 rows. And the pixel array size of each module is 16×8. The scan-boards at the first row of the array are special. Although they can load a module array of 2 columns and 3 rows, but the module arrays' size of each of them are just 2 columns and 2 rows. A corresponding sketch is shown in Fig.3-7-5.

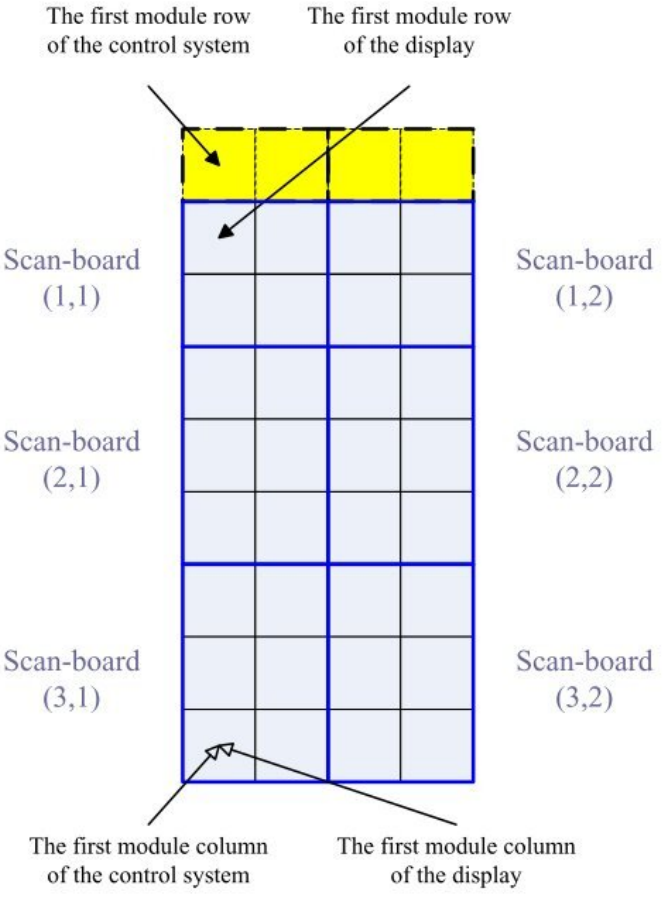


Fig.3-7-5 sketch of the display in the example

The scan-board configuration for such a display would be as shown in Fig.3-7-6. As each of the scan-boards loads only 2 rows of modules, there is 1 row offset between the first module row of the control system and that of the display. Thus the **Top Offset** should be 1. And as the first module column of the control system is the same as that of the display, there is no offset between them. Thus the **Left Offset** should be 0. **Top Offset** and **Left Offset** are set through dialog shown in Fig.3-7-7.

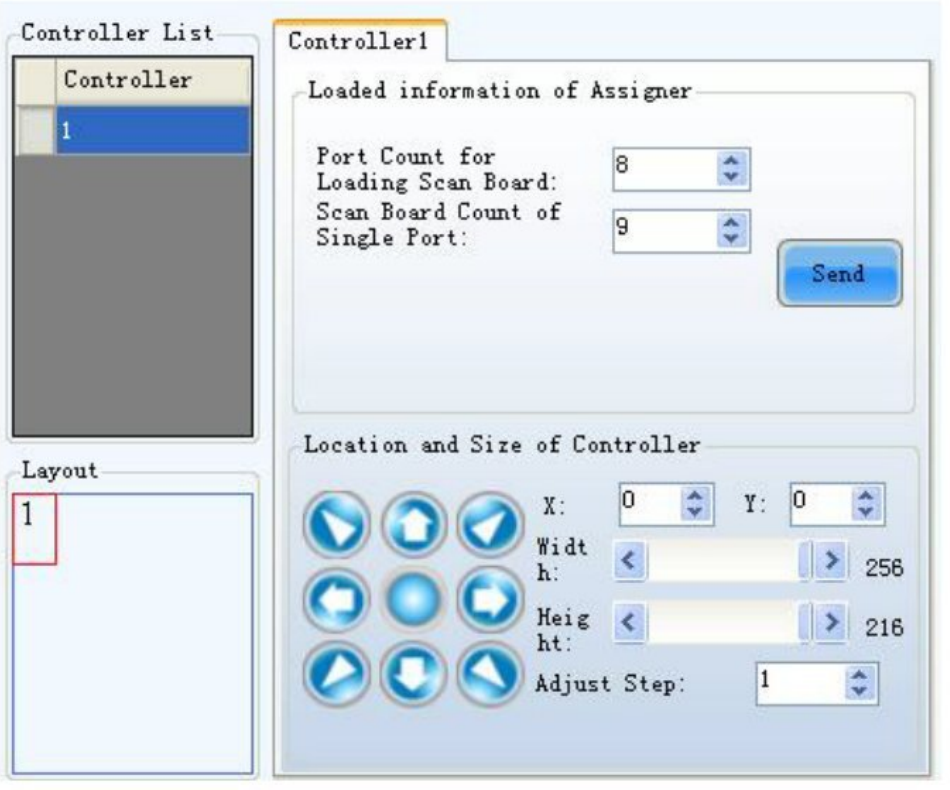


Fig.3-7-6 scan-board configuration

Fig.3-7-7 dialog for offsets setting

NOTE:

	When the operation of Online Correction is started, the display brightness will be set to 100% and Gamma coefficient to 1 by NovaLCT automatically.

3.7.2 Offline Calibration

Offline calibration is designed for the case that there is not network or the network does not work. In offline calibration, the color, brightness level and size of the display area to be calibrated need to be controlled manually through NovaLCT. The calibration software will analyze pictures of the display captured by a camera and generates the calibration coefficients.

Dialog for offline calibration is as Fig.3-7-8

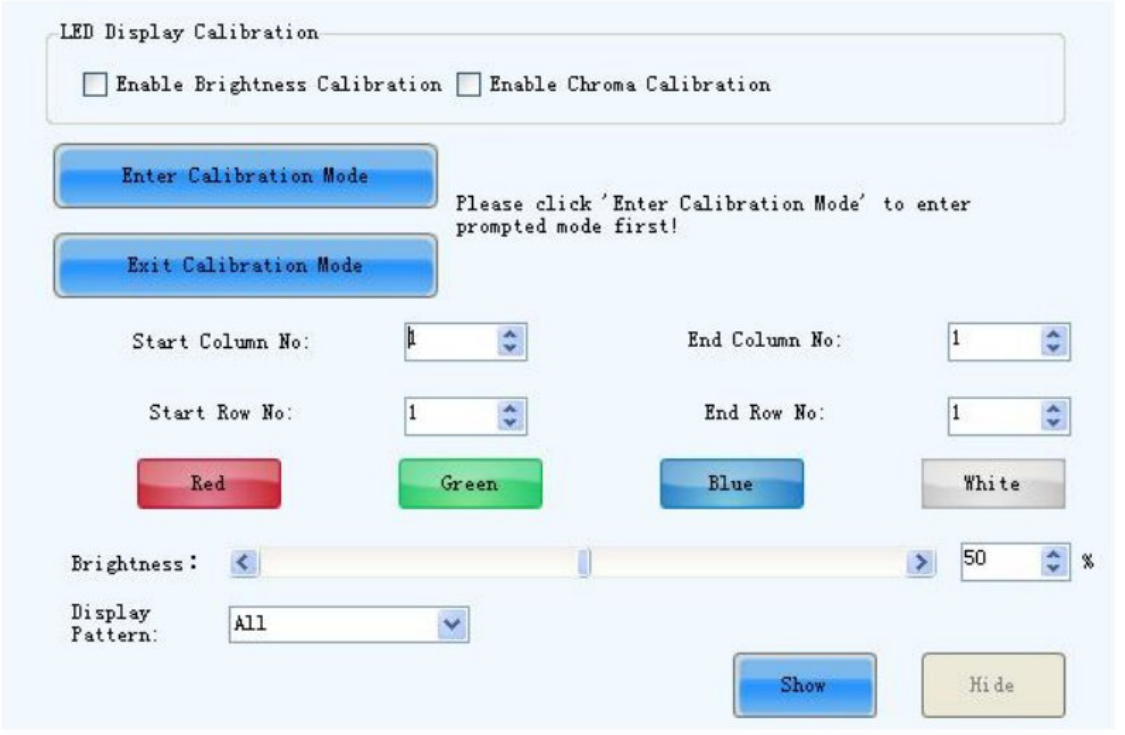


Fig.3-7-8 dialog for offline calibration

- Click **Enter Calibration Mode** to active offline calibration.
- Input the column/row indexes of the start and end modules to set the position and size of the calibration area.
- The mapping window can be shown or hidden by clicking **Show** or **Hide**.

CAUTION:

	Calibration coefficients must be uploaded to the control system for activation. See **3.8 Read, Adjust and Upload the Calibration Coefficients** for more information.

3.8 Read, Adjust and Upload the Calibration Coefficients

3.8.1 Saving Calibration Coefficients

Saving calibration coefficients as database is saving calibration coefficients of the whole display or any specified scan-boards or modules for backup or re-uploading in the next time.

To do this, advanced user login is required. Save coefficients through **Navigator Menu** -> **Calibration** -> **Coefficient Save.** You can save calibration coefficients by scan board or by module.

1. Saving Coefficients by Scan Board

Saving coefficients by scan board is as Fig.3-8-1

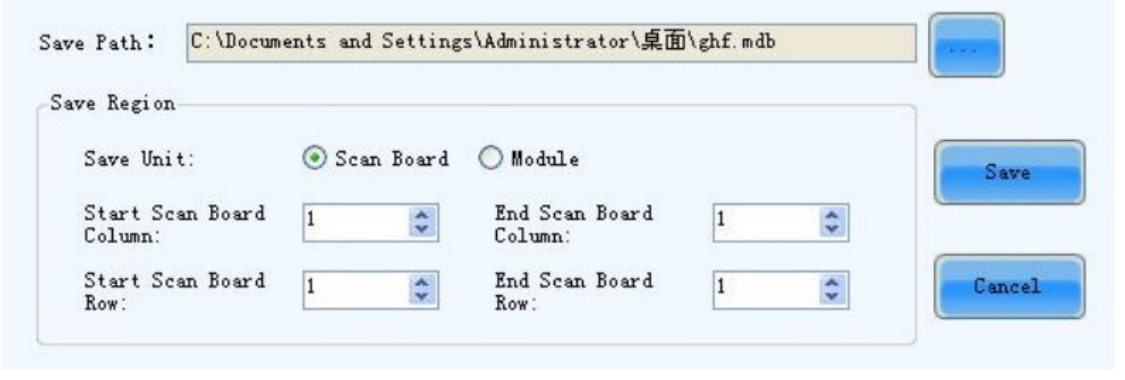


Fig.3-8-1 Saving coefficient by scan board

- Firstly, make sure the **Save Path** is correct or modify the save path;
- Secondly, select **Scan Board** and fill the blanks with start and end column, row. And make sure the information is correct;
- Thirdly，click **Save** to save the calibration coefficients to the setting path in Fig.3-8-1.

2. Saving Coefficients by Module

Saving coefficients by module is as Fig.3-8-2

Fig.3-8-2 Saving coefficients by module

The steps of saving coefficients by module are the same with saving coefficients by scan board; the only difference is that the unit for saving coefficients by module is the module.

	After saving the calibration coefficients as database, if you need to upload the saved database at any time, the setting information of uploading coefficients should be consistent with this page information.（See 3.8.2 **Manual Uploading of Calibration Coefficients** for more information of Uploading Coefficients）.

3.8.2 Manual Uploading of Calibration Coefficients

Copy the calibration coefficients to the computer in which NovaLCT is installed manually with mobile storages like U disk. And then upload the coefficients to the control system for display calibration. To do this, advanced user login is required. Upload the data through **Navigator Menu -> Calibration -> Coefficient Upload.**

Manual uploading of calibration coefficients are helpful for cases as follow.

1) If the control system or scan-boards are changed or the calibration coefficients are lost, manual upload operation can update or recover the coefficients.

2) Upload the calibration coefficients after offline calibration operation.

3.8.2.1 Upload Calibration Coefficients for the Whole Display

The dialog for upload calibration coefficients for the whole display is as Fig.3-8-3

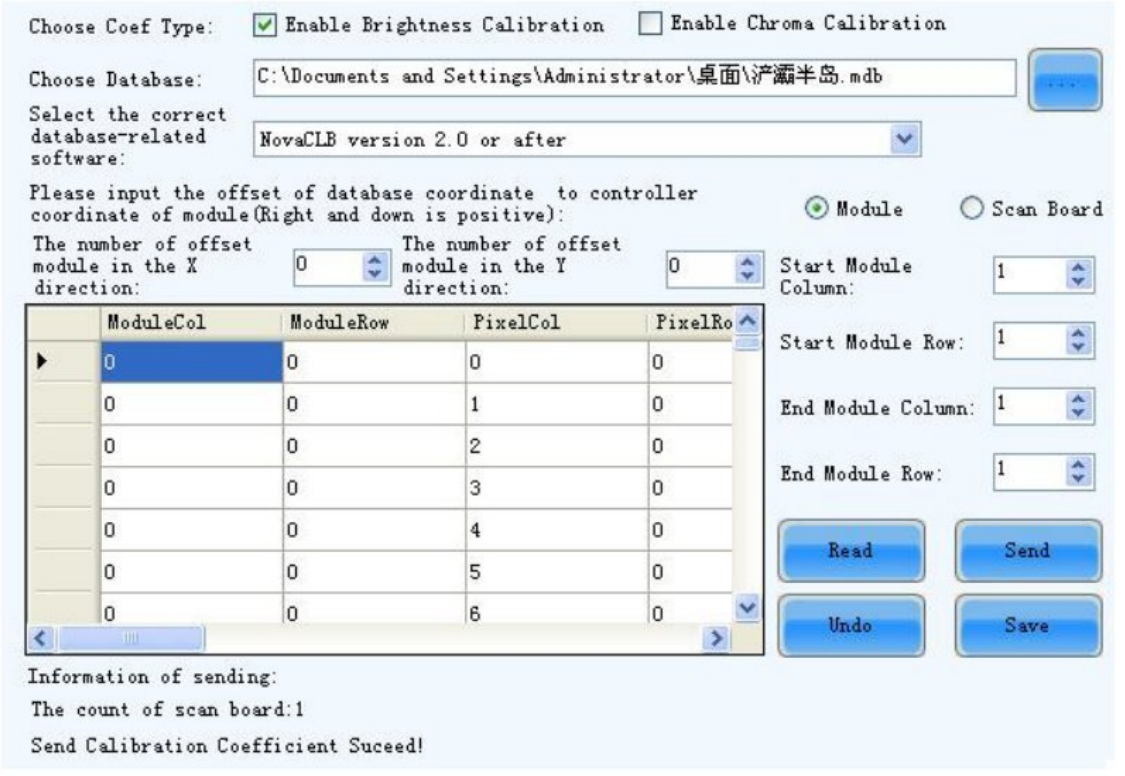


Fig.3-8-3 dialog for uploading calibration coefficients for the whole display

Steps.

1) Choose the desire Calibration mode (brightness or chroma).

2) Choose the calibration coefficients file to upload (.pmled or .mdb).

3) Choose the calibration software that generated the coefficients.

4) Fill the blanks with modules and scan-boards information. Make sure the information is correct, or the upload operation will be failed.

5) Click **Read** to read the coefficients into the software.

6) Click **Send** to upload the coefficients to the control system. Results of these calibration coefficients will be seen now.

7) If the calibration result is not satisfying, click **Undo** to clear the upload coefficients.

8) If the calibration result is satisfying, click **Save** to store the uploaded coefficients in the scan-boards.

CAUTION:

	When uploading the calibration coefficients for the whole display, make sure the input information of the modules and the scan-boards is correct and matches the calibration coefficients.

3.8.2.2 Upload Calibration Coefficients for a single Cabinet (Scan-board)

A cabinet will be regarded as a display when being calibrated in factory, because its location in the display is unsure at that time. Thus in the calibration process, each cabinet will have its position as (row 1, column 1). And each cabinet will have its own calibration coefficients file after calibration.

When constructing a display with those calibrated cabinets, the cabinets could be placed at any position. And except the one which is lucky to have its position still be (row 1, column 1), all others will have a position different from the one that they had when being calibrated. Their positions are shifted, so do the modules in them. If their calibration coefficients files are upload directly without taking position offset into account, the calibration coefficients will be applied on the cabinet at the position (row 1, column 1) of the display, which is not right. To avoid this, offset information must be set when uploading the coefficients.

Steps.

1) Login the advanced user, and open the Upload Coefficients dialog through **Navigator Menu -> Calibration -> Upload Calibration Coefficients**.

2) Find the corresponding calibration coefficients file according to the ID of the cabinet to be calibrated.

3) Find out the cabinet position in the display, for example, (row 4, column 3).

4) Select **Scan-board** on the Upload Coefficients dialog and then input the offset information for the cabinet. The offsets of row and column can be calculated as follow.

Left Offset = column position in the display – column position at factory calibration

Top Offset = row position in the display – row position at factory calibration

If the cabinet position is (row 4, column 3), the **Left Offset** should be (3 - 1) =2, and the Top Offset should be (4 - 1) = 3. this is shown in Fig.3-8-4.

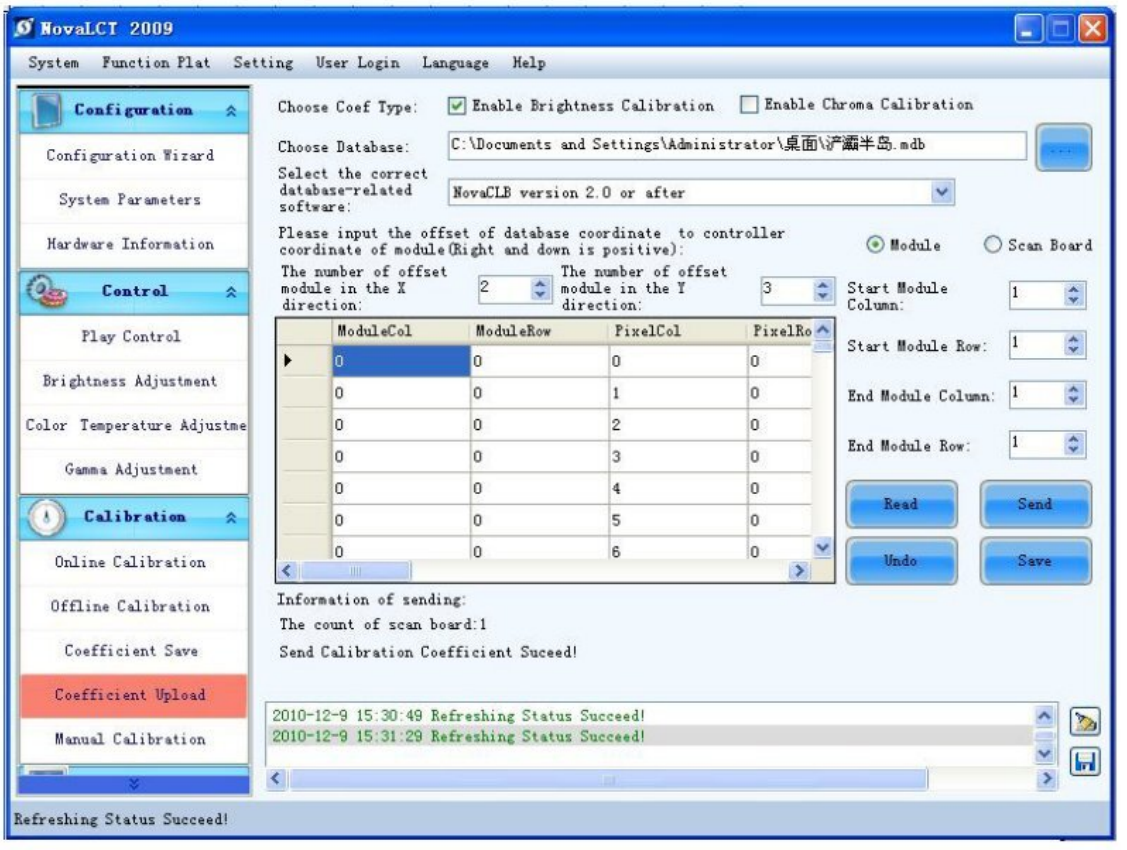


Fig.3-8-4 dialog for uploading calibration coefficients for a single cabinet

5) Since there is only one cabinet's (one scan-board's) calibration coefficients in the file, set 1 for all the column/row indexes of the start and end scan-boards.

6) Click **Read** and **Send** to read the coefficients into the software and upload them to the specified cabinet (scan-board).

7) Make sure to click **Save** to store the calibration coefficients in the cabinet (scan-board) after they have been uploaded. If the coefficients are uploaded to a wrong position, click **Undo** to clear them.

3.8.3 Calibrations Result Adjust for New Module

If a module of a calibrated display is replaced, the brightness and color of the new module may be different from those of its neighbors. In that case, Manual Calibration of LCT can be used to adjust the calibration coefficients of the new module, making its performance be concordance with its neighbors.

To access manual calibration, login advanced user, and then choose **Manual Calibration** in

Calibration from **Navigator Menu**. Dialog for Manual Calibration is as Fig.3-8-5.

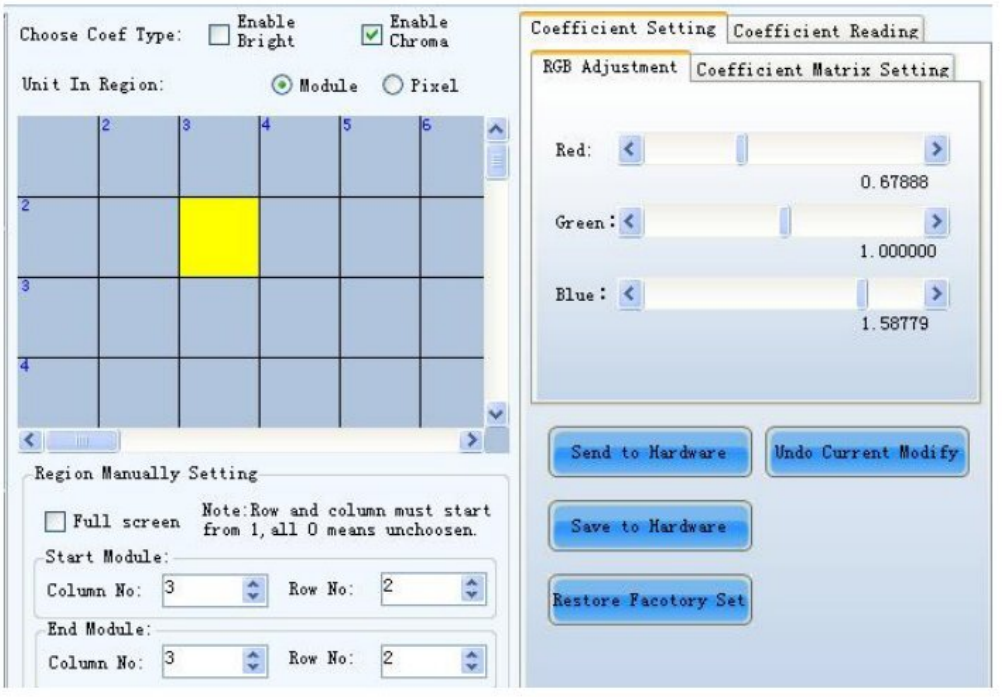


Fig.3-8-5 manual calibration dialog

Select the module or pixel to be adjust by input its position through the manual calibration dialog. There are two ways for adjustment.

1) RGB Bar

RGB bars are suitable for calibration coefficients adjustment for new modules which are different from its neighbors only in brightness. Dialog for calibration coefficients adjustment through RGB bars is shown in Fig.3-8-6

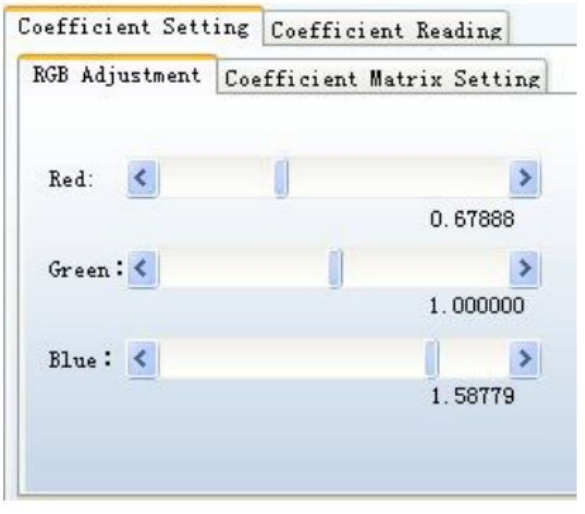


Fig.3-8-6 RGB bars for calibration adjustment

Keep on adjusting the slide blocks position until a satisfying calibration result is achieved.

Then, click **Save To Hardware** in the manual calibration dialog to store the adjusted calibration coefficients in the corresponding scan-board.

2) Coefficient Matrix

Coefficient matrix is used for calibration coefficients adjustment for new modules which are different from its neighbors both in brightness and color. Dialog for calibration coefficients adjustment through coefficient matrix is shown in Fig.3-8-7.

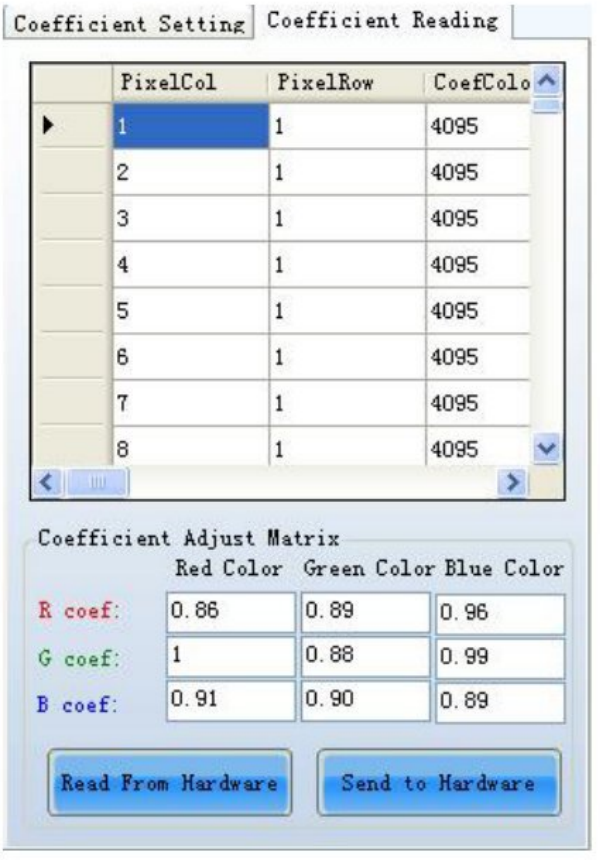


Fig.3-8-7 dialog for calibration adjustment through coefficient matrix

Click **Read From Hardware** to read the current calibration coefficients of the new module to software before adjust operation. Keep on changing the elements in the coefficient matrix and activating them by click **Send To Hardware** until a satisfying calibration result is achieved. Then, click **Save To Hardware** in the manual calibration dialog to store the adjusted calibration coefficients in the corresponding scan-board.

3.9 Scan-board Self-Recovery

If some scan-board goes wrong, the display might be unable to show images normally, or just be dark; if the scan-boards are not reloaded with programs after an unexpected power off, the display may not be able to work. With scan-board self-recovery functionality, those problems can be avoided.

To access scan-board self-recovery functionality, login maintenance user and choose **Navigator Menu** -> **Configuration** -> **Maintenance**.

1) Prerequisite

Scan-board self-recovery needs the cooperation of power manage board. To use the scan-board self-recovery functionality, power manage board should be connected the control system correctly and the connection between the power manage board and NovaLCT should also be built up.

2) Notes

- Dialog for scan-board self-recovery is shown in Fig.3-9. if the functionality of scan-board self-recovery is enabled, the corresponding index of the PLC to restart must be selected in the **Power Off** panel.
- Power of the dividers and scan-boards will also be restarted when control system power is restarted.

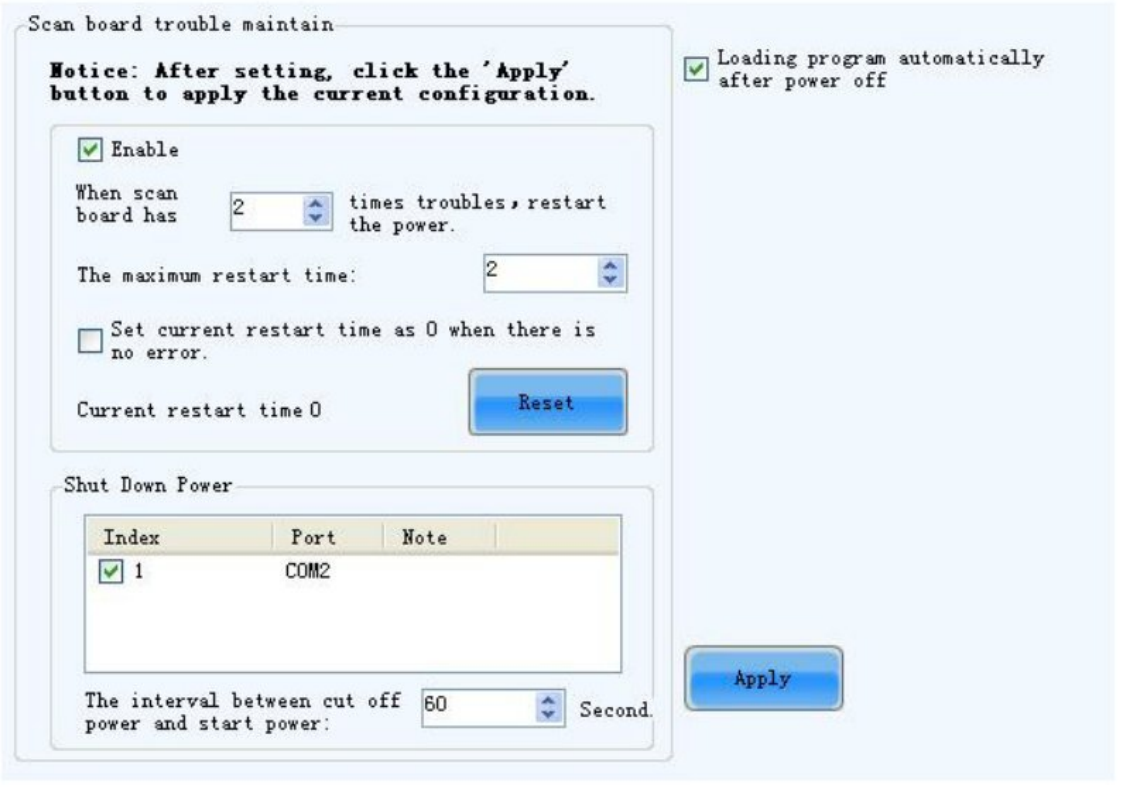


Fig.3-9 dialog for scan-board self-recovery

CAUTION:

	(1) Monitoring function of NovaLCT must be activated if the scan-board self-recovery functionality is enabled. See **3.10 Monitor** for more information. (2) If the scan-board self-recovery functionality is enabled, NovaLCT must be kept working and connecting with the control system.

3.10 Monitor

Sometimes, internal or external factors may make the display unable to work or to play images normally. To avoid those problems, monitoring functions of NovaLCT are designed for real-time control system status monitoring.

1) Prerequisite

If the scan-boards support temperature and humidity measuring, NovaLCT can acquire the temperature and humidity of the scan-boards. If not, monitor boards are required for temperature and humidity monitoring. Monitor boards are also required for smoke, fans speed, power voltage and light failure monitoring.

Make sure that monitor boards are correctly connected to the control system and work normally.

2) Monitor functions

Monitor functions of NovaLCT include control system (including controllers, dividers and scan-boards) status monitoring, control system temperature monitoring, scan-board (cabinet) humidity monitoring, scan-board (cabinet) smoke monitoring, scan-board (cabinet) fans speed monitoring, scan-board (cabinet) power voltage monitoring and LED light failure monitoring.

3) Features

- Each scan-board can be monitored in detail, including working status, temperature, humidity, fans speed, smoke and power voltage.
- Working status of each LED light on the display can be monitored. LED light type and threshold for failure checking can be set.
- if **Auto Update** is enabled, NovaLCT will automatically update the monitoring data periodically according to the set time interval. If not, monitoring data can be update by click **Update** on the software interface.
- **Update Rate** and **Overtime Limitation of scan-board checking** can be set for monitoring functions**.** Prolong the overtime limitation in Monitor Setting page if it is always exceeded. Update Rate can also be adjusted in this page.

3.11 LED Light Failure Checking

If some light suffers short circuit or open circuit, it will not be able to work, resulting in decreasing image quality of the display. Those kind of lights need to be replaced. As a display always has a great numbers of lights, it is very difficult to locate the failure lights. With light failure checking function of NovaLCT, this problem can be easily solved. NovaLCT can locate the failure lights by checking lights one by one. This function can also be used for failure checking of lights on a display which has work for some time.

There are 3 steps for light failure checking, each with a page.

1) Configuration page for light failure checking

The configuration page is as 3-11-1.

Fig.3-11-1 configuration page for light failure checkking

CAUTION:

	If Current Gain Setting is enabled, the gains for R, G and B must be set according to the field facts.

Click Light Checking to access the light failure checking page.

2) Page for light failure checking

The light failure checking page is as shown in Fig.3-11-2.

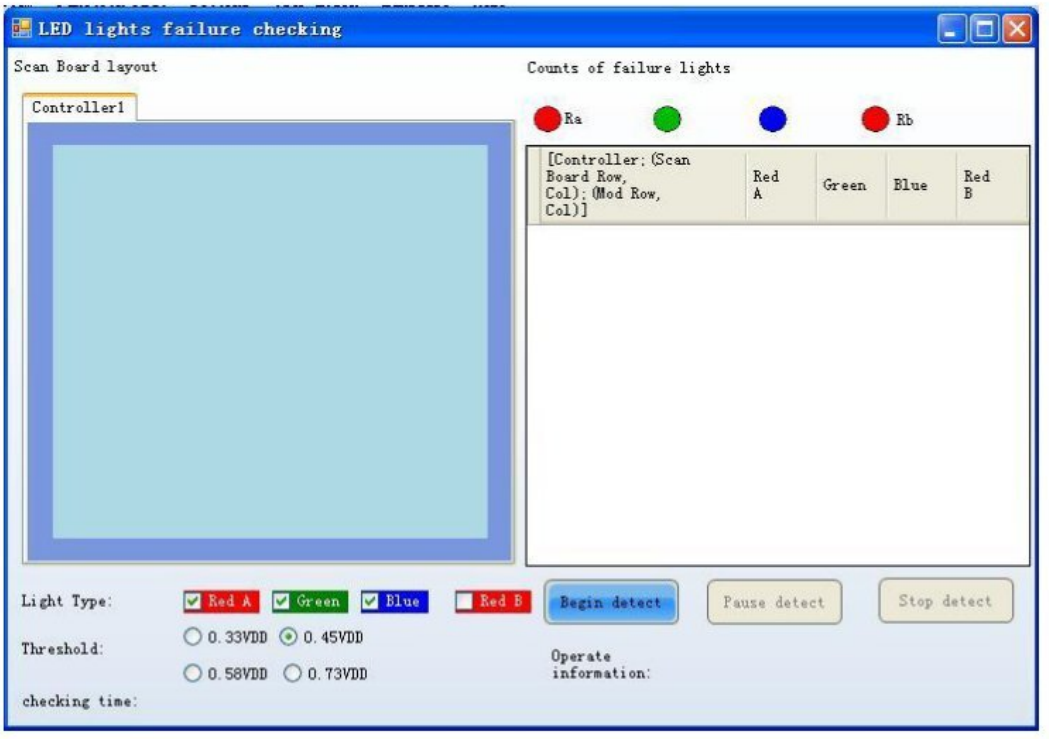


Fig.3-11-2 light failure checking page

CAUTION:

	Choose the light type and threshold for checking operation at the lower left of the dialog interface according to the field facts.

Click Start Checking to active checking process. Shown in Fig.3-11-3 is the light failure checking page after the checking operation.

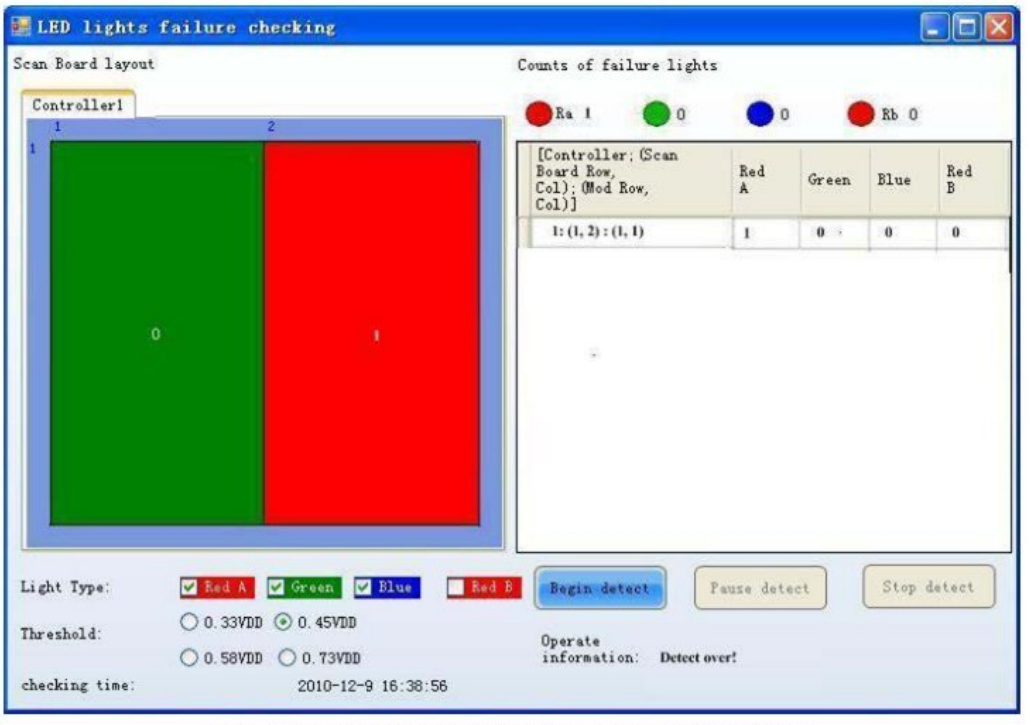


Fig.3-11-3 light failure checking page after checking operation

On the left of the page is the sketch of module load of the controller. Failure lights number of each module will be shown on the corresponding rectangle of the module. On the right of the page is the Failure Lights Counts Info window. Failure lights numbers of different colors in each module will be shown in the window. Go to the Module Lights Status Sketch page for the exact locations of the failure lights.

3) Module Light Status Sketch

Place the mouse on any rectangle of the module load array sketch shown on the left of light failure checking page (Fig.3-11-3) for 3 seconds to access the light status sketch of the corresponding module. The light status sketch is as shown in Fig.3-11-4. Choose **Red A**, **Green**, **Blue** and **Red B** on the top right of the page to find out failure lights' positions of the corresponding color respectively.

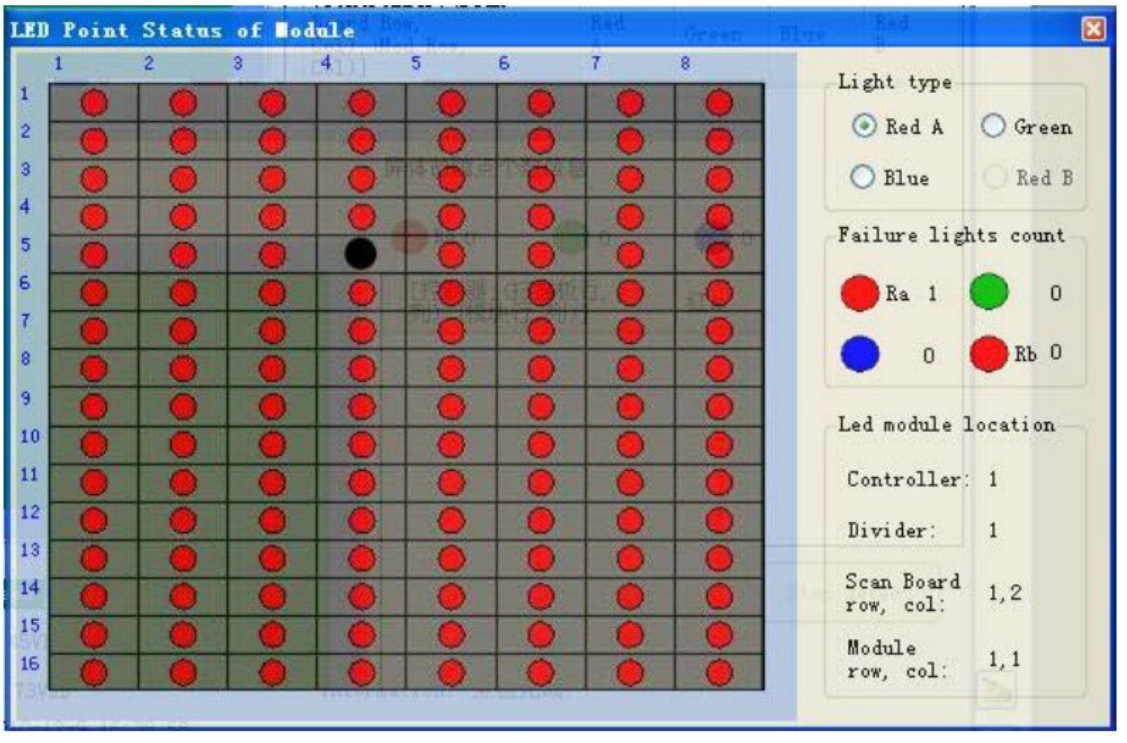


Fig.3-11-4 module light status sketch

As shown in Fig.3-11-4, failure lights will be labeled as black circles in the sketch while good lights are labeled as circles of their own color. This is helpful for find out their locations. Number of the failure lights of different color can also be found on the right of the page.

3.12 Usage of Power Manage Board

Sometimes, some or all of the display control system power supplies need to be turned on or off manually or automatically, for example, in scan-board self-recovery function. To do that, power manage boards are required to be equipped in the control system.

3.12.1 PLC Control

PLC control function can be used to control the power supplies of the display control system. For example, to turn or off each of the control system power supply when necessary or according to a preset schedule.

1) PLC Control Dialog

The PLC Control dialog is as Fig.3-12-1. There two modes PLC control, manual and auto. The modes can be switched by selecting the corresponding item.

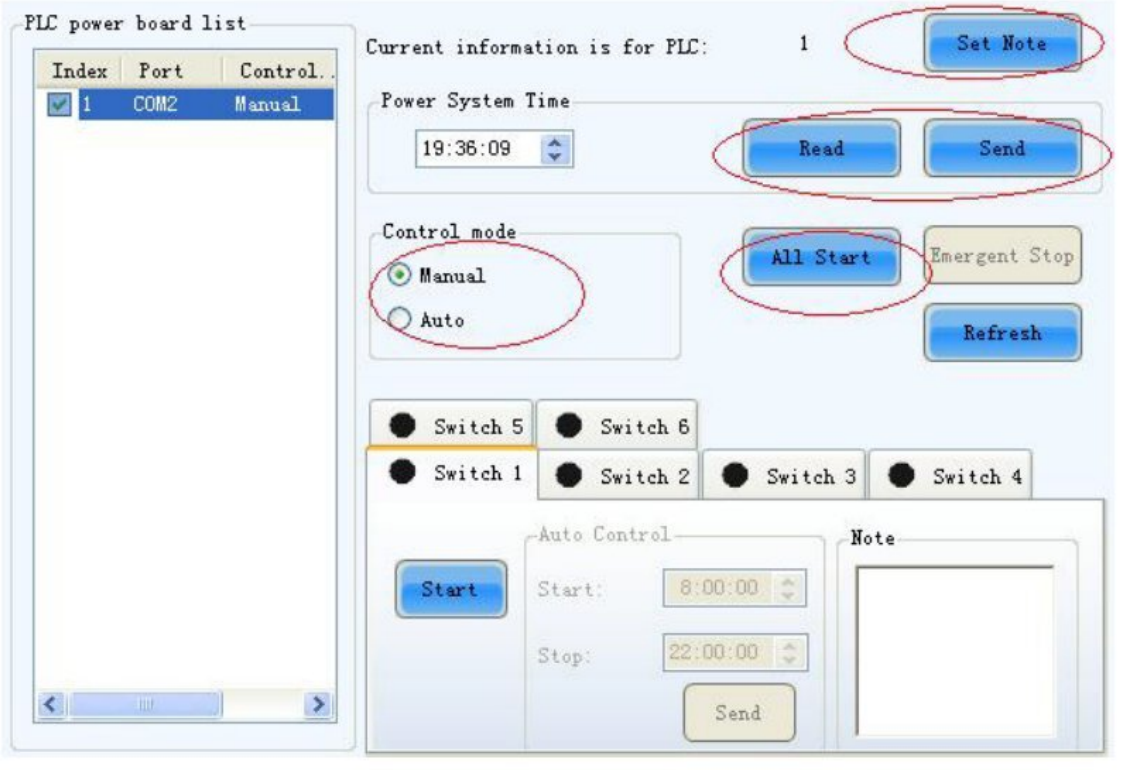


Fig.3-12-1 PLC control dialog

- On the left of the dialog interface is the list of the power manage boards connected to the control system, from which information of each of the power manage board can be

checked.

- In the manual control mode, each power supply can be started or stopped manually. In this mode, connection between NovaLCT and the power manage board must be built up.
- In the auto control mode, each power supply can be started or stopped according to the preset schedule. In this mode, when time schedule are set, power manage board can work independently.
- **All Start** and **Emergent Stop** are always available, no matter in manual mode or auto mode.
- Click **Set Note** on the top right of the page to edit remark to the currently activated power manage board. Remark for each of the 6 power supply output of a power manage board can be edited through the **Note** panel on the bottom right of the page.

2) Notes

- When the power manage board is restarted after an unexpected power off, if the saved settings are not lost, the display control system will keep on running according to the preset settings. In that case, it is recommended to click **Refresh** button to make the settings in the software and the hardware be consistant with each other.
- Click **Read** on the page to get current time of the power manage board when setting the time schedule for auto power control. If the power manage board time is not in accordance with the fact, click **Send** to set the current power manage board time the same as that of the computer.

3.12.2 PLC Schedule

In the case that real-time manual control is not possible, PLC Schedule function can be used to start or stop the control system power supply at any day or any time of a day.

1) Prerequisite

Only in manual mode of PLC control will PLC schedule function be available. Login advanced user and select **PLC Schedule** from **Power Board (PLC)** in **Navigator Menu** to access PLC Schedule dialog, which is shown in Fig.3-12-2.

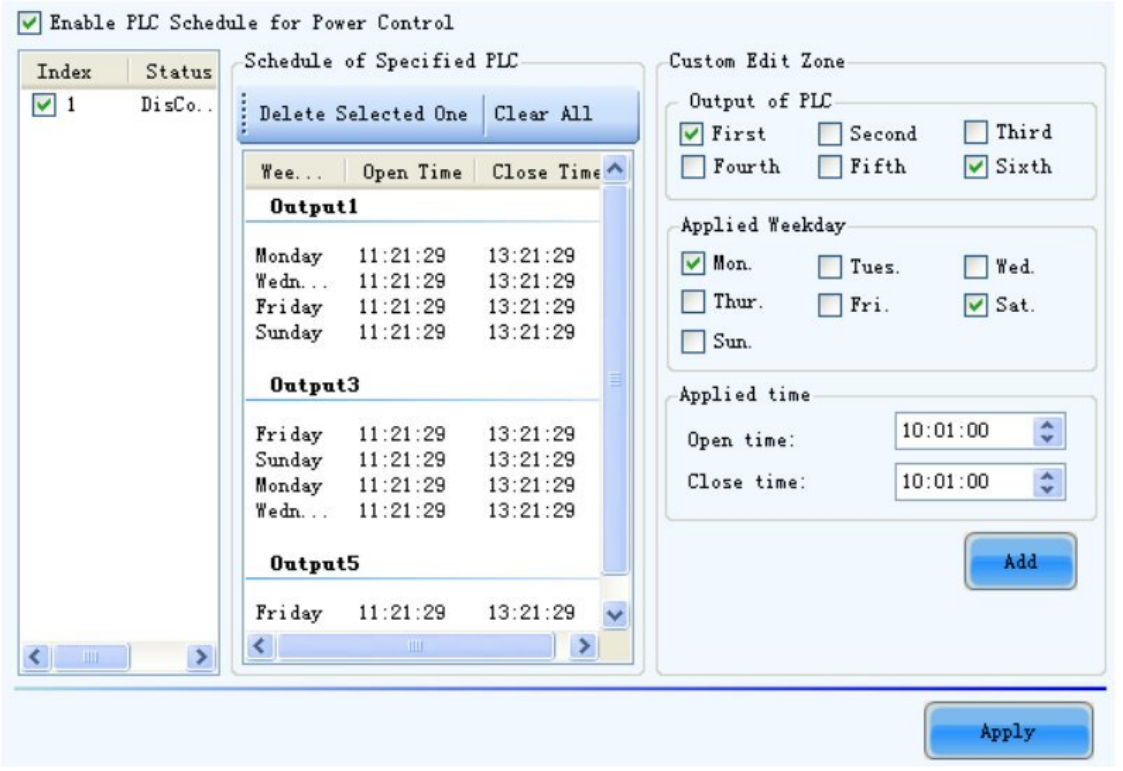


Fig.3-12-2 PLC Schedule dialog

2) PLC Schedule Dialog

The PLC Schedule dialog is shown in Fig.3-12-2.

- On the left of the dialog interface is the list of the power manage boards connected to the control system, from which information of each of the power manage board can be checked.
- On the right of the dialog interface, schedule for each of the 6 power supplies of the currently activated power manage board can be edited.
- In the middle of the dialog interface is the Schedule for specified PLC, form which the schedule can be checked.

3) Notes

- **Enable PLC Schedule for Power Control** must be selected for PLC schedule function to be activated.
- Click **Apply** to activate the schedule after the edition is finished.