

1.概述

XXS-99 型机柜式报警系统是用在大型发电机组运行中的越限报警和化工行业中防护报警。该系统充分利用了当代计算机的软件和硬件控制的特点来满足不同容量的要求和操作控制的要求，可广泛用于电力、化工、石油、冶金等场所，是确保各种设备与系统安全运行不可缺少的装置。

XXS-99 型机柜式报警系统特点：

1.1.采用高性能的 INTEL8031 单片微机为控制核心，组成多微处理机的组件化系统，因而具有可靠性高、稳定性好、抗干扰性能强等优点。

1.2.机内均用标准化模块结构形式，来满足不同容量的要求，部件通用，扩展灵活，操作维护方便。

1.3.最适合于国内电力系统大型发电机组闪光音响报警需要。

1.4.为提高抗干扰能力，在硬件和软件上采用抗电网干扰的有效措施。如光电隔离、电源滤波器、屏蔽、程序一旦“飞”出去立即“飞”回等等。

1.5.可以为用户提供特定的控制程序固化 EPROM2764。

2.主要技术指标

2.1.输入信号：

2.1.1.常闭、常开触点可任意混合选择，由报警单元插件板上双列直插式拨动开关选取。

2.1.2.均有光电隔离装置。

2.1.3.具有信号解除选择开关。

2.1.4.可再传输（返送）。

2.2.报警点数：160 点。

2.3.现场触点电压：+24V（DC）、电流：7mA（由报警系统提供）。

2.4.操作控制按钮：“试验”、“确认”、“消音”、“复位”这四个按钮为一组，可以分组接到操作控制台。

2.5.指示设备：LED 发光体光字牌。报警信号首出快闪，后续慢闪。

2.5.1.光字牌：每个光字牌尺寸：48mm×96mm、32mm×72mm、40mm×80mm 三种。光字牌有红色、绿色、黄色等多种颜色，供用户按不同监控要求选用。

2.5.2.光字牌组合方式：可任意组合，见图 4。

2.5.3.音响装置：电铃或蜂鸣器。常规音响和紧急音响。

2.6.稳压电源：微处理器用开关电源+5V/20A、信号触点用开关电源+24V/4.2A、光字牌灯用电源+24V/20A 和监控单元用多路开关电源。

2.7.机柜外形尺寸：高 2.1 米，宽 0.70 米，深 0.60 米（特殊尺寸可定制）。

2.8.端子排和电缆：

2.8.1.输入信号端子排 10 块，每块 16 个信号触点。

2.8.2.信号输入电缆是从发电机组通过地沟进入机柜。光字牌连接（19 芯）输出电缆可以从机柜底部引入机柜。电缆长度由用户确定。

2.9.整机功耗：正常使用不大于 150 瓦。

试验时小于 760 瓦。

2.10.环境温度：0℃~60℃ 。

3.微机报警系统结构和安装

XXS-99 型微机报警系统为机柜结构，机柜尺寸为高 2.1 米，宽 0.70 米，深 0.60 米（特殊尺寸可订货时说明，另行定制）。机内各部分位置见图 1、图 2，其中图 1 为机柜前面视图，图 2 为机柜后面视图。

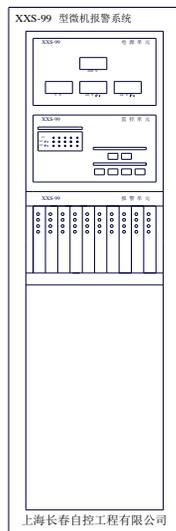


图 1

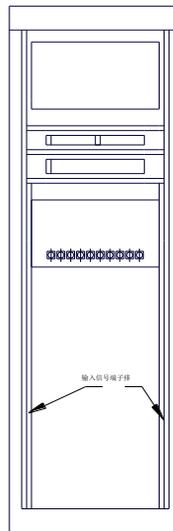


图 2

3.1.报警信号端子排

报警信号端子排如图 2，位于柜子后面左右两侧，右边为 A1~A5（80 个）信号输入端子，左边为 A6~A10（80 个）信号输入端子。它与发电机组的报警接点通过电缆线接入微机报警单元的报警插件板。（接线端子排列及接线说明见附 1、附 2）

3.2.微机报警插件板

在图 1 的报警单元中可插 10 块报警插件板，每块报警插件板上有 16 个报警点，报警接点可以是常开接点，也可以是常闭接点。每块板均相同结构，可以互换替

代使用。每块报警插件板上有四个发光管指示灯，作为工作指示。在运行时，上端第一个 LED 发光管在正常工作时应常闪，其呈平光或不亮时，表示此报警板有故障，此时拔下故障板（可带电插拔），用新板换之。

3.3. 监控单元

监控单元为整个报警系统监视和控制的核心。图 3 为监控单元面板视图，它的左边为“电源分配监视”，其中有十五个发光指示灯，分别表示 5 路 3 组电源（5V、24V (A)、24V (B)）的工作状况，灯亮为该路该组电源发生故障。它的右边为控制按钮。

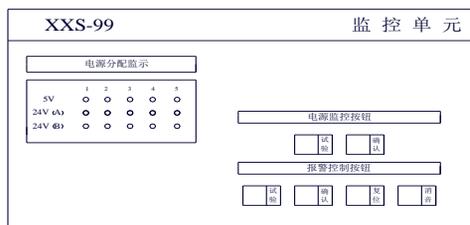


图3 监控单元面板

3.4. 光字牌组：

XXS-99 型微机报警系统的光字牌是分组安装在盘上，每组以任意矩阵方式排列，例如 $6 \times 6 = 36$ 个、 $6 \times 4 = 24$ 个、 $8 \times 3 = 24$ 个等排列供选择，各自的开孔尺寸见图 4 所示，也可以根据现场要求另外排列。盘上每组光字牌通过

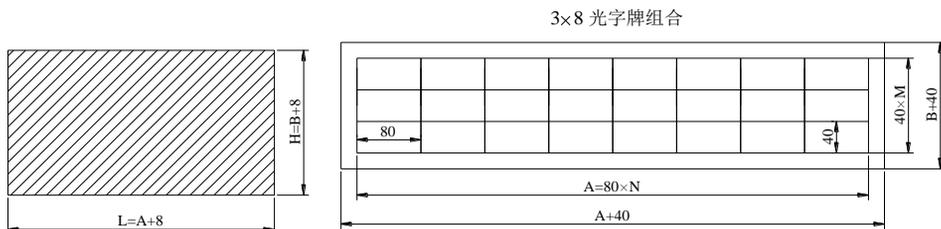


图4 (A) 光字牌组合开孔尺寸

图4 (B) 3×8光字牌排列图

配有 N 个 19 芯航空插头的电缆线接至报警单元的背面，与报警插件相接。

开孔尺寸计算：每个光字牌尺寸为：高×宽（mm）三种：48×96、40×80、32×72。

设 N 为横向光字牌数量，M 为竖向光字牌数量，则光字牌屏外尺寸：

横向 A=每个光字牌宽×N

竖向 B=每个光字牌高×M

因此盘上安装开孔尺寸：横向 L=A+8

竖向 H=B+8

设光字牌屏边框为 20mm，则光字牌屏外形尺寸：横向 A+40，竖向 B+40。

图 4（A）为组装式光字牌安装开孔尺寸。

例如：组合 8（横向）×3（竖向）光字牌排列，假如每个光字牌尺寸为 40×80(mm)，则开孔尺寸为：L=A+8=640+8=648（横向）、H=B+8=120+8=128（竖向）。

3.5.电源

系统配备三组直流电源：+5V、+24V（A）、+24（B），分别用于微处理器控制，光字牌 LED 供电及输入信号接点电压。三组电源通过电源分配总线（端子排引出）到各部分，当分配总线中的一路有故障时，机内自备电源立即进行监控指示。三组电源安装于机柜上部。隔离变压器安装在机柜底部。

4.微机报警系统原理

报警系统是监视用户系统信号的装置，一旦发现用户系统异于平时正常信号时，报警系统报警。例如，平时某触点是常开的（或常闭），当监测到这对触点闭合（或断开）时，报警系统铃响，相应信号的光字牌闪光，提醒值

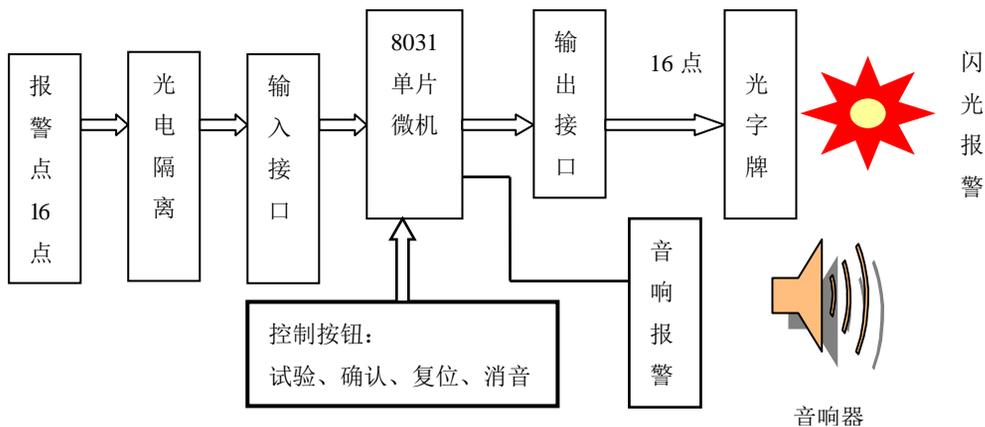


图 5 8031 单片机报警控制单元

班工作人员某处发生了故障，或开始了某过程，图 5 为报警单元结构框图。

图 5 中控制器采用 8031 微处理器，控制程序放在 EPROM2764 内。控制台

为四个按钮：试验、确认、复位、消音。各按钮功能见表 1。

表 1 功能按钮使用说明

| 按钮名称 | 功 能 |
|------------|-----------------------------|
| 试验 TEST | 进行闪光，音响，程序执行的全功能试验 |
| 确认 ACK | 当报警时，确认后闪光即停止变为平光显示，同时音响器消音 |
| 复位 RESET | 当报警信号已撤消或过程恢复正常后，手动复位 |
| 消音 SILENCE | 消音按钮按动后音响即消失 |

5.操作使用方法

5.1.开机和系统指示

当微机报警系统各部分安装连接完毕后，便可将机柜下方的总开关合上开机通电，通电后电源单元上电压表指示正常，监控单元面板上的 15 个电源分配总线故障指示灯均不亮，每个报警单元面板上第一个“闪光报警指示”应该闪光，这样表示整个系统内工作基本正常。

5.2.自检测试

报警系统可由监控单元面板上的试验按钮或盘上的试验按钮对 160 点报警通道进行自检测试，按下试验按钮时光字牌应闪光、音响报警，表示 160 点自检测试全部正常，可以投入使用。

5.3.报警控制按钮的操作

盘上的各组报警控制按钮中的“试验”“复位”、“确认”、“消音”电气上均是并接使用。现场来的任何一个报警信号都能使对应的光字牌闪光且铃响。首出点快闪，后续点慢闪。当按动“确认”按钮后则闪光变为平光，同时音响消除，若接着又有新的报警信号则该点对应的光字牌闪光，且响铃。而已确认过的报警点继续保持平光，报警点撤消，对应光字牌熄灭。见表 2。

表2 四个按钮报警工作状态

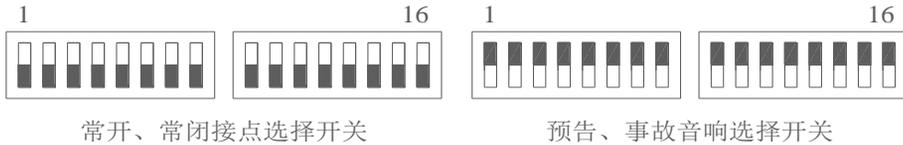
| XXS-99 报警器 | 正 常 | 报警 | | 确认 | | 试验 | 消音 | 复位 |
|---------------|--------|----|----|----|----|-------|-------|--------|
| | | 首出 | 后续 | 首出 | 后续 | 按下不释放 | | |
| 光字牌 | 灭 | 快闪 | 慢闪 | 平光 | 平光 | 全部闪光 | 保持原状态 | 报警撤消则灭 |
| 音响 | 不响 | 响 | 响 | 不响 | 不响 | 响 | 不响 | 不响 |

5.4.微机报警插件板

每一块报警插件板均为独立对 16 个报警点进行报警的控制单元，每块插件板的正面有四个指示灯，最上面的指示灯为同步闪光指示，其他三个灯亮分别表示微处理器、信号公共接点（AP）电压和光字牌公共电压正常。每块微机报警插件板可以在机内互换替代。

5.5.常闭、常开触点的混合选择

每块微机报警插件板的 16 个报警点，可以根据发电机组的常开、常闭接点进行混合选择。选择方法只要将报警插件板上的 16 个微型拨动开关按常闭、常开方向拨动即可。同样可选择“预告音响”与“事故音响”，见图 6。

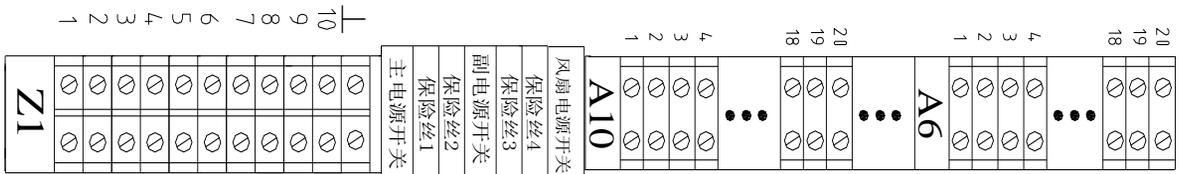


备注：

1. 此图所示拨动开关位置均为“常开接点”、“预告音响”位置。
2. 倘若要选“常闭接点”位置，则将拨动开关往上拨。同样要选“事故音响”则将拨动开关往下拨。
3. 每一组16个拨动开关相对应于1-16个接点信号，每个接点信号都可以有独自选择，互不干扰。

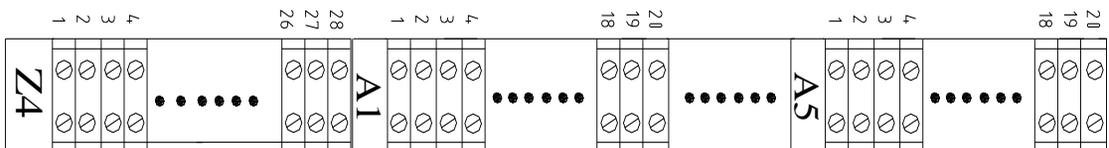
图6 输入接点状态选择与报警级别选择

附 1：接线端子排列图



机箱背面左侧接线端子

机箱背面右侧接线端子



附 2: 接线端子接线说明

A1~A10信号输入端子接线说明

(A2、A3、A4、A5、A6、A7、A8、A9、A10同上)

| | | | | | | | |
|------------------|------------------|---|---|-------|---------------|-------------------|-------------|
| A1/1 | A1/2 | | | A1/19 | A1/5、10、15、20 | | |
| #1报警板 第一点报警信号 | #1报警板 第二点报警信号 | ● | ● | ● | ● | #1报警板 第十六点报警信号 | #1报警板 AP |

Z1 接线端子接线说明

| | | | | | | | | | |
|-----|-----|-----|-------------|-------------|----|------------|------------|-------------|-------------|
| 1、2 | 3、4 | 5~6 | 7、8 | 9、10 | ⊥ | 主电源开关 | 保险丝1、2 | 副电源开关 | 保险丝3、4 |
| 铃1 | 铃2 | 空 | ~220V A相 | ~220V N相 | 接地 | 主电源 总开关 | 主电源 保险丝 | 监控电源 总开关 | 监控电源 保险丝 |

Z4接线端子接线说明

| | | | | |
|-----|------|-------|-------|-------|
| 1~5 | 6~10 | 11~15 | 16~20 | 21~28 |
| 试验 | 复位 | 消音 | 确认 | AP |

XXS-99 Computer Signal Alarming System

C O N T E N T S

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1. Computer Signal Alarming System and Application (Wu Yanan)

Shanghai 《Automation Meters》 88, 9th Period

2. XXS-87 Computer Signal Alarming Setup (Wu Yanan, Xu Zhenhai)

Irrigation Electric Power Department 《Electric Power Technology》

89, 2nd Period

1. Overview

XXS-99 Cabinet Type Alarming System is the threshold-crossing alarming in large dynamotor group and protection alarming in chemical industry. The system takes advantage of the characteristics of software and hardware control of contemporary era to meet the requirement of different capacity and operation control which can be widely used in electric power, chemical industry, petroleum, metallurgy and so on. It is the indispensable equipment guaranteeing secure operation of all equipments and system.

Characteristics of XXS-99 Cabinet Alarming System:

1.1. Adopt high performance INTEL8031 single-chip computer as control core to group parent system of multiple microprocessor. It owns the advantages of high credibility, good stability, and strong anti-jamming ability.

1.2. Computer adopts the format of standard module structure to meet the requirement of different capacity with the advantages of universal parts, flexible expansion, easy operation and maintenance.

1.3. Available to the requirement of flash acoustics alarming of large dynamotor of electric power system.

1.4. In order to enhance the ability of anti-jamming, adopt effective measure of anti-jamming of electric network in hardware and software, such as optoelectrical separation, power supply filter, screen, once program “fly away” but “fly back” immediately.

1.5. Offer optoelectrical users with special control procedure frozen EPROM2764.

2. Main Technique Index

2.1. Input Signal:

2.1.1. The contact of normal close and normal open can be mixed selected a twill by rocker dual in-line package switch in the component board of alarming unit to select.

2.1.2. Have optoelectronic separation equipment

2.1.3. Have selection switch of signal unblock

2.1.4. Can be re-transmitted (return) .

2.2. Alarming points: 160 points.

2.3. On-site contact voltage:+24V (DC)、current: 7mA (offered by alarming system) .

2.4. Button of operation control: four buttons of “test”, “confirm”, “silence”, “reset” is a group which can be grouped to contact to operation console.

2.5. Indication equipment: LED illuminant light-word plate. Alarming signal firstly quickly glitters and later slowly glitters. Initial alarming signal quickly lightens and sequent one slowly lightens.

2.5.1. Light-word plate: dimension of each light-word plate: three kinds of 48mm×96mm、32mm×72mm、40mm×80mm. The light-word plate has color of red, green, yellow and so on which can be selected according to different supervision by users.

2.5.2. Combination mode of light-word plate: random combination, see fig.4.

2.5.3. Acoustics Equipment: ringing or buzzer. Normal acoustics and emergency acoustics.

2.6. Stable voltage power: Microprocessor uses +5V/20A switch power, signal contact uses +24V/4.2A, light-word plate uses +24V/20A and supervision unit uses multiple switch power.

2.7. External dimension of cabinet: 2.1 meters in height, 0.70 meters in width, 0.60 meters in depth (special dimension can be customized.)

2.8. Terminal socket and cable:

2.8.1. Input signal terminal socket 10 blocks and each block has 16 signal contacts.

2.8.2. Signal input cable enters cabinet via ground groove by dynamotor group. Light-word plate connects output cable (19 chips) which can induct to cabinet from the bottom of cabinet. The length of cable is decided by users.

2.9. Integrated consumption: not more than 150 watt in normal application and less than 760 watt in test.

2.10. Environment temperature: 0℃~60℃.

3. Structure and Installation of Computer Alarming System

XXS-99 computer alarming system is cabinet structure. The dimension of cabinet is 2.1 meters in height, 0.70 meters in width and 0.60 meters in depth (special dimension can be instructed when ordered and can be customized). The location of each part in the interior of cabinet can be seen in fig.1, fig2, among which fig.1 is cabinet front view and fig.2 is cabinet back view.

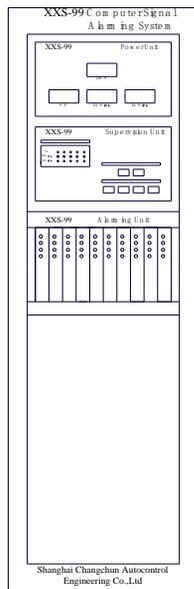


Fig. 1

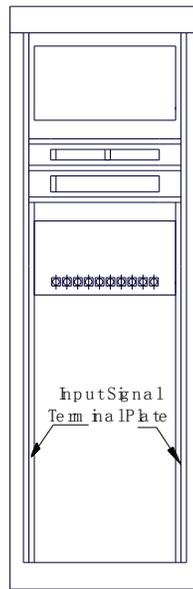


Fig. 2

3.1. Terminal Socket Alarming Signal

Terminal socket alarming signal is shown as fig.2 which is in the two side of right and left in the back of cabinet. The right is A1~A5 (80) signal input terminal. The left is A6~A10 (80) signal input terminal. It access alarming parts board of computer alarm unit with dynamotor group's alarming contact via cable. (see appendix 1 and appendix 2 for connector terminal arrangement and connector instruction).

3.2. Parts Board of computer alarming

In the alarming unit of fig.1, 10 blocks of alarming parts board can be inserted. There are 10 alarming points in each alarming parts board. Alarming contact can be normal open contact and normal close contact. Each board has the same structure and interactively substituted to use. Each alarming parts board has four light emitting diode indicator light which is job instruction. When it is in operation, the first LED light emitting diode in the upper end is normal lightening in normal work. When it is fat light or dull, it means that the alarming board has failure. At that time, pull out failure board (can plug-in with power) and change with new board.

3.3. Supervision Unit

Supervision unit is the supervision and control core of the whole alarming system. Fig.3 is panel view of supervision unit. Its left is "power distribution supervision", among which there are 15 light indicator light respective showing the

work condition of the power of 5 lines 3 groups (5V,24V(A),24V(B)). lightning means failure happening in the power in the group. Its right is control button.

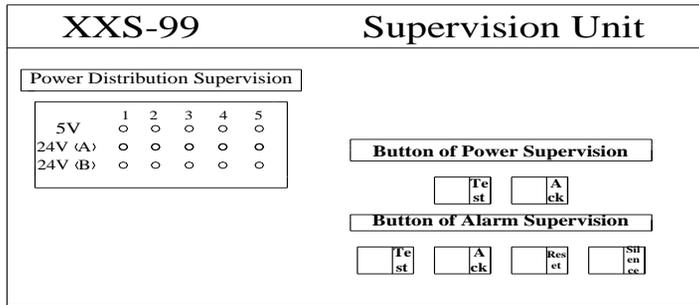


Fig.3 Supervision Unit Panel

3.4. Light-word Plate Group:

Light-word plate of XXS-99 computer alarming system is grouped to be installed in plate. Each group is arranged by random matrix mode, for example, $6 \times 6=36, 6 \times 4=24, 8 \times 3=24$ arrangement can be selected. Dimension of each hole can be seen in fig.4 and can be arranged according to on-site requirement. Each group of light-word plate in each plate can be connected to the back of alarming unit to connect with alarming parts via cable with NX19 chips aeronautical connector.

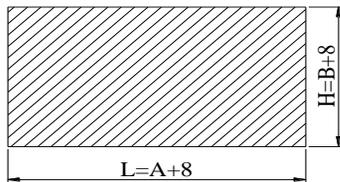


Fig.4 (A) Dimension of hole of Light-word plate combination

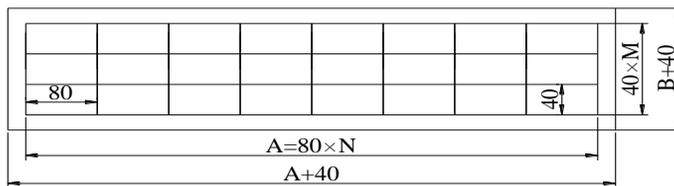


Fig.4 (B) 3x8 Light-word plate arrangement image

Calculation of dimension of hole: dimension of each light-word plate: three kinds of height x width (mm): $48 \times 96, 40 \times 80, 32 \times 72$.

Suppose that N is the number of landscape orientation of light-word plate and M is the number of vertical orientation, the dimension of external screen of light-word plate is::

Landscape Orientation $A = \text{width of each light-word plate} \times N$

Vertical Orientation $B = \text{height of each light-word plate} \times M$

Therefore, the installation hole dimension in plate:

$$\text{landscape orientation } L = A + 8$$

$$\text{Vertical orientation } H = B + 8$$

Suppose the frame of the screen of light-word plate is 20mm, the external dimension of external screen of light-word plate: landscape orientation $A + 40$, vertical orientation $B + 40$.

Fig. 4 (A) Hole Dimension of installation of combination light-word plate

For example: combination 8 (landscape orientation) \times 3 (vertical orientation) light-word plate arrangement, if the dimension of each light-word plate is 40×80 (mm), the dimension of hole is $L = A + 8 = 640 + 8 = 648$ (landscape orientation), $H = B + 8 = 120 + 8 = 128$ (vertical orientation).

3.5. Power

System is equipped with three group of direct current power: +5V, +24V(A), +24V(B) which is respectively used in microprocessor control, light-word plate LED power supply and input signal contact voltage. Three groups of power distribute bus circuit (educe from terminal socket) to each parts via power. When one line of distributed bus circuit has failure, the self-prepared power in the computer will immediately supervise the indication. Three groups of power install in the upper of cabinet. Separation transformer is installed in the bottom of cabinet.

4. Theory of Computer Alarming System

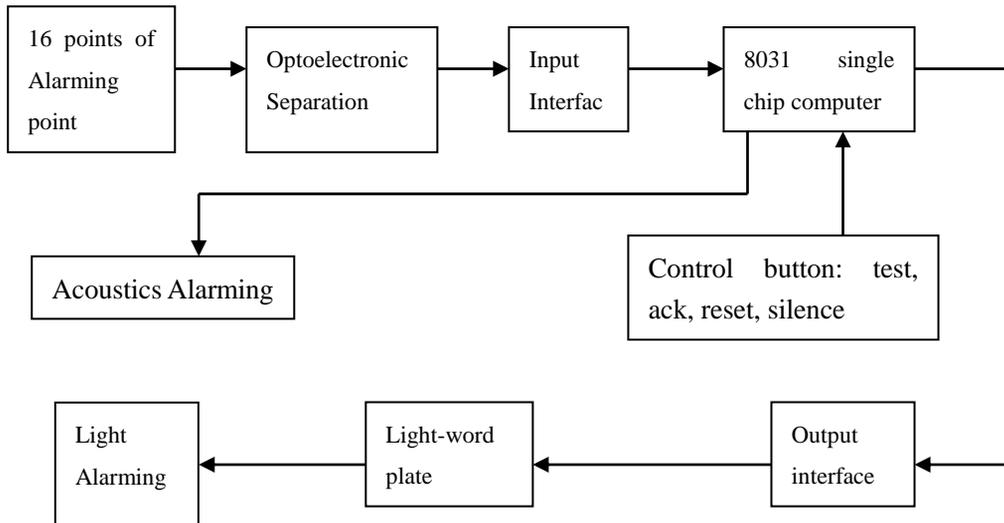


Fig.5: 8031 single chip computer alarming control unit

Alarming system is the equipment to supervise users' system signal. Once users' system is found to be different from normal signal, the alarming system will alarm. For example, certain contact in usual time is normal open (or normal close). When the contact is found in close (or cut down), alarming system will ring and corresponding light-word plate will flash to remind personnel in charge of failure eng. Or begin certain process. Fig. 5 is the structure image of alarming unit.

The controller in fig.5 adopts 8031 microprocessor and the control program is put in EPROM2764. The console is four buttons: test, ack, reset, silence. See function of each button in Table.1.

Table 1 Instruction of function button

| Button Name | Function |
|-------------|---|
| TEST | Test the full function of lightening, acoustics, procedure implement |
| ACK | When alarming, after confirmation, lightening stop soon and become fat light, meanwhile, acoustics equipment silence. |
| RESET | When alarming signal retract or after the procedure resume to normal, the manual operation reset. |
| SILENCE | After clicking silence button, acoustics disappears. |

5. Methods of Operation

5.1. Start-up and System Indication

After the completion of the installation and connection of each part of micro computer alarming system, the general switch below the cabinet closes to start-up and electrify. After electrified, the voltage table in power unit indicates normal. The failure indicator of 15 power distribution in supervision unit panel is dull. The first "Light Alarming Indication" in each alarming unit panel shall light which shows the normal work of the whole system.

5.2. Self-test

Alarming system can self-test 160 alarming channel by the test button in supervision unit panel and the test button in panel. When pressing test button, light-word plate shall lightening and acoustics alarms showing that 160 self-test are normal and can be exerted to use.

5.3. Operation of Alarming Control Button

Then button of alarming control of each group in plate of "test", "reset", "confirm" and "silence" are combined to use. Any on-site alarming signal can make corresponding light-word plate lighten and ring. The initial point lightens quickly and sequent point lightens slowly. When pressing the button of "confirm", the light

becomes flat light and meanwhile acoustics is silent. If there is new alarming signal, the corresponding light-word plate lightens and rings. The confirmed alarming point continues to keep flat light and alarming point retracts as well as corresponding light-word plate goes out. See table 2.

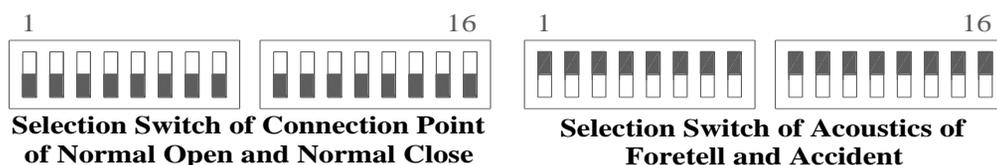
| Table 2 Alarming work condition of four buttons | | | | | | | | |
|---|--------|-------------|------------|------------|------------|---------------------|-------------------------|----------------------------|
| XXS-99 | Normal | alarming | | confirm | | test | Silence | reset |
| annunciator | | initial | sequent | initial | sequent | Press without loose | | |
| Light-word plate | Go out | Quick light | Slow light | Flat light | Flat light | All light | Keep original condition | Cancel alarming, then dull |
| acoustics | mute | ring | ring | mute | mute | ring | mute | mute |

5.4. Computer Alarming Parts Board

Each alarming parts board is the control unit which alarms independent according to 16 alarming point. The face of each parts board has four indicator light and the top indicator light is synchronization light indication and the other three lights respectively show microprocessor, signal public connector (AP) voltage and light-word plate public voltage normal. Each computer alarming parts board can be interactive substituted.

5.5. Mix selection of contacts of normal close and normal open

16 alarming point of each computer alarming parts board can be mixed to select according to the normal close and normal open contacts of dynamotor group. The method of selection is only to rocker the switch according the direction of normal close and normal open. "Foretell acoustics" and "accident acoustics" can be selected. Please see fig.5.

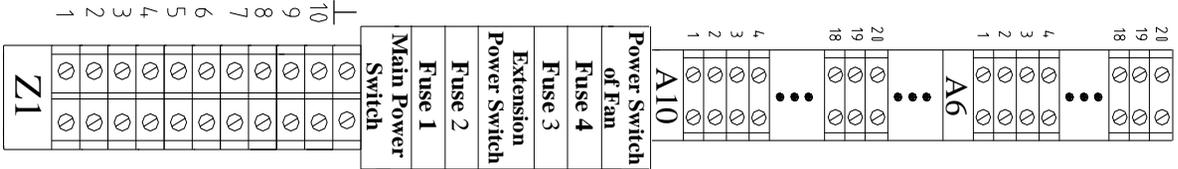


Remarks:

1. The rocker switches shown in the picture are both the location of "Normal Open Connection Point" and "Forecast Acoustics".
2. If selecting "Normal Close Connection Point", pull up the rocker switch. Alike, selecting "Accident Acoustics", pull down the rocker switch.
3. 16 rocker switches of each groups corresponds to 1-16 connection point signal which has independent connection point signal without interference.

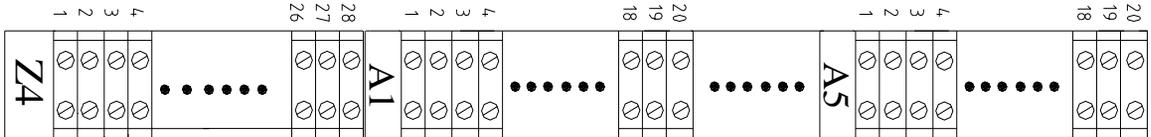
Fig.6 shows selection of connection point status and selection of alarming class.

Appendix 1: Figure of Connection Terminal Socket Arrangement



Connection terminal of the left side of the back of cabinet

Connection terminal of the right side of the back of cabinet



Appendix 2: Instruction of connection of connection terminal

Instruction of connection of A1~A10 signal input terminal
 (Alike A2, A3, A4, A5, A6, A7, A8, A9, A10)

| | | | | |
|---|---|-------|--|----------------------|
| A1/1 | A1/2 | ••••• | A1/16 | A1/5, 10, 15, 20 |
| #1 alarming board 1 point alarming signal | #2 alarming board 1 point alarming signal | | #16 alarming board 1 point alarming signal | #1 alarming board AP |

Z1 instruction of connection of connection terminal

| | | | | | |
|----------|----------|-------|---------|---------|-----------|
| 1, 2 | 3, 4 | 5~6 | 7, 8 | 9, 10 | ⊥ |
| Ringer 1 | Ringer 2 | empty | ~220V A | ~220V N | Grounding |

Instruction of connection of Z4 connection terminal

| | | | | |
|------|-------|---------|-------|-------|
| 1~5 | 6~10 | 11~15 | 16~20 | 21~28 |
| test | reset | silence | Ack | AP |