Hangar Door Operating System

EAGOSH Recommendation

May 2007

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Hangar Door Hazards

- **The function of the hangar doors is to open and close to allow aircraft, vehicles, equipment and personnel enter and exit**
- **The movement of the doors can produce hazardous situations which cannot be avoided in the design.**
- **These hazardous situations include collisions, impact, crushing, shearing and drawing-in points.**
- **Safety devices and operational procedures can be inserted and/or implemented to reduce the risk to the lowest level possible.**

Risks

- Collision of moving door with people, vehicles, aircraft, equipment
- Personnel riding on doors
- Personnel stepping in the path of moving door
- Entrapment of people as doors pass by each other.
- Entrapment of people as doors reach the Hangar end wall.
- Employees using the personnel door to enter or exit the Hangar while main door is moving
- Entrapment of limbs between doors as the move past each other
- Entrapment of limbs in wheels and cogs on drive motor
- Electric shock from electric door supply and power sources
- In manual operation possible misuse of or failure to use the tow bar
- In manual operation failure to follow the correct procedure for tow bar use

Controls

- **To reduce the risks to the lowest level reasonable practicable the following controls have been introduced.**
- **Interlocks on each set of personnel doors**
- **Two Safety Edges on the end of each door**
- **5 Flashing beacons on each door**
- **Warning sounders on each door which activate before door movement**
- **Emergency stops at each control switch on each door**
- **Emergency stop buttons at each personnel door and at end of each door**

Controls

- **Automatic stops on all doors at close position.**
- **Low speed operation (approx. 10 mtrs per min)**
- **All wheels and cogs fenced off.**
- **Preventative maintenance programme to include a weekly inspection of the safety devices on each door.**
- **Fence off the inside of each door to prevent ride on, or other events which could lead to personnel entering into or on the doors.**

Controls

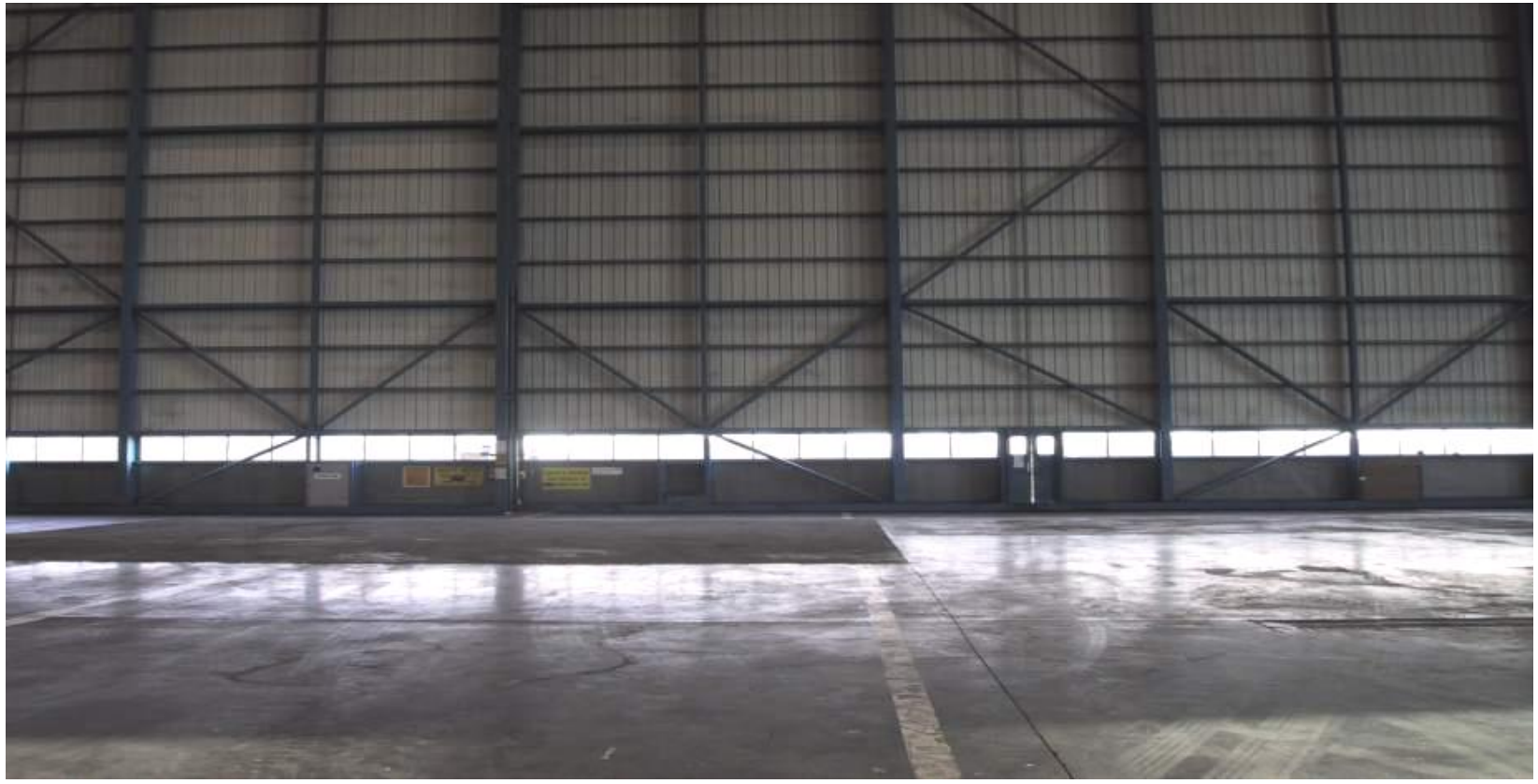
- **Install magnetic locks on personnel doors which are activated by the main door movement to prevent door opening.**
- **Change the control button operation into a Joystick type control which will be easier for the operator to activate and understand.**
- **Upon installation of the controls undertake a staff briefing on the new method of operation**
- **Position the tow bars at a central location.**
- **Install new signage to outline the essential safety/operating instructions.**

Controls

- **Paint hi-visibility Chevron stripes inside and outside of each door**
- **Paint the tow bars a distinct hi-visibility colour.**
- **Paint the towing hitch a distinct hi-visibility colour.**
- **Paint along tracks with yellow/black colouring to highlight area of door tracks.**
- **Paint end of each door a Hi Vis colour**
- **All cogs and wheels on drive motors covered**
- **Electric safety control circuits**

Hangar Doors Before Upgrade

Hangar Doors Before Upgrade



Hangar Doors Before Upgrade

Improved Ground Markings

Door Interior Protection and Markings

Door Exterior Markings

Old Control Buttons

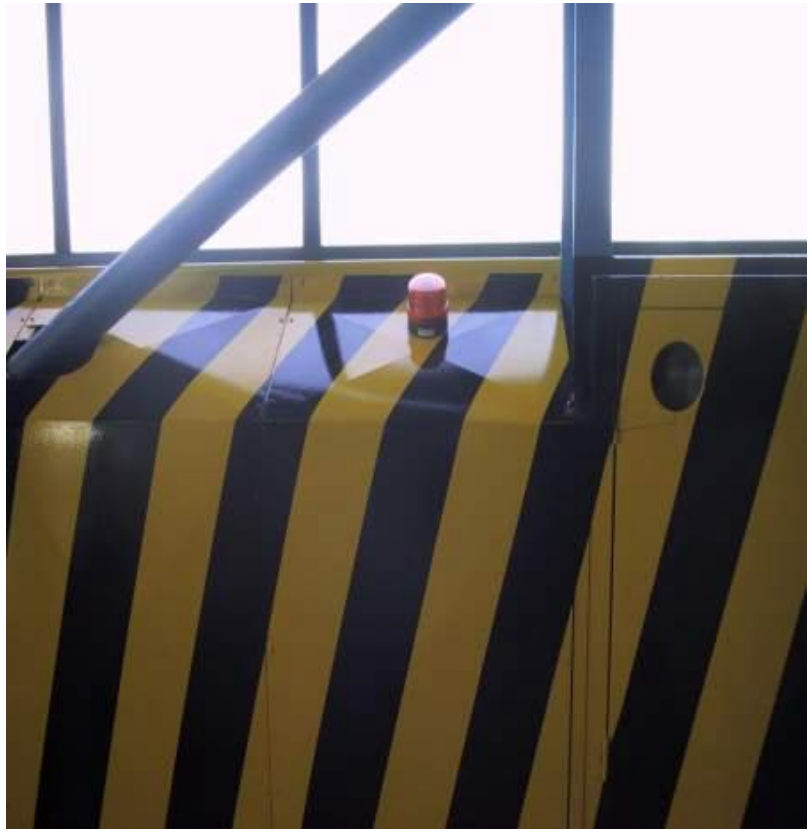
Control Station Interior

Control Station and Signage Interior

Control Station Exterior

Control Station and Signage Exterior

Warning Lights



Warning Lights and Emergency Stop

Warning Lights and Emergency Stop

Emergency Stops

Clutch Access Signage and Lock Out

Clutch Access Signage and Lock Out

Door End Emergency Stop, Signage and Light

Door End Safety Edges and Brushes

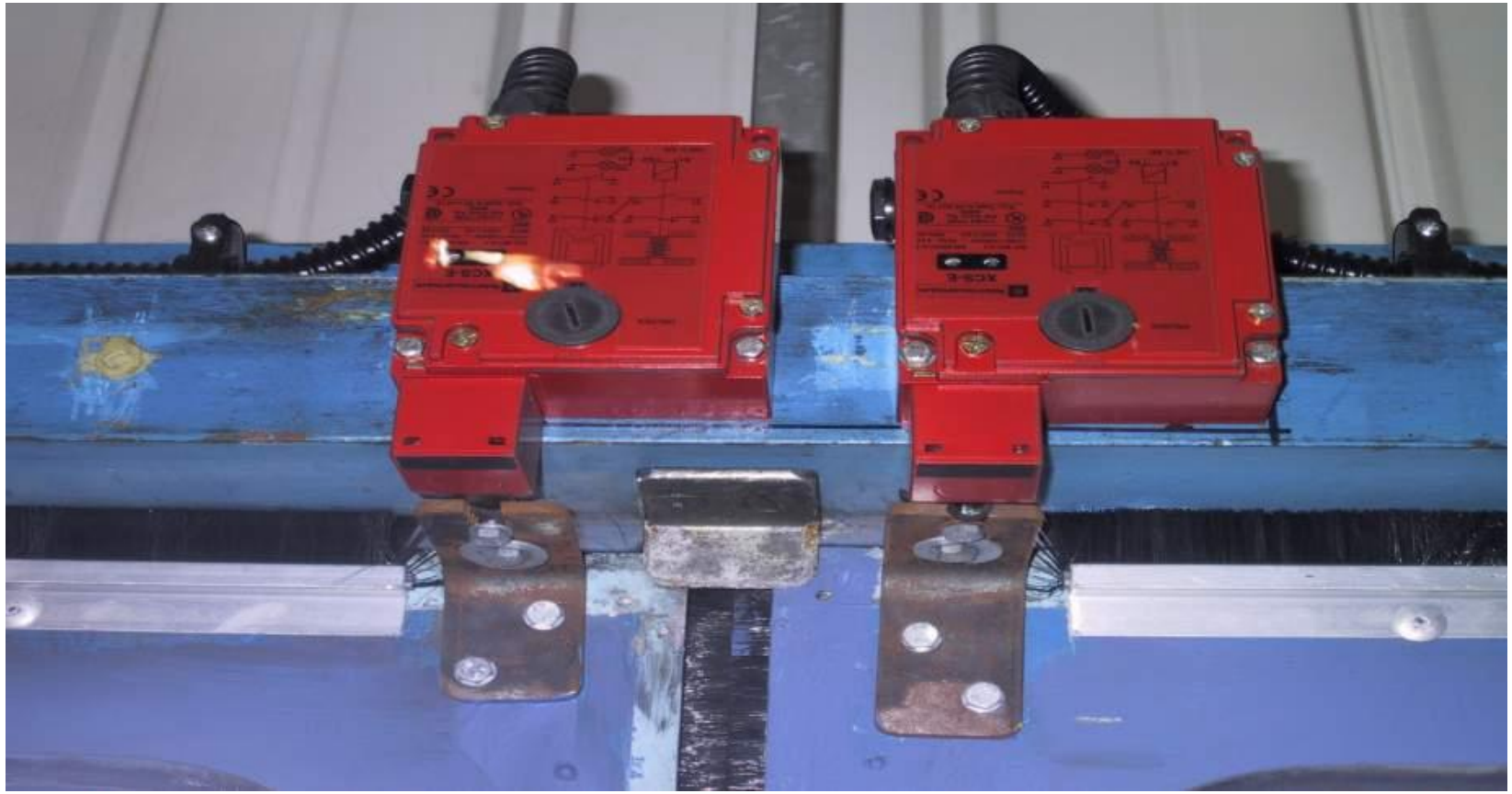
Clutch and Tow Hitch Signage

Clutch and Tow Hitch Signage

Tow Bar Location and Signage

Personnel Doors

Personnel Door Magnetic Locks



Safety Control System installed
On
Main Hangar Doors

Causes of Accidents in the Workplace

- Man-related factors
- Machine-related factors
- Plant-related factors

Man-related Factors

- Failure to comply with procedure
- Over familiarity with danger through habit
- Poor grasp of machine design and controls
- Underestimating the hazards – ignoring safety safeguards
- Lack of training/awareness
- Inadequate maintenance

Machine-related Factors

- Inadequate safety guarding
- Sophisticated nature of controls
- Inherent machine hazards
  - sudden starting
  - precarious stopping
- Machine not suitable to the application or environment

Plant-related Factors

- Movement of personnel
- Machinery using different technologies

Other Factors

- Possibility of overriding safety measures
  - Slows down production
  - Difficult to implement
  - Many operatives involved
  - Safety measures are not recognised as such
- Reliability of safety functions
  - Reliability of components and principles used
  - Component failure
  - Power failure or Electrical interference

Risk Assessment

Overall evaluation of the risk is a balanced consideration of all the above factors ensuring compliancy with:

- Current Regulations and Standards
- Industry Best Practice
- Further Internal Considerations to minimise the risk of an accident

Factors affecting the Risk – S,F,P

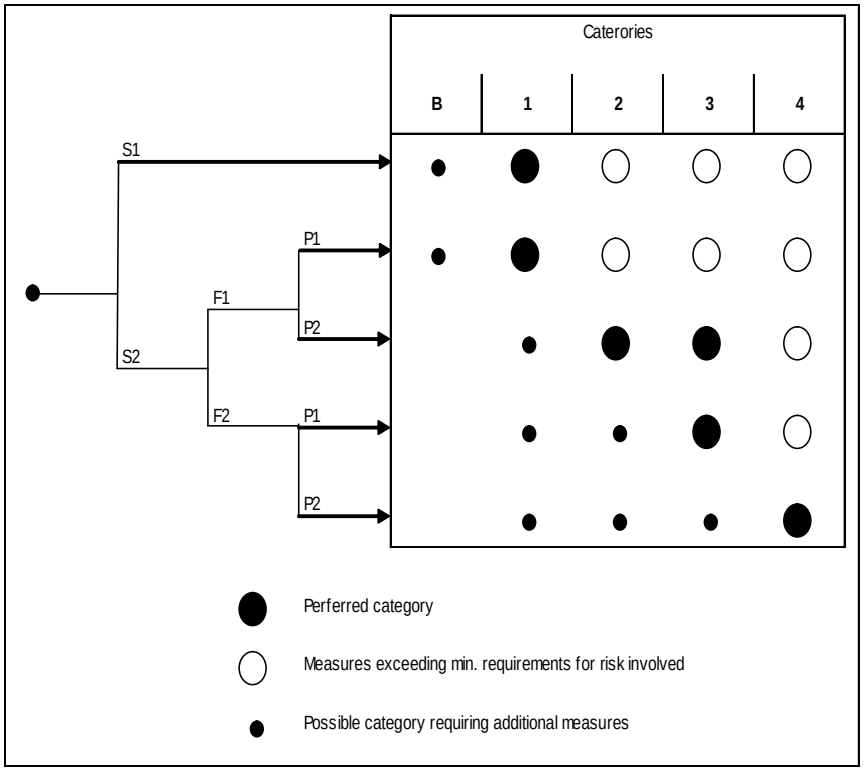
- **S** - Seriousness of possible injury
- **F** - Frequency and duration of exposure in the danger zone
- **P** - Probability of the risk occurring

Categories of Controls relating to safety conforming to EN 954-1

Category	Behaviour in the event of a fault
B	Possible loss of control function
1	Possible loss of control function but with less probability than with B
2	Fault detected at each test
3	Safety function ensured except in the event of an accumulation of faults
4	Safety function always ensured

Practical method for calculating a safety control category using factors S, F, P.

- **S** **Result of the accident**
- **S1** Slight injury
- **S2** Serious and permanent injury to or death of the person
- **F** **Presence in the danger zone**
- **F1** Rare to fairly frequent
- **F2** Frequent to permanent
- **P** **Possibility of preventing the accident**
- **P1** Possible in certain circumstances
- **P2** Virtually impossible



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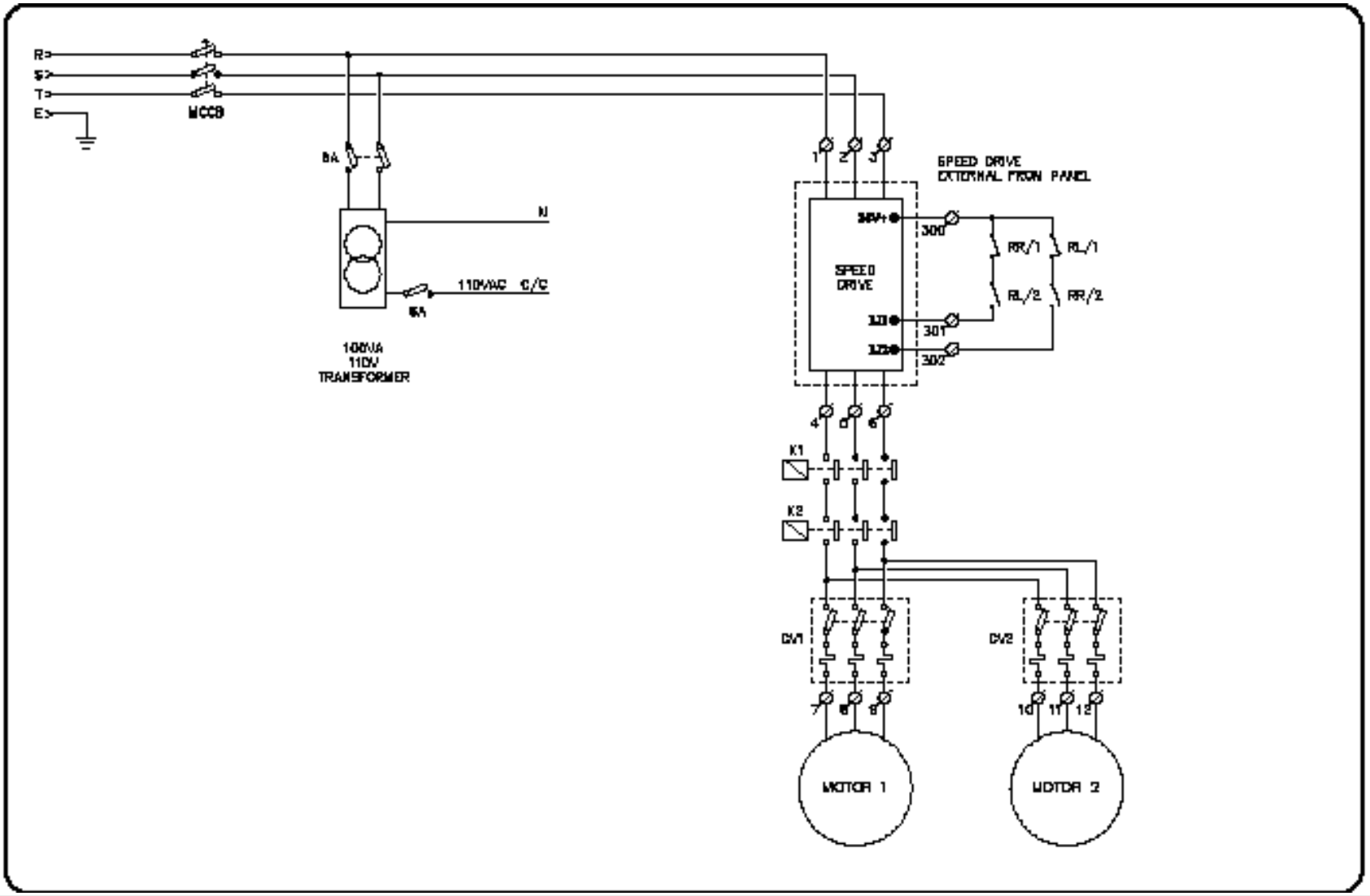

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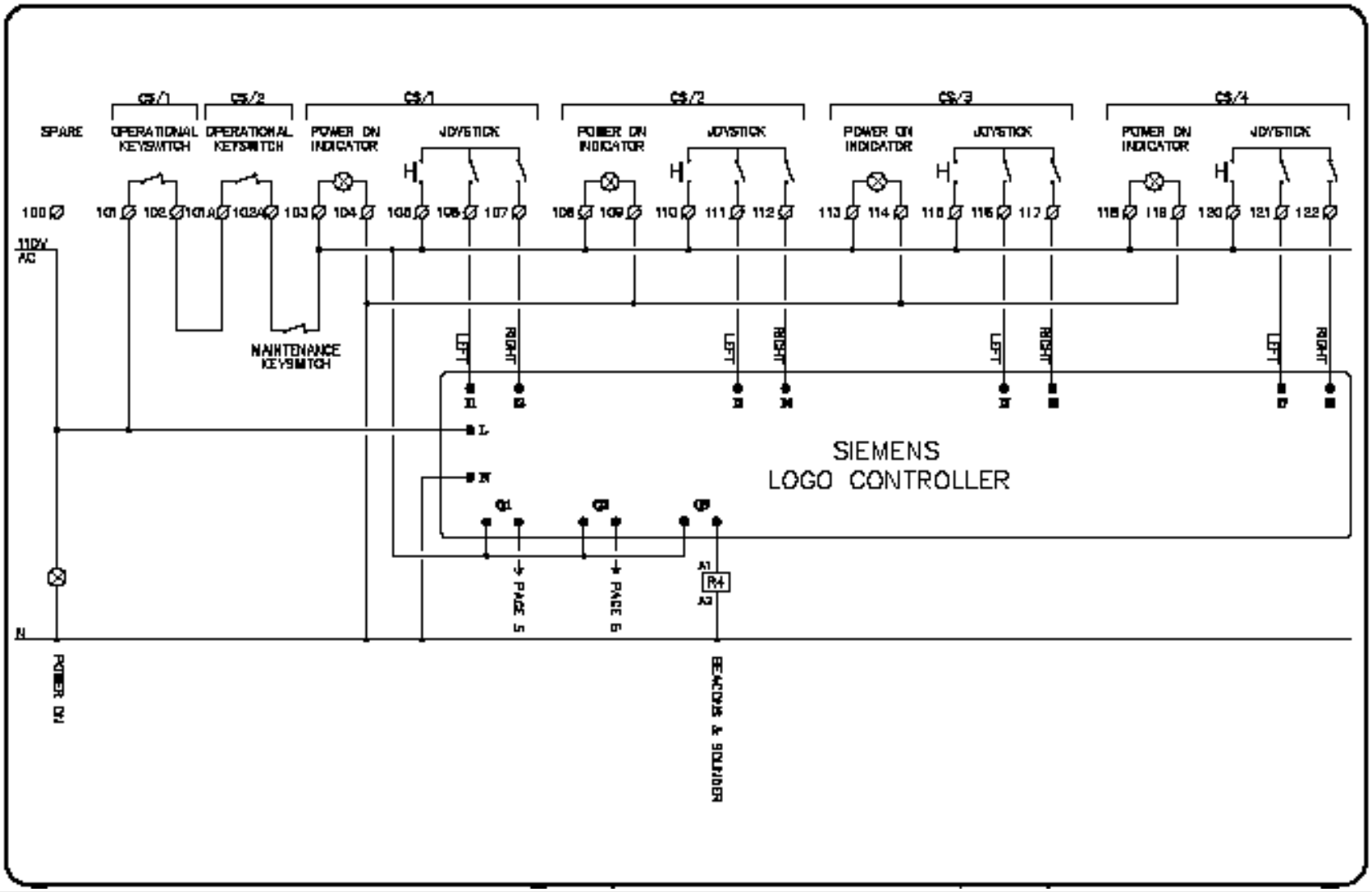

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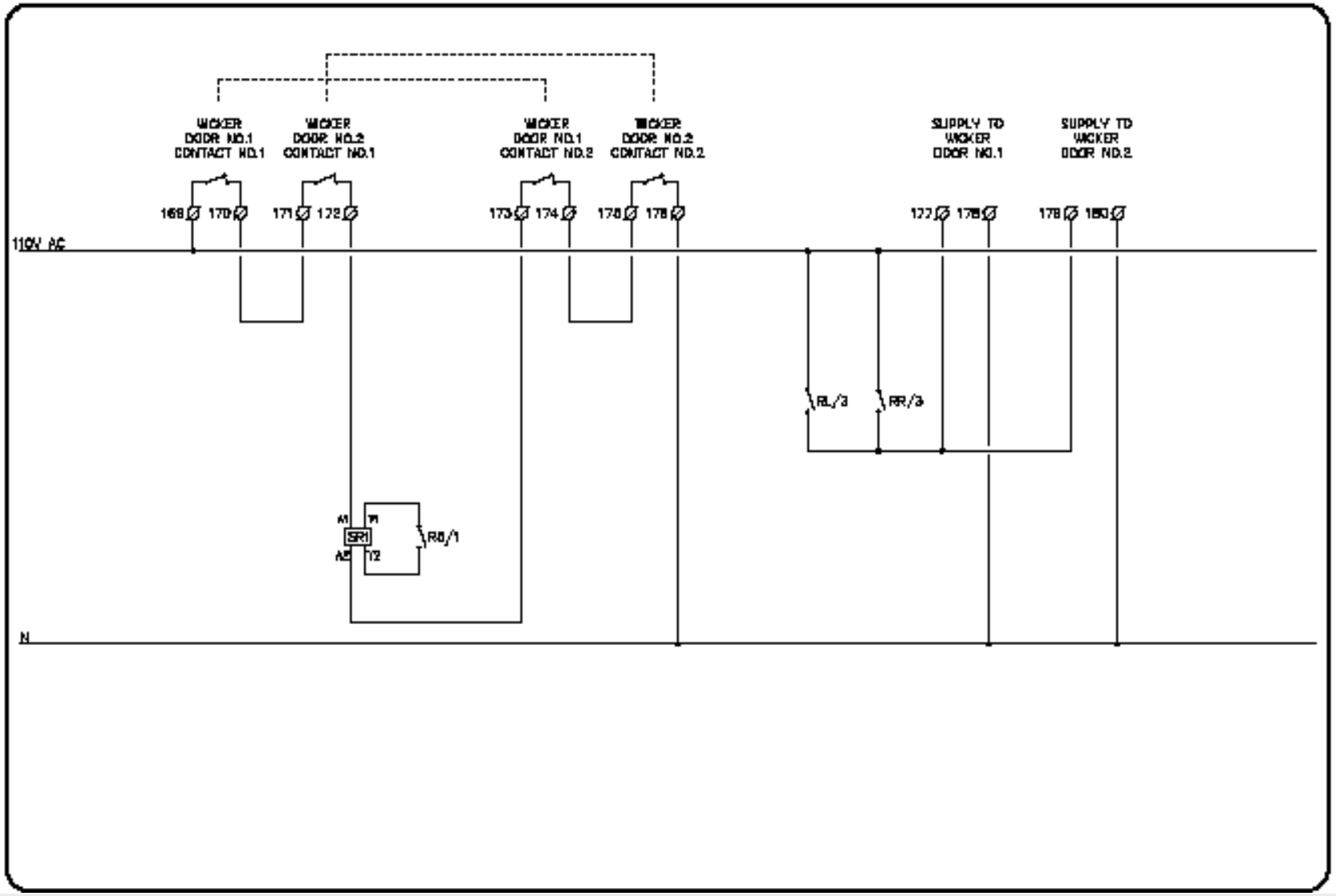

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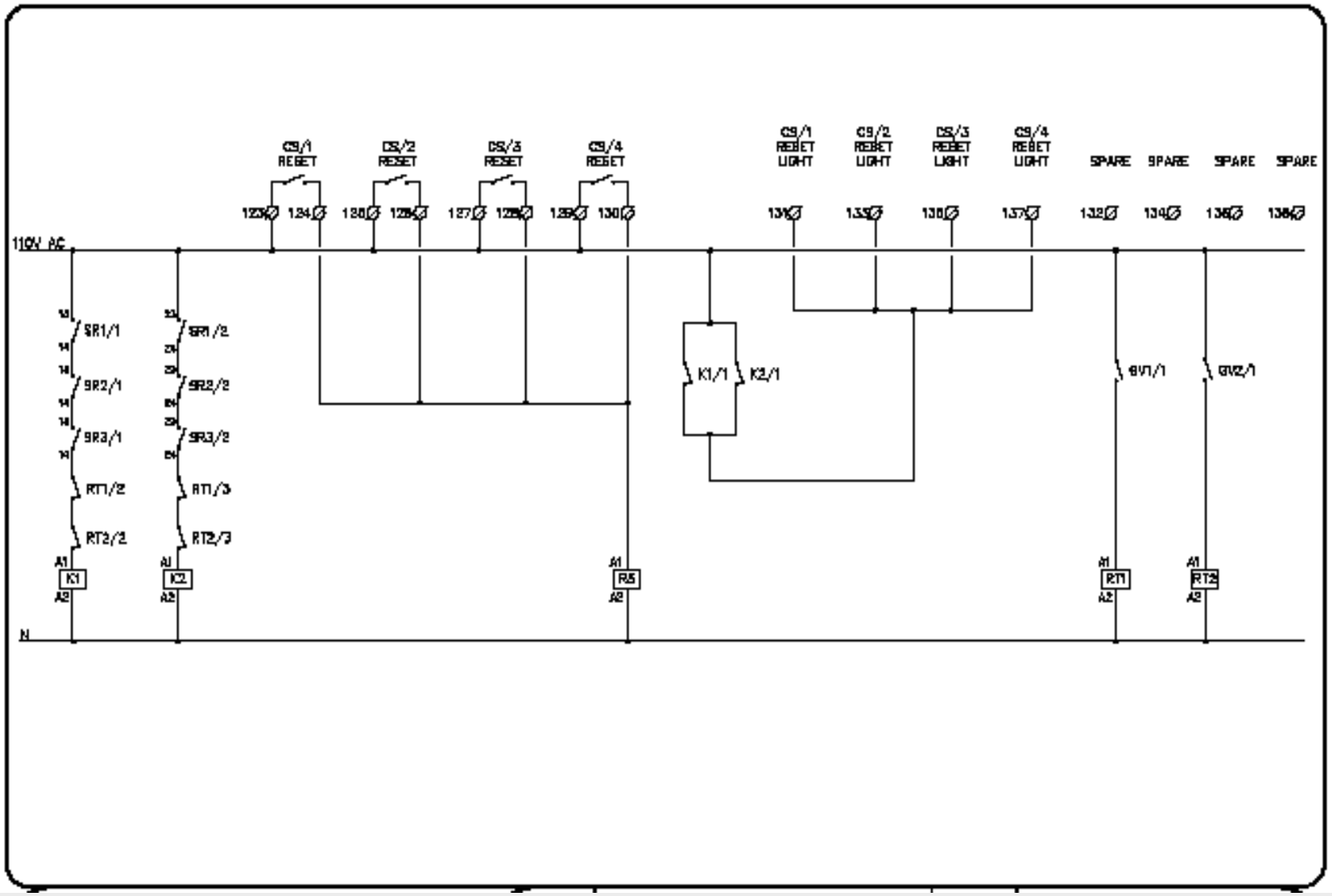
CS/1 RESET
CS/2 RESET
CS/3 RESET
CS/4 RESET
CS/1 RESET LIGHT
CS/2 RESET LIGHT
CS/3 RESET LIGHT
CS/4 RESET LIGHT
SPARE
SPARE
SPARE
SPARE
123
124
125
126
127
128
129
130
131
133
135
137
132
134
136
138
110V AC
SR1/1
SR2/1
SR3/1
RT1/2
RT2/2
SR1/2
SR2/2
SR3/2
RT1/3
RT2/3
K1/1
K2/1
GV1/1
GV2/1
K1
K2
R5
RT1
RT2
A1
A2
N

Thank you

- Any questions?