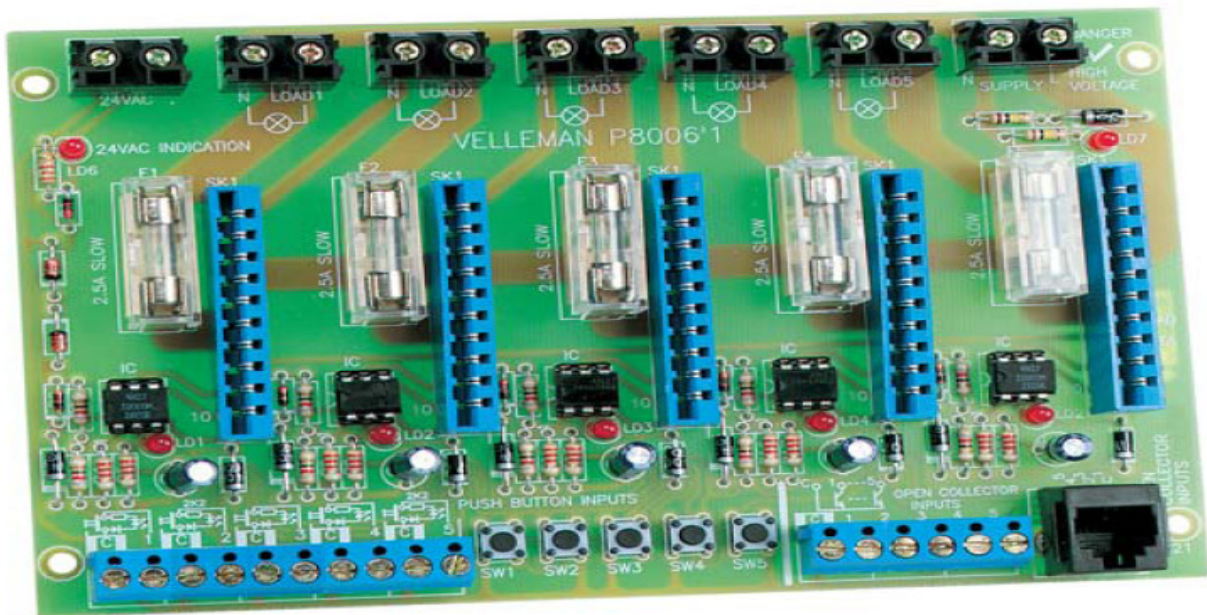


## Assembly Project (A)

### ‘Modular Light Control unit’

**(TIME 2 HOURS)**



#### **Contents:**

This base assembly unit is a modular light control system operated by multifunction relay sub assemblies. The Project consists of the following documentation:

- a) Construction instructions for 1 off (A.)
- b) Circuit diagrams
- c) Marking criteria
- d) Testing instruction

#### **INDUSTRIAL ELECTRONICS**

Submitted by:- Raymond Coyle  
TP16 Regional Competition  
United Kingdom  
Version 1.0 Date ----/2011

---

## Introduction:

- Perform the assembly in the order as set out in the detailed instructions.
- Position all components on the printed circuit boards as shown on the component layout diagram and solder.
- Where possible ensure that component values/identification marks can be read after assembly.
- Test the operation of the 'base unit' by plugging in the 'relay board' supplied into sockets Sk1 to Sk5 in turn.
- Candidates working processes will be observed throughout the competition to ensure that working methods conform to national health and safety standards.

## Marking Criteria:

A0	Assembly Project	Total---30.00 marks
A1	Mechanical assembly	10 Marks
A2	Component placement and lead forming	5.0 Marks
A3	Soldering Quality	10 Marks
A4	Testing	5.0 Marks

Note - 0.5 marks will be deducted for **each**:

- a) missing component.
- b) component leads not trimmed to acceptable quality standard.
- c) component that is damaged.
- e) observed unsafe working practice. (if judges deem that a candidate's working method(s) is likely to endanger the candidate's safety or another competitor's safety, said competitor could be eliminated from the competition)

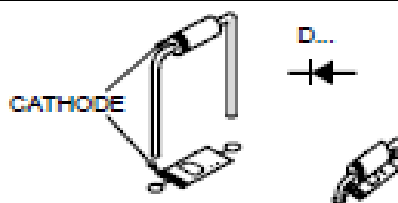
---

## INDUSTRIAL ELECTRONICS

Submitted by:- Raymond Coyle  
TP16 Regional Competition  
United Kingdom  
Version 1.0 Date ----/2011

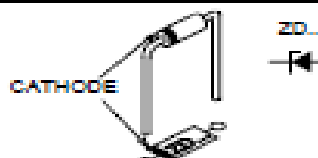
## Assembly Instructions: (A)

### 1. Diodes (check the polarity)



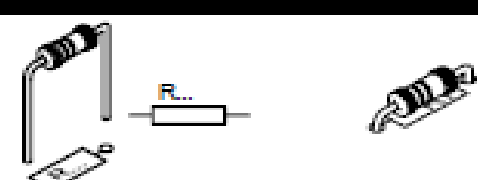
- D1 : 1N4148
- D2 : 1N4148
- D3 : 1N4148
- D4 : 1N4148
- D5 : 1N4148
- D6 : 1N4148
- D7 : 1N4007
- D8 : 1N4007
- D9 : 1N4007
- D10 : 1N4007
- D11 : 1N4007
- D12 : 1N4007
- D13 : 1N4007
- D14 : 1N4007
- D15 : 1N4007
- D16 : 1N4007
- D17 : 1N4007

### 2. Zener diodes (check the polarity)



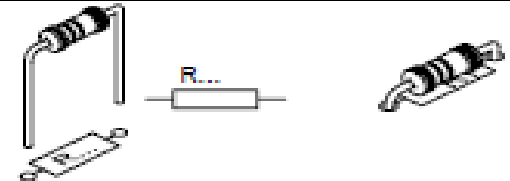
- ZD1 : 47V / 1,3W
- ZD2 : 47V / 1,3W

### 3. 1/4W Resistor.



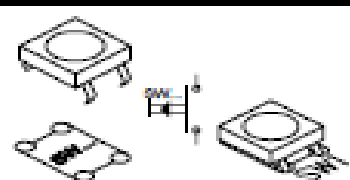
- R1 : 3K3 (3 - 3 - 2 - B)

### 4. 1/2W Resistors.



- R2 : 180 (1 - 8 - 1 - B - 9)
- R3 : 180 (1 - 8 - 1 - B - 9)
- R4 : 2K2 (2 - 2 - 2 - B - 9)
- R5 : 2K2 (2 - 2 - 2 - B - 9)
- R6 : 180 (1 - 8 - 1 - B - 9)
- R7 : 180 (1 - 8 - 1 - B - 9)
- R8 : 2K2 (2 - 2 - 2 - B - 9)
- R9 : 2K2 (2 - 2 - 2 - B - 9)
- R10 : 180 (1 - 8 - 1 - B - 9)
- R11 : 180 (1 - 8 - 1 - B - 9)
- R12 : 2K2 (2 - 2 - 2 - B - 9)
- R13 : 2K2 (2 - 2 - 2 - B - 9)
- R14 : 180 (1 - 8 - 1 - B - 9)
- R15 : 180 (1 - 8 - 1 - B - 9)
- R16 : 2K2 (2 - 2 - 2 - B - 9)
- R17 : 2K2 (2 - 2 - 2 - B - 9)
- R18 : 180 (1 - 8 - 1 - B - 9)
- R19 : 180 (1 - 8 - 1 - B - 9)
- R20 : 2K2 (2 - 2 - 2 - B - 9)
- R21 : 2K2 (2 - 2 - 2 - B - 9)
- R22 : 100K (1 - 0 - 4 - B - 9)
- R23 : 100K (1 - 0 - 4 - B - 9)

### 5. Pushbuttons



- SW1
- SW2
- SW3
- SW4
- SW5

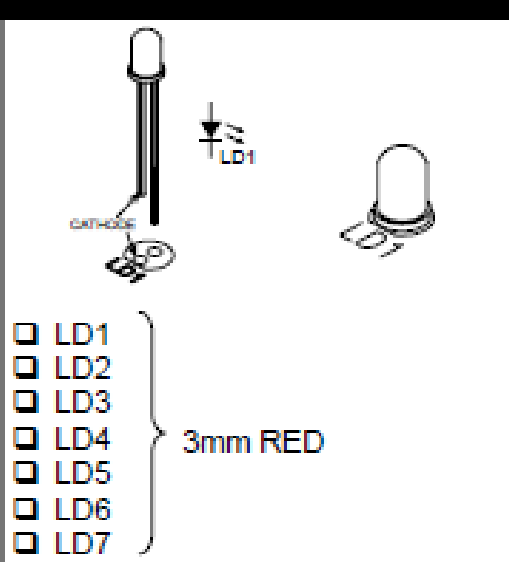
### 6. IC sockets



- IC1 : 6P
- IC2 : 6P
- IC3 : 6P
- IC4 : 6P
- IC5 : 6P

## Assembly Instructions: (A) Cont'd

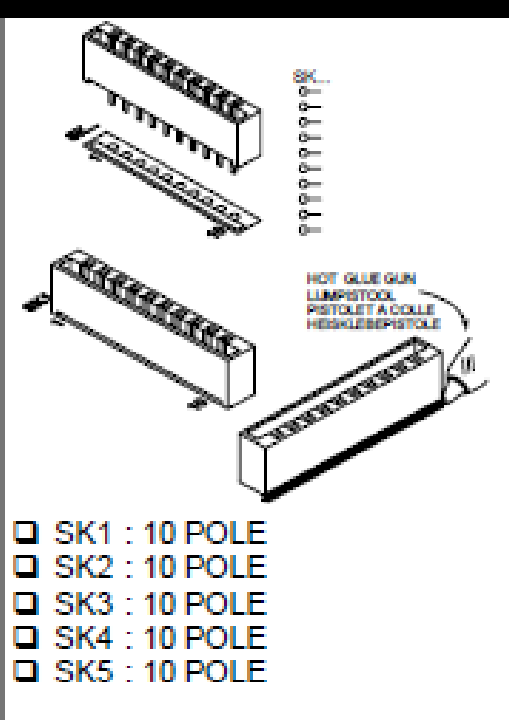
**7. LEDs. Watch the polarity!**



LD1  
 LD2  
 LD3  
 LD4  
 LD5  
 LD6  
 LD7

3mm RED

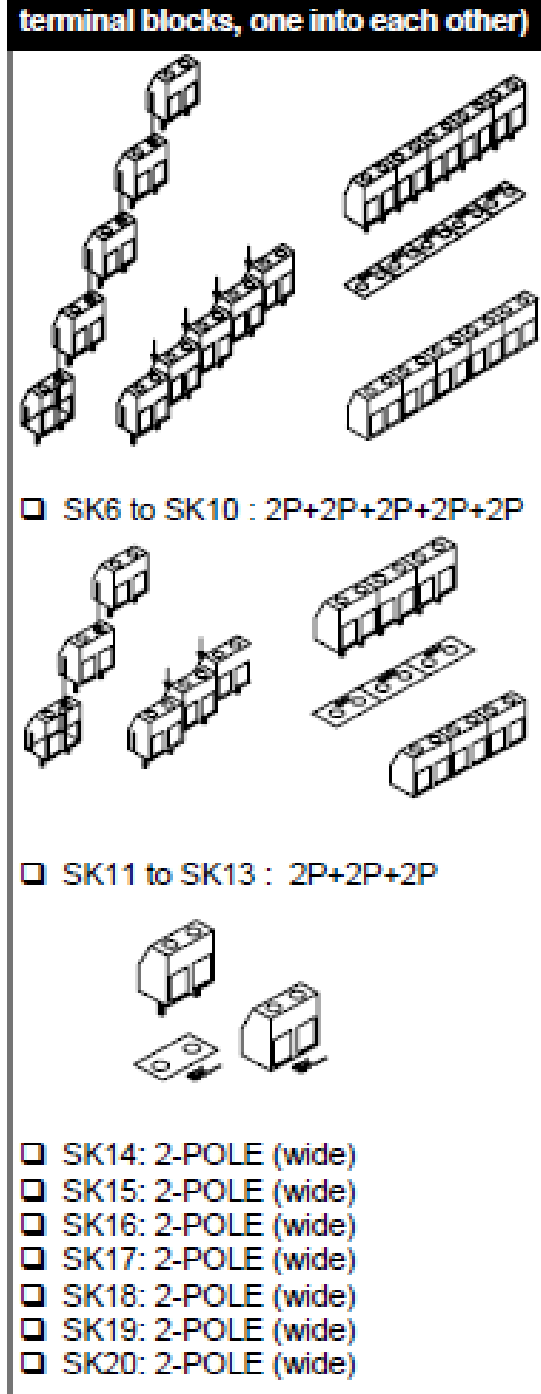
**8. PCB Edge Connectors (Watch the orientation!)**



HOT GLUE GUN  
LIMBSTÖCK,  
PISTOLET A COLLE  
HEISSKLEBERPISTOLE

SK1 : 10 POLE  
 SK2 : 10 POLE  
 SK3 : 10 POLE  
 SK4 : 10 POLE  
 SK5 : 10 POLE

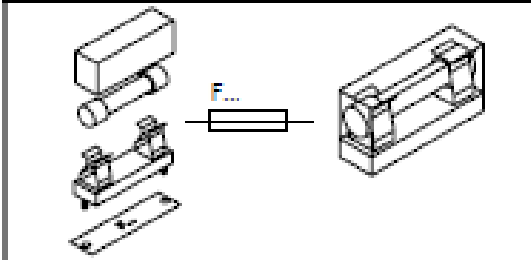
**9. PC Terminal blocks (Slide the terminal blocks, one into each other)**



SK6 to SK10 : 2P+2P+2P+2P+2P  
 SK11 to SK13 : 2P+2P+2P  
 SK14: 2-POLE (wide)  
 SK15: 2-POLE (wide)  
 SK16: 2-POLE (wide)  
 SK17: 2-POLE (wide)  
 SK18: 2-POLE (wide)  
 SK19: 2-POLE (wide)  
 SK20: 2-POLE (wide)

**Assembly Instructions: (A) Cont'd**

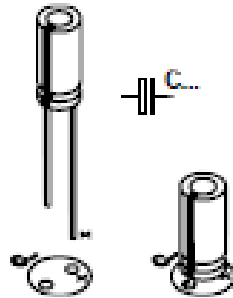
### 10. Fuse Holder + Fuse



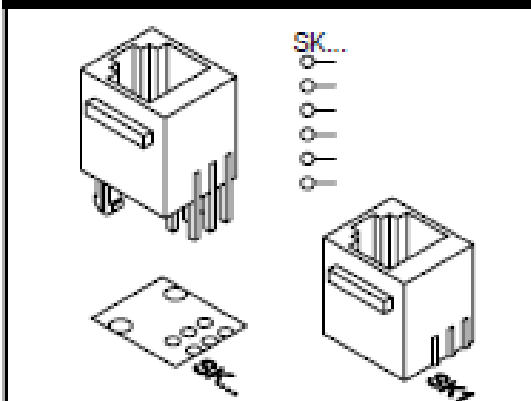
- F1 : 2,5A SLOW
- F2 : 2,5A SLOW
- F3 : 2,5A SLOW
- F4 : 2,5A SLOW
- F5 : 2,5A SLOW

### 11. Electrolytic capacitors. Check the polarity !

- C1 : 22µF/50V
- C2 : 22µF/50V
- C3 : 22µF/50V
- C4 : 22µF/50V
- C5 : 22µF/50V

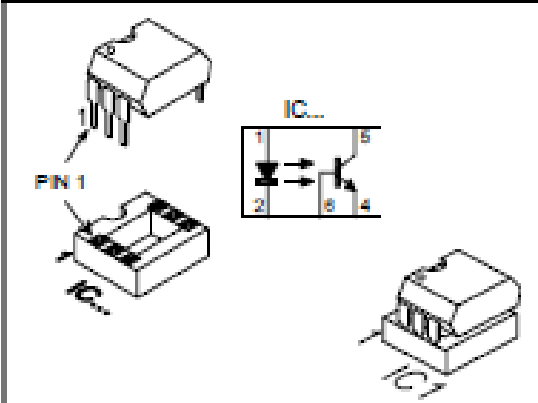


### 12. Modular Jack



- SK21 : 6-POLE

### 13. Insert the OPTO Coupler into the socket (Watch the position of the notch!)

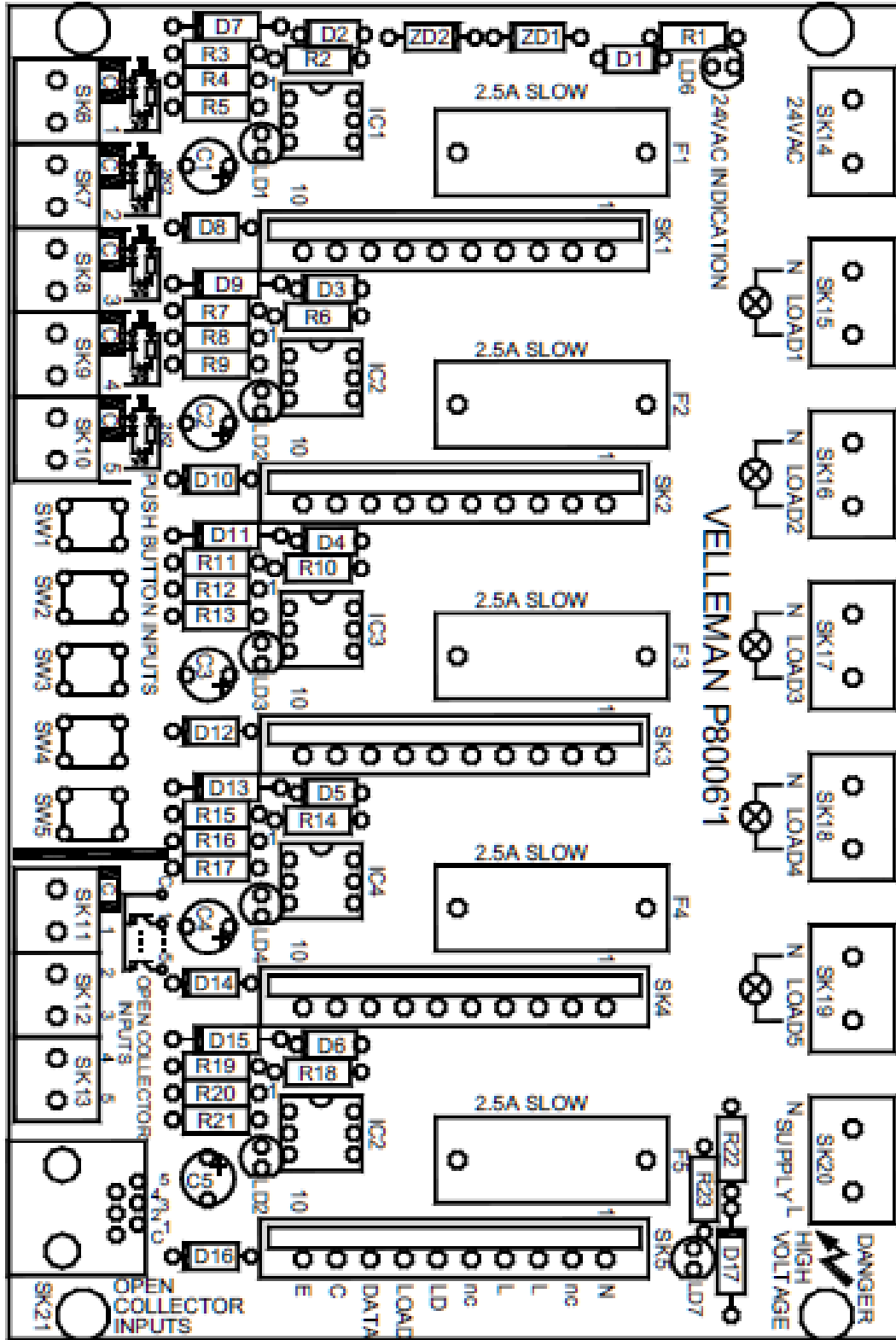


- IC1 : 4N27, TIL111 or eq.
- IC2 : 4N27, TIL111 or eq.
- IC3 : 4N27, TIL111 or eq.
- IC4 : 4N27, TIL111 or eq.
- IC5 : 4N27, TIL111 or eq.

## Assembly Instructions: (A)----- PCB Component Layout Diagram

### INDUSTRIAL ELECTRONICS

Submitted by:- Raymond Coyle  
 TP16 Regional Competition  
 United Kingdom  
 Version 1.0 Date -----/2011



**INDUSTRIAL ELECTRONICS**

Submitted by:- Raymond Coyle  
TP16 Regional Competition  
United Kingdom  
Version 1.0 Date -----/2011

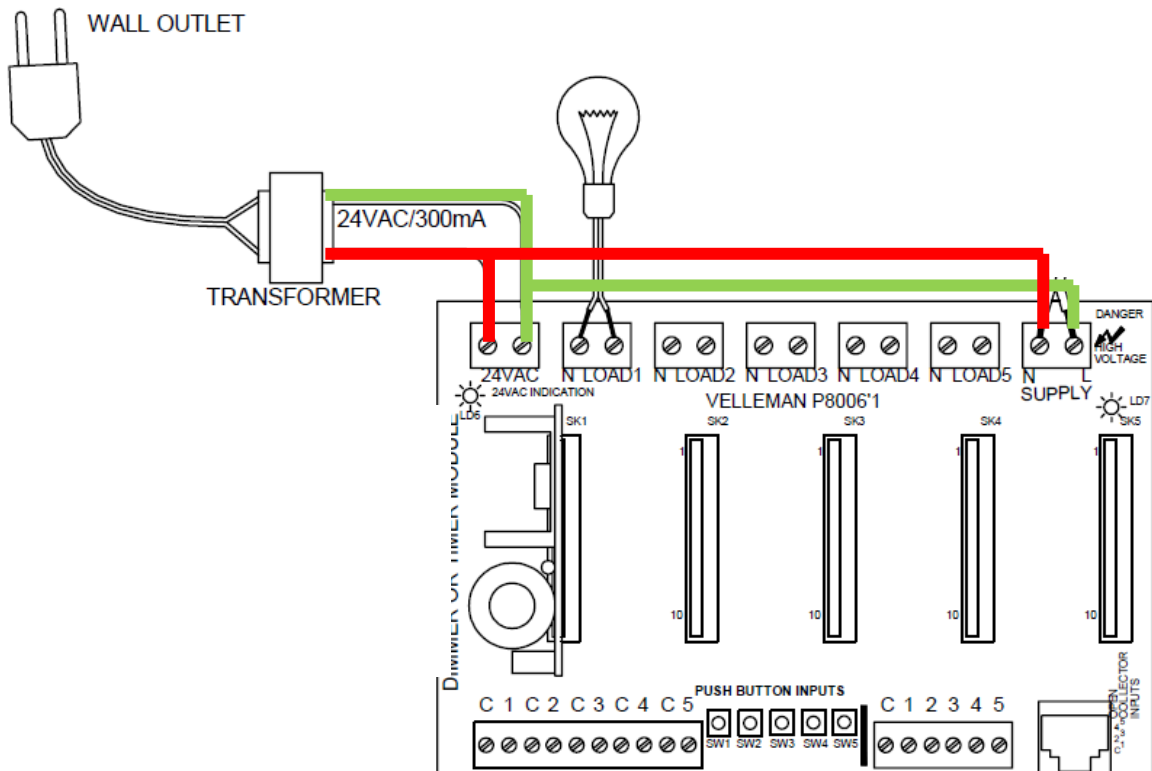




### Testing Instructions: (A)

- Select suitable resistors and wire one each in series with the supplied **LEDS**. Connect this combination to **replace** the bulbs shown in the wiring diagram to the load sockets Sk15 to Sk19.
- Connect the 24AC supply wires to Sk14, and then switch ‘on’ the 24v supply—observe that **LD6** is illuminated. Remove power.
- **Wire** Sk14 and Sk20 in **parallel** as shown in the wiring diagram and apply the 24vAC supply—Observe that **LD6 and LD7** are illuminated. Remove power
- **Insert** the **relay module** into SK1 as shown. Apply power
- Press push button SW1, the module will be activated and should be illuminated **LED 1**
- Test the remaining slots in a similar manner---ensure you record that each **LED 2 to LED 5** has illuminated
- Demonstrate the **operation** of the unit to the Judge.

### Wiring Diagram:



### INDUSTRIAL ELECTRONICS

Submitted by:- Raymond Coyle  
 TP16 Regional Competition  
 United Kingdom  
 Version 1.0 Date ----/2011