

# BASIC RELAY CIRCUITS

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Please note the following requirements in relation to tutorial work –

1. The three main parts of a relay are the coil, the iron core and the contacts. Draw a diagram showing the basic construction of a relay.

2. Briefly explain the function of each of the three main parts of a relay.

a) \_\_\_\_\_  
\_\_\_\_\_

b) \_\_\_\_\_  
\_\_\_\_\_

c) \_\_\_\_\_  
\_\_\_\_\_

3. Explain the meaning of a relay being:

a) de-energised -  
\_\_\_\_\_  
\_\_\_\_\_

b) energised. -  
\_\_\_\_\_  
\_\_\_\_\_

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4. Draw the Australian Standard drawing symbol for each of the following components:

normally open pushbutton	
normally closed pushbutton	
normally open relay contact	
normally closed relay contact.	

5. Using semi-detached symbols, draw a circuit diagram for the circuit that operates in the following manner:

- Closing a manual switch S1 energises a relay coil R
- energising the relay coil causes a pilot light L1 to turn on via a set of relay contacts R1
- energising the relay coil causes a pilot light L2 to turn off via a set of relay contacts R2



6. Draw the circuit diagram for the circuit that operates in the following manner:
- a) the coil of a relay R/4 has on/off control provided by two pushbuttons S1 and S2
  - b) when the relay is de-energised lamp L1 is to be on and lamp L2 is to be off
  - c) the relay has two normally open and two normally closed contacts
  - d) when the on pushbutton (S1) is pressed the relay is to be held in the energised condition by a latching contact.



7. Using detached relay symbols draw the circuit diagram for a start-stop station controlling a control relay CR. The control relay is to control a second relay R1. Relay 1 is to be energised when the control relay CR is de-energised and de-energised when the control relay CR is energised.



8. Draw the circuit diagram for a circuit that has to operate as follows -

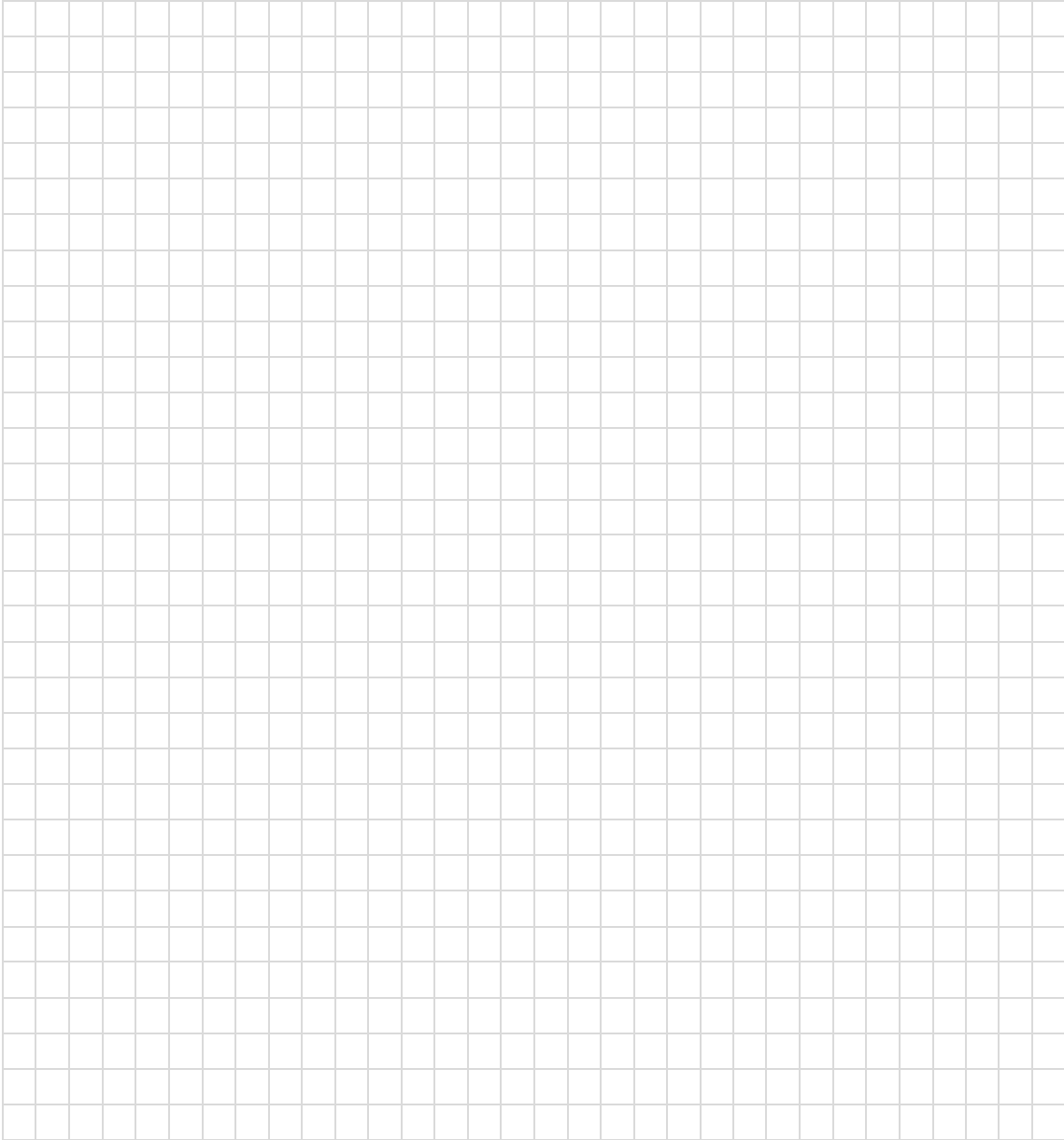
- S1, S3 and S5 are normally open pushbuttons
- S2, S4 and S6 are normally closed pushbuttons
- pushbuttons S1 and S2 provide start-stop control for relay R1
- when relay R1 is energised lamp L1 turns on
- pushbuttons S3 and S4 provide start-stop control for relay R2
- relay R2 is also controlled by a remote start-stop station, comprised of S5 and S6.
- when relays R1 & R2 are de-energised, lamp L2 turns on

Use a horizontal layout and include on your diagram wire numbers, line numbers and relay brackets.



9. An off-delay timer has a set of normally open contacts which are time delayed to re-open. The timer is set for a time delay of 10 seconds. State whether the contacts would be open or closed for each of the following conditions –
- a) prior to power being applied to the coil of the timer \_\_\_\_\_
  - b) 5 seconds after power is applied to the timer coil \_\_\_\_\_
  - c) 20 seconds after power is applied to the coil of the timer \_\_\_\_\_
  - d) 5 seconds after power has been removed from the coil of the timer \_\_\_\_\_
  - e) 15 seconds after power has been removed from the coil of the timer. \_\_\_\_\_
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10. Draw the circuit diagram, including both power and control circuits, for a circuit that operates in accordance with the following -
- a. a single phase 240V motor is to be controlled by a contactor K2 and protected by a thermal overload and a 10A circuit breaker
  - b. the control circuit is protected by a 2A circuit breaker
  - c. a start-stop station is used to switch a control relay K1
  - d. energising K1 causes a time delay relay KT to energise
  - e. after a time delay of 15 seconds the contactor K2 energises
  - f. if the thermal overload trips the entire control circuit is to be de-energised
  - g. a pilot light L1 is to be included to indicate when the motor is running.



11. Draw the circuit diagram, both power and control circuits, for a 3 phase direct on line(DOL) motor starter that has the following -

- start-stop control via pushbuttons
- thermal overload protection
- jog control via a double pole jog pushbutton.





