To Assemble a Household Circuit Comprising Three Bulbs, Three (on/off) Switches, a Fuse & a Power Source

Aim

To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source.

Apparatus and material

Apparatus: No apparatus required in assembling a circuit.
Material: Three bulbs (6 V, 1W) each, fuse of 0.6 A, main switch a power supply (battery . eliminator), three (on/off) switches flexible connecting wire with red and black plastic covering, a fuse wire.
Supplementary: Main electric board with a two-pin socket and main switch.

Theory

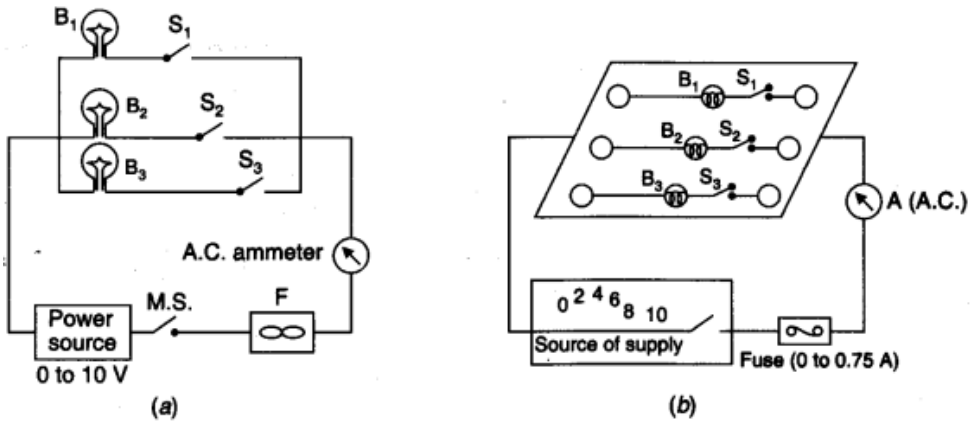
Electricity supplied to us for domestic purposes is 220 V A.C. and 50 Hz. The household circuit, all appliances are connected in “parallel” with mains. The switches are connected in series with each appliances in live wire. 5 A switches are required for normal appliances like, bulbs, fluorescent tubes fans etc. 15 A sockets and switches are required for heavy load appliances ‘ like, refrigerator, air conditioner, geyser, hot plates etc. All appliances must have three wires called live, neutral and the earth. Total power consumption ‘P’ at a time

$P = P_1 + P_2 + P_3 + \ldots\ldots\ldots$

where P_1, P_2, P_3 are the powers drawn by appliances.

To protect the appliances from damage when unduly high currents are drawn fuse of little higher rating, 10 to 20% higher than the current normally drawn by all appliances. For further safety, a suitable value MAINS FUSE like rating 32 A is connected in series with supply source.

Diagram



(*a*) Circuit diagram, (*b*) Actual layout.

Procedure

1. Connect the bulbs B_1, B_2 and B_3 in series with switches S_1, S_2 and S_3 respectively and connect each set of B-S in parallel with each other.
2. Connect main supply to a step-down transformer (battery eliminator) to get required voltage from 0 to 10 V (0, 2, 4, 6, 8 and 10 V).
3. Connect the mains fuse M.S. in series with the power supply (battery eliminator).
4. Connect an A.C. ammeter in series with the B-S set.
5. Connect one end of power supply to one end of B-S set.
6. Check the circuit one again to ensure that household circuit is complete.
7. Gradually increase the current to 0.75 A, the fuse must bum off at about 0.6 A.