

LECTURE-20

transmission line & feeder protection

Topic Covered

- ▣ Objective
- ▣ Introduction
- ▣ Need for protection
- ▣ **Protective relay**
- ▣ **Methods of protection of feeder**
- ▣ Protection of parallel feeder

Objective

- Feeder is the line that transfers the power from source end to the distribution end.
- To have a uninterrupted power supply for consumers, feeders need to be protected from various faults using different schemes.

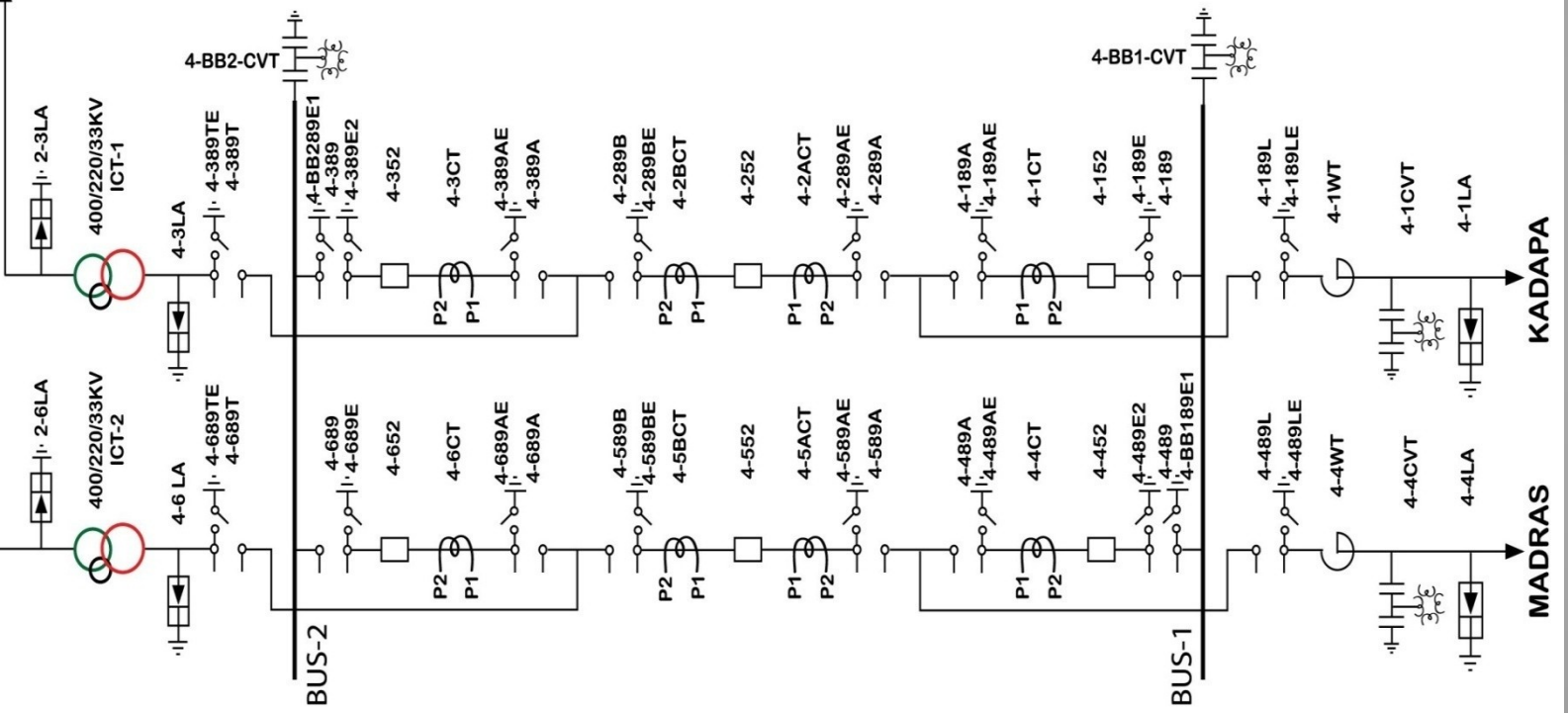
Introduction

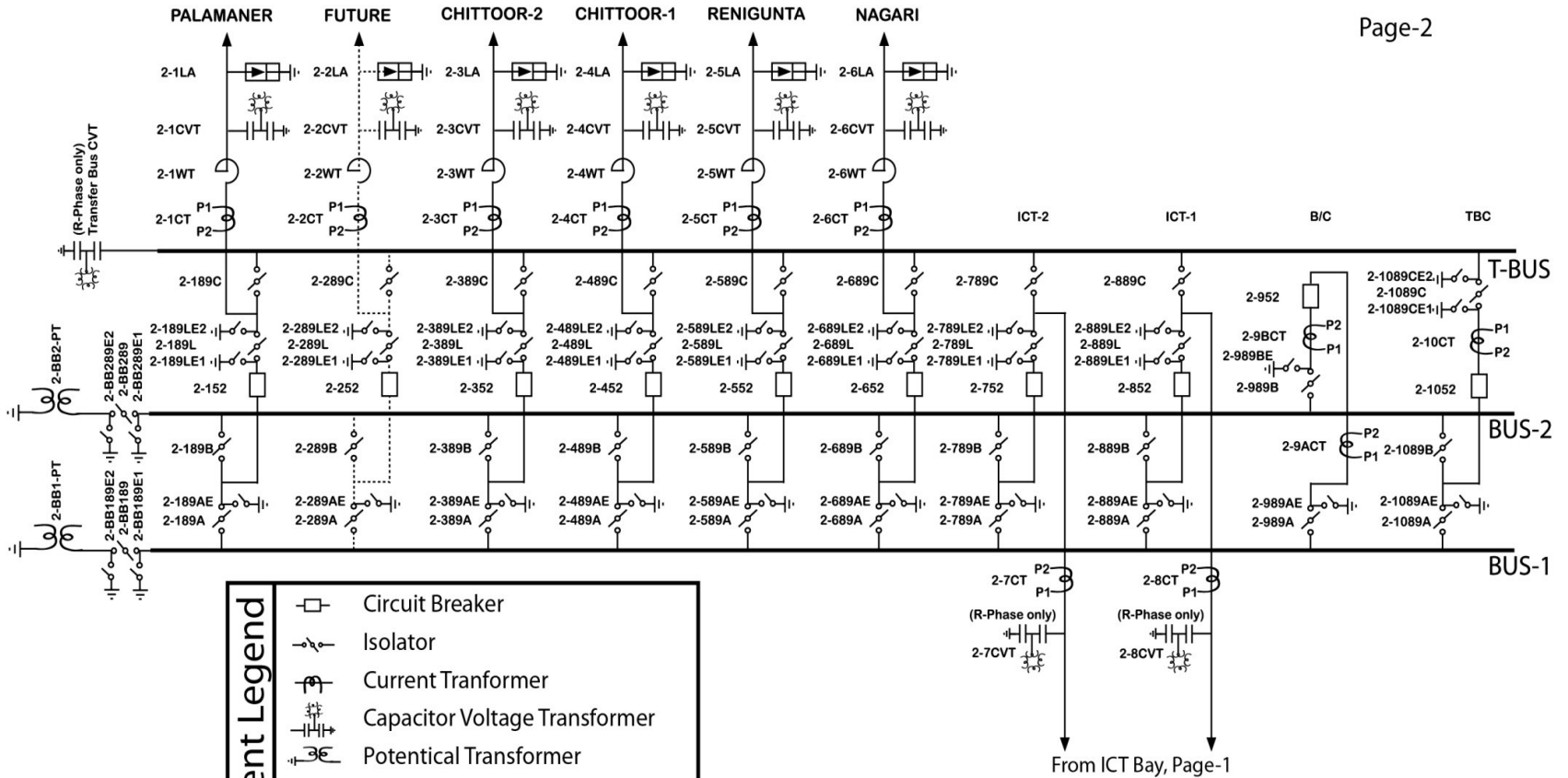
- The word FEEDER may be referred as the connecting link between the two circuits. The feeder could be in the form of transmission line that is short, medium, or long or this could be a distribution circuit.
- Feeders form the integral part of power system, as power is transferred through feeders from source to load.
- Hence it is important to protect feeders from faults for continuous supply of power to consumers.

400/220KV Sub-station, Chittoor

Single Line Diagram

To 220KV ICT LV Bays,
Page-2





Equipment Legend	
	Circuit Breaker
	Isolator
	Current Transformer
	Capacitor Voltage Transformer
	Potential Transformer
	Wave Trap
	Earth Switch
	Surge Arrestor
	400/220/33KV ICT

Need for protection

Following conditions lead to various faults:

- Over loading
- Over voltage
- Under Frequency
- Power Swings
- Transient Faults
- Permanent Faults
- Atmospheric Conditions(Temperature, Lightening)
- Short circuit Faults

Protective relay

- It is a device that detects the fault and initiates the operation of the circuit breaker to isolate the defective element from rest of the system.

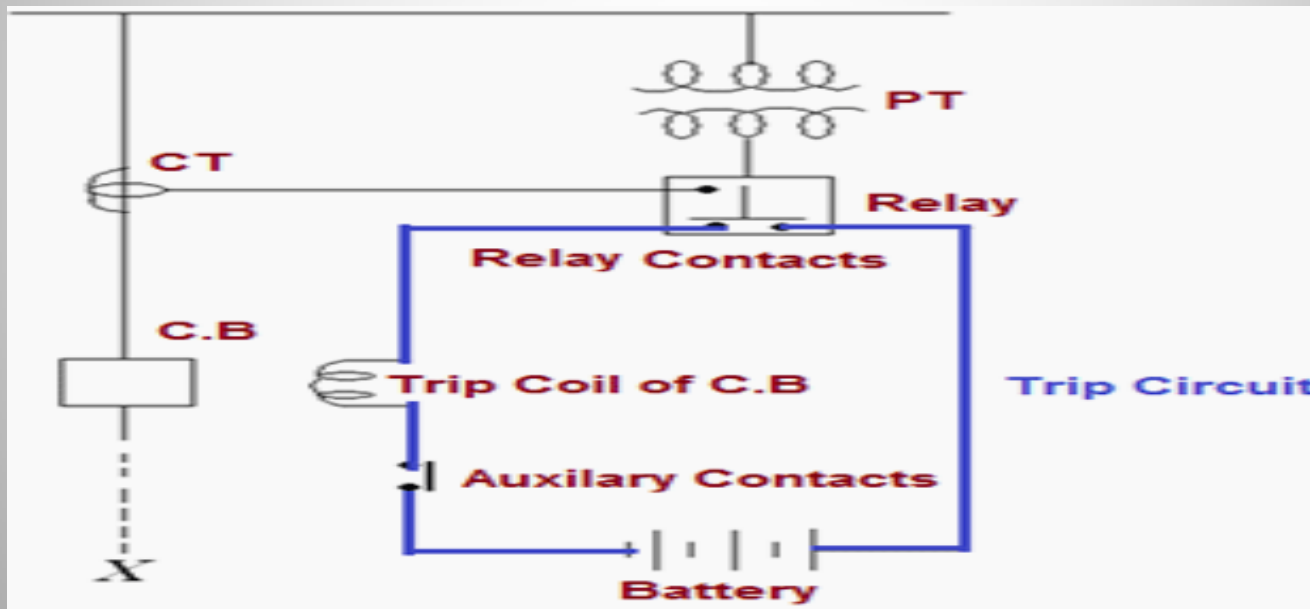


Fig: basic relay operation

Methods of protection of feeder

➤ **Non Unit Type Protection:**

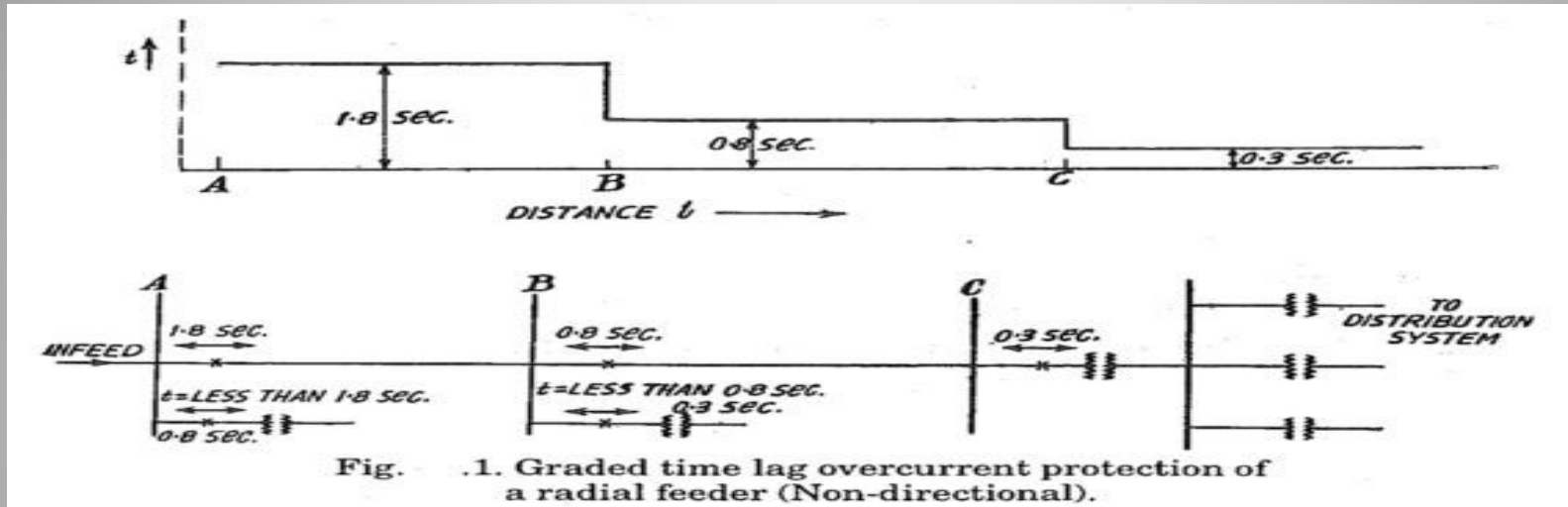
1. Time-graded over-current protection
2. Current-graded over current protection
3. Distance protection

➤ **Unit Type Protection:**

1. Differential protection
2. Carrier-current protection

Non unit type protection

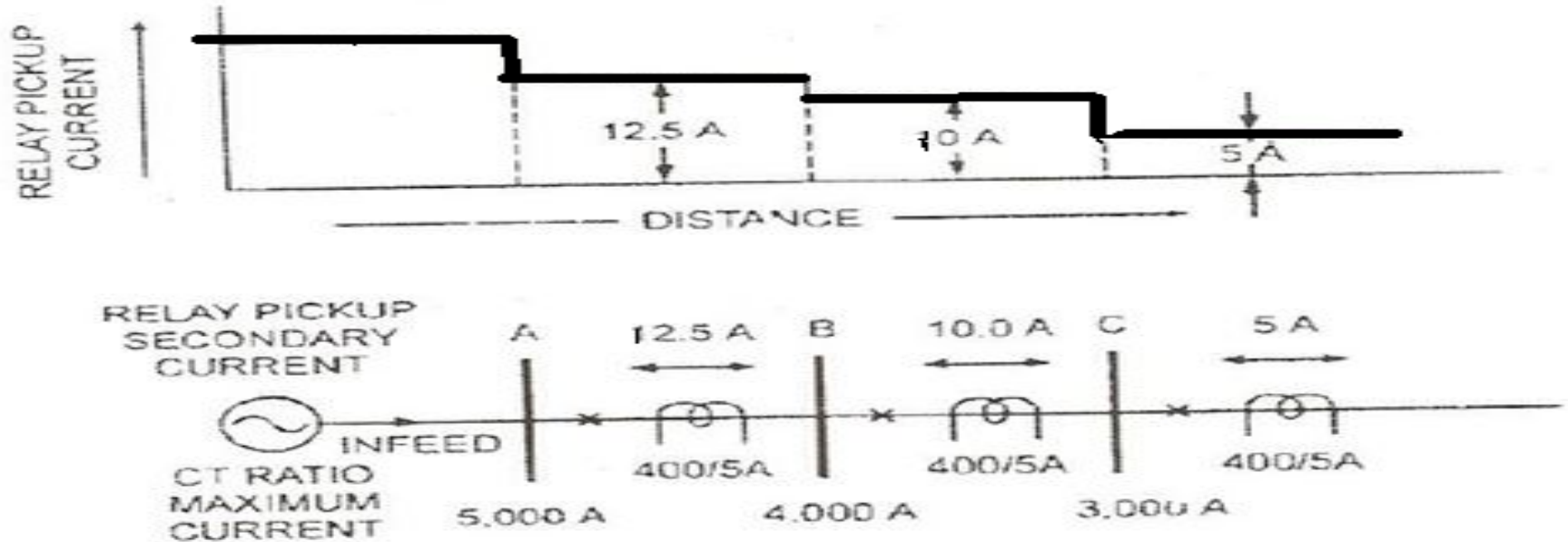
➤ Time-graded protection



Drawbacks:

- Time lag is provided which is not desirable on short circuits.
- Suitable for radial feeders with supply at one end only
- Difficult to coordinate and requires changes with addition of load.

Current graded protection



- As time graded system provides delay which is not required at high faulty currents, we use current graded system.
- It cannot differentiate the zone in which fault occurred due to low difference in their magnitudes.
- So time graded IDMT relays are used along with current grading scheme to overcome the limitations.

Protection of parallel feeder:

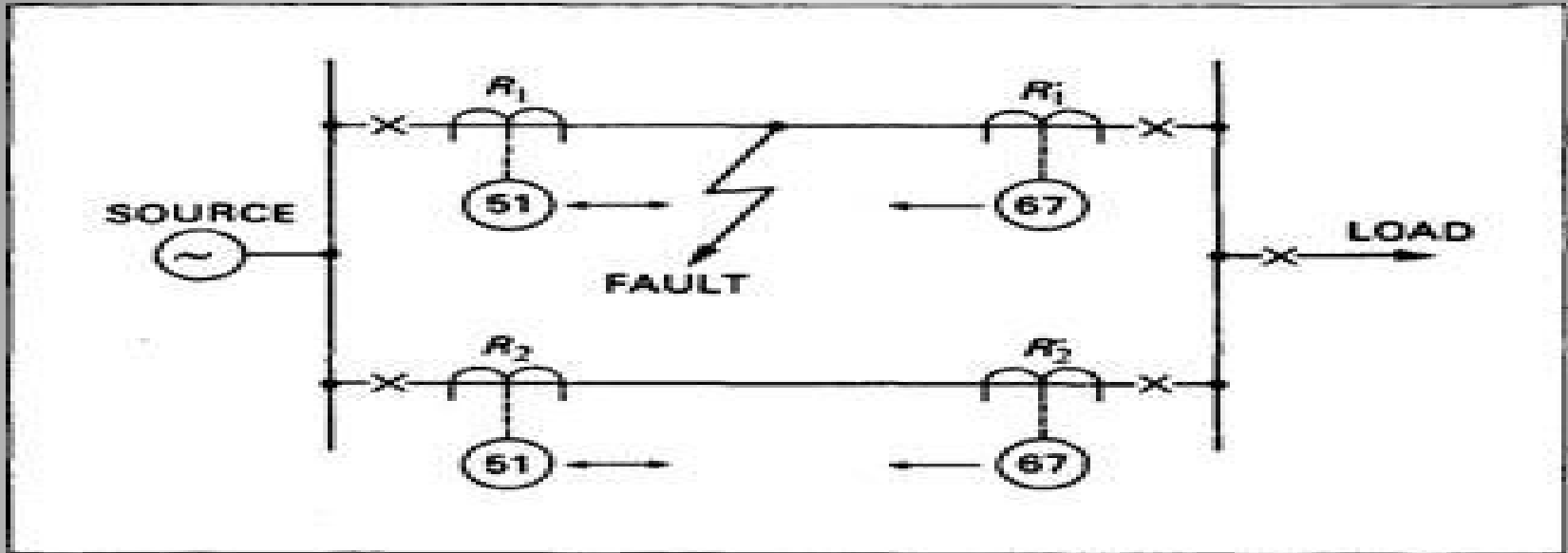


Fig: parallel feeder protection

- Due to the limit of loading of a single line, parallel feeders are used to meet the increased demand .
- As the power may flow in opposite direction at faults , directional relays are also used to provide protection.

Protection of ring main feeder

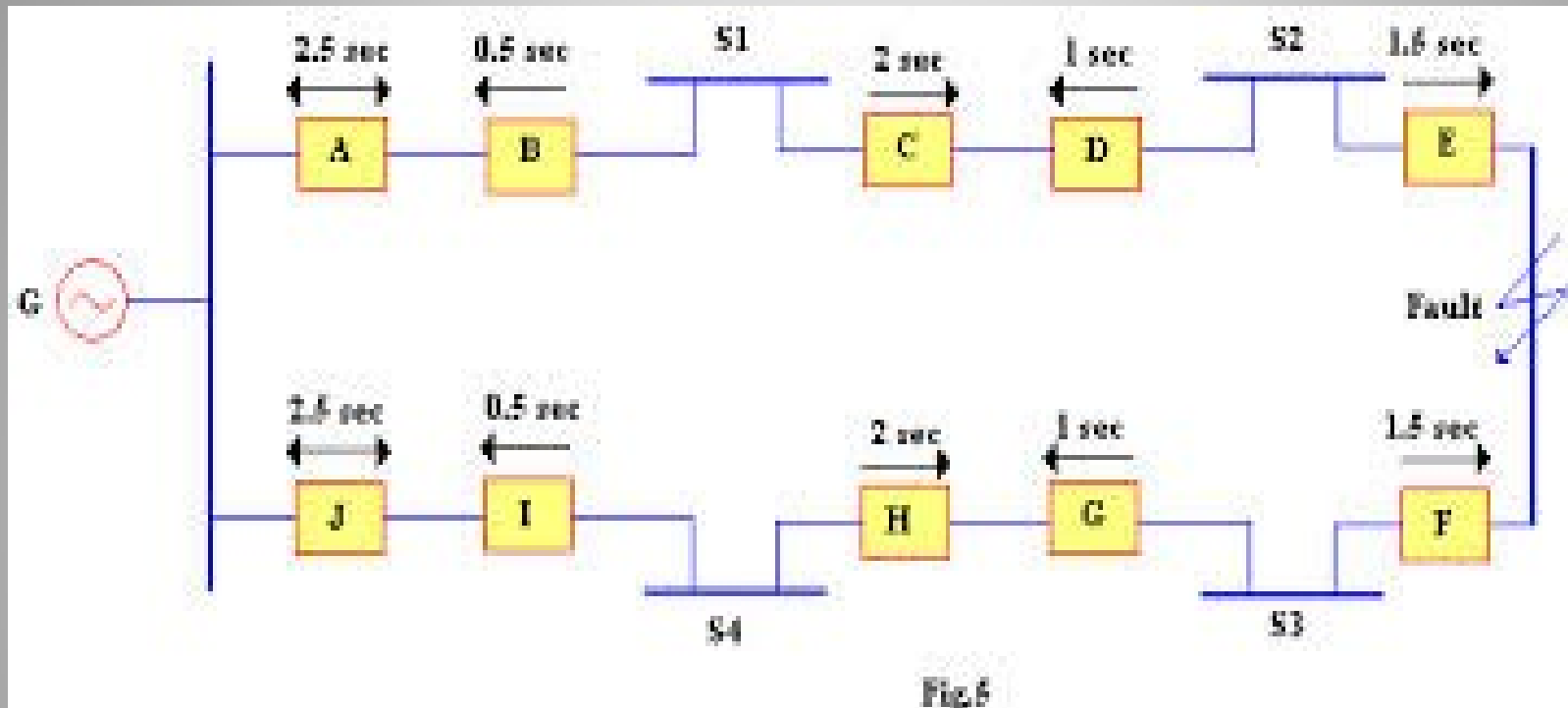


Fig: ring main feeder protection

- For reliability of power supply to all consumers even during faults in one path ring main feeder is used .
- In this feeder an alternative path is established to load end and power is supplied without any interruption .