

Lecture-16

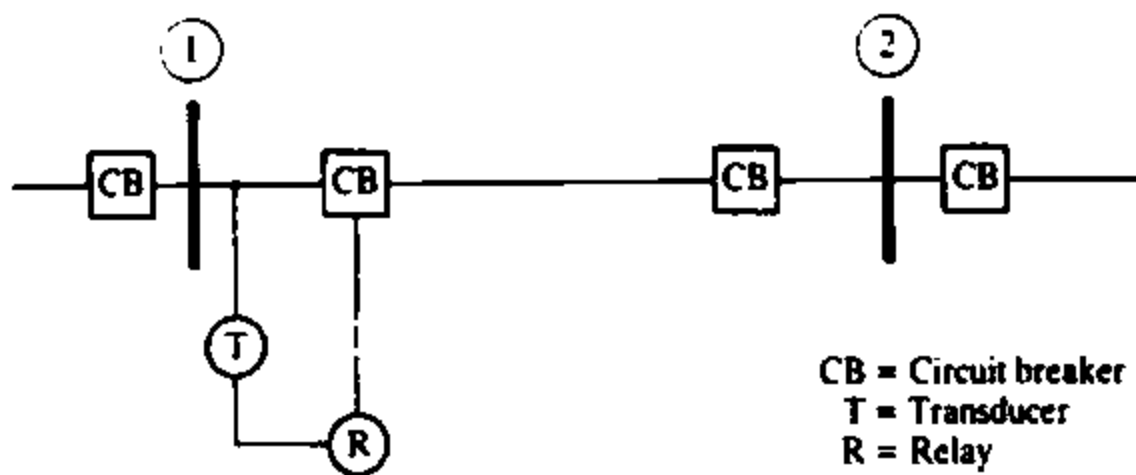
zone of protection, essential qualities, primary and backup protections

Topic Covered

- ▶ System Protection Components
 - ▶ Zones of Protection
 - ▶ Primary and Backup Protection
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System Protection Components

- Transducer / Instrument Transformer
- Relay
- Circuit Breaker

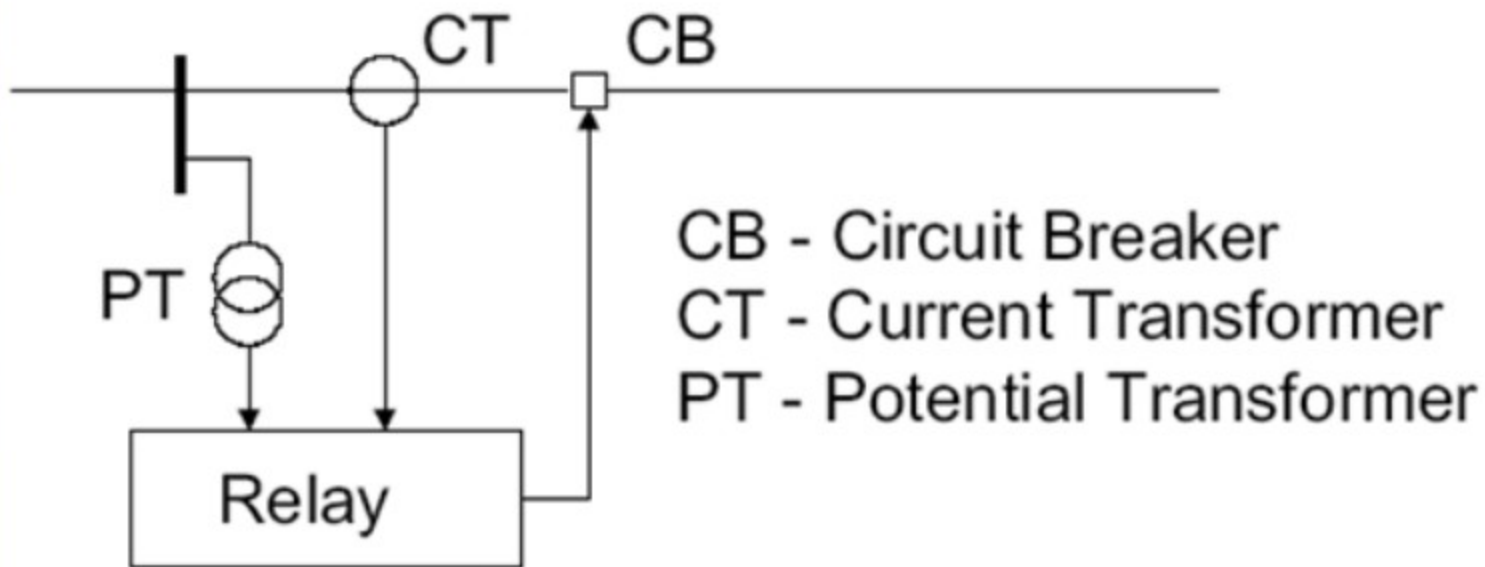


System Protection Components

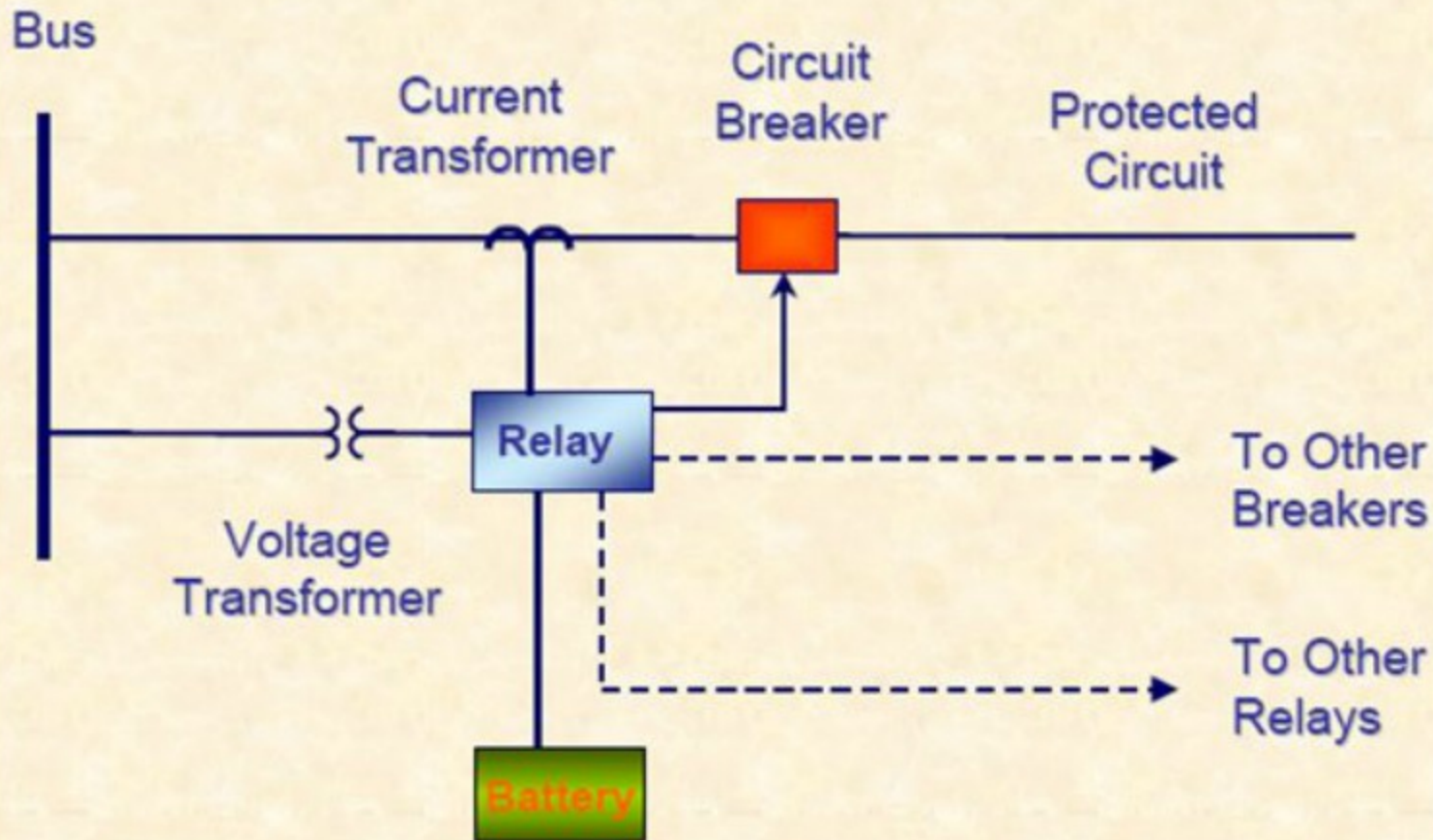
Function:

- Transducers/Instrument Transformers
 - Provide low current and voltage, standardized levels suitable for the relays operation.
- Relays
 - Discriminate between normal operating and fault conditions.
 - When current exceed a specified value relay will be operated and cause the trip coil of CB to be energized/open their contact.
- Circuit Breakers
 - Open the line

System Protection Components



System Protection Components



System Protection Flow

voltage or current rise from normal condition

voltage/current is reduced to match with relay rating

activate circuit breaker

circuit isolation

**Fault
Occur**

Transducer

Relay

**Circuit
Breaker**

**Fault
Clear**

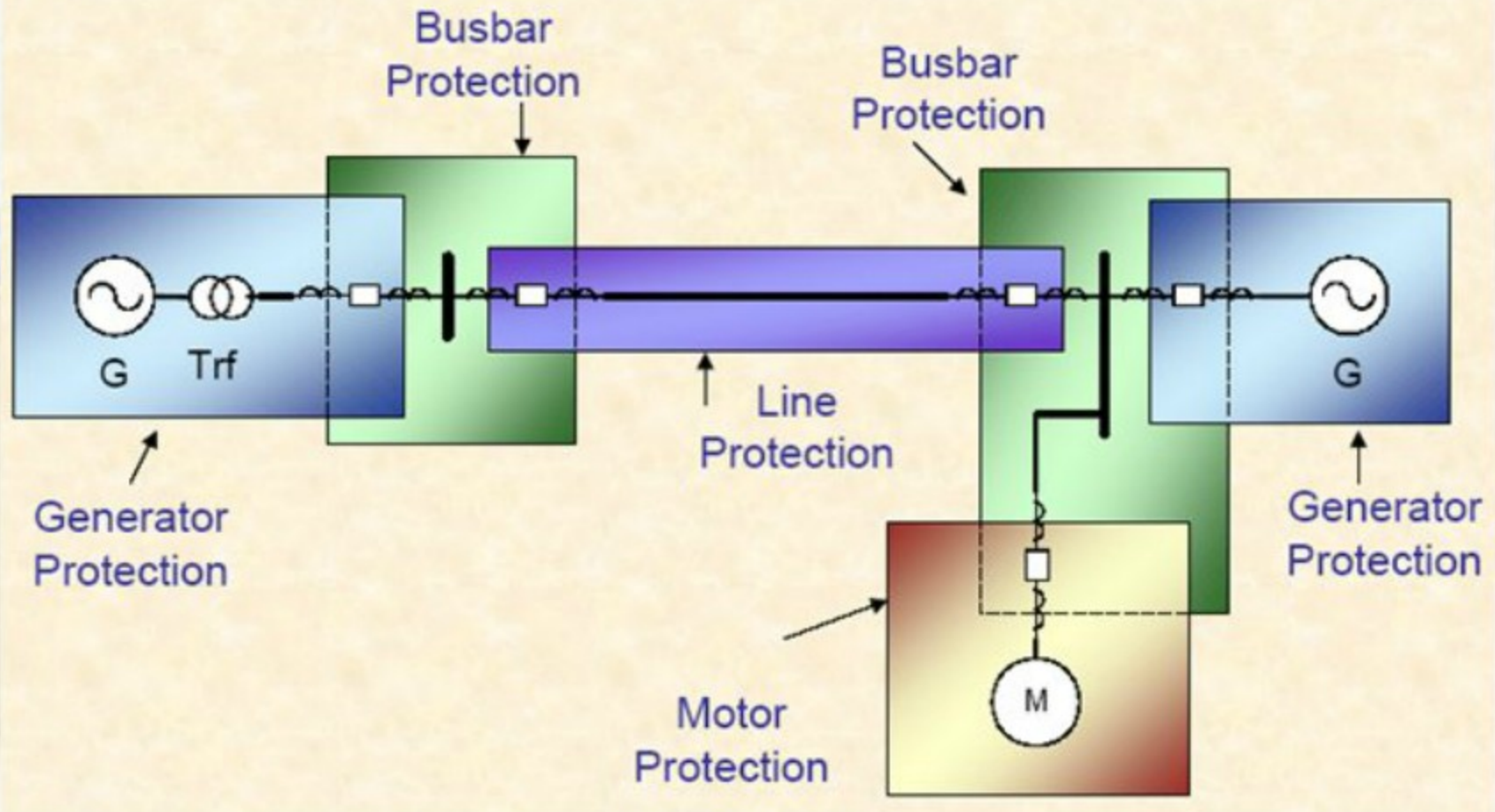
Zones of Protection

- For fault anyway within the zone, the protection system responsible to isolate everything within the zone from the rest of the system.
- Isolation done by CB
- Must isolate only the faulty equipment or section

Zones of Protection

- Zones are defined for:
 - Generators
 - Transformers
 - Buses
 - Transmission and distribution lines
 - Motors

Zones of Protection



Zones of Protection

- Characteristics:

- Zones are overlapped.
- Circuit breakers are located in the overlap regions.
- For a fault anywhere in a zone, all circuit breakers in that zone open to isolate the fault.

Primary & Back-up Protection

- **Primary protection** is the protection provided by each zone to its elements.
- However, some component of a zone protection scheme fail to operate.
- **Back-up protection** is provided which take over only in the event of primary protection failure.