

SNS COLLEGE OF ENGINEERING

Kurumbapalayam (Po), Coimbatore – 641 107

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DEPARTMENT OF ELECTRICAL AND ELECTRONICS ENGINEERING

COURSE NAME : 19EE605 PROTECTION AND SWITCHGEAR

III YEAR /VI SEMESTER

Unit 3- APPARATUS PROTECTION

Topic: Differential Pilot Wire Protection



Introduction

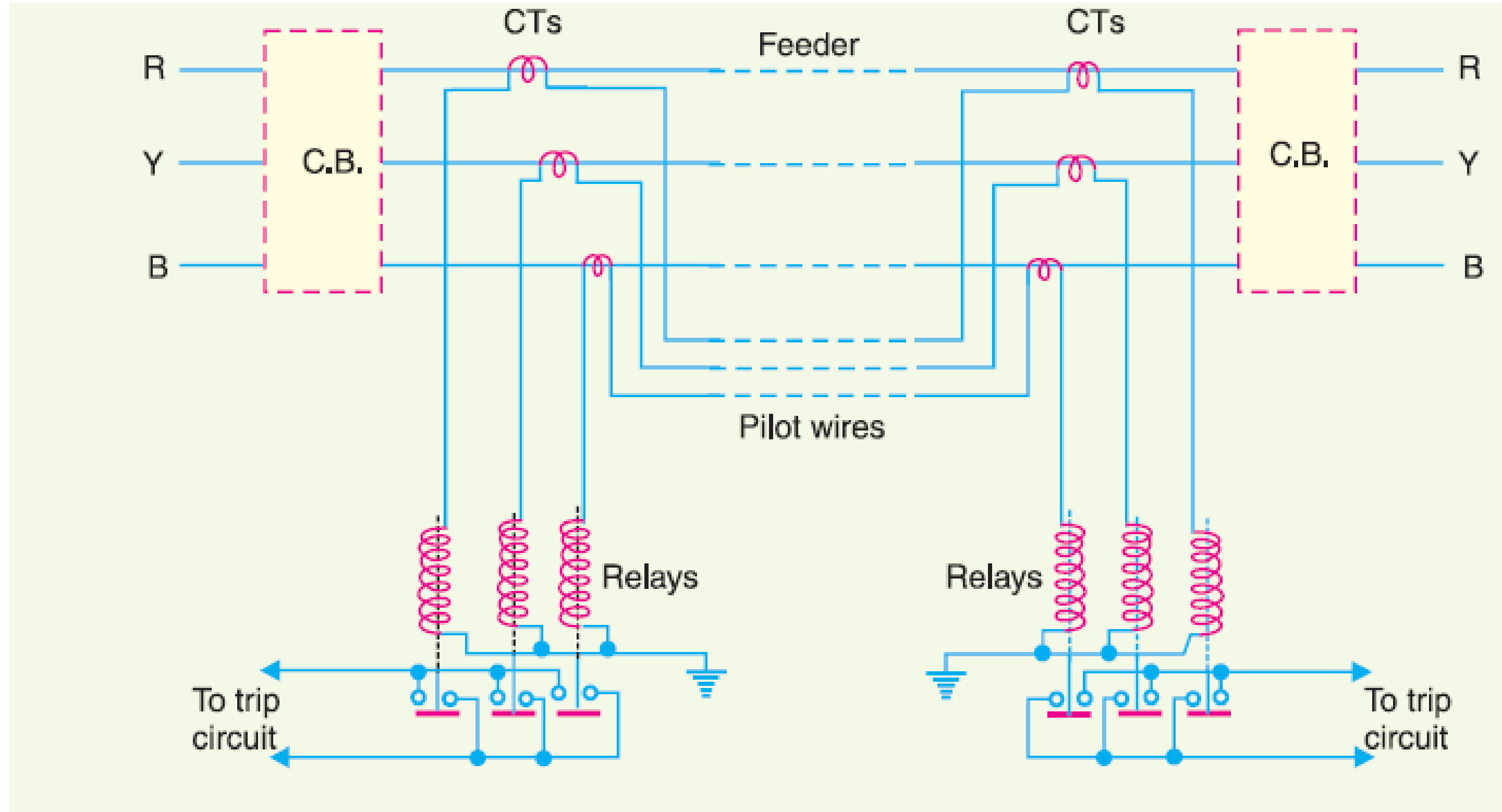
- The differential pilot-wire protection is based on the principle that under normal conditions, the current entering one end of a line is equal to that leaving the other end.
- As soon as a fault occurs between the two ends, this condition no longer holds and the difference of incoming and outgoing currents is arranged to flow through a relay which operates the circuit breaker to isolate the faulty line.
- There are several differential protection schemes in use for the lines.



However, only the following two schemes will be discussed :

1. Merz-Price voltage balance system
2. Translay scheme

Merz-Price voltage balance system





- Identical current transformers are placed in each phase at both ends of the line.
- The pair of *CTs* in each line is connected in series with a relay in such a way that under normal conditions, their secondary voltages are equal and in opposition *i.e.* they balance each other.
- Under healthy conditions, current entering the line at one-end is equal to that leaving it at the other end.
- Therefore, equal and opposite voltages are induced in the secondaries of the *CTs* at the two ends of the line.



- The result is that no current flows through the relays.
- Suppose a fault occurs at point F on the line.
- This will cause a greater current to flow through $CT1$ than through $CT2$.
- Consequently, their secondary voltages become unequal and circulating current flows through the pilot wires and relays.
- The circuit breakers at both ends of the line will trip out and the faulty line will be isolated.



Assessment



In a balanced voltage pilot wire protection scheme if the pilot circuit gets opened, the relay will

- A. Fail to trip on internal faults.
- B. Trip on full load
- C. Trip instantaneously on external faults
- D. None of the above





References

1. Sunil Rao, “Switchgear, Protection and Power System (Theory, Practice & Solved Problems)”, Khanna Publishers, New Delhi, 2019.
2. Paithankar Y G, Bhide S R, “Fundamentals of Power System Protection”, Prentice Hall of India Pvt Ltd., New Delhi, 2nd Edition, 2014.
3. Badriram, Vishwakarma B.H, “Power System Protection and Switchgear”, New Age International Pvt Ltd Publishers, 2nd Edition 2017.

Thank You