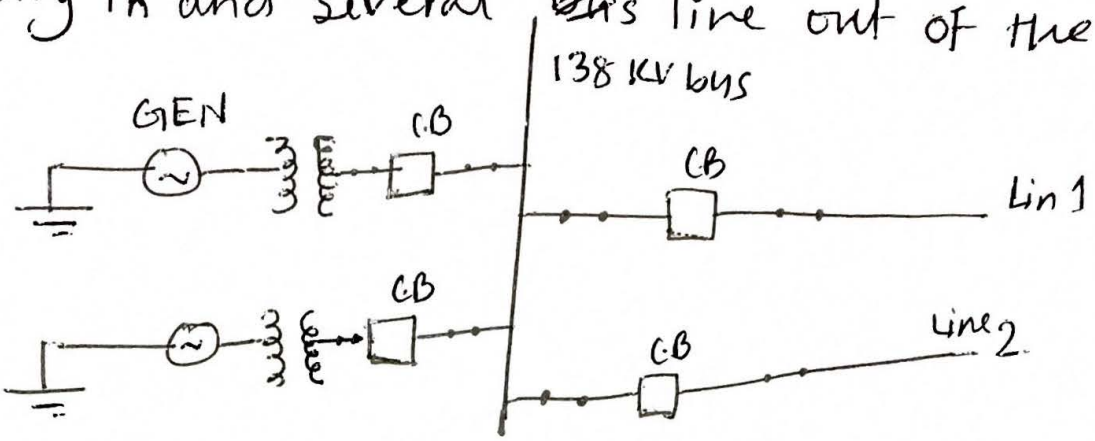
EEE 462, Lecture-9

1.3.18

Bus must be use ~~at~~ every junction point of line and feeder. Normaly a bus will have several power source feeding in and several ~~bus~~ line out of the bus.



at various point on Transmission line

Various ckt ~~and~~ ~~Breaker~~ are conneted to bus through Breaker so disconnection in either side of Breaker so that due to any fault it can be disconnected or isolated.

at Low voltage bus is made of copper which may be made indoor or outdor. In this arrangement breeker can be simply disconneet from bus For isolation.

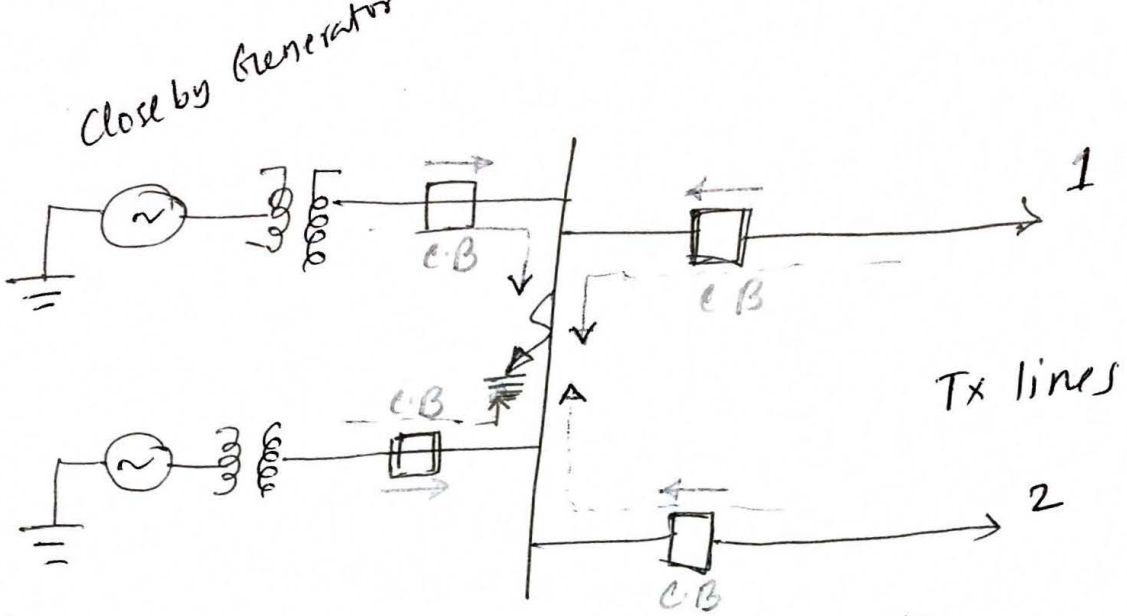
Common bus Faults:

→ animals or birds bridging an isulator

→ Lightning Flashover

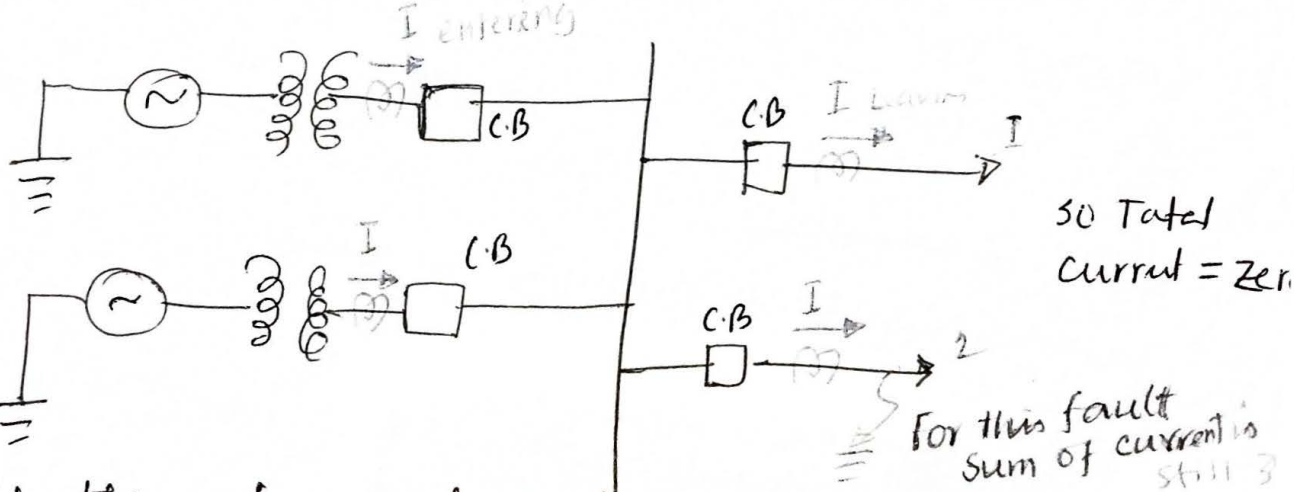
→ flying object bridging across bus bars

occur it must be clear as quickly as possib
otherwise extensive damage may occur.



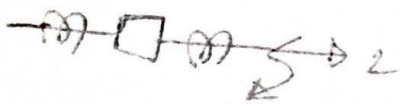
it reverse current flow prolong, it may cause outage of power generation and 2 Tx line

basis
Direction of flows forms bus protection using CTs on outboards like following fig

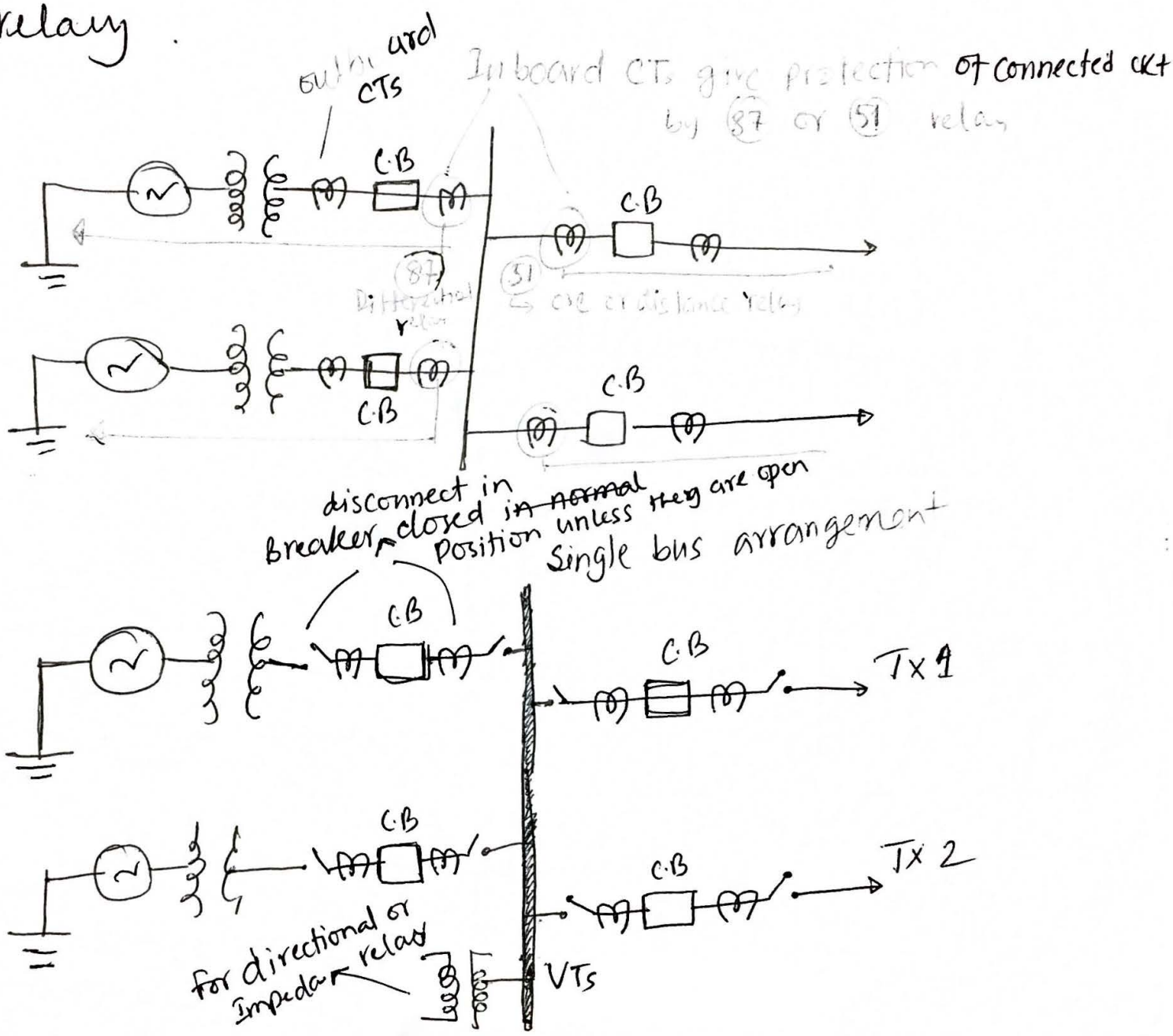


It there is no fault than sum of current Leaving equal to sum of the current entering

so this downstrem fault is cleared by activating Inboard CT by other protection relay



If fault does occur in Bus itself
of currents will no longer be zero and all curr.
fed to the fault will trip all the breaker
This is the well known formulay by differential
relay.

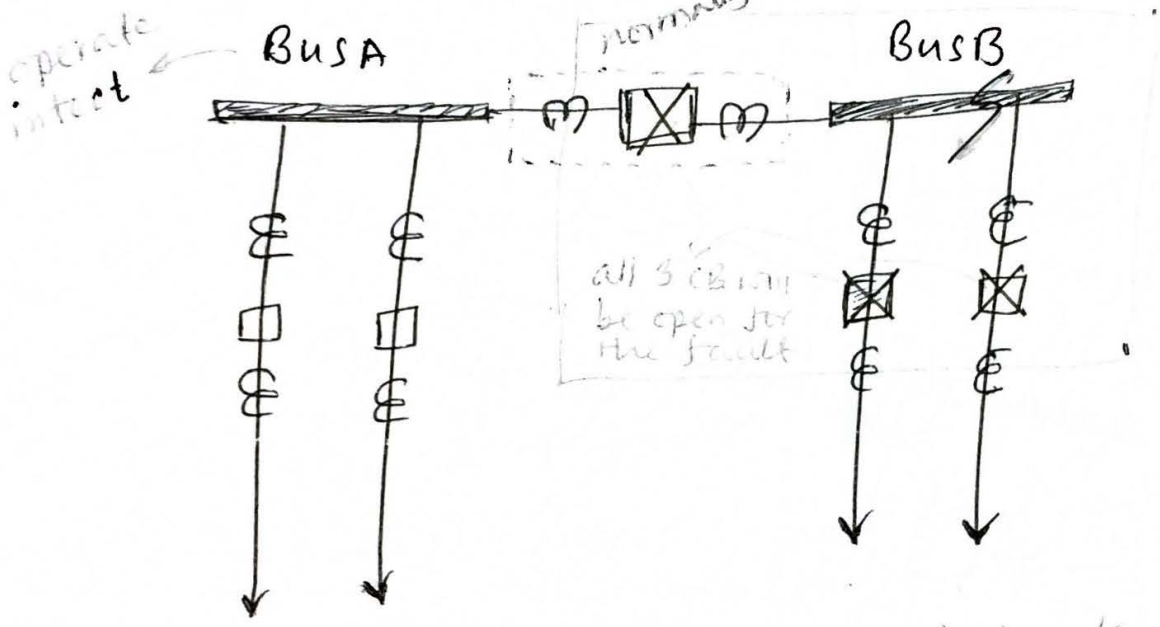


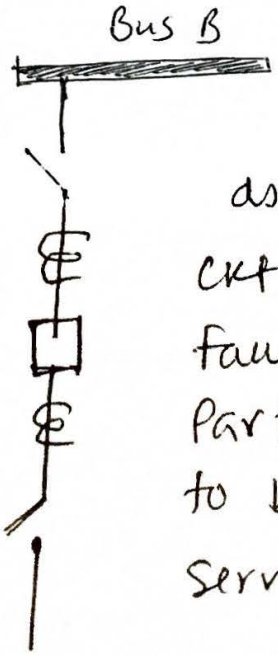
If there is need of a directional or Impedance relay a voltage transformer is being connected to the bus bar to fullfill the requirement of a voltage signal.

Disadvantage of single bus arrangement

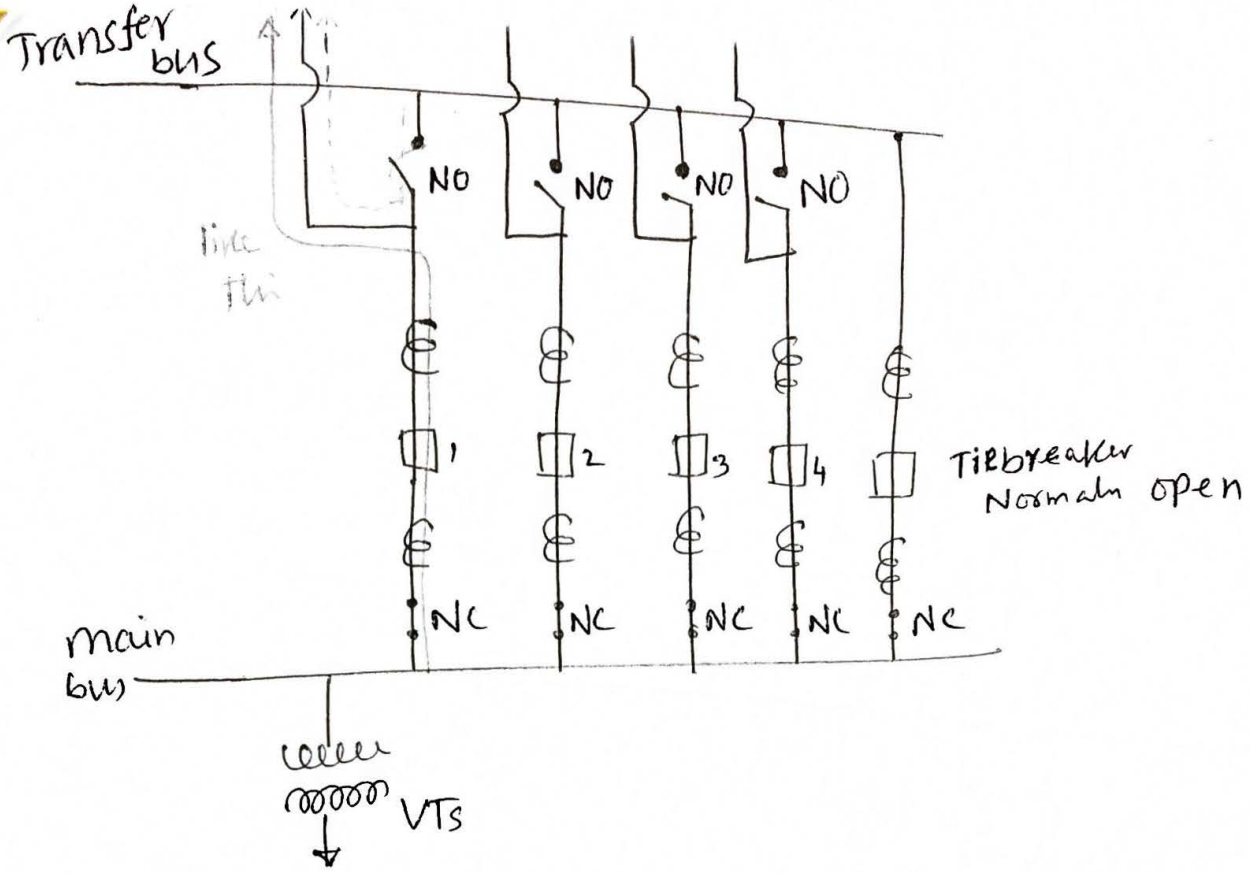
any fault in bus will necessitate shuting down the whole power system and losing the output from two generator [*all four CB will open]

To Improve relaiability we need to add a tiebreaker connecting the two halt



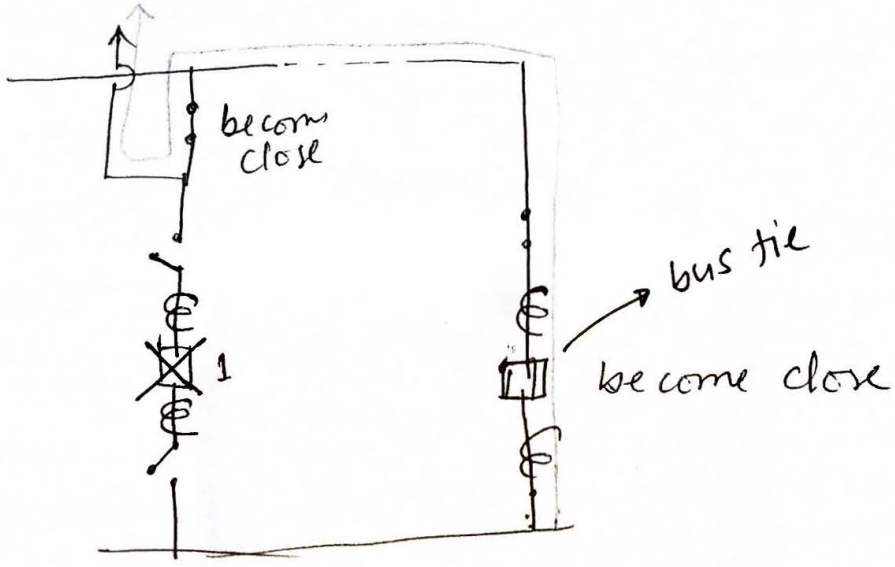


as one CB in Each ckt so due to any fault only thi Particular line need to be taken out of service for maintenance



The ckt Disconnect are arrange so that any line can feed into the main bus through CB (⟶) or (⋯⋯) direct to the Transf. bus

suppose we need to isolate CB1 for maintenance . In this situation



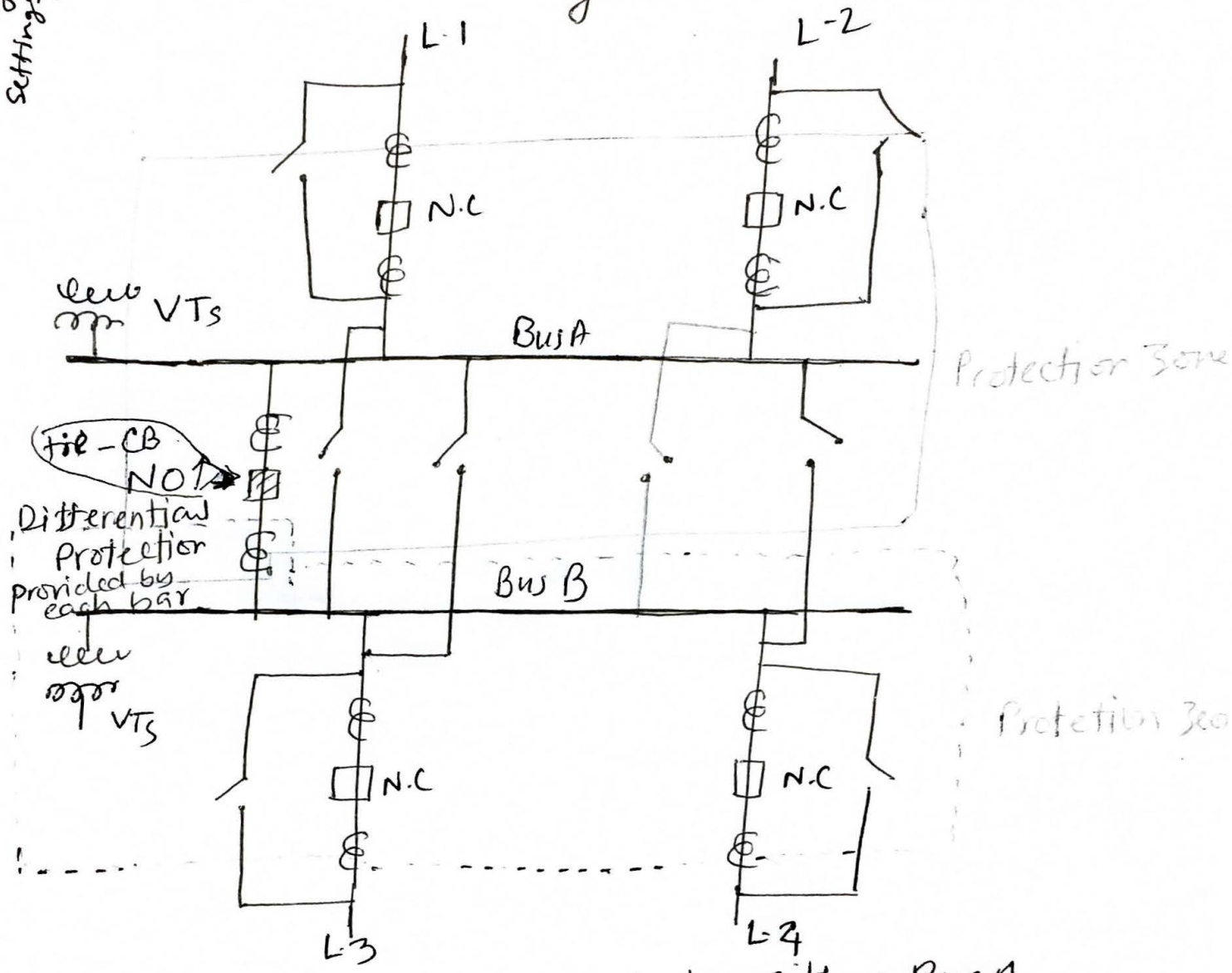
In this config the Transfer bus act as part of line and protected by Line protection. so for the Price of one CB we can substitute any one of line Breakers

[bus is protected by differential]

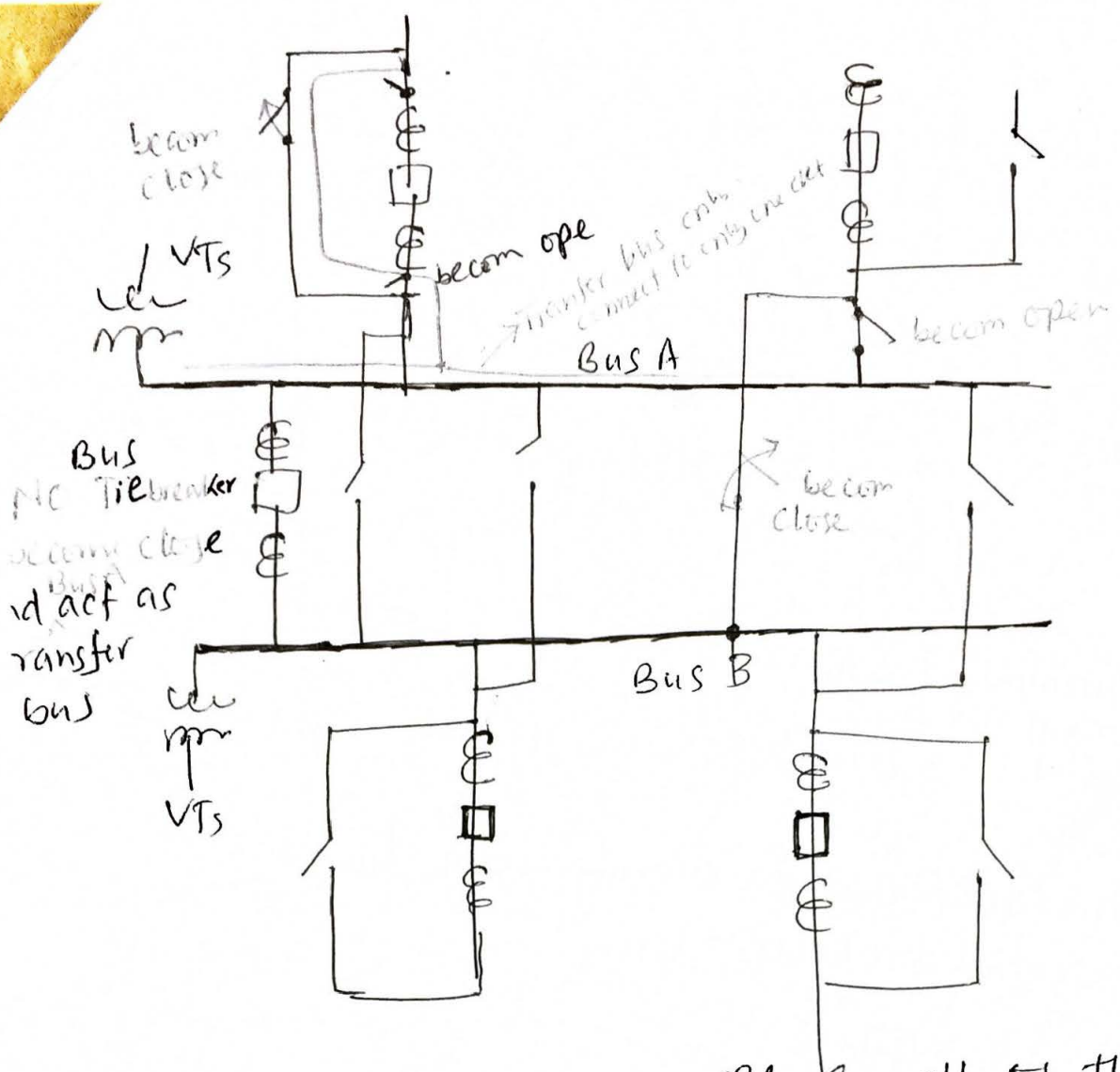
Problem [One can easily forget to change the incorrect settings]

transfar bus bar is not a true bas bar as it never can connect more than one ckt

True double bus arrangement



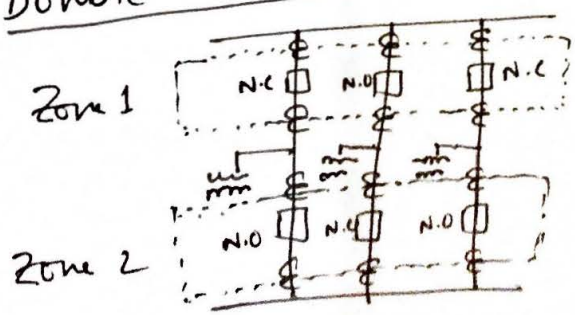
Each ckt can be connected to either Bus A or Bus B. For simplicity we are showing only two line to each bus bar. In practice there could be many more.

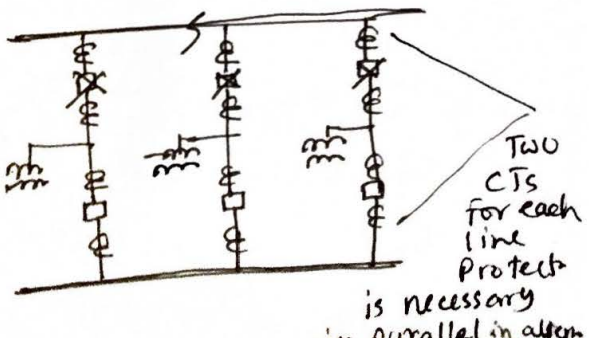


we wish to remove CB1 So all of the remainin
ckt is now connected to Bus B.

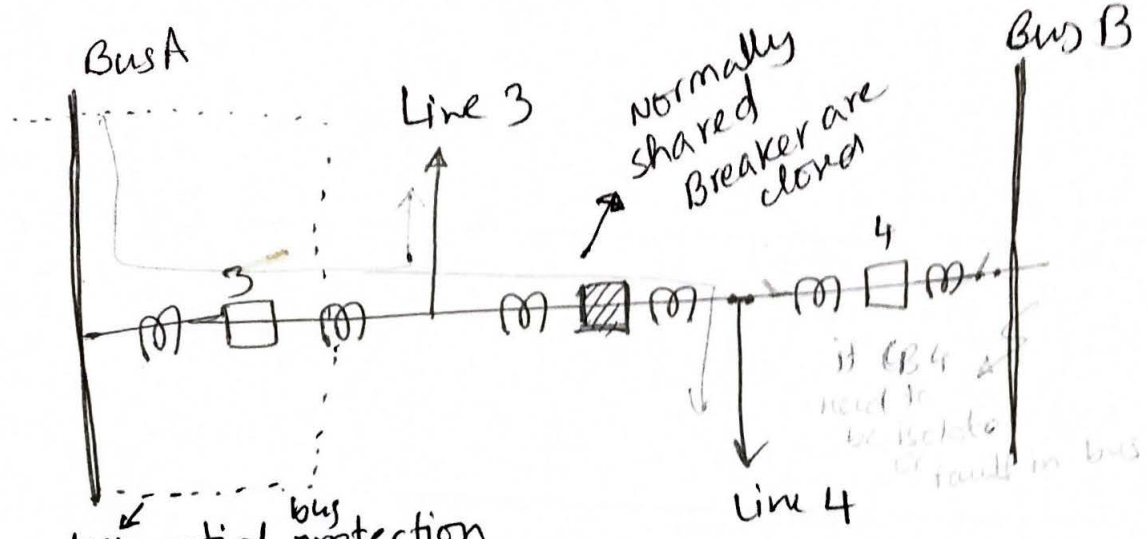
and bus tie need to be adaptable for all line

Double breaker double bus arrangement



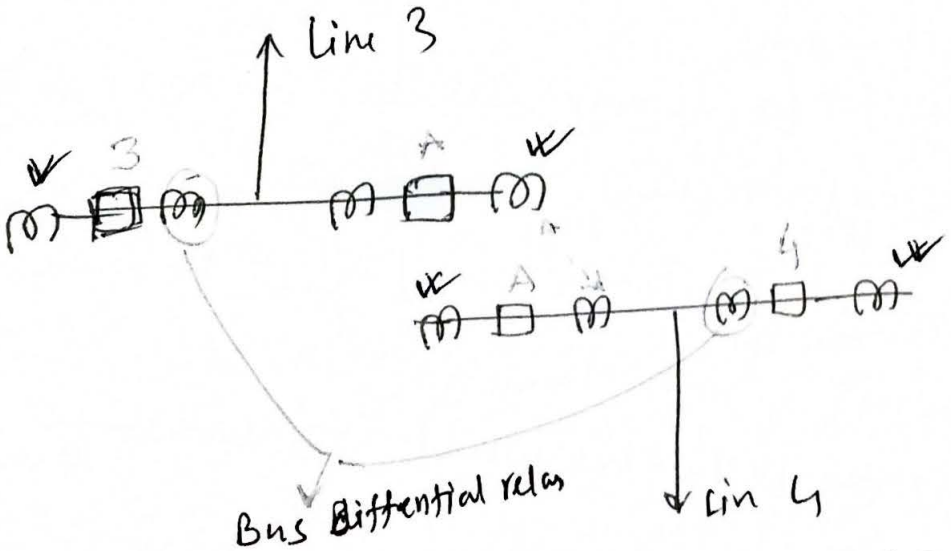


Breaker and half diagram

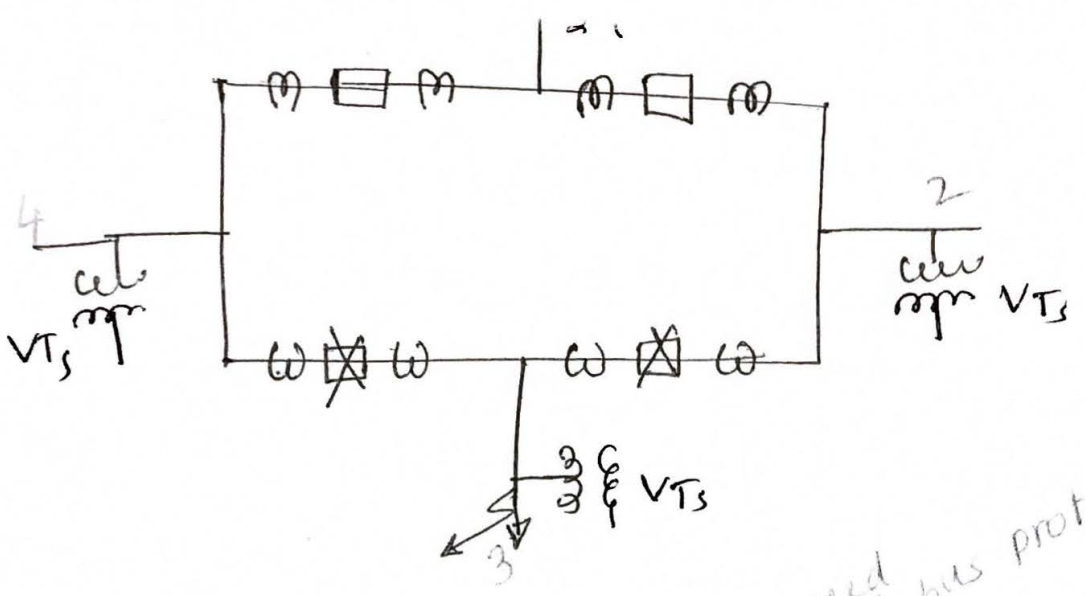


Line 3 and Lin4 are feed by Bus A and B

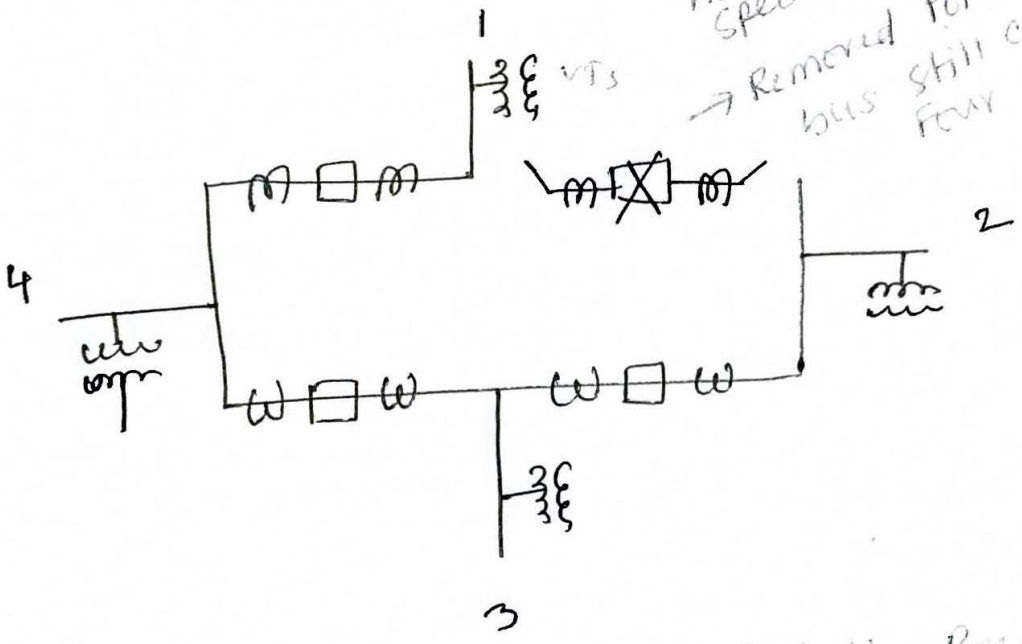
CTs are installed to provide both line and bus differential protection



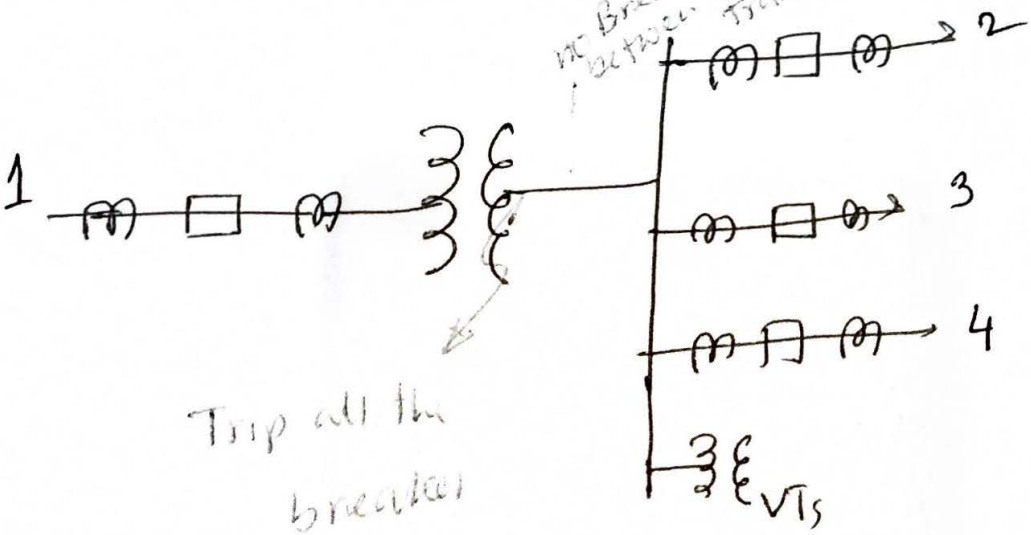
if Breaker 4 need to isolate for maintenance purpose CB4 will only open. line 3 and 4 will feed by bus A.

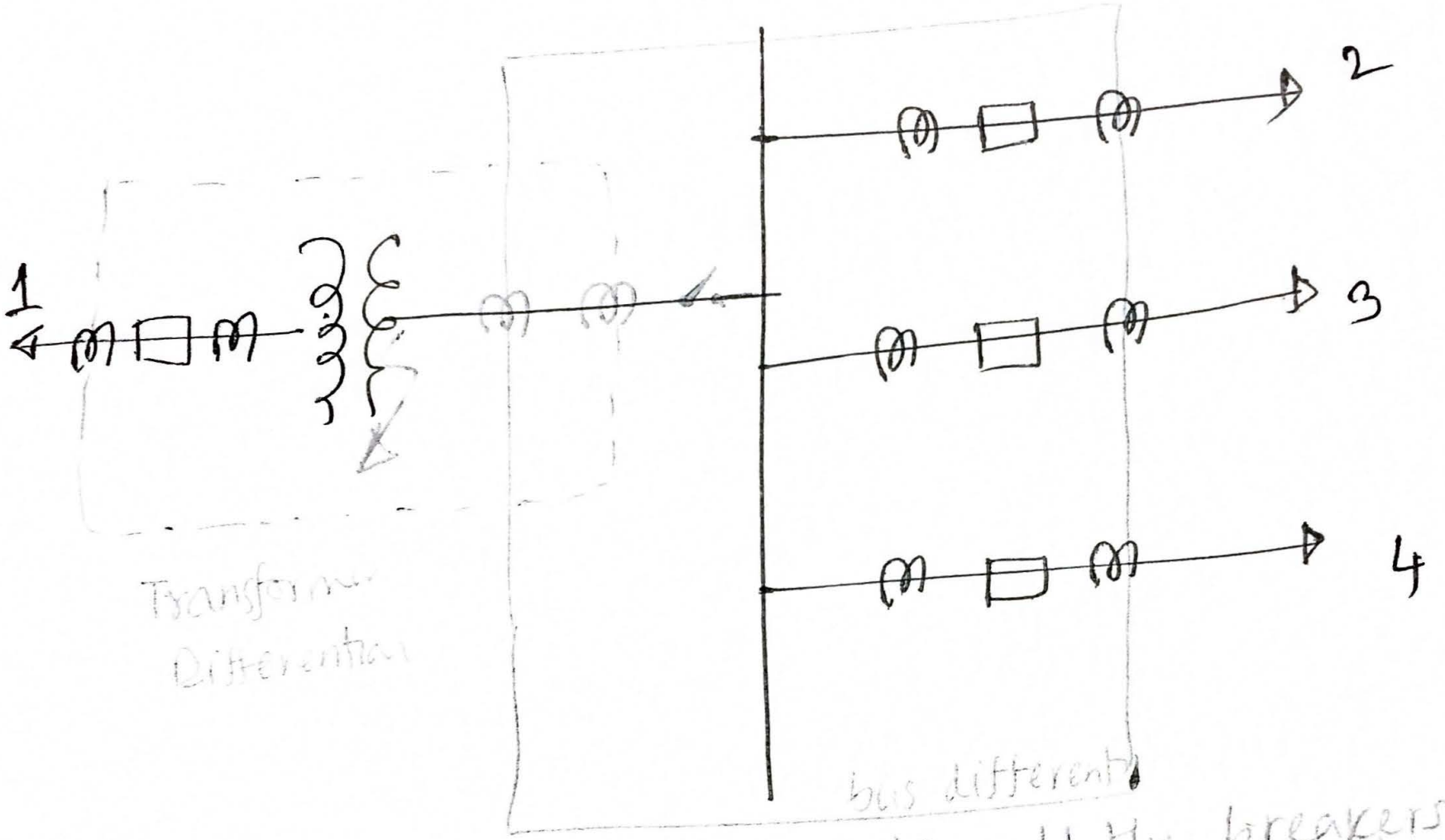


no need special bus protection for the circuit
→ Removed for maintenance
bus still connected to four ckt
so it is now open bus

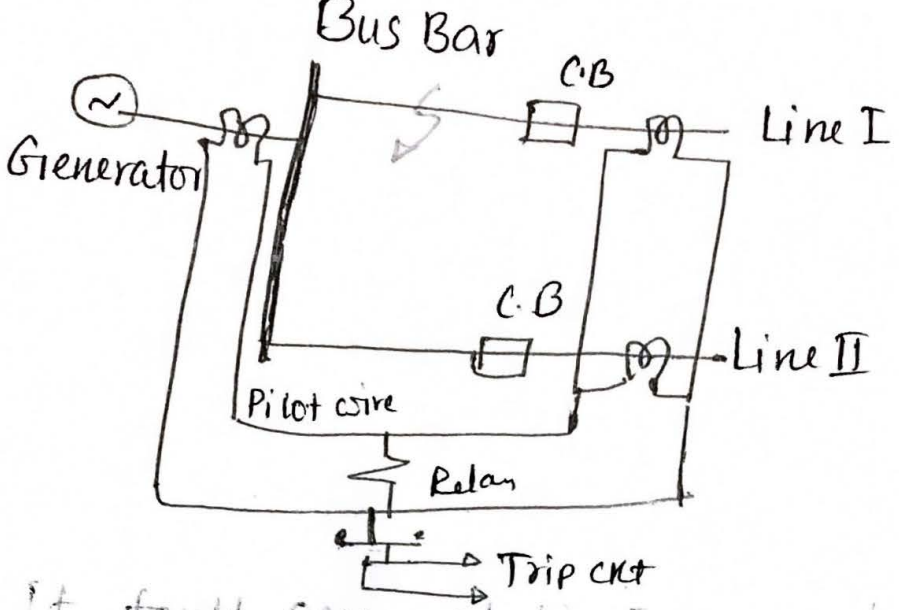


if fault occur at line 3 both Breakers related to that will open and bus will be split.





fault at Transformer will trip all the breakers as
Previous but after that a motor operated switch disconnect
will be open and the bus put back in the service



If fault occur at Line I, current at bus bar will be greater than rated current.

So current will flow throug CTs and relay got excited. so CB will be open and busbar will be protected.

Time graded system