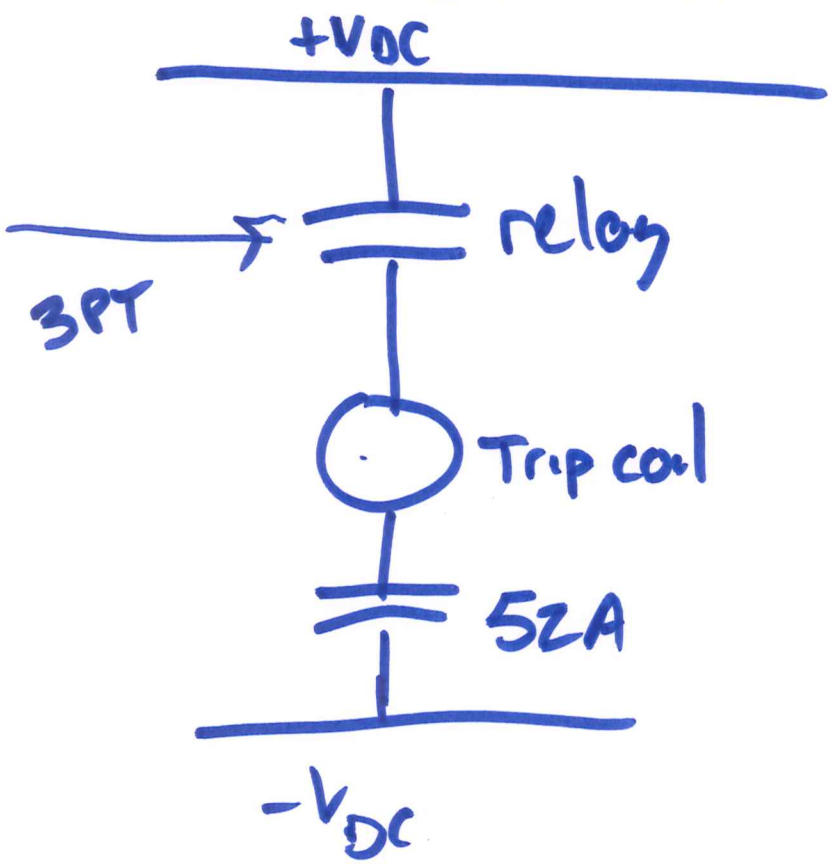
ECE 526

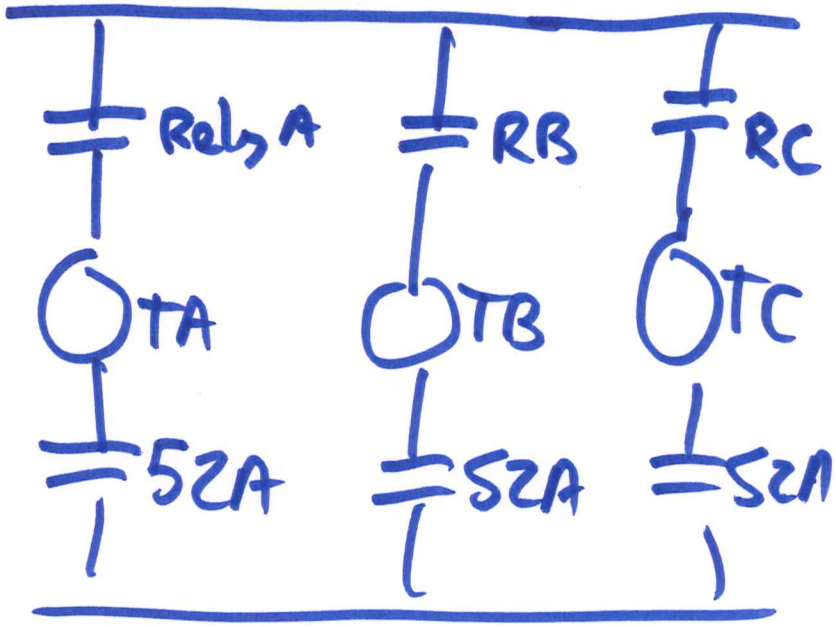
PROTECTION OF POWER SYSTEMS II

SESSION no. 17

3 pole tripping



Enable 3PT



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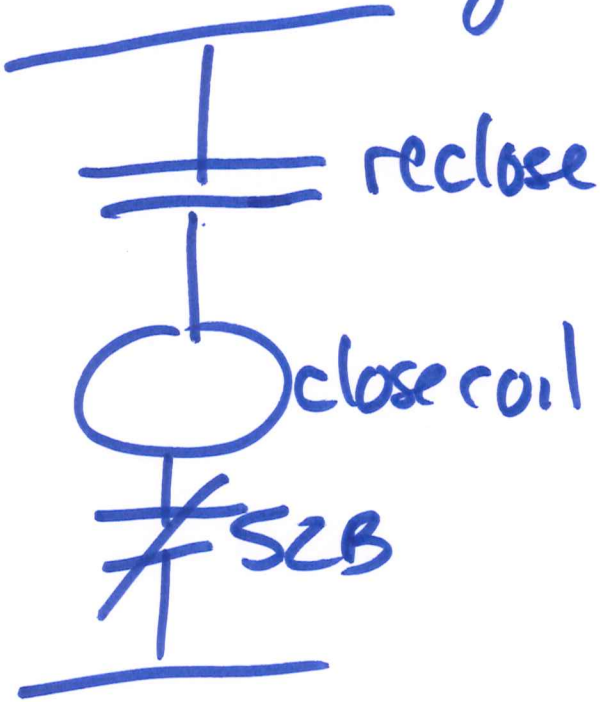
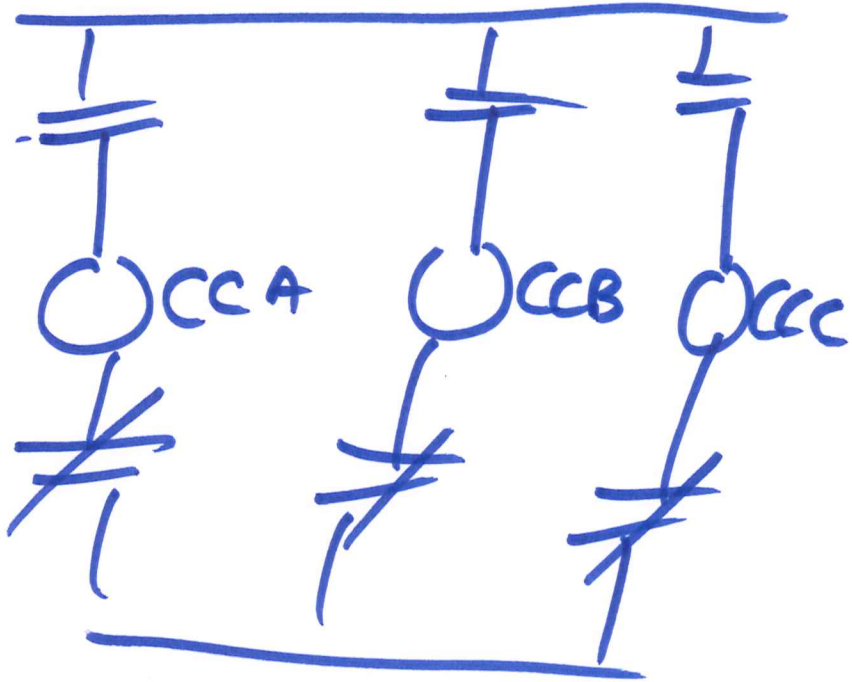
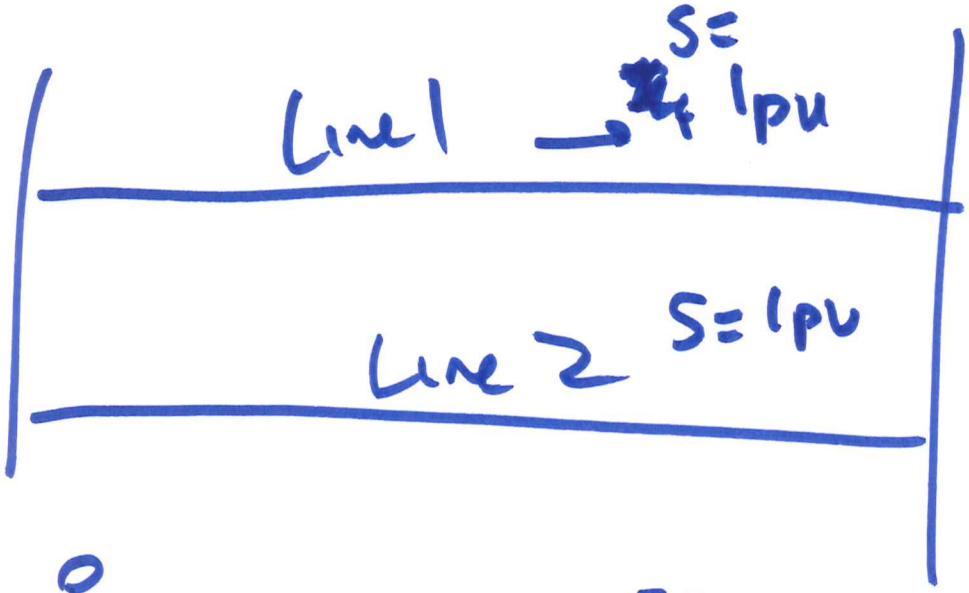
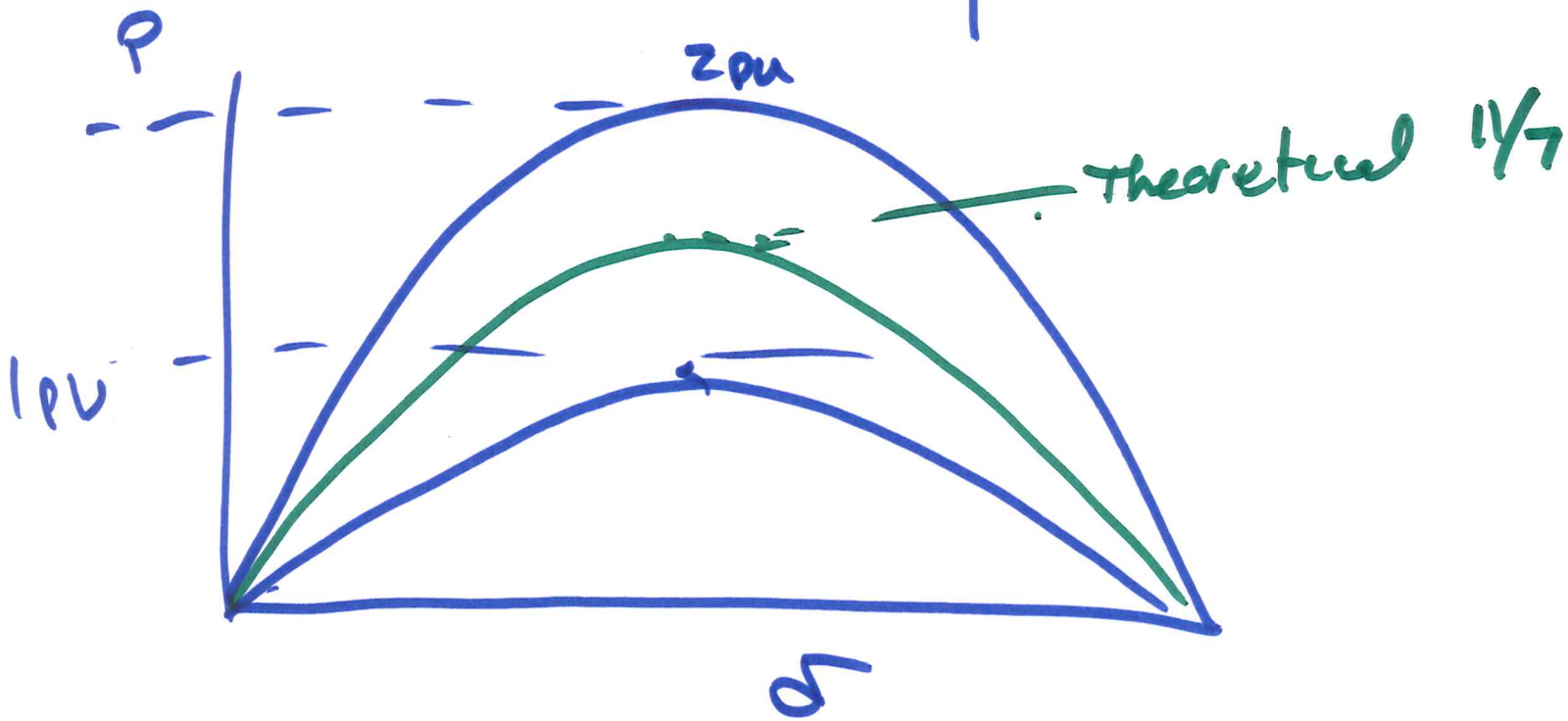
3 pole Reclosing



Single Pole Reclose




S=
Line 1
1pu
Line 2
S=1pu


P
2pu
1pu
Theoretical 1/7
δ

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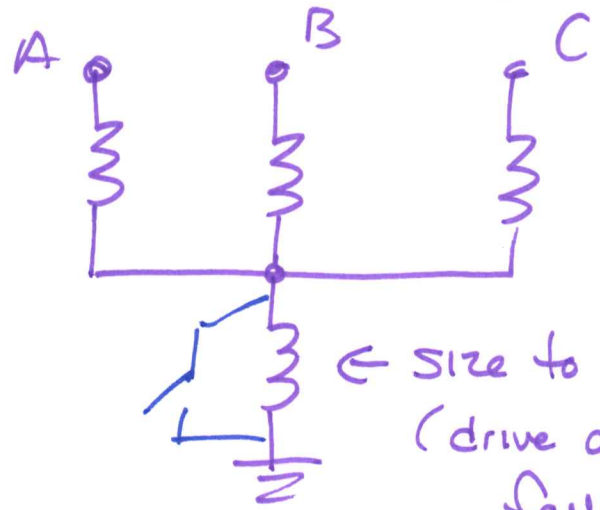
How decide when to ~~rete~~ reclose?

1. Empiracal Results/past history
   - some do staged fault tests
   - some just set at ~1sec

2. Try to speed extinction of arc

   A. shunt reactors at terminals



← size to cancel Caps of line (drive a resonant low voltage at fault location)

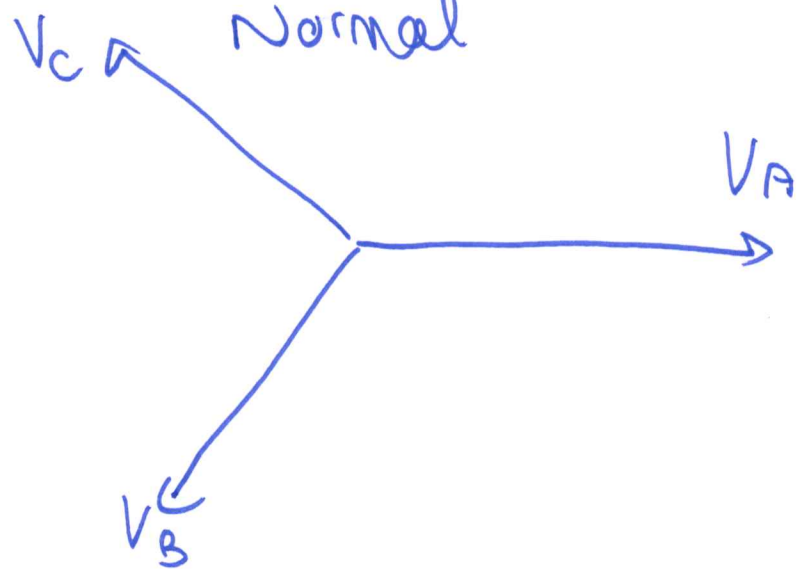
Relatively large X_L becaus X_C is large nF/mi

3 2. B. Add speed grounding switches on each phase

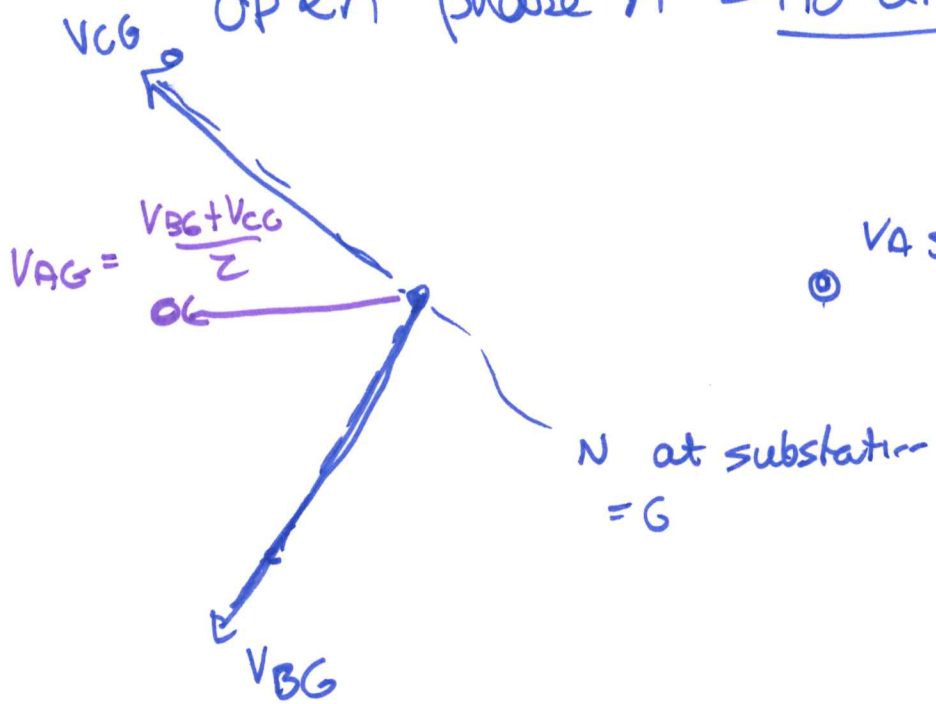
→ short open pole to ground after breakers clear

- kills arc more quickly
- Adds more control circuit complexity & cost

Normal



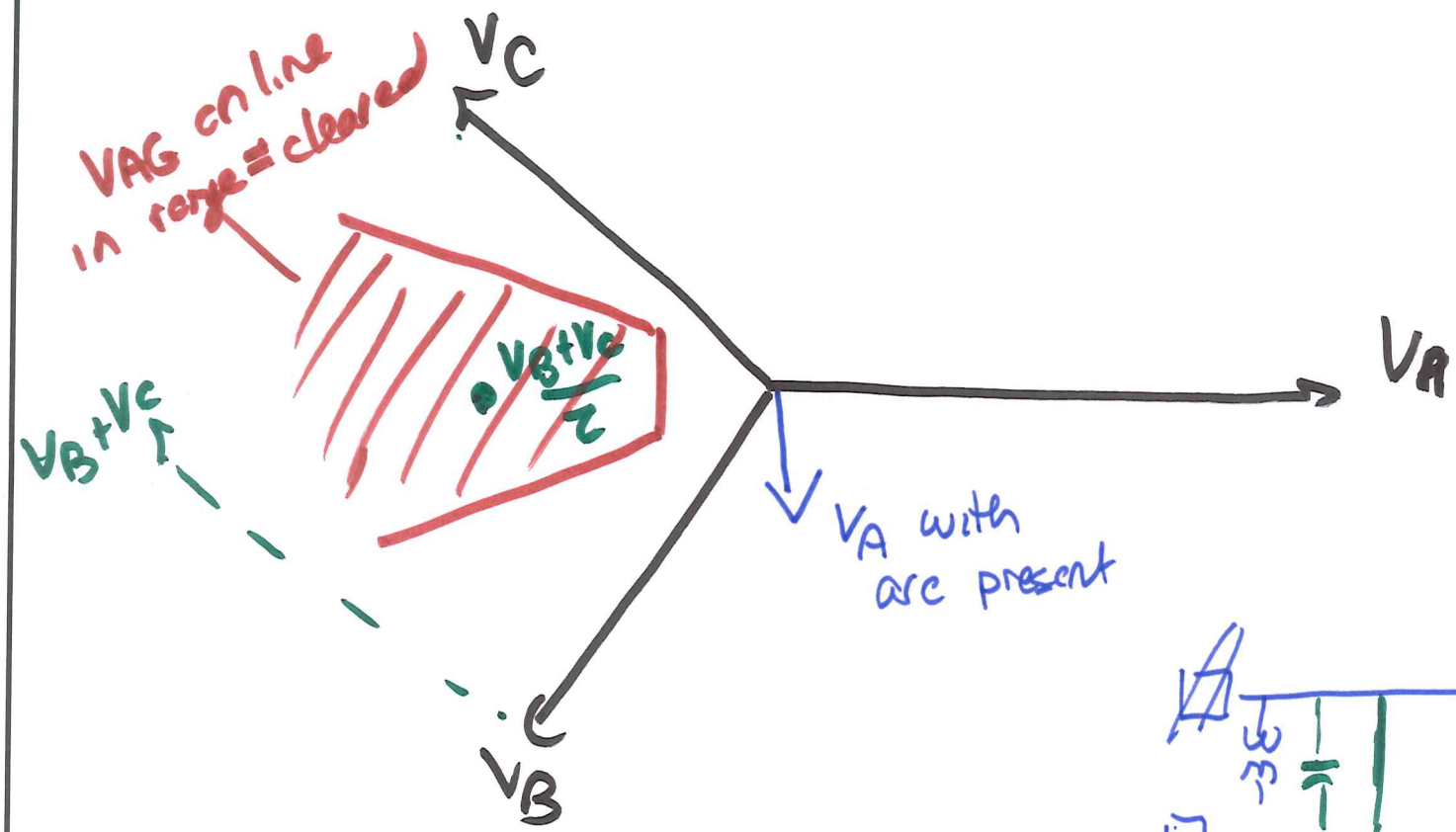
open phase A – <u>no arc</u>

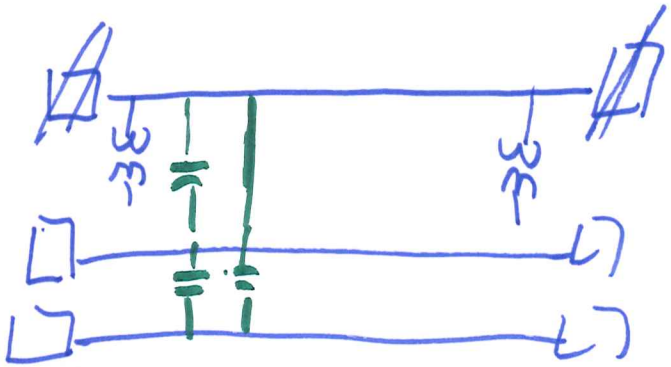


V_A system side of CB

3. Have relay detect that arc has cleared

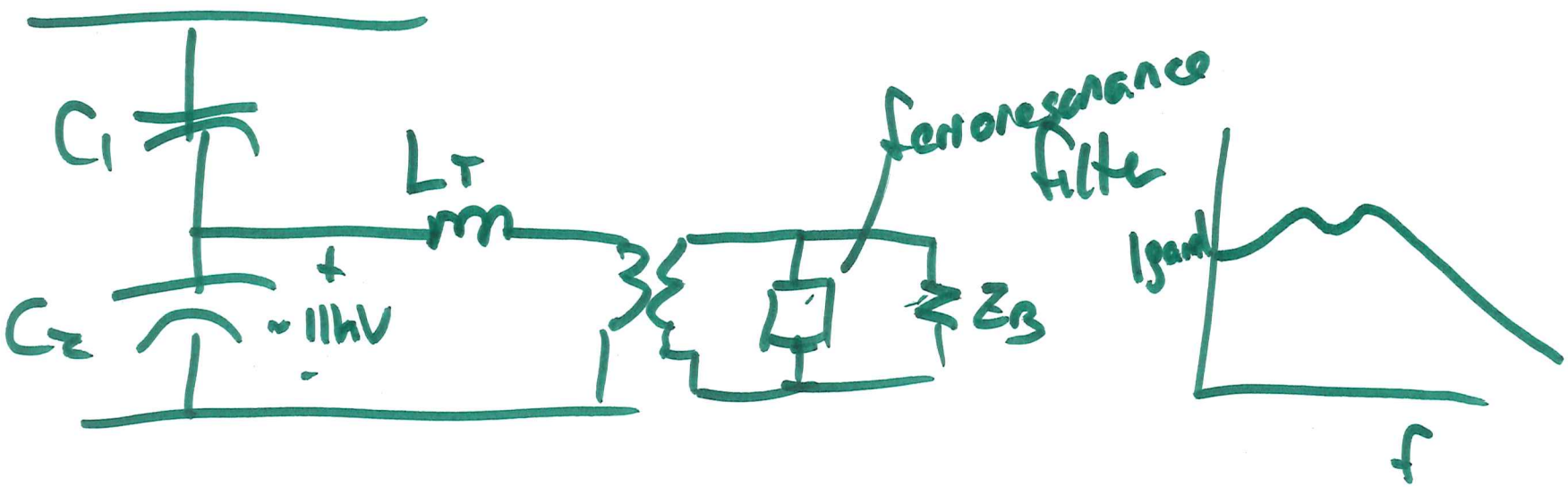
A. voltage angle/magnitude (on line side of breaker)





B. Frequency spectrum of V_{AG} (assuming AG fault)

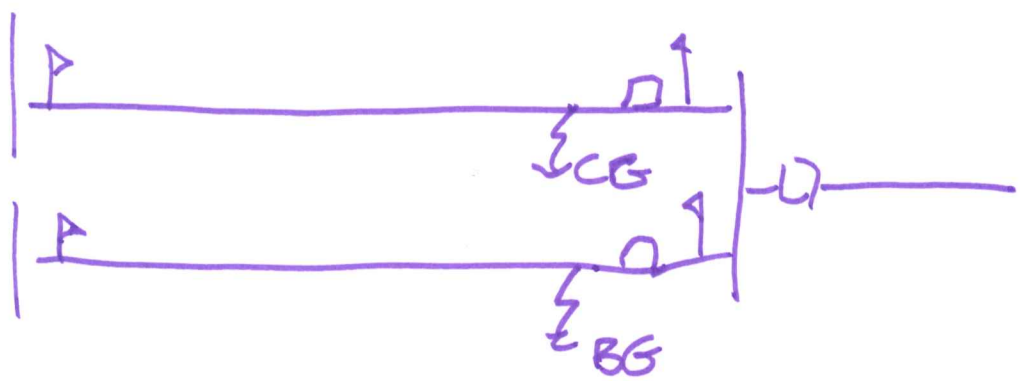
→ frequency spectrum of V_{AG} changes when ARC clears (high frequency noise with Arcing)



Implementation issues

- Distance elements
  - AG, BG, CG
  - reliable faulted phase selection and fault type ID

- POTT, DCB, etc...
  - additional comm channels & logic



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communicate

Limited comm bandwidth PT1 or PT3 (or DT1, DT3)

→ ~~Fse~~ when relay receives comm

receive: PT1 & sees SLG fault in zone 2
will initiate high speed SPT

receive PT3 and sees SLG in zone 2?
- wait for zone 2 timer
is a common/recommended by some vendors
(undertripping not overtripping)

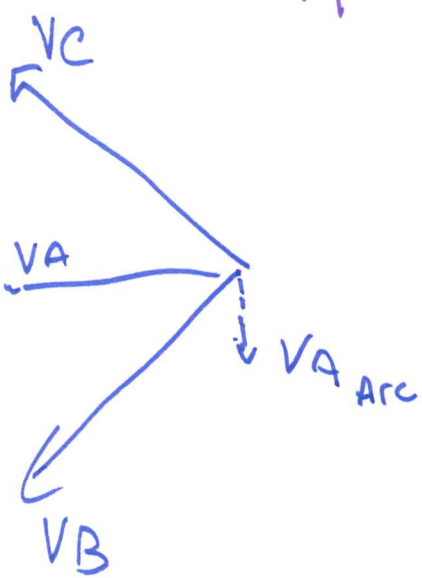
with more communication bandwidth

→ PTA
PTB
PTC

Polarizing quantity

V_1 vs V_{memory} (which side or PTs on)

Line side PTs



- polarizing for protection unfaulted phases
- long memory → careful about power swings

I_0, I_2 in faulted line

& <u>parallel lines</u>

X21G, R21G } quad elements

51G/67G - ground overcurrent elements } issues with single pole open condition

Mutual coupled lines