

# Setting Over Current Relays on ETAP

## Objectives:

- To learn settings of definite time over current relays on ETAP

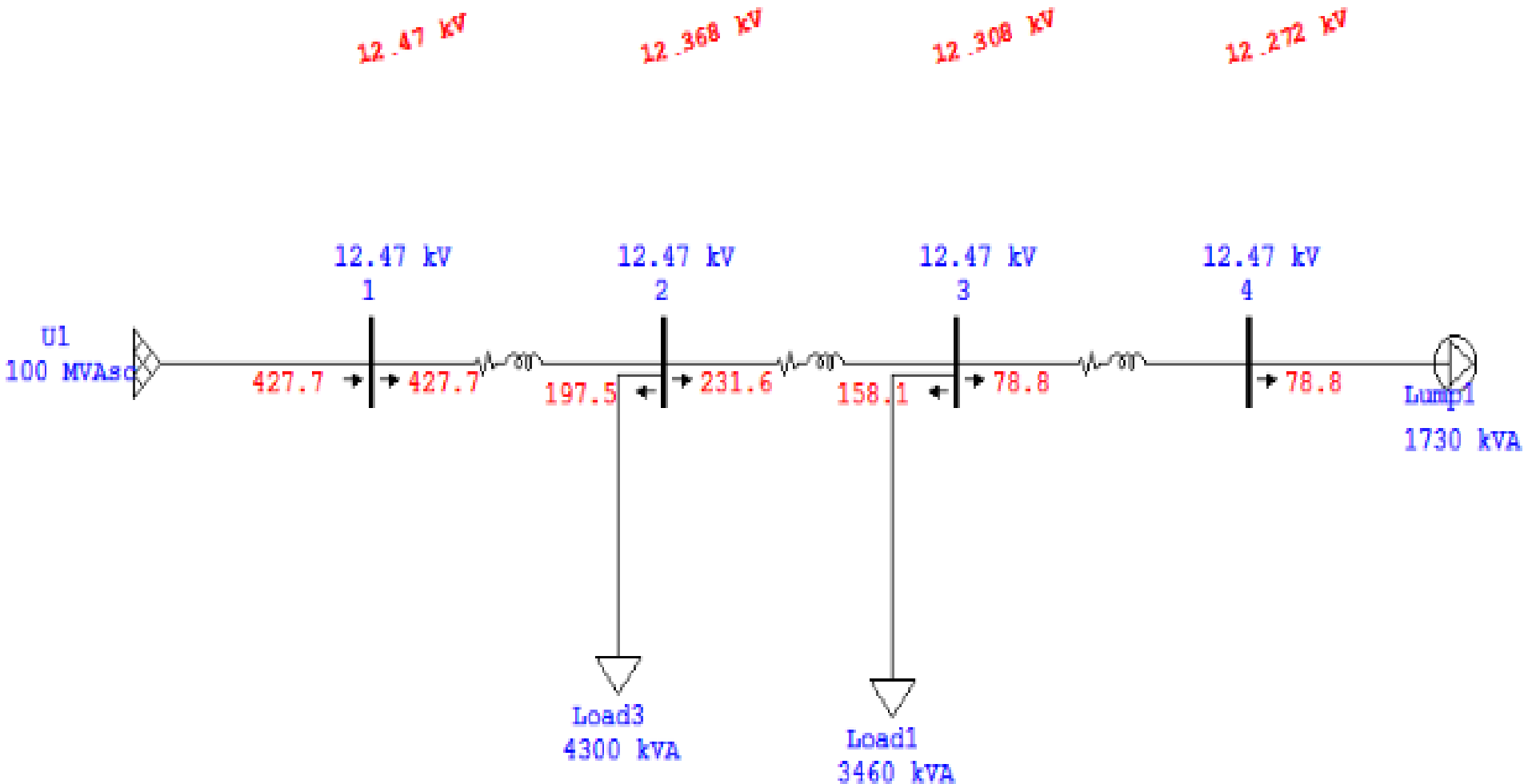
## System used:


- IEEE 4 Bus System

# Starting with the IEEE 4 bus system...

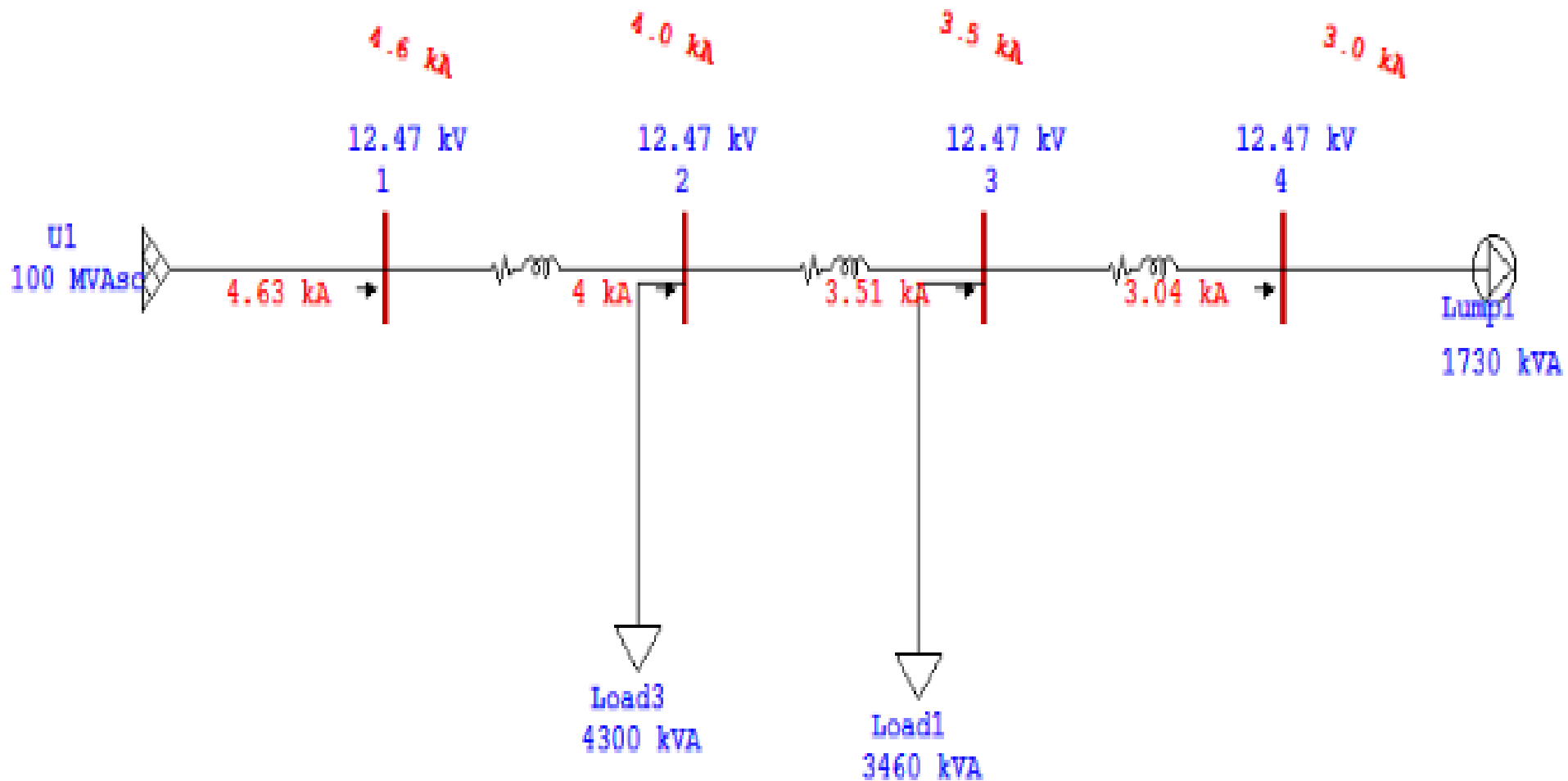
- The additional data required in this network is grid SC MVA, which is set to 100 MVA, with X/R 17
- Remove transformer from section 2 – 3 and copy line 1 in its place
- Modify the load connected at bus 4 to 100 % static and 1730 kVA
- Add static loads to bus 3 and 2 of 3460 and 4300 kVA respectively

- Run Load Flow Analysis & Note line current for all sections

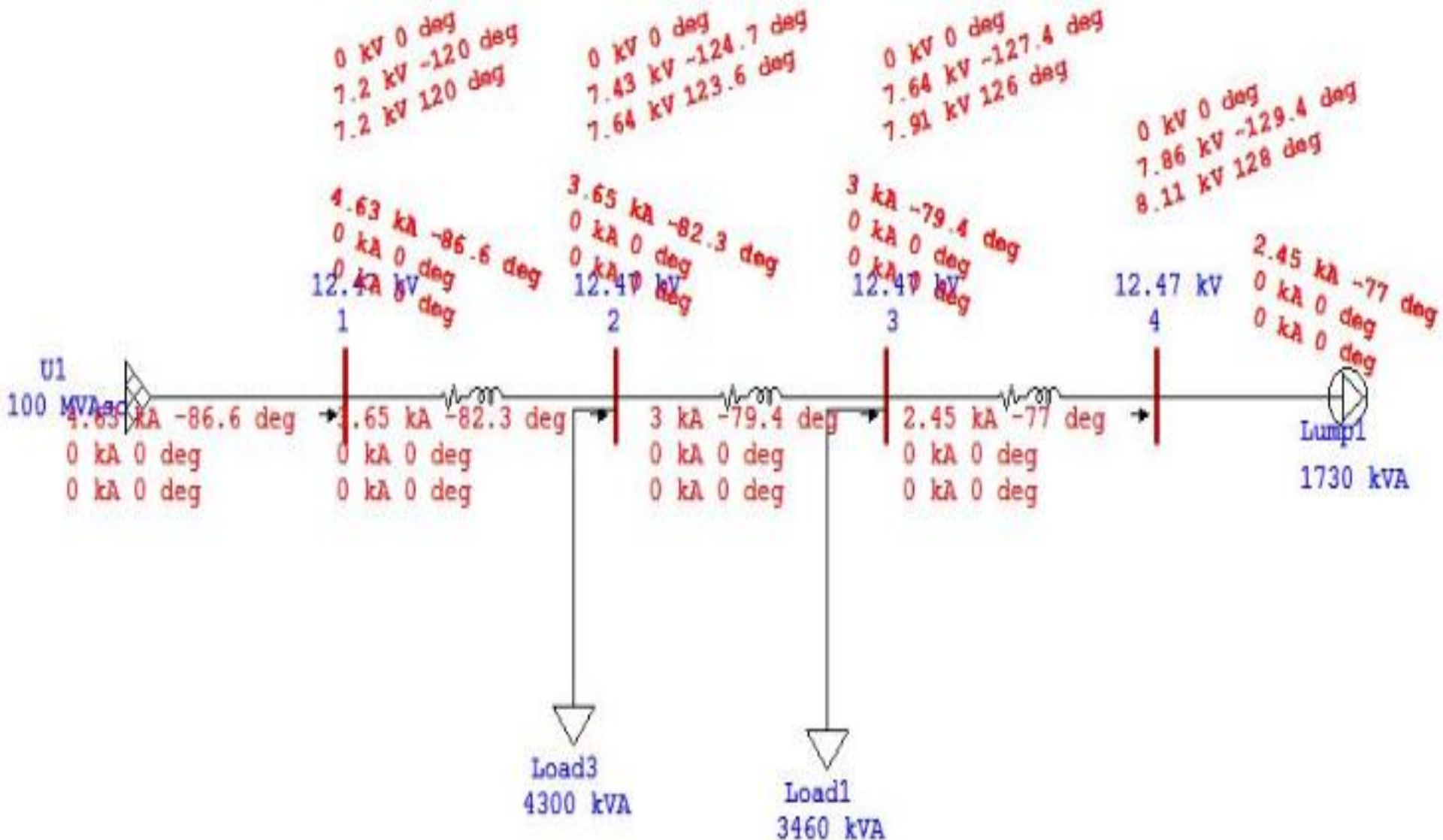


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- Run **short circuit analysis**:
  - For 3 phase fault , L-G, L-L and DLG faults & Note maximum and minimum fault currents for each bus

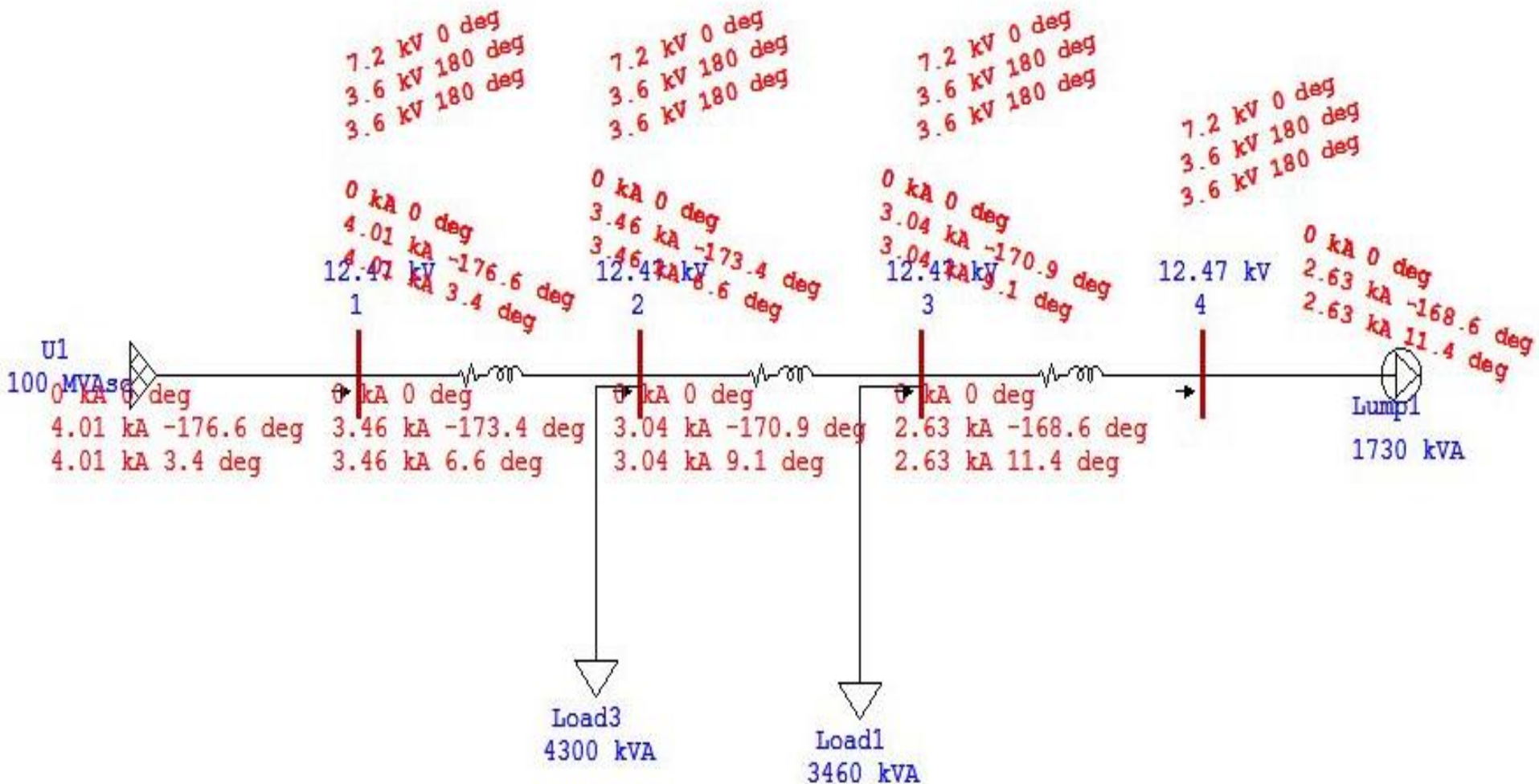
# 3 phase fault



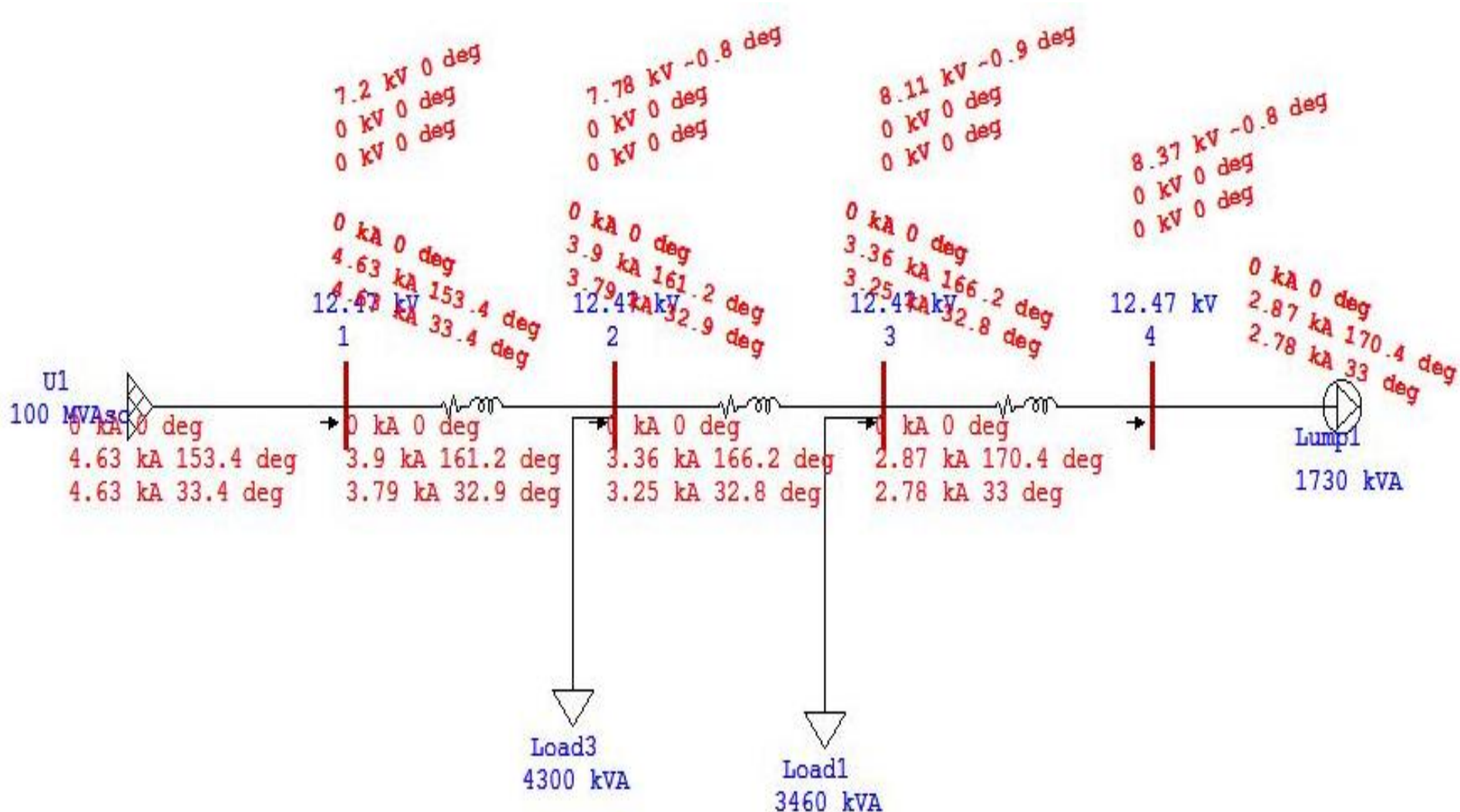
# L-G Fault



# Line-Line Fault



# DLG Fault





# Findings from Fault Analysis

Bus No	1	2	3	4
Normal (A)	427	427	232	79
Max If (A)	4630	4000	3500	3000
Min If (A)	4010	3460	3000	2450

# Current Protection



**Circuit  
Breaker  
Ratings**  
Select a CB  
from  
Library,  
keeping in  
mind the  
interrupting  
capacity  
required.

High Voltage Circuit Breaker Editor - CB1

Info Rating Reliability Remarks Comment

121 kV 2 Cy 20 kA 54 kA

Standard  
☒ ANSI  
☐ IEC

Library Info  
Library...

MFR ABB  
Model 121PM20

Rating

Max. kV	Cont. Amp	Standard	Cycle	CPT	Time Constant
121	1200	SYM	2	1.5	45
Rated Int.	Max Int.	C & L ms	C & L Peak	S Factor	% dc
20	20	32	54	1.2878	57.38

Application/Association  
☐ Association TRV

CB1 OK Cancel

# Current Transformer Ratings

Select appropriate turns ratio for CT keeping in mind the primary current in line where CT is connected. You can also select CT Burden class.

Current Transformer(CT) Editor - CT1

Info Rating Checker Remarks Comment

Ratio

Primary	Sec.	Ratio
100 A	5 A	100 : 5

Class

Designation B-2

Burden 50.046

☒ VA ☐ Ohm

CT1

OK Cancel

# Over Current Relay Parameters

Select an over current relay from a library of different models and manufacturers of OCR.

Overcurrent Relay Editor - Relay1

Info Input Output OCR TCC kA Model Info Checker Remarks Comment

ALSTOM P120

OC Level  
OC1 ☒ Enabled ☐ Integrated Curves  
☐ Link TOC + IOC for this level [Library...](#)

Setting

☒ Overcurrent

Curve Type: Definite Time

Pickup Range: 0.1 - 25 xCT Sec Multiples

Pickup: 1 Step: 0.01

Relay Amps: 5 100 Prim. Amps

Time Dial: 0.1 Step: 0.01

☒ Instantaneous

Instantaneous

Pickup Range: 0.01 - 8 xCT Sec Multiples

Pickup: 2 Step: 0.005

Relay Amps: 10 200 Prim. Amps

Delay Range: 0 - 150 sec

Delay (sec): 0.1 Step: 0.01

Relay1 OK Cancel

For example,  
select Alstom P120.

To observe definite  
time characteristic,  
uncheck the  
instantaneous  
option.

Library Quickpick - Relay

Manufacturer

- ABB
- AEI
- Allen Bradley
- ALSTOM**
- AREVA
- Basler Electric
- BBC

Reference

AREVA, GEC

Link

<http://www.areva-td.com/>

Selection

☐ Protection Type ☒ Function

- ☐ Differential
- ☐ Distance
- ☒ Overcurrent

Model

- CAG12
- CAG12C
- MX3IPD1A
- MX3IPD1B
- P120**
- P121
- P122

Functions

Overcurrent

Reference

MiCOM P120

Brand Name

MiCOM

Application

Protection of industrial networks, utilities, HV & MV substations and MV & LV transform

Help OK None Cancel

Connect CT  
with  
respective  
OCR and verify  
its turns ratio  
from Input Tab  
of Relay.

Overcurrent Relay Editor - Relay1

Info Input Output OCR TCC kA Model Info Checker Remarks Comment

ALSTOM P120

Current

☐ Current Summer ☐ Residual

Terminal	ID	Type	Prim. Amp	Sec. Amp
CT Input	CT1	Phase	100	5

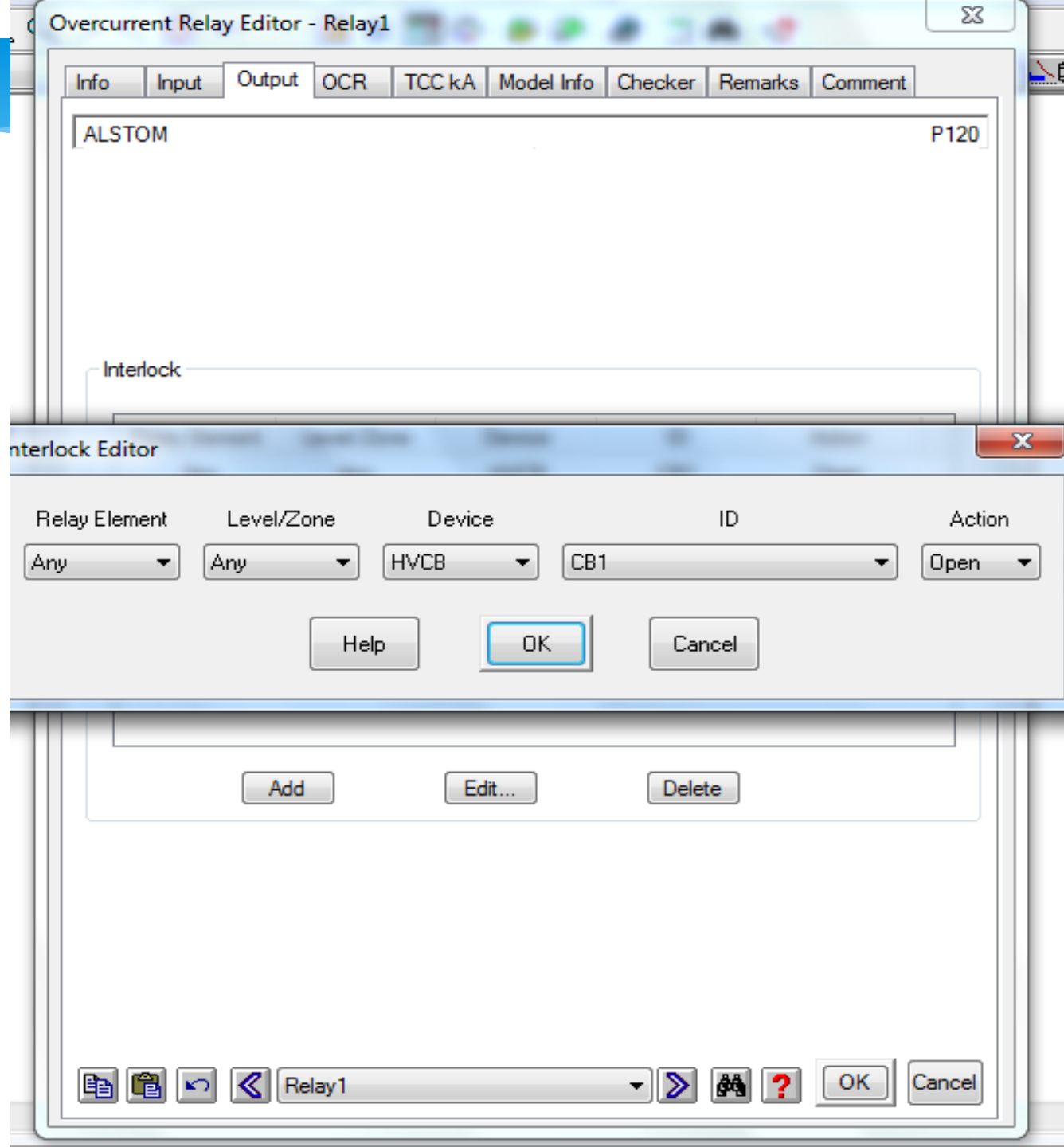
Voltage

Terminal	ID	Type	Prim. kV	Sec. Volts
PT Input			0.0	0.0

Relay1

OK Cancel

In output  
Tab of  
Relay  
Editor , **Add**  
one HV CB  
to which  
the relay  
should  
send its  
output.

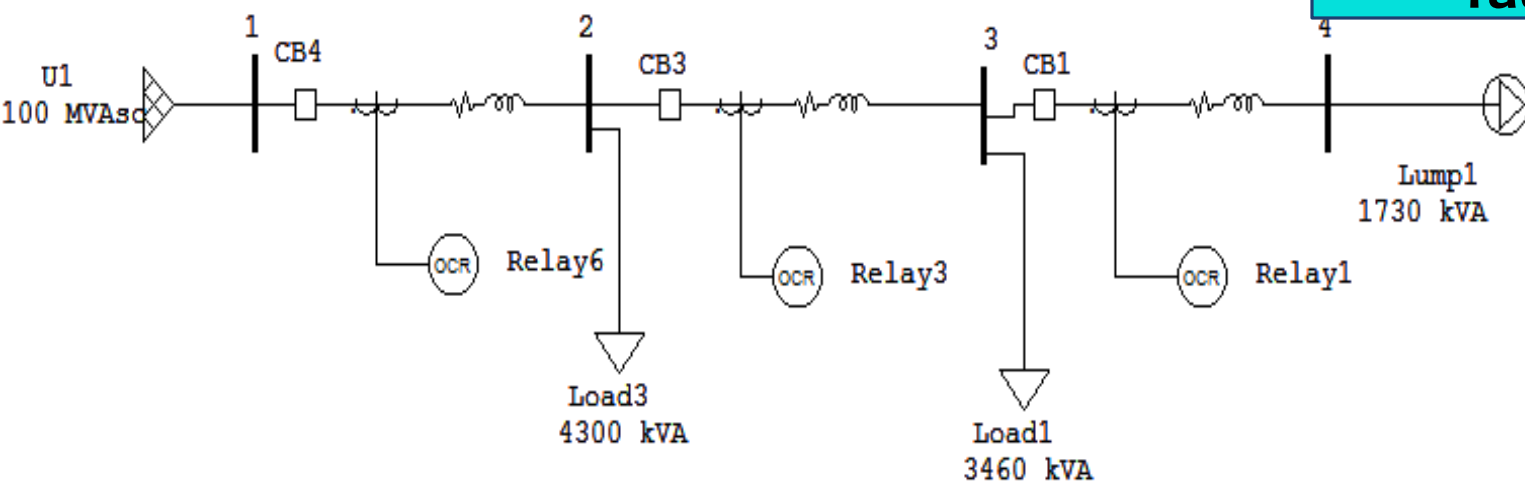






## Star Protective Device Coordination

Drag and Drop “Fault insertion” to any bus that you want to fault



The Circuit Breaker 1 operates (indicated by a cross) when fault is placed on bus 4.

