

Normal:  $i_1 = i_2 \Rightarrow I = 0 \Rightarrow$  O.C. relay does not sense

{ fault at C:  $i_1 = -i_2 \Rightarrow I = 2KI_1$   
 (2) load:  $i_2 = 0 \Rightarrow I = KI_1$   
 with high resistance  $\Rightarrow I \downarrow \Rightarrow$  setting for relay

### unit protection:

1) in order to protect only one equipment

2) { time trip is equal to zero ( $5^{ms}$  -  $50^{ms}$ )  
 it does not need to coordination.

(X)

# differential protection :

{ trans  
generator  
line

## problem statement :

condition ① : { fault in C, but current is low  
 $i = -i_2$   
↓  
relay doesn't sense

the best

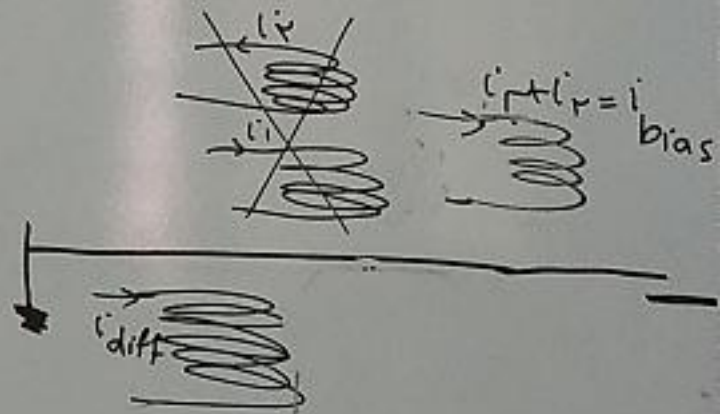
Solution: adding 2 windings called "bias"

fault (A):

if  $i_{bias1} = i_{bias2} \Rightarrow$  خنثی کردن  
اثر عیب

fault (C):

if  $i_{bias1} = -i_{bias2} \Rightarrow$  it helps to send trip.



## solution 2

amplifying  $i_{diff} \Rightarrow$  { every unbalancing such as  
small error in CT's or PT's  
cause to send trip



$i_1$	$i_r$	$i_{diff}$	$i_{bias}$	trip
47	40	7	87	No
48	40	8 <sup>down</sup>	88 <sup>up</sup>	yes (⊗)
48	0	48 <sup>down</sup>	48 <sup>up</sup>	yes (⊗⊗)

new microprocessor (digital) relay

