Location of an Earth Fault

If a series circuit has a low impedance isolation failure (Earth Fault), a simple method can be used to locate the position of the failure.

On the following page some figures helps to explain the idea.

Fig. 1:
A standard series circuit with isolating transformers and lamps connected to a CCR.
The current out of terminal 1 (I_1) will be equal to the return current into terminal 2 (I_2).

Fig. 2:
A low impedance Earth Fault somewhere in the circuit have no influence on the light as the current to earth (I_E).must be zero when only one connection to earth is present on the circuit.

Fig. 3:
However, if we connect terminal 2 to ground, we have established a second earth failure and an earth current can run. If the impedance in the earth failure is zero, the voltage present at the earth failure spot will be equal to the voltage on terminal 2 = zero, and $I_2 = 0$ while $I_1 = I_E$.
Therefore only the yellow marked light fixtures will be on, and the position of the earth fault can be located between the last fixture lighted and the first one not-lighted.

Fig. 3:
If the additional grounding is moved from terminal 2 to 1, the situation will be as shown on Fig.4, and in this case and $I_1 = 0$ while $I_2 = I_E$.
Therefore only the yellow marked light fixtures will be on, and the position of the earth fault can be located between the last fixture lighted and the first one not-lighted.

OBS:
If the earth failure is very close to one of the CCR outputs, grounding of the other output terminal will make a short-circuit of the CCR output, so we advise only to switch-on in the lowest intensity step, to see if the CCR is working stabile.

OLH

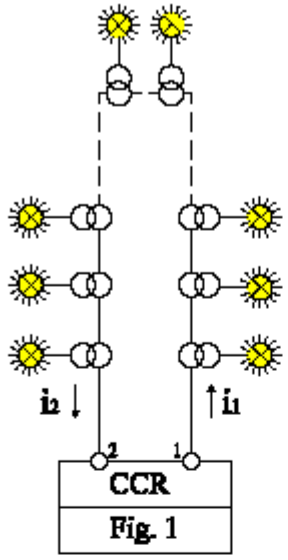

Fig. 1

$i_1 = i_2$

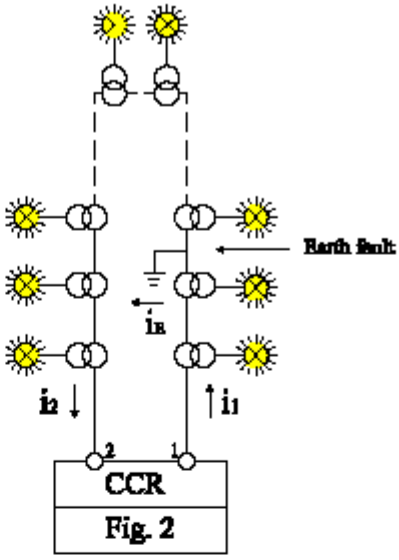

Fig. 2

$i_1 = i_2$

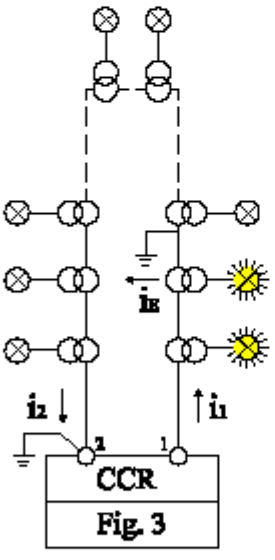

Fig. 3

$i_1 = i_E$

$i_2 = 0$

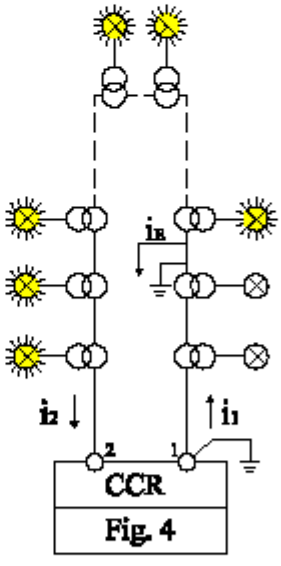

Fig. 4

$i_2 = i_E$

$i_1 = 0$

SCALE:	Trouble shooting on Circuit with low impedance Earth failure	INDUPERM A/S DENMARK
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REPLACES:		
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