Find r1 from Zs – TABLE of RATIOS

for standard twin and earth cables

		RADIAL		RING	
LINE	CPC	r1	r2	r1	r2
© LearnElectrics.com		R1+R2 x		4 x R1+R2 x	
1	1	0.5	0.5	0.5	0.5
1.5	1	0.4	0.6	0.4	0.6
2.5	1.5	0.375	0.625	0.375	0.625
4	1.5	0.273	0.727	0.273	0.727
4	2.5	0.385	0.615	0.385	0.615
6	2.5	0.294	0.706	0.294	0.706
10	4	0.286	0.714	0.286	0.714

R1+R2 = Zs - Ze

r1 is LINE or phase
rN is NEUTRAL : r1 = rN
r2 is EARTH or CPC

Find r1 from Zs

We should all know how to calculate Zs from the various circuit measurements. But can we reverse the process.
If we have measured Zs then how can we work backwards and arrive at the resistances of the individual circuit conductors?
And how do we unravel the resistance values of a ring circuit?

There are two methods.
If R1+R2 is known then multiply that number by the ratio factors in the table

A RADIAL circuit is a straight forward multiplication by the ratio shown in the table

A RING circuit must have R1+R2 multiplied by 4 before multiplying by the ratio.

If only Zs and Ze are known, then subtract Ze from Zs to find R1+R2 and then proceed as above

$Zs = Ze + (R1+R2)$

so … $(R1+R2) = Zs - Ze$

Resistance symbols

The resistance value of the Line conductor is called r1

If the Neutral is the same size (CSA) as the line then r1 = rN, they will be the same ohms value.

The resistance of the Earth or circuit protective conductor (CPC) is called r2

R1+R2

In a RADIAL circuit R1+R2 = r1+r2 ● For a RING circuit $R1+R2 = \frac{r1+r2}{4}$