PROPERTIES OF CONDUCTORS

SIZE AWG OR MCM	AREA CIRCULAR MILS	CONCENTRIC-LAY STRANDED CONDUCTORS		BARE CONDUCTORS		D. C. RESISTANCE OHMS/M. FT. AT 75°C OR 167°F		
		QUANTITY	DIAM. EACH WIRE, INCHES	DIAM., INCHES	AREA, SQUARE INCHES	COPPER		ALUMINUM
						COATED COND.	UNCOATED COND.	
14	4110	7	.024	.073	.004	3.14	3.26	5.17
12	6530	7	.030	.092	.006	1.98	2.05	3.25
10	10380	7	.038	.116	.011	1.24	1.29	2.04
8	16510	7	.049	.146	.017	.778	.809	1.28
6	26240	7	.061	.184	.027	.491	.510	.808
4	41740	7	.077	.232	.042	.308	.321	.508
3	52620	7	.087	.260	.053	.245	.254	.403
2	66360	7	.097	.292	.067	.194	.201	.319
1	83690	19	.066	.332	.087	.154	.160	.253
0	105600	19	.074	.373	.109	.122	.127	.201
00	133100	19	.084	.419	.138	.967	.101	.159
000	167800	19	.094	.470	.173	.0766	.079	.126
0000	211600	19	.106	.528	.219	.0608	.0626	.100
250	250000	37	.082	.575	.260	.0515	.0535	.0847
300	300000	37	.090	.630	.312	.0429	.0446	.0707
350	350000	37	.097	.681	.364	.0367	.0382	.0605
400	400000	37	.104	.728	.416	.0321	.0331	.0529
500	500000	37	.116	.813	.519	.0258	.0265	.0424
600	600000	61	.992	.893	.626	.0214	.0223	.0353
750	750000	61	.111	.998	.782	.0171	.0176	.0282
1000	1000000	61	.128	1.15	1.04	.0129	.0132	.0212
1500	1500000	91	.128	1.41	1.57	.0085	.0088	.0141
2000	2000000	127	.126	1.63	2.09	.0064	.0066	.0106

ELECTRICAL FORMULAS FOR CALCULATING AMPERES, HORSEPOWER, KILOWATTS, AND KVA

TO FIND	DIRECT CURRENT	ALTERNATING CURRENT		
		SINGLE PHASE	TWO PHASE FOUR WIRE	THREE PHASE
AMPERES WHEN "HP" IS KNOWN	$\frac{HP \times 746}{E \times \%EFF}$	$\frac{HP \times 746}{E \times \%EFF \times PF}$	$\frac{HP \times 746}{E \times \%EFF \times PF \times 2}$	$\frac{HP \times 746}{E \times \%EFF \times PF \times 1.73}$
AMPERES WHEN "KW" IS KNOWN	$\frac{KW \times 1000}{E}$	$\frac{KW \times 1000}{E \times PF}$	$\frac{KW \times 1000}{E \times PF \times 2}$	$\frac{KW \times 1000}{E \times PF \times 1.73}$
AMPERES WHEN "KVA" IS KNOWN		$\frac{KVA \times 1000}{E}$	$\frac{KVA \times 1000}{E \times 2}$	$\frac{KVA \times 1000}{E \times 1.73}$
KILOWATTS	$\frac{E \times I}{1000}$	$\frac{E \times I \times PF}{1000}$	$\frac{E \times I \times PF \times 2}{1000}$	$\frac{E \times I \times PF \times 1.73}{1000}$
KILOVOLT-AMPERES "KVA"		$\frac{E \times I}{1000}$	$\frac{E \times I \times 2}{1000}$	$\frac{E \times I \times 1.73}{1000}$
HORSEPOWER	$\frac{E \times I \times \%EFF}{746}$	$\frac{E \times I \times \%EFF \times PF}{746}$	$\frac{E \times I \times \%EFF \times PF \times 2}{746}$	$\frac{E \times I \times \%EFF \times PF \times 1.73}{746}$

PERCENT EFFICIENCY = $\%EFF = \frac{OUTPUT}{INPUT}$ POWER FACTOR = $PF = \frac{POWER\ USED\ (WATTS)}{APPARENT\ POWER} = \frac{KW}{KVA}$

NOTE: DIRECT CURRENT FORMULAS DO NOT USE (PF, 2, OR 1.73)
SINGLE PHASE FORMULAS DO NOT USE (2 OR 1.73)
TWO PHASE-FOUR WIRE FORMULAS DO NOT USE (1.73)
THREE PHASE FORMULAS DO NOT USE (2)

OHM'S LAW

THE RATE OF THE FLOW OF THE CURRENT IS EQUAL TO ELECTROMOTIVE FORCE DIVIDED BY RESISTANCE.

ELECTROMOTIVE FORCE = VOLTS = "E"
CURRENT = AMPERES = "I"
RESISTANCE = OHMS = "R"

$$\text{AMPERES} = \frac{\text{VOLTS}}{\text{OHMS}}$$

SERIES CIRCUIT

A SERIES CIRCUIT IS A CIRCUIT THAT HAS ONLY ONE PATH THROUGH WHICH THE ELECTRONS MAY FLOW.
NOTE: "T" STANDS FOR TOTAL.

$$ET = E1 + E2 + E3$$

$$IT = I1 = I2 = I3$$

$$RT = R1 + R2 + R3$$

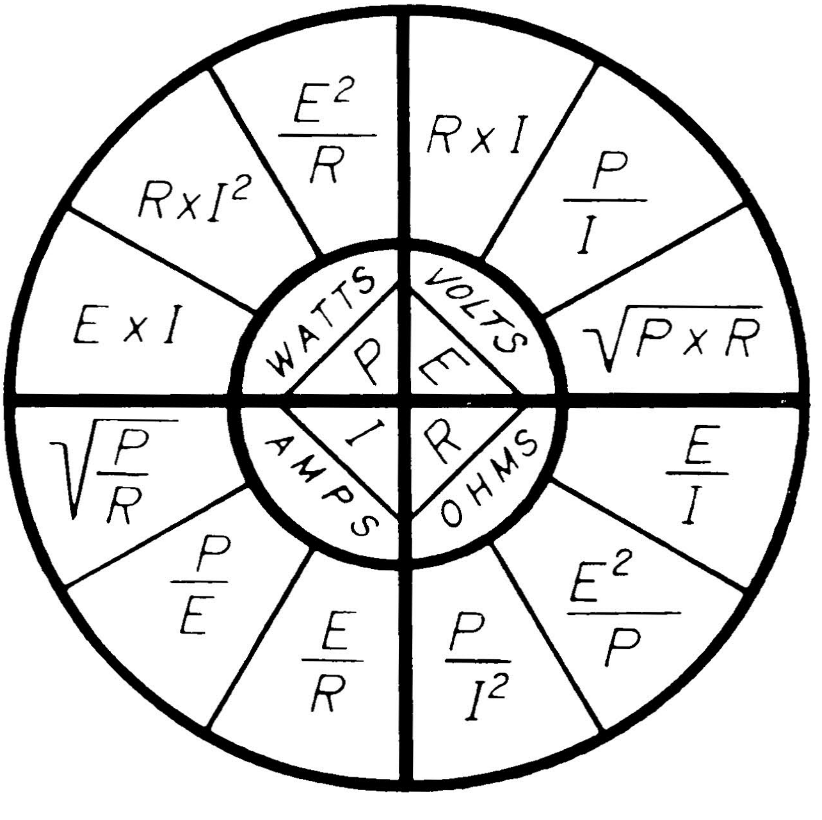
PARALLEL CIRCUIT

A PARALLEL CIRCUIT IS A CIRCUIT THAT HAS MORE THAN ONE PATH THROUGH WHICH THE ELECTRONS MAY FLOW.

$$ET = E1 = E2 = E3$$

$$IT = I1 + I2 + I3$$

$$\frac{1}{RT} = \frac{1}{R1} + \frac{1}{R2} + \frac{1}{R3}$$



NOTE: FOR A PARALLEL CIRCUIT HAVING ONLY TWO RESISTORS, THE FOLLOWING FORMULA MAY BE USED.

$$RT = \frac{R1 \times R2}{R1 + R2}$$