EL-0001

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EL-0005

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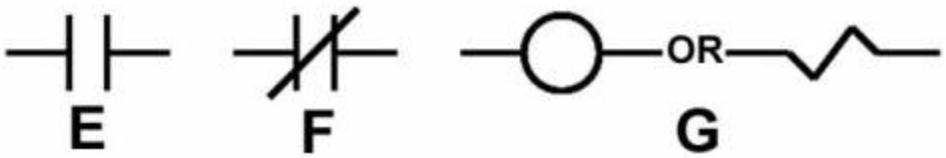
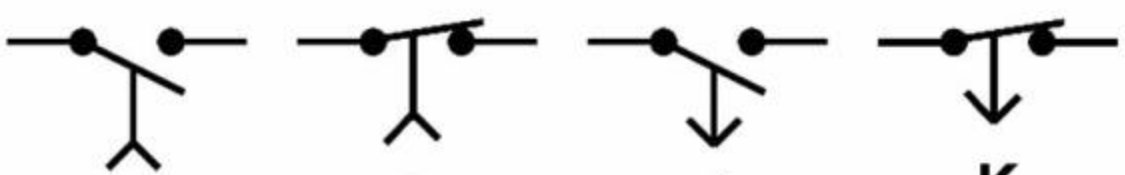


E F G



H I J K

EL-0015

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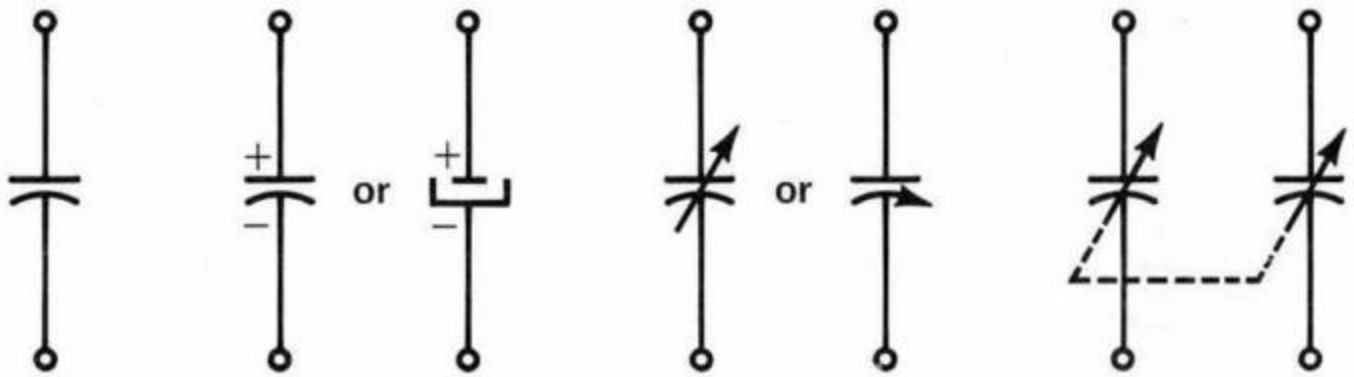

A B C D

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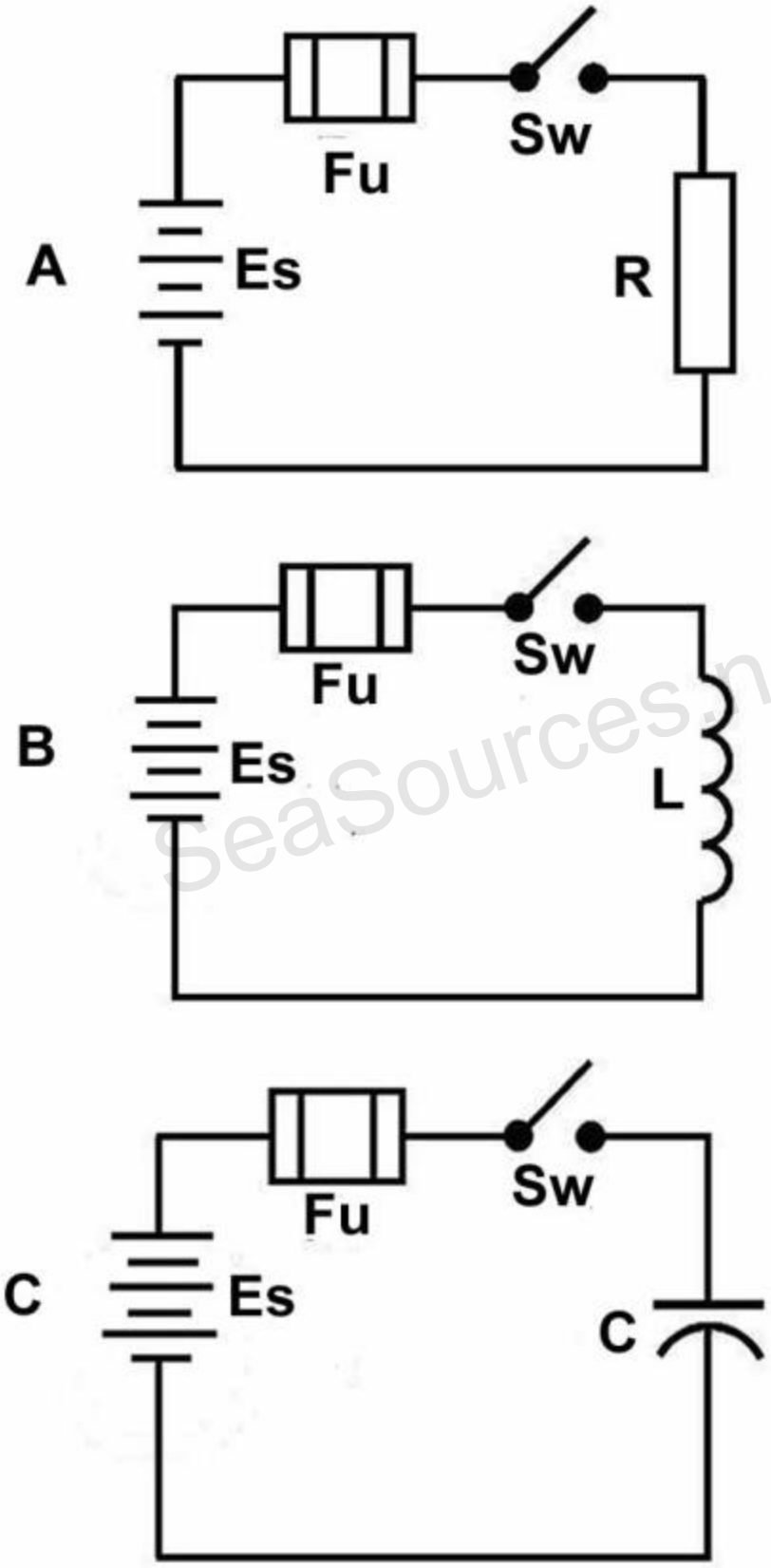
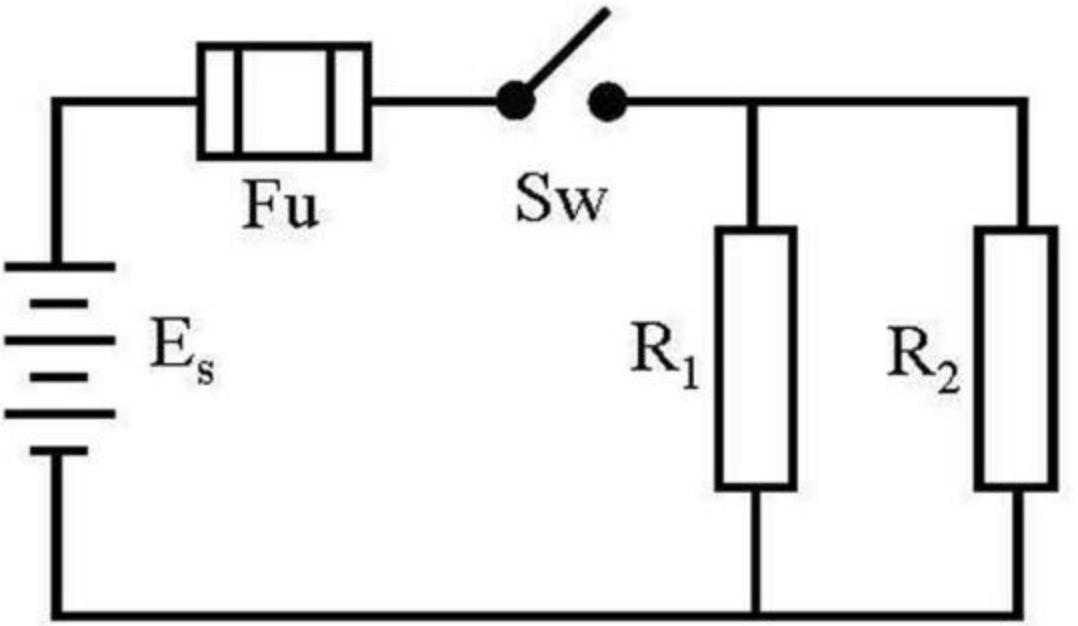


EL-0019



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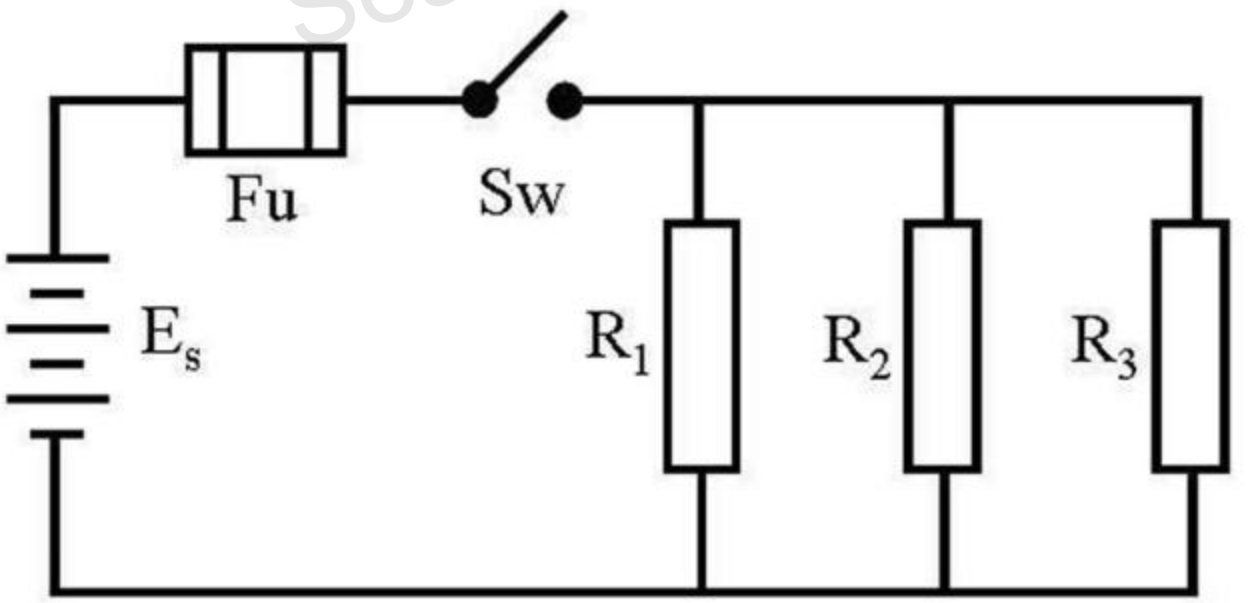

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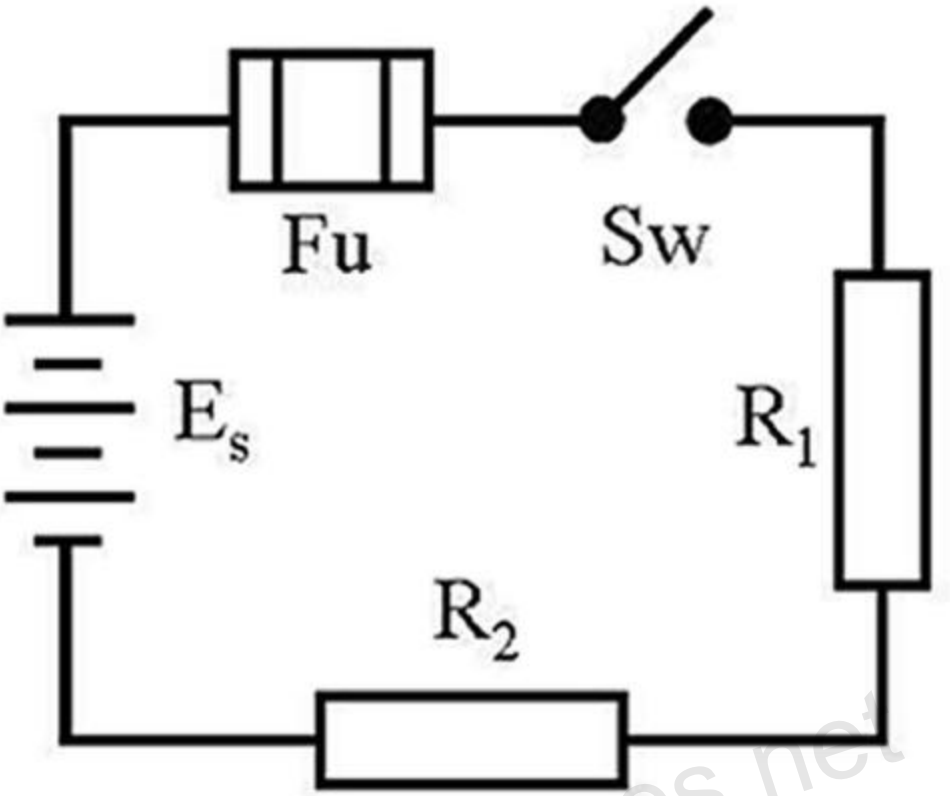

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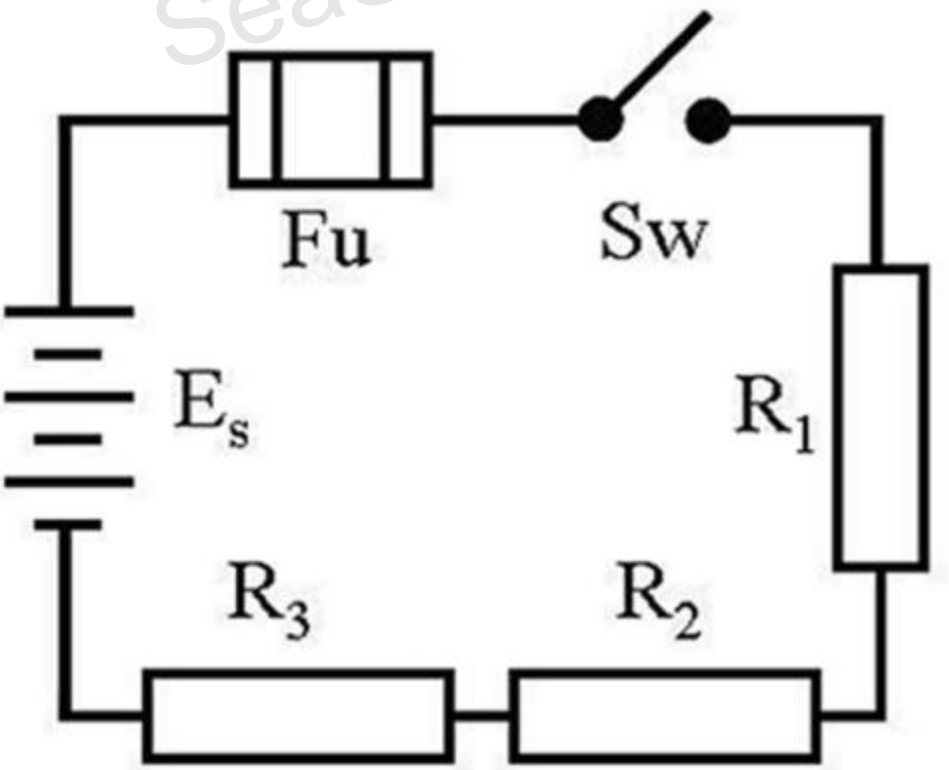

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EL-0021

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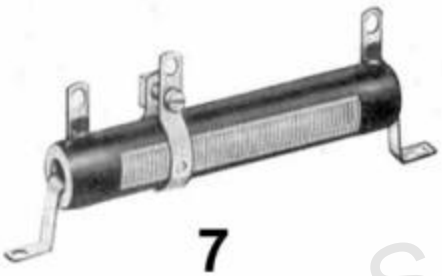

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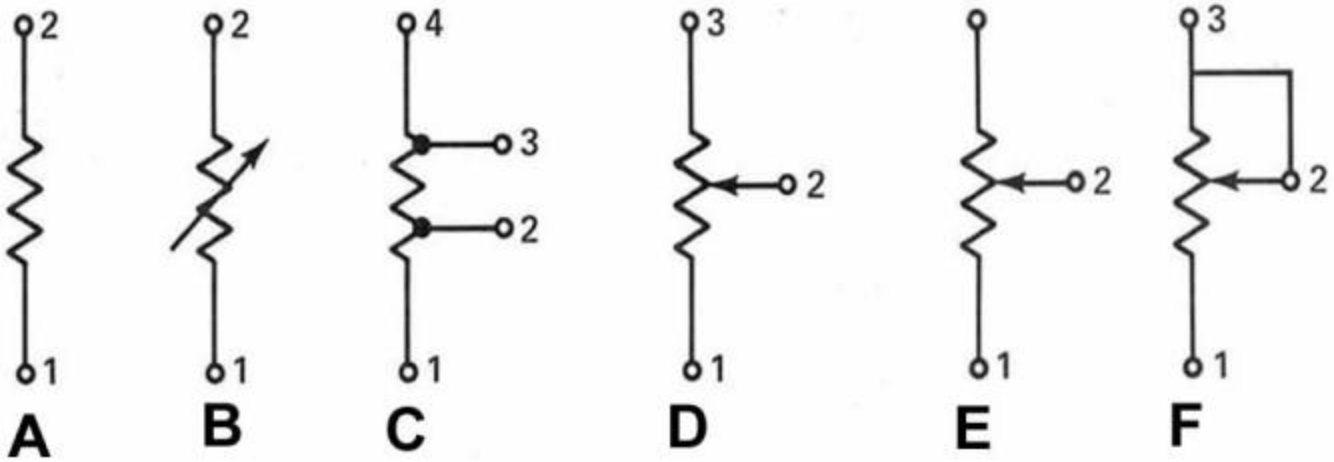

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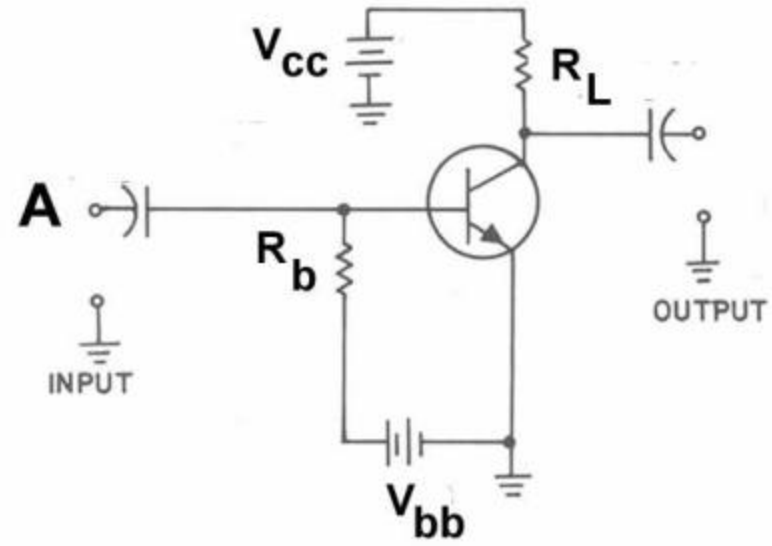

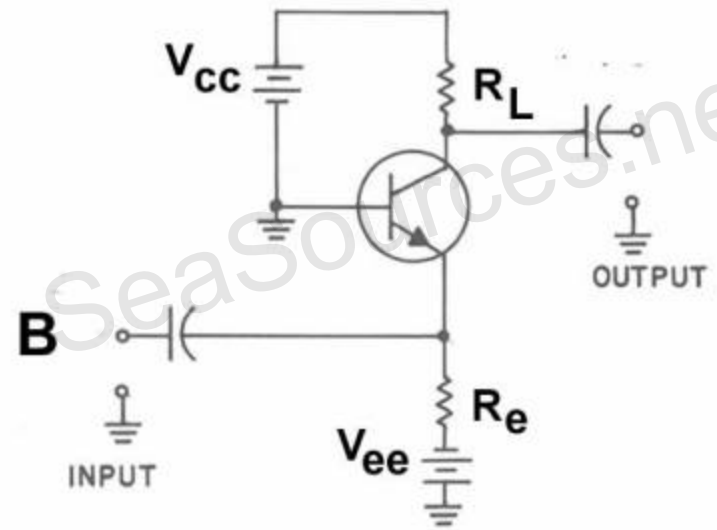

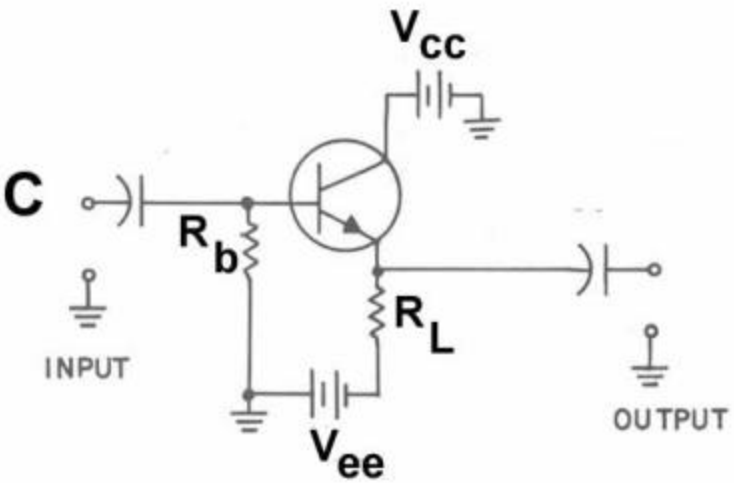

EL-0026

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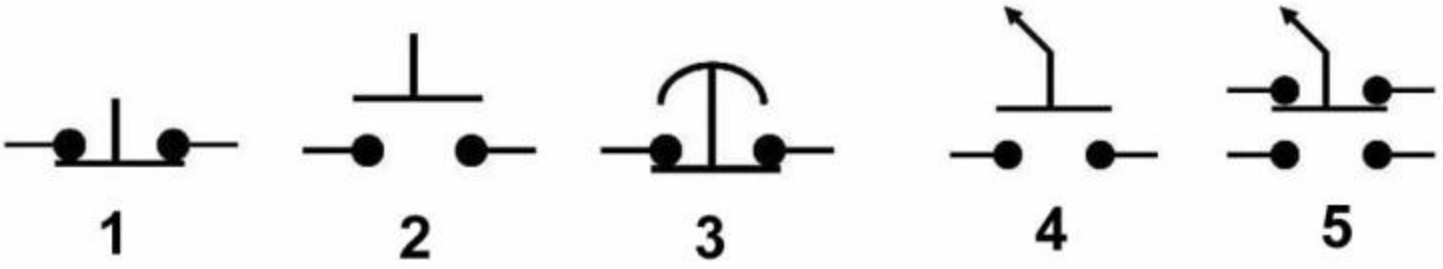

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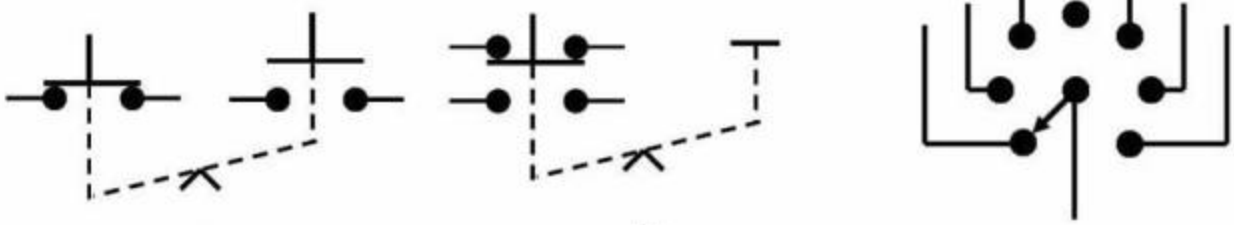

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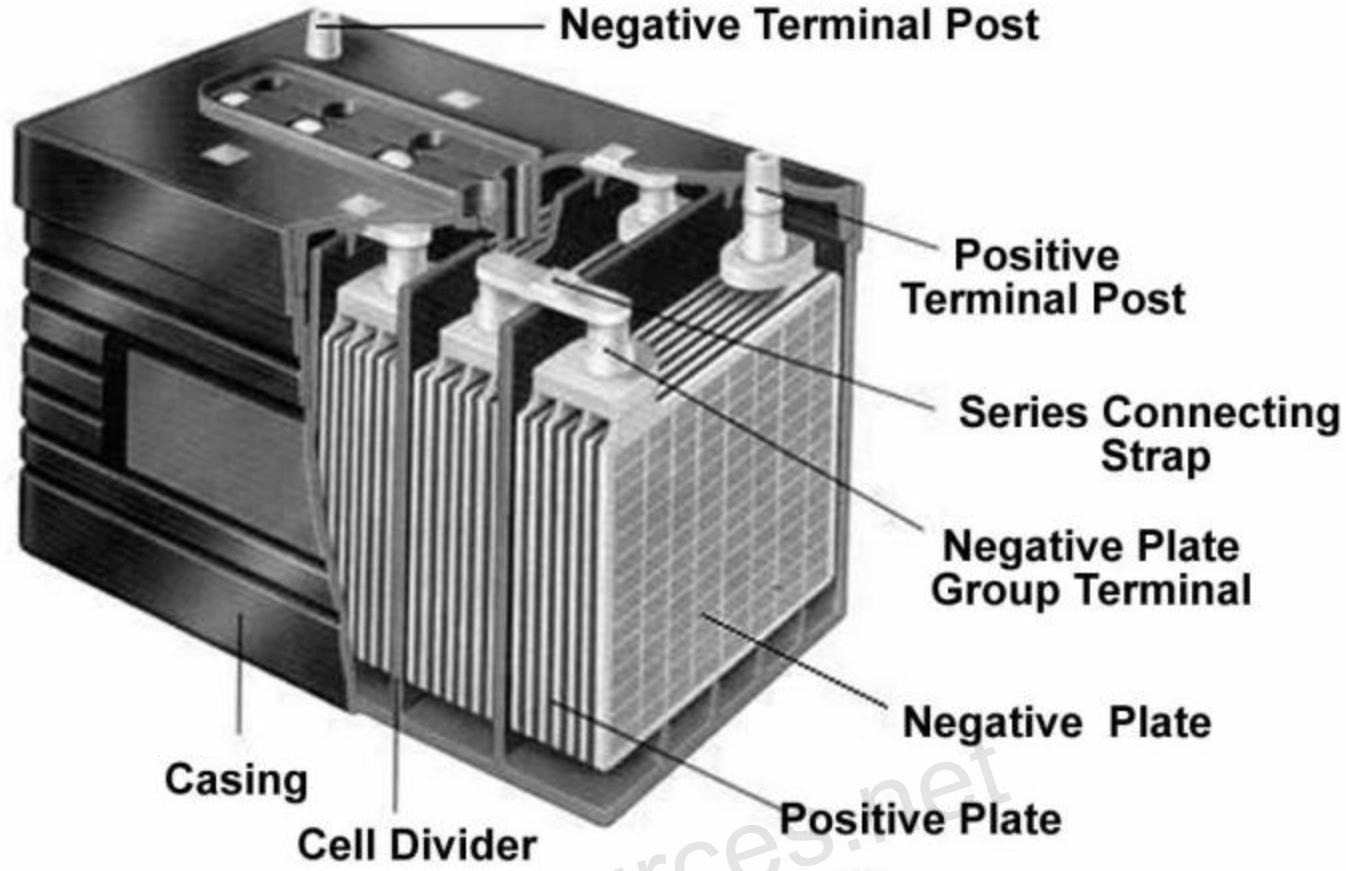
EL-0031



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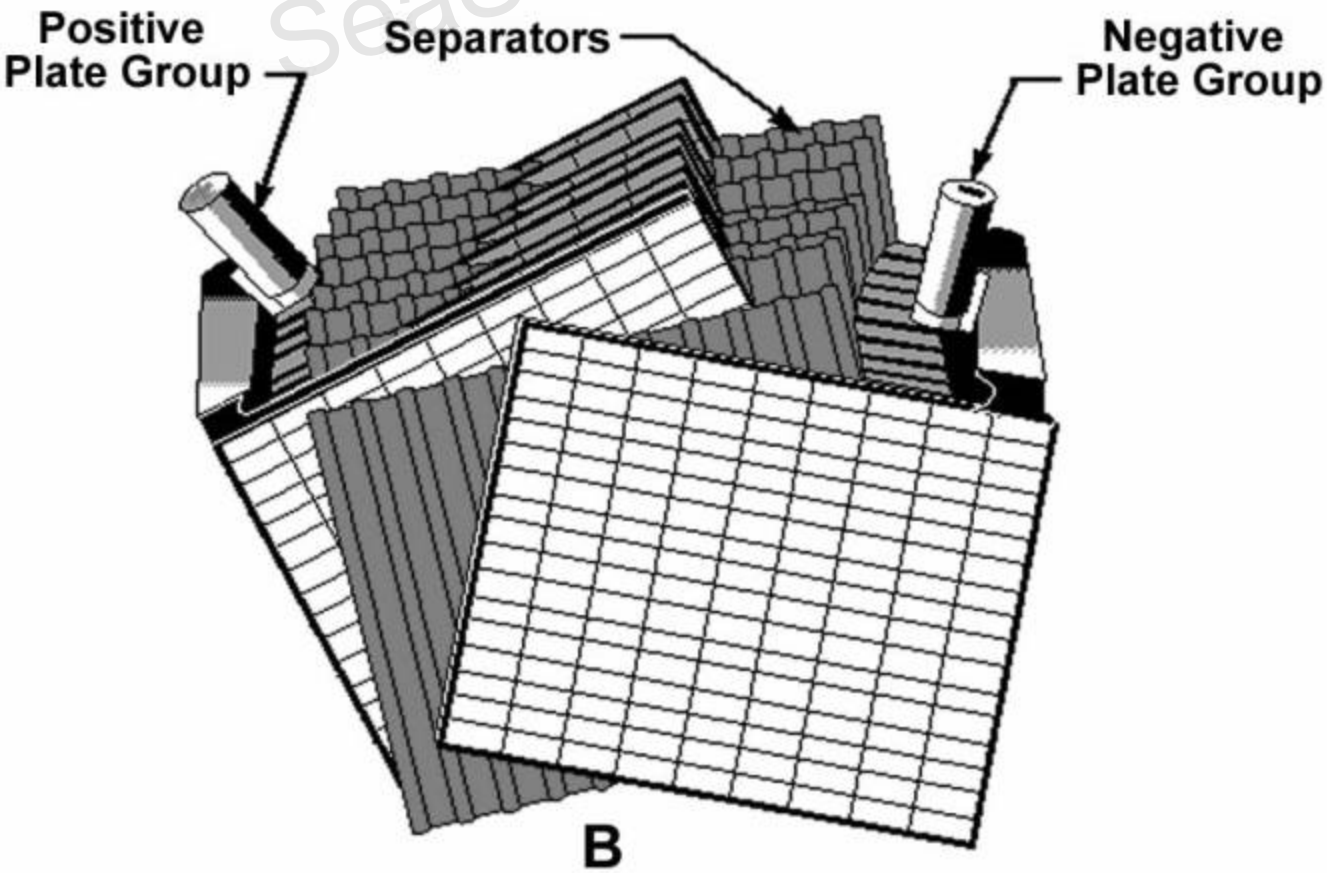
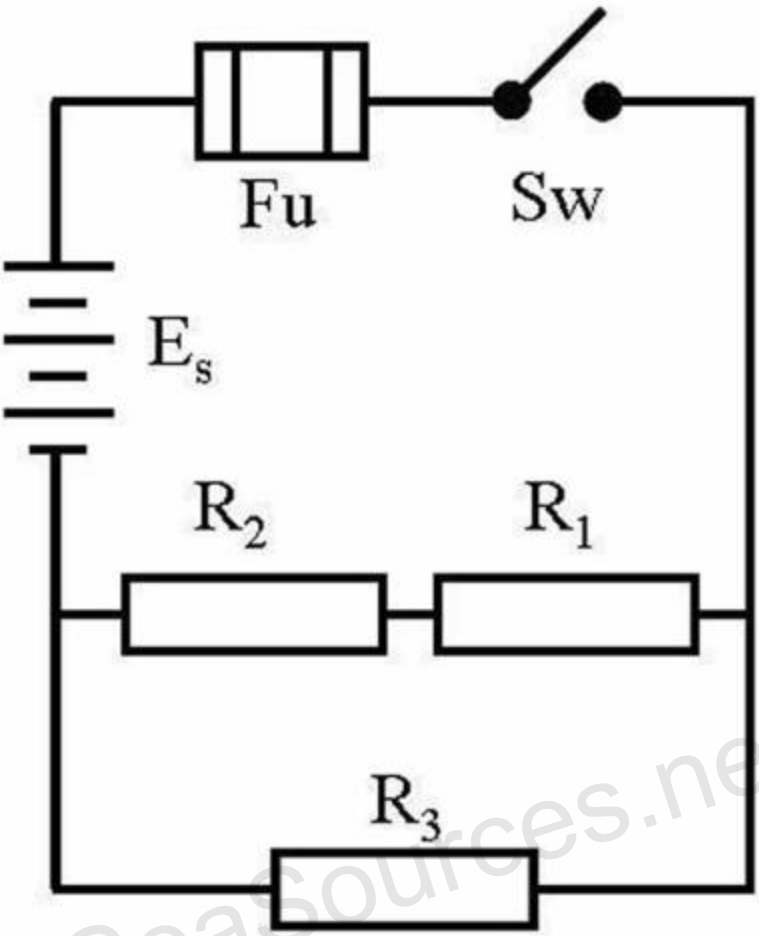


B

EL-0032



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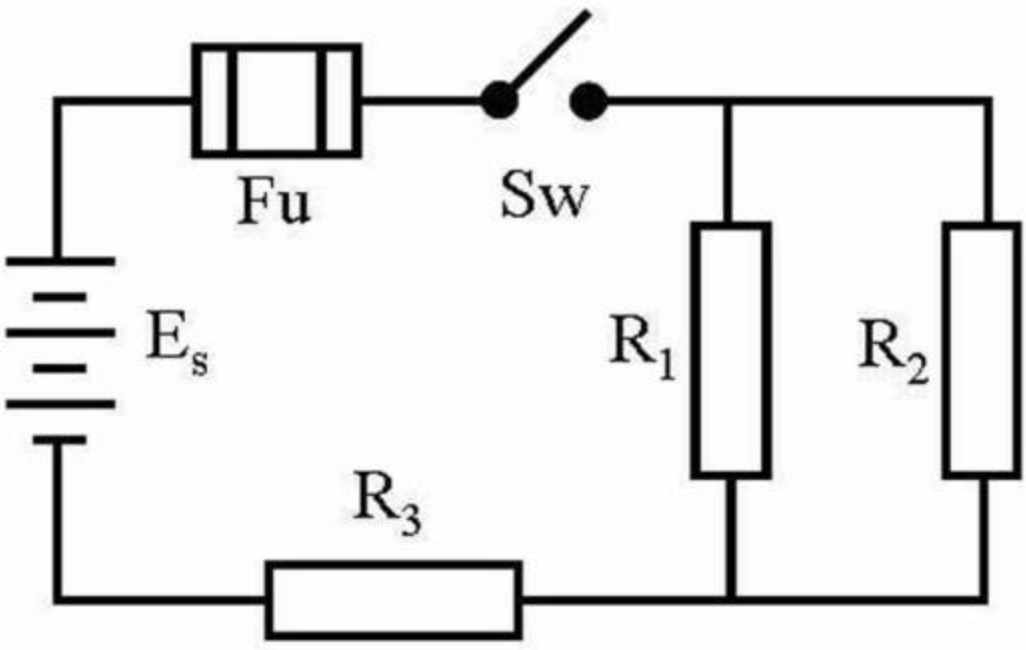

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EL-0033

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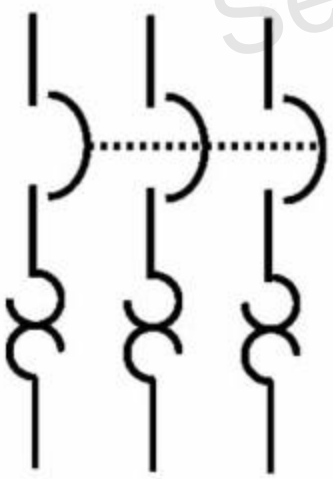

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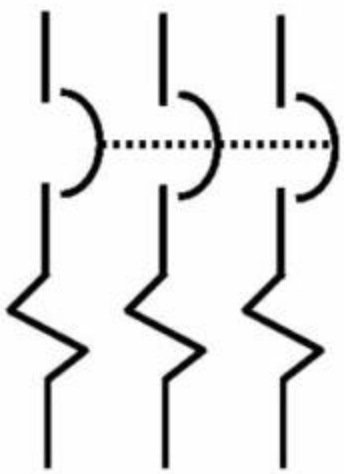

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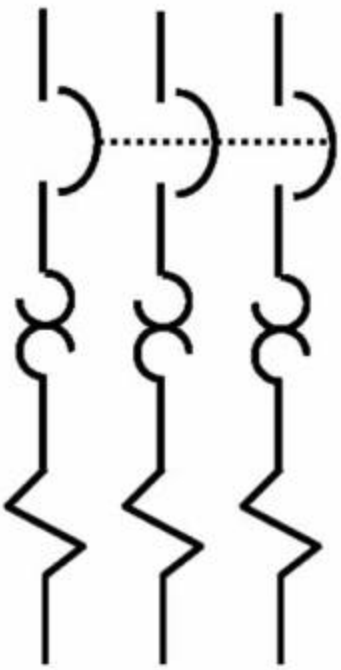

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EL-0034

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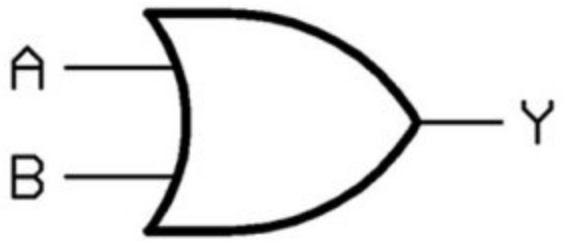
EL-0035



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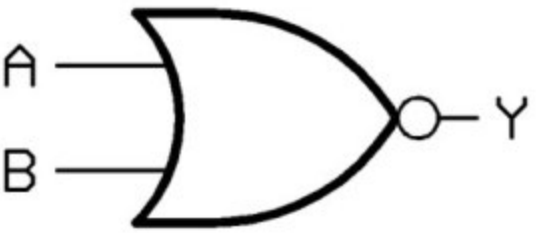

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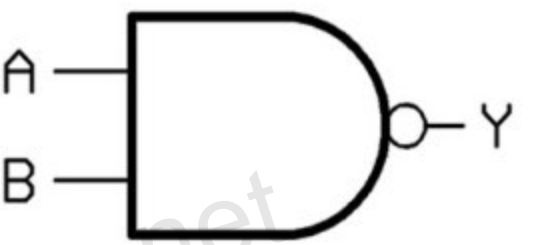

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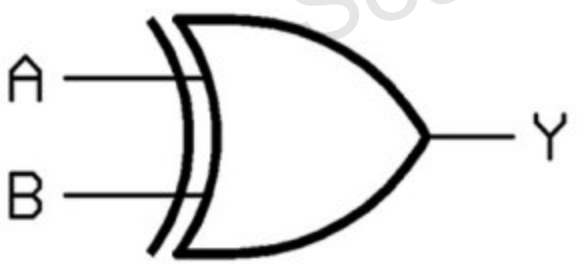

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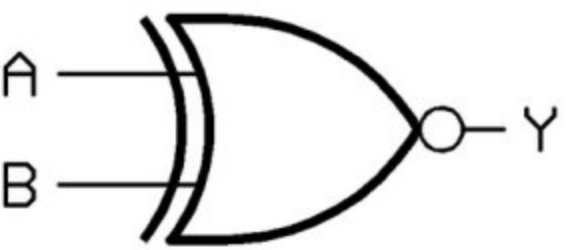

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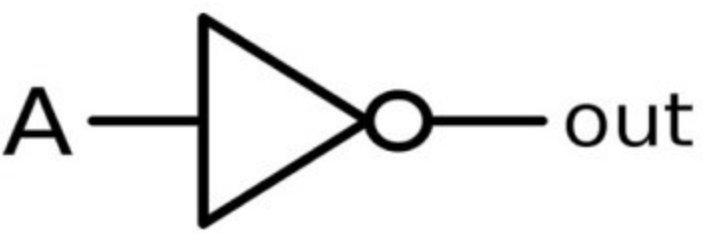

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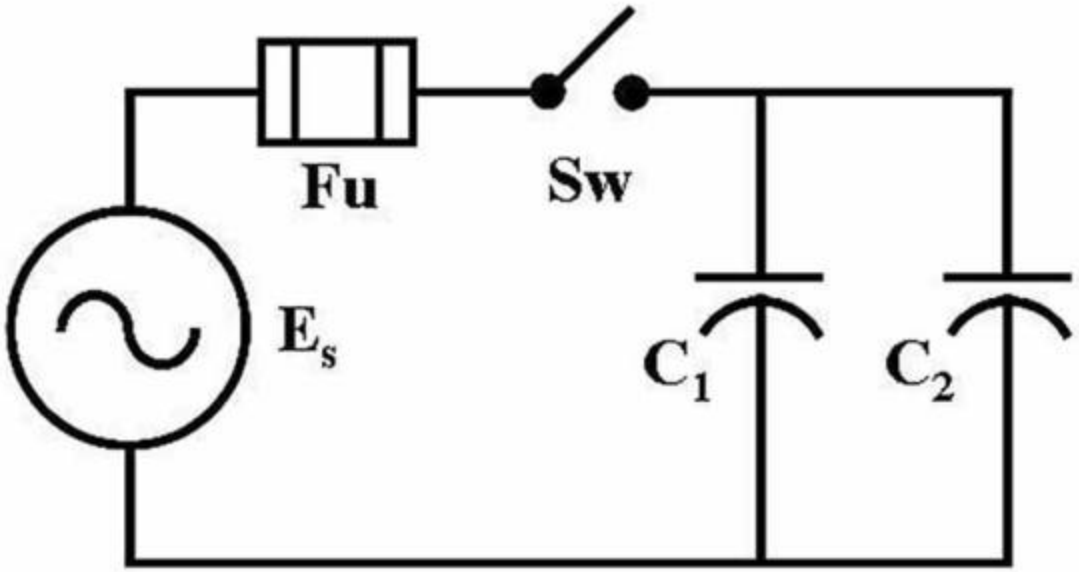
EL-0038



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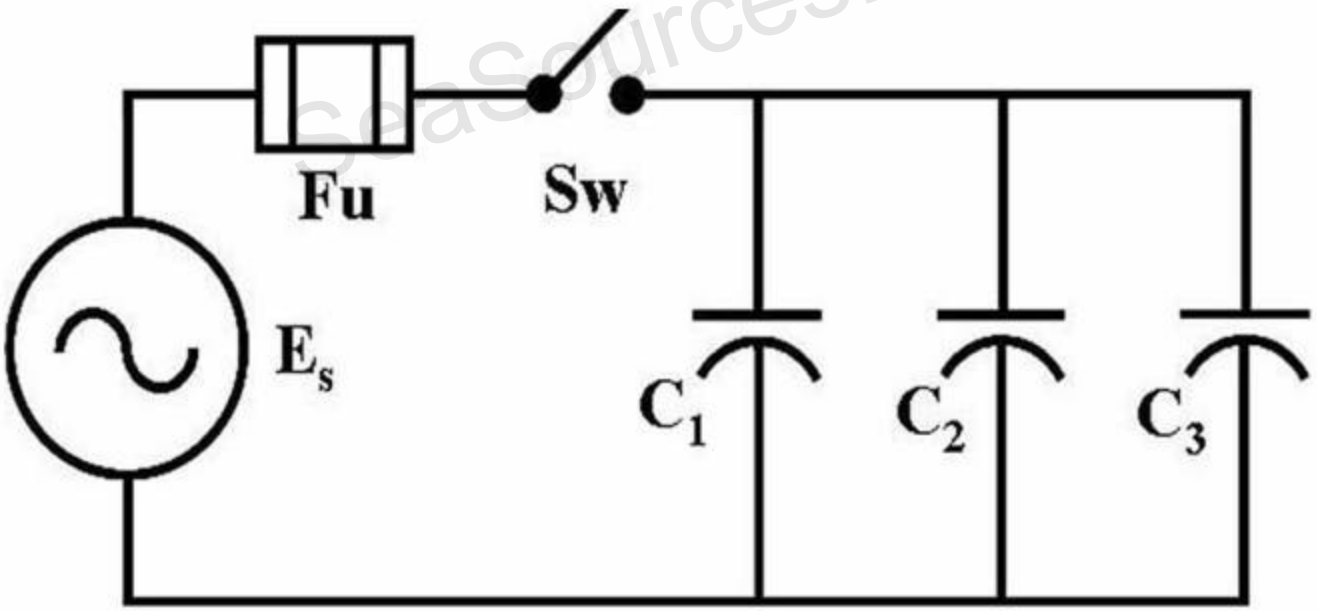

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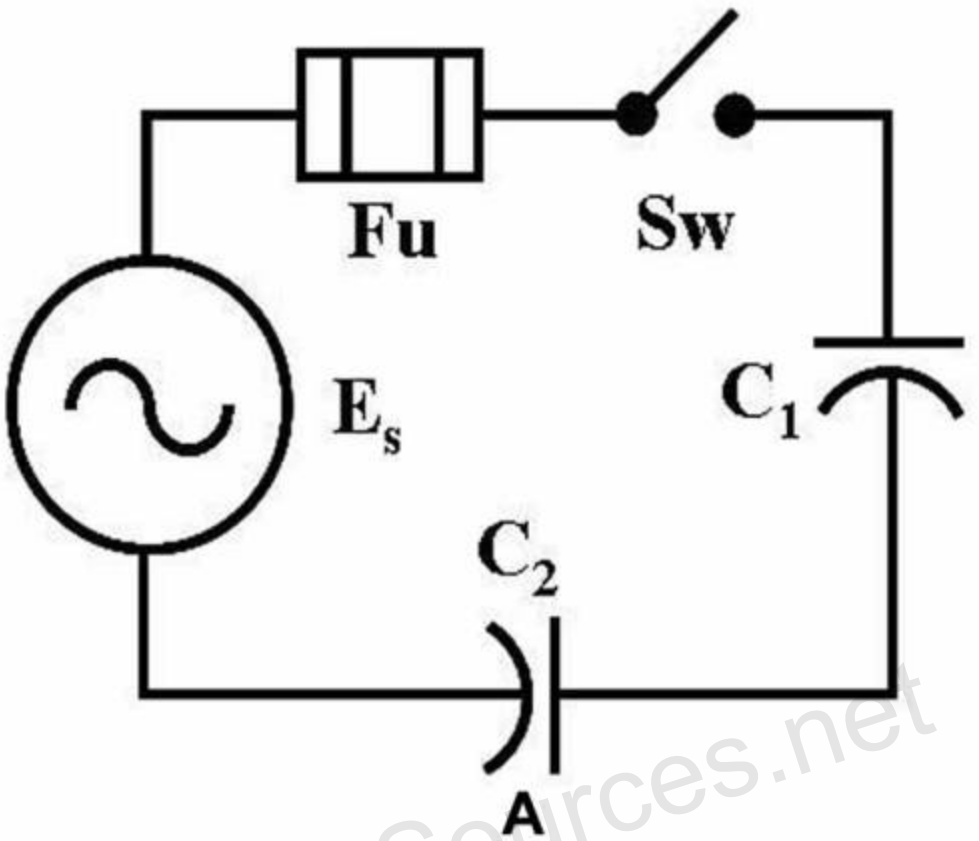
EL-0039



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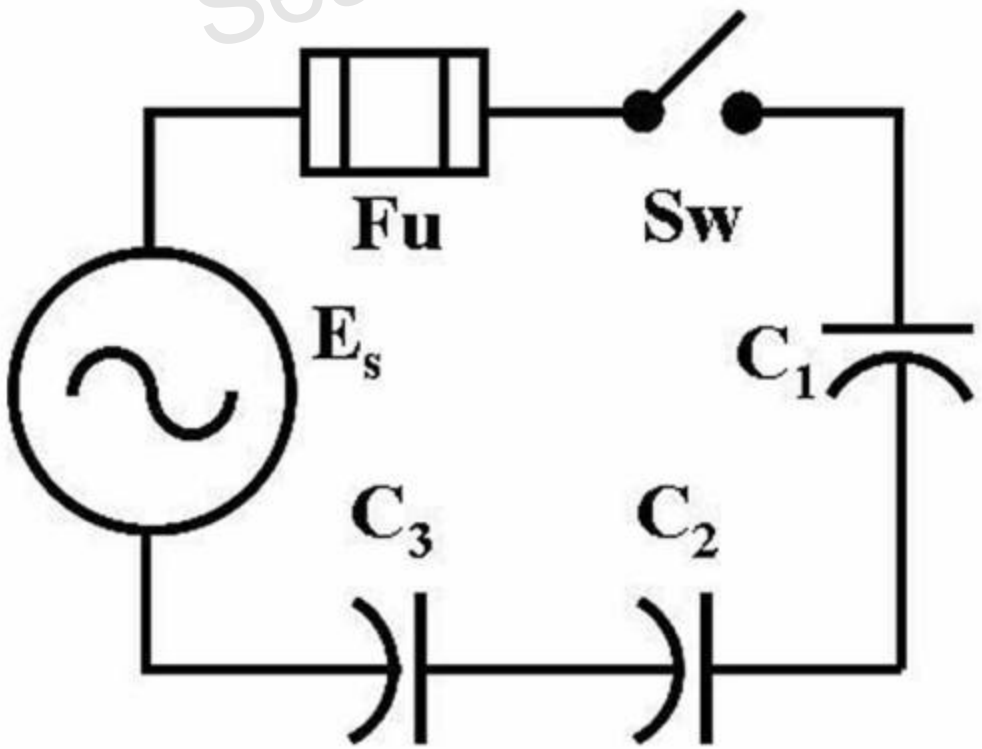

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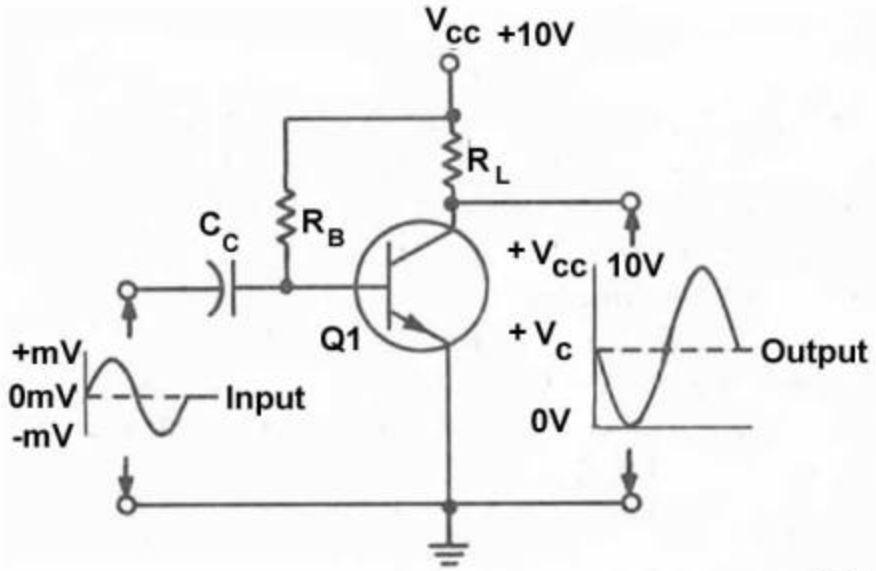
EL-0045



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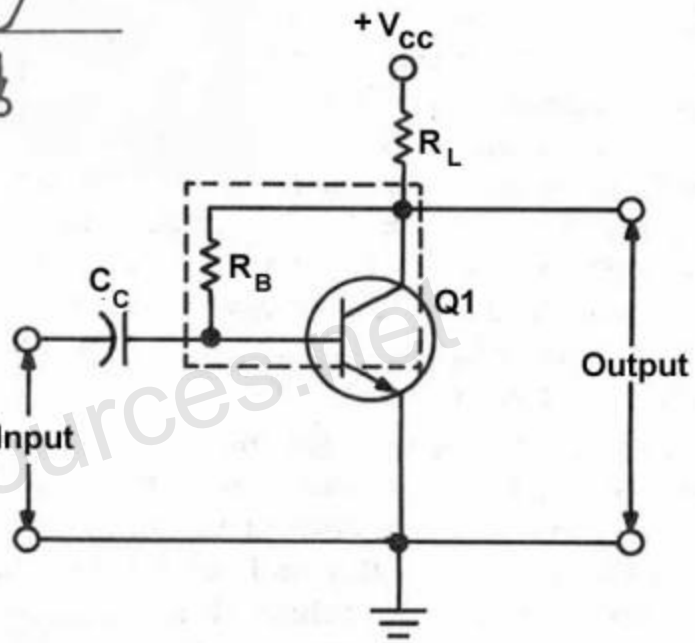

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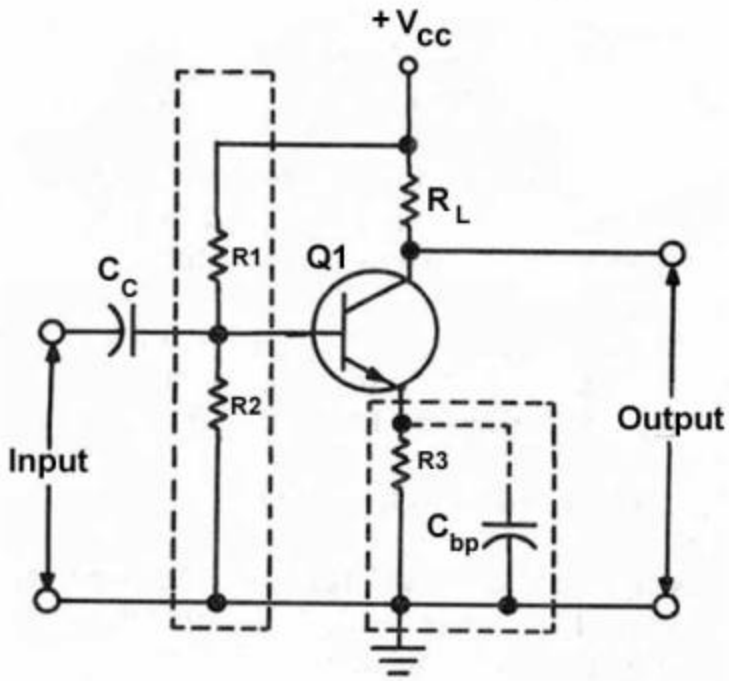

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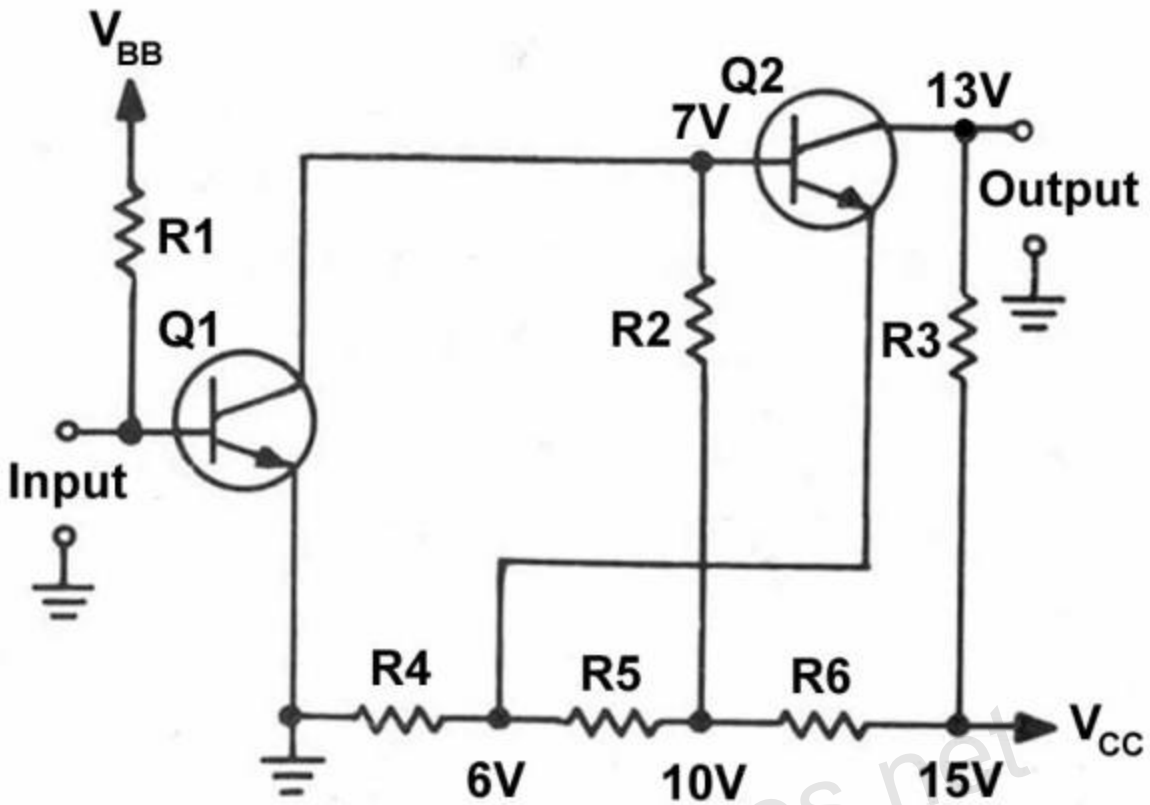
EL-0048



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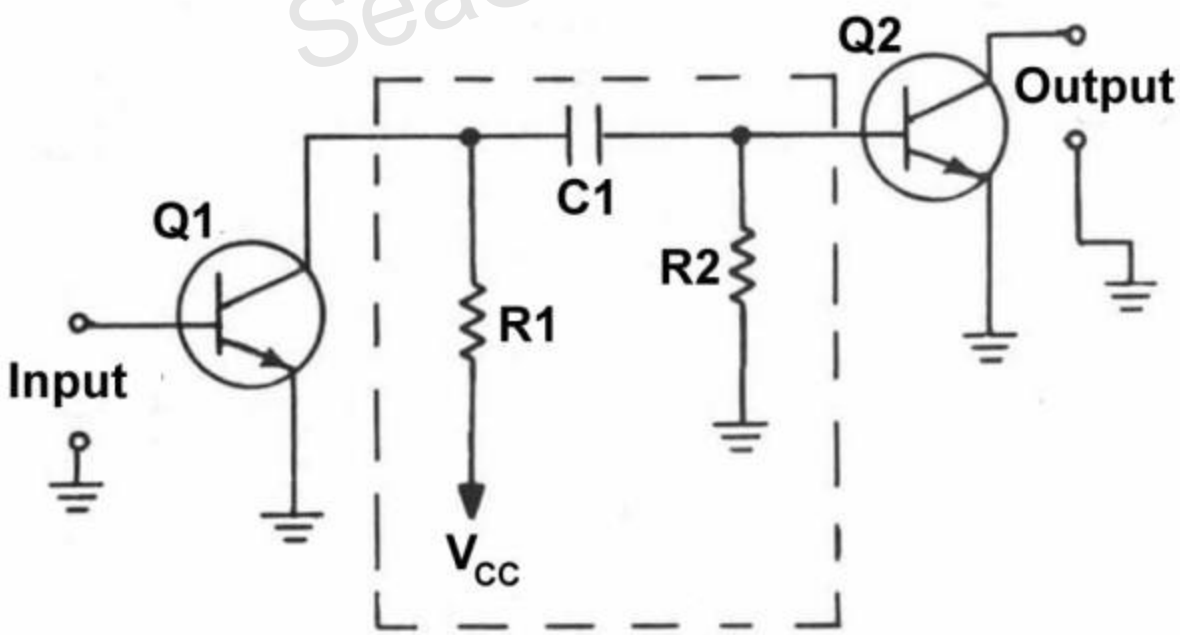

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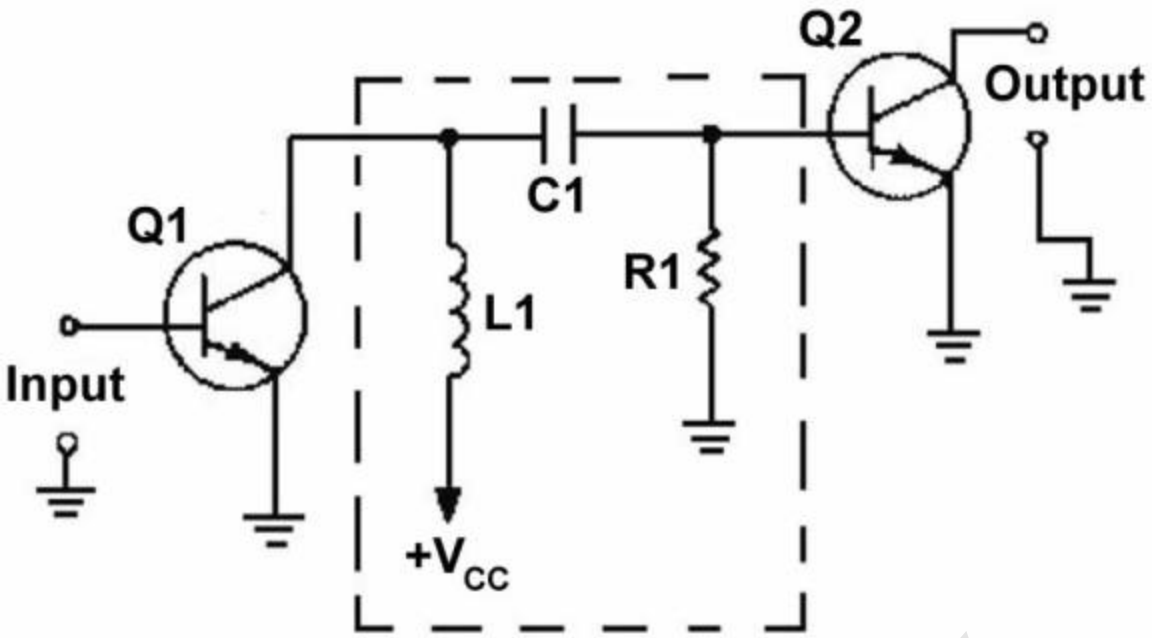

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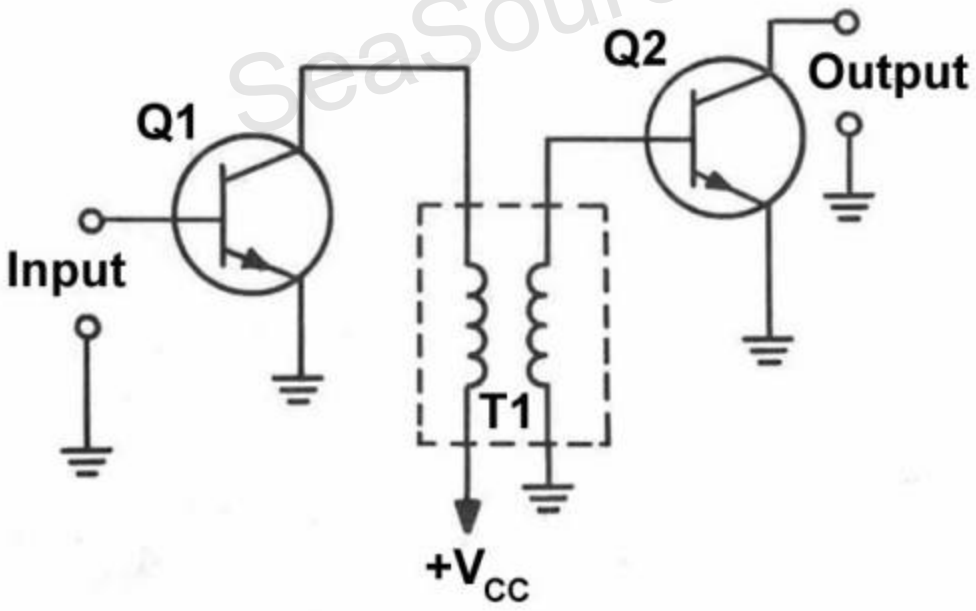
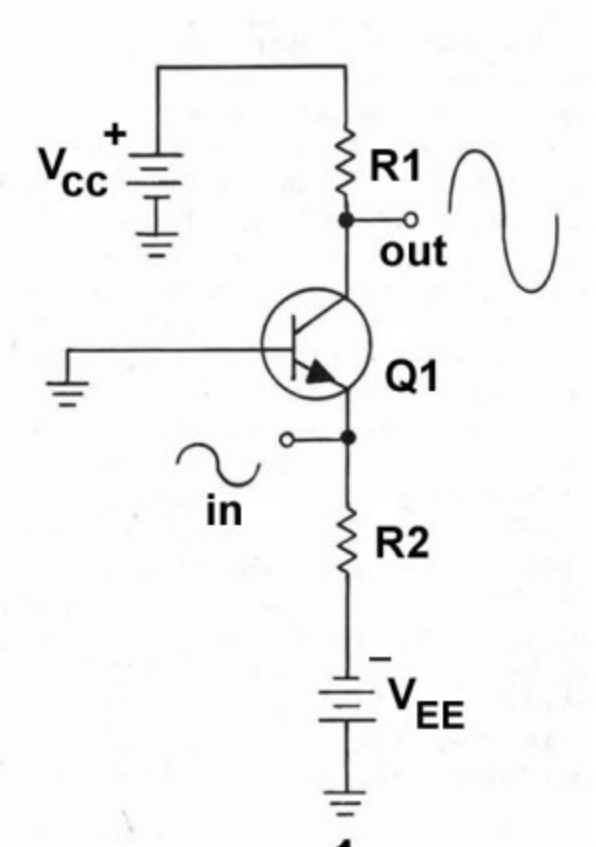


B

EL-0050



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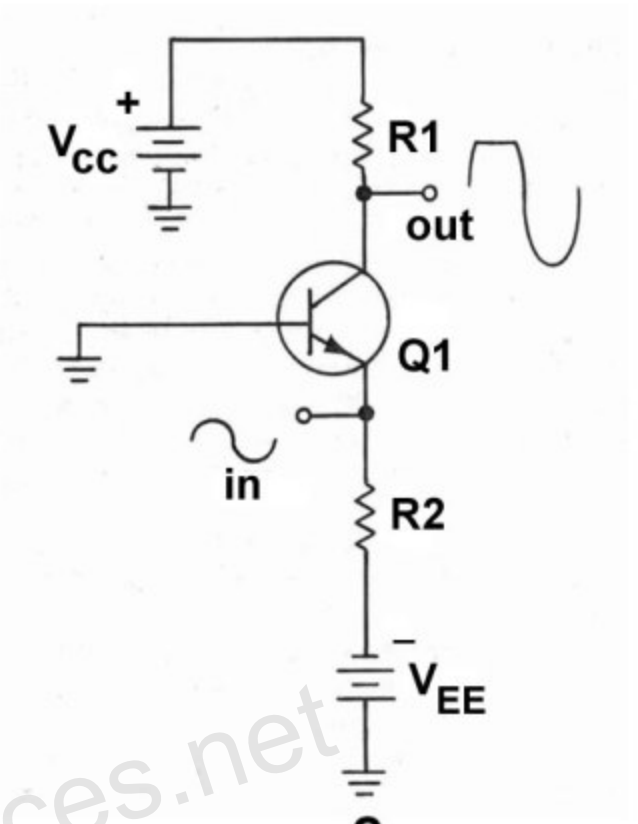

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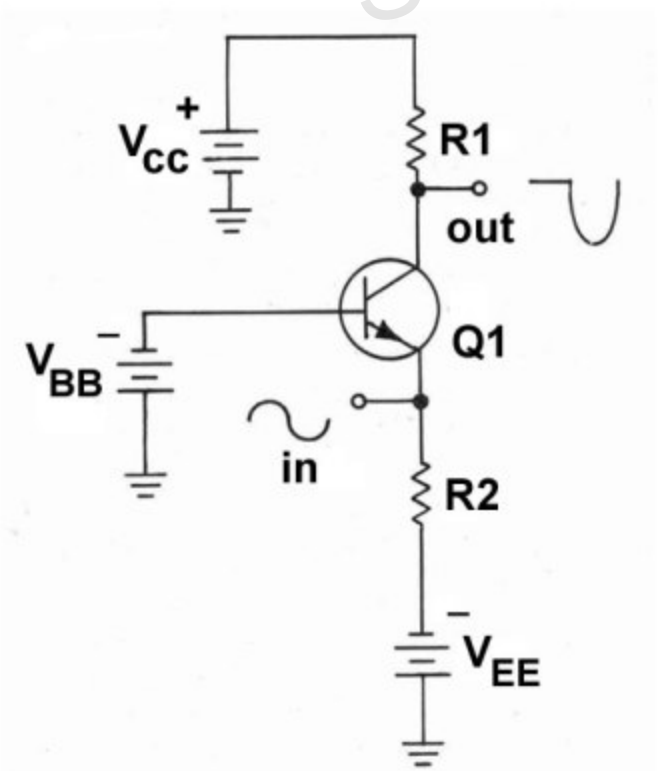

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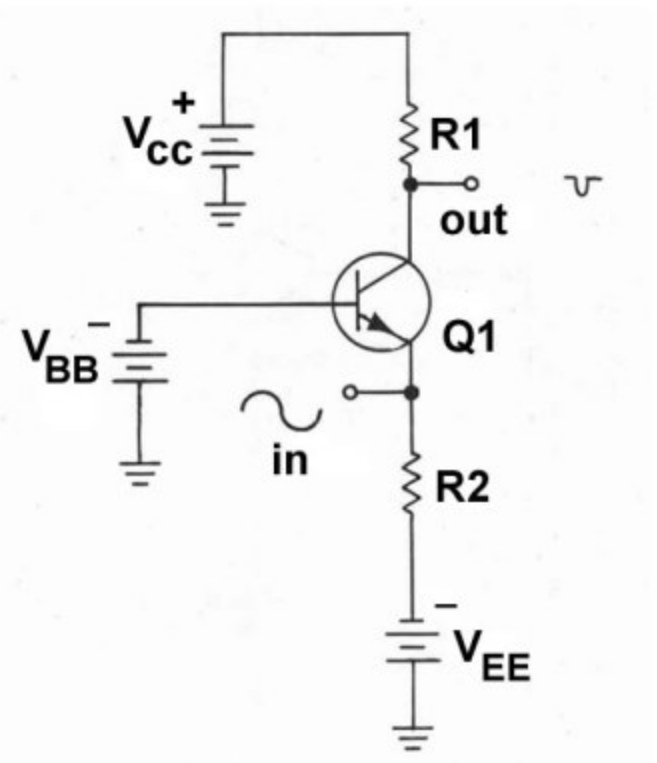

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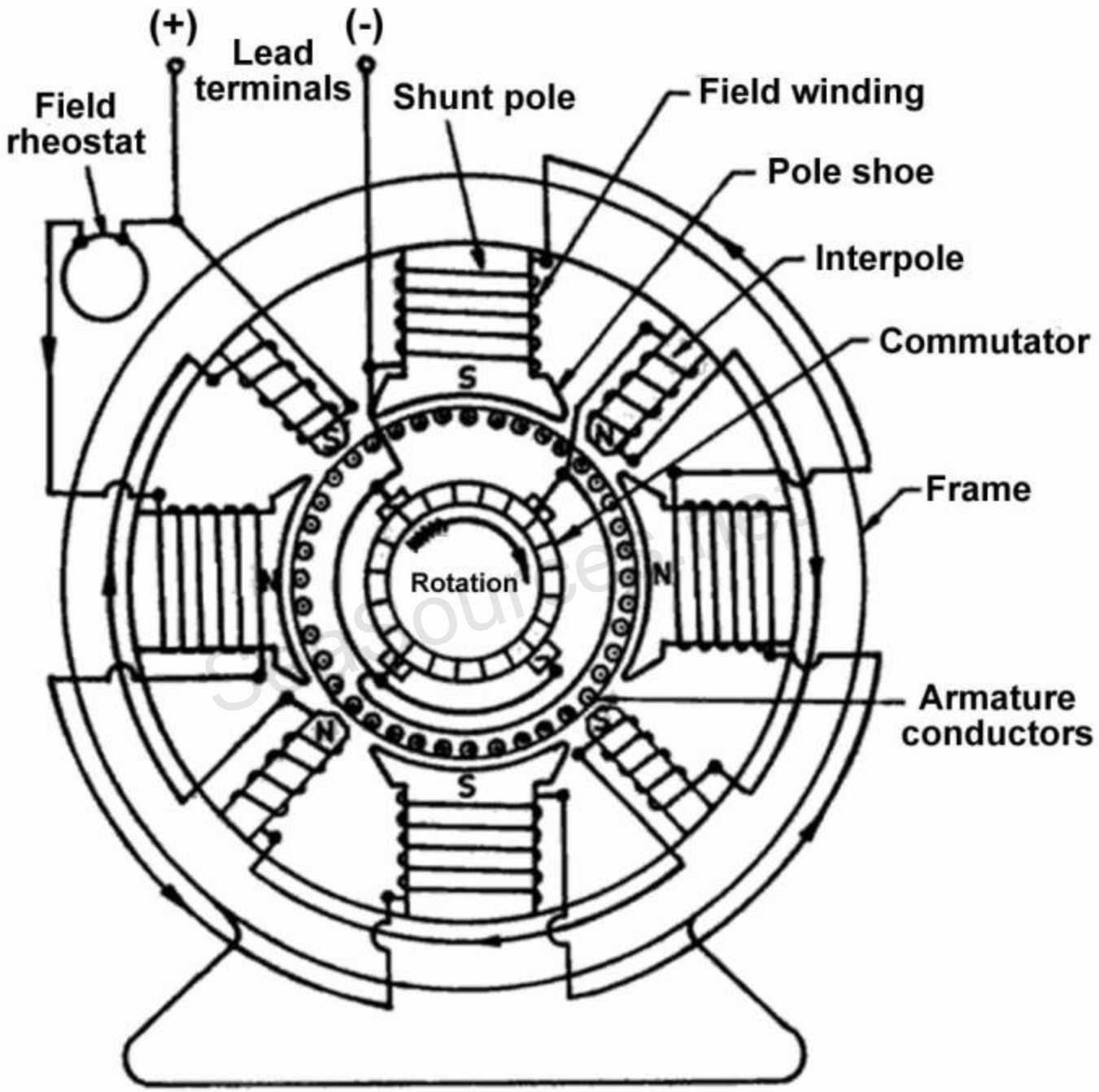
EL-0052


(+)
Lead terminals
(-)
Field rheostat
Shunt pole
Field winding
Pole shoe
Interpole
Commutator
Frame
Armature conductors
Rotation
S
N
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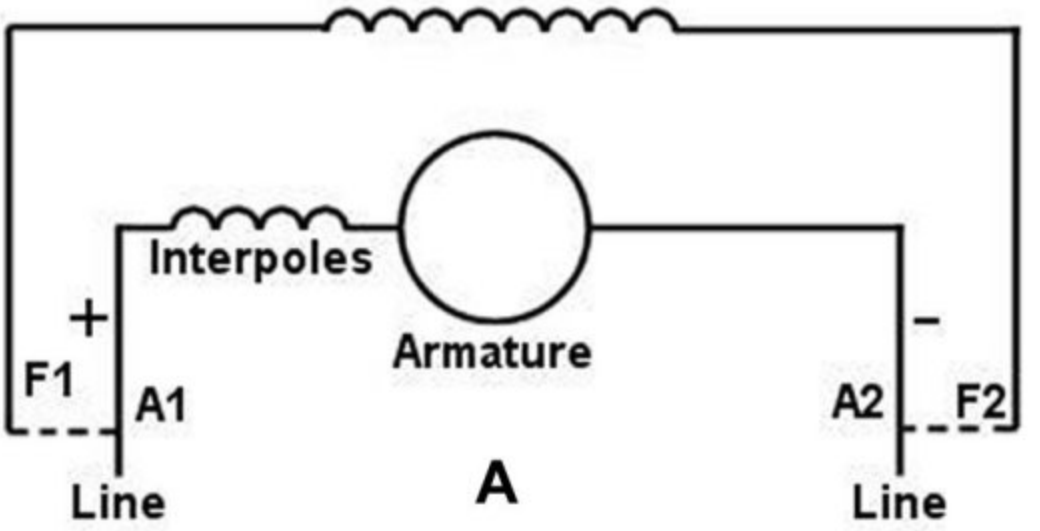
EL-0054



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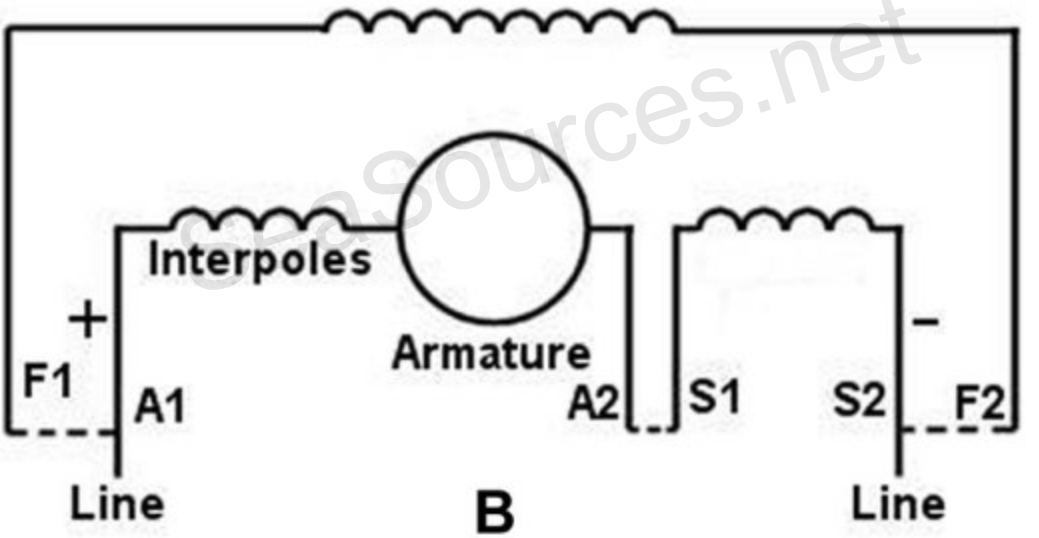

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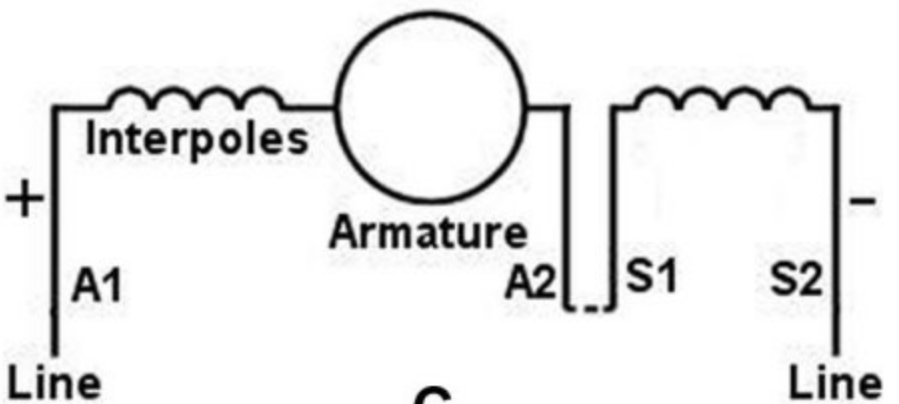

C

EL-0059

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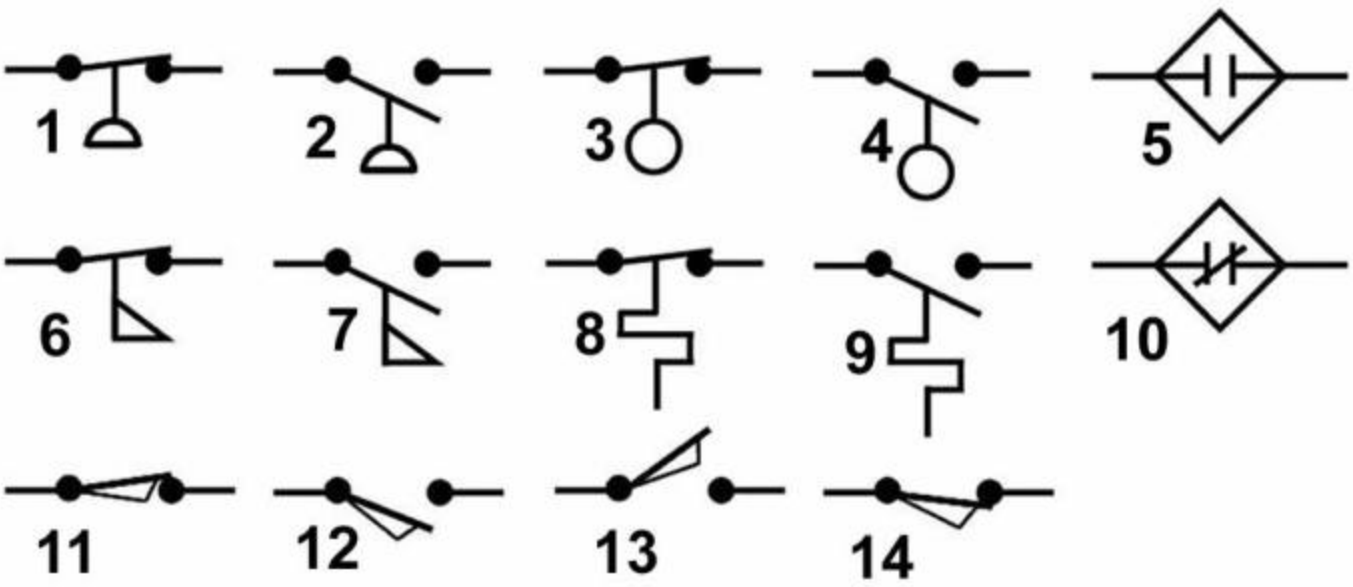
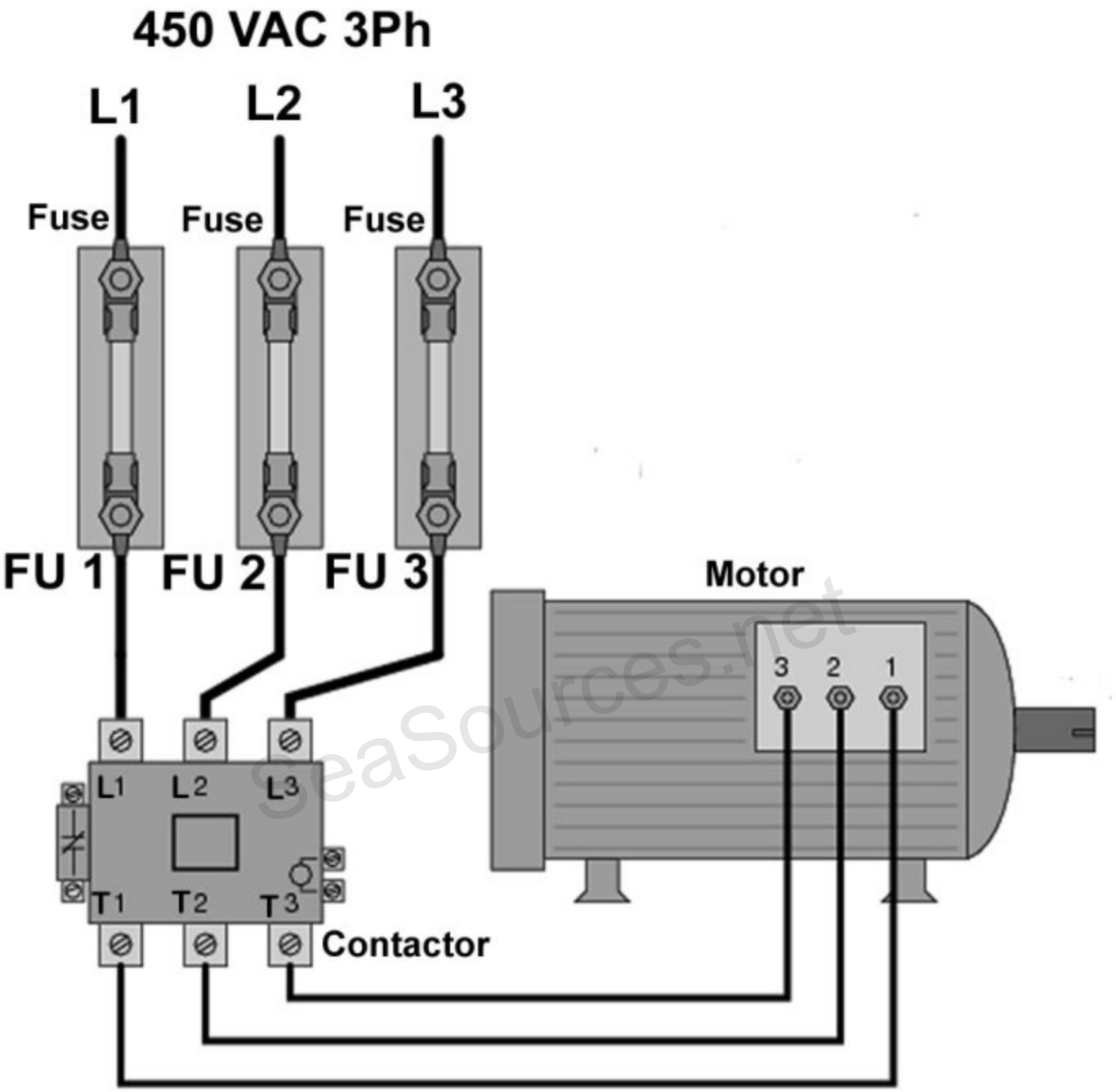
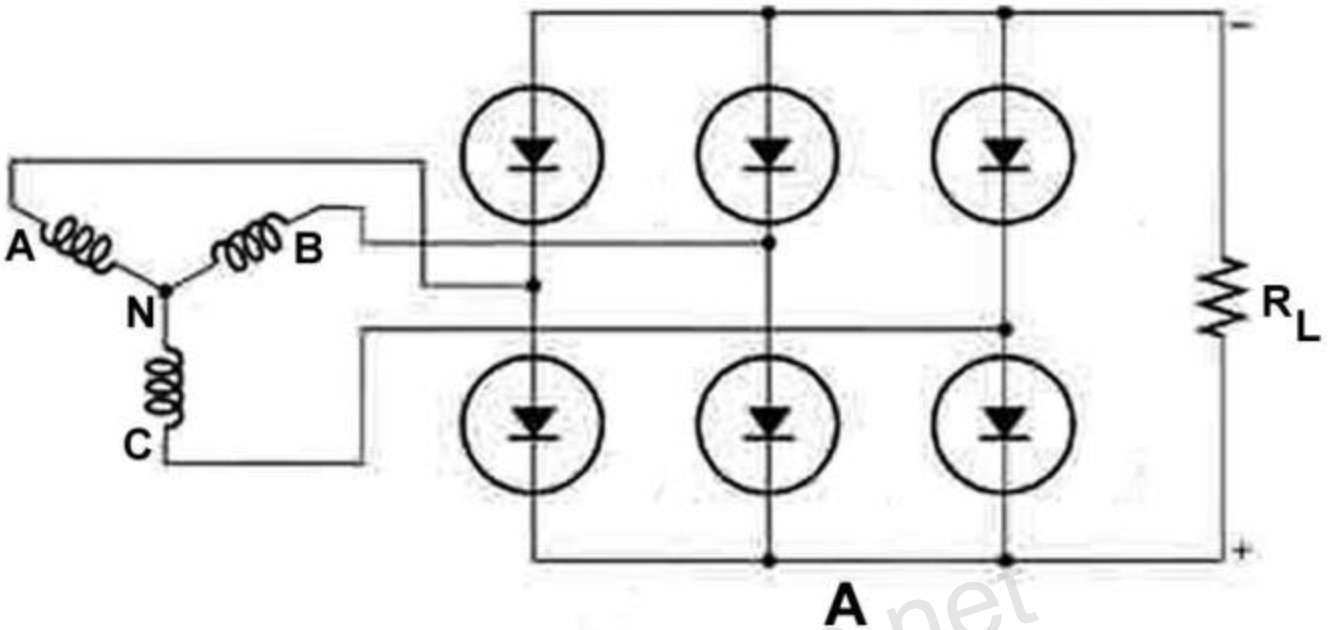


EL-0062



EL-0063



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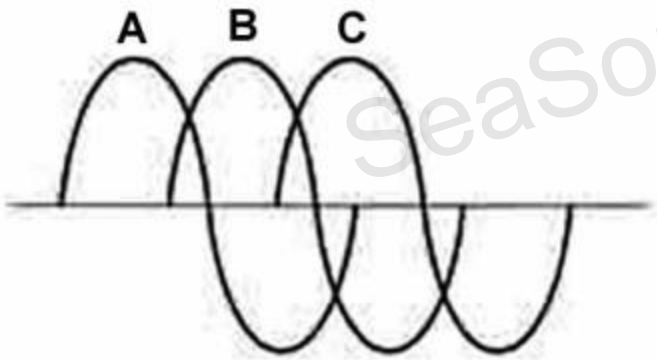

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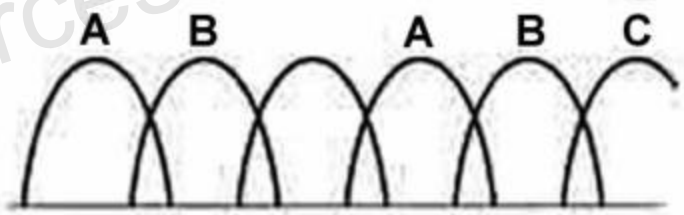
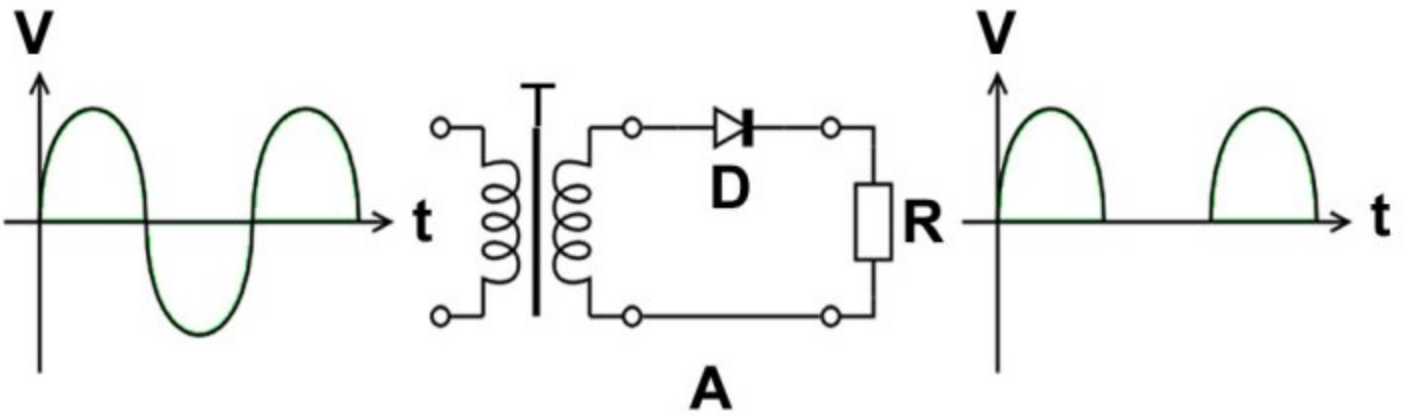


C

EL-0064



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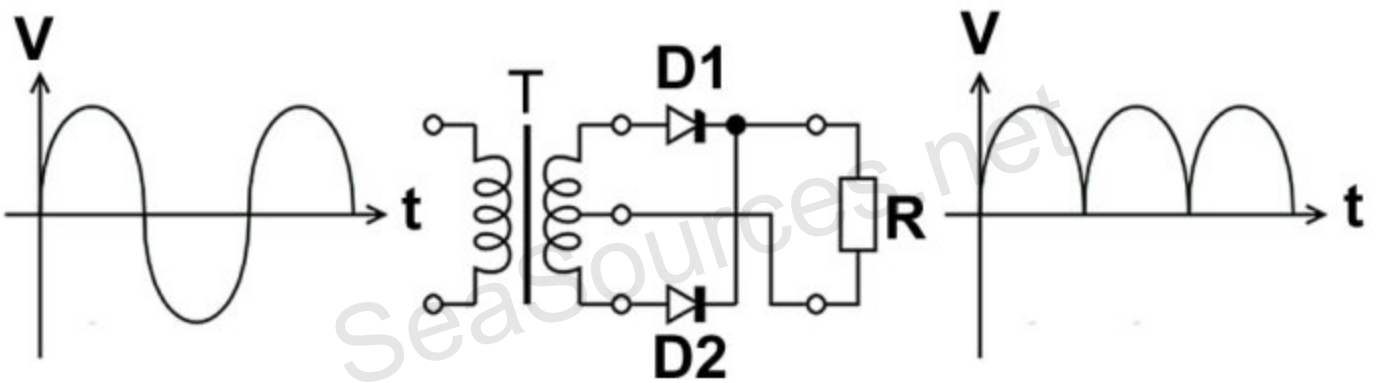

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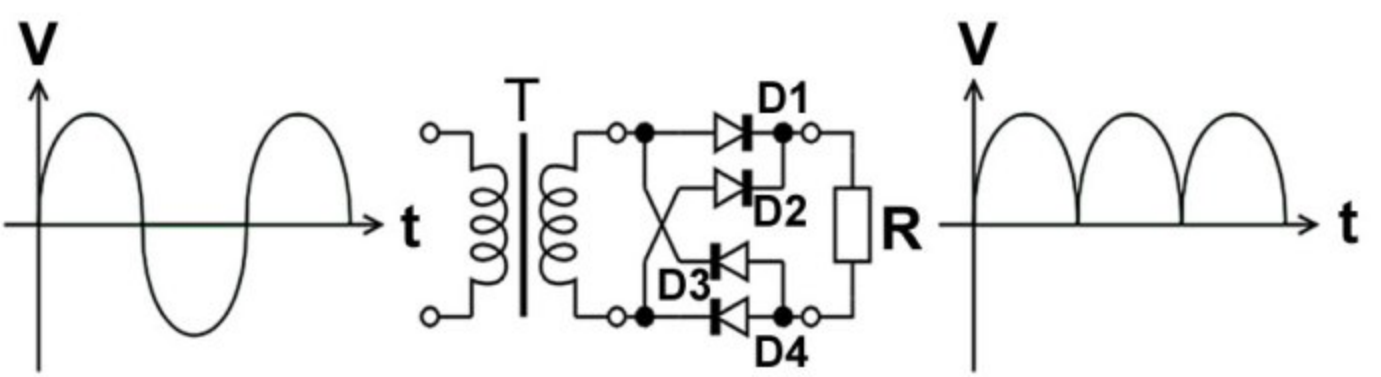
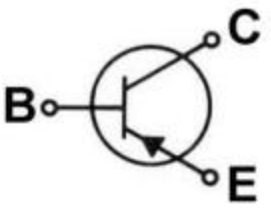
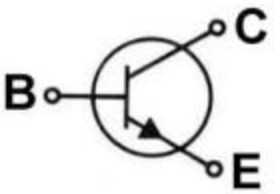
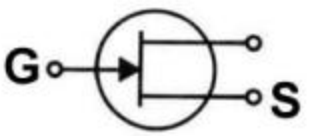


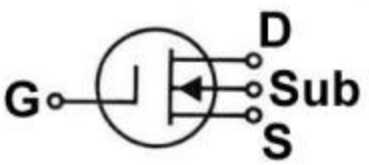
C

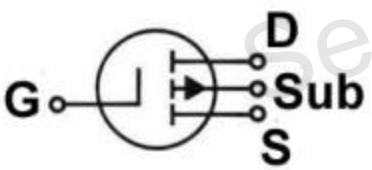
EL-0065

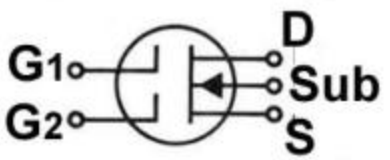
1 

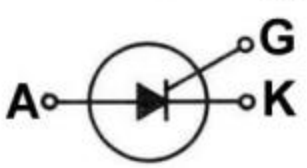
2 

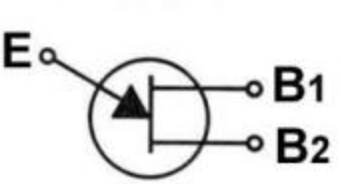
3 

4 

5 

6 

7 

8 

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EL-0068

1

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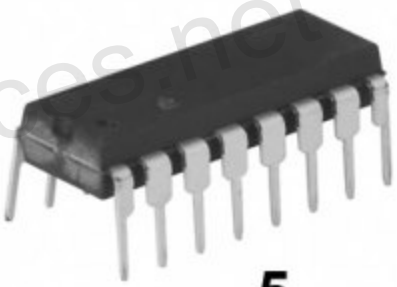

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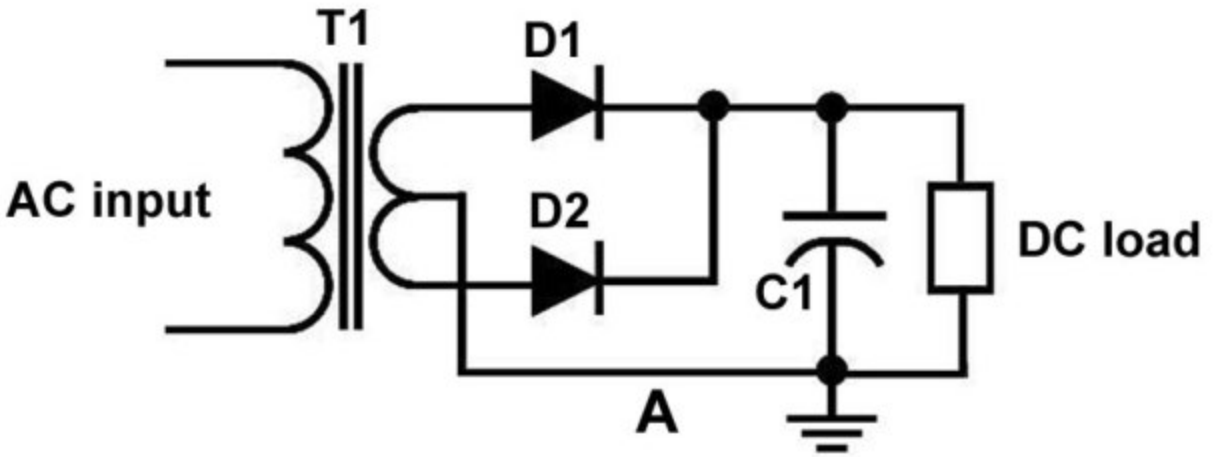
EL-0069



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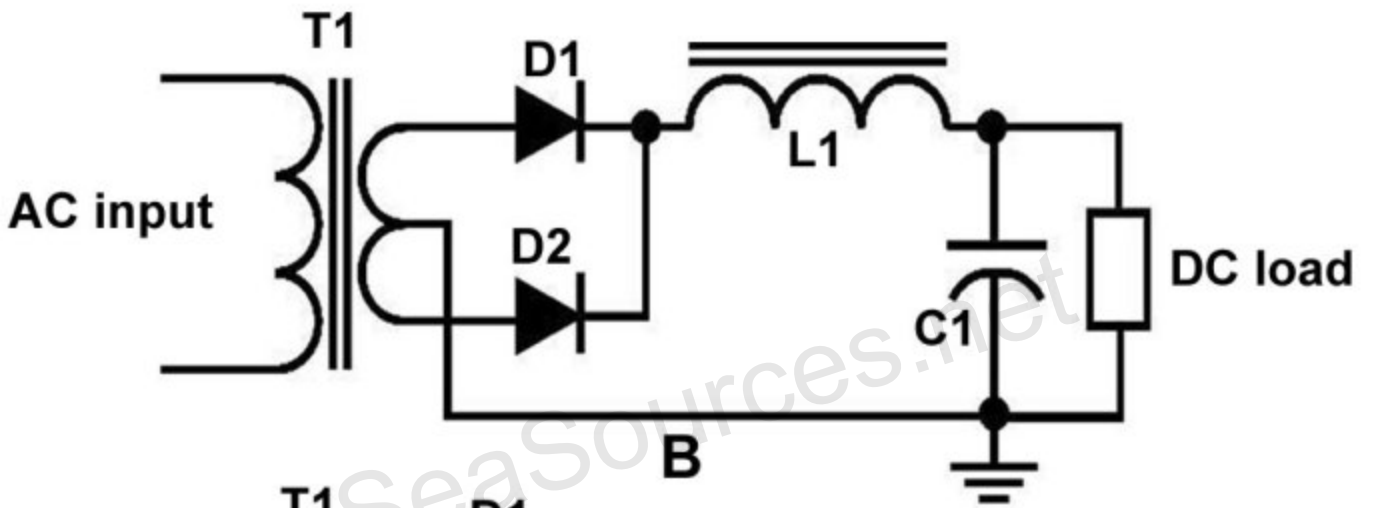
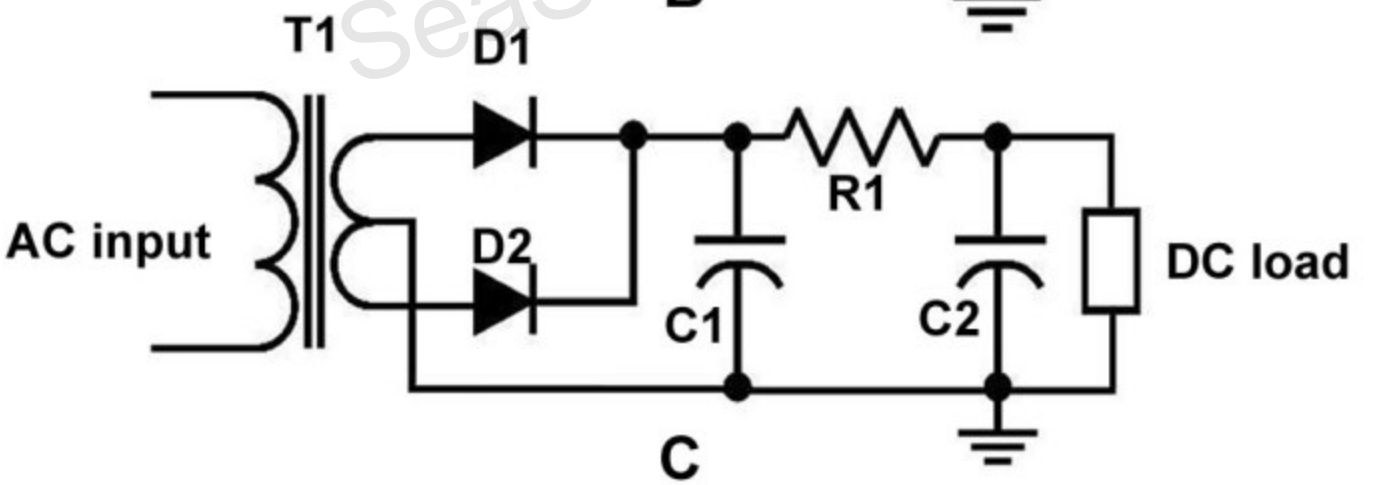
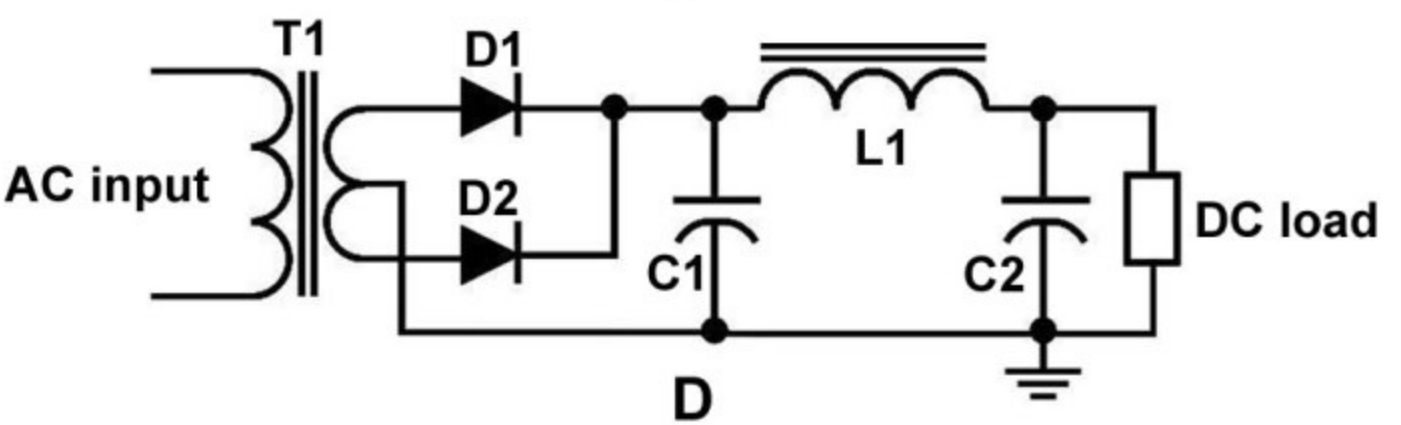


B

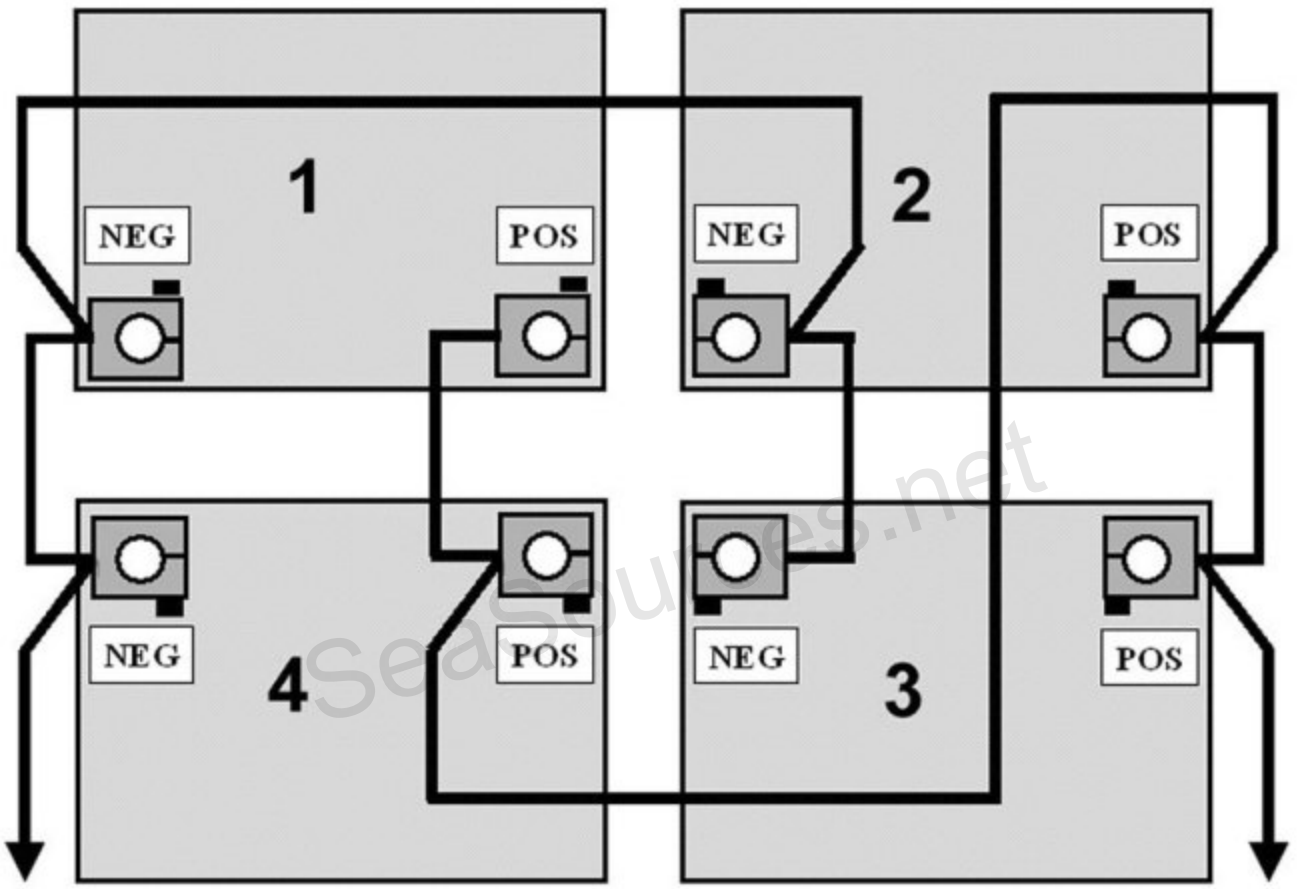


C

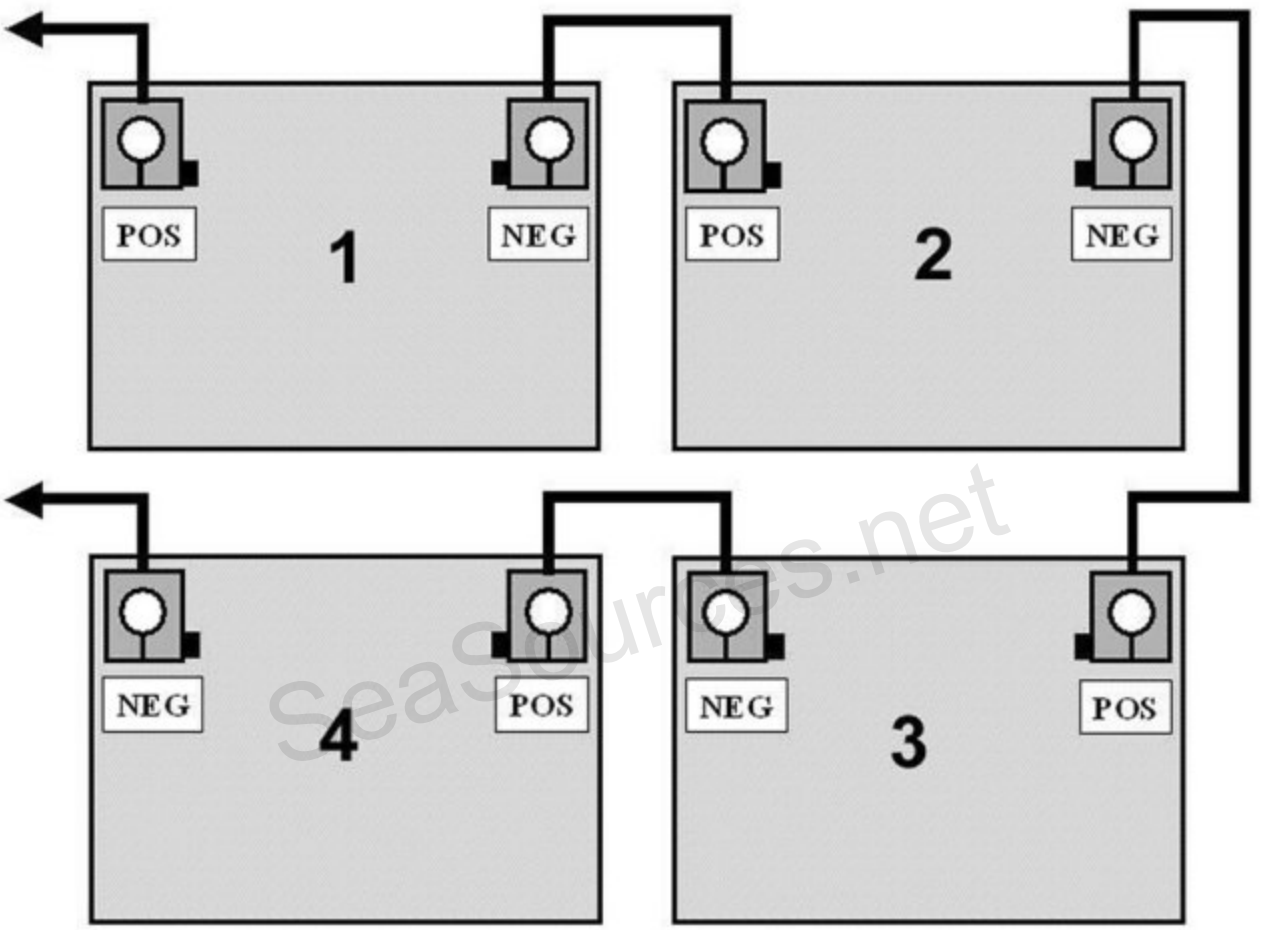


D

EL-0070



EL-0071



EL-0072

A	B	Output
0	0	0
0	1	0
1	0	0
1	1	1

A

A	B	Output
0	0	0
0	1	1
1	0	1
1	1	1

B

A	B	Output
0	0	1
0	1	1
1	0	1
1	1	0

C

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	0

D

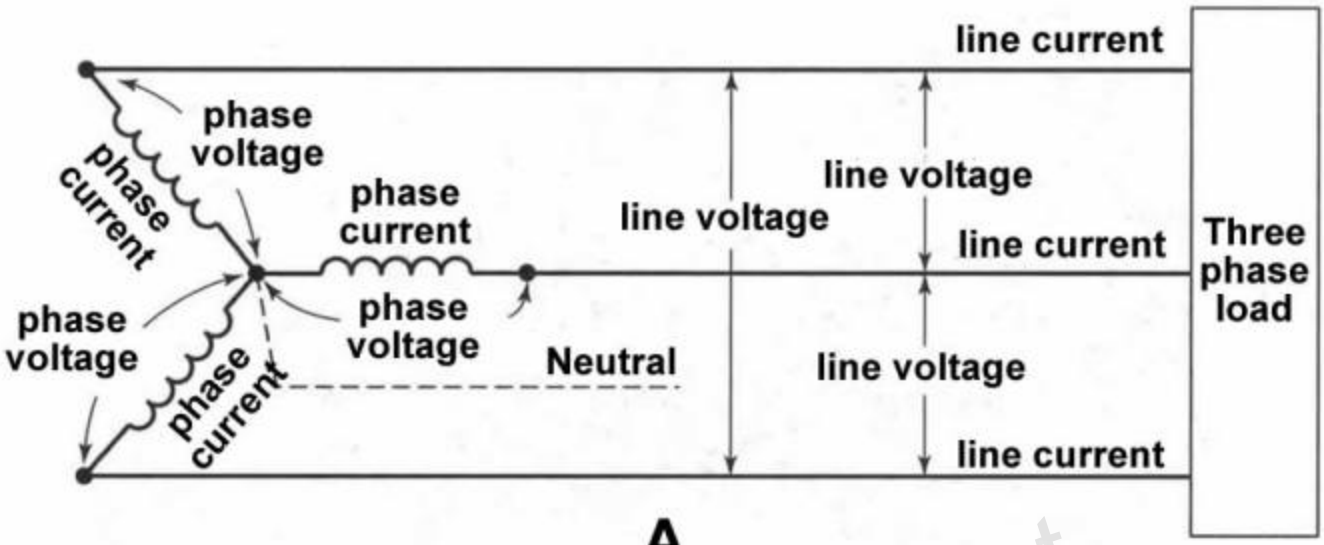
A	B	Output
0	0	0
0	1	1
1	0	1
1	1	0

E

A	B	Output
0	0	1
0	1	0
1	0	0
1	1	1

F

EL-0074



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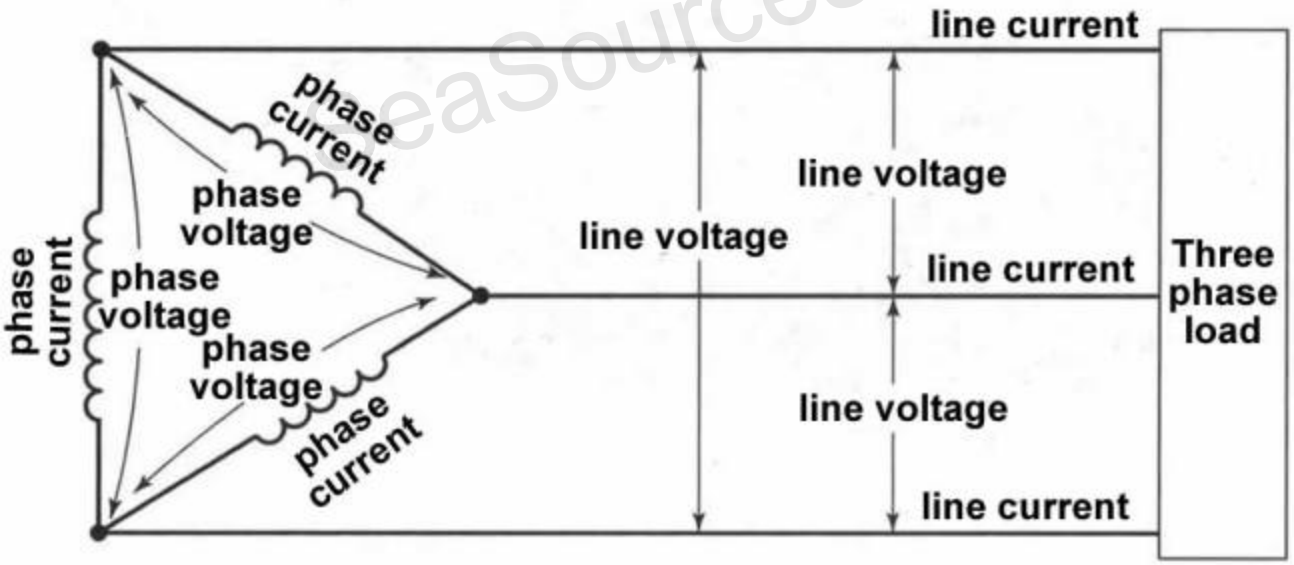
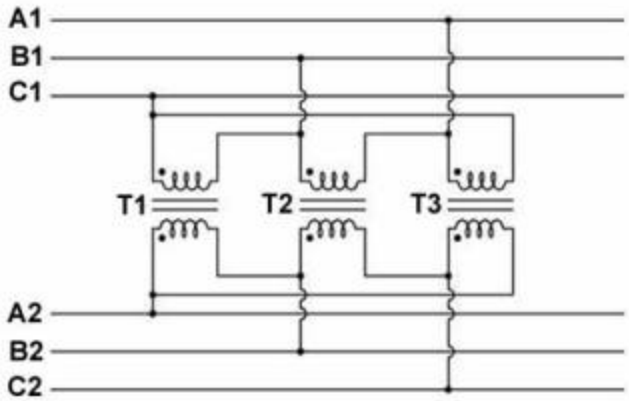


B

EL-0084



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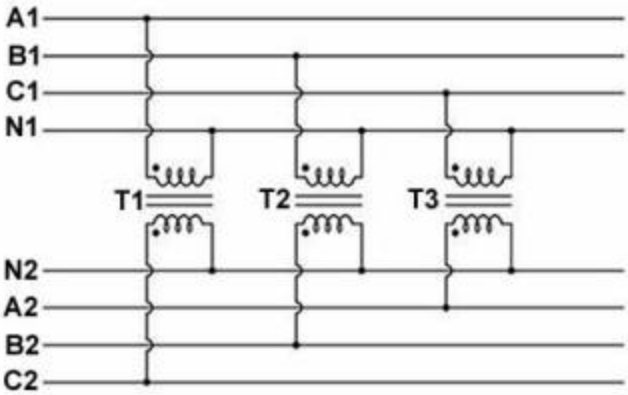

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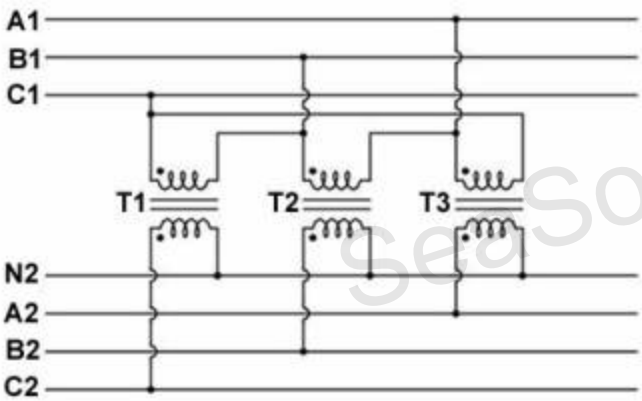

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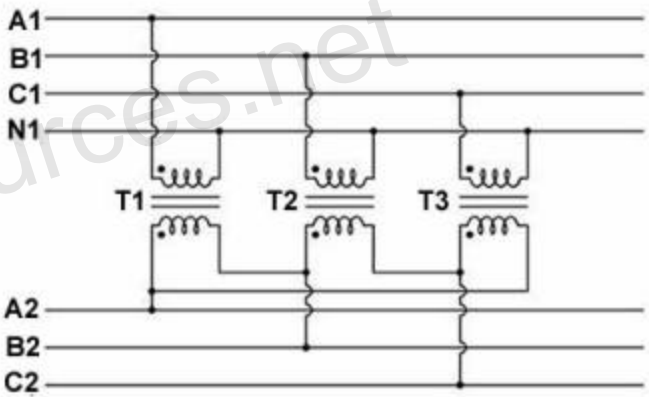

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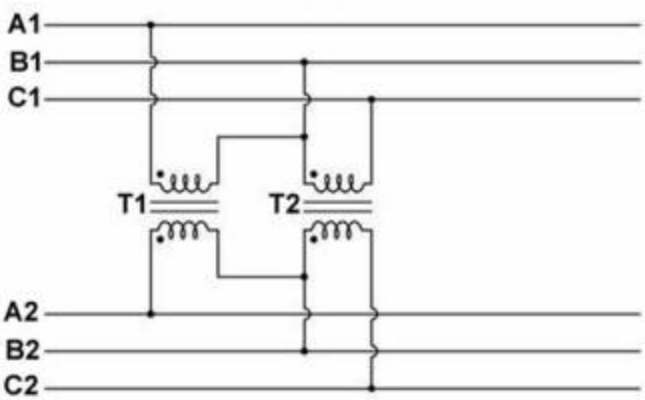

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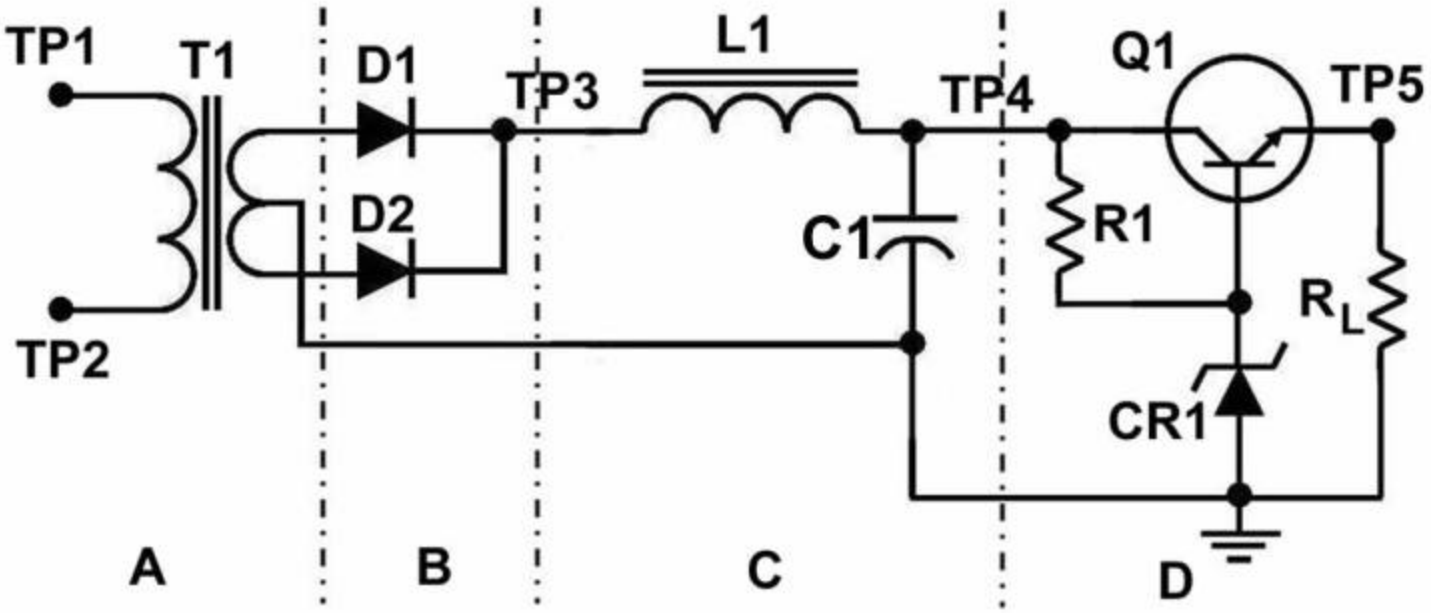
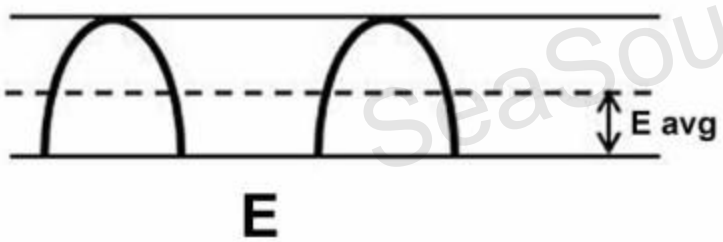
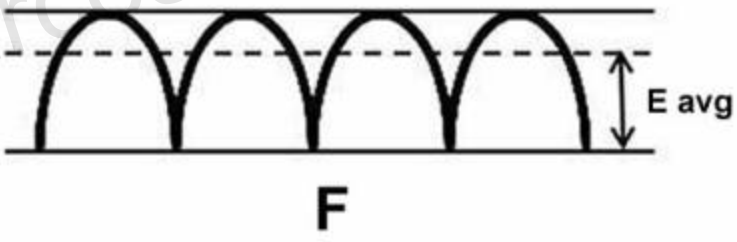
EL-0085

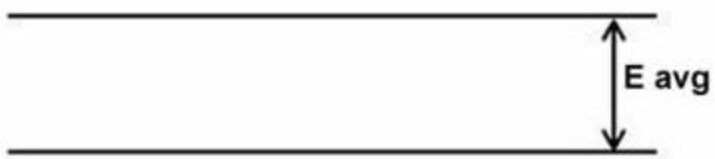




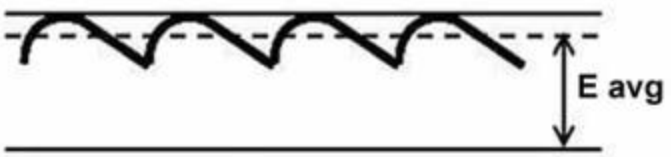
E



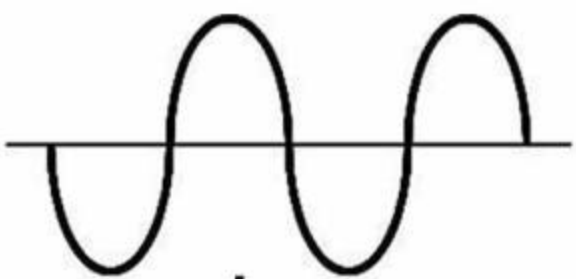
F



G

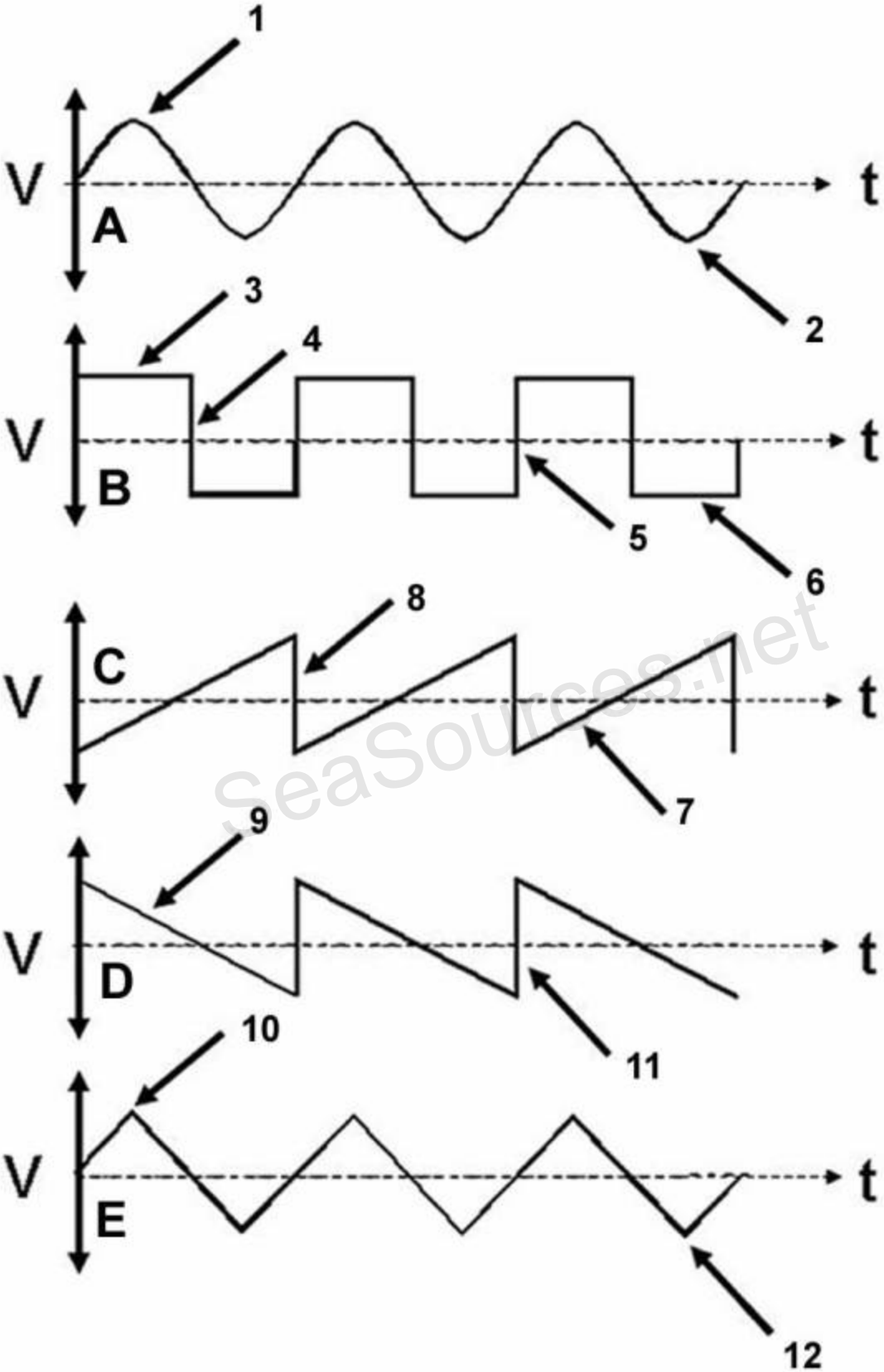


H

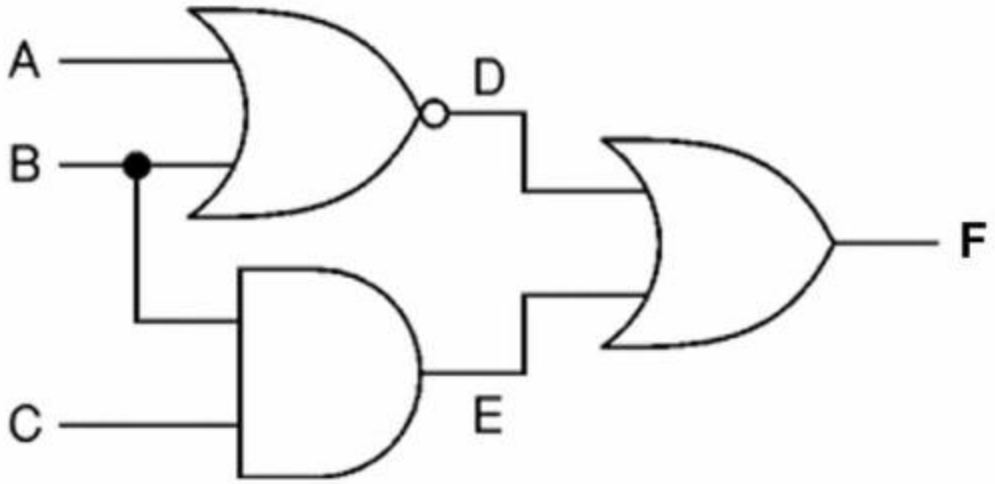


I

EL-0088



EL-0089



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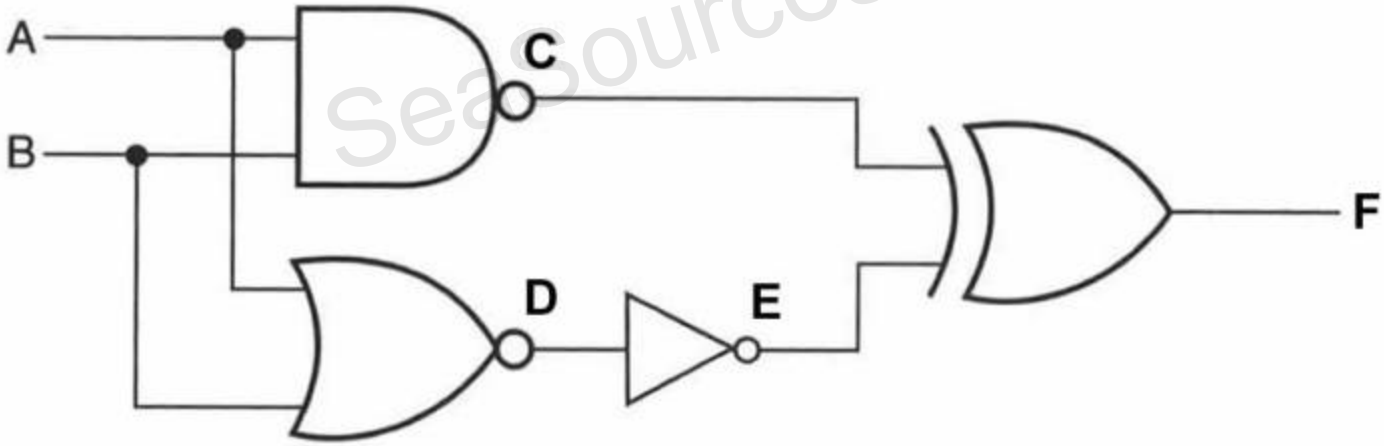
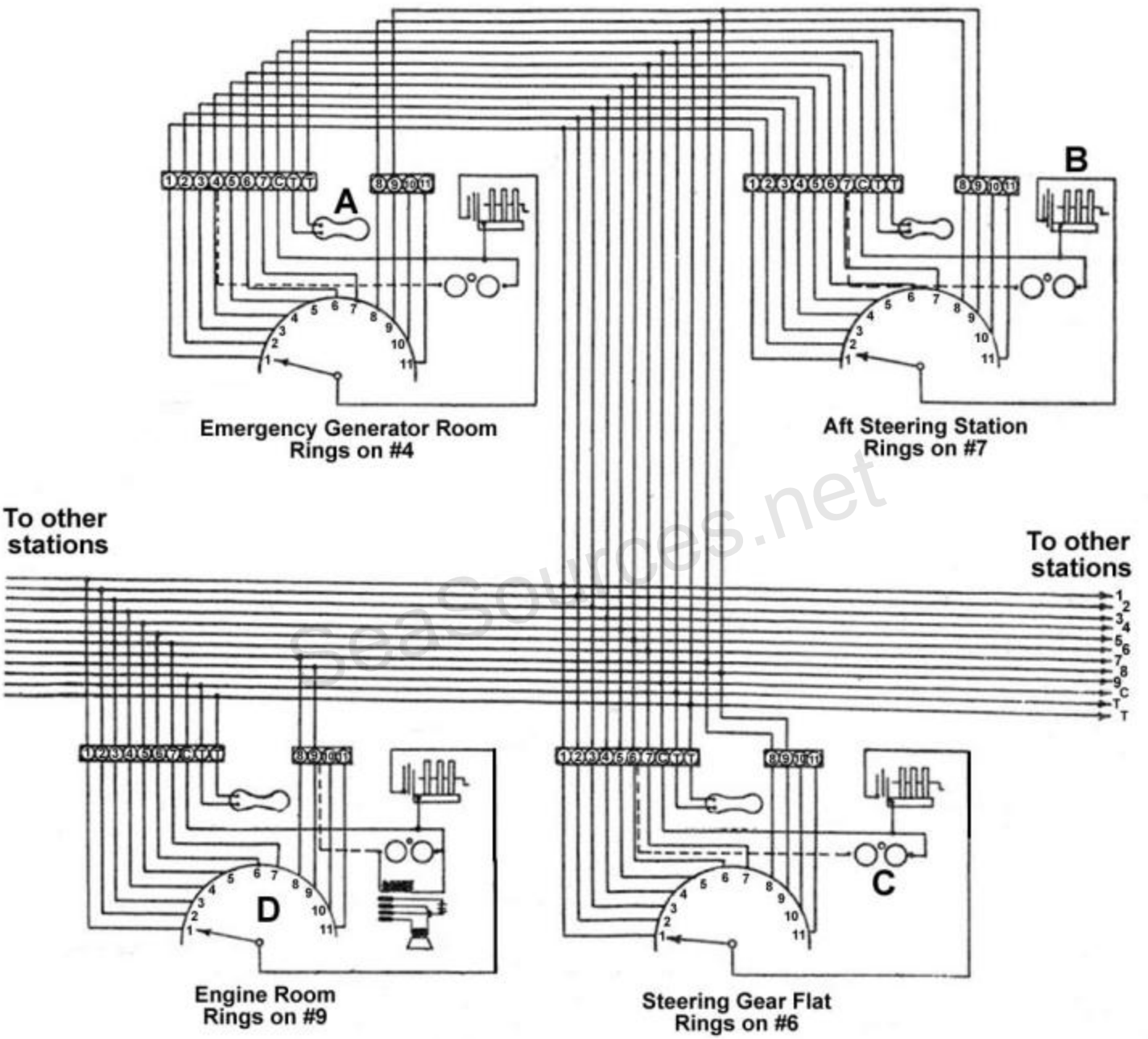
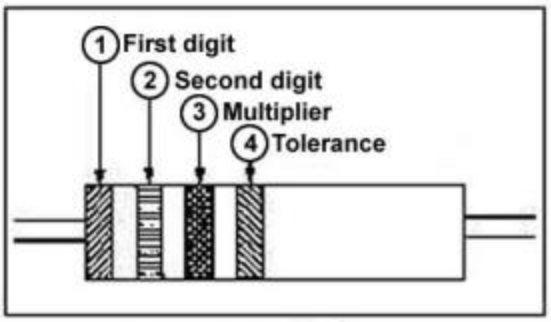


2

EL-0093



EL-0103

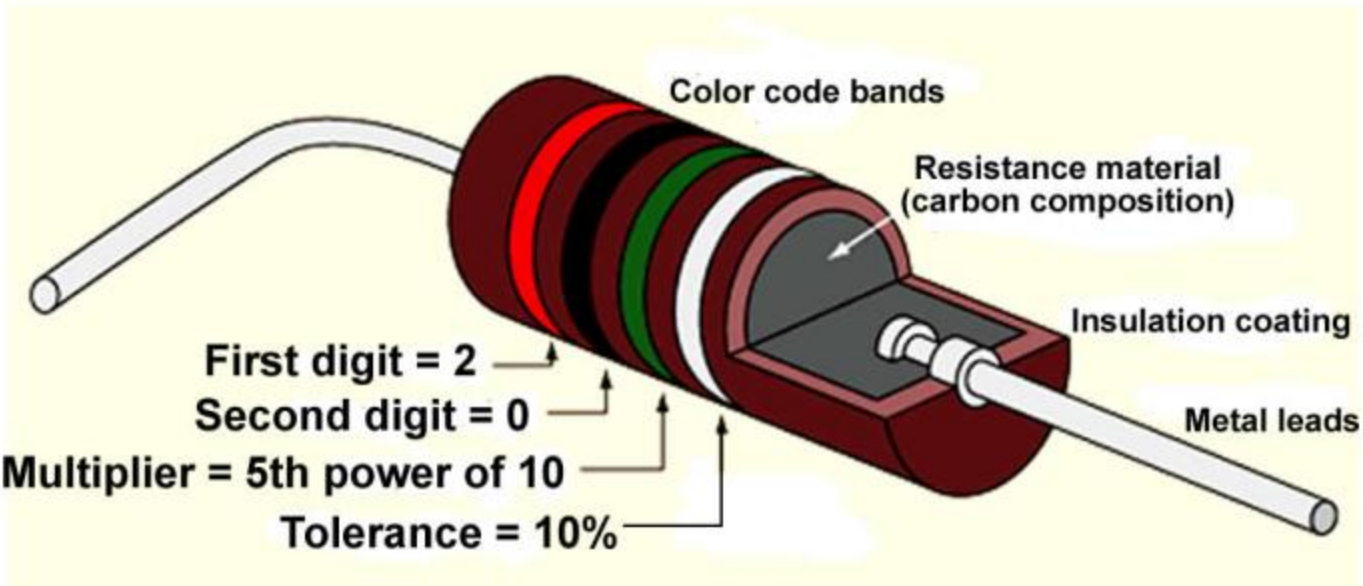


Color	1st Digit	2nd Digit	Multiplier	Tolerance (percent)
Black	0	0	1	
Brown	1	1	10	
Red	2	2	100	
Orange	3	3	1,000	
Yellow	4	4	10,000	
Green	5	5	100,000	
Blue	6	6	1,000,000	
Violet	7	7	10,000,000	
Gray	8	8	100,000,000	
White	9	9	1,000,000,000	
Gold			.1	5
Silver			.01	10
No color				20

Resistors for military use may have a fifth band to indicate reliability in terms of failure rate as follows:

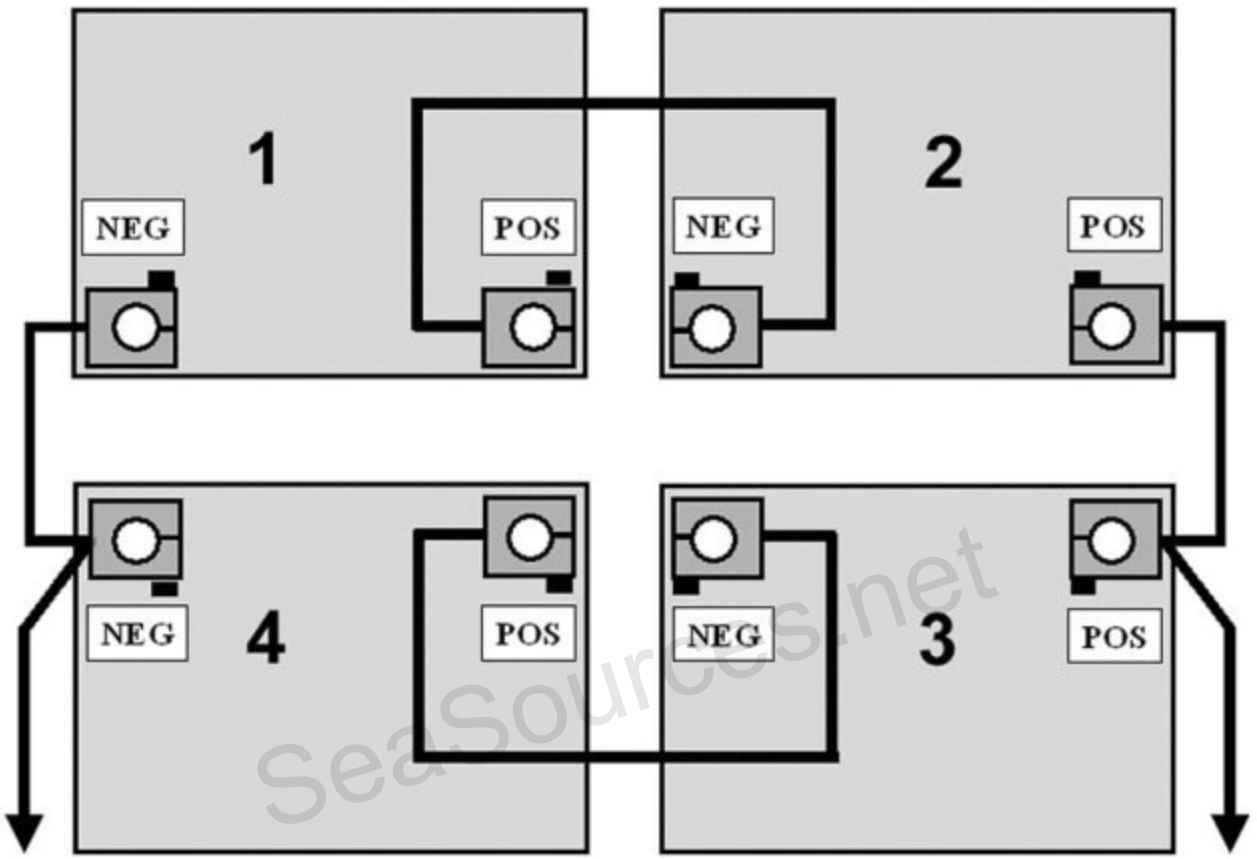
No color: No test made
Brown: 1.0 percent per 1000 hours
Red: 0.1 percent per 1000 hours
Orange: 0.01 percent per 1000 hours
Yellow: 0.001 percent per 1000 hours

A

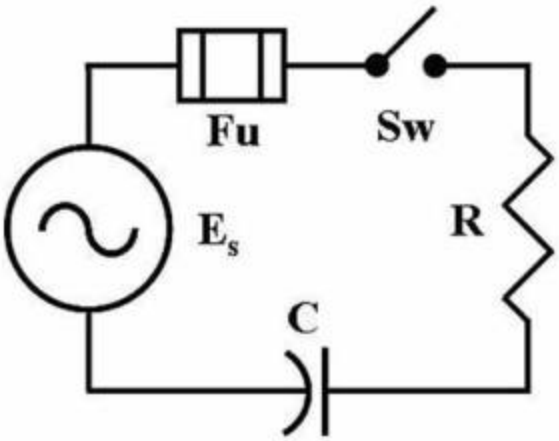


B

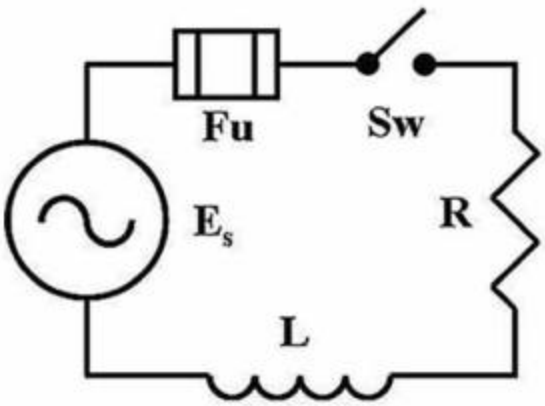
EL-0107



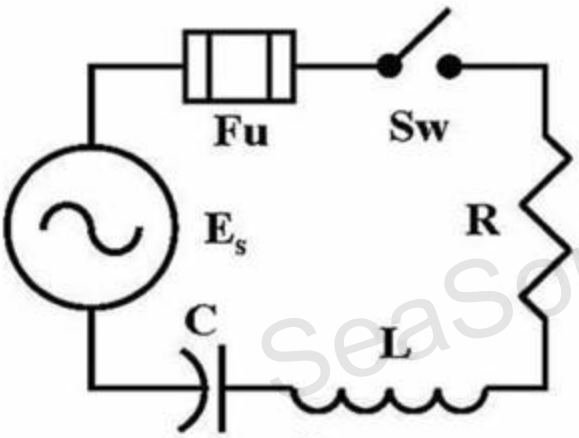
EL-0109



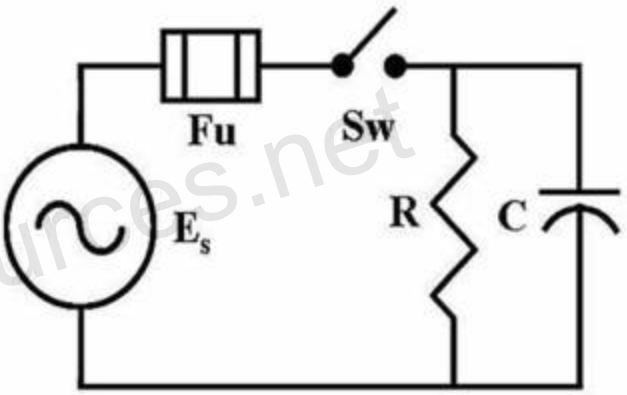
A



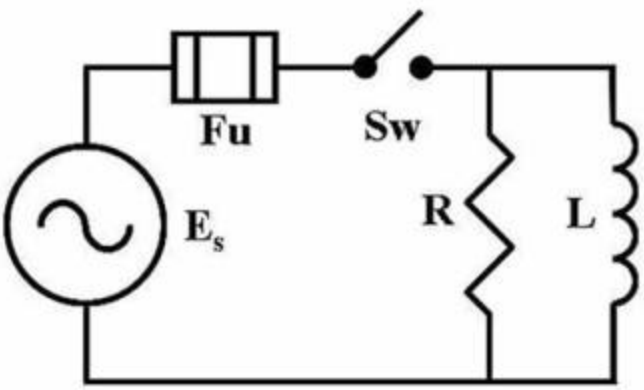
B



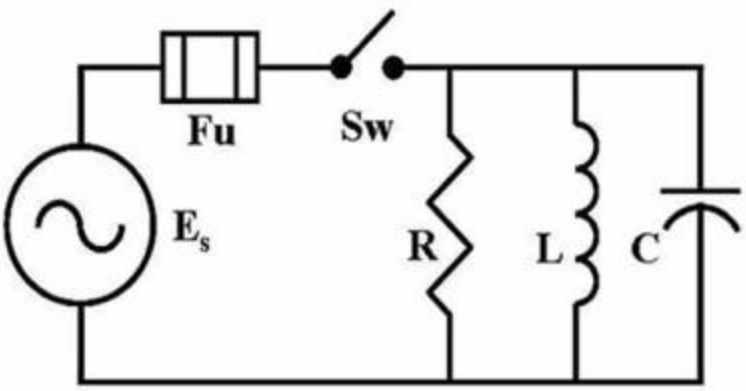
C



D

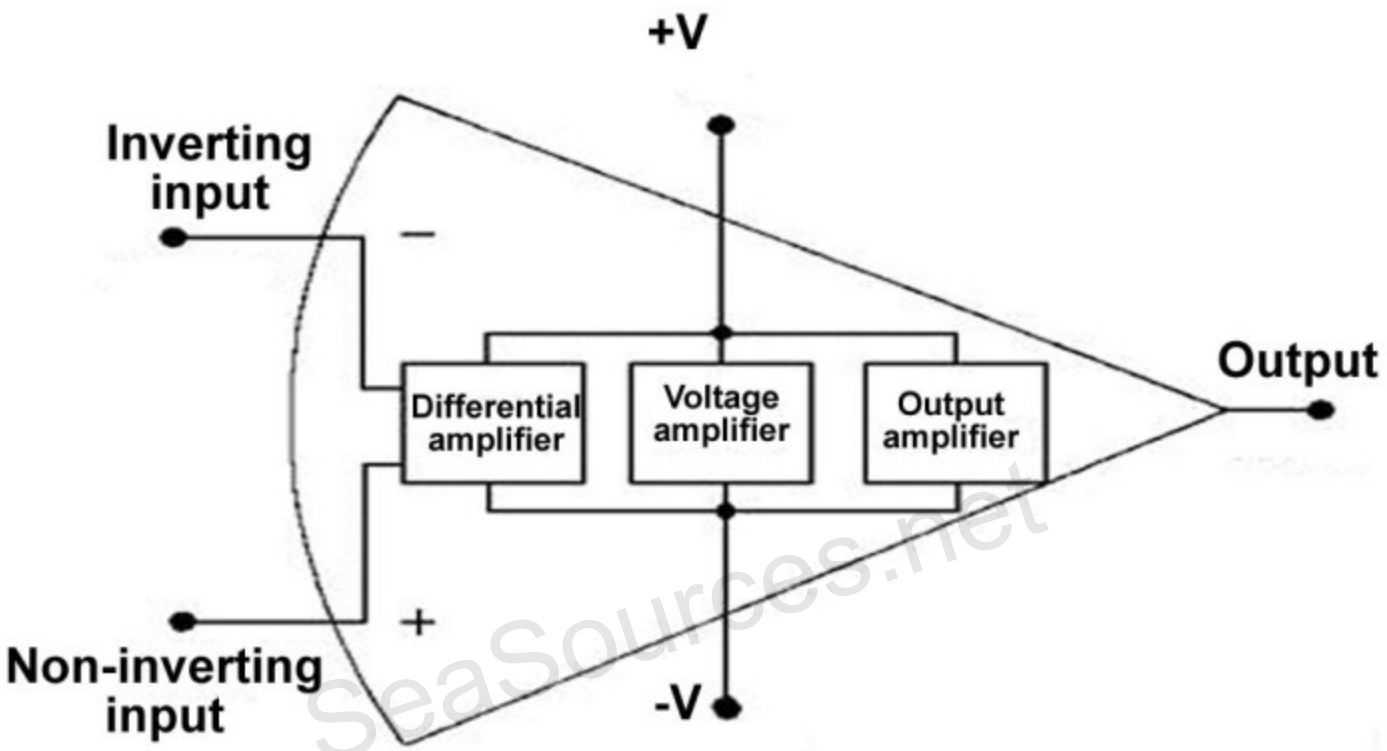


E

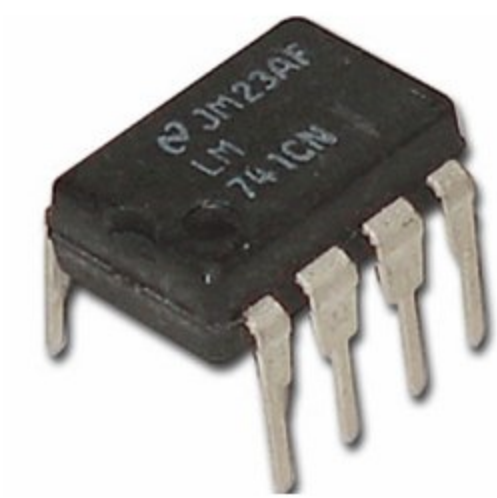


F

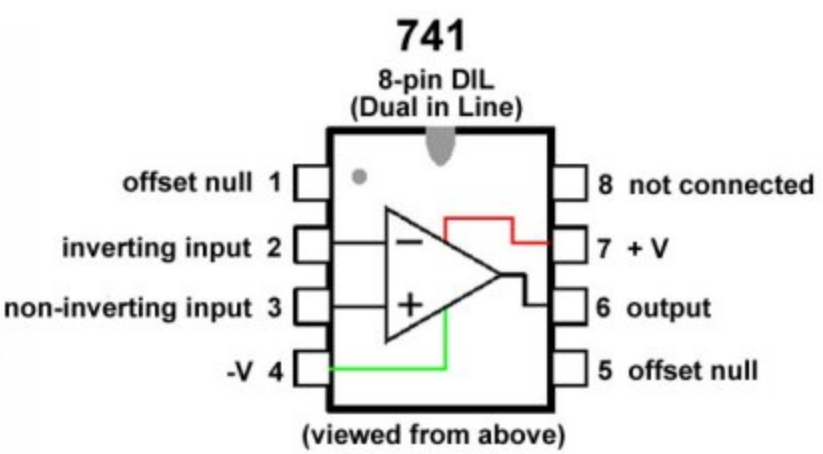
EL-0111



A

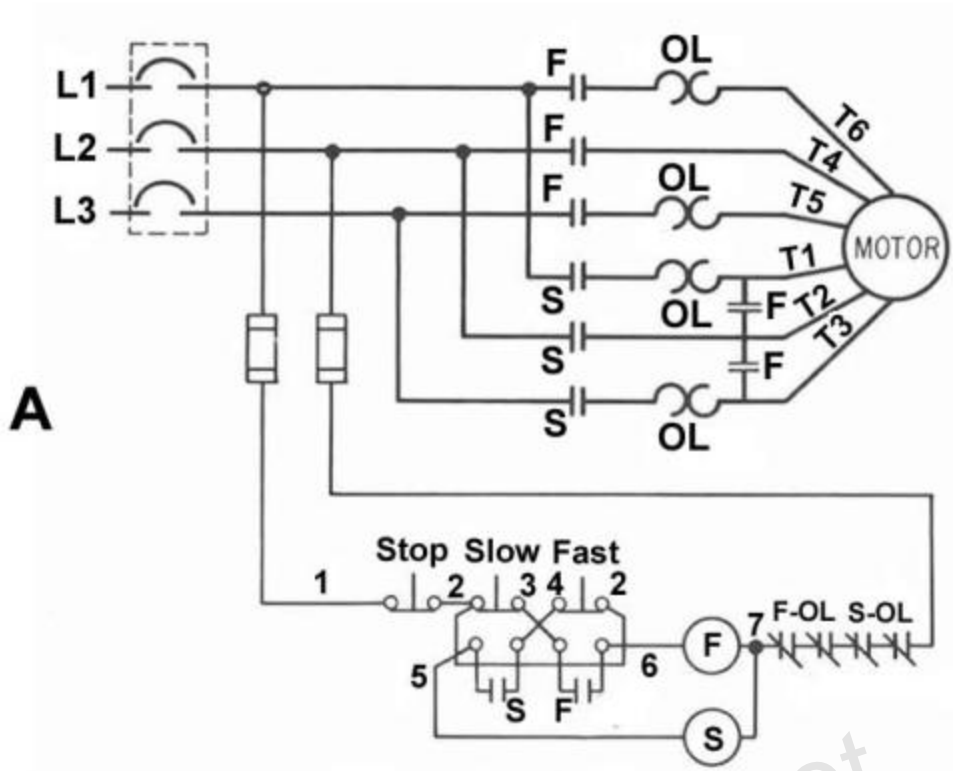


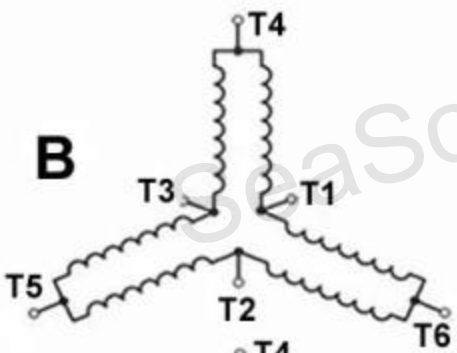
B



C

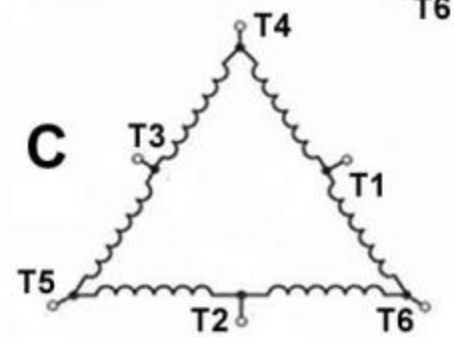
EL-0118





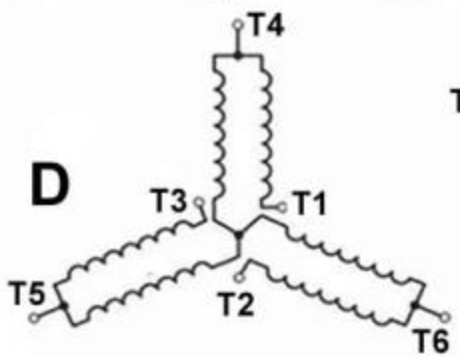
Two-speed single winding (constant torque)

Speed	L1	L2	L3	Tie together
Low	T1	T2	T3	----------
High	T6	T4	T5	T1 T2 T3



Two-speed single winding (variable torque)

Speed	L1	L2	L3	Tie together
Low	T1	T2	T3	----------
High	T6	T4	T5	T1 T2 T3



Two-speed single winding (constant horsepower)

Speed	L1	L2	L3	Tie together
Low	T1	T2	T3	T6 T4 T5
High	T6	T4	T5	----------

EL-0121

A

B

C

D

E

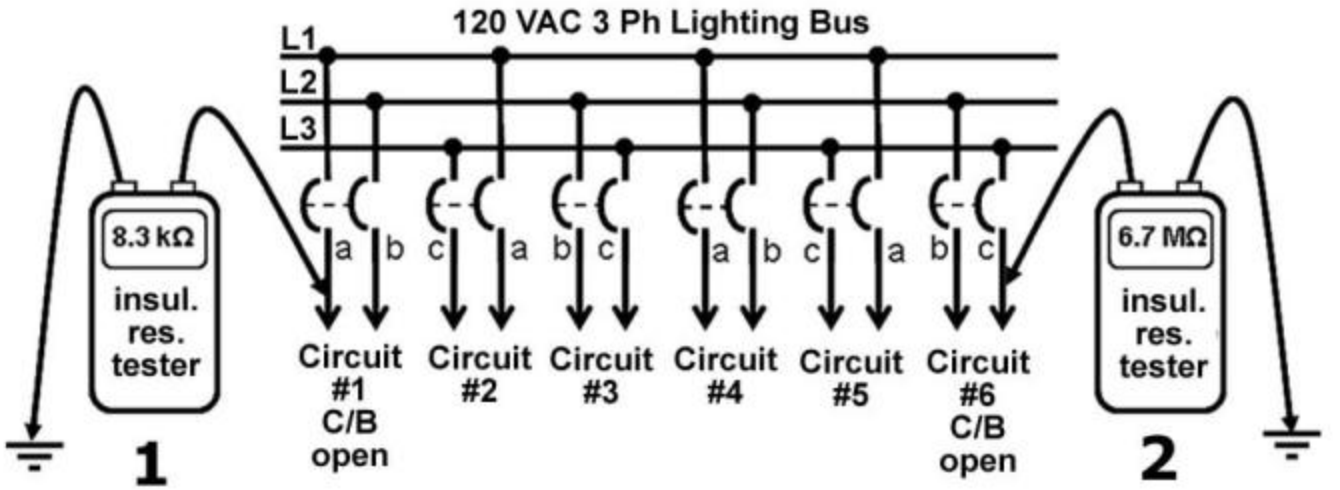
F

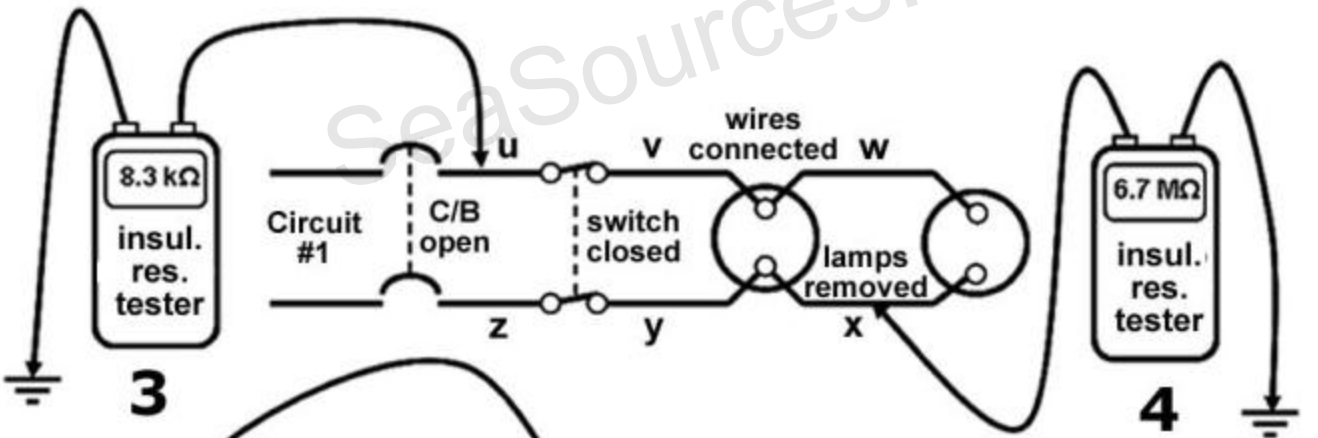
G

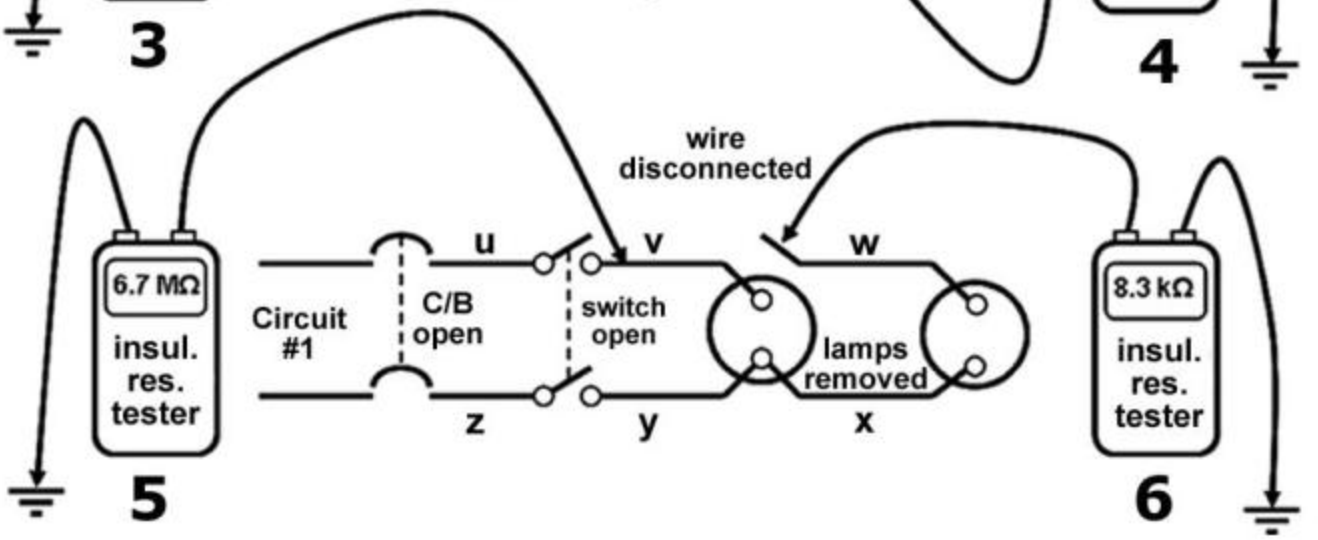
H

I

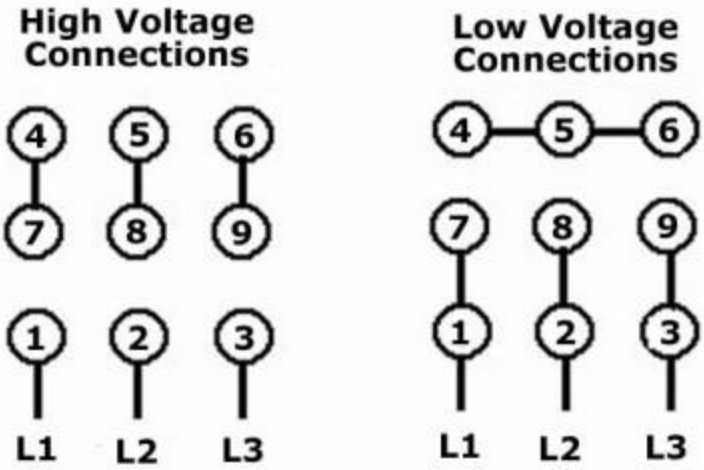
EL-0130



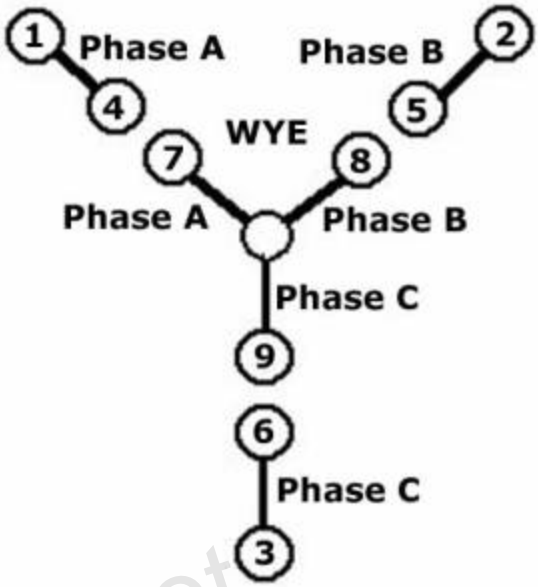


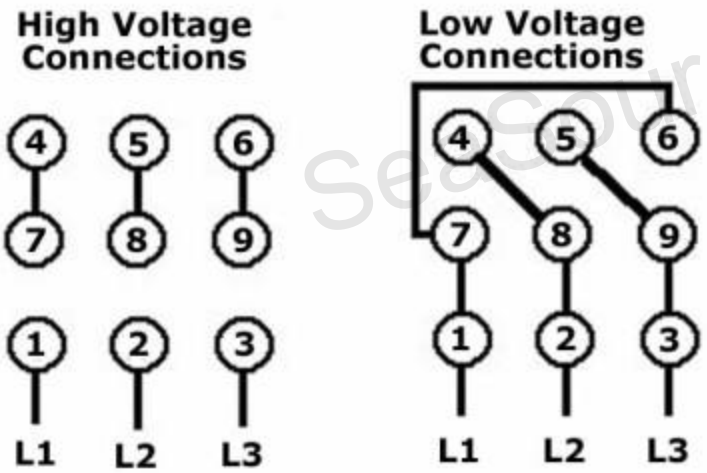


EL-0134

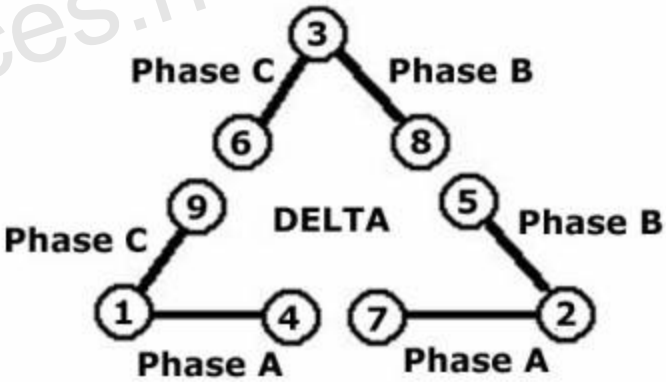


Dual Voltage Wye Connected Motor





Dual Voltage Delta Connected Motor



EL-0146

A

B

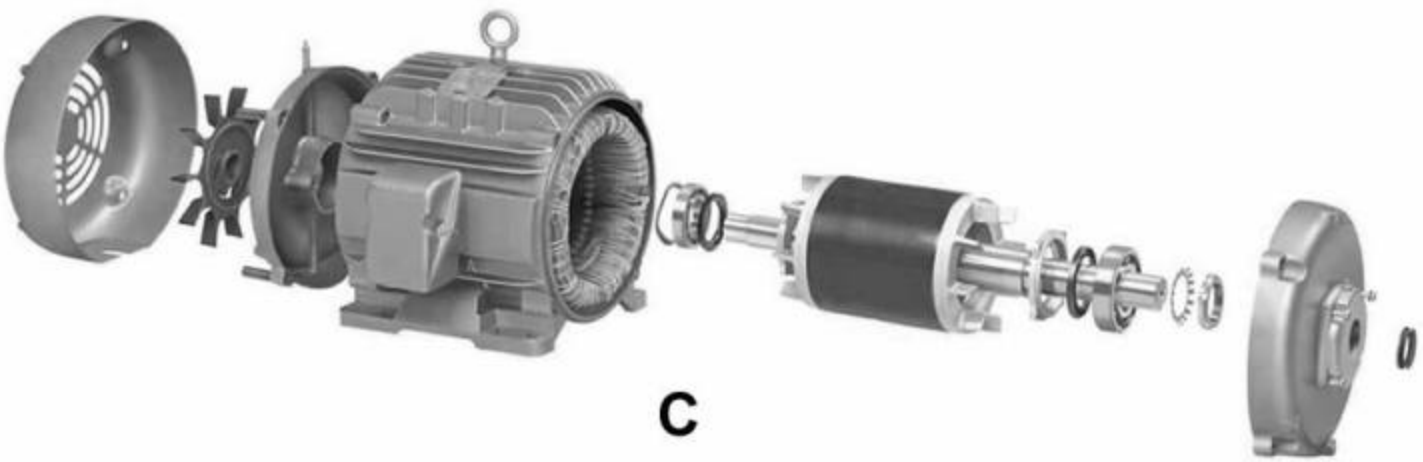
C

D

EL-0147

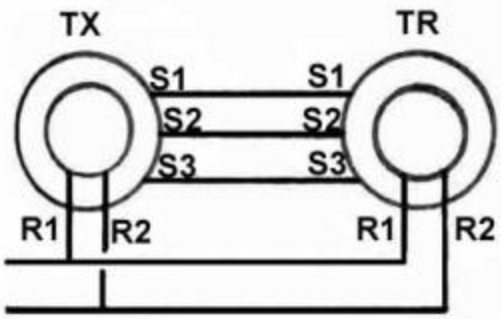
A

B

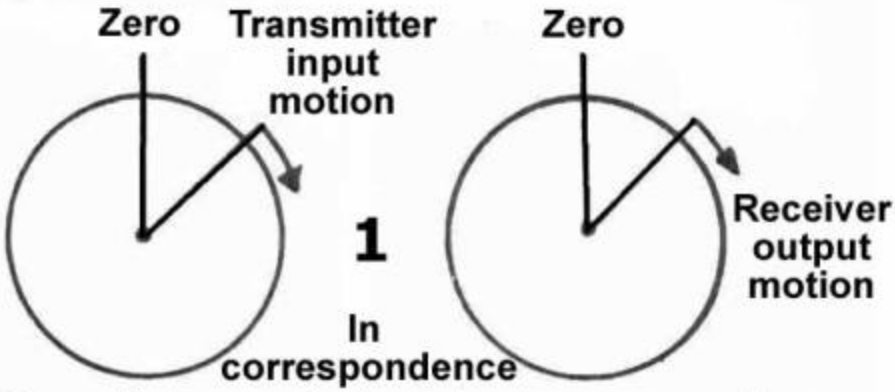


C

EL-0149

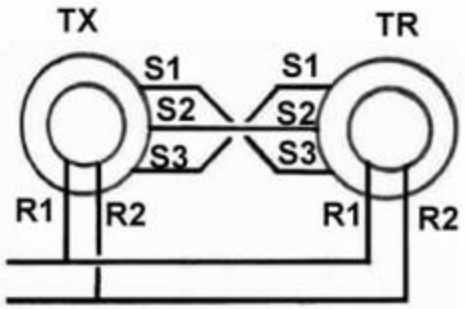


Correctly connected



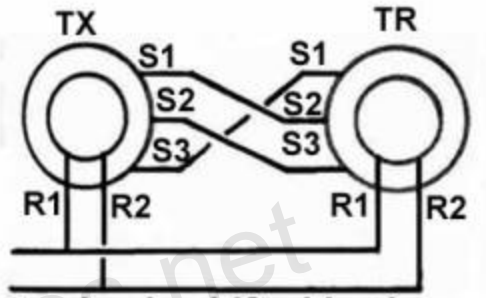
Correctly connected system causes receiver to be in correspondence with the transmitter

A



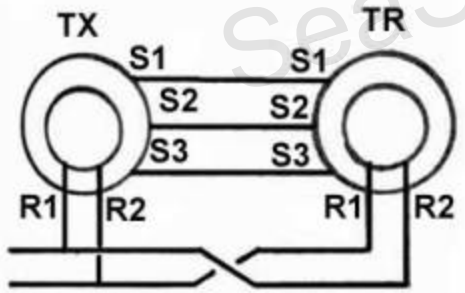
S1 and S3 leads reversed

C



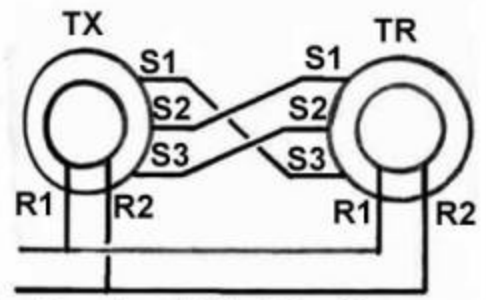
Stator leads shifted by 1 group

B

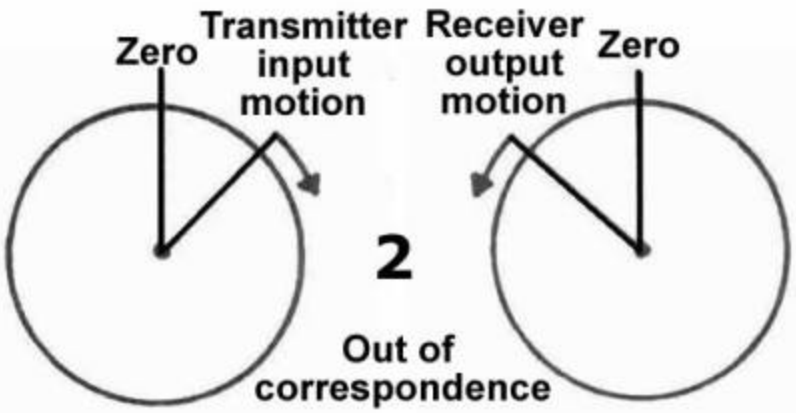


R1 and R2 leads reversed

D

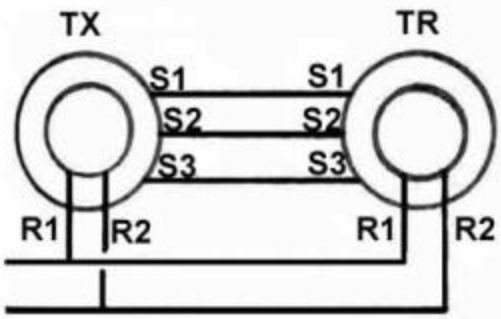


Stator leads shifted by 2 groups

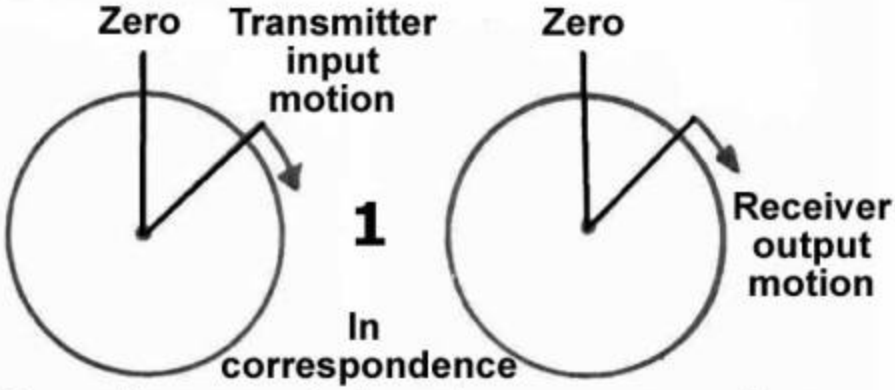


Incorrect connections:
properly zeroed,
but torque direction reversed

EL-0150

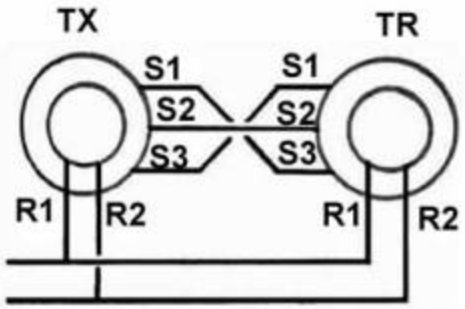


Correctly connected



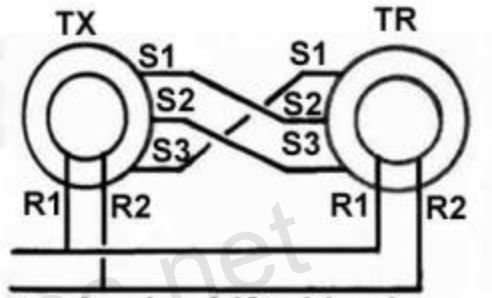
Correctly connected system causes receiver to be in correspondence with the transmitter

A



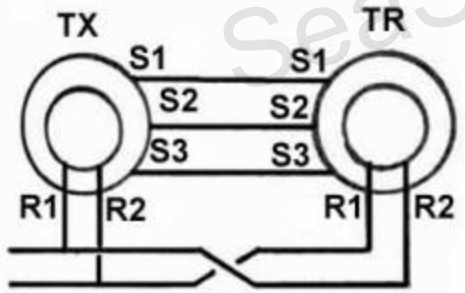
S1 and S3 leads reversed

C



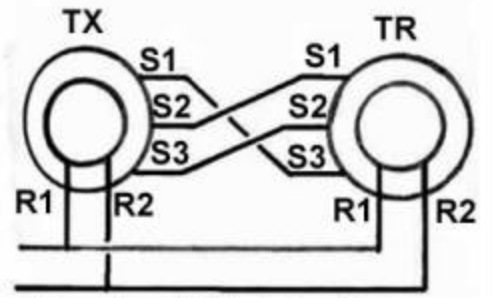
Stator leads shifted by 1 group

B



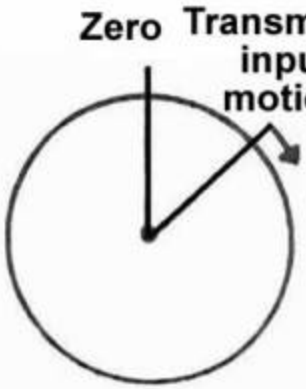
R1 and R2 leads reversed

D

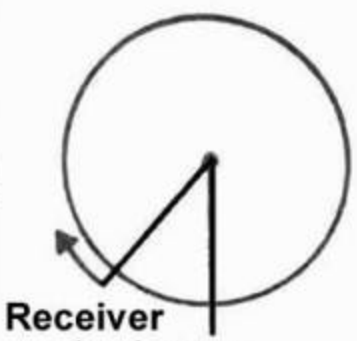


Stator leads shifted by 2 groups

Out of correspondence

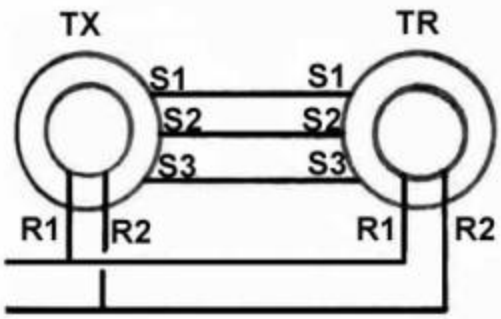


2

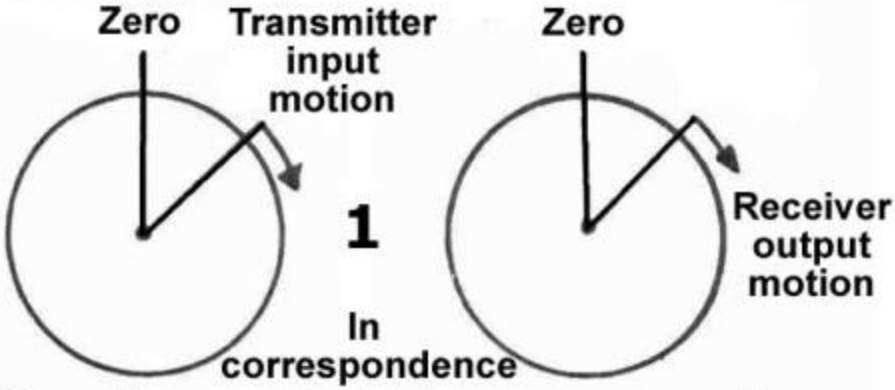


Incorrect connections:
180 degrees out of zero, but torque direction correct

EL-0151

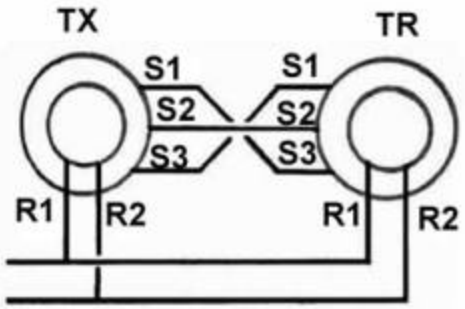


Correctly connected



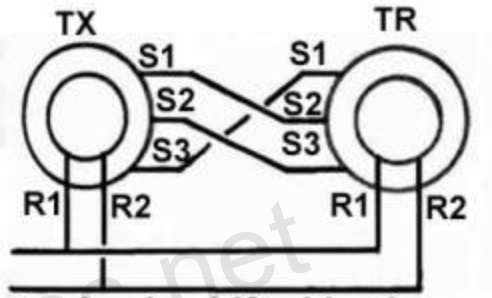
Correctly connected system causes receiver to be in correspondence with the transmitter

A



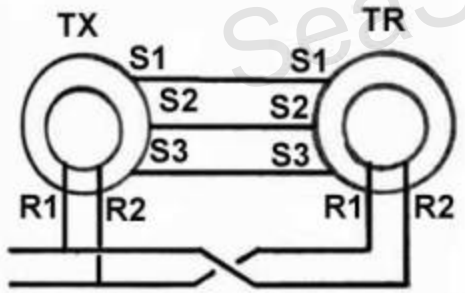
S1 and S3 leads reversed

C



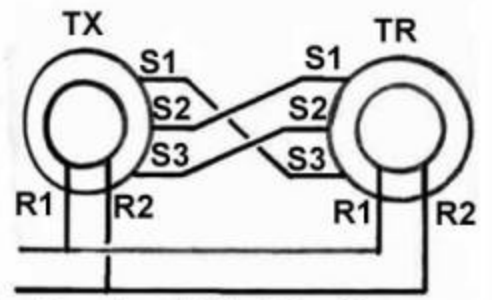
Stator leads shifted by 1 group

B



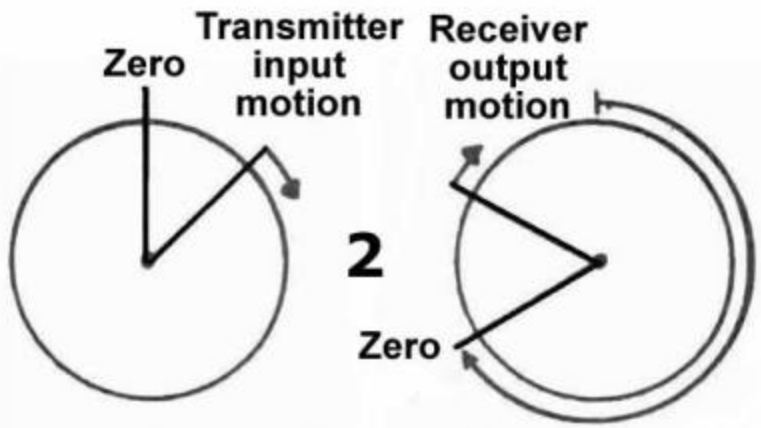
R1 and R2 leads reversed

D



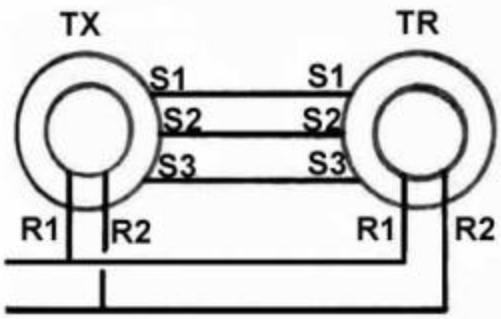
Stator leads shifted by 2 groups

Out of correspondence

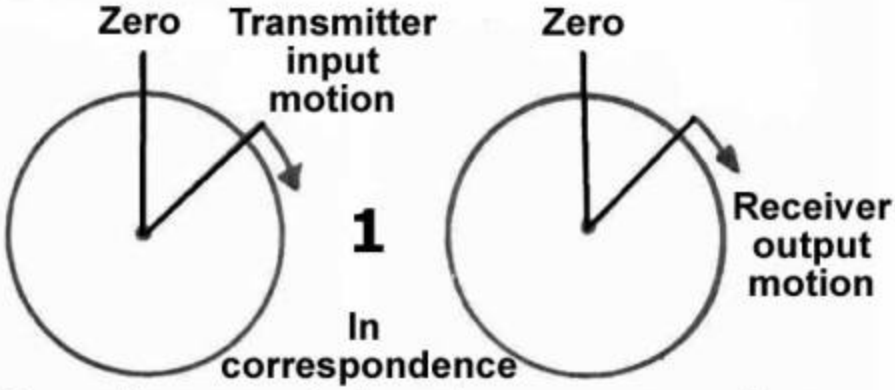


Incorrect connections:
240 degrees out of zero, but
torque direction correct

EL-0152

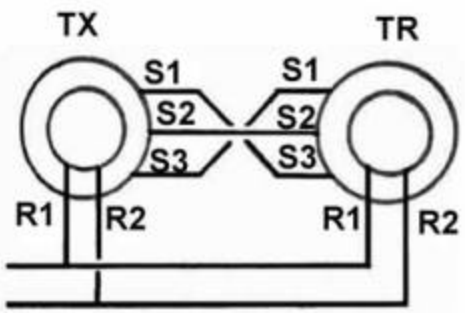


Correctly connected



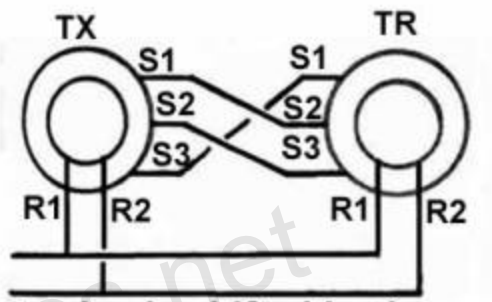
Correctly connected system causes receiver to be in correspondence with the transmitter

A



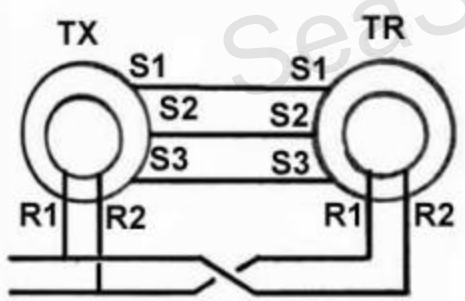
S1 and S3 leads reversed

C



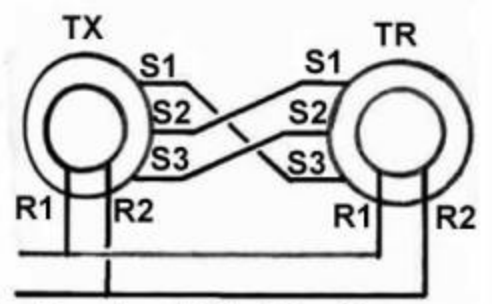
Stator leads shifted by 1 group

B

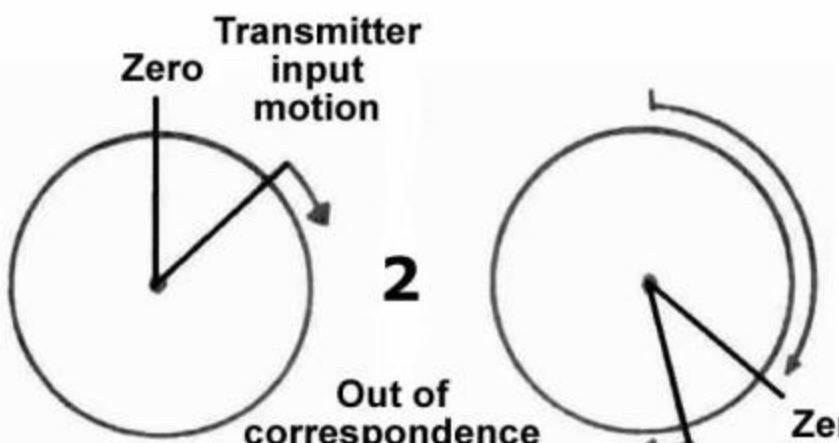


R1 and R2 leads reversed

D

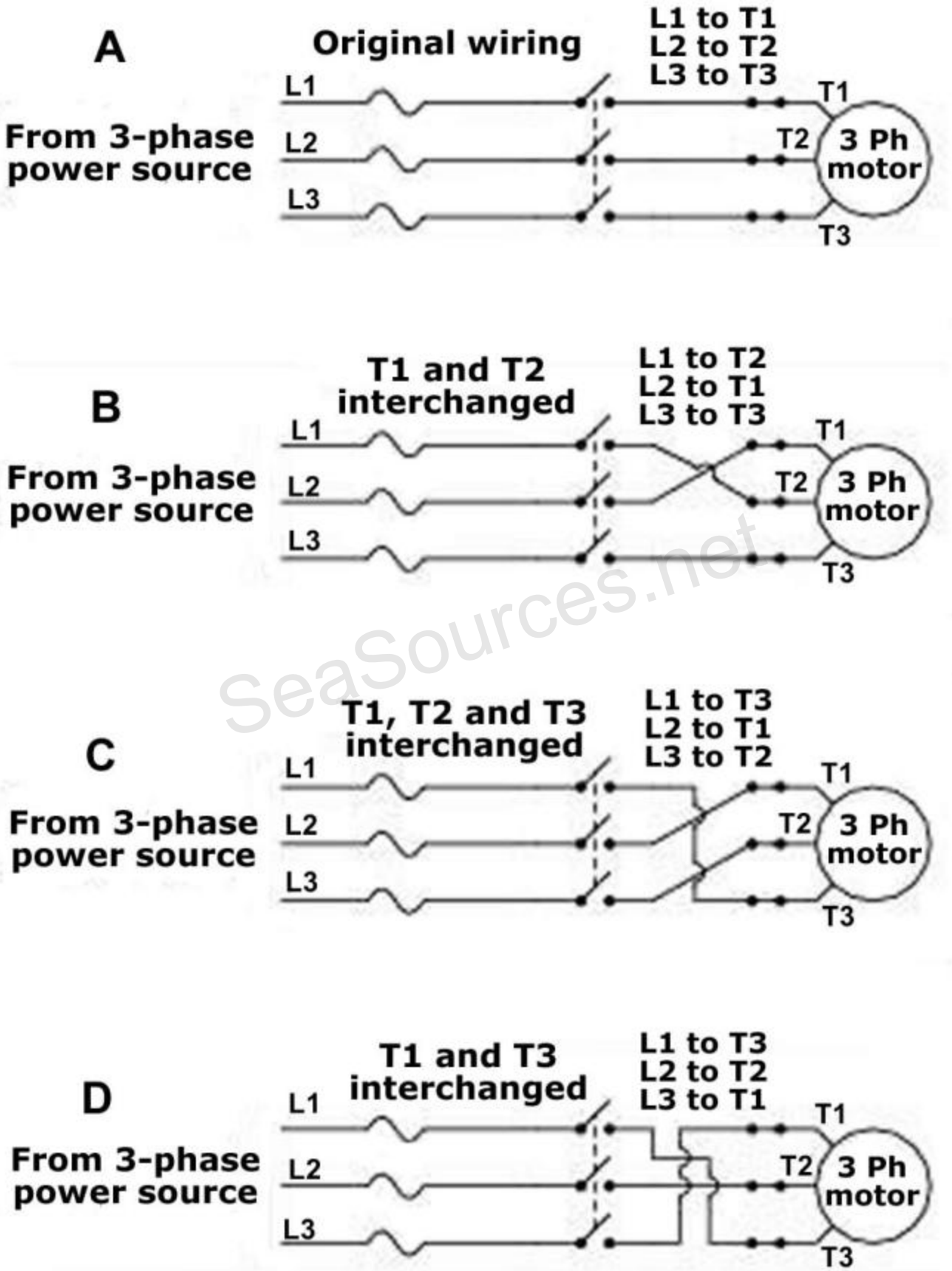


Stator leads shifted by 2 groups

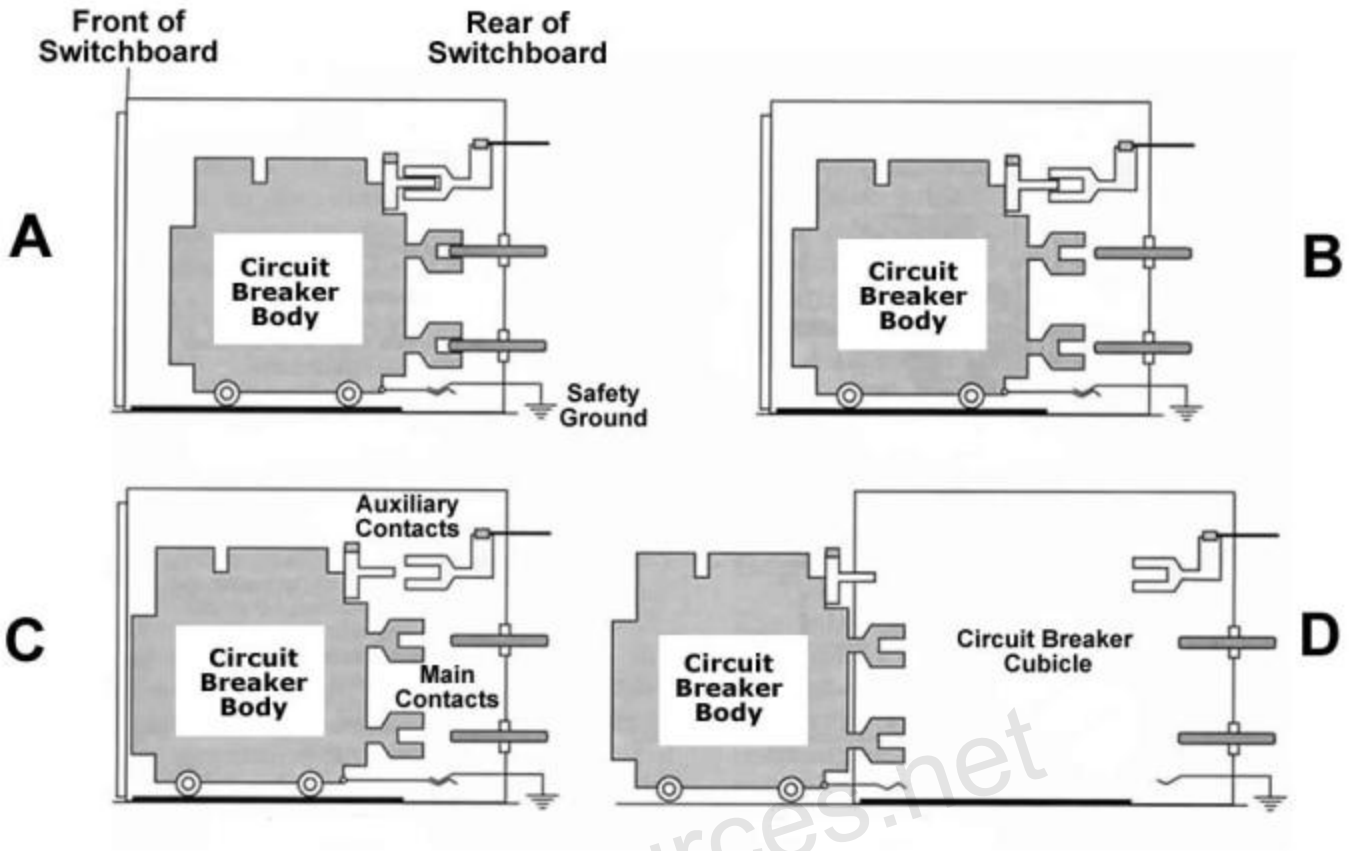


Incorrect connections:
120 degrees out of zero, but torque direction correct

EL-0156



EL-0167



E

F

EL-0171

Standard Overload Relays

General Instructions for Selection of Overload Relay Heater Elements:

1. Obtain full load current and service factor from motor nameplate or from motor manufacturer. Do not estimate full-load motor current from horsepower tables.
2. Determine if 1, 2, or 3 overload relays are needed.
3. Select proper heater from appropriate table according to class, size, type of enclosure and number of overload relays being used. Full load motor currents should be within the Min.-Max. ratings shown for the number of overload relays being used.
4. The tables apply only to standard, open type or totally enclosed fan-cooled, continuous duty motors (with a service factor of 1.15 and rated for 40 degrees C rise) in applications where motor and stater are located in the same ambient temperature. For applications of other motors with a service factor of 1, 50-55 degrees C rise, totally enclosed non-ventilated, explosion proof, or for installations where ambient temperatures of motor and starter are different, refer to Chart "A" for selection of overload heater units.

Chart A: Variations by Operating Conditions

Motor continuous rating °C rise	Ambient temperature same at starter and motor	Ambient temperature higher at starter than at motor	Ambient temperature lower at starter than at motor
1.15 service factor 40°C rise	As specified from tables	One size larger than specified for each 15°C difference	One size smaller than specified for each 15°C difference
1.0 service factor 50-55°C rise	One size smaller than for 1.15 service factor as above	One size smaller than for 1.15 service factor as above	One size smaller than for 1.15 service factor as above

Motor Nameplate

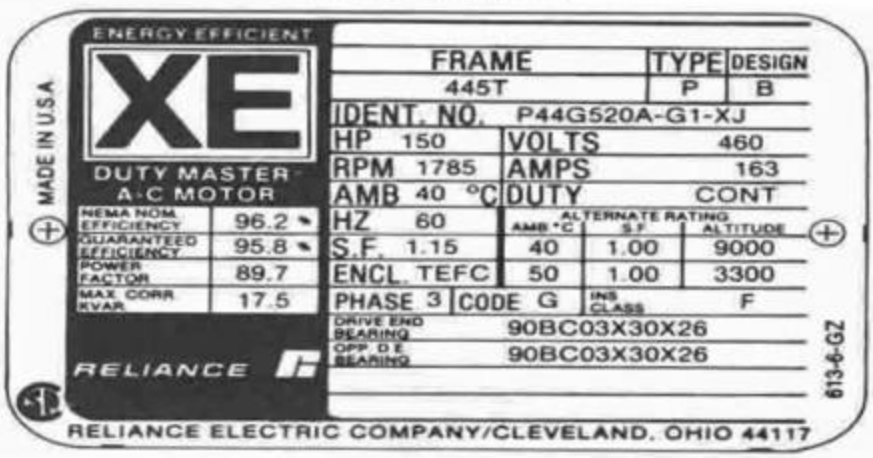


Table 24: NEMA Size 6
For all Standard Enclosures
Three Overload Relays per Starter

Heater Cat. No.	Motor Current	
	Min	Max
G30T19	142	157
G30T20	158	171
G30T21	172	188
G30T22	189	207
G30T23	208	229
G30T24	230	252
G30T25	253	277
G30T26	278	306
G30T27	307	336
G30T28	337	368
G30T29	369	405
G30T30	406	459
G30T31	460	480

EL-0176

A

B

C

D

EL-0177

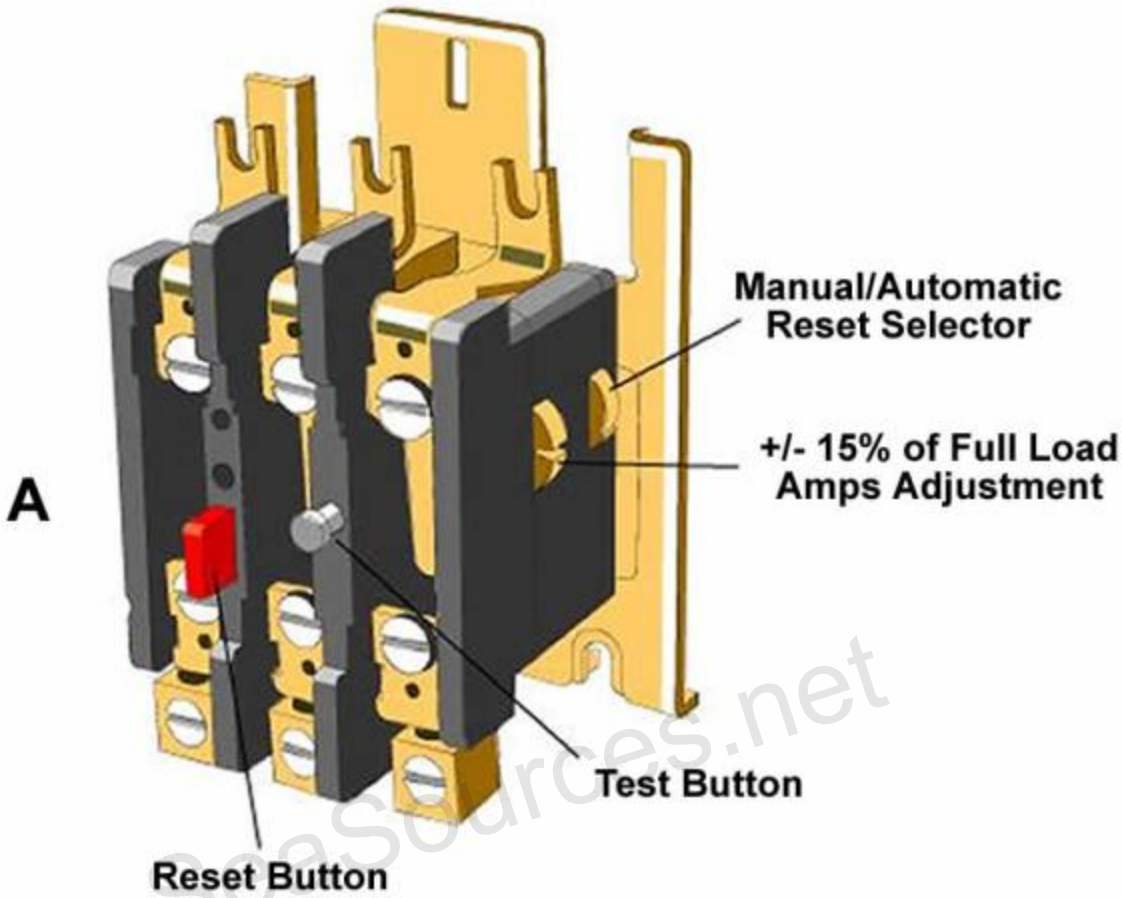
A

B

C

D

EL-0178



B

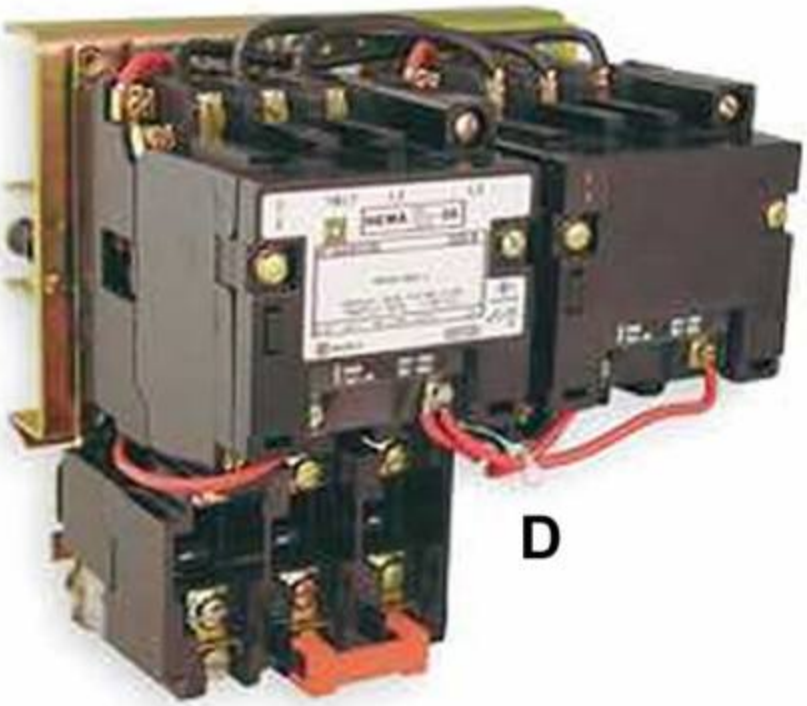
C

EL-0179

A

B

C



D

Catalog Number Selection Chart

Example Catalog Number

A N 1 9 A N 0 A 5E 005

Device Type
A = Starter
C = Contactor

Standard
E = IEC
N = NEMA

Device Assembly Configurations
70 = Multi-speed
1 = Non-reversing
5 = Reversing

OLR Type
5 = Contactor only-no overload relay
6 = Starter w/C306 bi-metallic OLR
9 = Starter w/C440 electronic overload

Contactor Frame Size *		
Suffix	NEMA Size	Continuous Amperes
A =	00	9
B =	0	18
D =	1	27
G =	2	45
K =	3	90
N =	4	135
S =	5	270
T =	6	540
U =	7	810
V =	8	1215

NEMA Enclosure
N = Open

For Starters

Starter Mounting Option
0 = Horizontal
V = Vertical
For Contactors only
2 = Two-pole
3 = Three-pole
4 = Four-pole
5 = Five-pole

AC Coil Suffix	
Suffix	Coil Volts and Hertz
A	= 120/60 or 110/50
B	= 240/60 or 220/50
C	= 480/60 or 440/50
D	= 600/60 or 550/50
E	= 208/60
H	= 277/60
J	= 208-240/60 **
K	= 240/50
L	= 380-415/50
N	= 550/50
T	= 24/60, 24/50 ***
U	= 24/50
V	= 32/50
W	= 48/60
Y	= 48/50

C440 OLR Designation (FVNR and FVR only)
5E = Standard feature set SEL Reset, SEL Class (10A, 10, 20, 30)
5G = Ground fault feature set SEL Reset, SEL Class (10, 20)

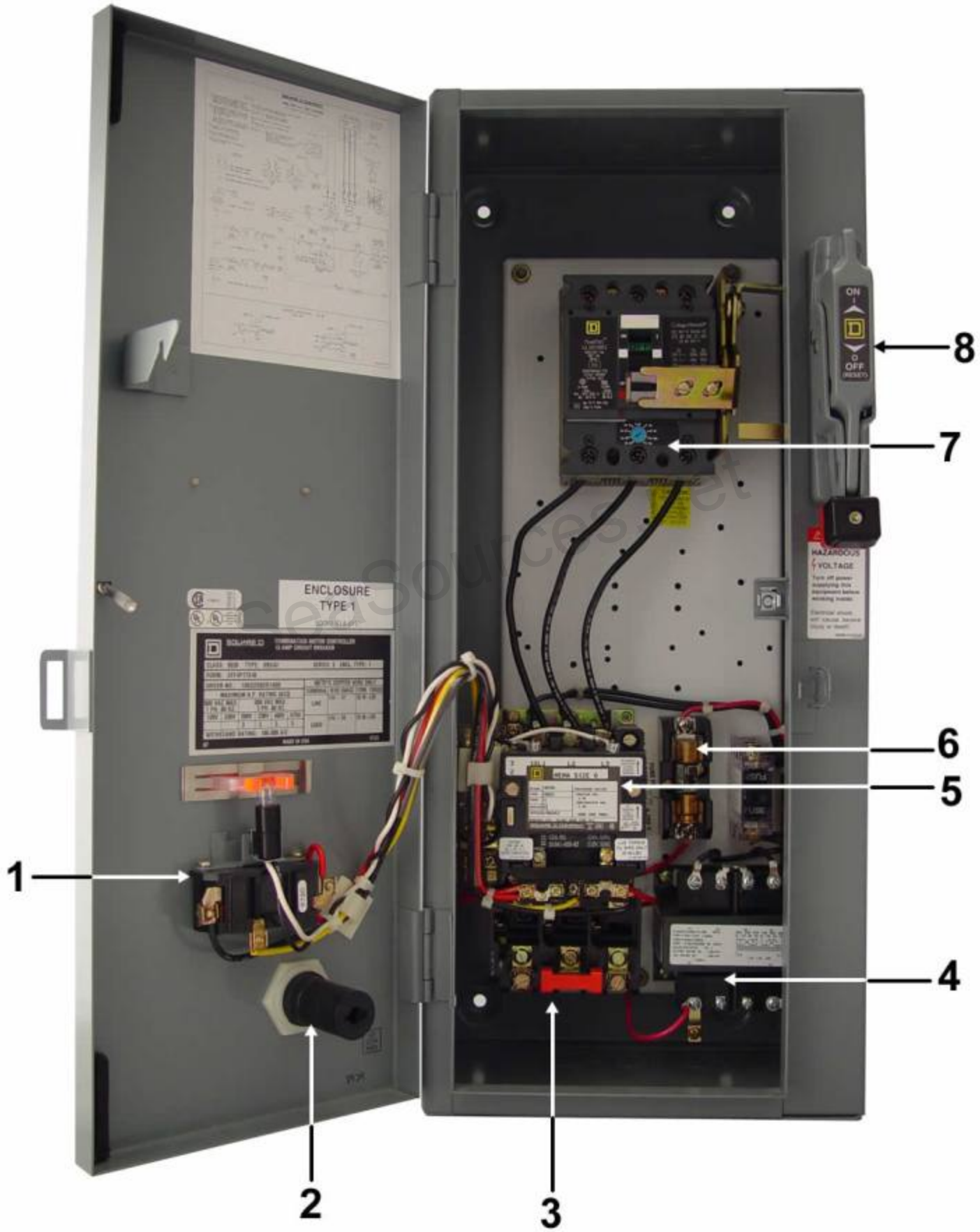
C440 FLA Range (FVNR and FVR only)
NEMA Size 00
1P6 = 0.33-1.65A **005** = 1-5A **020** = 4-20A
NEMA Size 0
1P6 = 0.33-1.65A **005** = 1-5A **020** = 4-20A
NEMA Size 1
1P6 = 0.33-1.65A **005** = 1-5A **020** = 4-20A **045** = 9-45A
NEMA Size 2
005 = 1-5A **020** = 4-20A **045** = 9-45A
NEMA Size 3
100 = 20-100A ****
NEMA Size 4 **
300 = 60-300A ****
NEMA Size 5 **
300 = 60-300A ****

Notes:

* For contactor only orders, add B to end of catalog number if NEMA size 00-2, 6.
** NEMA sizes 00 and 0 only.
*** NEMA sizes 00 and 0 only. Sizes 1-8 are 24/60 only.
**** NEMA sizes 4 and 5 require the use of CTs with 1-5A OL relay. Size 4 starters are not shipped as assembled units. Order CN15NN01 contactor 1-5A OL (C440A1A005SAX or C440A2A005SAX) with 60-300A CTs (ZEB-XCT300).

EL-0180

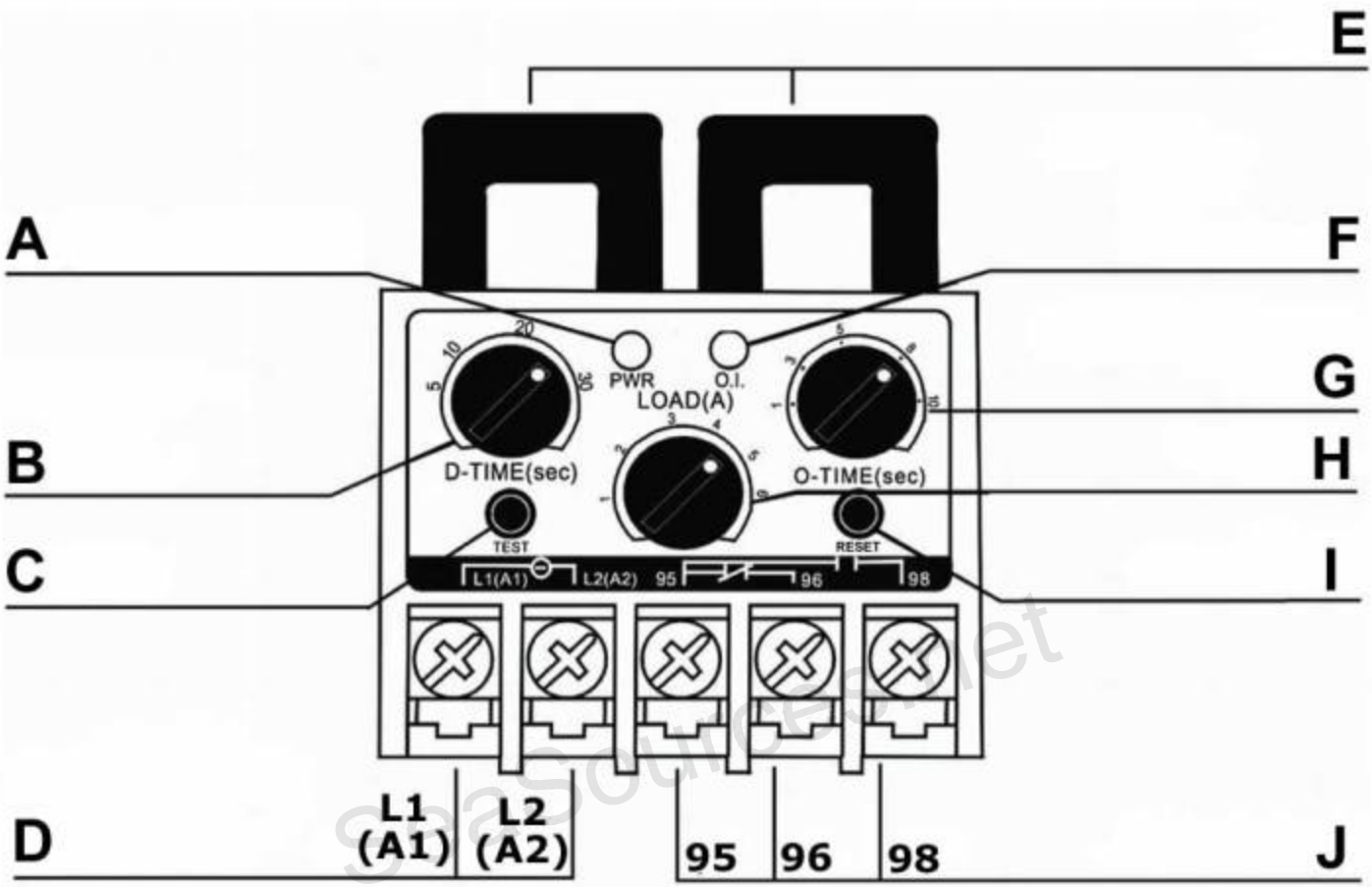
EL-0181



EL-0182


SIEMENS
ESP200
TRIP CLASS
5
10
20
30
PHASE UNBAL ON
PHASE LOSS ON
RESET MODE MAN
GROUND FAULT ON
OFF
OFF
AUTO
OFF
FULL LOAD AMPS
CAT.NO.
48ATC3S00
TEST
RESET
3UB8123-4CW2
95
96
A3+
A4-
97
98

EL-0183



Electronic Overload Relay

EL-0184

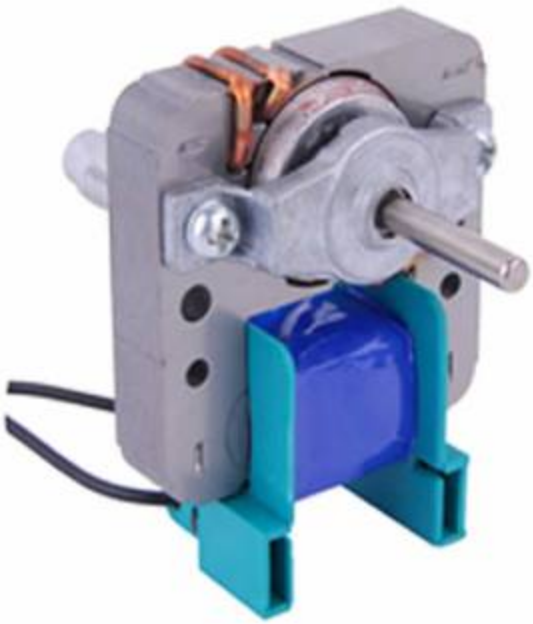
A

B

C

D

EL-0208



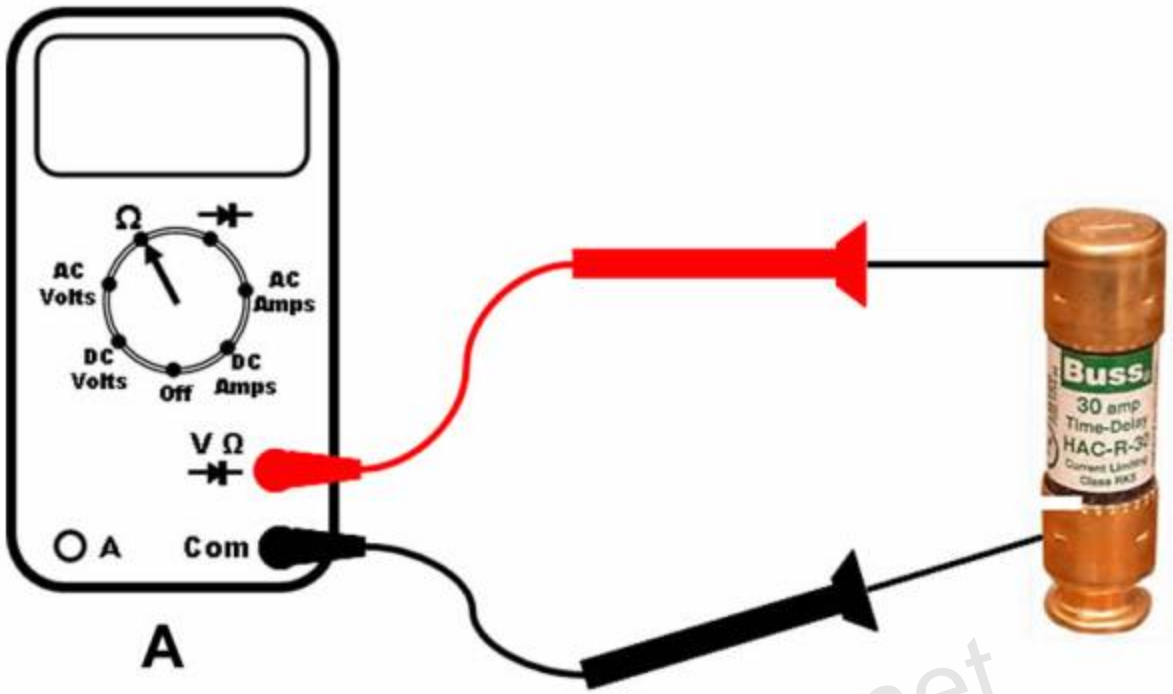
A

B

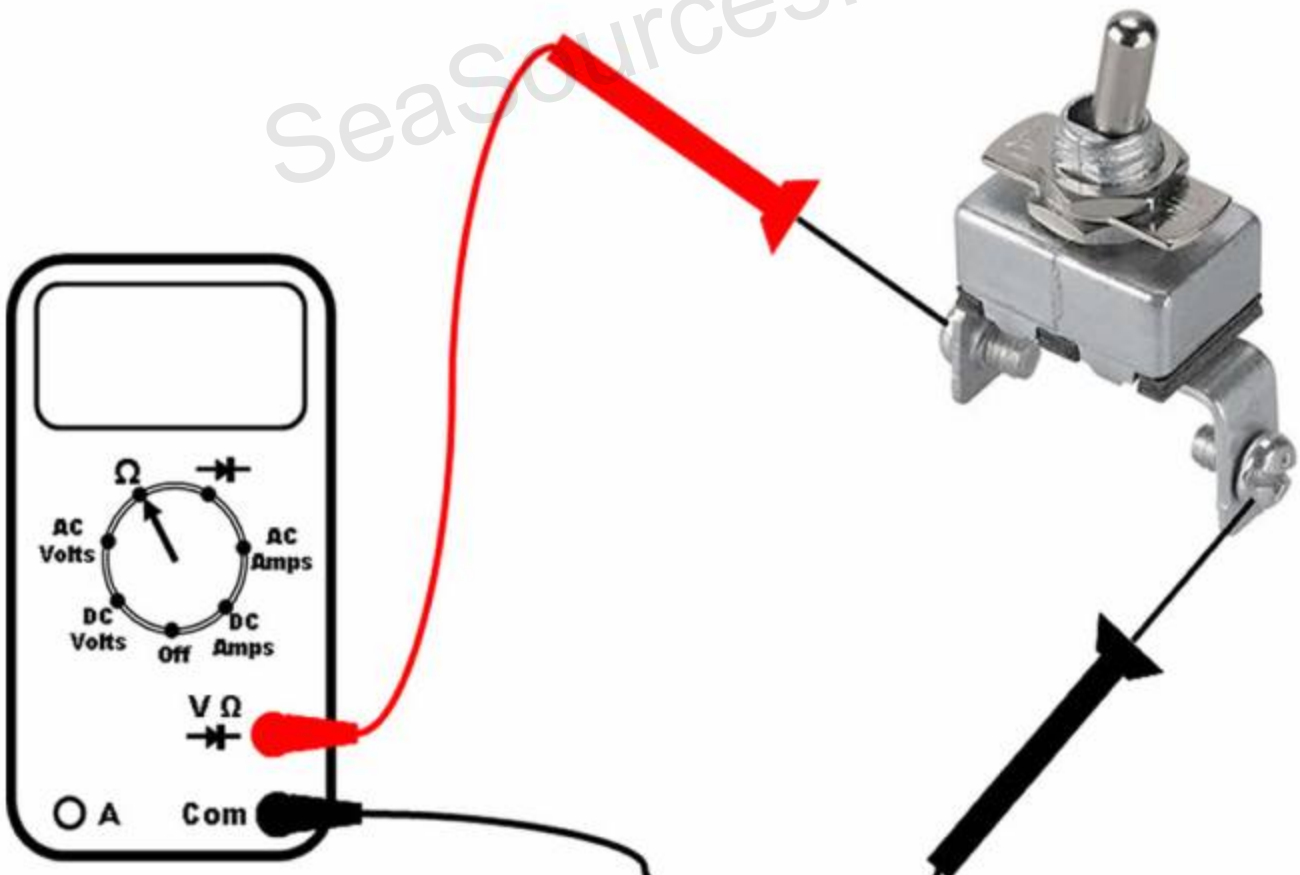
C

D

EL-0210

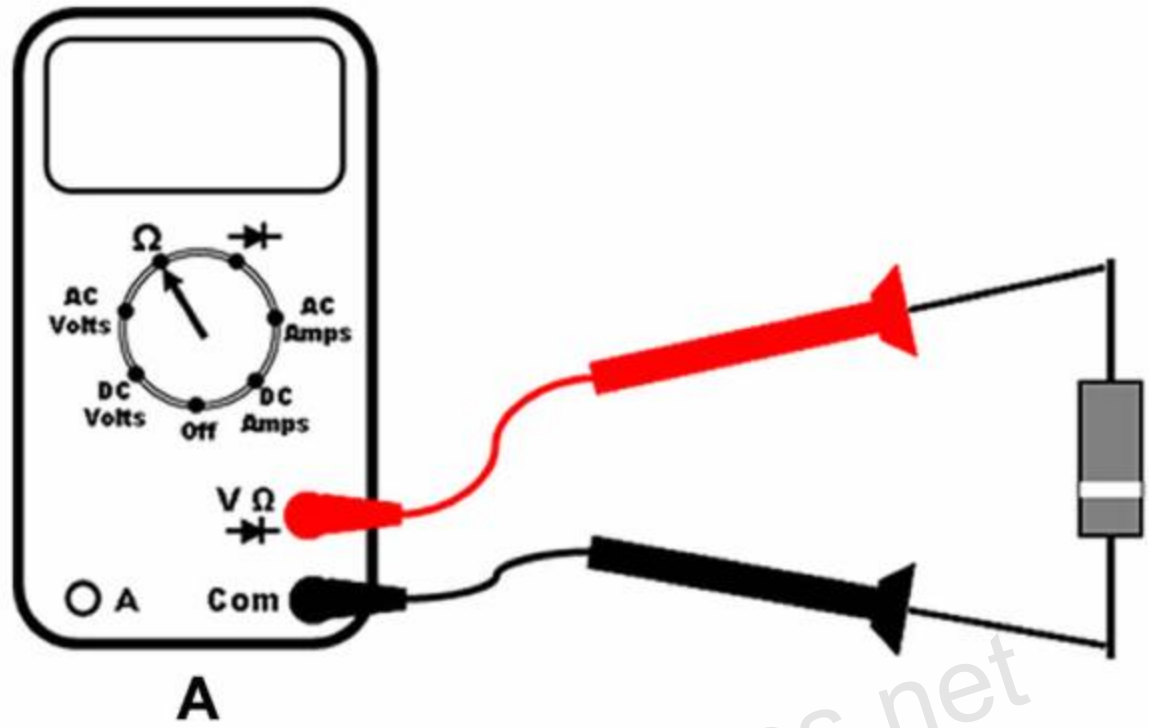


A

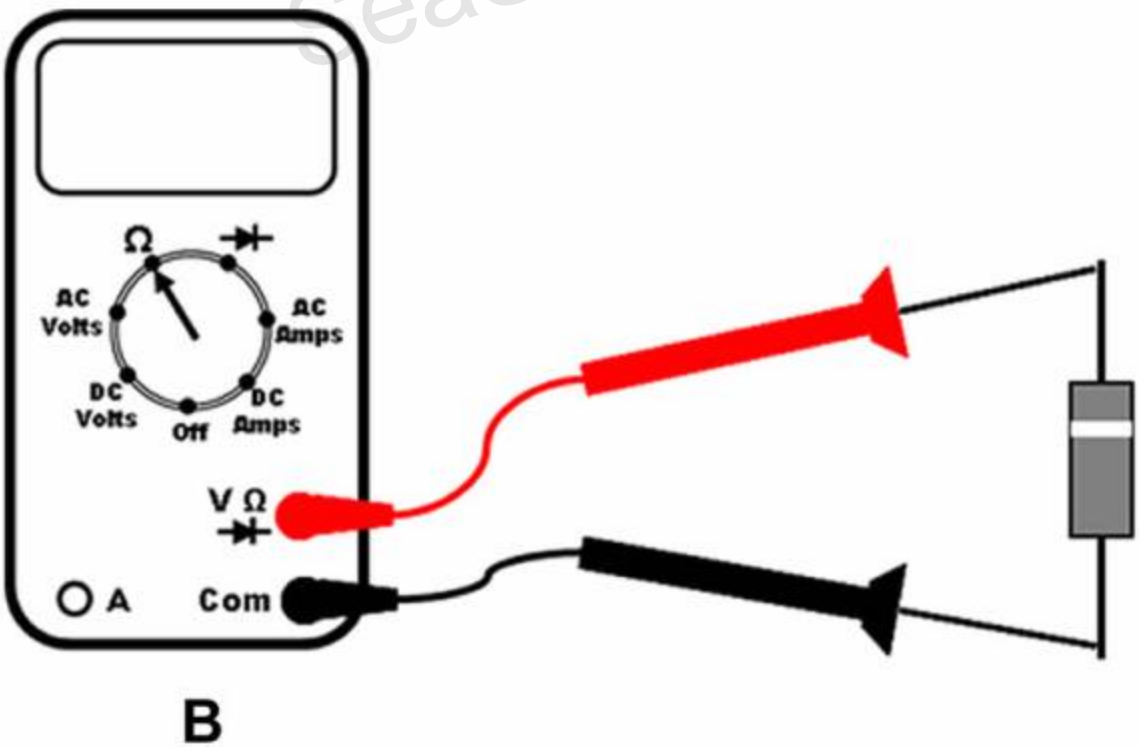


B

EL-0211

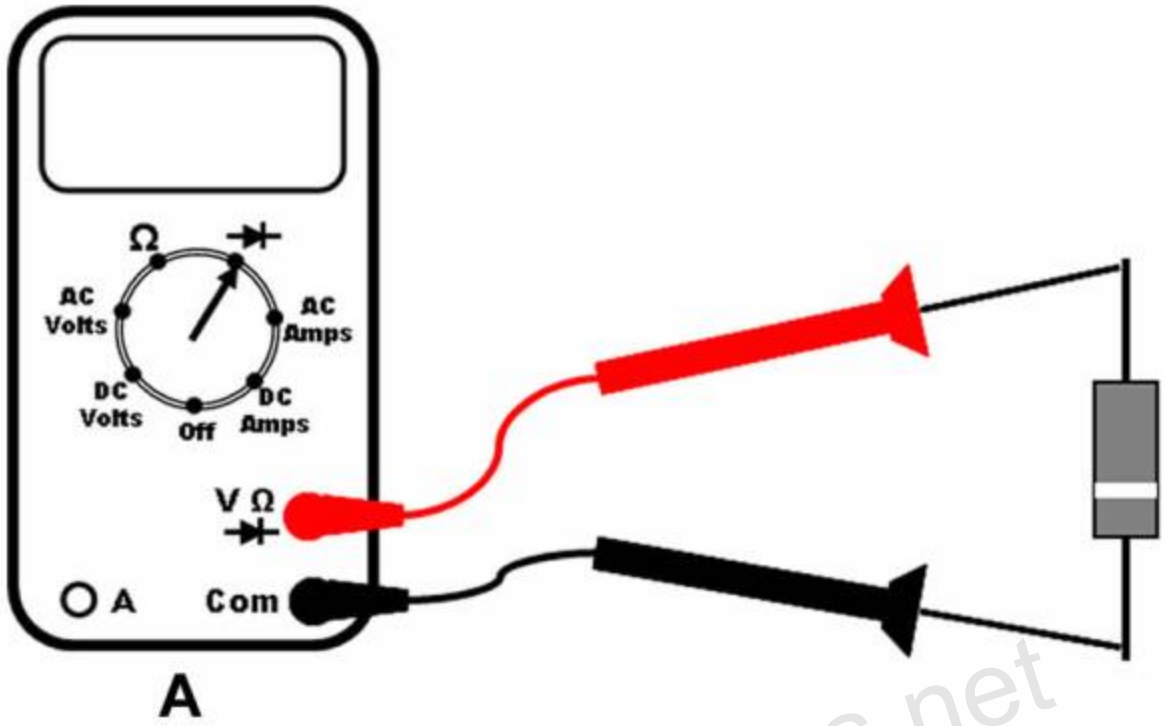


A

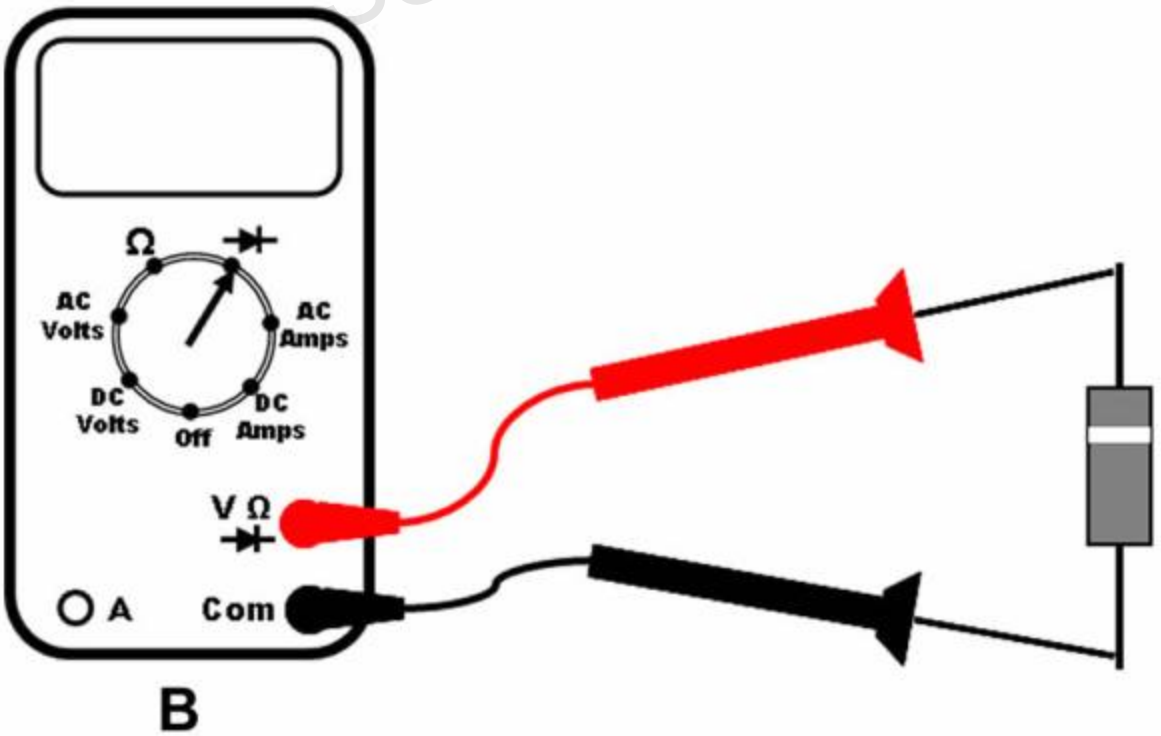


B

EL-0212

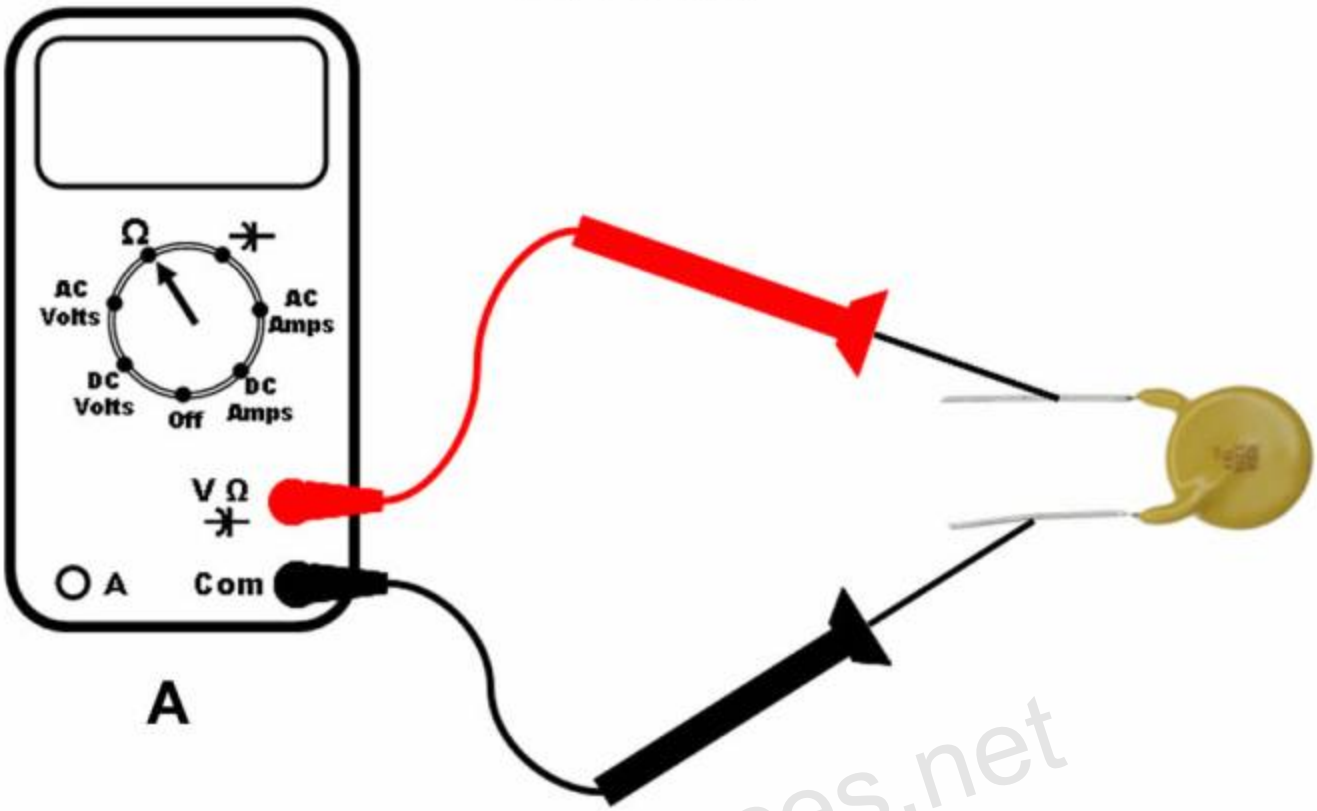


A

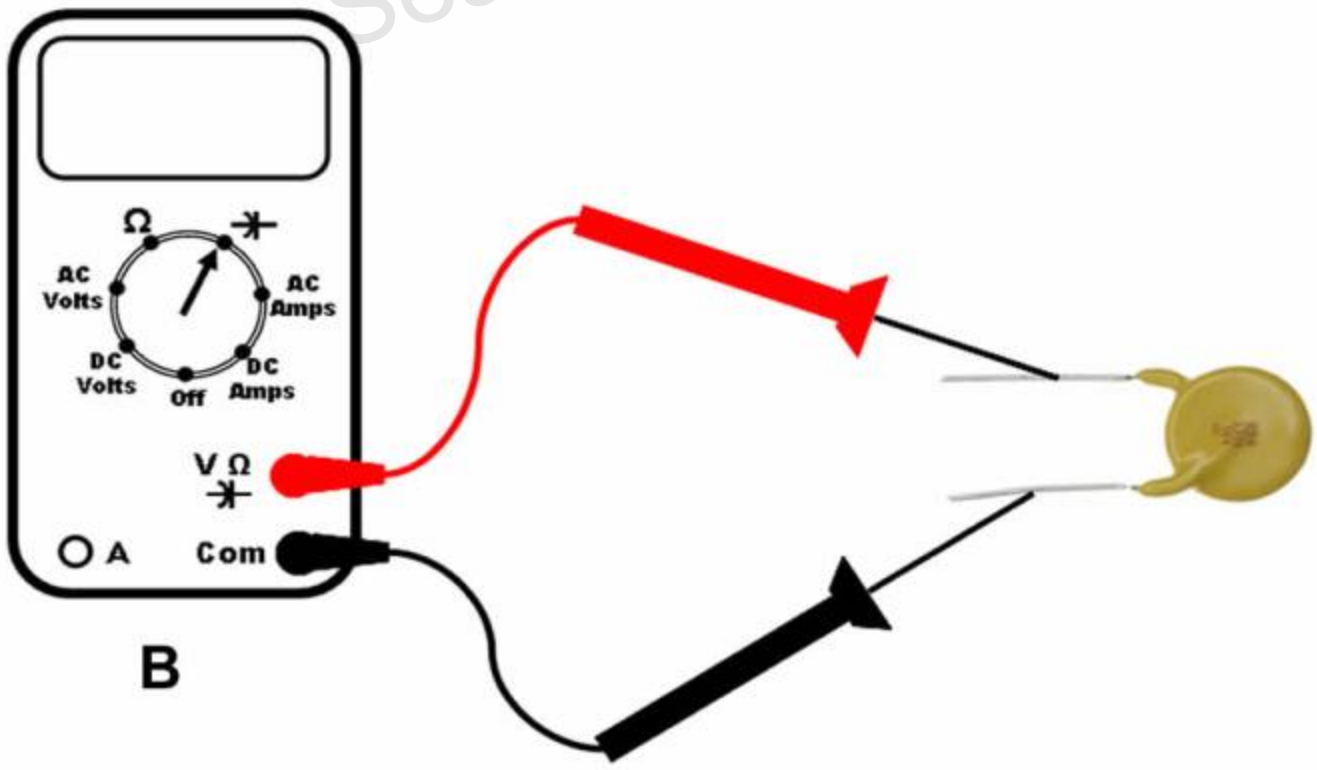


B

EL-0213

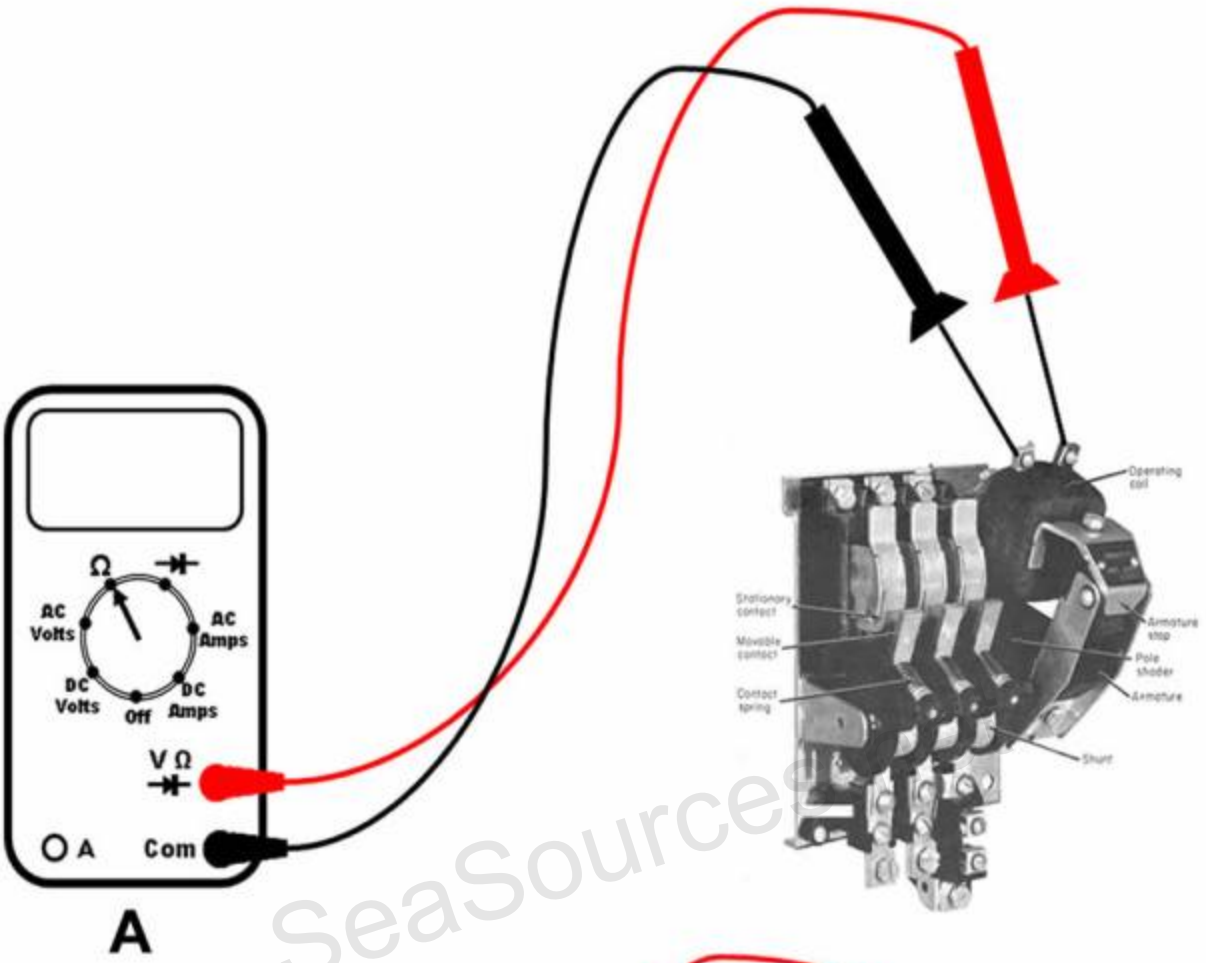


A

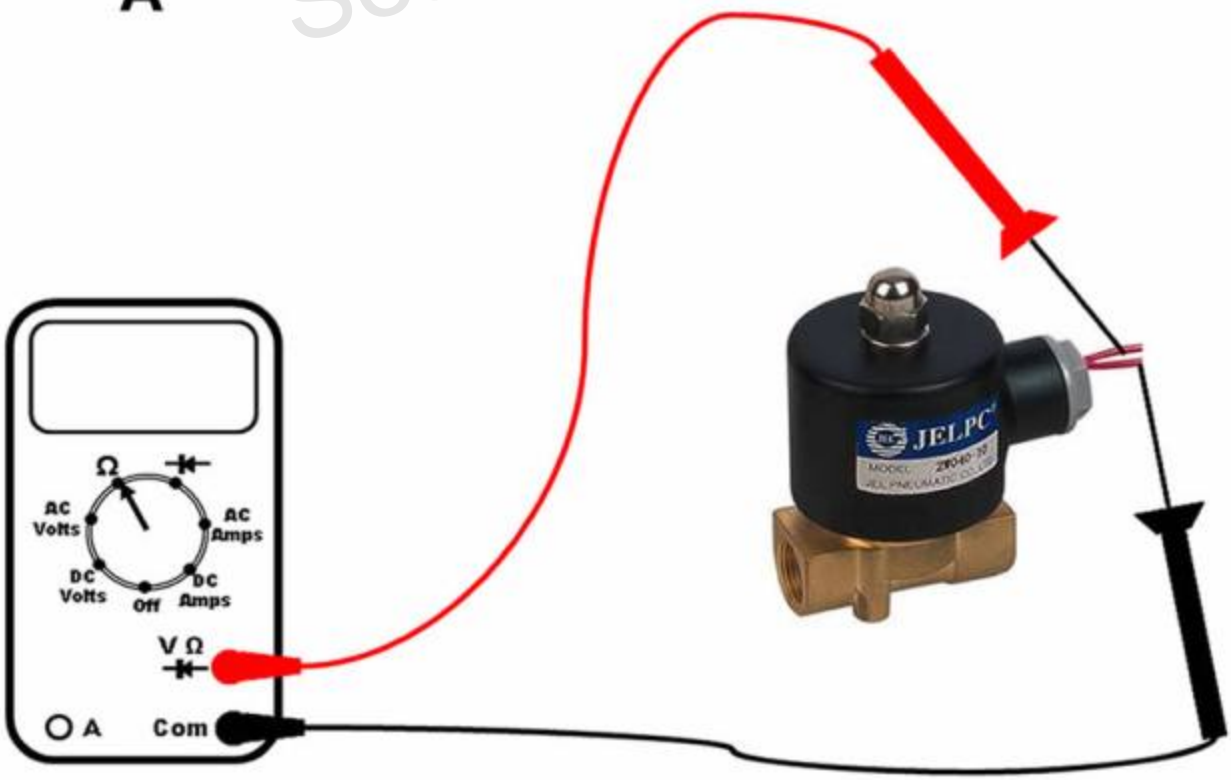


B

EL-0214

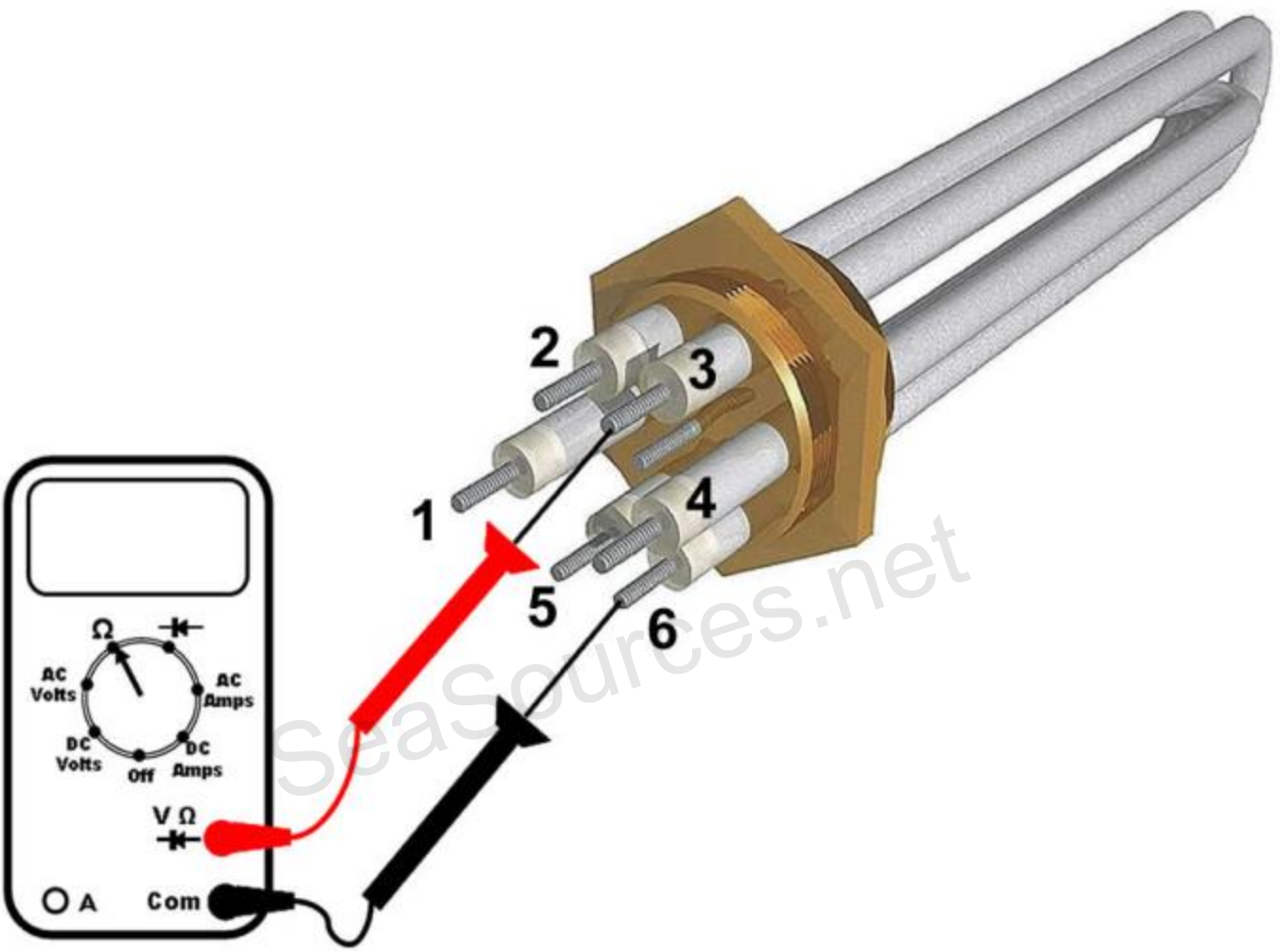


A



B

EL-0216



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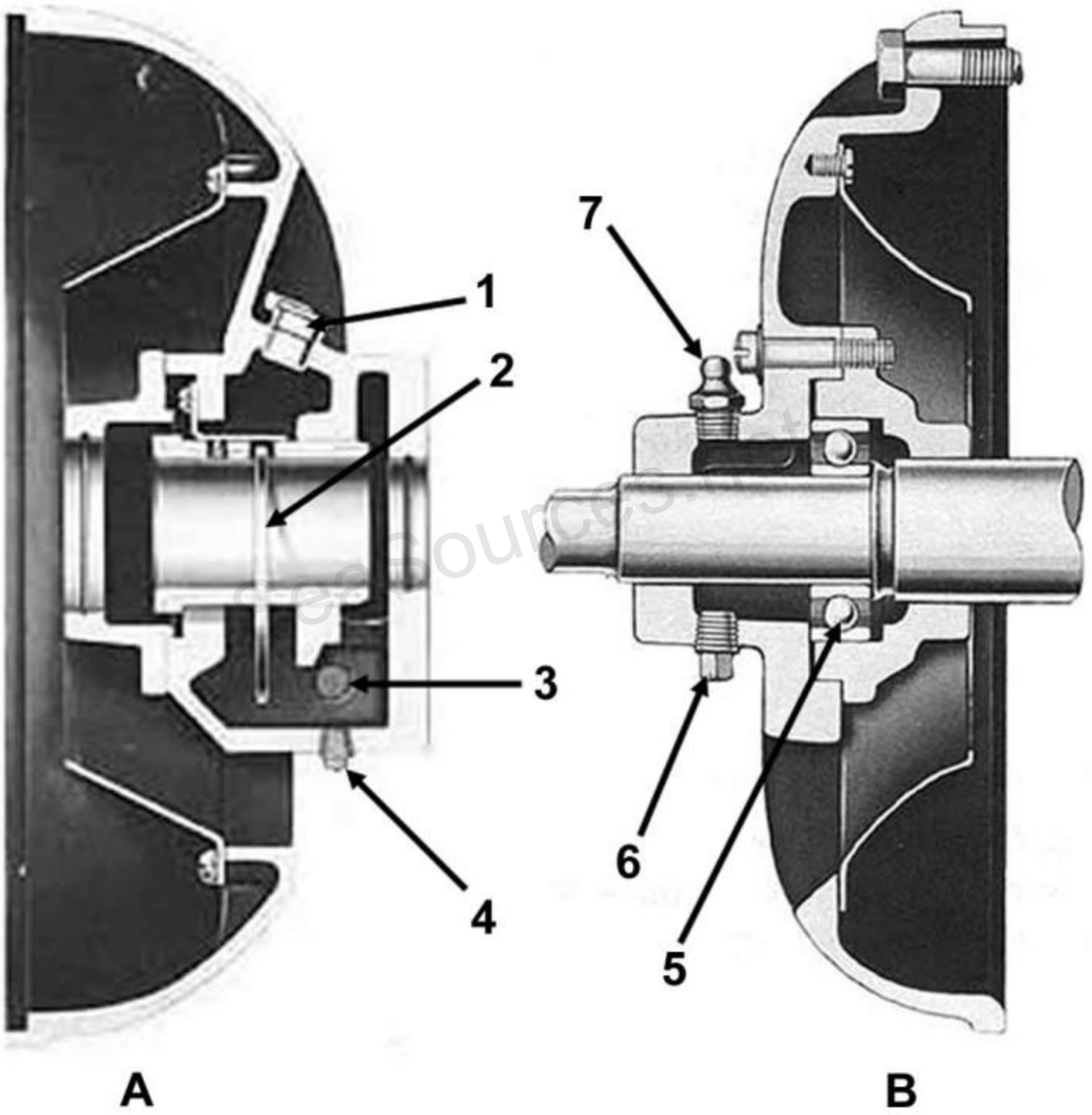

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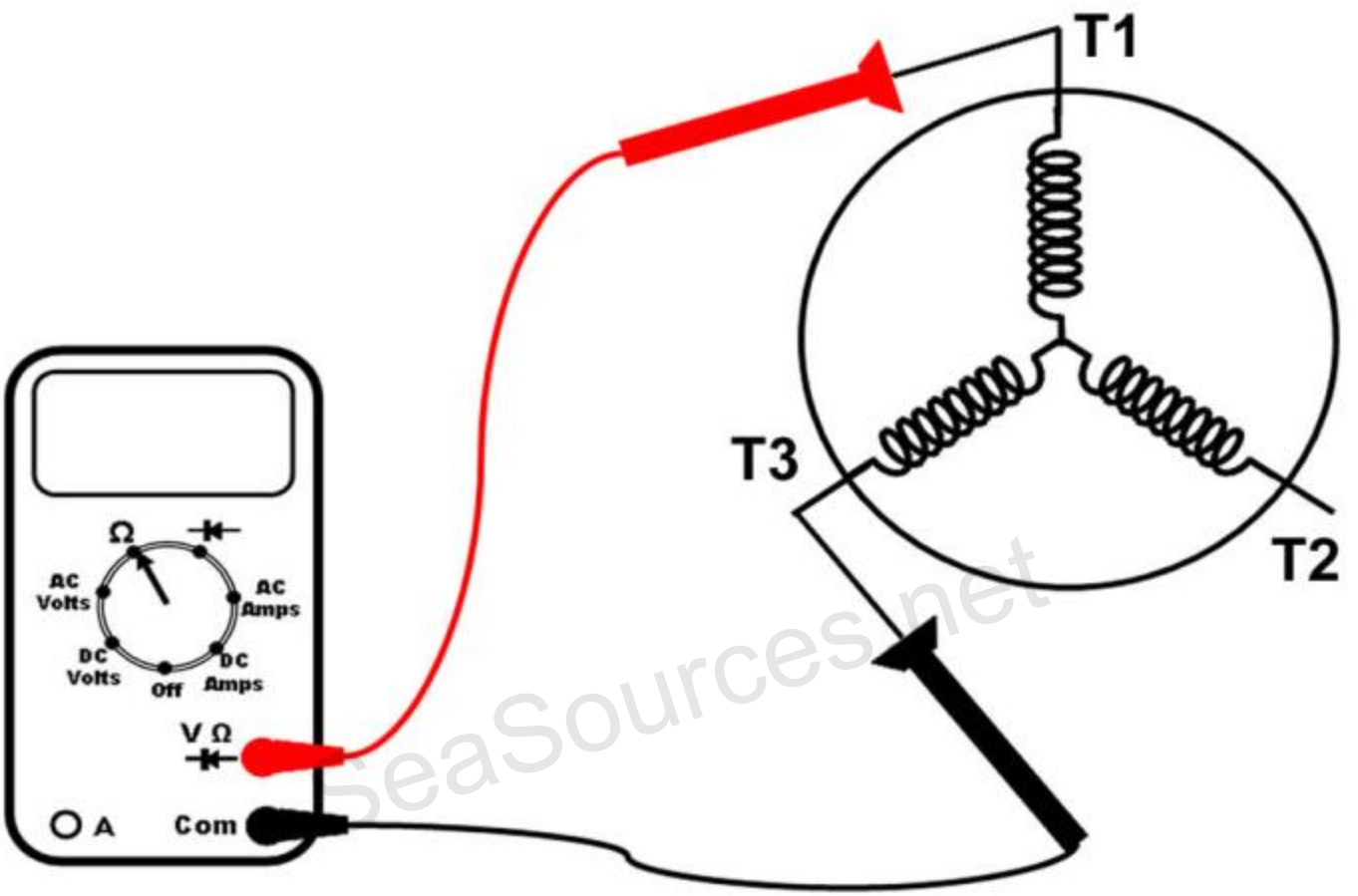

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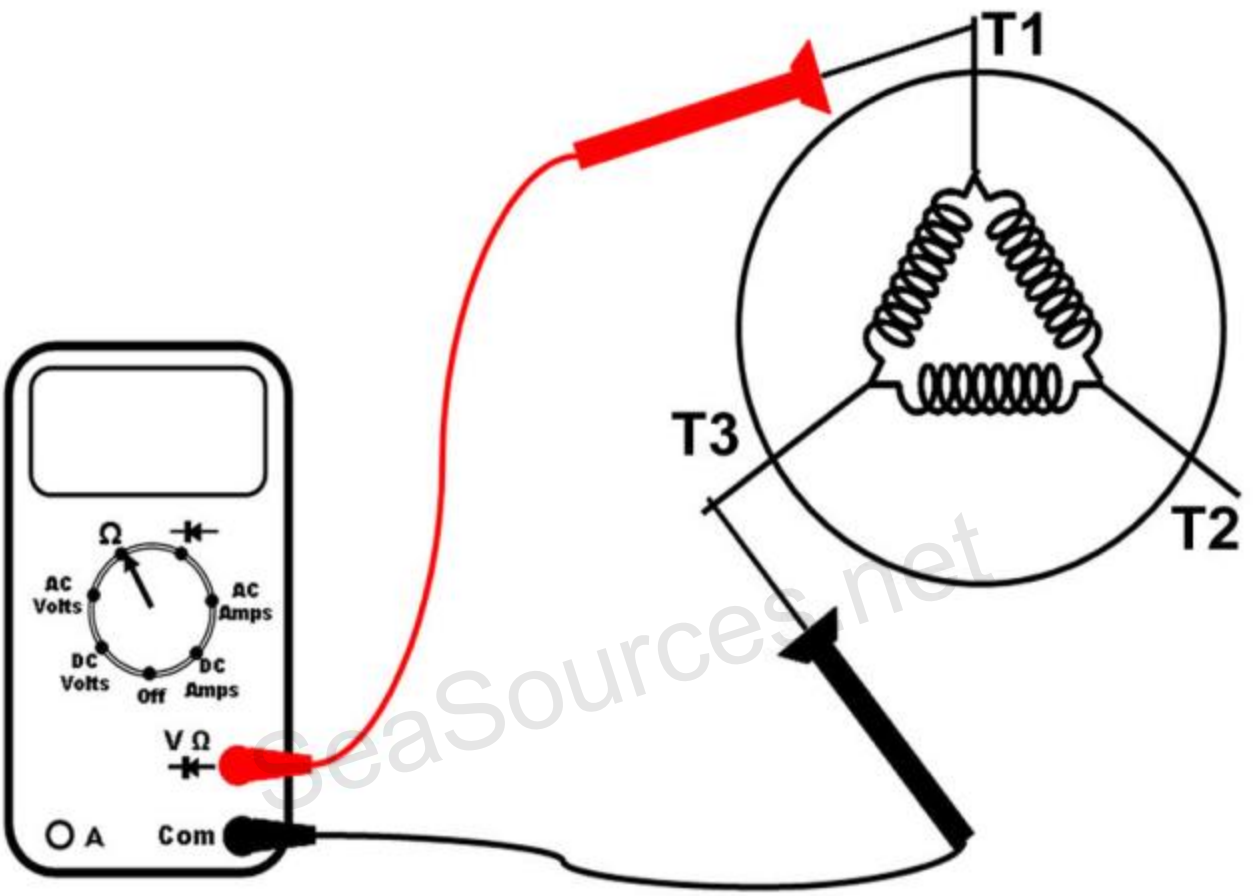
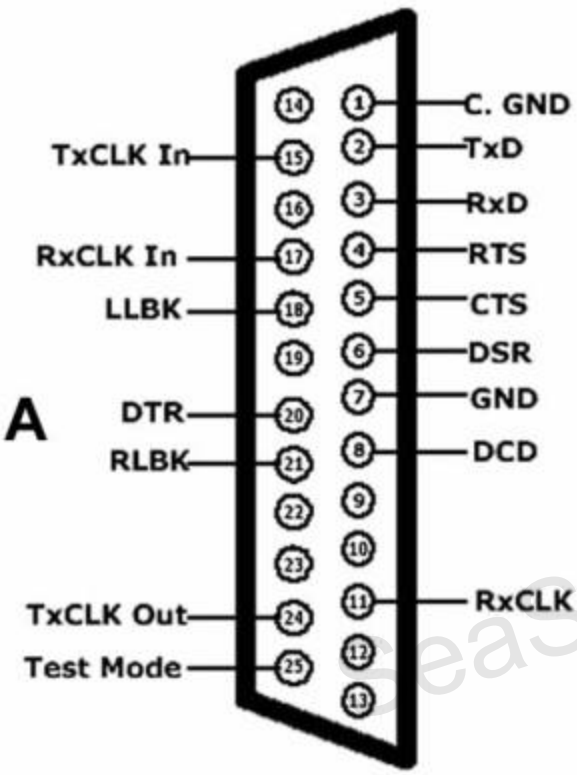


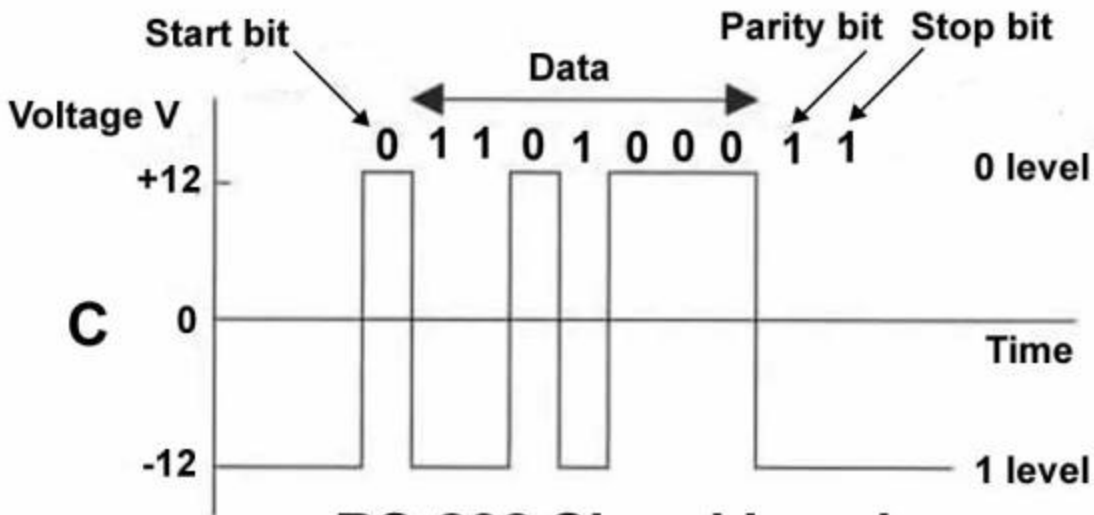
EL-0257

RS-232 Synchronous DB-25 Male Pinout



Pin 1 Chassis Ground
Pin 2 Transmit Data
Pin 3 Receive Data
Pin 4 Request to Send
Pin 5 Clear to Send
Pin 6 Data Set Ready
Pin 7 Signal Ground
Pin 8 Carrier Detect
Pin 11 Receive Clock Out
Pin 15 Transmit Clock In
Pin 17 Receive Clock In
Pin 18 Local Loopback
Pin 20 Data Terminal Ready
Pin 21 Remote Loopback
Pin 24 Transmit Clock Out
Pin 25 Test Mode

B



RS-232 Signal Levels