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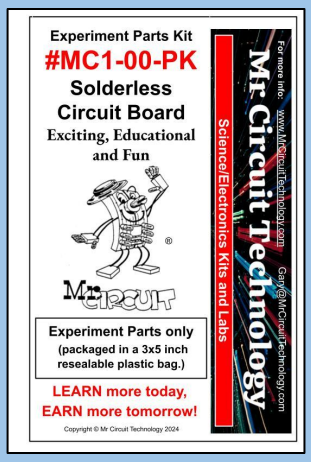
Mr Circuit Technology

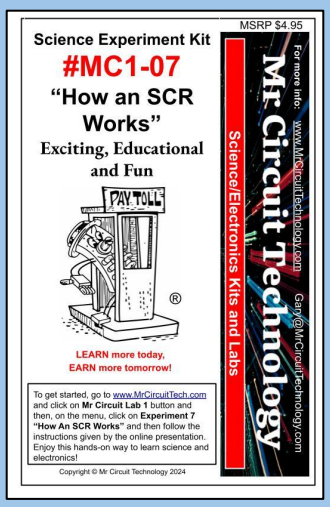
Science/Electronics Experiment Kits and Labs

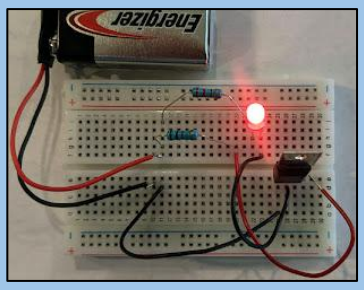
"HOW AN SCR WORKS"

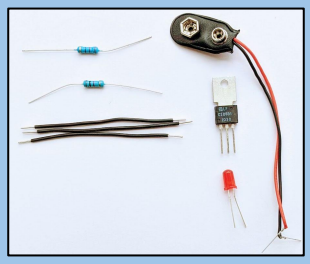


LESSON PLAN

Table of Contents







PREPARATION: You can put the Page 12 poster up on your classroom wall to announce the fact that you are going to do the Science-Electronics Experiment.

Step 1 - Make a copy of pages 1 through 8 for each student. The students can read and do these pages on their own or you can guide them.

Step 2 - Hand out Parts Kit #MC1-00-PK (that has the Solderless Circuit Board) and Parts Kit #MC1-07-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

Step 4 - Collect all the Written Quizzes for grading and use the Answer Key to grade them.

For Tech Support or any questions, you can email us or call 805-295-1642

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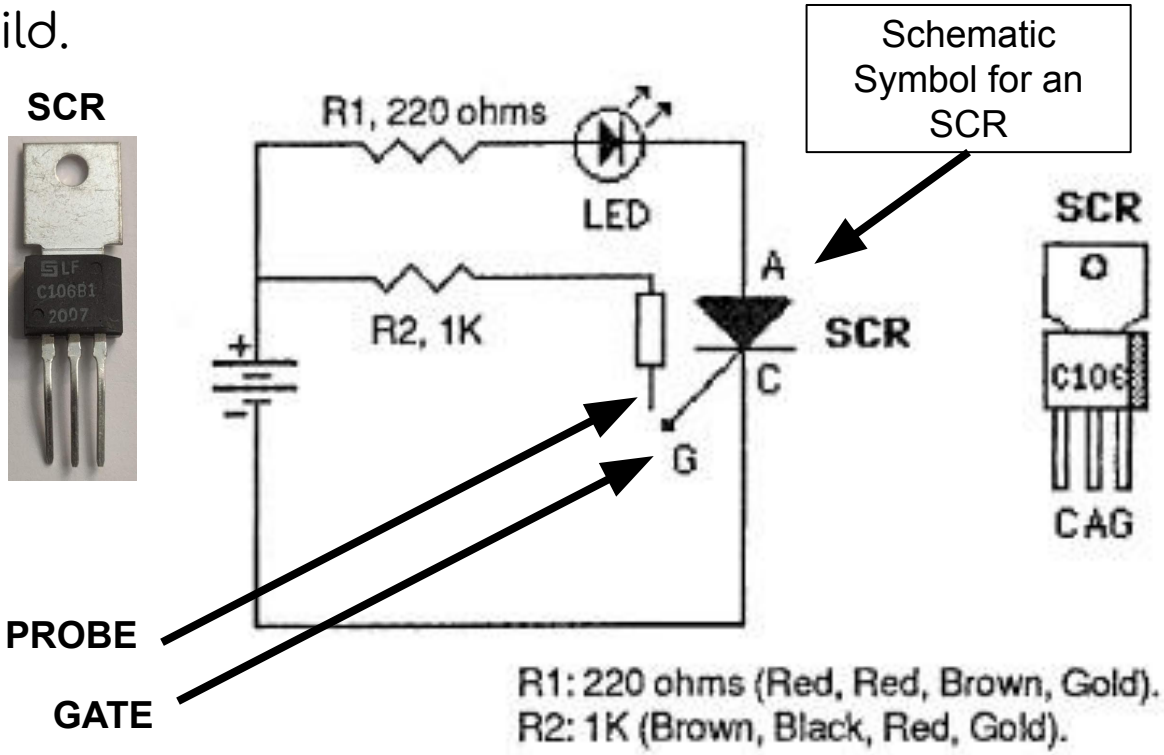
How an SCR Works (Page 1)

MC1-07-R-1

EXPLANATION OF EXPERIMENT

*** You are going to build a circuit to observe that an SCR is "A DIODE WITH A DIFFERENCE" because it has an 'extra' pin called a Gate pin and will allow current to flow in one-direction only, from Cathode to Anode, only after the Gate pin has a POSITIVE voltage applied to it.

Here is the SCHEMATIC DIAGRAM of the circuit you will build.



NOTE: C = Cathode pin A = Anode pin G = Gate pin

The main electron current in this circuit flows out of the negative side of the battery to the CATHODE of the SCR then through the SCR, through the LED and RESISTOR, and back to the positive side of the battery. But, no current will flow in the circuit until the PROBE wire puts a POSITIVE voltage on the Gate.

(Continue to Page 2)

How an SCR Works (Page 2)

MC1-07-R-2

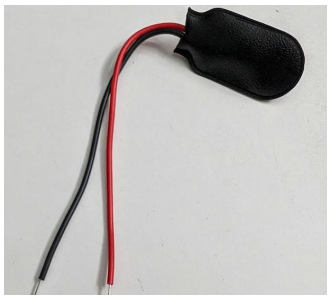
PURPOSE OF THIS EXPERIMENT

*** To observe an SCR allowing current to flow in one direction only when a small voltage is put on the Gate.

PARTS NEEDED FOR EXPERIMENT

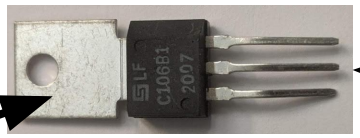
In this experiment, you will use

a BATTERY SNAP



an LED

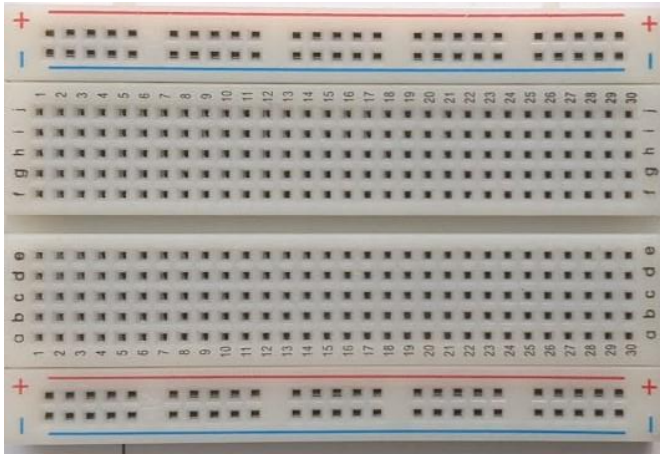
an SCR (Silicon Control Rectifier)



220 Ohm resistor

1000 Ohm resistor

and a SOLDERLESS CIRCUIT BOARD.



You will also need a good 9 Volt battery

(Continue to Page 3)

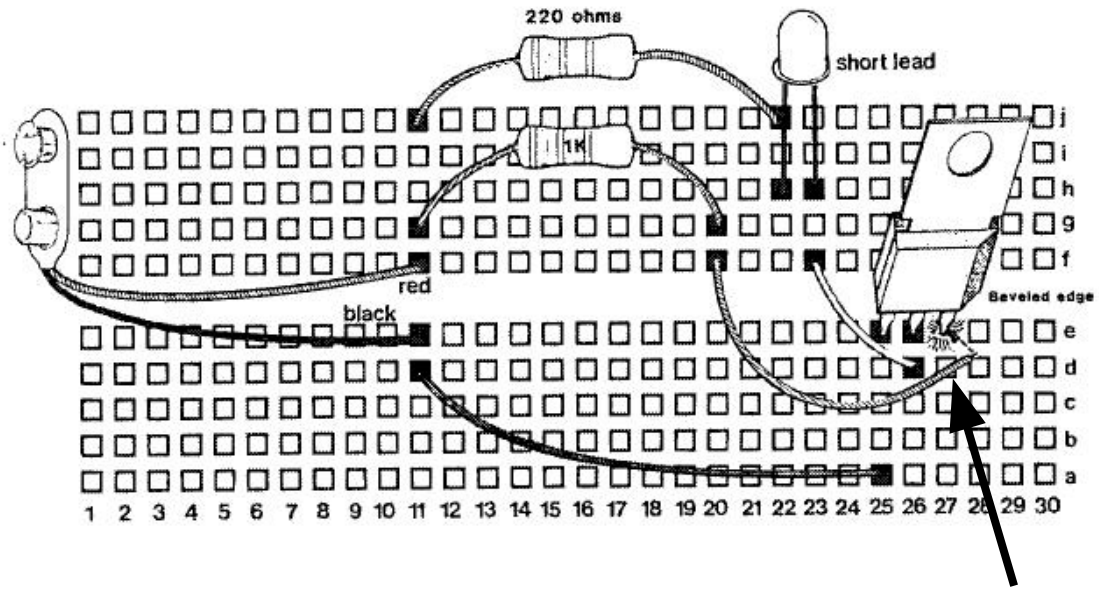
How an SCR Works (Page 3)

MC1-07-R-3

DO THE EXPERIMENT (part 1 of 3)

Now we are going to build the circuit.

Step 1 - Take out a **Battery Snap** and install it with its Red lead in hole **11f** and its Black lead in hole **11e** as shown in the pictorial diagram.



Step 2 - Install an LED with the short lead into hole 23h and the long lead into hole 22h.

Step 3 - Install a 220 Ohm resistor (color bands Red, Red, Brown, Gold) as shown on the pictorial into holes **11j** and **22j**. (This resistor protects the LED from too much current.)

Step 4 - Install a 1000 Ohm resistor (color bands Brown, Black, Red, Gold) into holes 11g and 20g.

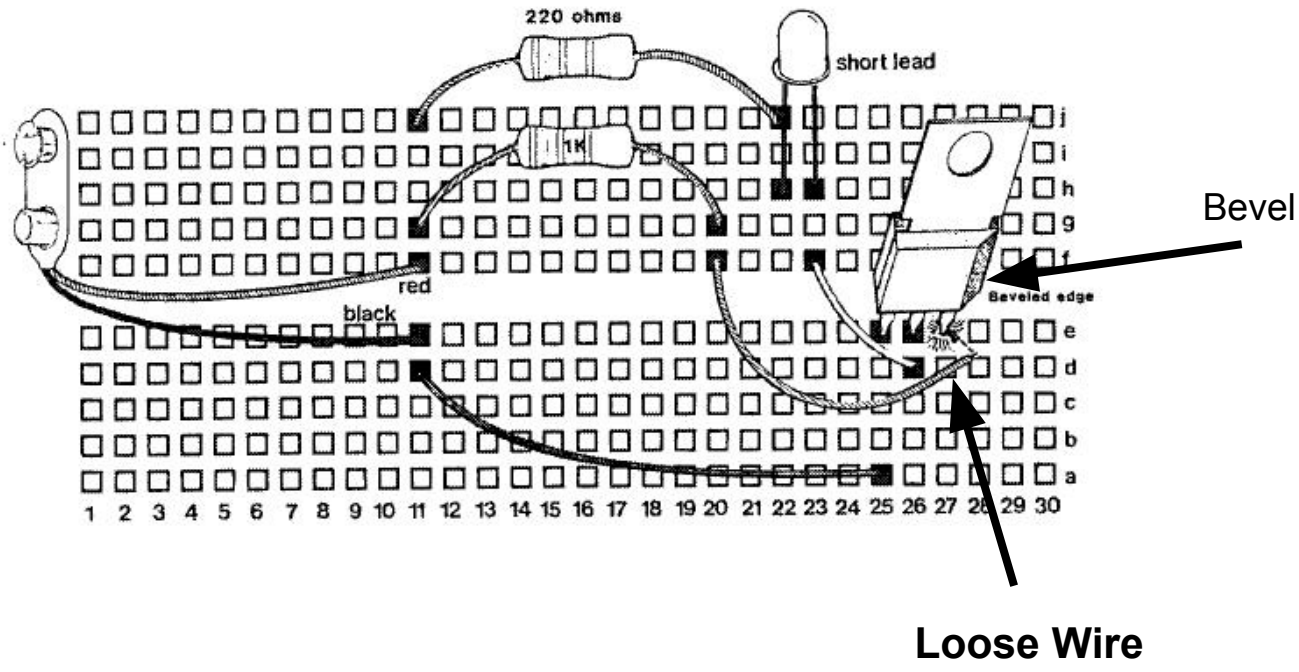
(Continue to Page 4)

How an SCR Works (Page 4)

MC1-07-R-4

DO THE EXPERIMENT (part 2 of 3)

Step 5 - Install the SCR in holes 25e, 26e, and 27e as shown in the pictorial with the beveled edge on the right hand side.



Step 6 - Install a Jumper Wire from hole 11d to hole 25a.

Step 7 - Install another Jumper Wire from hole 23f to 26d.

Step 8 - :Put one end of a Jumper Wire into hole 20f and leave the other end loose.

(Continue to Page 5)

How an SCR Works (Page 5)

MC1-07-R-5

DO THE EXPERIMENT (part 3 of 3)

Step 9 - Connect the BATTERY to the BATTERY SNAP. The LED should **not** light up..

Step 10 - Now, with the battery connected, touch the loose wire to the Gate of the SCR. (The Gate is the pin next to the beveled edge of the SCR.) You should notice the LED light up. And, even when you disconnect the wire from the Gate, the LED should remain lit.

Step 11 - The LED will remain lit until you remove power from the circuit.

To remove power from the circuit, take the black lead of the battery snap out of hole 11e. You will see the LED shut off. Then replace the black lead back into hole 11e and the LED will still not light up.

To get the LED to light up again, you have to keep the battery connected and at the same time touch the loose wire to the Gate of the SCR.

CONCLUSION

By doing this experiment, you have seen that an SCR will allow current to flow only when the Gate receives a small positive voltage. And, once the SCR is activated it will not stop the current until all power is removed from the circuit.

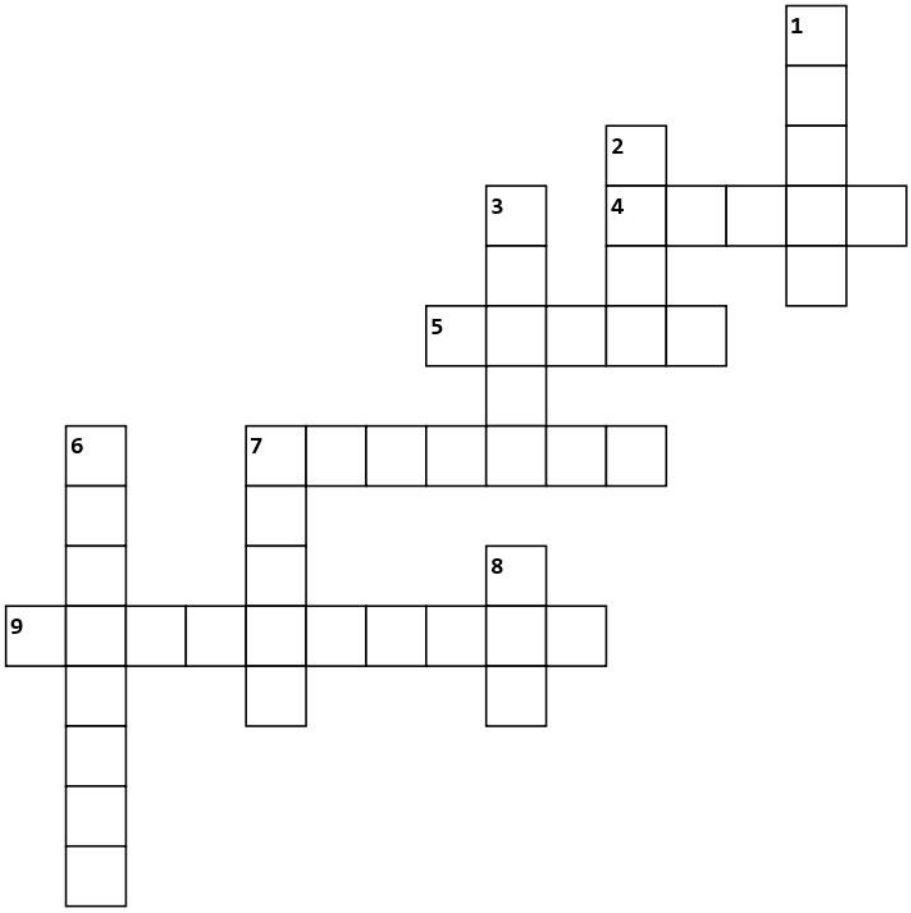
(End of Experiment 7)

Mr. CIRCUIT®

MC1-07-CW

CROSSWORD

Experiment 7 - "How an SCR Works"



Across

4. The metal tab with the hole in it is connected to the _____ of the SCR.

5. Once an SCR is 'turned on', it remains on until the _____ is removed from the circuit.

7. To shut off the current through the SCR, you have to disconnect the _____ .

9. An SCR is a "DIODE WITH A _____ ".

Down

1. Because the SCR is a _____ , if you reverse the battery snap, the circuit will not conduct current.

2. The three pins on an SCR are the CATHODE, the ANODE, and the _____ .

3. The center pin on an SCR is called the _____ .

6. To 'trigger' the SCR, a _____ voltage has to be applied to the GATE.

7. The GATE pin on the SCR is marked by the _____ .

8. What is the abbreviation for SILICON CONTROL RECTIFIER?

Mr. CIRCUIT®

MC1-07-WS

WORD SEARCH

Experiment 7 - "How an SCR Works"

S D Q W J Y G X E M N U R W F K K L G V
L A D T V W B F F Y N Y O I Y P E Q U I
T G A T E O Q H W T K W Q P E K D F N C
S V Z X W L V R V X O Q U I M R O A M P
C X Z E V N E W B J N C C L A E N M Z G
R F P D R D Q E E H P Z D L J N A D P V
A A H G X L E Q V G H Q L A I D H X L M
V A K K Z N J P E I T A Q W N O N V C E
X N W K K X K C L V P Z F L G Q I Y M A
K O L B Q C L O K V R U G U F O I U Q D
K D Q S O J S W K I A N U K D G Y Z B J
P E H N Z I Z S Z R J J E R I C Q R A Q
U P S K V Y H S N E I O P O F U M L T O
J P O S I T I V E D P O V A F Z K K T T
Z N A U K I L G W R I Z E T E M C L E Y
U H L R P O W E R V W T D C R O N P R O
F B Z M M O H B I U I R O O E P L H Y A
W A V X N M E R Z Q G W I Z N U L U S X
S O E W M V R P Y E Q Z D R C Q K U E J
F E N J A Y O R I Z M L B A E K A F B M

1. What is the abbreviation for SILICON CONTROL RECTIFIER?

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8. Because the SCR is a _____ , if you reverse the battery snap, the circuit will not conduct current.

9. To 'trigger' the SCR, a _____ voltage has to be applied to the GATE.

10. An SCR is a "DIODE WITH A _____ ".

(Student Name) (Period/Student Number) (Date)

QUIZ for Exp 07 or STEM KIT #07 in the Mr Circuit Electronics Training Lab 1

(Page 8)

This Quiz covers the training learned by completing

"How an SCR (Silicon Control Rectifier) Works" Exp. 7

Circle the letter for your answer to each question and then hand this quiz in to your teacher.

#1 What are the three connections on an SCR?

A. Input, Output, and Neutral
B. Up, Down, Middle
C. Right, Left, Straight
D. Cathode, Anode, Gate

#2 Once an SCR is turned on, in order to turn it off, you need to _____ .

A. remove the voltage on the Gate
B. clap your hands
C. remove the power from the entire circuit
D. double the voltage

#3 Most of the electron current flowing through an SCR is flowing through the _____ .

A. Anode to Cathode circuit
B. the Gate circuit
C. Anode to Gate circuit
D. Cathode to Anode circuit

#4 To turn on an SCR in a circuit, you need a _____ .

A. large current on the Gate
B. small positive voltage on the Anode
C. small positive voltage on the Gate
D. large current on the Cathode

#5 The Gate lead on the SCR in this experiment is marked by the _____ .

A. metal tab on the SCR
B. left lead on the SCR
C. beveled edge on the SCR
D. center lead on the SCR

#6 The letters SCR in Exp. #7 stand for 'Silicon Controlled Rectifier'. How many connection leads does an SCR have?

A. 5
B. 4
C. 3
D. 2

#7 If a positive voltage is applied to the Gate of an SCR, what happens in the circuit?

A. the electrons flow through the SCR
B. the SCR will turn off
C. the resistance of the SCR increases
D. absolutely nothing

#8 The Anode lead is connected internally to the _____ on the SCR.

A. metal tab with a hole in it
B. to the Gate lead
C. to the Cathode lead
D. to the round edge on the SCR

#9 If we reverse the polarity of the battery snap in the circuit, what will happen?

A. it will not work
B. it will work just fine
C. the SCR will burn out
D. the LED will self-destruct

#10 An SCR is considered to be a _____ .

A. a variable resistor
B. a variable capacitor
C. "a diode with a difference"
D. a good potentiometer

(Form SQ07)

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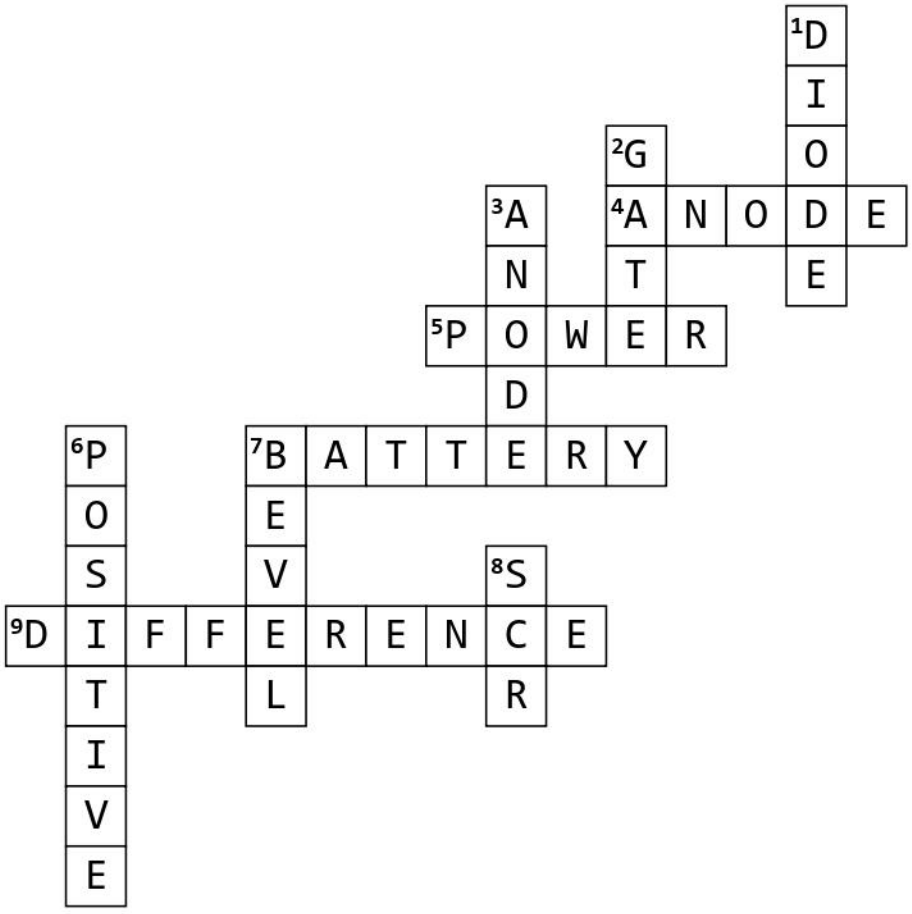
Score

ANSWERS FOR CROSSWORD

Experiment 7 - “How an SCR Works”



Across

4. The metal tab with the hole in it is connected to the _____ of the SCR.

5. Once an SCR is 'turned on', it remains on until the _____ is removed from the circuit.

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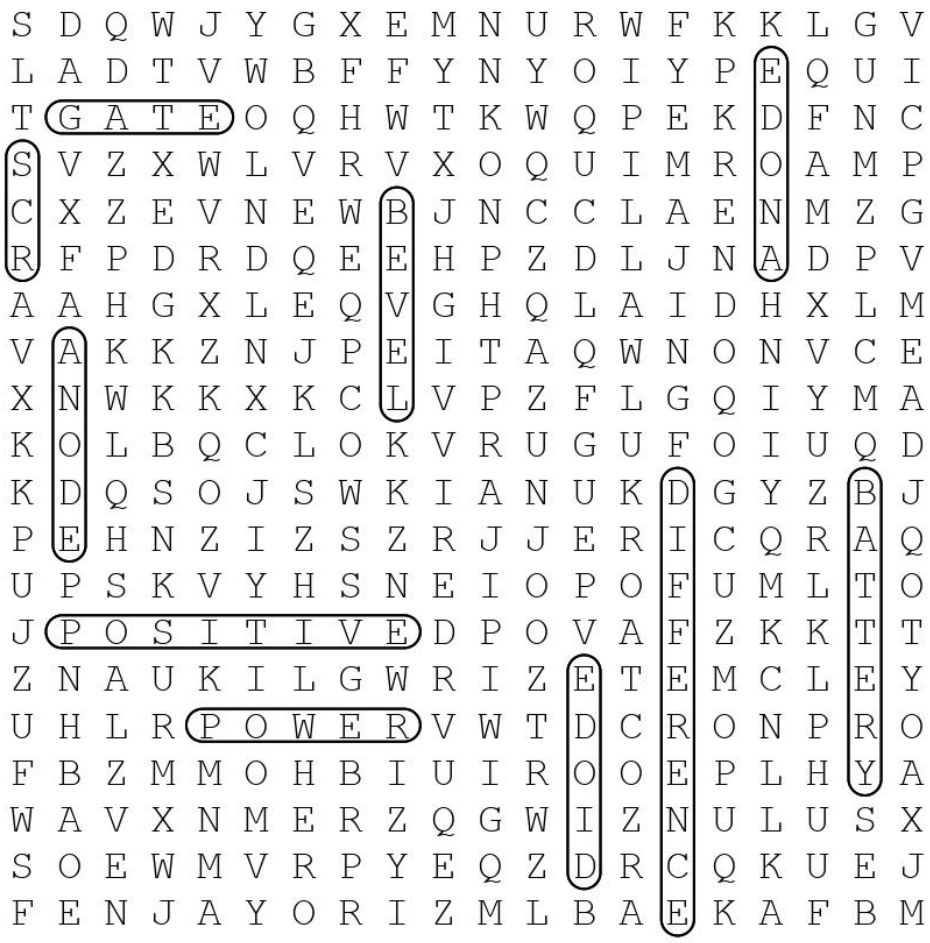
ANSWERS FOR WORD SEARCH

Experiment 7 - "How an SCR Works"



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10. An SCR is a "DIODE WITH A _____ ".

QUICK-CHECK ANSWER KEY for Experiment 07 QUIZ

Mr Circuit Electronics Training ("How an SCR - Silicon Control Rectifier Works")

Place this sheet over top of the STUDENT QUIZ (offset a little to the left and then offset to the right) to compare the answers on this sheet to the answers that the student marked. Put an 'X' for each wrong answer.

Count the right answers and record the score of right answers in your grade book.

#1 What are the three connections on an SCR?

A
B
C
(D)

A. Input, Output, and Neutral
B. Up, Down, Middle
C. Right, Left, Straight
D. Cathode, Anode, Gate

#2 Once an SCR is turned on, in order to turn it off, you need to _____ .

A
B
(C)
D

A. remove the voltage on the Gate
B. clap your hands
C. remove the power from the entire circuit
D. double the voltage

#3 Most of the electron current flowing through an SCR is flowing through the _____ .

A
B
C
(D)

A. Anode to Cathode circuit
B. the Gate circuit
C. Anode to Gate circuit
D. Cathode to Anode circuit

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A
B
(C)
D

A. large current on the Gate
B. small positive voltage on the Anode
C. small positive voltage on the Gate
D. large current on the Cathode

#5 The Gate lead on the SCR in this experiment is marked by the _____ .

A
B
(C)
D

A. metal tab on the SCR
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A
B
(C)
D

A. 5
B. 4
C. 3
D. 2

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C
D

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C. the resistance of the SCR increases
D. absolutely nothing

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C
D

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A. it will not work
B. it will work just fine
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D. the LED will self-destruct

#10 An SCR is considered to be a _____ .

A
B
(C)
D

A. a variable resistor
B. a variable capacitor
C. "a diode with a difference"
D. a good potentiometer

(Form SQAK07)

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BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

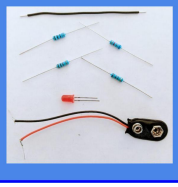
AN SCR (Silicon Control Rectifier)

BASIC ELECTRONICS LAB 1

"HOW AN SCR WORKS"

(Poster MC1-07-P01)

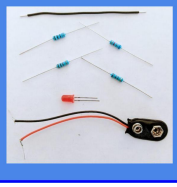
MC1-01
Electronic Parts



For more info: www.MrCircuitTechnology.com MrCircuit23@gmail.com

Mr Circuit Technology

MC1-01
Electronic Parts



PRICE LIST May 2024

PRICE LIST

PARTS KIT Number	Mr Circuit Series 1 SCIENCE / ELECTRONICS "PARTS KITS"	Price Each
MC1-00-PK	Solderless Circuit Board to build kits	$3.95
MC1-01-PK	Parts Kit for "How a Resistor Works	$1.95
MC1-02-PK	Parts Kit for "How a Potentiometer Works	$2.95
MC1-03-PK	Parts Kit for "How a Photocell Works	$1.95
MC1-04-PK	Parts Kit for "How a Capacitor Works	$2.95
MC1-05-PK	Parts Kit for "How a Speaker Works	$2.95
MC1-06-PK	Parts Kit for "How a Diode Works	$1.95
MC1-07-PK	Parts Kit for "How an SCR Works	$3.95
MC1-08-PK	Parts Kit for "How an NPN Transistor Works	$2.95
MC1-09-PK	Parts Kit for "How a PNP Transistor Works	$2.95
MC1-10-PK	Parts Kit for "How a Transistor Oscillator Works	$3.95
MC1-11-PK	Parts Kit for "How a 555 Timer IC Works	$2.95
MC1-12-PK	Parts Kit for "Burglar Alarm circuit	$3.95
MC1-13-PK	Parts Kit for "Solar-Activated Night Light circuit	$3.95
MC1-14-PK	Parts Kit for "DC to DC Power Supply circuit	$2.95
MC1-15-PK	Parts Kit for "Electronic Metronome circuit	$4.95
MC1-16-PK	Parts Kit for "Electronic Motorcycle circuit	$3.95
MC1-17-PK	Parts Kit for "Railroad Lights circuit	$2.95
MC1-18-PK	Parts Kit for "Variable Speed Lights circuit	$3.95
MC1-19-PK	Parts Kit for "Continuity Tester circuit	$4.95
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MC1-21-PK	Parts Kit for "Electronic Police Siren circuit	$4.95
MC1-22-PK	Parts Kit for "Solar-Activated Wake-Up Alarm circuit	$3.95
MC1-23-PK	Parts Kit for "Variable Timer circuit	$3.95
MC1-24-PK	Parts Kit for "Moisture Detector circuit	$2.95
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MC1-26-PK	Parts Kit for "Audible Water Detector circuit	$4.95
MC1-27-PK	Parts Kit for "English Police Siren circuit	$4.95
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MC1-29-PK	Parts Kit for "fantasy Space Machine Gun circuit	$5.95
MC1-30-PK	Parts Kit for "Ultrasonic Pest Repeller circuit	$5.95
Set-MC1-PK	**Complete Set of All Series 1 Parts Kits (31 total)**	**$120.00**