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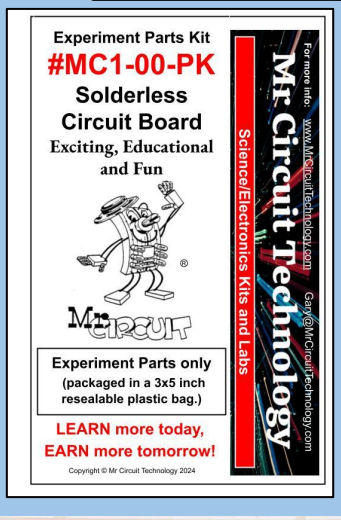
Mr Circuit Technology

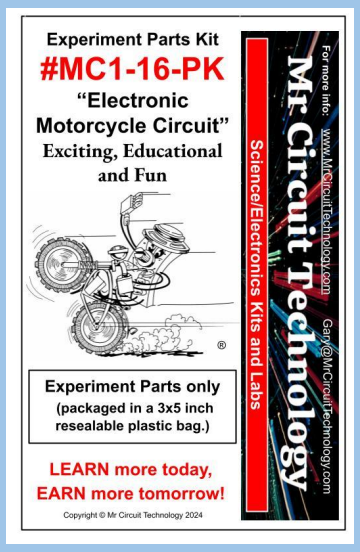
Science/Electronics Experiment Kits and Labs

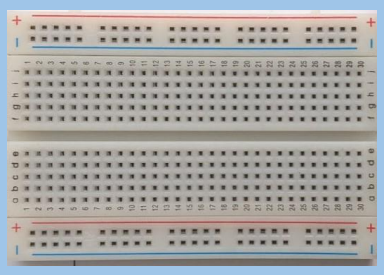
Exp. 16 - "ELECTRONIC MOTORCYCLE CIRCUIT"

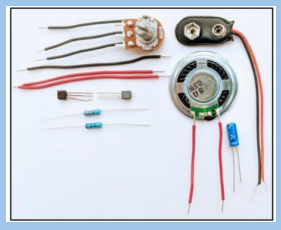


LESSON PLAN

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 #MC1-16-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

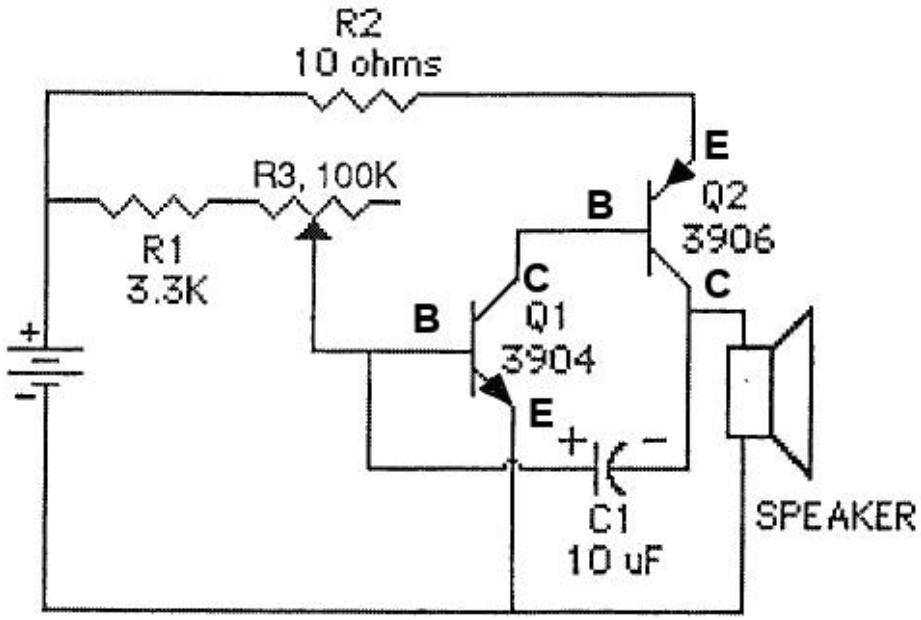
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

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

EXPLANATION OF EXPERIMENT part 1 of 2

***** You are going to build an ELECTRONIC MOTORCYCLE circuit. Here is the SCHEMATIC DIAGRAM of the circuit you will build.**



This interesting circuit was invented by engineers who needed a circuit that would make sounds like a **2-cycle motorcycle engine.**

You can use the Potentiometer like the 'throttle' to make the '2-cycle engine' go faster and slower.

You can accelerate or slow down the motorcycle.

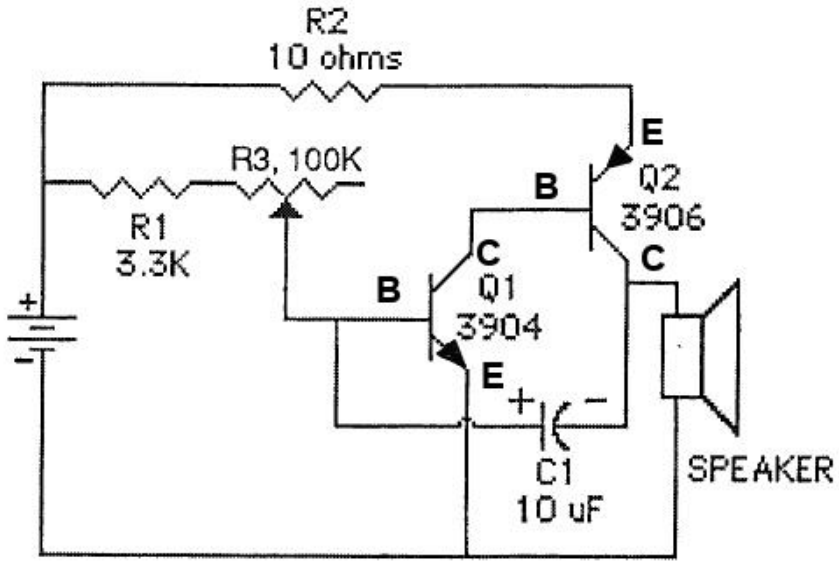
This Motocycle circuit is a low-frequency two-transistor oscillator. It uses a Potentiometer to adjust the speed (frequency) of the OSCILLATION or clicks. By rotating the shaft of the Potentiometer the speed of the engine sound will change.

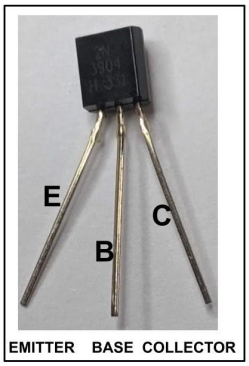
(Continue to Page 2)

EXPLANATION OF EXPERIMENT part 2 of 2

Let's talk about how the circuit works. Here is the schematic of the **ELECTRONIC MOTORCYCLE** circuit that you will build.

POTENTIOMETE





This circuit is an adjustable two-transistor oscillator similar to the circuit used in Mr Circuit Experiment 10.

Capacitor C1 charges and discharges at a rate varied by the value of the resistance of Potentiometer R2.

The clicks will be the fastest when the Potentiometer R2 is adjusted to zero Ohms. As you twist the shaft from the zero Ohm position to higher Ohms, the clicking rate will slow down.

You can use this circuit to simulate a real two-cycle motorcycle engine.

(Continue to Page 3)

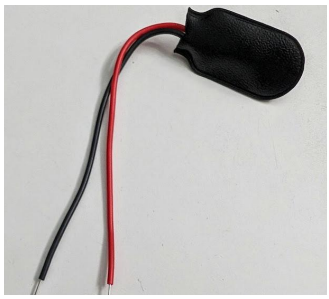
PURPOSE OF THIS EXPERIMENT

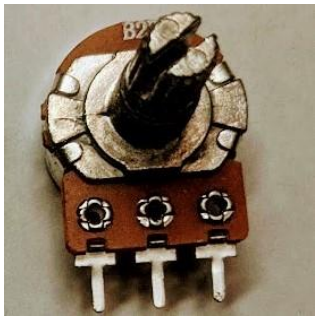
*** To build an ELECTRONIC MOTORCYCLE using two bipolar transistors and a potentiometer..

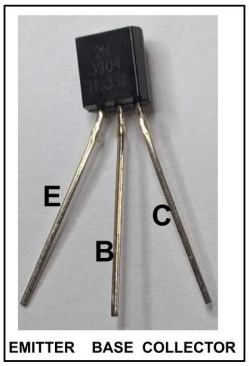
PARTS NEEDED FOR EXPERIMENT

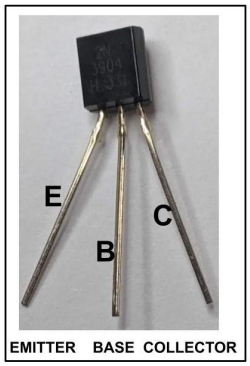
In this experiment, you will use the following items:

a BATTERY SNAP a POTENTIOMETER PNP & NPN







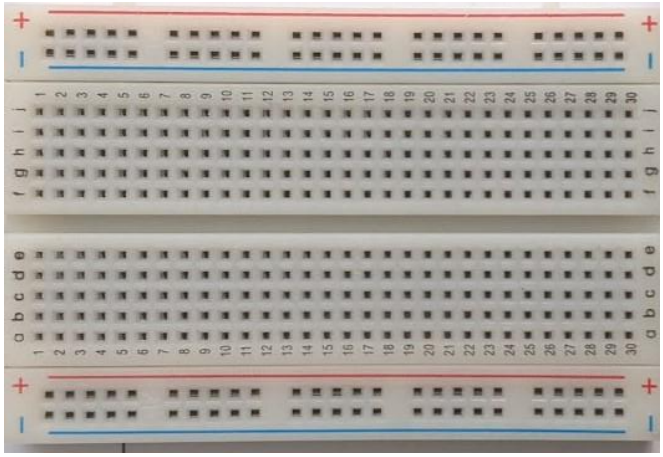


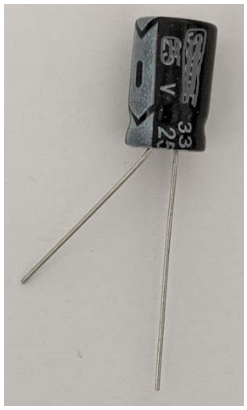
10 Ohm resistor

3.3k Ohm resistor

4 Jumper Wires

a SOLDERLESS CIRCUIT BOARD a Radial Capacitor





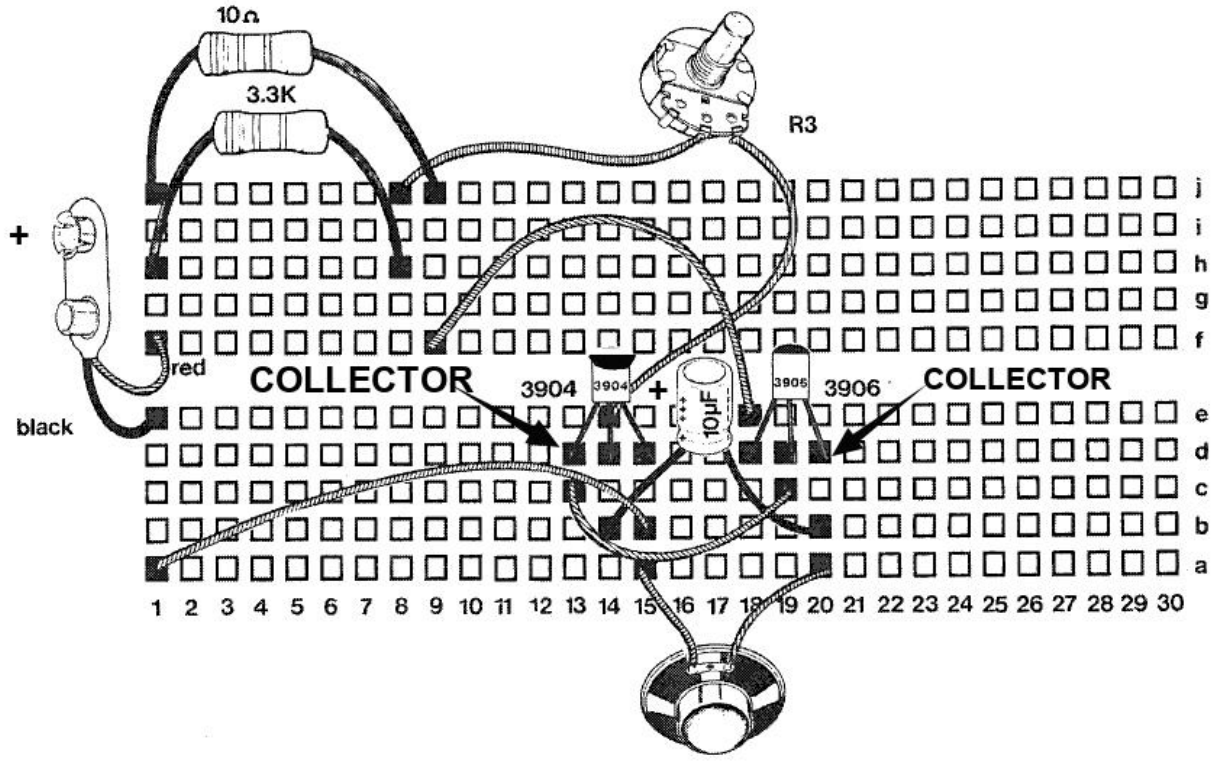
You will also need a good 9 Volt battery

(Continue to Page 4)

DO THE EXPERIMENT (part 1 of 2)

Now you are going to build the circuit on a Solderless CB.

Step 1 - Take out all the parts needed for this experiment.

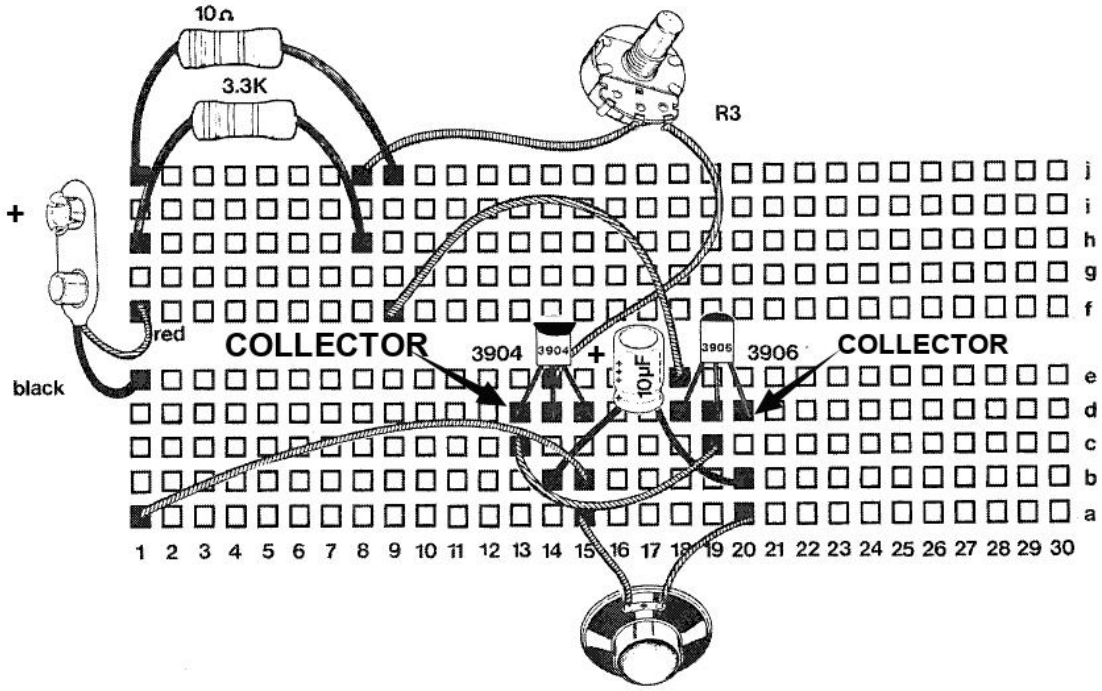


Step 2 - Install all the parts on the SCB as shown above.

- ❑ Install one 10 Ohm resistor (brown, black, black, gold) in holes 1j to 9j
- ❑ Install one 3.3k Ohm resistor (orange, orange, red, gold) in holes 1h to 8h
- ❑ Install one NPN 3904 Transistor - Collector in 13d, Base in 14d, Emitter in 15d
- ❑ Install one PNP 3906 Transistor - Emitter in 18d, Base in 19d, Collector in 20d
- ❑ Install one 10uF Capacitor long lead in hole,14b, short lead in hole 20b
- ❑ Install the Potentiometer, middle lead in 8j, edge in 14e
- ❑ Install Jumper Wire #1 in holes1a to 15b
- ❑ Install Jumper Wire #2 in holes 9f to 18e
- ❑ Install Jumper Wire #3 in holes 1j to 15j
- ❑ Install the Battery Snap, Black lead in hole 1e and Red Lead in hole 1f

(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)



Step 3 - Connect the battery to the Battery Snap. Adjust the Potentiometer back and forth and you should hear motorcycle 2- cycle engine sounds in the speaker vary from very slow to fast.

CONCLUSION

You should have observed that you can build an ELECTRONIC MOTORCYCLE circuit with two transistor oscillator and a potentiometer.

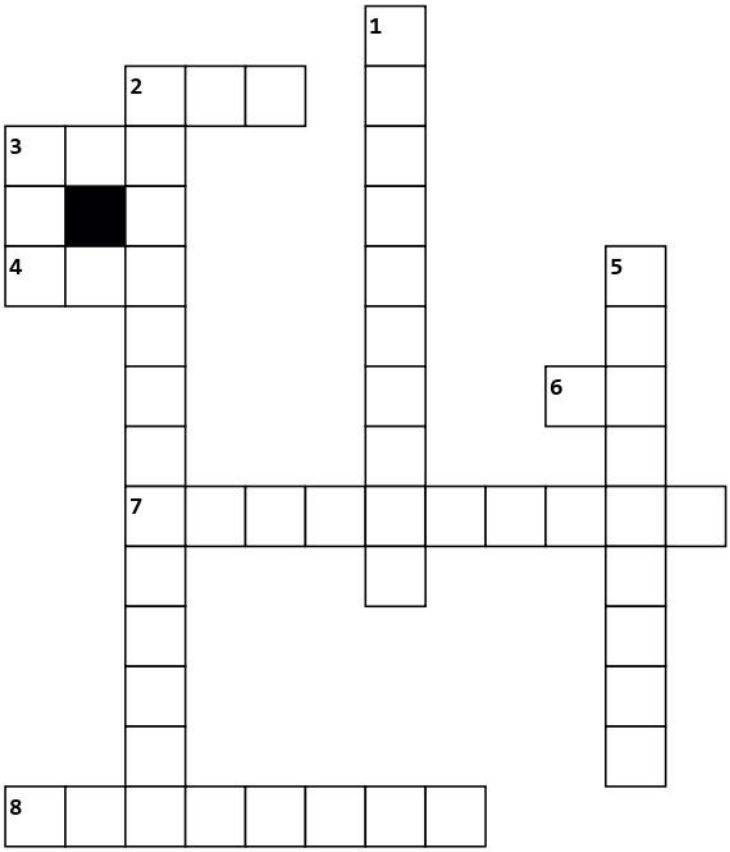
(End of Experiment 11)

Mr. CIRCUIT®

MC1-16-CW

CROSSWORD

Exp. 16 - "ELECTRONIC MOTORCYCLE CIRCUIT"



Across

2. This circuit uses an NPN and a _____ transistor.

3. How many fixed resistors are used in this circuit?

4. How many capacitors are used in this circuit?

6. This circuit is powered by 9 Volts DC or AC?

7. This circuit is a two-transistor _____ .

8. The potentiometer in this circuit is used as a '_____' .

Down

1. This circuit makes a sound like a two-cycle _____ engine.

2. What do you use to adjust the speed of the oscillator?

3. How many transistors are in this circuit?

5. To help you build this circuit on a solderless circuit board, you are given a _____ diagram.

WORD SEARCH

Exp. 16 - "ELECTRONIC MOTORCYCLE CIRCUIT"

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

1. What diagram is given to help you assemble the circuit on a solderless circuit board?

2. This component is used to adjust the speed of the two-transistor oscillator.

3. This transistor is used for Q2 in this circuit. **4.** This transistor is used for Q1 in this circuit.

5. This circuit uses a 10 microfarad radial _____ .

6. How many fixed resistors do we use in this circuit?

7. What component in this circuit emits the motorcycle sounds?

8. The _____ is connected to the snap in this circuit.

9. What diagram shows all the schematic symbols for the circuit?

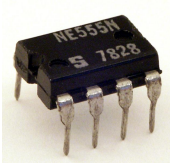
10. On schematic symbol for a transistor, the arrow is on the _____ lead.

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

QUIZ for Exp 16 or STEM KIT #16
in the Mr Circuit Electronics Training Lab 1

(Page 8)

This Quiz covers the training learned by completing



"Build an Electronic Motorcycle Circuit" Experiment 16

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

A B C D

#1 This motorcycle circuit is built using _____ .

A. a 555 Timer IC
B. a two-transistor oscillator
C. an SCR
D. a quad amplifier

A B C D

#2 The potentiometer is used to adjust the _____ .

A. the current through the speaker
B. the capacitance of the transistors
C. the loudness of the speaker
D. speed of the oscillation

A B C D

#3 The Collector of transistor Q1 is connected to the _____ of transistor Q2.

A. Collector
B. Anode
C. Emitter
D. Base

A B C D

#4 The potentiometer varies the _____ on the Base of transistor Q1.

A. voltage
B. capacitance
C. resistance
D. current

A B C D

#5 As you adjust the potentiometer from 0 Ohms to its maximum Ohms, the oscillator will _____ in speed.

A. decrease
B. increase
C. remain the same
D. not be affected

A B C D

#6 In this circuit, the speaker is connected to the _____ of transistor Q2.

A. Base
B. Anode
C. Collector
D. Emitter

A B C D

#7 Transistor Q2 in this circuit is _____ .

A. a PNP Transistor
B. an NPN Transistor
C. a variable diode
D. is a capacitance

A B C D

#8 Based on your understanding of a two-transistor oscillator circuit, the purpose of Capacitor C1 is to _____ .

A. reduce the current in the circuit
B. help control the speed of the oscillator
C. reduce the resistance of the circuit
D. reduce the voltage used in the circuit

A B C D

#9 The _____ of Q2 is connected through a 10 Ohm resistor to the positive of the battery.

A. Emitter
B. Collector
C. Base
D. Anode

A B C D

#10 The positive lead on Capacitor C1 is connected to the _____ of transistor Q1 and to the potentiometer.

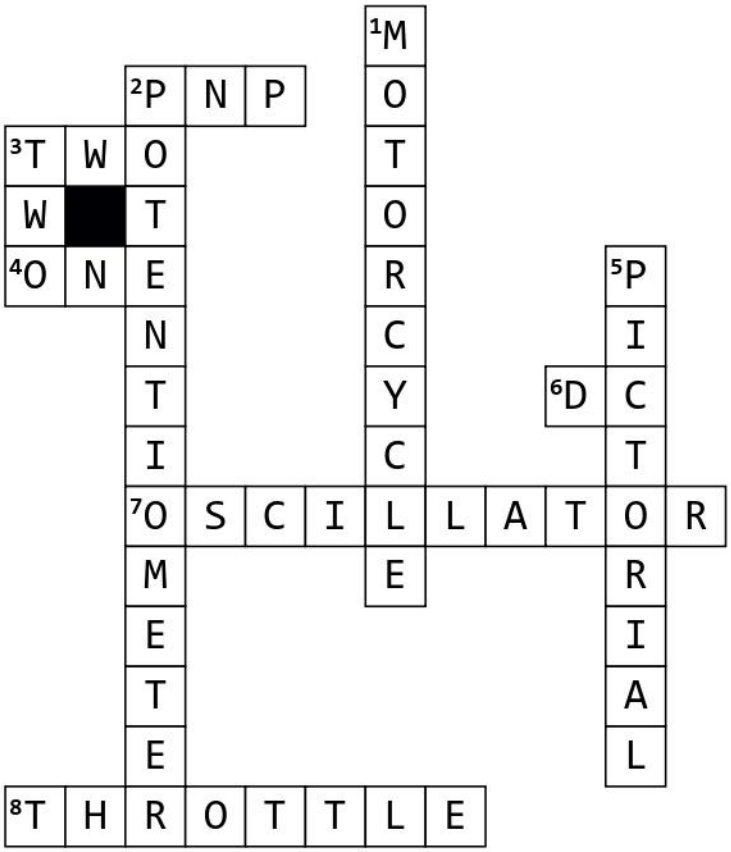
A. Collector
B. Anode
C. Emitter
D. Base

(Form SQ16)

Score	

ANSWERS FOR CROSSWORD

Exp. 16 - "ELECTRONIC MOTORCYCLE CIRCUIT"



Across

2. This circuit uses an NPN and a _____ transistor.

3. How many fixed resistors are used in this circuit?

4. How many capacitors are used in this circuit?

6. This circuit is powered by 9 Volts DC or AC?

7. This circuit is a two-transistor _____ .

8. The potentiometer in this circuit is used as a '_____' .

Down

1. This circuit makes a sound like a two-cycle _____ engine.

2. What do you use to adjust the speed of the oscillator?

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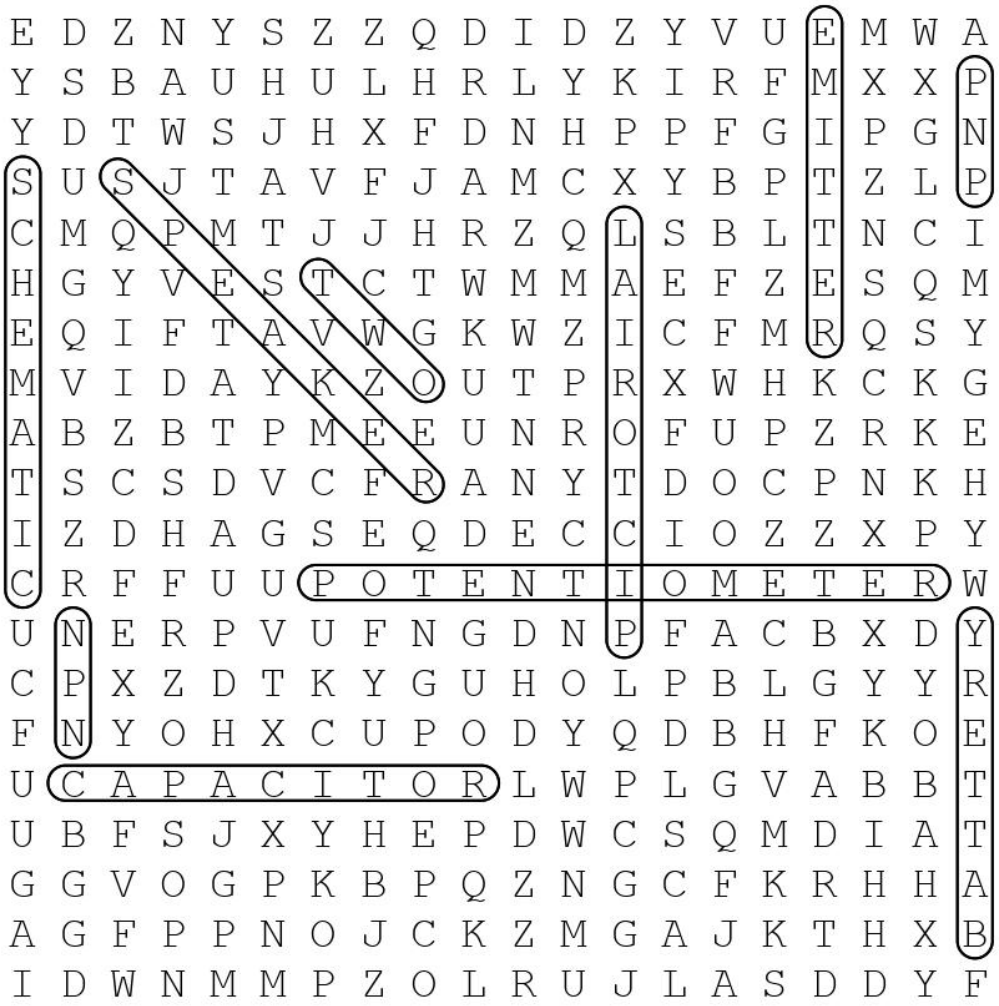
5. To help you build this circuit on a solderless circuit board, you are given a _____ diagram.

ANSWERS FOR WORD SEARCH

Exp. 16 - "ELECTRONIC MOTORCYCLE CIRCUIT"



1. What diagram is given to help you assemble the circuit on a solderless circuit board?

2. This component is used to adjust the speed of the two-transistor oscillator.

3. This transistor is used for Q2 in this circuit. **4.** This transistor is used for Q1 in this circuit.

5. This circuit uses a 10 microfarad radial _____ .

6. How many fixed resistors do we use in this circuit?

7. What component in this circuit emits the motorcycle sounds?

8. The _____ is connected to the snap in this circuit.

9. What diagram shows all the schematic symbols for the circuit?

10. On schematic symbol for a transistor, the arrow is on the _____ lead.

QUICK-CHECK ANSWER KEY for Experiment 16 QUIZ
for Mr Circuit Electronics Training ("Electronic Motorcycle")

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.

A
(B)
C
D

#1 This motorcycle circuit is built using _____ .

A. a 555 Timer IC
B. a two-transistor oscillator
C. an SCR
D. a quad amplifier

A
B
C
(D)

#2 The potentiometer is used to adjust the _____ .

A. the current through the speaker
B. the capacitance of the transistors
C. the loudness of the speaker
D. speed of the oscillation

A
B
C
D

#3 The Collector of transistor Q1 is connected to the _____ of transistor Q2.

A. Collector
B. Anode
C. Emitter
D. Base

(A)
B
C
D

#4 The potentiometer varies the _____ on the Base of transistor Q1.

A. voltage
B. capacitance
C. resistance
D. current

(A)
B
C
D

#5 As you adjust the potentiometer from 0 Ohms to its maximum Ohms, the oscillator will _____ in speed.

A. decrease
B. increase
C. remain the same
D. not be affected

A
B
(C)
D

#6 In this circuit, the speaker is connected to the _____ of transistor Q2.

A. Base
B. Anode
C. Collector
D. Emitter

(A)
B
C
D

#7 Transistor Q2 in this circuit is _____ .

A. a PNP Transistor
B. an NPN Transistor
C. a variable diode
D. is a capacitance

A
B
C
(D)

#8 Based on your understanding of a two-transistor oscillator circuit, the purpose of Capacitor C1 is to _____ .

A. reduce the current in the circuit
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C. reduce the resistance of the circuit.
D. reduce the voltage used in the circuit

A
(B)
C
D

#9 The _____ of Q2 is connected through a 10 Ohm resistor to the positive of the battery.

A. Emitter
B. Collector
C. Base
D. Anode

(A)
B
C
D

#10 The positive lead on Capacitor C1 is connected to the _____ of transistor Q1 and to the potentiometer.

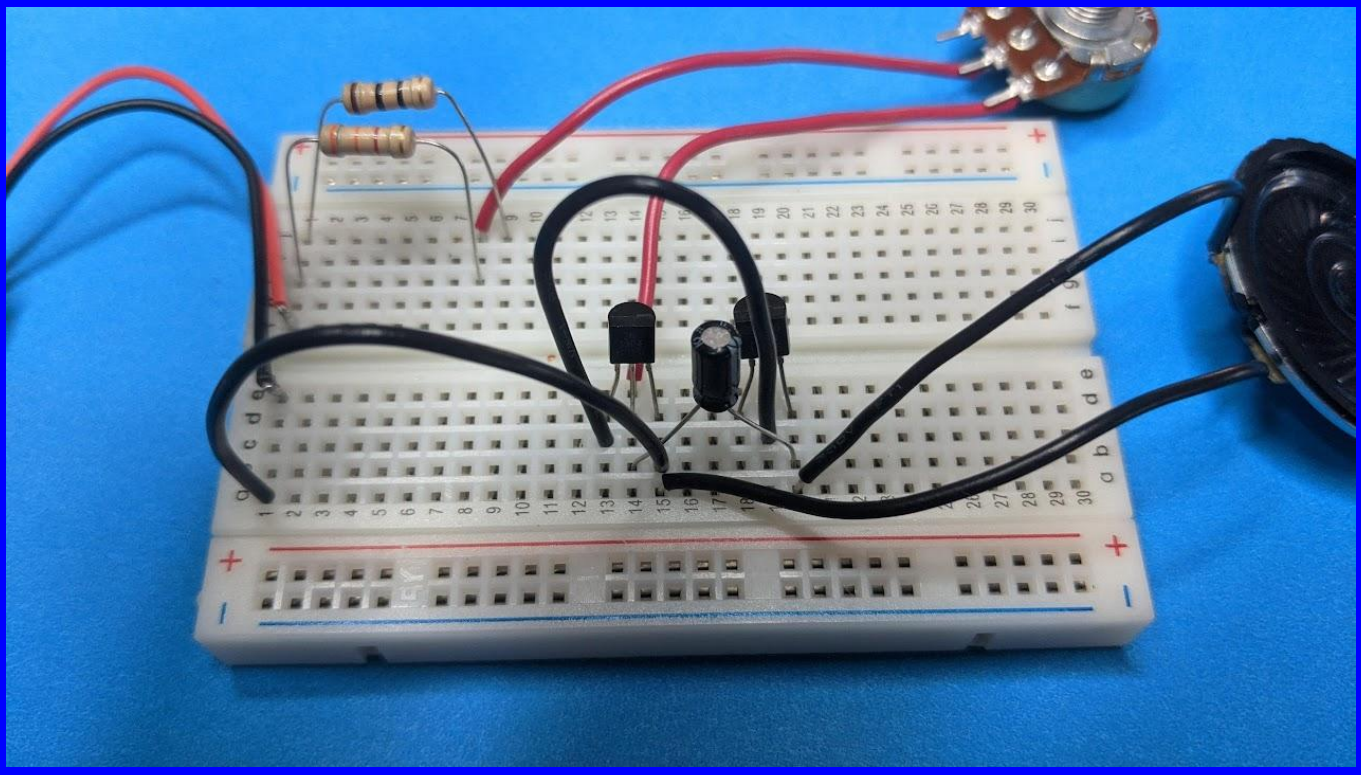
A. Collector
B. Anode
C. Emitter
D. Base

A
B
C
(D)

(Form SQAK16)

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

ELECTRONIC MOTORCYCLE

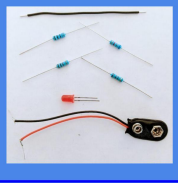


BASIC ELECTRONICS LAB 1

"ELECTRONIC MOTORCYCLE"

(Poster MC1-16-P01)

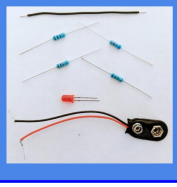
MC1-01
Electronic Parts



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

Mr Circuit Technology

MC1-01
Electronic Parts



PRICE LIST

PRICE LIST

PARTS KIT Number	Mr Circuit Series 1 PARTS KITS FOR "LESSON PLANS"	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 "0 TO 9V 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
MC1-20-PK	Parts Kit for "Audio Generator circuit	$5.95
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
MC1-25-PK	Parts Kit for "Code Oscillator circuit	$4.95
MC1-26-PK	Parts Kit for "Audible Water Detector circuit	$4.95
MC1-27-PK	Parts Kit for "English Police Siren circuit	$4.95
MC1-28-PK	Parts Kit for "Electronic Canary circuit	$7.95
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
MC1-SET-PK	**Complete Set of All Series 1 Parts Kits (31 total)**	**$120.00**