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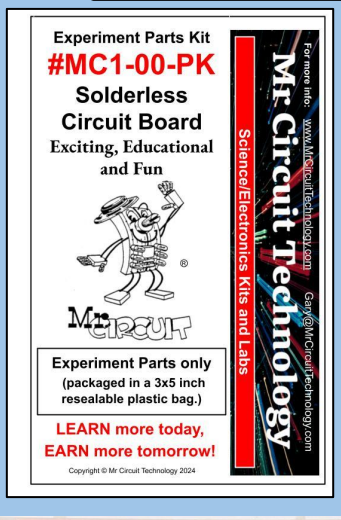
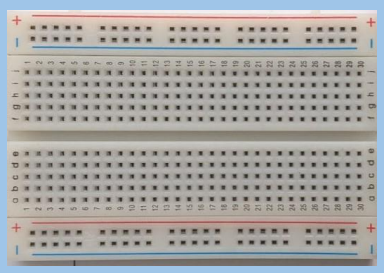
Mr Circuit Technology

Science/Electronics Experiment Kits and Labs

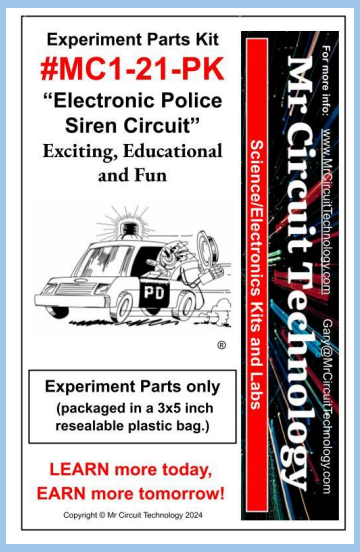
Exp. 21 - "ELECTRONIC POLICE SIREN CIRCUIT"

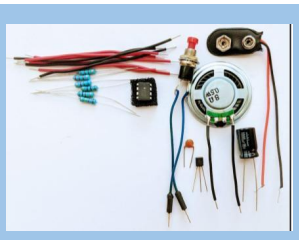




LESSON PLAN

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 #MC1-21-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

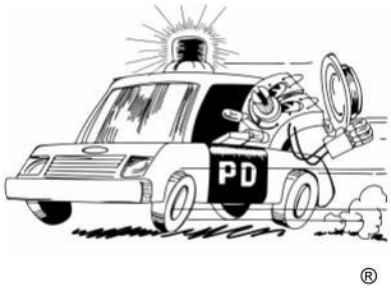
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

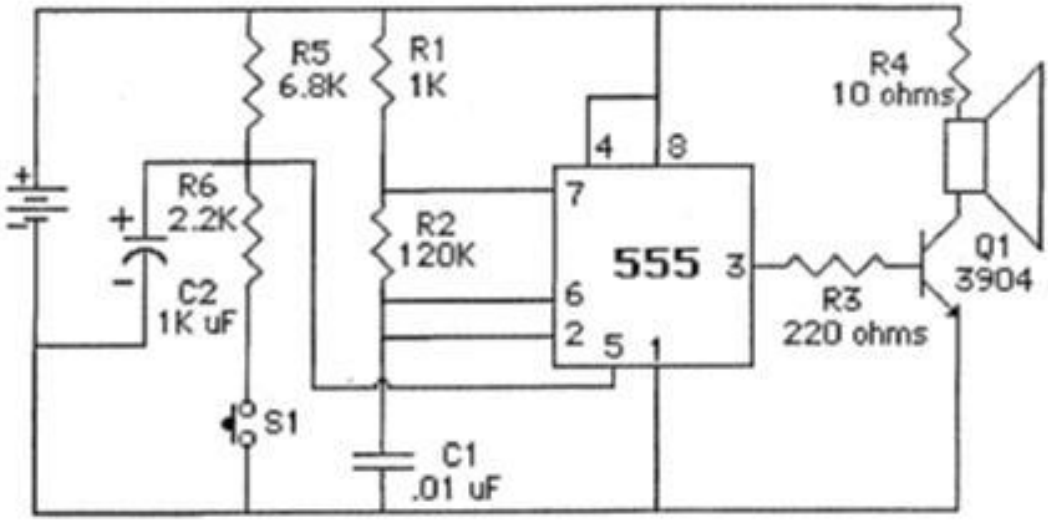
Step 4 - Collect all the Written Quizzes for grading and use the Answer Key to grade them.

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 POLICE SIREN circuit. Here is the SCHEMATIC DIAGRAM of the circuit you will build.**





This interesting circuit was invented by engineers who wanted a circuit that would simulate an actual police siren.

As you **hold down** the pushbutton switch, the tone will rise. When you **release** the pushbutton, the tone will fall.

If you continue this action, it will sound like an actual police siren.

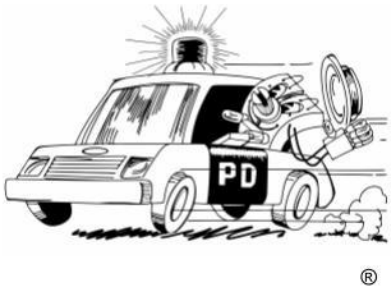
(Be careful, it could be illegal to use it in certain situations.)

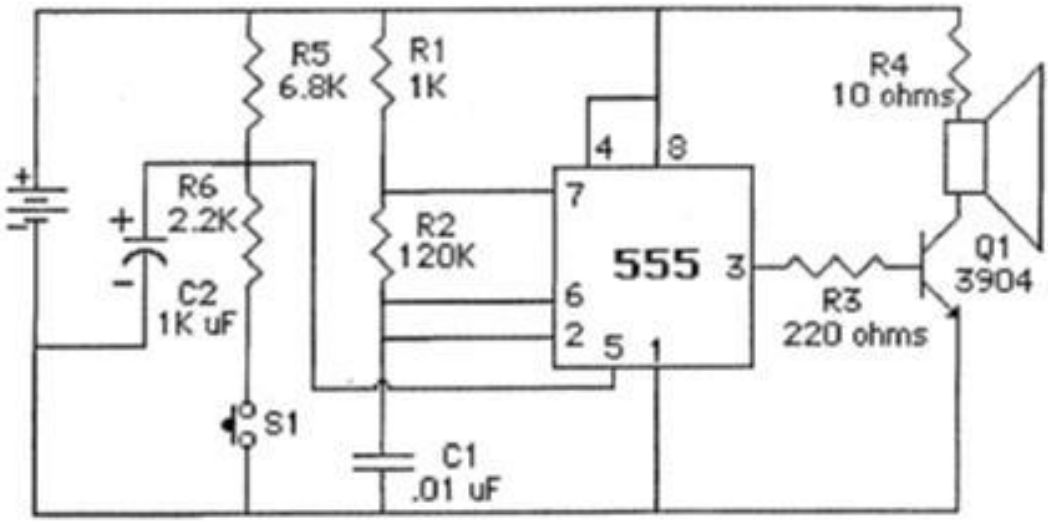
This circuit can be lots of fun to use with your friends.

(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 POLICE SIREN** circuit that you will build.





To start emitting a sound from the speaker requires that you press the pushbutton switch.

The frequency of the tone is controlled by the voltage on Pin 5 of the 555 IC which is generated by the electrical charge and discharge of capacitor C2. C2 discharges when you press the pushbutton and charges when you release it.

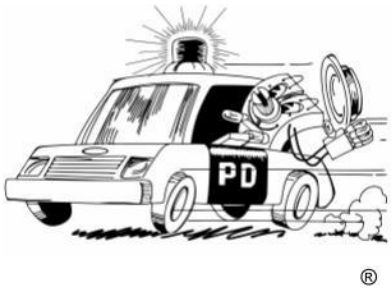
The 555 IC in this circuit is working as a **CLOCK** which means the 555 is putting out clock pulses.

The pulses coming from Pin 3 on the 555 are sent to the speaker through a transistor. The transistor amplifies the tones and makes them louder. A tone is the same thing as a pitch.

(Continue to Page 3)

PURPOSE OF THIS EXPERIMENT

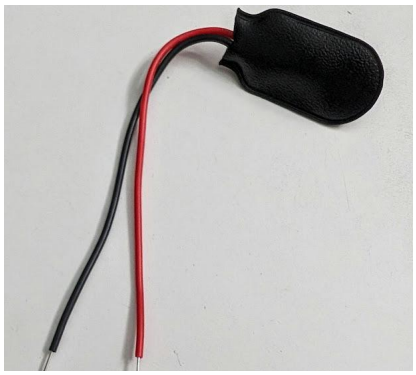
*** To build an ELECTRONIC POLICE SIREN circuit using a 555 Integrated circuit.



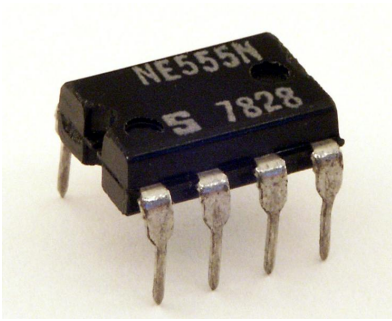
PARTS NEEDED FOR EXPERIMENT

In this experiment, you will use the following

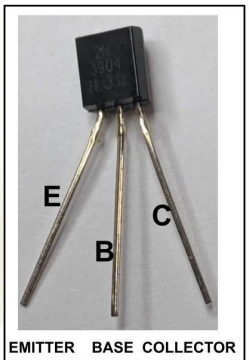
9-Volt Snap



555 IC



NPN



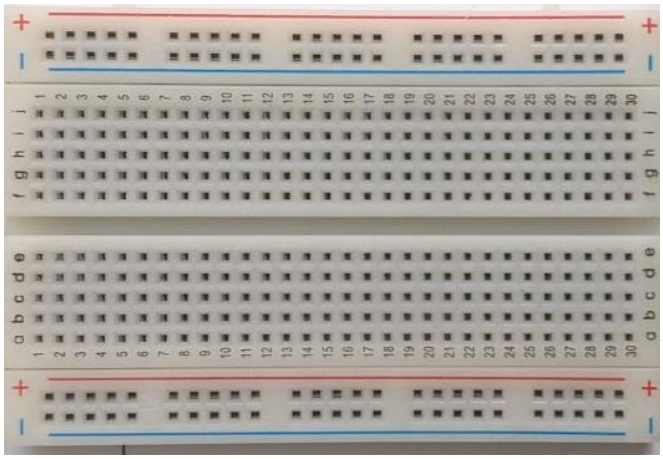
Speaker

6 fixed Resistors

8 Jumper Wires

Disc Capacitor

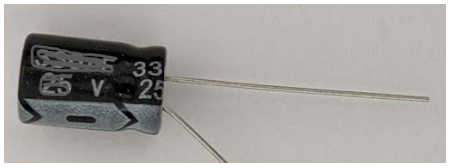
Solderless Circuit Board



9-V Battery

Pushbutton Switch

Radial Capacitor

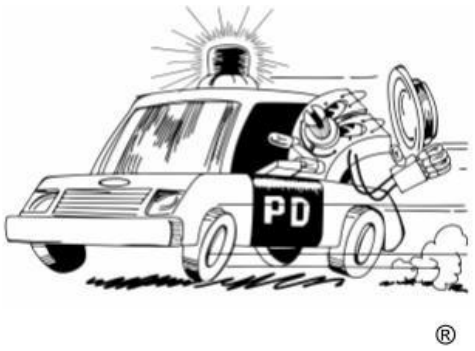


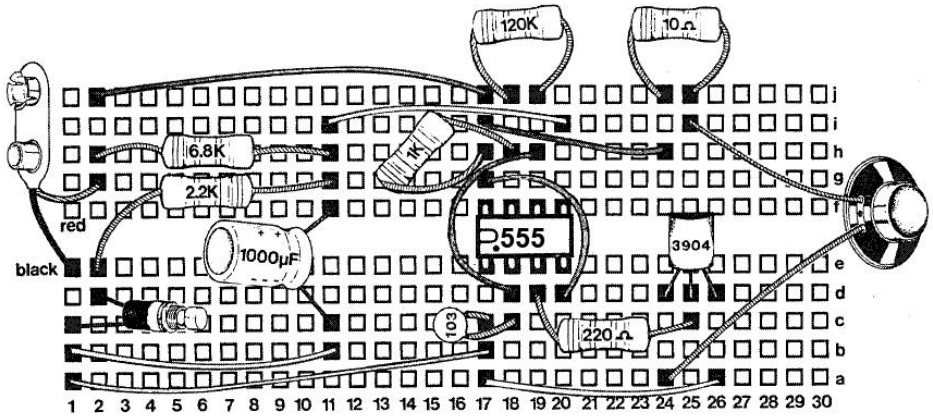
(Continue to Page 4)

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.



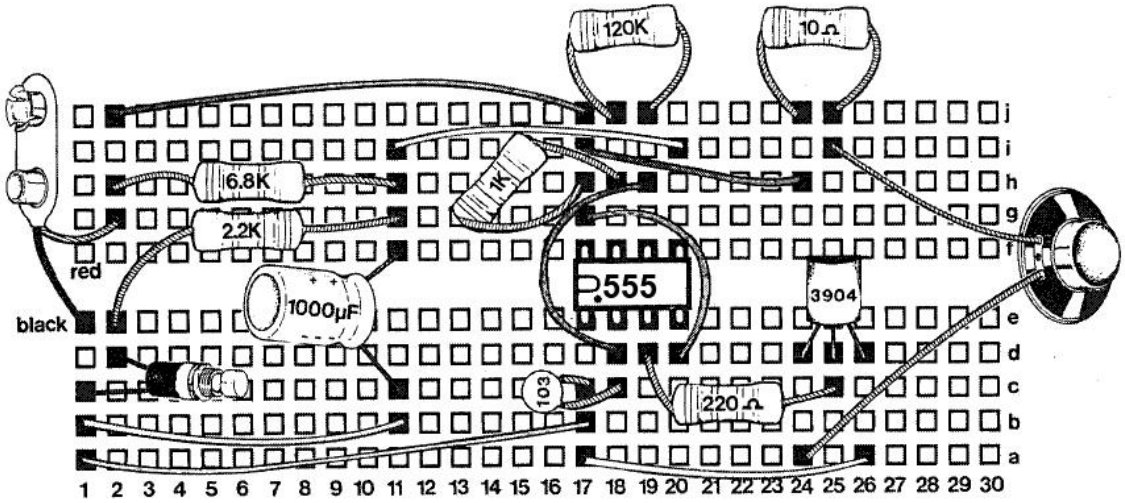


Step 2 - Install all the parts on the SCB as shown above.

- ❑ Install the 10 Ohm resistor (brown, black, black, gold) in holes 24j to 25j
- ❑ Install the 220 Ohm resistor (red, red, brown, gold) in holes 19d to 25c
- ❑ Install the 1000 (1k) Ohm resistor (brown, black, red, gold) in holes 17h to 18h
- ❑ Install the 2200 (2.2k) Ohm resistor (red, red, red, gold) in holes 2e to 11g
- ❑ Install the 6800 (6.8k) Ohm resistor (blue, gray, red, gold) in holes 2h to 11h
- ❑ Install the 120k Ohm resistor (brown, red, yellow, gold) in holes 18j to 19j
- ❑ Install the 555 Timer IC with Pin 1 in hole 17e as shown in pictorial
- ❑ Install a 0.01uF (103) disc Capacitor in holes 17c to 18c
- ❑ Install a 1000uF Electrolytic Capacitor Long lead in 11f, Short lead in 11c
- ❑ Install one NPN 3904 Transistor -Collector in 24d, Base in 25d, Emitter in 26d
- ❑ Install a Push Button Switch in holes 1c and 2d
- ❑ Install the Speaker in holes 24a to 25i
- ❑ Install Jumper Wire #1 in holes 1a to 17b
- ❑ Install Jumper Wire #2 in holes 1b to 11b
- ❑ Install Jumper Wire #3 in holes 17a to 26a
- ❑ Install Jumper Wire #4 in holes 2j to 17
- ❑ Install Jumper Wire #5 in holes 11i to 20i
- ❑ Install Jumper Wire #6 in holes 17i to 24i
- ❑ Install Jumper Wire #7 in holes 19h to 18d
- ❑ Install Jumper Wire #8 in holes 17g to 20d
- ❑ Install the Battery Snap, Black lead in hole 1e and Red Lead in hole 2g

(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)



Step 3 - Connect the battery to the Battery Snap. Press the Pushbutton switch and you will hear a rising tone and when you release the switch the tone will descend. Keep doing this to simulate a real police siren.

®

CONCLUSION

You should have observed that you can build an **ELECTRONIC POLICE SIREN** circuit with a 555 Integrated Circuit.

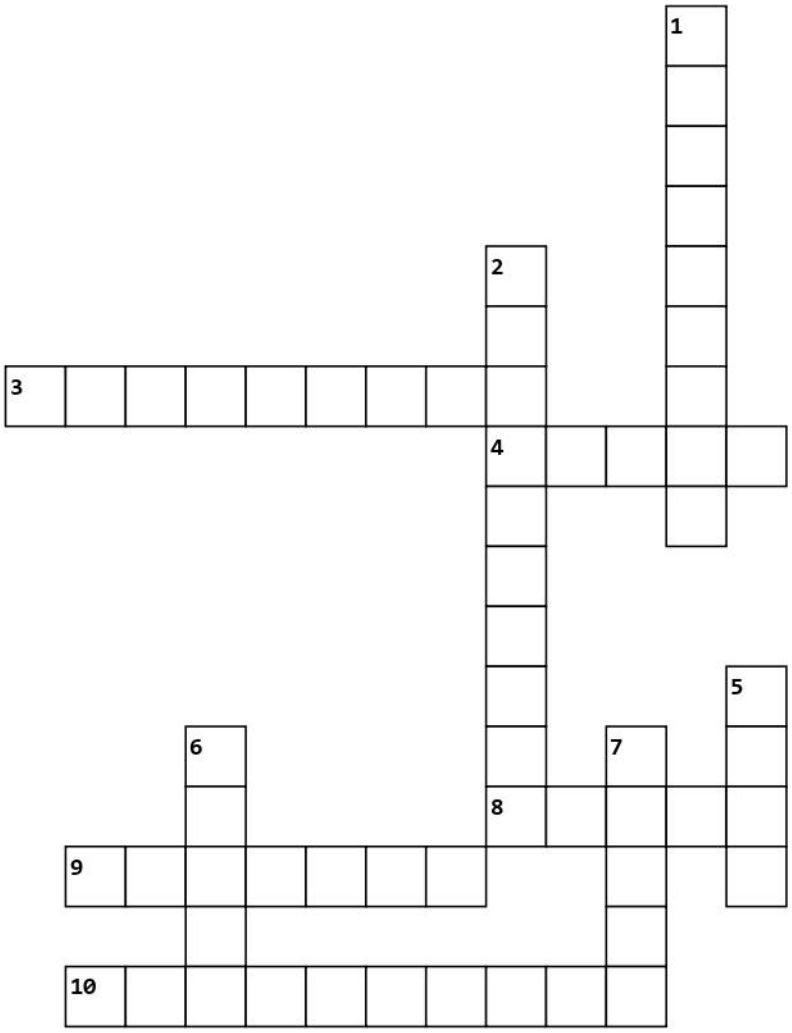
(End of Experiment 11)

Mr. CIRCUIT®

MC1-21-CW

CROSSWORD

Exp. 21 - "ELECTRONIC POLICE SIREN CIRCUIT"



Across

3. The transistor in the circuit _____ to tone.

4. This circuit uses a 555 Integrated Circuit as a _____ .

8. This circuit produces sounds of a rising and falling pitch that simulates a _____ sound.

9. To make the pitch go down, you _____ the switch.

10. If you hold the _____ switch down, the pitch will rise.

Down

1. Pin 5 controls the _____ of the tone or pitch of the tone.

2. When you press the switch, capacitor C2 _____ .

5. A _____ is the same thing as pitch.

6. This circuit is powered by nine _____ DC.

7. What color is the first color band on a 1k Ohm resistor?

Mr. CIRCUIT®

MC1-21-WS

WORD SEARCH

Exp. 21 - "ELECTRONIC POLICE SIREN CIRCUIT"

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

1. This circuit makes sounds like a police _____.

2. This circuit uses a 555 Integrated Circuit like a _____ .

3. The _____ C2 is a 1000 microfarad radial.

4. The 555 Integrated Circuit has _____ pins.

5. R4 is a _____ of 10 Ohms.

6. The electronic component that emits sound is called a _____ .

7. The _____ of this circuit is fixed.

8. The _____ is controlled by the voltage on Pin 5 of the 555 Integrated Circuit.

9. If you hold the pushbutton switch down, the pitch will _____ .

10. When you _____ the pushbutton, the tone will fall.

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

QUIZ for Exp 21 or STEM KIT #21
in the Mr Circuit Electronics Training Lab 1

(Page 8)

This Quiz covers the training learned by completing

"Build an Electronic Police Siren Circuit" Experiment 21

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

#1 This circuit uses 555 Timer IC working as a _____ .

A
B
C
D

A. a light generator
B. a timer
C. an amplifier
D. clock

#2 The loudness of the tone is _____ .

A
B
C
D

A. adjustable
B. controlled by Resistor R1
C. controlled by Capacitor C1
D. fixed

#3 The speaker in this circuit is connected to the _____ of transistor Q1.

A
B
C
D

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

#4 What is the value of the capacitor connected to Pin 6 of the 555 Timer IC in this circuit?

A
B
C
D

A. 10uF
B. 330uF
C. 33uF
D. 0.01uF

#5 If we reverse the polarity of the battery snap on the circuit, what will happen?

A
B
C
D

A. the LED will self-destruct
B. the LED will burn out
C. you might destroy the 555 Timer IC
D. it will work just fine

#6 Resistors R5 and R6 are _____ .

A
B
C
D

A. not connected
B. connected
C. not important
D. are connected to pin 7

#7 When this circuit is working, the speaker will _____ .

A
B
C
D

A. remain silent
B. self-destruct
C. emit a variable audiotone
D. get hot

#8 To vary the frequency of this oscillator, you _____ .

A
B
C
D

A. adjust the potentiometer
B. use the pushbutton switch
C. use the battery snap
D. remove resistor R1

#9 The rising and falling of the frequency of the oscillator is controlled by _____ .

A
B
C
D

A. the distance C2 is from the battery
B. charging and discharging of C2
C. charging and discharging of C1
D. the size of the speaker

#10 Switch S1 is in series with _____ .

A
B
C
D

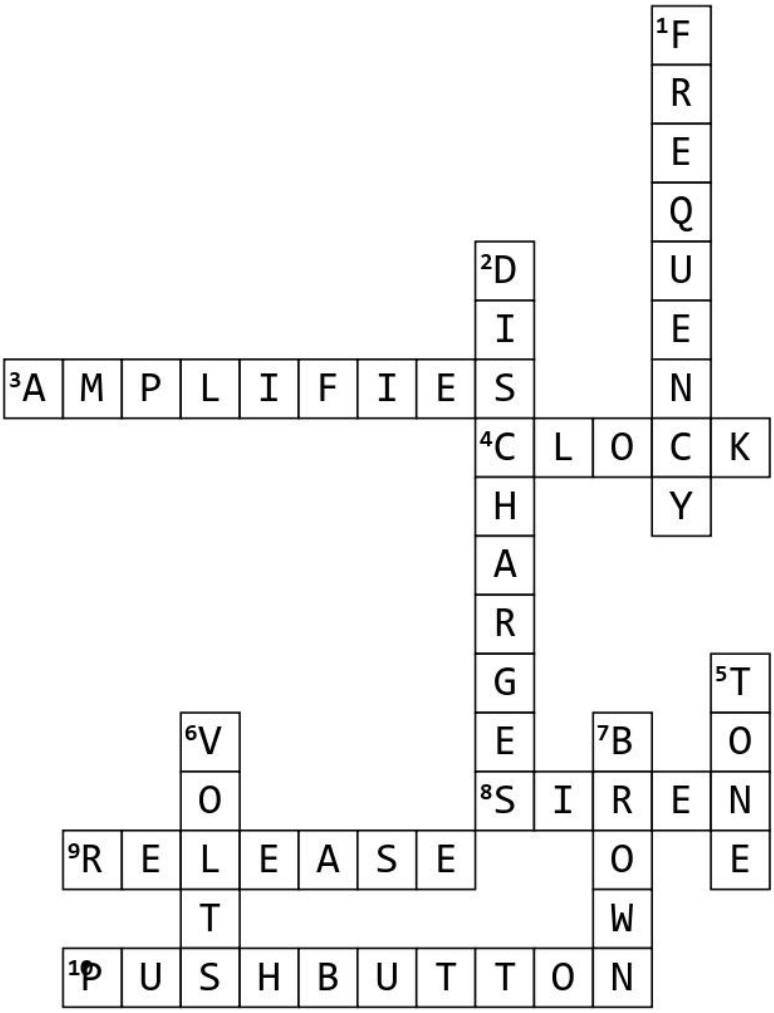
A. C1 and C2
B. R1 and R2
C. R5 and R6
D. R3 and R4

(Form SQ21)

Score	

ANSWERS FOR CROSSWORD

Exp. 21 - "ELECTRONIC POLICE SIREN CIRCUIT"



Across

3. The transistor in the circuit _____ to tone.

4. This circuit uses a 555 Integrated Circuit as a _____ .

8. This circuit produces sounds of a rising and falling pitch that simulates a _____ sound.

9. To make the pitch go down, you _____ the switch.

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1. Pin 5 controls the _____ of the tone or pitch of the tone.

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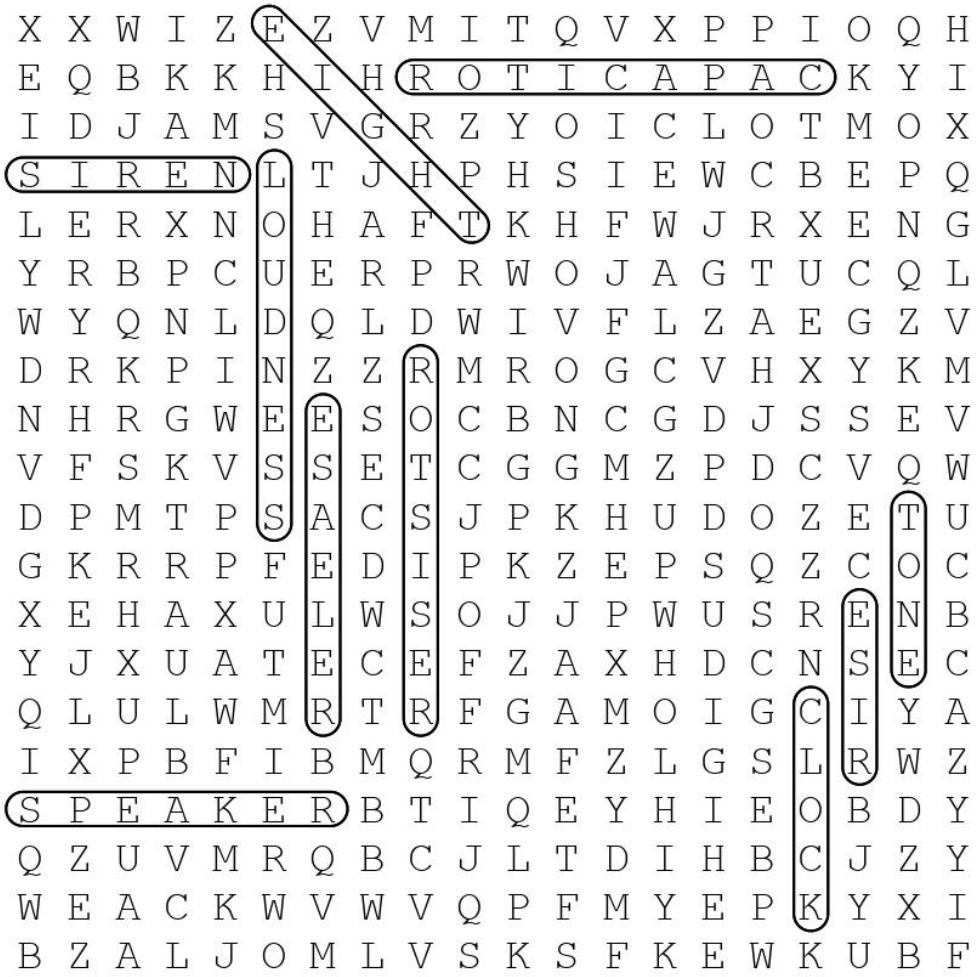
ANSWERS FOR WORD SEARCH

Exp. 21 - "ELECTRONIC POLICE SIREN CIRCUIT"



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2. This circuit uses a 555 Integrated Circuit like a _____ .

3. The _____ C2 is a 1000 microfarad radial.

4. The 555 Integrated Circuit has _____ pins.

5. R4 is a _____ of 10 Ohms.

6. The electronic component that emits sound is called a _____ .

7. The _____ of this circuit is fixed.

8. The _____ is controlled by the voltage on Pin 5 of the 555 Integrated Circuit.

9. If you hold the pushbutton switch down, the pitch will _____ .

10. When you _____ the pushbutton, the tone will fall.

QUICK-CHECK ANSWER KEY for Experiment 21 QUIZ
for Mr Circuit Electronics Training ("Electronic Police Siren")

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 circuit uses 555 Timer IC working as a _____ .

A. a light generator
B. a timer
C. an amplifier
D. clock

A
(B)
C
D

#6 Resistors R5 and R6 are _____ .

A. not connected
B. connected
C. not important
D. are connected to pin 7

A
B
C
(D)

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D

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A. remain silent
B. self-destruct
C. emit a variable audiotone
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A
B
C
(D)

#3 The speaker in this circuit is connected to the _____ of transistor Q1.

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

A
(B)
C
D

#8 To vary the frequency of this oscillator, you _____ .

A. adjust the potentiometer
B. use the pushbutton switch
C. use the battery snap
D. remove resistor R1

A
B
C
(D)

#4 What is the value of the capacitor connected to Pin 6 of the 555 Timer IC in this circuit?

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D. 0.01uF

A
(B)
C
D

#9 The rising and falling of the frequency of the oscillator is controlled by _____ .

A. the distance C2 is from the battery
B. charging and discharging of C2
C. charging and discharging of C1
D. the size of the speaker

A
B
(C)
D

#5 If we reverse the polarity of the battery snap on the circuit, what will happen?

A. the LED will self-destruct
B. the LED will burn out
C. you might destroy the 555 Timer IC
D. it will work just fine

A
B
(C)
D

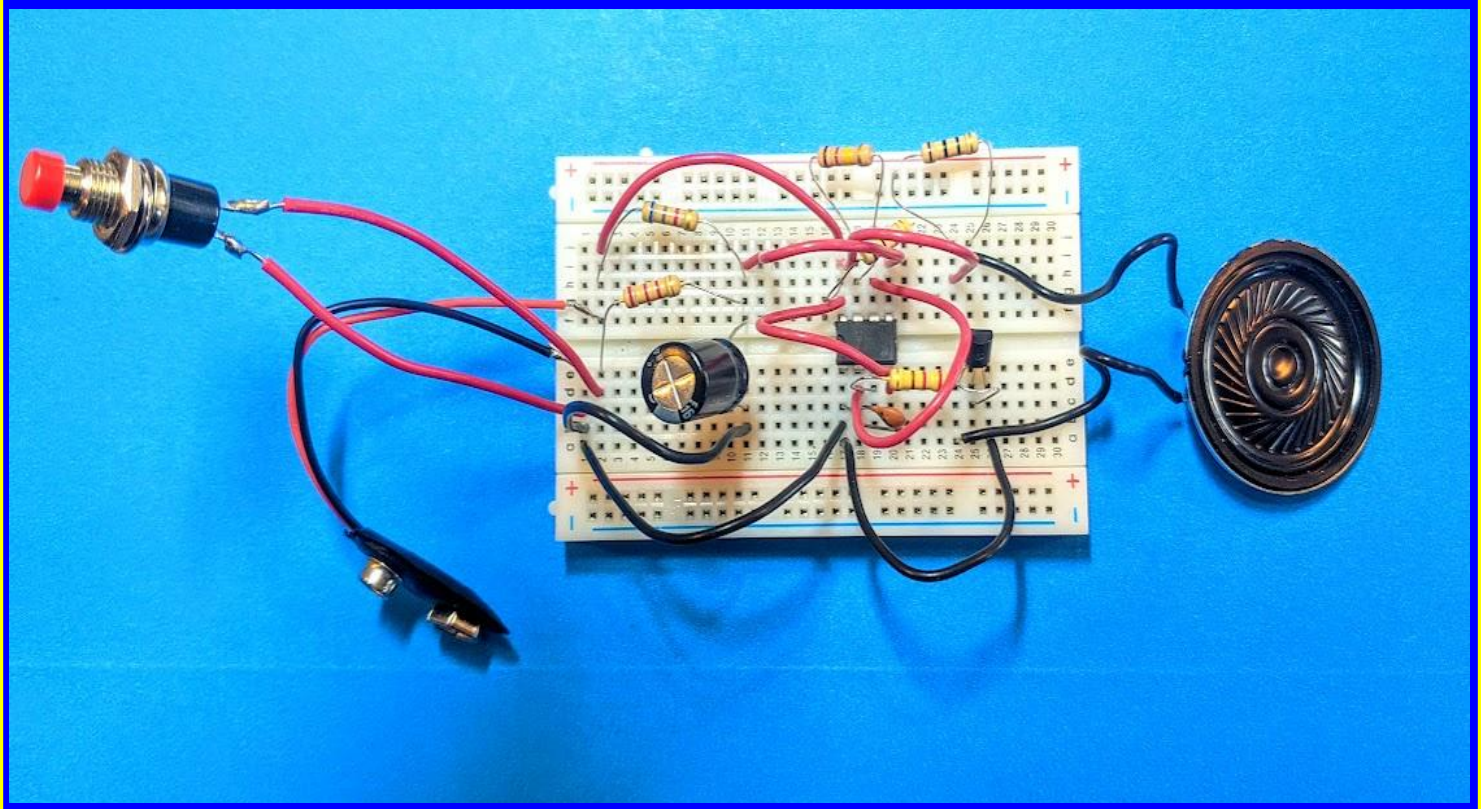
#10 Switch S1 is in series with _____ .

A. C1 and C2
B. R1 and R2
C. R5 and R6
D. R3 and R4

(Form SQAK21)

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

ELECTRONIC POLICE SIREN

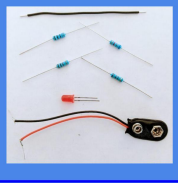


BASIC ELECTRONICS LAB 1

"ELECTRONIC POLICE SIREN CIRCUIT"

(Poster MC1-21-P01)

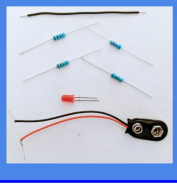
MC1-01
Electronic Parts



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**