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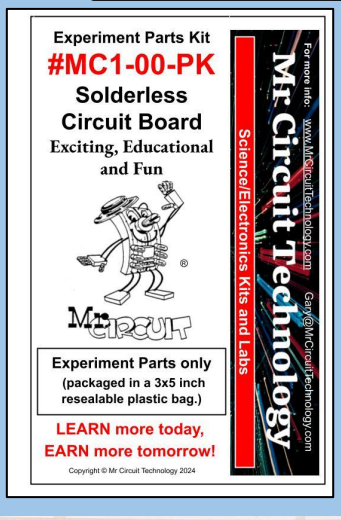
Mr Circuit Technology

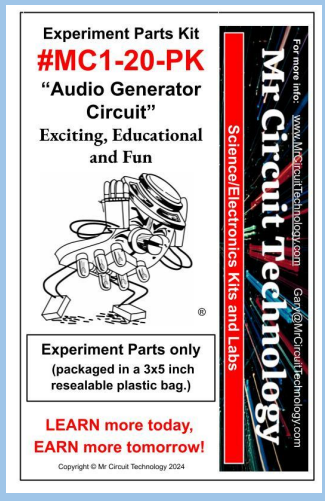
Science/Electronics Experiment Kits and Labs

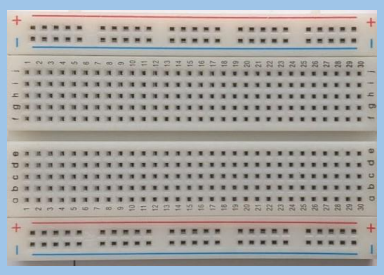
Exp. 20 - "AUDIO GENERATOR CIRCUIT"

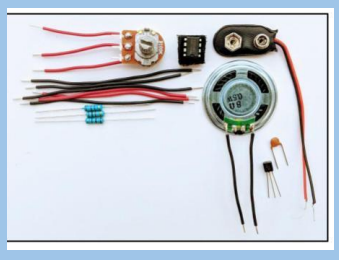


LESSON PLAN

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 #MC1-20-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

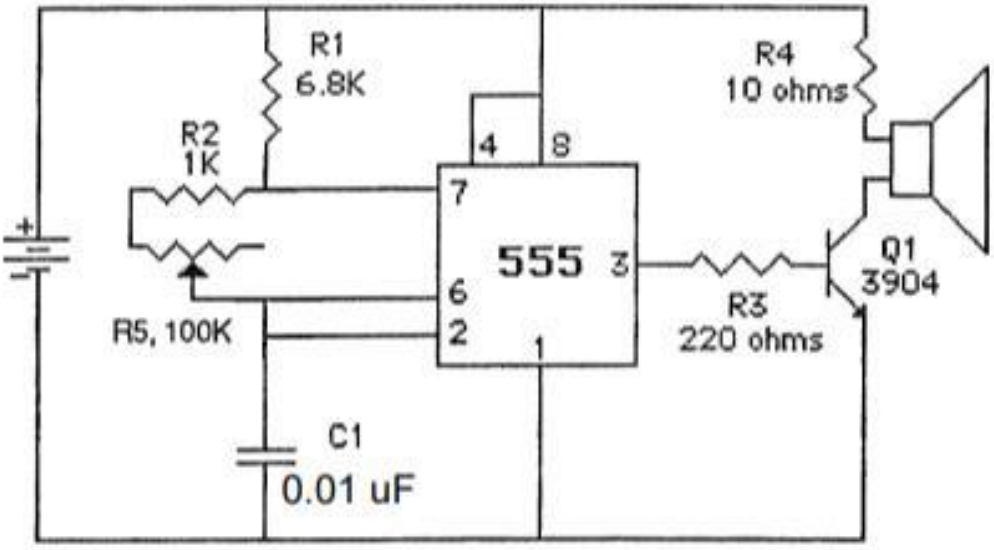
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

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 AUDIO GENERATOR 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 put out a range of audio tones.

The frequency of the audio tones can be adjusted by using the potentiometer in the circuit. The **loudness is fixed** and does not vary.

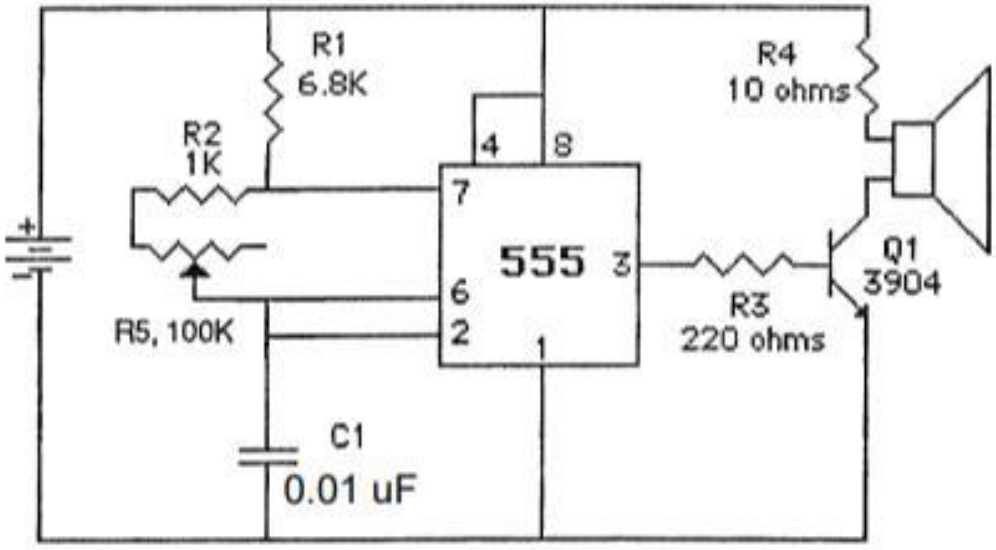
You can connect the output of this circuit to an oscilloscope to see the various waveforms of the audio tones.

This circuit can also be used to **troubleshoot** an audio amplifier circuit by injecting its signal into the circuit under test and viewing the results on an oscilloscope.

(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 **AUDIO GENERATOR** circuit that you will build.



As soon as you connect the battery to the circuit, the circuit will immediately emit a tone from the speaker.

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 tone and makes it louder. Tone is the same thing as pitch.

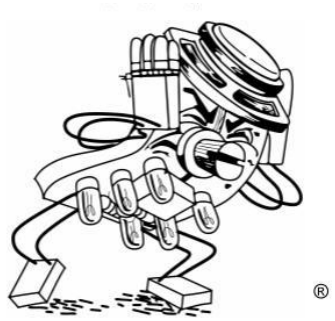
The 100k Ohms potentiometer is used to vary the frequency of the audio signal coming out of Pin 3 of the 555 Integrated Circuit.

(Continue to Page 3)

MC1-20-R-3

PURPOSE OF THIS EXPERIMENT

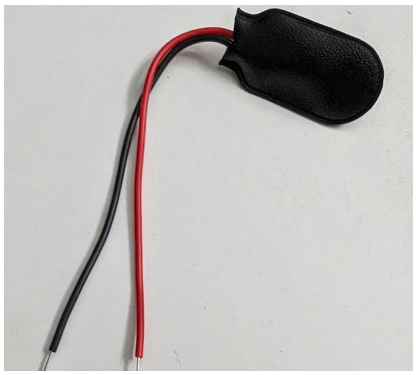
*** To build a AUDIO GENERATOR circuit using a 555 Integrated circuit.



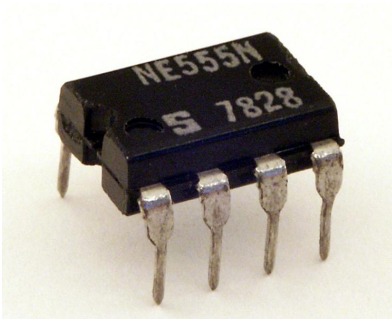
PARTS NEEDED FOR EXPERIMENT

In this experiment, you will use the following:

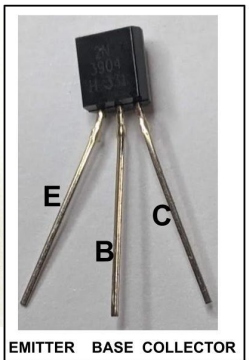
9-Volt Snap



555 IC



NPN

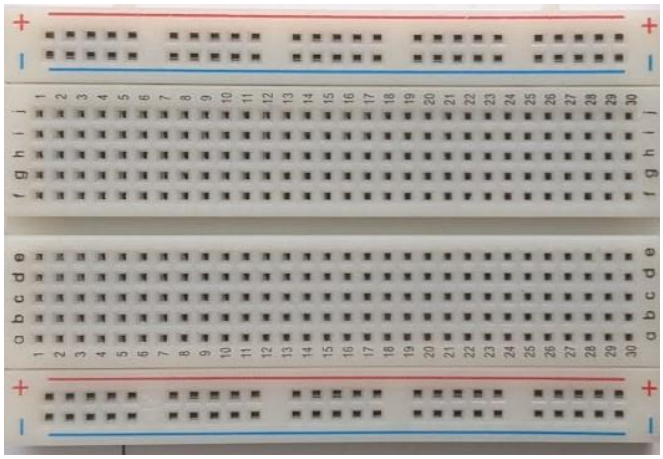


Speaker

4 fixed Resistors

6 Jumper Wires

Solderless Circuit Board



9-V Battery

Disc Capacitor

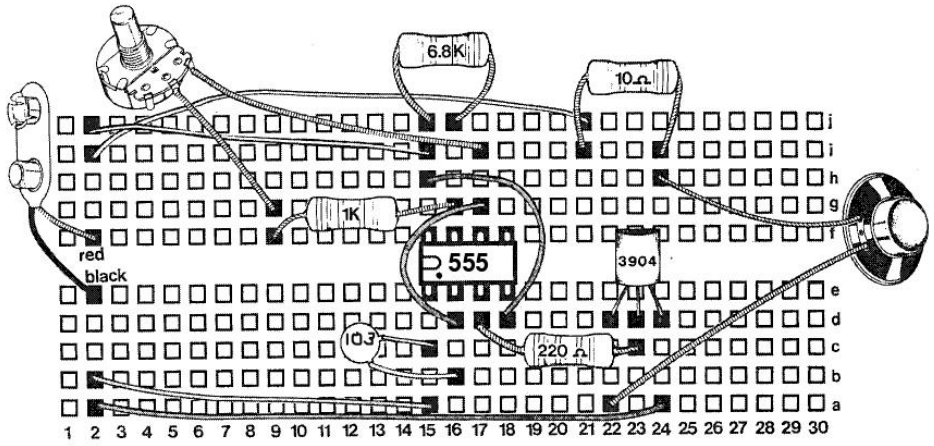
(Continue to Page 4)

MC1-20-R-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.

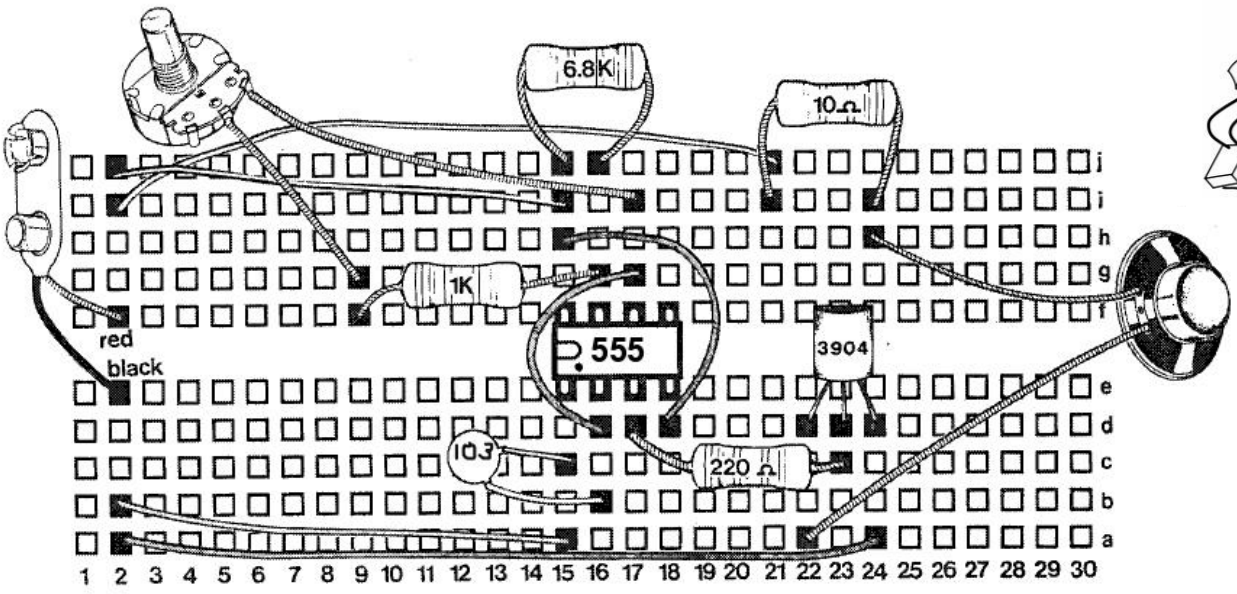


Step 2 - Install all the parts on the SCB as shown above.

- ❑ Install the 10 Ohm resistor (brown, black, black, gold) in holes 21i to 24i
- ❑ Install the 220 Ohm resistor (red, red, brown, gold) in holes 17d to 23c
- ❑ Install the 1000 (1k) Ohm resistor (brown, black, red, gold) in holes 9f to 16g
- ❑ Install the 6800 (6.8k) Ohm resistor (blue, gray, red, gold) in holes 15j to 16j
- ❑ Install the 555 Timer IC with Pin 1 in hole 15e as shown in pictorial
- ❑ Install one 0.01uF (103) disc Capacitor in holes 15c to 16b
- ❑ Install one NPN 3904 Transistor -Collector in 22d, Base in 23d, Emitter in 24d
- ❑ Install the Potentiometer, middle lead in 9g, edge in 17i
- ❑ Install the Speaker in holes 22a to 24h
- ❑ Install Jumper Wire #1 in holes 2a to 24a
- ❑ Install Jumper Wire #2 in holes 2b to 15a
- ❑ Install Jumper Wire #3 in holes 2j to 15i
- ❑ Install Jumper Wire #4 in holes 2i to 21j
- ❑ Install Jumper Wire #5 in holes 16d to 17g
- ❑ Install Jumper Wire #6 in holes 15h to 18d
- ❑ Install the Battery Snap, Black lead in hole 2e and Red Lead in hole 2f

(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)



Step 3 - Connect the battery to the Battery Snap. An audio tone will be emitted from the speaker. If you adjust, the potentiometer by twisting the shaft, the frequency of the tone will change.

CONCLUSION

You should have observed that you can build an **AUDIO GENERATOR** circuit
with a
555 Integrated Circuit.

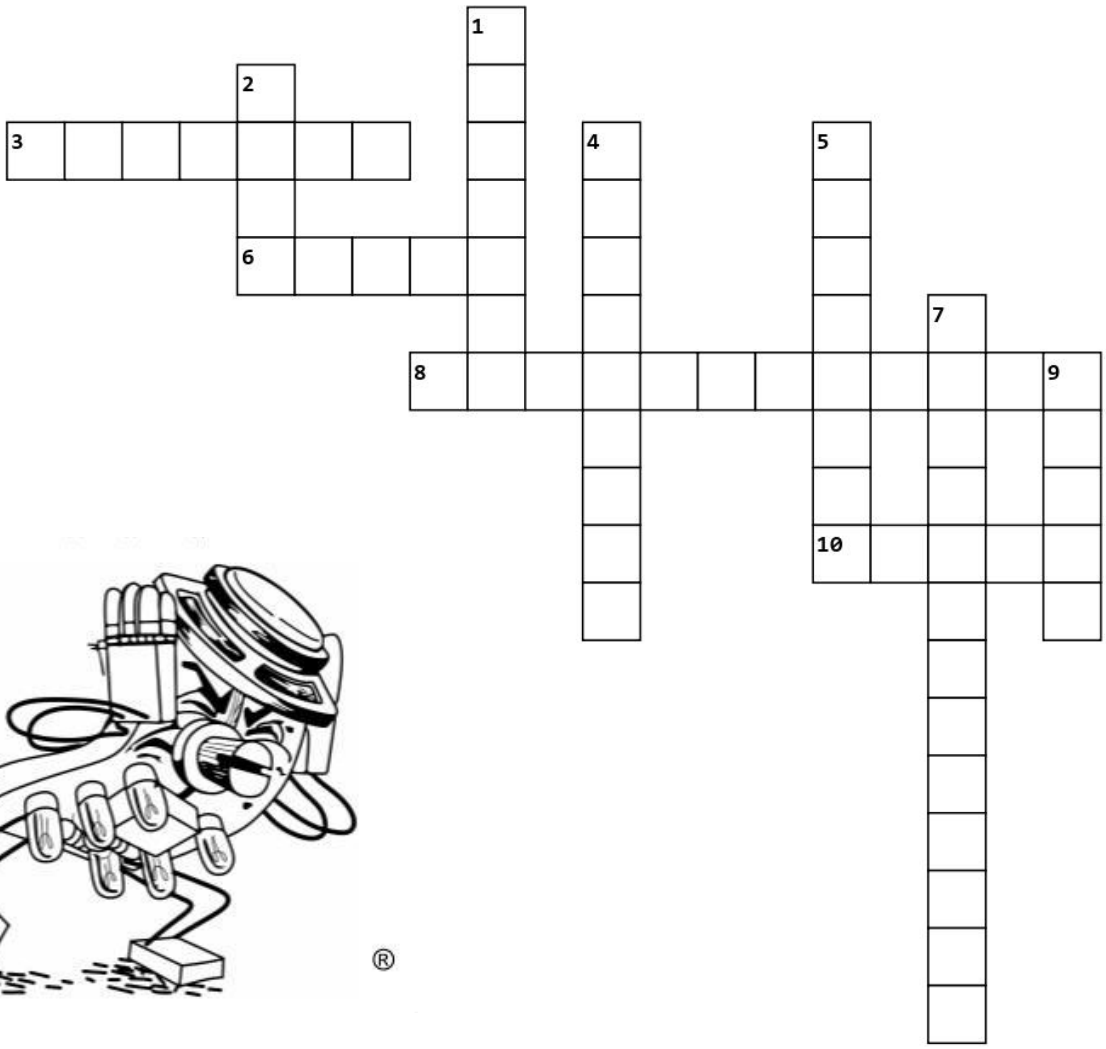
(End of Experiment 11)

Mr. CIRCUIT®

MC1-20-CW

CROSSWORD

Exp. 20 - "AUDIO GENERATOR CIRCUIT"



Across

3. The purpose of the transistor in this circuit is to _____ the sound level.

6. The 555 IC is used as a _____ in this circuit.

8. This circuit can be used to _____ an audio circuit.

10. This circuit will emit a _____ of audio tones.

Down

1. The Collector lead of transistor Q1 is connected to the _____ .

2. The 0.01uf capacitor is a _____ capacitor.

4. The _____ of the audio tones can be changed using the potentiometer.

5. Pin 3 of the 555 IC is connected to _____ R3.

7. The _____ is used to vary the pitch of the tone.

9. This audio generator circuit emits audio _____ .

Mr. CIRCUIT®

MC1-20-WS

WORD SEARCH

Exp. 20 - "AUDIO GENERATOR CIRCUIT"

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

1. The 555 IC has this many pins. **2.** The value of Resistor R4 that is connected to the speaker.

3. This circuit _____ audio tones.

4. This circuit uses a 555 IC as a _____ .

5. Transistor Q1 amplifies the audio tones making them _____ .

6. The diagram with the pictures of the components on the solderless circuit board is called a _____ diagram.

7. The diagram that shows _____ of each component is called a Schematic Diagram.

8. Pin 3 of the 555 IC emits pulses in the _____ range.

9. This circuit uses _____ transistor.

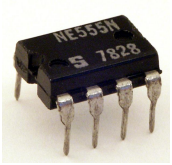
10. This circuit uses _____ fixed resistors.

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

QUIZ for Exp 20 or STEM KIT #20
in the Mr Circuit Electronics Training Lab 1

(Page 8)

This Quiz covers the training learned by completing



"Build an Audio Generator Circuit" Experiment 20

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

A B C D

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

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

A B C D

#2 The loudness of the tone is _____ .

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

A B C D

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

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

A B C D

#4 What is the value of the capacitor connected to Pin 2 of the 555 Timer IC in this circuit?

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

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. it will work just fine
D. you might destroy the 555 Timer IC

A B C D

#6 Resistor R2 is connect to _____ of the 555 Timer IC.

A. Pin 3
B. Pin 4
C. Pin 7
D. Pin 6

A B C D

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

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

A B C D

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

A. the potentiometer
B. the transistor
C. 555 Timer IC
D. battery snap

A B C D

#9 Pins 4 and 8 on the 555 Timer IC are _____ .

A. connected together
B. are insulated from each other
C. do not need to be connected
D. are not important in this circuit

A B C D

#10 The word 'tone' is the same thing as _____ .

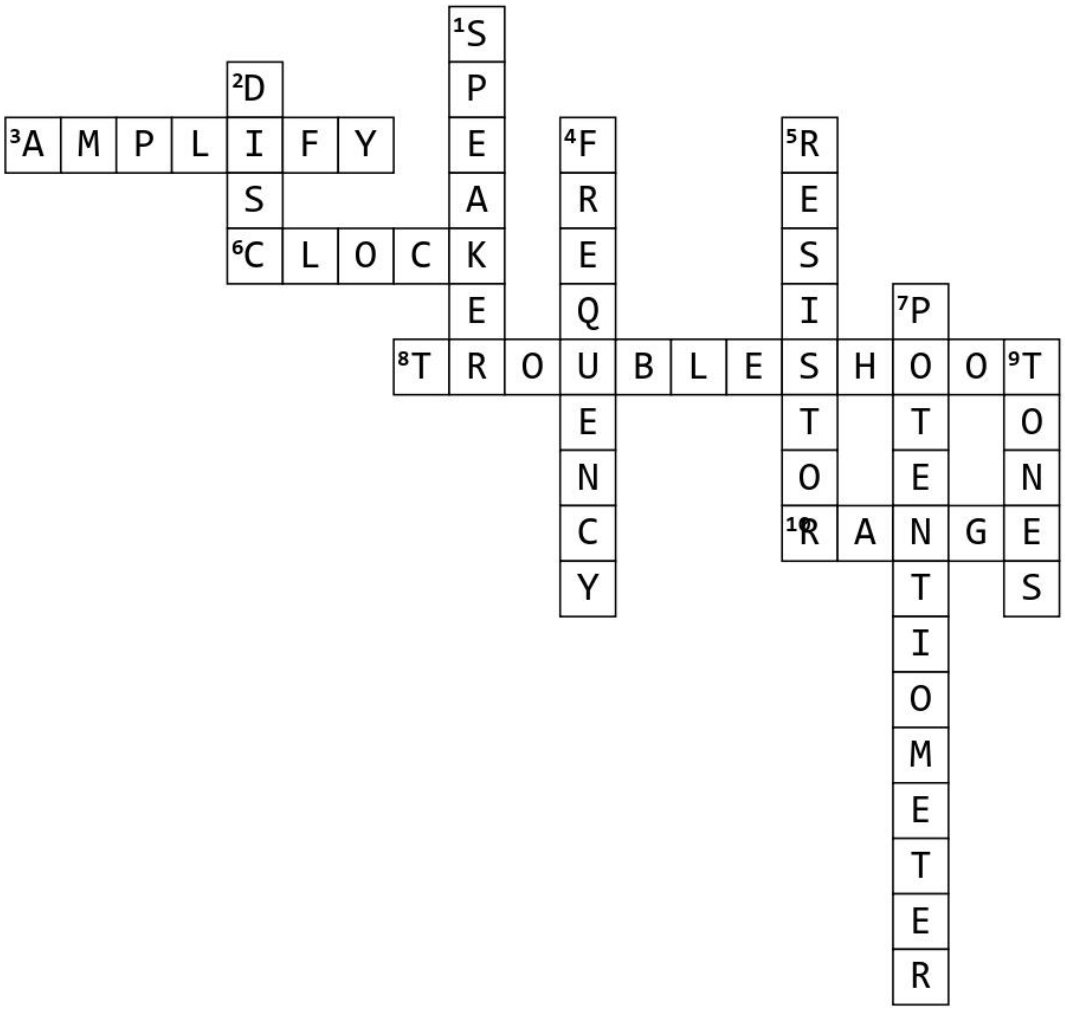
A. loudness
B. pitch
C. excitation
D. bias

(Form SQ20)

Score	

ANSWERS FOR CROSSWORD

Exp. 20 - "AUDIO GENERATOR CIRCUIT"



Across

3. The purpose of the transistor in this circuit is to _____ the sound level.

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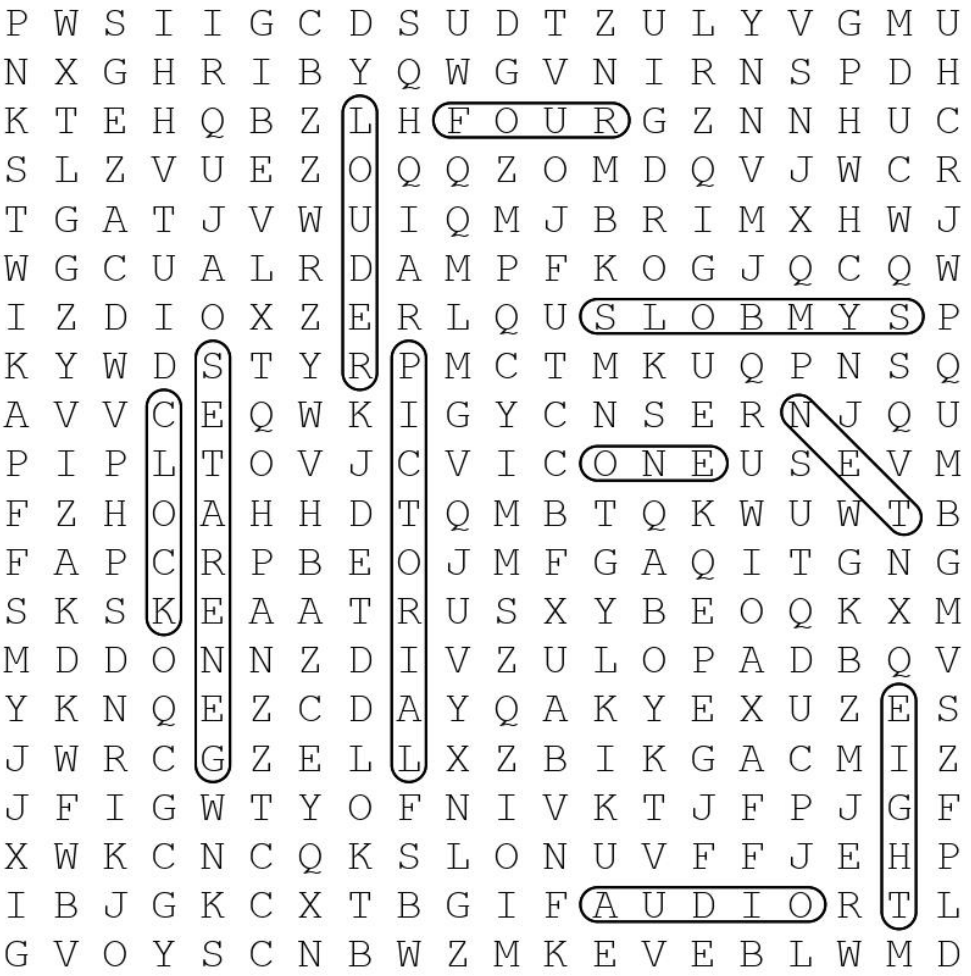
ANSWERS FOR WORD SEARCH

Exp. 20 - "AUDIO GENERATOR CIRCUIT"



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6. The diagram with the pictures of the components on the solderless circuit board is called a _____ diagram.

7. The diagram that shows _____ of each component is called a Schematic Diagram.

8. Pin 3 of the 555 IC emits pulses in the _____ range.

9. This circuit uses _____ transistor.

10. This circuit uses _____ fixed resistors.

QUICK-CHECK ANSWER KEY for Experiment 20 QUIZ
for Mr Circuit Electronics Training ("Audio Generator")

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.

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A. a clock
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D. a light generator

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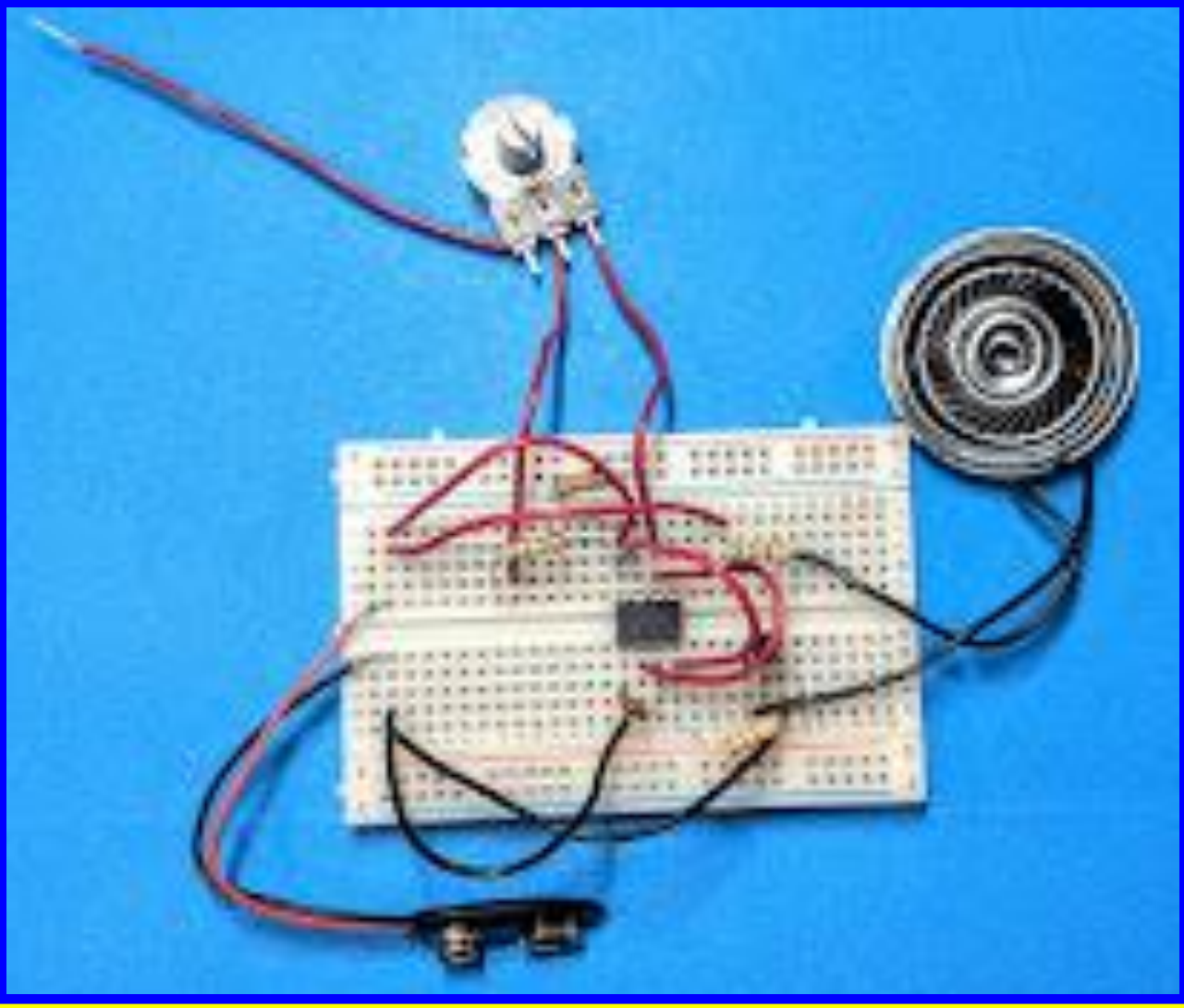
D. bias

(Form SQAK20)

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

AUDIO GENERATOR



BASIC ELECTRONICS LAB 1

"AUDIO GENERATOR CIRCUIT"

(Poster MC1-20-P01)

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

Mr Circuit Technology

PRICE LIST

PRICE LIST

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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
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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
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