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Mr Circuit Technology

Science/Electronics Experiment Kits and Labs


Exp. 25 - "CODE OSCILLATOR CIRCUIT"

LESSON PLAN

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- Page 13 - Price List for Parts Kits for your to order more. Send Purchase Order to Gary@MrCircuitTechnology.com or order online at www.MrCircuitTechnology.com

Experiment Parts Kit
#MC1-00-PK
 Solderless
 Circuit Board
 Exciting, Educational
 and Fun



Experiment Parts only
 (packaged in a 3x5 inch
 resealable plastic bag.)

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 EARN more tomorrow!**


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Science/Electronics Kits and Labs

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Experiment Parts Kit
#MC1-25-PK
 "Morse Code
 Oscillator Circuit"
 Exciting, Educational
 and Fun



Experiment Parts only
 (packaged in a 3x5 inch
 resealable plastic bag.)

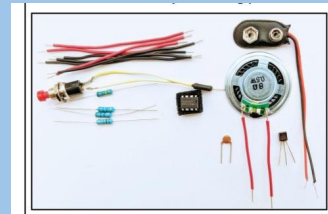
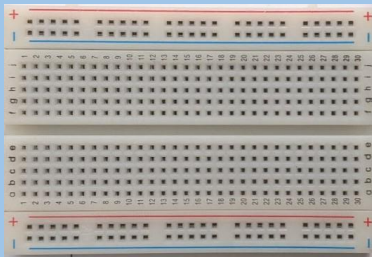
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PREPARATION: You can put the Page 12 poster up on your classroom wall to announce the fact that you are going to do the Science-Electronics Experiment.

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 #MC1-25-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

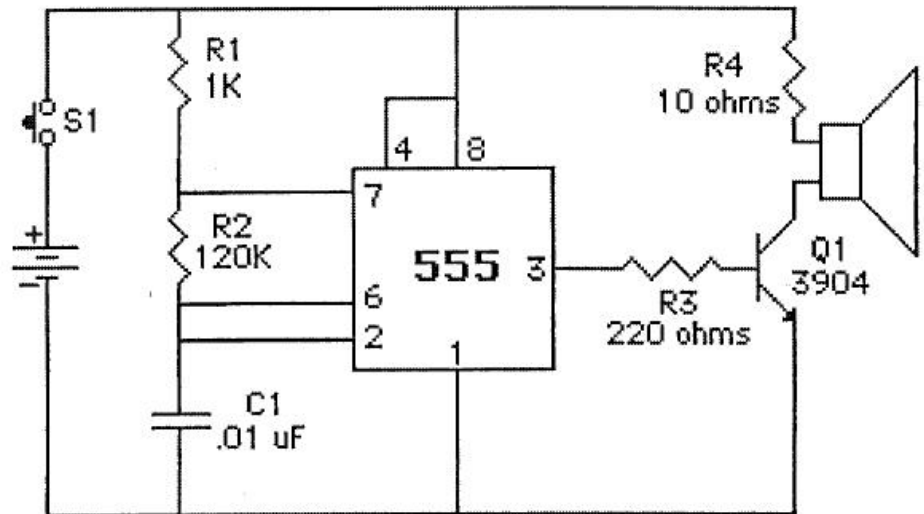
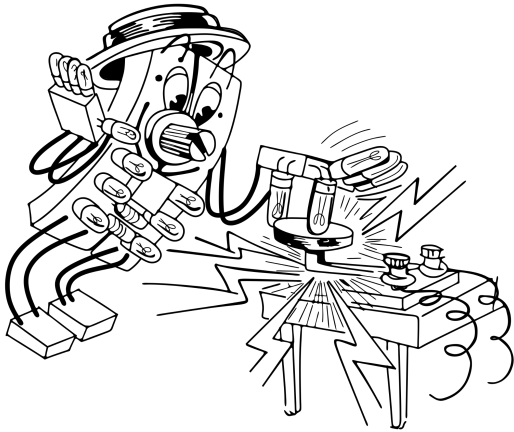
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

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 a CODE OSCILLATOR 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 send Morse Code signals at about 400 Hz to 600 Hz. (400 to 600 cycles per second)

The Morse Code has been used in many circumstances to send important messages. It consists of dots and dashes.

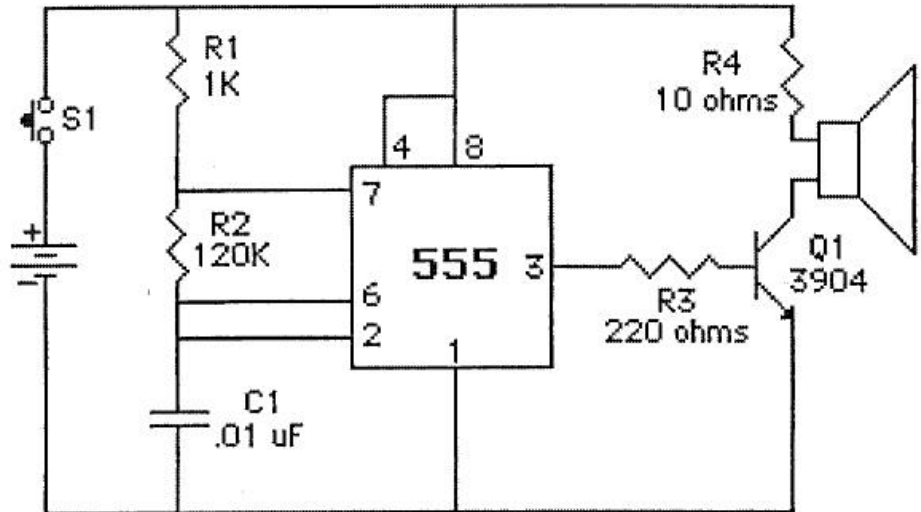
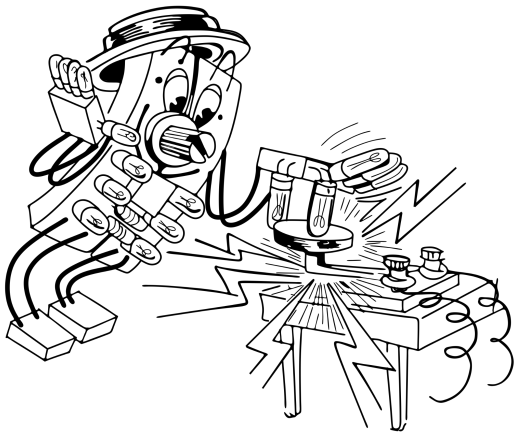
A "dot" represents a short signal, while a "dash" represents a longer signal. There is a 1 to 3 ratio between a dot and a dash.

The time unit between letters is equivalent to a dot.

(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 CODE OSCILLATOR circuit that you will build.



This circuit uses a 555 Integrated Circuit as **CLOCK**.

The frequency of the **CLOCK** pulses and duty-cycle are controlled by the values of R1, R2, and C1. Duty-cycle is the amount of time the output of Pin 3 is HI verses the amount of time that Pin 3 is LO. If they are equal, then the Duty-Cycle is 50 percent.

Each time you press the Push Button switch, a tone is heard from the speaker.

The loudness of the tone is **fixed** so you can't vary the volume of the sound. Also, now power is used if the switch is not pressed.

Longer tones are dashes and shorter tones are dots. The Morse Code is made up of dashes and dots.

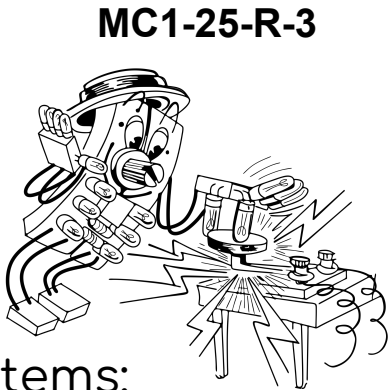
(Continue to Page 3)

PURPOSE OF THIS EXPERIMENT

*** To build a CODE OSCILLATOR using a 555 Integrated Circuit.

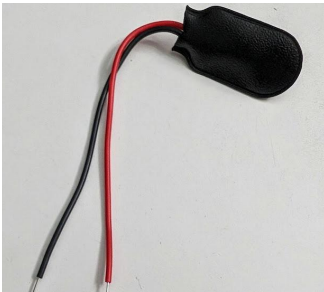
PARTS NEEDED FOR EXPERIMENT

In this experiment, you will use the following items:

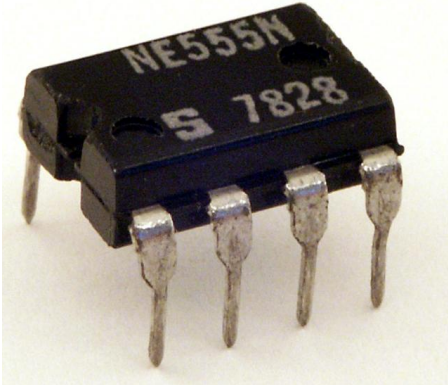


MC1-25-R-3

BATTERY SNAP



0.01 DISC CAPACITOR 555 IC



10 Ohm resistor



1000 Ohm resistor



120k Ohm resistor



220 Ohm resistor

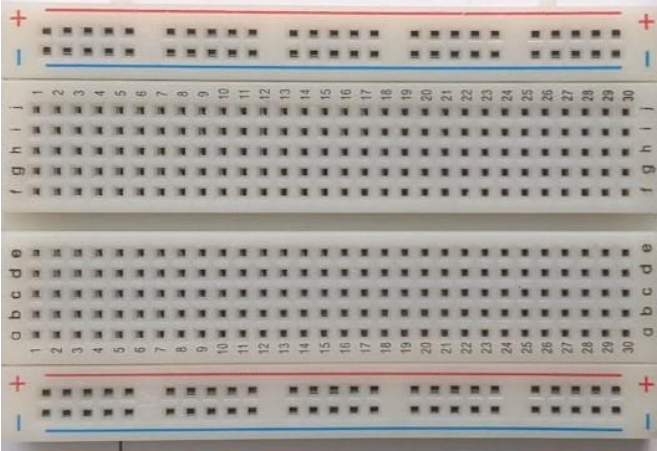


6 Jumper Wires



a SOLDERLESS CIRCUIT BOARD

Push Button Switch



You will also need a good 9 Volt battery

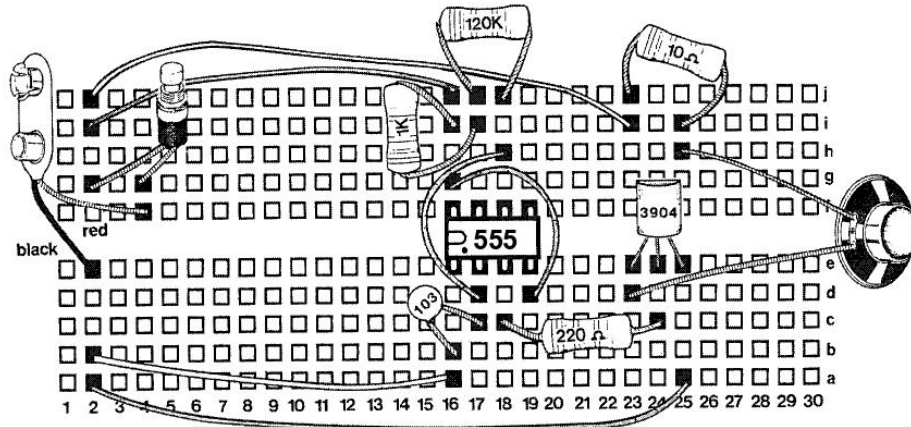
(Continue to Page 4)

DO THE EXPERIMENT (part 1 of 2)

MC1-25-R-4

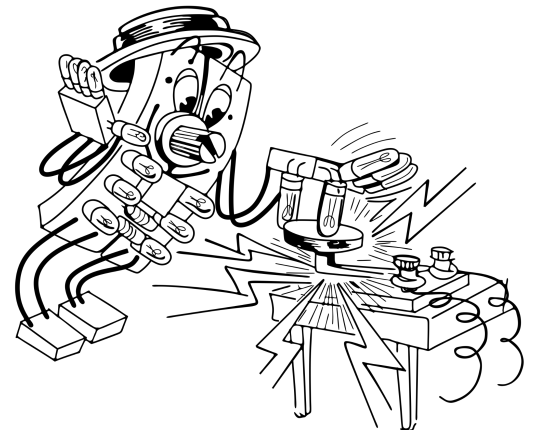
Now you are going to build the circuit on a Solderless CB.

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



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

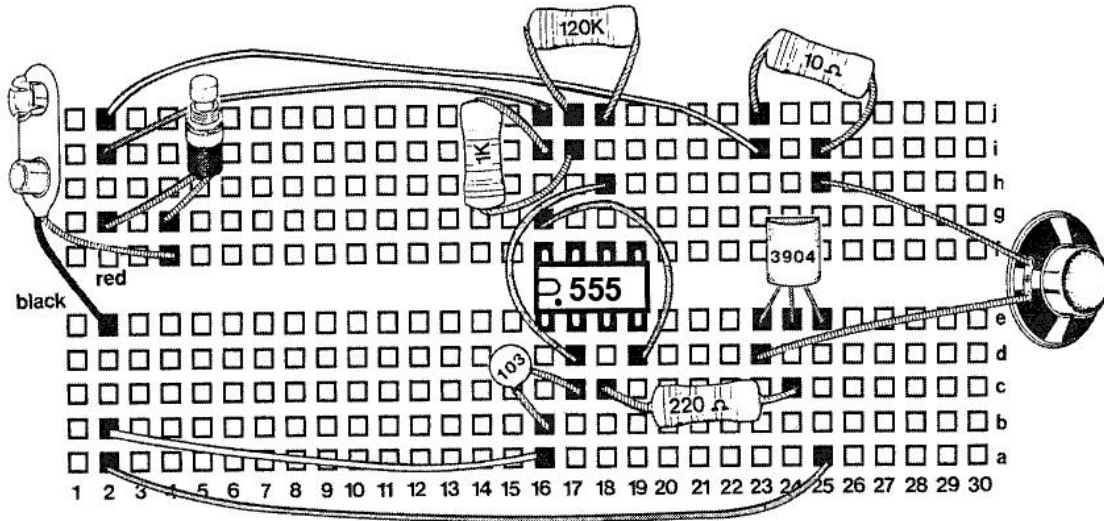
- Install the 10 Ohm resistor (brown, black, black, gold) in holes 23j to 25i
- Install the 220 Ohm resistor (red, red, brown, gold) in holes 18c to 24c
- Install the 1000 (1k) Ohm resistor (brown, black, red, gold) in holes 16i to 17i
- Install the 120k Ohm resistor (brown, red, yellow, gold) in holes 17j to 18j
- Install the 555 Timer IC with Pin 1 in hole 16e as shown in pictorial
- Install a NPN 3904 Transistor -Collector in 23e, Base in 24e, Emitter in 25e
- Install a Push Button Switch in holes 2g to 4g
- Install a 0.01uF (103) Capacitor in holes 16b to 17c
- Install a Speaker in holes 23d and 25h
- Install Jumper Wire #1 in holes 2a to 25a
- Install Jumper Wire #2 in holes 2b to 16a
- Install Jumper Wire #3 in holes 2j to 23i
- Install Jumper Wire #4 in holes 2i to 16j
- Install Jumper Wire #5 in holes 17d to 18h
- Install Jumper Wire #6 in holes 16g to 19d
- Install the Battery Snap, Black lead in hole 2e and Red Lead in hole 4f



(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)

MC1-25-R-5

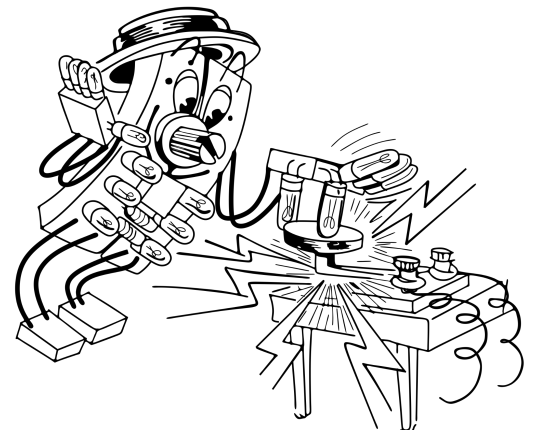


Step 3 - Connect the battery to the Battery Snap. Use the Push Button to send audio sounds, short sounds for dots and longer sounds for dashes. Here is the Morse Code for you to practice.

A	• —	U	• • —
B	— • • •	V	• • — —
C	— • — •	W	• — — —
D	— • •	X	— • • —
E	•	Y	— • — —
F	• • — •	Z	— — • •
G	— — •		
H	• • • •		
I	• •		
J	• — — —		
K	— • — —	1	• — — — —
L	• — • •	2	• • — — —
M	— — •	3	• • • — —
N	— • — —	4	• • • • —
O	— — — •	5	• • • • •
P	• — — —	6	— • • • •
Q	— — • —	7	— — • • •
R	• • •	8	— — — • •
S	• • •	9	— — — — •
T	—	0	— — — — —

dash

dot

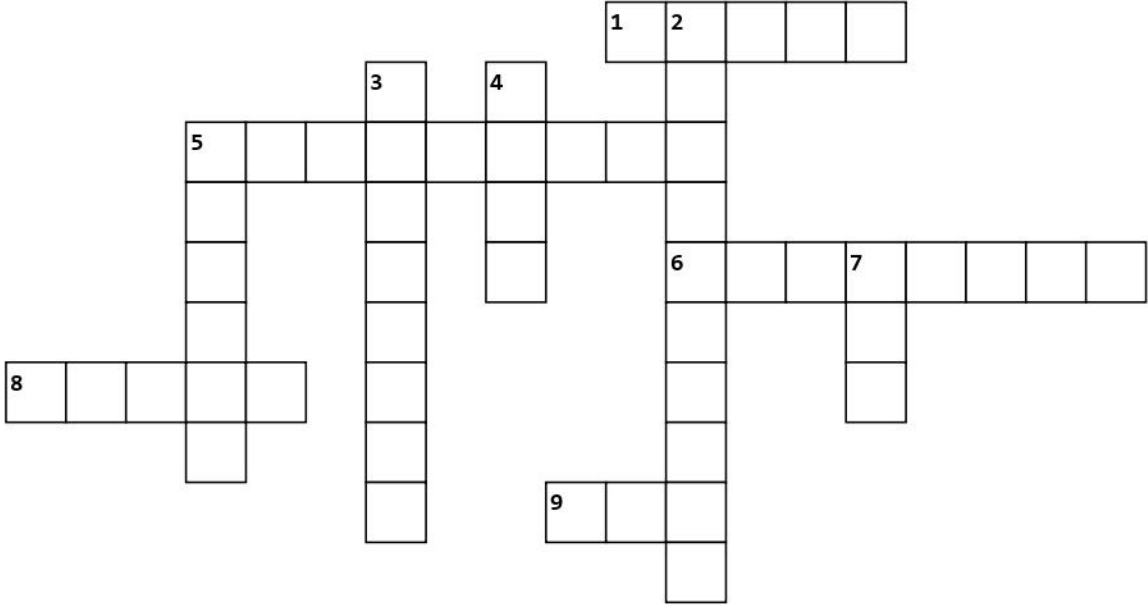


CONCLUSION: You should have observed that you can build an CODE OSCILLATOR circuit with a 555 Integrated Circuit.

(End of Experiment 25)

CROSSWORD

Exp. 25 - "CODE OSCILLATOR CIRCUIT"

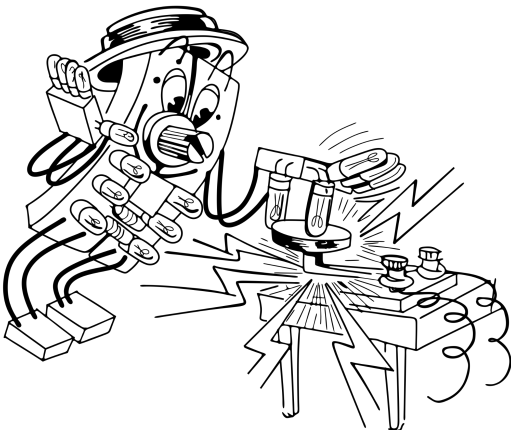


Across

- 1. The _____ Code is a set of dots and dashes that represent the alphabet and numbers.
- 5. The diagram that shows all the symbols of the electronic parts in the circuit.
- 6. The _____ of this circuit is not variable.
- 8. This circuit uses the 555 Integrated Circuit to make a _____ circuit.
- 9. How many types of tones are there in the Morse Code?

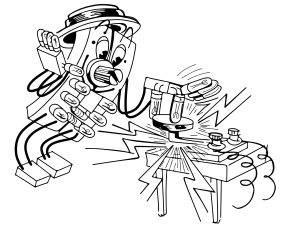
Down

- 2. A circuit that puts out a variable frequency.
- 3. The Morse Code is used to send _____ .
- 4. The longer tone in the Morse Code is a _____ .
- 5. The Push Button _____ is used to send Morse Code with this circuit.
- 7. The shorter tone in the Morse Code is a _____ .



Exp. 25 - "CODE OSCILLATOR CIRCUIT"

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

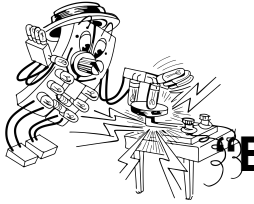


1. The _____ Code is a set of dots and dashes to represent letters and numbers.
2. The _____ of this circuit has symbols that represent the electronic parts used in the circuit.
3. This circuit is an audio _____ circuit used to emit tones.
4. The _____ is the device that emits the audio tones.
5. This circuit is used to emit tones of 400 to 600 _____ per second, also called 400 to 600 Hertz.
6. The time interval between letters when you send Morse Code is equivalent to the time of a _____.
7. The letter S is made up of _____ dots.
8. The letter A is made up of a Dot and a _____.
9. What pin on the 555 Integrated Circuit emits the pulses?
10. You control the _____ of how fast the Morse Code is sent.

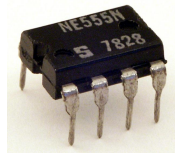


QUIZ for Exp 25 or STEM KIT #25 in the Mr Circuit Electronics Training Lab 1

(Page 8)



This Quiz covers the training learned by completing



“Build a Code Oscillator Circuit” Experiment 25

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 a 555 Timer IC as

_____.

- A. a variable resistor
- B. a variable capacitor
- C. a timer
- D. a clock

#6 The loudness of the emitted tone

_____.

- A. is fixed
- B. is adjustable by the value of R1
- C. is adjustable by the value of C1
- D. is controlled by S1

A
B
C
D

A
B
C
D

#2 R3 is connected to pin 3 on the 555 Timer IC and to the _____ on Q1.

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

#7 If you do not press the pushbutton switch, the circuit _____.

- A. will consume power
- B. will cause the speaker to emit a tone
- C. will apply voltage to the 555 Timer IC
- D. will not consume power

A
B
C
D

A
B
C
D

#3 On the 555 Timer _____.

- A. only 6 pins are used
- B. all but pin 5 are used
- C. all 8 pins are used
- D. all but pin 4 are used

#8 To make sure the circuit is working, you

_____.

- A. press the pushbutton switch to make a tone
- B. short capacitor C1
- C. remove the LED
- D. disconnect the battery

A
B
C
D

A
B
C
D

#4 The purpose of this circuit is to _____ as you press the pushbutton switch.

- A. sense moisture
- B. sense vibrations
- C. emit an audio tone
- D. sense light

#9 Pins 4 and 8 are _____.

- A. not connected
- B. connected
- C. not important
- D. determine the brightness of the LED

A
B
C
D

A
B
C
D

#5 How do you send Morse Code with this oscillator circuit?

- A. you press the pushbutton switch
- B. you squeeze resistor R1
- C. you remove the 10 Ohm resistor
- D. you adjust the speaker

#10 What controls the speed at which you send code with this oscillator?

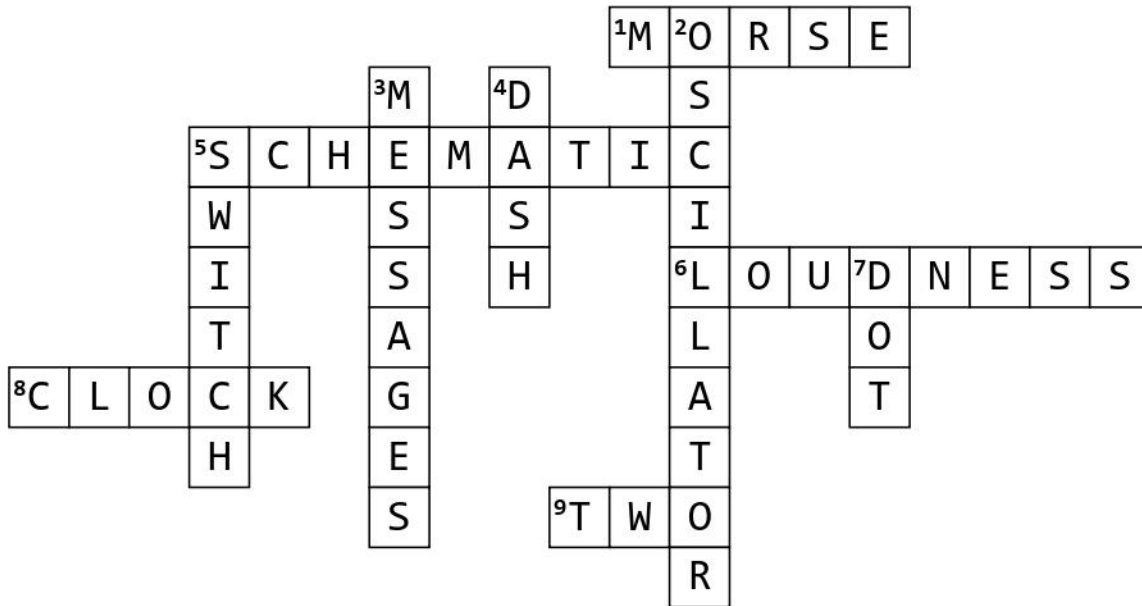
- A. the battery
- B. the speaker
- C. you do.
- D. the transistor

A
B
C
D

Score	
-------	--

ANSWERS FOR CROSSWORD

Exp. 25 - "CODE OSCILLATOR CIRCUIT"



Across

1. The _____ Code is a set of dots and dashes that represent the alphabet and numbers.
5. The diagram that shows all the symbols of the electronic parts in the circuit.
6. The _____ of this circuit is not variable.
8. This circuit uses the 555 Integrated Circuit to make a _____ circuit.
9. How many types of tones are there in the Morse Code?

Down

2. A circuit that puts out a variable frequency.
3. The Morse Code is used to send _____ .
4. The longer tone in the Morse Code is a _____ .
5. The Push Button _____ is used to send Morse Code with this circuit.
7. The shorter tone in the Morse Code is a _____ .

ANSWERS FOR WORD SEARCH

Exp. 25 - "CODE OSCILLATOR CIRCUIT"

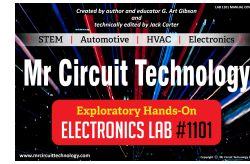
U O V K O X G K T U C V I O F Y G U G T
 C A O J K G C X Z L K E R O G Z Z Q L E
 U S F F R **(T O D)** U N F Q C R O A H P D E
 H E T S X T R N K L L L P I A K **(S)** Y Y D
 Y D X E X **(R E K A E P S)** I E A F **(P F C E)**
 N E E D A P H E G **(D A S H)** A J R E C Z E
 M O N D X F D D U Q P M K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

1. The _____ Code is a set of dots and dashes to represent letters and numbers.
2. The _____ of this circuit has symbols that represent the electronic parts used in the circuit.
3. This circuit is an audio _____ circuit used to emit tones.
4. The _____ is the device that emits the audio tones.
5. This circuit is used to emit tones of 400 to 600 _____ per second, also called 400 to 600 Hertz.
6. The time interval between letters when you send Morse Code is equivalent to the time of a _____.
7. The letter S is made up of _____ dots.
8. The letter A is made up of a Dot and a _____.
9. What pin on the 555 Integrated Circuit emits the pulses?
10. You control the _____ of how fast the Morse Code is sent.

**QUICK-CHECK ANSWER KEY for Experiment 25 QUIZ
for Mr Circuit Electronics Training (“Code Oscillator Circuit”)**

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.

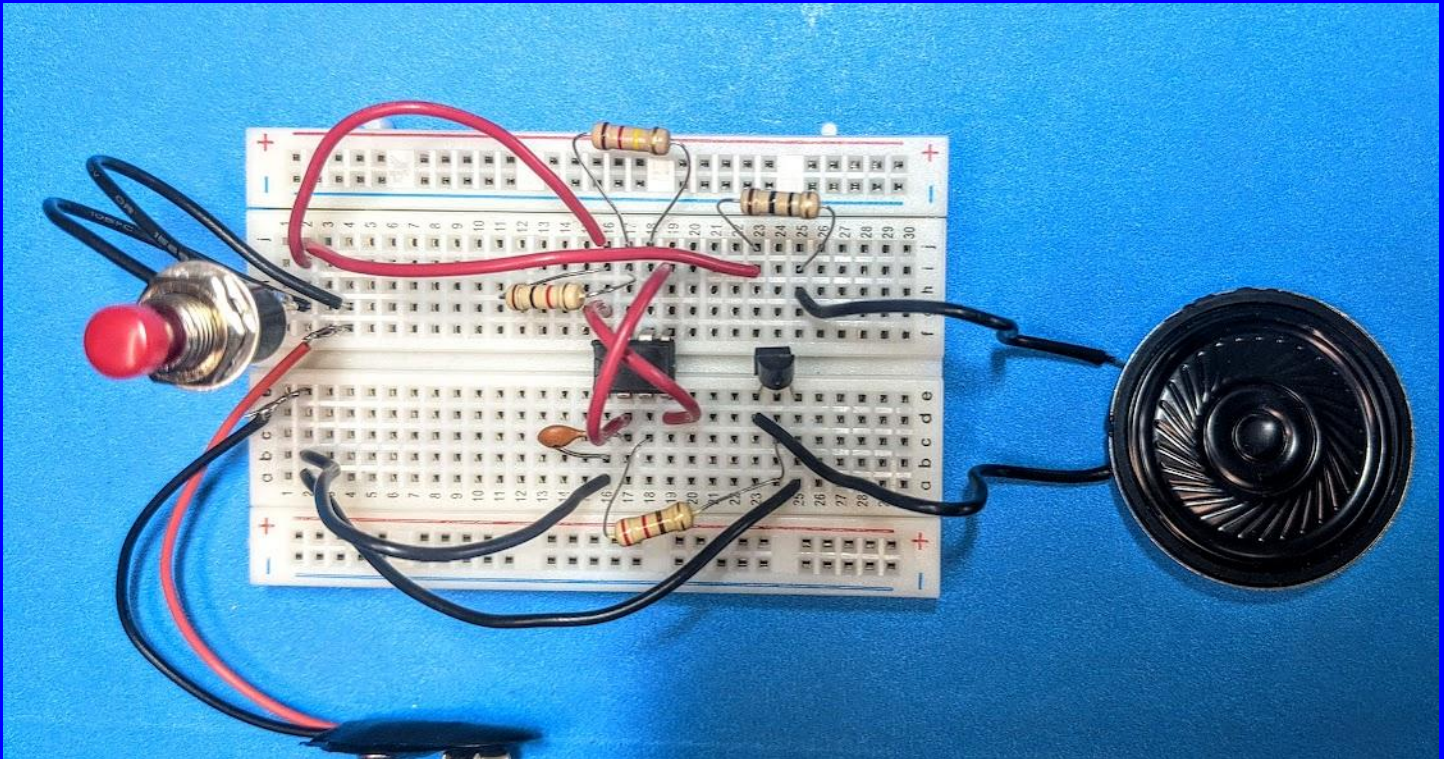
Count the right answers and record the score of right answers in your grade book.



<p>A B C D</p>	<p>#1 This circuit uses a 555 Timer IC as _____ .</p> <p>A. a variable resistor B. a variable capacitor C. a timer D. a clock</p>	<p>#6 The loudness of the emitted tone _____ .</p> <p>A. is fixed B. is adjustable by the value of R1 C. is adjustable by the value of C1 D. is controlled by S1</p>	<p>A B C D</p>
<p>A B C D</p>	<p>#2 R3 is connected to pin 3 on the 555 Timer IC and to the _____ on Q1.</p> <p>A. Emitter B. Base C. Collector D. Anode</p>	<p>#7 If you do not press the pushbutton switch, the circuit _____ .</p> <p>A. will consume power B. will cause the speaker to emit a tone C. will apply voltage to the 555 Timer IC D. will not consume power</p>	<p>A B C D</p>
<p>A B C D</p>	<p>#3 On the 555 Timer _____ .</p> <p>A. only 6 pins are used B. all but pin 5 are used C. all 8 pins are used D. all but pin 4 are used</p>	<p>#8 To make sure the circuit is working, you _____ .</p> <p>A. press the pushbutton switch to make a tone B. short capacitor C1 C. remove the LED D. disconnect the battery</p>	<p>A B C D</p>
<p>A B C D</p>	<p>#4 The purpose of this circuit is to _____ as you press the pushbutton switch.</p> <p>A. sense moisture B. sense vibrations C. emit an audio tone D. sense light</p>	<p>#9 Pins 4 and 8 are _____ .</p> <p>A. not connected B. connected C. not important D. determine the brightness of the LED.</p>	<p>A B C D</p>
<p>A B C D</p>	<p>#5 How do you send Morse Code with this oscillator circuit?</p> <p>A. you press the pushbutton switch B. you squeeze resistor R1 C. you remove the 10 Ohm resistor D. you adjust the speaker</p>	<p>#10 What controls the speed at which you send code with this oscillator?</p> <p>A. the battery B. the speaker C. you do. D. the transistor</p>	<p>A B C D</p>

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

CODE OSCILLATOR

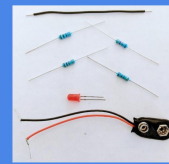
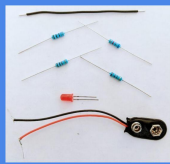


BASIC ELECTRONICS LAB 1

“CODE OSCILLATOR CIRCUIT”

(Poster MC1-25-P01)

(Page 12)



PRICE LIST

PARTS KIT	Mr Circuit Series 1	Price
Number	PARTS KITS FOR "LESSON PLANS"	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