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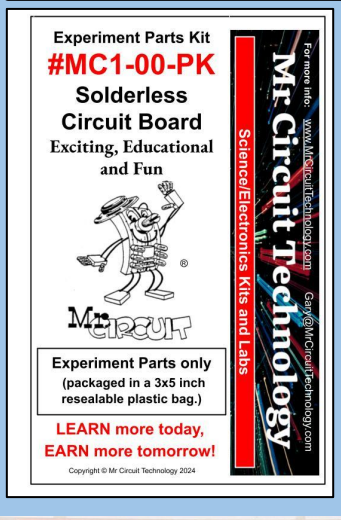
Mr Circuit Technology

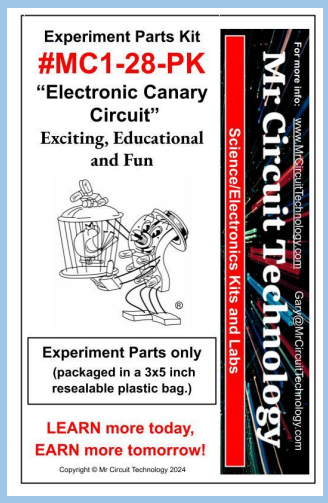
Science/Electronics Experiment Kits and Labs

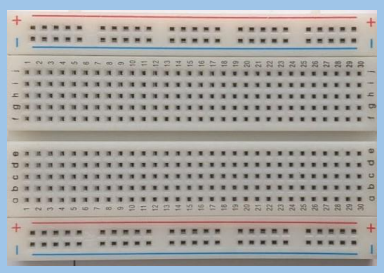
Exp. 28 - "ELECTRONIC CANARY CIRCUIT"

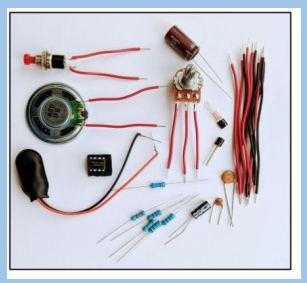


LESSON PLAN

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 #MC1-28-PK (that has the experiment parts) with a 9-Volt battery. Give these items to each student along with the 8 pages.

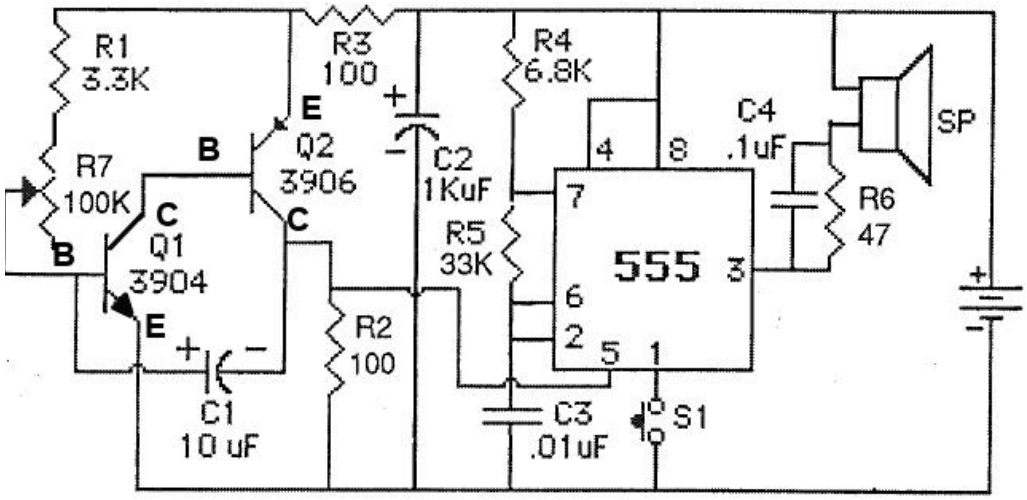
Step 3 - When your students have completed the experiment, collect all the Parts Kits and batteries for later use.

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 CANARY 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 make sounds similar to a Canary singing.

This is a fun circuit to play with. If there are live birds around, when they hear it it will cause them to chirp.

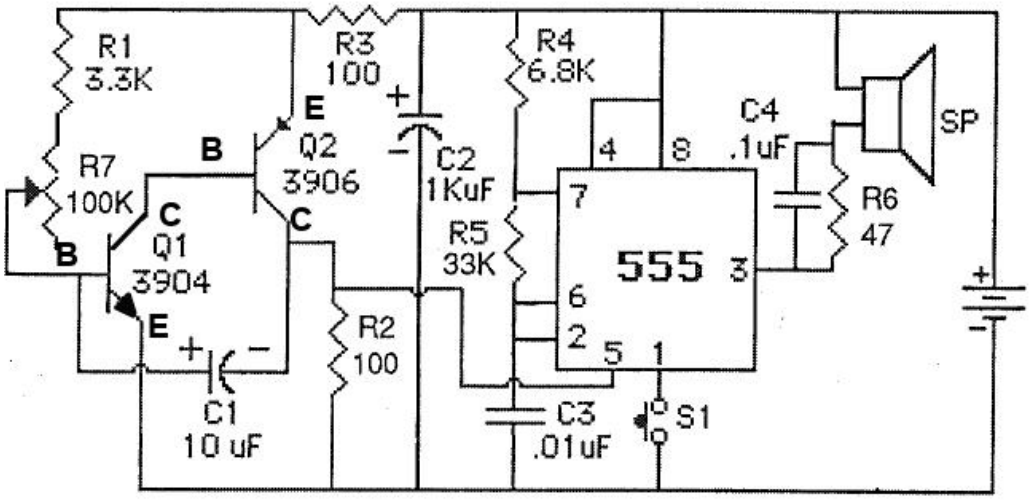
Mr Circuit is holding a bird cage with bird in it..

It is amazing how many circuits can be made with a few well chosen electronic components.

(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 CANARY** circuit that you will build.



This circuit uses a 555 Integrated Circuit as a **CLOCK to make an oscillator**. Then Pin 3 emits a **signal** to the speaker. Transistors Q1 and Q2 form a another oscillator. These two oscillators are connected in series.

Potentiometer R7 is adjusted to vary the frequency of the first oscillator and this frequency is fed into Pin 5 of the second oscillator made with the 555 Integrated circuit.

The audio frequency of the first oscillator is "injected" into the second oscillator through Pin 5. The audio signal coming out of the speaker is a mixture of these two oscillators.

By pressing and releasing the Push Button switch while continuously adjusting the potentiometer, you can create some interesting bird chirping sounds.

(Continue to Page 3)

PURPOSE OF THIS EXPERIMENT

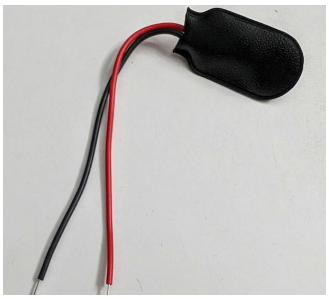
*** To build an ELECTRONIC CANARY Using a 555 Integrated Circuit.

PARTS NEEDED FOR EXPERIMENT

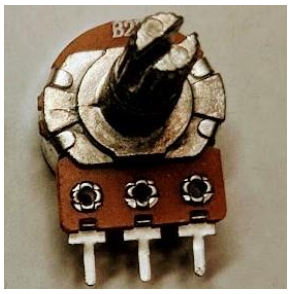
In this experiment, you will use the following:

Speaker

9V Battery Snap

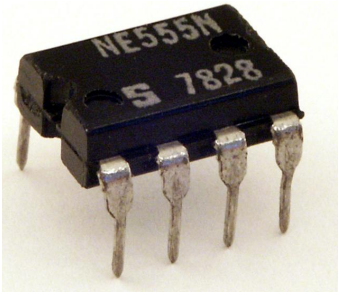


Potentiometer



0.01uF Cap

555 IC



47 Ohm resistor

100 Ohm resistor

100 Ohm resistor

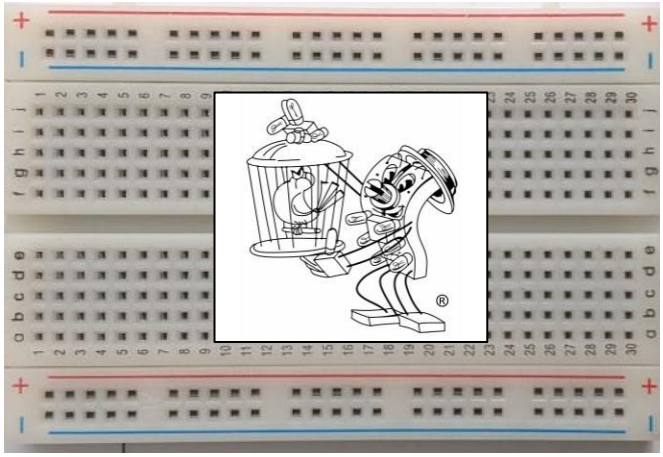
3.3k Ohm resistor

6.8k Ohm resistor

33k Ohm resistor

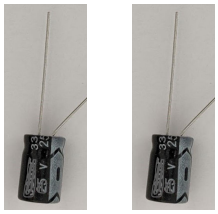
9 Jumper Wires

Solderless Circuit Board



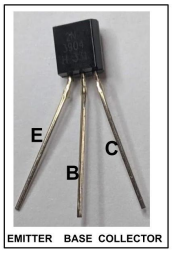
N/O Push Button Switch

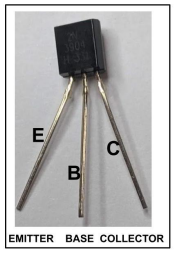
10uF & 1000uF Capacitors



You will also need a good 9 Volt battery

NPN & PNP Transistors



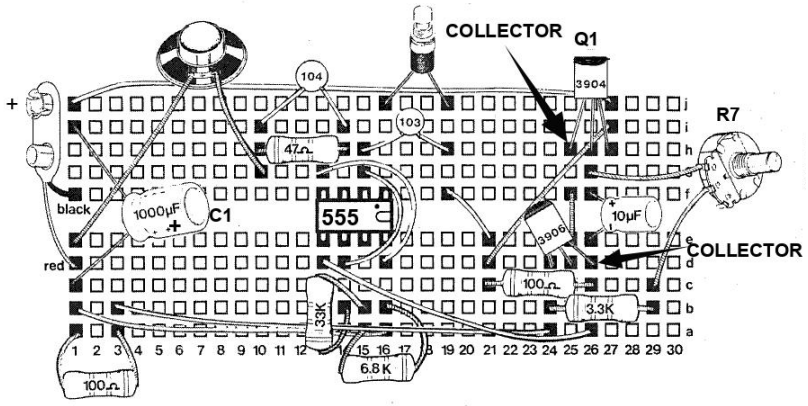


(Continue to Page 4)

MC1-28-R-4

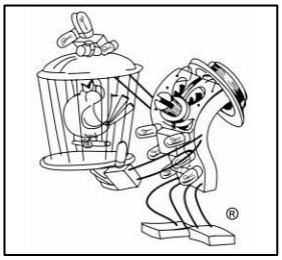
DO THE EXPERIMENT (part 1 of 2)

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



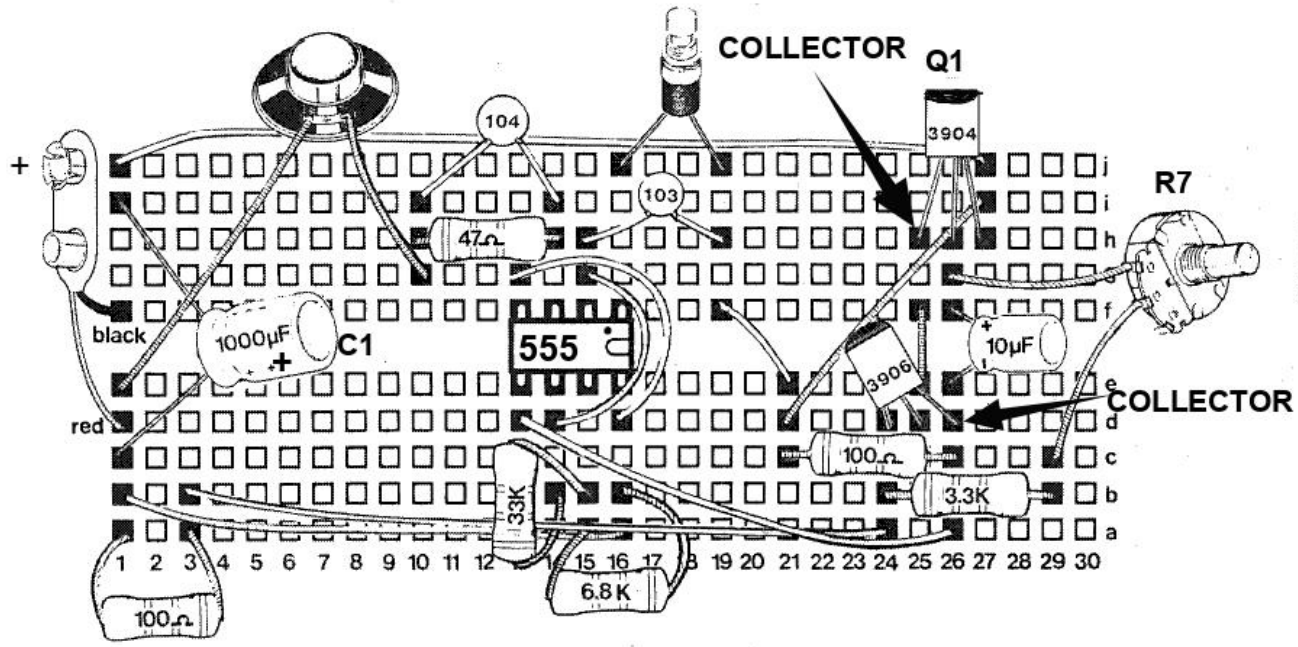
Step 2 - Install all the parts on the SCB as shown above.

- ❑ Install a 47 Ohm resistor (yellow, violet, black, gold) in holes 10h to 14h
- ❑ Install a 100 Ohm resistor (brown, black, brown, gold) in holes 1a to 3a
- ❑ Install a 100 Ohm resistor (brown, black, brown, gold) in holes 21c to 26c
- ❑ Install a 3.3k Ohm resistor (orange, orange, red, gold) in holes 24b to 29b
- ❑ Install a 6.8k Ohm resistor (blue, gray, red, gold) in holes 15a to 16b
- ❑ Install a 33k Ohm resistor (orange, orange, orange, gold) in holes 24b to 29b
- ❑ Install the 555 Timer IC with Pin 1 in hole 16f as shown in pictorial (careful!)
- ❑ Install a NPN 3904 Transistor - Collector in 25h, Base in 26h, Emitter in 27h
- ❑ Install a PNP 3906 Transistor - Emitter in 24d, Base in 25d,Collector in 26d
- ❑ Install a 0.01uF Capacitor in 15h to 19h **AND** Install a 0.1uF disc Capacitor in 10i to 14i
- ❑ Install a 10uF Electrolytic Capacitor - Long lead in hole 26f Short lead in hole 26e
- ❑ Install a 1000uF Electrolytic Capacitor - Long lead in hole 1c Short lead in hole 1i
- ❑ Install a Push Button Switch in holes 16j to 19j **AND** Install a Speaker in holes 1e to 10g
- ❑ Install a Potentiometer - middle lead in 29c, edge lead in 26g
- ❑ Install Speaker from hole 1e to 10g
- ❑ Install Jumper Wire #1 in holes 1b to 24a **AND** Install Jumper Wire #2 in holes 3b to 24a
- ❑ Install Jumper Wire #3 in holes 1j to 27j **AND** Install Jumper Wire #4 in holes 13g to 16d
- ❑ Install Jumper Wire #5 in 14d to 15g **AND** Install Jumper Wire #6 in holes 19f to 21e
- ❑ Install Jumper Wire #7 in holes 21d to 27i **AND** Install Jumper Wire #8 in 25e to 25f
- ❑ Install Jumper Wire #9 in holes 13d to 26a
- ❑ Install the Battery Snap, Black lead in hole 1f and Red Lead in hole 1d



(Continue to Page 5)

DO THE EXPERIMENT (part 2 of 2)



Step 3 - Connect the battery to the Battery Snap. Press the Push Button switch and you should hear sounds from the speaker. By pressing and releasing the Push Buttton switch while you adjust the Potentiometer back and forth you should be able to create interesting bird chirping sounds. If you use this circuit around live birds, it should cause them to start chirping. Have fun!

CONCLUSION: You should have observed that you can build an **ELECTRONIC CANARY** circuit with a 555 Integrated Circuit and two transistors..

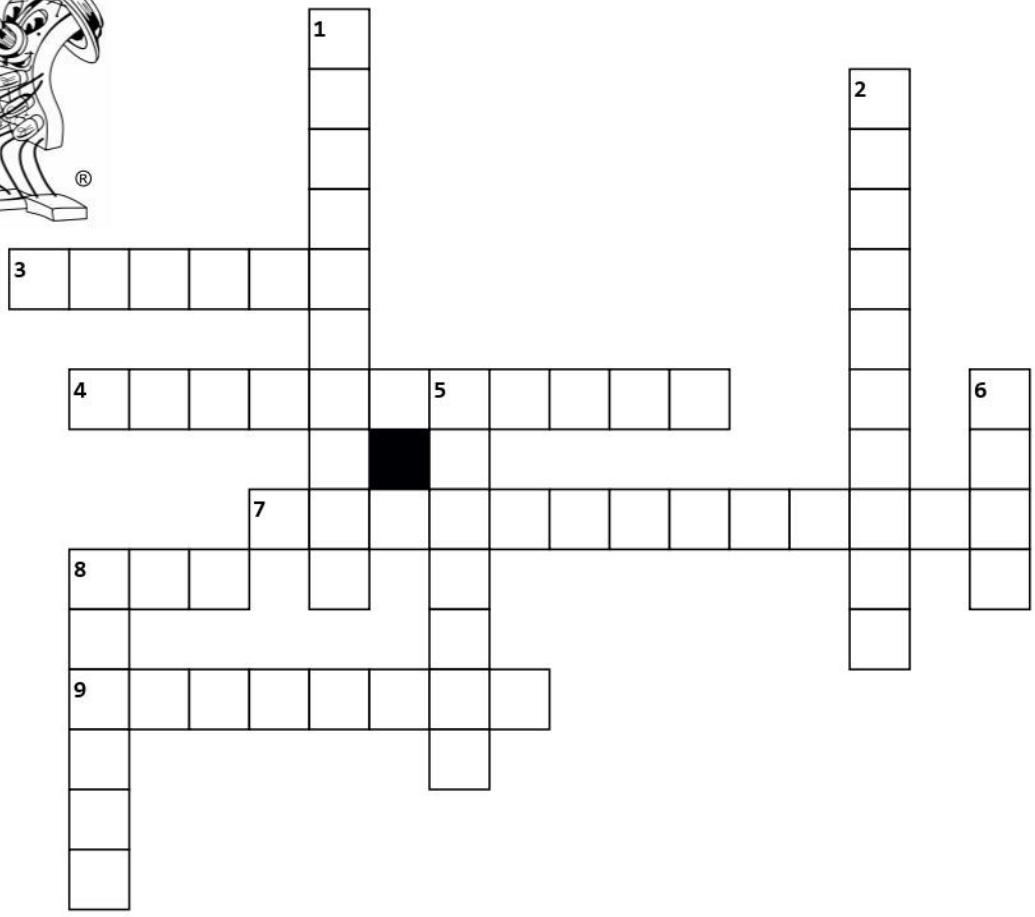
(End of Experiment 28)

Mr. CIRCUIT®

MC1-28-CW

CROSSWORD

Exp. 28 - "ELECTRONIC CANARY CIRCUIT"



Across

3. This circuit is used to make _____ of a chirping bird.

4. One of the oscillators in this circuit is made up of two _____ .

7. In this circuit, the _____ is used to vary chirping sounds.

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

9. The signal from the first oscillator is "fed" or _____ into Pin 5 of the 555 IC.

Down

1. Q1 is an NPN _____ .

2. The 555 Integrated Circuit is used to make an _____ .

5. The chirping sounds are emitted by the _____ in the circuit.

6. This circuit is designed to imitate a _____ chirping.

8. Pin 1 of the 555 Integrated Circuit is connected to a _____ .

Mr. CIRCUIT®

MC1-28-WS

WORD SEARCH

Exp. 28 - "ELECTRONIC CANARY CIRCUIT"

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

1. This circuit is made up of two _____ .

2. This circuit was invented by _____ .

3. This circuit will make sounds like a _____ chirping.

4. The 555 Integrated Circuit is working like a _____ circuit.

5. _____ Q1 is part of an oscillator circuit.

6. _____ R7 is used to adjust the chirping sounds.

7. The _____ signal from the first oscillator is fed into Pin 5 of the second oscillator.

8. The Push Button _____ is used to change the chirping sounds.

9. The audio signal from the first oscillator, made of two transistors, is _____ into the second oscillator.

10. How many pins does the 555 Integrated Circuit have?

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

QUIZ for Exp 28 or STEM KIT #28 in the Mr Circuit Electronics Training Lab 1

This Quiz covers the training learned by completing

"Build an Electronic Canary Circuit" Experiment 28

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

#1 This circuit uses a 555 Timer IC and _____ .

A
B
C
D

A. an SCR
B. a variable capacitor
C. a two-transistor oscillator
D. a Photocell

#2 R1 is connected to _____ .

A
B
C
D

A. R3
B. R7
C. C1
D. R2

#3 On the 555 Timer _____ .

A
B
C
D

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

#4 The purpose of this circuit is to _____ .

A
B
C
D

A. emit a siren sound
B. emit bird chirps
C. sense heat
D. sense light

#5 How do you make the circuit emit different tones?

A
B
C
D

A. connect and disconnect the battery
B. adjust R7 and press the pushbutton
C. vary the heat in the room
D. feed it birdseed

#6 The output of the two-transistor oscillator is fed into _____ of the 555 Timer IC .

A
B
C
D

A. Pin 5
B. Pin 6
C. Pin 7
D. Pin 8

#7 Switch S1 is connected to _____ .

A
B
C
D

A. Pin 4
B. Pin 1
C. Pin 3
D. Pin 6

#8 One side of the speaker is connected directly to _____ .

A
B
C
D

A. the Base of Q1
B. the Emitter of Q2
C. Pin 2 on the 555 Timer IC
D. the positive of the battery

#9 C4 and R6 are connected in parallel to the speaker and _____ of the 555 Timer IC.

A
B
C
D

A. Pin 3
B. Pin 4
C. Pin 5
D. Pin 8

#10 Capacitor C1 is part of _____ .

A
B
C
D

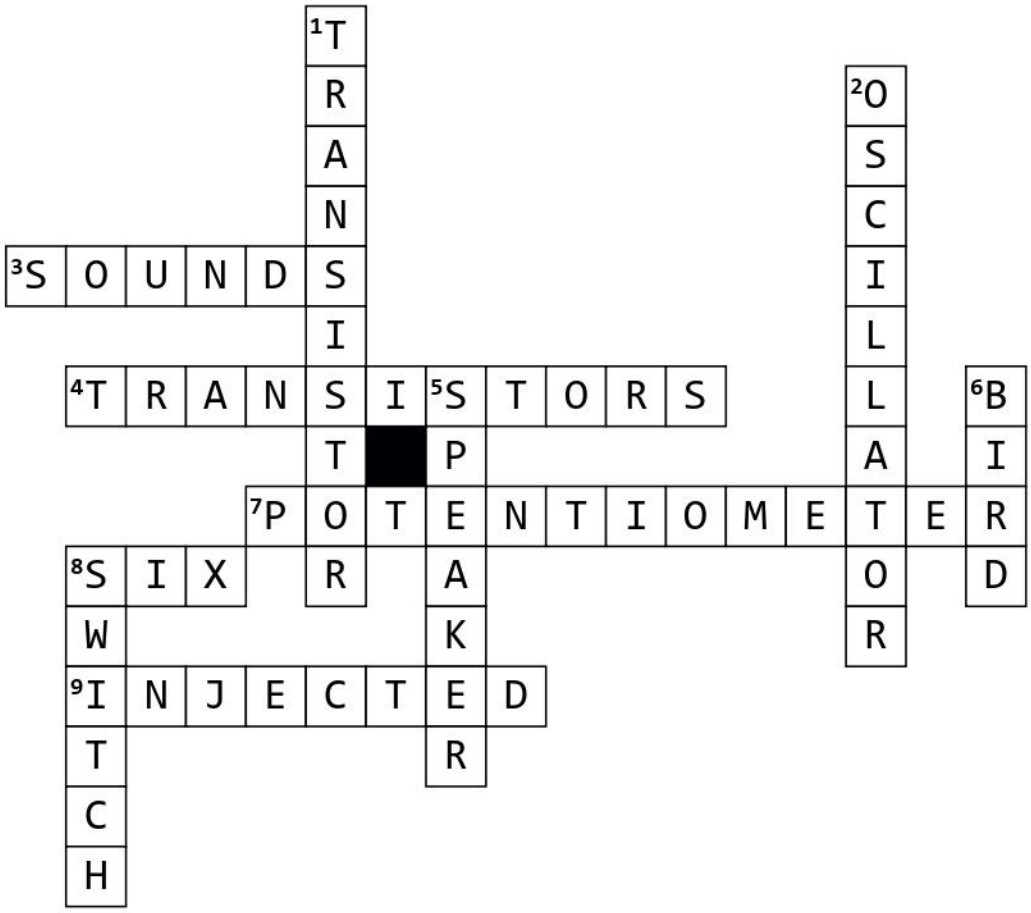
A. the two-transistor oscillator circuit
B. the voltage regulator circuit
C. the power supply circuit
D. output circuit

(Form SQ28)

Score

ANSWERS FOR CROSSWORD

Exp. 28 - "ELECTRONIC CANARY CIRCUIT"



Across

3. This circuit is used to make _____ of a chirping bird.

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Down

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2. The 555 Integrated Circuit is used to make an _____ .

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8. Pin 1 of the 555 Integrated Circuit is connected to a _____ .

ANSWERS FOR WORD SEARCH

Exp. 28 - "ELECTRONIC CANARY CIRCUIT"

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

1. This circuit is made up of two _____ .

2. This circuit was invented by _____ .

3. This circuit will make sounds like a _____ chirping.

4. The 555 Integrated Circuit is working like a _____ circuit.

5. _____ Q1 is part of an oscillator circuit.

6. _____ R7 is used to adjust the chirping sounds.

7. The _____ signal from the first oscillator is fed into Pin 5 of the second oscillator.

8. The Push Button _____ is used to change the chirping sounds.

9. The audio signal from the first oscillator, made of two transistors, is _____ into the second oscillator.

10. How many pins does the 555 Integrated Circuit have?

QUICK-CHECK ANSWER KEY for Experiment 28 QUIZ
for Mr Circuit Electronics Training ("Electronic Canary")

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 a 555 Timer IC and _____ .

A. an SCR
B. a variable capacitor
C. a two-transistor oscillator
D. a Photocell

A B C **D**

#2 R1 is connected to _____ .

A. R3
B. R7
C. C1
D. R2

A B **C** D

#3 On the 555 Timer _____ .

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

A **B** C D

#4 The purpose of this circuit is to _____ .

A. emit a siren sound
B. emit bird chirps
C. sense heat
D. sense light

A **B** C D

#5 How do you make the circuit emit different tones?

A. connect and disconnect the battery
B. adjust R7 and press the pushbutton
C. vary the heat in the room
D. feed it birdseed

#6 The output of the two-transistor oscillator is fed into _____ of the 555 Timer IC .

A. Pin 5
B. Pin 6
C. Pin 7
D. Pin 8

A B C D

#7 Switch S1 is connected to _____ .

A. Pin 4
B. Pin 1
C. Pin 3
D. Pin 6

A **B** C D

#8 One side of the speaker is connected directly to _____ .

A. the Base of Q1
B. the Emitter of Q2
C. Pin 2 on the 555 Timer IC
D. the positive of the battery

A B C **D**

#9 C4 and R6 are connected in parallel to the speaker and _____ of the 555 Timer IC.

A. Pin 3
B. Pin 4
C. Pin 5
D. Pin 8

A B C D

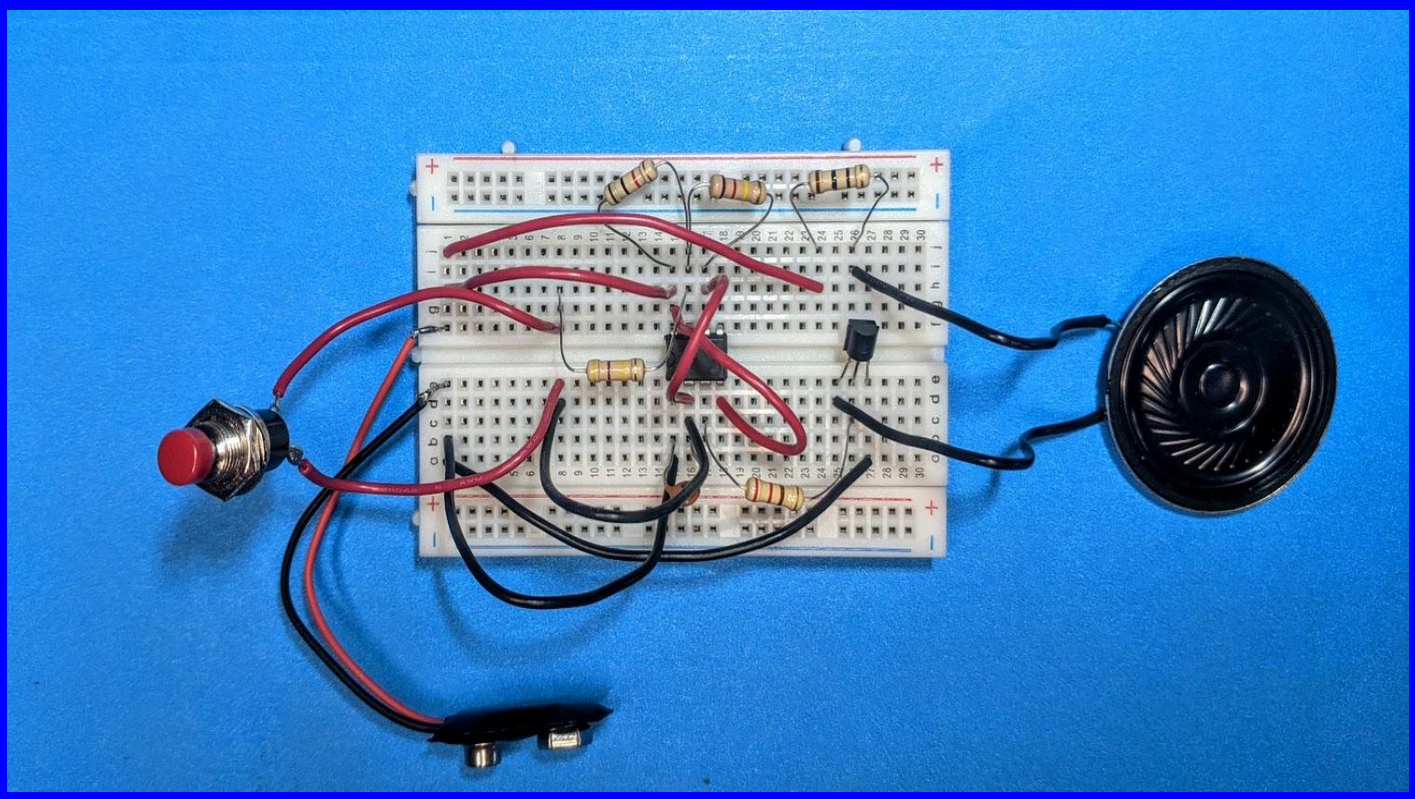
#10 Capacitor C1 is part of _____ .

A. the two-transistor oscillator circuit
B. the voltage regulator circuit
C. the power supply circuit
D. output circuit

(Form SQAK28)

BUILD A BETTER FUTURE by UNDERSTANDING SCIENCE-ELECTRONICS

ELECTRONIC CANARY



BASIC ELECTRONICS LAB 1

"ELECTRONIC CANARY CIRCUIT"

(Poster MC1-28-P01)

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

Mr Circuit Technology

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**